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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%**

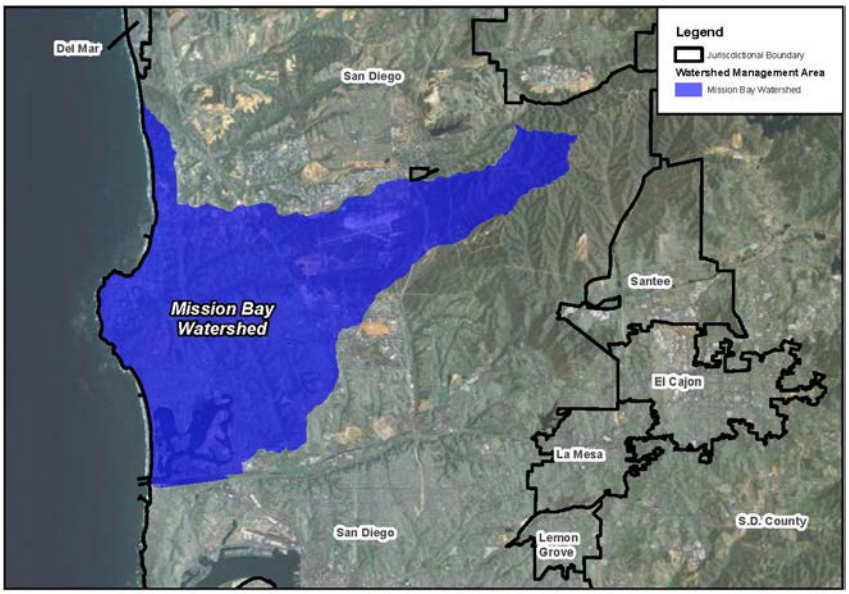

Figure C-1. Mission Bay Watershed

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.

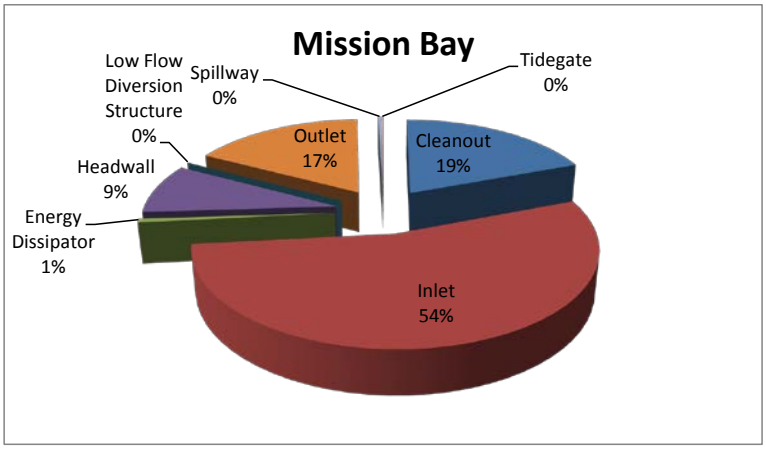

Figure C-2. Distribution of Storm Water Structures by Asset Count - Mission Bay Watershed

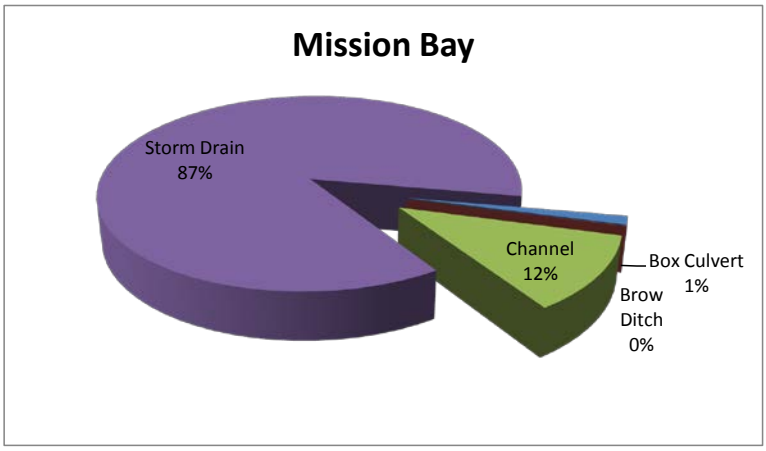

Figure C-3. Distribution of Storm Water Conveyance by Length - Mission Bay Watershed

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**

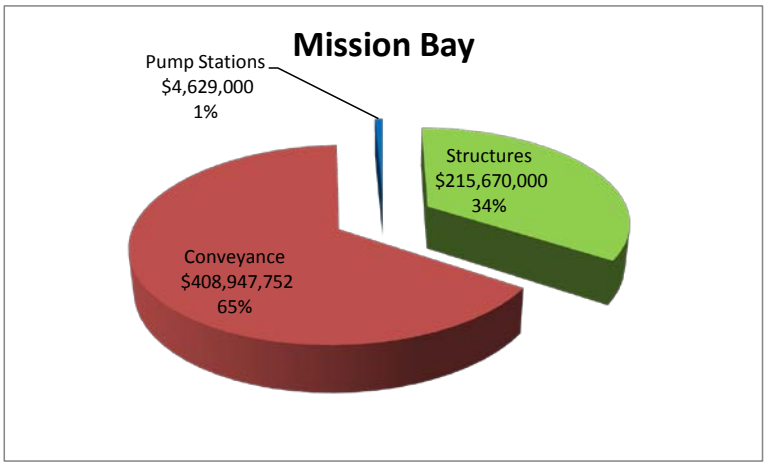

Figure C-4. Mission Bay Watershed Hard Assets Replacement Costs

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.

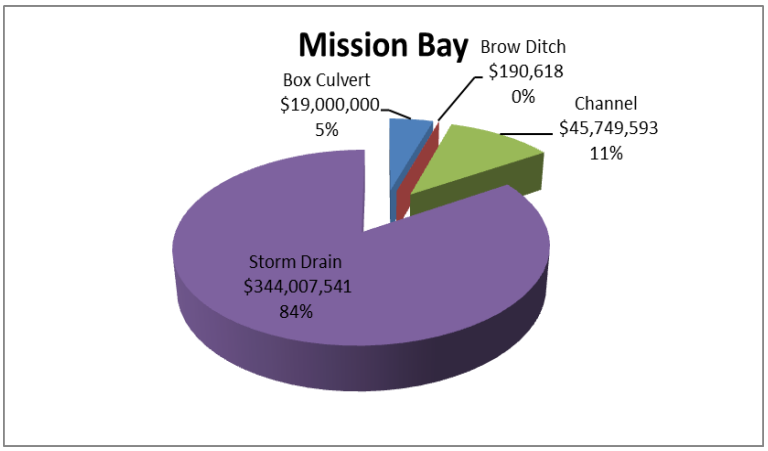

Figure C-5. Mission Bay Watershed Conveyance System Assets Replacement Costs

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.

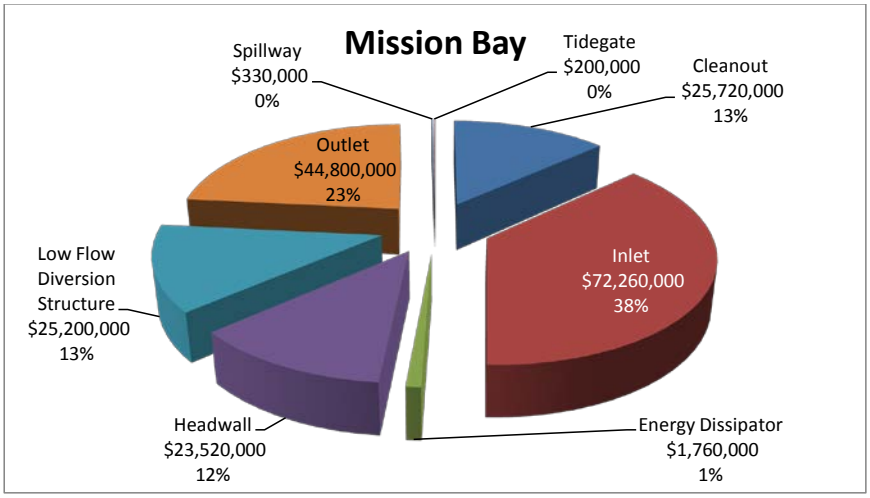

Figure C-6. Mission Bay Watershed Storm Water Structures Asset Replacement Costs

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).

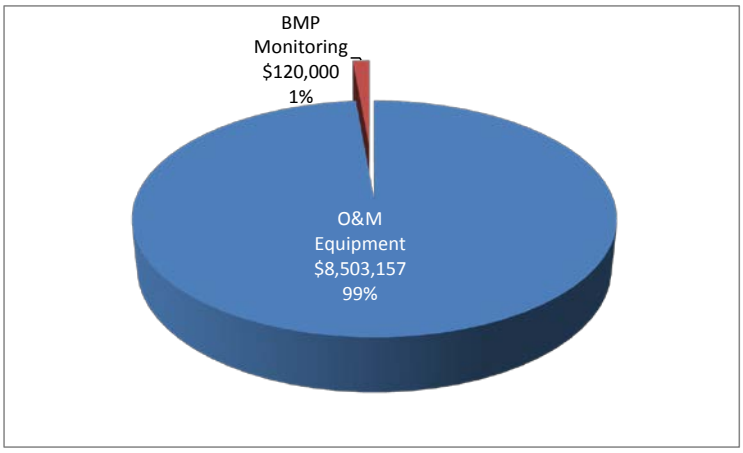

Figure C-7. The Division's Equipment Asset Replacement Costs

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.

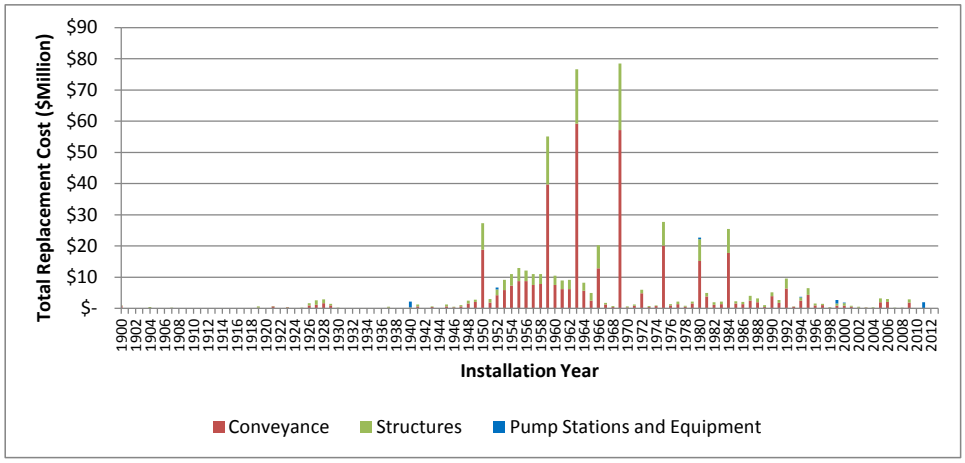

Figure C-8. Installation Profile - Mission Bay Watershed

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.

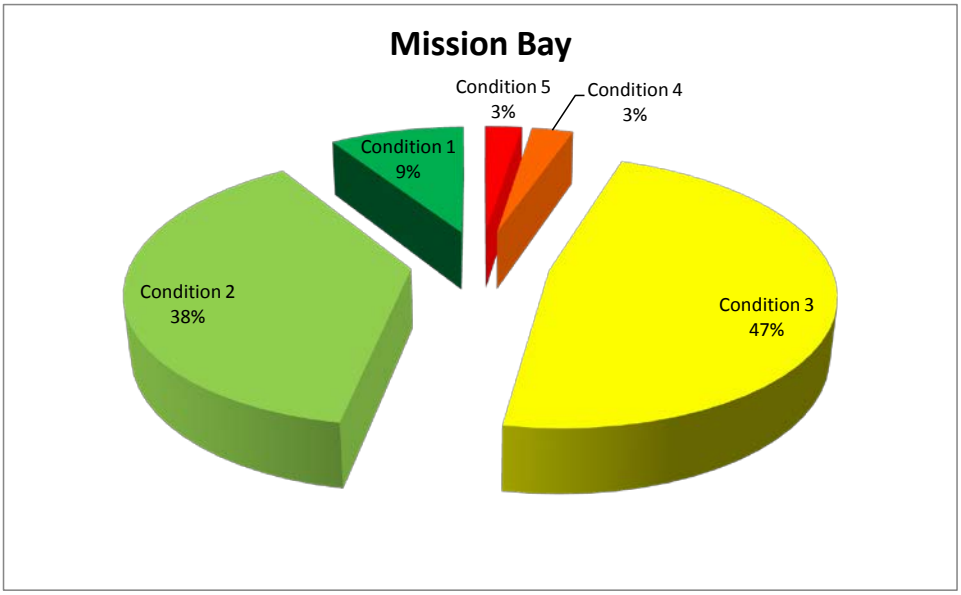

Figure C-9. Summary of Hard Asset Conditions - Mission Bay Watershed

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.

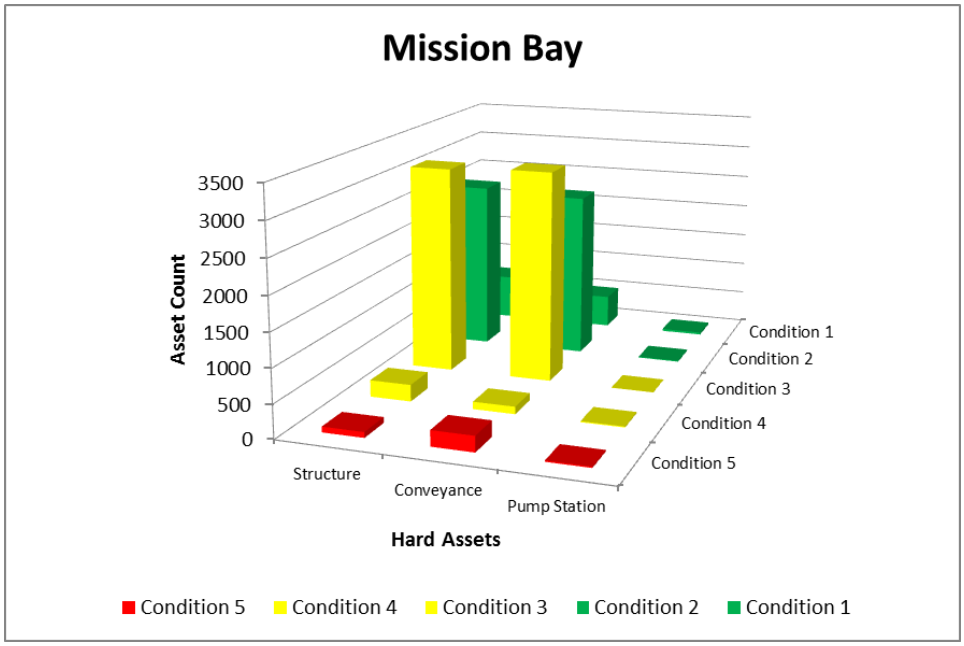

Figure C-10. Summary of Hard Asset Conditions by Asset Class - Mission Bay Watershed

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.

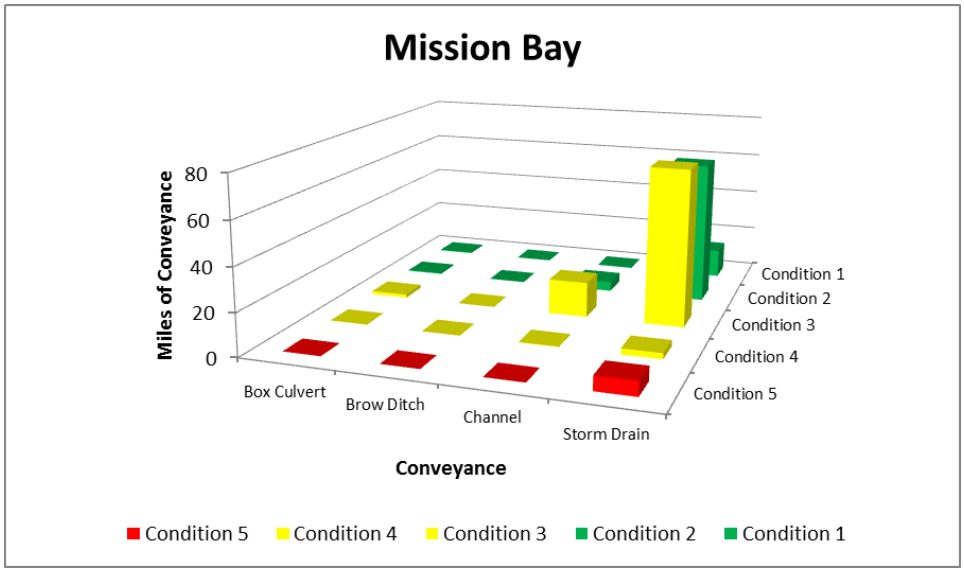

Figure C-11. Summary of Conveyance System Conditions - Mission Bay Watershed

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.

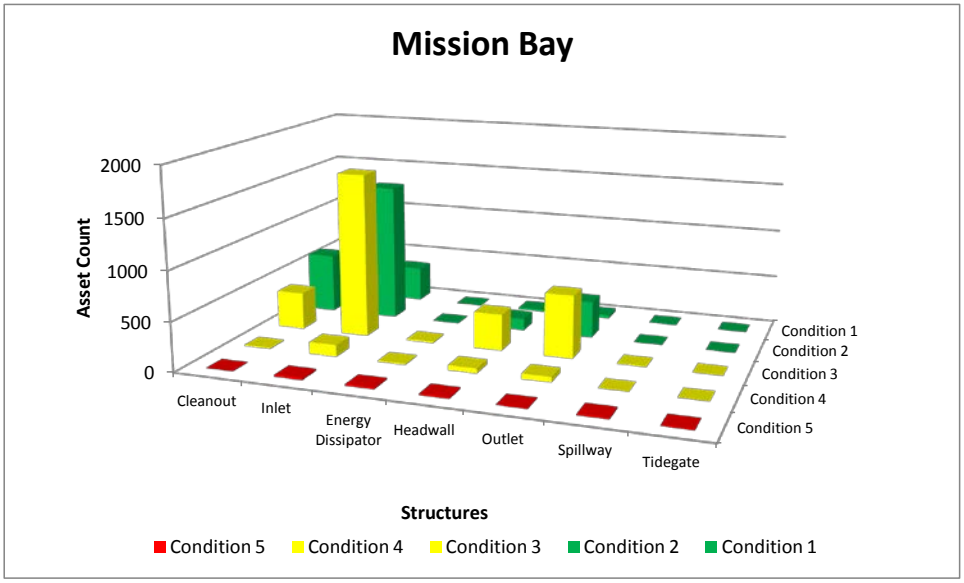

Figure C-12. Summary of Conditions of Storm Water Structures - Mission Bay Watershed

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.

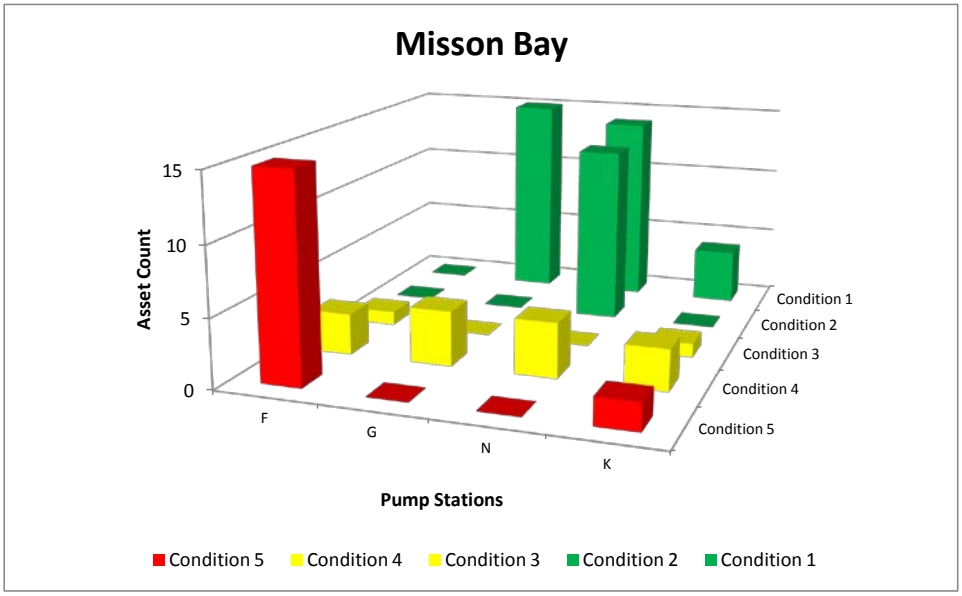

Figure C-13. Summary of Conditions of Pump Station Assets - Mission Bay Watershed

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

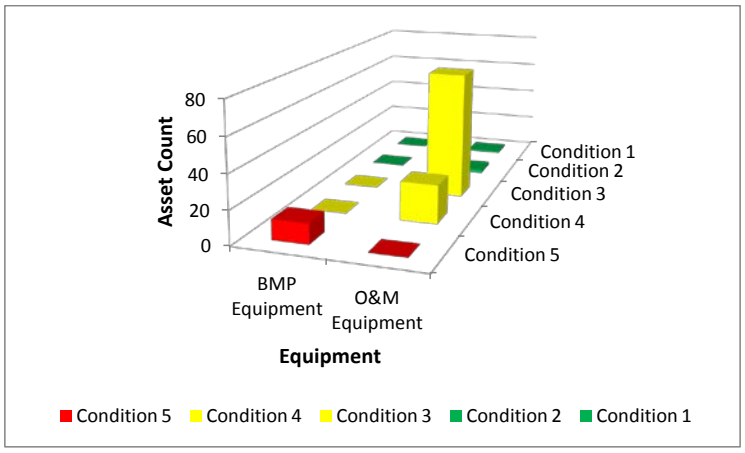

Figure C-14. Summary of Conditions of Equipment Assets – Mission Bay Watershed

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.

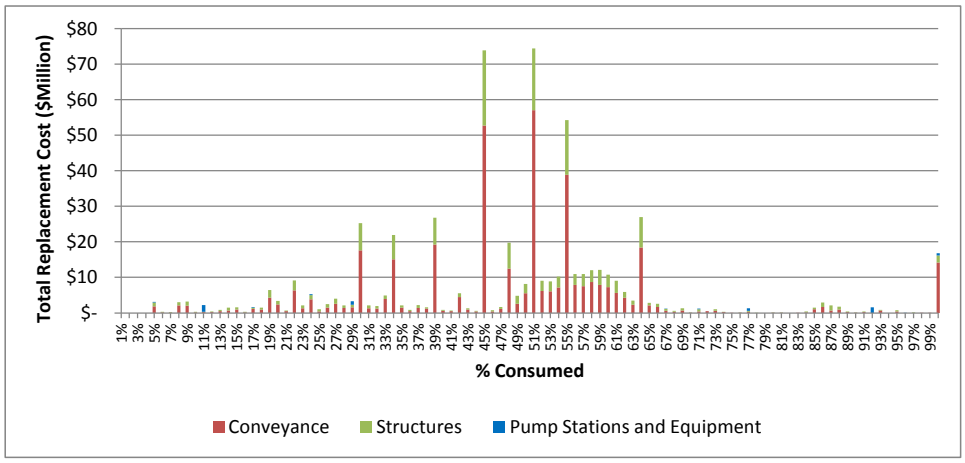

Figure C-15. Consumption Profile – Mission Bay Watershed

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. 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 ECP not installing BMPs per requirements Public Utilities Water discharging water to storm drain without approvals O&M reactionary to issues and not coordinating with others for many jobs 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 Modify new and re-development program to make Storm water division reviewer of water quality plans and have construction inspection role Modify asset ownership for public works water quality features for storm water to have ownership of those assets Updating and developing standard plans and specifications 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). Measurably reduce storm water pollutant discharges from the storm drain system within regulatory time frames (this objective also applies to Goals A and C). Develop plans to meet the objectives of regulatory drivers (TMDLs and ASBS) within regulatory time frames (this objective also applies to Goal A). 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. 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). Measurably reduce storm water pollutant discharges from the storm drain system within regulatory time frames (this objective also applies to Goals A and C). Develop plans to meet the objectives of regulatory drivers (TMDLs and ASBS) within regulatory time frames (this objective also applies to Goal A). 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. 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. Proactively coordinate with regulatory agencies to properly regulate non-storm water pollutant sources in the appropriate regulatory arena within 5 years. Influence the development of legislation, regulations, and policies based on best available science that are also enforceable and attainable. 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). 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. 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). Assess existing infrastructure improvements in priority areas within 3 years and update annually (coordinated with Objectives A.3 and C.1). 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. 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). Assess existing infrastructure improvements in priority areas within 3 years and update annually (coordinated with Objectives A.3 and C.1). 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. Plan and design feasible projects that can capture local runoff to augment water supply. Implement projects that capture local runoff to augment water supply (amount to be determined by an assessment). Establish development policies and standards that treat storm water as a resource and embrace/encourage/require storm water capture to reduce runoff. 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. Develop a position paper based on best available science for how harvested storm water should be regulated to ensure safety while allowing broad uses. Develop state-wide support for the position - update the position as necessary. Draft legislation. Use lobbyists effectively to promote the legislation, and move it through the legislature. Work with state agencies on promulgation of regulation associated with the new legislation. 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. Initiate capacity analysis study to identify the under capacity channel. 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. 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. 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 ECP not installing BMPs per requirements Public Utilities Water discharging water to storm drain without approvals 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 Follow up with training 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.

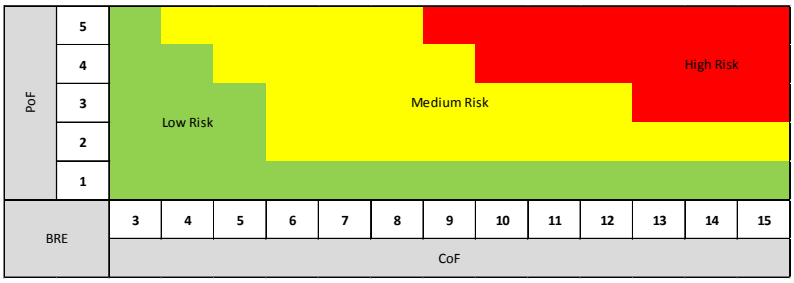


Figure C-16. Hard Asset Risk Category Map

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.

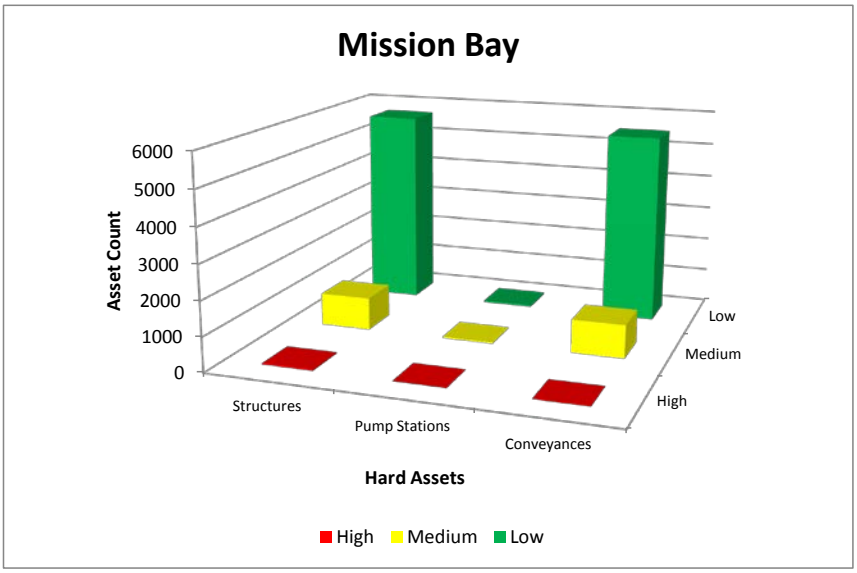


Figure C-17. Hard Asset BRE Scores by Asset Classes - Mission Bay Watershed

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.

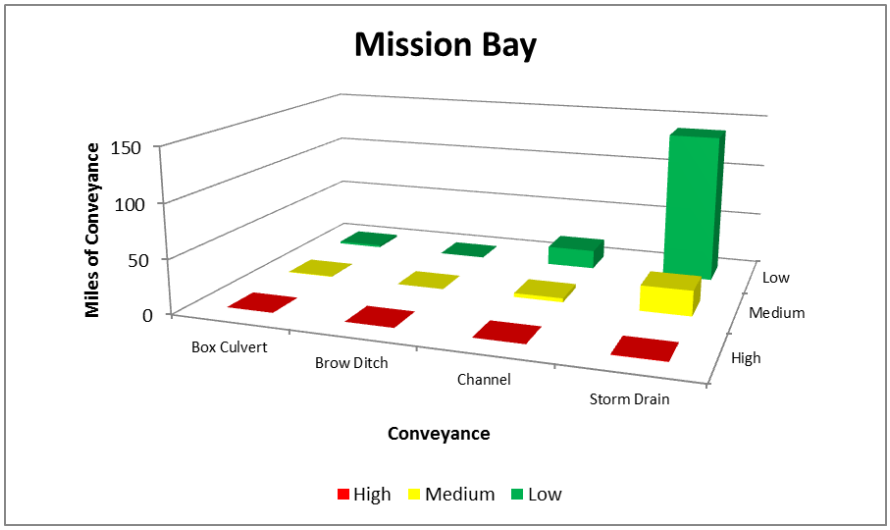


Figure C-18. BRE Summary of Conveyance System BRE Scores - Mission Bay Watershed

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.

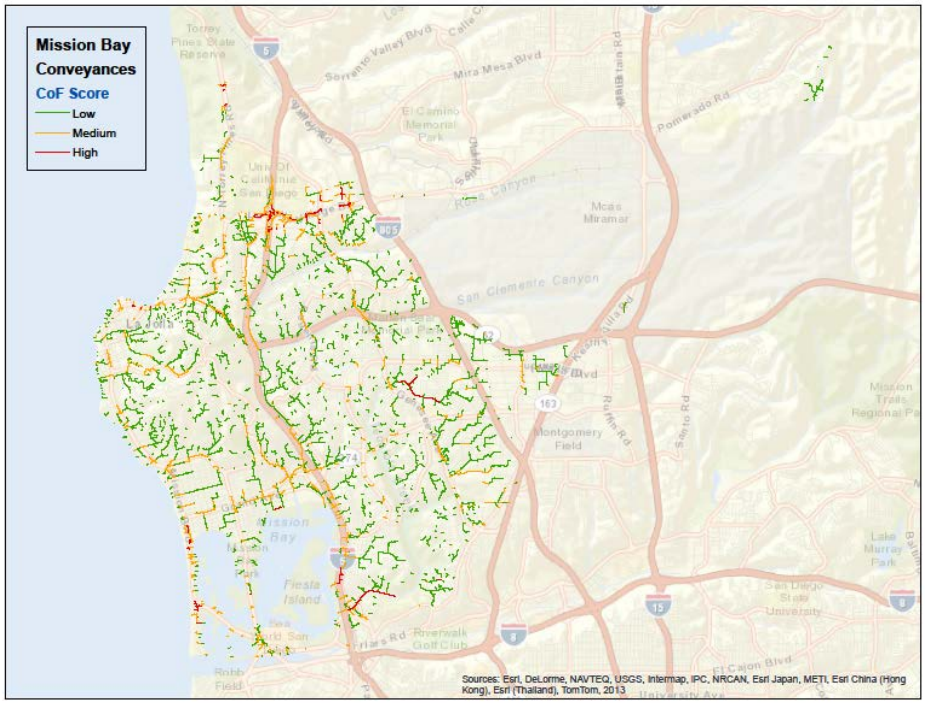


Figure C-19. Conveyance System CoF Score Map - Mission Bay Watershed

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.

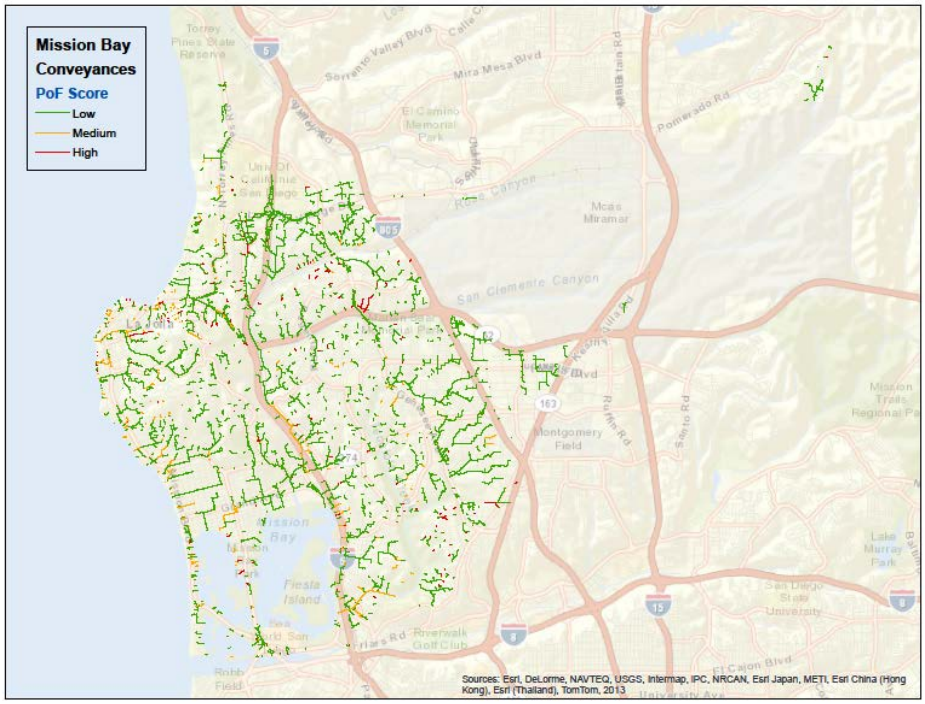


Figure C-20. Conveyance System PoF Score Map - Mission Bay Watershed

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.

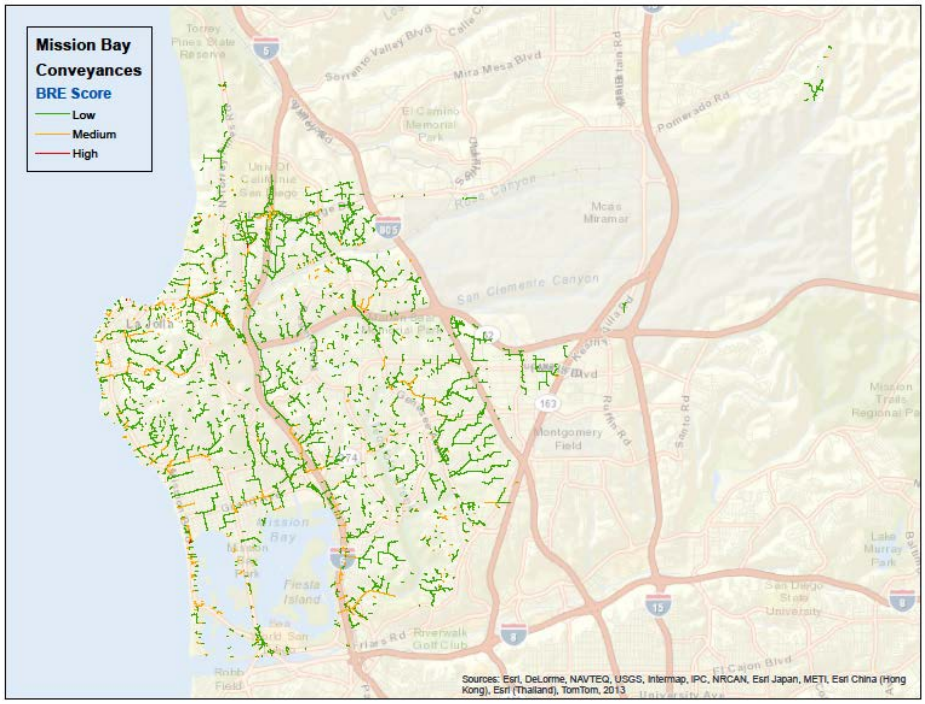


Figure C-21. Conveyance System BRE Score Map - Mission Bay Watershed

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.

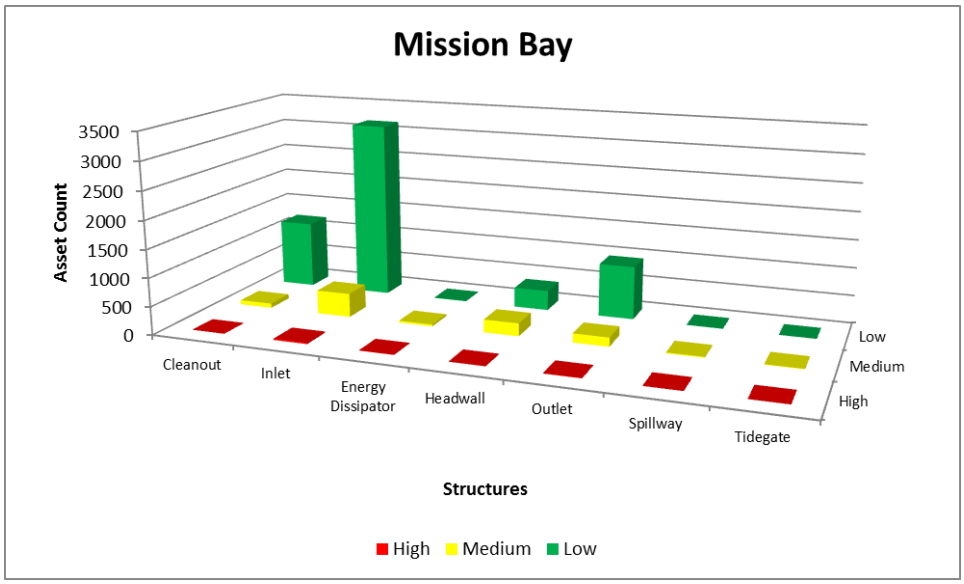


Figure C-22. Storm Water Structure BRE Scores- Mission Bay Watershed

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.

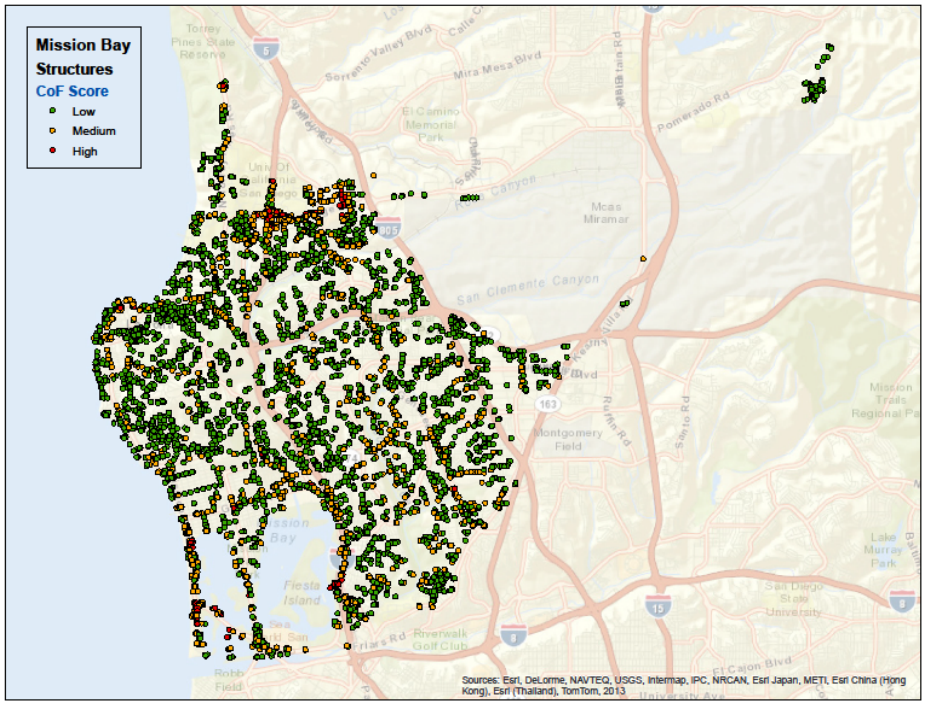


Figure C-23. Storm Water Structure CoF Score Map - Mission Bay Watershed

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.

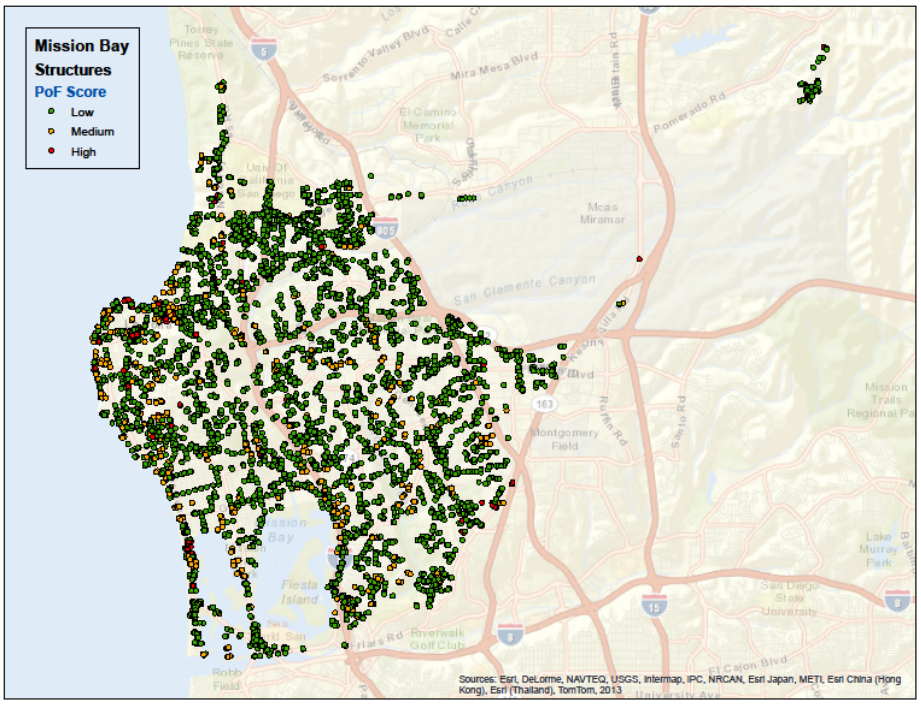


Figure C-24. Storm Water Structure PoF Score Map - Mission Bay Watershed

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.

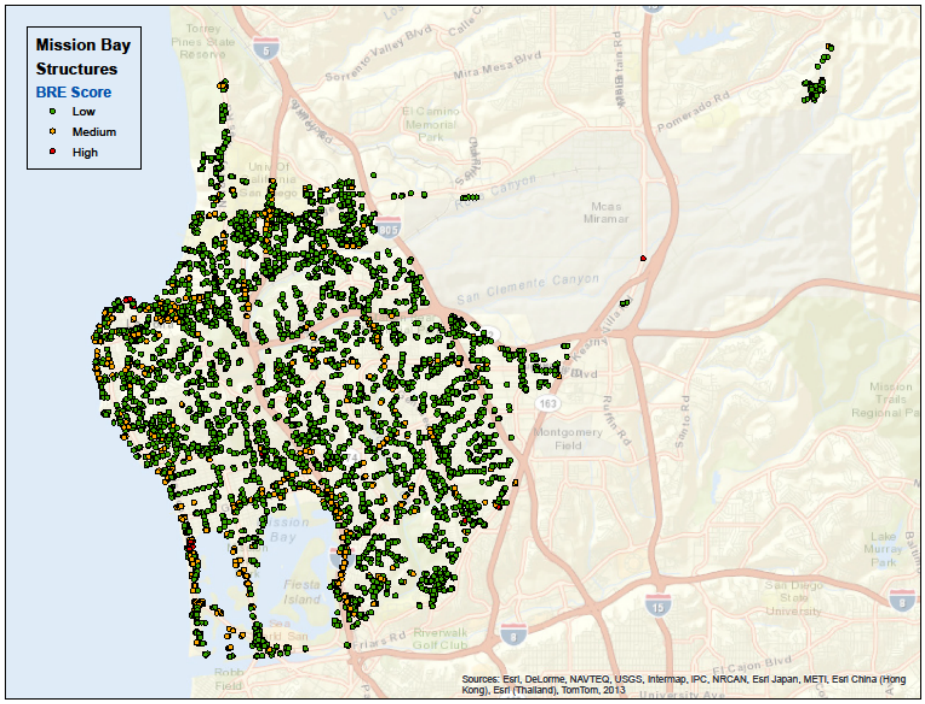


Figure C-25. Storm Water Structure BRE Score Map - Mission Bay Watershed

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

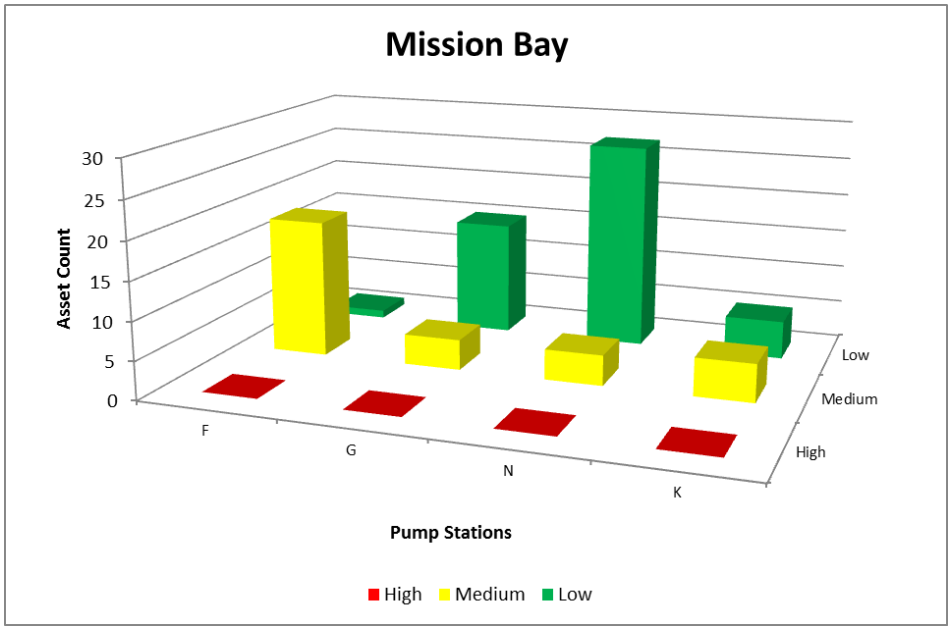


Figure C-26. Pump Station Asset BRE Scores - Mission Bay Watershed

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.

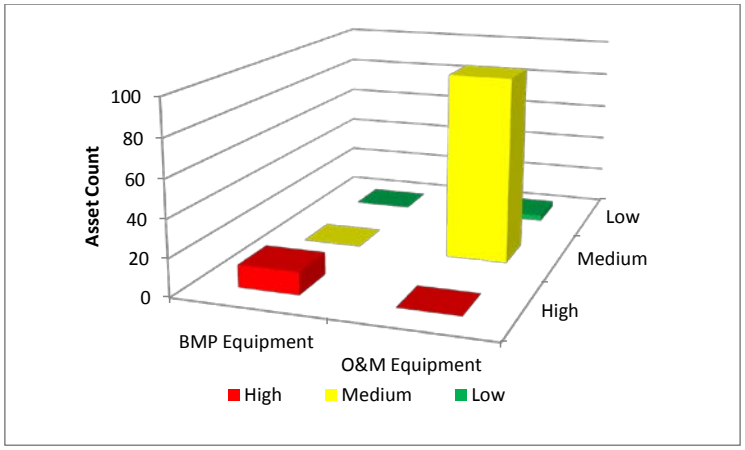


Figure C-27. Summary of Equipment Assets – San Diego City Wide

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.

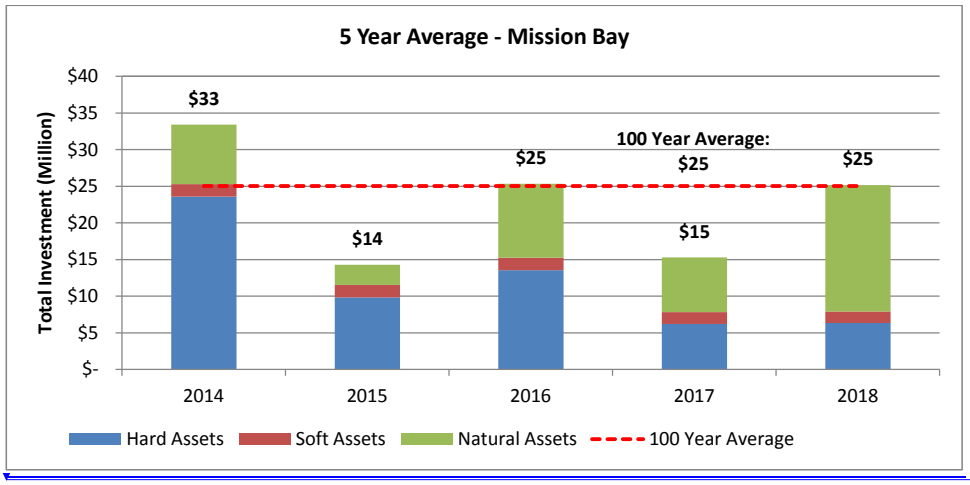
It is important to note the factors outlined below.

- 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.



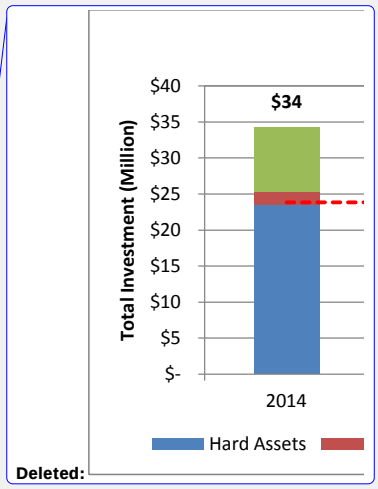


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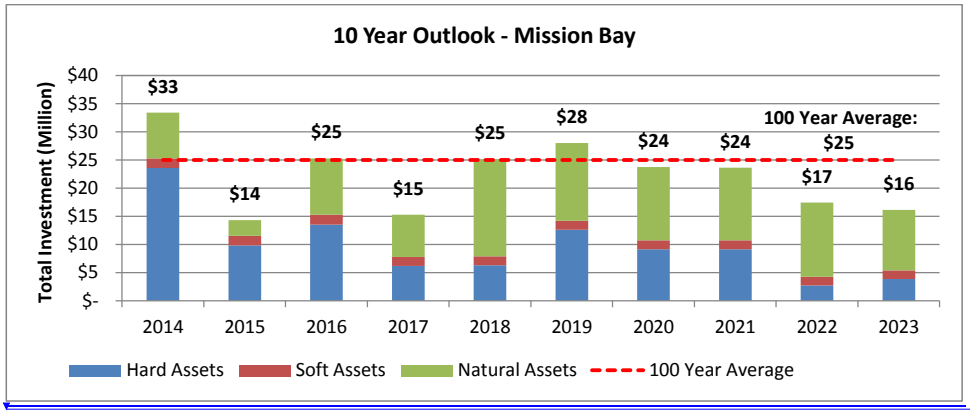
Figure C-28. Watershed 5 Year Outlook by Asset Type – Mission Bay Watershed



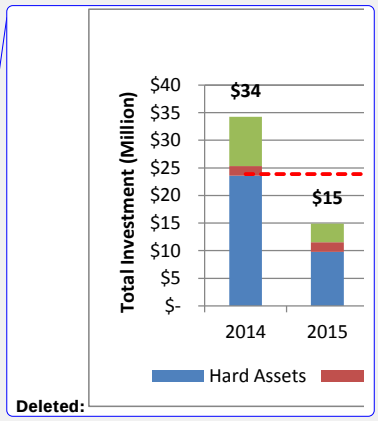


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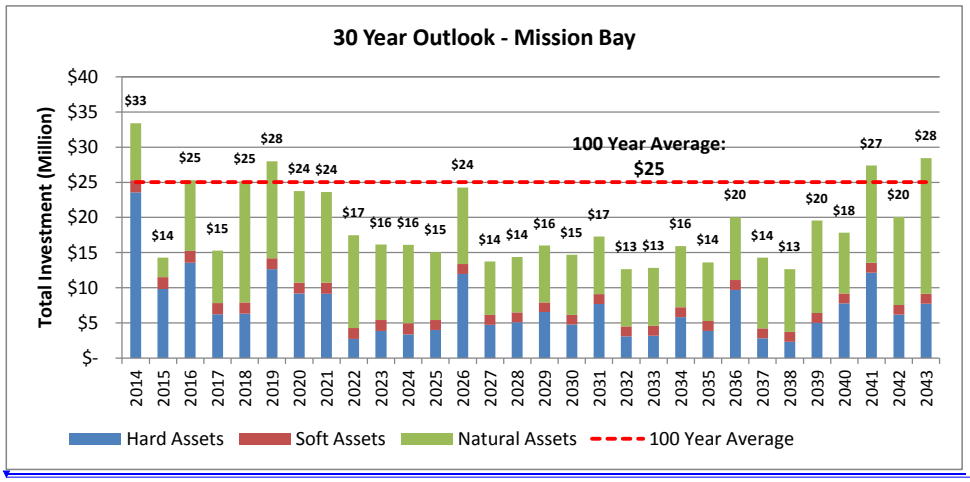
Figure C-29. Watershed 10 Year Outlook by Asset Type – Mission Bay Watershed



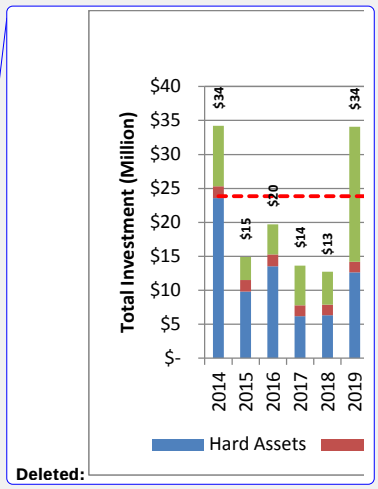


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Figure C-30. Watershed 30 Year Outlook by Asset Type – Mission Bay Watershed

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.

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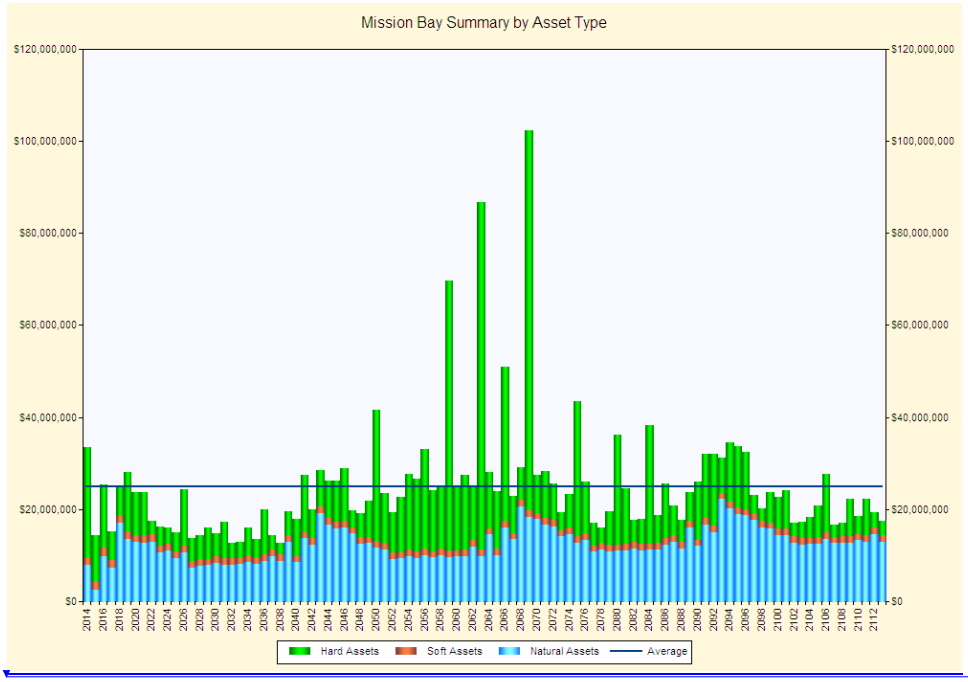

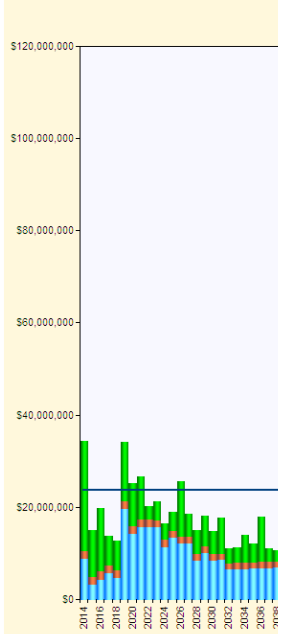

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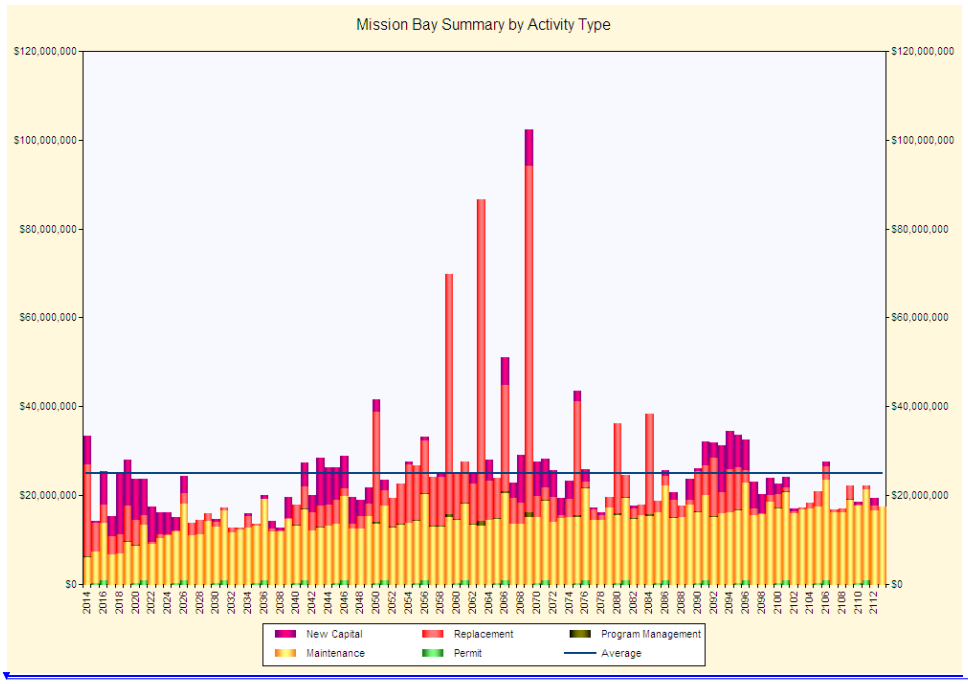
Figure C-31. 100 Year Forecast by Asset Type - Mission Bay Watershed



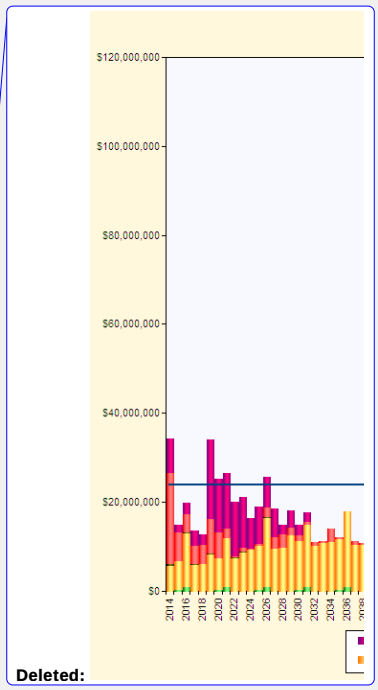


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Figure C-32. 100 Year Forecast by Activity Type - Mission Bay Watershed

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

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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	
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

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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	
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

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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	
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

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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	
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

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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	
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

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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	
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

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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	
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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