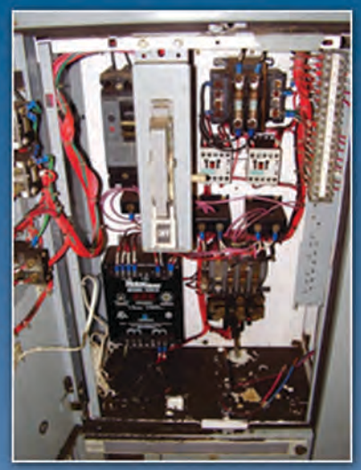
TRANSPORTATION AND STORM WATER DEPARTMENT
STORM WATER DIVISION

WATERSHED ASSET MANAGEMENT PLAN

TASK ORDER #57
DOC ID# CSD-RT-13-URS57-01

JULY 19
2013



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**DOC ID# CSD-RT-13-URS57-01**

**JULY 19, 2013**

**CITY OF SAN DIEGO**

PREPARED BY URS CORPORATION

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# List of Acronyms and Abbreviations

| | |
|---|---|
| Basin Plan | Water Quality Control Plan for the San Diego Basin |
| BMP | best management practice |
| BRE | business risk exposure |
| CAO | cleanup and abatement order |
| CCTV | close-caption television |
| CEQA | California Environmental Quality Act |
| City | City of San Diego |
| CLR | comprehensive load reduction |
| CLRP | Comprehensive Load Reduction Plan |
| CoF | consequence of failure |
| County | County of San Diego |
| CWA | Clean Water Act |
| Division | City of San Diego Storm Water Division |
| FTE | full-time equivalent |
| HA | hydrologic area |
| HSA | hydrologic subarea |
| HU | hydrologic unit |
| LOS | level of service |
| MS4 | municipal separate storm sewer system |
| MHPA | multiple-habitat planning area |
| NPDES | National Pollutant Discharge Elimination System |
| O&M | operations and maintenance |
| PoF | probability of failure |
| RCF | repair cost factor |
| RWQCB | (San Diego) Regional Water Quality Control Board |
| SANDAG | San Diego County Association of Governments |
| SRM | (Water Research Centre) Sewer Rehabilitation Manual |
| SWRCB | (California) State Water Resources Control Board |
| TMDL | total maximum daily load |
| USEPA | United States Environmental Protection Agency |
| WAMP | Watershed Asset Management Plan |
| WLA | waste load allocation |
| WMA | Watershed Management Area |
| WQIP | Water Quality Improvement Plan |

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# Glossary of Terms

Asset. Something one owns or manages that provides a level of service to rate payers, citizens, and/or regulators.

Asset Management. The practice of planning for the replacement, refurbishment, improvement, and operations and maintenance of utility assets to continue to meet current and future anticipated levels of service.

Best Management Practice (BMP). An activity or a device that reduces the amount of pollution that enters the storm drain system. BMPs can be non-structural (activities) or structural (devices). BMPs can reduce the sources of pollution or remove pollution from runoff before it reaches the storm drain system or the receiving water.

Bonds. Debt instruments sold to investors to secure funds. Repayment terms include the payment of interest and principle over a period of time.

Business Risk Exposure. The risk associated with the current performance of an asset, generally measured as to how likely it is to fail and what would happen should it fail.

Capacity. The ability of an asset to carry a needed volume. This can be the ability of a road to carry a number of vehicles per hour, the ability of a pipe or channel to carry a quantity of gallons of water per minute, etc.

Capital Improvement Program (CIP). A planning and funding program to replace constructed infrastructure or to build new constructed infrastructure.

Consequence of Failure. What would happen should an asset fail? This is generally evaluated as to the repercussions of the asset's failure. It is generally measured along three lines of evaluation – economic, social, and environmental.

Enterprise Fund. The account that fees for specific city services, generally paid for per use, flow into that is used to pay for the management of the assets that deliver those specific services.

Financial Efficiency. The degree to which the asset is costing the lowest amount possible to achieve a defined level of service on a life cycle basis. When considering the replacement costs, the improvement costs, and the operations and maintenance costs over the life cycle of the asset (length of its useful life), the total life cycle cost under the asset replacement schedule, asset improvement schedule, and operations and maintenance schedule are the lowest they can be to meet the level of service over that life cycle.

Flood Risk Management. The activities undertaken to protect life and property from water that flows outside of a naturally formed receiving water channel.

General Fund. The account that tax revenues flow into that is used to pay for most city services that are not funded by fees paid for those services.

Ground Water. Water that exists beneath the ground surface.

Hard Asset. A human made item that one can touch and see that provides a level of service.

Level of Service. The performance of the asset that the regulator's require and the citizens' desire. What the asset is supposed to achieve.

Mortality. Collapse of the asset. The asset fails in a manner in which it cannot function at all. This is generally viewed from a structural context – a bridge collapse, a pipe collapse, a road becomes impassable, etc.

Natural Asset. A naturally occurring item that one can touch or see that cannot be owned and that provides a level of service.

Operations and Maintenance (O&M). A program to fund and manage the activities that must occur each year in order to achieve levels of service with assets.

Permit. An allowance from a regulatory agency to engage in some activity that would otherwise be restricted or prohibited.

Probability of Failure. How likely it is that an asset will fail in the near term – generally within the current year. Failure can occur along one of 4 modes – mortality, capacity, level of service, and financial efficiency.

Receiving water. The water resource defined by the State of California as a public good that is protected by the state under the Porter-Cologne Act and possibly protected by the Federal Government under the Clean Water Act. Receiving waters are generally defined in the Water Quality Control Plans (Basin Plans).

Renewal. Extending the remaining useful life of an asset through some form of an investment in that asset. The investment may be replacing some or the entire asset, modifying the asset with some physical modification, or increasing the amount of operations and maintenance investment in the asset.

Soft Asset. A human-created intangible experiential element that cannot be touched or seen, but which provides a level of service.

Storm Water. Water that is generated by rainfall and runs off the land into a storm drain or receiving water.

Urban Runoff. Water that is discharged due to human activities and runs off into the storm drain or receiving water.

Useful Life. The period of time that an asset can continue to meet a specified level of service when all else remains equal.

Valuation. The amount an asset is worth. Valuation methods include 1) valuing the asset based on the lifecycle cost of managing the asset to achieve a given level of service – the asset's periodic replacement cost plus annual operations and maintenance costs; or 2) determine what the users will pay for the levels of service the asset provides.

Waters of the U.S. The water resource defined by the Federal Government as within the jurisdiction of and protected by the Clean Water Act. All Waters of the U.S. are Receiving Waters. Not all Receiving Waters are Waters of the U.S.

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# WATERSHED ASSET MANAGEMENT PLAN

This main body of the report presents the general approach taken to develop the Asset Management Plan. The appendices, each of which contains a watershed asset management plan (WAMP) for a specific watershed identified in the Water Quality Control Plan for the San Diego Basin (Basin Plan), follow the main text. Each section of the main report summarizes the more detailed information contained in the associated appendix, how the information was captured, and what analyses were completed to assess the information and draw conclusions. The actual data and conclusions drawn are presented in the appendices, each of which represents a fairly complete WAMP for one watershed.

This report is intended for the sole use of the City of San Diego. The scope of services performed during this project may not be appropriate to satisfy the needs of other users, and any use or re-use of this document or of the findings, conclusions, or recommendations presented herein is at the sole risk of said user. Background information and other data have been furnished to URS by the City of San Diego and/or third parties, and have been used by URS in preparing this report. URS has relied on this information as furnished, and is neither responsible for nor has confirmed the accuracy of this information.

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The City of San Diego Storm Water Division (Division) Watershed Asset Management Plan was completed with the combined efforts of many members of the Management, Pollution Prevention, and Operations and Maintenance staff. Contributions were made through workshops, interviews, and assistance in development and review of the Watershed Asset Management Plan. The efforts of this team should be acknowledged.

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# EXECUTIVE SUMMARY

## ES.1 PURPOSE

The purpose of this Watershed Asset Management Plan (WAMP) is to document the current state of assets (e.g., asset inventory, valuation, condition, risk) and to project the long-range asset renewal (rehabilitation and replacement) requirements for the City of San Diego (City) Storm Water Division (Division). An asset management plan is a long-range planning document used to provide a rational framework for understanding and planning the asset portfolio. This 2013 WAMP consolidates the Division's asset information into a structured framework and uses it to provide a justifiable basis to support long-term organization, operations, and asset management decisions.

The City elected to align asset management plans with watershed management plans, which include total maximum daily load implementation plans, where necessary. Each watershed management plan is referred to as a WAMP. Each 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.

This document includes a WAMP for each of the six watersheds (San Dieguito, Los Peñasquitos, Mission Bay and La Jolla, San Diego River, San Diego Bay, and Tijuana River) located within the City. Each WAMP will serve as a road map to ensure that actions and activities that address flood risk management and water quality. These plans 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 (O&M) activities within the watershed. The WAMPs will provide information that will be used to develop the Water Quality Improvement Plans (WQIPs), which are now required under Order No. R9-2013-0001 (Regional MS4 Permit). The development of the WQIPs provides a vehicle for public participation.

## ES.2 KEY COMPONENTS OF THE WAMP

The key components of the 2013 WAMP are summarized below.

- **Asset Inventory – "What Do We Own?"** (Section 2) describes the asset hierarchy, presents the methods employed to obtain asset information, and the general assumptions used where information was not available. An inventory summary of the assets in each watershed is presented in the respective watershed-specific appendix.
- **Asset Management Costs / Program Funding Requirements - "What is it Worth?"** (Section 3) presents the total costs for managing assets and the methods used to estimate the costs. The estimated costs for the assets of each watershed are presented in the respective watershed-specific appendix.
- **What is its Condition?** (Section 4) Describes the methods used to determine the assets' condition. For an asset to fail, it must either reach the end of its useful life (mortality failure mode), not meet the necessary ability to convey adequate flows (capacity failure mode), not meet other requirements (LOS failure mode), or be less expensive on a life cycle cost basis to manage

using a different management strategy (financial failure mode). The mortality and capacity failure modes generally apply only to hard assets because soft and natural assets generally do not have a defined useful life or required capacity to convey flows. Hard assets can also fail under the LOS and financial failure modes. The failure mode that results in the highest risk as estimated by multiplying the consequence of failure times the probability of failure is the failure mode that drives asset management decisions and expenditures. The LOS and financial failure modes are the only failure modes that would apply to natural and soft assets. The actual conditions of assets in each watershed are presented in the respective watershed-specific appendix.

- **What Needs to be Done?** (Section 5) Documents the current LOS that, to the best knowledge of the Division, the regulators require and citizens' desire from the assets.
- **When Do We Need to Do It?** (Section 6) details the business risk exposure the assets present to the Division and provides the results of the risk mapping conducted for this WAMP.
- **How Much Will it Cost?** (Section 7) presents long-term costs, the cost assumptions made, and the cost models that were used. The actual costs estimated for each watershed are presented in the respective watershed-specific appendix.
- **Funding Strategies – "How Will We Pay for It?** (Section 8) discusses various budgetary scenarios and general funding strategies.
- **Improvement Plan** (Section 9) presents the confidence-level rating, which measures the current asset management practice, and identifies and prioritizes future improvements.
- **Recommendations** (Section 10) provides recommendations for the assets within each watershed regarding the actions to be taken and projects to be completed to manage the assets to achieve the desired LOS.

Detailed information can be found by referencing the appropriate sections of each respective watershed-specific appendix. Key findings of the 2013 WAMP are summarized below.

## ES.3 ASSET VALUATION

To capture the assets that the Division must manage in order to fulfill its responsibilities, the assets have been categorized into three groups (asset types):

- human-made hard assets
- natural assets
- human-made soft assets

**Hard Assets** are the storm drain system and equipment greater than $5,000 in replacement costs. These assets are generally purchased or constructed, have defined lives, and can be replaced. The $5,000 or greater replacement cost requirement for equipment is a simplification step for tracking and managing hard assets that can have a significant budgetary impact. Smaller items are generally not managed as individual assets.

**Natural assets** are those things the Division must manage, but are not human made. They include receiving waters, runoff and discharges, City parcels, and multi-habitat planning areas (MHPAs). These are naturally occurring things that the City must manage to comply with its NPDES permit, other requirements or, in some cases, provide opportunity for additional flood risk or water quality mitigation. In the case of City parcels and MHPAs, these are City-owned lands or lands the City may make use of that provide opportunity for water capture and water quality improvement, and that can be used as assets in the City's toolbox for achieving TMDL and NPDES compliance.

**Soft assets** are those things that the Division must manage, are human made, but are not constructed or purchased outright. They do not have defined lives, although they can deteriorate to states that do not provide needed LOS. They do not have a defined replacement cost, but they do have defined costs to build them up and to continue to operate and maintain them. Soft assets include such items as City department behavior, public behavior, policies, ordinances, requirements, and regulatory relationships.

Asset valuations are an integral part of asset management. Based on the currently available asset data, the estimated replacement cost of the Division's hard assets is approximately $3.5 billion. It is not necessary to replace all of the City's hard assets immediately. Each hard asset has a remaining useful life. One may estimate the current condition of the hard assets based on its remaining useful life. It is sometimes useful to present the hard asset's financial condition based on the remaining useful life. For example, if a hard asset has a useful life of 100 years when new, costs $1M to replace, and is 50 years old, then one may say that 50% of the hard asset has been consumed. Therefore, the current financial condition of the hard asset is $500K or 50% of its replacement cost. Considering the age of the City's hard assets, when they were installed, and what their remaining useful lives are, in aggregate, the current financial condition of the Division's hard assets is approximately $ 1.99 billion. A breakdown of the total hard asset replacement costs and the current financial condition, based on each watershed, are provided in Figures ES-1 and ES-2. Soft and natural assets do not have replacement costs. Their valuation within this WAMP is generally based on the cost to manage the assets to achieve their LOS.

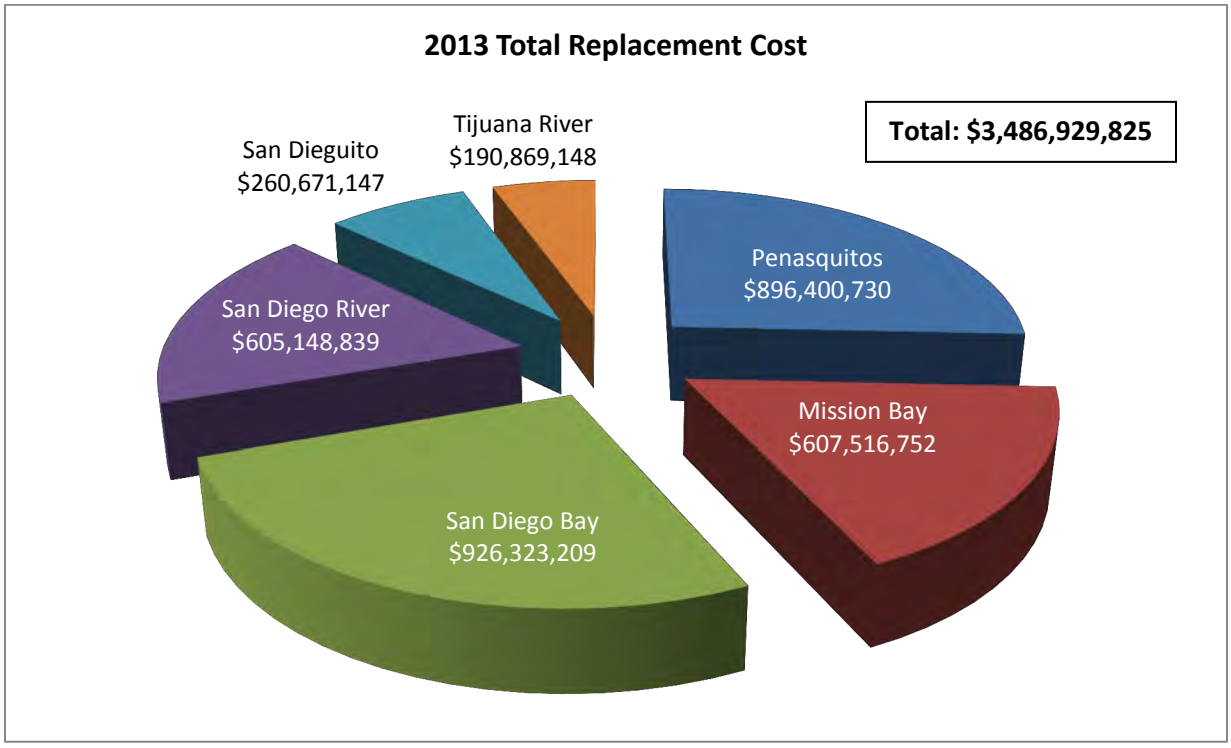


**Figure ES-1. Storm Water Division 2013 Total Replacement Cost**

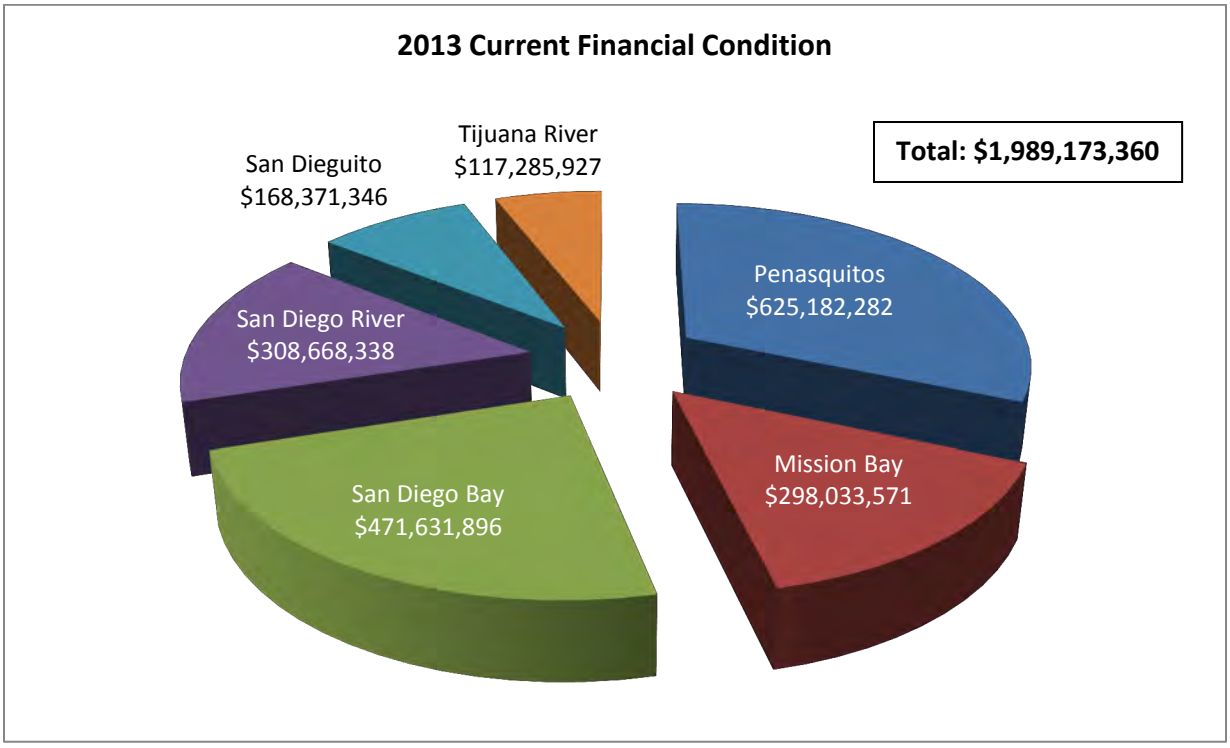


**Figure ES-2. Storm Water Division 2013 Current Financial Condition**

## ES.4 100-YEAR ASSET MANAGEMENT / PROGRAM FUNDING REQUIREMENTS

The Division's 100-year program funding requirements are presented in Figure ES-3. The funding requirements are differentiated by asset type (hard, soft, and natural). The costs in the figure are the projected program costs in 2013 dollars for managing the assets in each watershed to achieve their LOS. Based on the analysis, it is estimated that the Division will need to invest $199.76 million per year to fully fund the projected 100-year program, capital, and operations and maintenance requirements. This is an increase of $165 million from the current FY13 budget of $34.5 million.

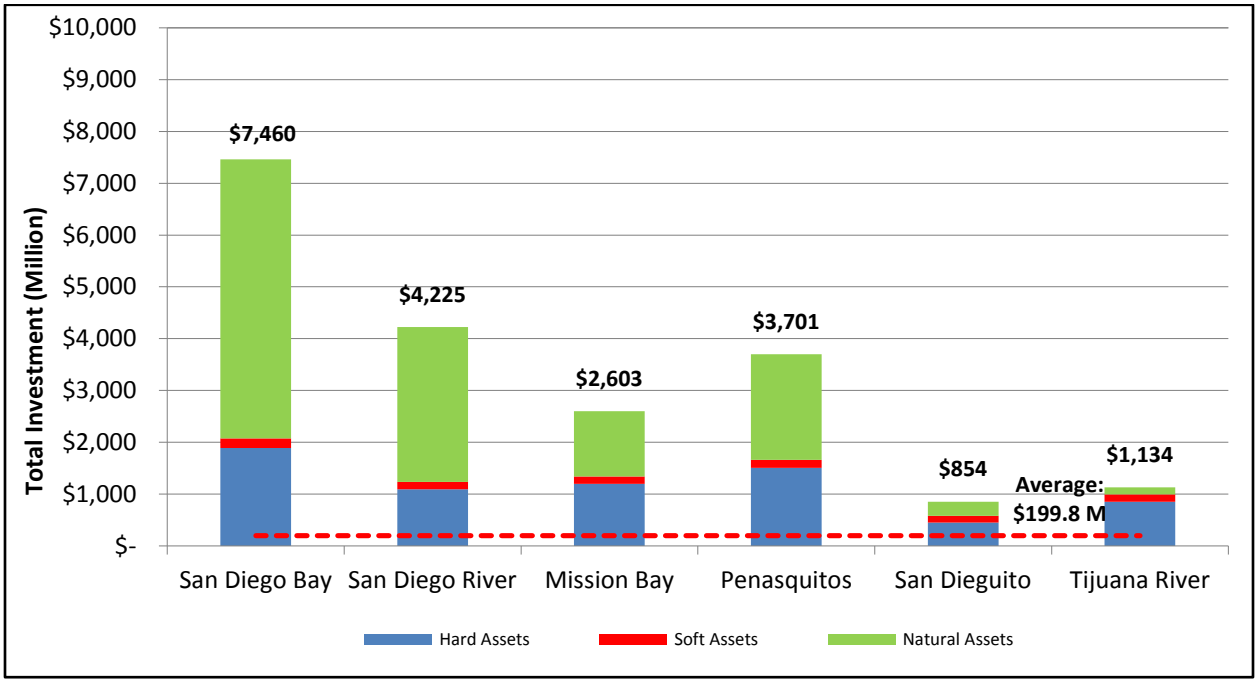


**Figure ES-3. Storm Water Division 100-year Asset Management Funding Requirement (All Assets) for Each Watershed**

## ES-5 RECOMMENDATIONS FOR ASSET MANAGEMENT IMPROVEMENT

The following high-level recommendations are made to help improve the Division's asset management practices. It is recommended that the Division:

1. Continue to improve the asset management plan on an annual basis by refining data to increase the level of confidence, and to effectively manage assets at the appropriate hierarchy.
2. Continue to develop a drainage master plan that assesses the hydraulic capacity of the storm drain pipes and inlets, and identifies under-capacity areas and the degree to which they are under capacity.
3. During all planning efforts – flood risk management, NPDES compliance, and TMDL implementation, create cross-functional teams that seek out opportunities to find synergy between projects and program elements that achieve multiple benefits of flood risk management and water quality improvement, if feasible.
4. Complete the Water Quality Improvement Plans and further refine the scheduling of the planning/design and construction costs for Comprehensive Load Reduction Plans (CLRPs) / Water Quality Improvement Plan (WQIP) Best Management Practices (BMPs) to achieve water quality compliance.

5. While doing routine field inspections, measure the following and collect the information for input into the GEO-SAP system:
   - inlet size and type,
   - pipe size, invert depths, and material,
   - channel size, geometry, material, and depths.
6. Continue to conduct condition assessments of assets (e.g., outfalls) and incorporate the results into future WAMP updates.
7. Include right-of-way as assets in WAMP updates for use as potential future BMPs (e.g. green streets).
8. For mitigation sites developed in response to permitting or other environmental requirements, capture the mitigation sites as assets with specific levels of service tied to the mitigation requirements and project life cycle costs for such assets in the updated WAMPs.
9. Allocate O&M budgets by asset categories and watershed to the extent practicable. Set up a staff charging system that aligns staff time and expenses to specific assets. This will allow for better tracking of costs to perform O&M activities needed to maintain asset LOS.
10. Refine cost categories during future WAMP updates to allocate planning costs, which includes environmental document development and reviews, for capital and maintenance projects into operations and maintenance and program budgets rather than capital budgets, as appropriate.
11. Apply the WAMP to proactively drive future decisions and actions.
12. Document business process flows (e.g., Division budget planning process, etc.) and capture critical asset data and processes. By doing so, the Division will be able to identify areas of potential efficiency gains and specific resources needed to perform the activities.
13. Continue refining the asset inventory (i.e., specific assets) and apply the process down to the appropriate level of the asset hierarchy.
14. Develop and incorporate a process or structure to stratify CLRP activities that are associated with LOS 13a and 13b. Each CLRP activity should be established as a tertiary LOS.
15. Review high risk (based on BRE score) assets shown in each appendix and develop management strategies to promote efficiency to lower risk.
16. Identify assets where additional maintenance or rehabilitation would cost effectively extend that asset's useful life. Adequate and timely maintenance will result in maintaining the asset's level of service.
17. Educate and train staff on the implementation of the WAMP.
18. Perform a cost of service study and identify a dedicated funding source.

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# SECTION 1 INTRODUCTION

With the business drivers of aging infrastructure, and limited budget and resources, the City of San Diego (City) Storm Water Division (Division) is making efforts to optimize its business processes and practices. A key approach that the Division has employed to optimize its business processes and practices was the integration of its planning, implementation and assessment of flood risk management and water quality protection programs.

In 2008, the City reorganized its Division to respond to a new National Pollutant Discharge Elimination System (NPDES) permit regulating discharges into and from its Municipal Separate Storm Sewer System (MS4). This reorganization increased the size of the Division more than four-fold and brought numerous operations previously under management by other City divisions into the Division, such as storm drain operations, and maintenance and street sweeping. The Division grew from being an organization primarily responsible for NPDES compliance program management and reporting to a Division responsible for managing City drainage and flood risk management systems.

Concurrently, the City began to transition to a zero-based budgeting approach. In this new framework, there were no historical budgets upon which future Division budgets could be based. Instead, Division staff is required to show justifications for each budget dollar requested each year.

In response to these fundamental changes, the Division developed an asset management program for managing its activities. This asset management program defined each activity the Division needed to conduct as a level of service (LOS) it was required to meet either under its NPDES permit, or through the expectations of citizens regarding functions of the storm drain system and the quality of water and related services to be maintained in streams, estuaries, and at beaches. This program provided a clear relationship between services enjoyed by the citizens of San Diego that were provided by the receiving waters and drainage system and the funding needs of the Division. This relationship allows the City to make rational budgeting decisions for this program and provides transparency for elected officials and citizens.

The application of asset management to storm water and watershed management is a way to successfully optimize use of resources, integrate municipal flood risk management and storm water quality management. This approach transparently justifies funding requirements and management decisions, and builds and transforms an organization into one that can sustainably manage storm water quality and drainage. This is being done on behalf of the municipality's residents, businesses and other customers. The United States Environmental Protection Agency's Office of Wastewater Management Asset Management Program was consulted during the process and endorsed the City's process in applying asset management to storm water management.

The Division has worked through program evaluation processes to develop its core mission, goals, objectives, and LOS. The Division defined and categorized the assets it is required to manage such as streams and beaches. From these LOS, the Division evaluated the business processes and organizational capabilities needed to fulfill those LOS and identified the specific capabilities and projects that are required to fulfill the LOS required by regulators and desired by citizens. Division staff reached out to other City departments to establish the LOS and business processes where those divisions had roles. The

Division also reached out to key influential members of the public, and business, regulatory and environmental communities to vet the LOS, receive their feedback, and incorporate the feedback into the LOS so that the LOS would represent what citizen's desire.

The first step in the Division's process of developing the overall asset management planning strategy was to formally define the Division's mission and goals. To do this, the Division conducted a series of workshops with Division staff, with staff in other City departments, and with a focus group comprised of members of the community with interests in or responsibilities for storm water quality and drainage management issues at the City. These workshops resulted in the development of a core mission and goals that all believed would fulfill what the regulators require under the MS4 NPDES permit, and what the citizens of San Diego desire from their drainage system, receiving waters, and beaches. Figure 1-1 shows the mission and goals developed by the City.

**Figure 1-1. San Diego Storm Water Division Mission and Goals**

The City elected to align asset management plans with watershed management plans, which include total maximum daily load (TMDL) implementation plans where necessary. Each watershed management plan is termed a Watershed Asset Management Plan (WAMP). Each WAMP identifies the assets owned or 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. This document includes WAMPs for each of the six watersheds (San Dieguito, Los Peñasquitos, Mission Bay and La Jolla, San Diego River, San Diego Bay, and Tijuana River) located within the City. The boundaries of each watershed are presented in Figure 1-2. Each 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. These plans will provide a vehicle to identify and prioritize potential water quality and flood risk management challenges. The WAMPs also evaluate opportunities for integrating water quality and flood risk management into City projects and operations and maintenance activities within the watershed. Finally, the WAMPs will provide information that will be used to develop the Water Quality Improvement Plans (WQIPs), which are now required under Order No. R9-2013-0001 (Regional MS4 Permit). The development of the WQIPs provides a vehicle for public participation.

## 1.1 CITY OF SAN DIEGO STORM WATER DIVISION RESPONSIBILITIES

The Division is responsible for both flood risk management and storm water quality and views its management requirements holistically. Division staff recognized that sound flood risk management practices also benefitted water quality, and vice versa. The Division saw the storm water that flowed through its drains as a resource that provides value to the citizens of San Diego and offered opportunities for capture for beneficial purposes.

The Division leads the City's efforts to reduce pollutants in urban runoff and storm water to the maximum extent practicable. These activities include but are not limited to: public education, employee training, water quality monitoring, source identification, code enforcement, watershed management, and best management practice (BMP) development/implementation within the City’s jurisdictional boundaries. Staff from the Division represents the City on storm water issues.

City Policy states that the City will generally only accept responsibility for maintenance of public drainage facilities that are designed and constructed to City standards, and that are located within a public street or drainage easement dedicated to the City. The Division is responsible for the storm water facilities within the public rights-of-way and drainage easements dedicated to the City, however, other City divisions, such as Parks and Recreation or Public Utilities, may also have the responsibility and jurisdiction to maintain the drainage systems with their own facilities. In addition, facilities located on private property or within another agencies’ jurisdiction or easements would not be the Division’s responsibility to maintain.

## 1.2 CITY OF SAN DIEGO STORM WATER DIVISION ORGANIZATIONAL CAPABILITIES

Organizations typically contain the functional capabilities to support and deliver the LOS to ultimately achieve established goals and objectives. Functional capabilities were largely defined by the senior storm water managers in the Division, with some assistance from the consultants. Table 1-1 lists and defines the functional capabilities that were identified.

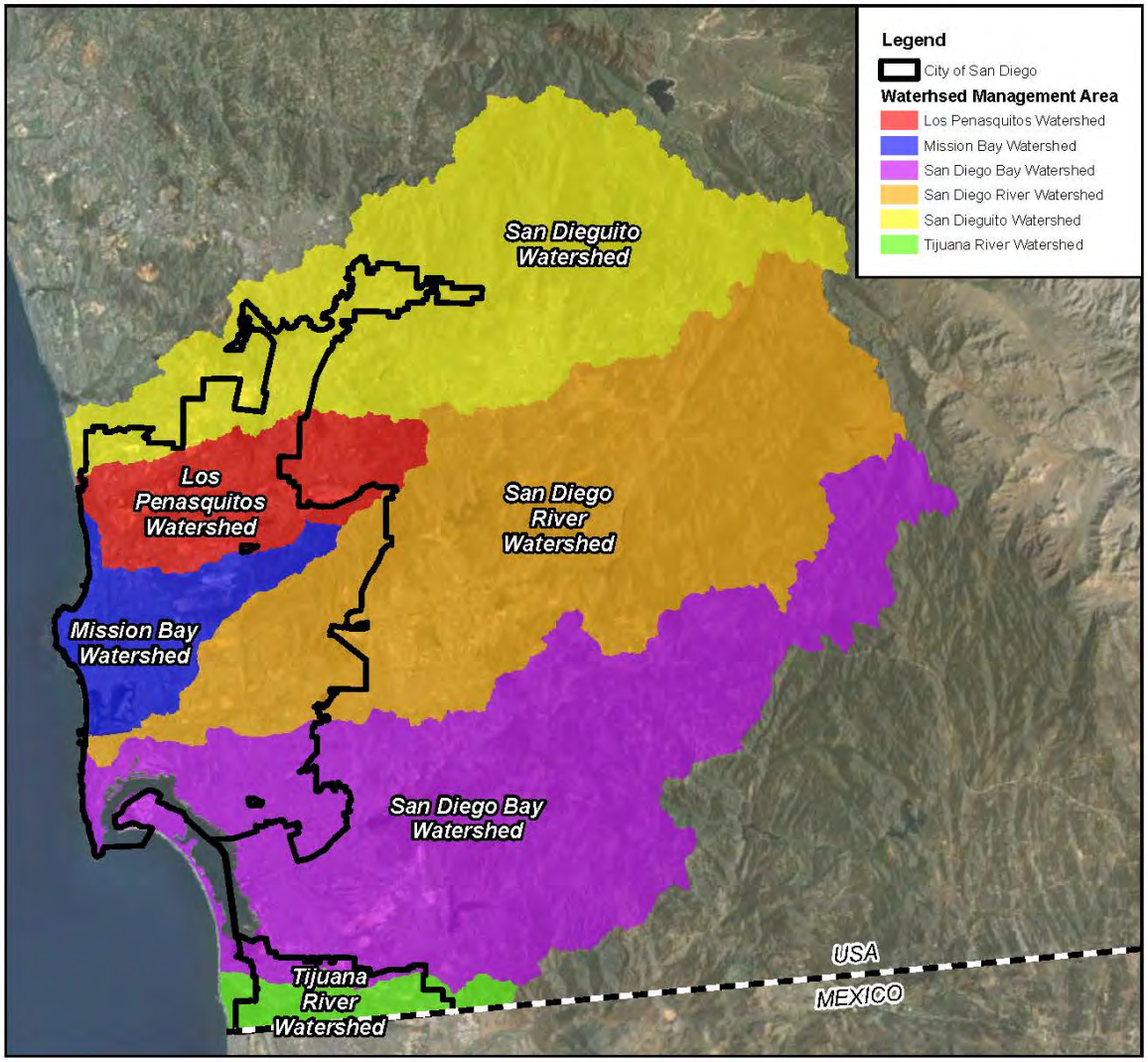


**Figure 1-2. City of San Diego Watershed Management Areas**

The Division has already begun to assess and structure its functional capabilities to successfully implement the strategic intent. One key task was establishing a watershed coordinator for each watershed. The role of the watershed coordinator is to develop watershed management plans, establish watershed-specific budgets, and coordinate activities within the watershed (i.e., NPDES compliance, flood system maintenance, capital improvement planning, special studies and regulatory negotiations [e.g., TMDLs]). The watershed coordinator directs specific activities, develops the budgets needed for those activities within the watershed, and provides that budget to the program element managers to identify those program elements that are within the watershed. Based on the specific needs of the watershed, the watershed coordinator also is responsible for managing activities, such as recommending budgets for public outreach, performing inspections and enforcement activities, conducting monitoring, planning capital improvements, completing capital improvements, conducting street sweeping, and performing flood system maintenance. In addition to these responsibilities, the watershed coordinator is responsible for understanding how the elements fit together, interact with each other, and meet the LOS within the watershed. The coordinator is responsible for collecting the information to assess performance of the assets within the watershed against the LOS within the watershed and develop the budgets for the different program elements necessary to meet the LOS. The coordinator understands the risks within the watershed and is able to make cases for budgetary needs and make choices regarding where to spend the budget available within the watershed to minimize the watershed-specific risks.

**Table 1-1. Functional Capability Definitions**

| Function | Description |
|---|---|
| Administration | Preparing reports, handling telephone calls, preparing correspondence, performing filing, routing, and office organization activities. |
| Asset Management | Planning capital improvement programs. |
| Information Technology | Servicing computers, laptops, computer servers, software licenses, specialized software, and specialized computer hardware. |
| Construction Management | Providing engineering oversight and performing inspections of construction activities. Managing construction activities. Performing scheduling and implementing project controls. |
| Contract Management | Developing, enforcing, and managing compliance with contracts. |
| Database Administration | Performing data entry, database management, database programming, and data manipulation. |
| Dispatch | Directing field crews regarding inspections, repairs, and emergencies. |
| Enforcement | Issuing citations, processing citations and appeals, communicating with violators, and providing educational materials to violators. |
| Engineering | Completing designs, developing projects and standards for development and redevelopment, completing reviews of plans and water quality management plans, developing standards for construction controls, completing reviews and inspections of construction projects, and negotiating permit requirements associated with water quality controls. |

**Table 1-1. Functional Capability Definitions**

| Function | Description |
|---|---|
| Management | Making final decisions pertaining to the Division. |
| Finance | Performing cost estimating, preparing budget analyses, overseeing grant acquisitions, and developing budgets for proposals and presentations. |
| GIS | Managing, analyzing, and mapping computer-based geographic data. |
| Hydrogeology | Applying professional expertise to understanding groundwater systems. |
| Inspection | Inspecting facilities for water quality violations; inspecting public works infrastructure to identify maintenance and repair requirements. |
| Laboratory | Analyzing water and other media to identify concentrations of various chemicals. |
| Landscape Architecture | Developing plans and specifications and overseeing the construction of landscapes. |
| Legal | Performing legal tasks. |
| Modeling | Using mathematical models to predict flows and pollutant loads based on rainfall, land use, and other physical, chemical, and biological processes. |
| Monitoring | Collecting samples of water and other media and analyzing the media to determine the concentrations of various chemicals. Includes the skills and tools to capture and store the data collected for future use. |
| O&M | Inspecting, repairing, and replacing infrastructure. |
| Planning | Developing overall goals and objectives and developing projects to meet those goals and objectives. Includes professionals skilled at evaluating the impacts of projects and planning decisions, weighing the different impacts, costs, and benefits, and making rational choices for project selection and development. Also includes the ability to communicate the reasoning behind planning decisions, listen to the concerns of stakeholders and elected officials, and adjust plans to meet the needs of parties to the extent practicable. |
| Policy | Evaluating the impacts of policy decisions on municipal and other operations, and developing policies and procedures to optimize municipal and other operations. Requires knowledge of environmental legislation and an understanding of how state or federal implementation policies will affect municipal costs and economic conditions. |
| Project Management | Achieving scope, quality, schedule, and budget goals in delivering a project. Usually associated with a capital improvement project, but can include studies and technical projects. |
| Public Outreach | Understanding, communicating with, and measuring the attitudes and behavior of the public. |

| Table 1-1. Functional Capability Definitions | |
|---|---|
| **Function** | **Description** |
| Regulatory | Understanding and applying regulations, particularly environmental regulations. Understanding what the regulatory requirements are, and what options are available for compliance with regulations. Includes expertise in the regulatory process for how regulations are developed, how they are enforced, and what the compliance risks are. |
| Science | Applying scientific methods to projects in the physical, chemical, and/or biological sciences arenas. Includes skills in how to design experiments, how to study designs, how to analyze and assess data, how to statistically analyze data and understand the uncertainty in the data, how to draw conclusions, and how to present those conclusions in light of how the experiment or study was conducted and what uncertainties exist. Includes knowledge of the underlying first principle theories of the scientific principles on which conclusions are based. |

**Acronyms/Abbreviations:**
CEQA – California Environmental Quality Act
Division – City of San Diego Storm Water Division
GIS – geographic information system
O&M – operations and maintenance

## 1.3 HISTORY

During the early twentieth century, because of its geography, climate, and low population density, the City relied on natural hydrology, allowing flood waters to flow by gravity through the City's vast network of naturally occurring gullies, canyons, rivulets, creeks, and streams. The City's Storm Water Facility Maintenance Program began in 1933 under the Depression-era federal Works Project Administration. Storm water facilities were manually cleaned using shovels and buckets. During World War II, the City witnessed exponential growth, including the construction of new streets and housing, and vast changes to its landscape to accommodate war-related facilities. Those activities increased the amount of impervious surface, changed storm water flow patterns, and altered the natural balance between runoff and natural absorption. This, in turn, substantially increased the volume, frequency, and velocity of storm water flows. Although the City constructed storm water facilities, the pace of growth dictated the need for improving capacity and performing preventative maintenance.

Mechanized maintenance was first introduced after World War II. The City acquired surplus military equipment, power shovels, and farm tractors. Maintenance activities consisted of grading storm water facilities and pushing the waste material to the sides in a practice called "sidecasting". By the mid-1950s, the City implemented annual inspections, completed the first mapping of its storm water infrastructure, and adopted requirements for private construction of storm water infrastructure associated with new commercial and residential developments. In subsequent decades, the number of storm water structures increased with the population. In addition, the City modernized its equipment to include bulldozers,

excavators, backhoes, and skid-steers to provide more efficient and flexible maintenance methods. The practice of side-casting was also replaced with disposal of waste to landfills.

In the mid-1990s, after a state-wide initiative to educate local governments regarding the environmental regulations associated with maintaining urban storm water infrastructure, the City embarked on its first application for a master storm water facility maintenance permit. In 2002, this effort was postponed after the City and regulatory agencies recognized that a programmatic approach to storm water maintenance would provide a more thorough and comprehensive analysis of the environmental impacts of the proposed program.

The federal Clean Water Act (CWA), originally enacted in 1972, was amended in 1987 to address urban runoff. One requirement of the amendment was that many municipalities throughout the United States were obligated for the first time to obtain NPDES permits for discharges of urban runoff from their MS4s. In response to the CWA amendment (and the pending federal NPDES regulations that would implement the amendment), in July 1990, the San Diego Regional Water Quality Control Board (RWQCB) issued a municipal storm water permit (Order No. 90-42) to the San Diego Region including the City of San Diego for its urban runoff discharges.

Order No. 90-42 was due for renewal in July 1995, but was administratively extended pursuant to federal law because of limited RWQCB resources. Order No. 90-42 was not reissued by the RWQCB until February 21, 2001. At that time, it was reissued as Order No. 2001-01. The regulatory approach incorporated into Order No. 2001-01 was a significant departure from the regulatory approach incorporated into Order No. 90-42. Whereas Order No. 90-42 included broad nonspecific requirements in order to provide the Copermitees[1] with the maximum amount of flexibility in implementing its programs, Order No. 2001-01 identified detailed specific requirements that outlined the minimum level of implementation required for the Copermittees' (including the City's) programs.

Since the adoption of Order No. 2001-01, and despite the subsequent legal actions, the City's storm water program has expanded dramatically. Audits of the City's programs by the RWQCB revealed that the City's jurisdictional program was compliant, with few exceptions with the Order. Efforts currently being conducted on a regular basis by the City, which were not conducted on a widespread basis prior to adoption of Order No. 2001-01, include:

- conducting construction site storm water inspections,

1

| | | | |
|---|---|---|---|
| City of Carlsbad | City of Escondido | City of Poway | County of San Diego |
| City of Chula Vista | City of Imperial Beach | City of San Diego | San Diego Unified Port District |
| City of Coronado | City of La Mesa | City of San Marcos | San Diego County Regional Airport Authority |
| City of Del Mar | City of Lemon Grove | City of Santee | |
| City of El Cajon | City of National City | City of Solana Beach | |
| City of Encinitas | City of Oceanside | City of Vista | |

- conducting industrial and commercial facility storm water inspections,
- conducting municipal facility storm water inspections,
- managing storm water quality from new development,
- developing BMP requirements for existing development,
- assessing storm water program effectiveness, and
- implementing post-construction BMPs for new development and redevelopment projects meeting priority development criteria.

In January 2007, Order No. R9-2007-0001 (Regional MS4 Permit) was adopted and continued to include more detailed requirements to be implemented by each Copermittee's jurisdictional runoff management program. This permit also include requirements to further emphasize a watershed management approach and for more coordination among jurisdictional runoff management programs. In addition, the permit included more requirements for assessing the effectiveness of the runoff management programs being implemented by the Copermittees. The intent of the inclusion of additional requirements was to enhance and better define elements of the permit that were expected to be incorporated into the iterative process for managing runoff from each Copermittee's jurisdiction and within the watersheds of the San Diego Region.

Order No. R9-2007-0001 included several new and emerging approaches for managing storm water runoff and discharges. Low impact development (LID) requirements were included for development and significant redevelopment to reduce pollutants in storm water runoff from sites through more natural processes such as infiltration and biofiltration closer to the source, rather than utilizing conventional mechanical end-of-pipe treatment systems. Hydrograph modification (hydromodification) management requirements were also included to mitigate the potential for increased erosion in receiving waters due to increased runoff rates and durations often caused by development and increased impervious surfaces.

On May 8, 2013, Order No. R9-2013-0001 (Regional MS4 Permit) was adopted and shifts the focus of the permit requirements from a minimum level of actions to be implemented by the Copermittees (including San Diego, Orange, and Riverside County Copermittees) to identifying outcomes to be achieved by those actions. The Regional MS4 Permit represents an important paradigm shift in the approach for MS4 permits within the San Diego Region. The focus has shifted through the jurisdictional runoff management programs to the development and implementation of Water Quality Improvement Plans (WQIPs). A WQIP will be developed and implemented for each Watershed Management Area. The Copermittees whose jurisdiction resides within the Watershed Management Area will implement the WQIP through their jurisdictional runoff management programs. Figure 1-3 depicts the relationship of the WQIPs and the jurisdictional runoff management program.

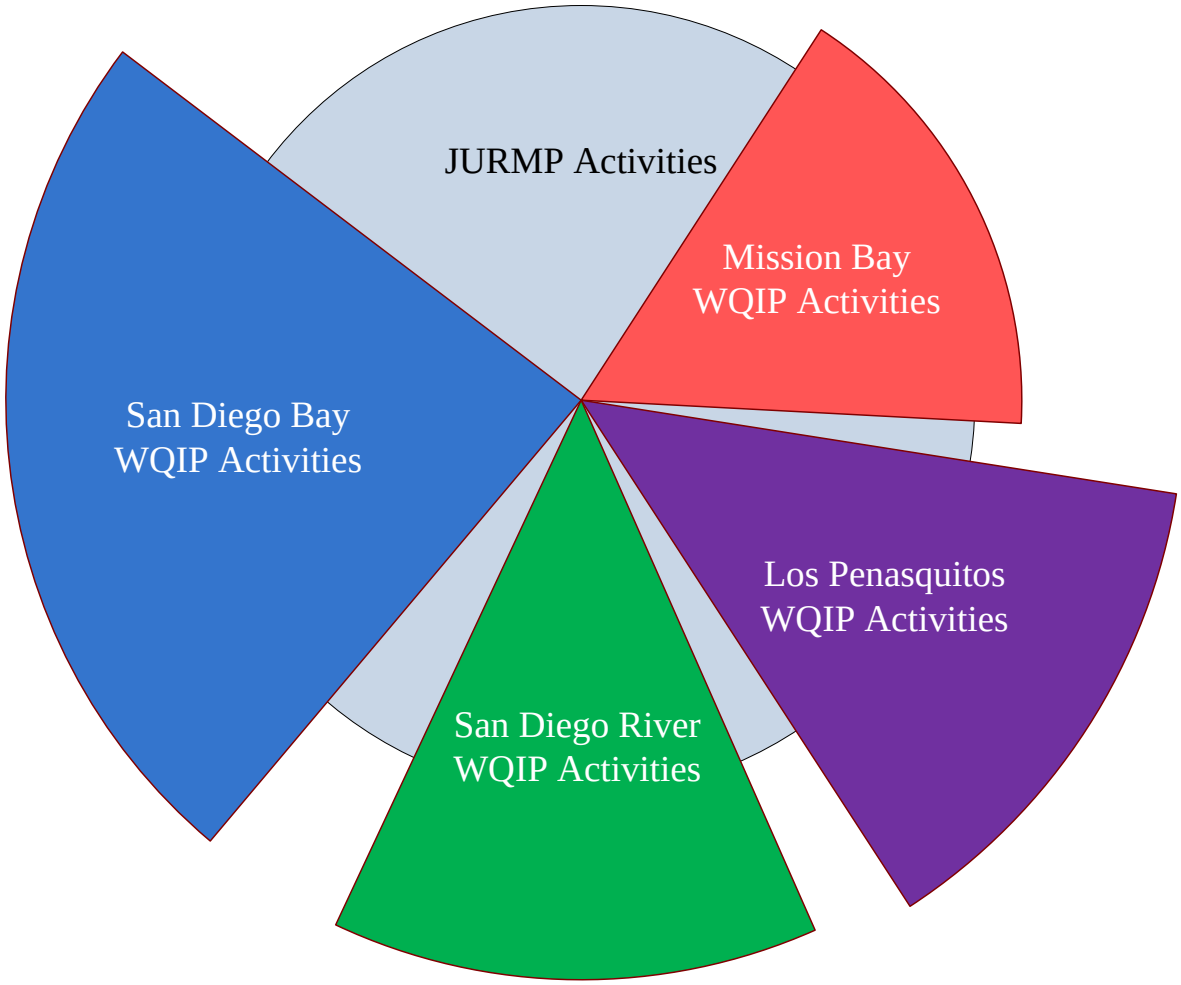


**Figure 1-3. WQIP and Jurisdictional Runoff Management Program**

The overall approach included in the Regional MS4 Permit with respect to the jurisdictional runoff management programs will not differ significantly from the current permits. The general requirements for the jurisdictional runoff management program components and compliance with those requirements will remain and be applied consistently throughout the San Diego Region under the Regional MS4 Permit.

The most significant difference in the new permitting approach is the specific manner of implementation for those jurisdictional runoff management programs. Implementation will be based on decisions made by the Copermittees in accordance with what they have identified as their highest priority water quality conditions in each watershed via WQIPs. In other words, the Copermittees will have significant control in how to implement programs to best utilize their available resources in addressing a specific set of priorities effectively, instead of trying to address all the water quality priorities ineffectively.

The Copermittees are given the responsibility of identifying their highest priority water quality conditions that they intend to address in each watershed's WQIP. The Copermittees will develop goals that can be used to measure and demonstrate progress or improvements toward addressing those priorities. In addition to the goals, the Copermittees will provide a schedule for achieving the goals for those highest priorities. The measurement of progress toward achieving the goals for those highest priorities requires a better defined and more focused program of monitoring and assessment than under prior permits.

The monitoring and assessment program must be designed to inform the Copermittees of their progress, and the need for modifications in their WQIPs and schedules to achieve their goals to improve water quality. The monitoring and assessment program requirements will have a more central role in the Regional MS4 Permit than in earlier permits. The monitoring and assessment requirements must also be designed to enable the Copermittees to focus and direct their efforts in implementing their WQIPs toward their stated desired outcomes to improve the quality of receiving waters and/or discharges from the MS4s.

By providing an MS4 permit that allows the Copermittees to make more decisions about how to utilize and focus their resources, along with a better defined monitoring and assessment program to inform their water quality management decisions, the Copermittees will have the opportunity to:

1) *Plan strategically*. The Copermittees have the ability to identify their available resources and develop and implement long term plans that can organize, collect, and use those resources in the most strategically advantageous and efficient manner possible. This ability to develop long term plans will allow the Copermittees to focus and utilize their resources in a more concerted way over the short term and long term to address specific water quality priorities through stated desired outcomes.
2) *Manage adaptively*. The Copermittees have the ability to modify their plans as additional information and data are collected from the monitoring and assessment programs. The Copermittees' plans may require modifications to the programs, priorities, goals, strategies, and/or schedules in order for the Copermittees to achieve a stated desired outcome.
3) *Identify synergies*. The Copermittees have more flexibility to identify efficiencies within and among their jurisdictional runoff management programs as the strategies are developed and implemented to increase the Copermittees' collective effectiveness. The Copermittees must also be able to identify and utilize resources available from other agencies and entities to further augment and enhance their jurisdictional runoff management programs and/or to collectively work with those other agencies and entities toward achieving a stated desired outcome.

The Regional MS4 Permit requirements will provide the Copermittees the flexibility and responsibility to decide what actions will be necessary to achieve an outcome that is tailored and designed by the Copermittees to improve specific prioritized water quality conditions. The San Diego Water Board expects the approach of the Regional MS4 Permit to give the Copermittees a greater sense of ownership for restoring the quality of receiving waters in the San Diego Region by becoming an integral part of the decision making process in identifying water quality conditions to be addressed, as well as determining the best use of their resources.

## 1.4 STORM DRAIN SYSTEM

The City's storm water system conveys drainage flows from impervious surfaces to provide flood risk management for the protection of life and property of its citizens. The storm water system also conveys urban runoff associated with development, such as irrigated landscaped areas, driveways, and streets. This runoff can flow into the drainage system and ultimately to the ocean. Storm water facilities include, but are not limited to, a network of underground storm drain pipes, culverts, outfalls/inlets, detention basins, pump stations, and open flood risk management channels.

During rain events or wet conditions, storm water and urban runoff is typically collected via drains from impervious surfaces, such as buildings, rooftops, paved driveways, and improved streets, and is conveyed downstream via the City's storm water system. When runoff cannot infiltrate into the ground, precipitation will follow drainage patterns, typically to the lowest point, collecting contaminants, sediment or debris along the way. Storm water and urban runoff can also erode unstable soil, carrying sediment downstream. Typically, urban runoff from development sources, such as irrigated landscaped areas, is the surface water collected during dry weather that also flows through the storm water system. Urban runoff results from human activities rather than the natural hydrological cycle. Common urban runoff contaminants include: oil and grease from parking lots; pesticides, herbicides, and fertilizers from lawns and landscaped areas; soapy water from carpet cleaning and restaurant washdown; and vehicle washing; sediment from construction projects; trash such as cigarette butts and bottles; and many other sources associated with everyday activities.

## 1.5 ASSET MANAGEMENT PLANNING

The Water Environment Research Foundation[2] has identified seven core elements that comprise an asset management plan. The seven elements, shown in Figure 1-4, include: 1) lifecycle processes and practices, 2) information systems, 3) data and knowledge, 4) people issues, 5) commercial tactics, 6) organizational issues, and 7) the total asset management plan. Balance of these core elements is required to develop a successful and sustainable asset management program.

[2] The Water Environment Research Foundation (WERF) is a non-profit organization, founded in 1989, that operates with funding from subscribers and the federal government. WERF is the leading independent research organization in the United States dedicated to finding solutions to wastewater and storm water issues.

**Figure 1-4. Seven Core Elements of Asset Management**

Each core element contains specific goals, identified in Table 1-2.

**Table 1-2. Core Elements and Goals of Asset Management**

| Core Asset Management Elements | Goals |
|---|---|
| Lifecycle Processes and Practices | Enhance the efficiency, transparency, and consistency of the business decision-making process. |
| Information Systems | Increase the system integration, functionality, and support capabilities. |
| Data and Knowledge | Capture, organize, and document asset information. |
| People | Provide a platform for managing and sharing information and knowledge. |
| Commercial Tactics | Focus on effective delivery of projects and services. |
| Organization | Establish sound, strategic support for asset management practices. |
| Asset Management Plan | Document the current state of the City of San Diego Storm Water Division's assets and future requirements. |

An asset management plan is a long-range planning document used to provide a rational framework for understanding the assets an organization owns, services it provides, risks it exposes, and financial investments it requires. The WAMP is intended to be a living document that will be updated by the Division and continually refined as part of annual ongoing asset management and business improvement processes. The Division has traditionally performed many of these tasks across the organization; however, previously, the results of this work had not been consolidated into one concise document.

## 1.6 COMPONENTS OF THE WATERSHED ASSET MANAGEMENT PLAN

For this initial version of the Division's WAMP, the focus was on developing and identifying areas for enhancement. As additional data become available and the asset management processes and practices mature, future versions of the WAMP will incorporate a more refined implementation of each core process. The following sections describe the questions that were addressed during the development of the WAMP.

### 1.6.1 What Is An Asset Management Plan?

An asset management plan is a long-range planning document used to provide a rational framework for the following:

- Identifying assets the Division owns and manages,
- Defining current and proposed LOS,
- Forecasting future financial commitments required,

- Analyzing the business risk exposure, and
- Linking business objectives and service levels.

An asset management plan consolidates and documents information currently available for infrastructure assets and service delivery programs. An asset management plan is a written representation of the intended asset management programs for the infrastructure assets.

### 1.6.2 Why Is An Asset Management Plan Needed?

Some of the Division's infrastructure assets are beginning to reach maturity. Aging assets are reaching a time in which they are beginning to fail, and, in some cases, are failing with significant consequences. In years past, there were far fewer assets to manage. Assets were often visible and younger. However, with the rapid development that has occurred in the City, the number of assets required to meet the growing demand has increased exponentially. As a result, assets can no longer be managed effectively by relying on the historical management practices. Operation and maintenance (O&M) staff are often faced with having to manage in a reactive mode.

In order to improve management practices, asset management helps to answer the following five core questions:

1. What do we own / manage?
2. What is its required level of service?
3. Which assets are critical?
4. What are my optimized management strategies?
5. What do I need to do to fund it?

An asset management plan is intended to answer the preceding questions. An asset management plan enables an organization to have the information required to make the right decision, at the right time, at the right cost, for the right reason.

By implementing core asset management processes, the Division will gain knowledge of the assets owned, the remaining useful life to manage, the amount of investment required, and the business risk it faces. The WAMP will provide the Division with a foundation to promote sustainable management practices.

### 1.6.3 How Can An Asset Management Plan Be Applied?

The key benefits of an asset management plan are listed below.

**Road map for future asset commitments**. Develop a funding model to estimate the revenues required to manage infrastructure at the established LOS.

**Effective use of existing funds**. Optimize the use of current funds to achieve the best value from both capital and O&M budgets.

**Future asset requirements**. Identify future long-term projects and strategies to deliver the most cost-effective service option from a lifecycle asset management perspective.

**Risk identification**. Identify future business risks impacting Division from both LOS and cost-of-service perspectives.

Developing an asset management requires that the following activities be completed and mastered:

1. Identify assets where rehabilitation or replacement will be cost effective,
2. Understand and manage critical assets,
3. Focus maintenance efforts using risk,
4. Optimize maintenance and capital needs to reduce the life-cycle cost of ownership, and
5. Understand the long-term future renewal, rehabilitation and replacement expenditure requirements of the Division and assist in the development of plans to mitigate the various peak expenditures identified.

### 1.6.4 Storm Water Division Assets

Under the principles of asset management, a utility or municipality is viewed as a collection of assets that are managed to meet goals, objectives, and LOS at the lowest possible lifecycle costs. This management approach leads to predictability, transparency, and a clear relationship between funding needs, generally in the form of rates, fees, or taxes, and services provided by the utility. Division assets range from natural to manmade and from hard structural assets to non-structural assets, which are important for providing the desired LOS, but are not viewed as a constructed or capital item.

The basic definition of an asset is that it must be something that the Division has to manage to meet goals, objectives, and LOS, and that it:

- Does not have to be owned by the Division,
- Does not to have to be physical or touchable, but
- Does have to be overseen in some part by the Division, in terms of its condition.

After brainstorming, it was determined that the Division is tasked with managing more than the storm drain system, primarily due to the goals of restoring and maintaining cleaner beaches, streams and bays. Also, the Division must comply with water quality regulatory requirements, which requires the coordination of numerous items, such as relationships, regulatory policy, and behaviors.

It is firmly believed that the Division needs to manage relationships, behaviors of others, good will, and regulatory policies to meet goals and objectives, therefore, these elements should be classified as "assets." They can degrade with time if no effort is made to maintain them. They require additional investment to improve them. Specific goals and objectives cannot be achieved without general good will from the public, stakeholders, and the regulators, without City staff complying with storm water requirements, and without the public willingly complying and taking extra steps to modify their behavior.

An asset hierarchy was established to keep track of assets, asset LOS, the conditions of the assets, and activities necessary to maintain the desired LOS. This hierarchy is geographical and based on watershed units. Upon evaluating the managerial responsibilities of the Division, it was determined that decisions are made within each watershed fairly independently of the needs of other watersheds. This fit the technical aspects of the Division's responsibilities to manage water quality and quantity, which depends on conditions that are specific to a watershed, subwatershed, or sub-drainage area within a watershed.

Some assets are managed at the mainstem outfall drainage area level. Assets in this category include much of the storm drain system, structural BMPs, and some non-structural BMPs. Other assets are managed at higher levels in the hierarchy, such as a Hydrologic Subarea (HSA), Hydrologic Area (HA), or entire watershed. Such assets would include many public behavior assets, Division behavior assets, various non-structural BMPs, relationship management, ordinances, standards, and requirements, and regulatory policy management assets.

### 1.6.5 Watershed Asset Management Plan Development Process

The Division's WAMP was developed based on the five fundamental issues regarding asset management presented above. Figure 1-5 presents the core processes (10 steps) used to develop the WAMP with respect to the five fundamental questions of asset management.

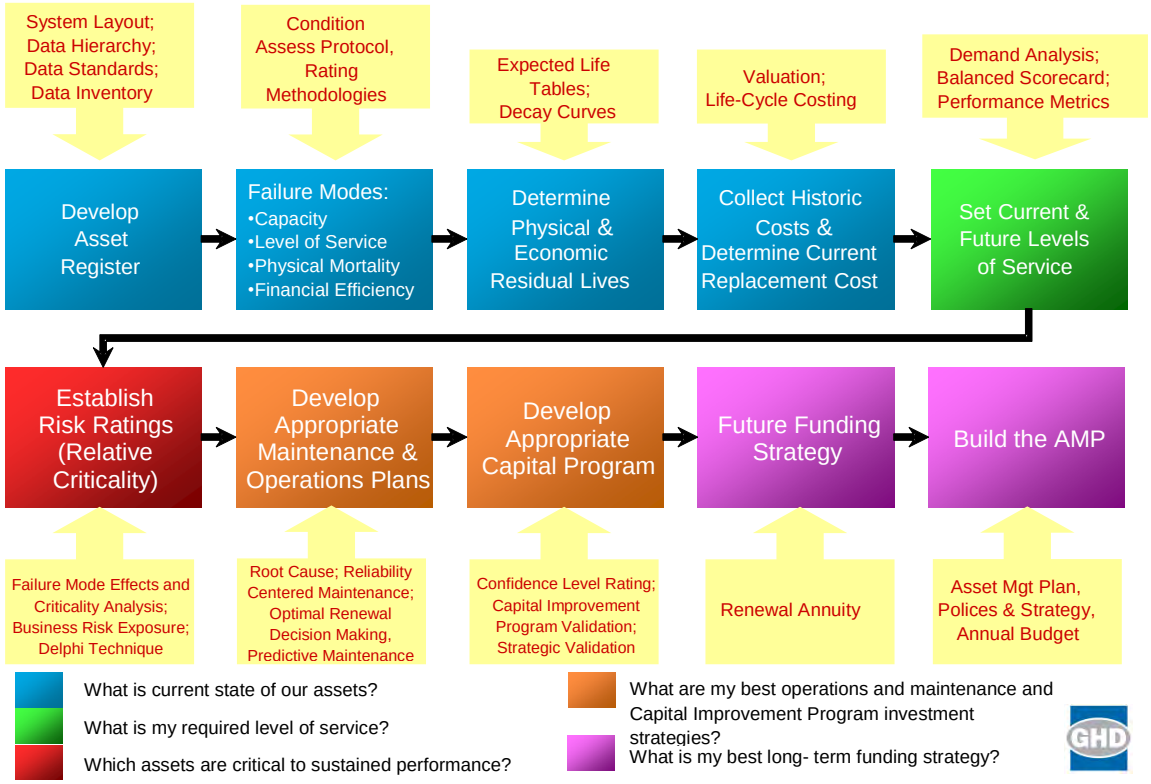


**Figure 1-5. Core Processes for Asset Management Plan Development**

### 1.6.6 Watershed Asset Management Plan Outline

An outline and a brief description of each section of the Division's WAMP are presented below. The main body of this document describes the methodology and approach that was used. Watershed-specific asset management plans are provided in Appendices A through F.

**Acknowledgement.** Recognizes the individuals involved in creating this WAMP.

**Glossary of Terms**. Lists terminology used in this WAMP and provides definitions.

**Executive Summary**. Emphasizes the key issues contained in the body of the Asset Management Plan.

**Section 1: Introduction.** Explains the Storm Water Division's overall mission and goals, and for what the WAMP is to be used. It describes the Division's organizational structure and some of the roles and responsibilities of different positions with respect to using the WAMP, updating the WAMP, and managing the assets.

**Section 2: Asset Inventory – "What Do We Own?"** Describes the asset hierarchy, presents the methods employed to obtain asset information, and the general assumptions used where information was not available. An inventory summary of the assets in each watershed is presented in the respective watershed-specific appendix.

**Section 3: Asset Management Costs / Program Funding Requirements - "What Is It Worth?"** presents the total costs for managing assets and the methods used to estimate the costs. The estimated costs for the assets of each watershed are presented in the respective watershed-specific appendix.

**Section 4: What Is Its Condition?** Describes the methods used to determine the assets' condition. For an asset to fail, it must either reach the end of its useful life (mortality failure mode), not meet the necessary ability to convey adequate flows (capacity failure mode), not meet other requirements (LOS failure mode), or be less expensive on a life cycle cost basis to manage using a different management strategy (financial failure mode) The mortality and capacity failure modes generally apply only to hard assets because soft and natural assets generally do not have a defined useful life or required capacity to convey flows. Hard assets can also fail under the LOS and financial failure modes. The failure mode that results in the highest risk as estimated by multiplying the consequence of failure times the probability of failure is the failure mode that drives asset management decisions and expenditures. The LOS and financial failure modes are the only failure modes that would apply to natural and soft assets. The actual conditions of assets in each watershed are presented in the respective watershed-specific appendix.

**Section 5: What Needs To Be Done?** Documents the current LOS that, to the best knowledge of the Division, the regulators require and citizens desire from the assets.

**Section 6: When Do We Need to Do It?** Details the business risk exposure the assets present to the Division and provides the results of risk mapping.

**Section 7: How Much Will It Cost?** Presents long-term costs, the cost assumptions made, and the cost models that were used. The actual costs estimated for each watershed are presented in the respective watershed-specific appendix.

**Section 8: Funding Strategies – "How Will We Pay for It**? Discusses various budgetary scenarios and general funding strategies.

**Section 9: Improvement Plan** - presents the confidence level rating, which measures the current asset management practice, and identifies and prioritizes future improvements.

**Section 10: Recommendations** - provides recommendations for the assets within each watershed regarding the actions to be taken and projects to be completed to manage the assets to achieve the required LOS.

**References:** Includes any reference documents necessary to support the WAMP.

**Appendices:** Documents the watershed-specific asset management plans.

## 1.7 DOCUMENT UPDATES

It is anticipated that this document will be a living document. Feedback from customers, other City departments, regulators, and/or elected officials over time may result in an adjustment to the Division's mission, goals, objectives, and LOS. The intent of the WAMP development and implementation process is for routine reviews to occur, involving feedback from the Division, in order to allow identification of and adjustment to business practices and policies to be performed as needed. These adjustments will then cascade into other planning efforts. Typically, an annual review of this document will take place just prior to or in conjunction with issuance of the Division's annual budget updates.

# SECTION 2 ASSET INVENTORY – "WHAT DO WE OWN / MANAGE?"

In order to determine the current state of assets, the Division needs to ask and find answers to the following questions:

1. What do I own and manage?
2. Where is it?
3. What condition is it in?
4. What is its remaining useful life?
5. What is its replacement cost?

This section focuses on the first two questions. Later sections will present the methodology used and finding to help identify the current state of the Division's assets.

Determination of the current state requires knowledge of the assets owned and managed. This step starts with defining an asset and consolidating them in a central location (asset register). With the assets in an asset register, the assets are grouped based on asset types and organized using a standard framework (asset hierarchy). The Division is responsible for the activities identified below.

- Perform O&M activities, and construct improvements to the City's storm drainage system. This includes permitting and mitigation for maintenance and capital improvements to the system. The storm drain system includes inlets, storm drain pipes, culverts, swales, brow ditches, outlets, pump stations, channels, treatment control BMPs, and other structures that convey storm flows and dry weather urban runoff from City-incorporated public rights-of-way. It does not include street curb and gutter features that convey storm flows, roof gutters and downspouts from City-owned buildings and structures, or storm water conveyance structures on City parcels upstream of the City street rights-of-way.
- Ensure compliance with the NPDES permit for the MS4, issued to the City by the RWQCB. Compliance requires that the City:
  - provide public education and outreach to change public behavior and reduce overall pollutant discharge,
  - establish and enforce requirements for new and re-development projects to implement best management practices (BMPs) that reduce pollutant generation and discharges to the maximum extent practicable,
  - inspect and enforce industrial and commercial operations to ensure that they are implementing required BMPs, including maintenance of structural BMPs,
  - inspect and enforce the maintenance of structural treatment control BMPs on properties (residential, commercial, industrial, public) where such BMPs were required under the new and/or redevelopment program,
  - inspect and enforce the implementation of BMPs on construction projects,

  - inspect and enforce public violations of municipal codes and ordinances,
  - monitor discharges and receiving waters at select locations,
  - coordinate the implementation of municipal BMPs by other City divisions and departments, and
  - develop and implement plans (e.g., treatment control BMPs) for complying with TMDL regulations within City-incorporated areas as they are adopted by the RWQCB.
- Conduct the following additional activities from time to time, as needed:
  - review the water quality sections of California Environmental Quality Act documents,
  - provide support for special cleanup and abatement orders issued by the RWQCB for discharges of pollutants through the City's assets, and
  - participate in the development of public policy at the state or local level regarding water quality regulations.

The Division owns and/or manages a number of different types of "assets." The storm drain system is one of the largest assets. The City's storm drain system is composed of built structures, including inlets, pipes, culverts, brow ditches, swales, pump stations, low flow diversions, and outfalls. These built structures have defined lives and replacement costs, and are required to achieve specified service levels to adequately convey storm flows and manage flood risk within the City.

However, the NPDES compliance responsibilities suggest that the Division manages more than the storm drain system. In order to achieve NPDES compliance, the Division must manage public behavior and relationships, regulatory relationships, monitoring equipment, ordinances and land development standards, the quality of water running into and out of the City's storm drain system, and the quality of water in the receiving water bodies. The Division must also manage the storm drain system so that it does not contribute to water pollution.

To capture the assets that the Division must manage in order to fulfill its responsibilities, the assets have been categorized into three groups (asset types):

- human-made hard assets
- natural assets
- human-made soft assets

**Hard Assets** are the storm drain system and equipment greater than $5,000 in replacement cost. These assets are generally purchased or constructed, have defined lives, and can be replaced. The $5,000 or greater replacement cost requirement for equipment is a simplification step for tracking and managing hard assets that can have a significant budgetary impact. Smaller items are generally not managed as individual assets.

**Natural assets** are those things the Division must manage, but are not human made. They include receiving waters, runoff and discharges, City parcels, and multi-habitat planning areas (MHPAs). These

are naturally occurring things that the City must manage to comply with its NPDES permit, other requirements or, in some cases, provide opportunity for additional flood risk or water quality mitigation. In the case of City parcels and MHPAs, these are City-owned lands or lands the City may make use of that provide opportunity for water capture and water quality improvement, and that can be used as assets in the City's toolbox for achieving TMDL and NPDES compliance. City right-of-way is another asset that provides opportunity for water capture and water quality improvement through the implementation of Green Streets. Right-of-way will be captured in future updates to the plan.

**Soft assets** are those things that the Division must manage, are human made, but are not constructed or purchased outright. They do not have defined lives, although they can deteriorate to states that do not provide needed LOS. They do not have a defined replacement cost, but they do have defined costs to build them up and to continue to operate and maintain them. Soft assets include such items as City department behavior, public behavior, policies, ordinances, requirements, and regulatory relationships.

Figure 2-1 shows the three asset types identified above and their associated asset classes.

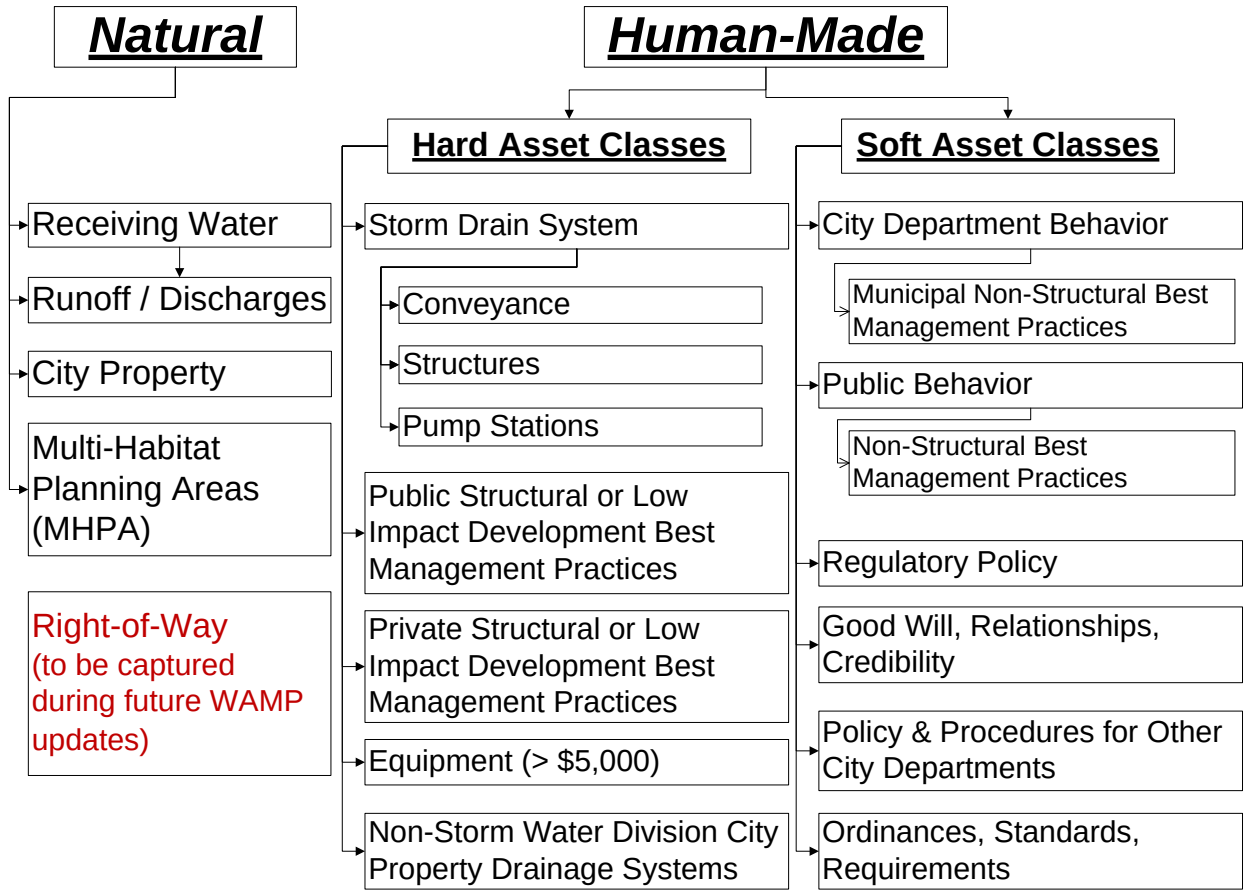


**Figure 2-1. Asset Classifications**

## 2.1 ASSET HIERARCHY

Some asset classes contain large numbers of assets while other classes may only have few assets. To effectively organize these assets into manageable units, they were put into a functional- and location-based asset hierarchy. An asset hierarchy provides a structured framework for organizing assets in an asset register. It has a structured relationship to allow consistent roll up / roll down of data. With an asset hierarchy, the Division will be able to easily identify, locate, and organize assets. The asset hierarchy also allows the Division to present asset and financial information at any level of the hierarchy. It provides a powerful structure for making management decisions (e.g., cost, condition, risk, capital needs) within the watershed, Hydrologic Unit (HU), Hydrologic Area (HA), and Hydrologic Subarea (HSA), and mainstem outfall drainage area. The mainstem outfall drainage area is where a network of storm drain pipes discharges into receiving water through one mainstem storm drain outfall. These areas vary in size, but consist of the smallest reasonable management unit for a set of assets that can be evaluated for its ability to meet flood risk reduction requirements within that catchment area, and NPDES compliance requirements within that reach of receiving water.

Figure 2-2 shows the Division asset hierarchy. As represented by the hierarchy, some assets are tracked at the Division level (e.g., regulatory policy, monitoring equipment), while others are tied to a specific watershed, HU, HA, HSA, or mainstem outfall drainage area.

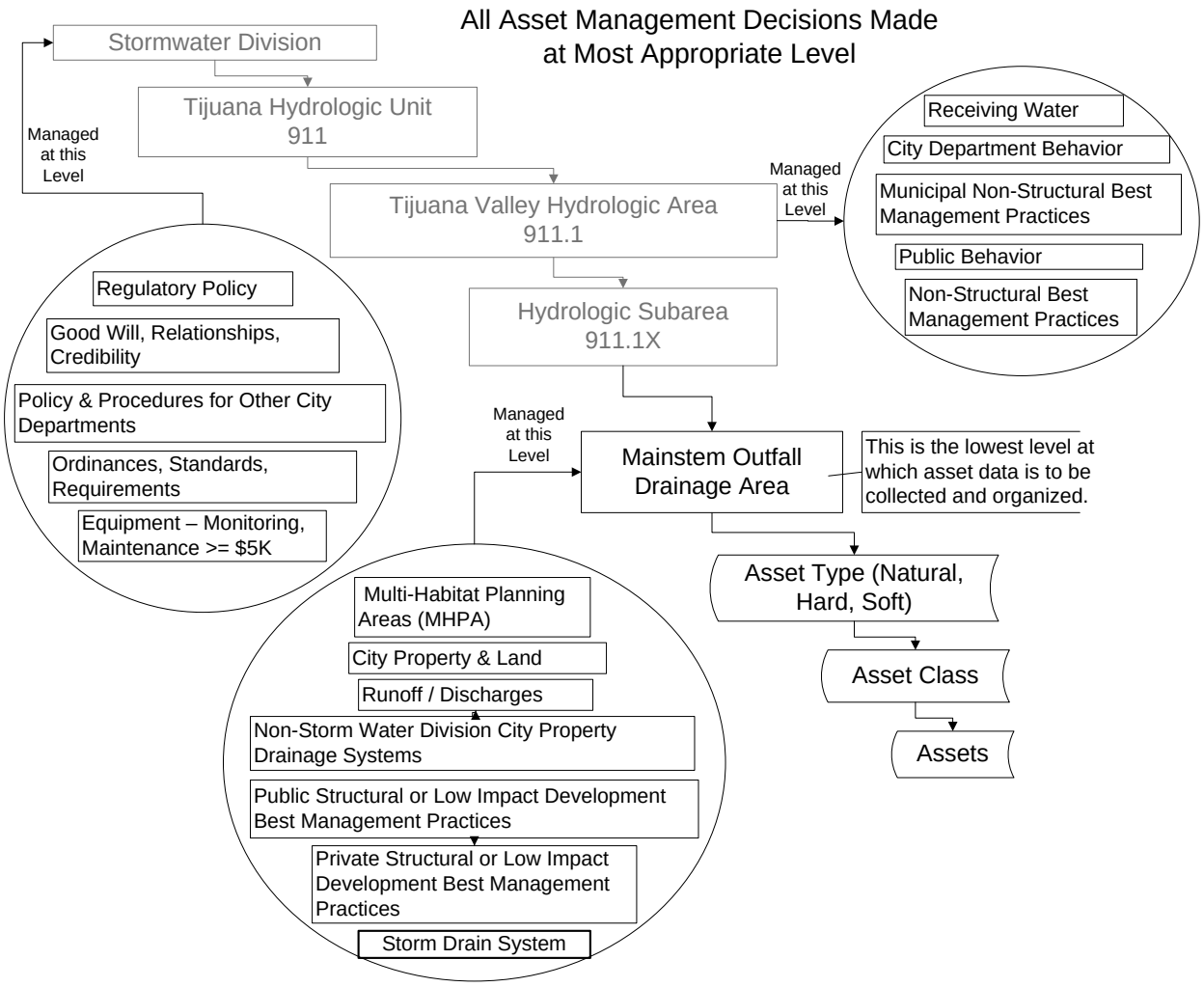


**Figure 2-2. Asset Hierarchy**

As represented by the asset hierarchy, assets can be managed efficiently at any level. This enables the Division to assess conditions, performance, and valuation at any level of the hierarchy. More importantly, the hierarchy establishes an organized structure to track costs (e.g., O&M, capital, monitoring). These costs will allow the Division to understand the true cost of providing the LOS. Some watersheds may not require the same level of effort to achieve a given LOS. Therefore, the resources devoted to an activity that manages a particular asset within one watershed may differ from other watersheds. In the appendices, the specific assets for each watershed are identified.

## 2.2 DATA SOURCES AND ASSET INVENTORY METHOD

The following data sources were used to develop the asset register.

- Applications that manage hard asset data such as storm drains, channels, inlets (i.e., City Geo-SAP system).
- California State Water Resources Control Board (SWRCB) receiving-water GIS data for HUs, HAs, and HSAs.
- RWQCB GIS data for watershed management areas (WMAs) as defined in the NPDES permit.
- San Diego county-wide GIS data for general mapping information, such as City boundary data, streets, and land uses.
- San Diego County parcel data for MHPAs, City parcels, and non-City parcels.
- Division BMP inspection database for City-owned structural treatment control BMPs.
- Tacit knowledge of Division staff regarding the condition of assets, areas where flooding occurs, achievement of levels of service, cost projections for additional actions to achieve levels of service, consequence of failure, probability of failure, and other needed asset condition information.
- Phase I and Phase II Comprehensive Load Reduction Plans (CLRPs) produced by City and County of San Diego (County) consultants that presented BMP opportunities for TMDL compliance.

The methods used to inventory assets largely involved collecting raw data from the City or other databases, followed by conducting interviews with Division staff. Where available, condition assessment data was also used. Ultimately, additional condition assessment data will be used to refine the WAMPs.

## 2.3 ASSET SUMMARY

The Division owns and/or manages a number of different types of assets. To capture the assets that the Division must manage in order to fulfill its responsibilities, the assets have been categorized into three groups (asset types):

- human-made hard assets
- natural assets
- human-made soft assets

Presented in the next subsections is a summary of the assets managed across the City by the Division.

### 2.3.1 Hard Assets

Table 2-1 summarizes the hard assets in each watershed owned or managed by the Division.

**Table 2-1. Summary of Hard Assets**

| Asset Class | Asset Type | Watershed | Quantity[1] |
|---|---|---|---|
| Conveyance System | Box Culvert | San Diego Bay | 350 (9.83 miles) |
| | | San Diego River | 93 (5.66 miles) |
| | | Mission Bay | 76 (2.50 miles) |
| | | Los Peñasquitos | 51 (1.04 miles) |
| | | San Dieguito | 42 (1.04 miles) |
| | | Tijuana River | 89 (2.90 miles) |
| | | **Total** | **701 (22.97 miles)** |
| | Brow Ditch | San Diego Bay | 71 (1.59 miles) |
| | | San Diego River | 23 (0.84 miles) |
| | | Mission Bay | 5 (0.09 miles) |
| | | Los Peñasquitos | 102 (3.72 miles) |
| | | San Dieguito | 68 (2.97 miles) |
| | | Tijuana River | 2 (0.17 miles) |
| | | **Total** | **271 (9.38 miles)** |
| | Channel | San Diego Bay | 356 (32.35 miles) |
| | | San Diego River | 494 (38.30 miles) |
| | | Mission Bay | 330 (21.66 miles) |
| | | Los Peñasquitos | 402 (21.64 miles) |
| | | San Dieguito | 152 (9.27 miles) |
| | | Tijuana River | 107 (9.23 miles) |
| | | **Total** | **1,841 (132.45 miles)** |
| | Storm Drain | San Diego Bay | 10,458 (253.56 miles) |
| | | San Diego River | 5,852 (152.84 miles) |
| | | Mission Bay | 6,086 (162.88 miles) |
| | | Los Peñasquitos | 10,660 (262.25 miles) |
| | | San Dieguito | 2,728 (68.07 miles) |
| | | Tijuana River | 1,804 (44.01 miles) |
| | | **Total** | **37,585 (943.61 miles)** |

**Table 2-1. Summary of Hard Assets**

| Asset Class | Asset Type | Watershed | Quantity[1] |
|---|---|---|---|
| Structures | Cleanout | San Diego Bay | 2,538 |
| | | San Diego River | 1,326 |
| | | Mission Bay | 1,286 |
| | | Los Peñasquitos | 3,578 |
| | | San Dieguito | 857 |
| | | Tijuana River | 594 |
| | | **Total** | **10,179** |
| | Inlet | San Diego Bay | 6,628 |
| | | San Diego River | 3,578 |
| | | Mission Bay | 3,613 |
| | | Los Peñasquitos | 5,775 |
| | | San Dieguito | 1,445 |
| | | Tijuana River | 955 |
| | | **Total** | **21,994** |
| | Energy Dissipator | San Diego Bay | 137 |
| | | San Diego River | 54 |
| | | Mission Bay | 44 |
| | | Los Peñasquitos | 346 |
| | | San Dieguito | 113 |
| | | Tijuana River | 82 |
| | | **Total** | **776** |
| | Headwall | San Diego Bay | 779 |
| | | San Diego River | 709 |
| | | Mission Bay | 588 |
| | | Los Peñasquitos | 1,080 |
| | | San Dieguito | 375 |
| | | Tijuana River | 244 |
| | | **Total** | **3,775** |
| | Low Flow Diversion Structure | San Diego Bay | 0 |
| | | San Diego River | 0 |
| | | Mission Bay | 63 |
| | | Los Peñasquitos | 0 |
| | | San Dieguito | 0 |

**Table 2-1. Summary of Hard Assets**

| Asset Class | Asset Type | Watershed | Quantity[1] |
|---|---|---|---|
| | | Tijuana River | 1 |
| | | **Total** | **64** |
| | Outlet | San Diego Bay | 1,667 |
| | | San Diego River | 1,166 |
| | | Mission Bay | 1,120 |
| | | Los Peñasquitos | 794 |
| | | San Dieguito | 367 |
| | | Tijuana River | 282 |
| | | **Total** | **5,396** |
| | Spillway | San Diego Bay | 12 |
| | | San Diego River | 22 |
| | | Mission Bay | 22 |
| | | Los Peñasquitos | 20 |
| | | San Dieguito | 7 |
| | | Tijuana River | 12 |
| | | **Total** | **123** |
| | Tidegate | San Diego Bay | 1 |
| | | San Diego River | 1 |
| | | Mission Bay | 8 |
| | | Los Peñasquitos | |
| | | San Dieguito | |
| | | Tijuana River | |
| | | **Total** | **10** |
| | Pump Station Assets (Components > $5,000) | San Diego Bay | 198 |
| | | San Diego River | 38 |
| | | Mission Bay | 80 |
| | | Los Peñasquitos | |
| | | San Dieguito | |
| | | Tijuana River | |
| | | **Total** | **316** |
| | Structural BMPs | San Diego Bay | **8** |
| | | San Diego River | |
| | | Mission Bay | **2** |

**Table 2-1. Summary of Hard Assets**

| Asset Class | Asset Type | Watershed | Quantity[1] |
|---|---|---|---|
| | | Los Peñasquitos | **5** |
| | | San Dieguito | |
| | | Tijuana River | |
| | | **Total** | **15** |

[1] The number of asset types is dependent on the hierarchy in which the asset is being managed. Assets managed at the mainstem outfall drainage area level will likely have large numbers of assets, whereas, assets managed at the watershed level will have a single asset.

In future revisions to this WAMP, the Structural BMPs listed below should be added to the hard asset inventory; these BMPs are in process of being designed and constructed.

- One Vegetated Swale, George L Stevens Senior Center, Project ID 982, APN 5494201700
- Four Vegetated Swales, Breen Park, Project ID 857, APN 3183122700
- One Vegetated Swale, Camino Ruiz Neighborhood Park, Project ID 140, APN 3090409100
- BMP TBD, Hilltop Community Park Expansion, Project ID 1001, APN 3120303000
- BMP TBD, Memorial Skateboard Park, Project ID 984, APN 5455920100
- Two Vegetated Swales, Otay Mesa/Nestor Library Expansion, Project ID 859, APN 6304314800
- BMP TBD, Cesar Chavez Community Park, Project ID TBD, APNs 6650640100, 6662100300, 6662100400, 6662101300.

### 2.3.2 Soft Assets

Table 2-2 summarizes the soft assets in each watershed owned or managed by the Division. These represent non-constructed elements that the Stormwater Division staff must manage in order to achieve levels of service.

**Table 2-2. Summary of Soft Assets**

| Asset Class | Asset Description | Watershed | Quantity[1] |
|---|---|---|---|
| City owned non structural BMPs | Non Structural BMPs implemented by the City that improve water quality for TMDL and NPDES compliance. | San Diego Bay Watershed | 1 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 1 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **6** |
| Non City owned non | Non Structural BMPs implemented by the | San Diego Bay Watershed | 1 |

**Table 2-2. Summary of Soft Assets**

| Asset Class | Asset Description | Watershed | Quantity[1] |
|---|---|---|---|
| structural BMPs TMDL | private parties or other non-City parties that improve water quality for TMDL compliance. | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 1 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **6** |

**Table 2-2. Summary of Soft Assets**

| Asset Class | Asset Description | Watershed | Quantity[1] |
|---|---|---|---|
| Public Pollution Prevention Behavior | Public behavior related to the discharge of pollutants to lands, receiving waters, and watersheds. | San Diego Bay Watershed | 1 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 1 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **6** |
| City Department Cooperation | The behavior of other City departments and storm water division sections with respect to coordinating between each other for project development and implementation. This asset is the relationship between City departments and the storm water division and within sections of the storm water division. If the relationship achieves the level of service, then projects are coordinated to take advantage of water quality and flood risk management improvement opportunities when done by non-stormwater departments. Additionally, the storm water sections also coordinate on projects to ensure that a flood risk management project evaluates water quality opportunities and a water quality project evaluates flood risk management opportunities. | San Diego Bay Watershed | 1 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 1 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **6** |
| City Department Compliance Behaviors TMDL | City departments comply with TMDL requirements. | San Diego Bay Watershed | 1 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 1 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **6** |

**Table 2-2. Summary of Soft Assets**

| Asset Class | Asset Description | Watershed | Quantity[1] |
|---|---|---|---|
| Ordinances standards and requirements TMDL | Ordinances, standards and requirements that relate to TMDL compliance requirements. | San Diego Bay Watershed | 1 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 1 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **6** |
| Land Development Regulations TMDL | Land Development Regulations that related to TMDL compliance requirements. | San Diego Bay Watershed | 1 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 1 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **6** |
| Regulatory Policy Basin Plan | Regulatory Policy associated with establishing beneficial uses and water quality objectives in the water quality control plan (basin plan) that are reflective of local uses. | San Diego Bay Watershed | 1 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 1 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | **Tijuana River Watershed** | **1** |
| | | **Total** | **6** |

**Table 2-2. Summary of Soft Assets**

| Asset Class | Asset Description | Watershed | Quantity[1] |
|---|---|---|---|
| Good will relationships credibility public City performance | Good will, relationships, and credibility with the public regarding the performance of the City with respect to management of flood risk and water quality. | San Diego Bay Watershed | 1 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 1 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **6** |
| Policy Procedures for other City Departments responsiveness | Policies and procedures that relate to responding to information regarding flooding, illicit discharges, and other water quality and flood issues. | San Diego Bay Watershed | 1 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 1 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **6** |
| City department behavior water department | City department behavior of the water department with respect to developing storm water harvesting opportunities that would benefit water supply as well as water quality. | San Diego Bay Watershed | 1 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 1 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **6** |
| City department behavior land use | City department behavior regarding use of city parcels for capturing storm water for use or treatment. | San Diego Bay Watershed | 1 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 1 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **6** |

**Table 2-2. Summary of Soft Assets**

| Asset Class | Asset Description | Watershed | Quantity[1] |
|---|---|---|---|
| Good will Relationships Credibility public permitting | Good will, relationships and credibility with the public regarding harvesting storm water for use. | San Diego Bay Watershed | 1 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 1 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **6** |
| Good will Relationships Credibility stakeholder permitting | Good will, Relationships, Credibility with stakeholders regarding permitting city projects, particularly flood risk management and water quality projects. | San Diego Bay Watershed | 1 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 1 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **6** |
| Storm water Use External Policy | Policies adopted by California, San Diego County, and other applicable regulatory agencies that relate to the use of harvested storm water | San Diego Bay Watershed | 1 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 1 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **6** |
| Regulatory Permitting Policies maintenance | Policies adopted by California, San Diego County, and other applicable regulatory agencies that relate to providing permits for storm drain, channel, and flood system maintenance work | San Diego Bay Watershed | 1 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 1 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **6** |

**Table 2-2. Summary of Soft Assets**

| Asset Class | Asset Description | Watershed | Quantity[1] |
|---|---|---|---|
| Regulatory Permitting Policies capital improvements | Policies adopted by California, San Diego County, and other applicable regulatory agencies that relate to providing permits for storm drain, channel, and flood system capital improvement work | San Diego Bay Watershed | 1 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 1 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **6** |
| Good will Relationships Credibility stakeholders permitting maintenance | Good will Relationships Credibility with stakeholders with respect to permitting maintenance | San Diego Bay Watershed | 1 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 1 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **6** |
| Good will Relationships Credibility stakeholders permitting capital improvement | Good will Relationships Credibility with stakeholders with respect to permitting capital improvements | San Diego Bay Watershed | 1 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 1 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **6** |
| City department behavior storm drain maintenance | City department behavior with respect storm drain maintenance on those city parcels | San Diego Bay Watershed | 1 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 1 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **6** |

**Table 2-2. Summary of Soft Assets**

| Asset Class | Asset Description | Watershed | Quantity[1] |
|---|---|---|---|
| Regulatory Policy enforcement | Regulatory policy associated with enforcement of permit and TMDL requirements. | **San Diego Bay Watershed** | **1** |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 1 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **6** |
| City Department Compliance Behaviors NPDES | City departments comply with NPDES requirements. | San Diego Bay Watershed | 1 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 1 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **6** |
| Public Behavior NPDES | Public Behavior with respect to the City's NPDES | San Diego Bay Watershed | 1 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 1 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **6** |
| Non City owned non-structural BMPs NPDES | Non Structural BMPs implemented by the private parties or other non-City parties that improve water quality for NPDES compliance. | San Diego Bay Watershed | 1 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 1 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **6** |

**Table 2-2. Summary of Soft Assets**

| Asset Class | Asset Description | Watershed | Quantity[1] |
|---|---|---|---|
| Policy Procedures for other City Departments storm drain maintenance NPDES | Policy Procedures for other City Departments with respect to storm drain maintenance as required by NPDES | San Diego Bay Watershed | 1 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 1 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **6** |
| Policy Procedures for other City Departments NPDES | Policy Procedures for other City Departments with respect to all requirements for NPDES | San Diego Bay Watershed | 1 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 1 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **6** |
| Ordinances standards and requirements NPDES | Ordinances standards and requirements with respect to NPDES requirements | San Diego Bay Watershed | 1 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 1 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **6** |
| Land Development Regulations NPDES | Land Development Regulations with respect to NPDES requirements | San Diego Bay Watershed | 1 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 1 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **6** |

**Table 2-2. Summary of Soft Assets**

| Asset Class | Asset Description | Watershed | Quantity[1] |
|---|---|---|---|
| Good will relationships credibility public City water quality performance | Good will, relationships, and credibility with the public regarding the performance of the City with respect to management of water quality. | San Diego Bay Watershed | 1 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 1 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **6** |
| Ordinances standards and requirements public approval | Ordinances standards and requirements with respect to public approval of those ordinances | San Diego Bay Watershed | 1 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 1 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **6** |

[1] The number of asset types is dependent on the hierarchy in which the asset is being managed. Assets managed at the mainstem outfall drainage area level will likely have large numbers of assets, whereas, assets managed at the watershed level will have a single asset.

### 2.3.3 Natural Assets

Table 2-3 summarizes the natural assets in each watershed owned or managed by the Division.

**Table 2-3. Summary of Natural Assets**

| Asset Class | Asset Description | Watershed | Quantity[1] |
|---|---|---|---|
| Runoff/Discharges | Monitoring activities to prioritize pollutant sources and measure effects of BMPs on runoff/discharge water quality | San Diego Bay Watershed | 2 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 3 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **9** |
| Runoff/Discharges | CLRP BMPs to improve quality and/or quantity of urban runoff and discharges (i.e., dry weather runoff discharges) | San Diego Bay Watershed | 2 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 3 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 0 |
| | | Tijuana River Watershed | 0 |
| | | **Total** | **7** |
| Runoff/Discharges | CLRP BMPs to improve quality and/or quantity of storm water runoff (i.e., wet weather runoff discharges) | San Diego Bay Watershed | 2 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 3 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 0 |
| | | Tijuana River Watershed | 0 |
| | | **Total** | **7** |
| Receiving Waters | Monitoring studies to assess appropriate modifications to beneficial uses and water quality objectives | San Diego Bay Watershed | 2 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 3 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **9** |

**Table 2-3. Summary of Natural Assets**

| Asset Class | Asset Description | Watershed | Quantity[1] |
|---|---|---|---|
| MHPAs | MHPAs | San Diego Bay Watershed | 2 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 3 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **9** |
| City Property | City parcels | San Diego Bay Watershed | 2 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 3 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **9** |
| Runoff/Discharges | Monitoring per Permit requirements | San Diego Bay Watershed | 2 |
| | | San Diego River Watershed | 1 |
| | | Mission Bay Watershed | 3 |
| | | Los Peñasquitos Watershed | 1 |
| | | San Dieguito Watershed | 1 |
| | | Tijuana River Watershed | 1 |
| | | **Total** | **9** |

[1] The number of asset types is dependent on the hierarchy in which the asset is being managed. Assets managed at the mainstem outfall drainage area level will likely have large numbers of assets, whereas, assets managed at the watershed level will have a single asset.

# SECTION 3 ASSET MANAGEMENT COSTS / PROGRAM FUNDING REQUIREMENTS: "WHAT IS IT 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.

Hard assets in the asset register were assigned an estimated replacement cost. The replacement cost was estimated based on what it might cost to replace the asset in today's (2013) dollars. Pipe replacement costs were calculated using pricing attributes of material, diameter, and length. The complete data availability for drainage systems supports the attribute-driven valuation methodology. However, a similar valuation methodology could not be implemented for structures and channels. The limited availability of supporting data attributes led to developing a more simplistic "unit price" approach. For example, regardless of an inlet's size, location and type, inlets were assigned a unit replacement cost (i.e., $20,000). Moving forward, this valuation process will be improved as better data becomes available.

The replacement cost of channels was determined based on recent channel replacement work. The total cost of the project was represented as the cost per linear foot. This replacement cost then was applied to the total length of the channel. The limited supporting data attribute availability, along with other potential environmental (e.g., concrete channel to natural) and social (e.g., acquisition of private land for right-of-way and capacity increase) considerations, led to the development of a simpler replacement cost determination approach. Moving forward, as the supporting data attributes become available, the channel replacement cost methodology can be improved.

For current O&M costs for hard assets, the Division's budgets were used to estimate the O&M costs for each asset type. For soft and natural assets the ongoing and projected O&M lifecycle costs were estimated. These costs may fluctuate based on the asset criticality and type. For capital and additional O&M costs for soft assets (e.g., building up program elements to respond to future flood risk management and compliance needs), staff input was used regarding the number of full-time equivalents (FTEs), professional services, or other costs that would be required. For estimating TMDL compliance costs, a cost model was developed using the Phase I and Phase II CLRPs as the basis for the costs. Section 7 describes the detailed cost assumptions, models developed, and methods used.

A summary of the Division's estimated hard asset replacement costs are provided in Figure 3-1. Based on the hard asset inventory summarized and the estimated replacement cost of each asset, the replacement cost in 2013 dollars of the Division's hard assets is approximately $3,487M. Figure 2-3 also presents the

overall hard asset replacement costs by watershed. Detailed hard asset replacement cost data for each watershed are presented in Section 3 of each Appendix and the database used to collect and analyze the data for the preparation of the WAMPs.

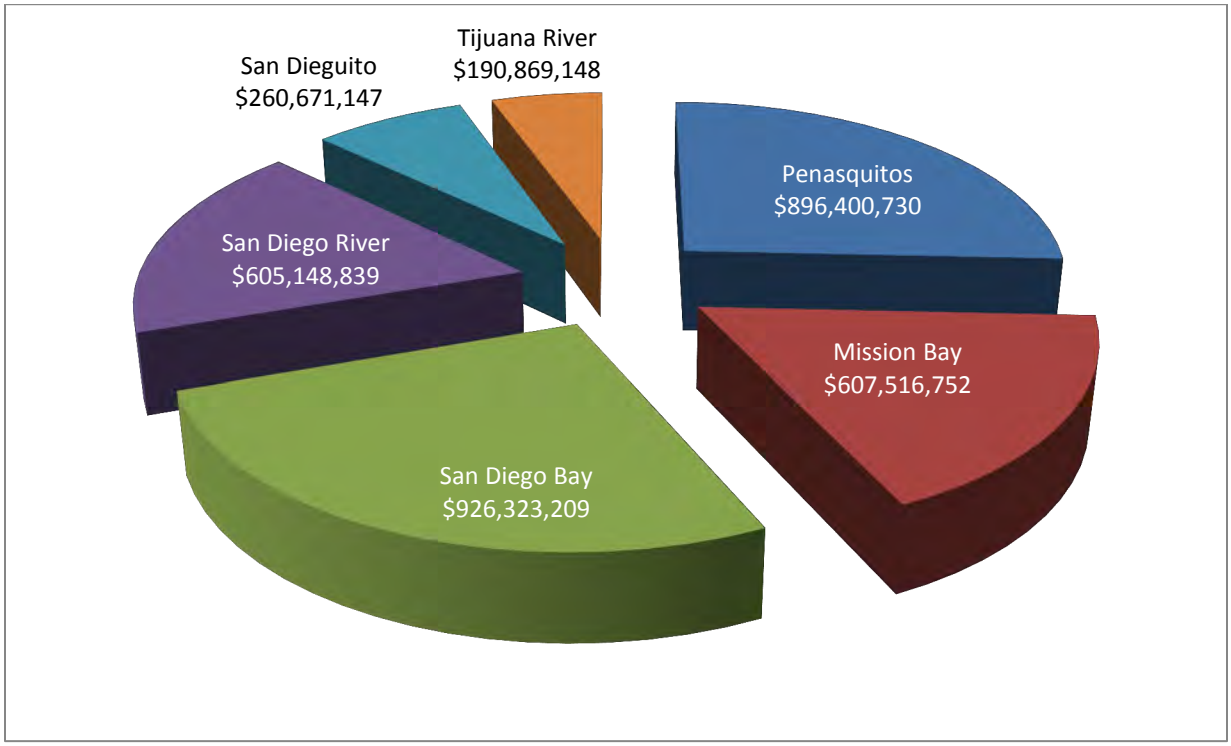


**Figure 3-1. Total Hard Asset Replacement Costs by Watershed**

# SECTION 4 WHAT IS ITS CONDITION?

A condition assessment is the technical review of the physical condition of an asset that uses an organized method to assist in decision-making regarding capital renewal and O&M programs. It provides the most up-to-date and accurate look at the asset's current status. The Division has implemented numerous condition assessment programs to perform condition assessment for various hard asset classes, notably storm drain pipes, outfalls, and pump stations. The condition assessment methodologies ranged from field inspections (e.g., closed circuit television [CCTV] inspections) to conducting 'Delphi' workshops with key members of the O&M staff. Delphi workshops use the process of iterative, independent questioning of a panel of experts to assess the timing, probability, significance and implications of factors, trends and events in the relation to the problem being considered.

A condition assessment is time- and resource-intensive process. As such, it is expensive. A significant financial investment is required to conduct condition assessments. However, in some cases, it may not be necessary. In order to cost effectively and efficiently assess the current conditions and identify areas where assets may be damaged or failing, a risk-based condition assessment approach was used. The Division's condition assessment methodology was based on a multi-step approach (Level 1, Level 2, and Level 3). This multi-stepped approach is illustrated in Figure 4-1 below.

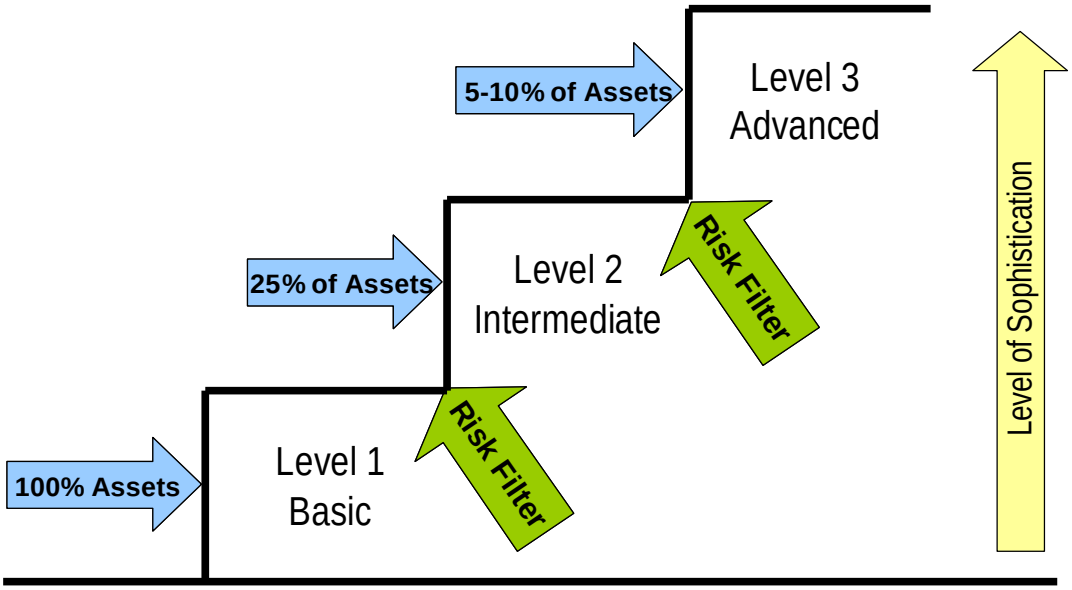


**Figure 4-1. Risk-Based Condition Assessment Methodology**

At the basic level (Level 1), the idea is to identify assets that are in poor condition and pose the greatest risk to the Division without undertaking field evaluations. Capitalizing on the engineering and field staff's historical and current knowledge of the storm drainage system, a high-level assessment is conducted to capture known conditions (e.g., assets already failing, known problematic areas, and historical condition data). Where condition data are not available, a statistical deterioration modeling process is used to estimate the condition. The deterioration modeling processes use asset attributes (e.g., year installed, type, useful life), decay curves, and staff knowledge to estimate a condition for the asset.

After the Level 1 condition assessment is completed, a risk assessment is performed. Section 6 introduces the risk methodology used to prioritize the Division's assets and projects.

At Level 2, assets are subjected to more detailed investigation (e.g., CCTV inspection). The assets that might require further analysis are recommended for an advanced level (Level 3) assessment. The risk-based condition assessment methodology will allow the Division to efficiently and effectively develop a justifiable and prioritized condition assessment schedule. Not all assets need to be inspected (e.g., low risk assets). The justification being, even with a failure, those assets pose very low risk to the City. The Division's limited resources and budget are better spent focusing on assets presenting the greater risk. The condition assessment methodology builds on the Division staff's knowledge to optimize the condition assessment process and minimize the overall cost and risk to the Division.

In most cases, the field inspection strategy incorporated a sampling approach (e.g., not all drainage pipes were inspected). A sample area, identified as the most problematic, was inspected and the condition information learned was applied to other similar assets. Problematic areas were chosen because they require the most immediate attention. Where no condition information was available, an age-based estimation was performed. The age-based approach uses the asset's useful life and establishes a condition score based on the remaining useful life. Figure 4-2 shows the relationship between condition and remaining useful life. The relationship between condition and age is based on the decay pattern of the asset. For example, Linear (0.74) was used to represent the decay pattern for structure assets.

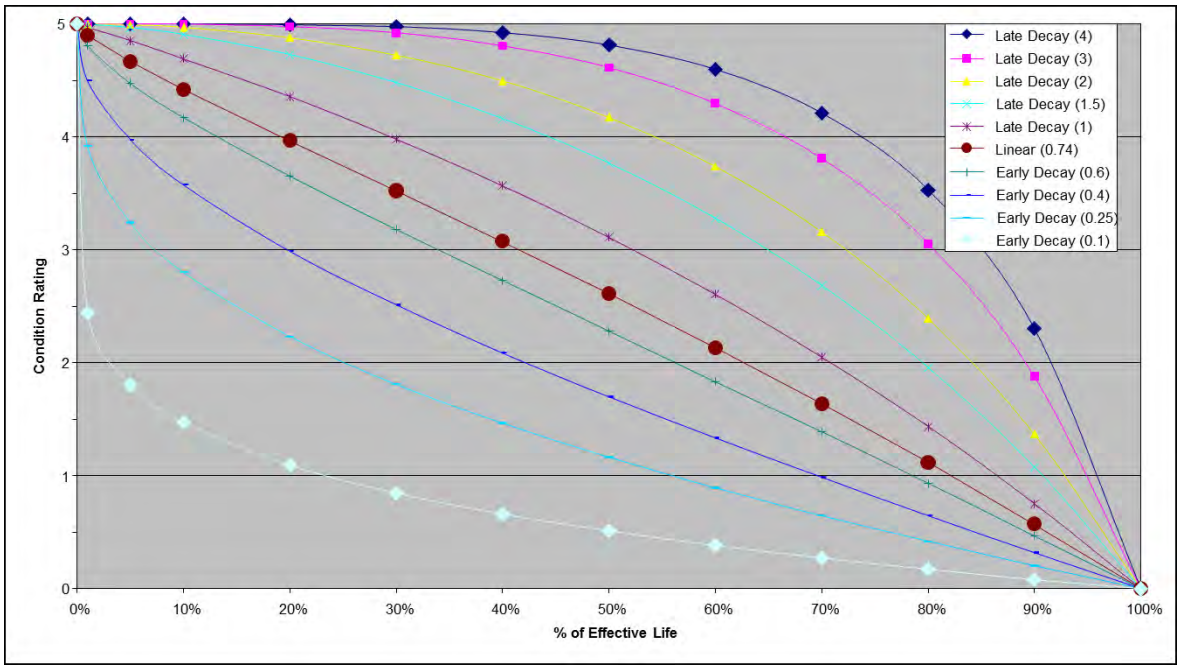


**Figure 4-2. Condition versus Age Relationship**

Using best available data, the Division's reinforced concrete pipe condition results are presented in Figure 4-3. The severity of the pipe condition is represented by the respective color (e.g., good in green, poor in red). The results indicate a heavy concentration of pipes in poor condition in downtown San Diego, as well as in the Old Town and Up Town areas. The results aligned with staff knowledge, as the areas identified are one of the San Diego's earliest development.

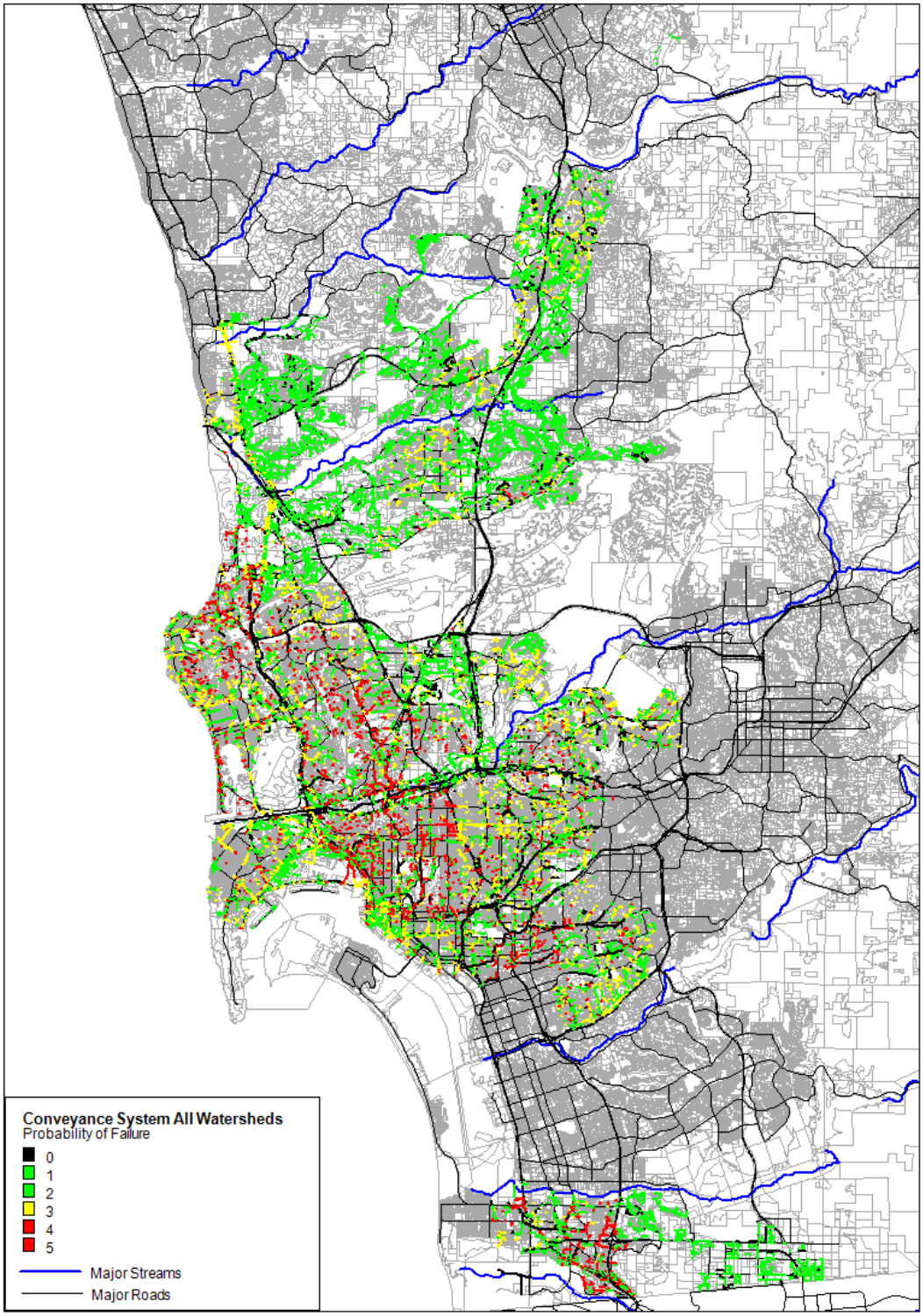


**Figure 4-3. Condition of Reinforced Concrete Pipes (All Watersheds)**

Condition assessment results for pump stations are summarized in Figure 4-4 below. During the pump station asset inventory workshop, key field personnel were asked to rate the condition of each asset using a set condition assessment scale. Much of this knowledge was based on a pump station assessment that was conducted in 2011. This resulted in a general capture of staff knowledge and helped to highlight assets in poor condition.

The results are grouped into three categories (good in green, poor in red, average in yellow). The results indicate that a large number of pump station assets (pump station components with replacement costs greater than$5,000) are in the 3 to 1 condition range. The results also indicate that Pump Stations C, F, and H will soon require several replacement and/or refurbishment activities. It is recommended that the Division inspects the condition 5 assets to verify their condition. When verified, the Division should plan to conduct a CIP project to renew the asset.

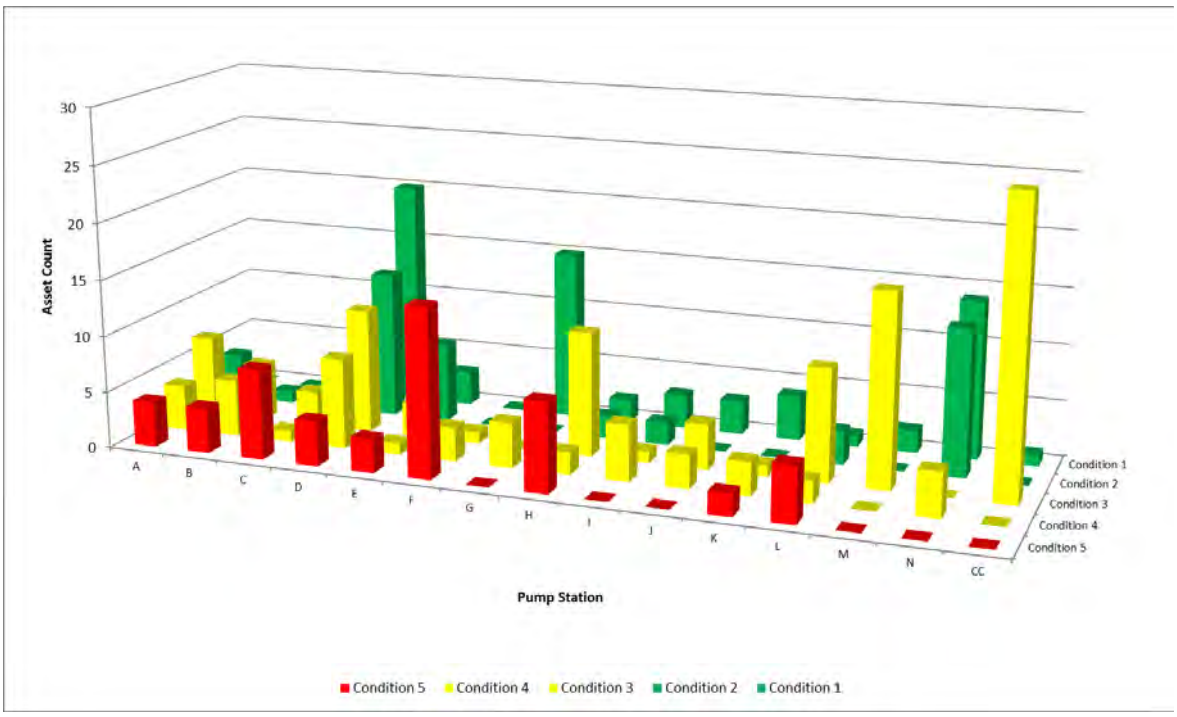


**Figure 4-4. Condition Assessment Results for Pump Station Components**

During the time this 2013 WAMP was being prepared, a condition assessment of the City's outfalls was in process. Results of the outfall condition assessment should be incorporated into future WAMP updates. A detailed condition assessment for each watershed is presented in Section 4 of each Appendix.

The condition of soft and natural assets was also assessed. The condition was assigned based on the Division staff's perception of the ability of the asset to achieve its LOS(s). As with hard assets, the condition results are grouped into three categories good (green), average (yellow), and poor (red). Results of the condition of soft and natural assets are presented in Figures 4-5 and 4-6, respectively.

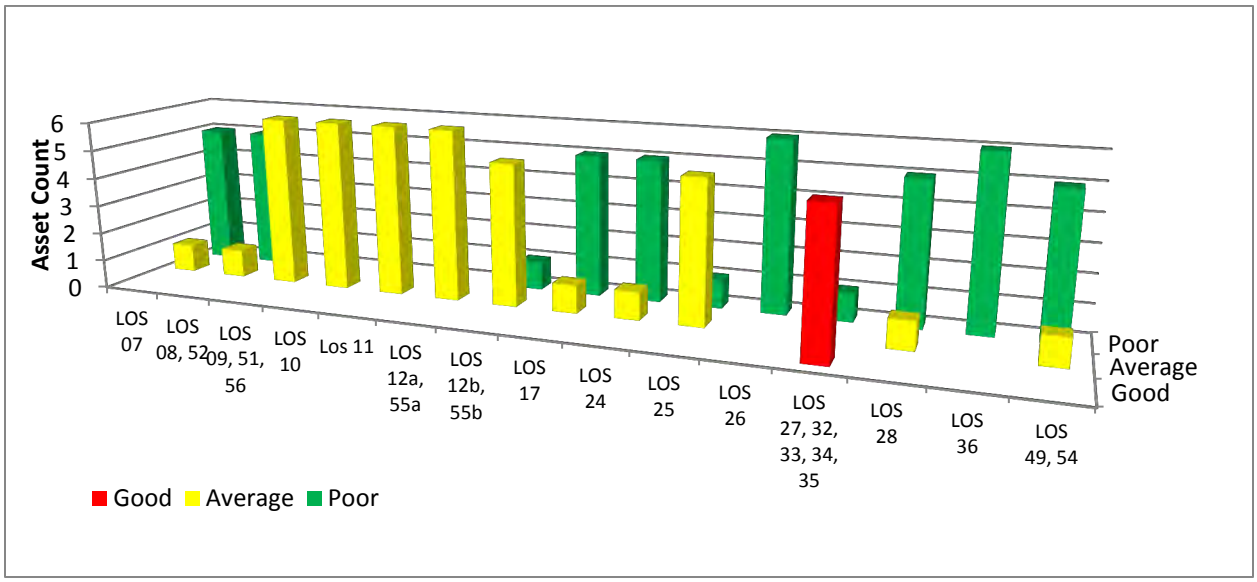


**Figure 4-5. Condition Assessment Results for Soft Assets**

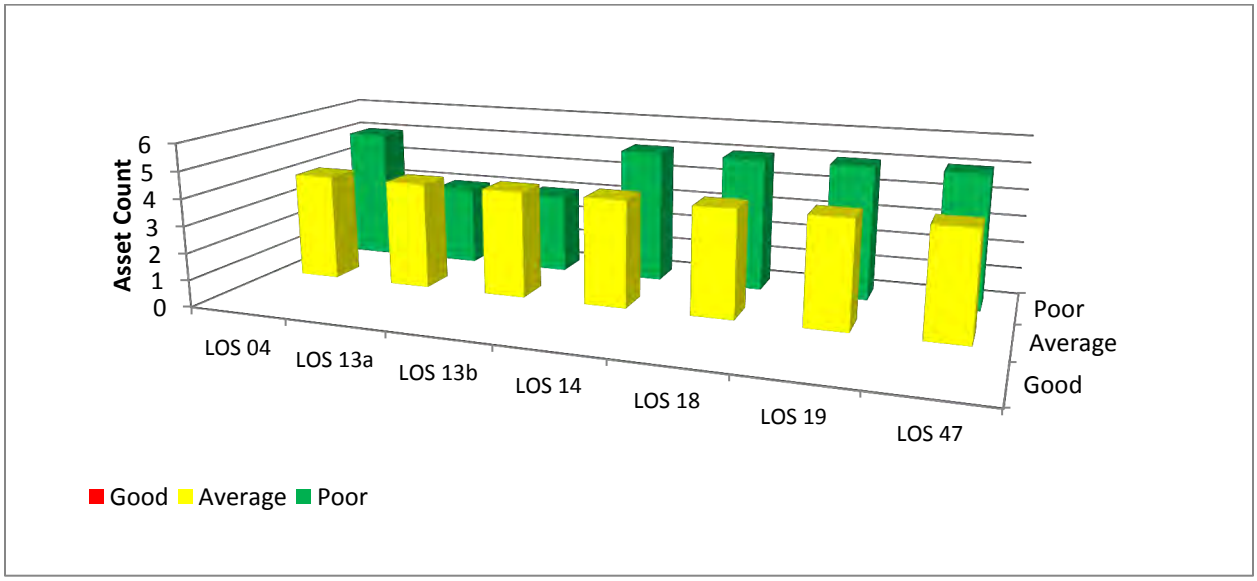


**Figure 4-6. Condition Assessment Results for Natural Assets**

# SECTION 5 WHAT NEEDS TO BE DONE?

Each asset is managed to achieve one or more specified LOS. The LOS is generally what the regulators require and what the citizens' desire. It is a balance between citizen desires, citizen willingness to bear costs, and the City's risk tolerance (Figure 5-1).

**Figure 5-1. Levels of Service**

LOS were developed for each of the Division's asset class. Each LOS is derived from one of five general goals (Figure 5-2). The goals align with flood risk management and NPDES compliance, as shown in Figure 5-2. Note that some goals overlap the NPDES compliance and flood risk management goals. The goal identified as Restore and Maintain Clean Beaches, Streams and Bays (Goal A), when achieved, will result in NPDES compliance and also maintenance of adequate capacity in flood risk management channels that are also receiving waters (by removing debris). Managing storm water as a resource will result in both NPDES compliance and flood risk management.

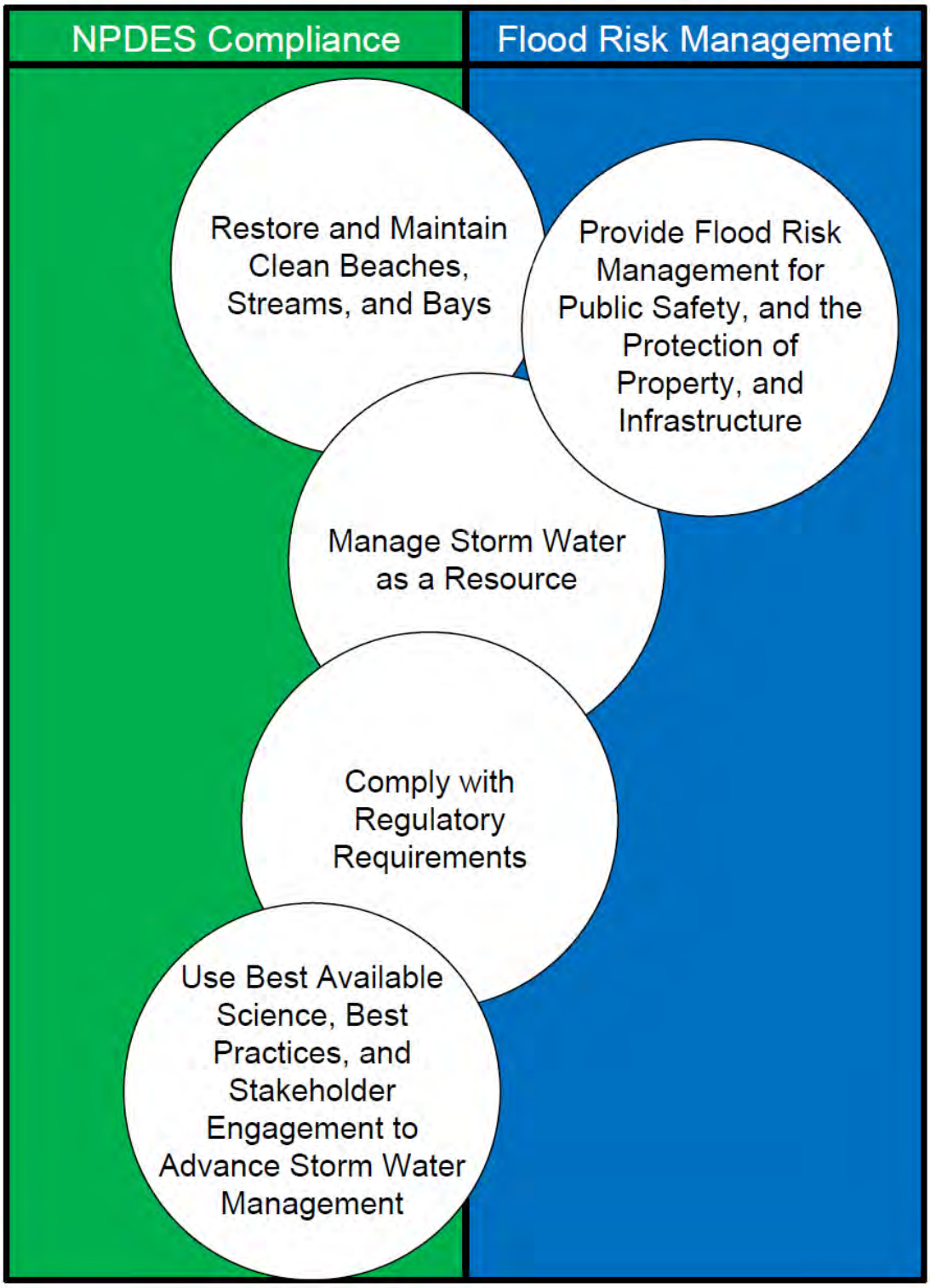


**Figure 5-2. Alignment of Goals with NPDES Compliance and Flood Risk Management**

Using best available science, best practices, and stakeholder engagement to advance storm water management will result in NPDES compliance and, at times, flood risk management. It will result in flood risk management when best available science allows for channel maintenance to occur without causing adverse impacts to other beneficiaries of the receiving water.

The assets are managed by the Division to achieve LOS that result in the achievement of the goals. The assets were segregated into primary and secondary LOS. Primary LOS are those that directly achieve one of the five goals. Secondary LOS are those that achieve a primary LOS. Table 5-1 shows the LOS that were developed for each asset class, how they relate to their specific secondary assets, and how they relate to the primary asset and its LOS. These LOS were developed through a series of workshops with Division staff and approved by the Division Deputy Director. These LOS should be re-evaluate from time-to-time to ensure they reflect current regulatory requirements and the citizens' desire. The appendices present information regarding whether the assets are achieving their specified LOS, when they will fail to achieve their LOS, and what actions are needed for the assets to achieve their LOS. In some cases, the LOS refer to a schedule contained in the WAMP. For these situations, the schedule is documented in the supporting WAMP database (i.e., TEAMPlan). Specifically, schedules for specific actions to achieve the LOS can be interpreted as the times when costs are incurred to perform operation and maintenance activities or when there is a capital expenditure.

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**Table 5-1. Levels of Service**

| Goal | Primary Asset | Primary LOS | Asset Class | Asset Type | Secondary LOS |
|---|---|---|---|---|---|
| Restore and Maintain Clean Beaches, Streams, and Bays | Receiving Water | Receiving water quality achieves waste load allocations for current and future TMDLs within implementation schedules. | Public Structural or LID BMPs | Hard | 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. |
| | | | | | 02. Maintenance activities, in conjunction with other BMPs in the watershed, will achieve pollutant load reductions (or waste load allocations for current and future TMDLs) that modeling predicts. |
| | | | Private Structural or LID BMPs | Hard | 03. Private structural BMPs will 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. |
| | | | Runoff / Discharges | Natural | 04. Monitoring activities will allow pollutant sources to be prioritized and measure effects of BMPs on runoff / discharge water quality. |
| | | | Equipment – (monitoring equipment ≥ $5K) | Hard | 05, 06, 48. Sufficient equipment is available 90% of the time to conduct monitoring activities. |
| | | | Equipment – (maintenance equipment ≥ $5K) | Hard | 06, 31, 39, 42. Sufficient equipment is available 90% of the time to conduct maintenance activities. |
| | | | Public Non-structural BMPs | Soft | 07. Public non-structural BMPs, in conjunction with other BMPs in the watershed, will achieve pollutant load reductions (or waste load allocations for current and future TMDLs) that modeling predicts. |
| | | | Private Non-structural BMPs | Soft | 08, 52. Private non-structural BMPs will 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 and permit requirements. |

**Table 5-1. Levels of Service**

| Goal | Primary Asset | Primary LOS | Asset Class | Asset Type | Secondary LOS |
|---|---|---|---|---|---|
| Restore and Maintain Clean Beaches, Streams, and Bays | Receiving Water | Receiving water quality achieves waste load allocations for current and future TMDLs within implementation schedules. | 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%. |
| | | | City Department Behavior | Soft | 10. Intra- and inter-departmental coordination and collaboration on water quality and flood risk management activities. Refer to LOS 1, 2, 7, 29, 30, 32, 33, 34, 35, 36, 37, 38, 40, 41, 43, 45, 50, and 53. |
| | | | | | 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. |
| | | | 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. |
| | | | Land Development Regulations | Soft | 12b, 55b. The ordinances, standards, and requirements that the City requires for activities in the City show that measureable reductions in pollutant loads are being achieved that make measurable progress toward meeting waste load allocations for current and future TMDLs and permit requirements. |
| | | | 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). |

**Table 5-1. Levels of Service**

| Goal | Primary Asset | Primary LOS | Asset Class | Asset Type | Secondary LOS |
|---|---|---|---|---|---|
| **Restore and Maintain Clean Beaches, Streams, and Bays 'Cont.'** | Receiving Water | Receiving water quality achieves waste load allocations for current and future TMDLs within implementation schedules. | 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). |
| **Use Best Available Science, Best Practices, and Stakeholder Engagement to Advance Storm Water Management** | Regulator Policy | Regulator actions direct City to achieve beneficial uses and water quality objectives in receiving waters that are based on actual uses of waters demanded by majority of citizens, when accounting for costs, and water quality objectives that science shows to protect those uses. | 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. |
| | | | Equipment – (monitoring equipment ≥ $5K) | Hard | 15. Sufficient equipment is available 90% of the time to conduct monitoring activities. |
| | Good will, Relationships, Credibility | Public perception shows approval ratings of City's water quality and flood risk management greater than 66%. | 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. |

**Table 5-1. Levels of Service**

| Goal | Primary Asset | Primary LOS | Asset Class | Asset Type | Secondary LOS |
|---|---|---|---|---|---|
| Manage Storm Water as a Resource | Runoff / Discharges | Storm water runoff is captured for beneficial use when the project costs meet the formula of being less than or equal to the costs of developing an alternative local water resource (recycled water or ocean desalination) plus the costs of treating the runoff to meet storm water quality management requirements. | MHPAs | Natural | 18. Where costs meet the formula, runoff is treated, stored and/or infiltrated within the MHPAs within the timeframes identified within the Watershed Asset Management Plan. |
| | | | City Property | Natural | 19. Where costs meet the formula, runoff is treated, stored and/or infiltrated within the City Parcels within the timeframes identified within the Watershed Asset Management Plan. |
| | | | 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 WAMP. |
| | | | 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 WAMP. |
| | | | 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 timeframes identified in each WAMP. |
| | | | D/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 WAMP. |
| | | | 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 Division is responsible for infrastructure associated with NPDES compliance (i.e., storm water capture, containment or infiltration). |
| | | | | | 25. Other City departments cooperate by allowing the use of its parcels to capture, infiltrate, and / or store storm water for beneficial use. |

**Table 5-1. Levels of Service**

| Goal | Primary Asset | Primary LOS | Asset Class | Asset Type | Secondary LOS |
|---|---|---|---|---|---|
| **Manage Storm Water as a Resource 'Cont."** | Runoff / Discharges | Storm water runoff is captured for beneficial use when the project costs meet the formula of being less than or equal to the costs of developing an alternative local water resource (recycled water or ocean desalination) plus the costs of treating the runoff to meet storm water quality management requirements. | Good Will, Relationships, Credibility | Soft | 26. Survey instruments show 66% or greater public acceptance of storm water harvesting for non-potable use. |
| | | | | | 27, 32, 33, 34, 35. Projects are not stopped by stakeholders or regulators through effective coordination and communication. |
| | | | Regulatory Policy | Soft | 34. Coordinate with stakeholders on channel maintenance projects. |

**Table 5-1. Levels of Service**

| Goal | Primary Asset | Primary LOS | Asset Class | Asset Type | Secondary LOS |
|---|---|---|---|---|---|
| Provide Flood Risk Management for Public Safety, and the Protection of Property, and Infrastructure | Storm Drain System | Channels have capacity to convey 100 year storm | Channels | Hard | 33. Regulators permit channel capacity improvement projects in an efficient, economical, and environmentally sensitive manner. |
| | | | | | 30. Channels are inspected annually. Channels that have capacities of less than 80% - 90% of the total design capacity are maintained to maximize conveyance capacity and reduce flood risks. |
| | | | Equipment – (maintenance equipment ≥ $5K) | Hard | 31. Sufficient equipment is available 90% of the time to conduct maintenance activities. |
| | | | 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. |
| | | Pipes/structures have the capacity to convey 50-year storm flows | Pipes and Structures | Hard | 37. Where under capacity, pipes/structures are improved within timeframes identified in each WAMP. |
| | | | | | 38. Pipes/structures are maintained annually or according to schedules in the WAMP to maximize design capacity and reduce flood risks. |
| | | | Equipment – (maintenance equipment ≥ $5K) | Hard | 39. Sufficient equipment is available 90% of the time to conduct maintenance activities. |
| | | Pump stations have the capacity to pump 100% of the design flow with dependability that keeps the pump station's business risk exposure less than 30% of maximum. | Pump Stations | Hard | 40. Where under capacity, pump stations are improved within timeframes identified in each WAMP. |
| | | | | | 41. Pump stations are maintained annually or according to schedules identified in the WAMP to function as designed. |
| | | | Equipment – (maintenance equipment ≥ $5K) | Hard | 42. Sufficient equipment is available 90% of the time to conduct maintenance activities. |

**Table 5-1. Levels of Service**

| Goal | Primary Asset | Primary LOS | Asset Class | Asset Type | Secondary LOS |
|---|---|---|---|---|---|
| Comply with Regulatory Requirements | Regulatory Policy | City Receives no Notices of Violation | Storm Drain System | Hard | 43. The storm drain system is mapped and updated per permit requirements. |
| | | | | | 44. Pipes/structures are maintained annually to meet flood risk management and water quality requirements. |
| | | | Public Structural or LID BMPs | Hard | 45. Public structural and LID BMPs for CIP projects are installed per permit requirements. |
| | | | Private Structural or LID BMPs | Hard | 46. Private structural and LID BMPs are installed and maintained per permit requirements. |
| | | | Runoff / Discharges | Natural | 47. Monitoring is completed per permit requirements. |
| | | | Equipment – (monitoring equipment ≥ $5K) | Hard | 48. Sufficient equipment is available 90% of the time to conduct monitoring activities. |
| | | | City Department Behavior | Soft | 49, 54. Other City departments comply with their responsibilities per the permit requirements congruent with policies and procedures. |
| | | | Non-SW Division City Property Drainage Systems | Hard | 50. Public non-structural BMPs are implemented per permit requirements. |
| | | | Policies and Procedures for other City Departments | Soft | 53. Storm drain systems on City property are maintained per permit requirements. |

**Acronyms/Abbreviations:**

BMP – best management practices
CIP – capital improvement program
City – City of San Diego
LID – low impact development
LOS – level of service
MHPA – Multi-Habitat Planning Area
NPDES – National Pollution Discharge Elimination System
SW – storm water
TMDL – total daily maximum load
WAMP – watershed asset management plan

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# SECTION 6 WHEN DO WE NEED TO DO IT?

Once the conditions of the assets have been determined, and an assessment of the actions needed for the assets to achieve their LOS has been completed, it is necessary to evaluate the criticality of the assets and the priority of the actions necessary to achieve their LOS. It is generally infeasible to complete necessary actions simultaneously and bring assets up to their LOS in a short time frame. Therefore, a risk-based approach to prioritizing and scheduling actions is taken.

## 6.1 RISK

Each asset represents a particular risk to the Division, characterized as a business risk exposure (BRE). As defined by Equation 1, BRE is the product of the probability of failure (PoF) and the consequence of failure (CoF). The PoF measures the timing to an asset failure (mortality, capacity, financial, or LOS). The CoF measures the impact of asset failure with respect to the triple-bottom-line (economic, social, and environmental) perspective.

$$BRE = PoF \ x \ CoF \qquad \text{Equation 1}$$

The four modes of asset failures are presented in Table 6-1.

**Table 6-1. Modes of Failure**

| Failure Mode | Definition | Tactical Aspects | Management Strategy |
|---|---|---|---|
| *Capacity* | Volume of demand exceeds design capacity | Growth, system expansion | Redesign |
| *Level of Service* | Functional requirements exceed design capacity | Codes and permits, regulations, safety, citizen demands | Operations and maintenance optimization, renewal, upgrade, add |
| *Mortality* | Consumption of the asset reduces performance below acceptable level | Physical deterioration due to age, usage | Operations and maintenance optimization, renew, replace |
| *Financial Efficiency* | Costs exceed that of feasible alternatives | Pay-back period | Replace |

The logic used to assign a PoF score to each asset type is summarized in Table 6-2. The PoF scores range from 1 to 5. Table 6-2 shows the logic for assigning the lowest and highest PoF scores. If an asset has multiple modes of failure, the mode of failure with the highest PoF prevails.

**Table 6-2. PoF Logic**

| PoF | Failure Modes Considered | | | |
|---|---|---|---|---|
| | **Mortality** | **Capacity** | **LOS** | **Financial Efficiency** |
| **Hard Assets:** | | | | Historical maintenance costs for the asset is not available. |
| PoF = 5 | Failing asset | Under capacity | Not meeting LOS | |
| PoF = 1 | New assets | Meeting capacity | Meeting LOS | |
| | | | | |
| **Soft and Natural Assets:** | | | | |
| PoF = 5 | N/A | Under capacity | Not meeting LOS | |
| PoF = 1 | N/A | Meeting capacity | Meeting LOS | |

The other element of the BRE equation is CoF. Figure 6-1 depicts the triple bottom line in a graphic form.

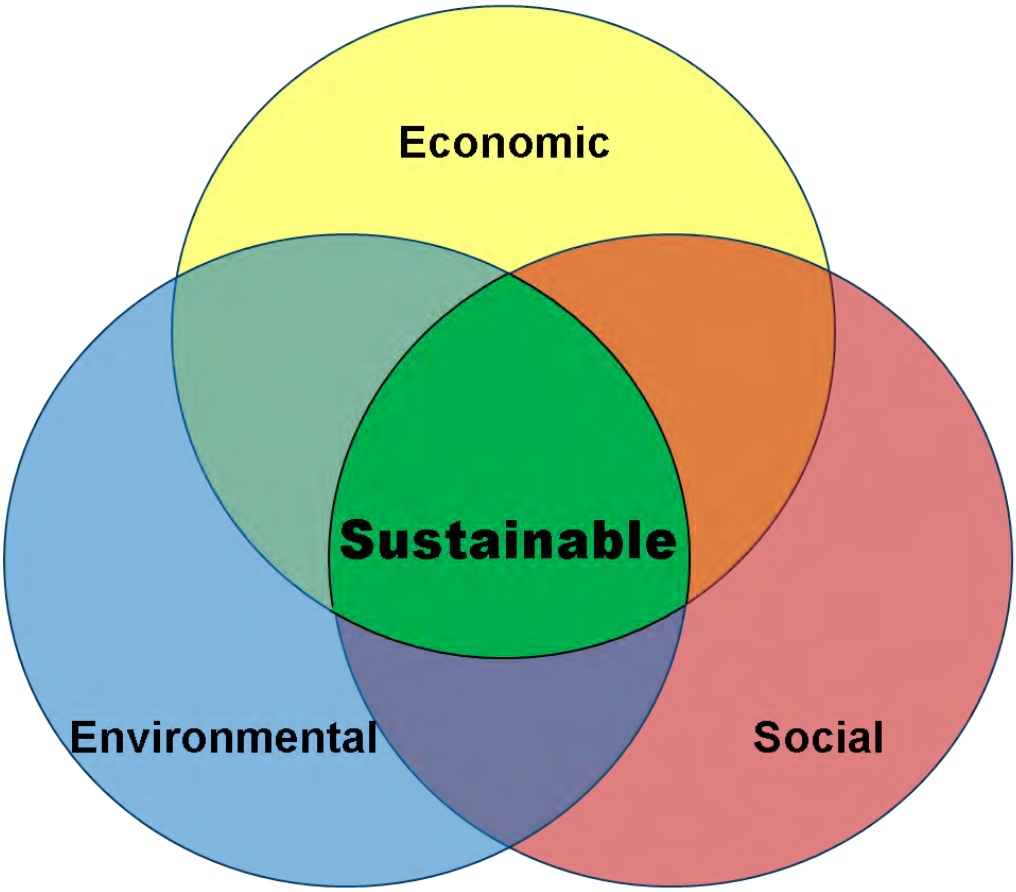


**Figure 6-1. Triple Bottom Line**

Using the triple-bottom-line approach makes projects sustainable in that the decisions made in selecting and developing projects, prioritizing investments, and developing actions are less likely to be resisted, and more likely to be funded, maintained, and used. For this WAMP, a balanced approach was used to weight the environmental, social, and economic consequences of failure. Each of these three major evaluation criteria was subdivided into two more evaluation criteria. Two environmental criteria, two social criteria, and two economic criteria were identified against which the consequences of failure were evaluated. Table 6-3 lists the evaluation criteria and their definitions.

**Table 6-3. Definitions of Consequence of Failure Categories**

| Category | Subcategory | Description |
|---|---|---|
| Social | Public Perception | Public perception of City's performance declines. This includes external or non-quantifiable potential economic costs associated with a decline in public perception of City performance. |
| | Public Health and Safety | Injuries, death, or property damage occurs. This includes external or non-quantifiable potential economic costs associated with increased health or safety risks to citizens. |
| Environmental | Regulatory | Regulators take action. This includes external or non-quantifiable economic costs associated with a deterioration in trust of the regulators for which the City is taking appropriate actions to achieve compliance with a permit that is not explicit. |
| | Environmental Quality | Measurements of environmental quality show declines (e.g. ecosystem health declines, standards are no longer met). This includes external or non-quantifiable economic costs associated with a degrading or degraded environmental quality or condition. Such economic costs could include reduction in property values, reductions in tourism, loss of jobs, and resulting reductions in tax revenues. |
| Economic | Short-term Financial | Fines, settlements. |
| | Long-term Financial | Increased regulatory compliance costs, increased City of San Diego Storm Water Division requirements, increased costs to rebuild public trust, capital outlays, and for other reasons. |

Each of the subcategories was weighted to account for its relative importance within the major categories. Each major category was given the same weight. Table 6-4 shows the relative weights assigned to the CoF for each subcategory and major category.

**Table 6-4. CoF Category Weights**

| Category | Sub-Category | Weight | | % Overall Weight |
|---|---|---|---|---|
| Social | Public Perception CoF | 1 | 0.2 | 6.67 |
| | Public Health & Safety CoF | | 0.8 | 26.67 |
| Environmental | Regulatory CoF | 1 | 0.7 | 23.33 |
| | Environmental Quality CoF | | 0.3 | 10.00 |
| Economic | Short Term Financial CoF | 1 | 0.6 | 20.00 |
| | Long Term Financial CoF | | 0.4 | 13.33 |
| Sum of Weights | | 3 | 3 | 100 |

**Acronym:**
CoF – consequence of failure

A CoF score of 1 to 5 was assigned to each subcategory. This CoF was multiplied by the weight to achieve the overall weight percentage. The ultimate CoF could range from 3 to 15. For example, if the public perception of an asset failure would result in significant press coverage and pressure on elected officials, it was assigned a CoF of 5 for that category. That would be multiplied by 0.2 and then added to the CoF multiples for the other categories.

Due to the large number of assets, the CoF for hard assets is calculated using a systematic GIS-based approach that incorporates triple-bottom-line elements. The methodology also considers the previous Risk Assessment methodology adopted by the Division (Water Research Centre's Sewer Rehabilitation Manual-SRM based method).

Specifically, the Repair Cost Factor (RCF) from the Pipeline Condition Assessment Strategy and Renewal Forecast, Appendix C, dated June 30, 2010 was used as one of the subcategory in Economic (SRM) and adding several new CoF elements to reflect the triple bottom line approach used in soft and natural assets.

Using the same triple-bottom-line approach, and considering additional information extracted from GIS, Table 6-5 summarizes the CoF components and over weight for hard assets. Main components in social and economic category consist of zoning and road class. Zoning consists of five different areas such as public services, business, airport and major tourist attractions, and schools. Road class consists of different types of roads such as freeway, prime arterial, major arterial, collector, local collector, and local street.

**Table 6-5. Hard Asset CoF Components**

| Category | Subcategory | Subcategory Weight | Components | Components Weight | Overall Weight |
|---|---|---|---|---|---|
| Social | Public Perception CoF | 0.2 | Zoning:<br>• Public services (Hospital, Fire Stations, Law Enforcement)<br>• Business Zone<br>• Airport and Major Tourist Attractions<br>• School Zone | 1 | 0.067 |
| | Public Health and Safety CoF | 0.8 | Zoning:<br>• Public services (Hospital, Fire Stations, Law Enforcement)<br>• Business Zone<br>• Airport and Major Tourist Attractions<br>• School Zone | 0.5 | 0.133 |
| | | | Road Class:<br>• Freeway/Freeway Ramp<br>• Prime Arterial<br>• Major Arterial<br>• Collector<br>• Local Collector<br>• Local Street | 0.5 | 0.133 |
| Environmental | Regulatory CoF | 0.7 | Regulatory | 1 | 0.233 |
| | Environmental Quality CoF | 0.3 | Open Water | 0.33 | 0.033 |
| | | | Environmental Quality | 0.33 | 0.033 |
| | | | Environmentally Sensitive Area | 0.33 | 0.033 |
| Economic | Short-term Financial CoF | 0.6 | Repair Cost Factor | 0.3 | 0.060 |
| | | | Road Class | 0.25 | 0.050 |
| | | | Canyon location | 0.25 | 0.050 |
| | | | 36" or larger size | 0.2 | 0.040 |
| | Long-term Financial CoF | 0.4 | Long term economic consequences | 1 | 0.133 |
| Sum of Weights | | 3 | | | 1.000 |

Repair Cost Factors (RCF) for pipelines is calculated based on depth, size, and soil type (see Table 6-6 below). Soils were assumed to be "good soil" (for construction purposes), unless they were within 20 feet of a creek or other water body. Note that for any pipes larger than 36 inches were also subject to a higher consequence of failure in regards to short-term economic impacts.

**Table 6-6. Repair Cost Factor**

| Small-diameter Pipes (diameter ≤12") | | | | Large-diameter Pipes (diameter >12") | | | |
|---|---|---|---|---|---|---|---|
| Bad Soil | | Good Soil | | Bad Soil | | Good Soil | |
| RCF | Depth | RCF | Depth | RCF | Depth | RCF | Depth |
| 1.5 | 3-6 ft | 1 | 3-6 ft | 5.5 | 3-6 ft | 4 | 3-6 ft |
| 2.5 | 6-9 ft | 2 | 6-9 ft | 9 | 6-9 ft | 7 | 6-9 ft |
| 3.5 | 9-12 ft | 3 | 9-12 ft | 16 | 9-12 ft | 13 | 9-12 ft |
| 5 | 12-15 ft | 4 | 12-15 ft | 24 | 12-15 ft | 19 | 12-15 ft |
| 6.5 | 15-18 ft | 5.5 | 15-18 ft | 31 | 15-18 ft | 26 | 15-18 ft |
| 8.5 | 18-21 ft | 7 | 18-21 ft | 40 | 18-21 ft | 33 | 18-21 ft |

**Acronyms:**
ft – feet
RCF – repair cost factor

Overall, after multiplying the PoF with CoF, a BRE could range from 3 to 75, with 75 representing the highest BRE score. Figure 6-2 shows the BRE matrix. The assets in the upper right quadrant (D) have the highest PoF and CoF scores. These assets need immediate attention, and as such, resources should be prioritized accordingly. Quadrant (A) represents the area where assets have a low PoF and low CoF failure. Resources can be diverted from these assets to because of the low consequence of failure. As assets are managed using this approach, they will ultimately plot along a band that reaches from the upper left quadrant (B) to the lower right quadrant (C). The appendices present the BRE scores for the different assets as they relate to LOS, capacity, or mortality failure modes.

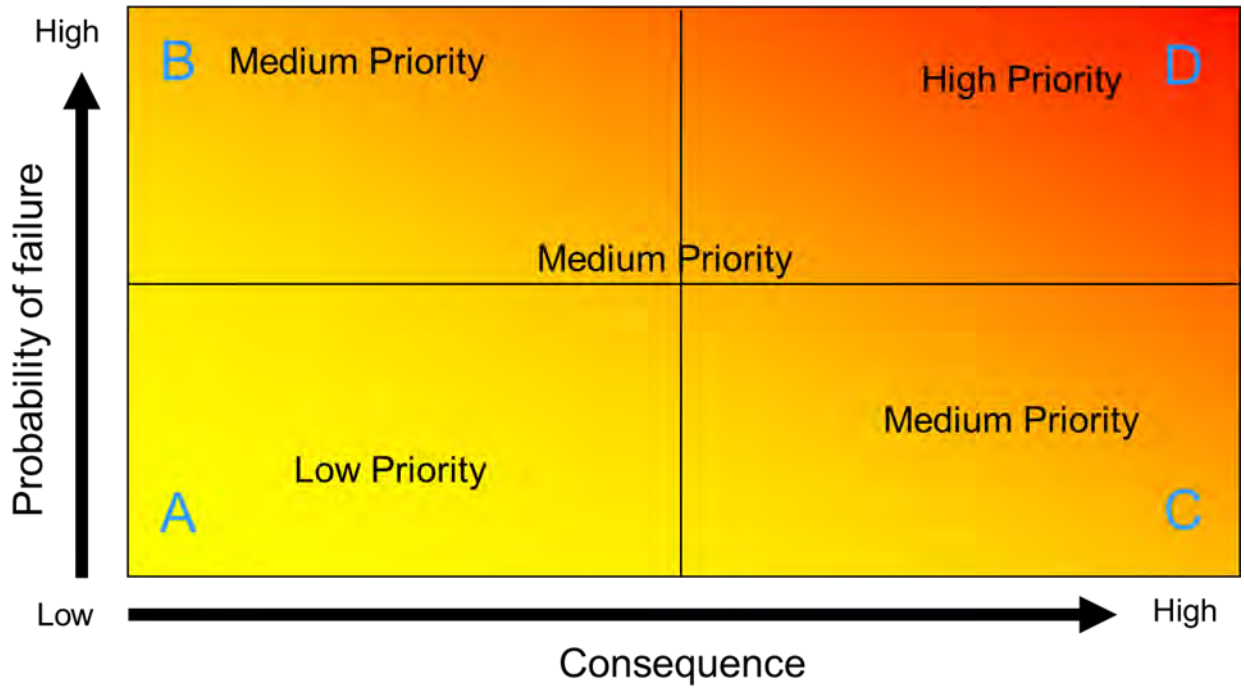


**Figure 6-2. BRE Plot**

## 6.2 EXPECTED USEFUL LIFE FOR DIFFERENT ASSET TYPES

Soft and natural assets generally exist indefinitely, although their performance may be significantly below their LOS. For the hard assets, the expected service life depends on the material of which the asset was constructed. Table 6-7 lists the useful lives for different asset classes.

**Table 6-7. Asset Useful Lives**

| Asset Class | Useful Life |
|---|---|
| **Soft Assets** | Indefinite |
| **Natural Assets** | Indefinite |
| **Hard Assets** | |
| **Culvert** | |
| Concrete | 100 years |
| **Drain-Circular** | |
| Metal | 35 years |
| Concrete | 100 years |
| Plastic | 100 years |
| **Open Conveyance System** | |
| **Channel-Circular** | |
| Concrete | 100 years |
| **Channel-Trapezoidal** | |
| Concrete | 100 years |
| Earth | 100 years |
| **Brow Ditch** | |
| Concrete | 100 years |
| Inlet (including catch basins / manholes) | 100 years |
| Cleanout | 100 years |
| Outlet | 100 years |
| Energy Dissipator (Rip Rap and Concrete) | 30 years |
| Spillway | 50 years |
| Tidegate | 20 years |
| Low Flow Diversion Structure | 40 years |
| Structural BMPs | 25 years |

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# SECTION 7 HOW MUCH WILL IT COST?

This section documents the amount of investment required to meet and maintain the LOS for the Division's storm water infrastructure system. In this section, the long-range investment projection for hard, soft and natural assets is presented.

## 7.1 PROBABLE COST ESTIMATION METHODOLOGY

Projections have been developed of probable costs for the actions identified to manage assets to achieve specified LOS. In general, two types of costs exist for which projections are provided, as described below.

- **Operations and Maintenance:** Costs that are incurred each year. This includes O&M of hard assets and operational costs for ongoing actions associated with managing soft and natural assets to achieved LOS.
- **Capital:** Costs that are incurred one time. This includes the following cost categories:
  - costs pertaining to planning, permitting, design, construction, and commissioning of new or replaced hard assets
  - costs pertaining to planning, permitting, design, construction, and commissioning of hard asset replenishment/refurbishment projects (e.g., rebuilding a pump),
  - costs pertaining to development of program elements for achieving LOS with soft and natural assets, and
  - costs pertaining to planning studies (e.g., drainage master planning) and other one-time costs that need to be spent to achieve any LOS, improve capacity, or replace/renew an asset.

  Note that planning and some permitting costs may be budgeted as part of an operating budget and not as part of a capital budget within the Division. It is recommended that future WAMPs make that distinction and account for cost in the appropriate category.

The projected opinions of costs were developed using different methods, depending on the type of asset and the types of actions specified. Table 7-1 describes the estimation methods for the different types of assets/actions.

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**Table 7-1. Opinion of Probable Cost Projection Methods Employed**

| Asset/Action Type | Opinion of Probable Cost Projection Method | |
|---|---|---|
| All Assets - Current O&M | FY 2014 budgets with staff input regarding division of budgets into asset categories where feasible. | |
| Hard Assets – Future Capital Costs<br><br>Hard Assets – Future Operations and Maintenance | LOS 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. | Standard construction unit costs for asset classes were provided by the Division staff. These costs were based on the Division's recent projects and procurement. The estimated costs included, among others, planning, design, and construction. This replacement cost methodology is applied to the following asset classes:<br>• Culvert<br>• Storm Drain<br>• Brow Ditch<br>• Channel<br>• Cleanout<br>• Energy Dissipator<br>• Inlet<br>• Outlet<br>• Spillway<br>• Tidegate<br>• Low Flow Diversions<br>• Pump Stations<br>• Equipment<br>Future O&M cost estimate for hard assets were estimated based on staff input during workshops. For each type of maintenance activity, labor requirements were identified at FTE level, contract requirements were identified, and equipment requirements were identified. In addition, the list of channel sections to be maintained (hotspots) was identified based on channel's Master Maintenance Program (MMP), and history of channel maintenance in the past 5 years. |
| | LOS 02. Maintenance activities, in conjunction with other BMPs in the watershed, will achieve pollutant load reductions (or waste load allocations for current and future TMDLs) that modeling predicts. | |
| | LOS 03. Private structural BMPs will 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. | |
| | LOS 05, 06, 48. Sufficient equipment is available 90% of the time to conduct monitoring activities. | |
| | LOS 06, 31, 39, 42. Sufficient equipment is available 90% of the time to conduct maintenance activities. | |
| | LOS 15. Sufficient equipment is available 90% of the time to conduct monitoring activities | |
| | LOS 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. | |
| | LOS 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 WAMP. | |

**Table 7-1. Opinion of Probable Cost Projection Methods Employed**

| Asset/Action Type | Opinion of Probable Cost Projection Method | |
|---|---|---|
| Hard Assets – Future Capital Costs (cont.)<br><br>Hard Assets – Future Operations and Maintenance (cont.) | LOS 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 timeframes identified in each WAMP. | Standard construction unit costs for asset classes were provided by the Division staff. These costs were based on the Division's recent projects and procurement. The estimated costs included, among others, planning, design, and construction. This replacement cost methodology is applied to the following asset classes:<br>• Culvert<br>• Storm Drain<br>• Brow Ditch<br>• Channel<br>• Cleanout<br>• Energy Dissipator<br>• Inlet<br>• Outlet<br>• Spillway<br>• Tidegate<br>• Low Flow Diversions<br>• Pump Stations<br>• Equipment<br><br>Future O&M cost estimate for hard assets were estimated based on staff input during workshops. For each type of maintenance activity, labor requirements were identified at FTE level, contract requirements were identified, and equipment requirements were identified. In addition, the list of channel sections to be maintained (hotspots) was identified based on channel's Master Maintenance Program (MMP), and history of channel maintenance in the past 5 years. |
| | LOS 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. | |
| | LOS 30. Channels are inspected annually. Channels that have capacities of less than 80% - 90% of the total design capacity are maintained to maximize conveyance capacity and reduce flood risks. | |
| | LOS 31. Sufficient equipment is available 90% of the time to conduct maintenance activities. | |
| | LOS 33. Regulators permit channel capacity improvement projects in an efficient, economical, and environmentally sensitive manner. | |
| | LOS 37. Where under capacity, pipes/structures are improved within timeframes identified in each WAMP. | |
| | LOS 38. Pipes/structures are maintained annually or according to schedules in the WAMP to maximize design capacity and reduce flood risks. | |
| | LOS 39. Sufficient equipment is available 90% of the time to conduct maintenance activities. | |
| | LOS 40. Where under capacity, pump stations are improved within timeframes identified in each WAMP. | |
| | LOS 41. Pump stations are maintained annually or according to schedules identified in the WAMP to function as designed. | |

**Table 7-1. Opinion of Probable Cost Projection Methods Employed**

| Asset/Action Type | Opinion of Probable Cost Projection Method | |
|---|---|---|
| Hard Assets – Future Capital Costs (cont.)<br><br>Hard Assets – Future Operations and Maintenance (cont.) | LOS 42. Sufficient equipment is available 90% of the time to conduct maintenance activities. | Standard construction unit costs for asset classes were provided by the Division staff. These costs were based on the Division's recent projects and procurement. The estimated costs included, among others, planning, design, and construction. This replacement cost methodology is applied to the following asset classes:<br>• Culvert<br>• Storm Drain<br>• Brow Ditch<br>• Channel<br>• Cleanout<br>• Energy Dissipator<br>• Inlet<br>• Outlet<br>• Spillway<br>• Tidegate<br>• Low Flow Diversions<br>• Pump Stations<br>• Equipment<br><br>Future O&M cost estimate for hard assets were estimated based on staff input during workshops. For each type of maintenance activity, labor requirements were identified at FTE level, contract requirements were identified, and equipment requirements were identified. In addition, the list of channel sections to be maintained (hotspots) was identified based on channel's Master Maintenance Program (MMP), and history of channel maintenance in the past 5 years. |
| | LOS 43. The storm drain system is mapped and updated per permit requirements. | |
| | LOS 44. Pipes/structures are maintained annually to meet flood risk management and water quality requirements. | |
| | LOS 45. Public structural and LID BMPs for CIP projects are installed per permit requirements. | |
| | LOS 46. Private structural and LID BMPs are installed and maintained per permit requirements. | |
| | LOS 48. Sufficient equipment is available 90% of the time to conduct monitoring activities. | |
| | LOS 50. Public non-structural BMPs are implemented per permit requirements. | |

**Table 7-1. Opinion of Probable Cost Projection Methods Employed**

| Asset/Action Type | Opinion of Probable Cost Projection Method | |
|---|---|---|
| Natural Assets – Program Actions – Future Capital and O&M<br><br>(Staff Input Regarding Number of FTEs, Equipment Costs, and Other Costs) | LOS 4. Data from monitoring activities is used to prioritize pollutant sources and measure effects of BMPs on runoff / discharge water quality. | $500,000/year divided by each watershed. Escalate 5% each year starting in 2015. 100% of services will be provided by Contracts plus an additional 10% for City oversight. |
| | LOS 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). | Future BMPs to comply with TMDLs in accordance with the CLRP. Costs presented in Phase I CLRPS were used for the Los Peñasquitos Watershed. Costs presented in the Phase II CLRPs were used for the San Diego Bay (specifically the Chollas Creek sub-watershed), San Diego River, and Mission Bay Watersheds (specifically, the Scripps and Tecolote Creek sub-watersheds). Note that a CLRP was not prepared for the Tijuana River Watershed, therefore, there are no future BMP costs projected. |
| | LOS 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). | |
| | LOS 14. Monitoring and scientific studies are conducted to provide sufficient scientific bases for appropriate modifications to beneficial uses and water quality objectives. | $4,080,000/year divided by each watershed. Escalate 5% each year starting in 2015. 100% of services will be provided by Contracts plus an additional 10% for City oversight. |
| | LOS 18. Where costs meet the formula, runoff is treated, stored and/or infiltrated within the MHPAs within the timeframes identified in the WAMP. | $250,000 for study (assumes desk top study plus field reconnaissance of 1/3 of sites x 2 people x 1 hr $100/hr). 100% of services will be provided by Contracts plus an additional 10% for City oversight. Cost divided based on proportion of MHPA acreage in each watershed. |
| | LOS 19. Where costs meet the formula, runoff is treated, stored and/or infiltrated within the City parcels within the timeframes identified in the WAMP. | Initial site reconnaissance required for 2/3 of 3,304 sites x 1 hr/site x 2 people x $100/hr. Desktop study for streets for all watersheds (equally proportioned across all watersheds) = $175K+ Field reconnaissance of 5% of streets (~4,000 miles) x2x$100x 1hr/mile. 100% of services will be provided by Contracts plus an additional 10% for City oversight. |

**Table 7-1. Opinion of Probable Cost Projection Methods Employed**

| Asset/Action Type | Opinion of Probable Cost Projection Method | |
|---|---|---|
| Natural Assets – Program Actions – Future Capital and O&M (cont.)<br><br>(Staff Input Regarding Number of FTEs, Equipment Costs, and Other Costs) | LOS 47. Monitoring is completed per permit requirements. | $1,500,000/year divided by each watershed. Escalate 5% each year starting in 2015. 60% of services provided by contracts and 40% provided by City staff plus an additional 10% for City oversight. Cost equally divided for each watershed. |
| Soft Assets – Future Capital and O&M Costs<br><br>(Staff Input Regarding Number of FTEs, Equipment Costs, and Other Costs) | LOS 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. | Current O&M = FY 2013 budget for Enforcement & Inspections x 0.25. Additional O&M is in LOS 13a and 13b. |
| | LOS 08. Private non-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. | Current O&M = FY 2014 budget for Enforcement and Inspection Units x 0.75. Additional O&M in LOS 13a and 13b. |
| | LOS 09. 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. | Current O&M = FY 2013 budget for Education & Outreach x 0.95. Additional O&M based on number of FTEs and costs projected by staff. |
| | LOS 10. Intra- and inter-departmental coordination and collaboration on water quality and flood risk management activities. Refer to LOS 1, 2, 7, 29, 30, 32, 33, 34, 35, 36, 37, 38, 40, 41, 43, 45, 50, and 53. | Current O&M = number of FTEs and costs staff stated were committed to this activity. Additional O&M based on number of FTEs and costs projected by staff. Capital based on number of FTEs, costs, and duration projected by staff. |
| | LOS 11. The policies and procedures that other City departments follow show that the actions of department staff are resulting in measureable reductions in pollutant loads that make measurable progress toward meeting waste load allocations for current and future TMDLs. | Current O&M = Number of FTEs and costs staff stated were committed to this activity. Additional O&M and capital projected under LOS 13a and 13b. |

**Table 7-1. Opinion of Probable Cost Projection Methods Employed**

| Asset/Action Type | Opinion of Probable Cost Projection Method | |
|---|---|---|
| Soft Assets – Future Capital and O&M Costs (cont.)<br><br>(Staff Input Regarding Number of FTEs, Equipment Costs, and Other Costs) | LOS 12a. The ordinances, standards, and requirements that the City requires for activities within the City show that these policies are resulting in measureable reductions in pollutant loads that make measurable progress toward meeting waste load allocations for current and future TMDLs. | Current O&M = Number of FTEs and costs staff stated were committed to this activity. Additional O&M and capital projected under LOS 13a and 13b. |
| | LOS 12b. The land development regulations that the City requires for activities within the City show that these regulations are resulting in measureable reductions in pollutant loads that make measurable progress toward meeting waste load allocations for current and future TMDLs. | Current O&M = Number of FTEs and costs staff stated were committed to this activity. Additional O&M and capital projected under LOS 13a and 13b. |
| | LOS 14 - 16. Regulator actions direct City to achieve beneficial uses and water quality objectives in receiving waters that are based on actual uses of waters demanded by majority of citizens, when accounting for costs, and water quality objectives that science shows protect those uses. | Current O&M = Number of FTEs and costs staff stated were committed to this activity. Additional O&M based on number of FTEs and costs projected by staff. Capital based on number of FTEs, costs, and duration projected by staff. |
| | LOS 17 - 17. Public perception shows approval ratings regarding the City's water quality and flood risk management activities are greater than 66%. | Covered under LOS 09 |
| | 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. | Current O&M = Number of FTEs and costs staff stated were committed to this activity. Additional O&M based on number of FTEs and costs projected by staff. Capital based on number of FTEs, costs, and duration projected by staff. |

**Table 7-1. Opinion of Probable Cost Projection Methods Employed**

| Asset/Action Type | Opinion of Probable Cost Projection Method | |
|---|---|---|
| Soft Assets – Future Capital and O&M Costs (cont.)<br><br>(Staff Input Regarding Number of FTEs, Equipment Costs, and Other Costs) | LOS 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 activities. The Division is responsible for infrastructure associated with NPDES compliance (i. e., storm water capture, containment or infiltration). | Current O&M = Number of FTEs and costs staff stated were committed to this activity. Additional O&M based on number of FTEs and costs projected by staff. Capital based on number of FTEs, costs, and duration projected by staff. |
| | LOS 25. Other City departments cooperate by allowing the use of their parcels to capture, infiltrate, and/or store storm water for beneficial use. | Current O&M = Number of FTEs and costs staff stated were committed to this activity. Additional O&M based on number of FTEs and costs projected by staff. Capital based on number of FTEs, costs, and duration projected by staff. |
| | LOS 26. Survey instruments show 66% or greater public acceptance of storm water harvesting for non-potable use. | Current O&M covered under LOS 9. Additional O&M based on number of FTEs and costs projected by staff. Capital based on number of FTEs, costs, and duration projected by staff. |
| | LOS 27. Projects are not stopped by stakeholders. | Current O&M = Number of FTEs and costs staff stated were committed to this activity. Additional O&M based on number of FTEs and costs projected by staff. Capital based on number of FTEs, costs, and duration projected by staff. |
| | LOS 28. State and local health and other agencies allow harvested storm water to be used without extraordinary treatment or plumbing requirements that make the project more costly than other forms of water quality management. | Current O&M = Number of FTEs and costs staff stated were committed to this activity. Additional O&M based on number of FTEs and costs projected by staff. Capital based on number of FTEs, costs, and duration projected by staff. |
| | LOS 32. Regulators authorize channel maintenance activities in an efficient, economical, and an environmentally acceptable manner. | Covered in LOS 27 |

**Table 7-1. Opinion of Probable Cost Projection Methods Employed**

| Asset/Action Type | Opinion of Probable Cost Projection Method | |
|---|---|---|
| Soft Assets – Future Capital and O&M Costs (cont.)<br><br>(Staff Input Regarding Number of FTEs, Equipment Costs, and Other Costs) | LOS 33. Regulators permit channel capacity improvement projects in an efficient, economical, and environmentally sensitive manner. | Covered in LOS 27 |
| | LOS 34. Coordinate with stakeholders on channel maintenance projects. | Covered in LOS 27 |
| | LOS 35. Coordinate with stakeholders on channel capacity improvement projects. | Covered in LOS 27 |
| | LOS 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. | Current O&M = Number of FTEs and costs staff stated were committed to this activity. Additional O&M based on number of FTEs and costs projected by staff. Capital based on number of FTEs, costs, and duration projected by staff. |
| | LOS 43 - 55. City Receives no Notices of Violation | Covered under all other LOS |
| | LOS 49. Other City departments comply with their responsibilities per permit requirements. | Current O&M covered in LOS 10. Additional O&M based on number of FTEs and costs projected by staff. Capital based on number of FTEs, costs, and duration projected by staff. |
| | LOS 51. Public outreach meets permit requirements. | Covered under LOS 09 |
| | LOS 52. Private non-structural BMPs are implemented per permit requirements. | Covered under LOS 08 |
| | LOS 53. Storm drain systems on City property are maintained per permit requirements. | Current O&M = Number of FTEs and costs staff stated were committed to this activity. Additional O&M based on number of FTEs and costs projected by staff. Capital based on number of FTEs, costs, and duration projected by staff. |
| | LOS 54. Policies and procedures for all municipal activities, including other departments, are implemented per permit requirements. | Covered under LOS 49 |

**Table 7-1. Opinion of Probable Cost Projection Methods Employed**

| Asset/Action Type | Opinion of Probable Cost Projection Method | |
|---|---|---|
| Soft Assets – Future Capital and O&M Costs (cont.)<br><br>(Staff Input Regarding Number of FTEs, Equipment Costs, and Other Costs) | LOS 55a Ordinances, standards, and requirements are developed and implemented per permit requirements. | Covered under LOS 12a |
| | LOS 55b. Land development regulations are developed and implemented per permit requirements. | Covered under LOS 12b |
| | LOS 56 - 56. Public perception shows approval ratings of City's water quality management are greater than 66%. | Covered under LOS 17 |
| | LOS 56. The ordinances, standards, and requirements implemented by the City that citizens must follow do not result in reduction in City approval ratings below 66%. | Covered under LOS 09 |

**Acronyms:**

BMP - best management practice
CLRP - comprehensive load reduction plans
Division – City of San Diego Storm Water Division
FTE - full-time equivalent
FY – fiscal year
LOS – level of service
NPDES – National Pollution Discharge Elimination System
O&M – operations and maintenance
TMDL – total maximum daily load – full-time equivalents
WAMP – Watershed Asset Management Plan

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The opinions regarding probable costs for work to be done on assets are provided in the individual appendices of this report.

## 7.2 NATURAL ASSET BMPS FOR TMDL COMPLIANCE COST MODEL

As noted above, the opinions of probable costs for BMPs that will be necessary to achieve the LOS for certain natural assets, such as runoff and discharges, to achieve TMDL waste load allocations (WLAs) were estimated using the CLRPs. CLRP watersheds are shown in Figure 7-1.

CLRP cost estimates were presented in the CLRPs in cost categories that included staff base salaries, staff fringe benefits, contract costs, information technology costs, capital costs, and various other costs. For the purpose of asset management planning, it is necessary to categorize between capital costs that recur only when an asset reaches the end of its useful life and operations and maintenance costs that occur regularly. For City budgetary planning, it is necessary to categorize between Capital Improvement Plan (CIP) budget requirements and General Fund budget requirements. CIP budgets can be bond-financed and so are approved through a different process than General Fund budgets.

For LOS 13a and 13b, thirty-six activities were identified in the CLRPs that would take place to achieve waste load allocations over time in TMDL watersheds. Of these 36 activities, activities 1 through 31 were generally programmatic in nature and activities 32 through 36 involved the construction of a publicly owned structural treatment control or low impact development best management practice. Programmatic activities (1-31) had some capital costs presented, which were likely purchases of equipment that would be used to implement the activities. Salary costs, fringe benefit costs, supplies and services costs, information technology costs, and energy and utilities costs were generally categorized as General Fund Operations and Maintenance costs. Capital expenditures, debt, and other costs were generally categorized as CIP Capital costs. Contracts were categorized as General Fund Operations and Maintenance costs for those activities largely programmatic in nature (1-31) and CIP Capital costs for those activities where capital infrastructure was constructed (32-36).

Table 7-2 shows the CLRP cost categories and which budget they were categorized in for the different CLRP activities.

**Table 7-2. CLRP Cost Categories and WAMP Cost Categories Cross Reference for CLRP Activities**

| CLRP Cost Category | CIP (Capital) | General (O&M) |
|---|---|---|
| Salary Cost | | 1-36 |
| Special Wages Cost | | 1-36 |
| Fringe Benefits Cost | | 1-36 |
| Supplies & Services | | 1-36 |
| Contracts | 32-36 | 1-31 |
| Information Technology | | 1-36 |
| Energy & Utilities | | 1-36 |
| Capital Expenditures | 1-36 | |
| Debt | 1-36 | |
| Other | 1-36 | |

Note that there may be some modifications required for how CLRP costs are categorized in the WAMP based on the actual CLRP expenditure envisioned.

Table 7-3 shows the costs that were estimated in the Phase I and Phase II CLRPs.

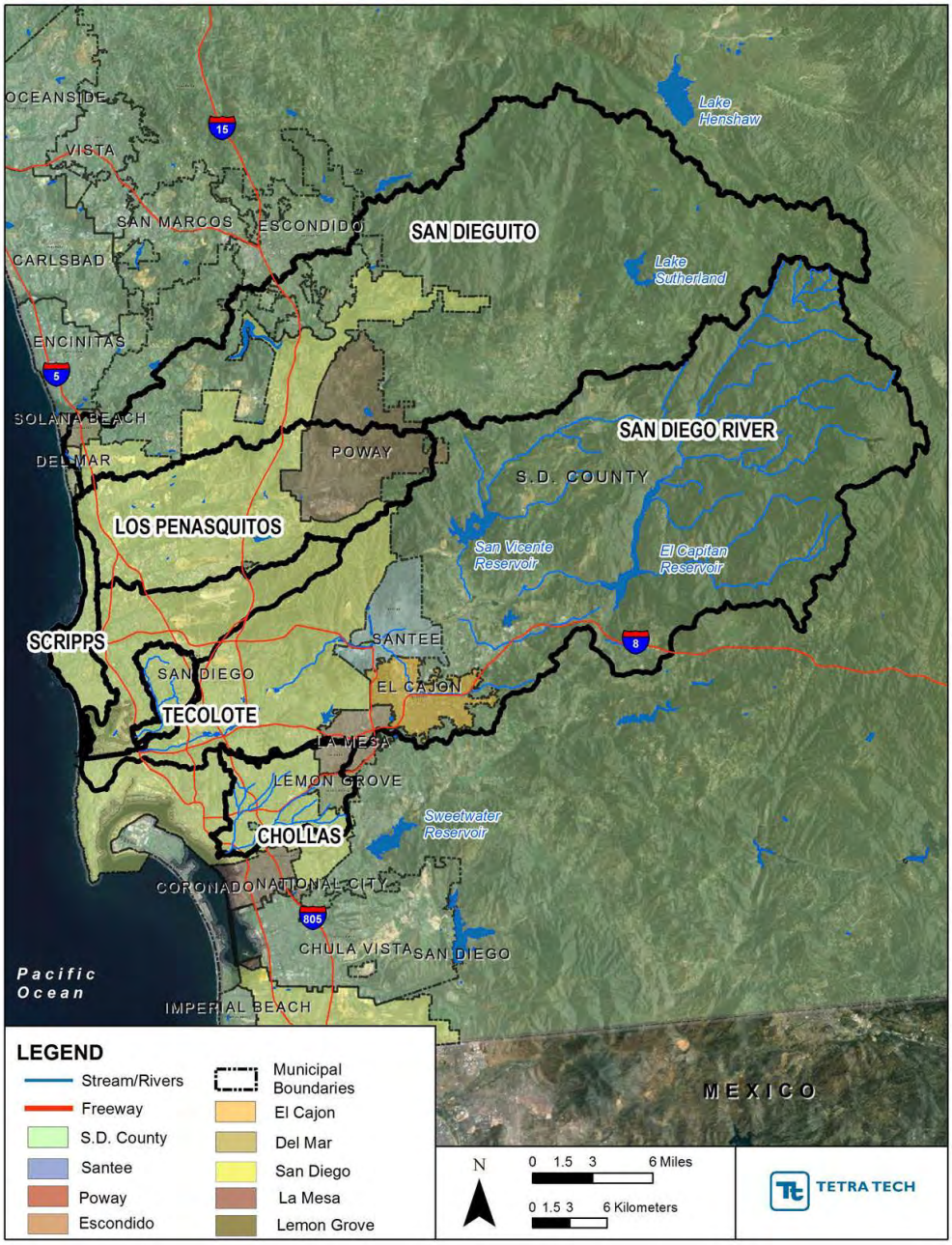


**Figure 7-1. CLRP Watersheds**

Note that San Dieguito is no longer considered a CLRP watershed for the City of San Diego.

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**Table 7-3. Phase I and Phase II City of San Diego CLRP Opinions of Probable Costs**

| | Activity | San Diego Bay | | | | | | Mission Bay | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Chollas | | Los Peñasquitos | | San Diego River | | ASBS No 29 | | Scripps | | Tecolote | |
| | | Capital | Annual O&M | Capital | Annual O&M | Capital | Annual O&M | Capital | Annual O&M | Capital | Annual O&M | Capital | Annual O&M |
| 01 | Enhance LID implementation for new development and redevelopment through zoning amendments | 0 | 9,136 | 0 | 0 | 0 | 10,796 | 0 | 2,180 | 0 | 8,614 | 0 | 10,276 |
| 02 | Train Development Services Department staff on LID regulatory changes and LID Design Manual | 0 | 6,149 | 0 | 0 | 0 | 7,266 | 0 | 1,467 | 0 | 5,798 | 0 | 6,917 |
| 03 | Develop regional training for and focus locally on enforcement of water-using mobile businesses | 0 | 6,936 | 0 | 0 | 0 | 5,408 | 0 | 1,004 | 0 | 4,498 | 0 | 5,887 |
| 05 | Design and implement property- and PGA-based inspections and accelerated enforcement | 0 | 12,204 | 0 | 0 | 0 | 14,421 | 0 | 2,912 | 0 | 11,507 | 0 | 13,726 |
| 06 | Amend SUSMP for Trash areas: require full four-sided enclosure, siting away from storm drains, cover; consider retrofit requirement | 0 | 457 | 0 | 0 | 0 | 540 | 0 | 109 | 0 | 431 | 0 | 514 |
| 07 | Amend SUSMP for: Animal-related facilities | 0 | 457 | 0 | 0 | 0 | 540 | 0 | 109 | 0 | 431 | 0 | 514 |
| 08 | Amend SUSMP for: Nurseries and garden centers | 0 | 457 | 0 | 0 | 0 | 540 | 0 | 109 | 0 | 431 | 0 | 514 |
| 09 | Amend SUSMP for: Auto-related uses | 0 | 457 | 0 | 0 | 0 | 540 | 0 | 109 | 0 | 431 | 0 | 514 |
| 10 | Update Minimum BMPs for existing residential, commercial & industrial development & enforce | 0 | 5,228 | 0 | 0 | 0 | 6,177 | 0 | 1,247 | 0 | 4,929 | 0 | 5,880 |
| 11 | Support partnership effort by social service providers to provide sanitation and trash management for persons experiencing homelessness | 0 | 2,741 | 0 | 0 | 0 | 3,239 | 0 | 654 | 0 | 2,584 | 0 | 3,083 |
| 12 | Develop pilot project to identify and carry out site disconnections in targeted areas | 0 | 13,474 | 0 | 0 | 0 | 10,506 | 0 | 1,764 | 0 | 8,738 | 0 | 11,435 |
| 13 | Continue to participate in source reduction initiatives | 0 | 3,857 | 0 | 0 | 0 | 4,558 | 0 | 920 | 0 | 3,637 | 0 | 4,339 |
| 14a | Expand residential BMP (irrigation, rainwater harvesting and turf conversion) rebate programs to multi-family housing in target areas | 0 | 4,121 | 0 | 0 | 0 | 3,523 | 0 | 812 | 0 | 3,106 | 0 | 3,914 |
| 14b | Residential BMP: Rain Barrel | 437 | 1,076 | 0 | 0 | 20,218 | 1,384 | 1,684 | 117 | 5,459 | 374 | 5,616 | 384 |
| 14c | Residential BMP: Irrigation Control (Turf Conversion) | 49,136 | 921 | 0 | 0 | 228,657 | 2,136 | 7,642 | 181 | 53,453 | 694 | 43,789 | 625 |
| 14d | Downspout Disconnect | 104,770 | 566 | 0 | 0 | 299,250 | 1,461 | 68 | 0 | 89,303 | 436 | 84,471 | 414 |
| 15 | Expand outreach to HOA common lands and HOA rebates | 0 | 5,699 | 0 | 0 | 0 | 5,412 | 0 | 1,093 | 0 | 4,318 | 0 | 5,151 |
| 16 | Increase enforcement of over-irrigation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Table 7-3. Phase I and Phase II City of San Diego CLRP Opinions of Probable Costs**

| | Activity | San Diego Bay | | | | | | Mission Bay | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Chollas | | Los Peñasquitos | | San Diego River | | ASBS No 29 | | Scripps | | Tecolote | |
| | | Capital | Annual O&M | Capital | Annual O&M | Capital | Annual O&M | Capital | Annual O&M | Capital | Annual O&M | Capital | Annual O&M |
| 17 | Develop outreach and training program for property managers responsible for HOAs and Maintenance Districts | 0 | 2,103 | 0 | 0 | 0 | 2,485 | 0 | 502 | 0 | 1,983 | 0 | 2,365 |
| 18 | Conduct trash clean-ups through community-based organizations involving target audiences | 0 | 5,482 | 0 | 0 | 0 | 6,477 | 0 | 1,308 | 0 | 5,169 | 0 | 6,166 |
| 19 | Enhance education and outreach based on results of effectiveness survey and changing regulatory requirements | 290,825 | 36,301 | 0 | 0 | 230,674 | 42,896 | 39,132 | 8,662 | 191,469 | 34,228 | 249,513 | 40,830 |
| 20 | Improve consistency & content of websites to highlight enforceable conditions & reporting methods | 0 | 841 | 0 | 0 | 0 | 994 | 0 | 201 | 0 | 793 | 0 | 946 |
| 22 | Optimize catch basin cleaning to maximize pollutant removal | 1,157,432 | 9,063 | 0 | 0 | 0 | 0 | 108,850 | 949 | 0 | 0 | 0 | 0 |
| 25 | Proactively monitor for erosion, and complete minor repair & slope stabilization | 1,786,627 | 4,296 | 0 | 0 | 1,786,627 | 5,076 | 339,391 | 1,025 | 1,446,878 | 4,051 | 1,786,627 | 4,832 |
| 26 | Increase identification and enforcement of actionable erosion and slope stabilization issues on private property and require stabilization and repair | 0 | 25,127 | 0 | 0 | 0 | 14,846 | 0 | 2,999 | 0 | 11,848 | 0 | 14,131 |
| 27 | Require sweeping of private roads & parking lots in targeted areas | 366,025 | 1,848 | 0 | 0 | 0 | 0 | 1,098,075 | 5,544 | 0 | 0 | 0 | 0 |
| 28 | Enhance street sweeping through equipment replacement and route optimization | 20,007,910 | 74,558 | 0 | 0 | 0 | 0 | 9,854,642 | 36,722 | 0 | 0 | 0 | 0 |
| 29 | Initiate sweeping of medians on high-volume arterial roadways | 3,527,892 | 31,779 | 0 | 0 | 0 | 0 | 1,737,619 | 15,652 | 0 | 0 | 0 | 0 |
| 30 | Complete dry weather flow separation and treatment projects per capital improvement plans | 0 | 0 | 23,013,771 | 183,343 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 31 | Identify sewer leaks and areas for sewer pipe replacement prioritization. | 0 | 1,600 | 0 | 0 | 0 | 1,600 | 0 | 304 | 0 | 1,296 | 0 | 1,600 |
| 32 | BMPs Centralized on Public Property | 487,039 | 4,479,844 | 64,705,640 | 46,296 | 2,341,803 | 7,149,355 | 50,870 | 800,243 | 216,867 | 3,304,421 | 1,773,398 | 4,576,685 |
| 33 | BMPs Distributed on Public Property | 2,226,703 | 1,886,195 | 67,633,133 | 162,603 | 4,300,982 | 3,495,877 | 213,962 | 176,172 | 910,995 | 708,977 | 1,551,676 | 1,286,936 |
| 34 | Green Streets | 30,301,909 | 45,664,234 | 0 | 0 | 7,131,741 | 10,928,344 | 435,453 | 535,689 | 0 | 0 | 327,645 | 500,271 |
| 35 | Centralized on Private | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 36 | Planned BMP (Location Identified, BMP Planned) | 193,251 | 1,919,226 | 0 | 0 | 52,433 | 48,932 | 604 | 836,952 | 2,577 | 3,456,007 | 164,578 | 444,921 |
| | **Total** | **60,499,955** | **54,216,435** | **156,635,482** | **440,971** | **16,392,385** | **21,775,328** | | **13,887,992** | **2,437,714** | **7,589,728** | **5,987,314** | **6,953,770** |

Note that these costs are for the development and O&M of structural and non-structural BMPs in areas that are subsets of the entire watershed management areas for which BMPs may ultimately be needed due to pending TMDLs provided in the 303(d) list. These costs are for the available BMPs. They include the following in general order of cost effectiveness:

- Maximization of non-structural programs to the extent practicable to optimize waste load reductions achievable with non-structural BMPs,
- Regional structural LID-type BMPs on City-owned parcels, not including streets,
- Distributed structural LID-type BMPs on City-owned parcels, not including streets,
- Green streets, and
- Regional structural LID-type BMPs on private parcels.

## 7.3 LONG-RANGE FORECAST

This section introduces the long-range renewal projection for the assets used to develop the City's WAMP. The information in this section is based on the inputs, assumptions, and logic presented in the previous sections. The long-range forecast is a look at the future investment needs for the City. It provides a snapshot of the future based on the current knowledge and historical practices. Understanding the long-range investment needs is a key step in making sustainable and proactive management decisions.

Using the asset data in the asset register, asset replacement cost, and management strategies, a 100-year renewal and O&M projection were generated. A 100-year planning horizon was used to capture the full lifecycle of collection system assets. For proper asset management planning, a long-range planning horizon was required to fully capture the cyclic nature of the installation and replacement trends. A short-range (e.g., 5-year, 10-year) planning horizon often fails to consider the large capital requirement that may lie just beyond the analysis window. Due to the enormous capital investment needs of infrastructure assets, without a long-range consideration, an organization will not be able to financially prepare for renewal requirements.

In this section, the methodology used to generate the long range forecast and the results for soft, natural and hard assets are presented and discussed.

### 7.3.1 Soft Assets

The methodology used to calculate the long-term forecasts for soft assets is presented in Table 7-1.

### 7.3.2 Natural Assets

BMP implementation to meet the LOS for TMDL compliance of natural assets requires meeting specific regulatory schedules. Each TMDL has associated implementation schedules. Future TMDLs do not require installation of BMPs or compliance activities until after they are adopted and an implementation schedule is developed. In general, implementation schedules are 7 years long for dry weather BMPs and 20 years long for wet weather BMPs. There may be changes to these schedules, but for the current

purposes of projecting costs, these implementation schedules have been used, starting at the year of TMDL adoption or anticipated TMDL adoption. Both Phase I CLRP (Los Peñasquitos) and Phase II CLRPs (San Diego River, Scripps, ASBS 29, Tecolote, Chollas watersheds) provided costs for each year during the TMDL implementation schedule,

For other costs not related to BMPs, Table 7-4 describes the long-term cost projection method that would be used.

**Table 7-4. Long-term Cost Opinion Projection Method**

| Asset/Action type | Long-term Cost Opinion Projection Method |
|---|---|
| Hard assets – future capital costs | Based on asset age, useful life, current condition, optimal replacement timing. |
| Hard assets – future operations and maintenance costs | Equivalent to current plus desired needs based on operations and maintenance shortfalls as provided by staff. |
| Natural assets – BMPs for TMDL compliance - future capital and operations and maintenance costs | Phase II CLRP annual projected costs where available. Unit cost curve per current TMDL implementation schedules for watersheds where only phase I CLRP costs are available. |
| Natural assets – program actions – future capital and O&M costs | Phase II CLRP annual projected costs where available. Unit cost curve per current TMDL implementation schedules for watersheds where only phase I CLRP costs are available. |
| Soft assets – future capital costs | Based on staff input as to when LOS would fail should investments in soft assets not be made. |
| Soft assets – future operations and maintenance | Based on staff input as to when LOS would fail should investments in soft assets not be made. |

**Acronyms:**

BMP – Best Management Practice
CLRP - Comprehensive Load Reduction Plan
LOS – Level of Service
O&M – Operations and Maintenance
TMDL – Total Maximum Daily Load

### 7.3.3 Soft Assets

The long-range forecast for hard assets was calculated incorporating the management strategies developed (Section 6) to drive the timing and investment for asset activities. For each asset, the investment needs and timing are tracked. As illustrated in Figure 7-2, as the asset's condition deteriorates, a refurbishment is required to revitalize and extend the life of the asset. This refurbishment takes place at a minimum acceptable condition rating and requires a cost (investment). The refurbishment resets the condition, and the process is repeated until an asset can no long be refurbished and, as such, is replaced. The lifecycle costs, including O&M costs, for each asset were calculated for the planning horizon (i.e., 100 years). These costs were amalgamated to generate the long-range forecast.

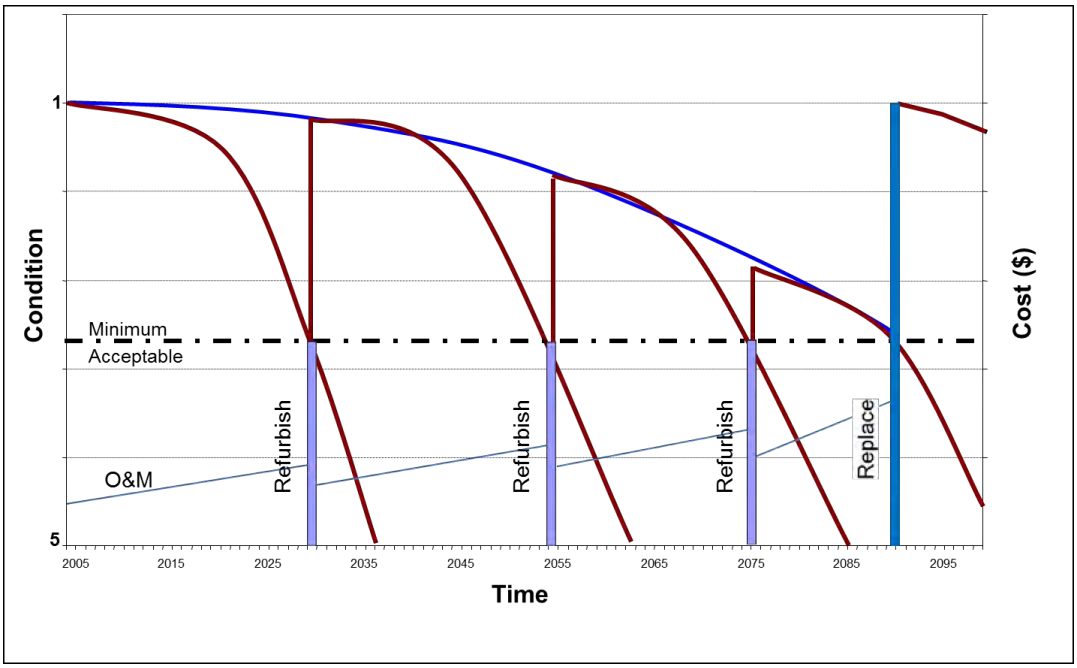


**Figure 7-2. Long-range Forecast Methodology**

In order to facilitate the calculation of lifecycle costs for individual assets, an asset management plan development tool, Total Enterprise Asset Management Plan (TEAMPlan), was utilized. TEAMPlan is designed to facilitate the creation of a WAMP through data consolidation and analysis. It is built around the core asset management processes, and has the ability to fully incorporate lifecycle costing and optimal decision-making methodologies. Figure 7-3 presents a screen shot of TEAMPlan's main screen.

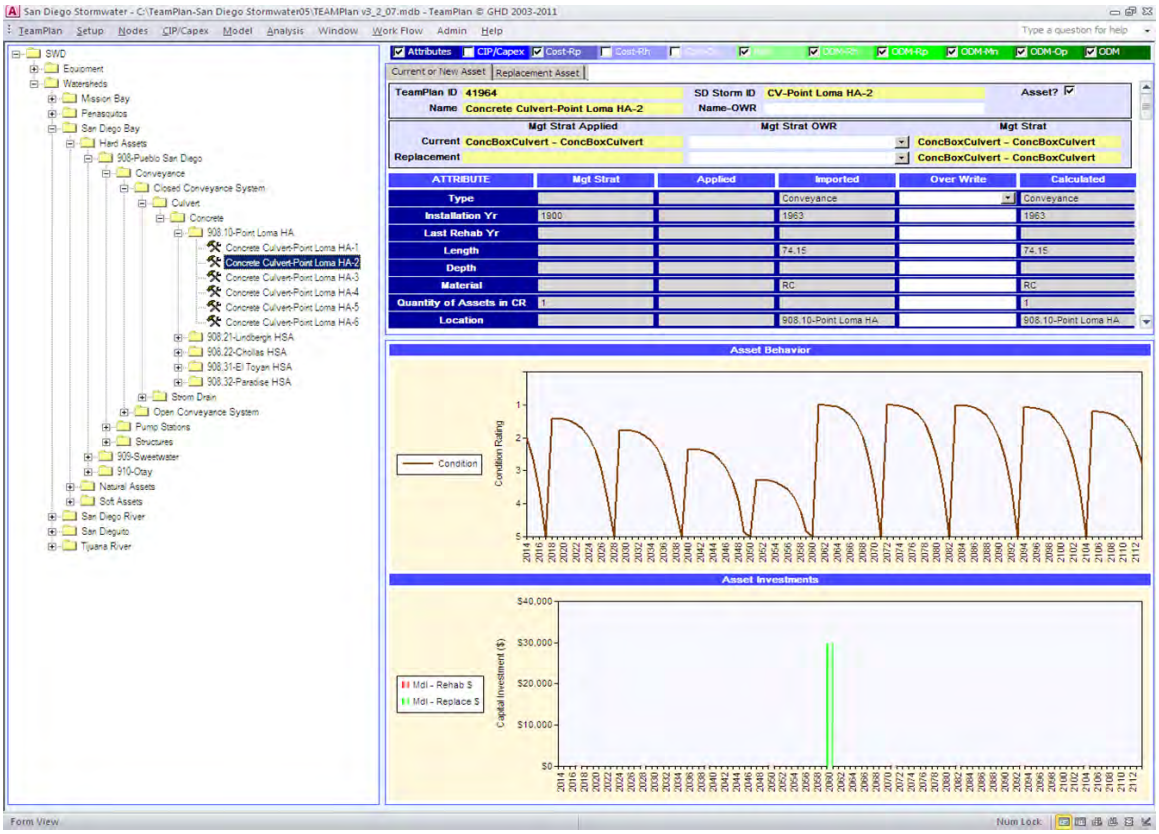


**Figure 7-3. TEAMPlan Screen Shot**

The TEAMPlan tool can be used to make decisions at any level in the asset hierarchy. The key management features described below add to TEAMPlan's flexibility.

- Asset Attributes. For any asset, TEAMPlan users can create and capture an unlimited number of attributes at any level in the asset hierarchy.
- Management Strategies. TEAMPlan users can make assumptions about data to fill missing gaps and enter formulas to calculate replacement costs and risk.
- Scenario Modeling. TEAMPlan's reporting module enables various scenarios to be saved and analyzed at user-defined levels within the asset hierarchy.

TEAMPlan will assist the City in improving the knowledge of the assets owned, and in facilitating the asset management decision-making process. It can calculate the future investment profile of the City, including capital and O&M costs. TEAMPlan can identify assets approaching the end of their useful life, and include them in CIP projects. TEAMPlan can help optimize the management strategies by including intervention points based on risk, cost, and/or condition.

### 7.3.4 Long-range Forecast

Using the methodology presented above and incorporating the management strategies and the asset valuations, the long-range forecast for the City was projected. A planning horizon of 100 years was used to ensure full capture of lifecycle costs (i.e., installation to disposal) of hard assets. Table 7-5 below summarizes the City's investment needs for each asset type. The long-range forecast projects that the City will need to invest over $19.98 billion (based on 2013 dollars) to successfully manage and deliver the LOS. Over 100 years, this total amount equates to about $199.8 million per year. This number includes the regulatory compliance, capital, and O&M costs. It is important to note that some years will require greater expenditures and other years will require lower expenditures. The early years, especially, will require greater expenditures because of the current regulatory requirement to implement programs and BMPs to achieve TMDL waste load allocations. These expenditures are largely shown in the Natural Assets costs.

**Table 7-5. Long-range Forecast by Asset Type**

| Asset Types | Total 100 Years, All Watersheds |
|---|---|
| Hard Assets | $7.0 Billion |
| Soft Assets | $894 Million |
| Natural Assets | $12.1 Billion |
| Total | $19.98 Billion |
| Annual Average | $199.8 Million |

Figure 7-4 represents the projected results based on watershed and asset types. The distribution of total needs, by asset type (i.e., soft, natural, hard), is represented by respective colors.

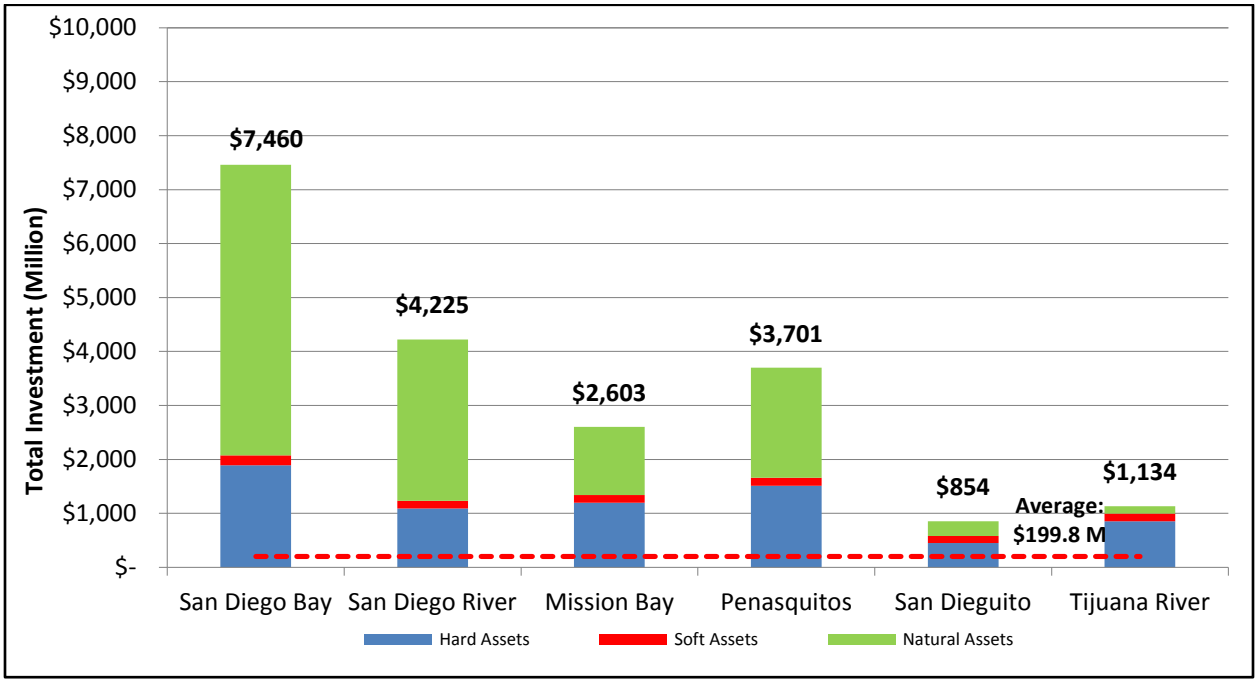


**Figure 7-4. Watershed Long-range Forecast by Asset Type**

Figures 7-5, 7-6, and 7-7 represent the projected results of 5 year, 10 year, and 30 year outlook respectively.

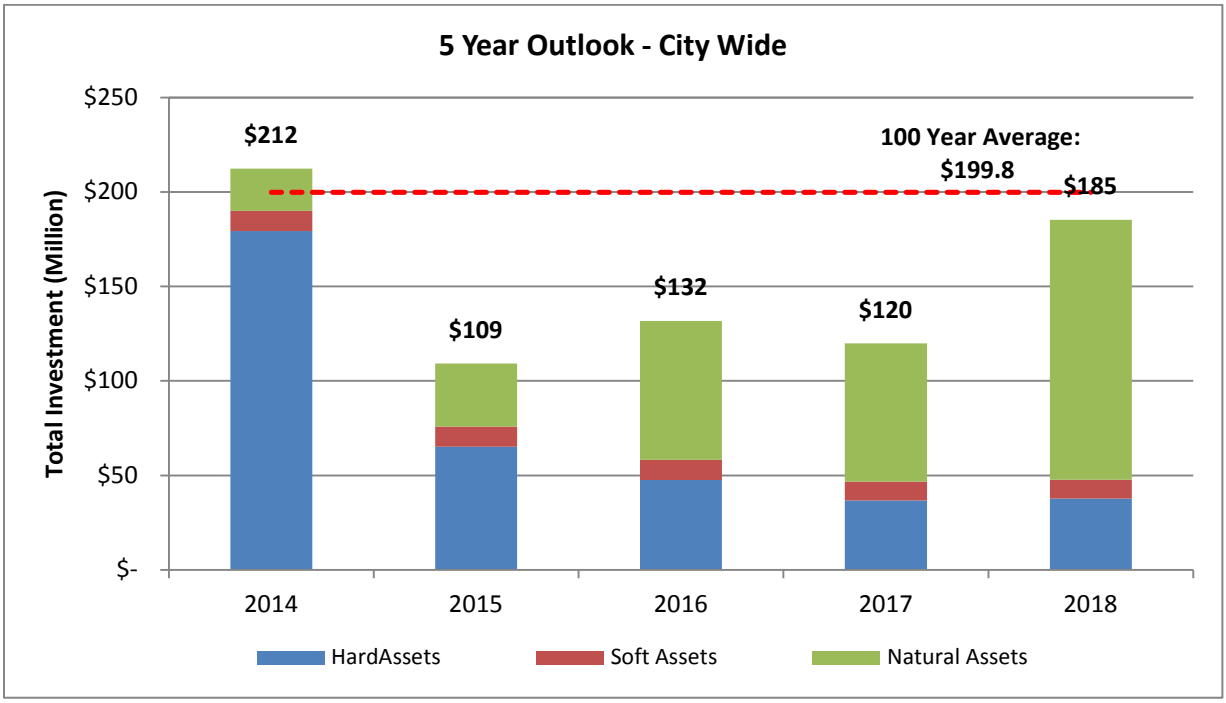


**Figure 7-5. Watershed 5 Year Outlook by Asset Type**

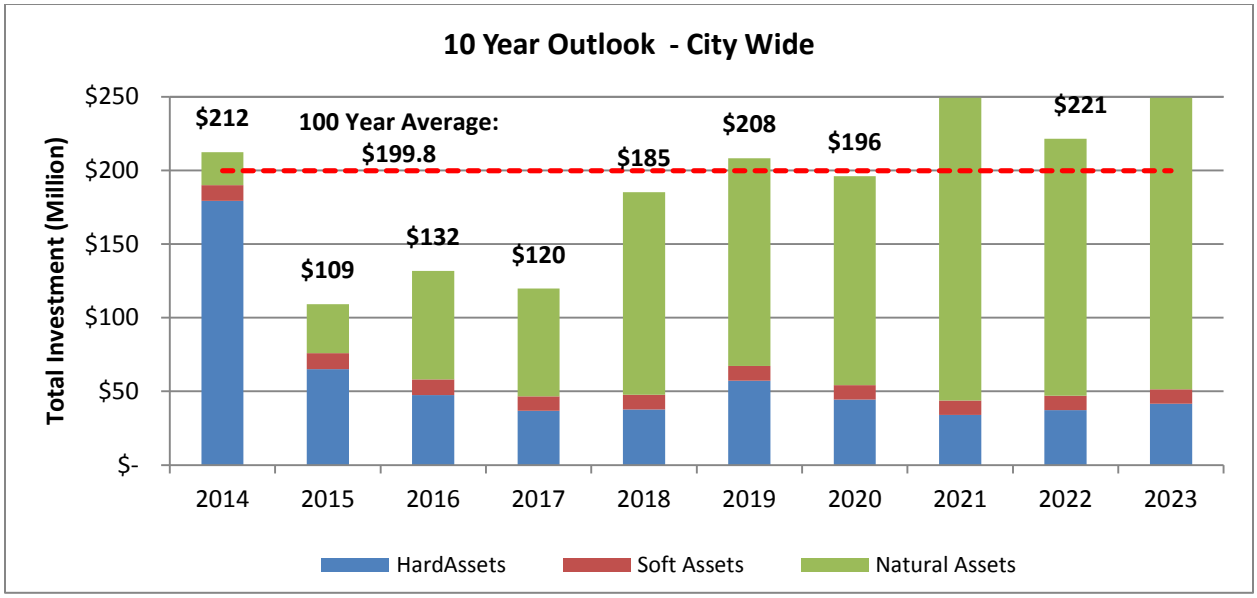


**Figure 7-6. Watershed 10 Year Outlook by Asset Type**

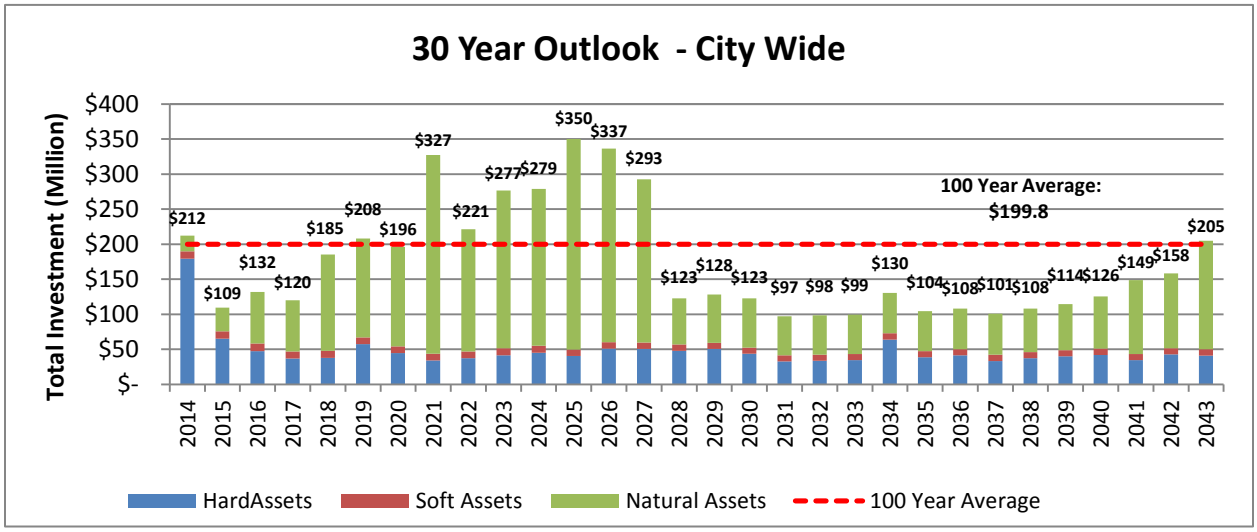


**Figure 7-7. Watershed 30 Year Outlook by Asset Type**

Figure 7-8 represents the overall 100 year projected results based on asset types. Based on the results, it is projected that the Division will have average annual costs of $199.8 million dollars for the next 100 years between capital and operations and maintenance costs. Some years will have higher costs. Other years will have lower costs. The costs are cyclic. However, some spikes are visible. In year 2014, the large spike in the hard asset represents deferred replacement needs of the hard assets. These are assets that have exceeded their useful life. Spikes in years 2059, 2063, 2069, 2075, 2080, and 2084 are also very noticeable. These are generated by the replacement need for the conveyance system. Much of the conveyance system was installed during the 1960s. As such, the hard assets within it will reach their useful lives around the 2060s.

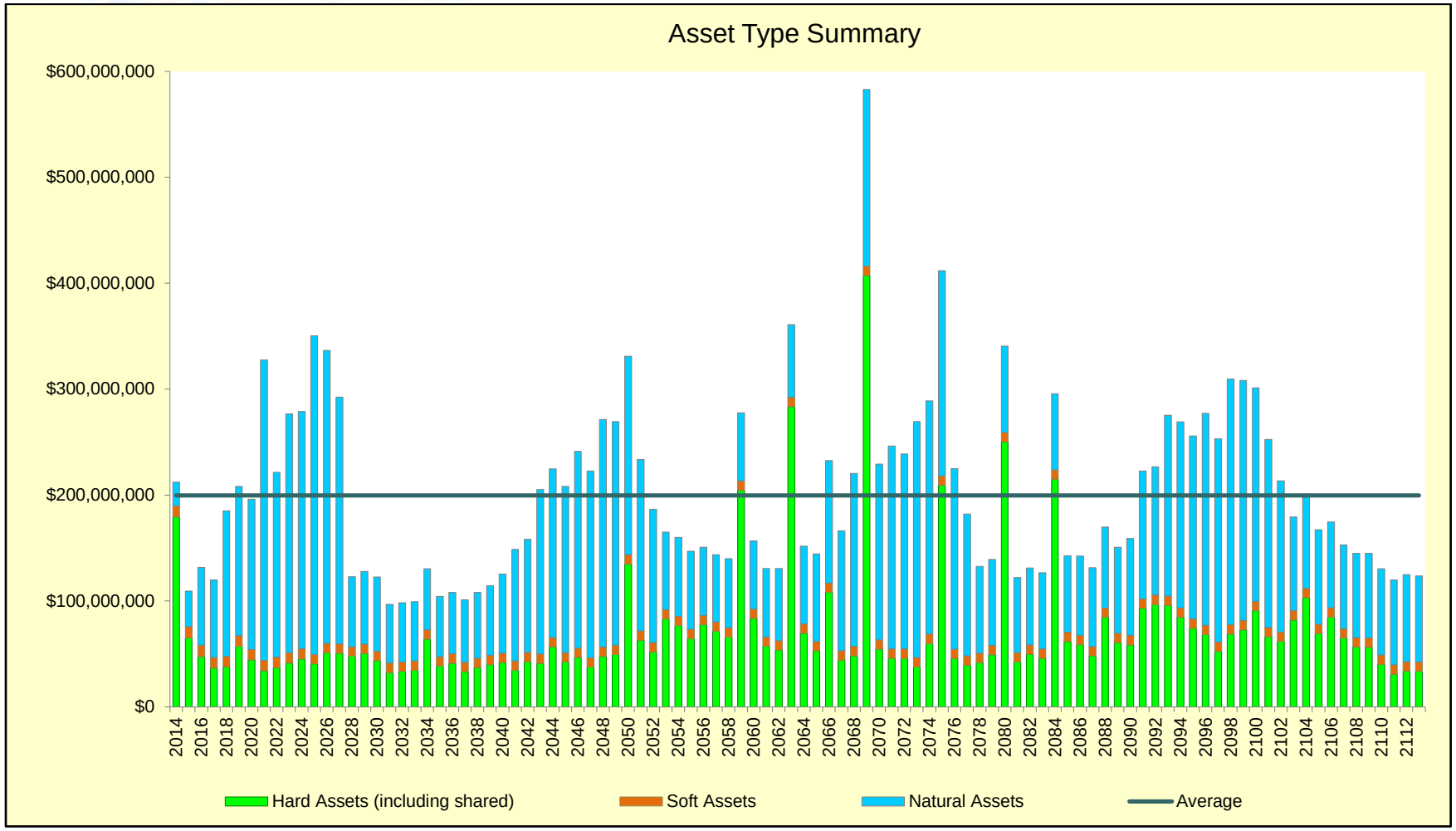


**Figure 7-8. Watershed 100 Year Forecast by Asset Type**

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The peaks in the 100 year forecast graph caused by hard asset replacement were normalized to develop a more realistic forecast (Figure 7-9). Normalization of future hard asset replacement costs, which was driven by the uncertainty in the data, accounts for the uncertainties associated with the age of the assets that might deviate from the expected values. Therefore costs of hard asset replacements were distributed utilizing standard normal distribution to prior and after the expected year. For instance, for a hard asset replacement of $370 M in 2069, the costs are normally distributed with standard deviation of 10 years. This would result in $14.78 M expenditure in 2069, the expected year of hard asset replacement, and $4.96 M in year 2029, 40 years prior to the expected replacement year.

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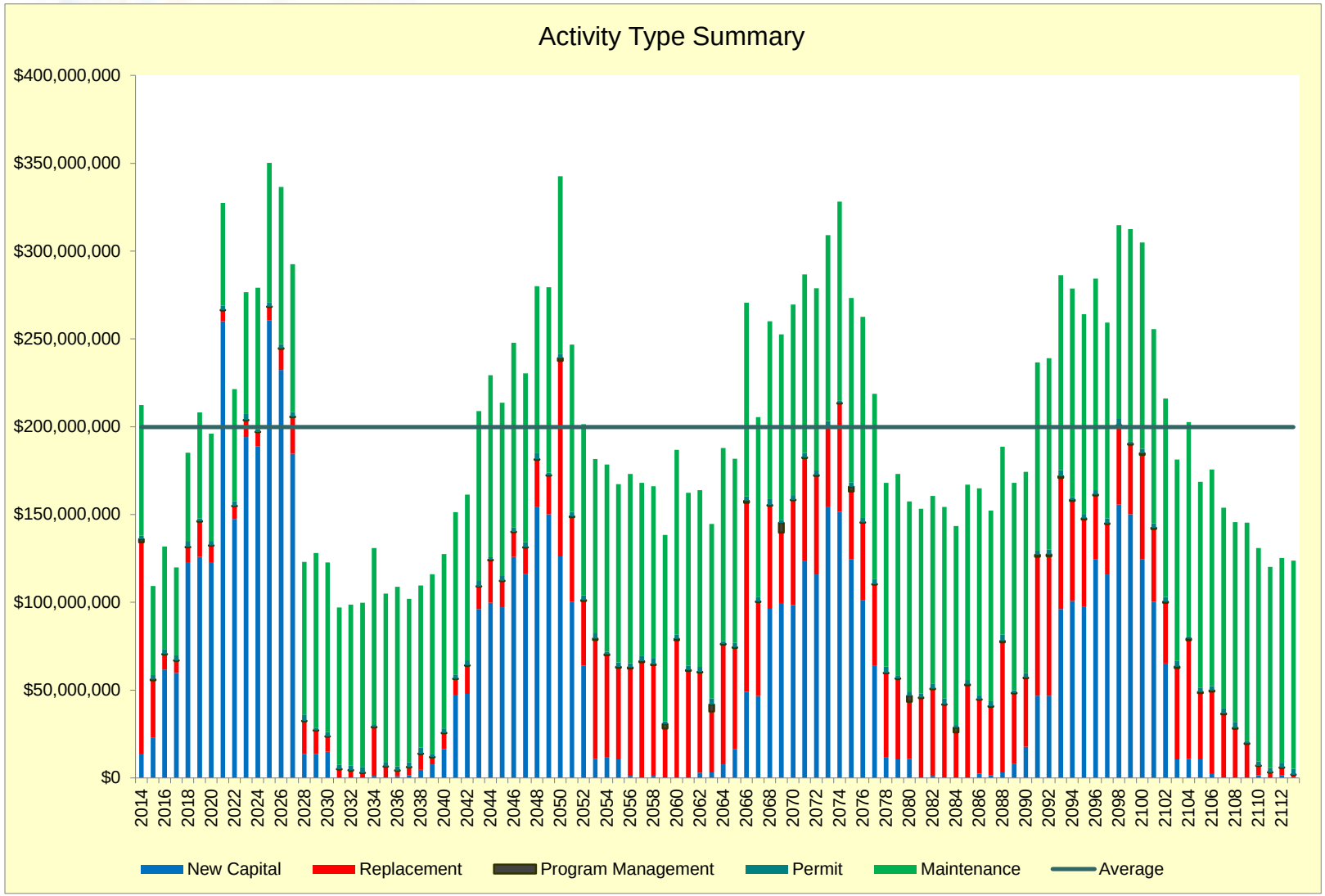


**Figure 7-9. Watershed 100 Year Forecast by Activity Type - Normalized**

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## 7.4 FY14 TOTAL BUDGET ESTIMATE

In order to develop two FY15 budget estimates in which activities/LOS are distinguished between the two funding types (General Fund or CIP), the following was assumed:

- All Soft Assets will be funded by the General Fund
- Hard Asset O&M costs will be funded by the General Fund, and Hard Asset Capital costs will be funded with the CIP funds
- All Natural Assets will be funded with the General Fund, except for LOS 13a (i.e., dry weather runoff discharges) and 13b (i.e., wet weather runoff discharges). Activities associated with LOS 13a and 13b will be funded by the types listed in Table 7-6.

**Table 7-6. LOS 13a and 13b Funding Source Assumptions**

| Activities Associated with LOS 13a and 13b | Funding Type |
|---|---|
| 01. Enhance LID implementation for new development and redevelopment through zoning amendments | General |
| 02. Train Development Services Department staff on LID regulatory changes and LID Design Manual | General |
| 03. Develop regional training for and focus locally on enforcement of water-using mobile businesses | General |
| 04. Identify and reduce incidents of power washing discharges from non-residential sites | General |
| 05. Design and implement property- and PGA-based inspections and accelerated enforcement | General |
| 06. Amend SUSMP for Trash areas: require full four-sided enclosure, siting away from storm drains, cover; consider retrofit requirement | General |
| 07. Amend SUSMP for: Animal-related facilities | General |
| 08. Amend SUSMP for: Nurseries and garden centers | General |
| 09. Amend SUSMP for: Auto-related uses | General |
| 10. Update Minimum BMPs for existing residential, commercial & industrial development & enforce | General |
| 11. Support partnership effort by social service providers to provide sanitation and trash management for persons experiencing homelessness | General |
| 12. Develop pilot project to identify and carry out site disconnections in targeted areas | General |
| 13. Continue to participate in source reduction initiatives | General |
| 14a. Expand residential BMP (irrigation, rainwater harvesting and turf conversion) rebate programs to multi-family housing in target areas | General |
| 14b. Residential BMP: Rain Barrel | General |
| 14c. Residential BMP: Irrigation Control (Turf Conversion) | General |

**Table 7-6. LOS 13a and 13b Funding Source Assumptions**

| Activities Associated with LOS 13a and 13b | Funding Type |
|---|---|
| 14d. Downspout Disconnect | General |
| 15. Expand outreach to HOA common lands and HOA rebates | General |
| 16. Increase enforcement of over-irrigation | General |
| 17. Develop outreach and training program for property managers responsible for HOAs and Maintenance Districts | General |
| 18. Conduct trash clean-ups through community-based organizations involving target audiences | General |
| 19. Enhance education and outreach based on results of effectiveness survey and changing regulatory requirements | General |
| 20. Improve consistency & content of websites to highlight enforceable conditions & reporting methods | General |
| 21. Contribute to County-led effort through regional education group for outreach, education, and policy measures for the equestrian community and property owners | General |
| 22. Optimize catch basin cleaning to maximize pollutant removal | General |
| 23. Proactively repair and replace MS4 components per capital improvement and asset management plans | CIP |
| 24. Increase frequency of open channel cleaning & scour pond repair to reduce pollutant loads | CIP |
| 25. Proactively monitor for erosion, and complete minor repair & slope stabilization | CIP |
| 26. Increase identification and enforcement of actionable erosion and slope stabilization issues on private property and require stabilization and repair | General |
| 27. Require sweeping of private roads & parking lots in targeted areas | General |
| 28. Enhance street sweeping through equipment replacement and route optimization | General |
| 29. Initiate sweeping of medians on high-volume arterial roadways | General |
| 30. Complete dry weather flow separation and treatment projects per capital improvement plans | CIP |
| 31. Identify sewer leaks and areas for sewer pipe replacement prioritization. | General |
| 32. Centralized on Public | CIP |
| 33. Distributed on Public | CIP |
| 34. Green Streets | CIP |
| 35. Centralized on Private | CIP |
| 36. Planned BMP | CIP |

### 7.4.1 FY14 5 Year CIP and General Fund Budgetary Estimate

Table 7-7 shows the budget estimate from the two funding sources. The total budgetary estimate for 2014 is $212 million. Of the total, the budget from CIP is $150 million and the budget from general fund is $62 million. As a result of deferred replacement, first year costs are higher than subsequent year costs. As the backlog of replacement is worked through, the costs continue to reduce over time.

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**Table 7-7. FY 14 5 Year Budget Projection**

| Funding Sources | Spending Types | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|
| CIP | Maintenance (Channel) | 37,335,747.34 | 13,923,693.76 | 12,557,056.94 | 15,988,509.44 | 12,835,189.97 |
| | Hard Assets Replacement | 111,905,043.19 | 32,596,211.84 | 8,063,958.35 | 6,487,489.54 | 6,904,773.18 |
| | New Capital (LOS 13, Activities 25, 30-36) | 809,097.50 | 7,928,828.63 | 45,466,827.12 | 45,066,040.42 | 101,574,479.21 |
| | **Sub total** | **150,049,888.03** | **54,448,734.23** | **66,087,842.41** | **67,542,039.40** | **121,314,442.36** |
| General Fund | Maintenance | 39,427,140.91 | 49,711,997.25 | 59,483,227.67 | 47,128,786.78 | 56,054,196.52 |
| | Replacement (O&M equipment) | 15,603,210.86 | 143,558.27 | 687,128.44 | 1,104,092.28 | 1,937,711.45 |
| | New Capital (LOS 13, Activities 1-22, 26-29) | 3,505,400.73 | 1,883,333.33 | 2,912,539.13 | 1,183,333.33 | 2,351,754.40 |
| | CIP Program Management | 1,700,036.45 | 495,194.35 | 122,505.83 | 98,556.47 | 104,895.75 |
| | Permit (channel maintenance) | 1,984,986.01 | 2,579,503.56 | 2,481,232.52 | 2,783,719.74 | 3,473,725.52 |
| | **Sub total** | **62,220,774.97** | **54,813,586.77** | **65,686,633.59** | **52,298,488.60** | **63,922,283.64** |
| | **Grand Total** | **212,270,663.00** | **109,262,321.00** | **131,774,476.00** | **119,840,528.00** | **185,236,726.00** |

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# SECTION 8 FUNDING STRATEGIES: "HOW WILL WE PAY FOR IT?"

Once the anticipated needed funds are estimated to keep assets achieving LOS, it is necessary to determine how to fund the overall program. Funding mechanisms for the City's WAMP are described below.

## 8.1 CURRENT FUNDING LEVELS

The Division is predominately funded from the City's General Fund; revenue from storm drain fees and parking lot enforcement also provide funding. Bonds are used to finance capital projects, as necessary, and are repaid by the general fund. Revenue for the general fund is derived from property and sales taxes. The general fund is used to fund most City services, with the exception of enterprise-funded services, such as sewer and water. The Division is allocated funding based on storm water needs and the competing needs of other City departments, which include Police, Fire, Streets, Facilities, Parks, Special Events Centers, General Administration, and other City services.

Capital projects for storm drains system expansion to support new or redevelopment can be funded by the development fees charged to the developer. Current funding levels for the Division are not fixed and will fluctuate from year to year based on the City budget and economic conditions. In general, given the state of the storm drain system, the pending permit and TMDL compliance requirements, the Division is not funded at levels sufficient to meet LOS. The NPDES and TMDL compliance costs are generally new costs the City has incurred or will incur. Costs for compliance have been growing, and, with TMDLs, are expected to grow significantly as projected in this WAMP.

## 8.2 BUDGETARY SCENARIOS

Section 7 of this report identified the Division's future funding requirements to sustain the infrastructure and to meet levels of service. However, given the budgetary and resource limitations of the Division, budgetary scenarios were analyzed to better understand the impacts to the assets with respect to varying funding levels.

The long-range funding requirements were modeled depicting the two funding sources: CIP and general. CIPs are typically bond funded and are approved under a process where the capital needs of the Division are reviewed and compared to the capital needs of other Departments and Divisions. Bonds are repaid from the general fund and not charged against the Division's operating budget. As mentioned above, the general fund is competed for by other City services and the budget allocated to the Division can vary year to year. The same is true of CIP funds. For FY13, $34.5 million was allocated to the Division from the general fund. This budget covers all non-capital costs, including operations and maintenance. New capital infrastructure owned and operated by the Division requires budgetary increases to accommodate operations, maintenance, and permitting costs. The budgetary scenarios evaluated the funding levels needed to adequately meet the increased operations and maintenance needs created by the new Division operated infrastructure.

Six budgetary scenarios were performed to illustrate the impacts of insufficient funding with respect to work backlog. The summary of these scenarios is provided in Figure 8-1. Brief descriptions of each scenario follow:

Scenario 1 – Full Service Level Attainment – This scenario illustrates the case where available budget meets the program funding requirements.

Scenario 2 – Current Budget – This scenario presents the current situation of the Division and assumes the current budget remains consistent at $34.5 million.

Scenario 3 – Ramp up $2 million per year for the next 5 years – This scenario demonstrates a funding situation where the budget level is increased by $2 million for the next five years. After the fifth year, the annual budget will be fixed at $44.5 million.

Scenario 4 – Ramp up $6 million per year for the next 5 years – This scenario demonstrates a funding situation where the budget level is increased by $6 million for the next five years. After the fifth year, the annual budget will be fixed at $64.5 million.

Scenario 5 – Ramp up $8 million per year for the next 5 years – This scenario demonstrates a funding situation where the budget level is increased by $8 million for the next five years. After the fifth year, the annual budget will be fixed at $74.5 million.

Scenario 6 – Ramp up $10 million per year for the next 5 years – This scenario demonstrates a funding situation where the budget level is increased by $10 million for the next five years. After the fifth year, the annual budget will be fixed at $84.5 million.

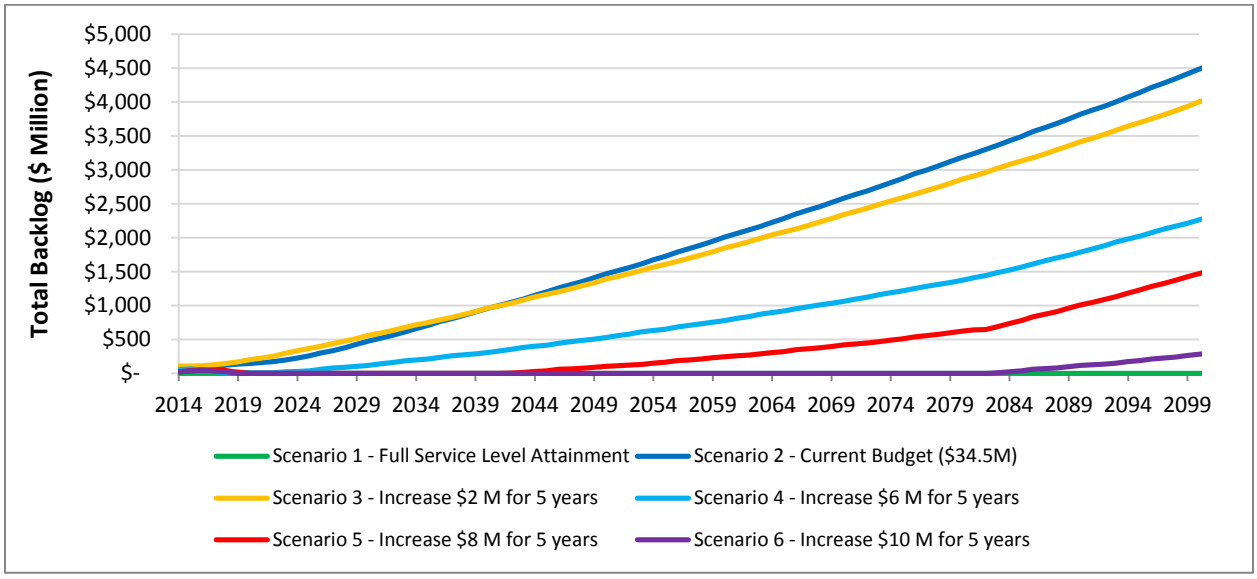


**Figure 8-1. Comparison of Funding Scenarios**

### 8.2.1 Full Service Level Attainment Scenario

Figure 8-2 below presents the long-range funding requirements for the Division. The CIP requirements are represented in blue and budget need from the general fund is represented in red.

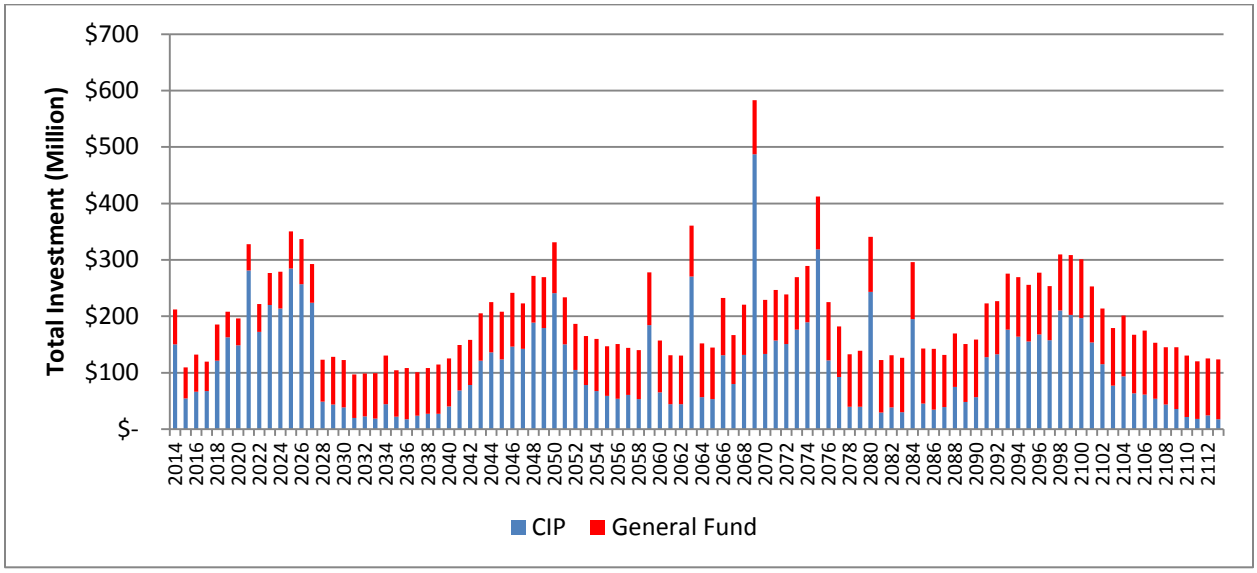


**Figure 8-2. Full Service Level Budget Projections**

Figure 8-3 presents the general fund requirements. As the results show, in general, the general fund budgetary need slowly increases with time. There are spikes, driven by increased need to maintain the newly constructed structural BMPs for TMDL compliance.

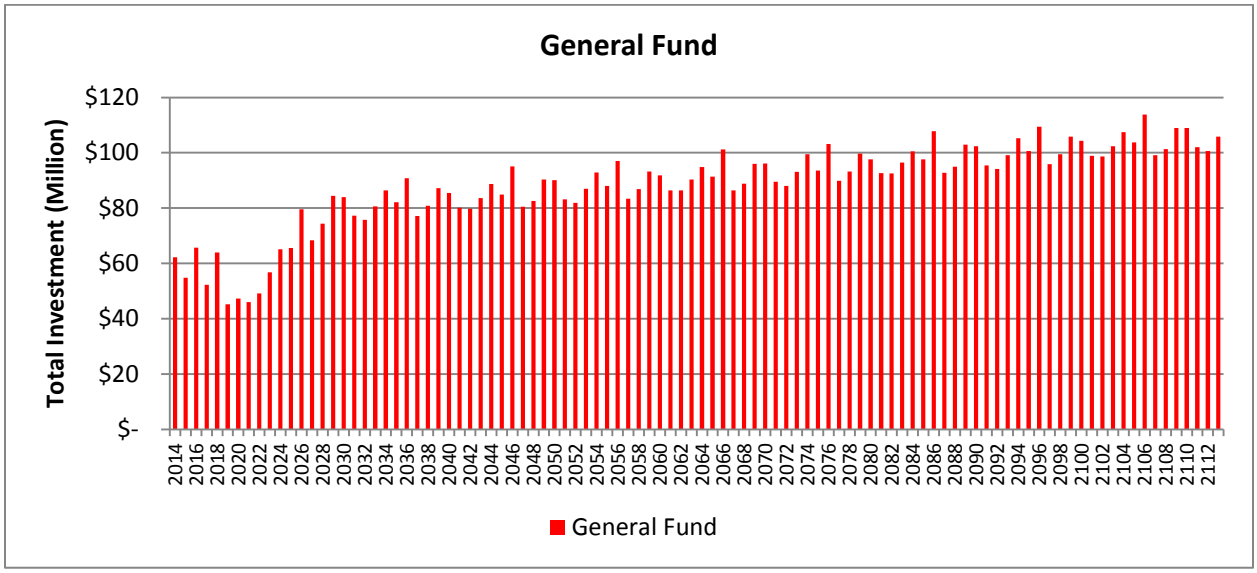


**Figure 8-3. Full Service Level General Fund Budget Requirements**

### 8.2.2 Current Budget

This scenario illustrates the impacts maintaining funding at the current budget ($34.5 million). In this scenario, it is assumed that the capital funding needed is provided, but the general fund allocation to operations and maintenance remains at current levels. As shown in Figure 8-4 below, the current budget is inadequate to accommodate the projected work requirements (budget deficit represented in red). Starting year 2014, each year, and the amount of work backlog accumulates due to insufficient funding. By year 2016, the unfunded work backlog reaches over $60 million. At this point, the scenario modeling was stopped because the future anticipated work requirements were not decreasing and, therefore, the deficit would only continue to increase.

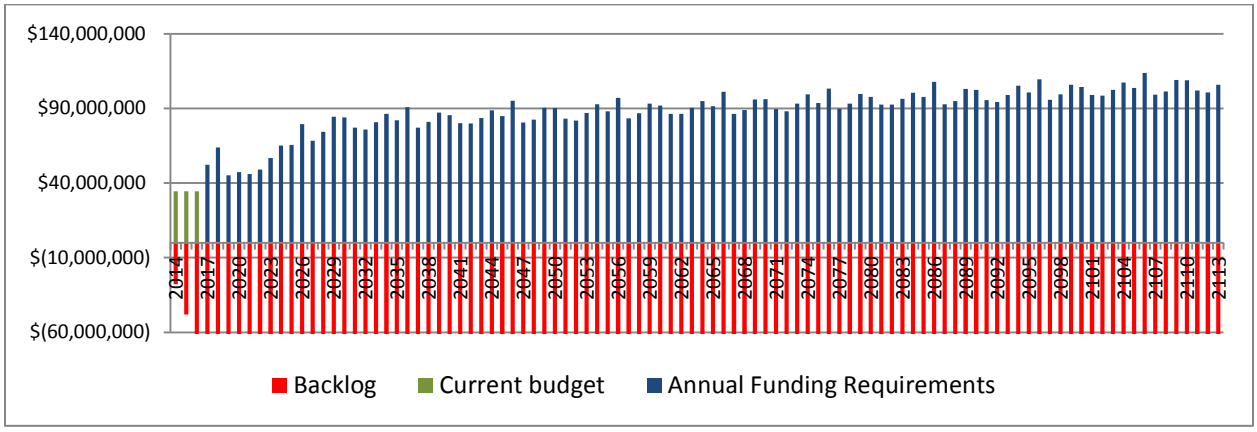


**Figure 8-4. Current Budget Backlog Projections**

### 8.2.3 Current Budget Plus $2M/YR for the Next 5 Years

In this scenario, the current budget is increased by $2 million each year for the next five years to result in an annual budget $10M greater than the current budget. After the fifth year, the budget will stay constant at $44.5 M. In this scenario assumes that any prior year's remaining budget will be carried into future years. In this scenario, it is assumed that the capital funding needed is provided, but the general fund allocation to operations and maintenance is increased as described and remains constant. As depicted in Figure 8-5 below, the additional budget does not help to reduce the backlog. By year 2017, the unfunded work backlog has reached over $60 million. At this point, the scenario modeling was stopped because the future anticipated work requirements were not decreasing and, therefore, the deficit would only continue to increase.

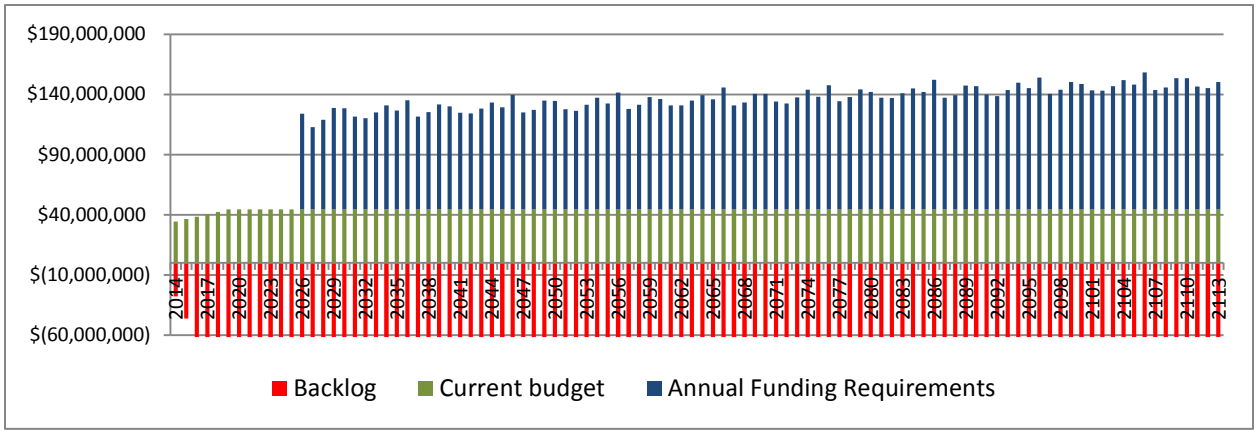


**Figure 8-5. Backlog Projections at Current Budget Plus $10 M**

### 8.2.4 Current Budget Plus $6M/YR for the Next 5 Years

In this scenario, the current budget is increased by $6 million each year, starting next year, for the next five years to result in an annual budget $30 M greater than the current budget. After the fifth year, the budget will stay constant at $64.5 M. In this scenario assumes that any prior year's remaining budget will be carried into future years. In this scenario, it is assumed that the capital funding needed is provided, but the general fund allocation to operations and maintenance is increased as described and remains constant. The results of this scenario are presented in Figure 8-6 below. While the backlog seems to reduce in 2020 to 2026, it increases to over $60 M by 2029. At this point, the scenario modeling was stopped because the future anticipated work requirements were not decreasing and, therefore, the deficit would only continue to increase.

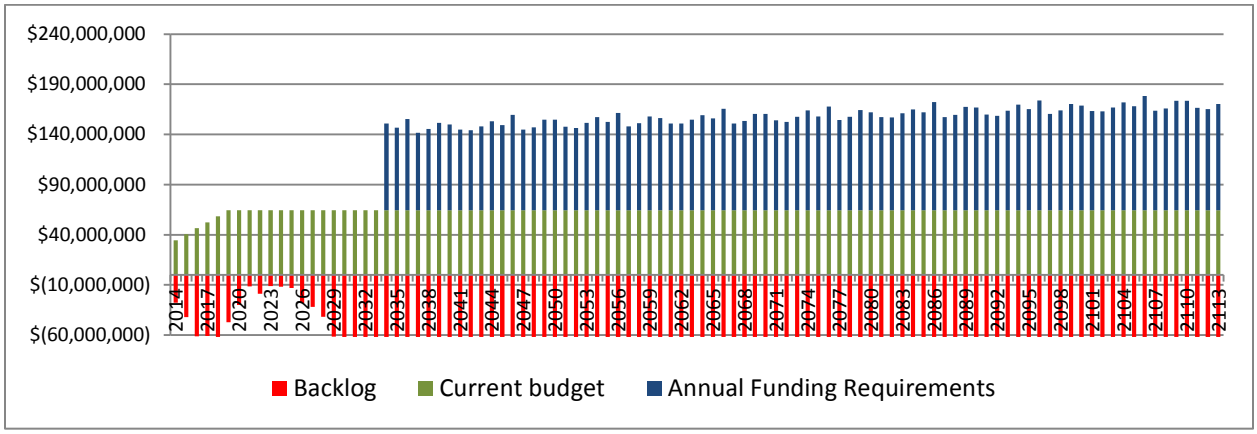


**Figure 8-6. Backlog Projections at Current Budget Plus $30 M**

### 8.2.5 Current Budget Plus $8M/YR for the Next 5 Years

In this scenario, the current budget is increased by $8 million each year, starting next year, for the next five years to result in an annual budget $40 M greater than the current budget. After the fifth year, the budget will stay constant at $74.5 M. In this scenario assumes that any prior year's remaining budget will be carried into future years. In this scenario, it is assumed that the capital funding needed is provided, but the general fund allocation to operations and maintenance is increased as described and remains constant. The results of this scenario are presented in Figure 8-7 below. The impact of the immediate increase in budget is dramatic. The scenario demonstrates that immediately increasing the annual budget by $8 million for the next five years greatly reduces the amount of work backlog accumulated. However, for years 2014 to 2019, increase of $8 million per year is still not sufficient. Work backlog still accumulates during those years. However, the increased budget starts to benefit after year 2017 where the work backlog starts to diminish. By year 2020, at the annual budget of $74.5 million, the work backlog is eliminated. However, in 2041, the work deficit re-appears and work becomes backlogged again with the backlog increasing thereafter.

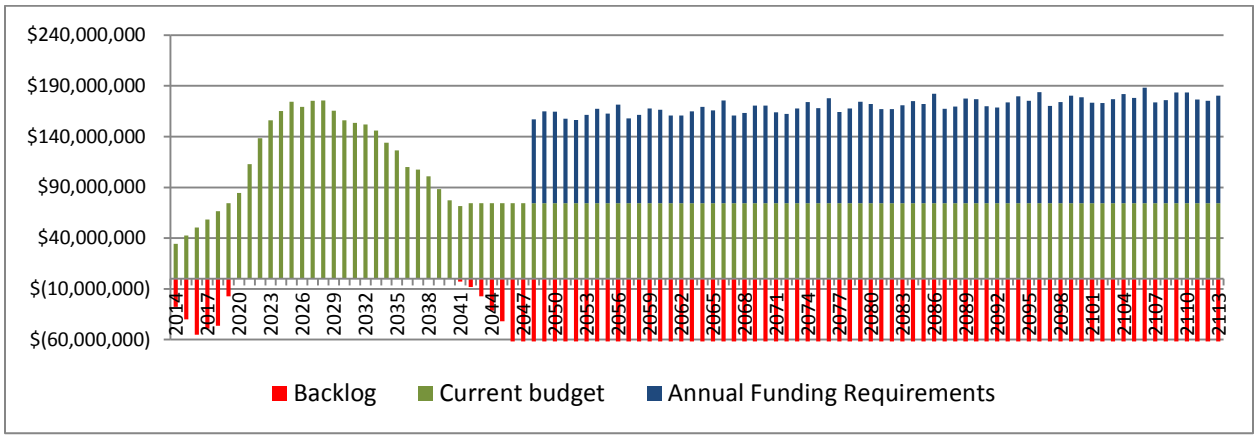

**Figure 8-7. Backlog Projections at Current Budget Plus $40 M**

### 8.2.6 Current Budget Plus $10M/YR for the Next 5 Years

In this scenario, the current budget is increased by $10 million each year, starting next year, for the next five years to result in an annual budget $50 M greater than the current budget. After the fifth year, the budget will stay constant at $84.5 M. In this scenario assumes that any prior year's remaining budget will be carried into future years. In this scenario, it is assumed that the capital funding needed is provided, but the general fund allocation to operations and maintenance is increased as described and remains constant. The results of this scenario are presented in Figure 8-8 below. The impact of the immediate increase in budget is dramatic. The scenario demonstrates that immediately increasing the annual budget by $10 million for the next five years greatly reduces the amount of work backlog accumulated. However, for years 2014 to 2018, increase of $10 million per year is still not sufficient. Work backlog still accumulates during those years. However, the increased budget starts to benefit after year 2017 where the work backlog starts to diminish. By year 2019, at the annual budget of $84.5 million, the work backlog is eliminated. However, in 2082, the work deficit re-appears and work becomes backlogged again with the backlog increasing thereafter.

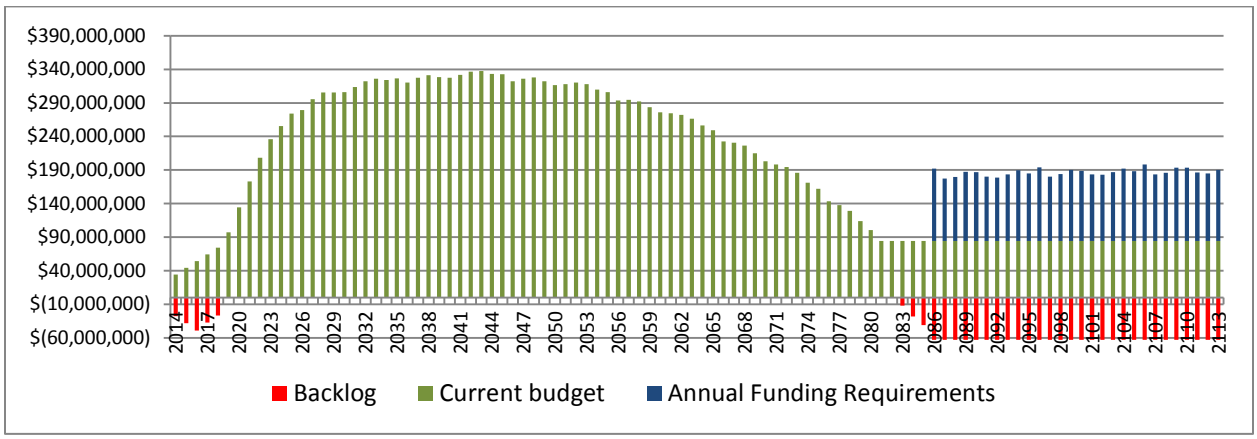


**Figure 8-8. Backlog Projections at Current Budget Plus $50 M**

## 8.3 FUTURE STRATEGIES

Methods that can be used to fund elements of the storm water program are summarized below.

- Transferring payments from water enterprise funds for water captured and used beneficially that offsets the demand for potable water.
- Developing a parcel assessment based on the pollutant discharge potential for City parcels. Unless legislation changes, this would require a property owner vote per the requirements of Proposition 218.

- Developing a general or sales tax to fund water quality program elements. Unless legislation changes, this would require a popular vote per the requirements of Proposition 218.
- Including water quality improvement requirements in transportation bond funds or transportation revenue initiatives promoted by the City, County, or San Diego County Association of Governments. This would allow for road improvement projects to incorporate green street features or other stormwater BMPs. Note that a substantial number of streets converted to green streets can achieve TMDL compliance. As streets are maintained, converting them to green streets will prevent the need for incorporating additional BMPs to achieve TMDL compliance.
- Increasing penalties for illegal discharges identified through the City's inspection and enforcement program.
- Increasing the restrictions on pollutant discharges per City ordinances so that there are greater numbers of citations and fines issued.
- Developing a gasoline tax that funds water quality improvements. This would require compliance with Proposition 218. It can be justified based on the fact that the bulk of pollutants come from vehicular traffic.
- Increasing park and beach access and parking fees to pay for water quality improvement programs that improve the healthfulness of parks and beach areas.
- Expanding grants for capital projects as applicable.
- Charging development fees for new and redevelopment that include:
  - funds for BMP projects to treat runoff from the new development,
  - funds placed in trust to fund operations and maintenance of new BMPs or improved storm drain systems, and
  - funds for improving the storm drain system to support the new or redevelopment.
- Combining two or more of the above options.

As can be seen, funding the storm water program is likely to require new revenue to the City because the NPDES and TMDL compliance requirements are new and were not historically considered when the City was developing its tax rates prior to Propositions 13 and 218. The TMDL compliance costs are expected to escalate dramatically and funding the projects from current revenues is likely infeasible.

The options available for developing new revenues generally require that the voters approve the additional costs. There may be some additional avenues to generate new revenues, such as through development fees. However, these will not likely be sufficient to fund full TMDL compliance.

# SECTION 9 ASSET MANAGEMENT IMPROVEMENT PLAN

The following paragraphs describe the components of the Asset Management Improvement Plan.

## 9.1 CONFIDENCE LEVEL RATING

The confidence-level rating (CLR) is used not only to measure the current asset management practice, but also to identify and prioritize future improvements. The confidence level rating provides a measure by which the Division can track the improvement of the WAMP and the associated management decisions.

In developing a first iteration WAMP, an organization will seldom have perfect data to support the asset portfolio. As illustrated in Figure 9-1, asset management is a process of continuous improvement. The Division can make improvements to the WAMP as the quantity and quality of data improves. The Division realized that data were not available across the asset types and classes, and may not be as accurate as desired. Through the WAMP development process, the Division gained a better understanding of the data gaps and developed mitigation plans to improve the overall data quality. Any assumed data will be superseded by actual data when it becomes available. As the first iteration, it is typical that the WAMP has a confidence level rating score of 60% or below. In addition, the confidence level varies over the planning horizon, as the planning period is extended (short-range versus long-range), the accuracy of the predictions decreases. For example, the confidence level for a 10-year projection will be much higher than with a projection of 80 to 100 years. It is important to have a high confidence level in early years (years 1 through 10), as the WAMP will form the basis for future capital and operational investment programs.

The CLR is based on the following key elements. These key elements play a critical role in the accuracy of the future renewal funding requirements projection and the acceptance of the asset management plan.

1. Asset Inventory – Measures the completeness of the asset data. (Did the asset register include the assets owned by the Division?)
2. Data Quality – Measures the quality and completeness of the data attributes used to develop the AMP. (How many data assumptions were used to complete the asset management plan?)
3. Asset Hierarchy – Measures the quality of the asset hierarchy used to develop the WAMP. (How effective and efficient is the asset hierarchy used to develop the asset management plan?)
4. Asset Replacement Cost – Measures the accuracy of the estimated replacement costs of the assets and systems. (How accurate is the estimated replacement cost of the asset?)
5. Management Strategies – Measures the accuracy of the management strategies and renewal strategies used in the WAMP. (How representative is the useful life?).
6. Business Risk Exposure – Measures the accuracy of the risk assessment performed. (Is the risk assessment representative of the actual risks facing the organization?).

7. Levels of Service – Measures the quality and efforts of developing the LOS to track the performance of the WAMP. (Were the levels of service identified across major asset systems? Do the levels of service link to actual asset performance?).

8. Staff Participation & Buy-In – Captures the personnel involvement in developing the WAMP and their acceptance in the quality of the asset management plan. (During the development phase, were key members of the Division's staff involved? Is the staff accepting the results of the asset management plan?).

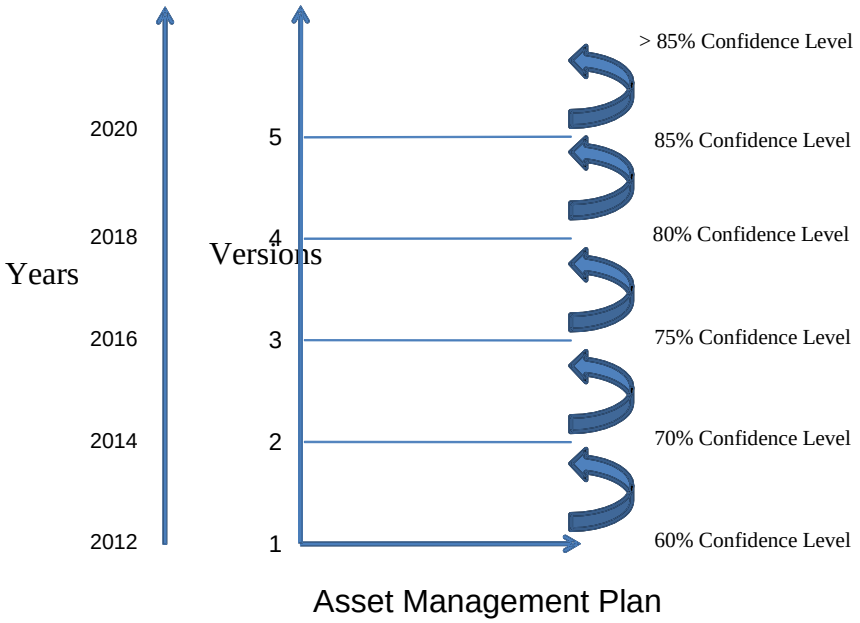


**Figure 9-1. Continuous Improvement Process**

Each CLR element listed above is assigned a weighting factor. The weighting factor quantifies the criticality of the key element with respect to the overall accuracy and quality of the WAMP. For example, the weighting of asset hierarchy is much lower than data quality, since the asset hierarchy only affects the organization of data and does not directly impact the accuracy of the future renewal funding requirement projections. Table 9-1 presents the primary weighting for each of the key CLR elements.

**Table 9-1. Primary, Secondary, and Tertiary Weighting**

| Key Confidence Level Elements | Primary Weighting |
|---|---|
| Asset Inventory | 15% |
| Data Quality | 15% |
| Asset Hierarchy | 5% |
| Asset Replacement Cost | 15% |
| Management Strategies | 20% |
| Business Risk Exposure | 10% |
| Levels of Service | 10% |
| Staff Participation and Staff Buy-in | 10% |
| Average Confidence Level Rating | 100% |

A secondary weighting adjusts the importance of different asset types (i.e., hard assets, soft assets, and natural assets) with respect to one another within the same key element. The tertiary weighting is applied among the different asset classes within each asset types. Currently, an equal weight is assigned to each asset type and asset classes within asset type. The actual CLR itself is assessed at the asset class level. Table 9-2 shows the complete list of asset types and asset classes with their associated secondary and tertiary weighting.

**Table 9-2. CLR Secondary and Tertiary Weighting**

| Asset Types/Asset Classes | Secondary Weighting | Tertiary Weighting |
|---|---|---|
| **Hard Assets** | 33% | |
| Conveyance | | 25% |
| Structures | | 25% |
| Pump Station | | 25% |
| Equipment | | 25% |
| **Soft Assets** | 33% | |
| City Department Behavior | | 11% |
| Public Non-structural BMPs | | 11% |
| Good Will, Relationships, Credibility | | 11% |
| Land Development Regulations | | 11% |
| Private Non-structural BMPs | | 11% |
| Ordinances, Standards, Requirements | | 11% |
| Public Behavior | | 11% |
| Policies and Procedures for other City Departments | | 11% |
| Regulatory Policy | | 11% |
| **Natural Assets** | 33% | |
| LOS 04 - Monitoring Activity | | 14% |
| LOS 13a - Dry Weather BMPs | | 14% |
| LOS 13b - Wet Weather BMPs | | 14% |
| LOS 14 - Receiving Waters | | 14% |
| LOS 18 – MHPA | | 14% |
| LOS 19 - City Property | | 14% |
| LOS 47 - Permit Monitoring | | 14% |

**Acronyms:**

BMP – best management practice

LOS – level of service

MHPA - multiple-habitat planning area

The confidence level rating is assessed at the asset type level. Each of the key confidence level elements has a maximum score of 100% (full confidence). Tables 9-3 to 9-6 show the completed assessment scores for hard, soft, and natural assets.

For hard assets, the Equipment asset class has the best confidence level rating with a score of 72 percent. This can be attributed to a significantly high data quality (80 percent). However, with regard to asset hierarchy, Equipment has the lowest score because the Division has not yet decided on a proper way to distribute types of equipment and their associated costs to all watersheds. The asset class with the lowest confidence level score is Storm Water Structures (54 percent), primarily due to low data quality (e.g., missing size, install years, type) and the resulting asset replacement costs.

**Table 9-3. Confidence Level Rating Assessment for Hard Assets**

| Key Confidence Level Elements | Hard Assets | | | |
|---|---|---|---|---|
| | Conveyance | Structures | Pump Stations | Equipment |
| Asset Inventory | 90% | 70% | 80% | 85% |
| Data Quality | 50% | 40% | 60% | 80% |
| Asset Hierarchy | 90% | 90% | 90% | 70% |
| Asset Replacement Costs | 50% | 40% | 60% | 80% |
| Management Strategies | 60% | 60% | 50% | 60% |
| Business Risk Exposure | 50% | 40% | 60% | 50% |
| Levels of Service | 70% | 60% | 40% | 70% |
| Staff Participation & Buy-in | 80% | 50% | 80% | 80% |
| Average | 65% | 54% | 63% | 72% |

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For soft assets, Land Development Regulations, Ordinances, Standards, Requirements, and Policy and Procedures for other City Departments have the best confidence level rating with an average score of 75 percent. This can be attributed to significantly high data quality (90 percent), which, in turn, resulted in a good prediction of asset valuation. For the rest of the asset classes, the confidence level is lower because of the low asset valuation confidence; asset valuation confidence is low because many assumptions were used in the valuation process.

**Table 9-4. Confidence Level Rating Assessment for Soft Assets**

| Key Confidence Level Elements | Soft Assets | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | City Department Behavior | Public Non-structural BMPs | Good Will, Relationships, Credibility | Land Development Regulations | Private Non-structural BMPs | Ordinances, Standards, Requirements | Public Behavior | Policies and Procedures for other City Departments | Regulatory Policy |
| Asset Inventory | 90% | 90% | 90% | 90% | 90% | 90% | 90% | 90% | 90% |
| Data Quality | 75% | 75% | 80% | 90% | 80% | 90% | 80% | 90% | 55% |
| Asset Hierarchy | 90% | 90% | 90% | 90% | 90% | 90% | 90% | 90% | 90% |
| Asset Valuation | 30% | 30% | 30% | 70% | 30% | 70% | 30% | 70% | 30% |
| Management Strategies | 60% | 60% | 50% | 70% | 60% | 60% | 50% | 60% | 60% |
| Business Risk Exposure | 60% | 60% | 60% | 60% | 60% | 60% | 60% | 60% | 60% |
| Levels of Service | 60% | 60% | 60% | 60% | 60% | 60% | 60% | 60% | 60% |
| Staff Participation and Buy-In | 80% | 80% | 80% | 80% | 80% | 80% | 80% | 80% | 80% |
| **Average** | **66%** | **66%** | **65%** | **76%** | **67%** | **74%** | **65%** | **74%** | **63%** |

For natural assets, LOS 18 (MHPA), LOS 19 (City Property), and LOS 47 (Permit Monitoring) have the best confidence level rating with an average score around 78 percent. This can be attributed to significantly high asset inventory (80 - 95 percent) and data quality (80 - 90 percent) which, in turn, resulted in a good prediction of asset valuation. On the other hand, LOS 13a and 13b have the lowest confidence level rating of 58 percent mostly due to the lack of asset inventory and hierarchy.

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**Table 9-5. Confidence Level Rating Assessment for Natural Assets**

| Key Confidence Level Elements | LOS 04 - Monitoring Activity | LOS 13a - Dry Weather BMPs | | | | | | LOS 13b - Wet Weather BMPs | | | | | | LOS 14 - Receiving Waters | LOS 18 - MHPA | LOS 19- City Property | LOS 47- Permit Monitoring |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Non-structural | Centralized on Public | Distributed on Public | Green Streets | Centralized on Private | Avg. | Non-structural | Centralized on Public | Distributed on Public | Green Streets | Centralized on Private | Avg. | | | | |
| Asset Inventory | **90%** | 65% | 80% | 65% | 70% | 10% | **58%** | 65% | 80% | 65% | 70% | 10% | **58%** | **95%** | **95%** | **80%** | **90%** |
| Data Quality | **50%** | 40% | 75% | 65% | 60% | 10% | **50%** | 40% | 75% | 65% | 60% | 10% | **50%** | **50%** | **90%** | **80%** | **80%** |
| Asset Hierarchy | **20%** | 75% | 60% | 20% | 0% | 0% | **31%** | 75% | 60% | 20% | 0% | 0% | **31%** | **20%** | **90%** | **90%** | **20%** |
| Asset Valuation | **50%** | 65% | 70% | 70% | 65% | 20% | **58%** | 65% | 70% | 70% | 65% | 20% | **58%** | **70%** | **70%** | **70%** | **90%** |
| Management Strategies | **70%** | 80% | 80% | 80% | 80% | 80% | **80%** | 80% | 80% | 80% | 80% | 80% | **80%** | **70%** | **70%** | **70%** | **90%** |
| Business Risk Exposure | **60%** | 25% | 30% | 40% | 75% | 90% | **52%** | 25% | 30% | 40% | 75% | 90% | **52%** | **60%** | **75%** | **75%** | **60%** |
| Levels of Service | **75%** | 80% | 85% | 80% | 80% | 80% | **81%** | 80% | 85% | 80% | 80% | 80% | **81%** | **75%** | **90%** | **90%** | **75%** |
| Staff Participation & Buy-In | **80%** | 75% | 75% | 75% | 25% | 5% | **51%** | 75% | 75% | 75% | 25% | 5% | **51%** | **80%** | **80%** | **80%** | **70%** |
| **Average CLR** | **62%** | **63%** | **69%** | **62%** | **57%** | **37%** | **58%** | **63%** | **69%** | **62%** | **57%** | **37%** | **58%** | **65%** | **83%** | **79%** | **72%** |

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Table 9-6 shows the summary of confidence level ratings of the Division's 2013 WAMP. The average confidence level rating score for all asset types is 64%. This score is within the expected range for a first iteration of asset management plan. This can be attributed to the fact that hard and natural assets have significantly lower data quality. The current asset valuation gets a lower rating due to data limitation (i.e., more assumption made during asset valuation). It is recommended that the Division focus on enhancing the natural asset inventory and improve the data valuation (better define the individual treatment control BMPs needed to comply with TMDLs and establish more confident cost estimates).

**Table 9-6. 2013 Confidence Level Rating**

| Key Confidence Level Elements | CLR by Asset Type | | | Primary Weighting | Weighted CLR |
|---|---|---|---|---|---|
| | Hard Assets | Soft Assets | Natural Assets | | |
| | 33% | 33% | 33% | | |
| Asset Inventory | 81% | 90% | 66% | 15% | 79% |
| Data Quality | 58% | 79% | 54% | 15% | 64% |
| Asset Hierarchy | 85% | 90% | 34% | 5% | 70% |
| Asset Valuation | 58% | 43% | 53% | 15% | 51% |
| Management Strategies | 58% | 59% | 67% | 20% | 61% |
| Business Risk Exposure | 50% | 60% | 60% | 10% | 57% |
| Levels of Service | 60% | 60% | 54% | 10% | 58% |
| Staff Participation & Staff Buy-In | 73% | 80% | 80% | 10% | 78% |
| **Average CLR** | **63%** | **68%** | **61%** | **100%** | **64%** |

Figure 9-2 presents the aggregate confidence level rating results for each key element organized by asset types. This figure can be used to track the performance of each key element for each asset type. In general, the confidence level for asset valuation, business risk exposure, and levels of service are lower than other key elements. However, the Division has a relatively good asset inventory and strong staff participation. By continuing the efforts to improve data quality, the Division should be able to improve the overall confidence level rating in the next iteration.

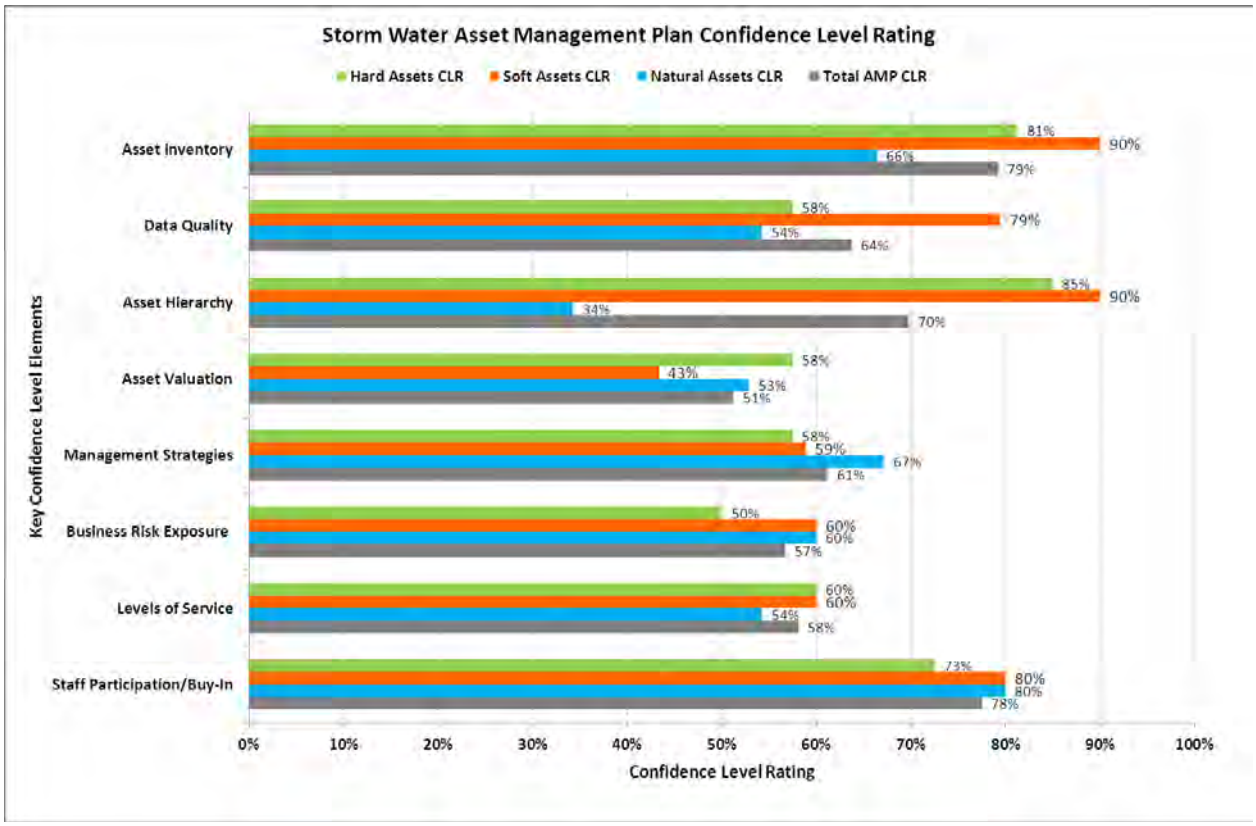


**Figure 9-2. 2013 Confidence Level Rating**

# SECTION 10 RECOMMENDATIONS

Based on information presented in Sections 1 through 9 of this WAMP, recommendations were developed for the assets within each watershed regarding the actions to be taken and projects to be completed to manage the assets to achieve LOS. Overall, a number of activities are needed to improve the overall asset management planning program. A number of uncertainties exist regarding the condition of the assets, the ability of assets to achieve LOS, and the projects necessary for the assets to achieve LOS. These uncertainties are applicable City-wide. The general recommendations provided below can be applied and generally are a high priority in order for the Division to become more proactive in managing assets to achieve LOS.

1. Continue to improve the asset management plan on an annual basis by refining data to increase the level of confidence, and to effectively manage assets at the appropriate hierarchy.
2. Continue to develop a drainage master plan that assesses the hydraulic capacity of the storm drain pipes and inlets, and identifies under-capacity areas and the degree to which they are under capacity.
3. During all planning efforts – flood risk management, NPDES compliance, and TMDL implementation, create cross-functional teams that seek out opportunities to find synergy between projects and program elements that achieve multiple benefits of flood risk management and water quality improvement, if feasible.
4. Complete the Water Quality Improvement Plans and further refine the scheduling of the planning/design and construction costs for CLRP/WQIP BMPs to achieve water quality compliance.
5. While doing routine field inspections, measure the following and input this information into the GEO-SAP system:
   - inlet size and material,
   - pipe size, invert depths, and material,
   - channel size, geometry, material, and depths.
6. Continue to conduct condition assessments of assets (e.g., outfalls) and incorporate the results into future WAMP updates.
7. Include right-of-way as assets in WAMP updates for use as potential future BMPs (e.g. green streets).
8. For mitigation sites developed in response to permitting or other environmental requirements, capture the mitigation sites as assets with specific levels of service tied to the mitigation requirements and project life cycle costs for such assets in the updated WAMPs.
9. Allocate O&M budgets by asset categories and watershed to the extent practicable. Set up a staff charging system that aligns staff time and expenses to specific assets. This will allow for better tracking of costs to perform O&M activities needed to maintain asset LOS.

10. Refine cost categories during future WAMP updates to allocate planning costs, which includes environmental document development and reviews, for capital and maintenance projects into operations and maintenance and program budgets rather than capital budgets, as appropriate.
11. Apply the WAMP to proactively drive future decisions and actions.
12. Document business process flows (e.g., Division budget planning process, etc.) and capture critical asset data and processes. By doing so, the Division will be able to identify areas of potential efficiency gains and specific resources needed to perform the activities.
13. Continue refining the asset inventory (i.e., specific assets) and apply the process down to the appropriate level of the asset hierarchy.
14. Develop and incorporate a process or structure to stratify CLRP activities that are associated with LOS 13a and 13b. Each CLRP activity should be established as a tertiary LOS.
15. Review high risk (based on BRE score) assets shown in each appendix and develop management strategies to promote efficiency to lower risk.
16. Identify assets where additional maintenance or rehabilitation would cost effectively extend that asset's useful life. Adequate and timely maintenance will result in maintaining the asset's level of service.
17. Educate and train staff on the implementation of the WAMP.
18. Perform a cost of service study and identify a dedicated funding source.

In addition to these general recommendations, several recommendations are watershed-specific. These recommendations are presented in Appendices A through F.

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# Appendix A San Diego Bay Watershed

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# A.1 INTRODUCTION

The San Diego Bay 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 San Diego Bay WMA. The San Diego Bay 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 San Diego Bay watershed, and provide a vehicle for public participation.

## A.1.1 San Diego Bay Watershed Description

The San Diego Bay WMA consists of three separate watersheds and encompasses a 415-square-mile area that extends to the east from San Diego Bay for more than 50 miles to the Laguna Mountains. The WMA ranges in elevation from sea level at San Diego Bay to a maximum elevation of approximately 6,000 feet above sea level at the eastern boundary. The majority of the WMA land area generally lies north of the Tijuana River WMA, south of the San Diego River WMA, west of the Anza Borrego WMA, and west to the Pacific Ocean. The headwaters of the WMA begin in the unincorporated area of the County of San Diego (County), and then transect all or portions of seven cities, namely San Diego, National City, Chula Vista, Imperial Beach, Coronado, Lemon Grove, and La Mesa. Table A-1 provides data on the percentage of each jurisdiction within the WMA at the watershed and sub-watershed level, and Figure A-1 shows the City's jurisdiction within the watershed. The Water Quality Control Plan for the San Diego Basin (Basin Plan) prepared by the RWQCB (SDRWQCB, 1994) defines the San Diego Bay WMA as consisting of three watersheds (or hydrological units [HUs]), namely the Pueblo San Diego Watershed, the Sweetwater Watershed, and the Otay Watershed.

**Table A-1. San Diego Bay WMA Jurisdictional Breakdown**

| Jurisdiction | Percentage of Jurisdictional Acreage per HU | | | % of Jurisdictional Acreage within WMA |
|---|---|---|---|---|
| | Pueblo San Diego (35,941 ac.) | Sweetwater (148,040 ac.) | Otay (98,352 ac.) | |
| San Diego County Regional Airport Authority | 1.29 | | | 0.16 |
| Chula Vista | | 9.44 | 17.71 | 11.12 |
| Coronado | | | 4.70 | 1.64 |
| Imperial Beach | | | 0.71 | 0.25 |
| La Mesa | 4.49 | 0.77 | | 0.97 |
| Lemon Grove | 4.58 | 0.58 | | 0.89 |
| National City | 6.93 | 1.23 | | 1.53 |

**Table A-1. San Diego Bay WMA Jurisdictional Breakdown**

| Jurisdiction | Percentage of Jurisdictional Acreage per HU | | | % of Jurisdictional Acreage within WMA |
|---|---|---|---|---|
| | Pueblo San Diego (35,941 ac.) | Sweetwater (148,040 ac.) | Otay (98,352 ac.) | |
| Port of San Diego | 3.31 | 0.47 | 1.59 | 1.22 |
| San Diego | 79.07 | 1.38 | 5.77 | 12.80 |
| Unincorporated | 0.34 | 86.12 | 69.52 | 69.42 |

**Acronyms**:
ac. – acres
HU – hydrologic unit
WMA – watershed management area

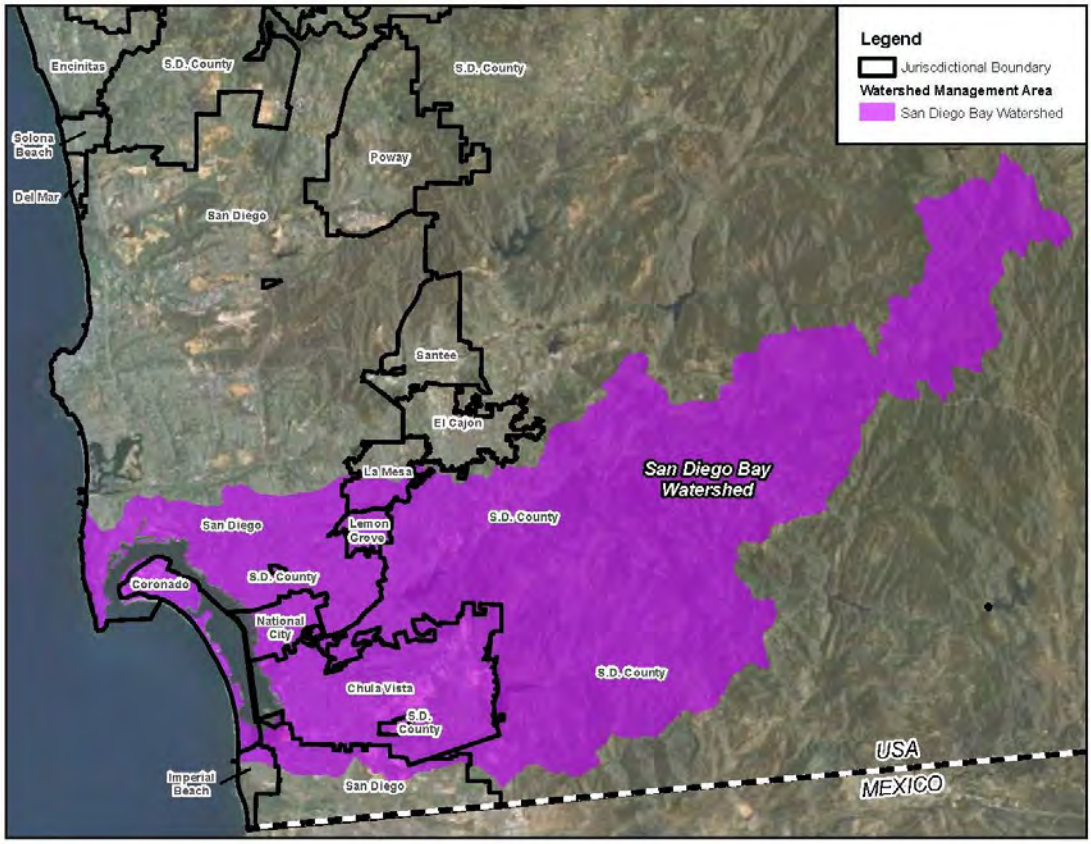


**Figure A-1. San Diego Bay Watershed**

San Diego Bay is the largest tidewater in the County and has been extensively developed as a port. It covers 10,532 acres of water and 4,419 acres of tidelands. Only 17 to 18 percent of the original bay floor remains undisturbed by dredge or fill. The major watercourses feeding San Diego Bay include the Sweetwater River, the Otay River, Chollas Creek, Paleta Creek, Paradise Creek, and Switzer Creek. The majority of freshwater input to San Diego Bay is from surface runoff from urban areas, and intermittent flow from these rivers and creeks during rain events. It should also be noted that dams and extensive use of groundwater in the Sweetwater and Otay Rivers has reduced the input from these rivers to San Diego Bay by seventy-six percent (76%). Additionally, there are more than 200 storm drains that discharge into San Diego Bay.

The San Diego Bay WMA contains a diverse assemblage of natural communities. Pine forests and oak woodlands found in the mountains form the headwaters of the Sweetwater and Otay Rivers. These forests are managed primarily for recreation and preservation, with campgrounds, off-road biking and hiking trails, and scenic overlooks. The Cleveland National Forest and Cuyamaca Rancho State Park are other public lands found in the watershed. Grassland meadows in these areas provide vegetation for wildlife, horses, and cattle. In the central part of the watershed, riparian vegetation containing willow, cottonwood, and sycamore trees provides habitat for the endangered least Bell's vireo. Hillsides along the river are covered with dense growths of chaparral vegetation and coastal sage scrub vegetation. Coastal sage scrub in this area provides habitat for one of the largest known populations of the threatened California gnatcatcher. In the western part of the watershed, the confluence of the Sweetwater River and the San Diego Bay forms a coastal salt marsh and brackish marsh. These marshes provide habitat for the light-footed clapper rail, the western snowy plover, Belding's savannah sparrow, and brown pelicans. Ninety percent of the original salt marshes and 50 percent of the original mudflats around San Diego Bay have been filled or dredged for development. The endangered California least tern and the threatened green sea turtle are just two of the many species that find suitable habitat in and around San Diego Bay itself.

#### *A.1.1.1 Pueblo San Diego Watershed (908)*

The Pueblo San Diego Watershed encompasses an area of approximately 60 square miles with no central stream system. San Diego River Watershed borders it to the north and the Sweetwater River Watershed borders it to the south (Figure A-1). The major population center is the City of San Diego. The Basin Plan identifies the Pueblo San Diego Watershed as the smallest of the three San Diego Bay watersheds, covering approximately 36,000 acres. It is comprised of three hydrologic areas (HAs): Point Loma (908.1), San Diego Mesa (908.2), and National City (908.3). Major water features include Chollas Creek, Paleta Creek, and San Diego Bay. The majority of the water from the Pueblo San Diego Watershed drains to San Diego Bay, although a portion of the Point Loma HA drains directly to the Pacific Ocean.

#### *A.1.1.2 Sweetwater Watershed (909)*

The Sweetwater Watershed encompasses approximately 230 square miles, with the Sweetwater River comprising the central drainage system. As shown in Figure A-1, the Pueblo San Diego Watershed is located to the north of the Sweetwater Watershed and the Otay Watershed is located to the south. The most urbanized parts of the Sweetwater Watershed include portions of the city of Chula Vista, city of Lemon Grove, National City, and the unincorporated communities of Spring Valley and Rancho San Diego. The Basin Plan identifies the Sweetwater Watershed as the largest of the three San Diego Bay

watersheds, encompassing over 148,000 acres. The watershed is comprised of three HAs: Lower Sweetwater (909.1), Middle Sweetwater (909.2), and Upper Sweetwater (909.3). Major water bodies within the Sweetwater Watershed include the Sweetwater River, Sweetwater Reservoir, Loveland Reservoir, and San Diego Bay, all of which support important wildlife habitat and provide public recreational opportunities.

#### *A.1.1.3 Otay Watershed (910)*

The Otay Watershed encompasses approximately 180 square miles, with the Otay River comprising the central drainage system (Figure A-1). The Sweetwater Watershed is located to the north and the Tijuana River Watershed is located to the south. The major population centers for the Otay Watershed include the city of San Diego, city of Imperial Beach, and city of Chula Vista. The Basin Plan identifies the Otay Watershed as the second largest of the three San Diego Bay watersheds. It is comprised of three HAs: Coronado (910.1), Otay (910.2), and Dulzura (910.3). The Otay Watershed consists of approximately 98,500 acres. Major water bodies include the Upper and Lower Otay Reservoirs, Otay River, and San Diego Bay. The two major reservoirs in the Otay Watershed supply water, important wildlife habitat, and recreational opportunities. A large percentage of the water within the Otay Watershed is actually imported from Morena and Barrett Reservoirs, which are physically located in the Tijuana River Watershed. The Dulzura flume delivers water from the Barrett Reservoir to DuIzura Creek in the Otay Watershed. Morena Reservoir is connected to Barrett Reservoir by Cottonwood Creek. Water in DuIzura Creek drains into the Lower Otay Reservoir, which is owned and operated by the City.

### A.1.2 San Diego 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 San Diego Bay Watershed:

- Ruth Kolb
- Daniel Lottermoser

### A.1.3 Water Quality

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

[1] San Diego Bay Watershed Urban Runoff Management Program, 2009-2010 Annual Report, City of Chula Vista, City of Coronado, City of Imperial Beach, City of La Mesa, City of Lemon Grove, City of National City, City of San Diego, County of San Diego, Port of San Diego, San Diego County Regional Airport Authority.

**Table A-2. San Diego Bay Watershed Baseline High-priority Water Quality Problems**

| Hydrologic Area | Bacteria | Gross Pollutants | Metals | Oil and Grease | Pesticides | Sediment | Trash |
|---|---|---|---|---|---|---|---|
| **Pueblo San Diego Hydrologic Unit** | | | | | | | |
| 908.1 | X | X | X | X | X | | |
| 908.2 | X | | X | | X | X | X |
| 908.3 | X | | | | | X | X |
| **Sweetwater Hydrologic Unit** | | | | | | | |
| 909.1 | X | | | | | | |
| 909.2 | | | | | X | | |
| 909.3 | | | | | | | |
| **Otay Hydrologic Unit** | | | | | | | |
| 910.1 | X | X | | | | | |
| 910.2 | X | | | | | | |
| 910.3 | | | | | | | |

Water bodies in the San Diego Bay WMA and constituents that have been placed on the State Water SWRCB 2010 Section 303(d) list are presented in Table A-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.

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**Table A-3. San Diego Bay 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 |
|---|---|---|---|---|---|---|---|---|
| San Diego Bay, Shelter Island Yacht Basin | Bay &Harbor | 90810000 / 18070304 | No | Copper, Dissolved | 154 Acres | 2002 | 5B | 2003 |
| Barrett Lake | Lake & Reservoir | 91130000 / 18070305 | No | 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 |
| Chollas Creek | River & Stream | 90822000 / 18070304 | Yes | Copper | 3.5 Miles | 1996 | 5A | 2004 |
| | | | | Diazinon | 3.5 Miles | 2002 | 5B | 2003 |
| | | | | Indicator Bacteria | 3.5 Miles | 2002 | 5A | 2005 |
| | | | | Lead | 3.5 Miles | 1996 | 5A | 2004 |
| | | | | Phosphorus | 3.5 Miles | 2010 | 5A | 2019 |
| | | | | Total Nitrogen as N | 3.5 Miles | 2010 | 5A | 2019 |
| | | | | Trash | 3.5 Miles | 2010 | 5A | 2021 |
| | | | | Zinc | 3.5 Miles | 1996 | 5A | 2004 |

**Table A-3. San Diego Bay 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 |
|---|---|---|---|---|---|---|---|---|
| Loveland Reservoir | Lake & Reservoir | 90931000 / 18070304 | No | Ammonia | 420 Acres | 2006 | 5A | 2019 |
| | | | | Color | 420 Acres | 2006 | 5A | 2019 |
| | | | | Iron | 420 Acres | 2006 | 5A | 2019 |
| | | | | Manganese | 420 Acres | 2006 | 5A | 2019 |
| Otay Reservoir, Lower | Lake & Reservoir | 91031000 / 18070304 | No | Nitrogen | 1050 Acres | 2010 | 5A | 2019 |
| | | | | pH (high) | 1050 Acres | 2006 | 5A | 2019 |
| | | | | Copper | 1050 Acres | 2006 | 5A | 2019 |
| | | | | Lead | 1050 Acres | 2006 | 5A | 2019 |
| | | | | Selenium | 1050 Acres | 2010 | 5A | 2021 |
| | | | | PCBs | 1050 Acres | 2006 | 5A | 2019 |
| Paleta Creek | River & Stream | 90831000 / 18070304 | Yes | Benthic Community Effects | 4.1 Miles | 2010 | 5A | 2021 |
| | | | | Sediment Toxicity | 4.1 Miles | 2010 | 5A | 2021 |
| | | | | Copper | 4.1 Miles | 2010 | 5A | 2021 |
| | | | | Benthic Community Effects | 4.1 Miles | 2010 | 5A | 2021 |

**Table A-3. San Diego Bay 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 |
|---|---|---|---|---|---|---|---|---|
| Paradise Creek, HSA 908.320 | River & Stream | 90912000 / 18070304 | Yes | Selenium | 2.8 Miles | 2010 | 5A | 2021 |
| San Diego Bay | Bay &Harbor | 91010000 / 18070304 | Yes (some) | PCBs | 10783 Acres | 2006 | 5A | 2019 |
| San Diego Bay Shoreline, 32nd Street San Diego Naval Station | Bay &Harbor | 90822000 / 18070304 | No | Benthic Community Effects | 103 Acres | 1998 | 5A | 2019 |
| | | | | Sediment Toxicity | 103 Acres | 1998 | 5A | 2019 |
| San Diego Bay Shoreline, Chula Vista Marina | Coastal & Bay Shoreline | 90912000 / 18070304 | No | Copper | 0.41 Miles | 2006 | 5A | 2019 |
| San Diego Bay Shoreline, Downtown Anchorage | Bay &Harbor | 90821000 / 18070304 | No | Benthic Community Effects | 7.4 Acres | 1998 | 5A | 2019 |
| | | | | Sediment Toxicity | 7.4 Acres | 1998 | 5A | 2019 |

**Table A-3. San Diego Bay 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 |
|---|---|---|---|---|---|---|---|---|
| San Diego Bay Shoreline, G Street Pier | Coastal & Bay Shoreline | 90821000 / 18070304 | Yes | Total Coliform | 0.42 Miles | 2010 | 5A | 2019 |
| San Diego Bay Shoreline, North of 24th Street Marine Terminal | Bay &Harbor | 90832000 / 18070304 | No | Benthic Community Effects | 9.5 Acres | 2002 | 5A | 2019 |
| | | | | Sediment Toxicity | 9.5 Acres | 2002 | 5A | 2019 |
| San Diego Bay Shoreline, Seventh Street Channel | Bay &Harbor | 90831000 / 18070304 | No | Benthic Community Effects | 9 Acres | 2002 | 5A | 2008 |
| | | | | Sediment Toxicity | 9 Acres | 2002 | 5A | 2008 |
| San Diego Bay Shoreline, Shelter Island Shoreline Park | Coastal & Bay Shoreline | 90810000 / 18070304 | | Enterococci | 0.42 Miles | | 5A | 2011 |
| | | | No | Fecal Coliform | 0.42 Miles | | 5A | 2011 |
| | | | | Total Coliform | 0.42 Miles | | 5A | 2011 |
| San Diego Bay Shoreline, Tidelands Park | Coastal & Bay Shoreline | 91010000 / 18070304 | No | Enterococci | 0.38 Miles | 2010 | 5A | 2021 |
| | | | | Total Coliform | 0.38 Miles | 2010 | 5A | 2019 |

**Table A-3. San Diego Bay 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 |
|---|---|---|---|---|---|---|---|---|
| San Diego Bay Shoreline, Vicinity of B Street and Broadway Piers | Bay &Harbor | 90821000 / 18070304 | Yes | Benthic Community Effects | 9.9 Acres | 2002 | 5A | 2019 |
| | | | | Sediment Toxicity | 9.9 Acres | 2002 | 5A | 2019 |
| | | | | Total Coliform | 9.9 Acres | 2002 | 5A | 2019 |
| San Diego Bay Shoreline, at Americas Cup Harbor | Bay &Harbor | 90810000 / 18070304 | No | Copper | 88 Acres | 1992 | 5A | 2019 |
| San Diego Bay Shoreline, at Bayside Park (J Street) | Bay &Harbor | 90911000 / 18070304 | No | Enterococci | 50Acres | | 5A | 2021 |
| | | | | Total Coliform | 50Acres | 2006 | 5A | 2019 |
| San Diego Bay Shoreline, at Coronado Cays | Bay &Harbor | 91010000 / 18070304 | No | Copper | 47 Acres | 1992 | 5A | 2019 |
| San Diego Bay Shoreline, at Glorietta Bay | Bay &Harbor | 91010000 / 18070304 | No | Copper | 52 Acres | 1992 | 5A | 2019 |
| San Diego Bay Shoreline, at Harbor Island (East Basin) | Bay &Harbor | 90821000 / 18070304 | No | Copper | 73 Acres | 1992 | 5A | 2019 |
| San Diego Bay Shoreline, at Harbor Island (West Basin) | Bay &Harbor | 90810000 / 18070304 | No | Copper | 132 Acres | 1992 | 5A | 2019 |

**Table A-3. San Diego Bay 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 |
|---|---|---|---|---|---|---|---|---|
| San Diego Bay Shoreline, at Marriott Marina | Bay &Harbor | 90821000 / 18070304 | No | Copper | 24 Acres | 1992 | 5A | 2019 |
| San Diego Bay Shoreline, at Spanish Landing | Bay &Harbor | 90821000 / 18070304 | No | Total Coliform | 47 Acres | 2010 | 5A | 2021 |
| San Diego Bay Shoreline, near Chollas Creek | Bay &Harbor | 90822000 / 18070304 | No | Benthic Community Effects | 15 Acres | 2002 | 5A | 2010 |
| | | | | Sediment Toxicity | 15 Acres | 2002 | 5A | 2010 |
| San Diego Bay Shoreline, near Coronado Bridge | Bay &Harbor | 90822000 / 18070304 | No | Benthic Community Effects | 37 Acres | 2002 | 5A | 2019 |
| | | | | Sediment Toxicity | 37 Acres | 2002 | 5A | 2019 |
| San Diego Bay Shoreline, near Switzer Creek | Bay &Harbor | 90821000 / 18070304 | No | Chlordane | 5.5 Acres | 2002 | 5A | 2019 |
| | | | | PAHs | 5.5 Acres | 2002 | 5A | 2019 |

**Table A-3. San Diego Bay 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 |
|---|---|---|---|---|---|---|---|---|
| San Diego Bay Shoreline, near Sub Vase | Bay & Harbor | 90810000 / 18070304 | No | Benthic Community Effects | 16 Acres | 2002 | 5A | 2021 |
| | | | | Sediment Toxicity | 16 Acres | 2002 | 5A | 2019 |
| | | | | Toxicity | 16 Acres | 2002 | 5A | 2021 |
| Sweetwater Reservoir | Lake & Reservoir | 90921000 / 18070304 | No | Oxygen, Dissolved | 925 Acres | 2006 | 5A | 2019 |
| Sweetwater River, Lower (below Sweetwater Reservoir) | Lake & Reservoir | 90912000 / 18070304 | | Enterococci | 5.3 Miles | 2010 | 5A | 2021 |
| | | | Yes | Fecal Coliform | 5.3 Miles | 2010 | 5A | 2021 |
| | | | | Phosphorus | 5.3 Miles | 2010 | 5A | 2021 |
| | | | | Selenium | 5.3 Miles | 2010 | 5A | 2021 |
| | | | | Total Dissolved Solids | 5.3 Miles | 2010 | 5A | 2021 |
| | | | | Total Nitrogen as N | 5.3 Miles | 2010 | 5A | 2021 |
| | | | | Toxicity | 5.3 Miles | 2010 | 5A | 2021 |
| | | | | Copper | 5.3 Miles | 2010 | 5A | 2021 |

**Table A-3. San Diego Bay 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 |
|---|---|---|---|---|---|---|---|---|
| Switzer Creek | River & Stream | 90822000 / 18070304 | Yes | Lead | 1.3 Miles | 2010 | 5A | 2021 |
| | | | | Zinc | 1.3 Miles | 2010 | 5A | 2021 |
| | | | | Copper | 1.3 Miles | 2010 | 5A | 2021 |
| San Diego Bay Shoreline, between Sampson and 28th Streets | Bay &Harbor | 90822000 / 18070304 | No | Copper | 53 Acres | 1992 | 4B | 2015 |
| | | | | Mercury | 53 Acres | 1990 | 4B | 2013 |
| | | | | PAHs | 53 Acres | 1990 | 4B | 2013 |
| | | | | PCBs | 53 Acres | 1990 | 4B | 2013 |
| | | | | Zinc | 53 Acres | 1990 | 4B | 2013 |

### A.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 San Diego Bay Watershed are listed in Table A-4.

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**Table A-4. San Diego Bay 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 | |
| 67 | Pueblo San Diego | Auburn Creek Channel | 635 | -- | 635 | 16 |
| 68 | Pueblo San Diego | Auburn Creek Channel | 2,693 | 1,566 | 1,127 | 20 |
| 69 | Pueblo San Diego | Auburn Creek Channel | 2,356 | 2,355 | 1 | 12 |
| 70 | Pueblo San Diego | Auburn Creek Channel | 1,418 | 413 | 1,006 | 39 |
| 71 | Pueblo San Diego | Chollas Creek Channel | 1,199 | 376 | 823 | 26 |
| 72 | Pueblo San Diego | Chollas Creek Channel | 435 | 433 | 2 | 26 |
| 76 | Pueblo San Diego | Auburn Creek Channel | 964 | -- | 964 | 27 |
| 77 | Pueblo San Diego | Auburn Creek Channel | 422 | -- | 422 | 33 |
| 78 | Pueblo San Diego | Chollas Creek Channel | 2,633 | 2,633 | -- | 54 |
| 79 | Pueblo San Diego | Chollas Creek Channel | 1,410 | 1,410 | -- | 54 |
| 79a | Pueblo San Diego | Delevan Drive | 991 | -- | 991 | 30 |
| 80 | Pueblo San Diego | Chollas Creek Channel | 1,899 | 539 | 1,360 | 54 |
| 84 | Pueblo San Diego | Washington Channel | 2,515 | 1,026 | 1,489 | 20 |
| 86 | Pueblo San Diego | Pershing Channel | 2,047 | 1,698 | 349 | 20 |
| 89 | Pueblo San Diego | Chollas Creek Channel | 2,442 | 2,318 | 124 | 25 |
| 90 | Pueblo San Diego | Imperial and Gillette Street | 385 | -- | 385 | 15 |
| 91 | Pueblo San Diego | Chollas Creek Channel | 2,498 | 2,498 | -- | 32 |
| 92 | Pueblo San Diego | 35th St & Martin Ave | 1,097 | -- | 1,097 | 12(top)<br>5(bottom) |
| 93 | Pueblo San Diego | Chollas Creek Channel | 2,590 | 1,267 | 1,323 | 54 |

**Table A-4. San Diego Bay 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 | |
| 94 | Pueblo San Diego | South Chollas Creek Channel | 2,595 | 40 | 2,555 | 59 |
| 95 | Pueblo San Diego | South Chollas Creek Channel | 1,604 | -- | 1,604 | 50 |
| 97 | Pueblo San Diego | South Chollas Creek Channel | 1,098 | -- | 1,098 | 45 |
| 97a | Pueblo San Diego | South Chollas Creek Channel | 854 | 292 | 562 | 55 |
| 98 | Pueblo San Diego | South Chollas Creek Channel | 2,800 | 661 | 2,139 | 49 |
| 99 | Pueblo San Diego | South Chollas Creek Channel | 278 | -- | 278 | 34 |
| 100 | Pueblo San Diego | 42nd & J St | 257 | -- | 257 | 12 |
| 101 | Pueblo San Diego | South Chollas Creek Channel | 1,911 | 1,122 | 789 | 34 |
| 103 | Pueblo San Diego | South Chollas Creek Channel | 1,237 | 1,046 | 191 | 34 |
| 104 | Pueblo San Diego | South Chollas Creek Channel | 1,969 | 1,071 | 898 | 34 |
| 105 | Pueblo San Diego | Euclid & Castana | 277 | -- | 277 | 20 |
| 106 | Pueblo San Diego | Encanto Channel | 2,436 | 405 | 2,031 | 44 |
| 107 | Pueblo San Diego | Encanto Channel | 2,607 | 644 | 1,963 | 44 |
| 108 | Pueblo San Diego | Encanto Channel | 1,900 | 1,900 | -- | 29 |
| 109 | Pueblo San Diego | Encanto Channel | 2,390 | 1,793 | 597 | 29 |
| 110 | Pueblo San Diego | Encanto Channel | 1,606 | 1,418 | 188 | 29 |
| 111 | Pueblo San Diego | Encanto Channel | 842 | 719 | 123 | 29 |
| 113 | Pueblo San Diego | Jamacha Channel | 815 | -- | 815 | 15 |
| 114 | Pueblo San Diego | Jamacha Channel | 2,683 | -- | 2,683 | 15 |
| 115 | Pueblo San Diego | Jamacha Channel | 1,886 | -- | 1,886 | 20 |

## Table A-4. San Diego Bay 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 | |
| 117 | Pueblo San Diego | Solola Channel | 1,244 | 1,176 | 68 | 20 |
| 118 | Pueblo San Diego | Solola Channel | 2,416 | 2,084 | 332 | 18 |
| 119 | Pueblo San Diego | Solola Channel | 846 | 728 | 118 | 8 |
| 120 | Pueblo San Diego | Cottonwood Channel | 1,904 | 1,885 | 19 | 23 |
| 121 | Pueblo San Diego | Cottonwood Channel | 530 | 522 | 8 | 19 |
| 122 | Sweetwater | Parkside Channel | 1,202 | 1,163 | 40 | 14 |
| 131 | Otay | Nestor Creek Channel | 1,201 | 978 | 223 | 10 |
| 132 | Otay | Nestor Creek Channel | 968 | -- | 968 | 29 |
| 133 | Otay | Nestor Creek Channel | 2,982 | -- | 2,982 | 54 |
| 134 | Otay | Nestor Creek Channel | 1,309 | 990 | 320 | 30 |

**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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## A.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 San Diego Bay Watershed asset category (i.e., hard, soft, and natural).

### A.2.1 Hard Assets

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

**Table A-5. San Diego Bay Watershed Hard Assets**

| Asset Class/Subclass | Asset Count | Total Length (feet) | Total Length (miles) |
|---|---|---|---|
| Conveyance System: | | | |
| • Box Culvert | 350 | 51,908 | 9.83 |
| • Brow Ditch | 71 | 8,406 | 1.59 |
| • Channel | 356 | 170,827 | 32.35 |
| • Storm Drain | 10,458 | 1,338,801 | 253.56 |
| Structures: | | | |
| • Cleanout | 2,538 | | |
| • Inlet | 6,628 | | |
| • Energy Dissipator | 137 | | |
| • Headwall | 779 | | |
| • Outlet | 1,667 | | |
| • Spillway | 40 | | |
| • Tidegate | 1 | | |
| Pump Stations Assets: | 198 | | |
| Structural Best Management Practices: | 8 | | |
| **Total** | **23,231** | **1,569,943** | **297.34** |

In terms of asset count, inlets account for 56 percent of San Diego Bay Watershed storm water structures assets, followed by cleanouts and outlets, with 22 percent and 14 percent, respectively. Within the conveyance system, the dominant asset type is the storm drain system, which accounts for 85 percent (254 miles) of total conveyance length. The detailed distribution of the storm water conveyance and structures is shown in Figures A-2 and A-3.

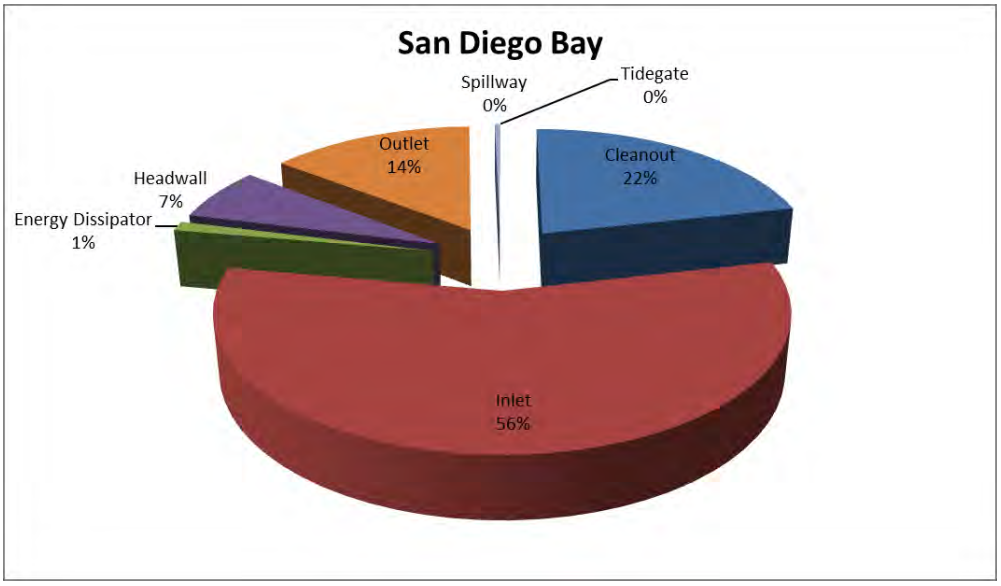


**Figure A-2. Distribution of Storm Water Structures by Asset Count - San Diego Bay Watershed**

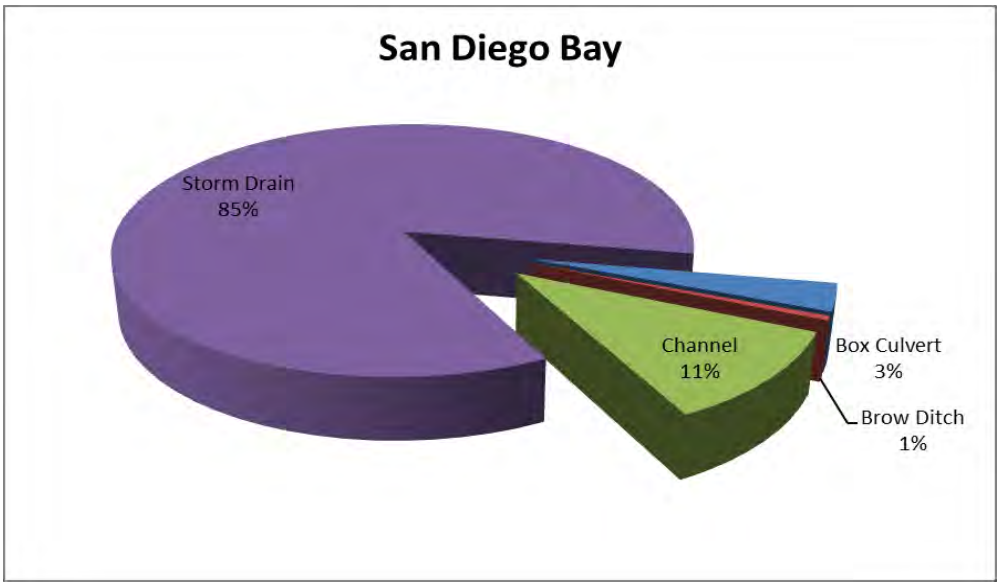


**Figure A-3. Distribution of Storm Water Conveyance by Length - San Diego Bay Watershed**

In addition to those assets listed in Table A-5, there is additional equipment that is not particularly part of the San Diego Bay Watershed since this equipment is used in all six watersheds. This equipment includes O&M equipment, structural BMPs, and BMP monitoring equipment. For this iteration of the WAMP, these assets will be tracked at the Division level. Table A-6 shows the list of assets within this category and their quantities.

**Table A-6. The Shared Equipment**

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

### A.2.2 Natural Assets

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

**Table A-7. San Diego Bay Watershed Natural Asset Classes/Subclasses and Quantities**

| Asset Class/Subclass | Quantity in San Diego Bay Watershed |
|---|---|
| Receiving Waters | Currently treated as one asset within the San Diego Bay Watershed. For future updates, recommend to refine into specific receiving water assets. For the San Diego Bay Watershed, there are 3,095 receiving waters/segments. |
| Runoff/Discharges | Currently treated as one asset within the San Diego Bay Watershed. For future updates, manage runoffs and discharges at the hydrologic sub-area level as defined in the CLRP. There are 1,667 mainstem outfalls in the San Diego Bay Watershed, which will be associated with the hydrologic sub-areas defined in the CLRP |
| City Parcels | There are 1,104 City Parcels in the San Diego Bay Watershed. |
| MHPAs | There are 223 MHPAs in the San Diego Bay Watershed. |

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

### A.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 A-8 shows the soft asset classes and the quantities of assets in those classes in the San Diego Bay Watershed.

**Table A-8. San Diego Bay Watershed Soft Asset Subclasses and Quantities**

| Asset Class/Subclass | Quantity in San Diego Bay Watershed |
|---|---|
| City Department Behavior | Currently treated as one asset in the San Diego Bay 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 San Diego Bay 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 | |

## A.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 asset register was assigned an estimated replacement cost. The replacement costs are 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 asset class are shown in Table A-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 San Diego Bay Watershed is provided below in Table A-9. Of the total, the conveyance system accounts for about 68 percent of the total replacement costs, structures account for 31 percent, pump stations account for 1, and structural BMP account for less than 1 percent  Figure A-4 shows the distribution of San Diego Bay Watershed hard asset replacement costs.

**Table A-9. San Diego Bay Watershed Assets Replacement Costs**

| Asset Class/Subclass | Replacement Cost | Total Replacement Cost |
|---|---|---|
| Conveyance System: | | |
| • Box Culvert | $250,000/unit | $87.5 million |
| • Brow Ditch | $400/linear feet | $3.4 million |
| • Channel | $400/linear feet | $68.3 million |
| • Storm Drain | $400/linear feet | $535.5 million |
| Structures: | | |
| • Cleanout | $20,000/unit | $50.8 million |
| • Inlet | $20,000/unit | $132.6 million |
| • Energy Dissipater | $40,000/unit | $5.5 million |
| • Headwall | $40,000/unit | $31.2 million |
| • Outlet | $40,000/unit | $66.7 million |
| • Spillway | $15,000/unit | $600,000 |
| • Tidegate | $25,000/unit | $25,000 |
| Pump Stations Asset: | Vary by asset types | $10.7 million |
| Structural BMP | Vary by asset types | $368,000 |
| **Total** | | **$926.3 million** |

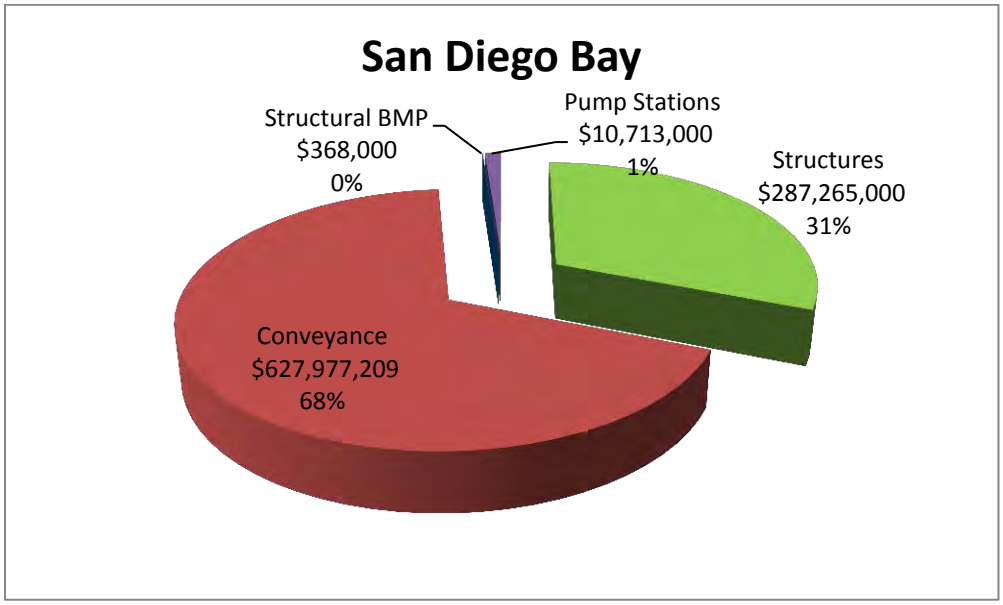


**Figure A-4. San Diego Bay Watershed Hard Assets Replacement Costs**

Figure A-5 shows the distribution of conveyance system replacement costs. About 77 percent consists of storm drains; followed by channels, box culverts, and brow ditches.

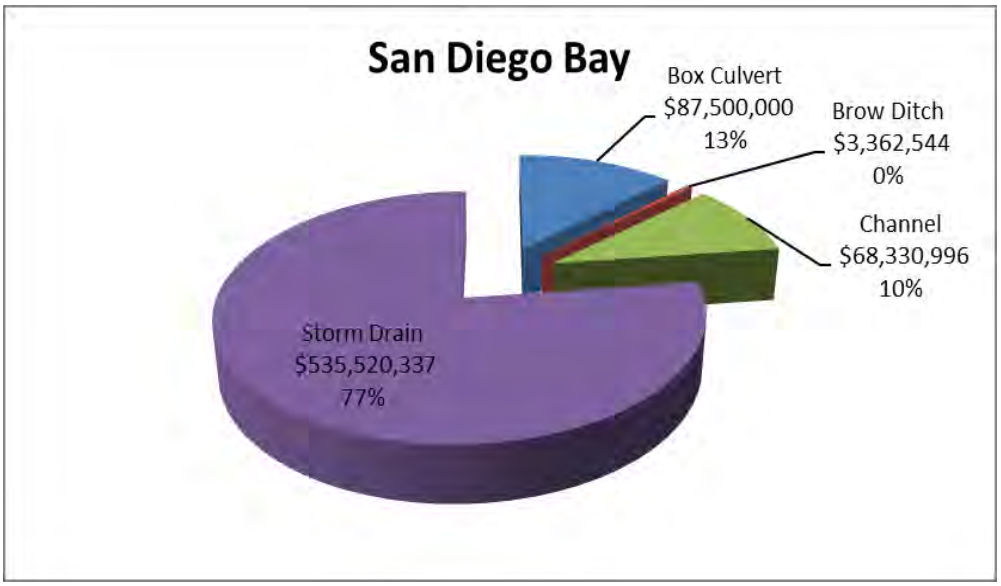


**Figure A-5. San Diego Bay Watershed Conveyance System Replacement Costs**

Figure A-6 shows the distribution of the replacement costs for storm water structures. Of the total system replacement costs, nearly half consists of inlets (46 percent), followed by outlets (23 percent), cleanouts (18 percent), and headwalls (11 percent). The three remaining asset classes (energy dissipaters, spillways, and tidegates) represent less than 3 percent of the total asset replacement costs.

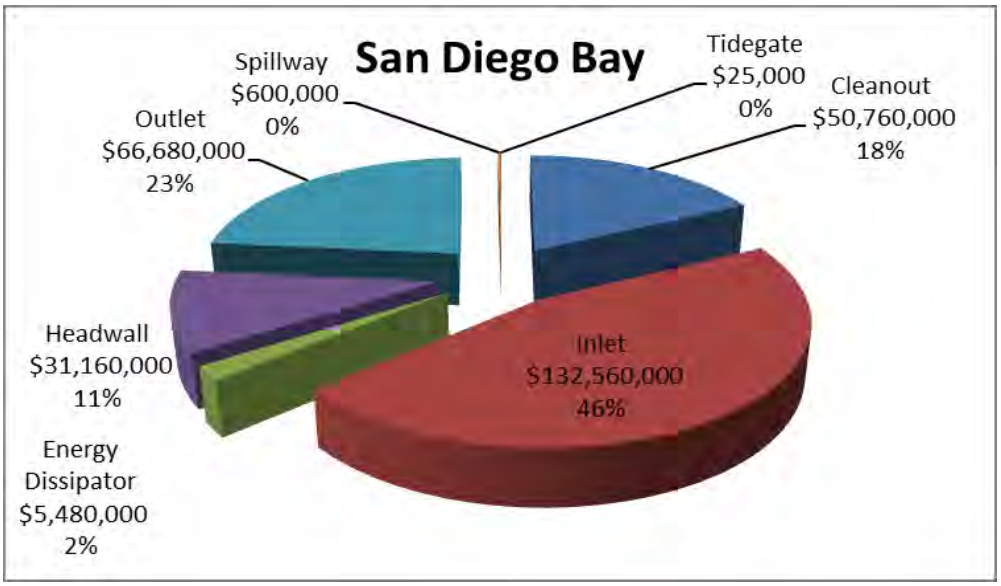


**Figure A-6. San Diego Bay Watershed Storm Water Structures Replacement Costs**

In addition to hard assets managed under San Diego Bay watershed above, there is equipment that is managed at the Division level. Figure A-7 shows the distribution of the total replacement costs for the Division's equipment assets. Nearly 99 percent of the equipment asset replacement costs consist of O&M equipment and 1 percent BMP monitoring equipment.

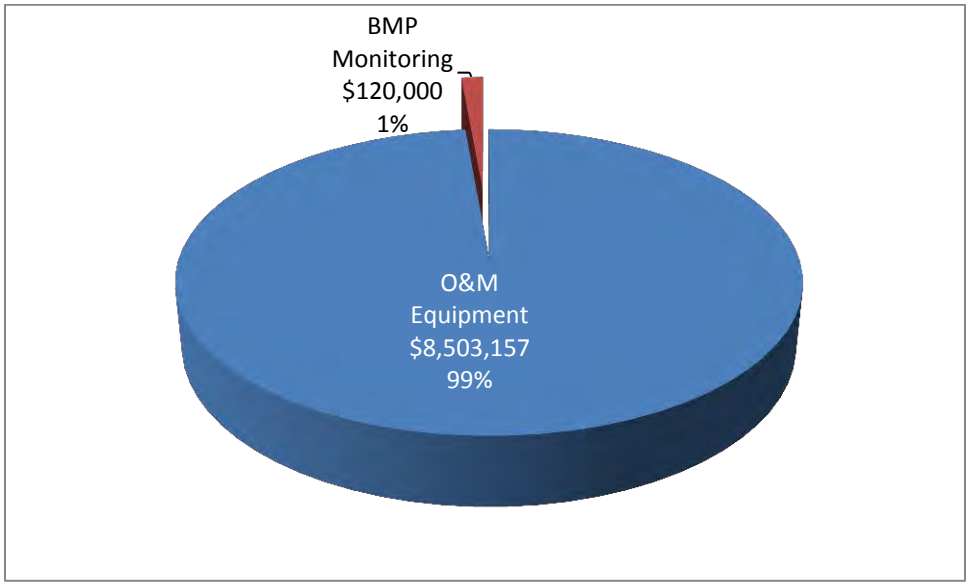


**Figure A-7. The Division's Equipment Replacement Costs**

## A.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 A-8 shows the historical asset installation profile of the San Diego Bay 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-1900s. There was some growth in the late-1920s, followed by a large amount of development in the early-1930s, and another big development period in the 1950s. After this time, the development trend was steady, with a few high peaks occurring every five years between the early-1960s and the early-1980s. Since 1985, the construction trend has grown at a steady pace, with some increased growth occurring in the early-2000s.

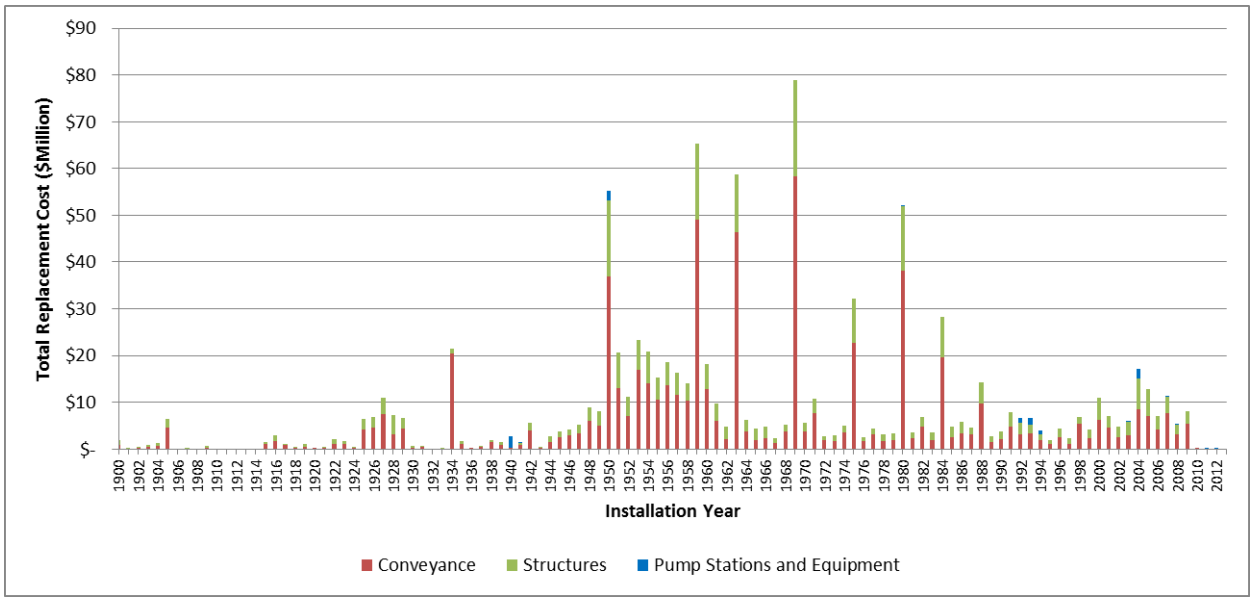


**Figure A-8. Installation Profile - San Diego Bay Watershed**

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 A-9, among the total of 23,223 assets listed in the San Diego Bay asset inventory excluding equipment, about 3 percent are condition score 5 (immediate attention) and about 88 percent are condition score 3 (fair) or better.

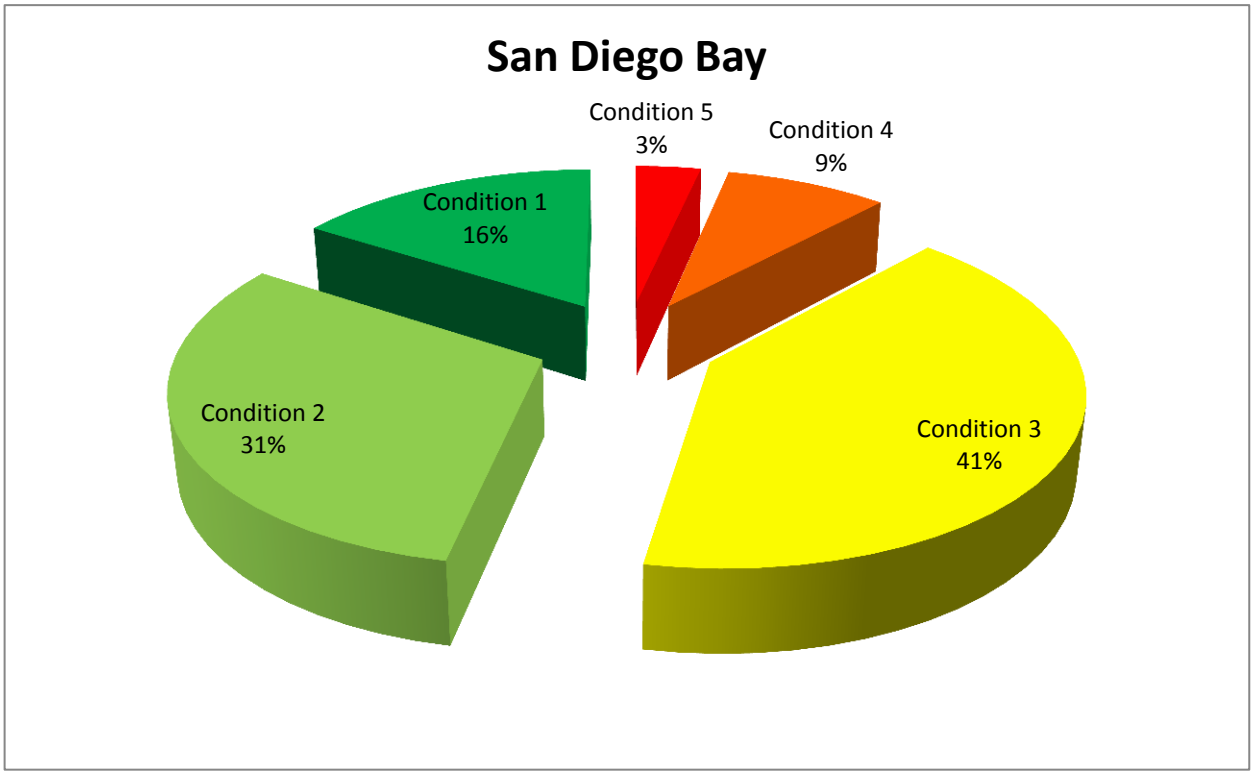


**Figure A-9. Summary of Hard Asset Conditions - San Diego Bay Watershed**

Among the asset groups (Figure A-10), the conveyance system accounts for the largest number of assets of condition 4 (poor) or worse. About 50 percent of hard assets of condition 4 or 5 are part of the conveyance system.

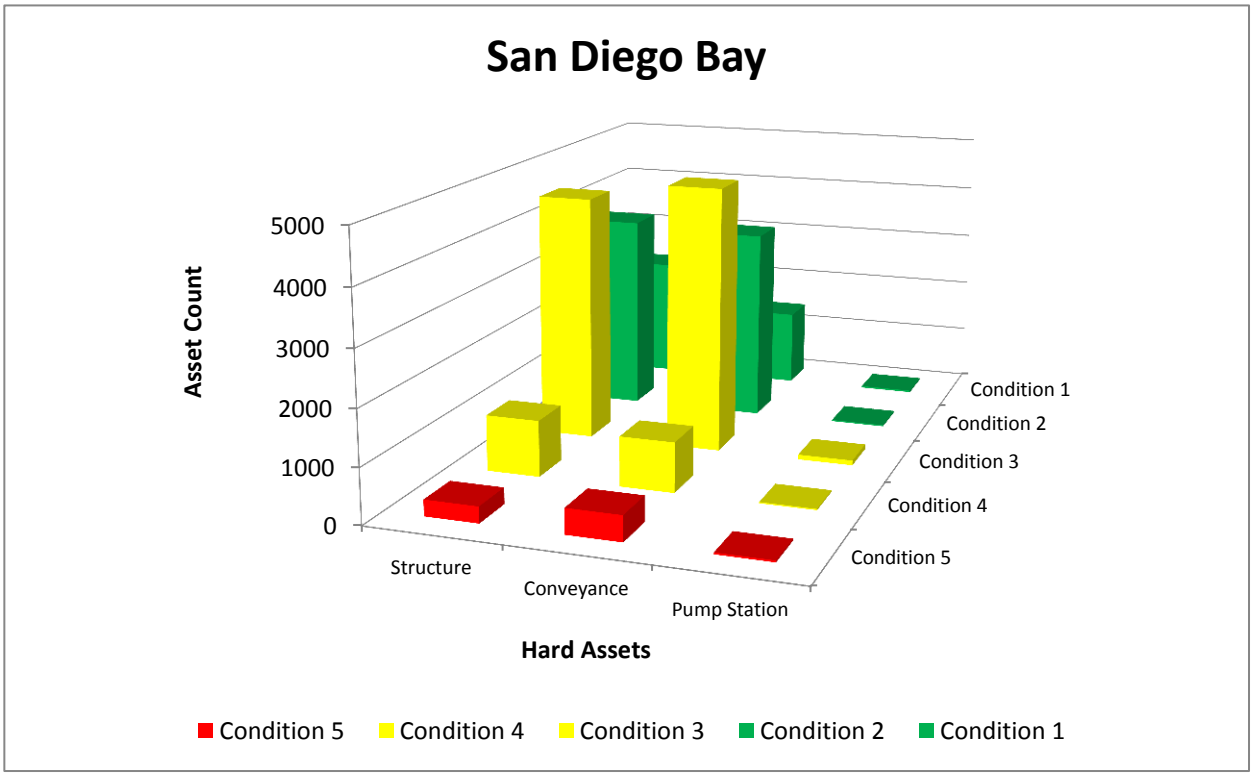


**Figure A-10. Summary of Hard Asset Conditions by Asset Class - San Diego Bay Watershed**

Figure A-11 provides a summary of the conveyance system asset conditions for the San Diego Bay Watershed. Within the conveyance system, storm drains account about 95 percent (12 miles) of the assets that are in need of immediate attention (condition 5). The majority of storm drains that are in need of replacement are metal pipes, which have a relatively short useful life of 35 years.

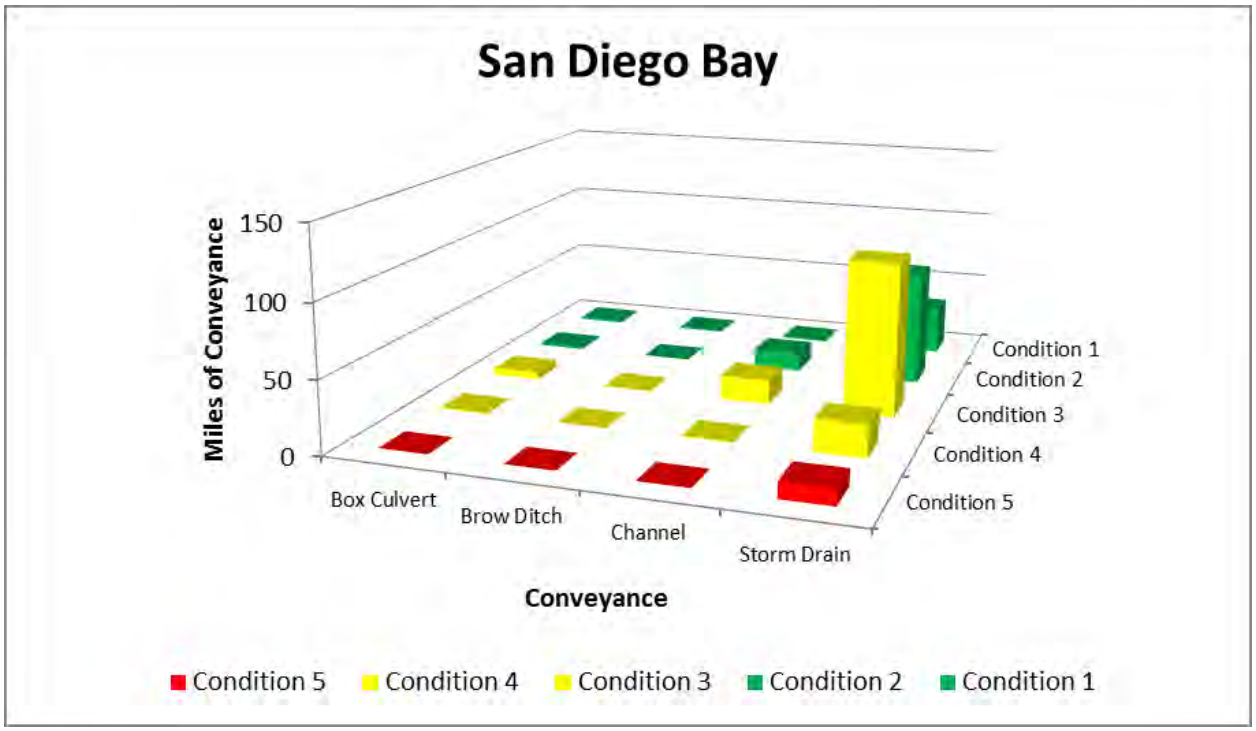


**Figure A-11. Summary of Conveyance System Conditions - San Diego Bay Watershed**

Figure A-12 provides a summary of the conditions of the storm water structures for the San Diego Bay Watershed. Most of the assets within this group (89 percent) are condition 3 (fair) or better, and fewer than 1 percent are in need of immediate attention (condition 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.

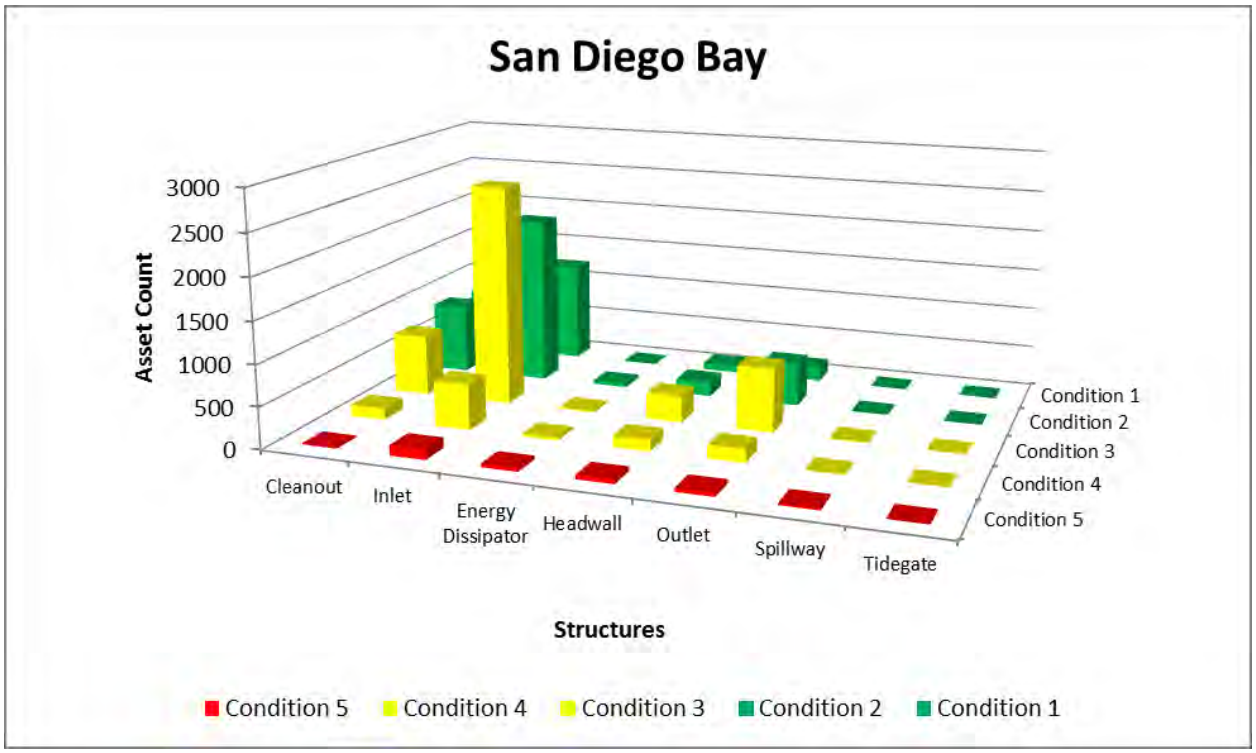


**Figure A-12. Summary of Conditions of Storm Water Structures - San Diego Bay Watershed**

Figure A-13 summarizes the conditions of pump station asset for the San Diego Bay Watershed. About 27 percent of the pump station assets are condition 1 or 2 (good), 57 percent are condition 3 or 4, and 17 percent are condition 5 (poor). Most of the pump station assets that are in need of immediate replacement and have exceeded their anticipated useful life of 15 to 30 years. This condition is consistent with the fact that about 35 percent of pump station assets were built or installed before the 1950s.

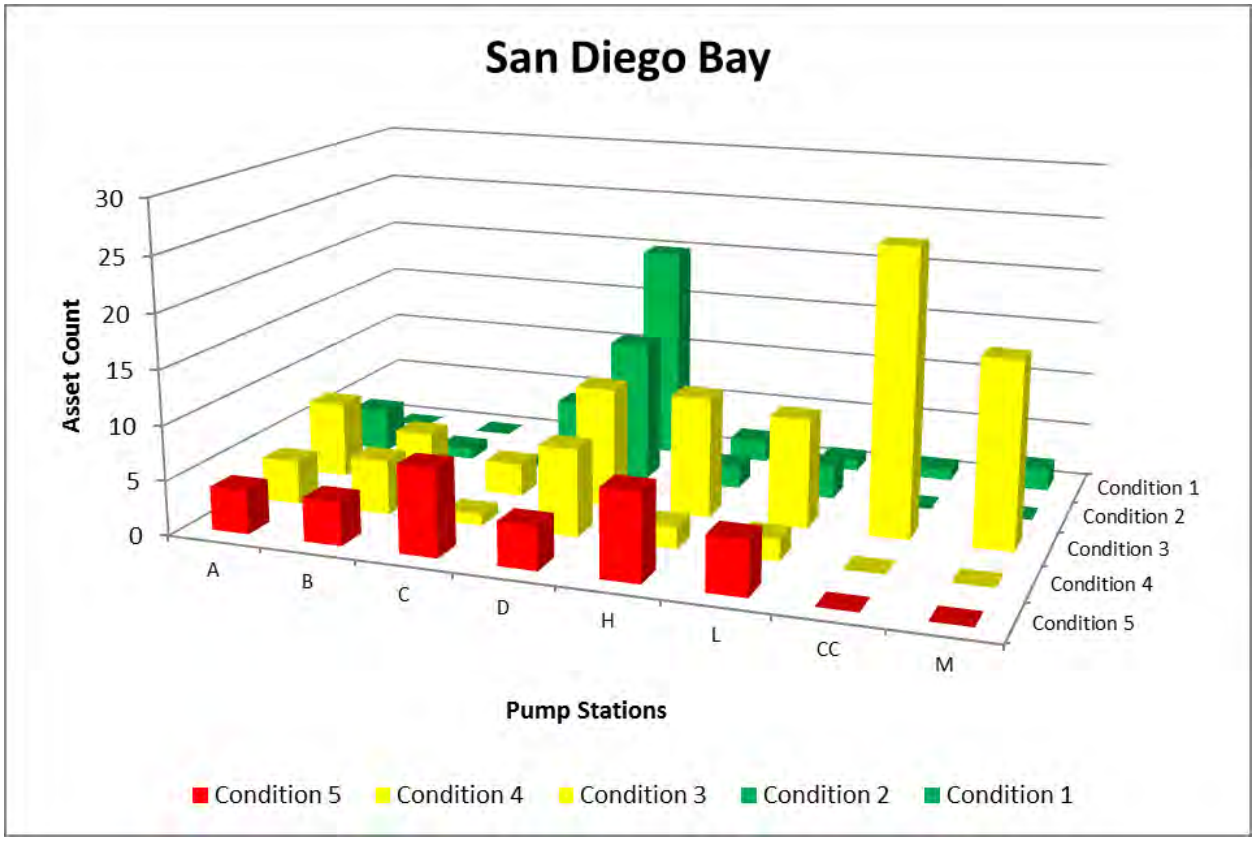


**Figure A-13. Summary of Conditions of Pump Station Assets - San Diego Bay Watershed**

Figure A-14 provides a summary of the condition of the Division's equipment, which consists of BMP monitoring equipment and O&M equipment.

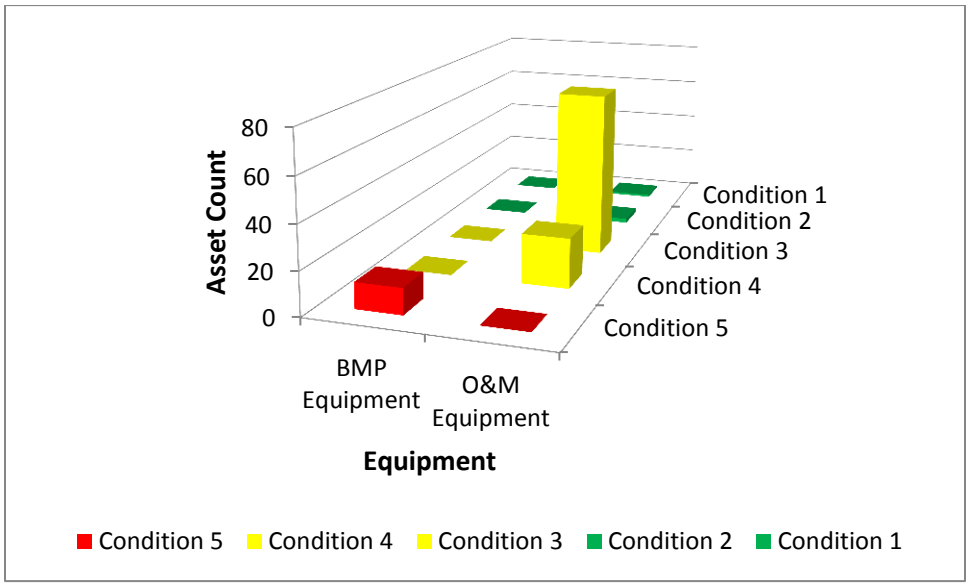


**Figure A-14. Summary of Conditions of Equipment Assets**

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, assets with short expected useful lives will be consumed more quickly than assets with long useful lives.

The Division's San Diego Bay hard asset consumption profile is presented in Figure A-15. The figure shows that the majority of the Division's hard assets are 45 to 65 percent consumed. About 4 percent of the hard assets have reached or exceeded their useful life. Most of these assets include the ones whose replacement has been deferred in previous years.

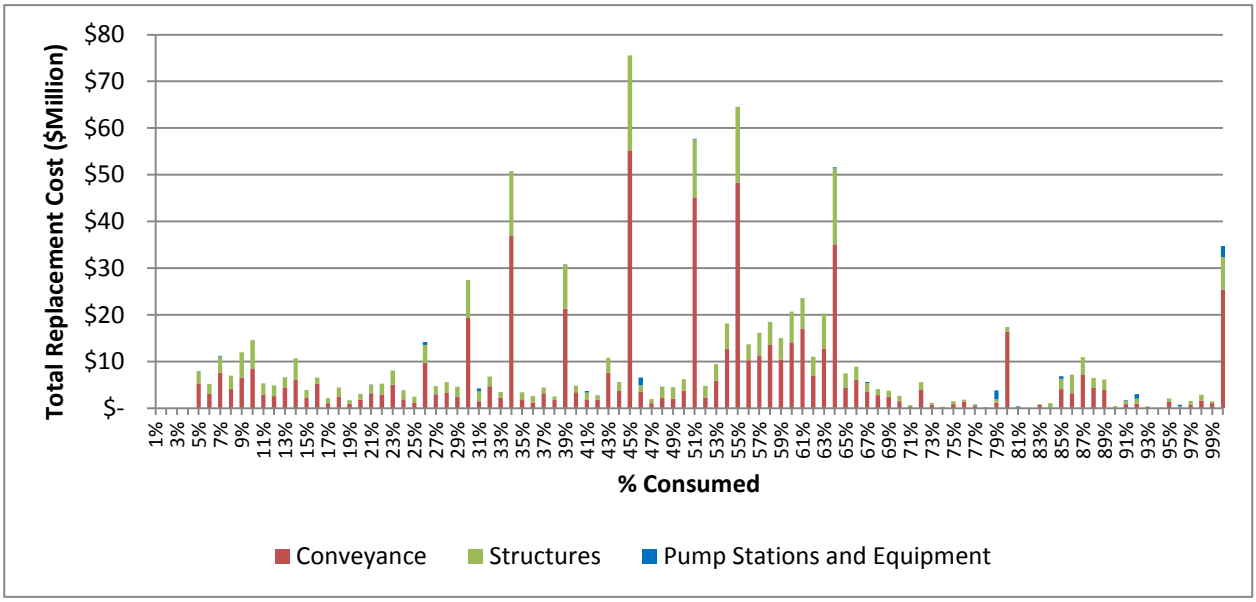


**Figure A-15. Consumption Profile - San Diego Bay Watershed**

## A.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 San Diego Bay Watershed, whether they are achieving the desired LOSs, and the necessary actions to achieve their LOSs. Table A-10 lists each asset class in the watershed, whether it is achieving its LOS, and the necessary actions to achieve its LOS.

**Table A-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 A-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 A-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 A-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 A-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 staff is 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 A-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 A-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 A-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 A-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 A-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 A-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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## A.6 WHEN DO WE NEED IT?

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

### A.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 A-11 lists the BRE scores for the San Diego Bay 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 A.7. The specific actions and projects slated for Fiscal Year 2015 are presented in Section A.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 A-11. Soft and Natural Asset BRE Scores - San Diego Bay 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 | 5 for Chollas Subwatershed; 4 for other subwatersheds | Area-weighted CPI Dr/Wet composite score for Chollas Subwatershed (2.92); 80% of Chollas Subwatershed (2.34) for other subwatersheds | 5 for Chollas Subwatershed; 3 for other subwatersheds | 5 all subwatersheds | 10.376 for Chollas Subwatershed; 8.302 for other subwatersheds | Area-weighted CPI Dry/Wet score for Chollas Subwatershed (2.92) 80% of Chollas Subwatershed; (2.34) for other subwatersheds | 30.3 for the Chollas Subwatershed; 19.4 for the other subwatersheds | Chollas: Medium Others: Low |

**Table A-11. Soft and Natural Asset BRE Scores - San Diego Bay 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 | | | | |
| 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. | | | | | | | | | | | |
| 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 | 5 | 3 | 4 | 5 | 10.2 | 5 | 51 | High |
| 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 | 3 | 1 | 4 | 2 | 1 | 3 | 6.6 | 5 | 33 | Medium |

**Table A-11. Soft and Natural Asset BRE Scores - San Diego Bay 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 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 |
| 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 |

**Table A-11. Soft and Natural Asset BRE Scores - San Diego Bay 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 | | | | |
| 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 | 5 | 3 | 3 | 5 | 9.2 | 5 | 46 | 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 | 5 | 4 | 3 | 5 | 9.5 | 5 | 47.5 | 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 | Per TMDL schedules | 1 for all subwatersheds | 1 for all subwatersheds | 5 for Chollas Subwatershed; 4 for other subwatersheds | Area-weighted CPI Dry score for Chollas Subwatershed (1.47); 80% of Chollas Subwatershed (1.18) for other subwatersheds | 5 for Chollas Subwatershed; 3 for other subwatersheds | 5 all subwatersheds | 9.941 for Chollas Subwatershed; 7.954 for other subwatersheds | Area-weighted CPI Dry/Wet score for Chollas Subwatershed (2.92) 80% of Chollas Subwatershed; (2.34) for other subwatersheds | 29.0 for the Chollas Subwatershed; 18.6 for the other subwatersheds | Chollas: Medium Other: Low |

**Table A-11. Soft and Natural Asset BRE Scores - San Diego Bay 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 | Per TMDL schedules | 1 for all subwatersheds | 1 for all subwatersheds | 5 for Chollas Subwatershed; 4 for other subwatersheds | Area-weighted CPI Wet score for Chollas Subwatershed (1.45); 80% of Chollas Subwatershed (1.16) for other subwatersheds | 5 for Chollas Subwatershed; 3 for other subwatersheds | 5 all subwatersheds | 9.935 for Chollas Subwatershed; 7.948 for other subwatersheds | Area-weighted CPI Dry/Wet score for Chollas Subwatershed (2.92) 80% of Chollas Subwatershed; (2.34) for other subwatersheds | 29.0 for the Chollas Subwatershed; 18.6 for the other subwatersheds | Chollas: Medium Other: 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 | 5 for Chollas Subwatershed; 4 for other subwatersheds | Area-weighted CPI Dr/Wet composite score for Chollas Subwatershed (2.92); 80% of Chollas Subwatershed (2.34) for other subwatersheds Area-weighted CPI Dr/Wet composite score for Chollas Subwatershed (0.876); 80% of Chollas Subwatershed (0.702) for other subwatersheds | 5 for Chollas Subwatershed; 3 for other subwatersheds | 5 all subwatersheds | 10.376 for Chollas Subwatershed; 8.302 for other subwatersheds | Area-weighted CPI Dry/Wet score for Chollas Subwatershed (2.92) 80% of Chollas Subwatershed; (2.34) for other subwatersheds | 30.3 for the Chollas Subwatershed; 19.4 for the other subwatersheds | Chollas: Medium Other: 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 |

**Table A-11. Soft and Natural Asset BRE Scores - San Diego Bay 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 | | | | |
| 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 | 5 for Chollas Subwatershed; 4 for other subwatersheds | Area-weighted CPI Dr/Wet composite score for Chollas Subwatershed (2.92); 80% of Chollas Subwatershed (2.34) for other subwatersheds | 5 for Chollas Subwatershed; 3 for other subwatersheds | 5 all subwatersheds | 10.376 for Chollas Subwatershed; 8.302 for other subwatersheds | Area-weighted CPI Dry/Wet score for Chollas Subwatershed (2.92) 80% of Chollas Subwatershed; (2.34) for other subwatersheds | 30.3 for the Chollas Subwatershed; 19.4 for the other subwatersheds | Chollas: Medium Other: 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 | 5 for Chollas Subwatershed; 4 for other subwatersheds | Area-weighted CPI Dr/Wet composite score for Chollas Subwatershed (2.92); 80% of Chollas Subwatershed (2.34) for other subwatersheds | 5 for Chollas Subwatershed; 3 for other subwatersheds | 5 all subwatersheds | 10.376 for Chollas Subwatershed; 8.302 for other subwatersheds | Area-weighted CPI Dry/Wet score for Chollas Subwatershed (2.92) 80% of Chollas Subwatershed; (2.34) for other subwatersheds | 30.3 for the Chollas Subwatershed; 19.4 for the other subwatersheds | Chollas: Medium Other: Low |
| 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. | | | | | | | | | | | |

**Table A-11. Soft and Natural Asset BRE Scores - San Diego Bay 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 | | | | |
| 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 | 2 | 3 | 2 | 3 | 5.7 | 5 | 28.5 | Medium |
| 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 | 5 | 4 | 4 | 5 | 10.1 | 4 | 40.4 | Medium |

**Table A-11. Soft and Natural Asset BRE Scores - San Diego Bay 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 | | | | |
| 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 A-11. Soft and Natural Asset BRE Scores - San Diego Bay 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. | | | | | | | | | | | |

**Table A-11. Soft and Natural Asset BRE Scores - San Diego Bay 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 | | | | |
| 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. | | | | | | | | | | | |
| 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 | 5 for Chollas Subwatershed; 4 for other subwatersheds | Area-weighted CPI Dr/Wet composite score for Chollas Subwatershed (2.92); 80% of Chollas Subwatershed (2.34) for other subwatersheds | 5 for Chollas Subwatershed; 3 for other subwatersheds | 5 all subwatersheds | 10.376 for Chollas Subwatershed; 8.302 for other subwatersheds | Area-weighted CPI Dry/Wet score for Chollas Subwatershed (2.92) 80% of Chollas Subwatershed; (2.34) for other subwatersheds | 30.3 for the Chollas Subwatershed; 19.4 for the other subwatersheds | Chollas: Medium Other: Low |
| Equipment – (Monitoring Equipment ≥ $5K) | 48. Sufficient equipment is available 90% of the time to conduct monitoring activities. | | | | | | | | | 3.35 | | 0 | |

**Table A-11. Soft and Natural Asset BRE Scores - San Diego Bay 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 | 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 | Medium |
| 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

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### A.6.2 Hard Asset BRE

The hard assets BRE scores were calculated for each individual hard asset listed in the San Diego Bay Watershed asset inventory. BRE scores are shown in three major categories: high, medium, and low. Figure A-16 shows a BRE map with the three distinct risk categories. For conveyances, equipments, and pump stations, the High Risk category (red) contains BRE scores of 49.5 or greater, the Medium Risk category (yellow) contains BRE scores of 31.5 to less than 49.5, and the Low Risk category (green) contains BRE scores less than 31.5. For structures, the High Risk, Medium Risk, and Low Risk category contains BRE scores of 45 or greater, 28 to less than 45, and less than 28 respectively.

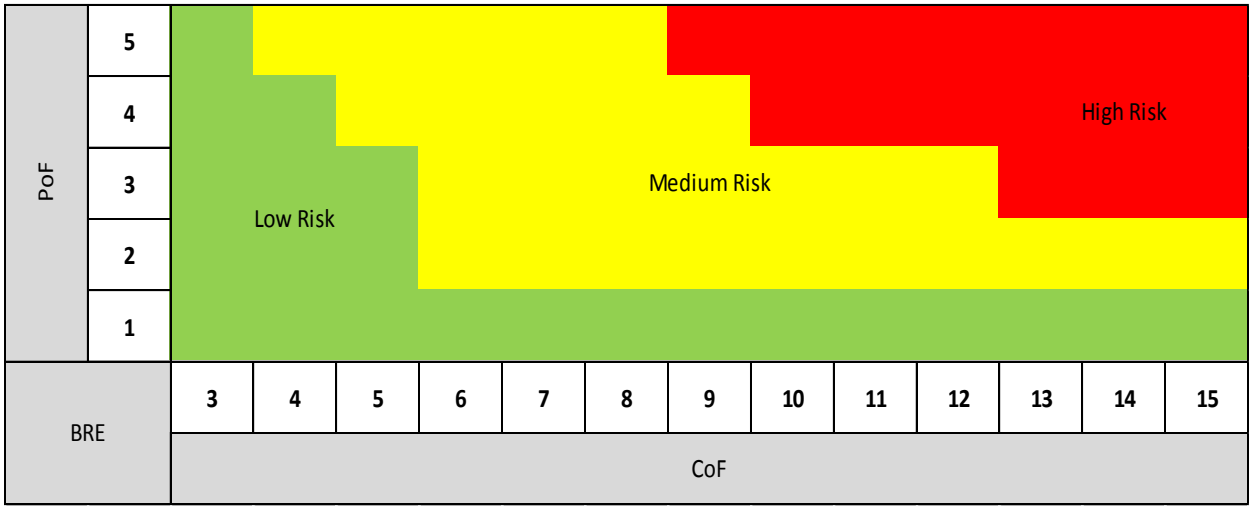


**Figure A-16. Hard Asset Risk Category Map**

Figure A-17 shows the summary of hard asset BRE scores by hard asset classes. Of the 23,223 total hard assets, 71 percent fall into the low risk category, followed by 27 percent in the medium risk category, and 2 percent in the high risk category.

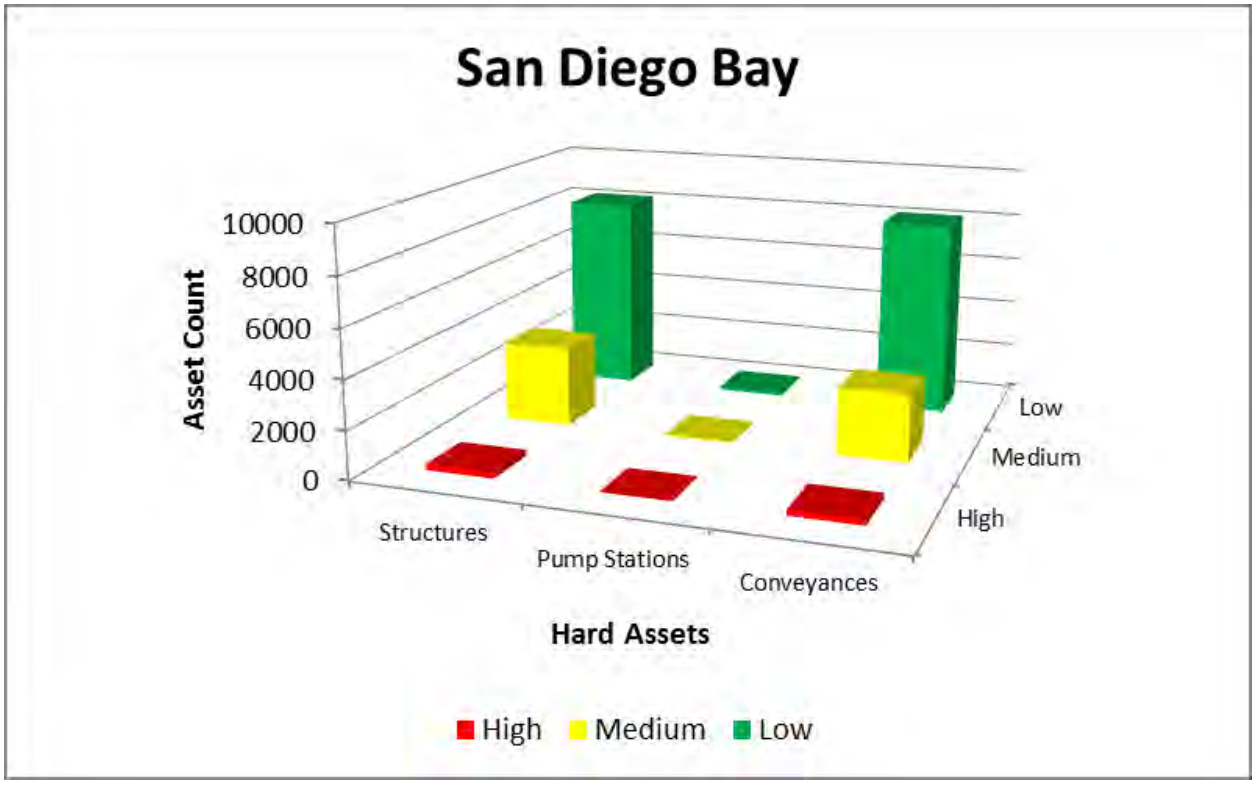


**Figure A-17. Hard Asset BRE Scores by Asset Classes - San Diego Bay Watershed**

Figure A-18 shows the BRE score summary for the storm water conveyance system in San Diego Bay Watershed. There are total of 10 miles of box culvert, less than 2 miles of brow ditch, 32 miles of channel and 254 miles of storm drain. Out of all the conveyance system, brow ditch has highest percentage of low risk assets (99 percent) and box culvert has the lowest percentage of low risk assets (62 percent).

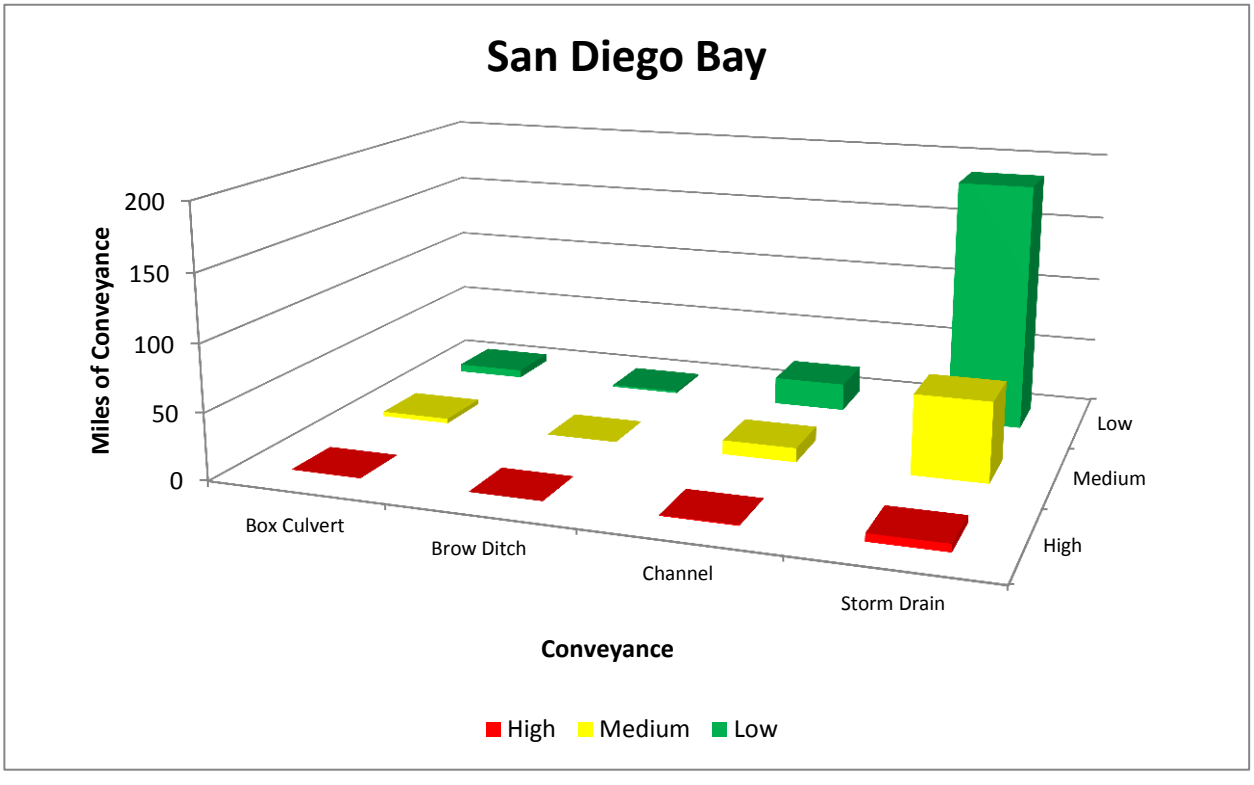


**Figure A-18. BRE Summary of Conveyance System BRE Scores - San Diego Bay Watershed**

Figure A-19 shows the conveyance system CoF score map for the San Diego Bay Watershed. The San Diego Bay Watershed conveyance system is approximately 297 miles and about 55 percent (164 miles) of the storm water conveyances have low CoF and about 12 percent (37 miles) have high CoF.

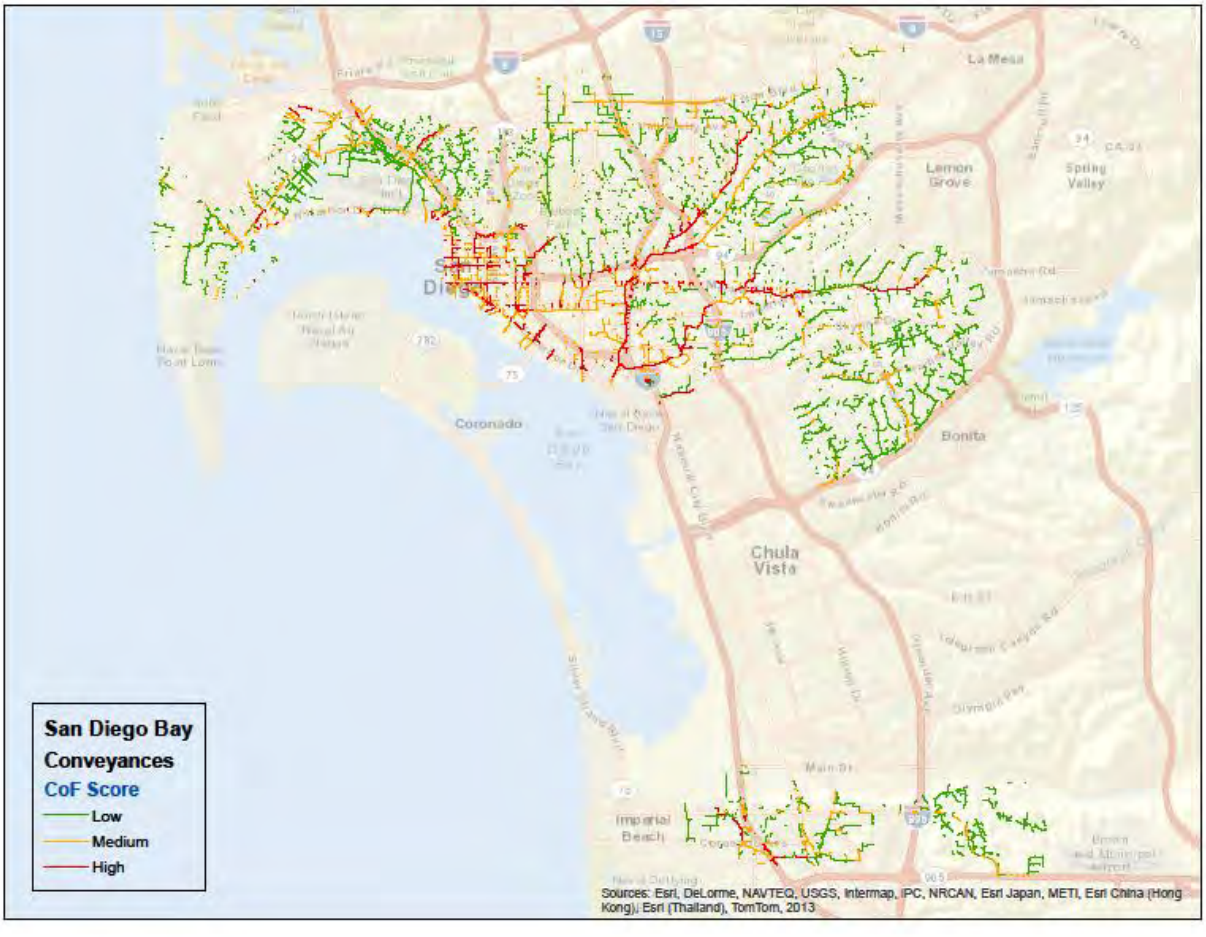


**Figure A-19. Conveyance System CoF Score Map - San Diego Bay Watershed**

Figure A-20 shows the conveyance system PoF score map for the San Diego Bay Watershed. Approximately 78 percent (231 miles) of the conveyances have low PoF and less than 6 percent (18 miles) have high PoF.

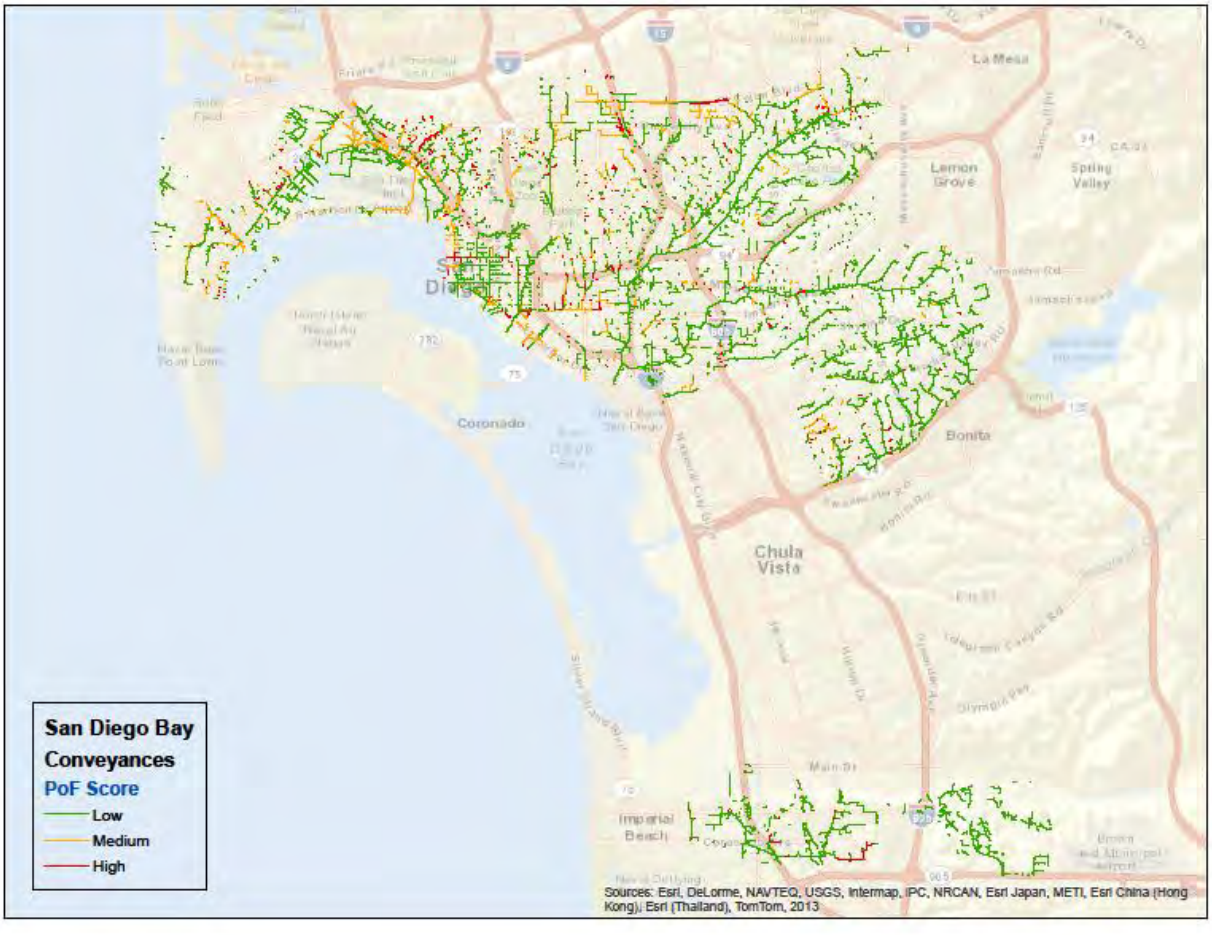


**Figure A-20. Conveyance System PoF Score Map - San Diego Bay Watershed**

Figure A-21 shows the conveyance system BRE score map for the San Diego Bay Watershed. More than 72 percent (216 miles) of the conveyance systems have low risk, about 25 percent (74 miles) have medium risk and about 2 percent (7 miles) have high risk.

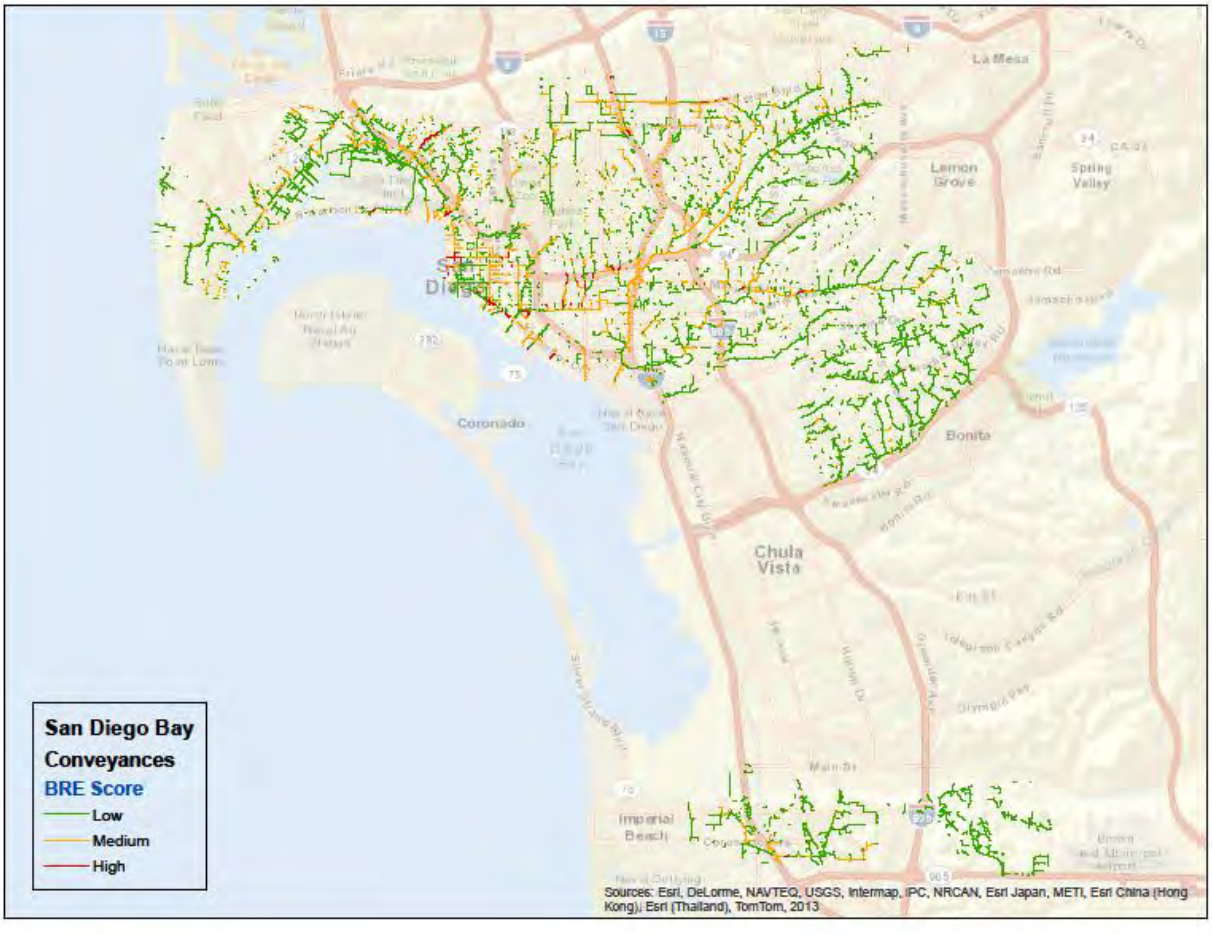


**Figure A-21. Conveyance System BRE Score Map - San Diego Bay Watershed**

Figure A-22 shows the BRE summary for storm water structures in San Diego Bay Watershed. In general, most of the storm water structures are low risk and less than 2 percent of assets (257 out of 11,790) are high risk. This can be attributed to the fact that the majority of storm water structures are still in good or excellent condition.

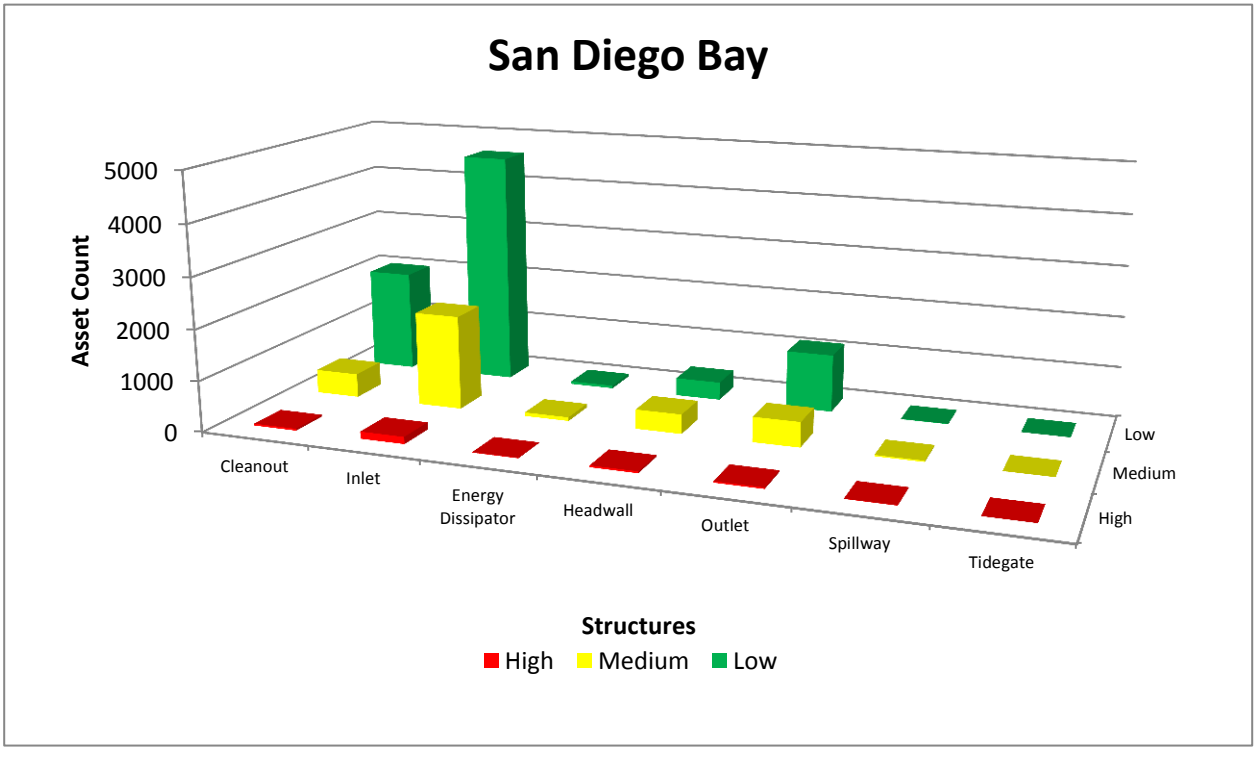


**Figure A-22. Storm Water Structure BRE Scores- San Diego Bay Watershed**

Figure A-23 shows the structures CoF score map for the San Diego Bay Watershed. More than 54 percent (6,425) of the structures have low CoF, and about 9 percent (1,092) have high CoF.

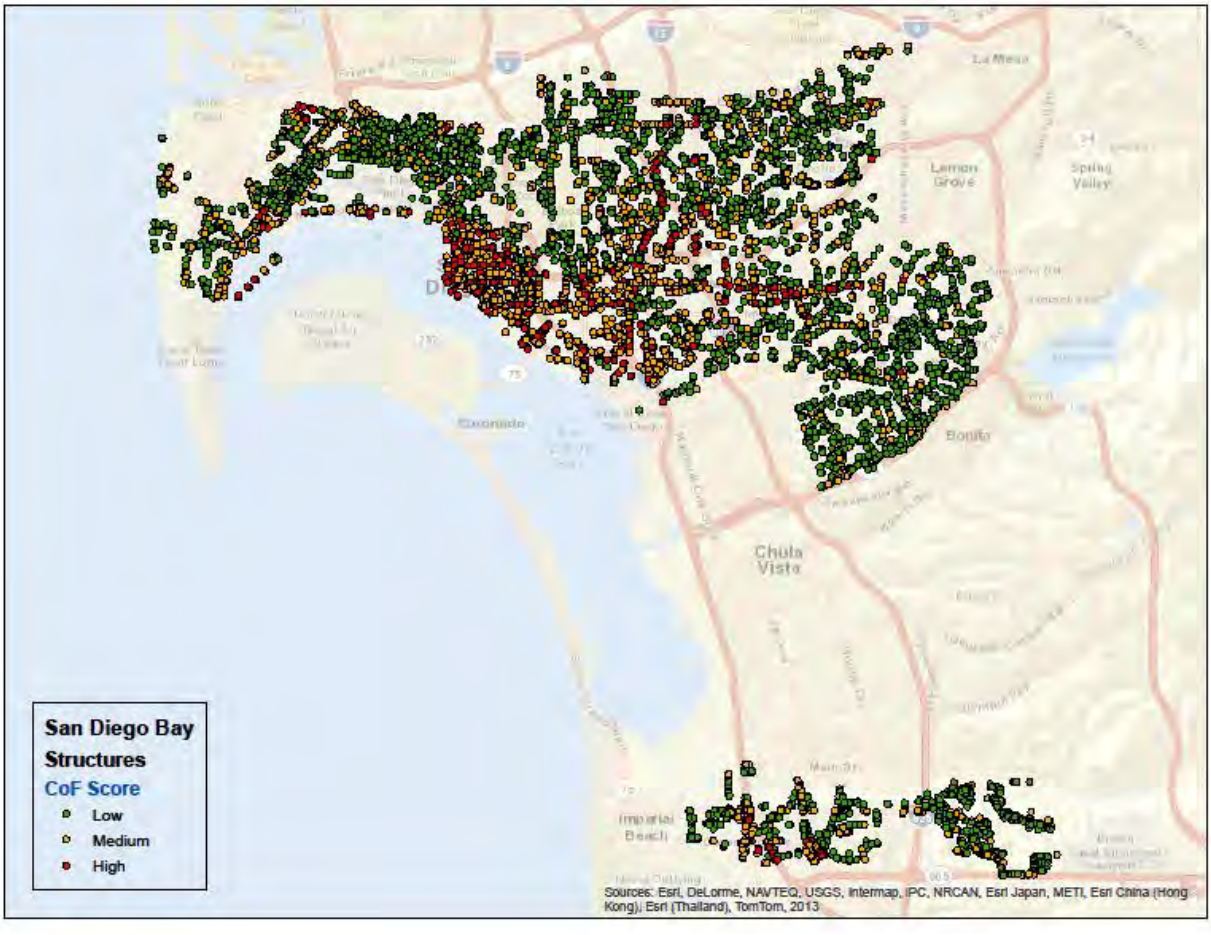


**Figure A-23. Storm Water Structure CoF Score Map - San Diego Bay Watershed**

Figure A-24 shows the structures PoF score map for the San Diego Bay Watershed. Approximately 77 percent (9,046) have low PoF, 18 percent (2,137) have medium PoF, and 5 percent (607) have high PoF.

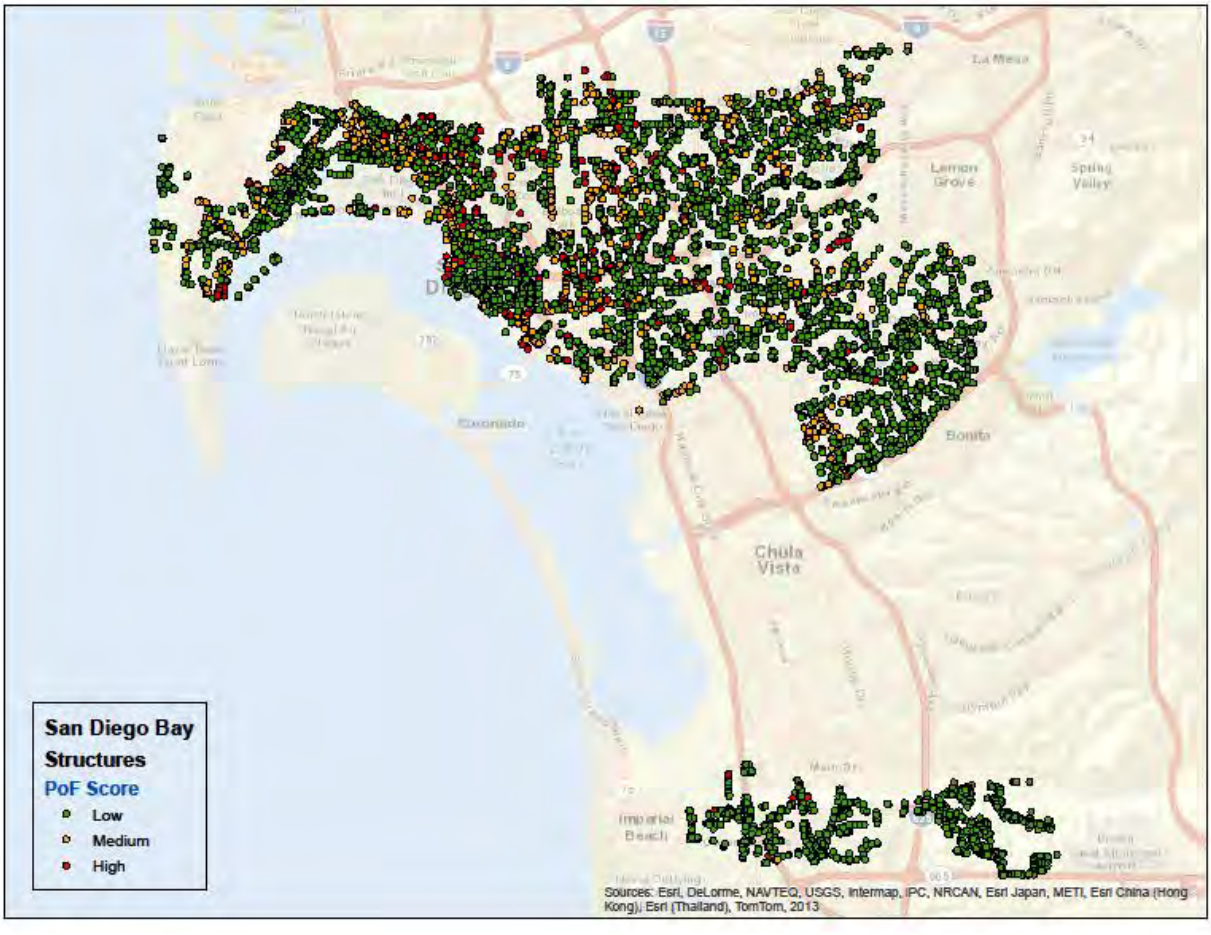


**Figure A-24. Storm Water Structure PoF Score Map - San Diego Bay Watershed**

Figure A-25 shows the structures BRE score map for the San Diego Bay Watershed. Approximately 70 percent (8,209) have low risk, 28 percent (3,324) have medium risk, and 2 percent (257) have high risk.

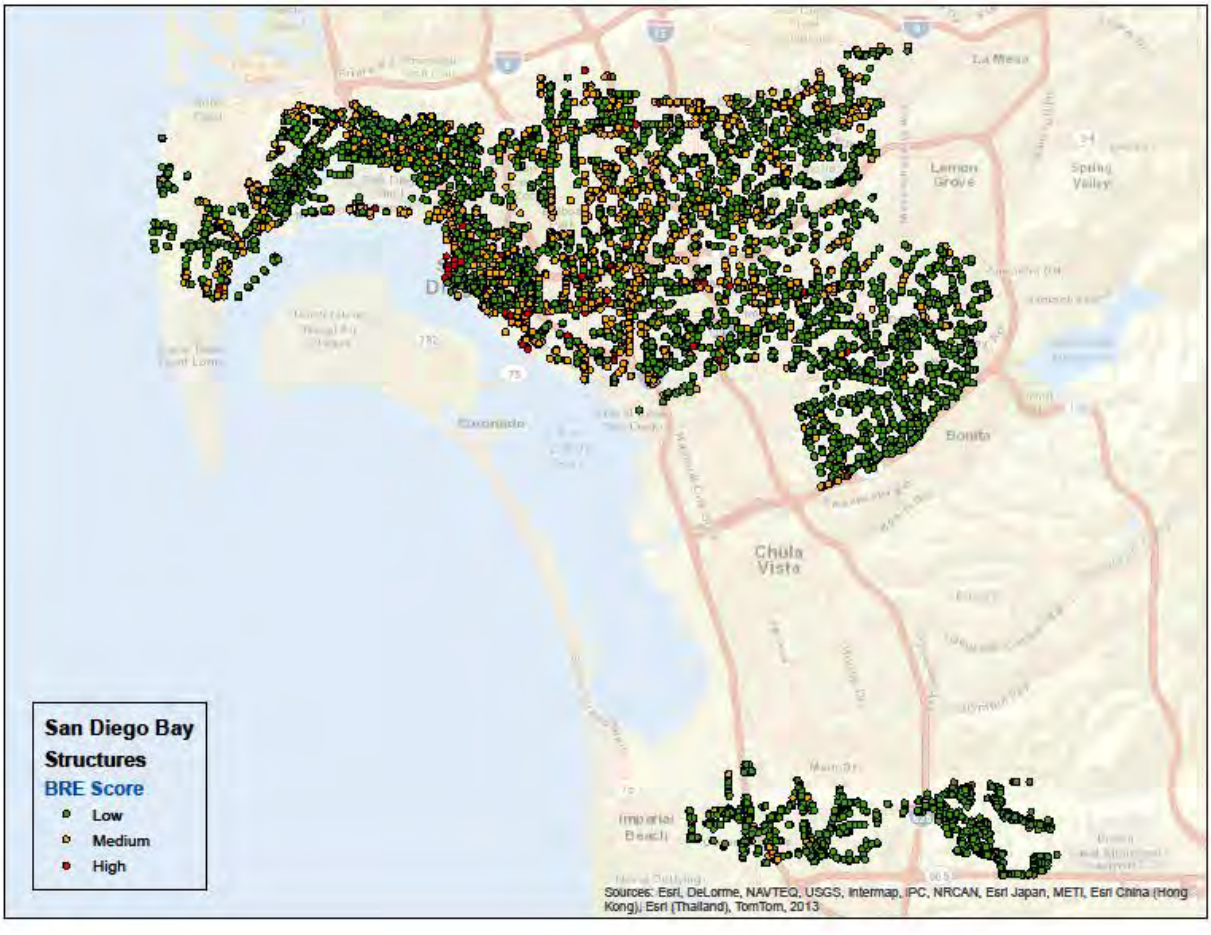


**Figure A-25. Storm Water Structure BRE Score Map - San Diego Bay Watershed**

Figure A-26 shows the BRE score summary for pump station assets. It shows that all of the high risk assets are located in Pump Stations D and H. The two pump stations have high consequence of failure due to their proximity to Old Town (Pump Station D) and the Sports Arena (Pump Station H).

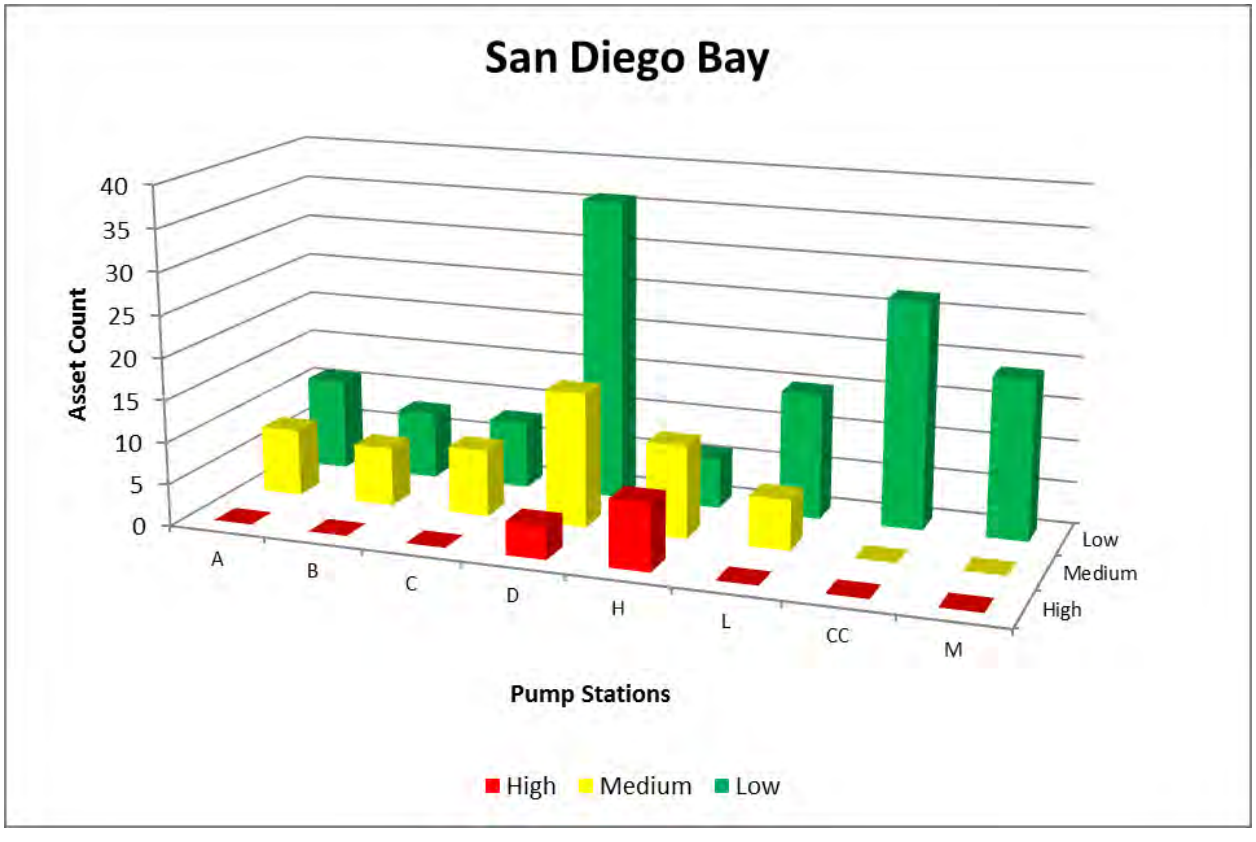


**Figure A-26. Pump Station Asset BRE Scores - San Diego Bay Watershed**

Figure A-27 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.

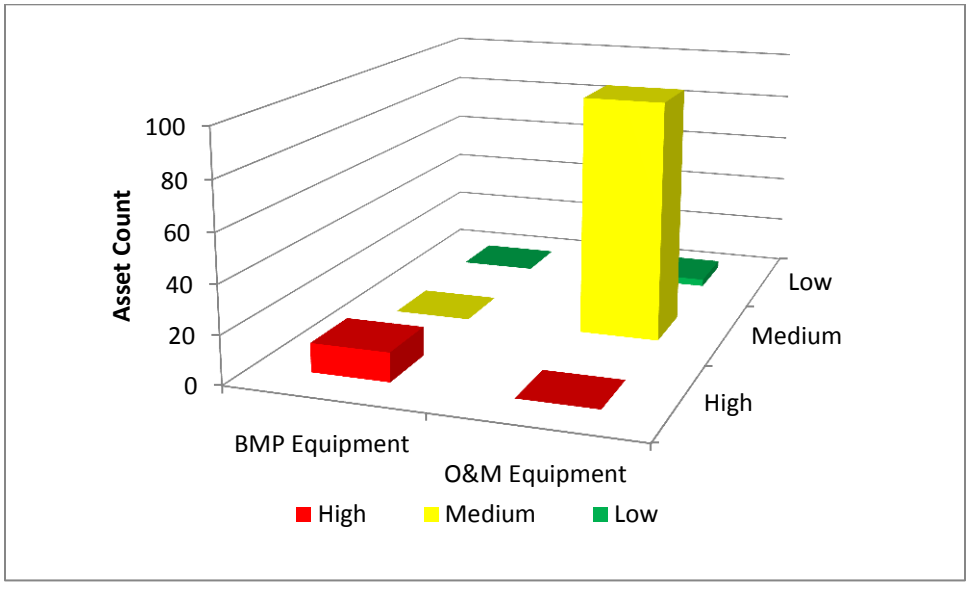


**Figure A-27. Summary of Equipment Assets – San Diego City Wide**

## A.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. The City conducted a Water Effects Ratio Study for Chollas Creek, which results in less BMP implementation if accepted by the RWQCB. The resulting costs for achieving LOSs 13a and 13b could be reduced by more than $480 million through FY 2030 if the Water Effects Ratio Study is adopted by the RWQCB as site specific criteria for Chollas Creek.
- For numerous hard assets (e.g., structures, channels) data attributes (e.g., size, type) required to support detailed asset replacement costs was 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 assets, 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 A-28, A-29, and A-30 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.

The results indicate that significant costs are projected from 2018 to mid-2031 with the highest from 2027 through 2031. This spike primarily is driven by large number of projected structural BMP implementation projects required to meet TMDL compliance. Hard assets requiring replacement also contributes to the investment need.

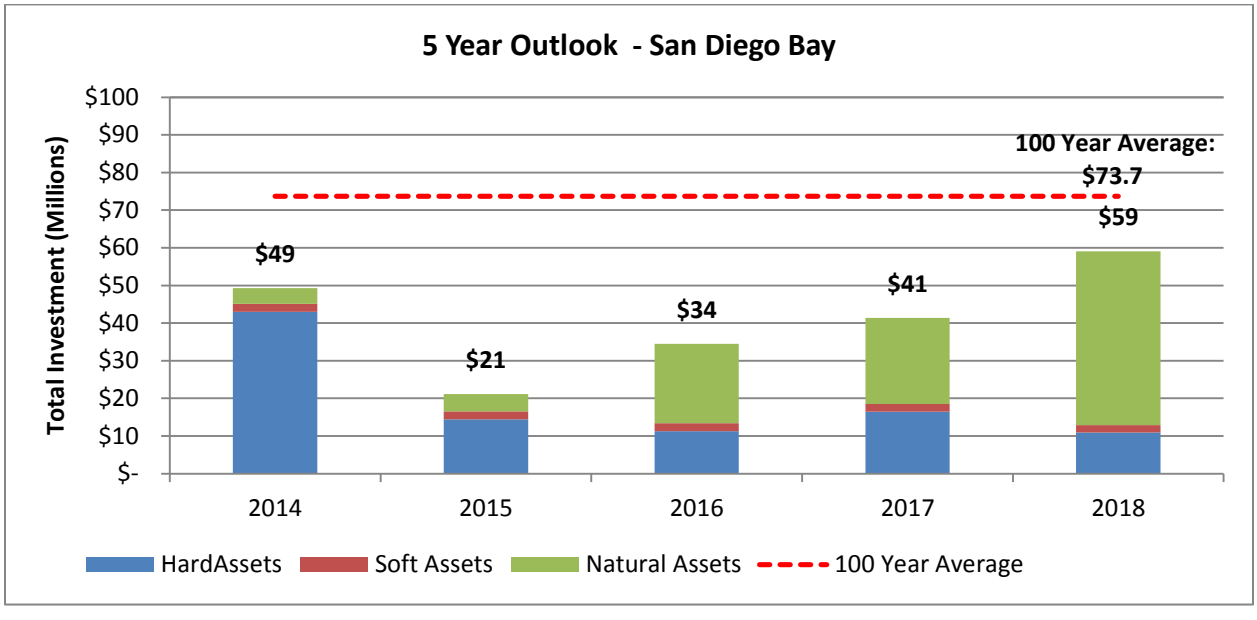


**Figure A-28. Watershed 5 Year Average Forecast by Asset Type – San Diego Bay Watershed**

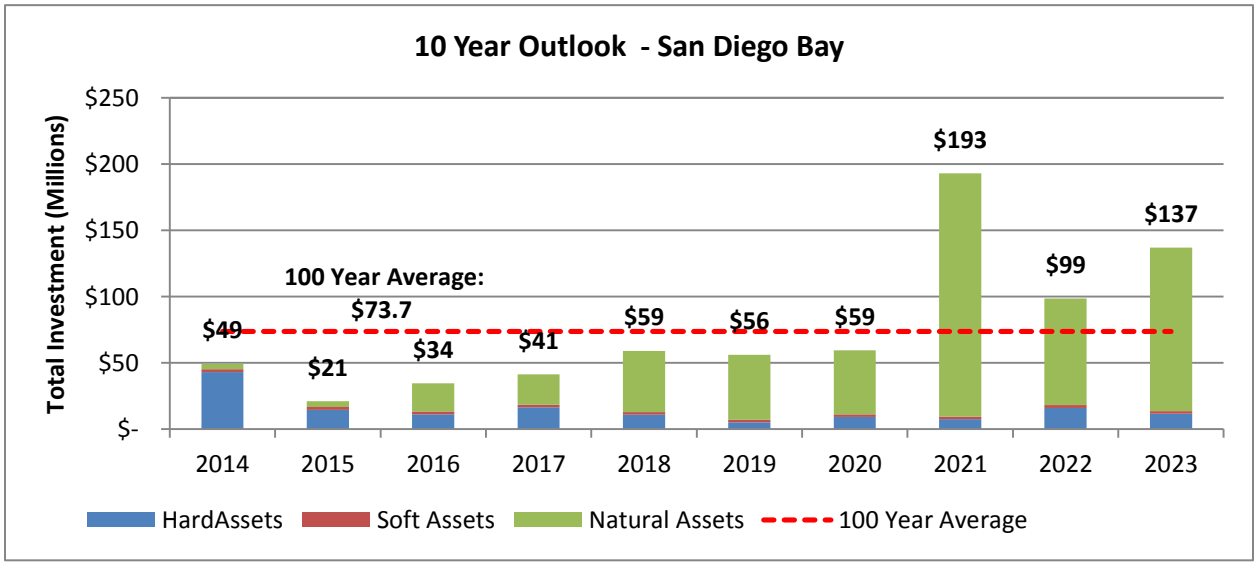


**Figure A-29. Watershed 10 Year Average Forecast by Asset Type – San Diego Bay Watershed**

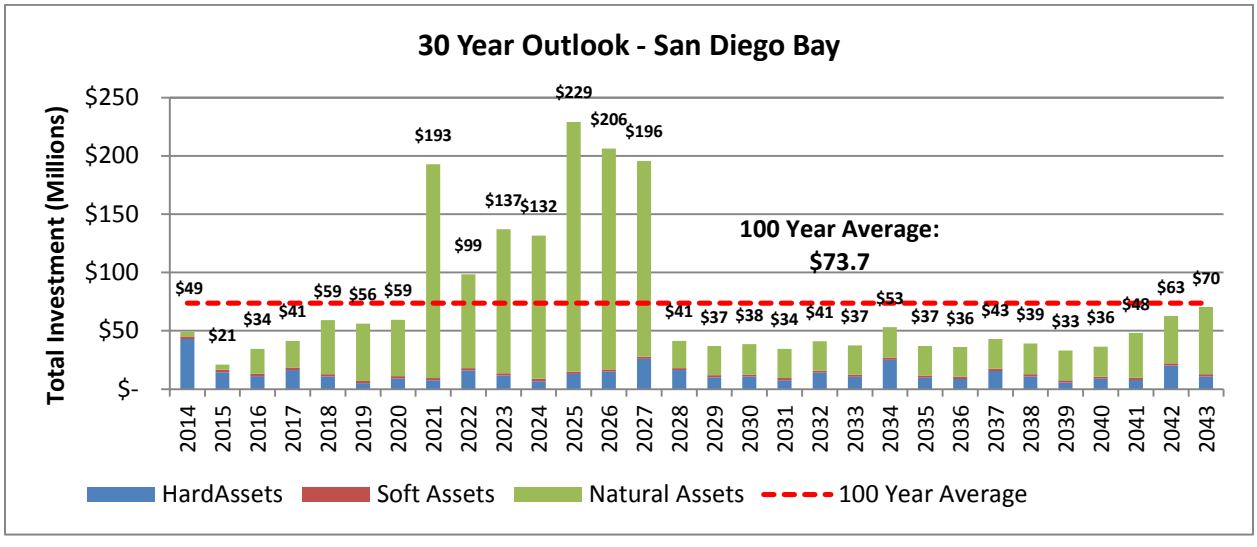


**Figure A-30. Watershed 30 Year Average Forecast by Asset Type – San Diego Bay Watershed**

Figures A-31 and A-32 represent the overall 100 year projected results based on asset type and activity type, respectively. Based on the results, it is projected that the San Diego Bay Watershed will need an average of $73.7 million dollars per year for capital and operational needs for the next 100 years. Some years will require more and others will require less.

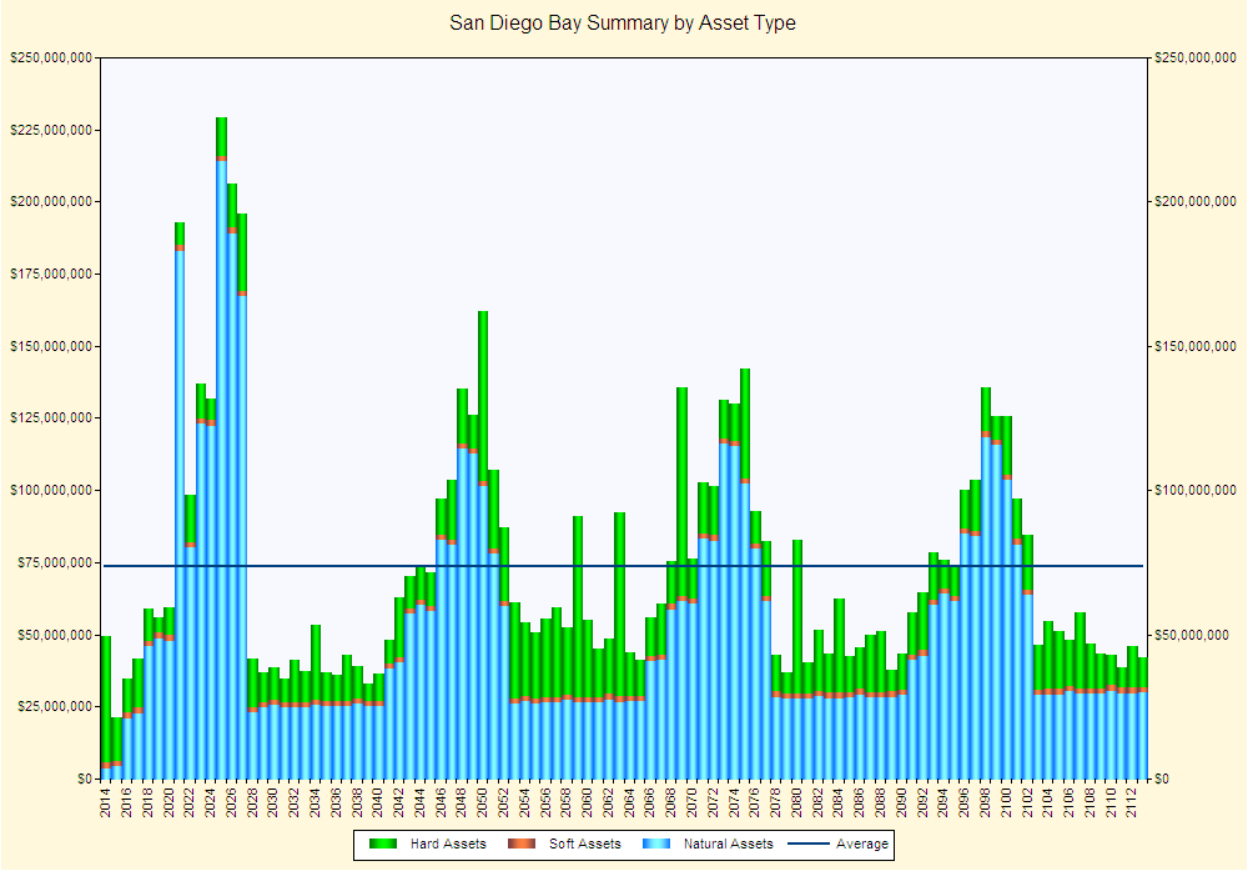


**Figure A-31. 100 Year Forecast by Asset Type - San Diego Bay Watershed**

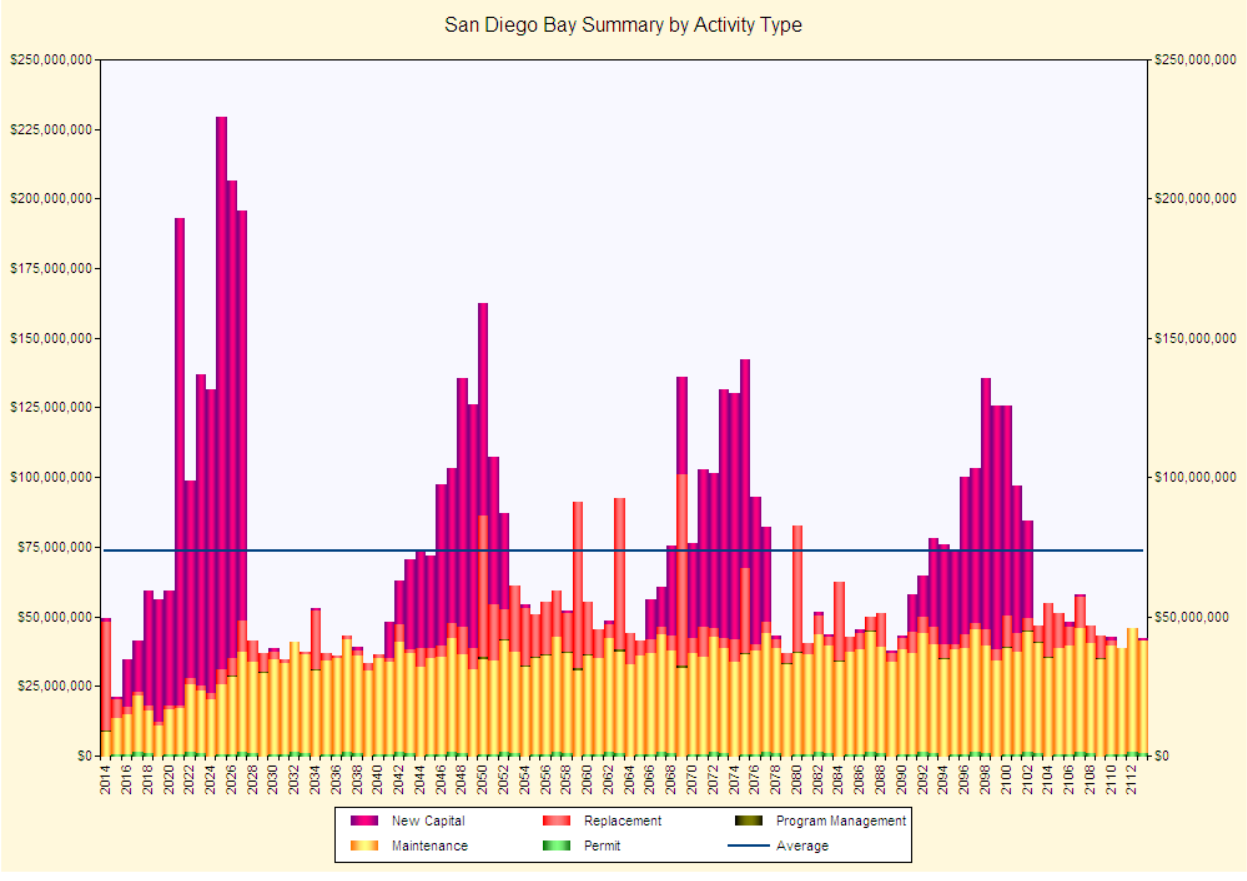


**Figure A-32. 100 Year Forecast by Activity Type - San Diego Bay Watershed**

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.

## A.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 San Diego Bay Watershed that would not be employed City-wide.

## A.9 ASSESSMENT MANAGEMENT IMPROVEMENT PLAN

See main document.

## A.10 RECOMMENDATIONS

The summary of activities for Fiscal Year 2014, organized by asset type and class, are listed in Table A-12. In addition, Table A-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 A-12. FY 2014 Activity Summary – San Dieog Bay Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Program Management (Op) | Total | Grand Total |
| **Hard Assets** | | | | | | | | | | | | | | |
| Channel | 36.17 | 48.21 | | | | 414,654.83 | | 414,654.83 | | | | 6,299.34 | 6,299.34 | 420,954.17 |
| Cleanout | 8.39 | 54.87 | | | | 320,000.00 | | 320,000.00 | 124,108.20 | | | 4,861.37 | 128,969.57 | 448,969.57 |
| Culvert | 11.11 | 54.42 | | | | 534,005.69 | | 534,005.69 | 38,546.35 | | | 8,112.50 | 46,658.85 | 580,664.53 |
| Drop Manhole | 14.47 | 43.18 | | | | | | | 6,601.50 | | | | 6,601.50 | 6,601.50 |
| Encased Storm Drain | 20.72 | 50.96 | | | | 2,028,743.34 | | 2,028,743.34 | 57.28 | | | 30,820.22 | 30,877.49 | 2,059,620.83 |
| Energy Dissipator | 18.55 | 53.61 | | | | 2,200,000.00 | | 2,200,000.00 | 241,071.25 | | | 33,421.91 | 274,493.16 | 2,474,493.16 |
| Headwall | 10.84 | 59.86 | | | | 400,000.00 | | 400,000.00 | 1,436,784.65 | | | 6,076.71 | 1,442,861.36 | 1,842,861.36 |
| Inlet | 9.26 | 55.66 | | | | 2,480,000.00 | | 2,480,000.00 | 17,701.80 | | | 37,675.61 | 55,377.41 | 2,535,377.41 |
| Outlet | 36.17 | 55.66 | | | | 1,760,000.00 | | 1,760,000.00 | | | | 26,737.53 | 26,737.53 | 1,786,737.53 |
| Pump Station | 12.00 | 60.00 | | | | | | | | 5,367,000.00 | | | 5,367,000.00 | 5,367,000.00 |
| Spillway | 40.57 | 49.96 | | | | 630,000.00 | | 630,000.00 | | | | 9,570.82 | 9,570.82 | 639,570.82 |
| Storm Drain | 9.84 | 61.26 | | | | 25,927,495.74 | | 25,927,495.74 | 1,799,739.26 | | | 393,884.72 | 2,193,623.98 | 28,121,119.72 |
| Tidegate | 41.77 | 41.77 | | | | 25,000.00 | | 25,000.00 | | | | 379.79 | 379.79 | 25,379.79 |
| **Sub-total Hard Assets** | | | | | **-** | **36,719,899.59** | **-** | **36,719,899.59** | **3,664,610.29** | **5,367,000.00** | **-** | **557,840.52** | **9,589,450.81** | **46,309,350.40** |
| | | | | | | | | | | | | | | |
| **Natural Assets** | | | | | | | | | | | | | | |
| LOS 04-Monitoring activities to prioritize pollutant sources and measure effects of BMPs on runoff / discharge water quality. | 30.30 | 30.30 | 10.38 | 2.92 | | | | | 104,758.69 | | | | 104,758.69 | 104,758.69 |
| LOS 13-Activity 01 Enhance LID implementation for new development and redevelopment through zoning amendments | 29.03 | 29.03 | 9.94 | 2.92 | | | | | 16,670.00 | | | | 16,670.00 | 16,670.00 |
| LOS 13-Activity 02 Train Development Services Department staff on LID regulatory changes and LID Design Manual | 29.03 | 29.03 | 9.94 | 2.92 | | | | | 11,220.24 | | | | 11,220.24 | 11,220.24 |

**Table A-12. FY 2014 Activity Summary – San Dieog Bay Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Program Management (Op) | Total | Grand Total |
| LOS 13-Activity 03 Develop regional training for and focus locally on enforcement of water-using mobile businesses | 29.03 | 29.03 | 9.94 | 2.92 | | | | | 7,673.87 | | | | 7,673.87 | 7,673.87 |
| LOS 13-Activity 05 Design and implement property- and PGA-based inspections and accelerated enforcement | 29.03 | 29.03 | 9.94 | 2.92 | | | | | 15,836.50 | | | | 15,836.50 | 15,836.50 |
| LOS 13-Activity 06 Trash areas: require full four-sided enclosure, siting away from storm drains, cover; consider retrofit requirement | 29.03 | 29.03 | 9.94 | 2.92 | | | | | 833.50 | | | | 833.50 | 833.50 |
| LOS 13-Activity 07 Animal-related facilities | 29.03 | 29.03 | 9.94 | 2.92 | | | | | 833.50 | | | | 833.50 | 833.50 |
| LOS 13-Activity 08 Nurseries and garden centers | 29.03 | 29.03 | 9.94 | 2.92 | | | | | 833.50 | | | | 833.50 | 833.50 |
| LOS 13-Activity 09 Auto-related uses | 29.03 | 29.03 | 9.94 | 2.92 | | | | | 833.50 | | | | 833.50 | 833.50 |
| LOS 13-Activity 10 Update Minimum BMPs for existing residential, commercial & industrial development & enforce | 29.03 | 29.03 | 9.94 | 2.92 | | | | | 9,538.70 | | | | 9,538.70 | 9,538.70 |
| LOS 13-Activity 11 Support partnership effort by social service providers to provide sanitation and trash management for persons experiencing homelessness | 29.03 | 29.03 | 9.94 | 2.92 | | | | | 5,001.00 | | | | 5,001.00 | 5,001.00 |

**Table A-12. FY 2014 Activity Summary – San Dieog Bay Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Program Management (Op) | Total | Grand Total |
| LOS 13-Activity 12 Develop pilot project to identify and carry out site disconnections in targeted areas | 29.03 | 29.03 | 9.94 | 2.92 | | | | | 4,808.46 | | | | 4,808.46 | 4,808.46 |
| LOS 13-Activity 13 Continue to participate in source reduction initiatives | 29.03 | 29.03 | 9.94 | 2.92 | | | | | 7,038.20 | | | | 7,038.20 | 7,038.20 |
| LOS 13-Activity 14a Expand residential BMP (irrigation, rainwater harvesting and turf conversion) rebate programs to multi-family housing in target areas | 29.03 | 29.03 | 9.94 | 2.92 | | | | | 4,808.46 | | | | 4,808.46 | 4,808.46 |
| LOS 13-Activity 14b Residential BMP Program: Rain Barrels | 29.03 | 29.03 | 9.94 | 2.92 | | | | | 2,826.27 | | | | 2,826.27 | 2,826.27 |
| LOS 13-Activity 14c Residential BMP Program: Irrigation Control (Turf Conversion) | 29.03 | 29.03 | 9.94 | 2.92 | | | | | 8,076.27 | | | | 8,076.27 | 8,076.27 |
| LOS 13-Activity 14d Residential BMP Program: Downspout Disconnect | 29.03 | 29.03 | 9.94 | 2.92 | | | | | 7,201.27 | | | | 7,201.27 | 7,201.27 |
| LOS 13-Activity 15 Expand outreach to HOA common lands and HOA rebates | 29.03 | 29.03 | 9.94 | 2.92 | | | | | 8,356.25 | | | | 8,356.25 | 8,356.25 |
| LOS 13-Activity 17 Develop outreach and training program for property managers responsible for HOAs and Maintenance Districts | 29.03 | 29.03 | 9.94 | 2.92 | | | | | 3,836.93 | | | | 3,836.93 | 3,836.93 |

**Table A-12. FY 2014 Activity Summary – San Dieog Bay Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Program Management (Op) | Total | Grand Total |
| LOS 13-Activity 18 Conduct trash clean-ups through community-based organizations involving target audiences | 29.03 | 29.03 | 9.94 | 2.92 | | | | | 10,002.00 | | | | 10,002.00 | 10,002.00 |
| LOS 13-Activity 19 Enhance education and outreach based on results of effectiveness survey and changing regulatory requirements | 29.03 | 29.03 | 9.94 | 2.92 | | | | | 84,006.13 | | | | 84,006.13 | 84,006.13 |
| LOS 13-Activity 20 Improve consistency & content of websites to highlight enforceable conditions & reporting methods | 29.03 | 29.03 | 9.94 | 2.92 | | | | | 1,534.77 | | | | 1,534.77 | 1,534.77 |
| LOS 13-Activity 22 Optimize catch basin cleaning to maximize pollutant removal | 29.03 | 29.03 | 9.94 | 2.92 | | | | | 1,427,147.29 | | | | 1,427,147.29 | 1,427,147.29 |
| LOS 13-Activity 25 Proactively monitor for erosion, and complete minor repair & slope stabilization | 29.03 | 29.03 | 9.94 | 2.92 | | | | | 8,335.00 | | | | 8,335.00 | 8,335.00 |
| LOS 13-Activity 28 Enhance street sweeping through equipment replacement and route optimization | 29.03 | 29.03 | 9.94 | 2.92 | | | | | 544,568.63 | | 419,337.72 | | 963,906.36 | 963,906.36 |
| LOS 13-Activity 29 Initiate sweeping of medians on high-volume arterial roadways | 29.03 | 29.03 | 9.94 | 2.92 | | | | | 157,866.22 | | | | 157,866.22 | 157,866.22 |
| LOS 13-Activity 31 Identify sewer leaks and areas for sewer pipe | 29.03 | 29.03 | 9.94 | 2.92 | | | | | 3,200.64 | | | | 3,200.64 | 3,200.64 |

**Table A-12. FY 2014 Activity Summary – San Dieog Bay Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Program Management (Op) | Total | Grand Total |
| replacement prioritization | | | | | | | | | | | | | | |
| LOS 14-Source identification and characterization studies | 30.30 | 30.30 | 10.38 | 2.92 | | | | | 854,747.64 | | | | 854,747.64 | 854,747.64 |
| 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). | 30.30 | 30.30 | 10.38 | 2.92 | | | | | | | 40,741.69 | | 40,741.69 | 40,741.69 |
| LOS 19-City Property-Initial site reconnassaince (2/3 of sites) to identify areas within City parcels with potential to capture/treat/store/infiltrate storm water and runoff. | 30.30 | 30.30 | 10.38 | 2.92 | | | | | | | 32,354.39 | | 32,354.39 | 32,354.39 |
| LOS 47-Permit monitoring | 30.30 | 30.30 | 10.38 | 2.92 | | | | | 288,498.85 | | | | 288,498.85 | 288,498.85 |
| **Sub-total Natural Assets** | | | | | | | | | **3,600,892.32** | | **492,433.80** | | **4,093,326.12** | **4,093,326.12** |
| | | | | | | | | | | | | | | |
| **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 | 35.00 | 35.00 | 7.00 | 5.00 | | | | | 337,500.00 | | 16,666.67 | | 354,166.67 | 354,166.67 |

**Table A-12. FY 2014 Activity Summary – San Dieog Bay Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Program Management (Op) | Total | Grand Total |
| departments behaviors. | | | | | | | | | | | | | | |
| 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 |
| LOS 12b-Land Development Regulations TMDL-Develop specification for 303(d) listings and TMDL, develop standard plans and specifications for LID and BMPs. | 47.50 | 47.50 | 9.50 | 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. | 40.00 | 40.00 | 8.00 | 5.00 | | | | | 397,500.00 | | 166,666.67 | | 564,166.67 | 564,166.67 |
| 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 | | | | | 322,294.39 | | | | 322,294.39 | 322,294.39 |

**Table A-12. FY 2014 Activity Summary – San Dieog Bay Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Program Management (Op) | Total | Grand Total |
| LOS 24-City department behavior: water deparatment-Complete a planning level study in all watersheds with 15% design concepts and costs, changes in regulatory, and develop cost sharing model. | 28.50 | 28.50 | 5.70 | 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. | 40.40 | 40.40 | 10.10 | 4.00 | | | | | 7,916.67 | | 13,888.89 | | 21,805.56 | 21,805.56 |
| 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 |

**Table A-12. FY 2014 Activity Summary – San Dieog Bay Watershed**

| | | | | | CIP | | | | Operating Budget | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Asset Type and Class** | **Min BRE** | **Max BRE** | **CoF** | **PoF** | **Maintenance (CM)** | **Replacement (Mh)** | **New Capital (Nw)** | **Total** | **Maintenance (CM)** | **Replacement (Mh)** | **New Capital (Nw)** | **Program Management (Op)** | **Total** | **Grand Total** |
| 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 |
| 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 servcices of inspection contractor. | 7.30 | 7.30 | 7.30 | 1.00 | | | | | 2,500.00 | | | | 2,500.00 | 2,500.00 |
| **Sub-total Soft Assets** | | | | | **-** | **-** | **-** | **-** | **1,828,699.97** | **-** | **313,888.89** | **-** | **2,142,588.86** | **2,142,588.86** |
| | | | | | | | | | | | | | | |
| **Grand Total** | | | | | | **36,719,899.59** | | **36,719,899.59** | **9,094,202.57** | **5,367,000.00** | **806,322.69** | **557,840.52** | **15,825,365.79** | **52,545,265.38** |

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**Table A-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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# Appendix B San Diego River Watershed

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## B.1 INTRODUCTION

The San Diego 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 San Diego River WMA. The San Diego 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 San Diego River watershed, and provide a vehicle for public participation.

### B.1.1 San Diego River Watershed Description

San Diego Hydrologic Unit (HU) is a long, triangular shaped area of about 440 square miles drained by the San Diego River. It is the second largest watershed lying entirely within San Diego County and contains portions of the cities of San Diego, El Cajon, La Mesa, Poway, and Santee and several unincorporated communities. The Water Quality Control Plan for the San Diego Basin (Basin Plan) prepared by the RWQCB (SDRWQCB, 1994) defines the San Diego River WMA as consisting of four Hydrological Areas (HAs), namely the Lower San Diego (907.10), the San Vincente (907.20), the El Capitan (907.30) and the Boulder Creek (907.40). Table B-1 provides data on the percentage of each jurisdiction within the WMA at the watershed level, and Figure B-1 shows the City's jurisdiction within the watershed.

The mouth of the San Diego River discharges into the Pacific Ocean at the community of Ocean Beach. The main surface water draining the WMA is the San Diego River, which discharges into the Pacific Ocean between Mission Beach and Ocean Beach. The other principal surface water bodies of the WMA are Forester Creek, Boulder Creek, Santee Lakes, and five reservoirs: El Capitan, San Vicente, Lake Jennings, Lake Cuyamaca, and Lake Murray. Principal groundwater aquifers in the WMA include the Santee/El Monte Basin and the Mission Valley Basin.

**Table B-1. San Diego River WMA Jurisdictional Breakdown**

| Jurisdiction | Acres in Watershed | Percent of Watershed |
|---|---|---|
| El Cajon | 9,245 | 3% |
| La Mesa | 3,052 | 1% |
| Poway | 596 | 0% |
| San Diego | 46,849 | 17% |
| Santee | 10,540 | 4% |
| County of San Diego | 207,258 | 75 |

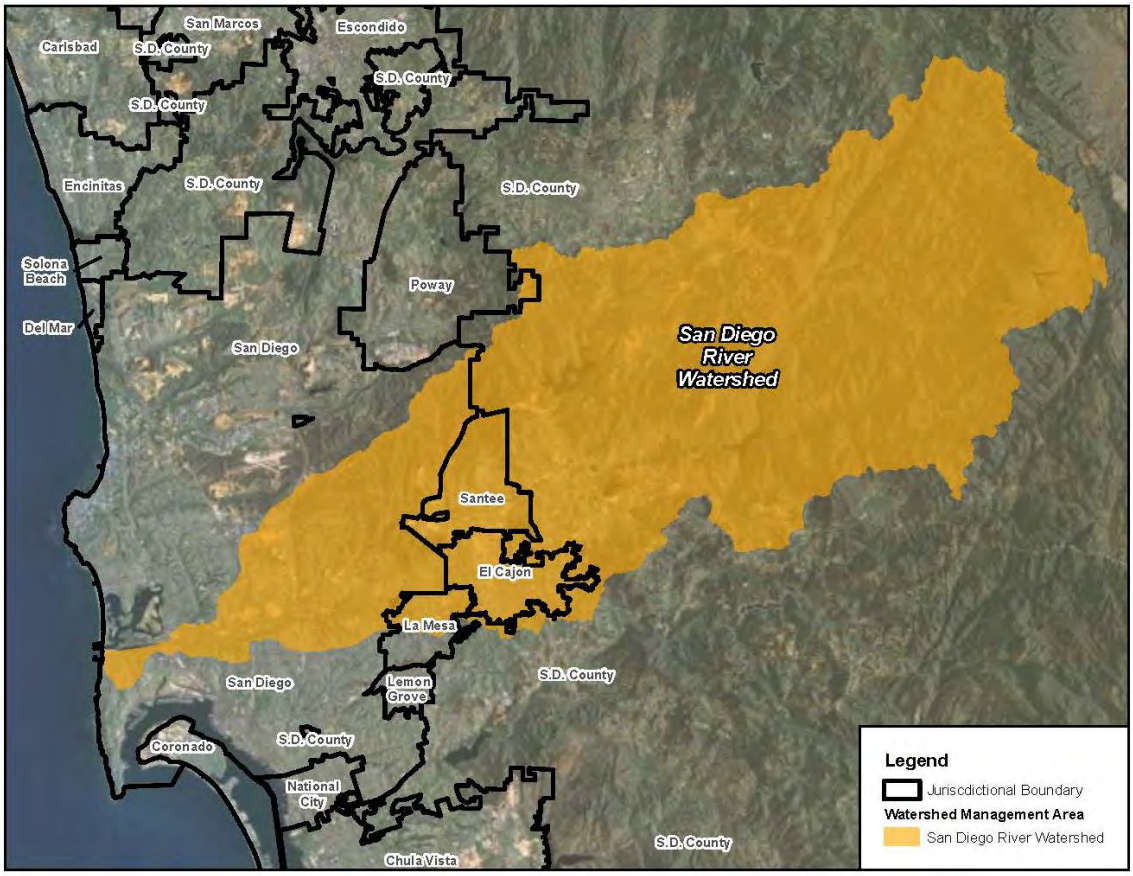


**Figure B-1. San Diego River Watershed**

El Capitan, San Vicente, Cuyamaca, Jennings, and Murray reservoirs are the major storage facilities. Important hydrologic resources in the watershed include five water storage reservoirs, a large groundwater aquifer, extensive riparian habitat, coastal wetlands, and tide pools. San Vicente Reservoir, Murray Reservoir, Jennings, and Murray Reservoir store mainly Colorado River water, whereas, El Capitan mainly stores local runoff and some Colorado River water. Cuyamaca Reservoir stores only local runoff. Much of the impounded water is used to serve major population centers, including a portion of the San Diego metropolitan area and the communities of El Cajon, Santee, Lakeside, Alpine and Julian. Annual precipitation ranges from less than 11 inches at the coast to about 35 inches around Cuyamaca and El Capitan Reservoir.

Other areas including the Cleveland National Forest, Mission Trails Regional Park, and the river flood plain near Lakeside represent three important undeveloped areas that host a wide variety of intact habitats and endangered species like the arroyo toad, least bell's vireo, and the southwestern pond turtle. In addition, Famosa Slough, near the mouth of the San Diego River contains extremely productive wetlands habitat.

### B.1.2 San Diego 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 San Diego River Watershed:

- Bill Harris
- Bill Tamargo (OCA: Sam Ferschweler/Aaron Snelling)

### B.1.3 Water Quality

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

[1] San Diego River Watershed Urban Runoff Management Program, Annual Report 2009-2010, City of El Cajon, City of La Mesa, City of San Diego, City of Santee, and County of San Diego.

**Table B-2. San Diego River Watershed Baseline High-priority Water Quality Problems**

| Hydrologic Area | Bacteria Indicators | Nutrients (Phosphorus) | Total Dissolved Solids (including Chloride) | Low Dissolved Oxygen (DO) | Turbidity |
|---|---|---|---|---|---|
| **Lower San Diego Hydrologic Area** | | | | | |
| 907.1 | X | X | X | X | X |
| **San Vincente Hydrologic Area** | | | | | |
| 907.2 | X | X | X | X | X |
| **El Capitan Hydrologic Area** | | | | | |
| 907.3 | X | X | X | X | X |
| **Boulder Creek Hydrologic Area** | | | | | |
| 907.4 | X | X | X | X | X |

Water bodies in the San Diego River WMA and constituents that have been placed on the State Water SWRCB 2010 Section 303(d) list are presented in Table B-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 B-3. San Diego 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 |
|---|---|---|---|---|---|---|---|---|
| Alvarado Creek | River & Stream | 90711000 / 18070304 | Yes | Selenium | 5.1 Miles | 2010 | 5A | 2021 |
| El Capitan Lake | Lake & Reservoir | 90731000 / 18070304 | Yes | Color | 1454 Acres | 2006 | 5A | 2019 |
| | | | | Manganese | 1454 Acres | 2006 | 5A | 2019 |
| | | | | Phosphorus | 1454 Acres | 2010 | 5A | 2021 |
| | | | | Total Nitrogen as N | 1454 Acres | 2010 | 5A | 2021 |
| | | | | pH | 1454 Acres | 2006 | 5A | 2019 |
| Famosa Slough and Channel | Estuary | 90711000 / 18070304 | Yes | Eutrophic | 32 Acres | 1990 | 5A | 2019 |
| Forester Creek | River & Stream | 90712000 / 18070304 | Yes | Fecal Coliform | 6.4 Miles | 2002 | 5A | 2005 |
| | | | | Selenium | 6.4 Miles | 2010 | 5A | 2019 |
| | | | | Total Dissolved Solids | 6.4 Miles | 2002 | 5A | 2019 |
| | | | | pH | 6.4 Miles | 2002 | 5A | 2019 |
| Los Coches Creek | River & Stream | 90714000 / 18070304 | Yes | Selenium | 8.8 Miles | 2010 | 5A | 2019 |
| Mission Bay Shoreline, at Bonita Cove | Coastal & Bay Shoreline | 90751000 / 18070304 | Yes | Enterococci | 0.09 Miles | 2006 | 5A | 2019 |
| | | | | Fecal Coliform | 0.09 Miles | 2006 | 5A | 2021 |
| | | | | Total Coliform | 0.09 Miles | 2006 | 5A | 2019 |

**Table B-3. San Diego 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 |
|---|---|---|---|---|---|---|---|---|
| Mission Bay Shoreline, at Fanual Park | Coastal & Bay Shoreline | 90751000 / 18070304 | Yes | Enterococci | 0.12 Miles | 2006 | 5A | 2021 |
| | | | | Total Coliform | 0.12 Miles | 2006 | 5A | 2019 |
| Mission Bay at Quivira Basin | Bay & Harbor | 90752000 / 18070304 | Yes | Copper | 65 Acres | 2010 | 5A | 2021 |
| Murray Reservoir | Lake & Reservoir | 90711000 / 18070304 | Yes | Nitrogen | 119 Acres | 2010 | 5A | 2021 |
| | | | | pH | 119 Acres | 2006 | 5A | 2019 |
| Pacific Ocean Shoreline, San Diego HU, at the San Diego River outlet, at Dog Beach | Coastal & Bay Shoreline | 90711000 / 18070304 | Yes | Enterococci | 0.03 Miles | 1998 | 5A | 2021 |
| | | | | Total Coliform | 0.03 Miles | 1998 | 5A | 2010 |
| San Diego River (Lower) | River & Stream | 90711000 / 18070304 | Yes | Enterococci | 16 Miles | 2010 | 5A | 2021 |
| | | | | Fecal Coliform | 16 Miles | 2002 | 5A | 2009 |
| | | | | Low Dissolved Oxygen | 16 Miles | 2002 | 5A | 2019 |
| | | | | Manganese | 16 Miles | 2010 | 5A | 2021 |
| | | | | Nitrogen | 16 Miles | 2010 | 5A | 2021 |
| | | | | Phosphorus | 16 Miles | 2002 | 5A | 2019 |
| | | | | Total Dissolved Solids | 16 Miles | 2002 | 5A | 2019 |

**Table B-3. San Diego 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 |
|---|---|---|---|---|---|---|---|---|
| | | | | Toxicity | 16 Miles | 2010 | 5A | 2021 |
| San Vincente Creek (San Diego County) | River & Stream | 90722000 / 18070304 | Yes | Ammonia as Nitrogen | 16 Miles | 2010 | 5A | 2021 |
| | | | | Benthic Community Effects | 16 Miles | 2010 | 5A | 2021 |
| | | | | Total Nitrogen as N | 16 Miles | 2010 | 5A | 2021 |
| | | | | Toxicity | 16 Miles | 2010 | 5A | 2021 |
| San Vincente Reservoir | Lake & Reservoir | 90721000 / 18070304 | Yes | Chloride | 1058 Acres | 2006 | 5A | 2019 |
| | | | | Color | 1058 Acres | 2006 | 5A | 2019 |
| | | | | Sulfates | 1058 Acres | 2006 | 5A | 2019 |
| | | | | Total Nitrogen as N | 1058 Acres | 2010 | 5A | 2021 |
| | | | | pH (high) | 1058 Acres | 2006 | 5A | 2019 |

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### B.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 lood 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 San Diego River Watershed are listed in Table B-4.

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**Table B-4. San Diego 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 | |
| 47 | San Diego | 7969 & 7971 Engineer Rd | 1,230 | -- | 1,230 | 8 |
| 51 | San Diego | Red River Dr & Conestoga Dr | 876 | 876 | -- | 10 |
| 52 | San Diego | Camino del Arroyo | 1,039 | -- | 1,039 | 9 |
| 53 | San Diego | Cowles Mtn Channel | 711 | 378 | 333 | 8 |
| 54 | San Diego | San Carlos Creek Channel | 957 | 433 | 524 | 10 |
| 58 | San Diego | Murphy Canyon Creek Channel | 2,523 | 772 | 1,752 | 57 |
| 58a | San Diego | Murphy Canyon Creek Channel | 2,371 | 633 | 1,738 | 15 |
| 59 | San Diego | Alvarado Creek Channel | 1,072 | 869 | 203 | 46 |
| 60 | San Diego | Alvarado Creek Channel | 582 | 570 | 12 | 29 |
| 61 | San Diego | Alvarado Creek Channel | 2,130 | 2,104 | 26 | 46 |
| 62 | San Diego | Alvarado Creek Channel | 2,392 | 2,348 | 45 | 32 |
| 64 | San Diego | Alvarado Creek Channel | 2,600 | 1,335 | 1,265 | 40 |
| 65a | San Diego | Fairmont Creek Channel | 813 | 749 | 64 | 19 |
| 65b | San Diego | Fairmont Channel | 848 | 38 | 811 | 12 |
| 65c | San Diego | Fairmont Channel | 1,235 | 1,233 | 2 | 15 |
| 66 | San Diego | Montezuma Channel | 1,420 | 1,420 | -- | 19 |
| 81 | San Diego | Camino de la Reina & Camino del Arroyo | 648 | 648 | -- | 9 |
| 82 | San Diego | Nimitz Channel | 865 | 234 | 631 | 12 |
| 83 | San Diego | Famosa Blvd & Valeta St | 185 | 66 | 119 | 20 |

## Table B-4. San Diego 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 | |

**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.

## B.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 San Diego River Watershed asset category (i.e., hard, soft, and natural).

### B.2.1 Hard Assets

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

**Table B-5. San Diego River Watershed Hard Assets**

| Asset Class/Subclass | Asset Count | Total Length (feet) | Total Length (miles) |
|---|---|---|---|
| Conveyance System: | | | |
| • Box Culvert | 93 | 29,891 | 5.66 |
| • Brow Ditch | 23 | 4,436 | 0.84 |
| • Channel | 494 | 202,242 | 38.30 |
| • Storm Drain Pipe | 5,852 | 807,013 | 152.84 |
| Structures: | | | |
| • Cleanout | 1,326 | | |
| • Inlet | 3,578 | | |
| • Energy Dissipator | 54 | | |
| • Headwall | 709 | | |
| • Outlet | 1,166 | | |
| • Spillway | 12 | | |
| • Tidegate | 1 | | |
| Pump Stations (components > $5,000K): | 38 | | |
| **Total** | **13,346** | **1,043,581** | **197.64** |

In terms of asset count, inlets account for 52 percent of San Diego River Watershed storm water structures assets, followed by cleanouts and outlets, with 20 percent and 17 percent, respectively. Within the conveyance system, the dominant asset type is the storm drain system, which accounts for 77 percent (153 miles) of total conveyance length. The detailed distribution of the storm water conveyance and structures is shown in Figures B-2 and B-3.

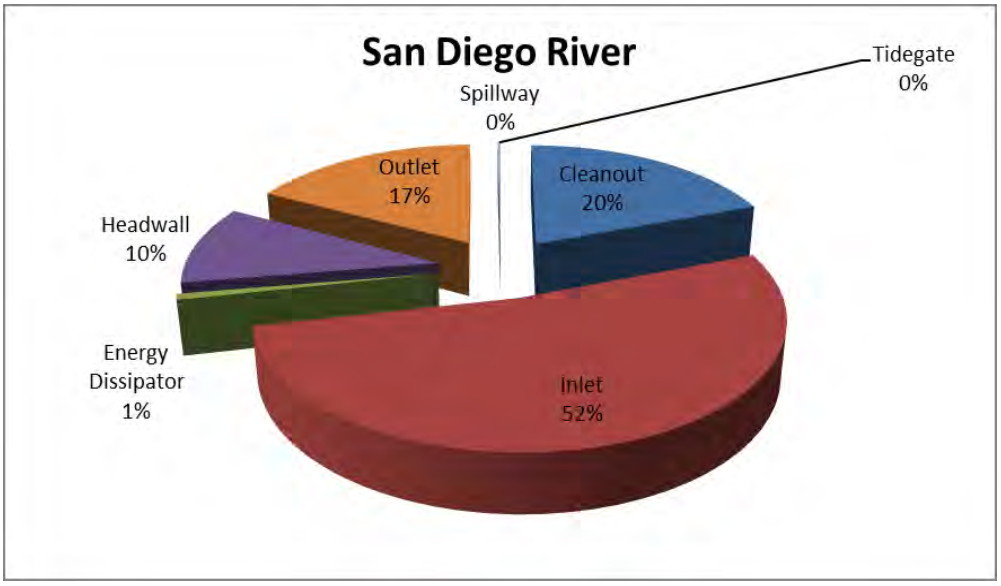


**Figure B-2. Distribution of Storm Water Structures by Asset Count - San Diego River Watershed**

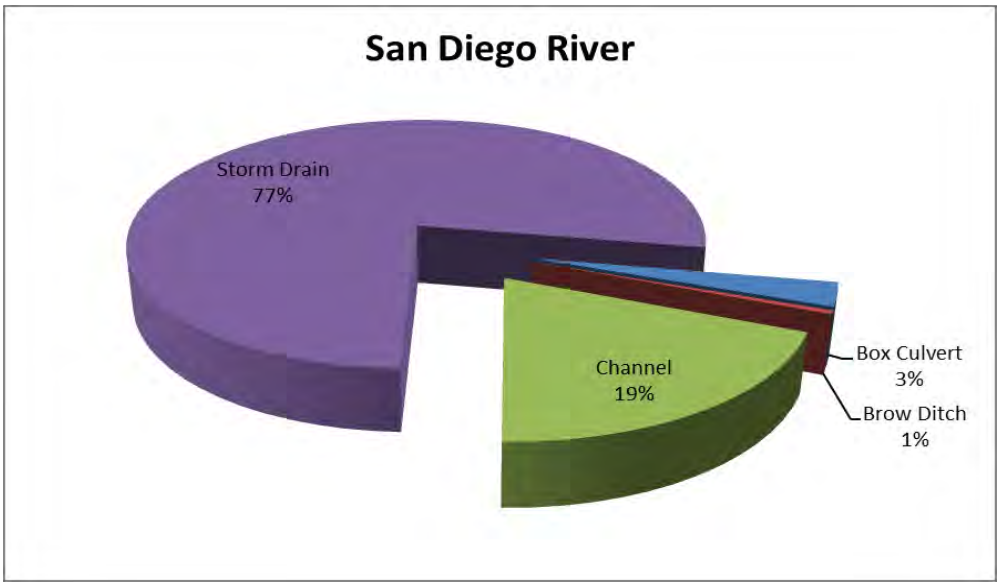


**Figure B-3. Distribution of Storm Water Conveyance by Length - San Diego River Watershed**

In addition to those assets listed in Table B-5, there is additional equipment that is not particularly part of the San Diego 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 B-6 shows the list of assets within this category and their quantities.

**Table B-6. The Equipment**

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

### B.2.2 Natural Assets

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

**Table B-7. San Diego River Watershed Natural Asset Classes/Subclasses and Quantities**

| Asset Class/Subclass | Quantity in San Diego River Watershed |
|---|---|
| Receiving Waters | Currently treated as one asset within the San Diego River Watershed. For future updates, recommend to refine into specific receiving water assets. For the San River Watershed, there are 1,673 receiving waters/segments. |
| Runoff/Discharges | Currently treated as one asset within the San Diego River Watershed. For future updates, manage runoffs and discharges at the hydrologic sub-area level as defined in the CLRP. There are 1,166 mainstem outfalls in the San Diego River Watershed, which will be associated with the hydrologic sub-areas defined in the CLRP |
| City Parcels | There are 579 City Parcels in the San Diego River Watershed. |
| MHPAs | There are 287 MHPAs in the San Diego River Watershed. |

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

### B.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 B-8 shows the soft asset classes and the quantities of assets in those classes in the San Diego River Watershed.

**Table B-8. San Diego River Watershed Soft Asset Subclasses and Quantities**

| Asset Class/Subclass | Quantity in San Diego River Watershed |
|---|---|
| City Department Behavior | Currently treated as one asset in the San Diego 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 San Diego 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 | |

## B.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 asset register was assigned an estimated replacement cost. The replacement value 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 asset class are shown in Table B-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 San Diego River Watershed is provided below in Table B-9. Of the total, the conveyance system accounts for about 71 percent of the total replacement cost, structures account for 29 percent, and pump stations account for less than 1 percent. Figure B-4 shows the distribution of San Diego River Watershed hard asset replacement costs.

**Table B-9. San Diego River Watershed Assets Replacement Costs**

| Asset Class/Subclass | Replacement Cost | Total Replacement Cost |
|---|---|---|
| Conveyance System: | | |
| • Box Culvert | $250,000/unit | $23.3 million |
| • Brow Ditch | $400/linear feet | $1.8 million |
| • Channel | $400/linear feet | $80.9 million |
| • Storm Drain | $400/linear feet | $322.8 million |
| Structures: | | |
| • Cleanout | $20,000/unit | $26.5 million |
| • Inlet | $20,000/unit | $71.6 million |
| • Energy Dissipater | $40,000/unit | $2.2 million |
| • Headwall | $40,000/unit | $28.4 million |
| • Outlet | $40,000/unit | $46.7 million |
| • Spillway | $15,000/unit | $180,000 |
| • Tidegate | $25,000/unit | $25,000 |
| Pump Stations: | Vary by asset types | $998,000 |
| **Total** | | **$605.1 million** |

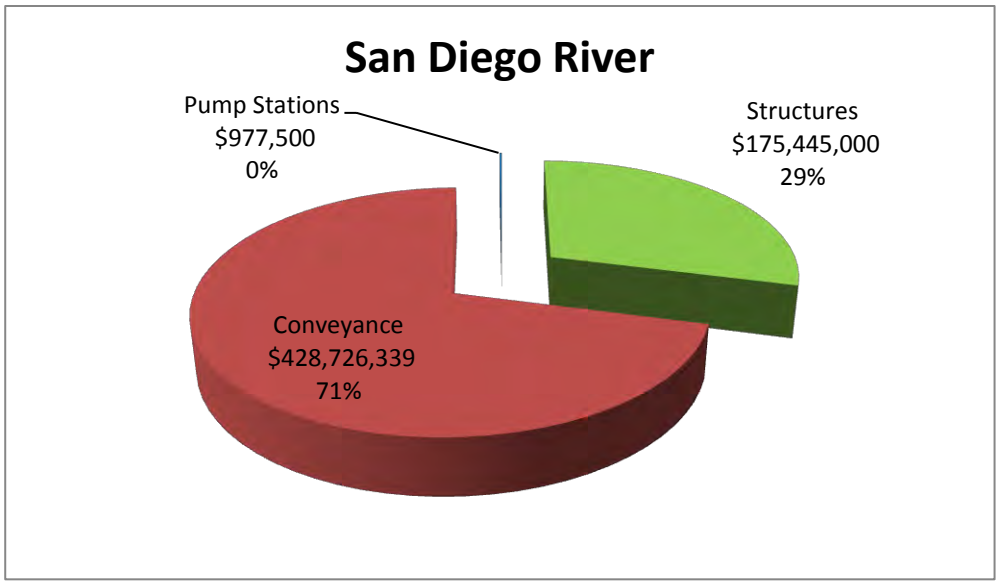


**Figure B-4. San Diego River Watershed Hard Assets Replacement Costs**

Figure B-5 shows the distribution of conveyance system asset replacement costs. Of the total conveyance system, about 75 percent consists of storm drains; followed by channels, box culverts, and brow ditches.

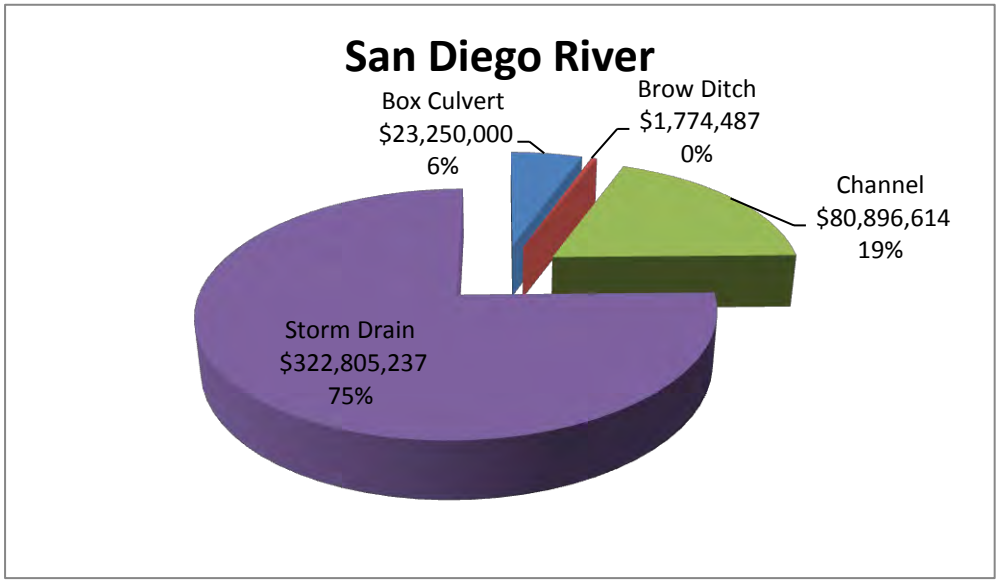


**Figure B-5. San Diego River Watershed Conveyance System Assets Replacement Costs**

Figure B-6 shows the distribution of the asset replacement costs for storm water structures. Of the total , most of structures consist of inlets (41 percent), followed by outlets (27 percent), headwalls (16 percent), and cleanouts (15 percent). The three remaining asset classes (energy dissipaters, spillways, and tidegates) represent 1 percent of the total asset replacement costs.

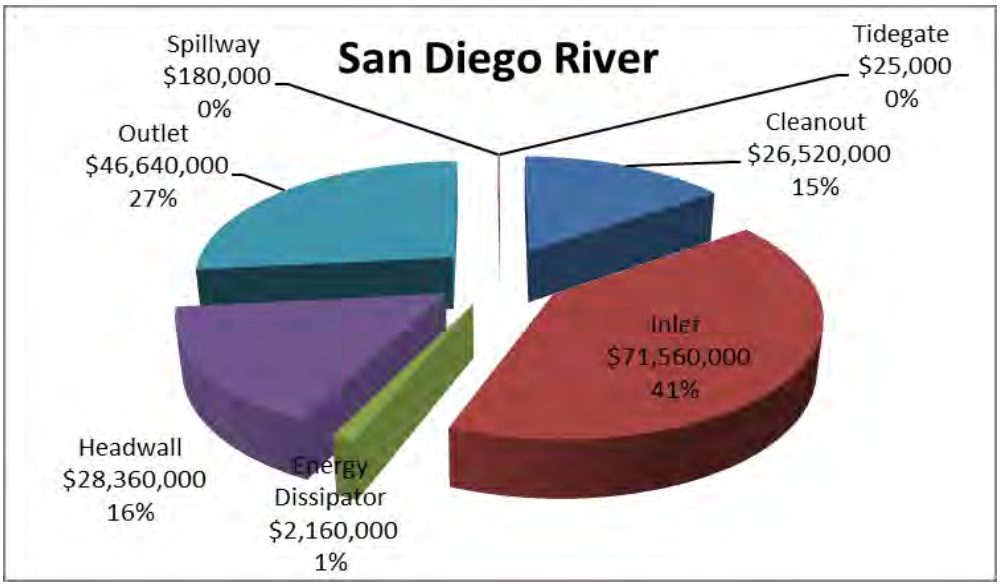


**Figure B-6. San Diego River Watershed Storm Water Structures Asset Replacement Cost**

In addition to hard assets managed under San Diego River watershed above, there is additional $8.6 million worth of equipment that is managed at the Division level. Figure B-7 shows the distribution of the total replacement cost for the Division's equipment assets. Nearly 99 percent of the total equipment asset replacement costs consists of O&M equipment and BMP monitoring equipment (1 percent).

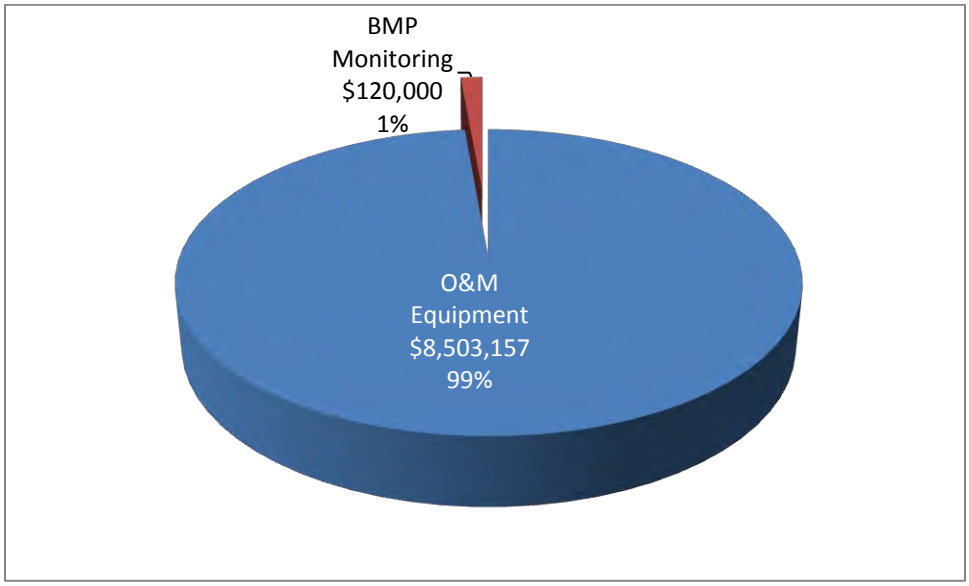


**Figure B-7. The Division's Equipment Asset Replacement Cost**

## B.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 B-8 shows the historical asset installation profile of the San Diego 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-1900s. There was some growth in the late-1920s, followed by a large amount of development in the 1950s. After this time, the development trend was steady, with a few high peaks occurring every five years between the early-1970s and the early-1980s. Since mid 1980s, the construction trend has grown at a steady pace, with some increased growth occurring in the late 1990s and early-2000s.

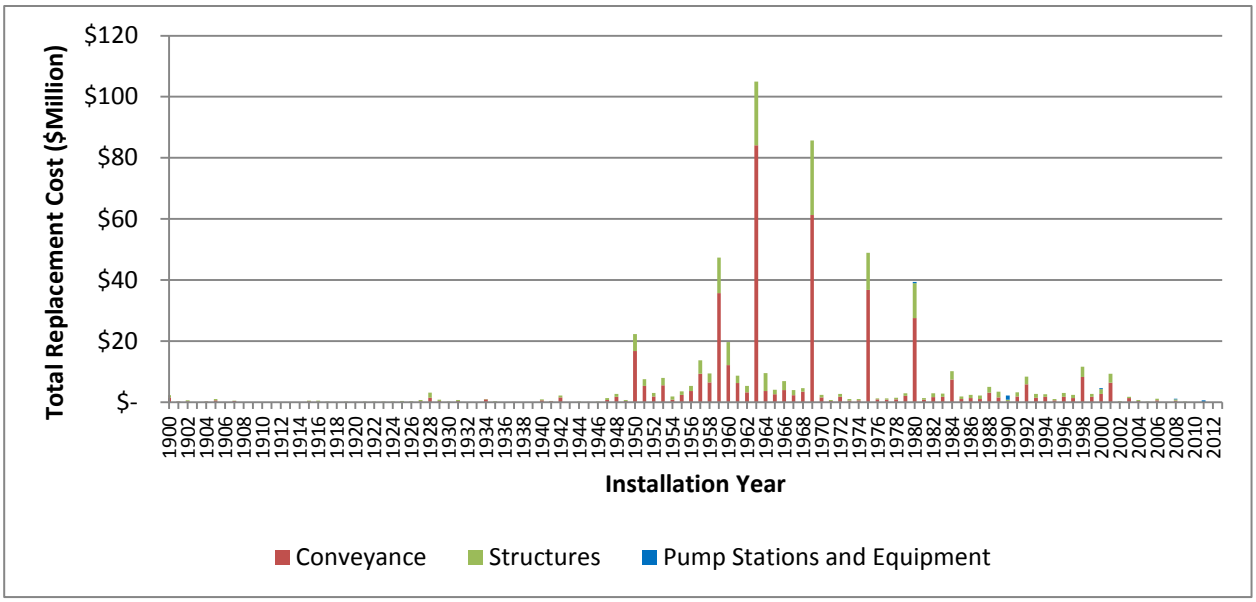


**Figure B-8. Installation Profile - San Diego River Watershed**

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 B-9, among the total of 13,346 assets listed in the San Diego River asset inventory excluding equipment, about 4 percent are condition score 5 (immediate attention) and about 94 percent are condition score 3 (fair) or better.

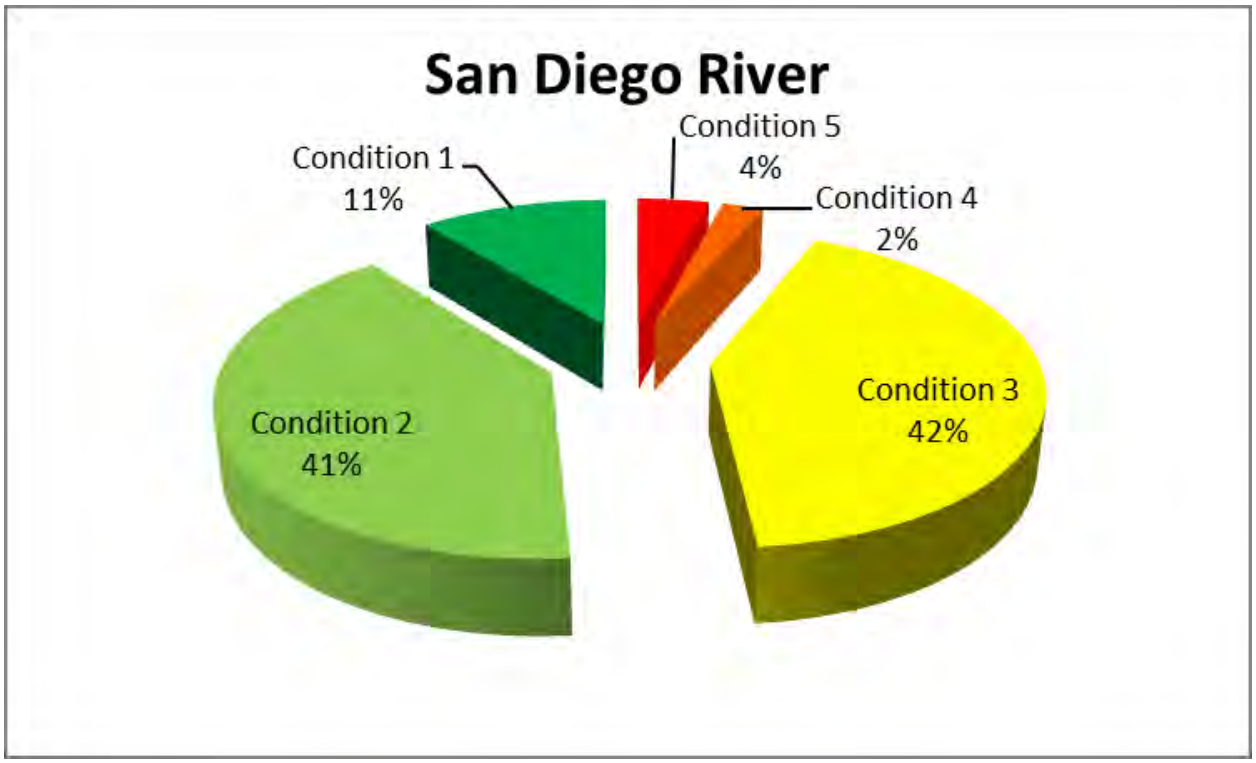


**Figure B-9. Summary of Hard Asset Conditions - San Diego River Watershed**

Among the asset groups (Figure B-10), the conveyance system accounts for the largest number of assets of condition 4 (poor) or worse. About 63 percent of hard assets of condition 4 or 5 are part of the conveyance system.

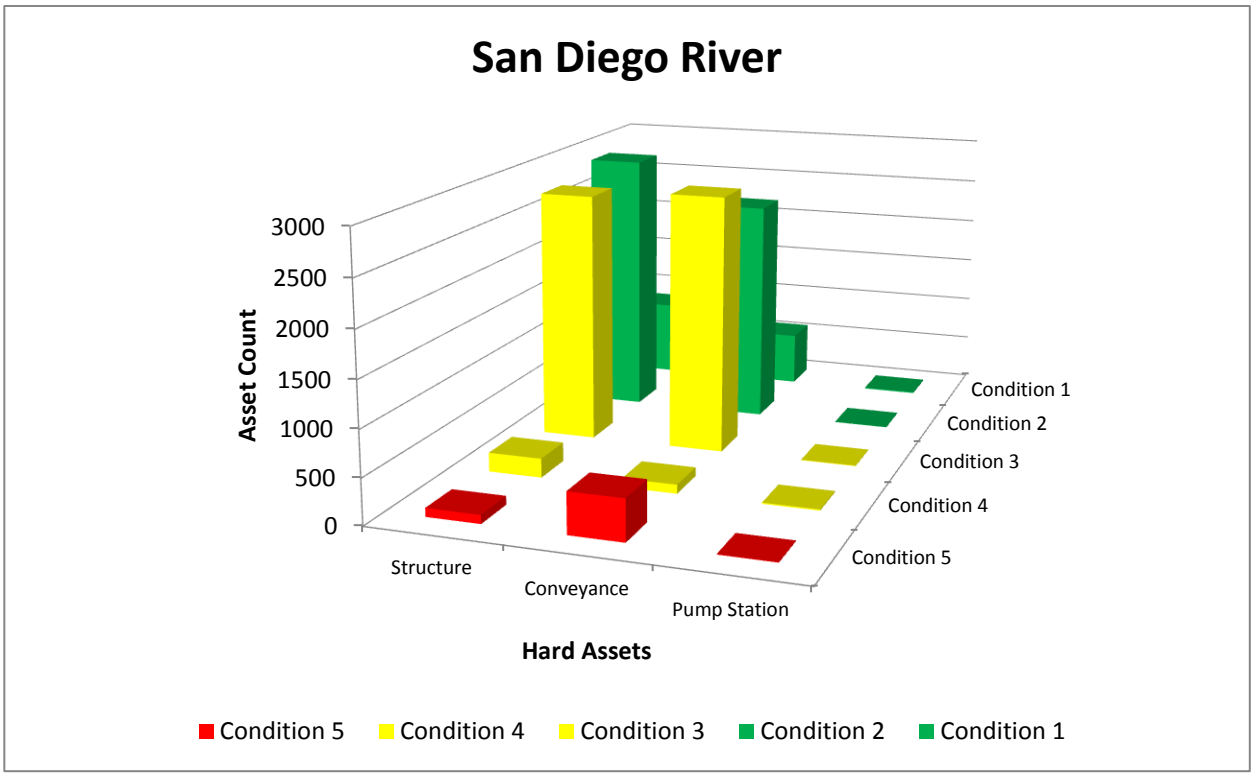


**Figure B-10. Summary of Hard Asset Conditions by Asset Class - San Diego River Watershed**

Figure B-11 provides a summary of the conveyance system asset conditions for the San Diego River Watershed. Within the conveyance system, storm drains account about 86 percent (12 miles) of the assets that are in need of immediate attention (condition 5). The majority of storm drains that are in need of replacement are metal pipes, which have a relatively short useful life of 35 years.

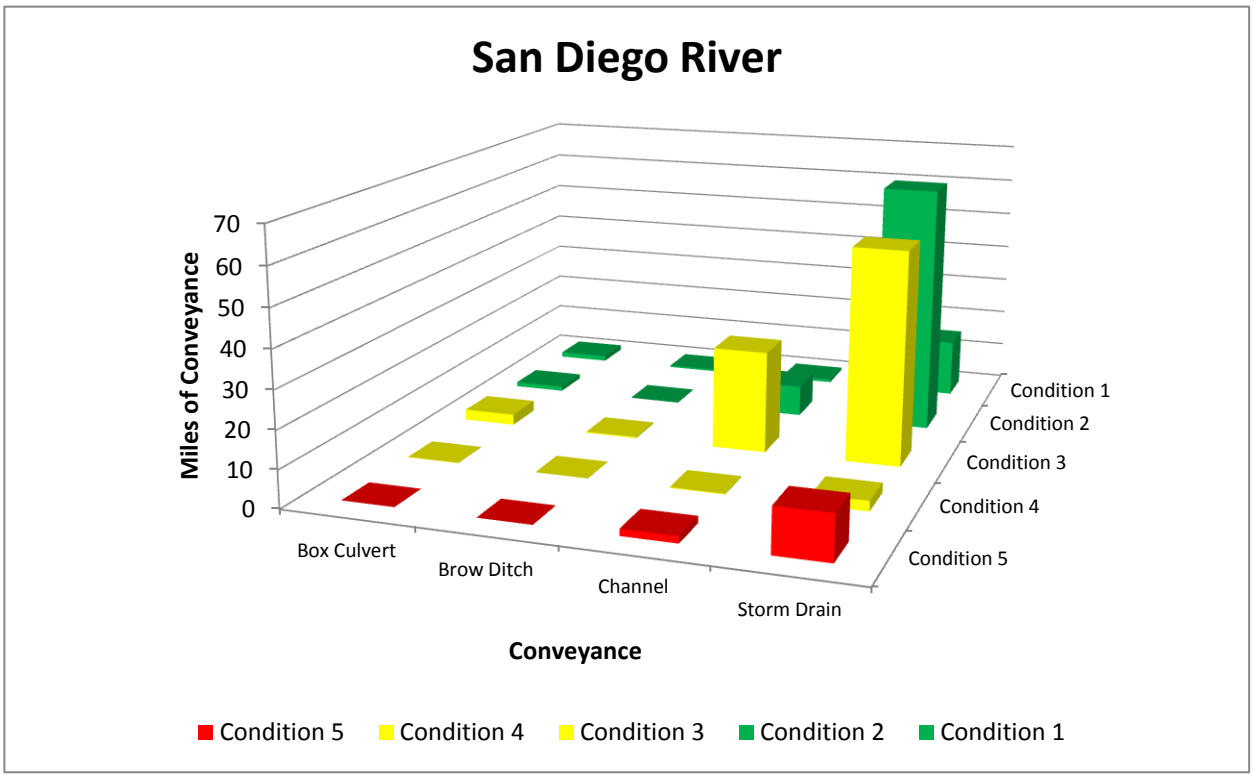


**Figure B-11. Summary of Conveyance System Conditions - San Diego River Watershed**

Figure B-12 provides a summary of the conditions of the storm water structures for the San Diego River Watershed. Most of the assets within this group (95 percent) are condition 3 (fair) or better, and 1 percent are in need of immediate attention (condition 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.

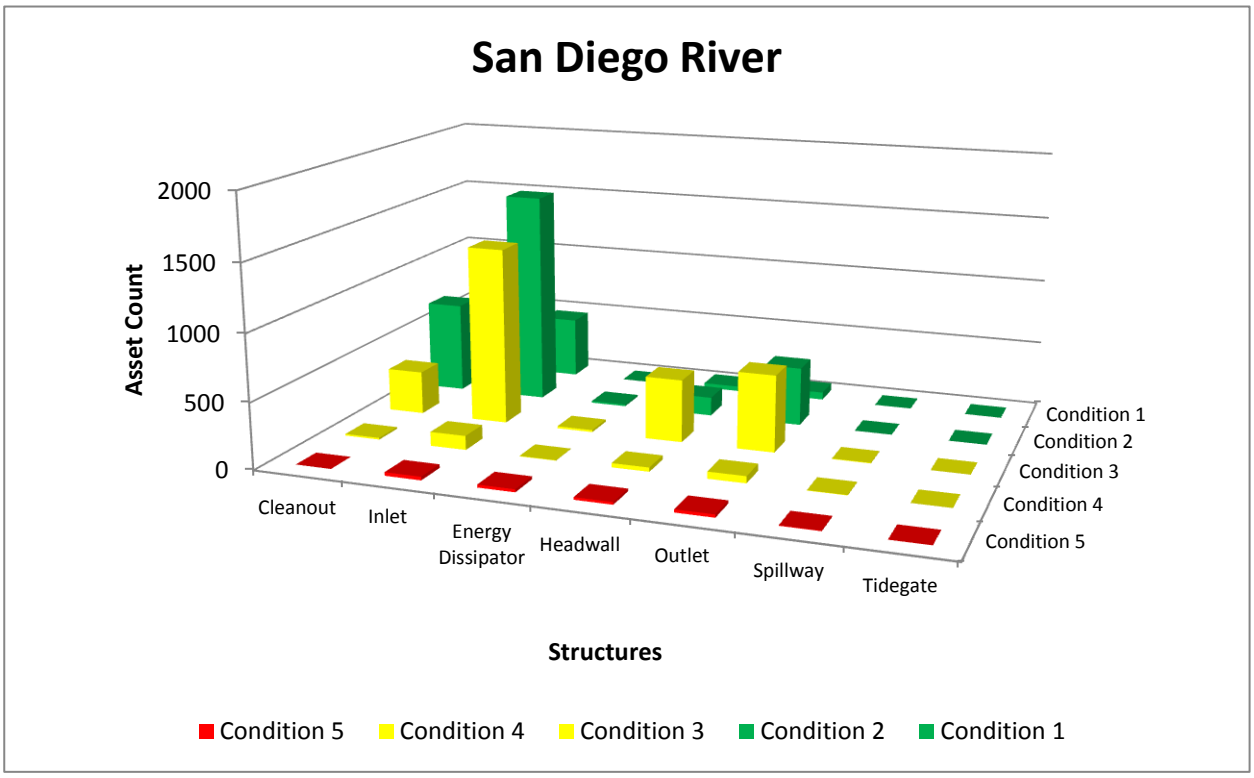


**Figure B-12. Summary of Conditions of Storm Water Structures - San Diego River Watershed**

Figure B-13 summarizes the conditions of pump station asset for the San Diego River Watershed. About 47 percent of pump station assets are condition 4 or 3 (fair), 45 percent are condition 2 or 1, and 8 percent are in need of immediate attention.

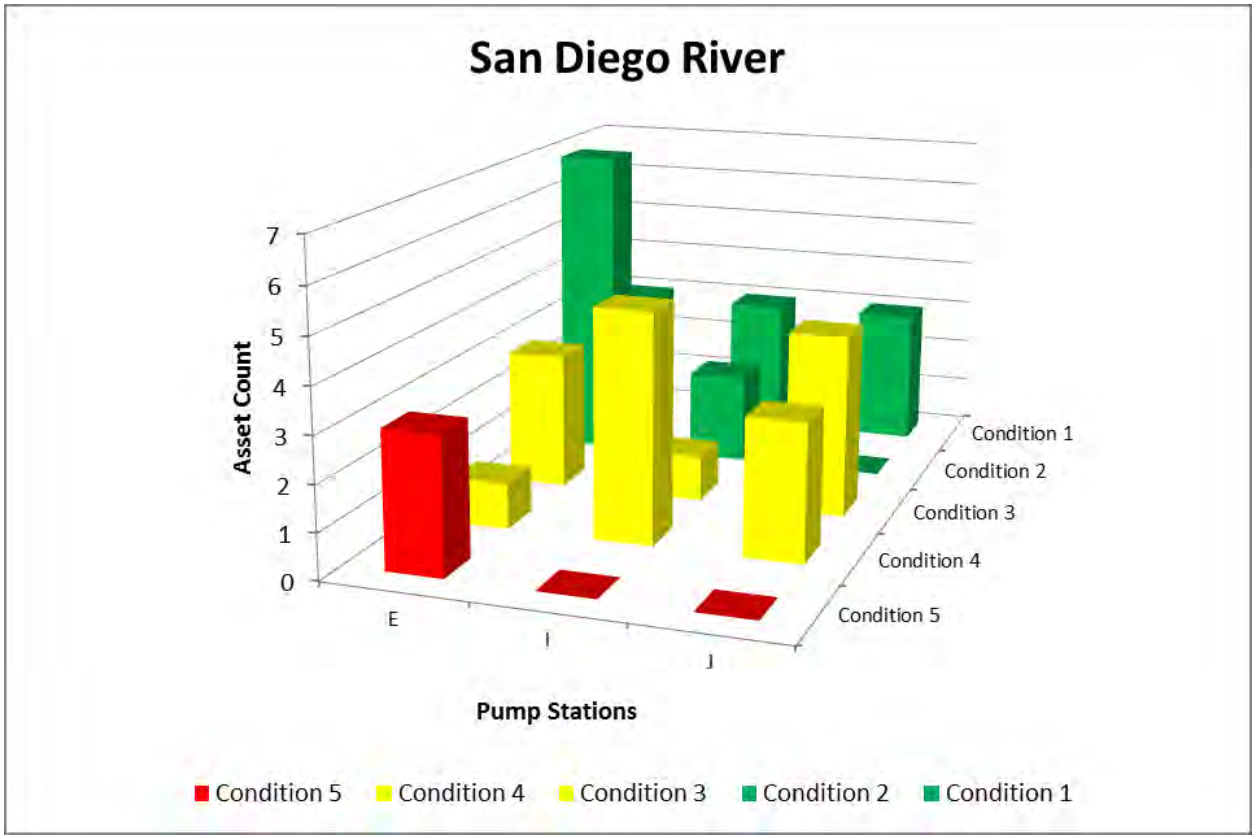


**Figure B-13. Summary of Conditions of Pump Station Assets - San Diego River Watershed**

Figure B-14 provides a summary of the condition of the Division's equipment, which consists of BMP monitoring equipment and O&M equipment.

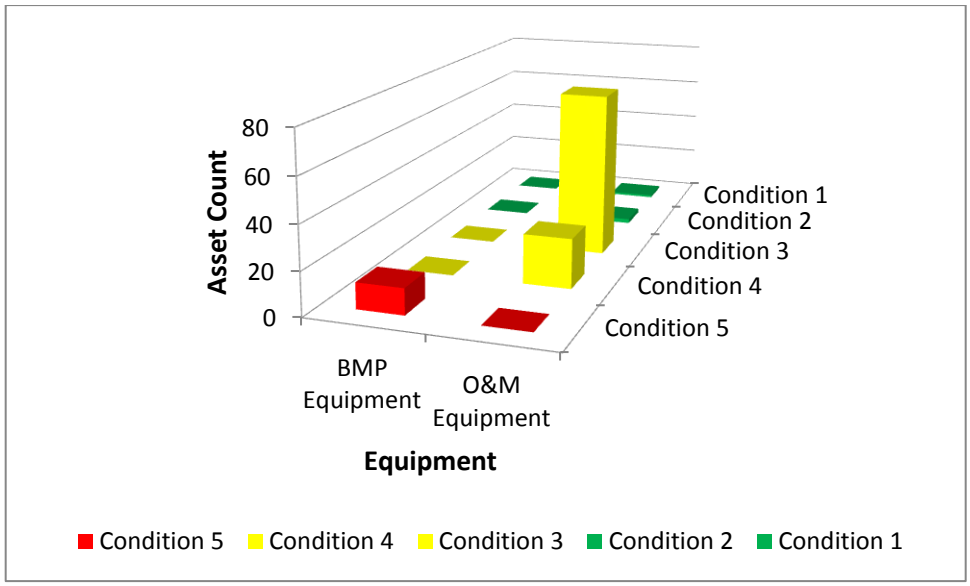


**Figure B-14. Summary of Conditions of Equipment Assets – San Diego River Watershed**

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 Division's total system consumption profile is presented in Figure B-15. The figure shows that the majority of the Division's hard assets are 34 to 55 percent consumed. About 5 percent of the hard assets have reached or exceeded their useful life. Most of these assets include the ones whose replacement was deferred in previous years.

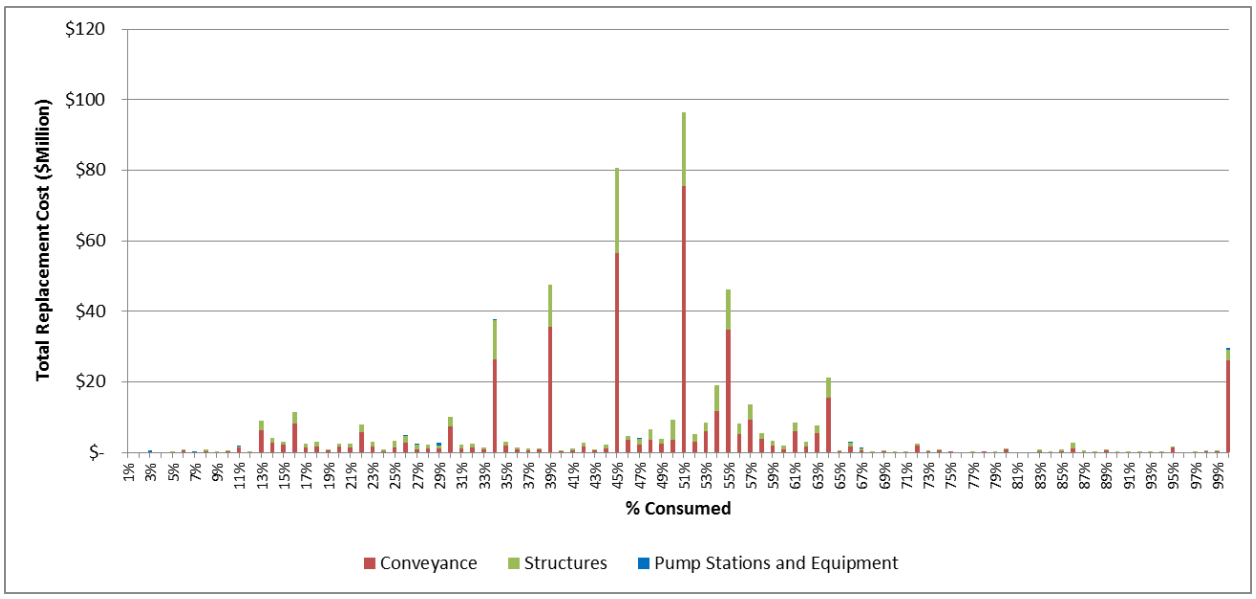


**Figure B-15. Consumption Profile – San Diego River Watershed**

## B.5 WHAT NEEDS TO BE DONE

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

**Table B-10. Actions needed for Assets to Achieve LOSs - San Diego River Watershed**

| 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 B-10. Actions needed for Assets to Achieve LOSs - San Diego River Watershed**

| 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 B-10. Actions needed for Assets to Achieve LOSs - San Diego River Watershed**

| 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 B-10. Actions needed for Assets to Achieve LOSs - San Diego River Watershed**

| 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 B-10. Actions needed for Assets to Achieve LOSs - San Diego River Watershed**

| 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 B-10. Actions needed for Assets to Achieve LOSs - San Diego River Watershed**

| 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 B-10. Actions needed for Assets to Achieve LOSs - San Diego River Watershed**

| 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 B-10. Actions needed for Assets to Achieve LOSs - San Diego River Watershed**

| 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.<br>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 B-10. Actions needed for Assets to Achieve LOSs - San Diego River Watershed**

| 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. |

**Table B-10. Actions needed for Assets to Achieve LOSs - San Diego River Watershed**

| Asset Class | Asset Type | LOS | Achieves LOS | Description of LOS Failure | Time to Failure LOS | Actions Needed[2] |
|---|---|---|---|---|---|---|
| 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 |
| 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). |

**Table B-10. Actions needed for Assets to Achieve LOSs - San Diego River Watershed**

| Asset Class | Asset Type | LOS | Achieves LOS | Description of LOS Failure | Time to Failure LOS | Actions Needed[2] |
|---|---|---|---|---|---|---|
| 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 |
| 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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## B.6 WHEN DO WE NEED IT?

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

### B.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 B-11 lists the BRE scores for the San Diego 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 B.7. The specific actions and projects slated for Fiscal Year 2015 are presented in Section B.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 B-11. Soft and Natural Asset BRE Scores - San Diego 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 | 1 | 5 | Area-weighted CPI Dr/Wet composite score (2.95) | 2 | 4 | 8.185 | Area-weighted CPI Dry/Wet score (2.95) | 24.1 | 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 B-11. Soft and Natural Asset BRE Scores - San Diego 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 | 5 | 3 | 4 | 5 | 10.2 | 5 | 51 | High |
| 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 | 3 | 1 | 4 | 2 | 1 | 3 | 6.6 | 5 | 33 | Medium |
| 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 B-11. Soft and Natural Asset BRE Scores - San Diego 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 | 3 | 1.8 | 3 | 5 | 7.44 | 5 | 37.2 | 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 | 5 | 4 | 3 | 5 | 9.5 | 5 | 47.5 | 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 | Per TMDL schedules | 1 | 1 | 5 | Area-weighted CPI Dry composite score (1.5) | 2 | 4 | 7.75 | Area-weighted CPI Dry/Wet score (2.95) | 22.9 | Low |

**Table B-11. Soft and Natural Asset BRE Scores - San Diego 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 | Per TMDL schedules | 1 | 1 | 5 | Area-weighted CPI Wet score (1.44) | 2 | 4 | 7.73 | Area-weighted CPI Dry/Wet score for (2.95) | 22.8 | 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 | 1 | 5 | Area-weighted CPI Dr/Wet composite score (2.95) | 2 | 4 | 8.185 | Area-weighted CPI Dry/Wet score (2.95) | 24.1 | 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 | 1 | 5 | Area-weighted CPI Dr/Wet composite score (2.95) | 2 | 4 | 8.185 | Area-weighted CPI Dry/Wet score (2.95) | 24.1 | 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 | 1 | 5 | Area-weighted CPI Dr/Wet composite score (2.95) | 2 | 4 | 8.185 | Area-weighted CPI Dry/Wet score (2.95) | 24.1 | Low |
| 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. | | | | | | | | | | | |

**Table B-11. Soft and Natural Asset BRE Scores - San Diego 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 | | | | |
| 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 | 2 | 3 | 2 | 3 | 5.7 | 5 | 28.5 | Medium |
| 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 | 5 | 4 | 4 | 5 | 10.1 | 4 | 40.4 | Medium |

**Table B-11. Soft and Natural Asset BRE Scores - San Diego 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 | | | | |
| 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 B-11. Soft and Natural Asset BRE Scores - San Diego 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. | | | | | | | | | | | |

**Table B-11. Soft and Natural Asset BRE Scores - San Diego 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 | | | | |
| 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. | | | | | | | | | | | |
| 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 | 1 | 5 | Area-weighted CPI Dr/Wet composite score (2.95) | 2 | 4 | 8.185 | Area-weighted CPI Dry/Wet score (2.95) | 24.1 | 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 | Medium |
| 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

### B.6.2 Hard Asset BRE

The hard assets BRE scores were calculated for each individual asset listed in the San Diego River Watershed asset inventory. BRE scores are further shown in three major categories: high, medium, and low. Figure B-16 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.

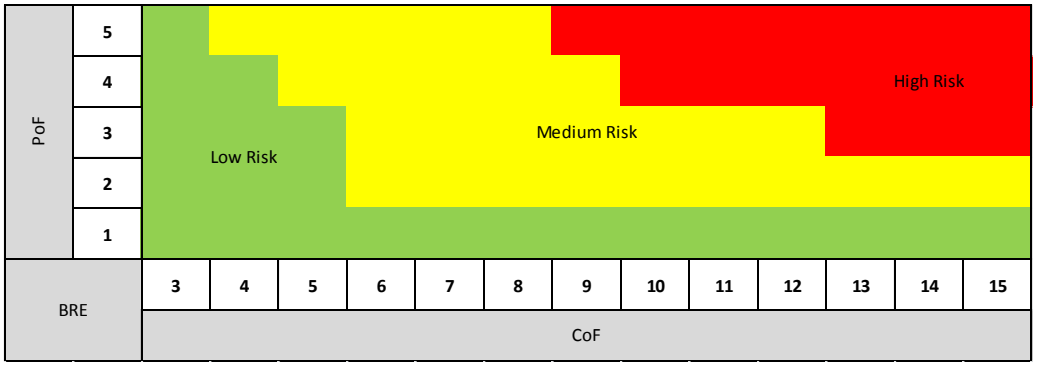


**Figure B-16. Hard Asset Risk Category Map**

Figure B-17 shows the summary of hard asset BRE scores by hard asset classes. Of the 13,346 total hard assets, 81 percent fall into the low risk category, followed by 18 percent in the medium risk category, and 1 percent in the high risk category.

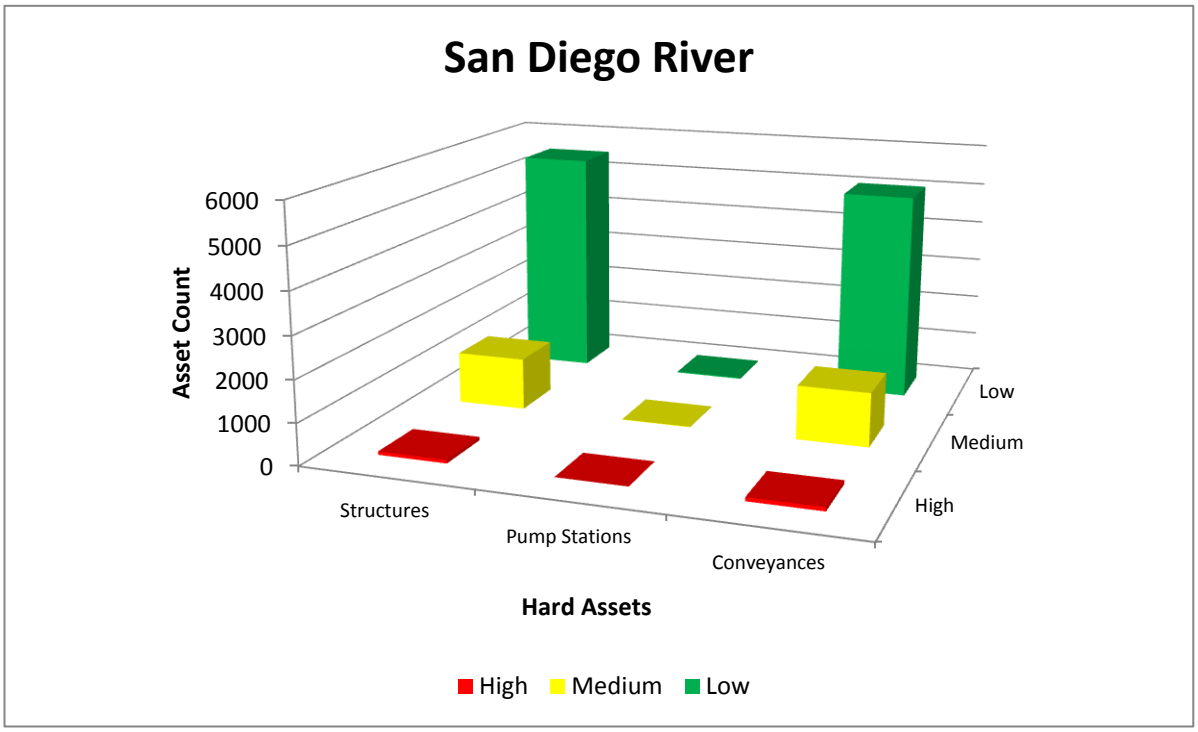


**Figure B-17. Hard Asset BRE Scores by Asset Classes - San Diego River Watershed**

Figure B-18 shows the BRE score summary for the storm water conveyance system in San Diego River Watershed. There are total of 6 miles of box culvert, less than a mile of brow ditch, 38 miles of channel, and 153 miles of storm drain. Out of all the conveyance system, brow ditch has highest percentage of low risk assets (99 percent) and channel has the lowest percentage of low risk assets (62 percent).

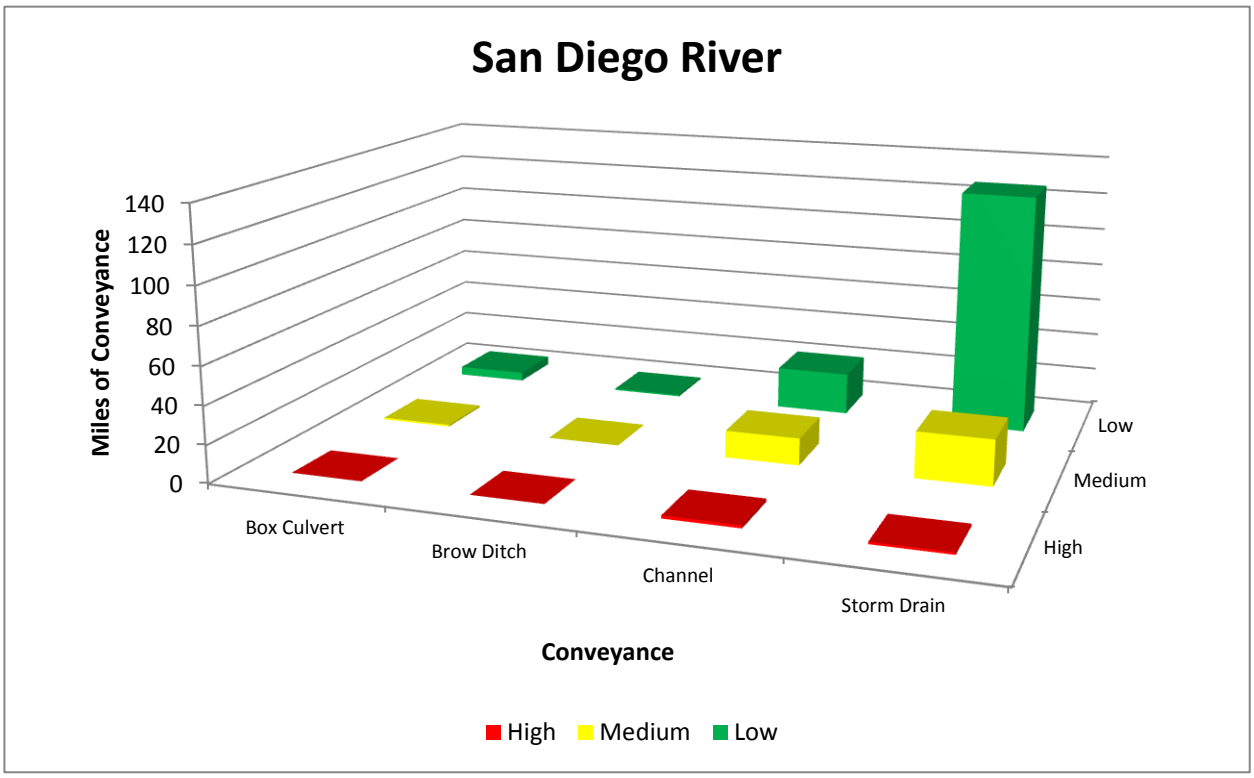


**Figure B-18. BRE Summary of Conveyance System BRE Scores - San Diego River Watershed**

Figure B-19 shows the conveyance system CoF score map for the San Diego River Watershed. The San Diego River Watershed conveyance system is approximately 198 miles and about 61 percent (120 miles) of the storm water conveyances have low CoF and about 10 percent (20 miles) have high CoF.

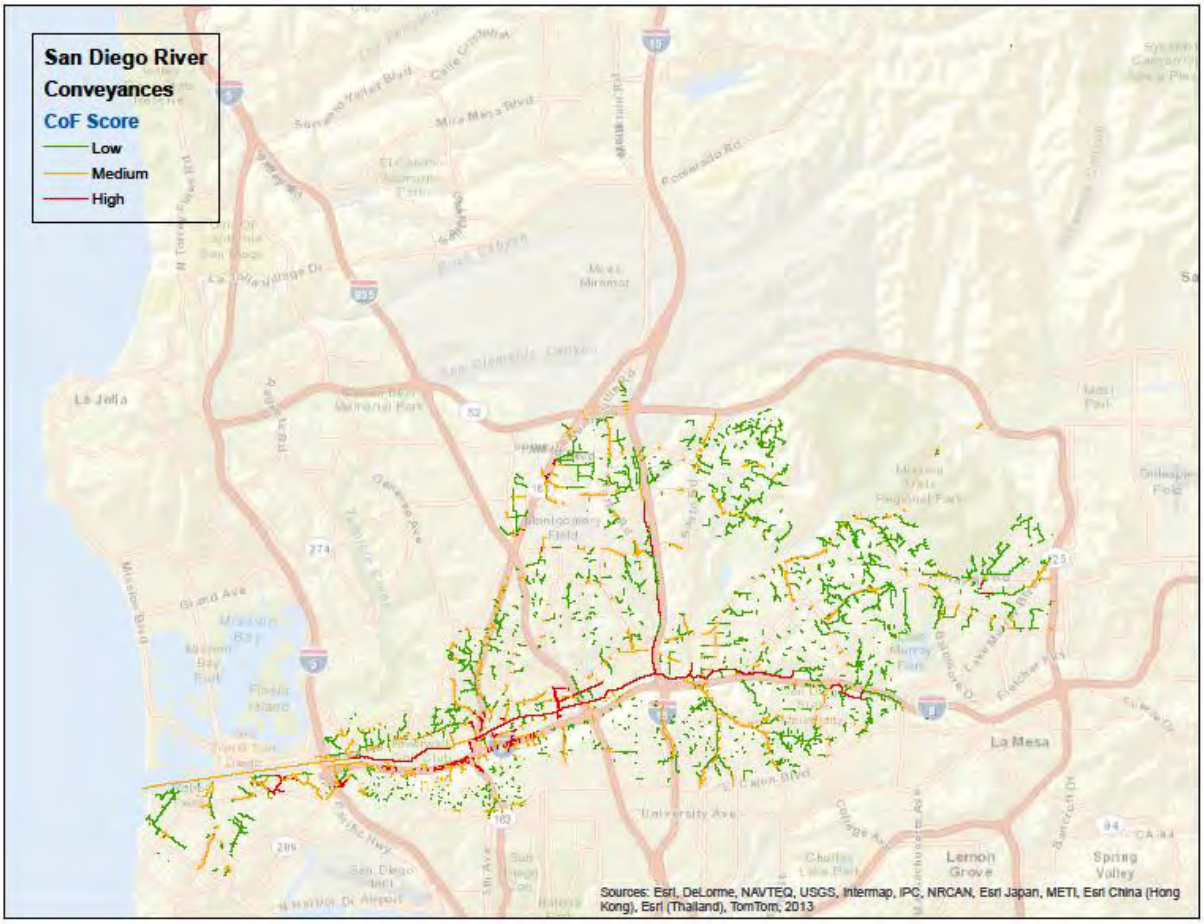


**Figure B-19. Conveyance System CoF Score Map - San Diego River Watershed**

Figure B-20 shows the conveyance system PoF score map for the San Diego River Watershed. Approximately 86 percent (171 miles) of the conveyances have low PoF and less than 8 percent (18 miles) have high PoF.

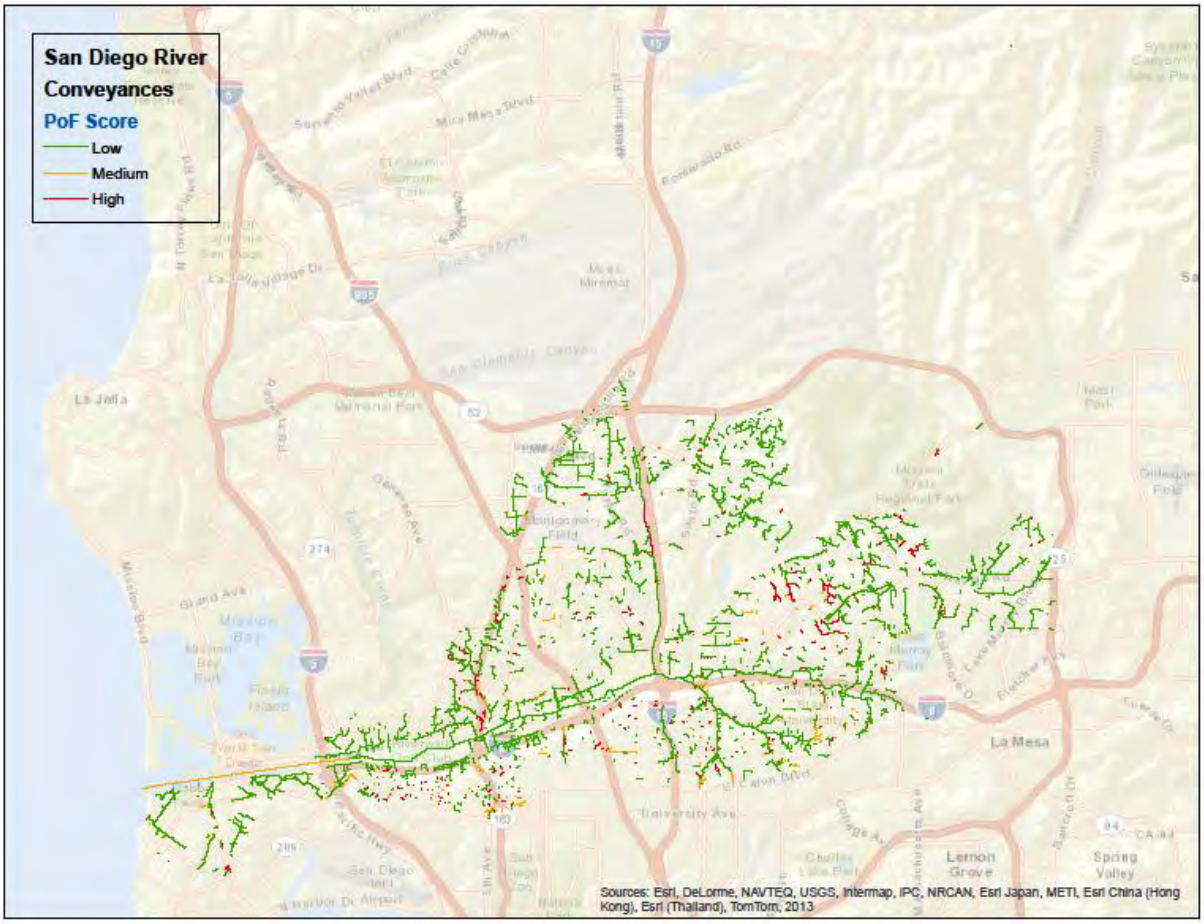


**Figure B-20. Conveyance System PoF Score Map - San Diego River Watershed**

Figure B-21 shows the conveyance system BRE score map for the San Diego River Watershed. More than 78 percent (155 miles) of the conveyance systems have low risk, 20 percent (74 miles) have medium risk, and 1 percent (7 miles) have high risk.

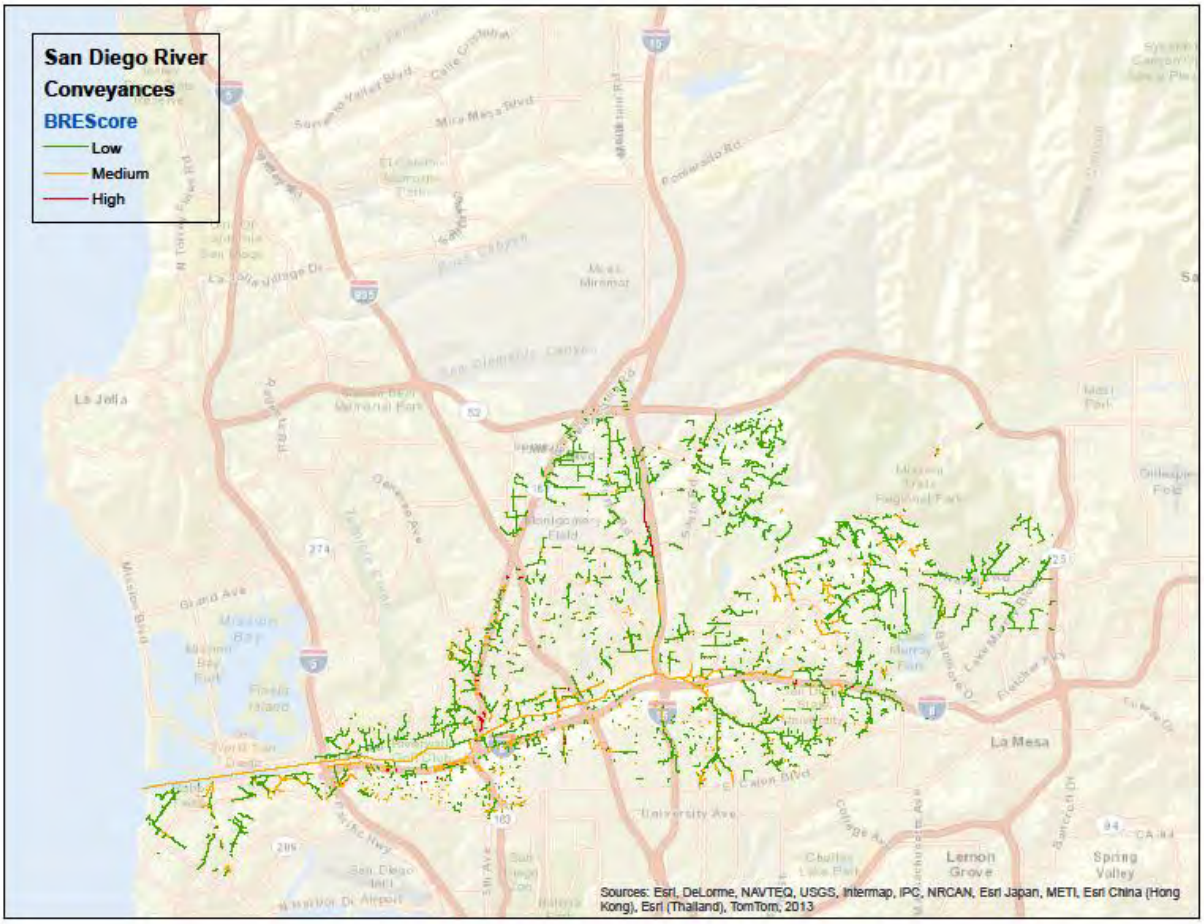


**Figure B-21. Conveyance System BRE Score Map - San Diego River Watershed**

Figure B-22 shows the BRE summary for storm water structures in San Diego River Watershed. In general, most of the storm water structures have low risk and 1 percent of assets (82 out of 6,846) have high risk. This can be attributed to the fact that the majority of storm water structures are still in good or excellent condition.

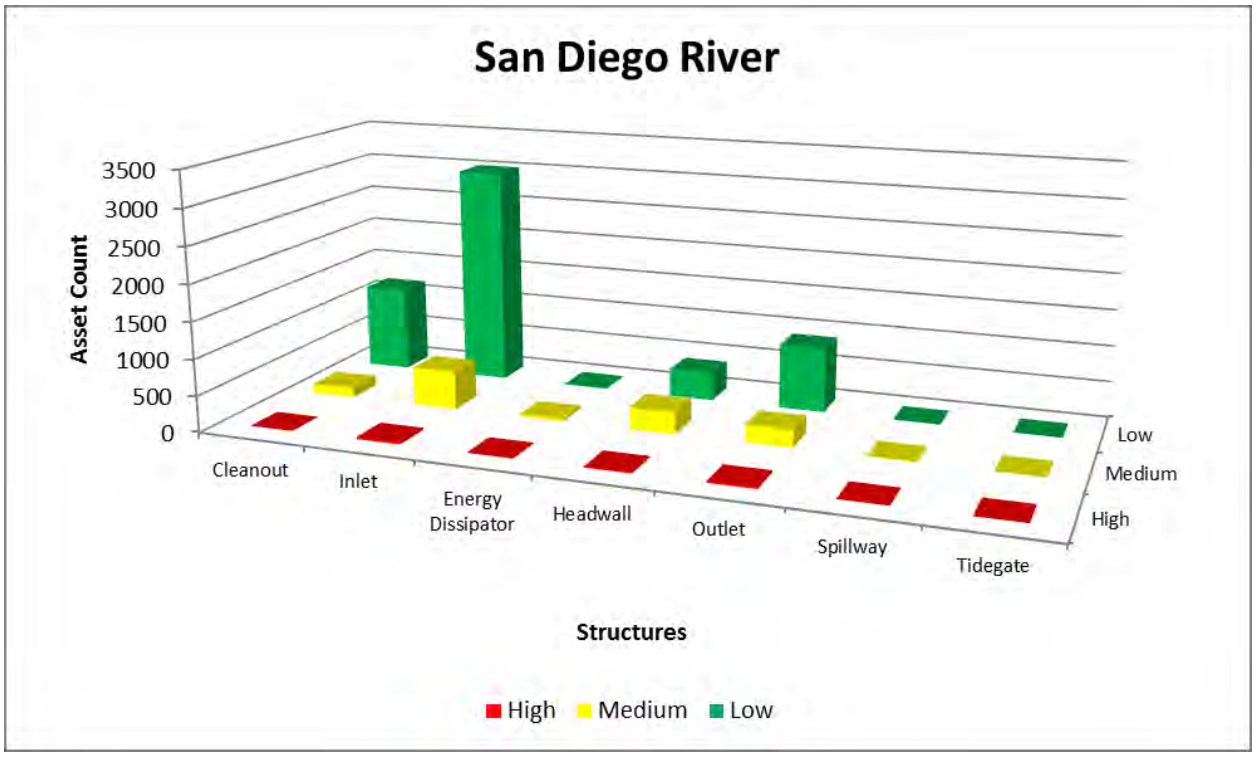


**Figure B-22. Storm Water Structure BRE Scores- San Diego River Watershed**

Figure B-23 shows the structures CoF score map for the San Diego River Watershed. More than 65 percent (4,437) of the structures have low CoF and about 4 percent (287) have high CoF.

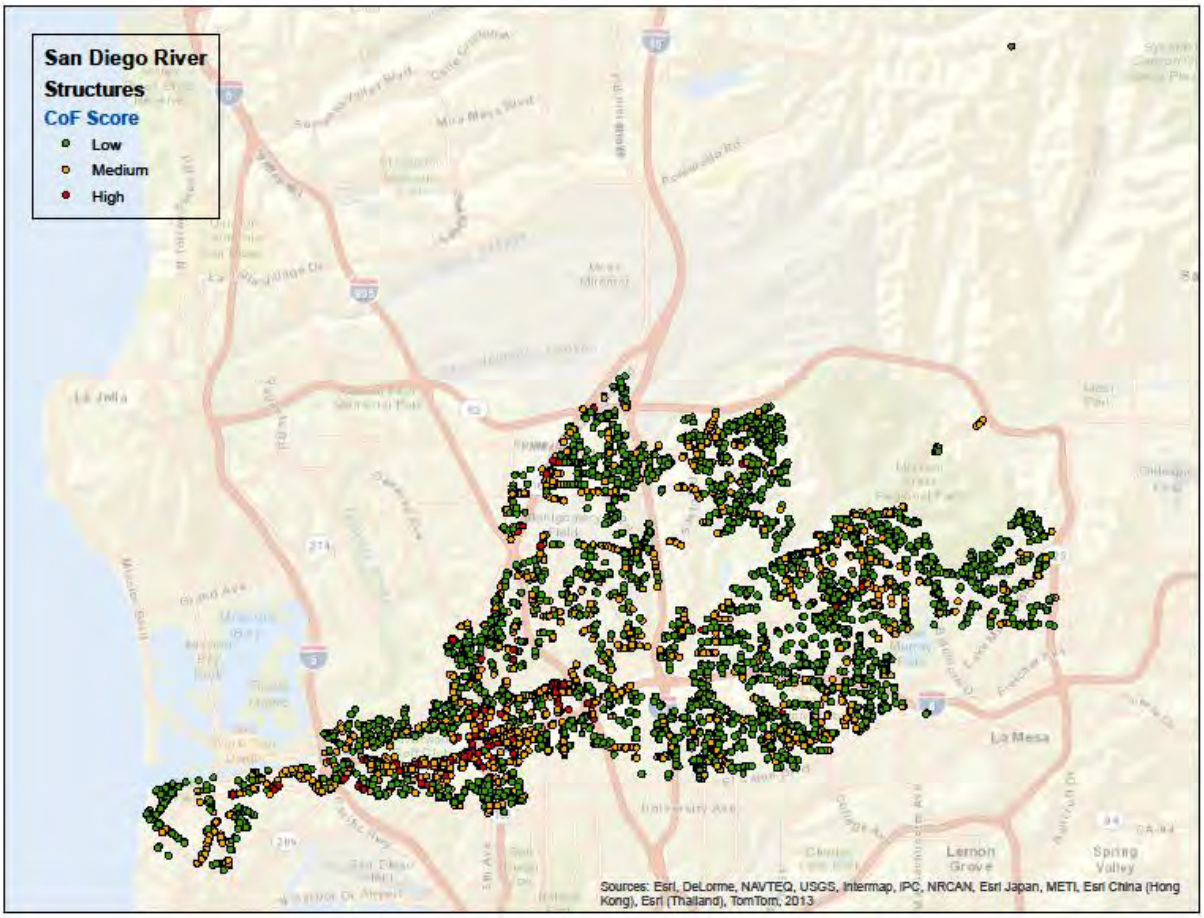


**Figure B-23. Storm Water Structure CoF Score Map - San Diego River Watershed**

Figure B-24 shows the structures PoF score map for the San Diego River Watershed. Approximately 86 percent (5,914) have low PoF, 11 percent (770) have medium PoF, and 2 percent (162) have high PoF.

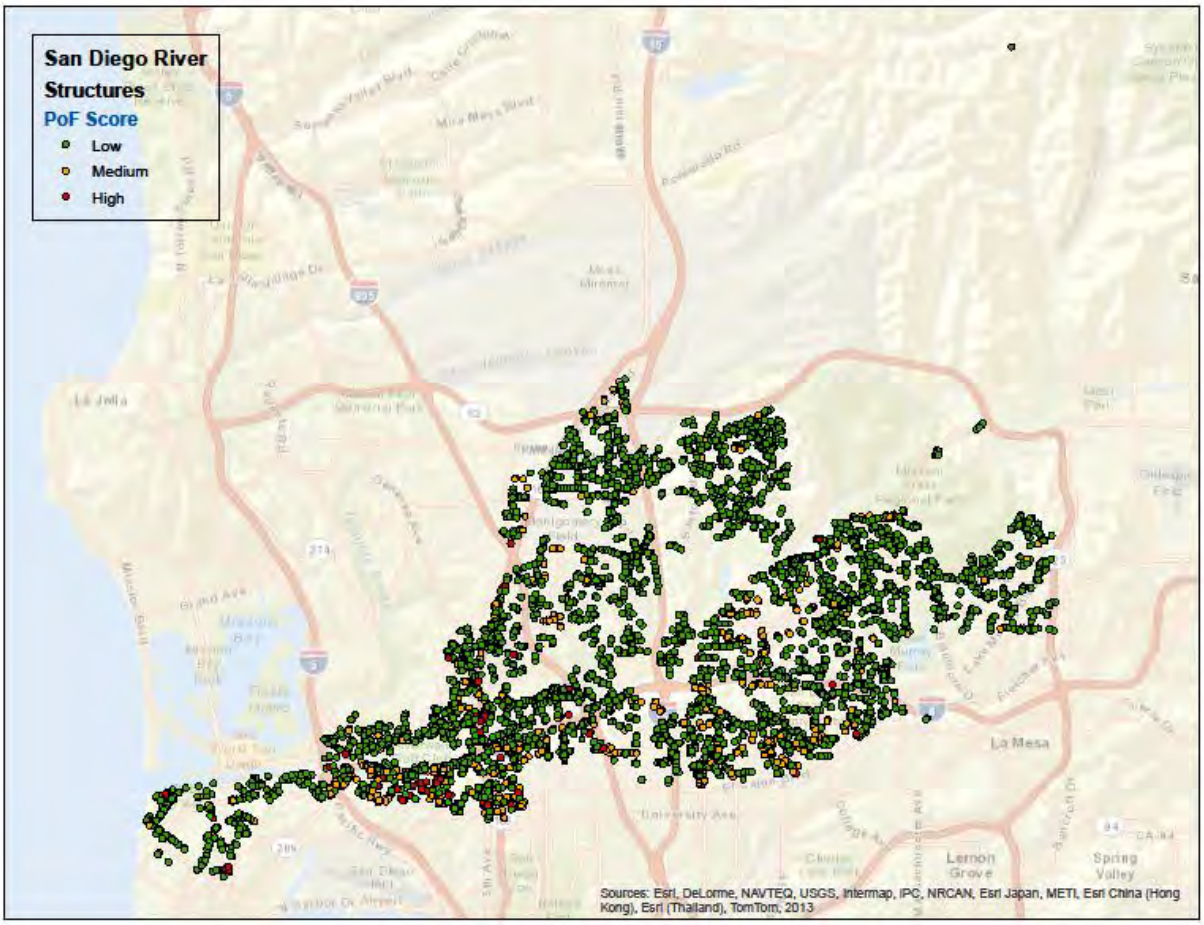


**Figure B-24. Storm Water Structure PoF Score Map - San Diego River Watershed**

Figure B-25 shows the structures BRE score map for the San Diego River Watershed. Approximately 80 percent (5,506) have low risk, 18 percent (1,258) have medium risk, and 1 percent (82) have low risk.

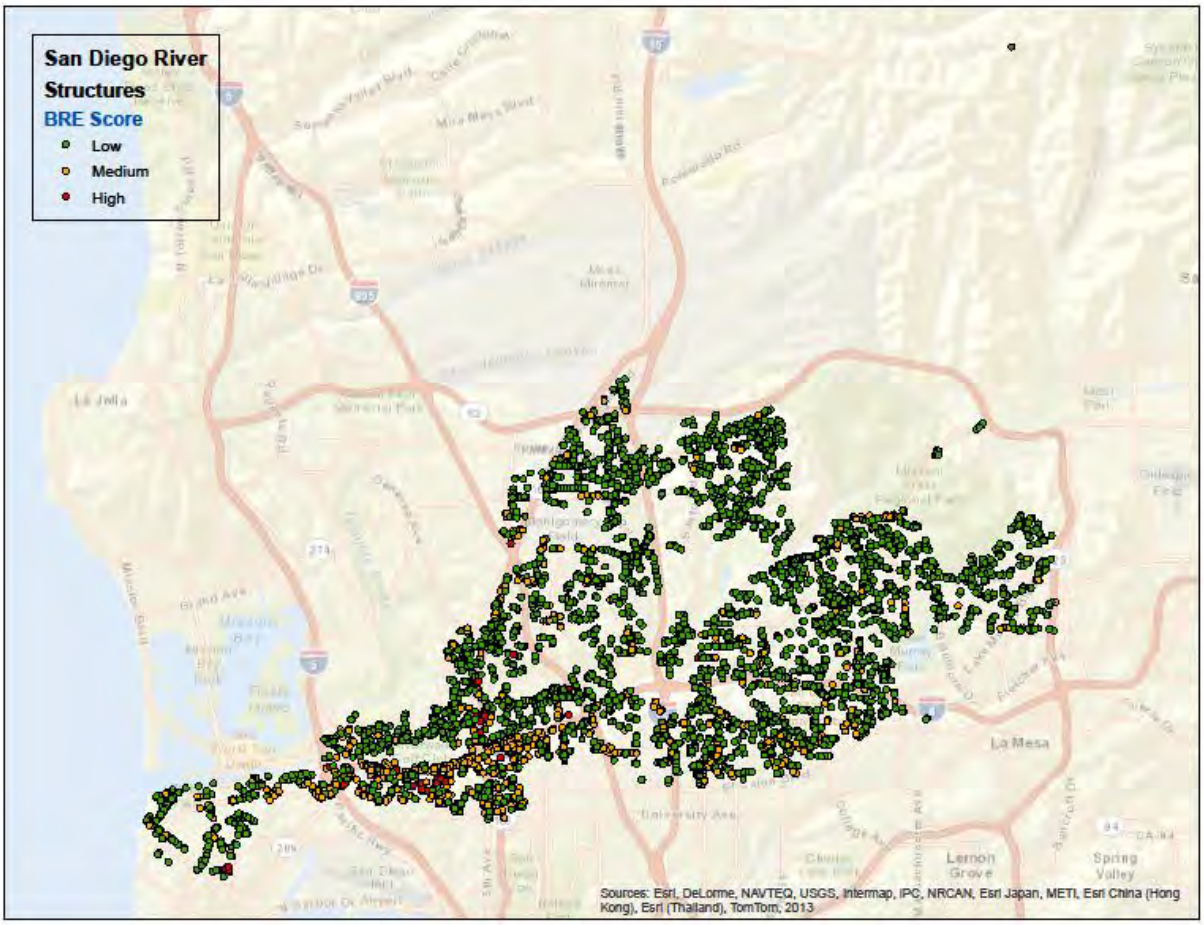


**Figure B-25. Storm Water Structure BRE Score Map - San Diego River Watershed**

Figure B-26 shows the BRE score summary for pump station assets. It shows there aren't any pump stations that have high risk.

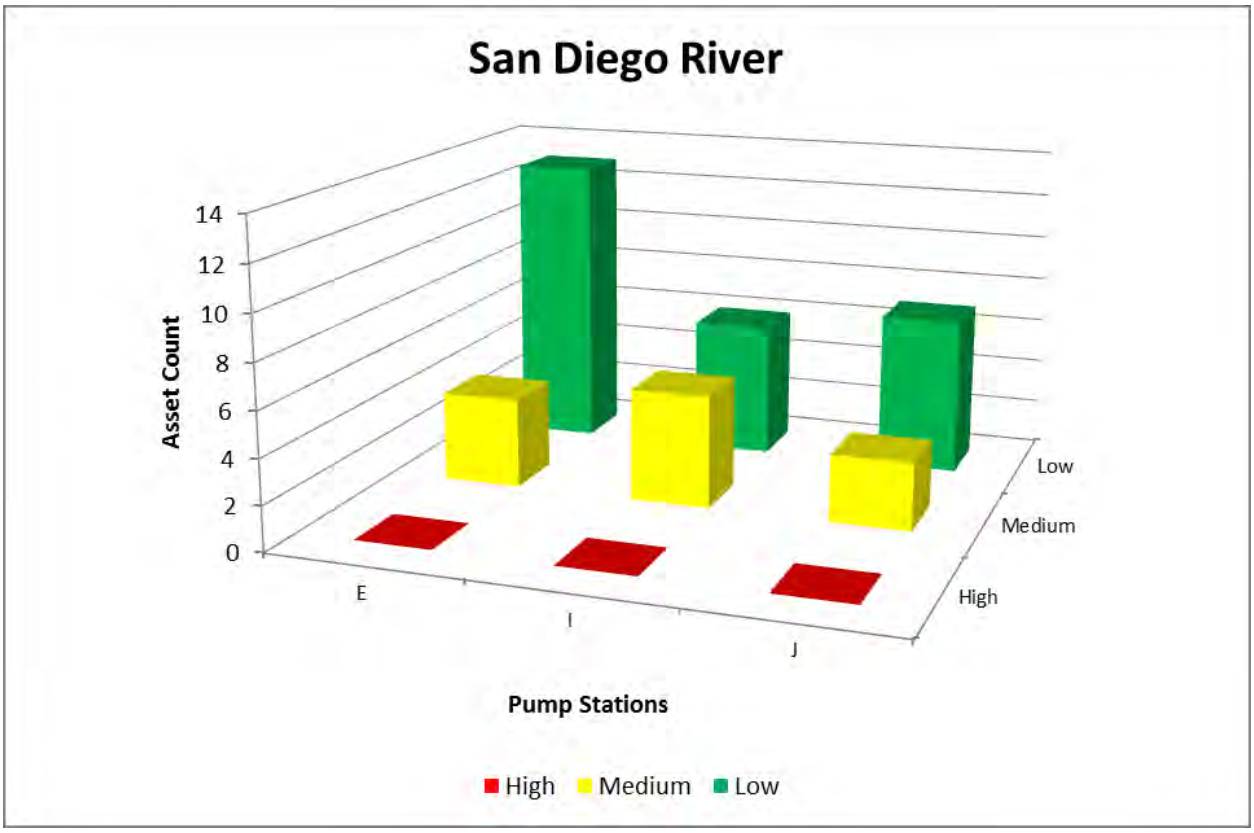


**Figure B-26. Pump Station Asset BRE Scores - San Diego River Watershed**

Figure B-27 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.

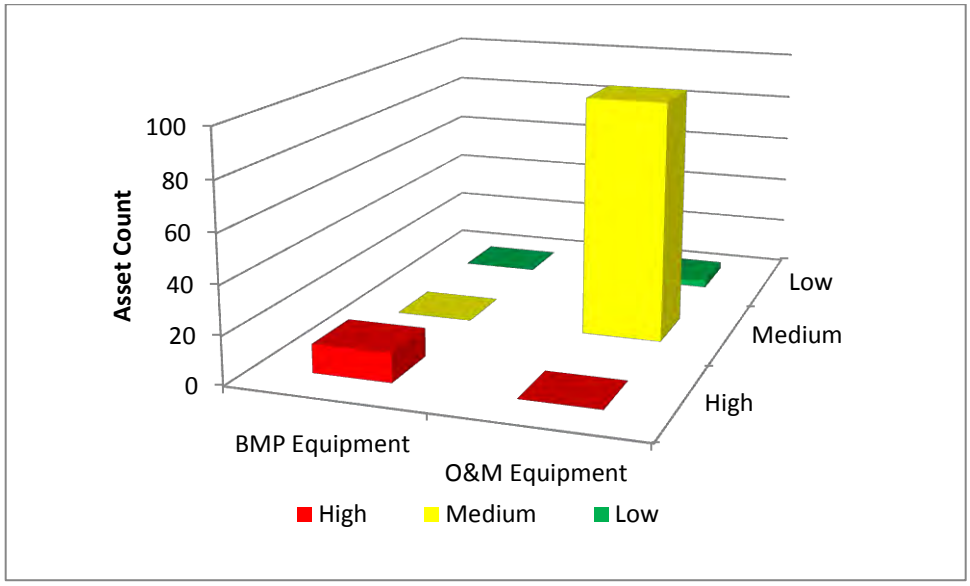


**Figure B-27. Summary of Equipment Assets – San Diego City Wide**

## B.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 requirement) 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 cost was 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 assets, 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 B-28, B-29, and B-30 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.

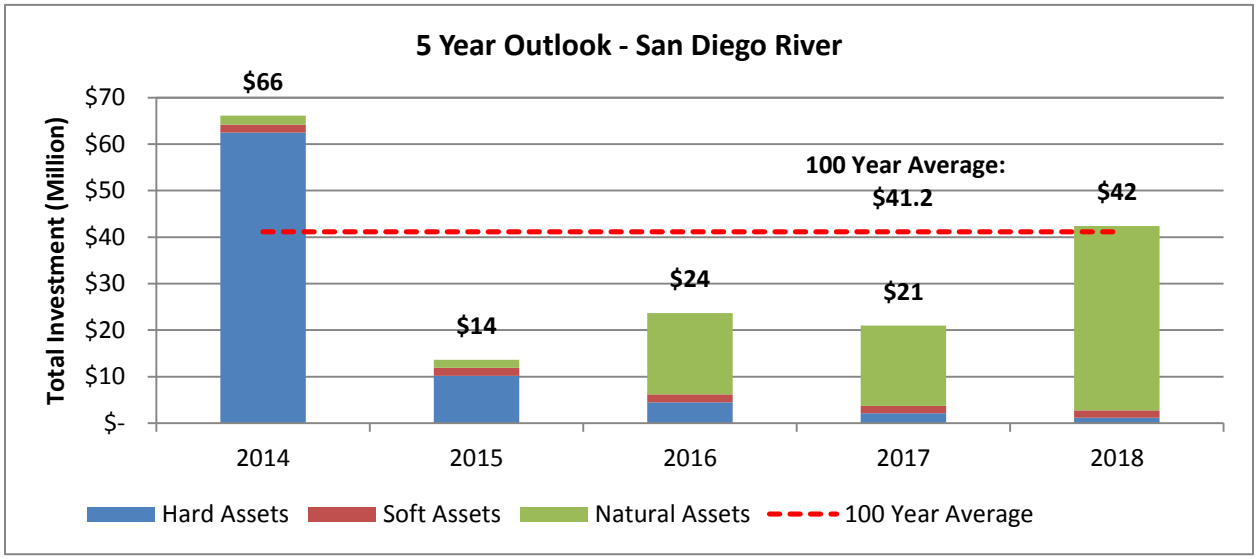


**Figure B-28. Watershed 5 Year Outlook by Asset Type – San Diego River Watershed**

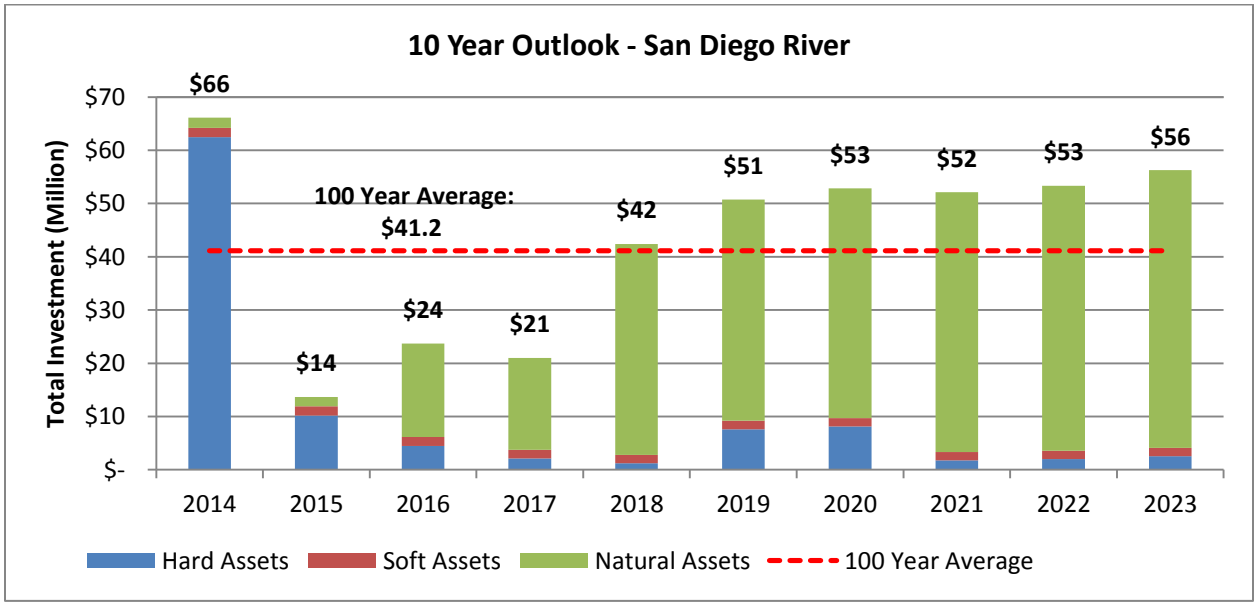


**Figure B-29. Watershed 10 Year Outlook by Asset Type – San Diego River Watershed**

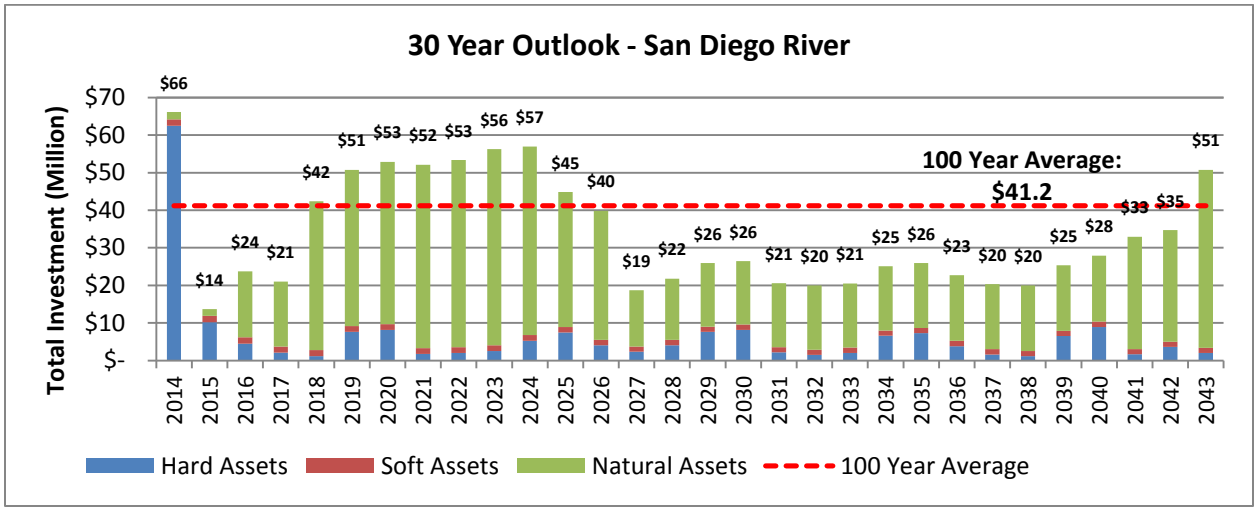


**Figure B-30. Watershed 30 Year Outlook by Asset Type – San Diego River Watershed**

Figures B-31 and B-32 represent the overall 100 year projected results based on asset type and activity type, respectively. Based on the results, it is projected that the San Diego River Watershed will need an average of $41.2 million dollars per year for capital and operational needs for the next 100 years. Some years will require more and some years will require less.

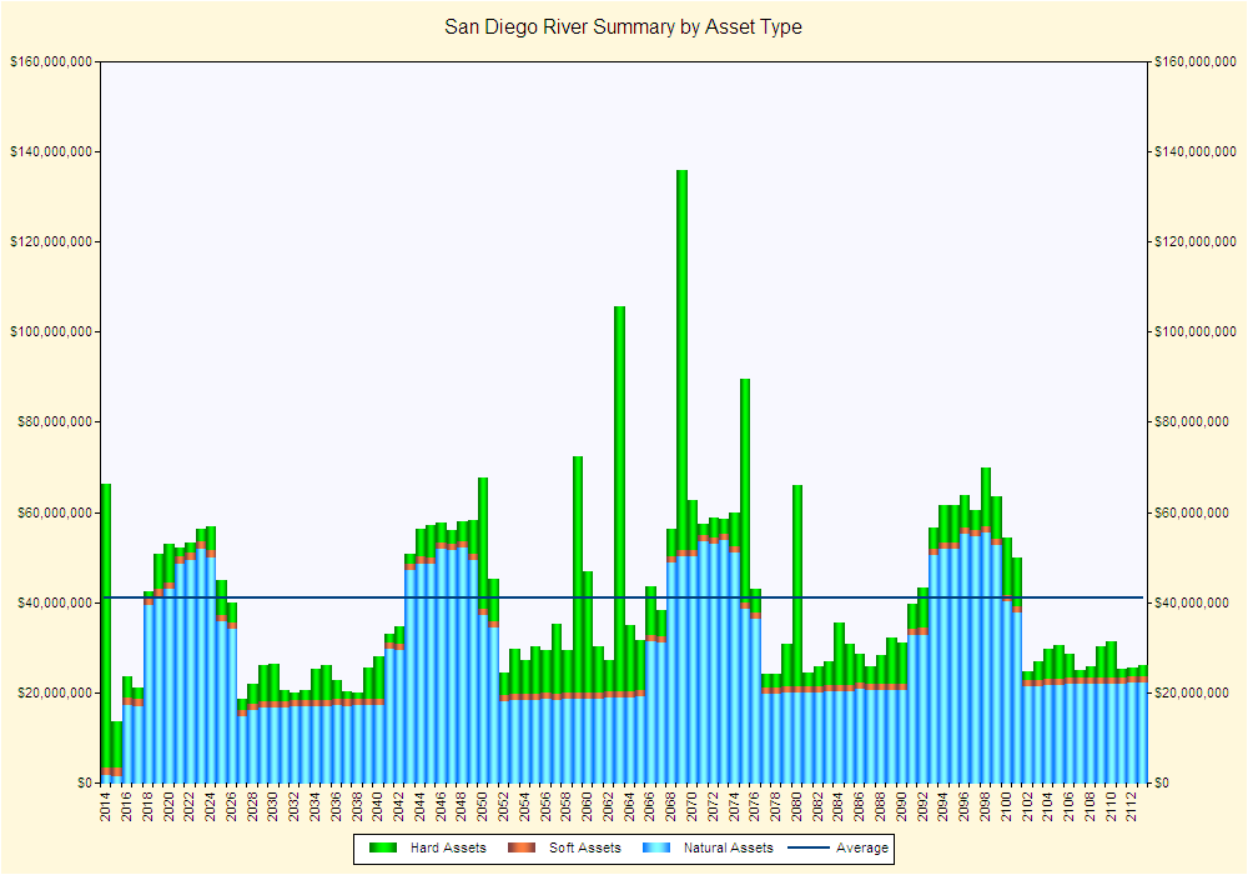


**Figure B-31. 100 Year Forecast by Asset Type - San Diego River Watershed**

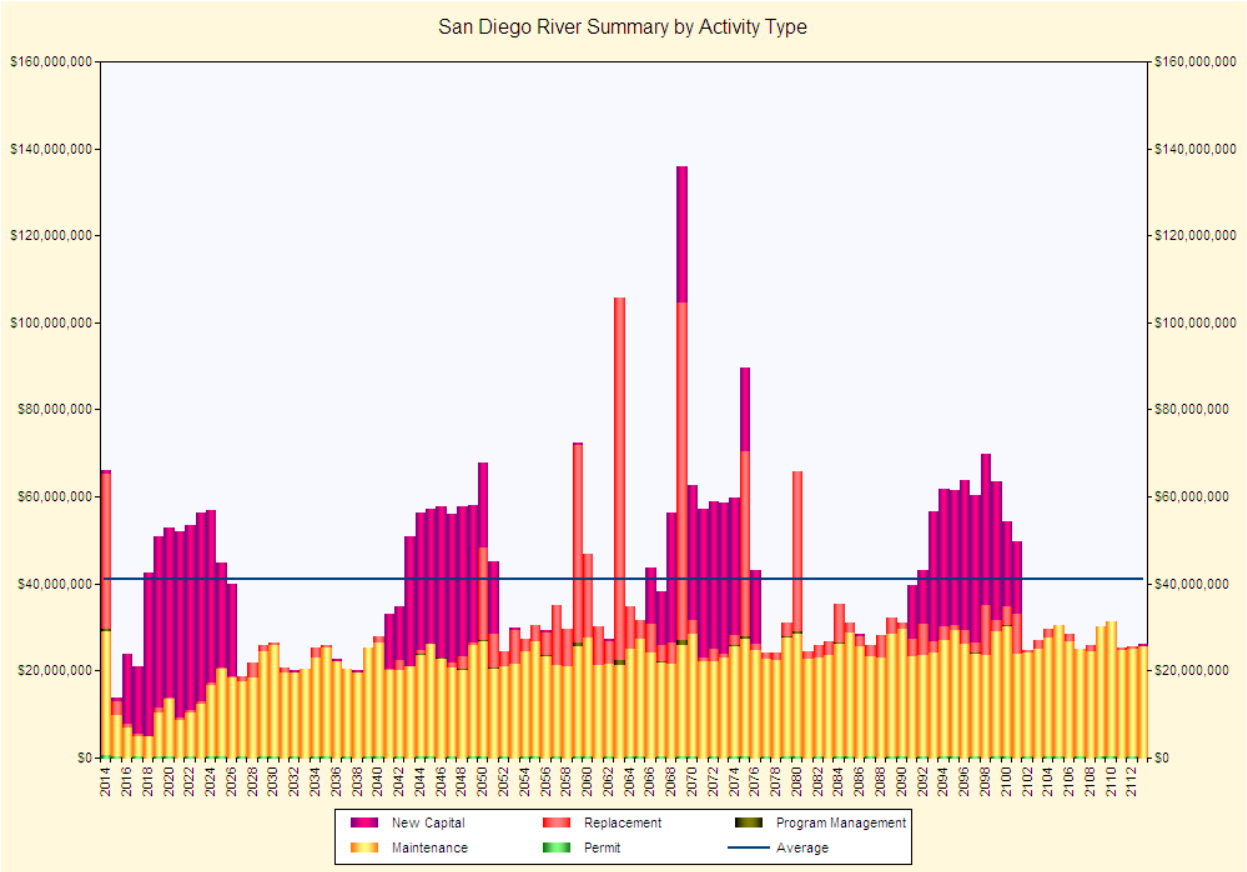


**Figure B-32. 100 Year Forecast by Activity Type - San Diego River Watershed**

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.

## B.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 San Diego River Watershed that would not be employed City-wide.

## B.9 ASSESSMENT MANAGEMENT IMPROVEMENT PLAN

See Main Document.

## B.10 RECOMMENDATIONS

The summary of activities for Fiscal Year 2014, organized by asset type and class, are listed in Tables B-12. In addition, Table B-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.

**Table B-12. FY 2014 Activity Summary - San Diego River Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Program Management (Op) | Permit (PM) | Total | |
| **Hard Assets** | | | | | | | | | | | | | | | |
| Channel | 33.12 | 60.00 | | | 24,573,138.27 | 798,150.69 | | 25,371,288.96 | | | | 12,125.33 | 992,493.01 | 1,004,618.33 | 26,375,907.30 |
| Cleanout | 9.11 | 49.87 | | | | | | | 64,841.40 | | | | | 64,841.40 | 64,841.40 |
| Culvert | 21.43 | 47.60 | | | | 92,594.07 | | 92,594.07 | 18,858.32 | | | 1,406.67 | | 20,264.99 | 112,859.05 |
| Drop Manhole | 16.59 | 38.83 | | | | | | | 4,938.90 | | | | | 4,938.90 | 4,938.90 |
| Encased Storm Drain | 16.41 | 16.41 | | | | | | | 675.85 | | | | | 675.85 | 675.85 |
| Energy Dissipator | 22.17 | 57.63 | | | | 920,000.00 | | 920,000.00 | 38,571.40 | | | 13,976.44 | | 52,547.84 | 972,547.84 |
| Headwall | 14.26 | 59.33 | | | | 400,000.00 | | 400,000.00 | 221,785.55 | | | 6,076.71 | | 227,862.26 | 627,862.26 |
| Inlet | 9.72 | 50.28 | | | | 540,000.00 | | 540,000.00 | 24,107.70 | | | 8,203.56 | | 32,311.26 | 572,311.26 |
| Outlet | 37.98 | 59.58 | | | | 920,000.00 | | 920,000.00 | | | | 13,976.44 | | 13,976.44 | 933,976.44 |
| Pump Station | 24.00 | 40.00 | | | | | | | | 1,290,000.00 | | | | 1,290,000.00 | 1,290,000.00 |
| Spillway | 40.38 | 48.29 | | | | 150,000.00 | | 150,000.00 | | | | 2,278.77 | | 2,278.77 | 152,278.77 |
| Storm Drain | 10.57 | 62.28 | | | | 31,266,578.86 | | 31,266,578.86 | 314,147.01 | | | 474,994.89 | | 789,141.90 | 32,055,720.77 |
| Tidegate | 43.58 | 43.58 | | | | 25,000.00 | | 25,000.00 | | | | 379.79 | | 379.79 | 25,379.79 |
| **Sub-total Hard Assets** | | | | | **24,573,138.27** | **35,112,323.62** | **-** | **59,685,461.89** | **687,926.12** | **1,290,000.00** | **-** | **533,418.59** | **992,493.01** | **3,503,837.72** | **63,189,299.62** |
| | | | | | | | | | | | | | | | |
| **Natural Assets** | | | | | | | | | | | | | | | |

**Table B-12. FY 2014 Activity Summary - San Diego River Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Program Management (Op) | Permit (PM) | Total | |
| LOS 04-Monitoring activities to prioritize pollutant sources and measure effects of BMPs on runoff / discharge water quality. | 24.15 | 24.15 | 8.19 | 2.95 | | | | | 112,293.23 | | | | | 112,293.23 | 112,293.23 |
| LOS 13-Activity 01 Enhance LID implementation for new development and redevelopment through zoning amendments | 22.86 | 22.86 | 7.75 | 2.95 | | | | | 16,670.00 | | | | | 16,670.00 | 16,670.00 |
| LOS 13-Activity 02 Train Development Services Department staff on LID regulatory changes and LID Design Manual | 22.86 | 22.86 | 7.75 | 2.95 | | | | | 11,220.24 | | | | | 11,220.24 | 11,220.24 |
| LOS 13-Activity 03 Develop regional training for and focus locally on enforcement of water-using mobile businesses | 22.86 | 22.86 | 7.75 | 2.95 | | | | | 7,673.87 | | | | | 7,673.87 | 7,673.87 |
| LOS 13-Activity 05 Design and implement property- and PGA-based inspections and accelerated enforcement | 22.86 | 22.86 | 7.75 | 2.95 | | | | | 15,836.50 | | | | | 15,836.50 | 15,836.50 |
| LOS 13-Activity 06 Trash areas: require full four-sided enclosure, siting away from storm drains, cover; consider retrofit requirement | 22.86 | 22.86 | 7.75 | 2.95 | | | | | 833.50 | | | | | 833.50 | 833.50 |

**Table B-12. FY 2014 Activity Summary - San Diego River Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Program Management (Op) | Permit (PM) | Total | |
| LOS 13-Activity 07 Animal-related facilities | 22.86 | 22.86 | 7.75 | 2.95 | | | | | 833.50 | | | | | 833.50 | 833.50 |
| LOS 13-Activity 08 Nurseries and garden centers | 22.86 | 22.86 | 7.75 | 2.95 | | | | | 833.50 | | | | | 833.50 | 833.50 |
| LOS 13-Activity 09 Auto-related uses | 22.86 | 22.86 | 7.75 | 2.95 | | | | | 833.50 | | | | | 833.50 | 833.50 |
| LOS 13-Activity 10 Update Minimum BMPs for existing residential, commercial & industrial development & enforce | 22.86 | 22.86 | 7.75 | 2.95 | | | | | 9,538.70 | | | | | 9,538.70 | 9,538.70 |
| LOS 13-Activity 11 Support partnership effort by social service providers to provide sanitation and trash management for persons experiencing homelessness | 22.86 | 22.86 | 7.75 | 2.95 | | | | | 5,001.00 | | | | | 5,001.00 | 5,001.00 |
| LOS 13-Activity 12 Develop pilot project to identify and carry out site disconnections in targeted areas | 22.86 | 22.86 | 7.75 | 2.95 | | | | | 4,808.46 | | | | | 4,808.46 | 4,808.46 |
| LOS 13-Activity 13 Continue to participate in source reduction initiatives | 22.86 | 22.86 | 7.75 | 2.95 | | | | | 7,038.20 | | | | | 7,038.20 | 7,038.20 |
| LOS 13-Activity 14a Expand residential BMP (irrigation, rainwater harvesting and turf conversion) rebate programs to multi-family housing in target areas | 22.86 | 22.86 | 7.75 | 2.95 | | | | | 4,808.46 | | | | | 4,808.46 | 4,808.46 |

**Table B-12. FY 2014 Activity Summary - San Diego River Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Program Management (Op) | Permit (PM) | Total | |
| LOS 13-Activity 14b Residential BMP Program: Rain Barrels | 22.86 | 22.86 | 7.75 | 2.95 | | | | | 7,267.56 | | | | | 7,267.56 | 7,267.56 |
| LOS 13-Activity 14c Residential BMP Program: Irrigation Control (Turf Conversion) | 22.86 | 22.86 | 7.75 | 2.95 | | | | | 21,921.32 | | | | | 21,921.32 | 21,921.32 |
| LOS 13-Activity 14d Residential BMP Program: Downspout Disconnect | 22.86 | 22.86 | 7.75 | 2.95 | | | | | 19,546.32 | | | | | 19,546.32 | 19,546.32 |
| LOS 13-Activity 15 Expand outreach to HOA common lands and HOA rebates | 22.86 | 22.86 | 7.75 | 2.95 | | | | | 8,356.25 | | | | | 8,356.25 | 8,356.25 |
| LOS 13-Activity 17 Develop outreach and training program for property managers responsible for HOAs and Maintenance Districts | 22.86 | 22.86 | 7.75 | 2.95 | | | | | 3,836.93 | | | | | 3,836.93 | 3,836.93 |
| LOS 13-Activity 18 Conduct trash clean-ups through community-based organizations involving target audiences | 22.86 | 22.86 | 7.75 | 2.95 | | | | | 10,002.00 | | | | | 10,002.00 | 10,002.00 |
| LOS 13-Activity 19 Enhance education and outreach based on results of effectiveness survey and changing regulatory requirements | 22.86 | 22.86 | 7.75 | 2.95 | | | | | 84,006.13 | | | | | 84,006.13 | 84,006.13 |
| LOS 13-Activity 20 Improve consistency & content of websites to highlight enforceable conditions & reporting methods | 22.86 | 22.86 | 7.75 | 2.95 | | | | | 1,534.77 | | | | | 1,534.77 | 1,534.77 |

**Table B-12. FY 2014 Activity Summary - San Diego River Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Program Management (Op) | Permit (PM) | Total | |
| LOS 13-Activity 25 Proactively monitor for erosion, and complete minor repair & slope stabilization | 22.86 | 22.86 | 7.75 | 2.95 | | | | | 8,335.00 | | | | | 8,335.00 | 8,335.00 |
| LOS 13-Activity 31 Identify sewer leaks and areas for sewer pipe replacement prioritization | 22.86 | 22.86 | 7.75 | 2.95 | | | | | 16,670.00 | | | | | 16,670.00 | 16,670.00 |
| LOS 14-Source identification and characterization studies | 24.15 | 24.15 | 8.19 | 2.95 | | | | | 916,223.46 | | | | | 916,223.46 | 916,223.46 |
| 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). | 24.15 | 24.15 | 8.19 | 2.95 | | | | | | | 70,919.99 | | | 70,919.99 | 70,919.99 |
| LOS 19-City Property-Initial site reconnassaince (2/3 of sites) to identify areas within City parcels with potential to capture/treat/store/infiltrate storm water and runoff. | 24.15 | 24.15 | 8.19 | 2.95 | | | | | | | 294,082.70 | | | 294,082.70 | 294,082.70 |
| LOS 47-Permit monitoring | 24.15 | 24.15 | 8.19 | 2.95 | | | | | 309,248.49 | | | | | 309,248.49 | 309,248.49 |
| **Sub-total Natural Assets** | | | | | | | | | **1,591,701.53** | | **365,002.69** | | | **1,956,704.22** | **1,956,704.22** |
| | | | | | | | | | | | | | | | |
| **Soft Assets** | | | | | | | | | | | | | | | |
| LOS 09-Public Pollution Prevention Behavior-Develop watershed specific education materials and conduct subwatershed | 42.50 | 42.50 | 8.50 | 5.00 | | | | | 298,333.33 | | | | | 298,333.33 | 298,333.33 |

**Table B-12. FY 2014 Activity Summary - San Diego River Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Program Management (Op) | Permit (PM) | Total | |
| events and surveys. | | | | | | | | | | | | | | | |
| 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 |
| LOS 12b-Land Development Regulations TMDL-Develop specification for 303(d) listings and TMDL, develop standard plans and specifications for LID and BMPs. | 47.50 | 47.50 | 9.50 | 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. | 34.50 | 34.50 | 6.90 | 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 | 41.50 | 41.50 | 8.30 | 5.00 | | | | | 165,065.54 | | | | | 165,065.54 | 165,065.54 |

**Table B-12. FY 2014 Activity Summary - San Diego River Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Program Management (Op) | Permit (PM) | Total | |
| and flooding (including those identified by City staff) | | | | | | | | | | | | | | | |
| LOS 24-City department behavior: water deparatment-Complete a planning level study in all watersheds with 15% design concepts and costs, changes in regulatory, and develop cost sharing model. | 28.50 | 28.50 | 5.70 | 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. | 40.40 | 40.40 | 10.10 | 4.00 | | | | | 7,916.67 | | 13,888.89 | | | 21,805.56 | 21,805.56 |
| 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 |

**Table B-12. FY 2014 Activity Summary - San Diego River Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Program Management (Op) | Permit (PM) | Total | |
| 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 |
| 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 servcices 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** | | | **1,712,026.68** | **1,712,026.68** |
| | | | | | | | | | | | | | | | |
| **Grand Total** | | | | | **24,594,464.47** | **35,112,323.62** | | **59,685,461.89** | **3,677,765.44** | **1,290,000.00** | **678,891.58** | **533,418.59** | **992,493.01** | **7,172,568.62** | **66,858,030.51** |

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**Table B-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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# Appendix C Mission Bay Watershed

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# C.1 INTRODUCTION

The Mission Bay 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 Mission Bay WMA. The Mission Bay 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 Mission Bay watershed, and provide a vehicle for public participation.

## C.1.1 Mission Bay Watershed Description

The Mission Bay (& La Jolla) WMA is the smallest WMA in the San Diego region with a land area of over 43,000 acres. It is fully within the jurisdiction of the City of San Diego. The geography of the Mission Bay & La Jolla WMA features: four main water bodies; canyons and wildlife preserves; a coastline with steep bluffs and sandy and rocky beaches; salt marshes; mesas; and desert. San Clemente Creek, Rose Creek, and Tecolote Creek flow into Mission Bay. Mission Bay itself is a system of islands, peninsulas, beaches, remnant salt marshes, and a navigable inlet to the Pacific Ocean, whose current configuration is largely the result of dredging of tidal salt marshes and mudflats.

The Water Quality Control Plan for the San Diego Basin (Basin Plan) prepared by the RWQCB (SDRWQCB, 1994) defines the Mission Bay WMA as consisting of three hydrologic areas (HAs), namely the Scripps HA (906.3), Miramar HA (906.4), and Tecolote HA (906.5). Together with the Miramar Reservoir HA (906.1) and the Poway HA (906.2), the Mission Bay (& La Jolla) WMA forms the Peñasquitos Hydrologic Unit (906.0).

The Mission Bay Watershed is fully within the City of San Diego. Table C-1 provides data on the percentage and acreage of land use categories within the WMA. Figure C-1 shows the City's jurisdiction within the watershed.

**Table C-1. Mission Bay WMA Land Use**

| Land Use Categories | Acreage | Percentage of WMA |
|---|---|---|
| Agriculture | 80 | 0.22% |
| Commercial | 1,301 | 3.55% |
| Industrial | 1,580 | 4.31% |
| Military | 2,126 | 5.80% |
| Open Space/Open Water | 11,269 | 30.72% |
| Parks/Recreation | 2,064 | 5.63% |
| Public | 607 | 1.65% |
| Residential | 8,422 | 22.96% |

**Table C-1. Mission Bay WMA Land Use**

| Land Use Categories | Acreage | Percentage of WMA |
|---|---|---|
| Roads | 5,429 | 14.80% |
| Schools | 1,248 | 3.40% |
| Undeveloped | 2,553 | 6.96% |
| **Total** | **36,678** | **100.00%** |

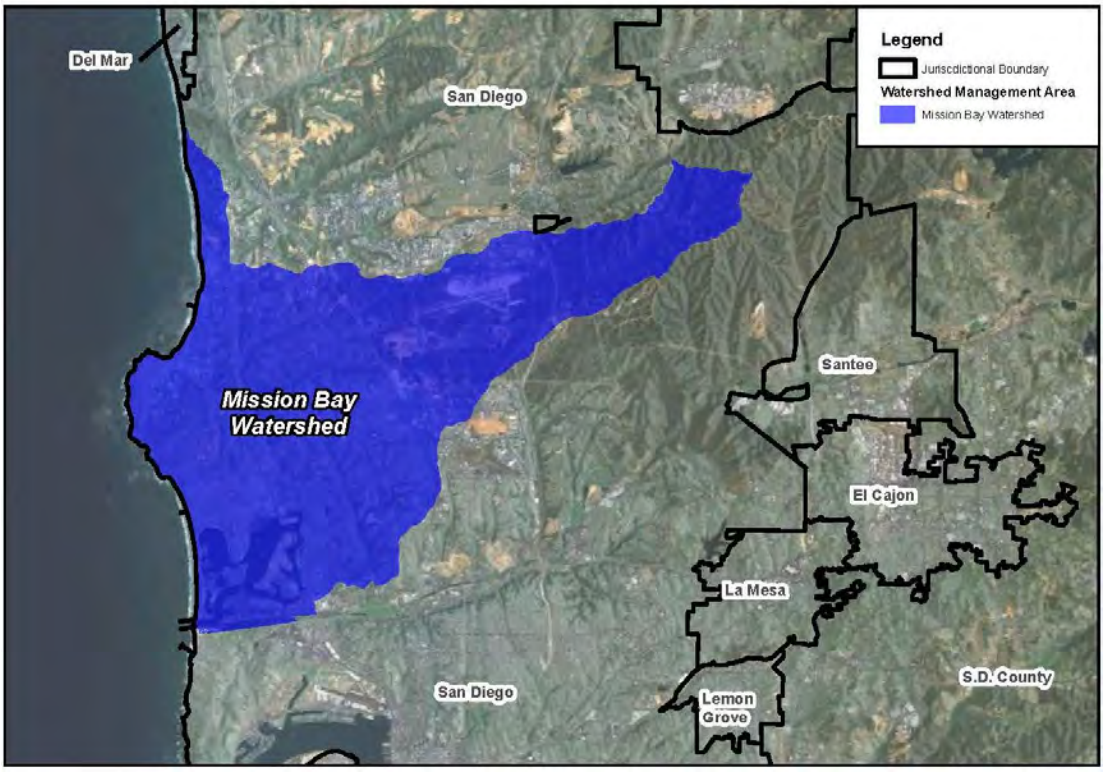


**Figure C-1. Mission Bay Watershed**

The Miramar and Tecolote HAs drain directly into Mission Bay via Rose and Tecolote creeks, respectively. The Scripps HA drains into the Pacific Ocean along the coastlines of the communities of Pacific Beach and La Jolla. The Mission Bay (& La Jolla) WMA contains some of the more intensely urbanized areas of San Diego County (the San Diego Association of Governments estimated the population of the WMA to be 226,446 in 2000).

The Miramar Marine Corps Air Station and the University of California, San Diego, occupy the northern portion of the Miramar HA. Mission Bay, the largest aquatic park along the western coast of the United States, is the outstanding land use at the southwestern corner of the WMA. It supports a variety of recreational uses and a small amount of remnant salt marshes. Commercial and industrial land uses are

clustered generally along Interstate 5 and in the Golden Triangle area (bounded by Interstate 805, Interstate 5, and State Route 52). Wildlife preserves and parks run along San Clemente, Rose, and Tecolote creeks.

Mission Bay provides habitat for numerous sensitive species indigenous to the Southern California coastline and is home to several wildlife preserves that provide important habitat for the federally endangered least tern, brown pelican, and light-footed clapper rail. Tecolote Canyon Natural Park, the Rose Canyon Open Space Preserve, the Marian Bear Memorial Natural Park, and the Kendall-Frost Mission Bay Marsh Reserve also provide habitat for a variety of both animal and plant species, including riparian and chaparral vegetation, such as willows and coastal sage scrub.

### C.1.2 Mission Bay 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 Mission Bay Watershed:

- Andre Sonksen
- Stephanie Bracci

### C.1.3 Water Quality

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

[1] Mission Bay Watershed Urban Runoff Management Program, 2010-2011 Annual Report, City of San Diego.

**Table C-2. Mission Bay Watershed Baseline High-priority Water Quality Problems**

| Hydrologic Area | Bacteria/Pathogens | Nutrients | Heavy Metals |
|---|---|---|---|
| **Scripps Hydrologic Area** | | | |
| 906.3 | X | X | X |
| **Miramar Hydrologic Area** | | | |
| 906.4 | X | X | X |
| **Tecolote Hydrologic Area** | | | |
| 906.5 | X | X | X |

Water bodies in the Mission Bay WMA and constituents that have been placed on the State Water SWRCB 2010 Section 303(d) list are presented in Table C-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 C-3. Mission Bay 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, Scripps HA, at Avenida de la Playa at La Jolla Shores Beach | Coastal & Bay Shoreline | 90630000 / 18070304 | Yes | Total Coliform | 0.03 Miles | 2010 | 5A | 2019 |
| Pacific Ocean Shoreline, Scripps HA, at Childrens Pool | Coastal & Bay Shoreline | 90630000 / 18070304 | Yes | Enterococcus | 0.03 Miles | 1998 | 5A | 2021 |
| | | | | Fecal Coliform | 0.03 Miles | 1998 | 5A | 2021 |
| | | | | Total Coliform | 0.03 Miles | 1998 | 5A | 2021 |
| Pacific Ocean Shoreline, Scripps HA, at La Jolla Cove | Coastal & Bay Shoreline | 90630000 / 18070304 | Yes | Total Coliform | 0.03 Miles | 2010 | 5A | 2019 |
| Pacific Ocean Shoreline, Scripps HA, at Pacific Beach Point, Pacific Beach | Coastal & Bay Shoreline | 90630000 / 18070304 | Yes | Enterococcus | 0.03 Miles | 2010 | 5A | 2019 |
| | | | | Fecal Coliform | 0.03 Miles | 2010 | 5A | 2019 |
| | | | | Total Coliform | 0.03 Miles | 2010 | 5A | 2019 |
| Pacific Ocean Shoreline, Scripps HA, at Ravina | Coastal & Bay Shoreline | 90630000 / 18070304 | Yes | Total Coliform | 0.03 Miles | 1998 | 5A | 2019 |
| Pacific Ocean Shoreline, Scripps HA, at Vallecitos Court at La Jolla Shores Beach | Coastal & Bay Shoreline | 90630000 / 18070304 | Yes | Total Coliform | 0.03 Miles | 2010 | 5A | 2021 |

**Table C-3. Mission Bay 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 |
|---|---|---|---|---|---|---|---|---|
| Mission Bay (area at mouth of Rose Creek only) | Bay & Harbor | 90640000 / 18070304 | Yes | Eutrophic | 9.2 Acres | 1996 | 5A | 2019 |
| | | | | Lead | 9.2 Acres | 1996 | 5A | 2019 |
| Mission Bay (area at mouth of Tecolote Creek only) | Bay & Harbor | 90650000 / 18070304 | Yes | Eutrophic | 3.1 Acres | 1996 | 5A | 2019 |
| | | | | Lead | 3.1 Acres | 1996 | 5A | 2019 |
| Mission Bay Shoreline at Campland | Coastal & Bay Shoreline | 90640000 / 18070304 | Yes | Enterococcus | 0.08 Miles | 2006 | 5A | 2019 |
| | | | | Fecal Coliform | 0.08 Miles | 2006 | 5A | 2019 |
| | | | | Total Coliform | 0.08 Miles | 2006 | 5A | 2019 |
| Mission Bay Shoreline at De Anza Cove | Coastal & Bay Shoreline | 90640000 / 18070304 | Yes | Enterococcus | 0.06 Miles | 2006 | 5A | 2019 |
| | | | | Fecal Coliform | 0.06 Miles | 2006 | 5A | 2019 |
| | | | | Total Coliform | 0.06 Miles | 2006 | 5A | 2019 |
| Mission Bay Shoreline at Leisure Lagoon | Coastal & Bay Shoreline | 90640000 / 18070304 | Yes | Enterococcus | 0.12 Miles | 2006 | 5A | 2019 |
| | | | | Total Coliform | 0.12 Miles | 2006 | 5A | 2019 |
| Mission Bay Shoreline at North Crown Point | Coastal & Bay Shoreline | 90640000 / 18070304 | Yes | Enterococcus | 0.12 Miles | 2006 | 5A | 2019 |
| | | | | Total Coliform | 0.12 Miles | 2006 | 5A | 2019 |
| Mission Bay Shoreline at Tecolote Shores | Coastal & Bay Shoreline | 90650000 / 18070304 | Yes | Enterococcus | 0.04 Miles | 2006 | 5A | 2019 |
| | | | | Total Coliform | 0.04 Miles | 2006 | 5A | 2019 |

**Table C-3. Mission Bay 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 |
|---|---|---|---|---|---|---|---|---|
| Mission Bay Shoreline at Visitors Center | Coastal & Bay Shoreline | 90640000 / 18070304 | Yes | Enterococcus | 0.1 Miles | 2006 | 5A | 2019 |
| | | | | Fecal Coliform | 0.1 Miles | 2006 | 5A | 2019 |
| | | | | Total Coliform | 0.1 Miles | 2006 | 5A | 2019 |
| Rose Creek | River & Stream | 90640000 / 18070304 | Yes | Selenium | 13 Miles | 2010 | 5A | 2021 |
| | | | | Toxicity | 13 Miles | 2010 | 5A | 2021 |
| Tecolote Creek | River & Stream | 90650000 / 18070304 | Yes | Cadmium | 6.6 Miles | 1996 | 5A | 2019 |
| | | | | Copper | 6.6 Miles | 1996 | 5A | 2019 |
| | | | | Indicator Bacteria | 6.6 Miles | 1996 | 5A | 2009 |
| | | | | Lead | 6.6 Miles | 1996 | 5A | 2019 |
| | | | | Nitrogen | 6.6 Miles | 2010 | 5A | 2021 |
| | | | | Phosphorus | 6.6 Miles | 2006 | 5A | 2019 |
| | | | | Selenium | 6.6 Miles | 2010 | 5A | 2021 |
| | | | | Toxicity | 6.6 Miles | 1996 | 5A | 2019 |
| | | | | Turbidity | 6.6 Miles | 2006 | 5A | 2019 |
| | | | | Zinc | 6.6 Miles | 1996 | 5A | 2019 |

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### C.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 Mission Bay Watershed are listed in Table C-4.

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## Table C-4. Mission Bay 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 | |
| 32 | Mission Bay | Rose Creek Channel | 1,349 | 1,337 | 12 | 57 |
| 33 | Mission Bay | Rose Creek Channel | 1,329 | 1,329 | -- | 57 |
| 34 | Mission Bay | Rose Creek Channel | 1,416 | 376 | 1,040 | 124 |
| 35 | Mission Bay | Rose Creek Channel | 2,270 | -- | 2,270 | 104 |
| 36 | Mission Bay | Mission Bay High School | 900 | 900 | 1 | 10 |
| 37 | Mission Bay | Pacific Beach Dr & Olney St | 1,078 | 178 | 900 | 17 |
| 40 | Mission Bay | Chateau Creek Channel | 2,242 | 1,387 | 856 | 18 |
| 41 | Mission Bay | Chateau Creek Channel | 2,471 | 1,681 | 790 | 20 |
| 42 | Mission Bay | Chateau Creek Channel | 874 | 834 | 41 | 20 |
| 55a | Mission Bay | West Morena Blvd | 270 | -- | 270 | 12 |
| 55 | Mission Bay | Tecolote Creek Channel | 2,584 | 2,443 | 142 | 25 |
| 56 | Mission Bay | Tecolote Creek Channel | 2,018 | 1,606 | 412 | 29 |
| 57 | Mission Bay | Tecolote Creek Channel | 768 | 120 | 648 | 29 |

**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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## C.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 Mission Bay Watershed asset category (i.e., hard, soft, and natural).

### C.2.1 Hard Assets

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

**Table C-5. Mission Bay Watershed Hard Assets**

| Asset Class/Subclass | Asset Count | Total Length (feet) | Total Length (miles) |
|---|---|---|---|
| Conveyance System: | | | |
| • Box Culvert | 76 | 13,224 | 2.50 |
| • Brow Ditch | 5 | 477 | 0.09 |
| • Channel | 330 | 114,374 | 21.66 |
| • Storm Drain | 6,086 | 860,019 | 162.88 |
| Structures: | | | |
| • Cleanout | 1,286 | | |
| • Inlet | 3,613 | | |
| • Energy Dissipator | 44 | | |
| • Headwall | 588 | | |
| • Outlet | 1,120 | | |
| • Spillway | 22 | | |
| • Low Flow Diversion | 63 | | |
| • Tidegate | 8 | | |
| Pump Stations: | 80 | | |
| Structural Best Management Practices: | 2 | | |
| **Total** | **13,323** | **988,094** | **187.14** |

In terms of asset count, inlets account for 54 percent of Mission Bay Watershed storm water structures assets, followed by cleanouts and outlets, with 19 percent and 17 percent, respectively. Within the conveyance system, the dominant asset type is the storm drain system, which accounts for 87 percent (163 miles) of total conveyance length. The detailed distribution of the storm water conveyance and structures is shown in Figures C-2 and C-3.

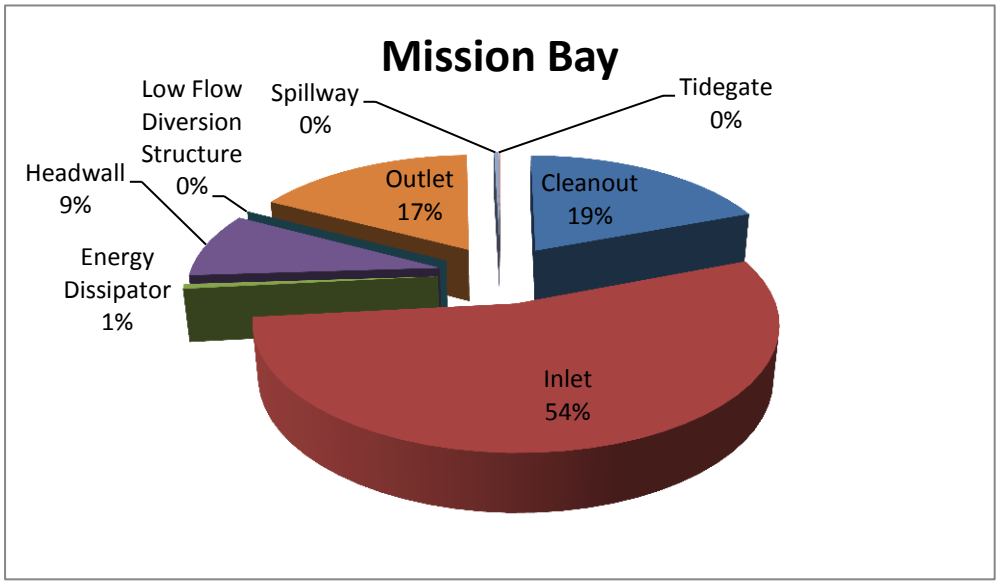


**Figure C-2. Distribution of Storm Water Structures by Asset Count - Mission Bay Watershed**

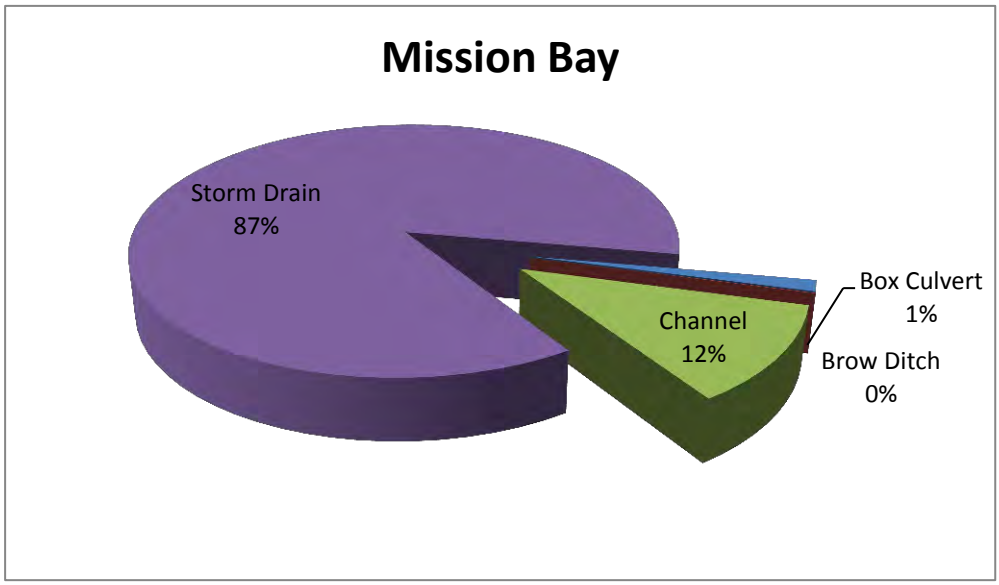


**Figure C-3. Distribution of Storm Water Conveyance by Length - Mission Bay Watershed**

In addition to those assets listed in Table C-5, there is additional equipment that is not particularly part of the Mission Bay 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 C-6 shows the list of assets within this category and their quantities.

**Table C-6. The Equipment**

| Asset Class/Subclass | Asset Count |
|---|---|
| Operation and Maintenance Equipment | 102 |
| Best Management Practices Monitoring Equipment | 12 |
| **Total** | **115** |

## C.2.2 Natural Assets

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

**Table C-7. Mission Bay Watershed Natural Asset Classes/Subclasses and Quantities**

| Asset Class/Subclass | Quantity in Mission Bay Watershed |
|---|---|
| Receiving Waters | Currently treated as one asset within the Mission Bay Watershed. For future updates, recommend to refine into specific receiving water assets. For the San River Watershed, there are 206 receiving waters/segments. |
| Runoff/Discharges | Currently treated as one asset within the Mission Bay Watershed. For future updates, manage runoffs and discharges at the hydrologic sub-area level as defined in the CLRP. There are 1,120 mainstem outfalls in the Mission Bay Watershed, which will be associated with the hydrologic sub-areas defined in the CLRP |
| City Parcels | There are 224 City Parcels in the Mission Bay Watershed. |
| MHPAs | There are 83 MHPAs in the Mission Bay Watershed. |

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

## C.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 C-8 shows the soft asset classes and the quantities of assets in those classes in the Mission Bay Watershed.

**Table C-8. Mission Bay Watershed Soft Asset Subclasses and Quantities**

| Asset Class/Subclass | Quantity in Mission Bay Watershed |
|---|---|
| City Department Behavior | Currently treated as one asset in the Mission Bay 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 Mission Bay 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 | |

## C.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 C-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 Mission Bay Watershed is provided below in Table C-9. Of the total, the conveyance system accounts for about 65 percent of the total replacement costs, structures account for 34 percent, and pump stations account for 1 percent. Figure C-4 shows the distribution of Mission Bay Watershed hard asset replacement costs.

**Table C-9. Mission Bay Watershed Assets Replacement Costs**

| Asset Class/Subclass | Replacement Cost | Total Replacement Costs |
|---|---|---|
| Conveyance System: | | |
| • Box Culvert | $250,000/unit | $19 million |
| • Brow Ditch | $400/linear feet | $191,000 |
| • Channel | $400/linear feet | $45.7 million |
| • Storm Drain Pipe | $400/linear feet | $344 million |
| Structures: | | |
| • Cleanout | $20,000/unit | $25.7 million |
| • Inlet | $20,000/unit | $72.3 million |
| • Energy Dissipater | $40,000/unit | $1.8 million |
| • Headwall | $40,000/unit | $23.5 million |
| • Low Flow Diversion Structure | $400,000/unit | $25.2 million |
| • Outlet | $40,000/unit | $44.8 million |
| • Spillway | $15,000/unit | $330,000 |
| • Tidegate | $25,000/unit | $200,000 |
| Pump Stations (components > $5,000K): | Vary by asset types | $4.6 million |
| **Total** | | **$607 million** |

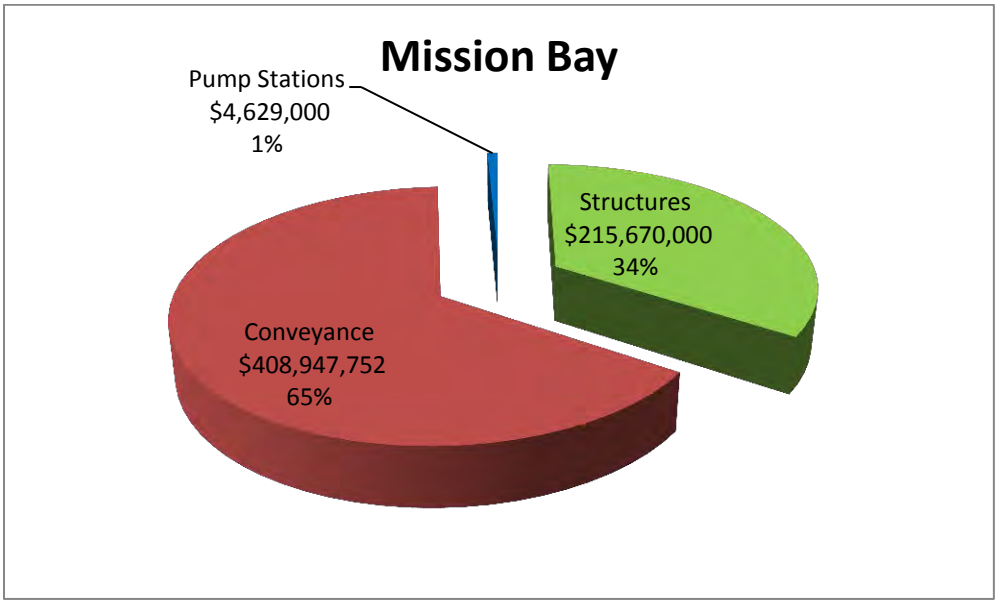


**Figure C-4. Mission Bay Watershed Hard Assets Replacement Costs**

Figure C-5 shows the distribution of conveyance system asset replacement costs. Of the total conveyance system, about 84 percent consists of storm drains; followed by channels, box culverts, and brow ditches.

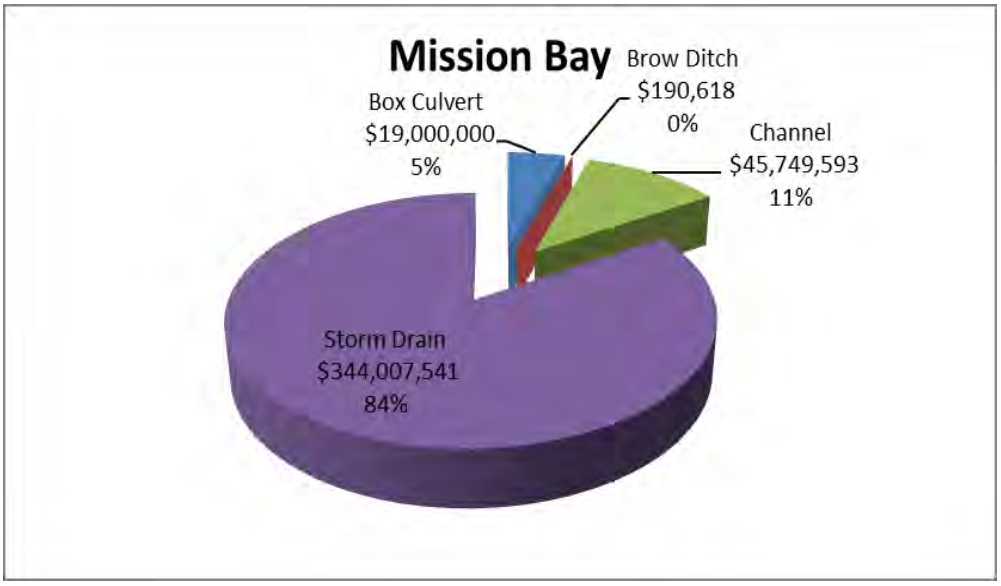


**Figure C-5. Mission Bay Watershed Conveyance System Assets Replacement Costs**

Figure C-6 shows the distribution of the asset replacement costs for storm water structures. Of the total system, most of structures consist of inlets (38 percent), followed by outlets (23 percent), cleanouts (13 percent), low flow diversion structures (13%), and headwall (12 percent). The three remaining asset classes (energy dissipaters, spillways, and tidegates) represent 1 percent of the total asset replacement costs.

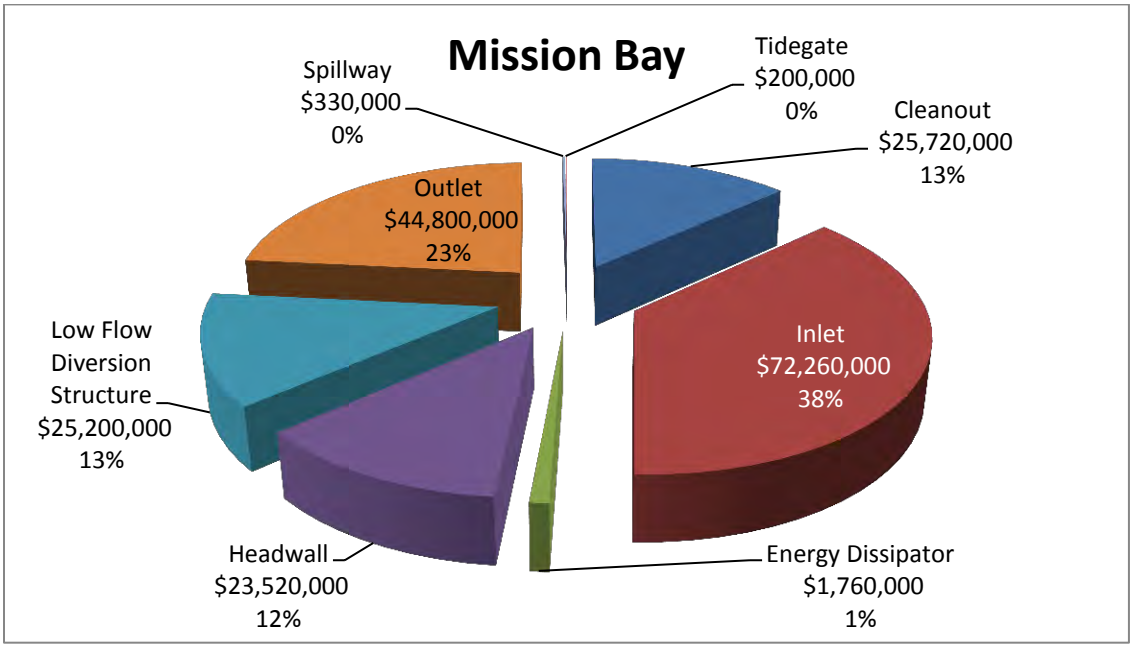


**Figure C-6. Mission Bay Watershed Storm Water Structures Asset Replacement Costs**

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

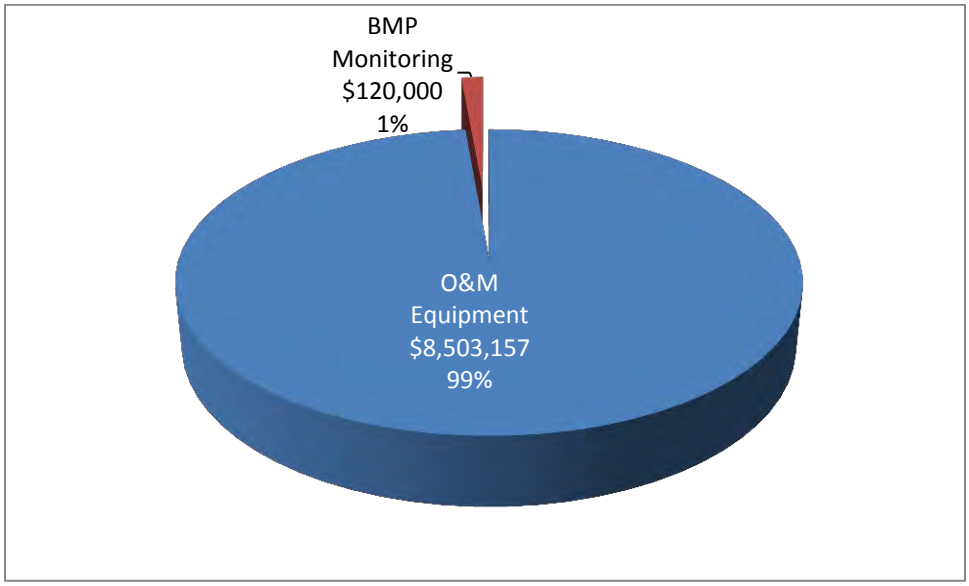


**Figure C-7. The Division's Equipment Asset Replacement Costs**

## C.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 C-8 shows the historical asset installation profile of the Mission Bay 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-1900s. There was some growth in the late-1920s, followed by a large amount of development in the 1950s. After this time, the development trend was steady, with a few high peaks occurring every five years between the early-1960s and the early-1980s. Since mid-1980s, the construction trend has grown at a steady pace with increased development in late-1990s and early-2000s.

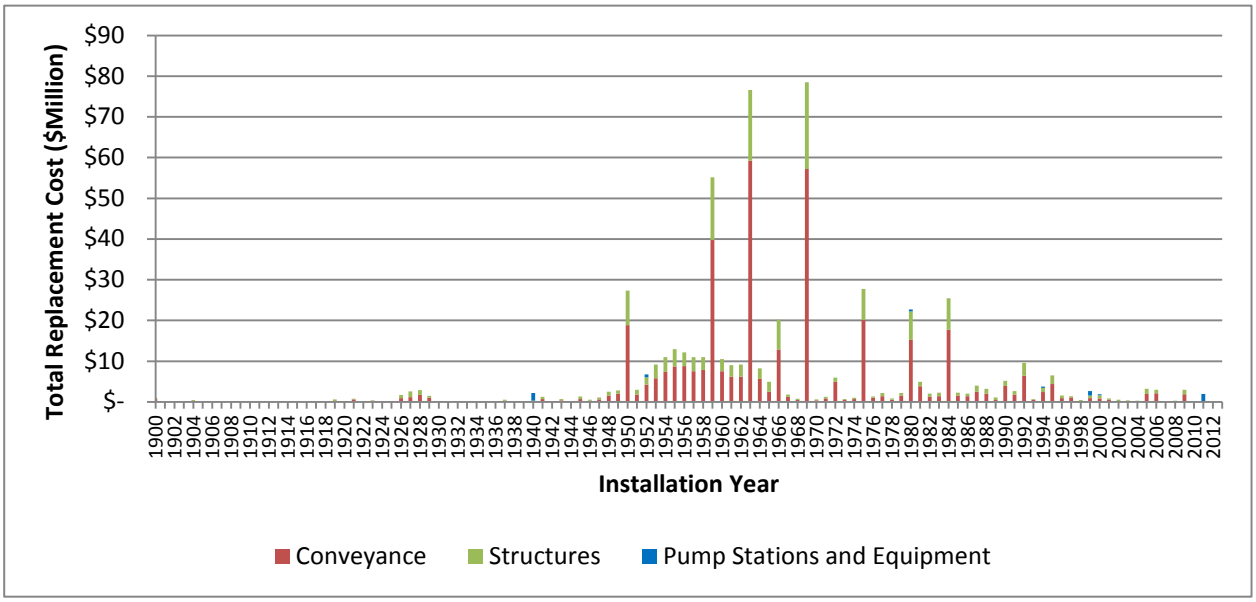


**Figure C-8. Installation Profile - Mission Bay Watershed**

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 C-9, among the total of 13,257 assets listed in the Mission Bay asset inventory excluding equipment, about 3 percent are condition score 5 (immediate attention) and about 94 percent are condition score 3 (fair) or better.

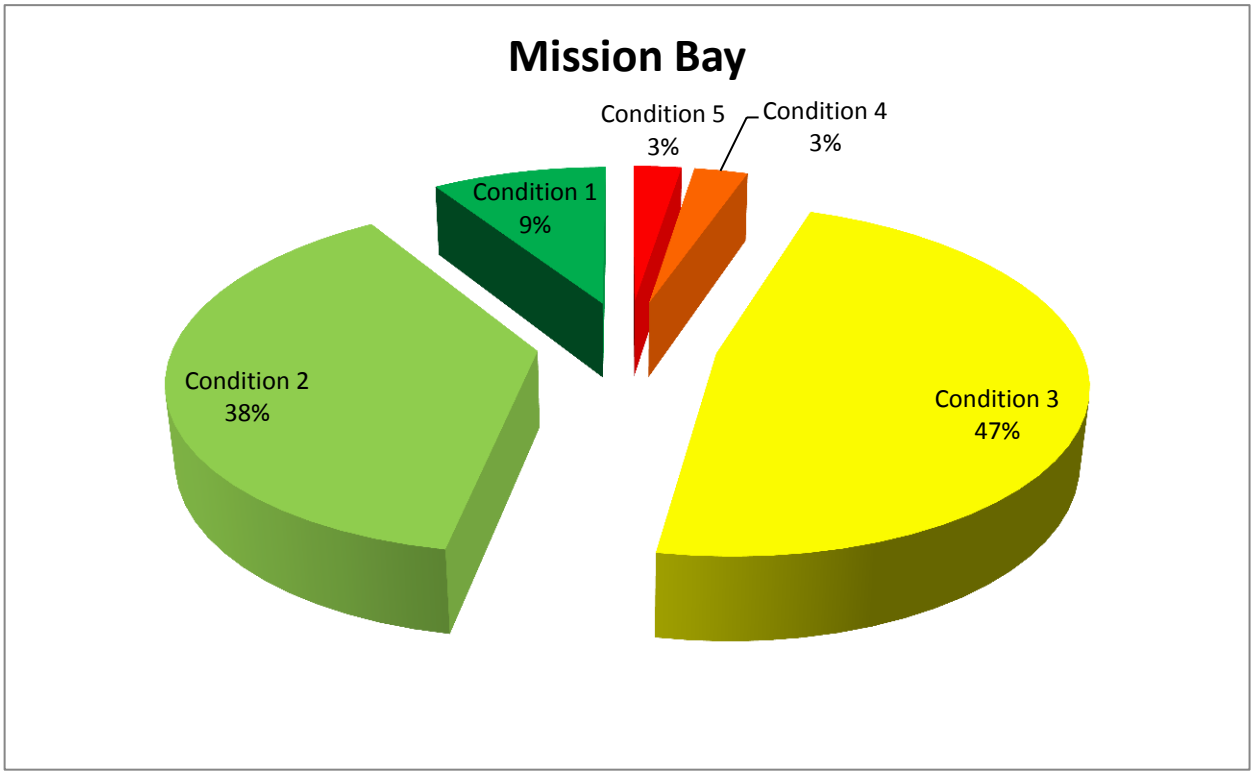


**Figure C-9. Summary of Hard Asset Conditions - Mission Bay Watershed**

Among the asset groups (Figure C-10), the conveyance system (48 percent) and structure (47 percent) accounts for the largest number of assets of condition 4 (poor) or worse.

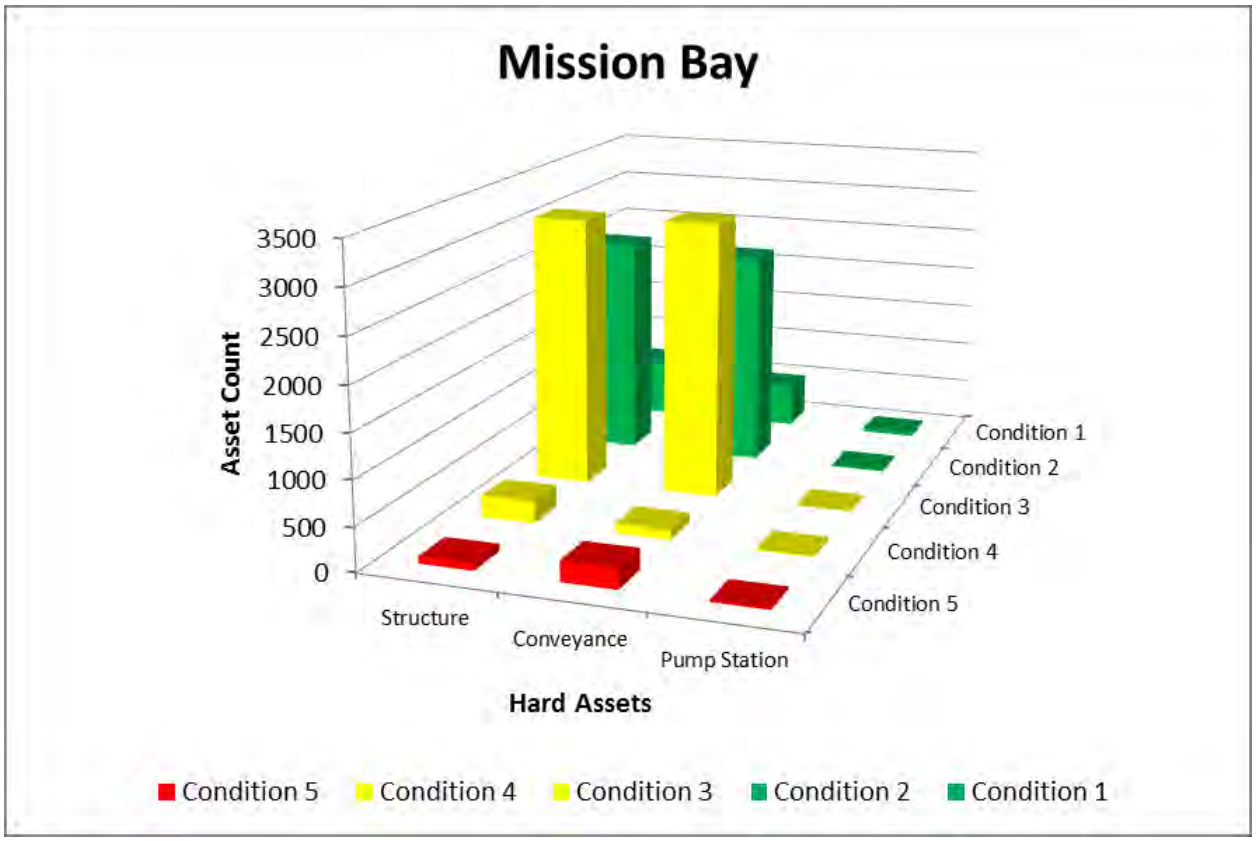


**Figure C-10. Summary of Hard Asset Conditions by Asset Class - Mission Bay Watershed**

Figure C-11 provides a summary of the conveyance system asset conditions for the Mission Bay Watershed. Within the conveyance system, storm drains account for all of the assets that are in need of immediate attention (condition 5). The majority of storm drains that are in need of replacement are metal pipes, which have a relatively short useful life of 35 years.

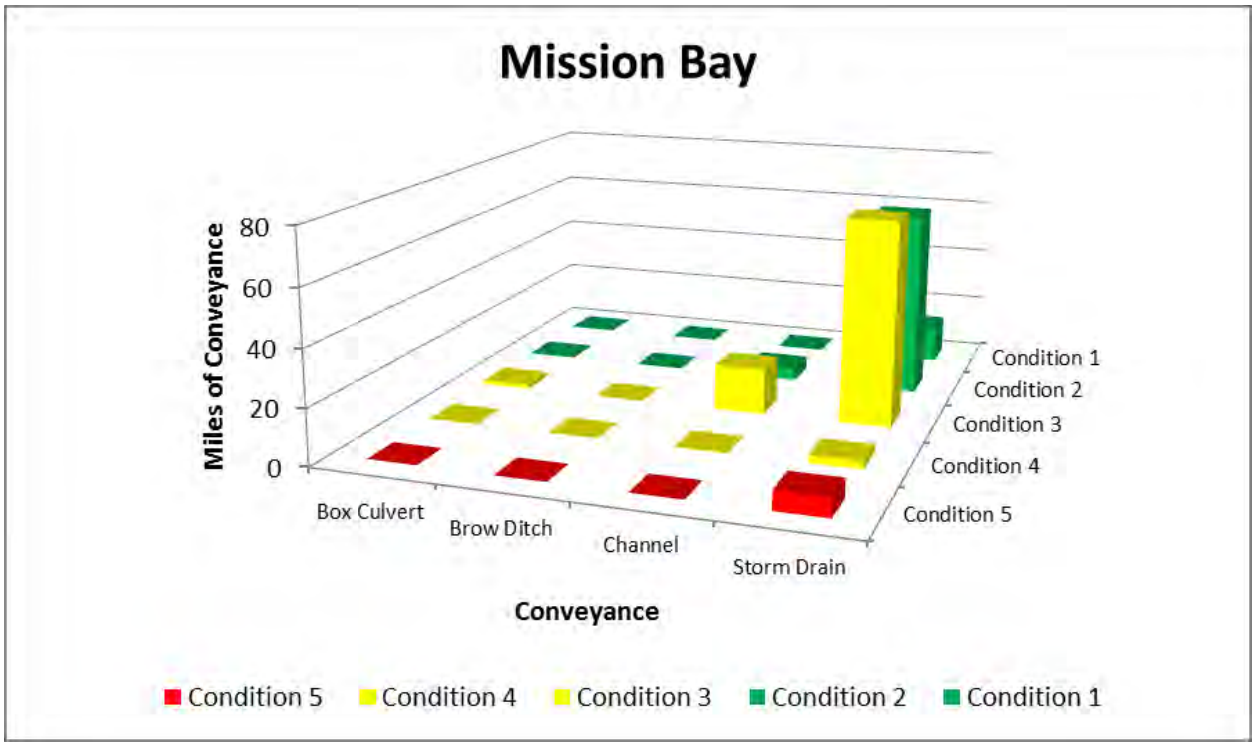


**Figure C-11. Summary of Conveyance System Conditions - Mission Bay Watershed**

Figure C-12 provides a summary of the conditions of the storm water structures for the Mission Bay 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.

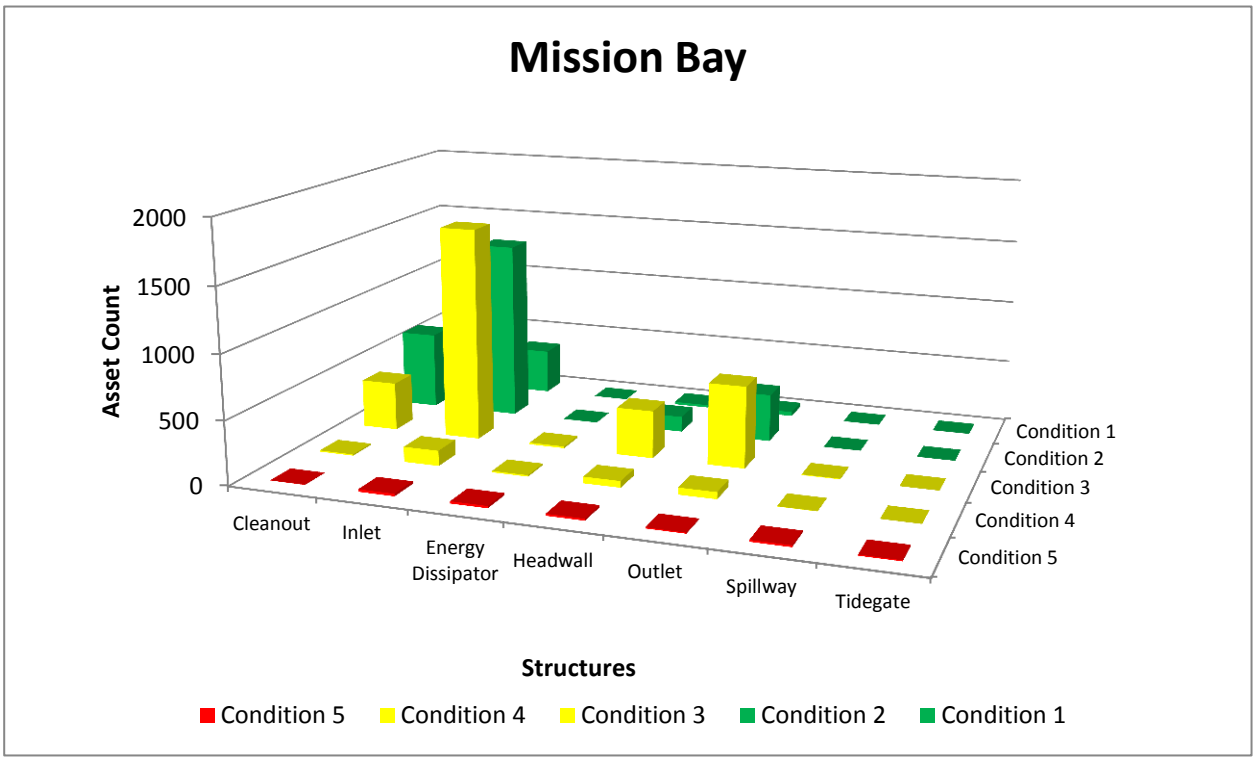


**Figure C-12. Summary of Conditions of Storm Water Structures - Mission Bay Watershed**

Figure C-13 summarizes the conditions of pump station asset for the Mission Bay Watershed. About 61 percent of pump station assets are condition 3 or better and 22 percent are in need of immediate attention. All the assets that are in condition 5 are pump stations F and K. This condition profile reflects the fact that most of the pump station in F and K were developed in 1940 and 1980.

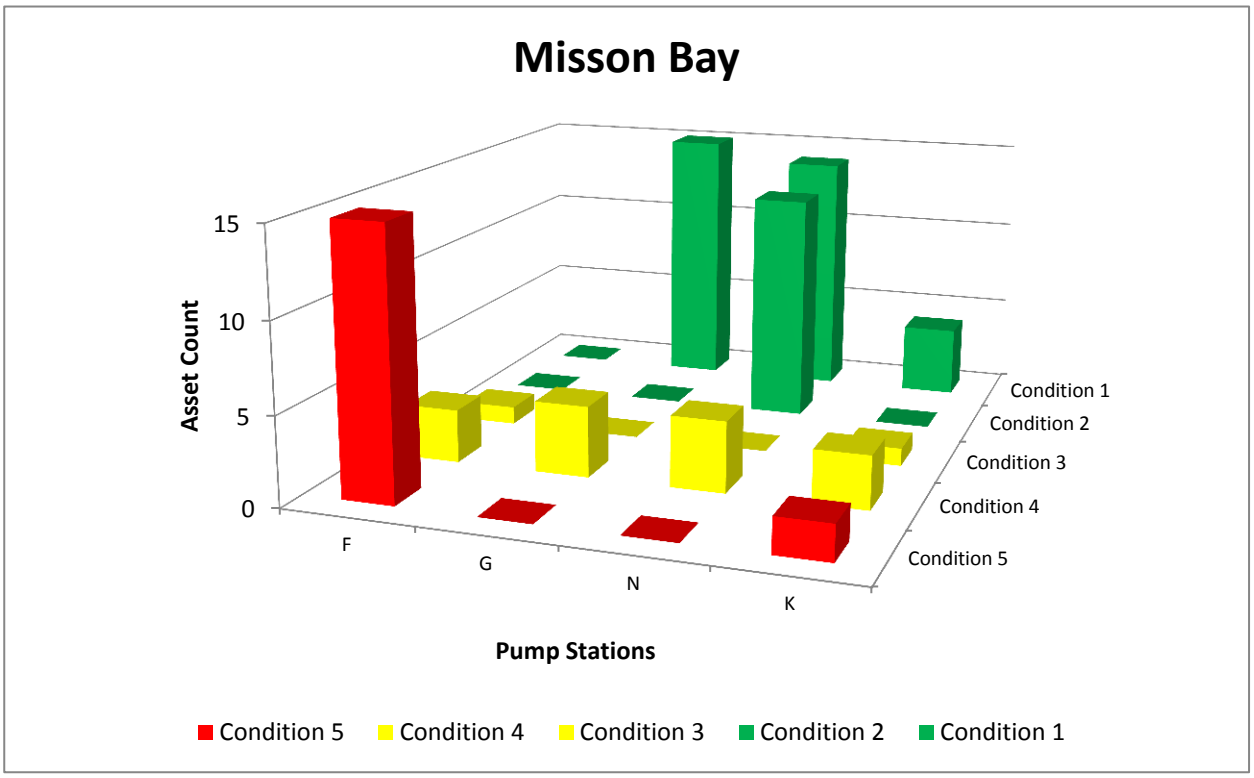


**Figure C-13. Summary of Conditions of Pump Station Assets - Mission Bay Watershed**

Figure C-14 provides a summary of the condition of the Division's equipment, which consists of BMP monitoring equipment and O&M equipment.

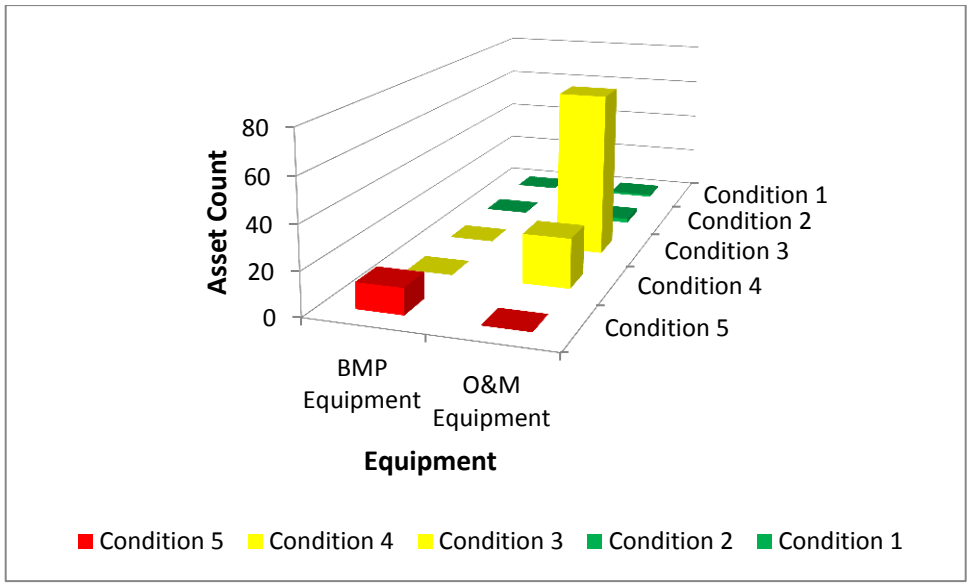


**Figure C-14. Summary of Conditions of Equipment Assets – Mission Bay Watershed**

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 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 Division's Mission Bay system consumption profile is presented in Figure C-15. The figure shows that the majority of the Division's hard assets are 45 to 65 percent consumed. About 3 percent of the hard assets have reached or exceeded their useful life.

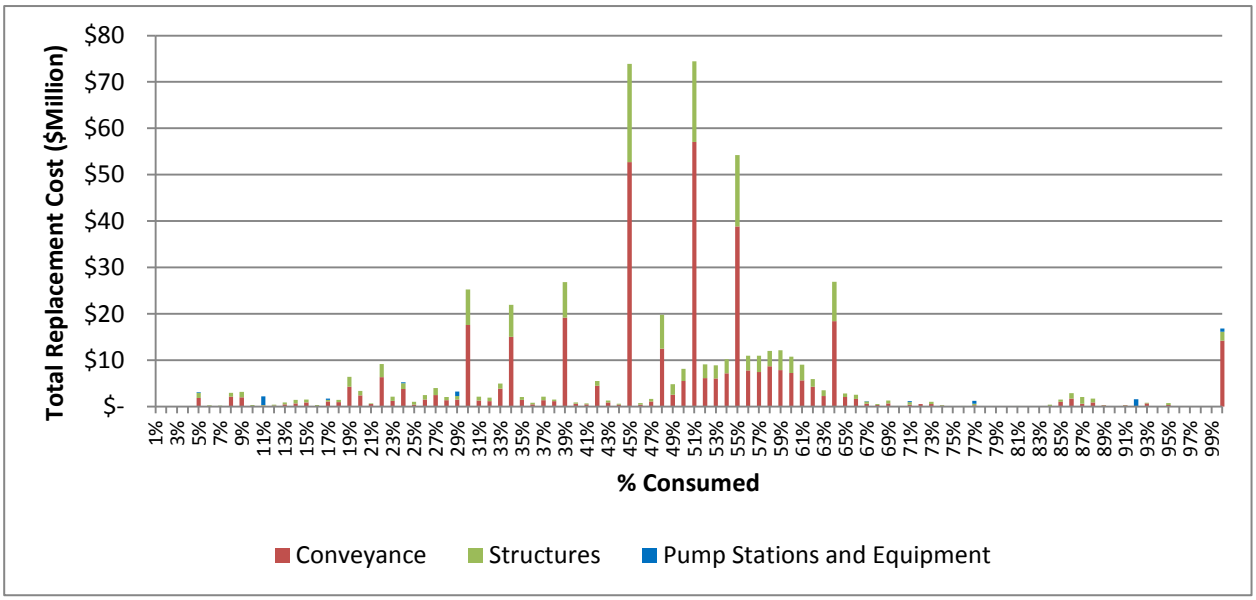


**Figure C-15. Consumption Profile – Mission Bay Watershed**

## C.5 WHAT NEEDS TO BE DONE

The main body of the WAMP describes the LOSs that was developed for each asset class. This appendix presents the assets within the Mission Bay Watershed, whether they are achieving the desired LOSs, and the necessary actions to achieve their LOSs. Table C-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 C-10. Actions needed for Assets to Achieve LOSs – Mission Bay Watershed**

| 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 C-10. Actions needed for Assets to Achieve LOSs – Mission Bay Watershed**

| 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 C-10. Actions needed for Assets to Achieve LOSs – Mission Bay Watershed**

| 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 C-10. Actions needed for Assets to Achieve LOSs – Mission Bay Watershed**

| 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 C-10. Actions needed for Assets to Achieve LOSs – Mission Bay Watershed**

| 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 C-10. Actions needed for Assets to Achieve LOSs – Mission Bay Watershed**

| 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 C-10. Actions needed for Assets to Achieve LOSs – Mission Bay Watershed**

| 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 C-10. Actions needed for Assets to Achieve LOSs – Mission Bay Watershed**

| 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 C-10. Actions needed for Assets to Achieve LOSs – Mission Bay Watershed**

| 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 C-10. Actions needed for Assets to Achieve LOSs – Mission Bay Watershed**

| 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 C-10. Actions needed for Assets to Achieve LOSs – Mission Bay Watershed**

| 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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## C.6 WHEN DO WE NEED IT?

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

### C.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 C-11 lists the BRE scores for the Mission Bay 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 C.7. The specific actions and projects slated for Fiscal Year 2015 are presented in Section C.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 C-11. Soft and Natural Asset BRE Scores - Mission Bay 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 | 5 for Decollate and Scripps Sub watersheds; 4 for Mission Bay Sub watershed | Area-weighted CPI Dry/Wet composite score for Decollate Sub watershed (2.88); Scripps Sub watershed (2.83); 80% of Penasquitos Sub watershed (2.51) for Mission Bay Sub watershed | 5 for Decollate and Scripps Sub watersheds; 3 for Mission Bay Sub watersheds | 5 all subwatersheds | 10.364 for Decollate Sub watershed; 10.349 for other Scripps Sub watersheds; 8.353 for Mission Bay Watershed | Area-weighted CPI Dry/Wet score for Decollate Sub watershed (2.88); Scripps (2.83); 80% of Penasquitos Sub watershed; (2.51) | 29.8 for the Decollate Sub watershed; 29.3 for the Scripps Sub watershed; 21.0 for Mission Bay Sub watersheds | Decollate: Medium Scripps: Medium Mission Bay: Low |

**Table C-11. Soft and Natural Asset BRE Scores - Mission Bay 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 | | | | |
| 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. | | | | | | | | | | | |
| 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 | 5 | 3 | 4 | 5 | 10.2 | 5 | 51 | High |
| 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 | 3 | 1 | 4 | 2 | 1 | 3 | 6.6 | 5 | 33 | Medium |

**Table C-11. Soft and Natural Asset BRE Scores - Mission Bay 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 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 |
| 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 |

**Table C-11. Soft and Natural Asset BRE Scores - Mission Bay 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 | | | | |
| 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 | 5 | 3 | 3 | 5 | 9.2 | 5 | 46 | 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 | 5 | 4 | 3 | 5 | 9.5 | 5 | 47.5 | Medium |

**Table C-11. Soft and Natural Asset BRE Scores - Mission Bay 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 | 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 | Per TMDL schedules | 1 for all subwatersheds | 1 for all subwatersheds | 5 for Decollate and Scripps Sub watersheds; 4 for Mission Bay Sub watershed | Area-weighted CPI Dry composite score for Decollate Sub watershed (1.43); Scripps Sub watershed (1.42); 80% of Penasquitos Sub watershed (1.31) for Mission Bay Sub watershed | 5 for Decollate and Scripps Sub watersheds; 3 for Mission Bay Sub watershed | 5 all subwatersheds | 9.929 for Decollate Sub watershed; 9.926 for other Scripps Sub watersheds; 7.993 for Mission Bay Watershed | Area-weighted CPI Dry/Wet score for Decollate Sub watershed (2.88); Scripps (2.83); 80% of Penasquitos Sub watershed; (2.51) | 28.6 for the Decollate Sub watershed; 28.1 for the Scripps Sub watershed; 20.1 for Mission Bay Sub watersheds | Decollate: Medium Scripps: Medium Mission Bay: Low |
| 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 | Per TMDL schedules | 1 for all subwatersheds | 1 for all subwatersheds | 5 for Decollate and Scripps Sub watersheds; 4 for Mission Bay Sub watershed | Area-weighted CPI Wet composite score for Decollate Sub watershed (1.45); Scripps Sub watershed (1.41); 80% of Penasquitos Sub watershed (1.20) for Mission Bay Sub watershed | 5 for Decollate and Scripps Sub watersheds; 3 for Mission Bay Sub watershed | 5 all subwatersheds | 9.935 for Decollate Sub watershed; 9.923 for other Scripps Sub watersheds; 7.960 for Mission Bay Watershed | Area-weighted CPI Dry/Wet score for Decollate Sub watershed (2.88); Scripps (2.83); 80% of Penasquitos Sub watershed; (2.51) | 28.6 for the Decollate Sub watershed; 28.1 for the Scripps Sub watershed; 20.0 for Mission Bay Sub watersheds | Decollate: Medium Scripps: Medium Mission Bay: 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 | 5 for Decollate and Scripps Sub watersheds; 4 for Mission Bay Sub watershed | Area-weighted CPI Dry/Wet composite score for Decollate Sub watershed (2.88); Scripps Sub watershed (2.83); 80% of Penasquitos Sub watershed (2.51) for Mission Bay Sub watershed | 5 for Decollate and Scripps Sub watersheds; 3 for Mission Bay Sub watershed | 5 all subwatersheds | 10.364 for Decollate Sub watershed; 10.349 for other Scripps Sub watersheds; 8.353 for Mission Bay Watershed | Area-weighted CPI Dry/Wet score for Decollate Sub watershed (2.88); Scripps (2.83); 80% of Penasquitos Sub watershed; (2.51) | 29.8 for the Decollate Sub watershed; 29.3 for the Scripps Sub watershed; 21.0 for Mission Bay Sub watersheds | Decollate: Medium Scripps: Medium Mission Bay: 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. | | | | | | | | | | | |

**Table C-11. Soft and Natural Asset BRE Scores - Mission Bay 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 | | | | |
| 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 | 5 for Decollate and Scripps Sub watersheds; 4 for Mission Bay Sub watershed | Area-weighted CPI Dry/Wet composite score for Decollate Sub watershed (2.88); Scripps Sub watershed (2.83); 80% of Penasquitos Sub watershed (2.51) for Mission Bay Sub watershed | 5 for Decollate and Scripps Sub watersheds; 3 for Mission Bay Sub watershed | 5 all subwatersheds | 10.364 for Decollate Sub watershed; 10.349 for other Scripps Sub watersheds; 8.353 for Mission Bay Watershed | Area-weighted CPI Dry/Wet score for Decollate Sub watershed (2.88); Scripps (2.83); 80% of Penasquitos Sub watershed; (2.51) | 29.8 for the Decollate Sub watershed; 29.3 for the Scripps Sub watershed; 21.0 for Mission Bay Sub watersheds | Decollate: Medium Scripps: Medium Mission Bay: 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 | 5 for Decollate and Scripps Sub watersheds; 4 for Mission Bay Sub watershed | Area-weighted CPI Dry/Wet composite score for Decollate Sub watershed (2.88); Scripps Sub watershed (2.83); 80% of Penasquitos Sub watershed (2.51) for Mission Bay Sub watershed | 5 for Decollate and Scripps Sub watersheds; 3 for Mission Bay Sub watershed | 5 all subwatersheds | 10.364 for Decollate Sub watershed; 10.349 for other Scripps Sub watersheds; 8.353 for Mission Bay Watershed | Area-weighted CPI Dry/Wet score for Decollate Sub watershed (2.88); Scripps (2.83); 80% of Penasquitos Sub watershed; (2.51) | 29.8 for the Decollate Sub watershed; 29.3 for the Scripps Sub watershed; 21.0 for Mission Bay Sub watersheds | Decollate: Medium Scripps: Medium Mission Bay: Low |

**Table C-11. Soft and Natural Asset BRE Scores - Mission Bay 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. | | | | | | | | | | | |

**Table C-11. Soft and Natural Asset BRE Scores - Mission Bay 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 | 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 | 2 | 3 | 2 | 3 | 5.7 | 5 | 28.5 | Medium |
| 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 | 5 | 4 | 4 | 5 | 10.1 | 4 | 40.4 | 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 |

**Table C-11. Soft and Natural Asset BRE Scores - Mission Bay 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 | | | | |
| 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. | | | | | | | | | | | |
| 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 |

**Table C-11. Soft and Natural Asset BRE Scores - Mission Bay 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 | | | | |
| 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. | | | | | | | | | | | |

**Table C-11. Soft and Natural Asset BRE Scores - Mission Bay 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 | | | | |
| 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. | | | | | | | | | | | |
| 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 | 5 for Decollate and Scripps Sub watersheds; 4 for Mission Bay Sub watershed | Area-weighted CPI Dry/Wet composite score for Decollate Sub watershed (2.88); Scripps Sub watershed (2.83); 80% of Penasquitos Sub watershed (2.51) for Mission Bay Sub watershed | 5 for Decollate and Scripps Sub watersheds; 3 for Mission Bay Sub watershed | 5 all subwatersheds | 10.364 for Decollate Sub watershed; 10.349 for other Scripps Sub watersheds; 8.353 for Mission Bay Watershed | Area-weighted CPI Dry/Wet score for Decollate Sub watershed (2.88); Scripps (2.83); 80% of Penasquitos Sub watershed; (2.51) | 29.8 for the Decollate Sub watershed; 29.3 for the Scripps Sub watershed; 21.0 for Mission Bay Sub watersheds | Decollate: Medium Scripps: Medium Mission Bay: Low |
| Equipment – (Monitoring Equipment ≥ $5K) | 48. Sufficient equipment is available 90% of the time to conduct monitoring activities. | | | | | | | | | 3.35 | | 0 | |

**Table C-11. Soft and Natural Asset BRE Scores - Mission Bay 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 | 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 | Medium |
| 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

## C.6.2 Hard Asset BRE

The hard assets BRE scores were calculated for each individual hard asset listed in the Mission Bay Watershed asset inventory. BRE scores are shown in three major categories: high, medium, and low. Figure C-16 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.

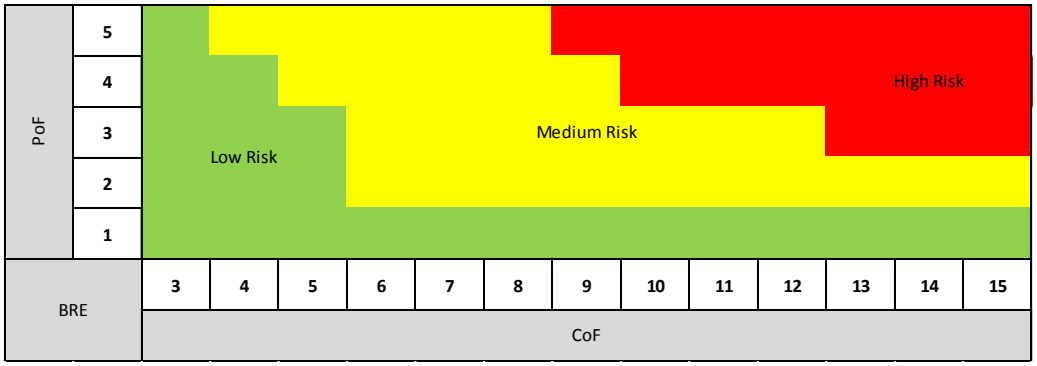


**Figure C-16. Hard Asset Risk Category Map**

Figure C-17 shows the summary of hard asset BRE scores by hard asset classes. Of the 13,257 total hard assets, 85 percent fall into the low risk category, followed by 15 percent in the medium risk category, and less than 1 percent in the high risk category.

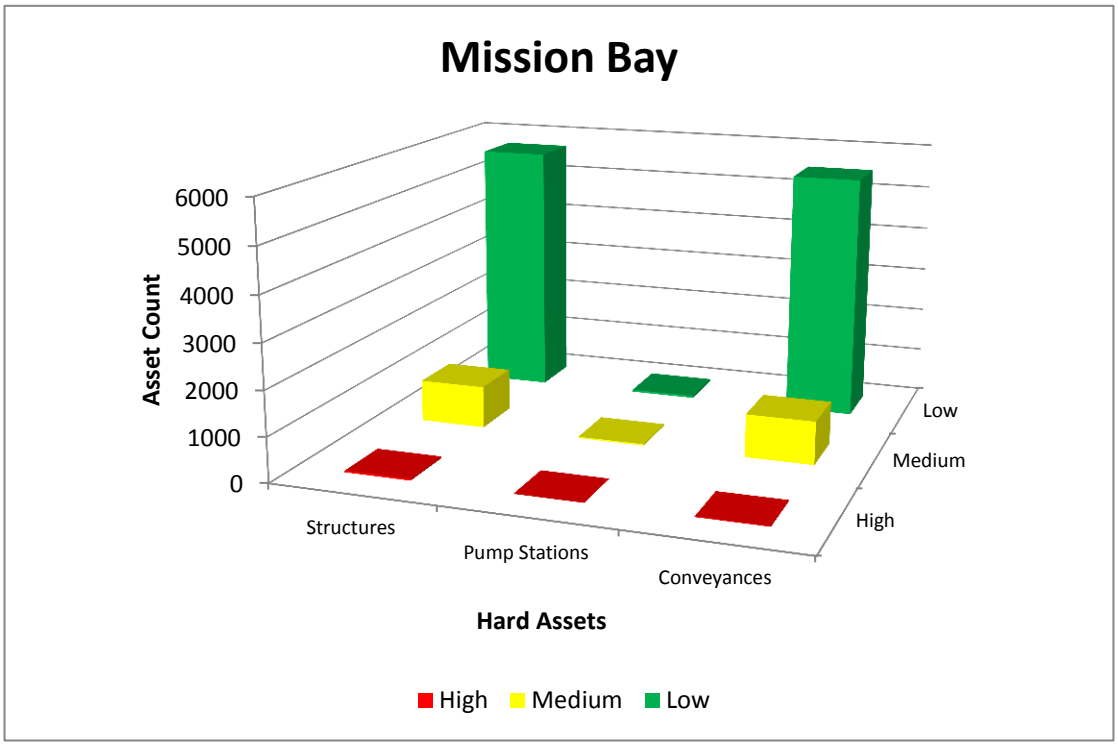


**Figure C-17. Hard Asset BRE Scores by Asset Classes - Mission Bay Watershed**

Figure C-18 shows the BRE score summary for the storm water conveyance system in Mission Bay Watershed. There are total of 3 miles of box culvert, less than a mile of brow ditch, 22 miles of channel, and 163 miles of storm drain. Out of all the conveyance systems, only storm drains have assets that have high risk.

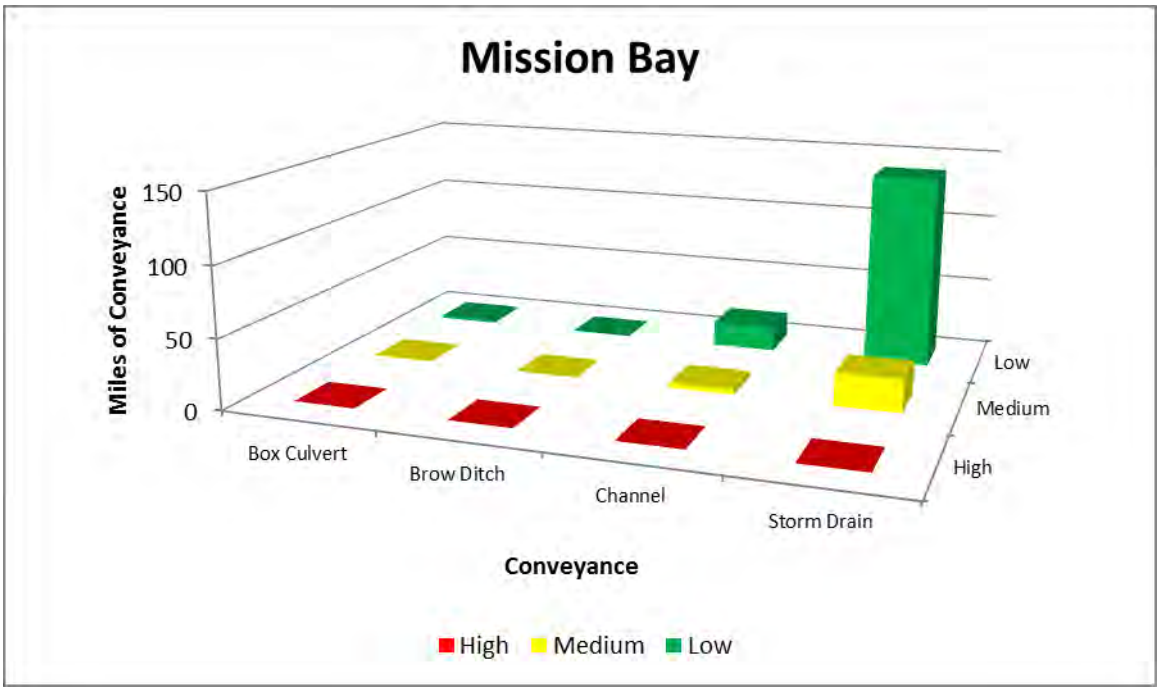


**Figure C-18. BRE Summary of Conveyance System BRE Scores - Mission Bay Watershed**

Figure C-19 shows the conveyance system CoF score map for the Mission Bay Watershed. The Mission Bay Watershed conveyance system is approximately 187 miles and about 69 percent (130 miles) of the storm water conveyances have low CoF and about 4 percent (8 miles) have high CoF.

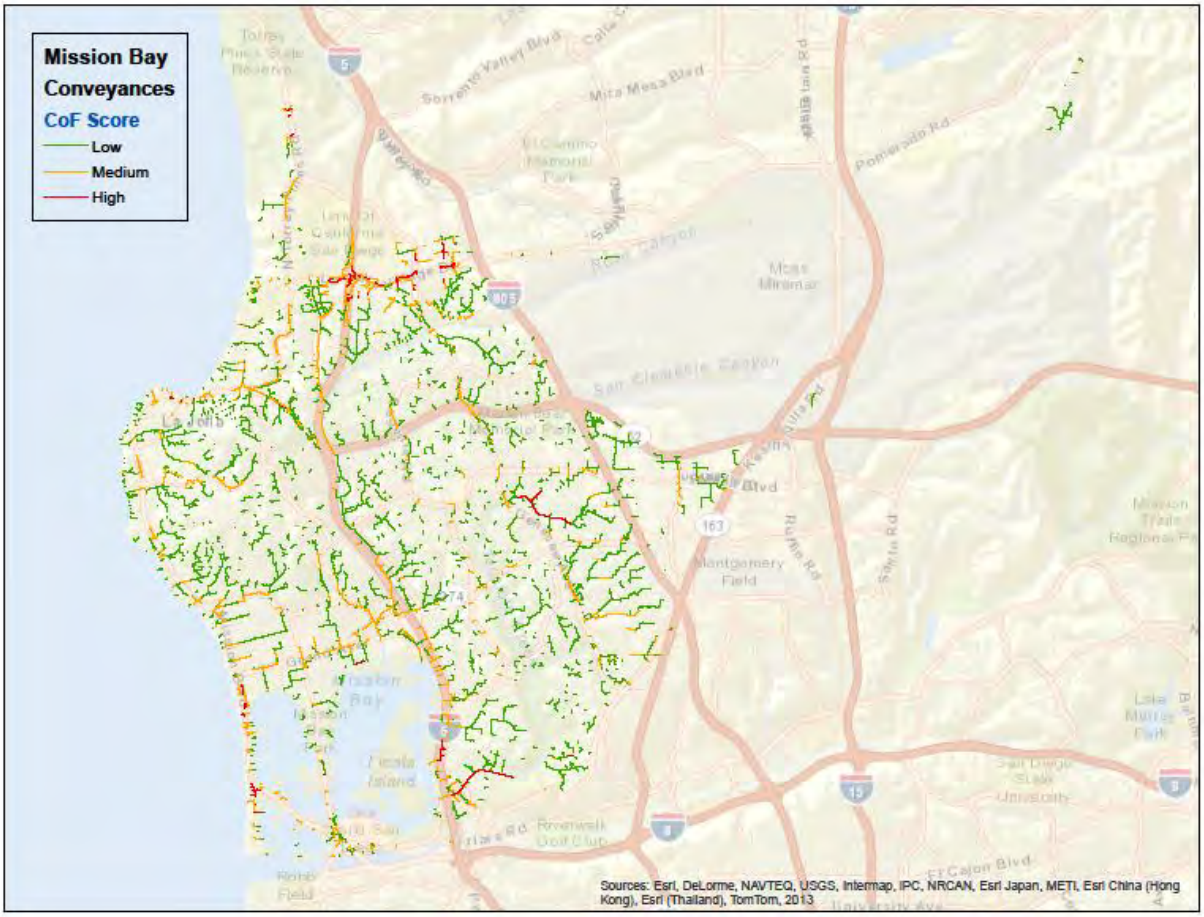


**Figure C-19. Conveyance System CoF Score Map - Mission Bay Watershed**

Figure C-20 shows the conveyance system PoF score map for the Mission Bay Watershed. Approximately 88 percent (165 miles) of the conveyances have low PoF and less than 8 percent (15 miles) have high PoF.

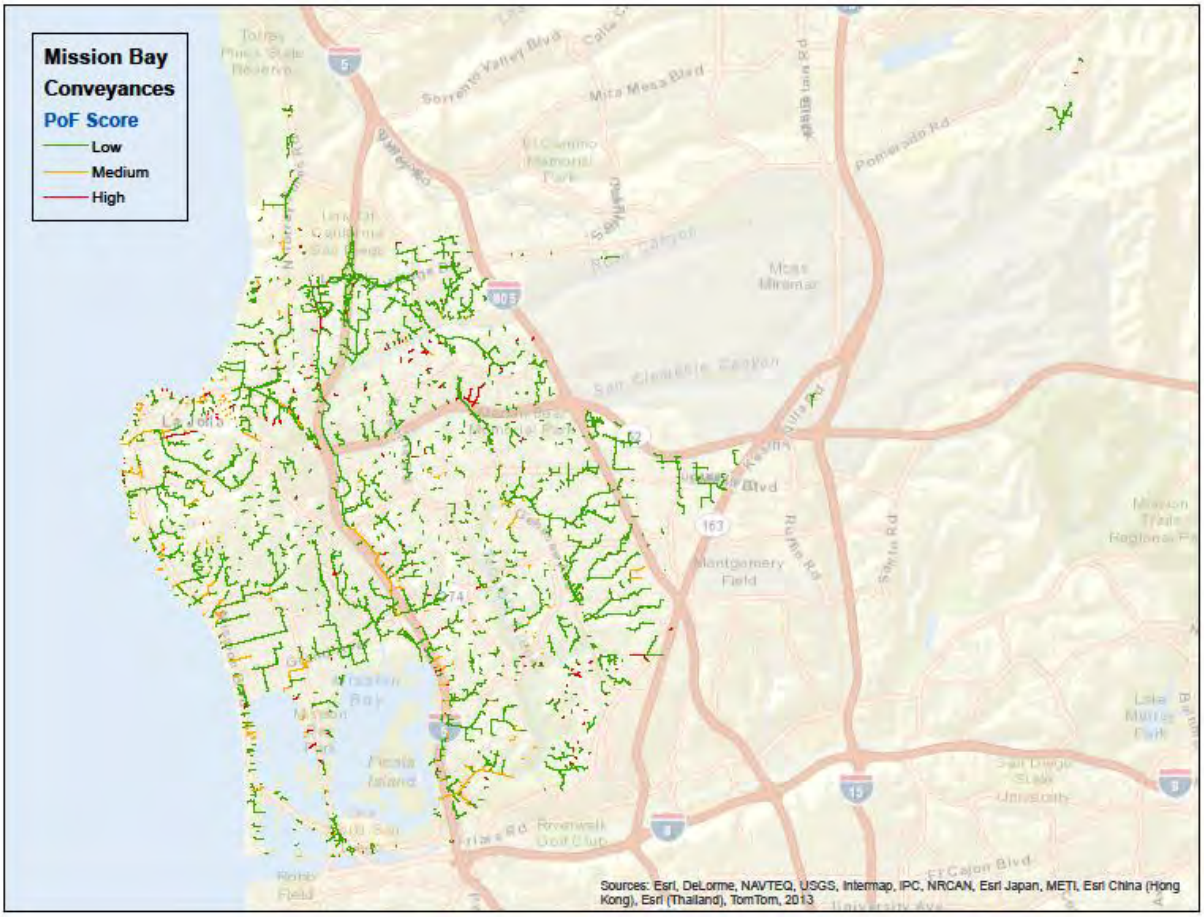


**Figure C-20. Conveyance System PoF Score Map - Mission Bay Watershed**

Figure C-21 shows the conveyance system BRE score map for the Mission Bay Watershed. 85 percent (159 miles) of the conveyance systems have low risk, 15 percent (30 miles) have medium risk, and less than 1 percent (less than a mile) have high risk.

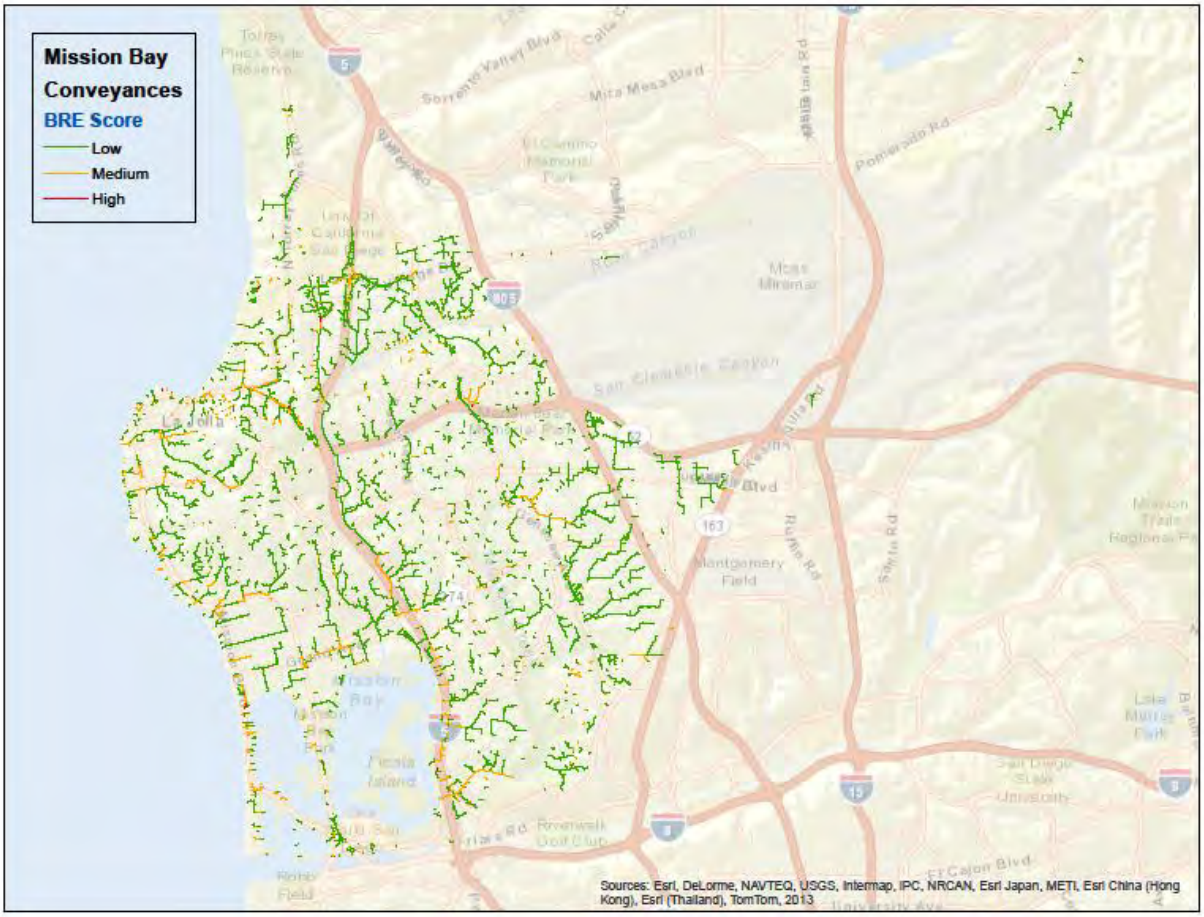


**Figure C-21. Conveyance System BRE Score Map - Mission Bay Watershed**

Figure C-22 shows the BRE summary for storm water structures in Mission Bay Watershed. In general, most of the storm water structures have low risk and less than 1 percent of assets (37 out of 6,681) have high risk. This can be attributed to the fact that the majority of storm water structures are still in good or excellent condition.

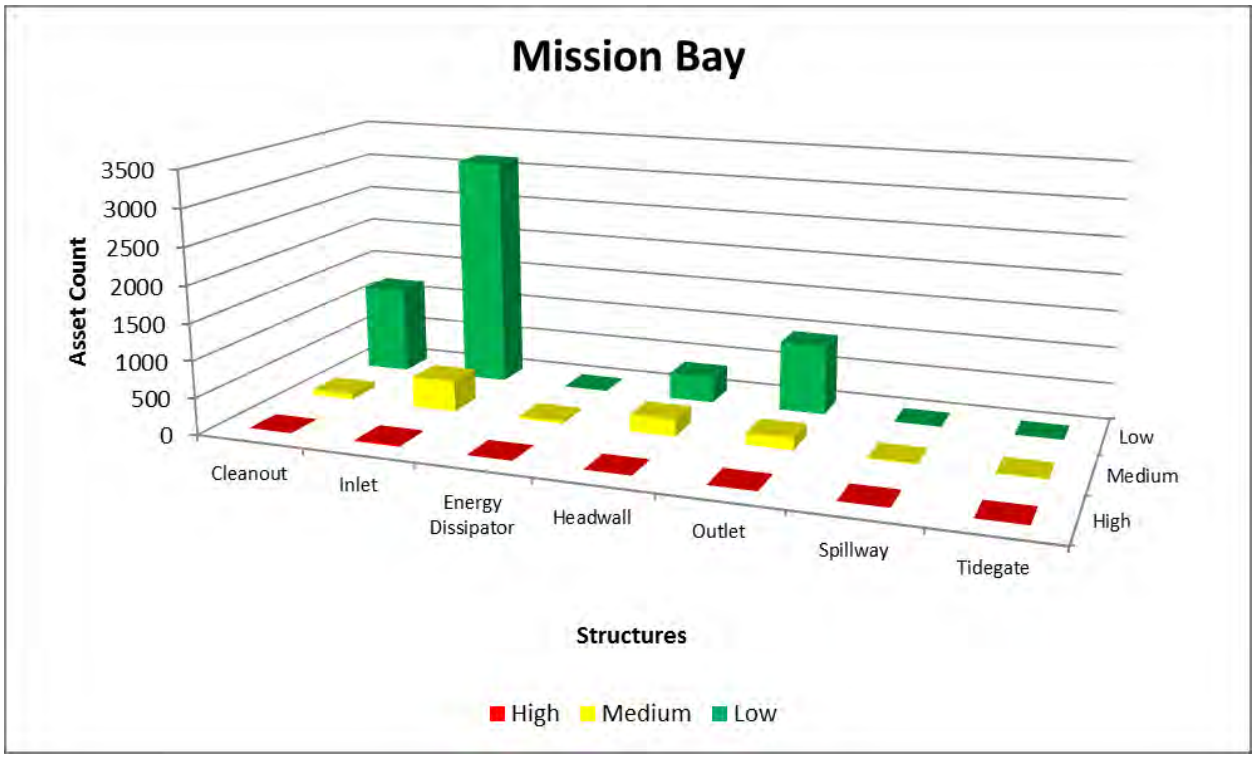


**Figure C-22. Storm Water Structure BRE Scores- Mission Bay Watershed**

Figure C-23 shows the structures CoF score map for the Mission Bay Watershed. More than 72 percent (4,782) of the structures have low CoF and about 3 percent (169) have high CoF.

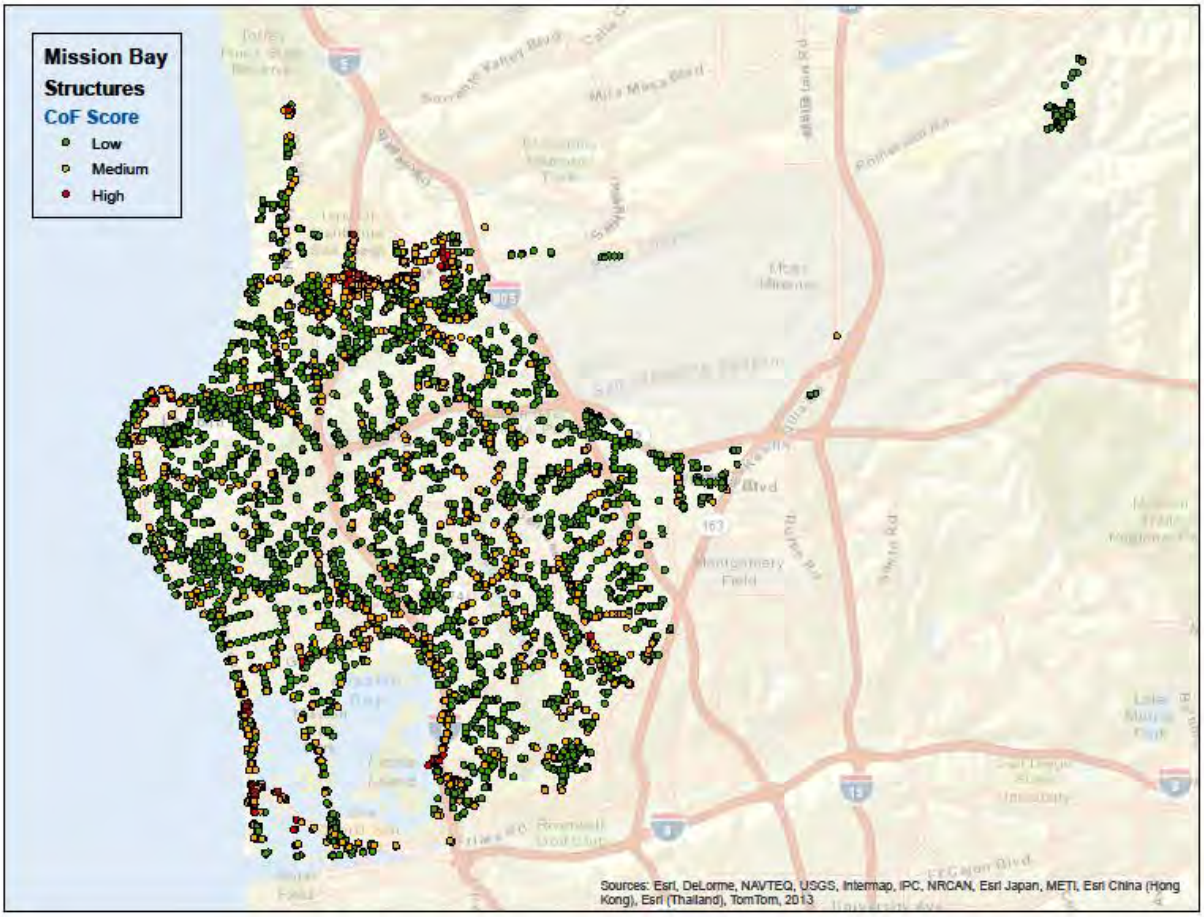


**Figure C-23. Storm Water Structure CoF Score Map - Mission Bay Watershed**

Figure C-24 shows the structures PoF score map for the Mission Bay Watershed. Approximately 85 percent (5,681) have low PoF, 13 percent (874) have medium PoF, and 2 percent (126) have high PoF.

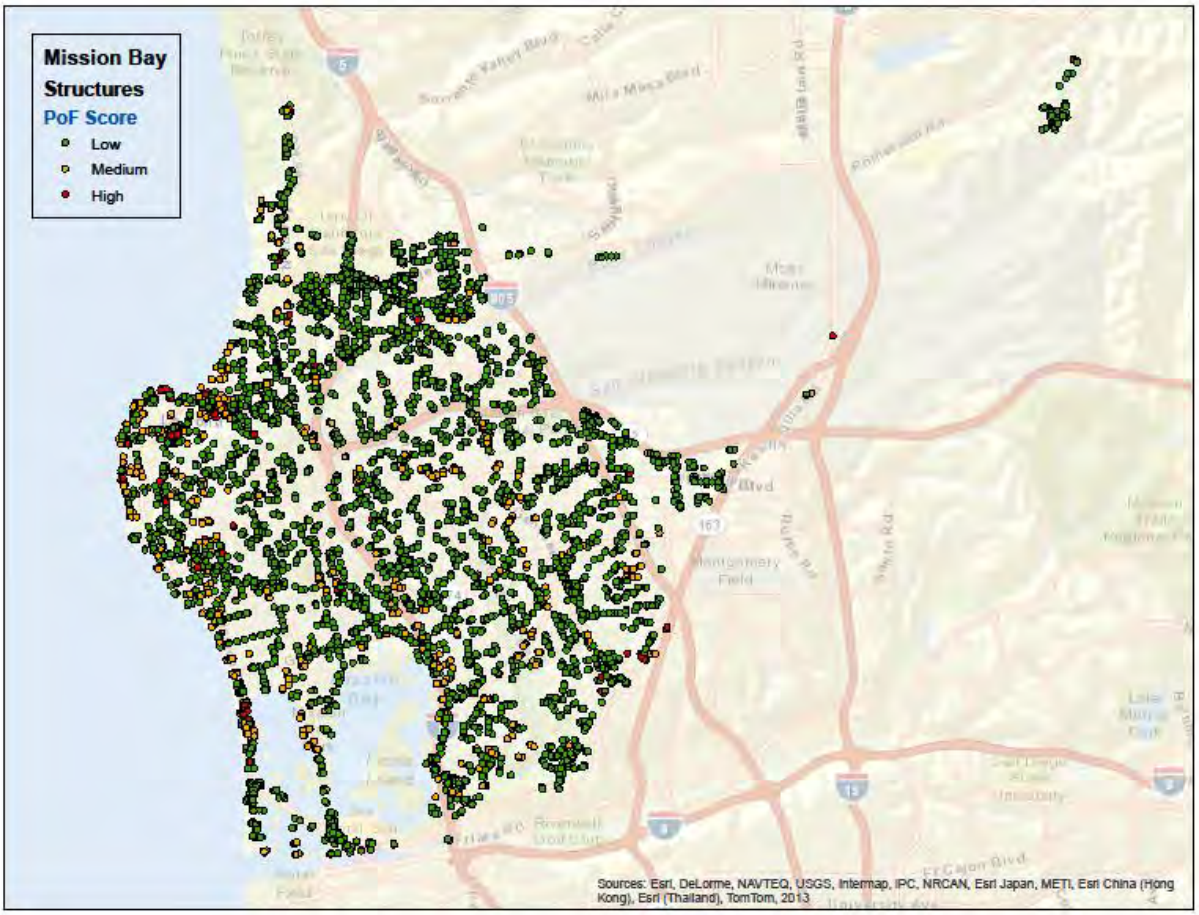


**Figure C-24. Storm Water Structure PoF Score Map - Mission Bay Watershed**

Figure C-25 shows the structures BRE score map for the Mission Bay Watershed. Approximately 85 percent (5,595) have low risk, 14 percent (949) have medium risk, and less than 1 percent (37) have low risk.

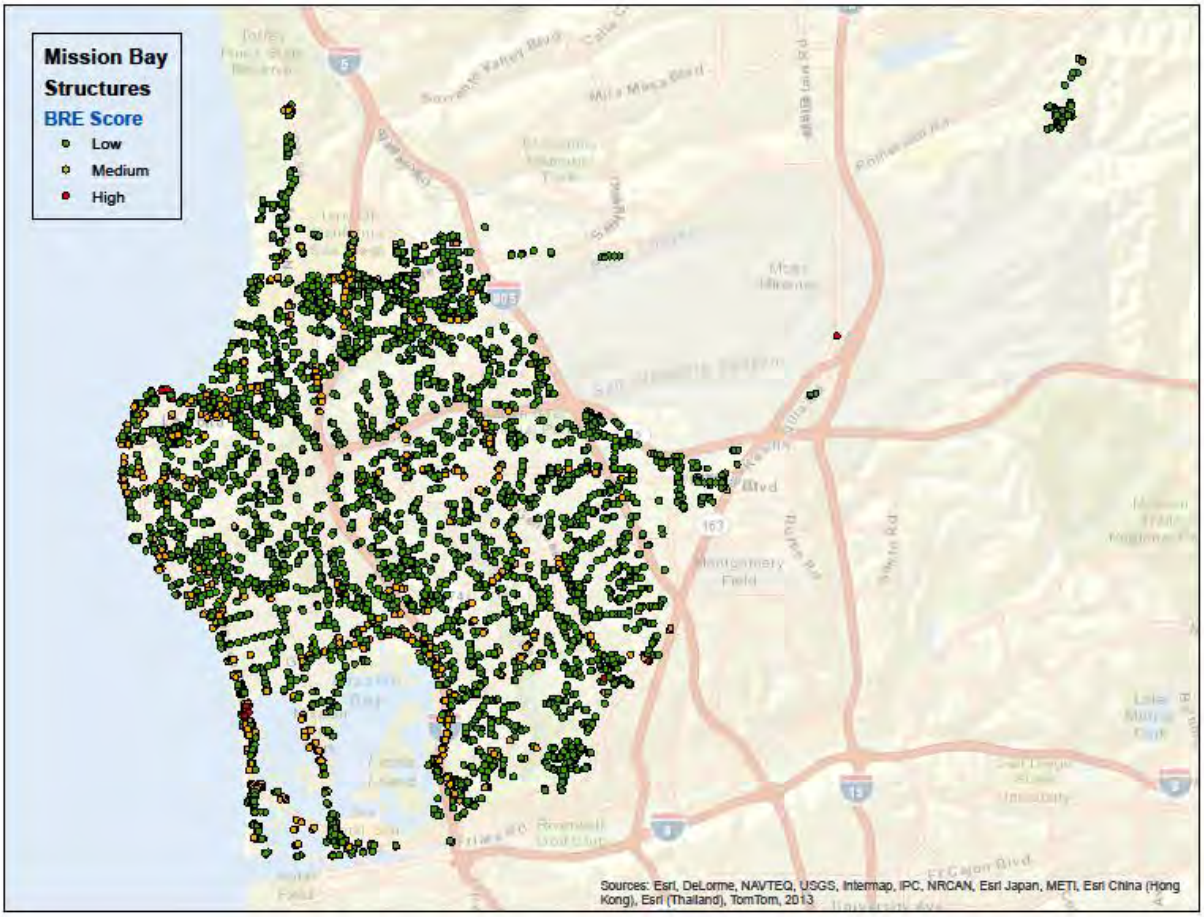


**Figure C-25. Storm Water Structure BRE Score Map - Mission Bay Watershed**

Figure C-26 shows the BRE score summary for pump station assets. It shows there aren't any pump stations that have high risk.

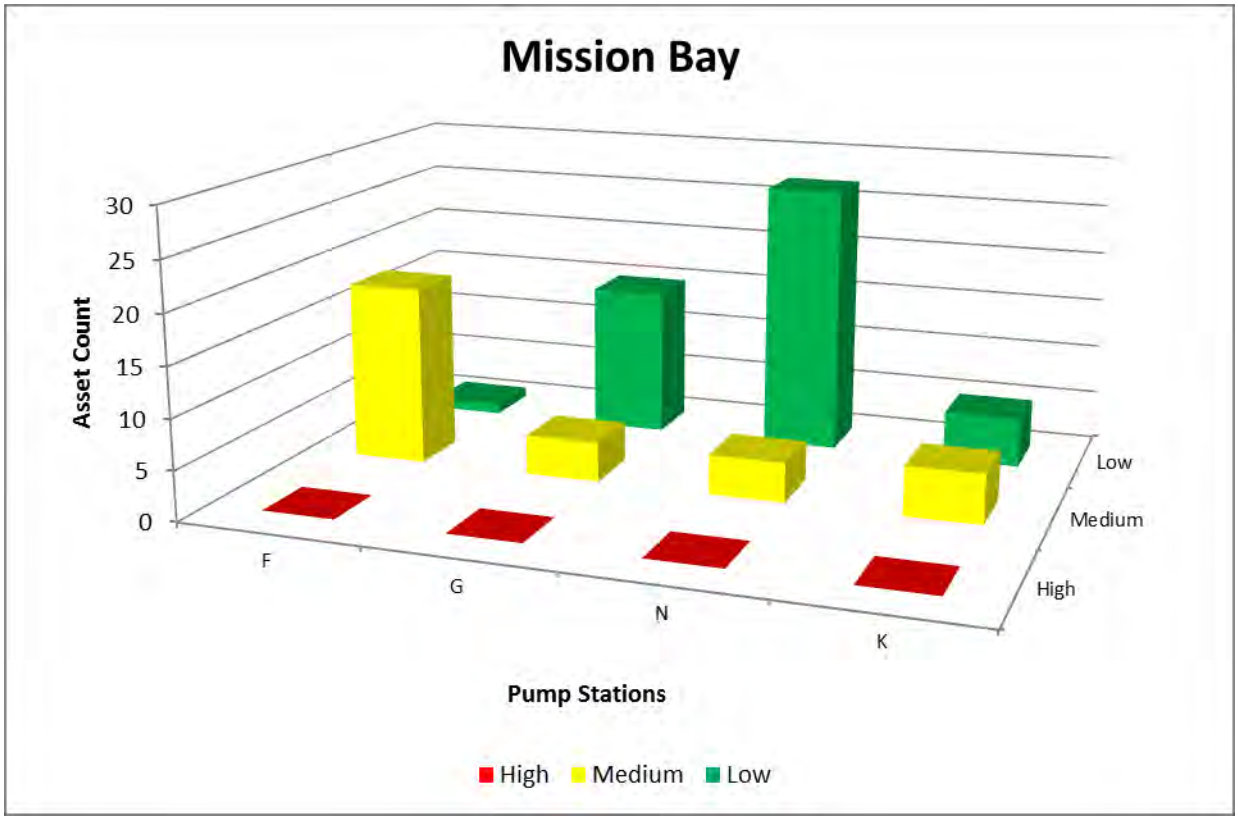


**Figure C-26. Pump Station Asset BRE Scores - Mission Bay Watershed**

Figure C-27 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.

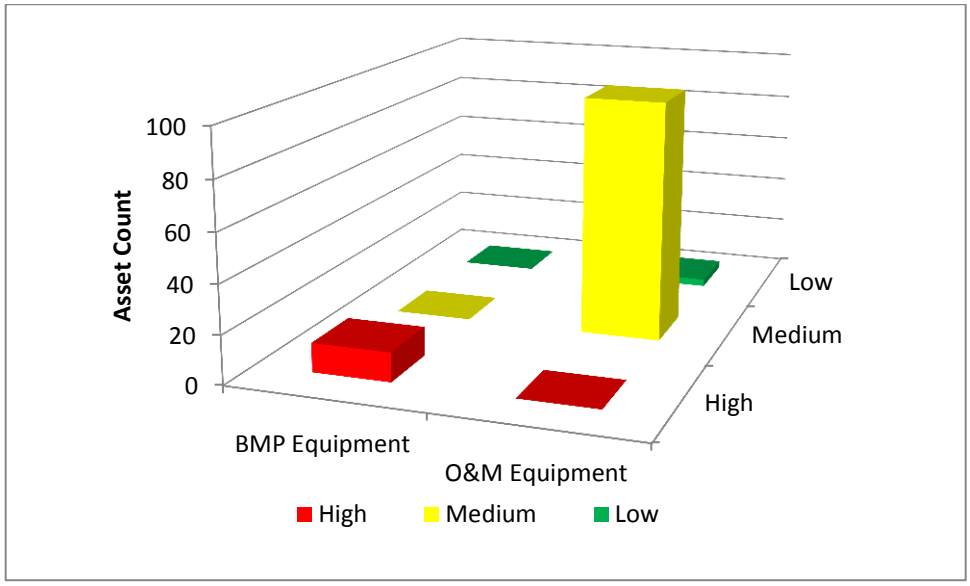


**Figure C-27. Summary of Equipment Assets – San Diego City Wide**

## C.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. The City conducted a Dilution Study for the Scripps ASBS, which results in less BMP implementation if accepted by the RWQCB. The resulting costs for achieving LOSs 13a and 13b could be reduced by more than $27 million through FY 2030 if the Dilution Study is adopted by the RWQCB.
- 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 assets, 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. Figure 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 C-28, C-29, and C-30 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.

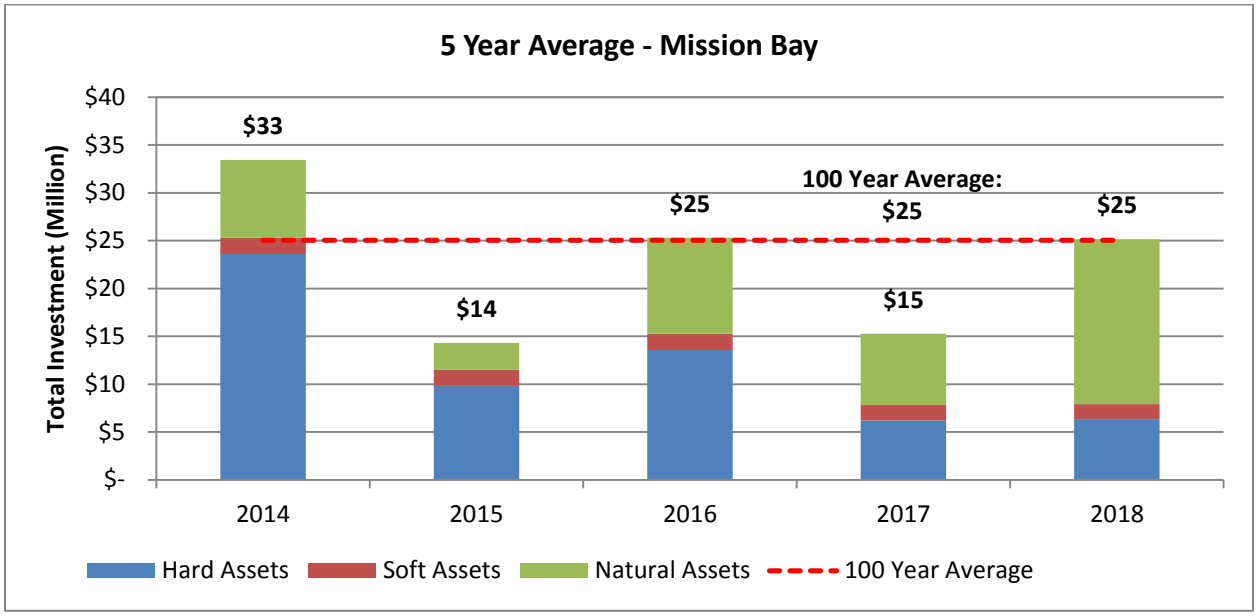


**Figure C-28. Watershed 5 Year Outlook by Asset Type – Mission Bay Watershed**

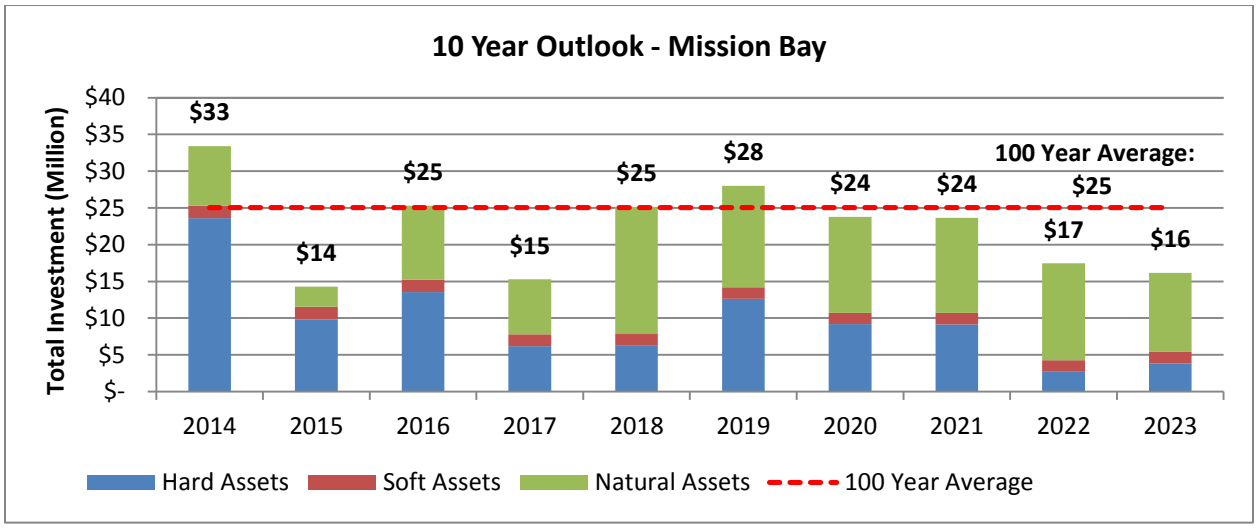


**Figure C-29. Watershed 10 Year Outlook by Asset Type – Mission Bay Watershed**

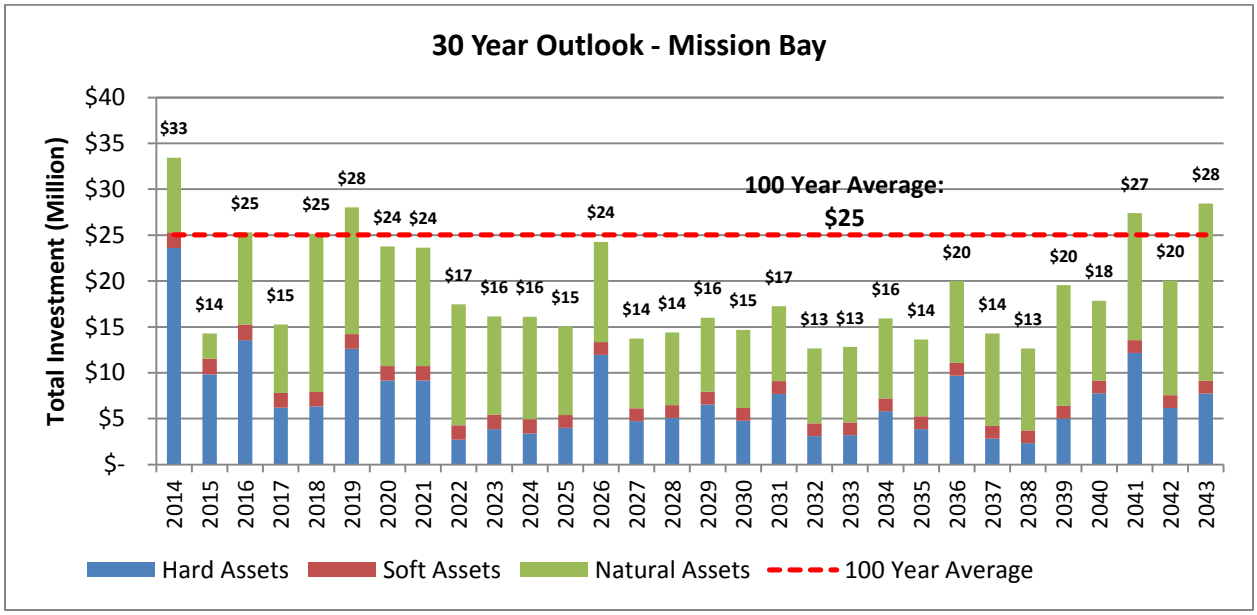


**Figure C-30. Watershed 30 Year Outlook by Asset Type – Mission Bay Watershed**

Figures C-31and C-32 represent the overall 100 year projected results based on asset type and activity type, respectively. Based on the results, it is projected that the Mission Bay Watershed will need an average of $25 million dollars per year for capital and operational needs for the next 100 years. Some years will require more and others will require less.

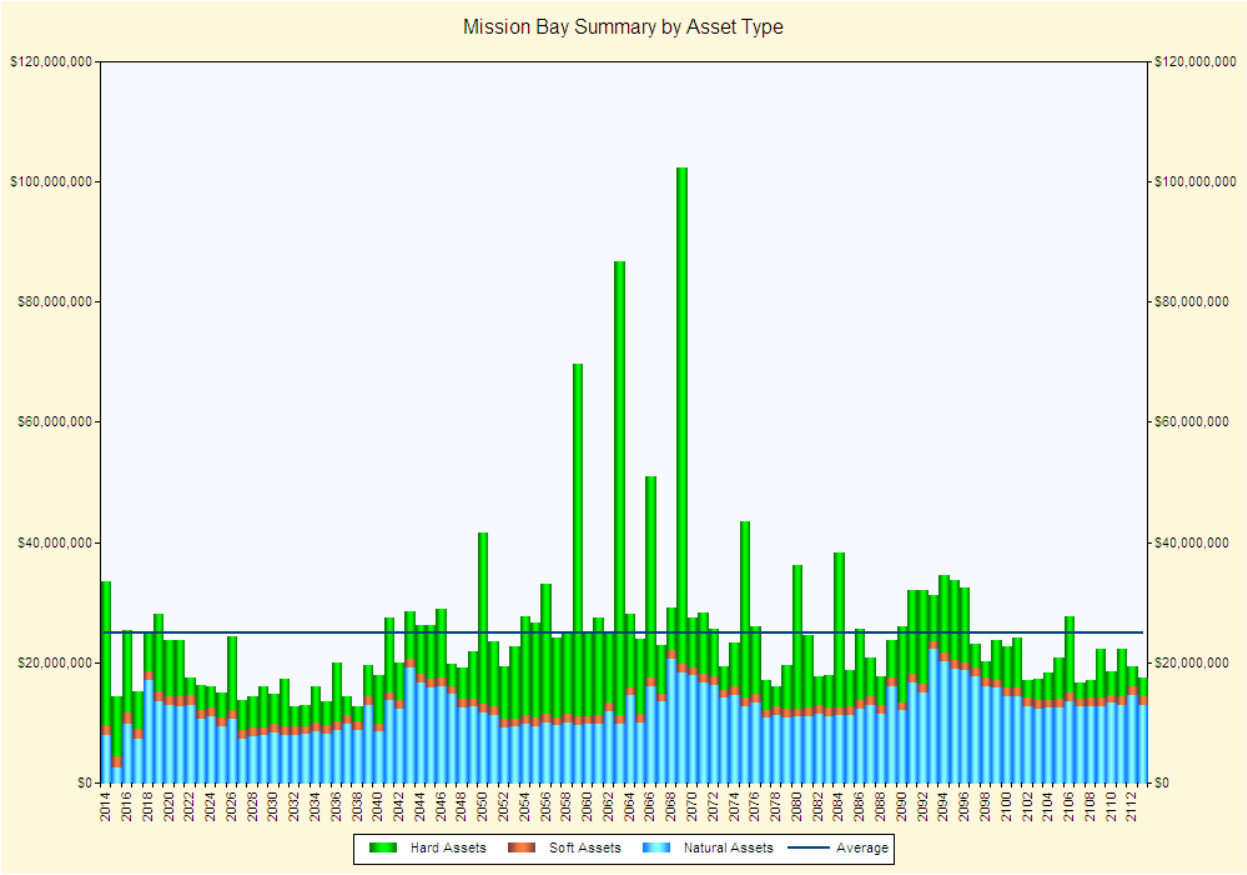


**Figure C-31. 100 Year Forecast by Asset Type - Mission Bay Watershed**

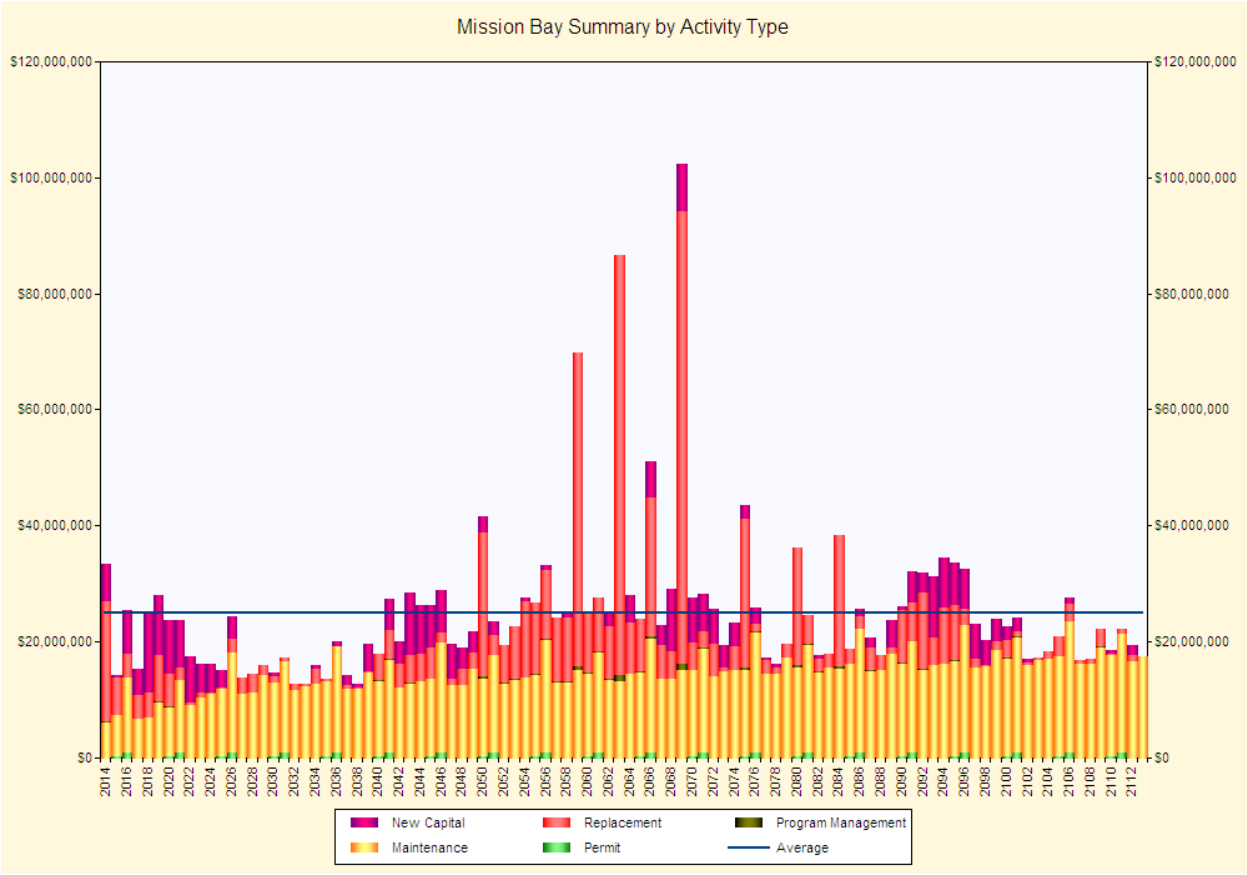


**Figure C-32. 100 Year Forecast by Activity Type - Mission Bay Watershed**

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.

## C.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 Mission Bay Watershed that would not be employed City-wide.

## C.9 ASSESSMENT MANAGEMENT IMPROVEMENT PLAN

See Main Document.

## C.10 RECOMMENDATIONS

The summary of activities for Fiscal Year 2014, organized by asset type and class, are listed in Tables C-12. In addition, Table C-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 C-12. FY 2014 Activity Summary - Mission Bay Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Program Management (Op) | Total | |
| **Hard Assets** | | | | | | | | | | | | | | |
| Channel | 38.26 | 39.94 | | | | 92,561.57 | | 92,561.57 | | | | 1,406.17 | 1,406.17 | 93,967.74 |
| Cleanout | 8.41 | 53.92 | | | | 40,000.00 | | 40,000.00 | 62,885.40 | | | 607.67 | 63,493.07 | 103,493.07 |
| Drop Manhole | 15.66 | 33.53 | | | | | | | 5,134.50 | | | | 5,134.50 | 5,134.50 |
| Encased Storm Drain | 17.09 | 24.92 | | | | | | | 1,646.46 | | | | 1,646.46 | 1,646.46 |
| Energy Dissipator | 27.32 | 53.02 | | | | 760,000.00 | | 760,000.00 | 38,571.40 | | | 11,545.75 | 50,117.15 | 810,117.15 |
| Forced Storm Drain | 25.13 | 25.13 | | | | | | | 3,171.89 | | | | 3,171.89 | 3,171.89 |
| Headwall | 12.02 | 46.16 | | | | 40,000.00 | | 40,000.00 | 347,142.60 | | | 607.67 | 347,750.27 | 387,750.27 |
| Inlet | 8.41 | 60.62 | | | | 420,000.00 | | 420,000.00 | 114,230.40 | | | 6,380.55 | 120,610.95 | 540,610.95 |
| Low Flow Diversion Structure | 32.74 | 41.18 | | | | | | | 1,306,819.70 | | | | 1,306,819.70 | 1,306,819.70 |
| Outlet | 36.26 | 50.26 | | | | 360,000.00 | | 360,000.00 | | | | 5,469.04 | 5,469.04 | 365,469.04 |
| Pump Station | 10.00 | 48.00 | | | | | | | | 5,082,000.00 | | | 5,082,000.00 | 5,082,000.00 |
| Spillway | 38.66 | 51.36 | | | | 420,000.00 | | 420,000.00 | | | | 6,380.55 | 6,380.55 | 426,380.55 |
| Storm Drain | 10.11 | 61.07 | | | | 15,929,380.06 | | 15,929,380.06 | 842,370.50 | | | 241,995.58 | 1,084,366.09 | 17,013,746.15 |
| Tidegate | 45.52 | 47.52 | | | | 200,000.00 | | 200,000.00 | | | | 3,038.36 | 3,038.36 | 203,038.36 |
| **Sub-total Hard Assets** | | | | | **-** | **18,261,941.63** | **-** | **18,261,941.63** | **2,721,972.86** | **5,082,000.00** | **-** | **277,431.34** | **8,081,404.20** | **26,343,345.83** |
| | | | | | | | | | | | | | | |
| **Natural Assets** | | | | | | | | | | | | | | |
| LOS 04-Monitoring activities to prioritize pollutant sources and measure effects of BMPs on runoff / discharge water quality. | 29.85 | 29.85 | 10.36 | 2.88 | | | | | 104,321.27 | | | | 104,321.27 | 104,321.27 |
| LOS 13-Activity 01 Enhance LID implementation for new development and redevelopment through zoning amendments | 29.85 | 29.85 | 10.36 | 2.88 | | | | | 33,340.00 | | | | 33,340.00 | 33,340.00 |

**Table C-12. FY 2014 Activity Summary - Mission Bay Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Program Management (Op) | Total | |
| LOS 13-Activity 02 Train Development Services Department staff on LID regulatory changes and LID Design Manual | 28.61 | 28.61 | 9.94 | 2.88 | | | | | 22,440.49 | | | | 22,440.49 | 22,440.49 |
| LOS 13-Activity 03 Develop regional training for and focus locally on enforcement of water-using mobile businesses | 28.61 | 28.61 | 9.94 | 2.88 | | | | | 15,347.74 | | | | 15,347.74 | 15,347.74 |
| LOS 13-Activity 05 Design and implement property- and PGA-based inspections and accelerated enforcement | 28.61 | 28.61 | 9.94 | 2.88 | | | | | 31,673.00 | | | | 31,673.00 | 31,673.00 |
| LOS 13-Activity 06 Trash areas: require full four-sided enclosure, siting away from storm drains, cover; consider retrofit requirement | 28.61 | 28.61 | 9.94 | 2.88 | | | | | 1,667.00 | | | | 1,667.00 | 1,667.00 |
| LOS 13-Activity 07 Animal-related facilities | 28.61 | 28.61 | 9.94 | 2.88 | | | | | 1,667.00 | | | | 1,667.00 | 1,667.00 |
| LOS 13-Activity 08 Nurseries and garden centers | 28.61 | 28.61 | 9.94 | 2.88 | | | | | 1,667.00 | | | | 1,667.00 | 1,667.00 |
| LOS 13-Activity 09 Auto-related uses | 28.61 | 28.61 | 9.94 | 2.88 | | | | | 1,667.00 | | | | 1,667.00 | 1,667.00 |
| LOS 13-Activity 10 Update Minimum BMPs for existing residential, commercial & industrial development & enforce | 28.61 | 28.61 | 9.94 | 2.88 | | | | | 19,077.40 | | | | 19,077.40 | 19,077.40 |

**Table C-12. FY 2014 Activity Summary - Mission Bay Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Program Management (Op) | Total | |
| LOS 13-Activity 11 Support partnership effort by social service providers to provide sanitation and trash management for persons experiencing homelessness | 28.61 | 28.61 | 9.94 | 2.88 | | | | | 10,002.00 | | | | 10,002.00 | 10,002.00 |
| LOS 13-Activity 12 Develop pilot project to identify and carry out site disconnections in targeted areas | 28.61 | 28.61 | 9.94 | 2.88 | | | | | 9,616.92 | | | | 9,616.92 | 9,616.92 |
| LOS 13-Activity 13 Continue to participate in source reduction initiatives | 28.61 | 28.61 | 9.94 | 2.88 | | | | | 14,076.40 | | | | 14,076.40 | 14,076.40 |
| LOS 13-Activity 14a Expand residential BMP (irrigation, rainwater harvesting and turf conversion) rebate programs to multi-family housing in target areas | 28.61 | 28.61 | 9.94 | 2.88 | | | | | 9,616.92 | | | | 9,616.92 | 9,616.92 |
| LOS 13-Activity 14b Residential BMP Program: Rain Barrels | 28.61 | 28.61 | 9.94 | 2.88 | | | | | 4,441.29 | | | | 4,441.29 | 4,441.29 |
| LOS 13-Activity 14c Residential BMP Program: Irrigation Control (Turf Conversion) | 28.61 | 28.61 | 9.94 | 2.88 | | | | | 13,845.04 | | | | 13,845.04 | 13,845.04 |
| LOS 13-Activity 14d Residential BMP Program: Downspout Disconnect | 28.61 | 28.61 | 9.94 | 2.88 | | | | | 10,980.95 | | | | 10,980.95 | 10,980.95 |
| LOS 13-Activity 15 Expand outreach to HOA common lands and HOA rebates | 28.61 | 28.61 | 9.94 | 2.88 | | | | | 16,712.50 | | | | 16,712.50 | 16,712.50 |

**Table C-12. FY 2014 Activity Summary - Mission Bay Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Program Management (Op) | Total | |
| LOS 13-Activity 17 Develop outreach and training program for property managers responsible for HOAs and Maintenance Districts | 28.61 | 28.61 | 9.94 | 2.88 | | | | | 7,673.87 | | | | 7,673.87 | 7,673.87 |
| LOS 13-Activity 18 Conduct trash clean-ups through community-based organizations involving target audiences | 28.61 | 28.61 | 9.94 | 2.88 | | | | | 20,004.00 | | | | 20,004.00 | 20,004.00 |
| LOS 13-Activity 19 Enhance education and outreach based on results of effectiveness survey and changing regulatory requirements | 28.61 | 28.61 | 9.94 | 2.88 | | | | | 168,012.26 | | | | 168,012.26 | 168,012.26 |
| LOS 13-Activity 20 Improve consistency & content of websites to highlight enforceable conditions & reporting methods | 28.61 | 28.61 | 9.94 | 2.88 | | | | | 3,069.55 | | | | 3,069.55 | 3,069.55 |
| LOS 13-Activity 22 Optimize catch basin cleaning to maximize pollutant removal | 28.61 | 28.61 | 9.94 | 2.88 | | | | | 134,215.80 | | | | 134,215.80 | 134,215.80 |
| LOS 13-Activity 25 Proactively monitor for erosion, and complete minor repair & slope stabilization | 28.61 | 28.61 | 9.94 | 2.88 | | | | | 16,670.00 | | | | 16,670.00 | 16,670.00 |
| LOS 13-Activity 28 Enhance street sweeping through equipment replacement and route optimization | 28.61 | 28.61 | 9.94 | 2.88 | | | | | 268,220.37 | | 206,539.48 | | 474,759.85 | 474,759.85 |
| LOS 13-Activity 29 Initiate sweeping of medians on | 28.61 | 28.61 | 9.94 | 2.88 | | | | | 77,755.00 | | | | 77,755.00 | 77,755.00 |

**Table C-12. FY 2014 Activity Summary - Mission Bay Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Program Management (Op) | Total | |
| high-volume arterial roadways | | | | | | | | | | | | | | |
| LOS 13-Activity 31 Identify sewer leaks and areas for sewer pipe replacement prioritization | 28.61 | 28.61 | 9.94 | 2.88 | | | | | 6,401.28 | | | | 6,401.28 | 6,401.28 |
| LOS 14-Source identification and characterization studies | 29.85 | 29.85 | 10.36 | 2.88 | | | | | 851,178.61 | | | | 851,178.61 | 851,178.61 |
| 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). | 29.85 | 29.85 | 10.36 | 2.88 | | | | | | | 14,681.69 | | 14,681.69 | 14,681.69 |
| LOS 19-City Property-Initial site reconnassaince (2/3 of sites) to identify areas within City parcels with potential to capture/treat/store/infiltrate storm water and runoff. | 29.85 | 29.85 | 10.36 | 2.88 | | | | | | | 45,352.66 | | 45,352.66 | 45,352.66 |
| LOS 47-Permit monitoring | 29.85 | 29.85 | 10.36 | 2.88 | | | | | 287,294.21 | | | | 287,294.21 | 287,294.21 |
| **Sub-total Natural Assets** | | | | | | | | | **2,162,654.87** | **-** | **266,573.83** | **-** | **2,429,228.70** | **2,429,228.70** |
| | | | | | | | | | | | | | | |
| **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 | 35.00 | 35.00 | 7.00 | 5.00 | | | | | 337,500.00 | | 16,666.67 | | 354,166.67 | 354,166.67 |

**Table C-12. FY 2014 Activity Summary - Mission Bay Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Program Management (Op) | Total | |
| construction inspection role, update enforcement of operating departments behaviors. | | | | | | | | | | | | | | |
| 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 |
| LOS 12b-Land Development Regulations TMDL-Develop specification for 303(d) listings and TMDL, develop standard plans and specifications for LID and BMPs. | 47.50 | 47.50 | 9.50 | 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. | 34.50 | 34.50 | 6.90 | 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 deparatment-Complete a planning level study in all watersheds with 15% design concepts and costs, | 28.50 | 28.50 | 5.70 | 5.00 | | | | | 6,416.67 | | 83,333.33 | | 89,750.00 | 89,750.00 |

**Table C-12. FY 2014 Activity Summary - Mission Bay Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Program Management (Op) | Total | |
| changes in regulatory, and develop cost sharing model. | | | | | | | | | | | | | | |
| 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. | 40.40 | 40.40 | 10.10 | 4.00 | | | | | 7,916.67 | | 13,888.89 | | 21,805.56 | 21,805.56 |
| 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 |

**Table C-12. FY 2014 Activity Summary - Mission Bay Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Program Management (Op) | Total | |
| 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 |
| 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 servcices 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** | **-** | **1,712,026.68** | **1,712,026.68** |
| | | | | | | | | | | | | | | |
| **Grand Total** | | | | | | **18,261,941.63** | | **18,261,941.63** | **6,282,765.51** | **5,082,000.00** | **580,462.71** | **277,431.34** | **12,222,659.57** | **30,484,601.20** |

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**Table C-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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# Appendix D Los Peñasquitos Watershed

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# D.1 INTRODUCTION

The Los Peñasquitos 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 Los Peñasquitos WMA. The Los Peñasquitos WAMP will serve as a road map to ensure that actions and activities that address flood risk reduction and water quality align across City departments. This plan will provide a vehicle to identify and prioritize potential water quality and flood risk reduction challenges, evaluate opportunities for integrating water quality and flood risk reduction management into City projects and operations and maintenance activities within the Los Peñasquitos watershed, and provide a vehicle for public participation.

## D.1.1 Los Peñasquitos Watershed Description

The Los Peñasquitos watershed encompasses a land area of approximately 100 square miles, extending from the foothills east of the City of Poway to the coastal plain where the watershed drains into Los Peñasquitos Lagoon before flowing into the Pacific Ocean through a narrow mouth at Torrey Pines State Beach. The WMA includes portions of the Cities of Del Mar, San Diego, and Poway as well as areas within the jurisdiction of the County of San Diego. The Los Peñasquitos WMA is located within west–central San Diego County.

The Water Quality Control Plan for the San Diego Basin (Basin Plan) prepared by the RWQCB (SDRWQCB, 1994) defines the Los Peñasquitos WMA as consisting of two hydrologic areas (Has), namely the Miramar Reservoir (906.1) and Poway (906.2). The Los Peñasquitos WMA encompasses the drainage areas of Los Peñasquitos Creek, Carmel Creek, and Carroll Canyon Creek (Soledad Canyon), with the remaining 1,107 acres comprising the lagoon and coastal drainages. Table D-1 provides data on the percentage of each jurisdiction within the WMA at the watershed level, and Figure D-1 shows the City's jurisdiction within the watershed.

**Table D-1. Los Peñasquitos WMA Jurisdictional Breakdown**

| Jurisdiction | Acres in Watershed | Percent of Watershed |
|---|---|---|
| Del Mar | 151 | <1 |
| Poway | 15,441 | 26 |
| San Diego | 42,970 | 71 |
| County of San Diego | 1,856 | 3 |

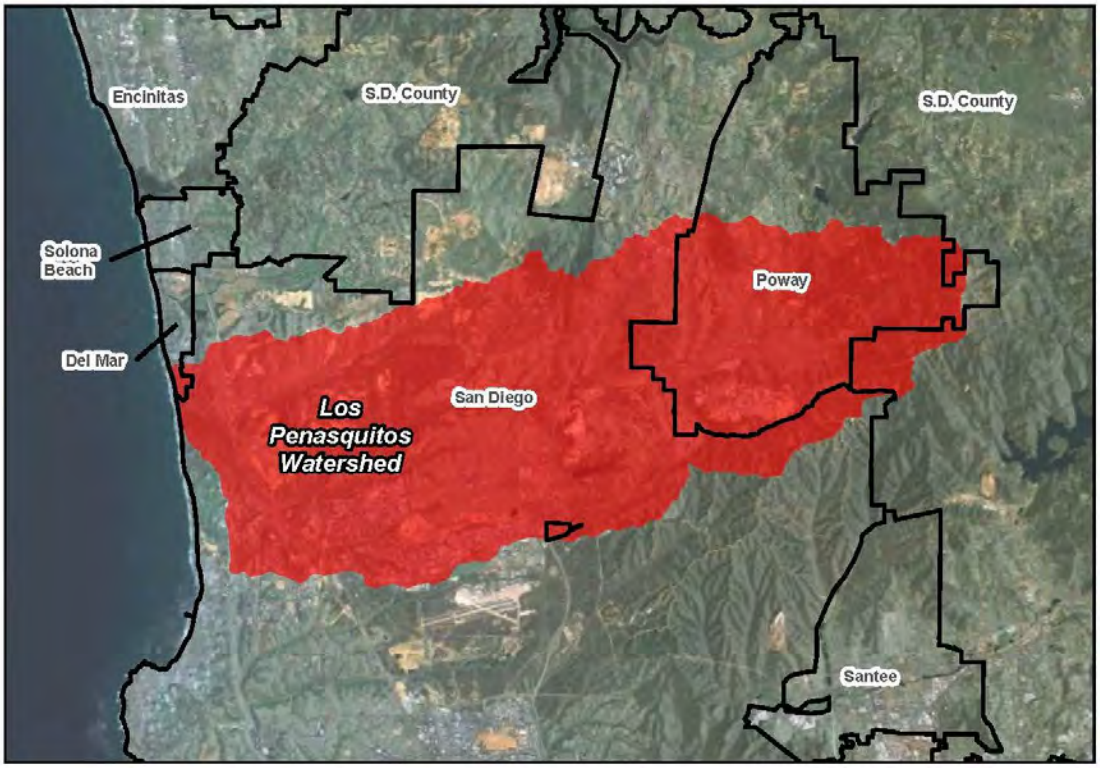


**Figure D-1. Los Peñasquitos Watershed**

Land use within the overall Los Peñasquitos WMA is classified primarily as open space/parks and recreation (31%), residential (22%), vacant and undeveloped land (14%), and transportation (13%). However, there are several notable differences in land use composition among the three creek drainage areas and between the two has that make up the watershed. The Los Peñasquitos WMA is mostly within City of San Diego jurisdiction (71%), with the remaining areas in City of Poway (25%), County of San Diego (3%), and City of Del Mar (0.2%) jurisdiction. Over 60% of the watershed is privately owned land.

The annual precipitation ranges from less than 8 inches along the coast to 18 inches inland. The upper portion of the watershed includes topography that is relatively steep. Therefore, in this area there are stream channels that run through narrow and deep valleys. In the lower portion of the watershed, the topography is less steep resulting in stream channels that cut through relatively broad valleys. The three main water drainage areas include the Los Peñasquitos Creek, Carroll Creek, and Carmel Creek.

The watershed provides a home to over 180 sensitive plant and animal species. Many of the species in the watershed are considered endangered under state and federal listings. Some of the species that can be found in the watershed include the Salt marsh daisy, Quino checkerspot butterfly, American peregrine falcon, California gnatcatcher, California least tern, Cooper's hawk, Orange-throated whiptail, Western spadefoot toad, and the San Diego black-tailed jackrabbit. The Los Peñasquitos watershed is also a stopover location for migratory birds, and includes riparian wetlands, vernal pools, salt marshes, and open waters.

### D.1.2 Los Peñasquitos 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 Los Peñasquitos Watershed:

- Drew Kleis
- Roger Wammack

### D.1.3 Water Quality

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

[1] Los Peñasquitos Watershed Urban Runoff Management Program, Annual Report 2010-2011, City of Del mar, City of Poway, County of San Diego, and City of San Diego.

**Table D-2. Los Peñasquitos Watershed Baseline High-priority Water Quality Problems**

| Hydrologic Area | Bacteria | Sediments |
|---|---|---|
| **Miramar Reservoir Hydrologic Area** | | |
| 906.1 | X | X |
| **Poway Hydrologic Area** | | |
| 906.2 | X | |

Water bodies in the Los Peñasquitos WMA and constituents that have been placed on the State Water SWRCB 2010 Section 303(d) list are presented in Table D-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 D-3. Los Peñasquitos 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 |
|---|---|---|---|---|---|---|---|---|
| Los Peñasquitos Creek | River & Stream | 90610000 / 18070304 | Yes | Enterococci | 12 Miles | 2010 | 5A | 2019 |
| | | | | Fecal Coliform | 12 Miles | 2010 | 5A | 2019 |
| | | | | Selenium | 12 Miles | 2010 | 5A | 2019 |
| | | | | Total Dissolved Solids | 12 Miles | 2006 | 5A | 2019 |
| | | | | Total Nitrogen as N | 12 Miles | 2010 | 5A | 2019 |
| | | | | Toxicity | 12 Miles | 2010 | 5A | 2021 |
| Los Peñasquitos Lagoon | Estuary | 90610000 / 18070304 | Yes | Sedimentation/ Siltation | 469 Acres | 1992 | 5A | 2019 |
| Miramar Reservoir | Lake & Reservoir | 90610000 / 18070304 | Yes | Total Nitrogen as N | 138 Acres | 2010 | 5A | 2019 |
| Pacific Ocean Shoreline, Miramar Reservoir HA, at Los Peñasquitos River mouth | Coastal & Bay Shoreline | 90610000 / 18070304 | Yes | Total Coliform | 0.39 Miles | 2010 | 5A | 2019 |

**Table D-3. Los Peñasquitos 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 |
|---|---|---|---|---|---|---|---|---|
| Poway Creek | River & Stream | 90620000 / 18070304 | Yes | Selenium | 7.3 Miles | 2010 | 5A | 2021 |
| | | | | Toxicity | 7.3 Miles | 2010 | 5A | 2021 |
| Soledad Canyon | River & Stream | 90610000 / 18070304 | Yes | Sediment Toxicity | 1.7 Miles | 2002 | 5A | 2019 |
| | | | | Selenium | 1.7 Miles | 2010 | 5A | 2021 |

### D.1.4 Flood Risk Reduction

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 reduction 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 Los Peñasquitos Watershed are listed in Table D-4.

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## Table D-4. Los Peñasquitos 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 | |
| 4 | Los Peñasquitos | 11044 Via San Marco | 711 | 73 | 638 | 5 |
| 6 | Los Peñasquitos | 11689 Sorrento Valley Rd | 1,847 | 1,470 | 378 | 20 |
| 6a | Los Peñasquitos | 3000 Industrial Court | 682 | 417 | 265 | 12 |
| 7 | Los Peñasquitos | Los Peñasquitos Creek Channel | 1,609 | -- | 1,609 | 104 |
| 8 | Los Peñasquitos | Los Peñasquitos Creek Channel | 1,600 | -- | 1,600 | 104 |
| 9 | Los Peñasquitos | 11000 Roselle St / 11100 Flinkote Ave | 1,030 | 1,016 | 14 | 15 |
| 10 | Los Peñasquitos | Dunhill St & Roselle St | 405 | -- | 405 | 16 |
| 11 | Los Peñasquitos | Soledad Creek Channel | 2,539 | 891 | 1,648 | 26 |
| 12 | Los Peñasquitos | Soledad Creek Channel | 1,397 | 1,397 | -- | 59 |
| 18 | Los Peñasquitos | Maya Linda & Via Pasar | 964 | -- | 964 | 22 |
| 19 | Los Peñasquitos | Candida & Via Pasar | 1,178 | 1,178 | -- | 12 |

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] D isturbance 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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## D.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 Los Peñasquitos Watershed asset category (i.e., hard, soft, and natural).

### D.2.1 Hard Assets

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

**Table D-5. Los Peñasquitos Watershed Hard Assets**

| Asset Class/Subclass | Asset Count | Total Length (feet) | Total Length (miles) |
|---|---|---|---|
| Conveyance System: | | | |
| • Box Culvert | 51 | 5,479 | 1.04 |
| • Brow Ditch | 102 | 19,657 | 3.72 |
| • Channel | 402 | 114,284 | 21.64 |
| • Storm Drain Pipe | 10,660 | 1,384,685 | 262.25 |
| Structures: | | | |
| • Cleanout | 3,578 | | |
| • Inlet | 5,775 | | |
| • Energy Dissipator | 346 | | |
| • Headwall | 1,080 | | |
| • Outlet | 794 | | |
| • Spillway | 22 | | |
| Structural Best Management Practices: | 5 | | |
| **Total** | **22,815** | **1,524,106** | **288.66** |

In terms of asset count, inlets account for 50 percent of Los Peñasquitos Watershed storm water structures assets, followed by cleanouts and headwalls, with 31 percent and 9 percent, respectively. Within the conveyance system, the dominant asset type is the storm drain system, which accounts for 91 percent (262 miles) of total conveyance length. The detailed distribution of the storm water conveyance and structures is shown in Figures D-2 and D-3.

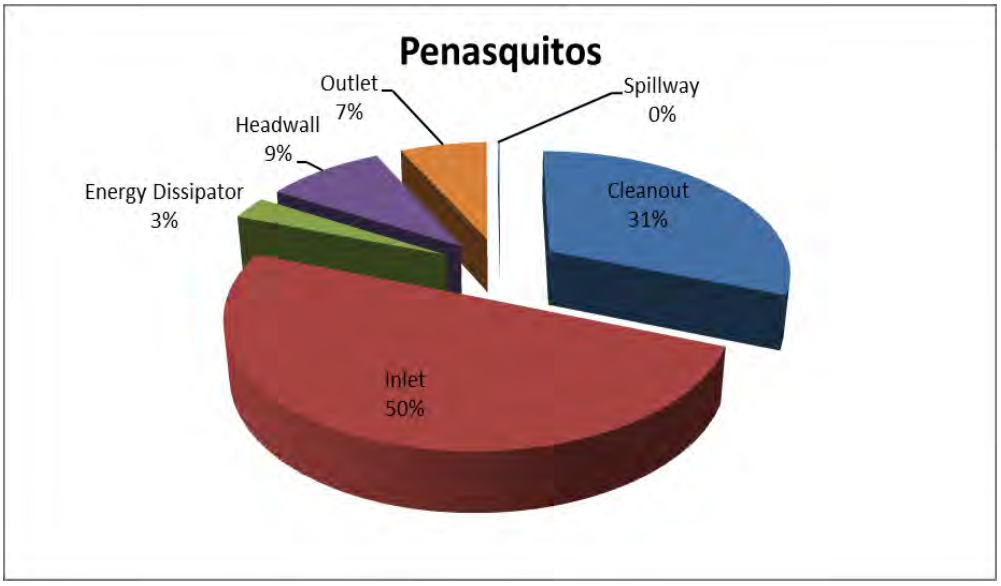


**Figure D-2. Distribution of Storm Water Structures by Asset Count - Los Peñasquitos Watershed**

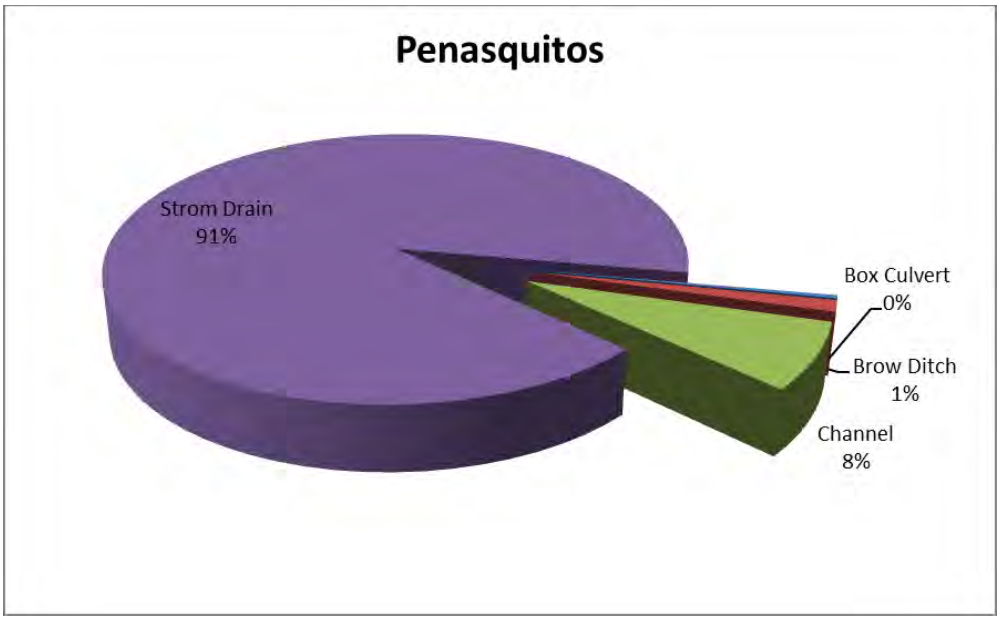


**Figure D-3. Distribution of Storm Water Conveyance by Length - Los Peñasquitos Watershed**

In addition to those assets listed in Table D-5, there is additional equipment that is not particularly part of the Los Peñasquitos 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 D-6 shows the list of assets within this category and their quantities.

**Table D-6. The Equipment**

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

## D.2.2 Natural Assets

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

**Table D-7. Los Peñasquitos Watershed Natural Asset Classes/Subclasses and Quantities**

| Asset Class/Subclass | Quantity in Los Peñasquitos Watershed |
|---|---|
| Receiving Waters | Currently treated as one asset within the Los Peñasquitos Watershed. For future updates, recommend to refine into specific receiving water assets. For the San River Watershed, there are 483 receiving waters/segments. |
| Runoff/Discharges | Currently treated as one asset within the Los Peñasquitos Watershed. For future updates, manage runoffs and discharges at the hydrologic sub-area level as defined in the CLRP. There are 794 mainstem outfalls in the Los Peñasquitos Watershed, which will be associated with the hydrologic sub-areas defined in the CLRP |
| City Parcels | There are 1,053 City Parcels in the Los Peñasquitos Watershed. |
| MHPAs | There are 375 MHPAs in the Los Peñasquitos Watershed. |

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

## D.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 D-8 shows the soft asset classes and the quantities of assets in those classes in the Los Peñasquitos Watershed.

**Table D-8. Los Peñasquitos Watershed Soft Asset Subclasses and Quantities**

| Asset Class/Subclass | Quantity in Los Peñasquitos Watershed |
|---|---|
| City Department Behavior | Currently treated as one asset in the Los Peñasquitos 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 Los Peñasquitos 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 | |

## D.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 (2012) 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 D-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 Los Peñasquitos Watershed is provided below in Table D-9. The replacement cost of the Division's collection system is estimated at $896.4 million. Of the total, the conveyance system accounts for about 69 percent of the total replacement costs and structures account for 31 percent. Figure D-4 shows the distribution of Los Peñasquitos Watershed hard asset replacement costs.

**Table D-9. Los Peñasquitos Watershed Assets Replacement Costs**

| Asset Class/Subclass | Replacement Cost | Total Replacement Costs |
|---|---|---|
| Conveyance System: | | |
| • Box Culvert | $250,000/unit | $12.8 million |
| • Brow Ditch | $400/linear feet | $7.9 million |
| • Channel | $400/linear feet | $45.7 million |
| • Storm Drain | $400/linear feet | $554 million |
| Structures: | | |
| • Cleanout | $20,000/unit | $71.6 million |
| • Inlet | $20,000/unit | $116 million |
| • Energy Dissipater | $40,000/unit | $13.8 million |
| • Headwall | $40,000/unit | $43.2 million |
| • Outlet | $40,000/unit | $31.8 million |
| • Spillway | $15,000/unit | $330,000 |
| **Total** | | **$896.4 million** |

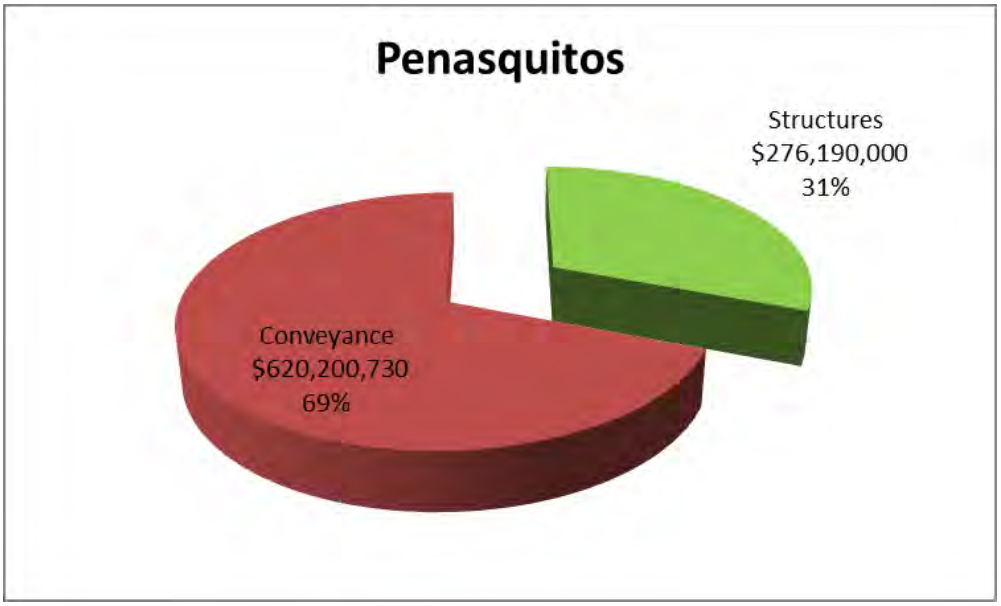


**Figure D-4. Los Peñasquitos Watershed Hard Assets Replacement Costs**

Figure D-5 shows the distribution of conveyance system asset replacement costs. Of the total conveyance system, about 89 percent consists of storm drains; followed by channels, box culverts, and brow ditches.

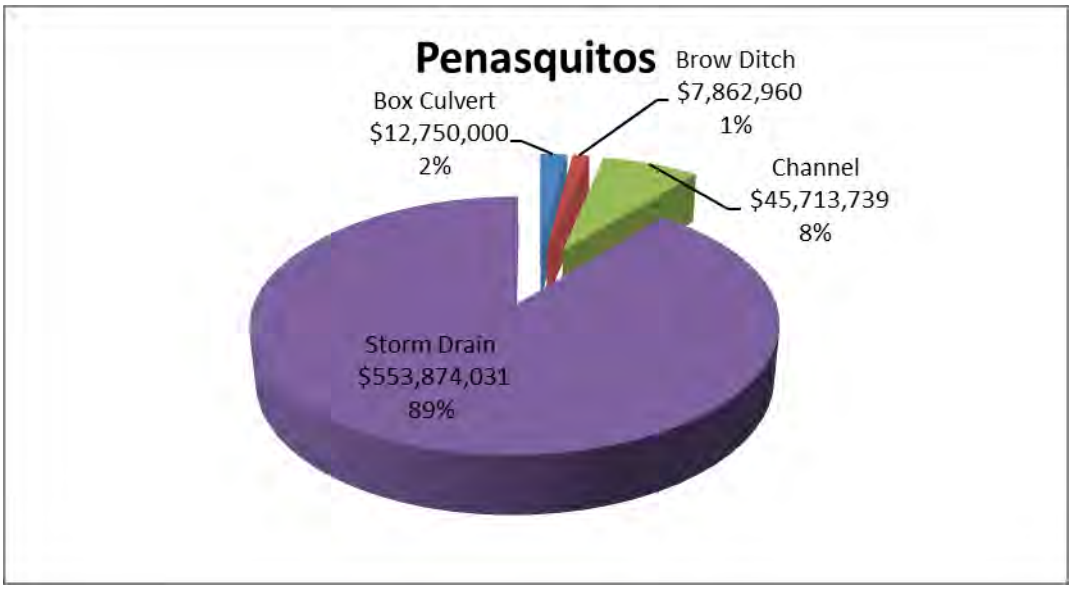


**Figure D-5. Los Peñasquitos Watershed Conveyance System Assets Replacement Costs**

Figure D-6 shows the distribution of the asset replacement costs for storm water structures. Of the total system, most of structures consist of inlets (42 percent), followed by cleanouts (26 percent), headwalls (16 percent), and outlet (11 percent). The two remaining asset classes, energy dissipators and spillways represent 5 percent of the total asset replacement costs.

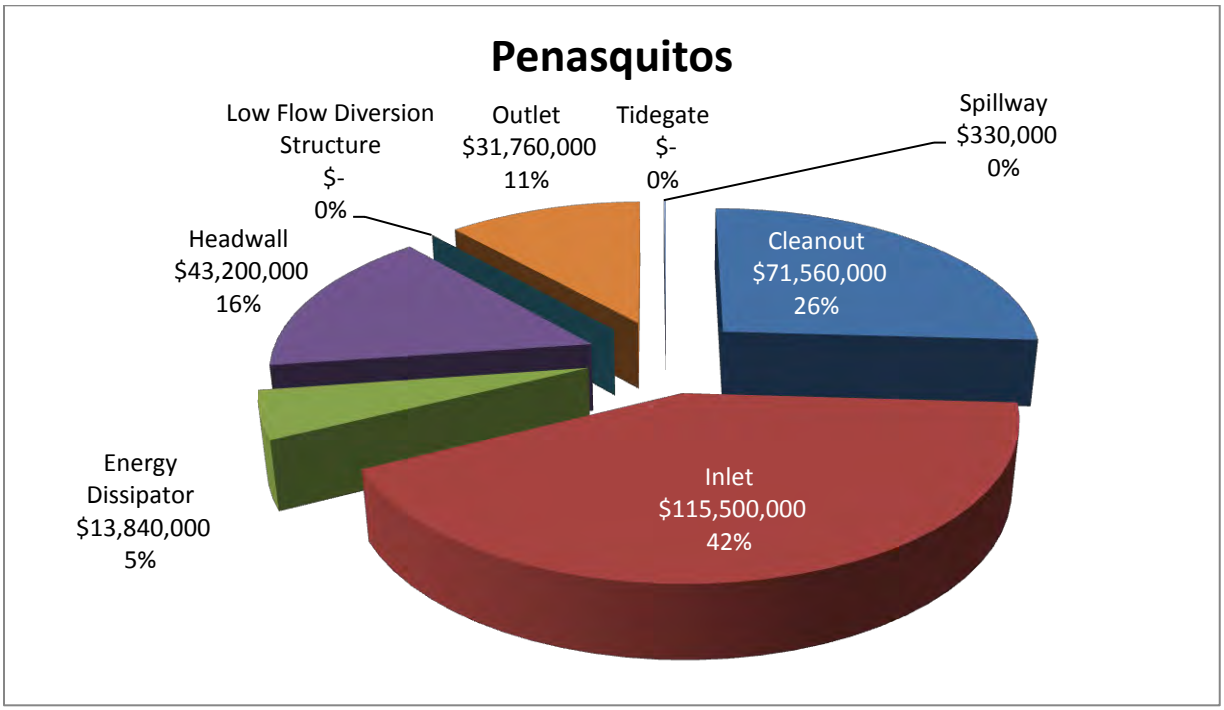


**Figure D-6. Los Peñasquitos Watershed Storm Water Structures Asset Replacement Costs**

In addition to hard assets managed under Los Peñasquitos watershed above, equipment is managed at the Division level. Figure D-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).

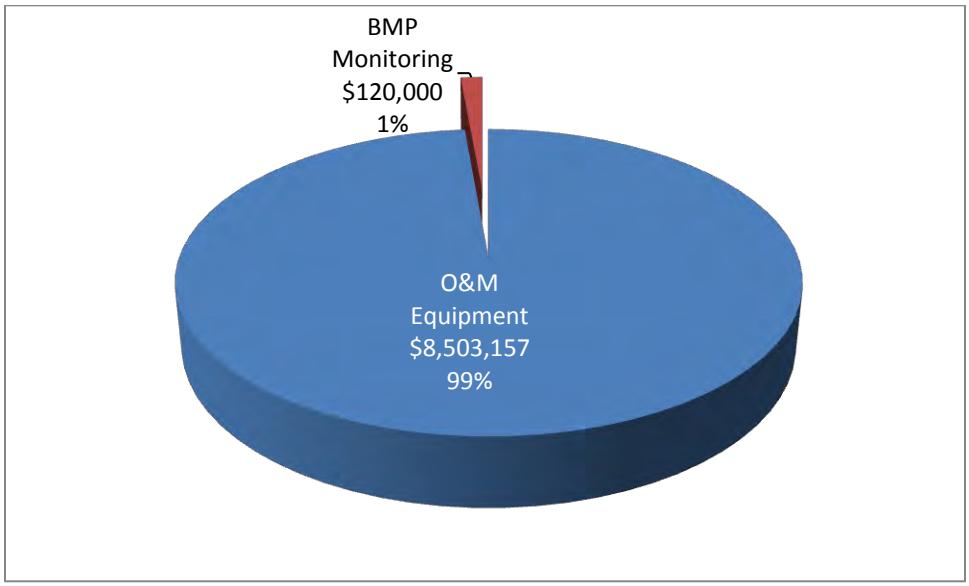


**Figure D-7. The Division's Equipment Asset Replacement Costs**

## D.4 WHAT IS ITS CONDITION?

During the hard asset inventory process it was realized that the hard 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 hard assets (e.g., pipe and cleanout)
- Nearby hard assets (street section)
- Neighboring hard assets (the install year of majority of similar hard asset types in the hydrologic subarea)

Figure D-8 shows the historical hard asset installation profile of the Los Peñasquitos 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 hard assets installed per year, represented in 2013 dollars, dating back to the earliest hard 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 1950 and mid-1980s. After this time, the development trend has grown steady.

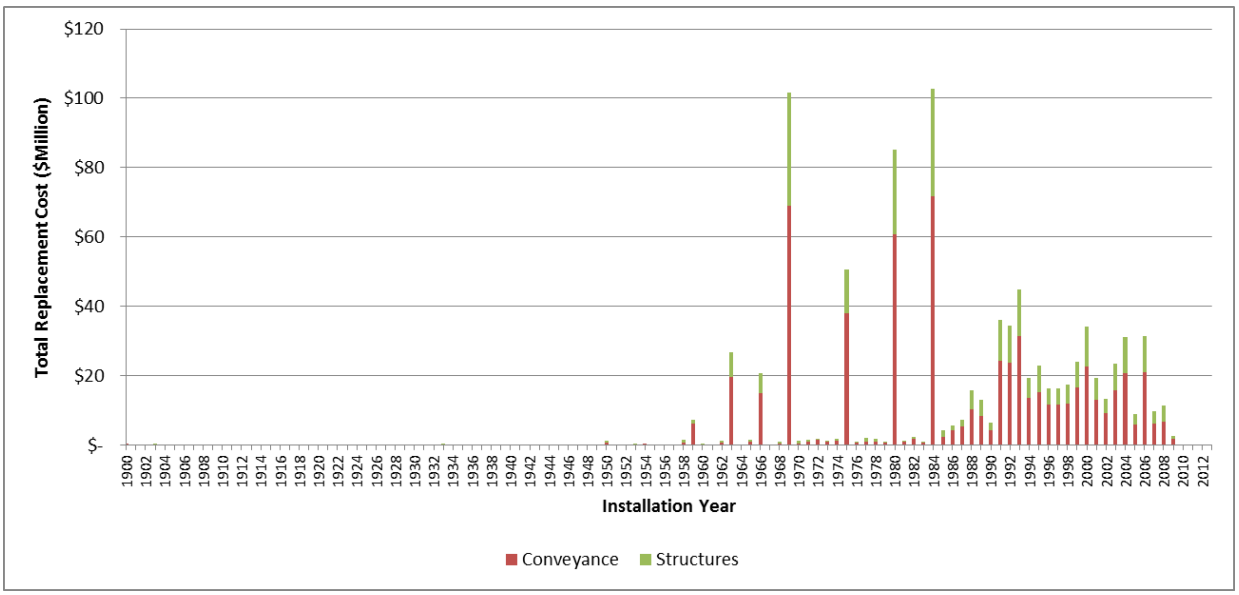


**Figure D-8. Installation Profile - Los Peñasquitos Watershed**

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 D-9, among the total of 22,810 assets listed in the Los Peñasquitos asset inventory excluding equipment, about 94 percent are either in excellent or good condition (condition 1 and condition 2 ) and only 1 percent of the hard assets are in immediate need of attention

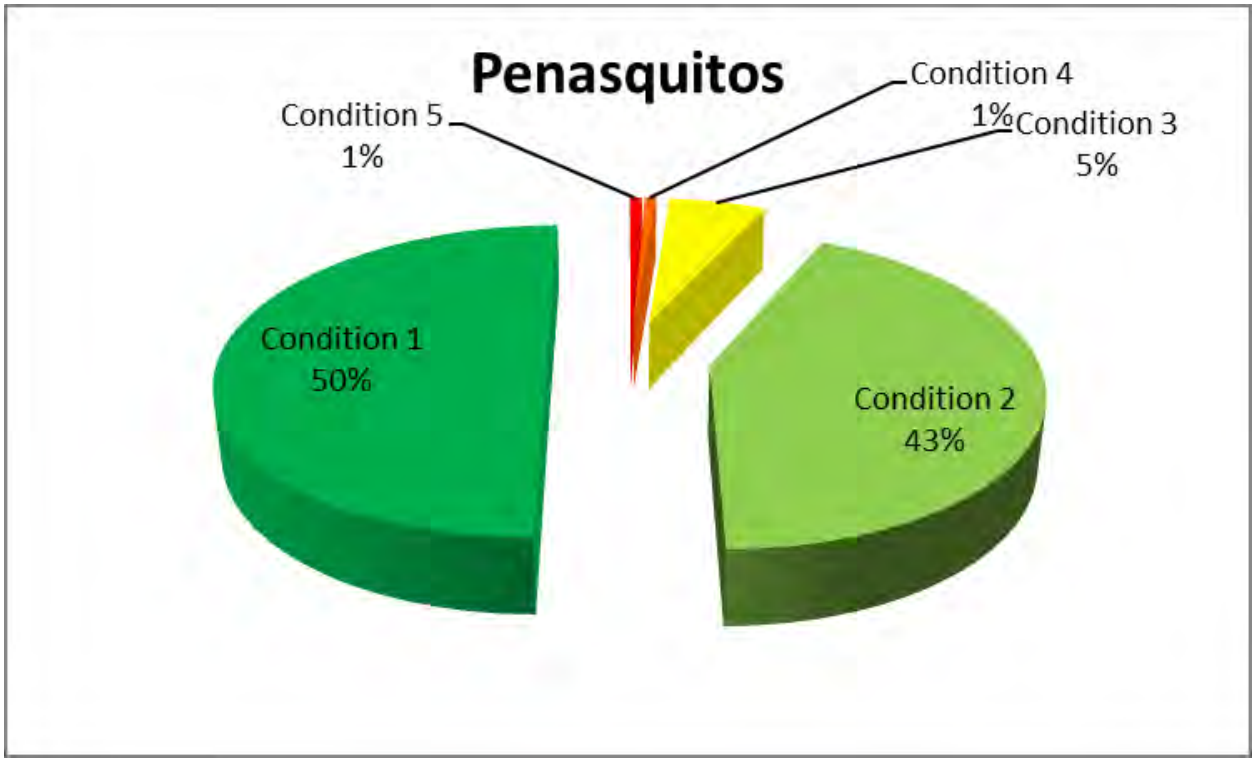


**Figure D-9. Summary of Hard Asset Conditions - Los Peñasquitos Watershed**

As shown in (Figure D-10), both conveyance and structure mostly are in condition 3 or better with only 1 percent of the hard asset in condition 4 or worse.

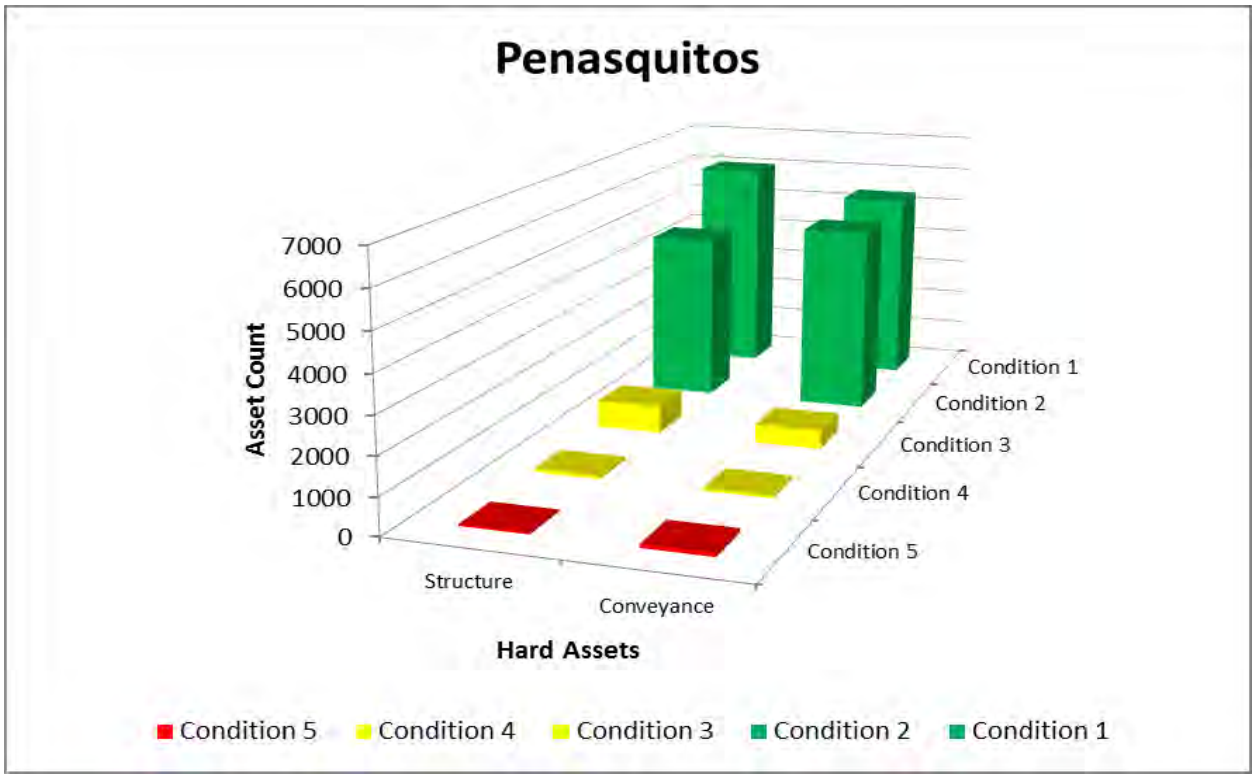


**Figure D-10. Summary of Hard Asset Conditions by Asset Class - Los Peñasquitos Watershed**

Figure D-11 provides a summary of the conveyance system hard asset conditions for the Los Peñasquitos Watershed. Within the conveyance system, storm drains account for all of the hard assets that are condition 4 or worse. The majority of storm drains that are in need of replacement are metal pipes, which have a relatively short useful life of 35 years.

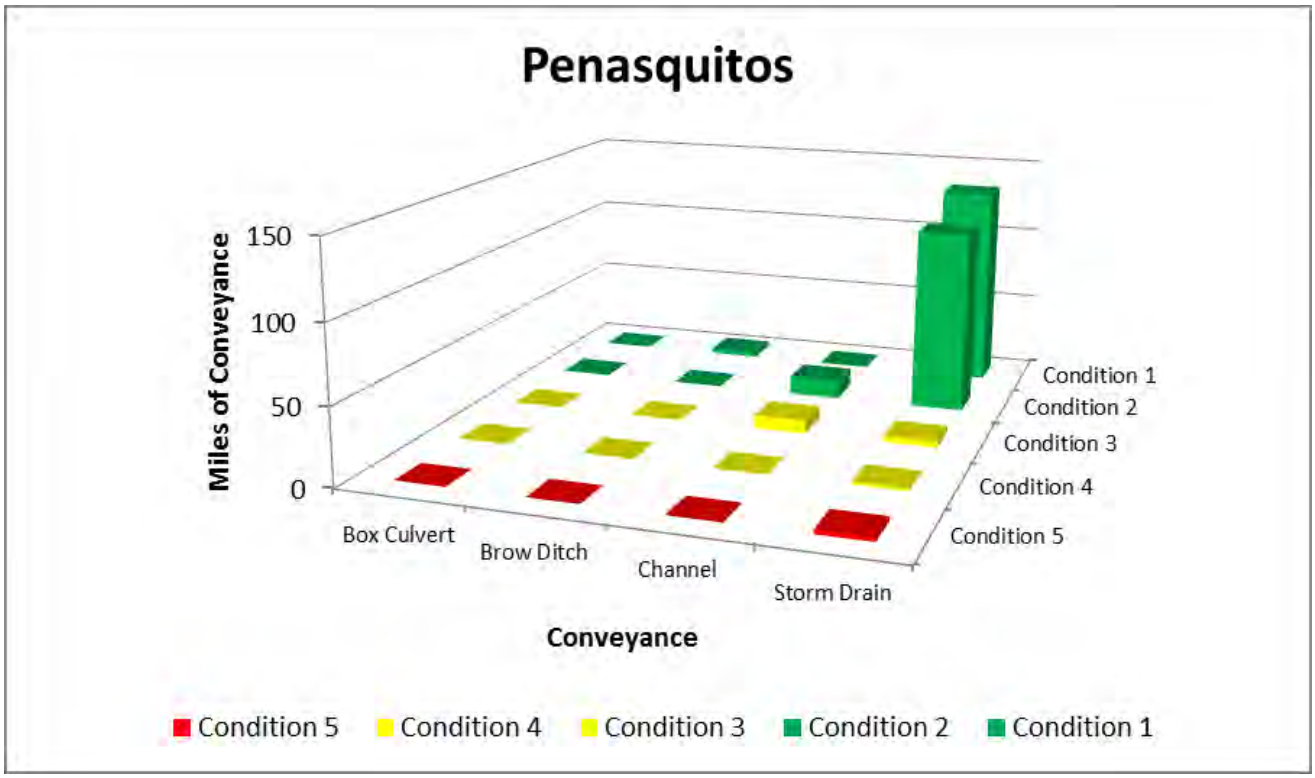


**Figure D-11. Summary of Conveyance System Conditions - Los Peñasquitos Watershed**

Figure D-12 provides a summary of the conditions of the storm water structures for the Los Peñasquitos 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.

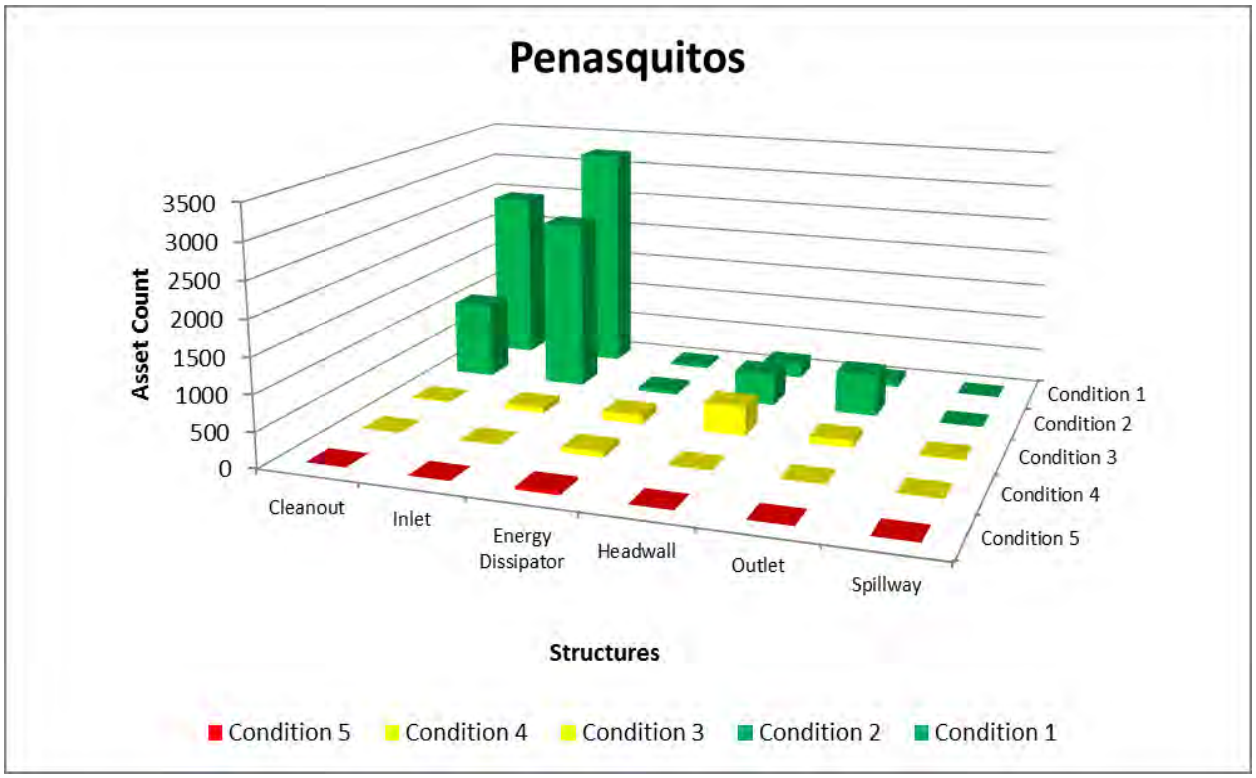


**Figure D-12. Summary of Conditions of Storm Water Structures - Los Peñasquitos Watershed**

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

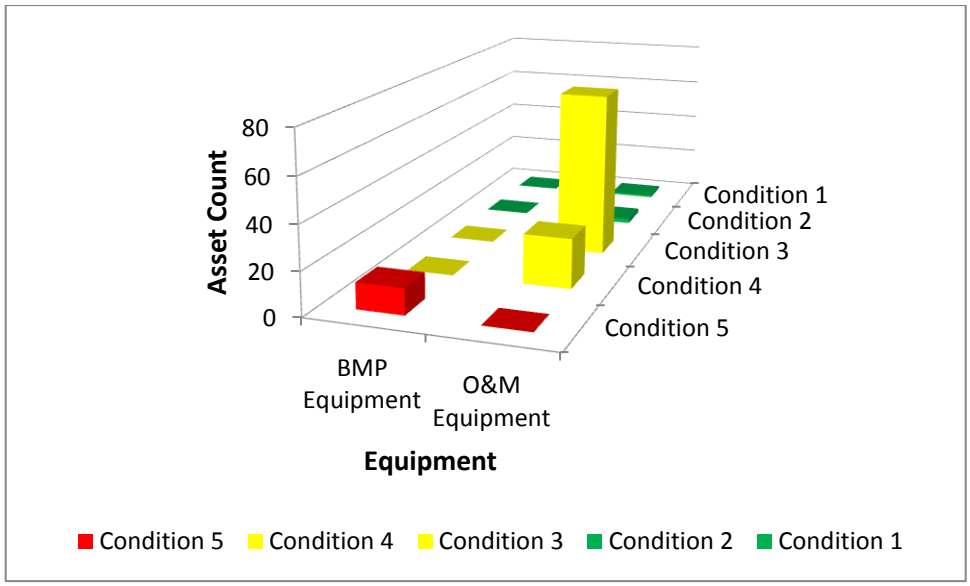


**Figure D-13. Summary of Conditions of Equipment Assets – Los Peñasquitos Watershed**

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 Division's total system consumption profile is presented in Figure D-14. The figure shows that the majority of the Division's hard assets are 30 to 45 percent ($348M) consumed. Less than 1 percent ($8M) of the hard assets have reached or exceeded their useful life.

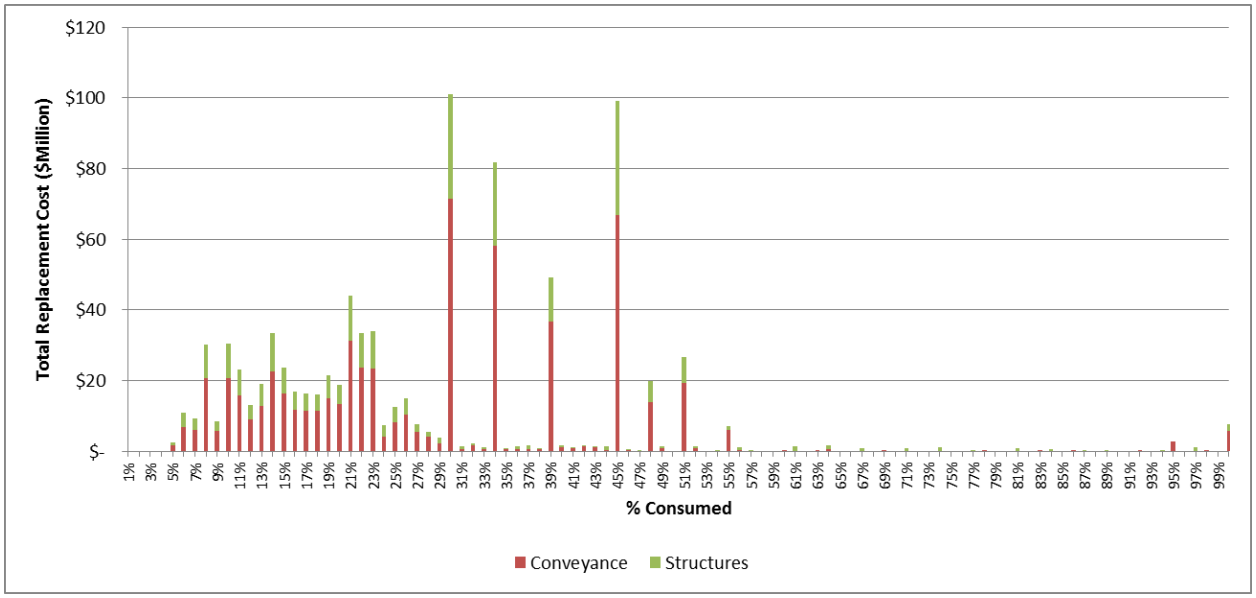


**Figure D-14. Consumption Profile – Los Peñasquitos Watershed**

## D.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 Los Peñasquitos Watershed, whether they are achieving the desired LOSs, and the necessary actions to achieve their LOSs. Table D-10 lists each asset class in the watershed, whether it is achieving its LOS, and the necessary actions to achieve its LOS.

**Table D-10. Actions needed for Assets to Achieve LOSs - Los Peñasquitos Watershed**

| 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 D-10. Actions needed for Assets to Achieve LOSs - Los Peñasquitos Watershed**

| 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 reduction 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 D-10. Actions needed for Assets to Achieve LOSs - Los Peñasquitos Watershed**

| 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 D-10. Actions needed for Assets to Achieve LOSs - Los Peñasquitos Watershed**

| 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 D-10. Actions needed for Assets to Achieve LOSs - Los Peñasquitos Watershed**

| 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 D-10. Actions needed for Assets to Achieve LOSs - Los Peñasquitos Watershed**

| 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 D-10. Actions needed for Assets to Achieve LOSs - Los Peñasquitos Watershed**

| 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 D-10. Actions needed for Assets to Achieve LOSs - Los Peñasquitos Watershed**

| 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 D-10. Actions needed for Assets to Achieve LOSs - Los Peñasquitos Watershed**

| 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 reduction 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 D-10. Actions needed for Assets to Achieve LOSs - Los Peñasquitos Watershed**

| 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 reduction 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 D-10. Actions needed for Assets to Achieve LOSs - Los Peñasquitos Watershed**

| 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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## D.6 WHEN DO WE NEED IT?

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

### D.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 D-11 lists the BRE scores for the Los Peñasquitos 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 D.7. The specific actions and projects slated for Fiscal Year 2015 are presented in Section D.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 D-11. Soft and Natural Asset BRE Scores – Los Peñasquitos 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 | 2 for all subwatersheds | 1 for all subwatersheds | 5 for all subwatersheds | Area-weighted CPI Dr/Wet composite score for all subwatershed (3.14) | 5 for all subwatersheds | 5 all subwatersheds | 10.642 for all subwatersheds | Area-weighted CPI Dry/Wet score for all subwatershed (3.14) | 33.4 for all subwatershed | Medium |
| 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 D-11. Soft and Natural Asset BRE Scores – Los Peñasquitos 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 | 5 | 3 | 4 | 5 | 10.2 | 5 | 51 | High |
| 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 | 3 | 1 | 4 | 2 | 1 | 3 | 6.6 | 5 | 33 | Medium |
| 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 reduction 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 D-11. Soft and Natural Asset BRE Scores – Los Peñasquitos 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 | 3 | 1.8 | 3 | 5 | 7.44 | 5 | 37.2 | 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 | 5 | 4 | 3 | 5 | 9.5 | 5 | 47.5 | 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 | Per TMDL schedules | 2 for all subwatersheds | 1 for all subwatersheds | 5 for all subwatersheds | Area-weighted CPI Dry score for all subwatershed (1.64) | 5 for all subwatersheds | 5 all subwatersheds | 10.192 for all subwatersheds | Area-weighted CPI Dry/Wet score for all subwatershed (3.14) | 32.0 for all subwatershed | Medium |

**Table D-11. Soft and Natural Asset BRE Scores – Los Peñasquitos 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 | Per TMDL schedules | 2 for all subwatersheds | 1 for all subwatersheds | 5 for all subwatersheds | Area-weighted CPI Wet score for all subwatershed (1.5) | 5 for all subwatersheds | 5 all subwatersheds | 10.150 for all subwatersheds | Area-weighted CPI Dry/Wet score for all subwatershed (3.14) | 31.9 for all subwatershed | Medium |
| 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 | 2 for all subwatersheds | 1 for all subwatersheds | 5 for all subwatersheds | Area-weighted CPI Dr/Wet composite score for all subwatershed (3.14) | 5 for all subwatersheds | 5 all subwatersheds | 10.642 for all subwatersheds | Area-weighted CPI Dry/Wet score for all subwatershed (3.14) | 33.4 for all subwatershed | Medium |
| 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 | 2 for all subwatersheds | 1 for all subwatersheds | 5 for all subwatersheds | Area-weighted CPI Dr/Wet composite score for all subwatershed (3.14) | 5 for all subwatersheds | 5 all subwatersheds | 10.642 for all subwatersheds | Area-weighted CPI Dry/Wet score for all subwatershed (3.14) | 33.4 for all subwatershed | Medium |
| 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 | 2 for all subwatersheds | 1 for all subwatersheds | 5 for all subwatersheds | Area-weighted CPI Dr/Wet composite score for all subwatershed (3.14) | 5 for all subwatersheds | 5 all subwatersheds | 10.642 for all subwatersheds | Area-weighted CPI Dry/Wet score for all subwatershed (3.14) | 33.4 for all subwatershed | Medium |
| 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. | | | | | | | | | | | |

**Table D-11. Soft and Natural Asset BRE Scores – Los Peñasquitos 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 | | | | |
| 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 | 2 | 3 | 2 | 3 | 5.7 | 5 | 28.5 | Medium |
| 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 | 5 | 4 | 4 | 5 | 10.1 | 4 | 40.4 | Medium |

**Table D-11. Soft and Natural Asset BRE Scores – Los Peñasquitos 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 | | | | |
| 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. | | | | | | | | | | | |
| 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 reduction requirements. | No | Failed | 1 | 1.5 | 4 | 4 | 3 | 4 | 8.8 | 5 | 44 | Medium |

**Table D-11. Soft and Natural Asset BRE Scores – Los Peñasquitos 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 | | | | |
| 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 reduction 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. | | | | | | | | | | | |
| 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 | |

**Table D-11. Soft and Natural Asset BRE Scores – Los Peñasquitos 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 | 47. Monitoring is completed per permit requirements. | Yes | N/A | 2 for all subwatersheds | 1 for all subwatersheds | 5 for all subwatersheds | Area-weighted CPI Dr/Wet composite score for all subwatershed (3.14) | 5 for all subwatersheds | 5 all subwatersheds | 10.642 for all subwatersheds | Area-weighted CPI Dry/Wet score for all subwatershed (3.14) | 33.4 for all subwatershed | Medium |
| 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 | Medium |
| 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

### D.6.2 Hard Asset BRE

The hard assets BRE scores were calculated for each individual hard asset listed in the Los Peñasquitos Watershed asset inventory. BRE scores are shown in three major categories: high, medium, and low. Figure D-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.

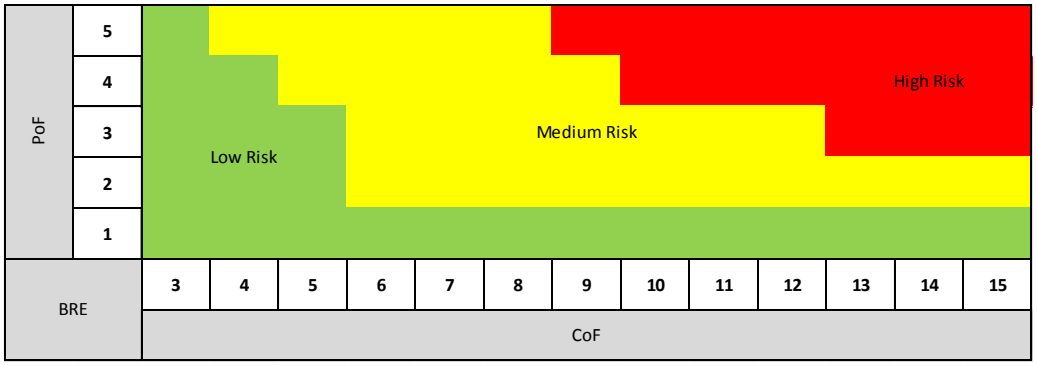


**Figure D-15. Hard Asset Risk Category Map**

Figure D-16 shows the summary of hard asset BRE scores by asset classes. Of the 22,810 total assets, 96 percent fall into the low risk category, followed by less than 4 percent in the medium or high risk category.

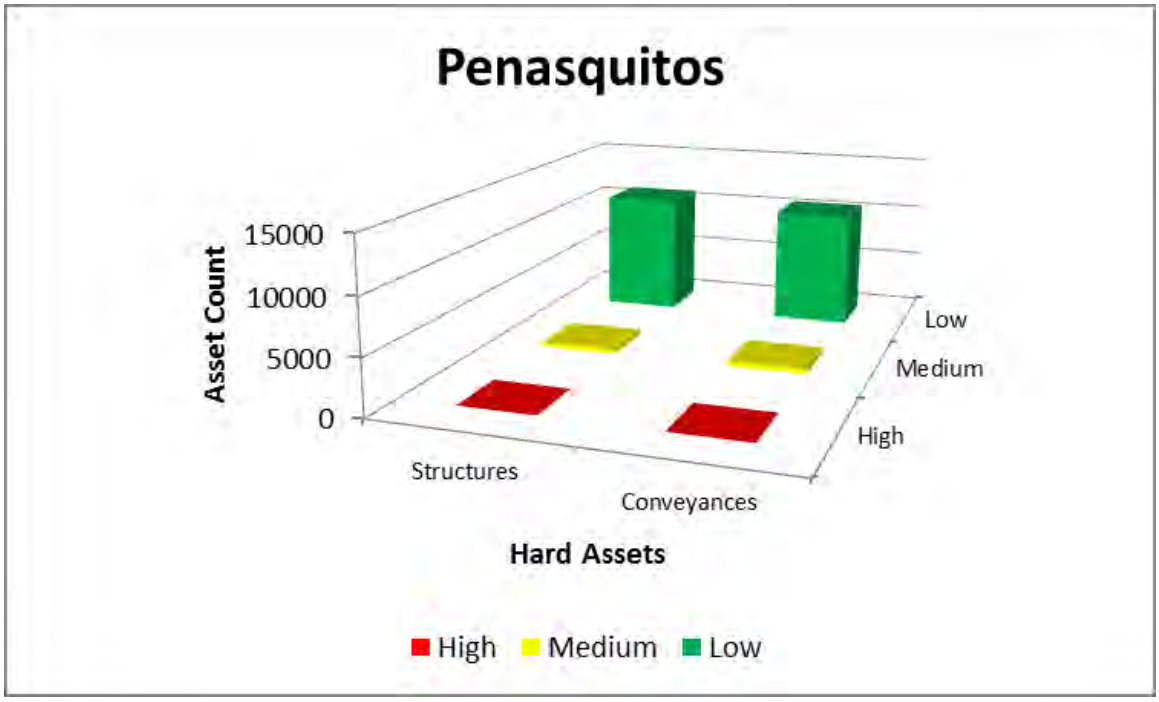


**Figure D-16. Hard Asset BRE Scores by Asset Classes - Los Peñasquitos Watershed**

Figure D-17 shows the BRE score summary for the storm water conveyance system in Los Peñasquitos Watershed. There are total of 1 mile of box culvert, 3 miles of brow ditch, 22 miles of channel, and 262 miles of storm drain. Out of all the conveyance systems, only storm drains have hard assets that have high risk.

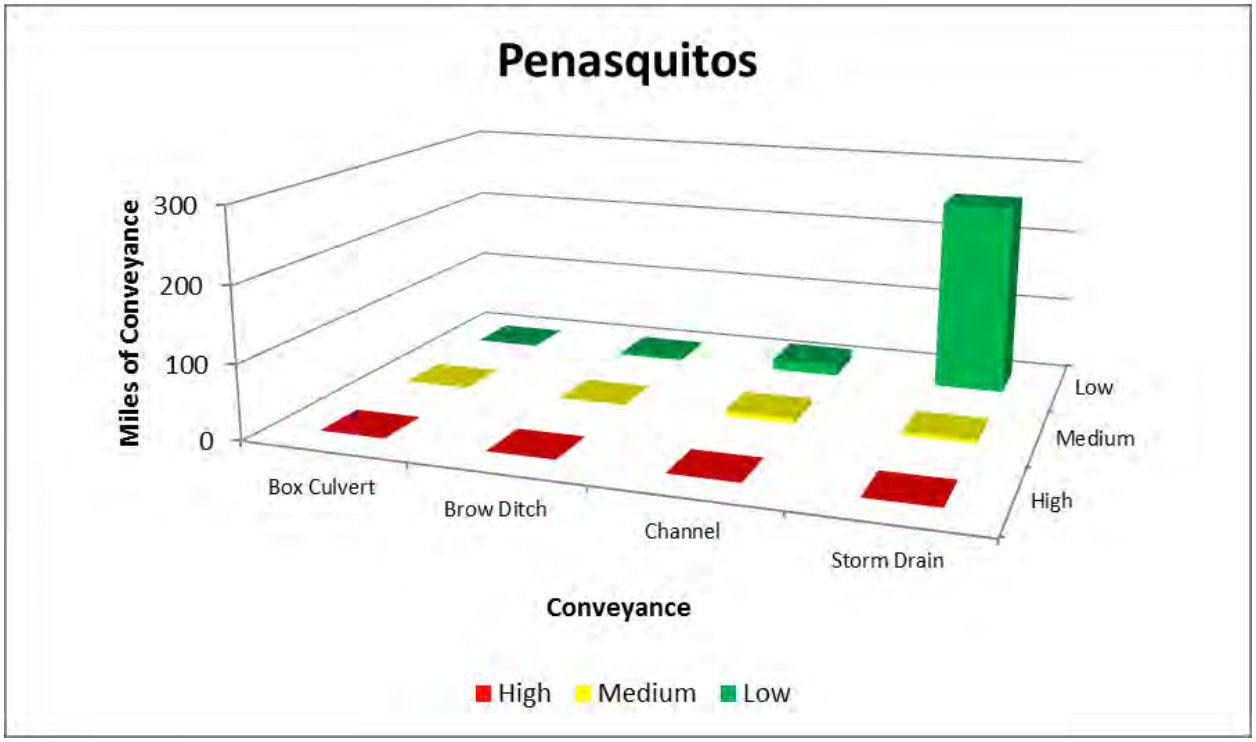


**Figure D-17. BRE Summary of Conveyance System BRE Scores - Los Peñasquitos Watershed**

Figure D-18 shows the conveyance system CoF score map for the Los Peñasquitos Watershed. The Los Peñasquitos Watershed conveyance system is approximately 289 miles and about 70 percent (201 miles) of the storm water conveyances have low CoF and about 3 percent (8 mile) have high CoF.

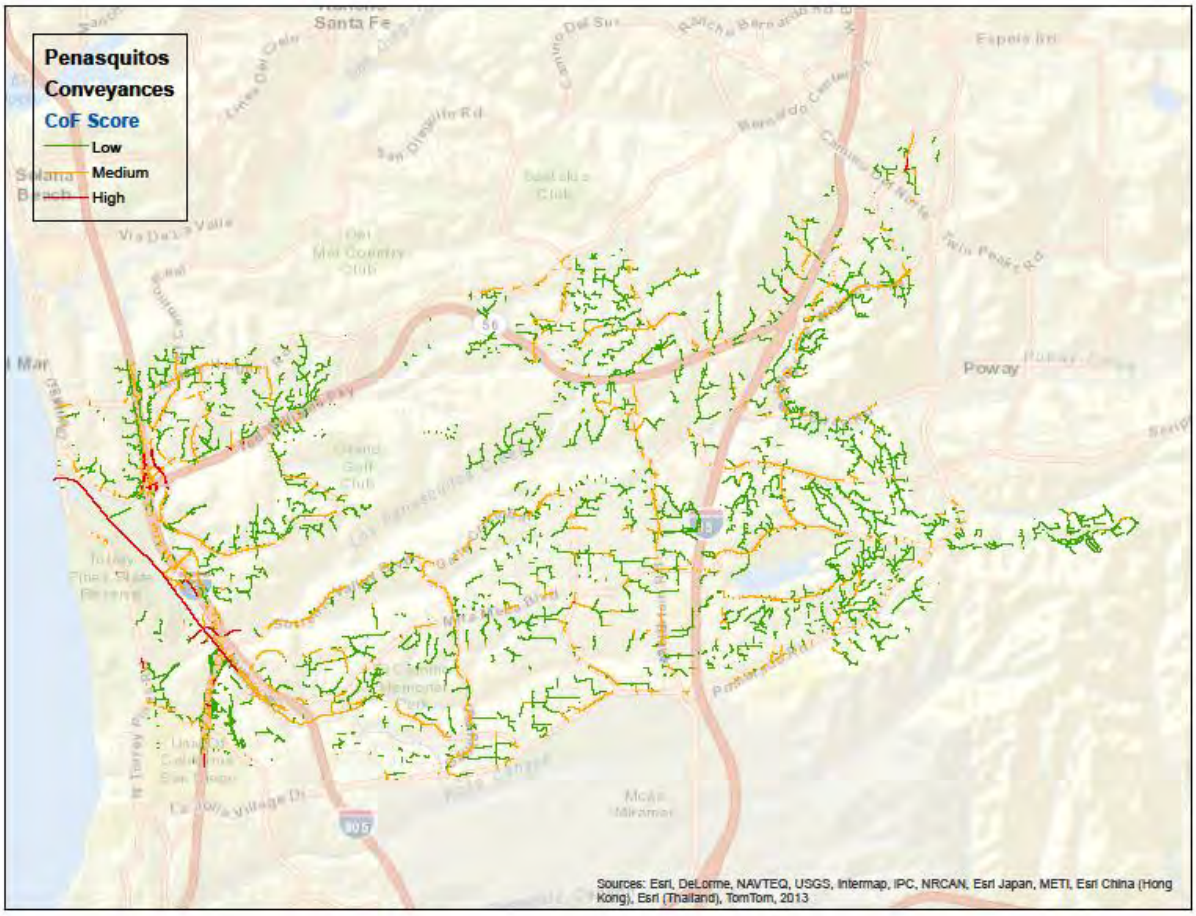


**Figure D-18. Conveyance System CoF Score Map - Los Peñasquitos Watershed**

Figure D-19 shows the conveyance system PoF score map for the Los Peñasquitos Watershed. Approximately 98 percent (284 miles) of the conveyances have low PoF and 1 percent (4 miles) have high PoF.

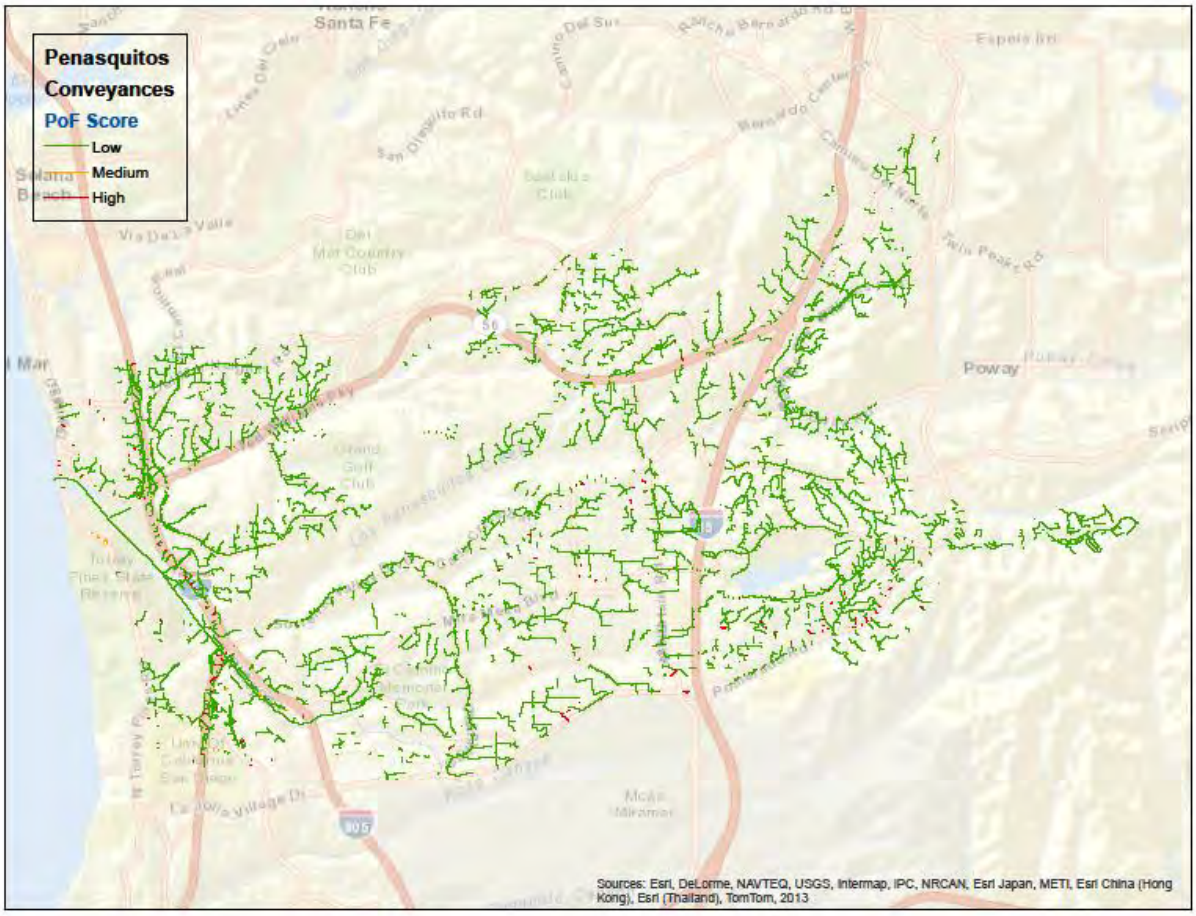


**Figure D-19. Conveyance System PoF Score Map - Los Peñasquitos Watershed**

Figure D-20 shows the conveyance system BRE score map for the Los Peñasquitos Watershed. 96 percent (276 miles) of the conveyance systems have low risk, 3 percent (2miles) have medium risk, and less than 1 percent (less than a mile) have high risk.

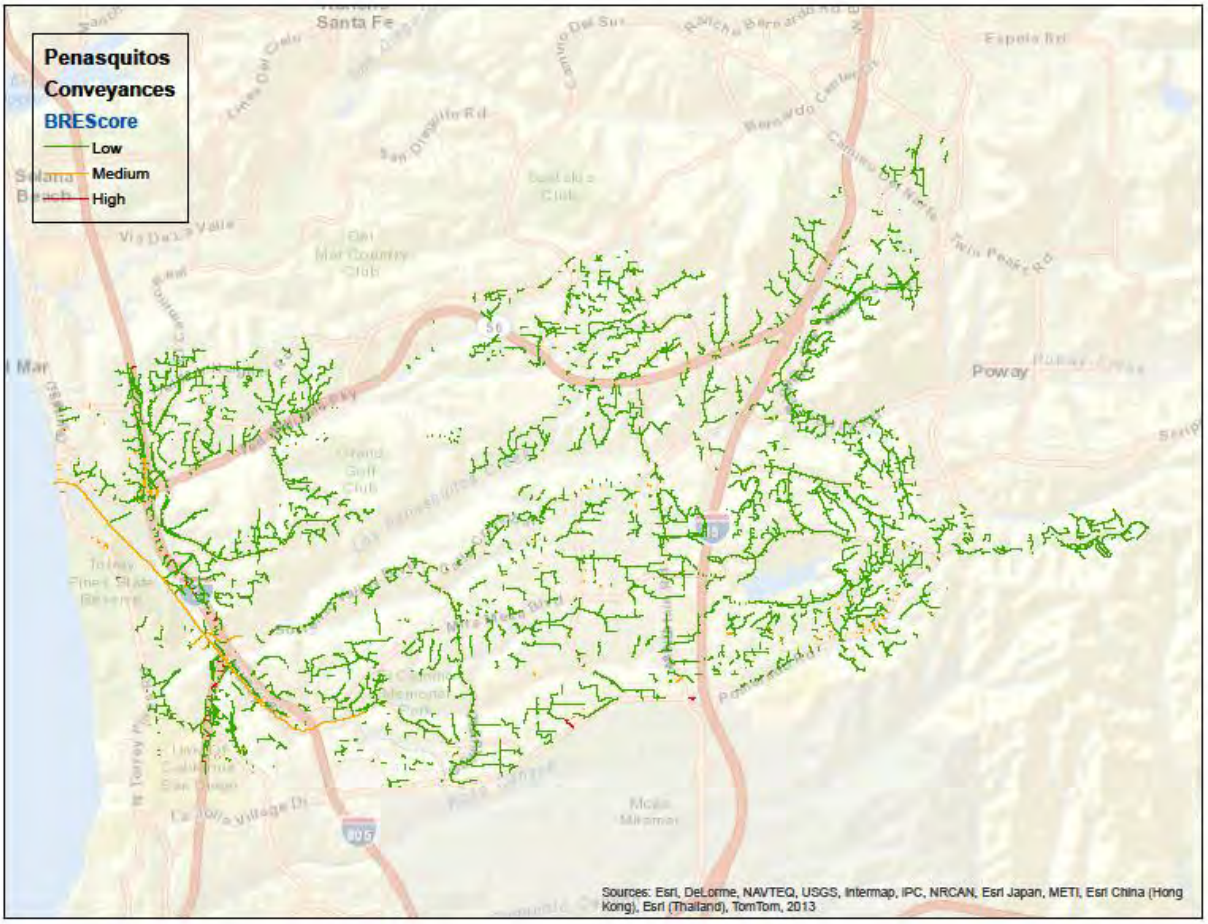


**Figure D-20. Conveyance System BRE Score Map - Los Peñasquitos Watershed**

Figure D-21 shows the BRE summary for storm water structures in Los Peñasquitos Watershed. 96 percent (11,163 out of 11,595) of the storm water structures have low risk and less than 0.1 percent of assets (8 out of 11,595) have high risk. This can be attributed to the fact that the majority of storm water structures are still in good or excellent condition.

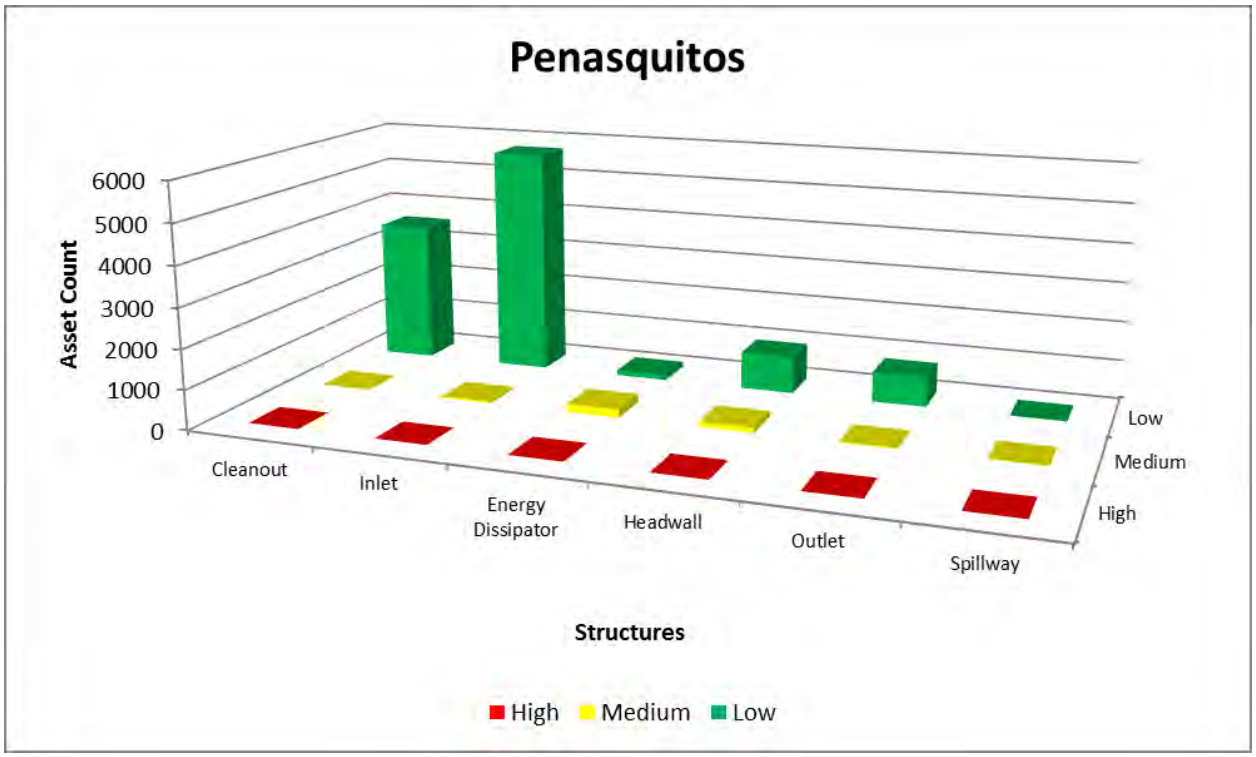


**Figure D-21. Storm Water Structure BRE Scores- Los Peñasquitos Watershed**

Figure D-22 shows the structures CoF score map for the Los Peñasquitos Watershed. Approximately 71 percent (8,270) of the structures have low CoF and less than 1 percent (87) have high CoF.

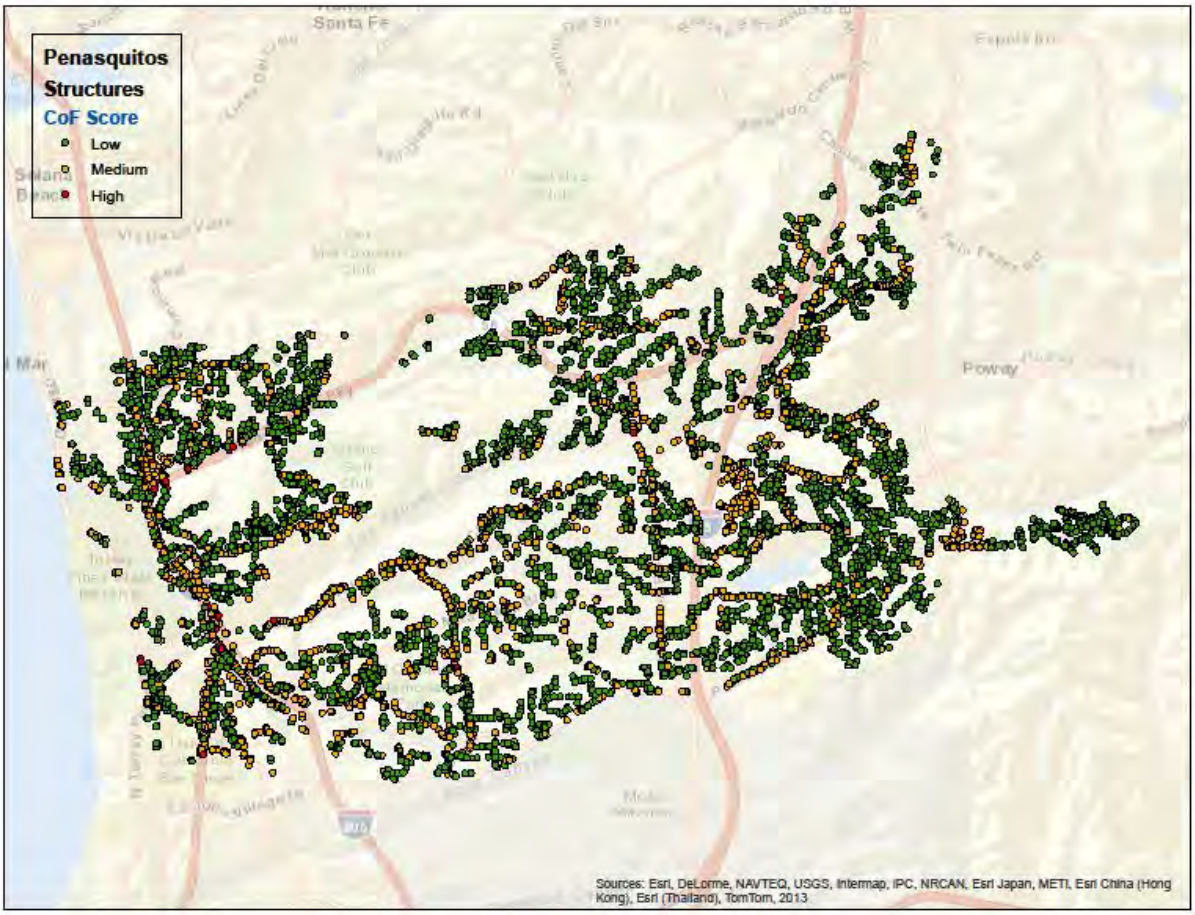


**Figure D-22. Storm Water Structure CoF Score Map - Los Peñasquitos Watershed**

Figure D-23 shows the structures PoF score map for the Los Peñasquitos Watershed. Approximately 97 percent (11,251) have low PoF, and less than 1 percent (93) have high PoF.

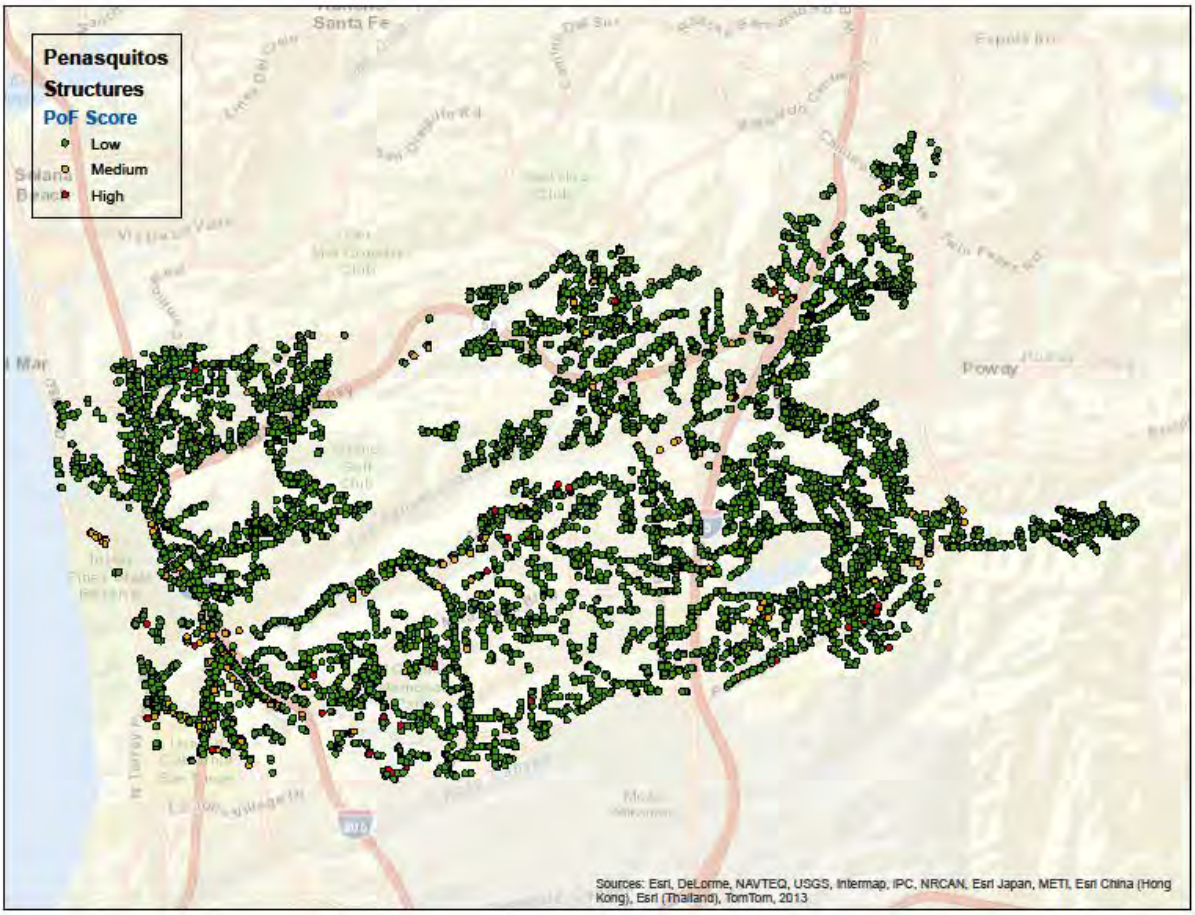


**Figure D-23. Storm Water Structure PoF Score Map - Los Peñasquitos Watershed**

Figure D-24 shows the structures BRE score map for the Los Peñasquitos Watershed. Approximately 96 percent (11,163) have low risk, 4 percent (424) have medium risk, and less than 0.1 percent (8) have low risk.

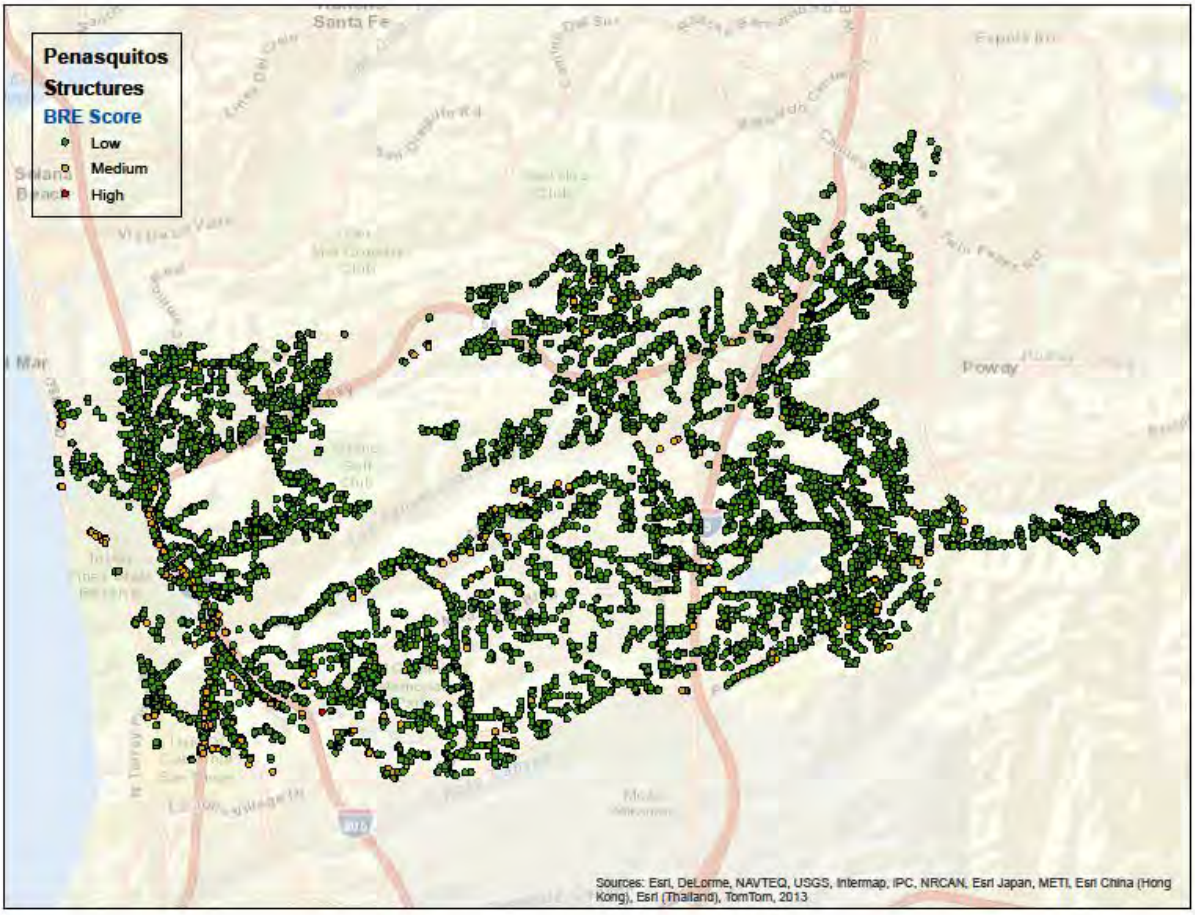


**Figure D-24. Storm Water Structure BRE Score Map - Los Peñasquitos Watershed**

Figure D-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.

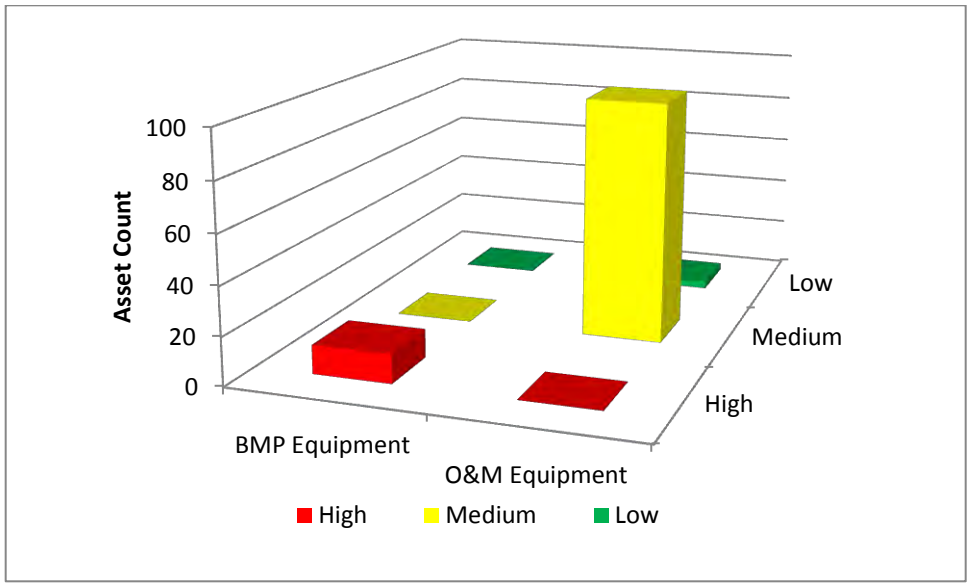


**Figure D-25. Summary of Equipment Assets – San Diego City Wide**

## D.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, 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 were 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 D-26, D-27, and D-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.

The results indicate that significant costs are projected from 2015 to mid-2020s. This spike primarily is driven by large number of projected structural BMP implementation projects required to meet TMDL compliance. Hard assets requiring replacement also contributes to the investment need.

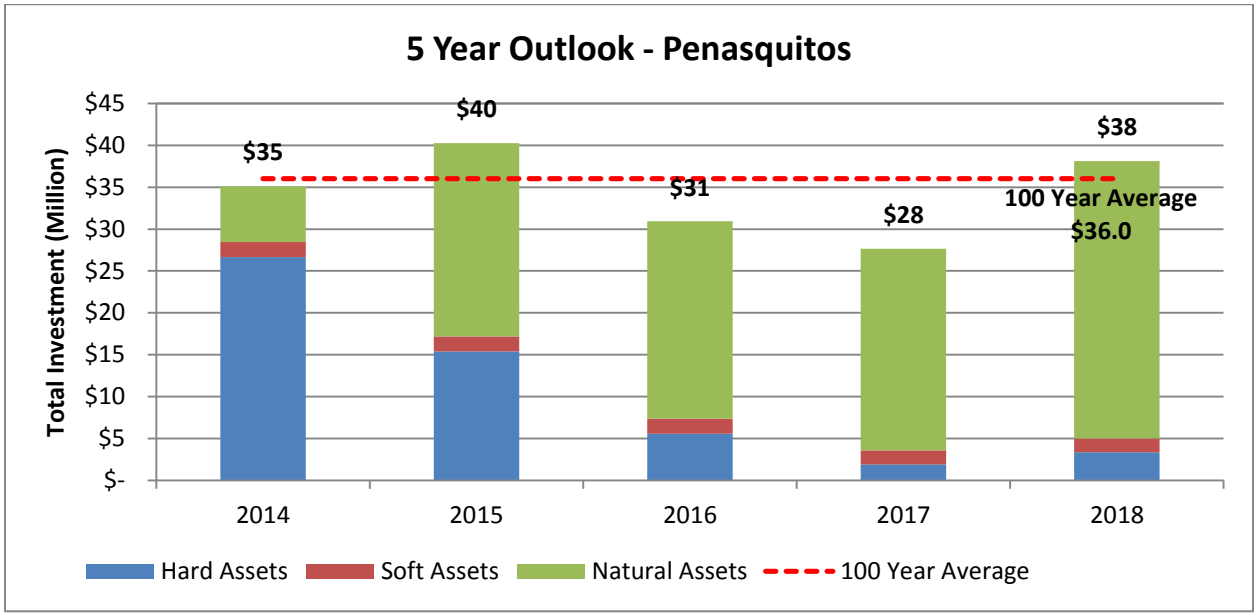


**Figure D-26. Watershed 5 Year Outlook by Asset Type – Los Peñasquitos Watershed**

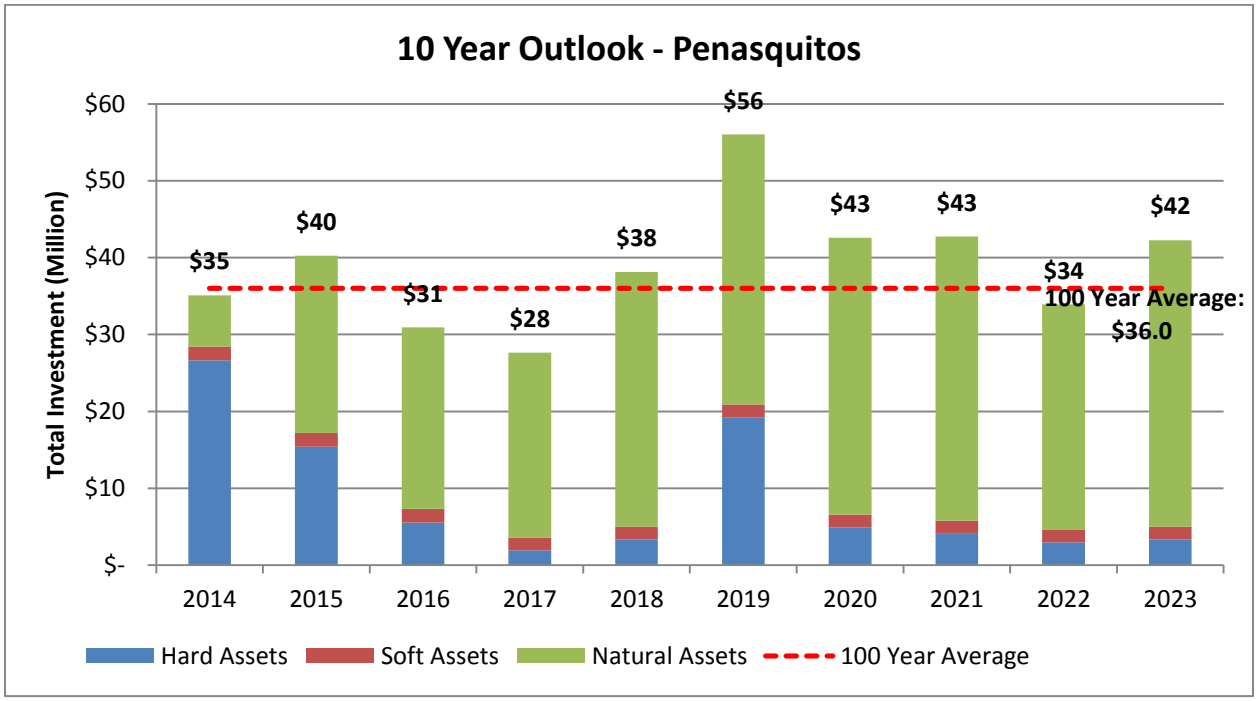


**Figure D-27. Watershed 10 Year Outlook by Asset Type – Los Peñasquitos Watershed**

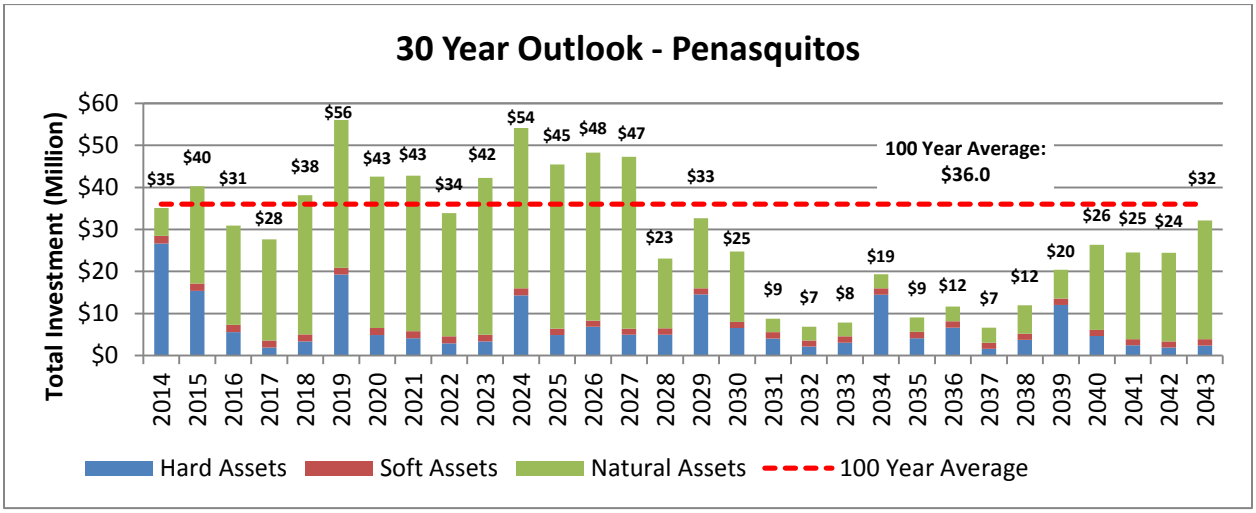


**Figure D-28. Watershed 30 Year Outlook by Asset Type – Los Peñasquitos Watershed**

Figures D-29 and D-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 Los Peñasquitos Watershed will need an average of $36.0 million dollars per year for capital and operational needs for the next 100 years. Some years will require more and others will require less.

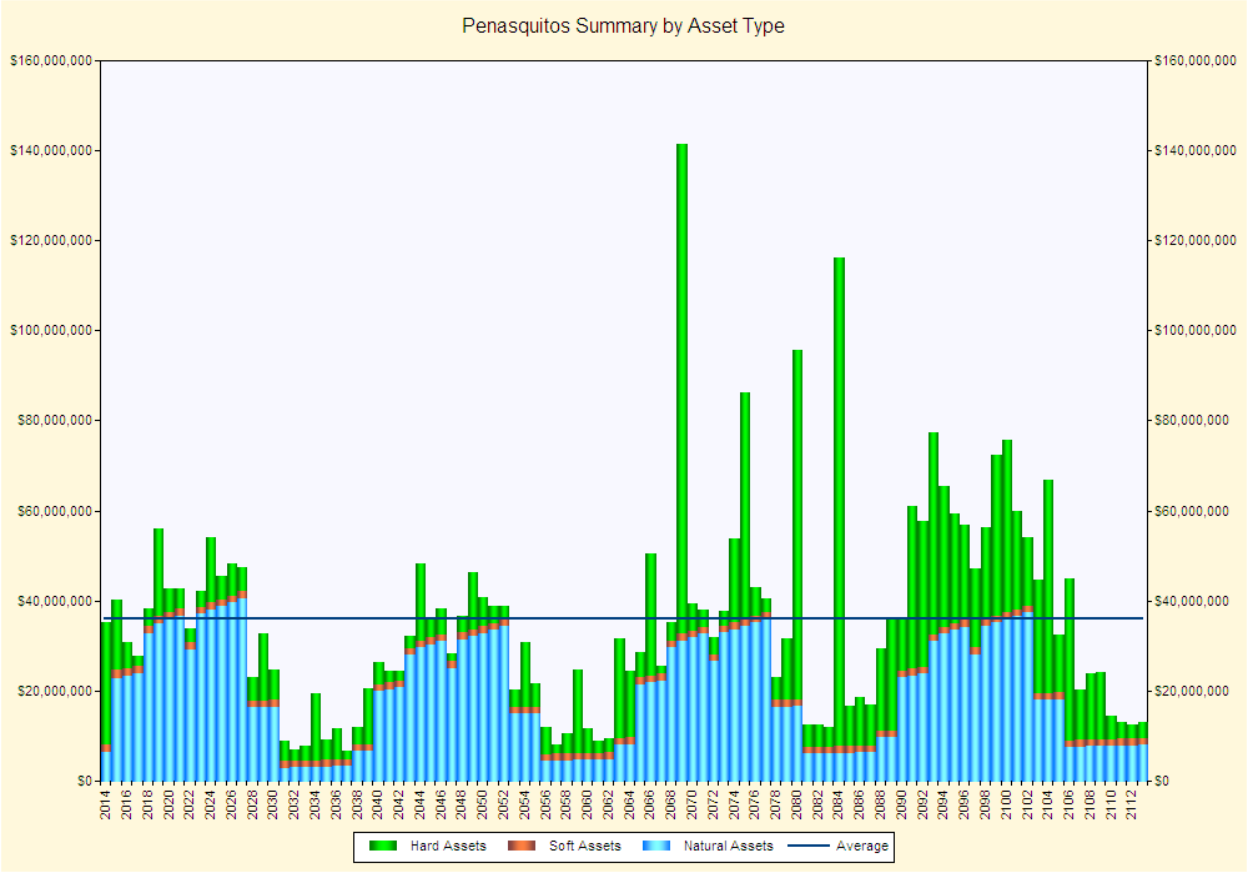


**Figure D-29. 100 Year Forecast by Asset Type - Los Peñasquitos Watershed**

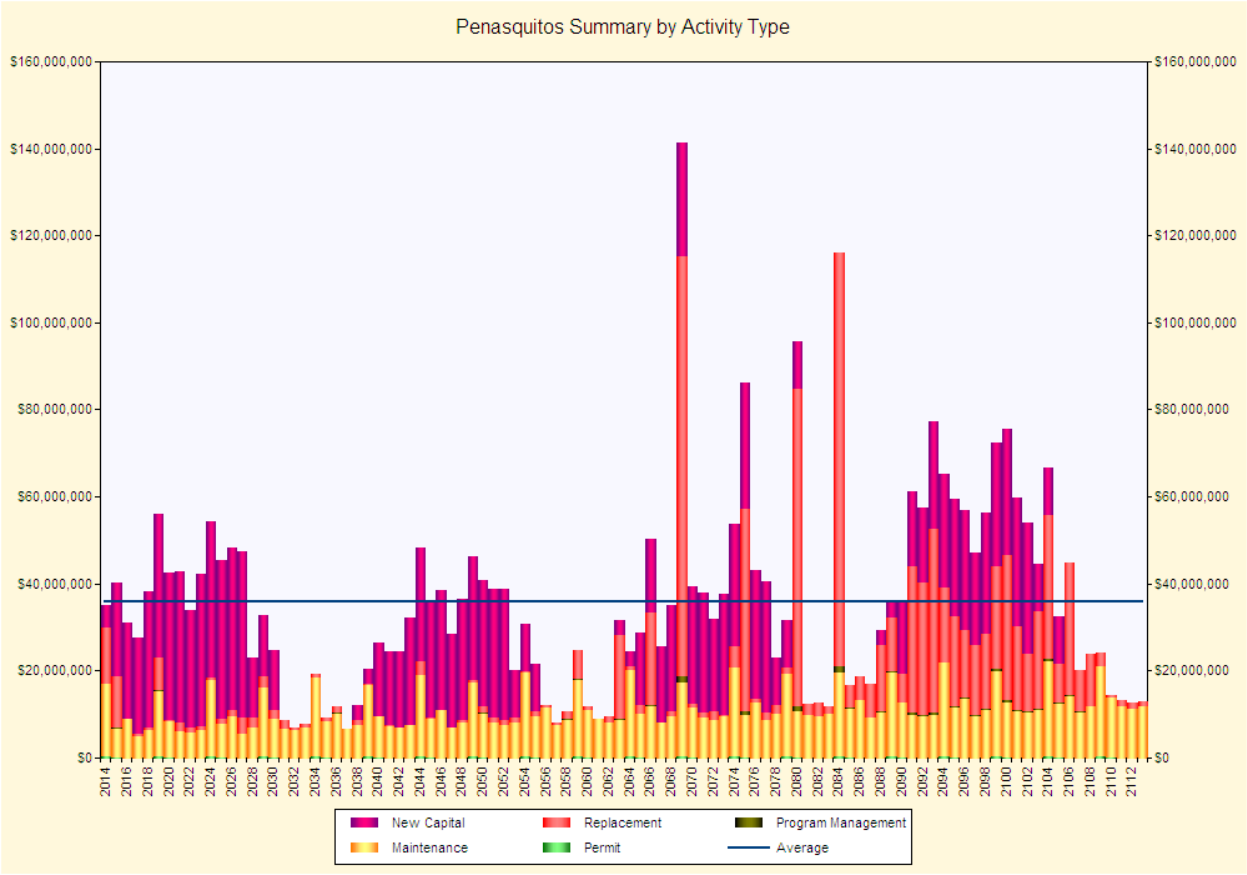


**Figure D-30. 100 Year Forecast by Activity Type - Los Peñasquitos Watershed**

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.

## D.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 Los Peñasquitos Watershed that would not be employed City-wide.

## D.9 ASSESSMENT MANAGEMENT IMPROVEMENT PLAN

The following sections describe the Asset Management Improvement Plan for the Los Peñasquitos Watershed.

### D.9.1 Confidence Level Rating for Los Peñasquitos Storm Watershed Asset Management Plan

See Main Document.

## D.10 RECOMMENDATIONS

The summary of activities for Fiscal Year 2014, organized by asset type and class, are listed in Tables D-12. In addition, Table D-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.

**Table D-12. FY 2014 Activity Summary - Los Peñasquitos Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | New Capital (Nw) | Program Management (Op) | Permit (PM) | Total | |
| **Hard Assets** | | | | | | | | | | | | | | |
| Channel | 33.12 | 37.92 | | | 7,988,484.95 | | | 7,988,484.95 | | | | 496,246.50 | 496,246.50 | 8,484,731.45 |
| Cleanout | 9.30 | 29.76 | | | | | | | 174,964.20 | | | | 174,964.20 | 174,964.20 |
| Culvert | 12.77 | 19.96 | | | | | | | 19,854.44 | | | | 19,854.44 | 19,854.44 |
| Drop Manhole | 13.78 | 29.13 | | | | | | | 10,709.10 | | | | 10,709.10 | 10,709.10 |
| Encased Storm Drain | 17.70 | 40.07 | | | | 25,400.00 | | 25,400.00 | 458.20 | | 385.87 | | 844.07 | 26,244.07 |
| Energy Dissipator | 18.69 | 61.17 | | | | 3,000,000.00 | | 3,000,000.00 | 559,285.30 | | 45,575.33 | | 604,860.63 | 3,604,860.63 |
| Headwall | 11.97 | 42.68 | | | | | | | 1,523,570.30 | | | | 1,523,570.30 | 1,523,570.30 |
| Inlet | 9.30 | 40.07 | | | | 40,000.00 | | 40,000.00 | 36,821.70 | | 607.67 | | 37,429.37 | 77,429.37 |
| Outlet | 40.07 | 40.07 | | | | 40,000.00 | | 40,000.00 | | | 607.67 | | 607.67 | 40,607.67 |
| Storm Drain | 10.90 | 61.97 | | | | 9,886,590.31 | | 9,886,590.31 | 2,663,262.87 | | 150,194.87 | | 2,813,457.74 | 12,700,048.05 |
| **Sub-total Hard Assets** | | | | | **7,988,484.95** | **12,991,990.31** | **-** | **20,980,475.26** | **4,988,926.11** | **-** | **197,371.42** | **496,246.50** | **5,682,544.03** | **26,663,019.29** |
| | | | | | | | | | | | | | | |
| **Natural Assets** | | | | | | | | | | | | | | |
| LOS 04-Monitoring activities to prioritize pollutant sources and measure effects of BMPs on runoff / discharge water quality. | 33.42 | 33.42 | 10.64 | 3.14 | | | | | 103,374.57 | | | | 103,374.57 | 103,374.57 |
| LOS 13-Activity 01 Enhance LID implementation for new development and redevelopment through zoning amendments | 32.00 | 32.00 | 10.19 | 3.14 | | | | | 169,202,51 | | | | 169,202,51 | 169,202,51 |
| LOS 13-Activity 02 Train Development Services Department staff on LID regulatory changes and LID Design Manual | 32.00 | 32.00 | 10.19 | 3.14 | | | | | 3,658,197.13 | | | | 3,658,197.13 | 3,658,197.13 |

**Table D-12. FY 2014 Activity Summary - Los Peñasquitos Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | New Capital (Nw) | Program Management (Op) | Permit (PM) | Total | |
| LOS 13-Activity 03 Develop regional training for and focus locally on enforcement of water-using mobile businesses | 32.00 | 32.00 | 10.19 | 3.14 | | | | | 6,347,426.28 | | | | 6,347,426.28 | 6,347,426.28 |
| LOS 13-Activity 05 Design and implement property- and PGA-based inspections and accelerated enforcement | 32.00 | 32.00 | 10.19 | 3.14 | | | | | 4,199,324.10 | | | | 4,199,324.10 | 4,199,324.10 |
| LOS 13-Activity 06 Trash areas: require full four-sided enclosure, siting away from storm drains, cover; consider retrofit requirement | 32.00 | 32.00 | 10.19 | 3.14 | | | | | 30,659.07 | | | | 30,659.07 | 30,659.07 |
| LOS 13-Activity 08 Nurseries and garden centers | 32.00 | 32.00 | 10.19 | 3.14 | | | | | 18,241.84 | | | | 18,241.84 | 18,241.84 |
| LOS 13-Activity 09 Auto-related uses | 32.00 | 32.00 | 10.19 | 3.14 | | | | | 16,436.96 | | | | 16,436.96 | 16,436.96 |
| LOS 13-Activity 10 Update Minimum BMPs for existing residential, commercial & industrial development & enforce | 32.00 | 32.00 | 10.19 | 3.14 | | | | | 239,530.86 | | | | 239,530.86 | 239,530.86 |
| LOS 13-Activity 11 Support partnership effort by social service providers to provide sanitation and trash management for persons experiencing homelessness | 32.00 | 32.00 | 10.19 | 3.14 | | | | | 14,681.15 | | | | 14,681.15 | 14,681.15 |
| LOS 13-Activity 12 Develop pilot project to identify and carry out site disconnections in targeted areas | 32.00 | 32.00 | 10.19 | 3.14 | | | | | 84,795.97 | | | | 84,795.97 | 84,795.97 |

**Table D-12. FY 2014 Activity Summary - Los Peñasquitos Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | New Capital (Nw) | Program Management (Op) | Permit (PM) | Total | |
| LOS 13-Activity 13 Continue to participate in source reduction initiatives | 32.00 | 32.00 | 10.19 | 3.14 | | | | | 20,112.01 | | | | 20,112.01 | 20,112.01 |
| LOS 13-Activity 14b Residential BMP Program: Rain Barrels | 32.00 | 32.00 | 10.19 | 3.14 | | | | | 339,927.07 | | | | 339,927.07 | 339,927.07 |
| LOS 13-Activity 15 Expand outreach to HOA common lands and HOA rebates | 32.00 | 32.00 | 10.19 | 3.14 | | | | | 47,317.77 | | | | 47,317.77 | 47,317.77 |
| LOS 13-Activity 17 Develop outreach and training program for property managers responsible for HOAs and Maintenance Districts | 32.00 | 32.00 | 10.19 | 3.14 | | | | | 15,403.13 | | | | 15,403.13 | 15,403.13 |
| LOS 13-Activity 18 Conduct trash clean-ups through community-based organizations involving target audiences | 32.00 | 32.00 | 10.19 | 3.14 | | | | | 57,743.48 | | | | 57,743.48 | 57,743.48 |
| LOS 13-Activity 19 Enhance education and outreach based on results of effectiveness survey and changing regulatory requirements | 32.00 | 32.00 | 10.19 | 3.14 | | | | | 19,103.46 | | | | 19,103.46 | 19,103.46 |
| LOS 13-Activity 20 Improve consistency & content of websites to highlight enforceable conditions & reporting methods | 32.00 | 32.00 | 10.19 | 3.14 | | | | | 361,391.67 | | | | 361,391.67 | 361,391.67 |
| LOS 13 Activity 22 Optimize catch basin cleaning to maximize pollutant removal | 32.00 | 32.00 | 10.19 | 3.14 | | | | | 119,221.03 | | | | 119,221.03 | 119,221.03 |

**Table D-12. FY 2014 Activity Summary - Los Peñasquitos Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | New Capital (Nw) | Program Management (Op) | Permit (PM) | Total | |
| LOS 13-Activity 25 Proactively monitor for erosion, and complete minor repair & slope stabilization | 32.00 | 32.00 | 10.19 | 3.14 | | | 44,089.36 | 44,089.36 | | | | | | 44,089.36 |
| LOS 13-Activity 26 Increase identification and enforcement of actionable erosion and slope stabilization issues on private property and require stabilization and repair | 32.00 | 32.00 | 10.19 | 3.14 | | | | | 308,950.37 | | | | 200,871.00 | 308,950.37 |
| LOS 13-Activity 36 Planned BMP | 32.00 | 32.00 | 10.19 | 3.14 | | | 765,008.14 | 765,008.14 | | | | | | 765,008.14 |
| LOS 14-Source identification and characterization studies | 33.42 | 33.42 | 10.64 | 3.14 | | | | | 843,454.31 | | | | 843,454.31 | 843,454.31 |
| 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). | 33.42 | 33.42 | 10.64 | 3.14 | | | | | | 76,427.99 | | | 76,427.99 | 76,427.99 |
| LOS 19-City Property-Initial site reconnassaince (2/3 of sites) to identify areas within City parcels with potential to capture/treat/store/infiltrate storm water and runoff. | 33.42 | 33.42 | 10.64 | 3.14 | | | | | | 160,397.20 | | | 160,397.20 | 160,397.20 |
| LOS 47-Permit monitoring | 33.42 | 33.42 | 10.64 | 3.14 | | | | | 284,687.07 | | | | 284,687.07 | 284,687.07 |
| **Sub-total Natural Assets** | | | | | - | - | **809,097.50** | **809,097.50** | **17,299,181.81** | **236,825.19** | - | - | **17,536,007.00** | **18,345,104.50** |
| | | | | | | | | | | | | | | |
| **Soft Assets** | | | | | | | | | | | | | | |

**Table D-12. FY 2014 Activity Summary - Los Peñasquitos Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | New Capital (Nw) | Program Management (Op) | Permit (PM) | Total | |
| 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 |
| LOS 12b-Land Development Regulations TMDL-Develop specification for 303(d) listings and TMDL, develop standard plans and specifications for LID and BMPs. | 47.50 | 47.50 | 9.50 | 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. | 34.50 | 34.50 | 6.90 | 5.00 | | | | | 205,000.00 | 166,666.67 | | | 371,666.67 | 371,666.67 |

**Table D-12. FY 2014 Activity Summary - Los Peñasquitos Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | New Capital (Nw) | Program Management (Op) | Permit (PM) | Total | |
| 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 deparatment-Complete a planning level study in all watersheds with 15% design concepts and costs, changes in regulatory, and develop cost sharing model. | 28.50 | 28.50 | 5.70 | 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. | 40.40 | 40.40 | 10.10 | 4.00 | | | | | 7,916.67 | 13,888.89 | | | 21,805.56 | 21,805.56 |
| 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 |

**Table D-12. FY 2014 Activity Summary - Los Peñasquitos Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | New Capital (Nw) | Program Management (Op) | Permit (PM) | Total | |
| 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. | 44.00 | 44.00 | 8.80 | 5.00 | | | | | 19,650.08 | 16,666.67 | | | 36,316.74 | 36,316.74 |
| 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 |

**Table D-12. FY 2014 Activity Summary - Los Peñasquitos Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP | | | | Operating Budget | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | New Capital (Nw) | Total | Maintenance (CM) | New Capital (Nw) | Program Management (Op) | Permit (PM) | Total | |
| LOS 53-Policy Procedures for other City Departments: storm drain maintenance NPDES-Increase number of engagements. Offer servcices of inspection contractor. | 7.30 | 7.30 | 7.30 | 1.00 | | | | | 1,666.67 | | | | 1,666.67 | 1,666.67 |
| **Sub-total Soft Assets** | | | | | - | - | - | - | **1,478,137.79** | **313,888.89** | - | - | **1,792,026.68** | **1,792,026.68** |
| | | | | | | | | | | | | | | |
| **Grand Total** | | | | | **7,988,484.95** | **12,991,990.31** | **809,097.50** | **21,789,572.76** | **23,766,245.71** | **550,714.08** | **197,371.42** | **496,246.50** | **25,010,577.71** | **46,800,150.47** |

**Table D-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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# Appendix E San Dieguito Watershed

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# E.1 INTRODUCTION

The San Dieguito 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 San Dieguito WMA. The San Dieguito 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 San Dieguito watershed, and provide a vehicle for public participation.

## E.1.1. San Dieguito Watershed Description

The San Dieguito River WMA is the fourth largest hydrologic unit in the San Diego region with a land area of approximately 434 square miles in west-central San Diego County. The watershed includes portions of the cities of Del Mar, Escondido, Poway, San Diego, and Solana Beach, and unincorporated San Diego County. The Water Quality Control Plan for the San Diego Basin (Basin Plan) prepared by the RWQCB (SDRWQCB, 1994) defines the San Dieguito WMA as consisting of five hydrological areas (HAs), namely Solana Beach (905.1), Hodges (905.2), San Pasqual (905.3), Santa Maria Valley (905.4) and Santa Ysabel Hydrologic Areas (905.5). The San Dieguito River and its tributaries function as the main drainage channel for the WMA. The San Dieguito River drainage receives water from several low mountain areas east of Del Mar, including Santa Ysabel, Ramona, and San Pasqual. Rainfall in the WMA ranges from 10.5 inches along the coast to 31.5 inches in the inland areas. Table E-1 provides data on the percentage of each jurisdiction within the WMA at the watershed level, and Figure E-1 shows the City's jurisdiction within the watershed.

**Table E-1. San Dieguito WMA Jurisdictional Breakdown**

| Jurisdiction | Acres in Watershed | Percent of Watershed |
|---|---|---|
| Del Mar | 992 | <1 |
| Escondido | 5,950 | 3 |
| Poway | 9,011 | 4 |
| San Diego | 27,346 | 12 |
| County of San Diego | 176,642 | 80 |

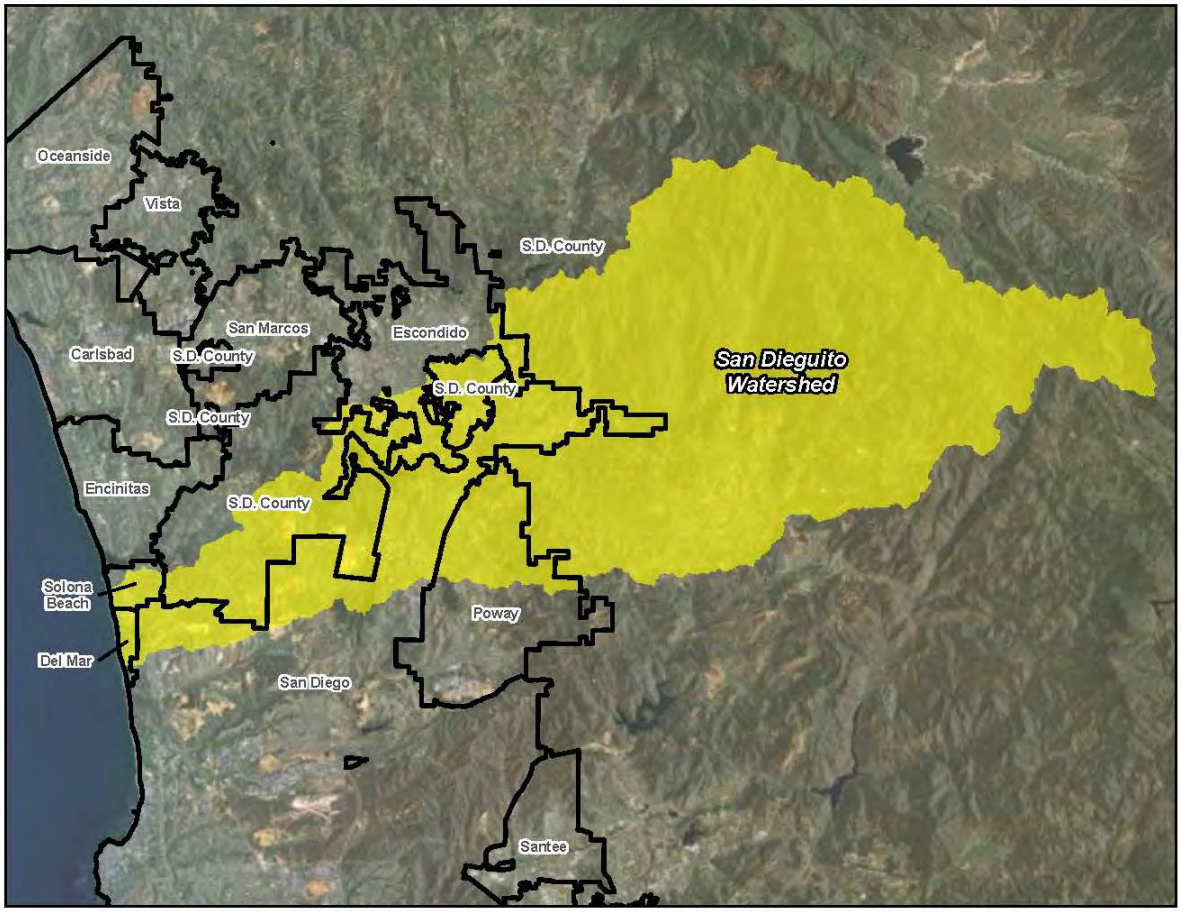


**Figure E-1. San Dieguito Watershed**

The San Dieguito River watershed is presently divided into vacant/undeveloped (54%), parks/open space (29 %), and urban (18%) land uses. Nearly half of the vacant land area is open to future development, most of which is zoned for residential usage. The current watershed population is approximately 125,000 however; this level is projected increase to over 210,000 residents by 2015.

The WMA extends through a diverse array of habitats from its eastern headwaters in the Volcan Mountains to the outlet at the San Dieguito Lagoon and the Pacific Ocean. There are several important natural areas within the WMA that sustain a number of threatened and endangered species. Among these are the 55-mile long, 80,000 acre San Dieguito River Park, the 150 acre San Dieguito Lagoon, and five water storage reservoirs including Lake Hodges, Lake Sutherland, and Lake Poway.

Special-status species identified in the WMA include San Diego horned lizard, orange-throated whiptail, common loon, brown pelican, white-faced ibis, osprey, north harrier, sharp-shinned hawk, Western snowy plover, long-billed curlew, California gull, elegant tern, California least tern, black skimmer, tricolor blackbird, Belding's Savannah sparrow, and California gnatcatcher.

### E.1.2. San Dieguito 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 San Dieguito Watershed:

- Gus Brown
- Gene Matter
- Sumer Hasenin

### E.1.3. Water Quality

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

[1] San Dieguito Watershed Urban Runoff Management Program, Annual Report 2010-2011, City of Del mar, City of Escondido, City of Poway, County of San Diego, City of San Diego, and City of Solano Beach.

**Table E-2. San Dieguito Watershed Baseline High-priority Water Quality Problems**

| Hydrologic Area | Bacteria | Nutrients |
|---|---|---|
| **Solano Beach Hydrologic Area** | | |
| 905.1 | X | |
| **Hodges Hydrologic Area** | | |
| 905.2 | X | |
| **San Pasqual Hydrologic Area** | | |
| 905.3 | X | X |
| **Santa Maria Valley Hydrologic Area** | | |
| 905.4 | X | |
| **Santa Ysabel Valley Hydrologic Area** | | |
| 905.5 | X | |

Water bodies in the San Dieguito WMA and constituents that have been placed on the State Water SWRCB 2010 Section 303(d) list are presented in Table E-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 E-3. San Dieguito 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 |
|---|---|---|---|---|---|---|---|---|
| Cloverdale Creek | River & Stream | 90532000 / 18070304 | Yes | Phosphorus | 1.2 Miles | 2002 | 5A | 2019 |
| | | | | Total Dissolved Solids | 1.2 Miles | 2002 | 5A | 2019 |
| Felicita Creek | River & Stream | 90523000 / 18070304 | Yes | Aluminum | 0.92 Miles | 2006 | 5A | 2019 |
| | | | | Total Dissolved Solids | 0.92 Miles | 2002 | 5A | 2019 |
| Green Valley Creek | River & Stream | 90521000 / 18070304 | Yes | Chloride | 0.98 Miles | 2006 | 5A | 2019 |
| | | | | Manganese | 0.98 Miles | 2006 | 5A | 2019 |
| | | | | Pentachlorophenol (PCP) | 0.98 Miles | 2006 | 5A | 2019 |
| | | | | Sulfates | 0.98 Miles | 2002 | 5A | 2019 |
| Lake Hodges | Lake & Reservoir | 90521000 / 18070304 | Yes | Color | 1104 Acres | 2002 | 5A | 2019 |
| | | | | Manganese | 1104 Acres | 2006 | 5A | 2019 |
| | | | | Mercury | 1104 Acres | 2010 | 5A | 2021 |
| | | | | Nitrogen | 1104 Acres | 2002 | 5A | 2019 |
| | | | | Phosphorus | 1104 Acres | 2002 | 5A | 2013 |
| | | | | Turbidity | 1104 Acres | 2006 | 5A | 2019 |
| | | | | pH | 1104 Acres | 2006 | 5A | 2019 |

**Table E-3. San Dieguito 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 |
|---|---|---|---|---|---|---|---|---|
| Kit Carson Creek | River & Stream | 90521000 / 18070304 | Yes | Pentachlorophenol (PCP) | 0.99 Miles | 2006 | 5A | 2019 |
| | | | | Total Dissolved Solids | 0.99 Miles | 2002 | 5A | 2019 |
| Pacific Ocean Shoreline, San Dieguito HU, at San Dieguito Lagoon Mouth at San Dieguito River Beach | Coastal & Bay Shoreline | 90511000 / 18070304 | Yes | Total Coliform | 0.03 Miles | 1998 | 5A | 2010 |
| San Dieguito River | River & Stream | 90511000 / 18070304 | Yes | Enterococcus | 19 Miles | 2010 | 5A | 2021 |
| | | | | Fecal Coliform | 19 Miles | 2010 | 5A | 2021 |
| | | | | Nitrogen | 19 Miles | 2010 | 5A | 2021 |
| | | | | Phosphorus | 19 Miles | 2010 | 5A | 2021 |
| | | | | Total Dissolved Solids | 19 Miles | 2010 | 5A | 2021 |
| | | | | Toxicity | 19 Miles | 2010 | 5A | 2021 |

**Table E-3. San Dieguito 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 |
|---|---|---|---|---|---|---|---|---|
| Santa Ysabel Creek (above Sutherland Reservoir) | River & Stream | 90553000 / 18070304 | Yes | Toxicity | 12 Miles | 2010 | 5A | 2021 |
| Sutherland Reservoir | Lake & Reservoir | 90553000 / 18070304 | Yes | Color | 561 Acres | 2002 | 5A | 2019 |
| | | | | Iron | 561 Acres | 2010 | 5A | 2021 |
| | | | | Manganese | 561 Acres | 2006 | 5A | 2019 |
| | | | | Total Nitrogen as N | 561 Acres | 2010 | 5A | 2021 |
| | | | | pH | 561 Acres | 2006 | 5A | 2019 |

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### E.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 San Dieguito Watershed are listed in Table E-4.

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## Table E-4. San Dieguito 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 | |
| 1 | San Dieguito | Rancho Bernardo Rd & Bernardo Center Dr | 116 | -- | 116 | 15 |
| 2 | San Dieguito | Rancho Bernardo | 1,811 | 1,811 | -- | 14 |
| 3 | San Dieguito | Rancho Bernardo | 2,487 | 2,439 | 48 | 14 |

**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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## E.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 San Dieguito Watershed asset category (i.e., hard, soft, and natural).

### E.2.1. Hard Assets

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

**Table E-5. San Dieguito Watershed Hard Assets**

| Asset Class/Subclass | Asset Count | Total Length (feet) | Total Length (miles) |
|---|---|---|---|
| Conveyance System: | | | |
| • Box Culvert | 42 | 5,513 | 1.04 |
| • Brow Ditch | 68 | 15,700 | 2.97 |
| • Channel | 152 | 48,964 | 9.27 |
| • Storm Drain Pipe | 2,728 | 359,413 | 68.07 |
| Structures: | | | |
| • Cleanout | 857 | | |
| • Inlet | 1,445 | | |
| • Energy Dissipator | 113 | | |
| • Headwall | 375 | | |
| • Outlet | 367 | | |
| • Spillway | 20 | | |
| **Total** | **3,177** | **429,591** | **81.36** |

In terms of asset count, inlets account for 45 percent of San Dieguito Watershed storm water structures assets, followed by cleanouts and headwalls, with 27 percent and 12 percent, respectively. Within the conveyance system, the dominant asset type is the storm drain system, which accounts for 84 percent (68 miles) of total conveyance length. The detailed distribution of the storm water conveyance and structures is shown in Figures E-2 and E-3.

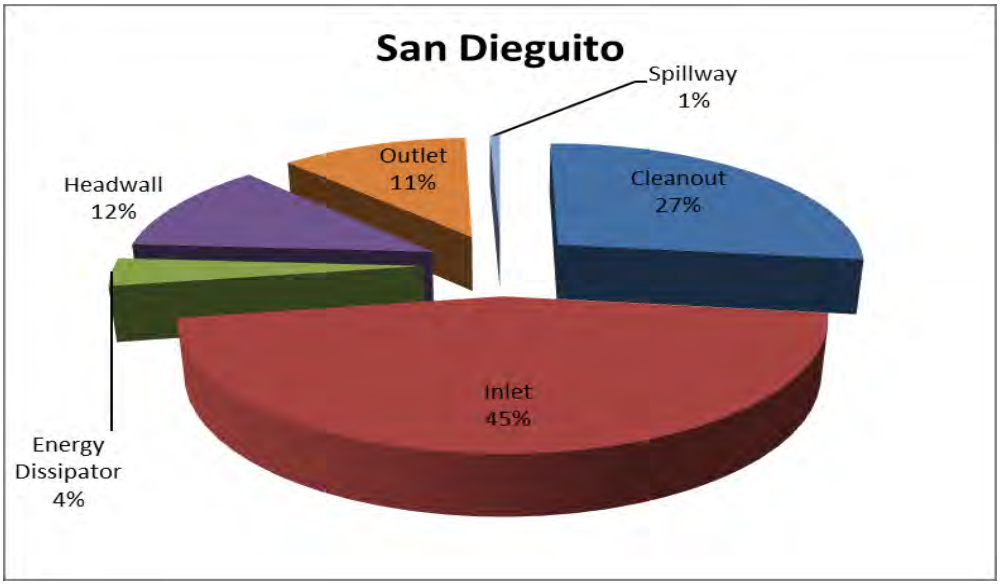


**Figure E-2. Distribution of Storm Water Structures by Asset Count - San Dieguito Watershed**

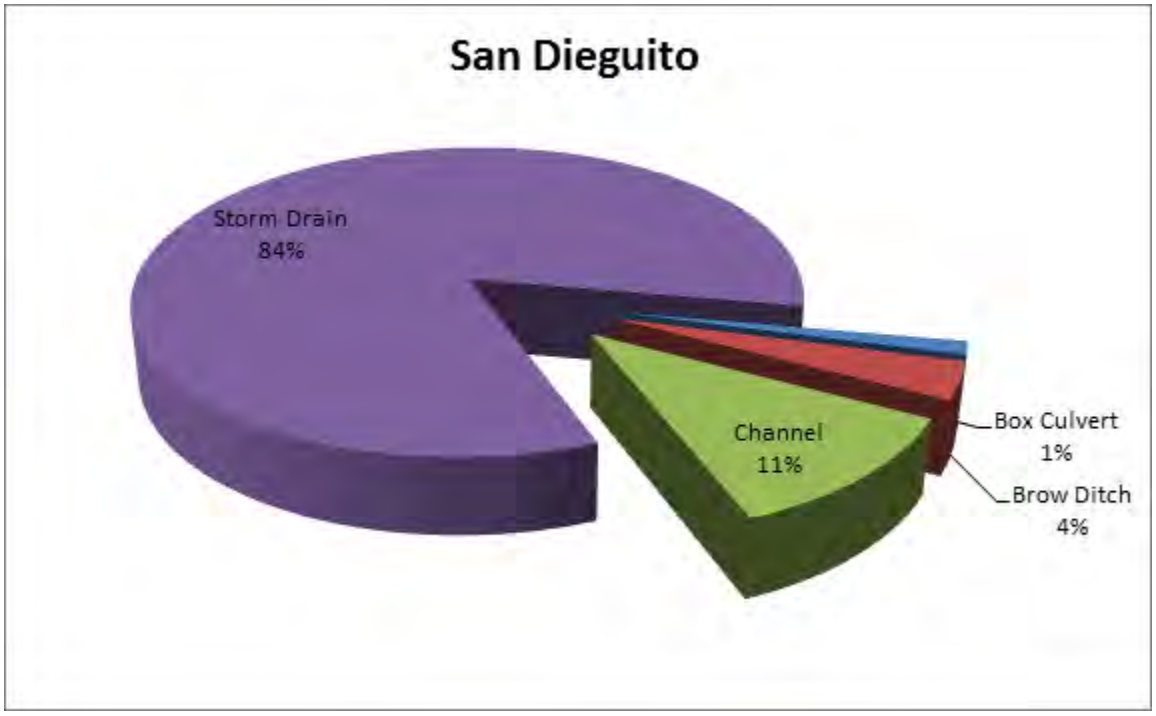


**Figure E-3. Distribution of Storm Water Conveyance by Length - San Dieguito Watershed**

In addition to those assets listed in Table E-4, there is additional equipment that is not particularly part of the San Dieguito 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 E-6 shows the list of assets within this category and their quantities.

**Table E-6. The Equipment**

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

## E.2.2. Natural Assets

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

**Table E-7. San Dieguito Watershed Natural Asset Classes/Subclasses and Quantities**

| Asset Class/Subclass | Quantity in San Dieguito Watershed |
|---|---|
| Receiving Waters | Currently treated as one asset within the San Dieguito Watershed. For future updates, recommend to refine into specific receiving water assets. For the San Dieguito Watershed, there are 1,761 receiving waters/segments. |
| Runoff/Discharges | Currently treated as one asset within the San Dieguito Watershed. For future updates, manage runoffs and discharges at the hydrologic sub-area level as defined in the CLRP. There are 367 mainstem outfalls in the San Dieguito Watershed, which will be associated with the hydrologic sub-areas defined in the CLRP |
| City Parcels | There are 232 City Parcels in the San Dieguito Watershed. |
| MHPAs | There are 113 MHPAs in the San Dieguito Watershed. |

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

## E.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 E-8 shows the soft asset classes and the quantities of assets in those classes in the San Dieguito Watershed.

**Table E-8. San Dieguito Watershed Soft Asset Subclasses and Quantities**

| Asset Class/Subclass | Quantity in San Dieguito Watershed |
|---|---|
| City Department Behavior | Currently treated as one asset in the San Dieguito 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 San Dieguito 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 | |

## E.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 costs 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 E-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 San Dieguito Watershed is provided below in Table E-9. Of the total, the conveyance system accounts for about 69 percent of the total replacement costs and structures account for 31 percent. Figure E-4 shows the distribution of San Dieguito Watershed hard asset replacement costs.

**Table E-9. San Dieguito Watershed Assets Replacement Costs**

| Asset Class/Subclass | Replacement Cost | Total Replacement Costs |
|---|---|---|
| Conveyance System: | | |
| • Box Culvert | $250,000/unit | $10.5million |
| • Brow Ditch | $400/linear feet | $6.2 million |
| • Channel | $400/linear feet | $19.6 million |
| • Storm Drain | $400/linear feet | $144 million |
| Structures: | | |
| • Cleanout | $20,000/unit | $17.1 million |
| • Inlet | $20,000/unit | $29.0 million |
| • Energy Dissipater | $40,000/unit | $4.5 million |
| • Headwall | $40,000/unit | $15.0 million |
| • Outlet | $40,000/unit | $14.7 million |
| • Spillway | $15,000/unit | $300,000 |
| **Total** | | **$260.7 million** |

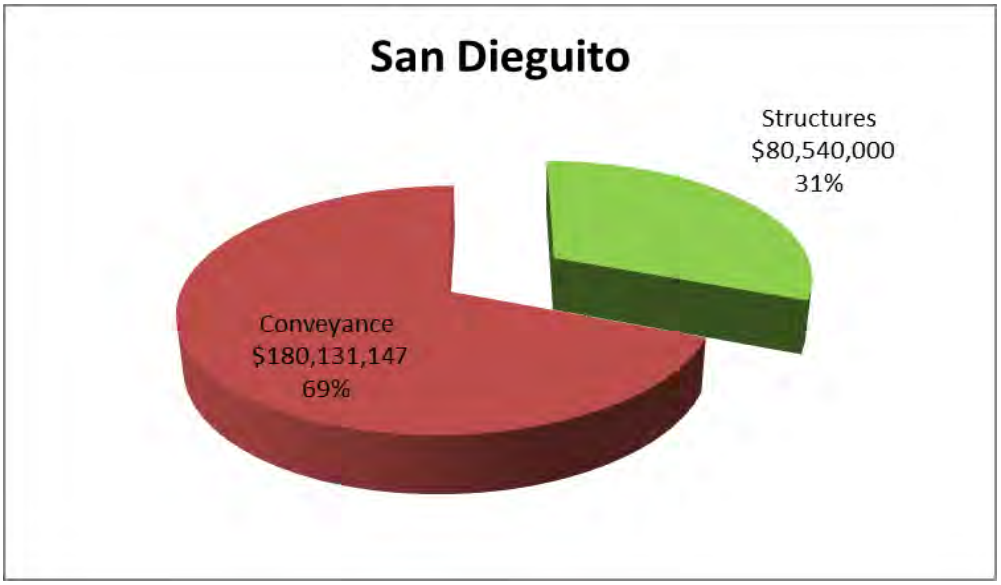


**Figure E-4. San Dieguito Watershed Hard Assets Replacement Costs**

Figure E-5 shows the distribution of conveyance system asset replacement costs. Of the total conveyance system, about 80 percent consists of storm drains; followed by channels, box culverts, and brow ditches.

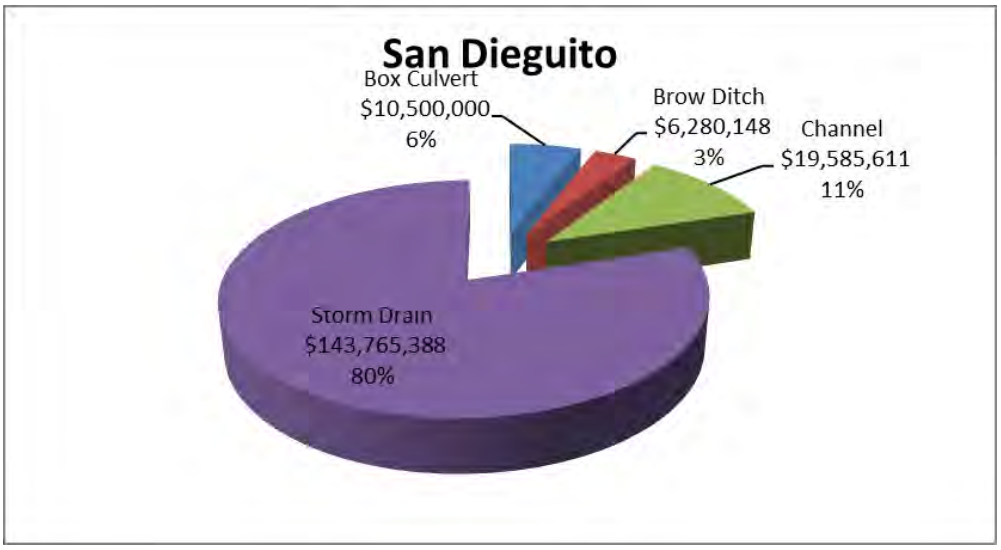


**Figure E-5. San Dieguito Watershed Conveyance System Assets Replacement Costs**

Figure E-6 shows the distribution of the asset replacement costs for storm water structures. Of the total system, most of structures consist of inlets (36 percent), followed by cleanouts (21 percent), headwalls (19 percent), and outlet (18 percent). The two remaining asset classes, energy dissipators and spillways represent 6 percent of the total asset replacement costs.

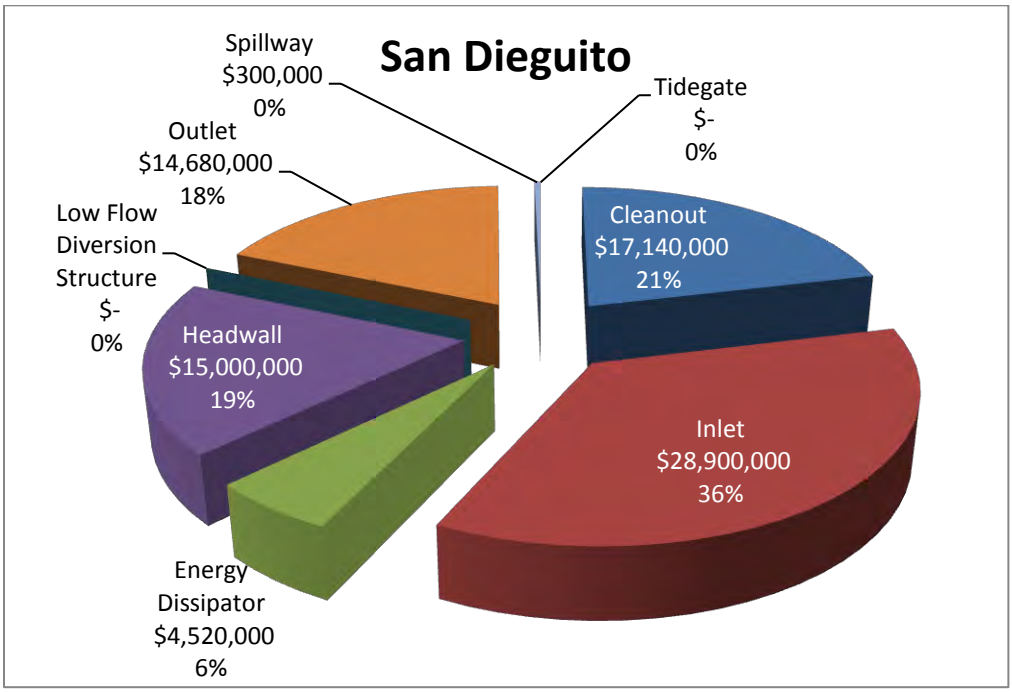


**Figure E-6. San Dieguito Watershed Storm Water Structures Asset Replacement Costs**

In addition to hard assets managed under San Dieguito watershed above, there is equipment that is managed at the Division level. Figure E-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).

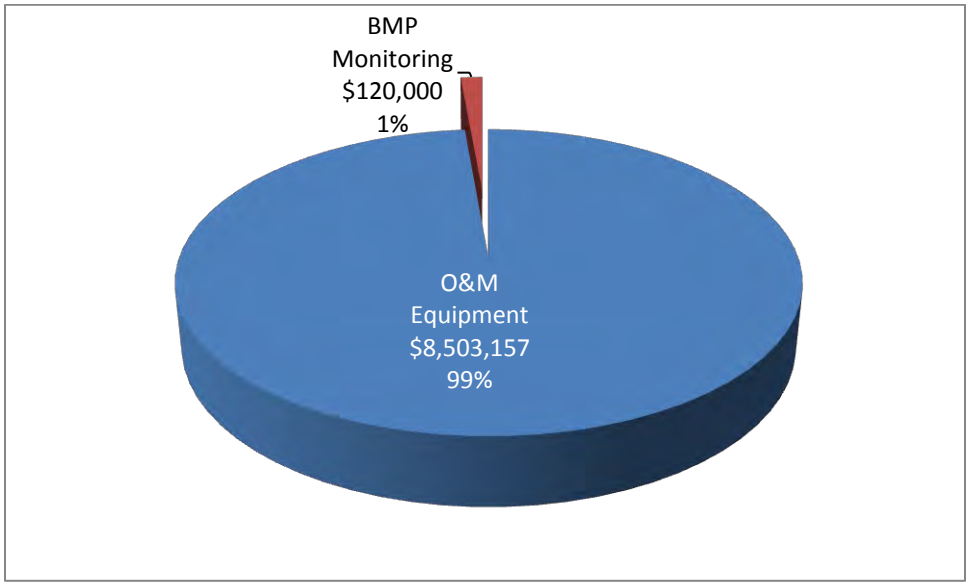


**Figure E-7. The Division's Equipment Asset Replacement Costs**

## E.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 E-8 shows the historical asset installation profile of the San Dieguito 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 late-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 between mid-1990s to early-2000.

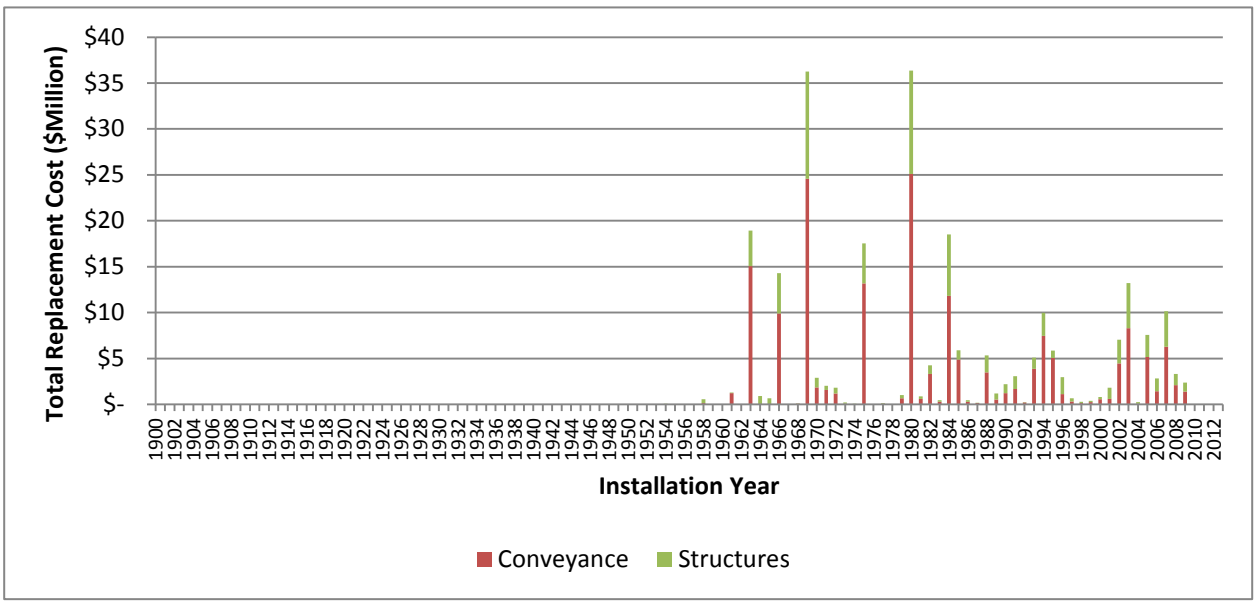


**Figure E-8. Installation Profile - San Dieguito Watershed**

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 E-9, among the total of 6,167 assets listed in the San Dieguito asset inventory excluding equipment, about 89 percent are either in excellent or good condition (condition 1 and condition 2 ) and only 1 percent of the assets are in immediate need of attention

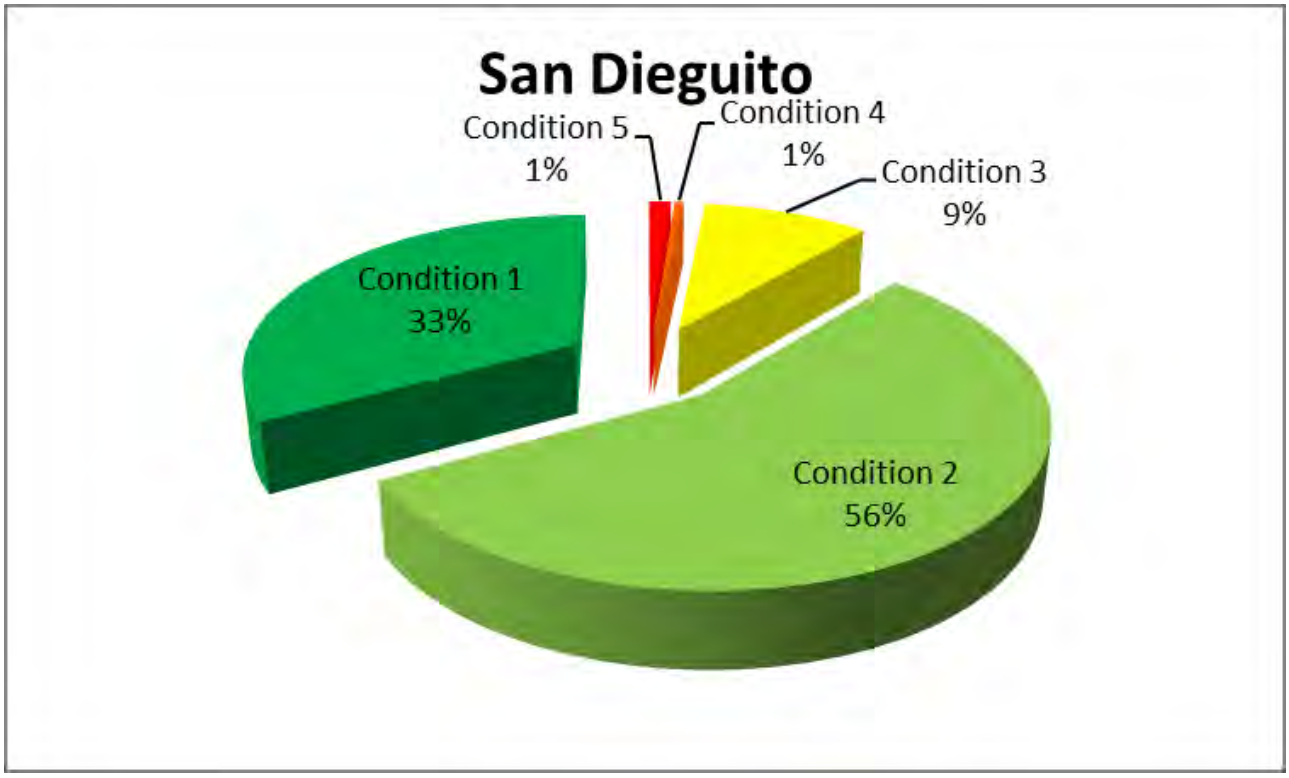


**Figure E-9. Summary of Hard Asset Conditions - San Dieguito Watershed**

As shown in (Figure E-10), both conveyance and structure mostly are in condition 3 or better with only 2 percent of the asset in condition 4 or worse.

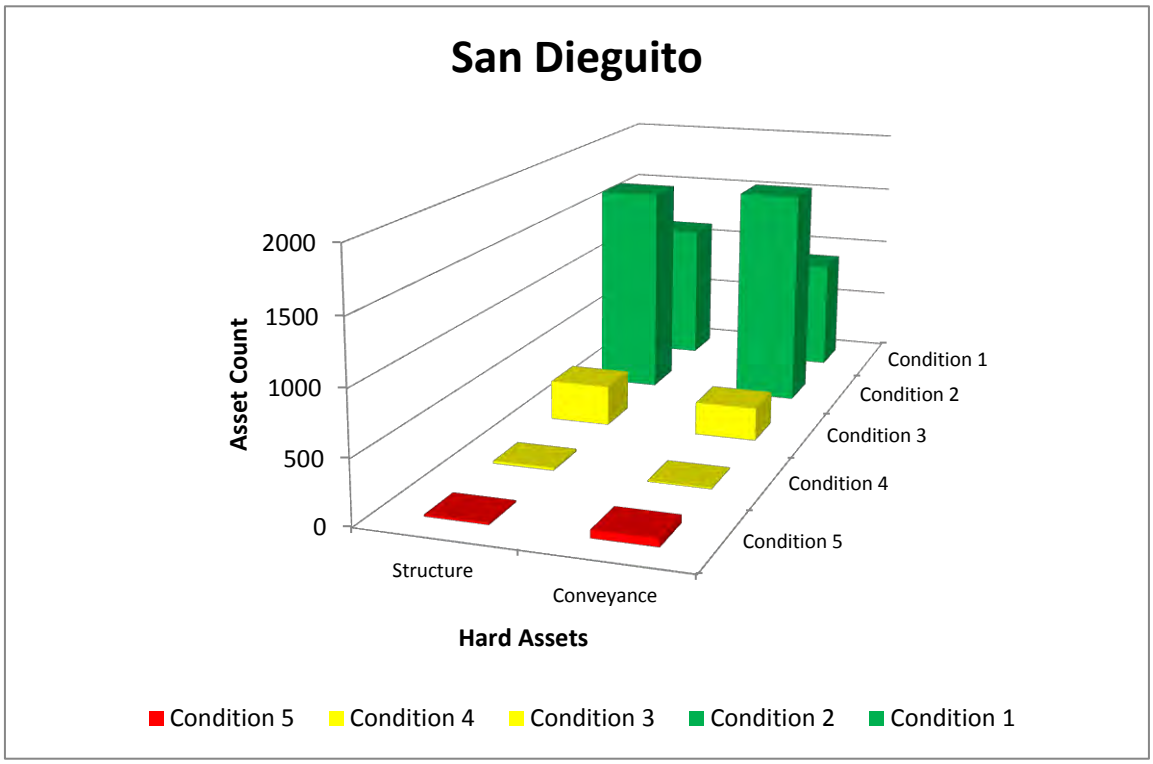


**Figure E-10. Summary of Hard Asset Conditions by Asset Class - San Dieguito Watershed**

Figure E-11 provides a summary of the conveyance system asset conditions for the San Dieguito Watershed. Within the conveyance system, storm drains account for most of the assets that are condition 4 or worse (96 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.

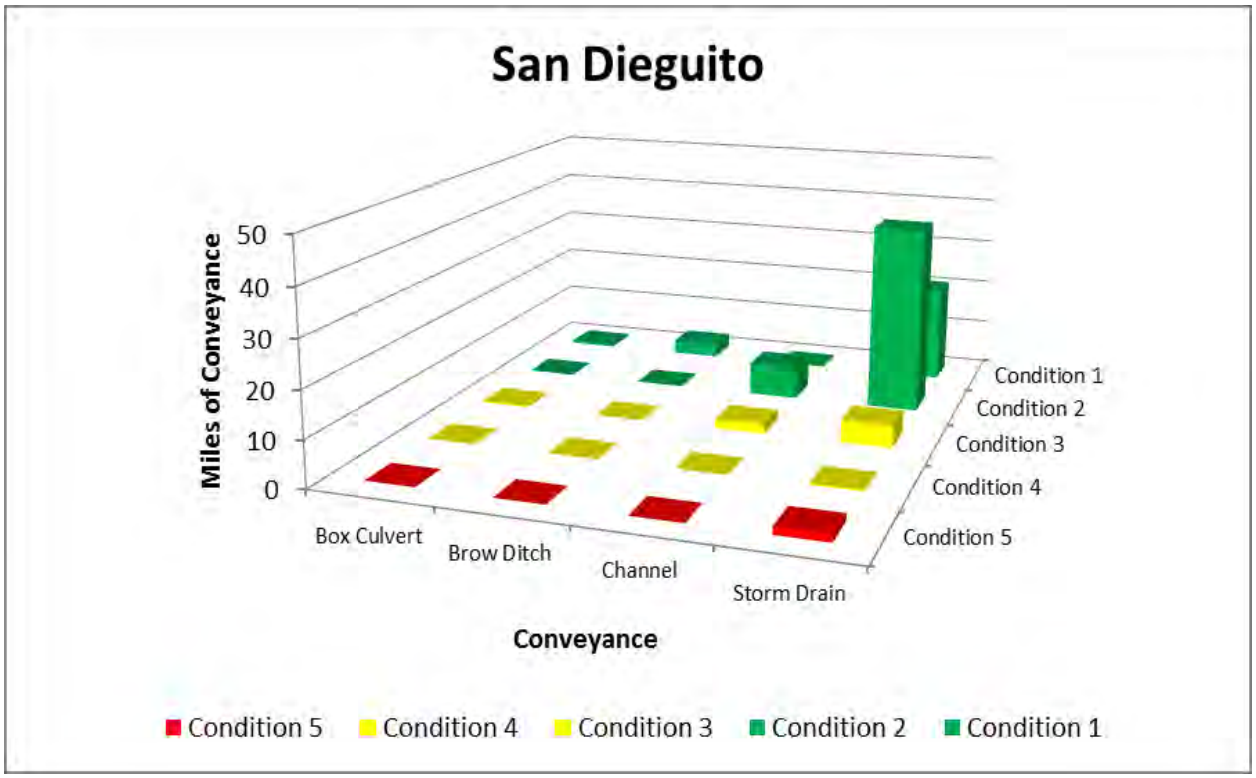


**Figure E-11. Summary of Conveyance System Conditions - San Dieguito Watershed**

Figure E-12 provides a summary of the conditions of the storm water structures for the San Dieguito 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.

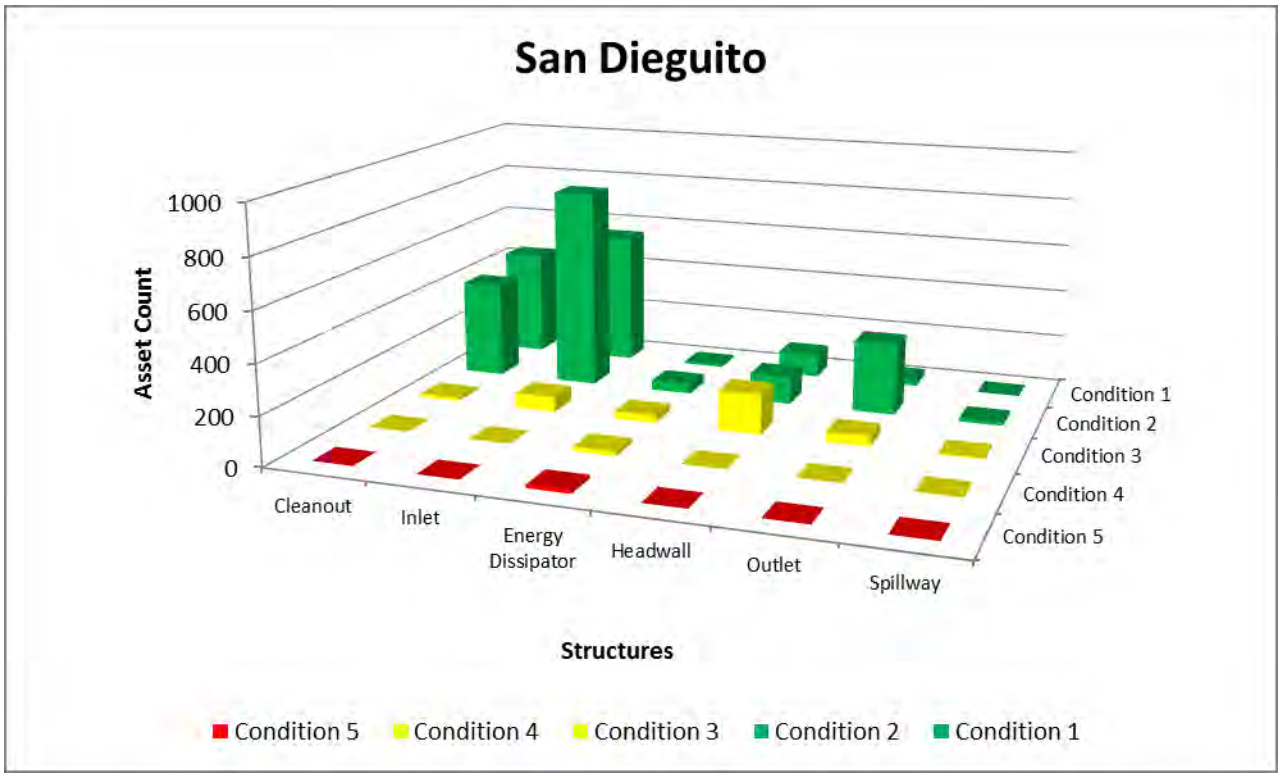


**Figure E-12. Summary of Conditions of Storm Water Structures - San Dieguito Watershed**

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

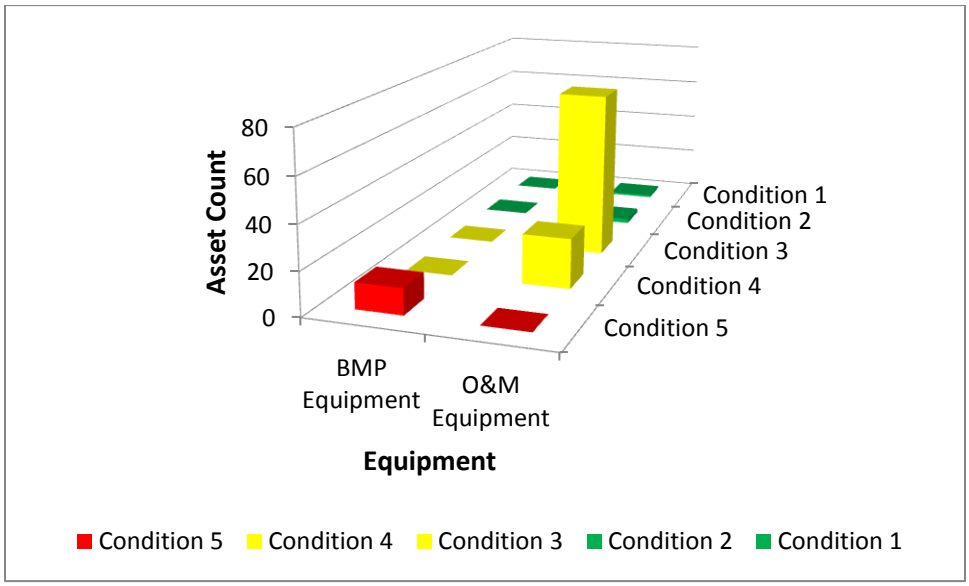


**Figure E-13. Summary of Conditions of Equipment Assets – San Dieguito Watershed**

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 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, assets with short expected useful lives will be consumed more quickly than assets with long useful lives.

The San Dieguito Watershed system consumption profile is presented in Figure E-14. The figure shows that the majority of the Division's hard assets are 30 to 45 percent consumed. Less than 2 percent of the hard assets have reached or exceeded their useful life.

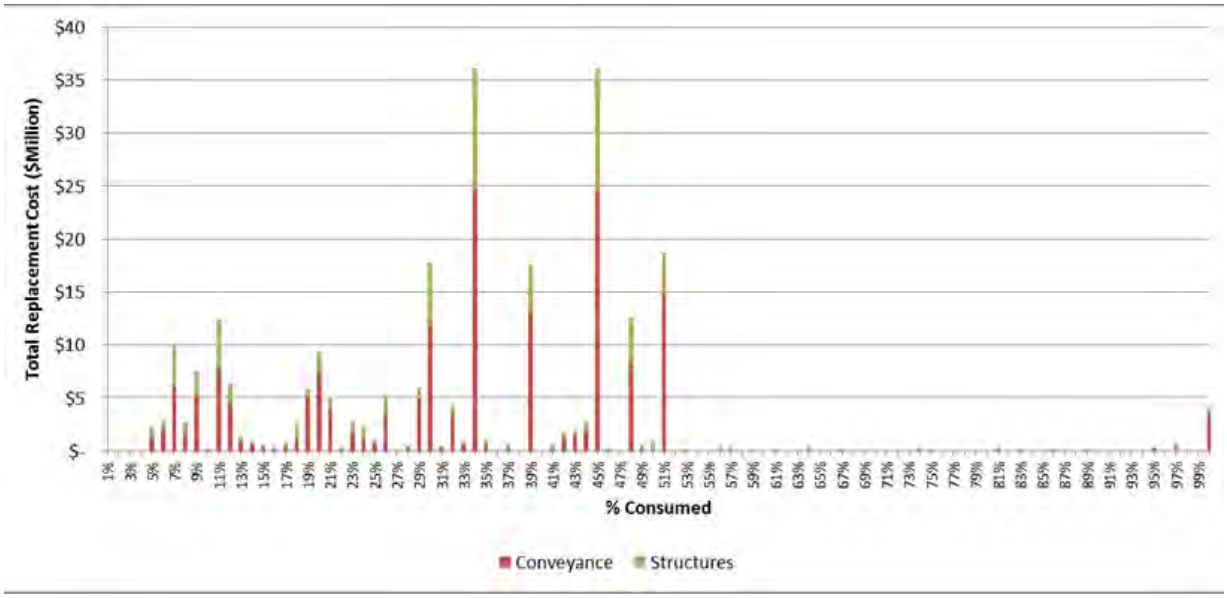


**Figure E-14. Consumption Profile – San Dieguito Watershed**

## E.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 San Dieguito Watershed, whether they are achieving the desired LOSs, and the necessary actions to achieve their LOSs. Table E-10 lists each asset class in the watershed, whether it is achieving its LOS, and the necessary actions to achieve its LOS.

**Table E-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 E-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 E-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 E-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 E-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 are 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 E-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 E-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 E-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 E-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 E-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 E-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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## E.6 WHEN DO WE NEED IT?

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

### E.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 E-11 lists the BRE scores for the San Dieguito 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 E.7. The specific actions and projects slated for Fiscal Year 2015 are presented in Section E.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 E-11. Soft and Natural Asset BRE Scores - San Dieguito 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 | 3 for all subwatersheds | Area-weighted CPI Dr/Wet composite score for all subwatersheds (3.08) | 2 for all subwatersheds | 4 for all subwatersheds | 6.824 for all subwatersheds | Area-weighted CPI Dry/Wet score for all subwatersheds (3.08) | 21.0 for all subwatersheds | |
| 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. | | | | | | | | | | | |
| 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 | 5 | 3 | 4 | 5 | 10.2 | 5 | 51 | High |

**Table E-11. Soft and Natural Asset BRE Scores - San Dieguito 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 | | | | |
| 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 | 3 | 1 | 4 | 2 | 1 | 3 | 6.6 | 5 | 33 | Medium |
| 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 |
| 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 |

**Table E-11. Soft and Natural Asset BRE Scores - San Dieguito 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 | | | | |
| 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 | 3 | 5 | 6.56 | 5 | 32.8 | 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 | 5 | 4 | 3 | 5 | 9.5 | 5 | 47.5 | 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 | Per TMDL schedules | 1 for all subwatersheds | 1 for all subwatersheds | 3 for all subwatersheds | Area-weighted CPI Dry score fall subwatershed (1.53) | 2 for all subwatersheds | 4 for all subwatersheds | 6.359 for all subwatersheds | 1 for all subwatersheds | 6.4 for all subwatersheds | Low |
| 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 | Per TMDL schedules | 1 for all subwatersheds | 1 for all subwatersheds | 3 for all subwatersheds | Area-weighted CPI Wet score for all subwatershed (1.55) | 2 for all subwatersheds | 4 for all subwatersheds | 6.365 for all subwatersheds | 1 for all subwatersheds | 6.4 for all subwatersheds | Low |

**Table E-11. Soft and Natural Asset BRE Scores - San Dieguito 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 | | | | |
| 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 | 3 for all subwatersheds | Area-weighted CPI Dr/Wet composite score for all subwatersheds (3.08) | 2 for all subwatersheds | 4 for all subwatersheds | 6.824 for all subwatersheds | Area-weighted CPI Dry/Wet score for all subwatersheds (3.08) | 21.0 for 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 | 3 for all subwatersheds | Area-weighted CPI Dr/Wet composite score for all subwatersheds (3.08) | 2 for all subwatersheds | 4 for all subwatersheds | 6.824 for all subwatersheds | Area-weighted CPI Dry/Wet score for all subwatersheds (3.08) | 21.0 for 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 | 3 for all subwatersheds | Area-weighted CPI Dr/Wet composite score for all subwatersheds (3.08) | 2 for all subwatersheds | 4 for all subwatersheds | 6.824 for all subwatersheds | Area-weighted CPI Dry/Wet score for all subwatersheds (3.08) | 21.0 for all subwatersheds | Low |
| 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. | | | | | | | | | | | |

**Table E-11. Soft and Natural Asset BRE Scores - San Dieguito 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 | | | | |
| 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 | 2 | 3 | 2 | 3 | 5.7 | 5 | 28.5 | Medium |
| 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 | 5 | 4 | 4 | 5 | 10.1 | 4 | 40.4 | 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 |

**Table E-11. Soft and Natural Asset BRE Scores - San Dieguito 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 | | | | |
| 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. | | | | | | | | | | | |
| 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. | | | | | | | | | | | |

**Table E-11. Soft and Natural Asset BRE Scores - San Dieguito 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 | | | | |
| 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. | | | | | | | | | | | |
| 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 | 3 for all subwatersheds | Area-weighted CPI Dr/Wet composite score for all subwatersheds (3.08) | 2 for all subwatersheds | 4 for all subwatersheds | 6.824 for all subwatersheds | Area-weighted CPI Dry/Wet score for all subwatersheds (3.08) | 21.0 for all subwatersheds | Low |
| Equipment – (Monitoring Equipment ≥ $5K) | 48. Sufficient equipment is available 90% of the time to conduct monitoring activities. | | | | | | | | | 3.35 | | 0 | |

**Table E-11. Soft and Natural Asset BRE Scores - San Dieguito 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 | 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 | Medium |
| 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

## E.6.2. Hard Asset BRE

The hard assets BRE scores were calculated for each individual hard asset listed in the San Dieguito Watershed asset inventory. BRE scores are shown in three major categories: high, medium, and low. Figure E-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.

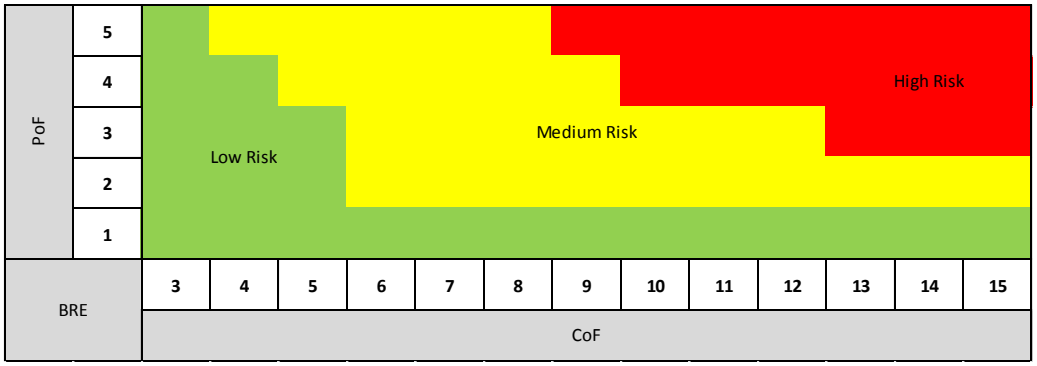


**Figure E-15. Hard Asset Risk Category Map**

Figure E-16 shows the summary of hard asset BRE scores by hard asset classes. Of the 6,167 total hard assets, 98 percent fall into the low risk category, followed by less than 2 percent in the medium or high risk category.

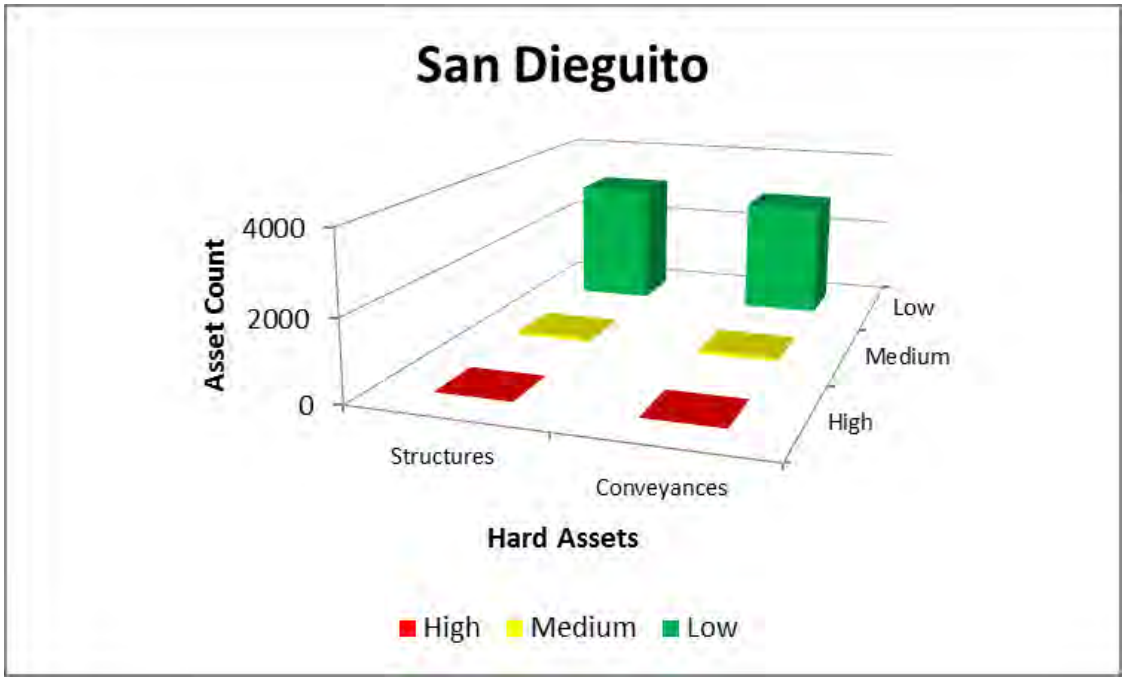


**Figure E-16. Hard Asset BRE Scores by Asset Classes - San Dieguito Watershed**

Figure E-17 shows the BRE score summary for the storm water conveyance system in San Dieguito Watershed. There are total of 1 mile of box culvert, 3 miles of brow ditch, 10 miles of channel, and 68 miles of storm drain. Out of all the conveyance systems, only storm drain and box culvert have assets that are in high risk.

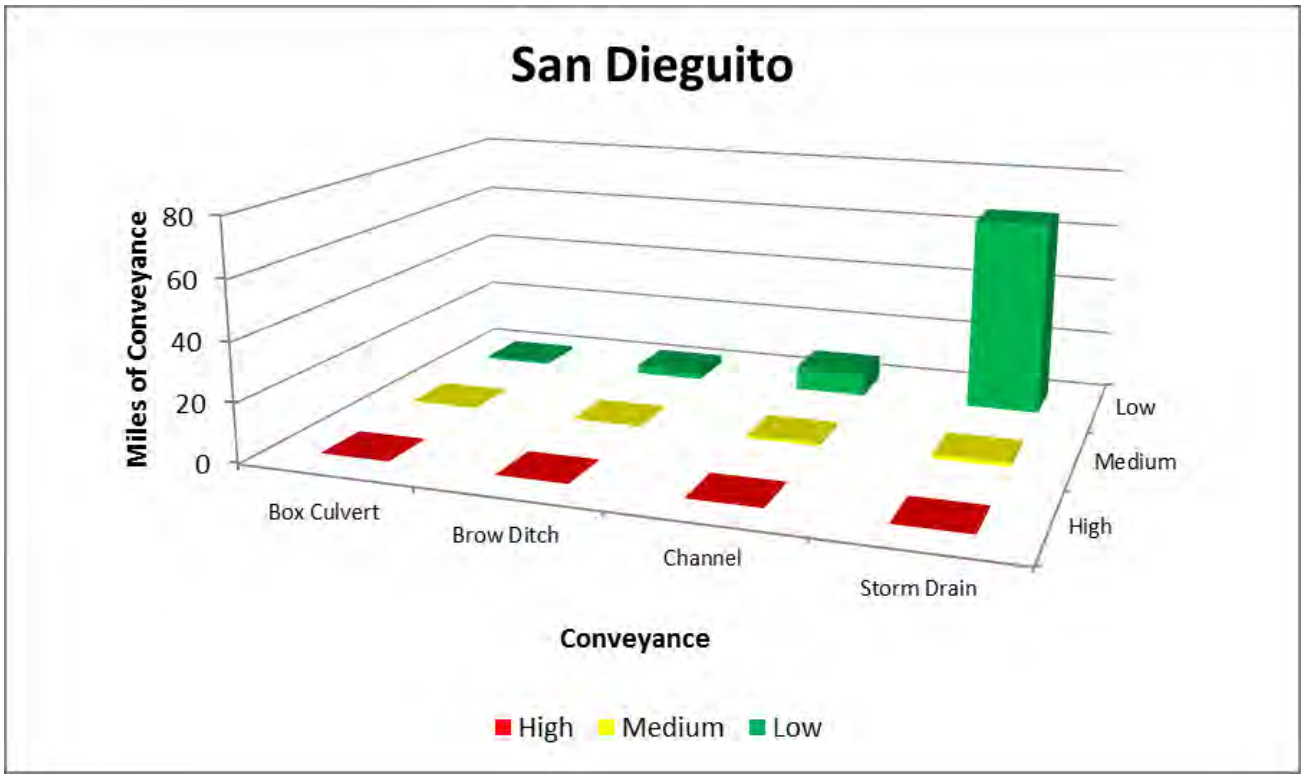


**Figure E-17. BRE Summary of Conveyance System BRE Scores - San Dieguito Watershed**

Figure E-18 shows the conveyance system CoF score map for the San Dieguito Watershed. The San Dieguito Watershed conveyance system is approximately 81 miles and about 96 percent (79 miles) of the storm water conveyances have low CoF and about 1 percent (1 mile) have high CoF.

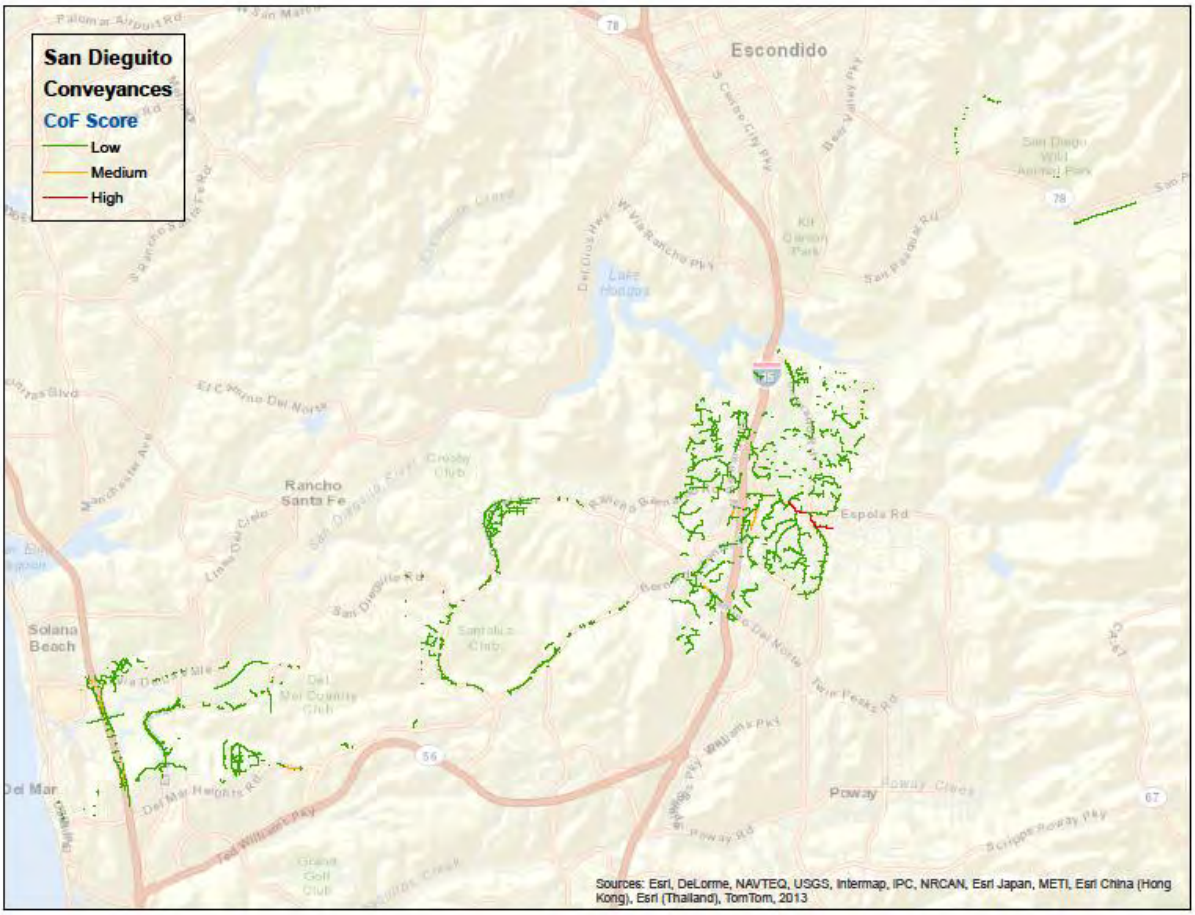


**Figure E-18. Conveyance System CoF Score Map - San Dieguito Watershed**

Figure E-19 shows the conveyance system PoF score map for the San Dieguito Watershed. Approximately 97 percent (79 miles) of the conveyances have low PoF and 2 percent (2 miles) have high PoF.

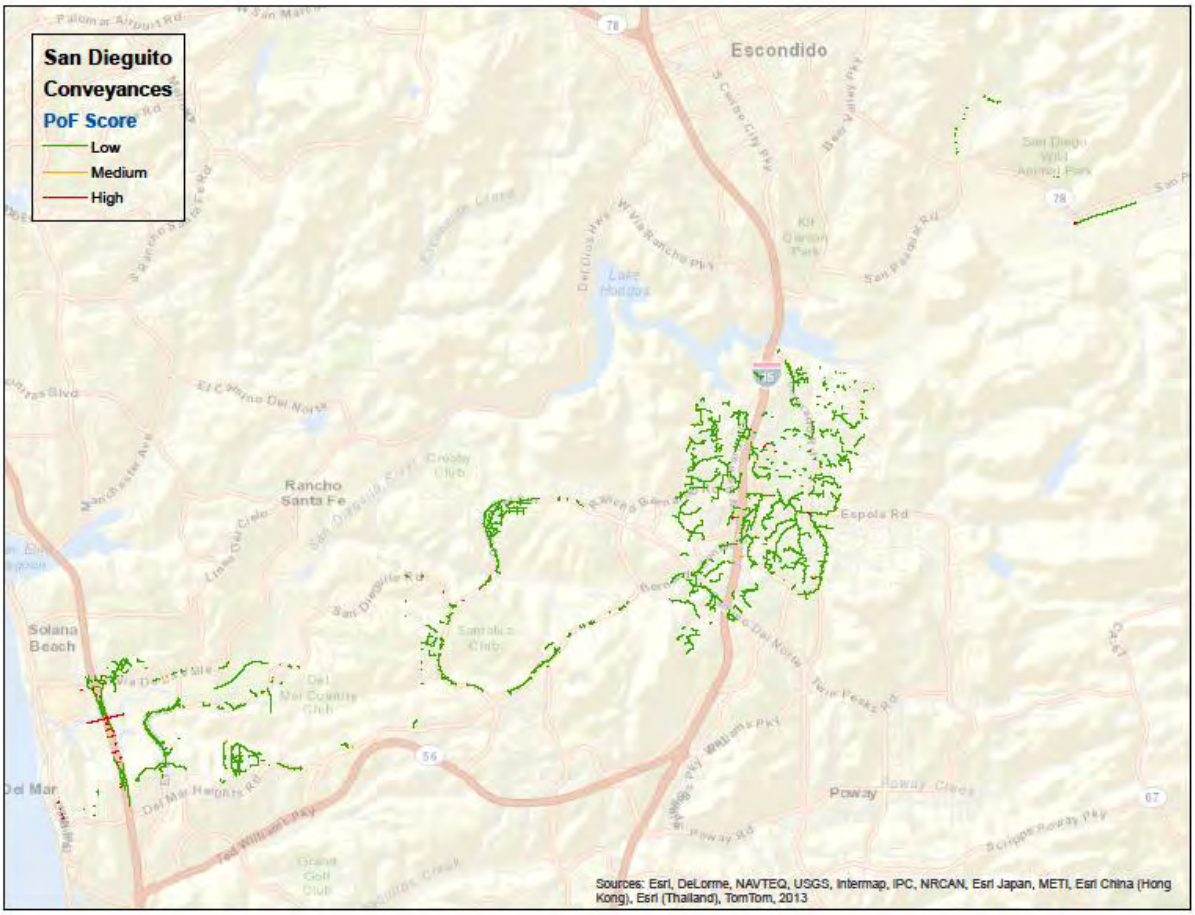


**Figure E-19. Conveyance System PoF Score Map - San Dieguito Watershed**

Figure E-20 shows the conveyance system BRE score map for the San Dieguito Watershed. 97 percent (79 miles) of the conveyance systems have low risk, 3 percent (2 miles) have medium risk, and 1 percent (less than a mile) have high risk.

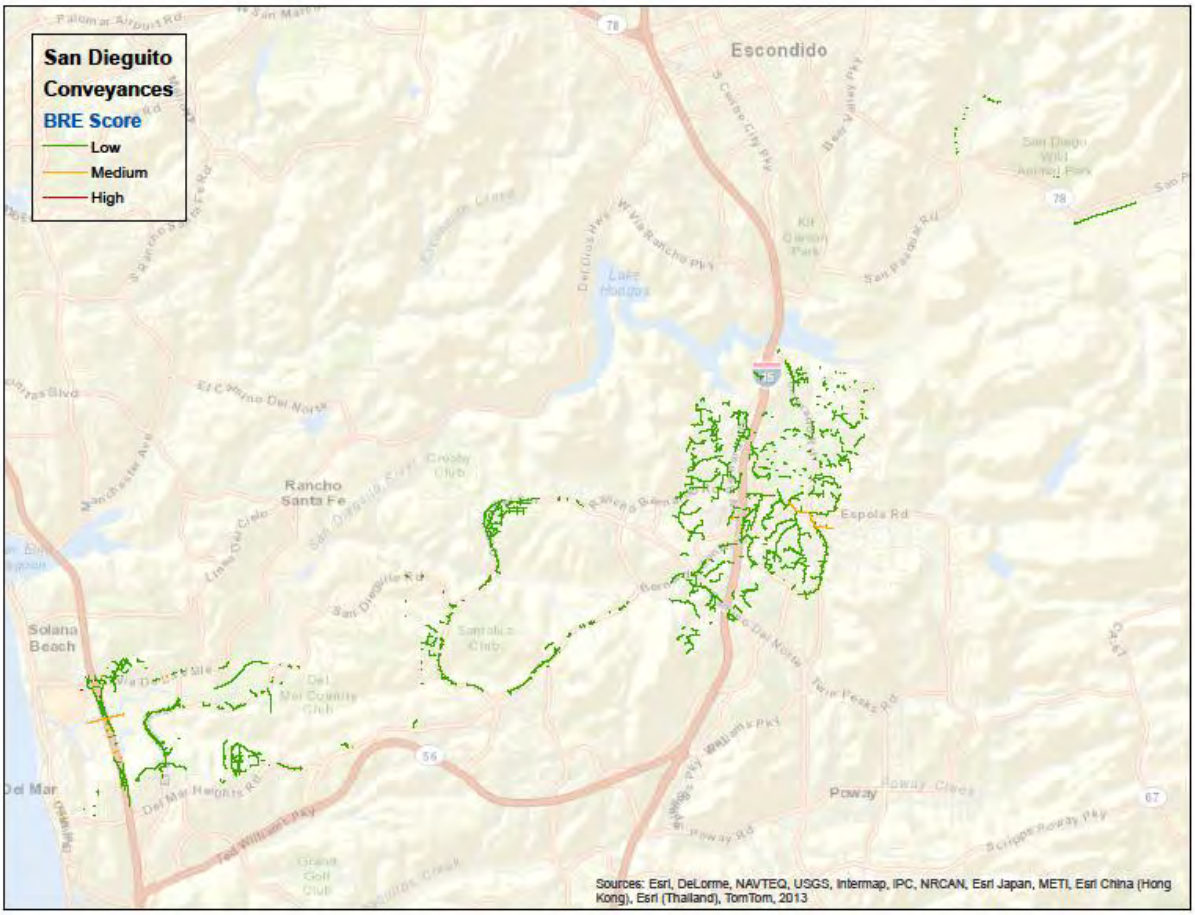


**Figure E-20. Conveyance System BRE Score Map - San Dieguito Watershed**

Figure E-21 shows the BRE summary for storm water structures in San Dieguito Watershed. 97 percent (3,101 out of 3,177) of the storm water structures have low risk and there are no assets that have high risk. This can be attributed to the fact that the majority of storm water structures are still in good or excellent condition.

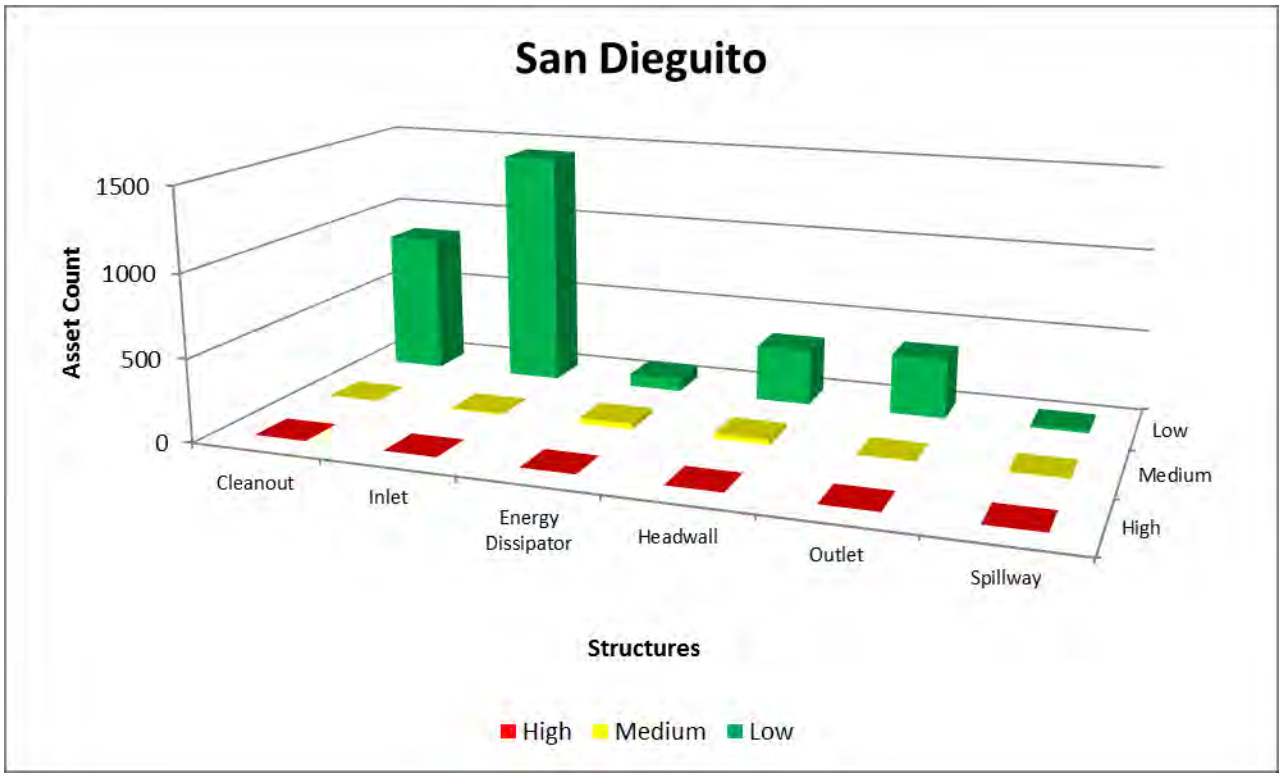


**Figure E-21. Storm Water Structure BRE Scores- San Dieguito Watershed**

Figure E-22 shows the structures CoF score map for the San Dieguito Watershed. Approximately 94 percent (2,971) of the structures have low CoF and less than 1 percent (12) have high CoF.

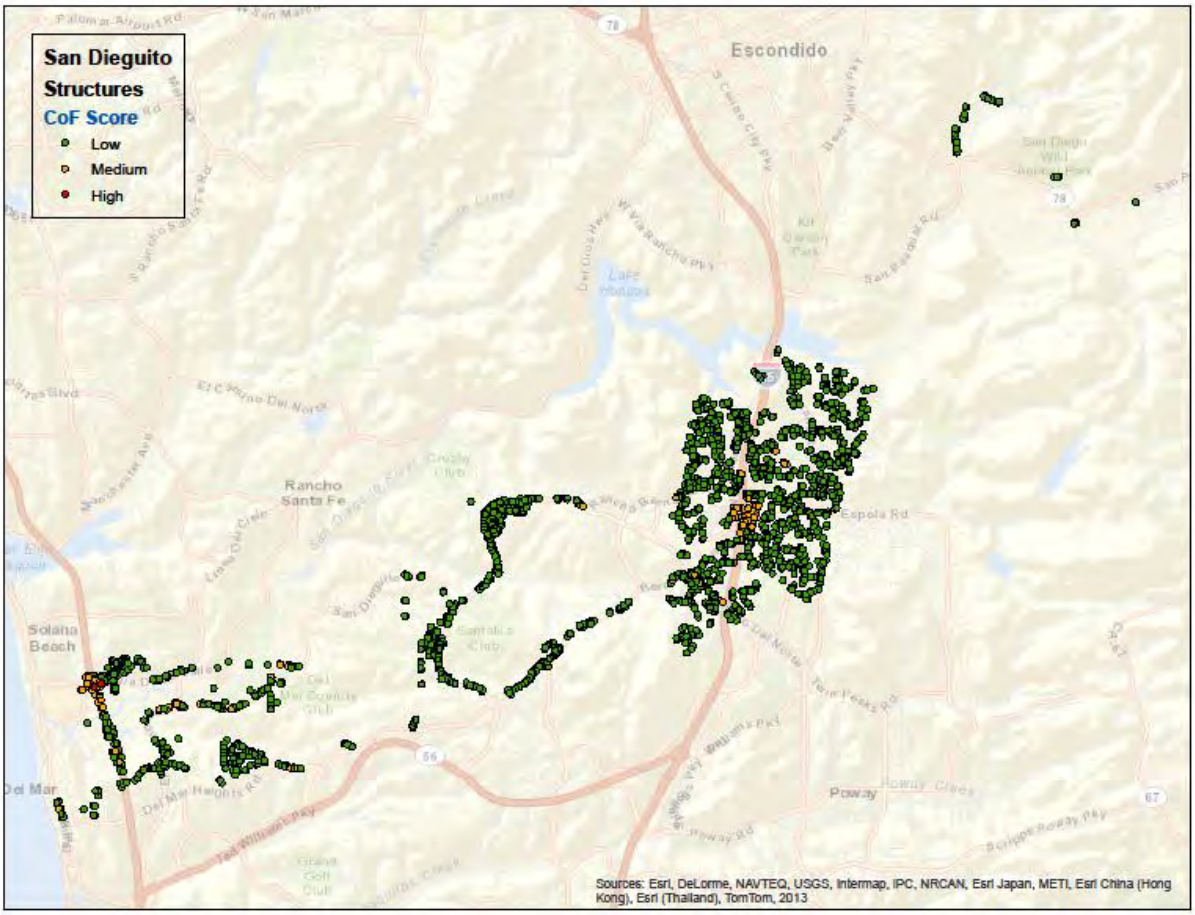


**Figure E-22. Storm Water Structure CoF Score Map - San Dieguito Watershed**

Figure E-23 shows the structures PoF score map for the San Dieguito Watershed. Approximately 97 percent (3,095) have low PoF, and less than 1 percent (31) have high PoF.

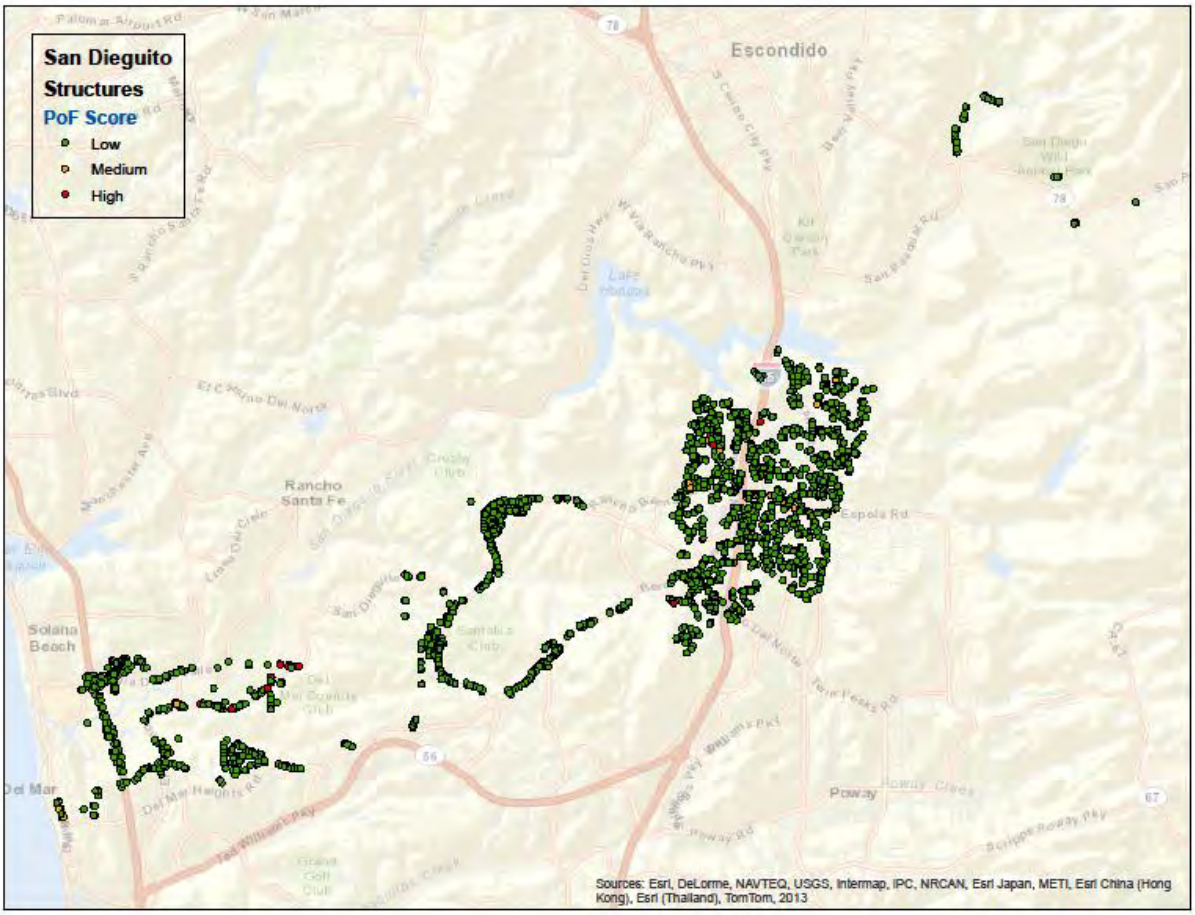


**Figure E-23. Storm Water Structure PoF Score Map - San Dieguito Watershed**

Figure E-24 shows the structures BRE score map for the San Dieguito Watershed. Approximately 98 percent (3,101) have low risk, 2 percent (76) have median risk and there are no assets that have high risk.

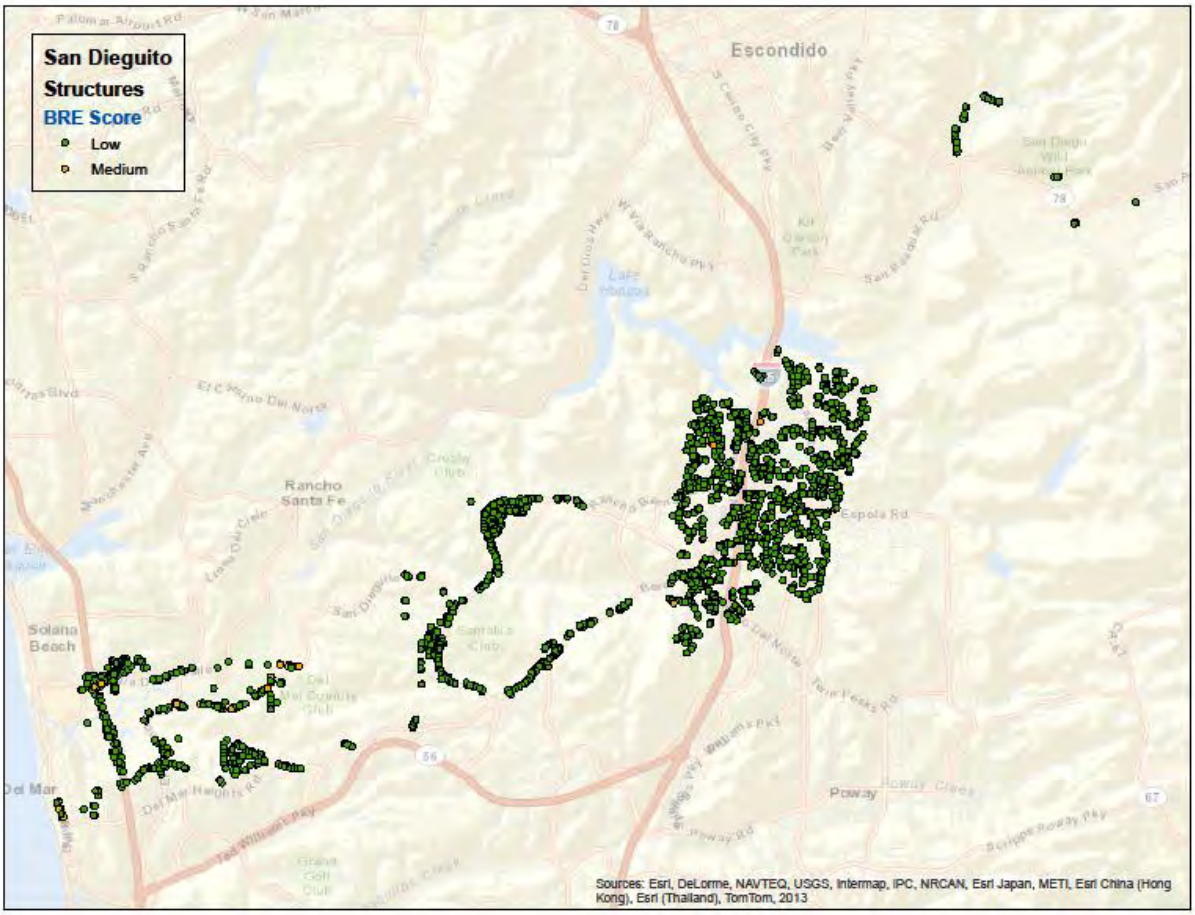


**Figure E-24. Storm Water Structure BRE Score Map - San Dieguito Watershed**

Figure E-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.

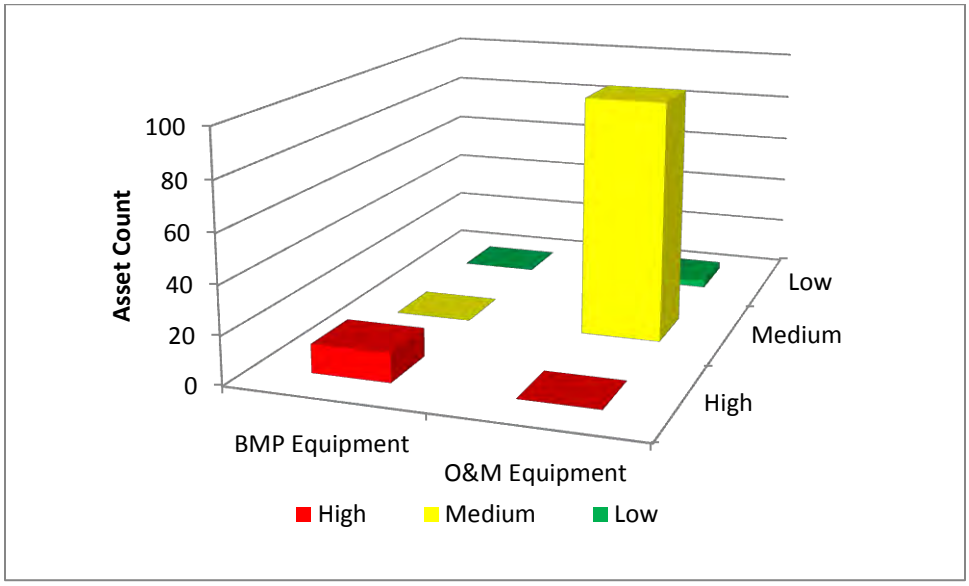


**Figure E-25. Summary of Equipment Assets – San Diego City Wide**

## E.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.

Figures E-26, E-27, and E-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.

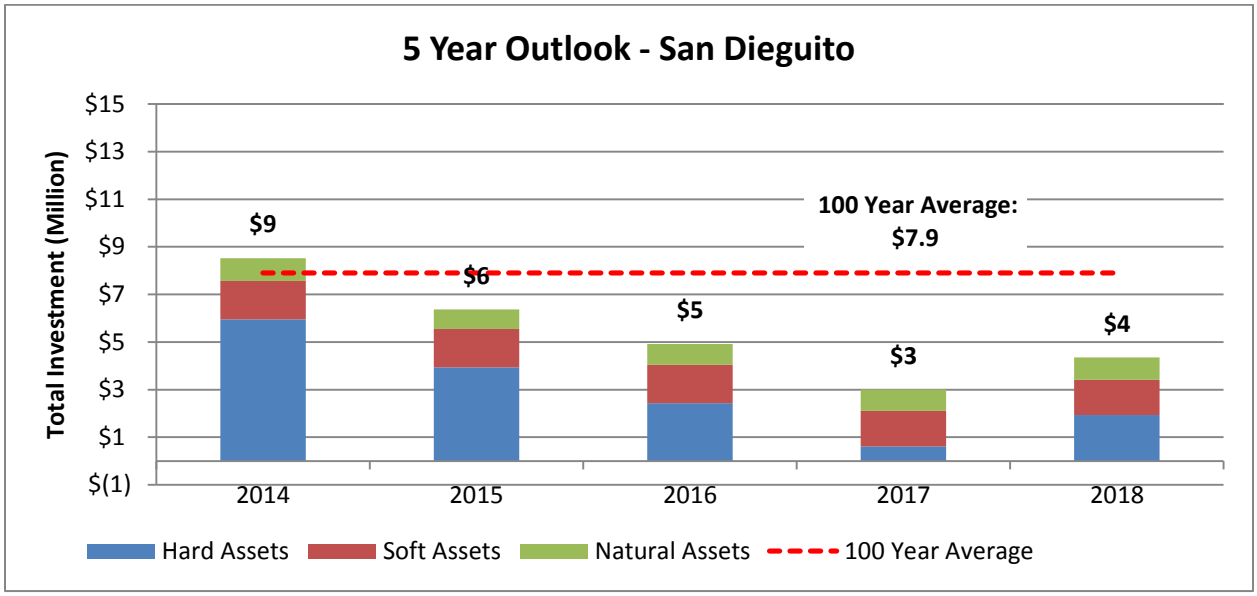


**Figure E-26. Watershed 5 Year Outlook by Asset Type – San Dieguito Watershed**

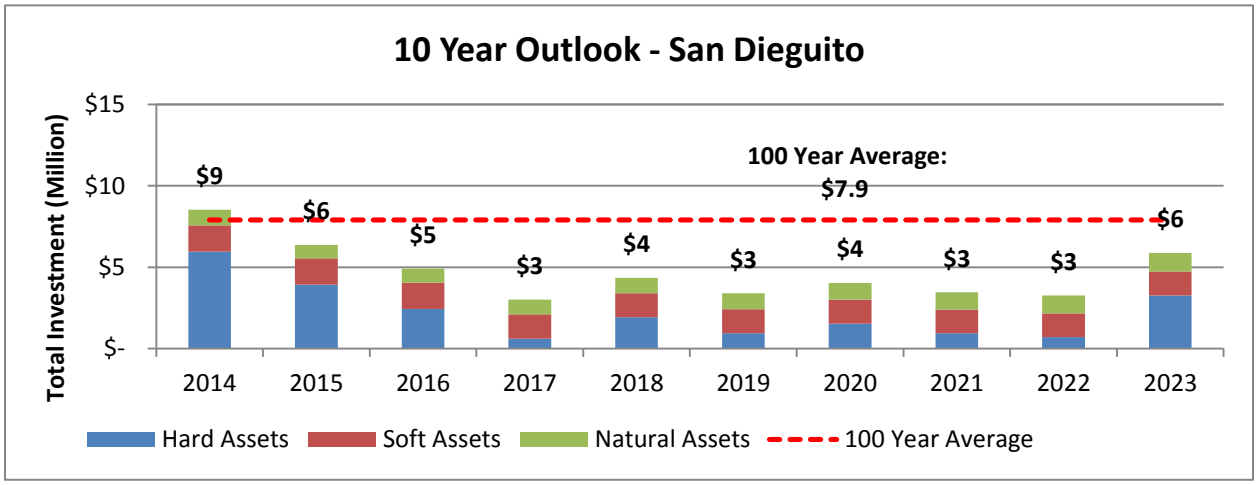


**Figure E-27. Watershed 10 Year Outlook by Asset Type – San Dieguito Watershed**

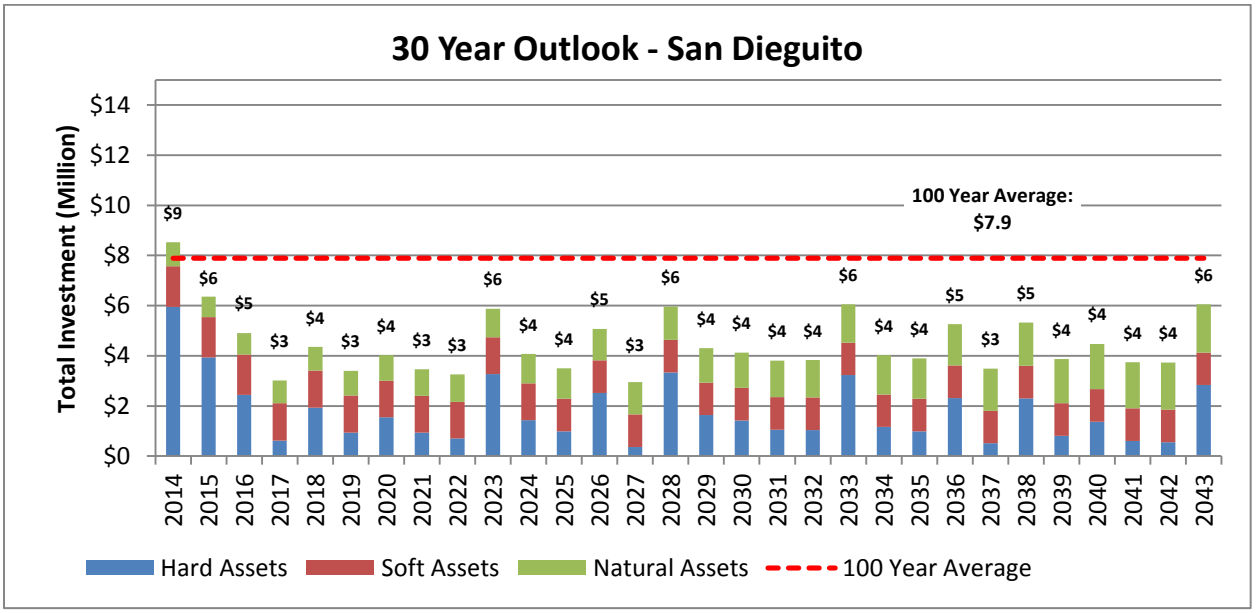


**Figure E-28. Watershed 30 Year Outlook by Asset Type – San Dieguito Watershed**

Figures E-29 and E-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 San Dieguito Watershed will need an average of $7.9 million dollars per year for capital and operational needs for the next 100 years. Some years will require more and others will require less.

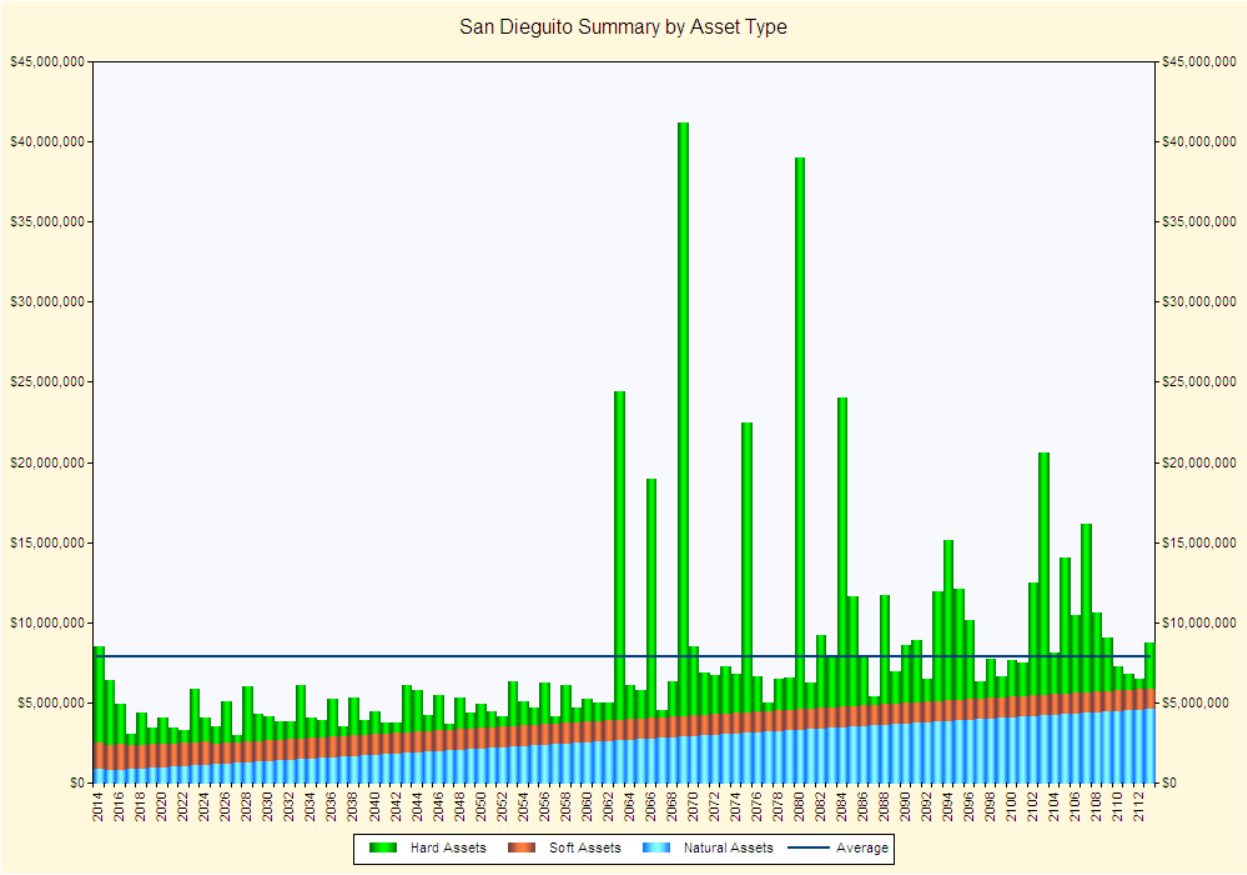


**Figure E-29. 100 Year Forecast by Asset Type - San Dieguito Watershed**

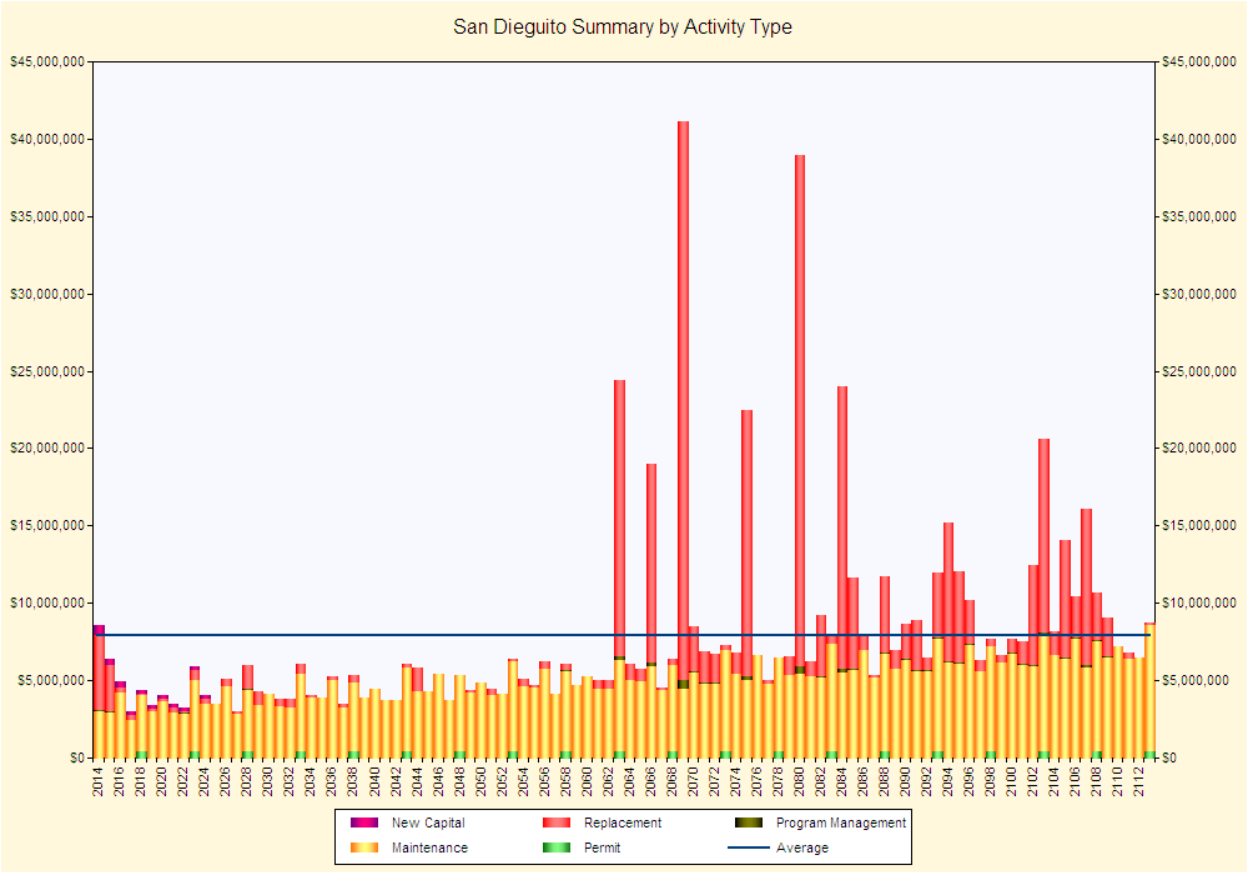


**Figure E-30. 100 Year Forecast by Activity Type - San Dieguito Watershed**

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.

## E.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 San Dieguito Watershed that would not be employed City-wide.

## E.9 ASSESSMENT MANAGEMENT IMPROVEMENT PLAN

See Main Document.

## E.10 RECOMMENDATIONS

The summary of activities for Fiscal Year 2014, organized by asset type and class, are listed in Tables E-12. In addition, Table E-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.

**Table E-12. FY 2014 Activity Summary – San Dieguito Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP Budget | | Operating Budget | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Replacement (Mh) | Total | Maintenance (CM) | New Capital (Nw) | Program Management (Op) | Total | |
| **Hard Assets** | | | | | | | | | | | |
| Cleanout | 7.20 | 27.46 | | | | | 41,907.30 | | | 41,907.30 | 41,907.30 |
| Drop Manhole | 12.42 | 27.46 | | | | | 2,787.30 | | | 2,787.30 | 2,787.30 |
| Encased Storm Drain | 42.04 | 42.04 | | | 1,237,881.13 | 1,237,881.13 | | | 18,805.62 | 18,805.62 | 1,256,686.75 |
| Energy Dissipator | 15.59 | 40.69 | | | 1,240,000.00 | 1,240,000.00 | 260,356.95 | | 18,837.80 | 279,194.75 | 1,519,194.75 |
| Headwall | 12.57 | 19.35 | | | | | 231,428.40 | | | 231,428.40 | 231,428.40 |
| Inlet | 7.20 | 30.32 | | | | | 17,212.80 | | | 17,212.80 | 17,212.80 |
| Storm Drain | 9.34 | 52.94 | | | 2,439,855.61 | 2,439,855.61 | 409,769.09 | | 37,065.74 | 446,834.83 | 2,886,690.44 |
| **Sub-total Hard Assets** | | | | | **4,917,736.74** | **4,917,736.74** | **963,461.84** | **-** | **74,709.16** | **1,038,171.00** | **5,955,907.74** |
| | | | | | | | | | | | |
| **Natural Assets** | | | | | | | | | | | |
| LOS 04-Monitoring activities to prioritize pollutant sources and measure effects of BMPs on runoff / discharge water quality. | 21.02 | 21.02 | 6.82 | 3.08 | | | 65,789.88 | | | 65,789.88 | 65,789.88 |
| LOS 14-Source identification and characterization studies | 21.02 | 21.02 | 6.82 | 3.08 | | | 536,793.11 | | | 536,793.11 | 536,793.11 |
| 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). | 21.02 | 21.02 | 6.82 | 3.08 | | | | 47,010.51 | | 47,010.51 | 47,010.51 |
| 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. | 21.02 | 21.02 | 6.82 | 3.08 | | | | 127,533.00 | | 127,533.00 | 127,533.00 |
| LOS 47-Permit monitoring | 21.02 | 21.02 | 6.82 | 3.08 | | | 181,181.19 | | | 181,181.19 | 181,181.19 |
| **Sub-total Natural Assets** | | | | | **-** | **-** | **783,764.18** | **174,543.51** | **-** | **958,307.69** | **958,307.69** |
| | | | | | | | | | | | |
| **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 |

**Table E-12. FY 2014 Activity Summary – San Dieguito Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP Budget | | Operating Budget | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Replacement (Mh) | Total | Maintenance (CM) | New Capital (Nw) | Program Management (Op) | Total | |
| 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 |
| LOS 12b-Land Development Regulations TMDL-Develop specification for 303(d) listings and TMDL, develop standard plans and specifications for LID and BMPs. | 47.50 | 47.50 | 9.50 | 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 | | | 25,000.00 | 166,666.67 | | 191,666.67 | 191,666.67 |
| 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. | 28.50 | 28.50 | 5.70 | 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. | 40.40 | 40.40 | 10.10 | 4.00 | | | 7,916.67 | 13,888.89 | | 21,805.56 | 21,805.56 |
| 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 |

**Table E-12. FY 2014 Activity Summary – San Dieguito Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP Budget | | Operating Budget | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Replacement (Mh) | Total | Maintenance (CM) | New Capital (Nw) | Program Management (Op) | Total | |
| 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 |
| 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** | | | | | **-** | **-** | **1,298,137.79** | **313,888.89** | **-** | **1,612,026.68** | **1,612,026.68** |
| | | | | | | | | | | | |
| **Grand Total** | | | | | **4,917,736.74** | **4,917,736.74** | **3,045,363.81** | **488,432.40** | **74,709.16** | **3,608,505.37** | **8,526,242.11** |

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**Table E-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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# 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 |

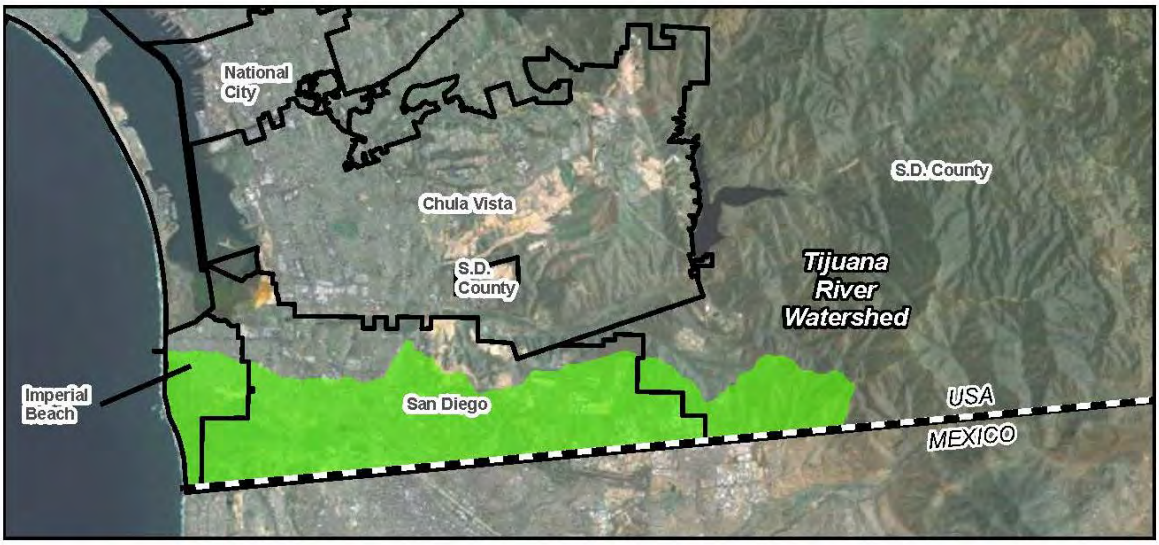


**Figure F-1. Tijuana River Watershed**

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.

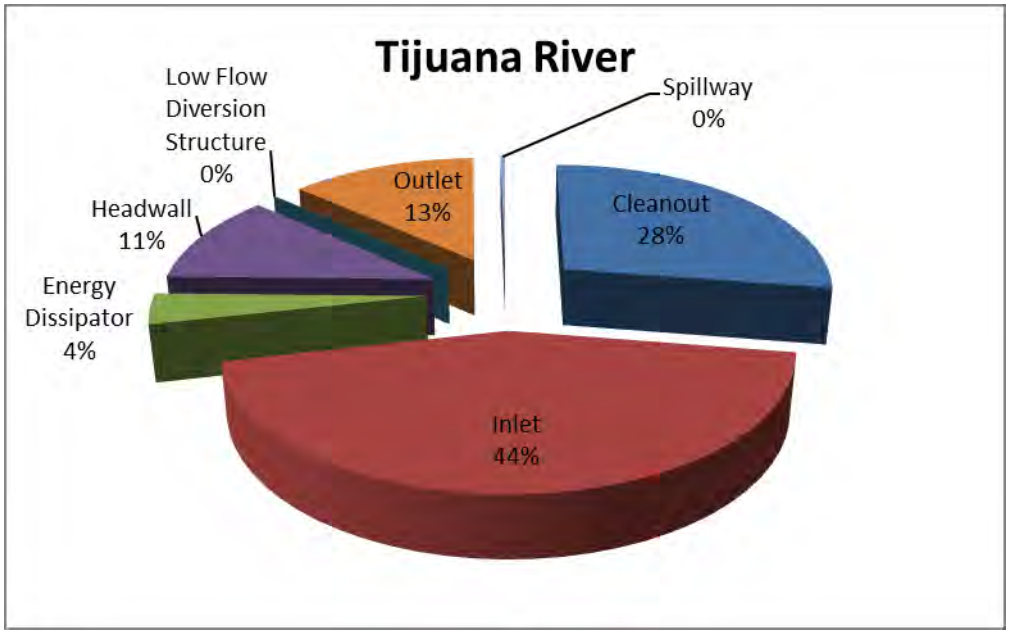


**Figure F-2. Distribution of Storm Water Structures by Asset Count - Tijuana River Watershed**

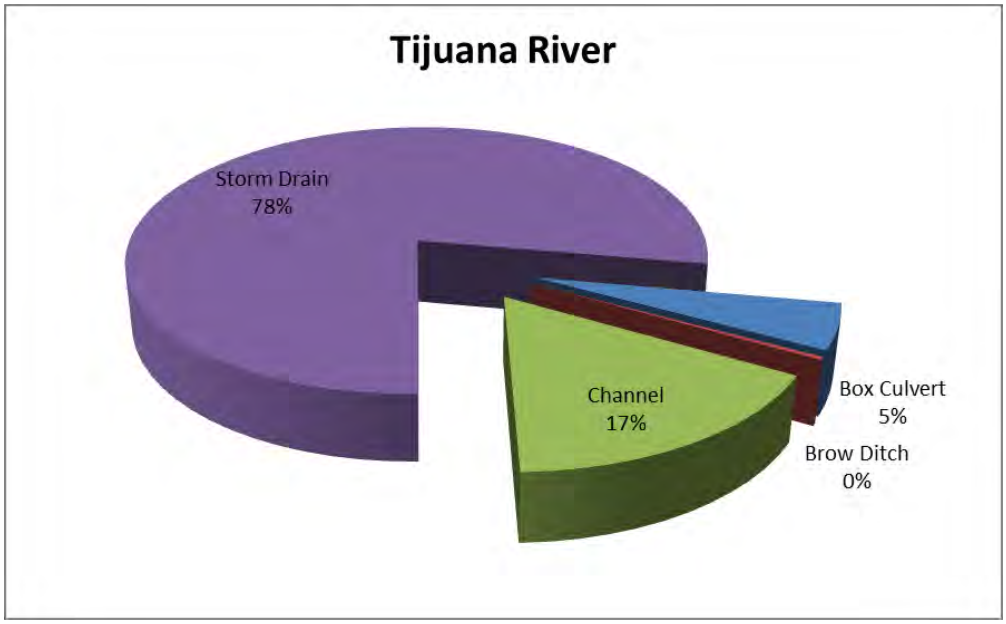


**Figure F-3. Distribution of Storm Water Conveyance by Length - Tijuana River Watershed**

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** |

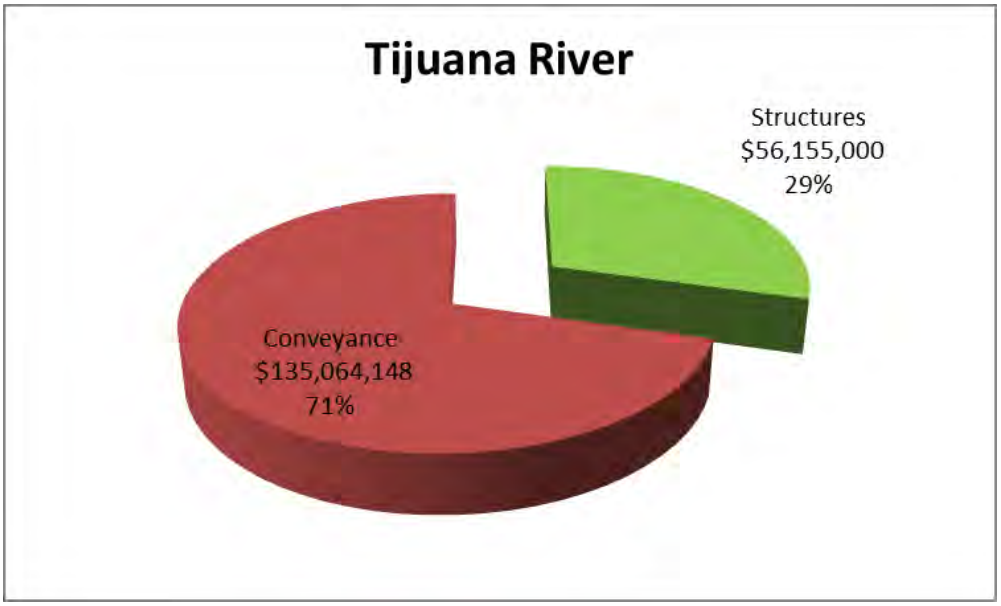


**Figure F-4. Tijuana River Watershed Hard Assets Replacement Costs**

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.

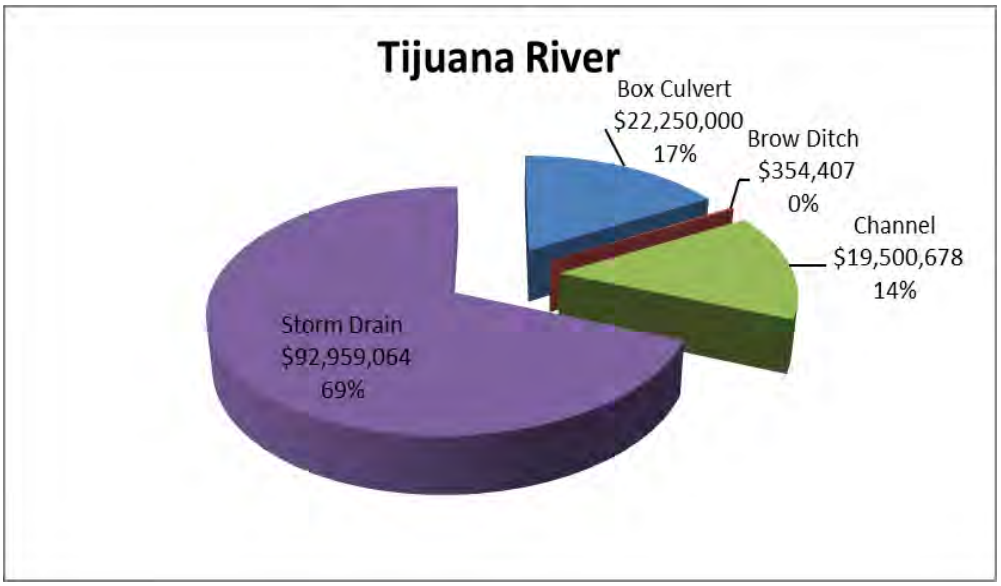


**Figure F-5. Tijuana River Watershed Conveyance System Assets Replacement Costs**

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.

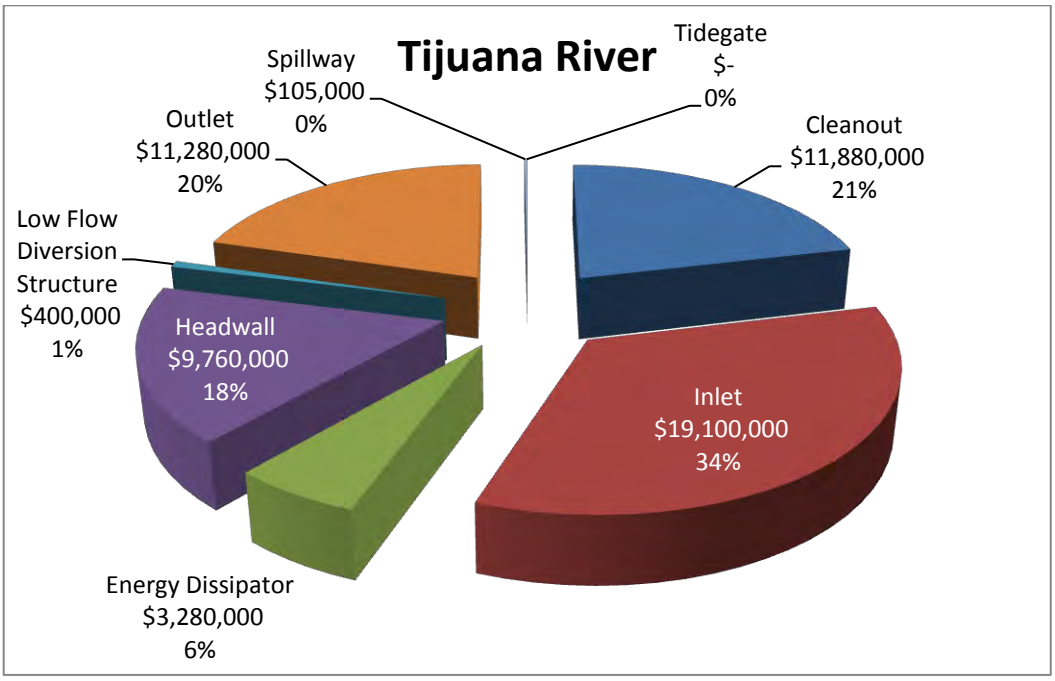


**Figure F-6. Tijuana River Watershed Storm Water Structures Asset Replacement Costs**

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).

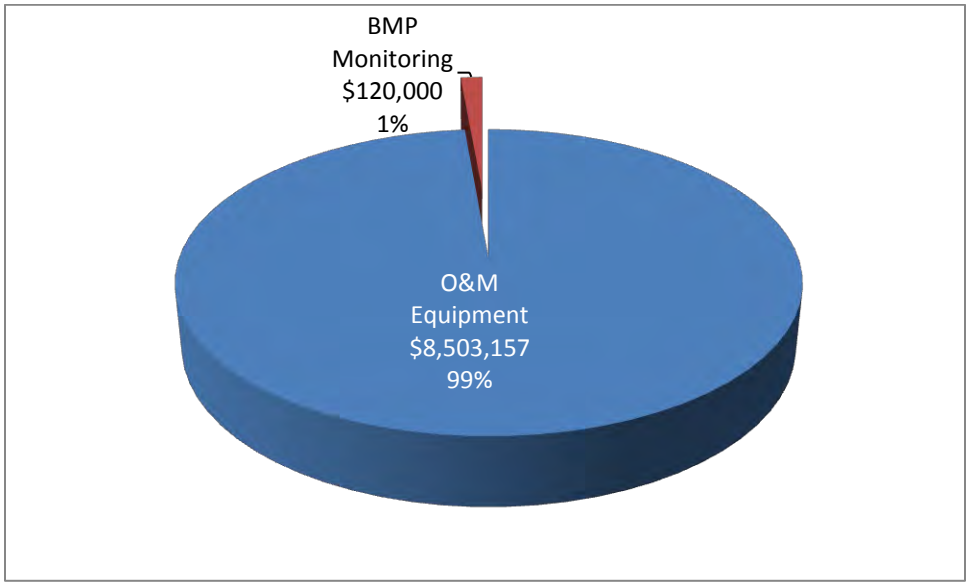


**Figure F-7. The Division's Equipment Asset Replacement Costs**

## 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.

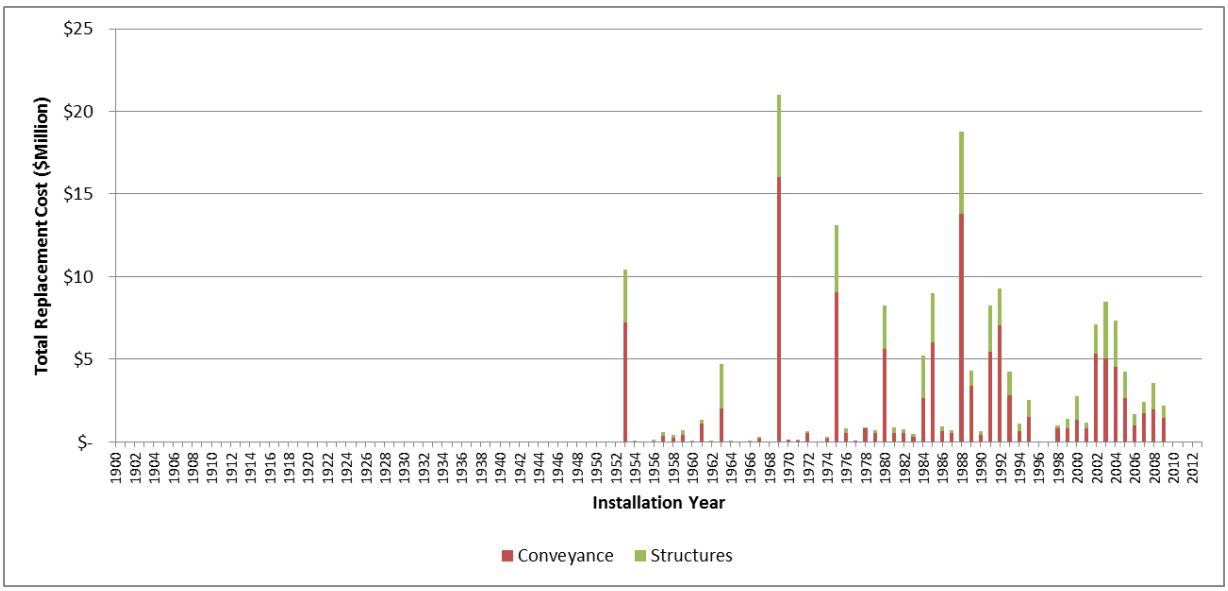


**Figure F-8. Installation Profile - Tijuana River Watershed**

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.

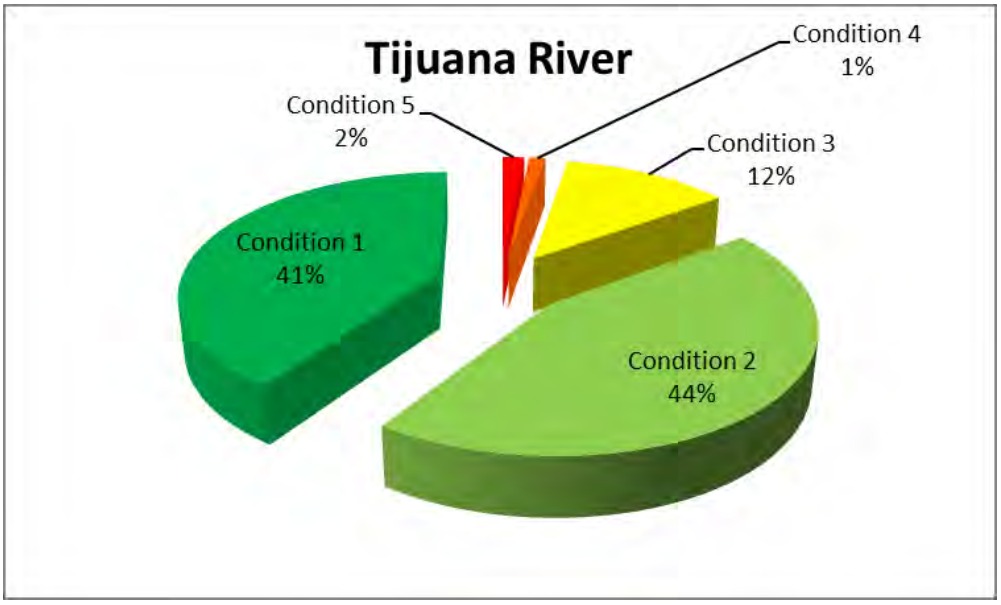


**Figure F-9. Summary of Hard Asset Conditions - Tijuana River Watershed**

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.

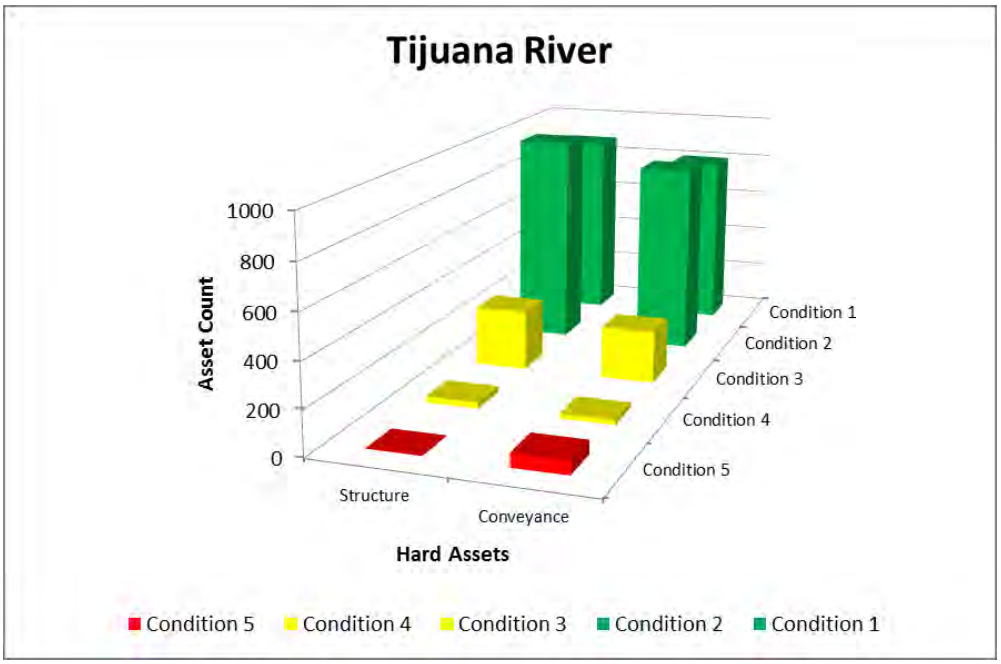


**Figure F-10. Summary of Hard Asset Conditions by Asset Class - Tijuana River Watershed**

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.

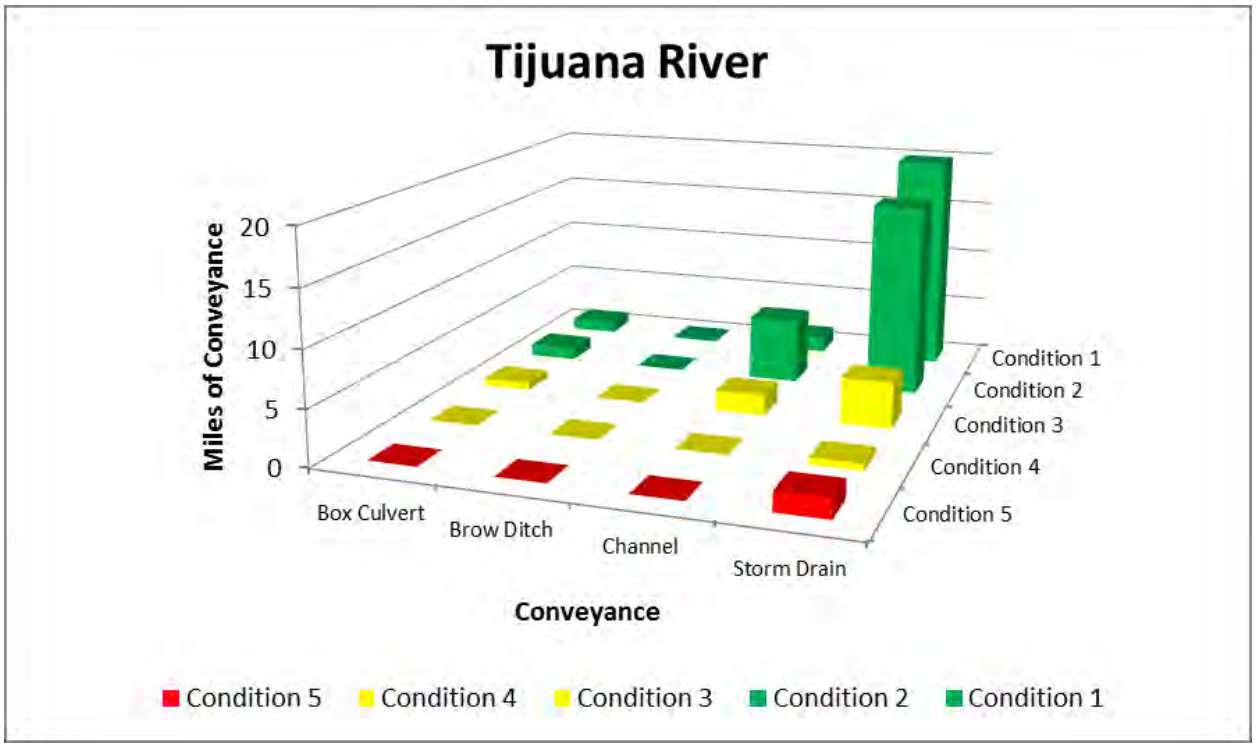


**Figure F-11. Summary of Conveyance System Conditions - Tijuana River Watershed**

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.

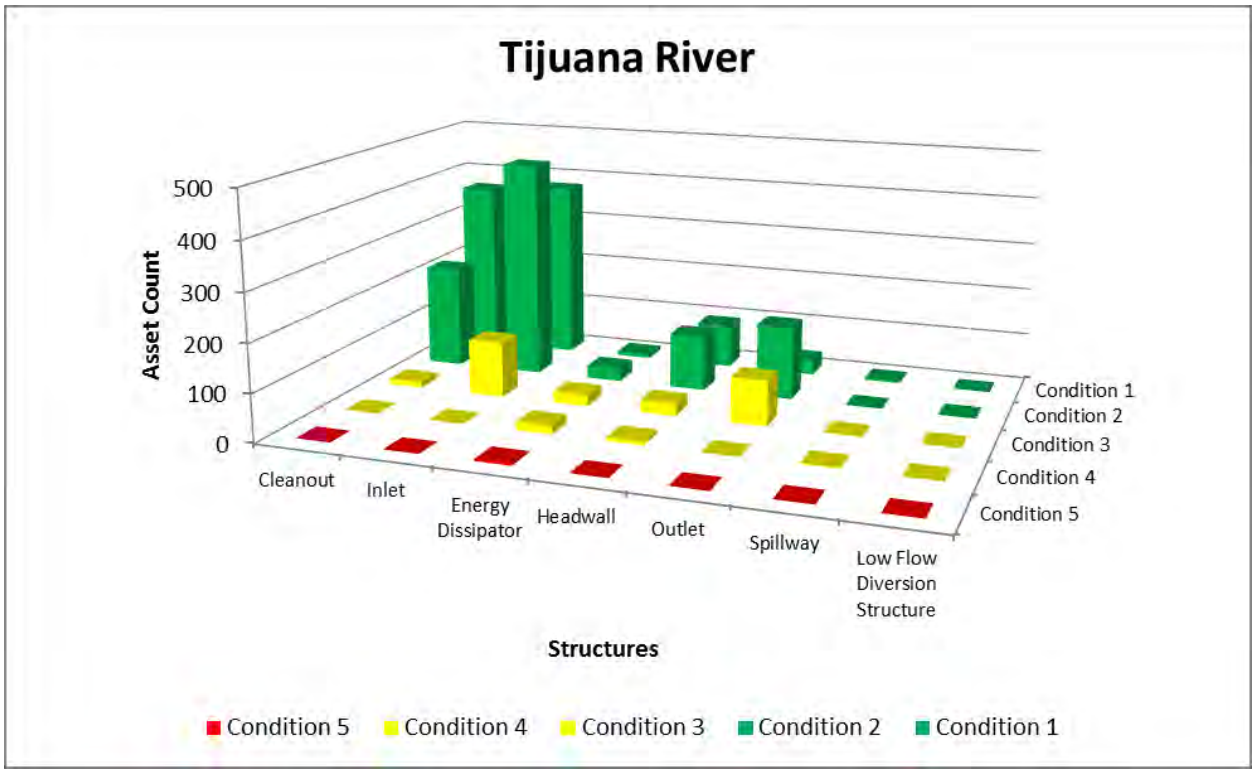


**Figure F-12. Summary of Conditions of Storm Water Structures - Tijuana River Watershed**

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

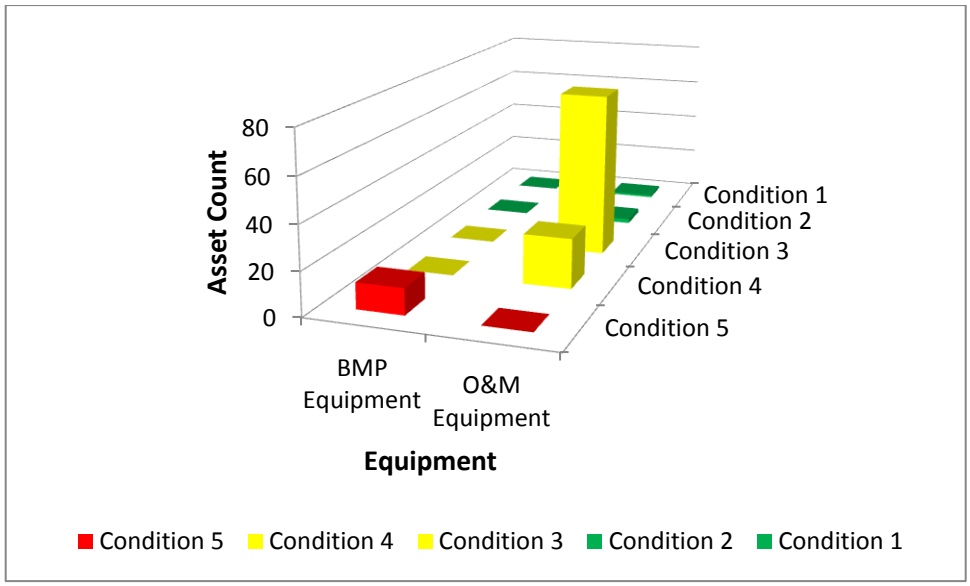


**Figure F-13. Summary of Conditions of Equipment Assets – Tijuana River Watershed**

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.

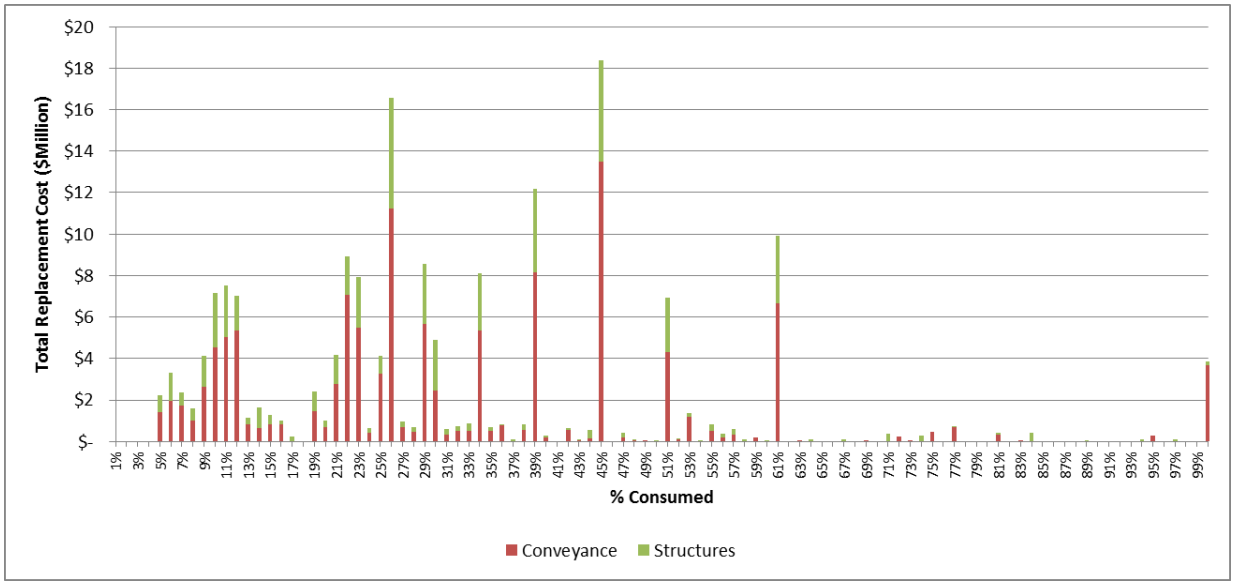


**Figure F-14. Consumption Profile – Tijuana River Watershed**

## 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.

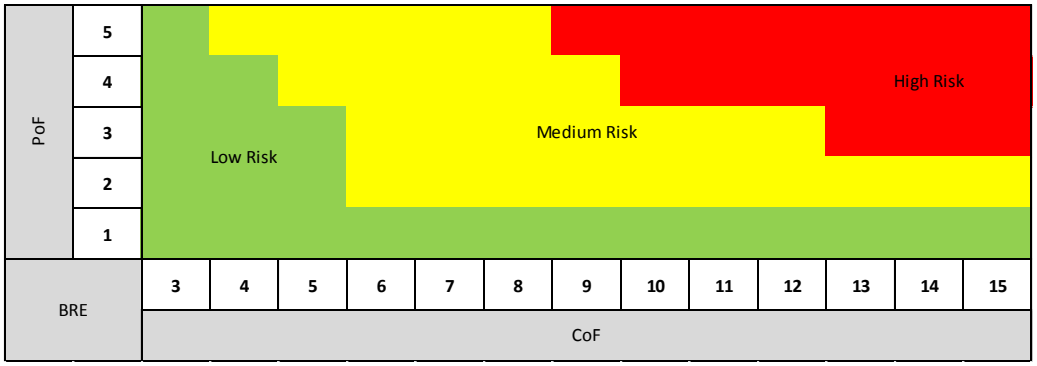


**Figure F-15. Hard Asset Risk Category Map**

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.

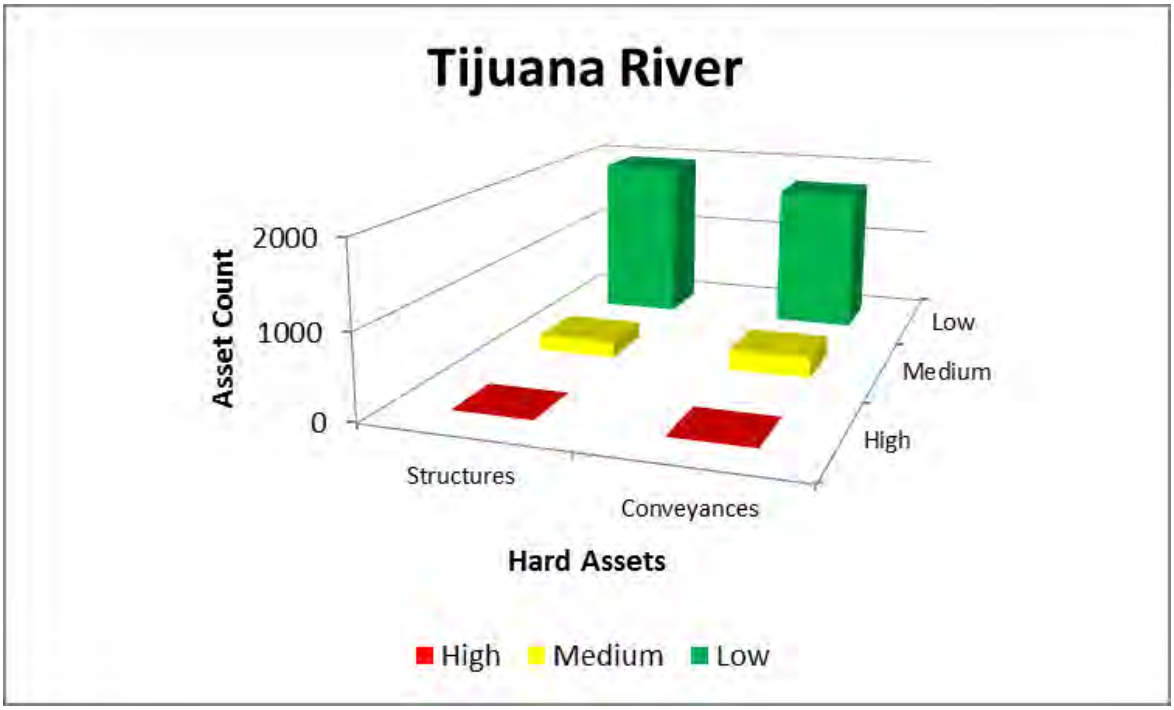


**Figure F-16. Hard Asset BRE Scores by Asset Classes - Tijuana River Watershed**

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.

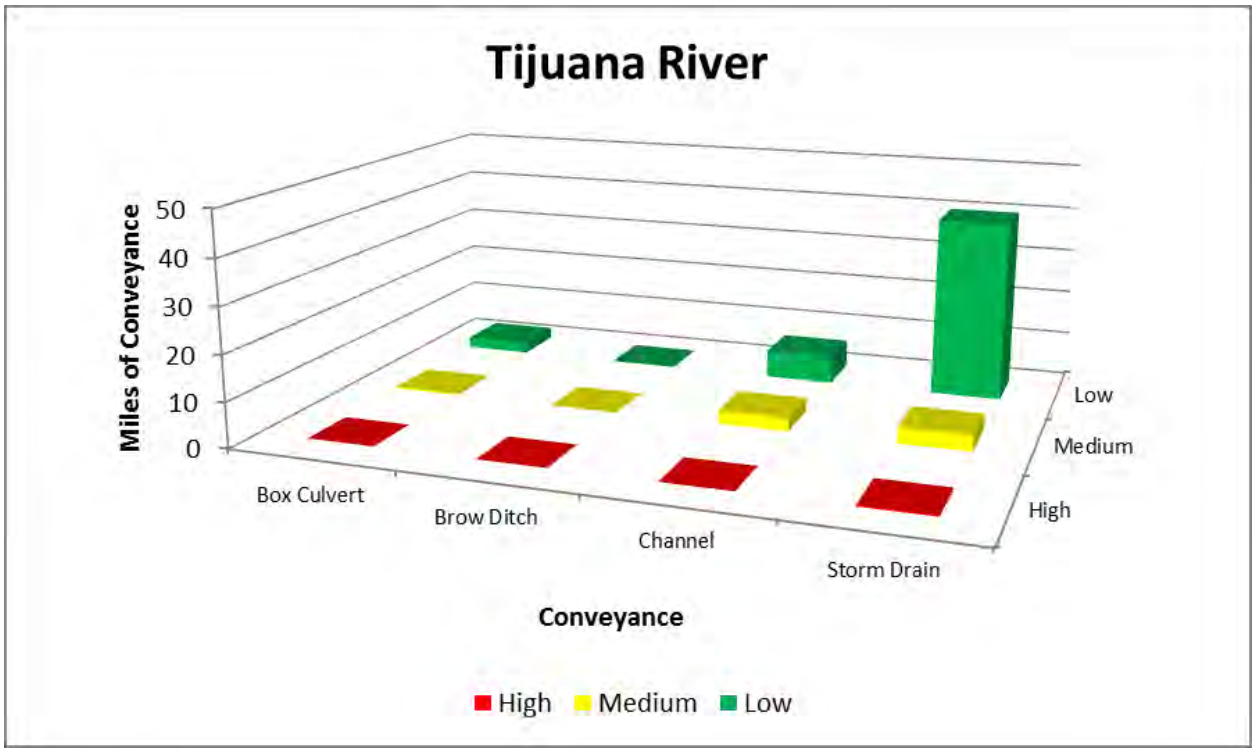


**Figure F-17. BRE Summary of Conveyance System BRE Scores - Tijuana River Watershed**

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.

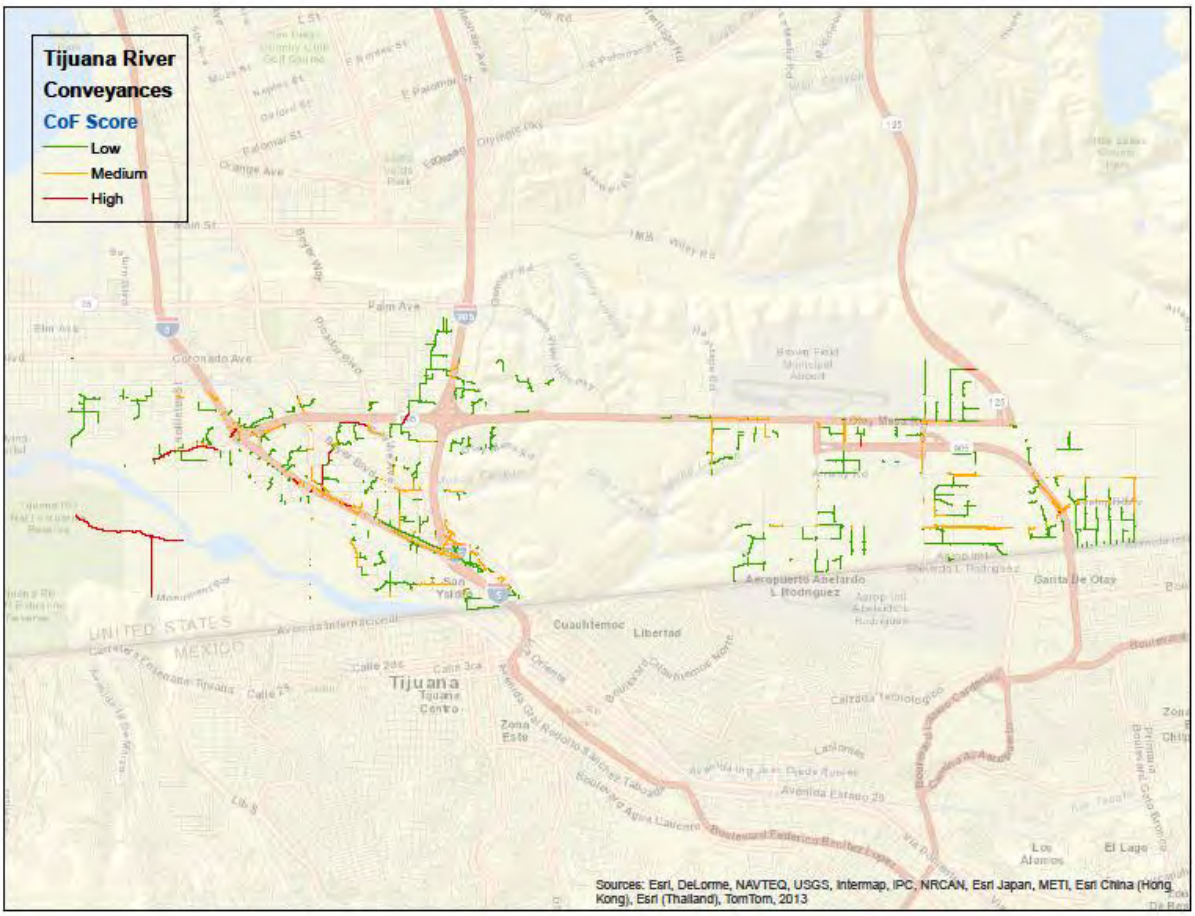


**Figure F-18. Conveyance System CoF Score Map - Tijuana River Watershed**

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.

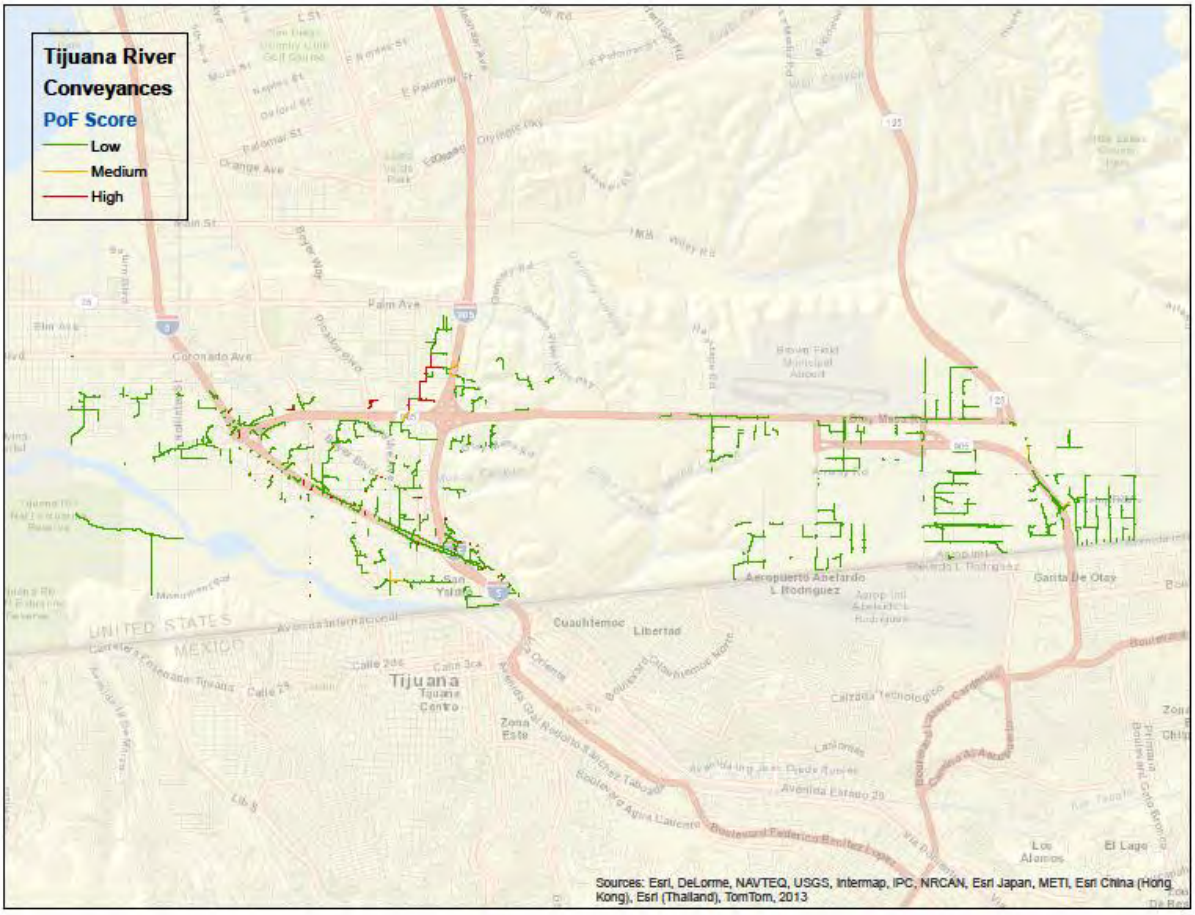


**Figure F-19. Conveyance System PoF Score Map - Tijuana River Watershed**

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.

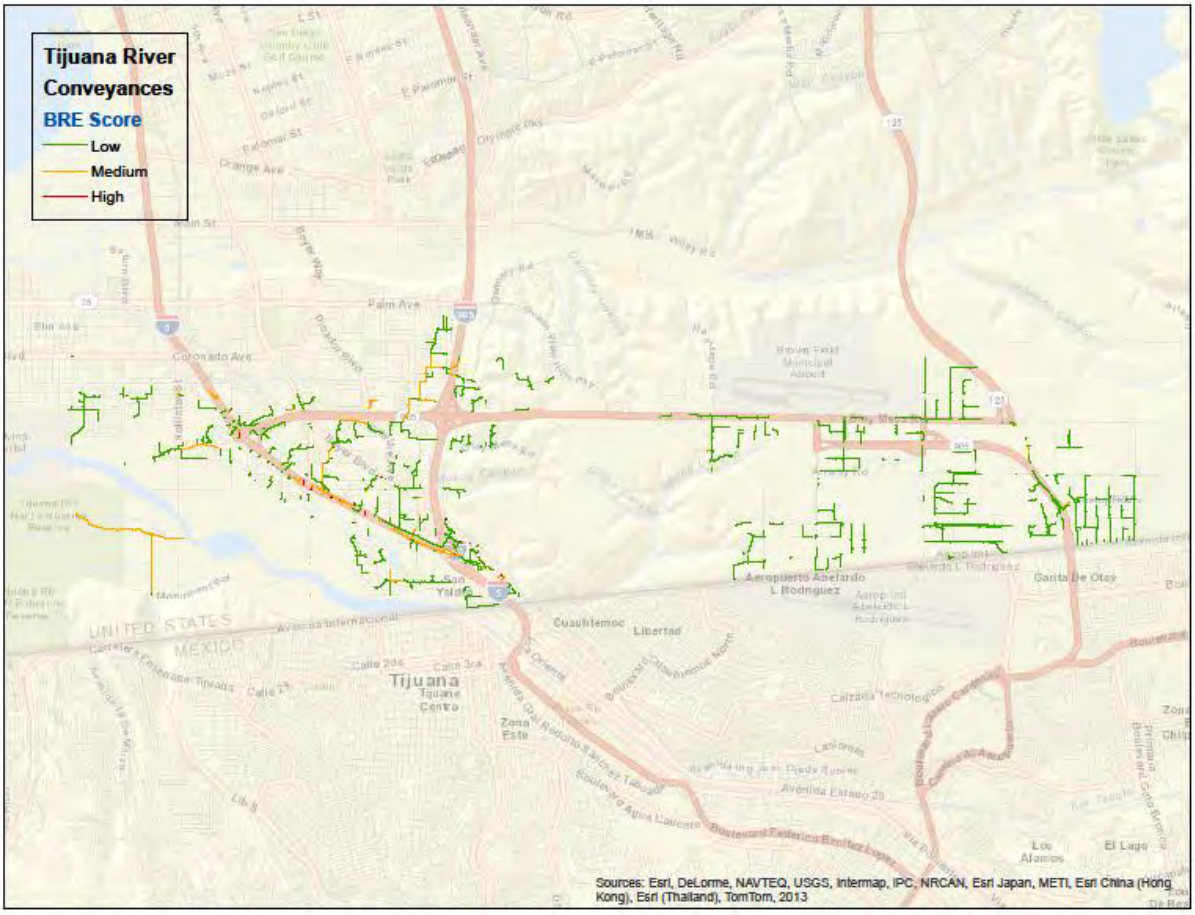


**Figure F-20. Conveyance System BRE Score Map - Tijuana River Watershed**

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.

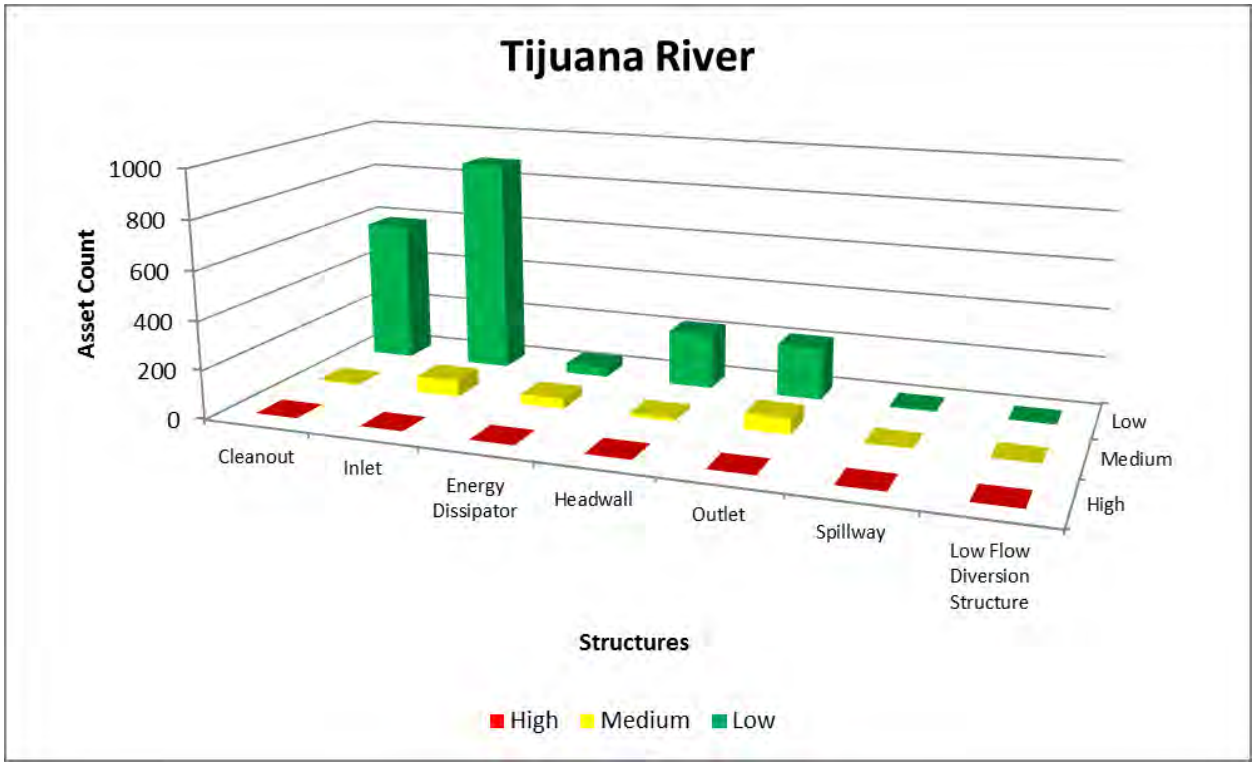


**Figure F-21. Storm Water Structure BRE Scores- Tijuana River Watershed**

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.

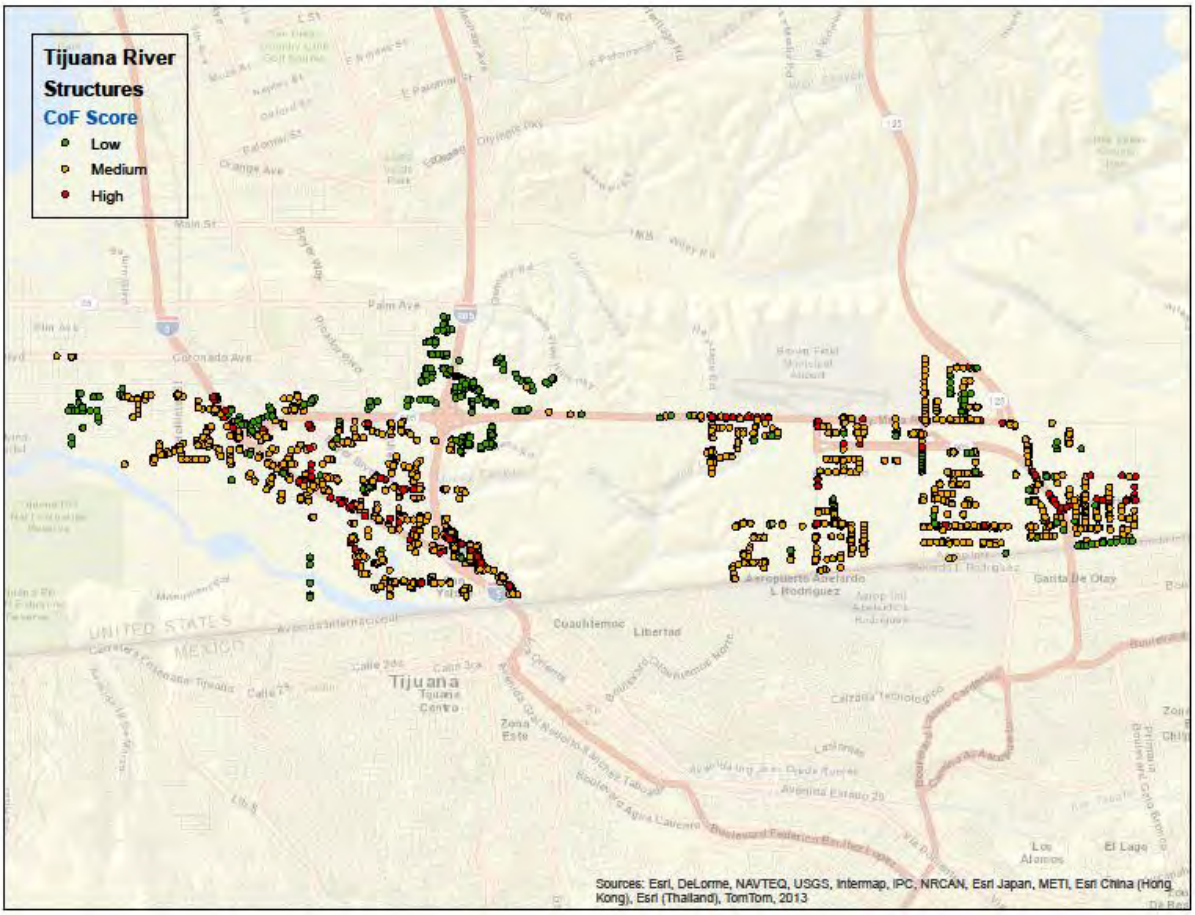


**Figure F-22. Storm Water Structure CoF Score Map - Tijuana River Watershed**

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.

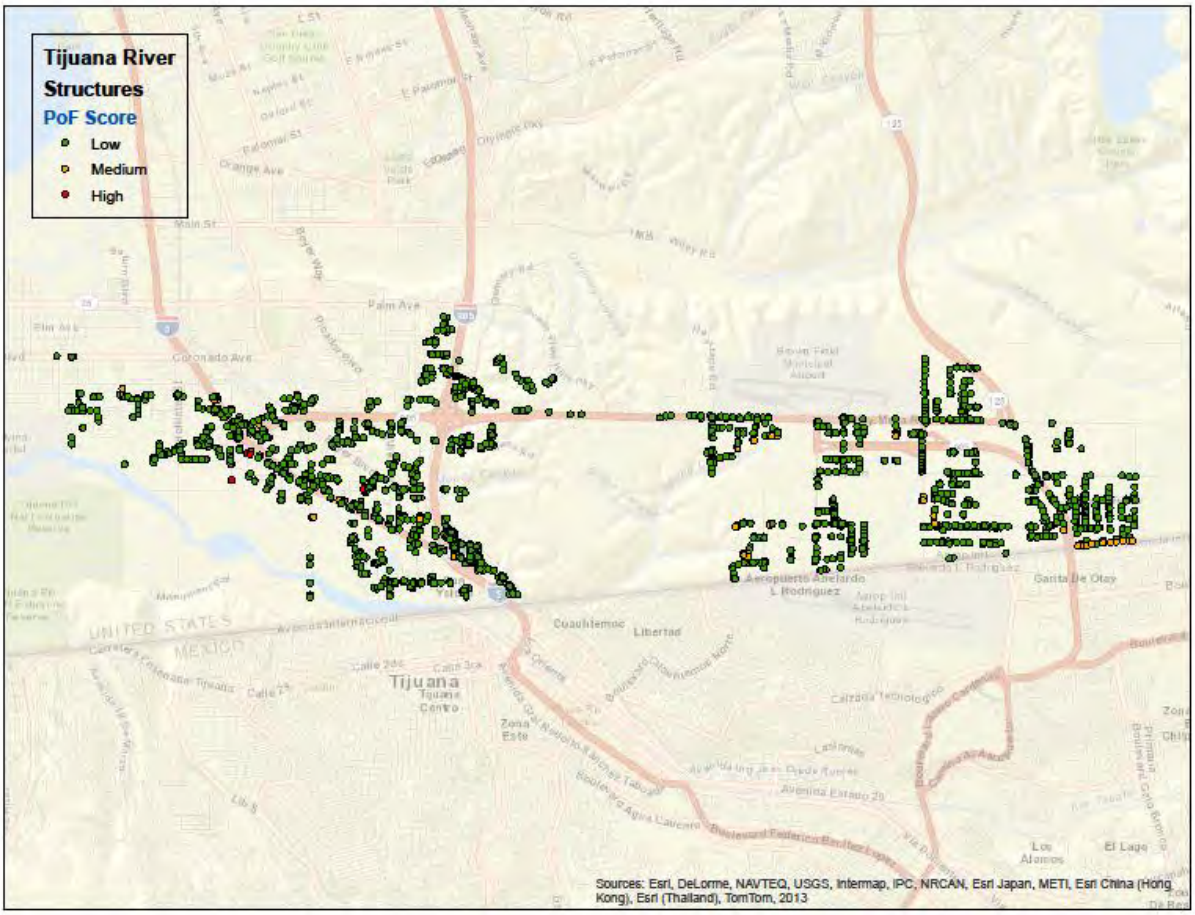


**Figure F-23. Storm Water Structure PoF Score Map - Tijuana River Watershed**

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).

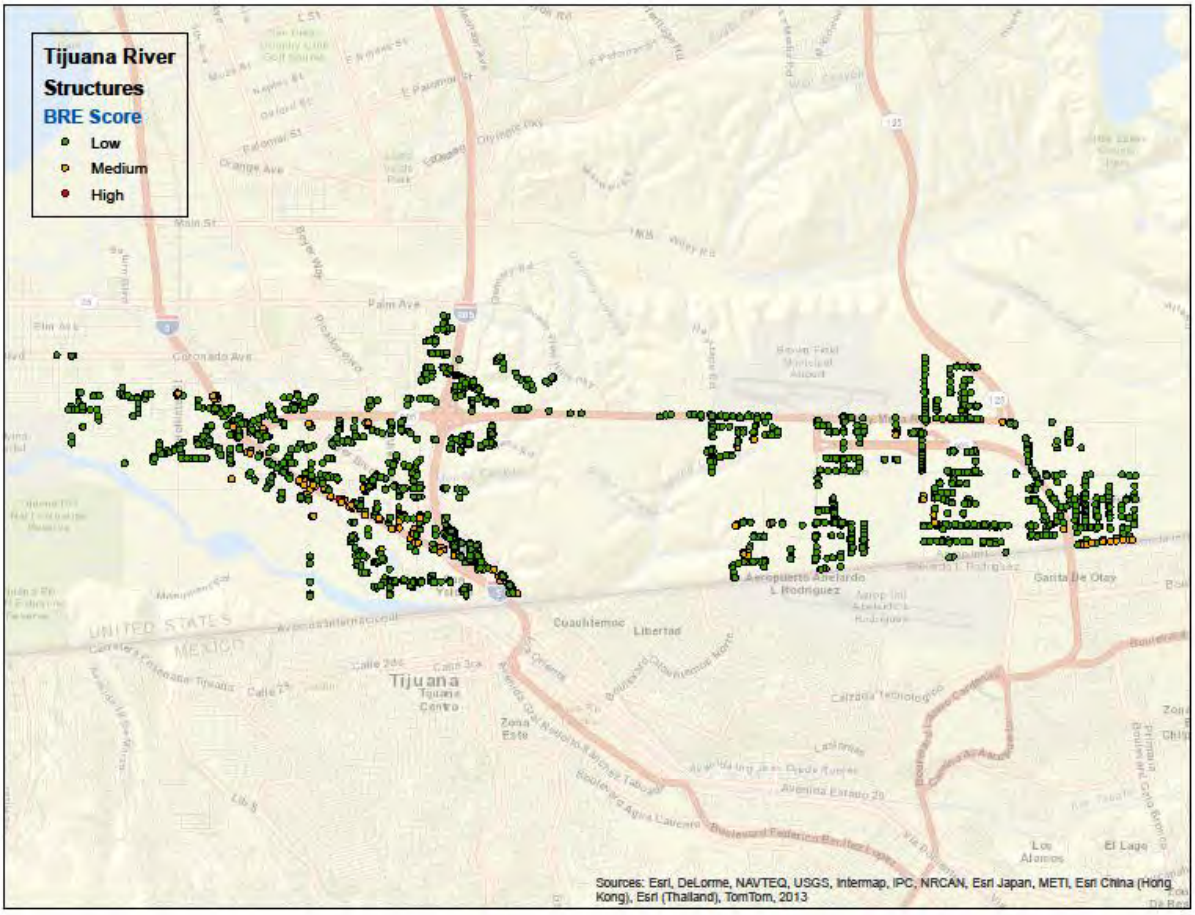


**Figure F-24. Storm Water Structure BRE Score Map - Tijuana River Watershed**

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.

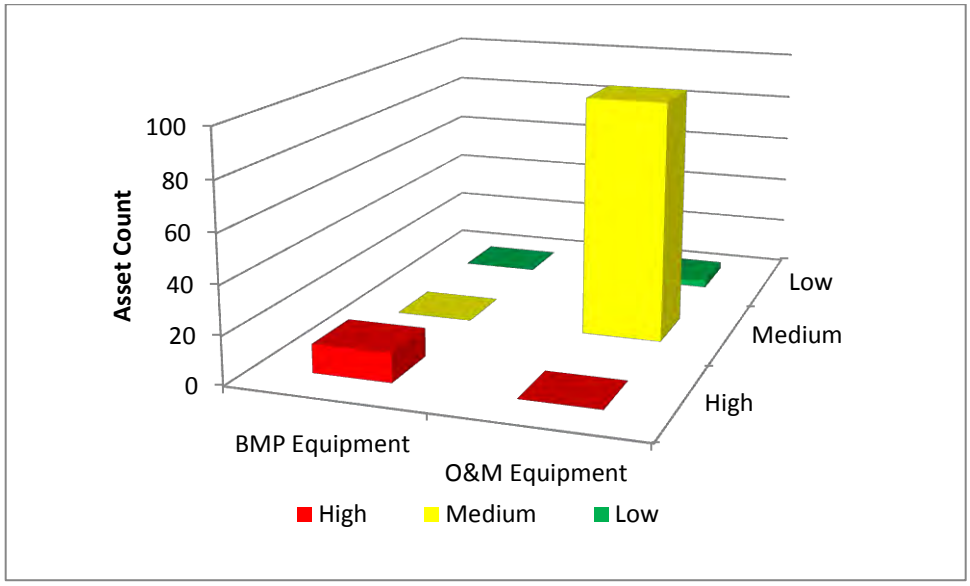


**Figure F-25. Summary of Equipment Assets – San Diego City Wide**

## 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.

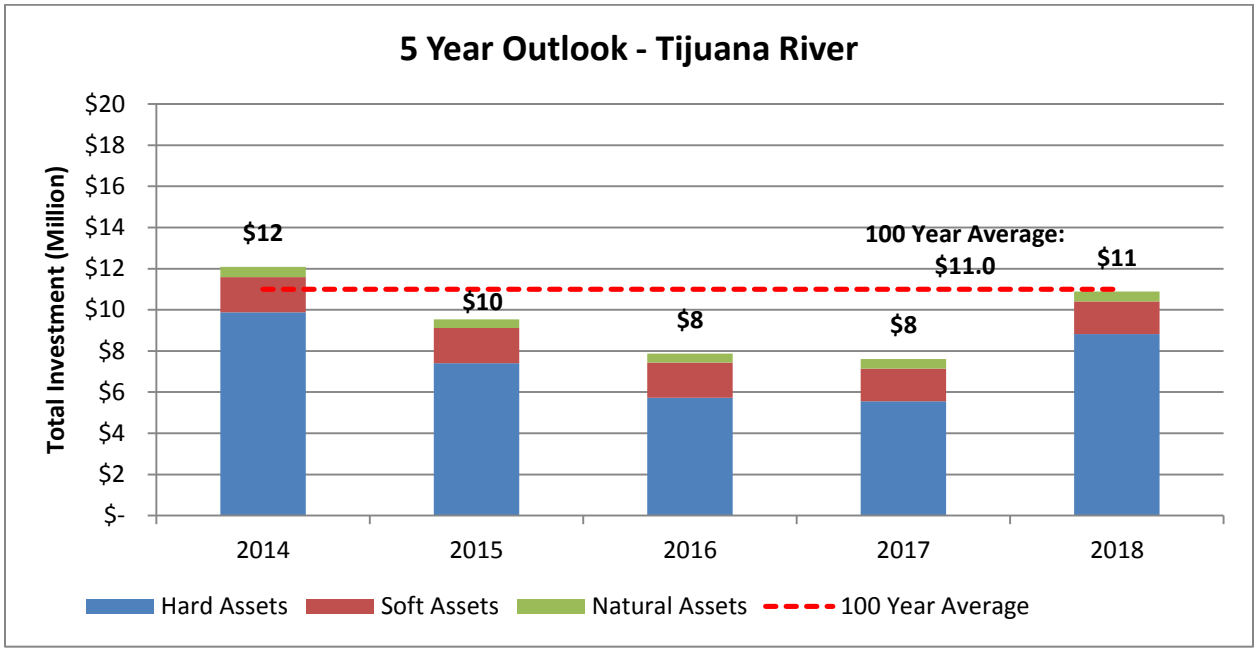


**Figure F-26. Watershed 5 Year Outlook by Asset Type – Tijuana River Watershed**

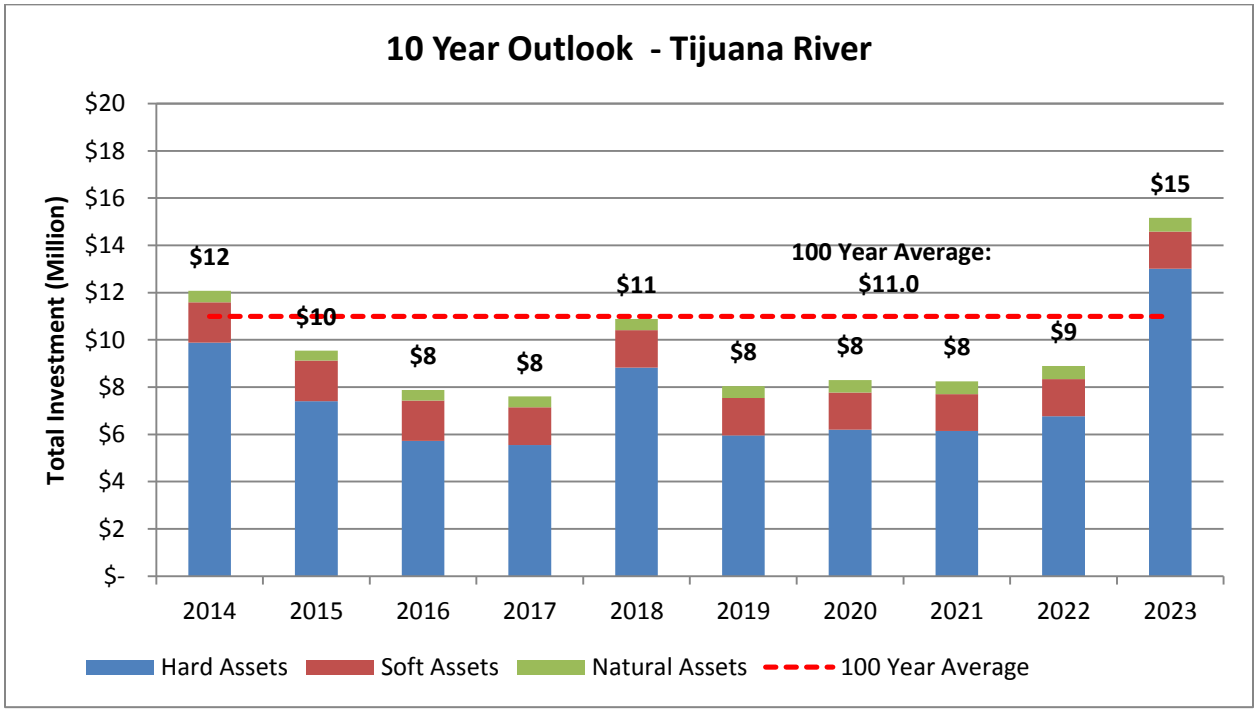


**Figure F-27. Watershed 10 Year Outlook by Asset Type – Tijuana River Watershed**

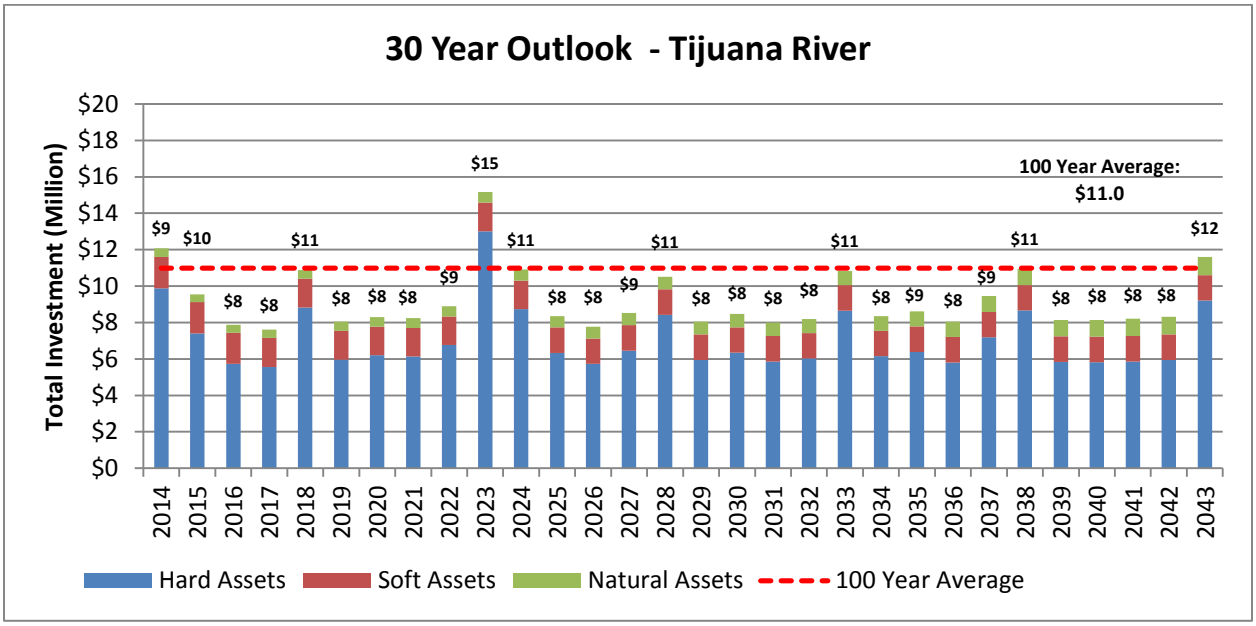


**Figure F-28. Watershed 30 Year Outlook by Asset Type – Tijuana River Watershed**

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.

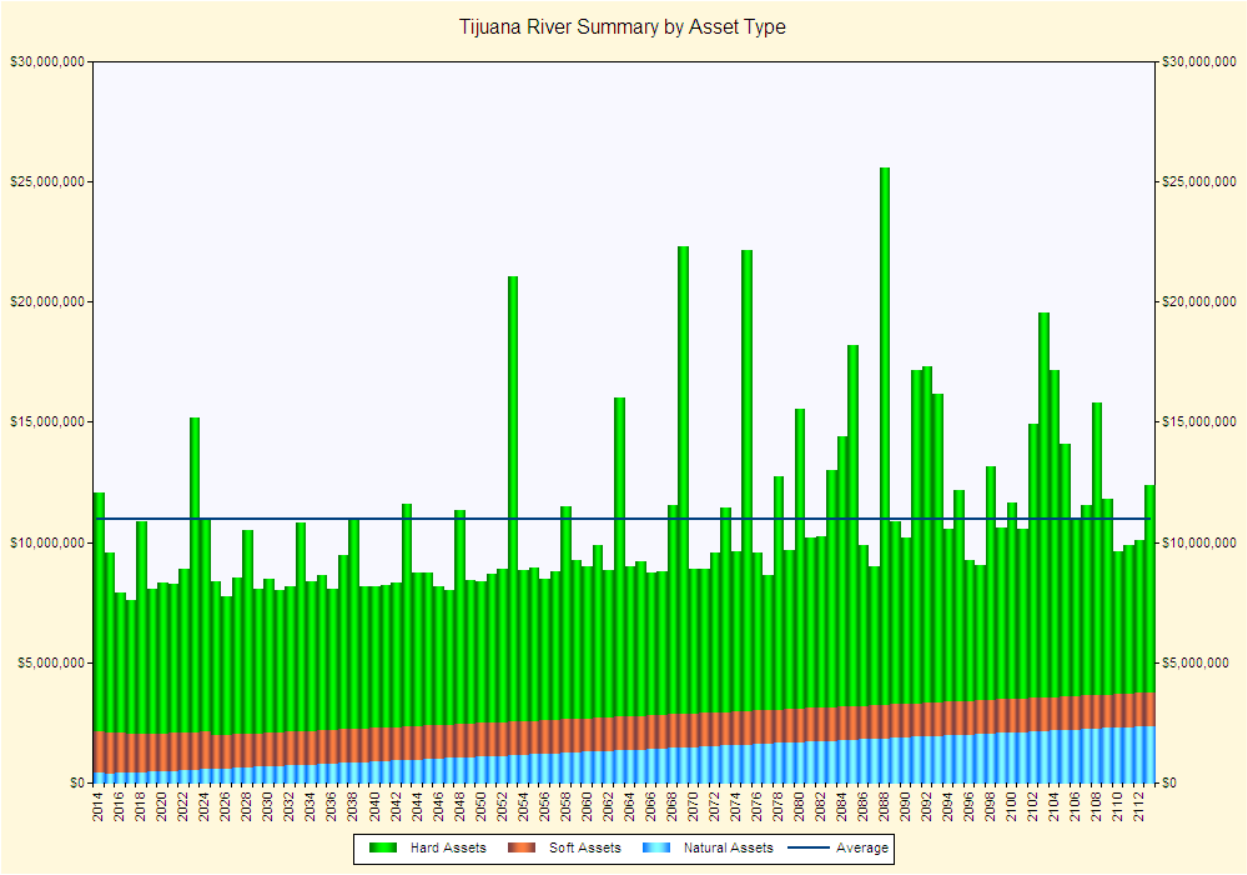


**Figure F-29. 100 Year Forecast by Asset Type - Tijuana River Watershed**

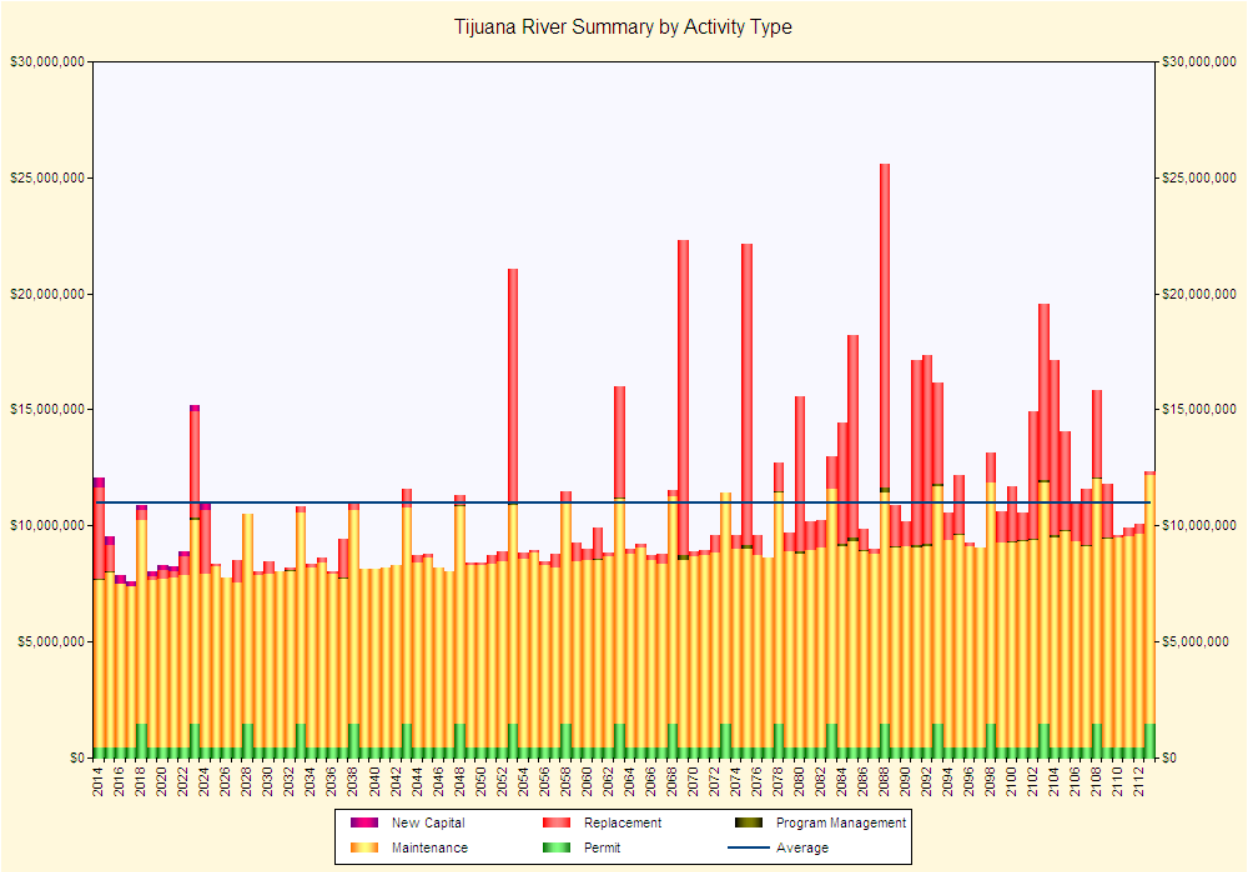


**Figure F-30. 100 Year Forecast by Activity Type - Tijuana River Watershed**

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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