# Watershed Asset Management Plan Version 2.0

# Transportation and Stormwater Department, Stormwater Division

# City of San Diego

**January 2021-1**

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# Glossary of Terms

**Activity Plan** – An internal, action-oriented plan that includes a sequence of steps that must be taken, or activities that must be performed, in order to meet a specified target.

**Adaptive Management** – The iterative process in which a framework is developed to evaluate progress towards meeting performance targets and allows for modification and adaptation to strategies to reduce uncertainty, increase efficiencies, and/or meet changing conditions.

**Adopted Budget** – The Mayor and City Council's approved plan for the City's financial operations, which includes an estimate of expenditures and revenues for a given fiscal year.

**Annualization** – Prorating expenditures for a portion of a year over 12 months for the purpose of estimating annual costs.

**Appropriation** – A legal authorization to make expenditures and to incur obligations for specific purposes.

**Asset –** Something that the City owns or manages, that has an identifiable value, and that is or could be used by the City for it to provide a level of service to ratepayers, citizens, and/or regulators. Physical assets include land, structures, equipment, and intellectual property, like conveyance channels, pump stations, best management practices, and other stormwater structures. Other assets include activities like operations and maintenance, site inspections, compliance planning, or street sweeping.

**Asset Condition** – Measure of an asset's state as it pertains to the asset's ability to perform its required level of service such as the conveyance capacity of a pipe or the water quality of a receiving water that has certain beneficial uses.

**Asset Condition Assessment** – Process of continuous or periodic inspection, assessment, measurement, and interpretation of the resultant data to indicate the condition of a specific asset in order to determine the need for preventative or remedial action. It is a crucial part of asset management to determine remaining useful life and an asset's capability to meet performance requirements.

**Asset Database** – Database containing the asset register and related information.

**Asset Groups** – Groups that assets can be organized based on location, function, and character (tangible, intangible). An Asset Group is considered the "parent asset."

**Asset Hierarchy** – A standard framework used to organize assets in an asset register.

**Asset Inventory** – List of assets containing sufficient information about the assets to physically locate and identify them.

**Asset Improvement Schedule** – A firm schedule of asset improvement that is based on asset's condition and useful life.

**Asset management** – A recommended practice for effectively and sustainably managing assets at a desired level of service for the lowest lifecycle cost. Asset management provides needed information

on existing assets, such as condition and desired level of service, so that City staff can develop optimal strategies for maintenance and rehabilitation of assets.

**Asset Register** – Database or document containing specific information about the assets owned or controlled by an organization or for which it has responsibility.

**Asset Subgroups** – Division of the asset group with additional parameters to refine the grouping of assets. An Asset Subgroup is considered the "child asset."

**Asset replacement schedule** – A firm schedule of asset replacement that is based on asset's condition, criticality and remaining useful life.

**Basin Plan –** The Water Quality Control Plan for the San Diego Basin, which establishes water quality objectives and implementation plans for water bodies in the San Diego Region. The Basin Plan is approved through the San Diego Regional Water Quality Control Board.

**Best Management Practice (BMP)** – An activity or a device that reduce the amount of pollution or runoff volume that enters the stormwater conveyance system or downstream receiving water bodies. BMPs can be non-structural (activities) or structural (devices).

**Bioretention Area** – Bioretention areas are vegetated stormwater treatment control BMPs (also referred to as bioretention cells or rain gardens) that use soil, plants, and microbes to treat stormwater before it is infiltrated or discharged. Bioretention areas are shallow depressions filled with sandy or biotreatment soil, topped with a thick layer of mulch, and planted with dense vegetation.

**Bond** – A funding tool representing a written promise to pay a specific sum (face value or principal amount) in the future (maturity date), plus interest. In California, municipal government bonds are only used to finance capital improvements.

**Bond Financing** – Bond financing is a long-term borrowing tool used to meet the City's cash flow needs and to provide funds for capital projects. The City Council has approved financing agreements to provide funding for capital projects throughout the City. The list of capital projects includes improvements to City streets, buildings, and storm drains.

**Bond, General Obligation** – A limited tax bond which is secured by the City's property tax.

**Bond Proceeds** – Funds derived from the sale of bonds for the purpose of constructing major capital facilities.

**Bond Rating** – A methodology used to measure the fiscal health of the City. Generally, analyst firms such as Standard and Poor's, Moody's Investor Service, and Fitch Ratings provide bond ratings to municipalities. Bonds rated AAA/Aaa are judged to be the best quality and carry the smallest degree of risk and, together with AA/Aa bonds, comprise high grade bonds. Ratings including "+" or "1" designate the strongest bonds in the rating category. Generally, highly rated bonds result in lower interest rates.

**Budget** – Proposed plan of expenditure and revenue over a specified period of time such as a fiscal year or accounting period.

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

**Calendar Year (CY)** – A 12-month term from January through December.

**Capacity** – The ability of an asset to perform its needed function (i.e., the ability of a pipe to carry a quantity of gallons of water per minute, the capacity of pump station to pump the required volume of water, or the ability of storm drain channels to convey floodwaters to prevent flooding ).

**Capital Improvement Program (CIP) Budget** – A financial plan of capital projects and the authorized means of their expenditures over a given period of time.

**Capital improvement project (also CIP project)** – The purchase, construction, repair, or major renovation of infrastructure. Stormwater capital projects are often for system components like pipes, channels, inlets, and other infrastructure used for stormwater management. Stormwater capital improvement projects may include the construction of a detention basin, the development of green infrastructure to improve water quality, or the rehabilitation of an outfall or stormwater pump station.

**Capital Improvements Program (also CIP)** – The long-range coordinated plan for all individual capital improvement projects and funding sources.

**Capital Expenditure** – This expenditure category includes purchases of capital equipment, such as stormwater infrastructure, vehicles, large machinery, and other capital items. The Equipment and Vehicle Financing Program is budgeted within this expenditure category.

**Capital Outlay** – Capital Outlay Funds are used exclusively for the acquisition, construction, and completion of permanent public improvements or real property; replacement or reconstruction of public facilities; and other improvements of a permanent character. Capital projects benefiting from this fund are typically managed and maintained by asset-owning General Fund departments such as the City's Stormwater Division.

**Child Asset** – A child asset is a sub-asset that is attached or associated with another parent asset. Examples of the parent to child asset relationship include, a screen (child) for a pump station (parent), a grate (child) for a drop inlet (parent).

**Compensatory Mitigation** – Compensatory mitigation is a type of mitigation that is associated with habitat restoration and mitigation programmatic assets. Compensatory mitigation may be required for new stormwater assets in environmentally sensitive areas (i.e., Water of the US or Waters of the State) and for existing assets during O&M activities.

**Consequence of Failure** – The economic, social, and/or environmental repercussions of an asset's failure.

**Corrective Maintenance** – Maintenance carried out after a failure has occurred and intended to restore an item to a state in which it can perform its required function. (This may include physical or mechanical breakdown such that the item can no longer perform its function, or reactive maintenance).

**Cost Centers** – Specific center to which the cost of an asset is associated.

**Consumer Price Index (CPI)** – An inflationary indicator that measures the change in the cost of a fixed basket of products and services, including housing, electricity, food, and transportation. CPI is an index of the cost of all goods and services to a typical consumer.

**Continuing Appropriations** – Funding approved in prior fiscal years, but not expended within the respective fiscal year, are carried forward into subsequent fiscal years for their intended purpose.

**Contractual Service** – A written agreement or legal instrument whereby the City of San Diego is committed to expend, or does expend, public funds in consideration for work, labor, services, equipment, or any combination of the foregoing.

**Contracts** – This expenditure category consists of contractual agreement expenses for services provided.

**Critical Asset** – An asset for which the financial, business or service level consequences of failure are sufficiently severe to justify proactive inspection and rehabilitation. Critical assets have a lower threshold for action than non-critical assets.

**Criticality** – Quality, state, or degree of being of the highest importance.

**Debt** – Payment of interest and principal on an obligation resulting from the issuance of bonds.

**Defect** – An imperfection within an asset that could potentially lead to the premature failure of the asset.

**Deferred Capital** – Needed capital improvements, refurbishment, or expansion of existing facilities that have been delayed and unfunded. Postponing capital projects is generally due to limited available funding, but often will increase the cost of repairs as the condition of facilities and infrastructure gets worse.

**Department** – A basic organizational unit of government that may be sub-divided into divisions, programs, activity groups, and/or activities.

**Depreciation** – Reduction in the value of an asset due to usage, passage of time, environmental factors, wear and tear, obsolescence, depletion or inadequacy.

**Development Impact Fees (DIF)** – Development impact fees are collected to mitigate the impact of new development in urbanized communities that are near build-out. The amount of the DIF is based on a portion of the financing needed for identified public facilities. Property being developed is assessed the fee(s) at the time the building permit is issued. The City of San Diego assesses DIF throughout the city employing two types of methodologies: Facilities Benefit Assessment (FBA) and DIF. A Development Impact Fee in an FBA community historically has typically provided 100% of funds for public facilities projects within that community and are identified in a Public Facilities Financing Plan (PFFP). The dollar amount of the DIF is based upon the cost of each public facility equitably distributed over the remaining development in the community planning area.

**Disbursements** – Funds actually expended.

**Discretionary Funds** – Funds for which there are no restrictions on the use of fees or taxes collected.

**Division** – An organizational component of a department, possibly sub-divided into sections and groups.

**Donations and Developer Funding** – Projects may be funded by contributions and/or donations from private sources, such as residents, developers, private organizations, and businesses. Contributions by developers and vendors may be reimbursed by City funds in future years.

**Drivers** – External expectations placed on the City by customer needs, regulations, and permits.

**Emergency Repairs or Maintenance** – Repair or maintenance activities that need to be performed as a result of physical or mechanical failure of stormwater infrastructure that pose an immediate threat to public health or safety. Examples include replacing collapsed pipes, repairing a sinkhole, or removing water after flooding of critical roadways and homes.

**Emergency Reserve** – This reserve was established for the purpose of sustaining General Fund operations in the case of a public emergency such as a natural disaster or other unforeseen catastrophic event. This reserve may be expended only if an event is determined to be a public emergency by a two-thirds vote of the City Council.

**Encumbrance** – An encumbrance designates or reserves funds for a specific purpose as approved by the appropriate authority. When the goods and services are received, the encumbrance is released, and the expenditure is recorded for the actual costs.

**Enterprise** – Public utility or a section thereof that provides certain classes of services to the public, including common carrier transportation; telephone and telegraph; power, heat, and light; and community facilities for water, sanitation, stormwater, and similar services. Various assets are managed by the modern enterprises at present. The assets may be fixed assets like buildings, plants, machineries or moving assets like vehicles, ships, moving equipment etc. The lifecycle management of the high value physical assets require regressive planning and execution of the work.

**Enterprise asset management (EAM)** – Management of the maintenance of physical and programmatic assets of an organization throughout each asset's lifecycle. EAM is used to plan, optimize, execute, and track the needed maintenance activities with the associated priorities, skills, materials, tools, and information. This covers the design, construction, commissioning, operations, maintenance and decommissioning or replacement of plant, equipment and facilities, and planning, design and monitoring of programmatic activities.

**Enterprise Funds** – Enterprise Funds account for specific services that are funded directly by fees and charges to users such as water and sewer services. These include the services provided by Public Utilities, Environmental Services, Airports and Golf Courses. These funds are intended to be fully self-supporting and are not typically subsidized by any general revenue or taxes. Within each Enterprise Fund, budgets are developed which are sufficient to fund current year operations and maintenance expenses, as well as provide for current and future years' upgrade, replacement, and expansion-related capital construction requirements.

**Enterprise Resource Planning (ERP)** – Enterprise Resource Planning is the City of San Diego's process of providing support to the City's SAP system. ERP works with departments including Office of the Comptroller, Financial Management, Office of the City Treasurer, Personnel, Human

Resources and Risk Management to help maintain the critical functions that the SAP systems provide for the City.
Software used for ERP commonly provides the following functions: accounting, procurement, project management risk management and compliance, and supply chain operations. The City of San Diego uses SAP for its ERP.

**Facilities Benefit Assessments (FBA)** – Facilities Benefit Assessments (FBA) provide 100 percent of funding for public facilities projects that service a designated area of benefit and are identified in the public facilities financing plan. The dollar amount of the assessment is based upon the cost of each public facility equitably distributed over a designated area of benefit in the community planning area. Assessments are recorded as liens with the County of San Diego Assessor's Office (https://arcc.sdcounty.ca.gov/Pages/property-assessments.aspx). Property being developed is assessed at the time the building permit is issued. The amount of the assessment is determined by the type and size the development.

**Failure** – When an asset's function is no longer in accordance with its level of service.

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

**Financial Model** – Tool that evaluates and compares the financial feasibility of alternative funding strategies and cost recovery mechanisms side-by-side in real time.

**Fines, Forfeitures, And Penalties** – Revenue or expenditure resulting from violations of various City and State laws and from damage to City property.

**Fiscal Year (FY)** – A 12-month timeframe designating the beginning and ending period for recording financial transactions. The City of San Diego has specified July 1 through June 30 as the fiscal year.

**Five-Year CIP Outlook** – The Five-Year CIP Outlook models long-range fiscal and capital asset planning. The CIP Outlook aims to provide fiscal information on the basis for revenue projects, criteria to determine capital infrastructure needs, and present a board overview of capital infrastructure needs and funding over the next five fiscal years. The City's recently published their Fiscal Year (FY) 2019-2023 Five-Year CIP Outlook.

**Five-Year Financial Outlook** – The Five-Year Financial Outlook includes General Fund revenue and expenditure forecasts which are based on various assumptions, such as economic conditions or previous policy decisions. The Financial Outlook serves as a long-range planning tool which identifies priorities, economic trends, risks, and opportunities, and guides the City in the development of future budgets.

**Flood Risk Management** – The activities undertaken to protect life and property from water that flows outside of a receiving water or stormwater conveyance system. Flood risk management includes construction or improvement of stormwater conveyance components like channels, levees,

and pipes and operations and maintenance activities like operation of stormwater pumps, cleaning of stormwater conveyance, and clearing of trash and debris before rainfall.

**Found Asset** – An asset not included in an organization's asset register at the time of its construction, that is subsequently identified as a being owned by the organization, and belatedly recognized.

**Fringe Benefits** – This expenditure category consists of the costs to provide employee benefits. Typical employee benefits include the flexible benefit program, insurance, and retirement. According to the City Charter, fringe benefit expense is not considered a salary or wage expense.

**Full-Time Equivalent (FTE)** – The decimal equivalent of a part-time position converted to a fulltime basis, i.e., one person working half-time would count as a 0.50 FTE position.

**Functional Location** – A functional location represents the place at which a maintenance task is to be performed.

**Fund** – A fiscal and accounting entity with a self-balancing set of accounts to record revenues and expenditures.

**Funding Gap** – Difference between; a) the amount of funds required annually for satisfactory operation, maintenance, and renewal of an asset class over the useful life of that asset class, and b) the amount of funds currently being spent on the asset annually. Funding gap can also be defined as the difference between projected funding and projected funding need (or cost of service).

**General Fund** – The City's main operating account that tax revenues flow into, and that is used to pay for basic City services (police, fire, parks, library, transportation and stormwater) that are not funded by fees paid for those services. Some allocations to the CIP budget are allocated from the operating budget of General Fund departments.

**Grants** – An amount of money that may be provided from the state and federal government and other agencies and often requires varying levels of commitment for reporting, matching of funds, and timeline for completion of a project or effort. The receipts of certain grants and reimbursements typically follow the award of contracts.

**Ground Water** – Water that exists beneath the ground surface.

**Hard Asset** – A human made item that one can touch and see that provides a level of service. Hard assets are now referred to as Physical Assets in the Watershed Asset Management Plan 2.0.

**Illicit (or Illegal) Discharge** – An illicit discharge is generally any discharge, release, or pumping of a pollutant or polluted water into the stormwater system. Alternate **–** A non-stormwater discharge that is prohibited in the MS4 Permit (Provision E.2), such as over-irrigation runoff, wash water, sanitary wastewater, and improper disposal of auto fluids.

**Illegal Discharge Detection and Elimination (IDDE)** – Program related to the detection and elimination of illicit discharge into the stormwater system. This program helps the City comply with the Regional Permit.

**Improvement costs** – The cost of improvement or rehabilitation of an asset before the end of its useful life.

**Infrastructure Fund (Charter 77.1)** – This fund was established to expend monies for General Fund infrastructure, such as streets, sidewalks, bridges, buildings, and the maintenance and repair of such infrastructure and is supported specific sources of revenue as outlined in Section 77.1 of City Charter.

**Internal Service Funds** – Internal Service Funds are established for the financing of goods or services provided by one City department to another City department on a cost-reimbursement basis. Examples of Internal Service Funds used in the CIP budget are the Energy Conservation Program Fund and the Fleet Services Internal Service Fund, managed by General Services.

**Jurisdictional Runoff Management Plan (JRMP)** – The Jurisdictional Runoff Management Plan (JRMP) outlines the City of San Diego's approach to meeting the requirements of its Municipal Permit by developing and presenting detailed strategies for meeting the requirements of the Municipal Permit. The JRMP provides strategies for improving water quality in its rivers, bays, lakes, and ocean through reducing discharges of pollutants to the municipal separate storm sewer system (MS4; hereafter, "storm drain system").

**Level of Service** – Defined as the service quality for a given activity, asset, or program. Levels of Service are often documented as a commitment to carry out a given action or actions within a specified time frame in response to an event or asset condition data.

**Lifecycle Cost** – Refers to the total cost of ownership over the life of an asset including; planning, design, construction/acquisition, operation, maintenance, renewal, finance and disposal costs.

**Lifecycle Cost Analysis** – Method of assessing which asset option, will be the most economical over an extended period of time.

**Maintenance** – Any activity performed on an asset with a view to ensuring that it is able to deliver an expected level of service until it is scheduled to be renewed, replaced or disposed of. Maintenance may sometimes include renewal and replacement of whole or part of the asset.

**Maintenance Strategy** – A strategy for the implementation and documentation of asset maintenance practices, plans, processes, and procedures.

**Mortality** – The failure method of an asset in a manner in which it cannot function at all (i.e., a pipe collapse).

**Municipal Separate Storm Sewer System (MS4) Permit** – The permit (NPDES Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4) Draining the Watersheds within the San Diego Region, Order No. R9-2013-0001, as Amended by Order Nos. R9-2015-0001 and R9-2015-0100, NPDES NO. CAS0109266) that regulates both stormwater runoff and non-storm water runoff discharges to surface waters in the San Diego Region. The MS4 permit is issued to all Copermittees in the region (San Diego County, and parts of Orange and Riverside Counties) by the San Diego Regional Water Quality Control Board (San Diego Water Board) and dictates the Stormwater Division's actions and priorities related to watershed management in San Diego. Also referred to as Municipal Permit.

**Natural Asset** – A naturally occurring item that one can touch or see that cannot be owned and that provides a level of service. Natural assets are now replaced by Programmatic assets and Physical assets in the 2020 Watershed Asset Management Plan.

**Non-General Fund** – A fund that is not supported by General Fund dollars. Examples of non-general funds include internal service, special revenue, trust, agency, and enterprise funds.

**Operational Efficiency** – Operational efficiency is the ability of an organization to reduce waste in time, effort, and materials as much as possible, while still providing its required function or level of service.

**Operations and Maintenance (O&M)** – The activities that must occur to ensure that stormwater assets and programs continue to function properly and yield benefits through their expected useful life. O&M may include, but not be limited to, operation of pump stations, maintenance of pipes, channels, and inlets, removing trash and debris from storm drains, street sweeping, and basin cleaning.

**Operations and Maintenance (O&M) Cost** – An annual cost incurred to operation and maintain an asset or an activity in order to achieve levels of service with assets.

**Operations and Maintenance (O&M) Schedule** – A firm schedule that outlines the frequency of routine operation and maintenance activities for an asset or group of assets.

**Parent Asset** – The main asset group that sub-assets are attached to.

**Performance Target** – An asset-specific numeric goal that meaningfully evaluates the mission statement objectives.

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

**Periodic Maintenance** – Similar to, but more extensive than routine maintenance. Typically, periodic maintenance involves programmed upgrades.

**Physical Assets** – A human made item that one can touch and see that provides a level of service.

**Planned Maintenance** – Maintenance organized and carried out with forethought, control, and the use of records to a predetermined plan.

**Preventive Maintenance** – Maintenance carried out at predetermined intervals, or corresponding to prescribed criteria, and intended to reduce the probability of failure or the performance degradation of an item.

**Proactive Maintenance** – Targeted maintenance programmed in response to measurements indicating a heightened possibility of failure.

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

**Programs** – A set of related measures or activities with a particular long-term aim.

**Programmatic Assets** – A human-created intangible experiential element that cannot be touched or seen, but which provides a level of service.

**Program Elements** – City-determined public-facing “buckets” for reporting.

**Reactive Maintenance** – Maintenance in which equipment and facilities are repaired only in response to a breakdown, fault or defect.

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

**Redundancy** – Designing a system in which critical components are duplicated, so that if one fails the other component can take over the function of the failed component.

**Rehabilitation** – Work carried out to rebuild or replace parts or components of an asset, to restore it to a required functional condition and extend its life, which may incorporate some modification.

**Remaining Useful Life** – Estimated length of time remaining before it will need to be replaced.

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

**Replacement** – Complete replacement of an asset that has reached the end of its life. so as to provide a similar or agreed alternative level of service.

**Replacement Cost** – Cost of replacing an existing asset with an, identical new asset or a modern equivalent.

**Revenue Categories** – The major categories of revenue are - property tax; sales tax; transient occupancy tax; franchise fees; property transfer tax; safety sales tax; motor vehicle license fees; licenses and permits; fines, forfeitures, and penalties; revenue from money and property; interest earnings; revenue from other agencies; charges for current services; other financial sources and uses; and other revenue.

**Routine Maintenance** – Regular ongoing day-to-day work that is necessary to keep assets operating, including instances where portions of the asset fail and need immediate repair to make the asset operational again.

**Soft Asset** – A human-created intangible experiential element that cannot be touched or seen, but which provides a level of service. Soft assets are now replaced with Programmatic assets in the 2020 Watershed Asset Management Plan. The Division's programs such as channel maintenance, street sweeping etc. are soft assets.

**Special Revenue Funds** – Special Revenue Funds account for revenue received for specifically identified purposes. Examples of Special Revenue Funds used in the CIP budget are the Concourse and Parking Garages Operating, Environmental Growth, Fire/Emergency Medical Services Transport and QUALCOMM Stadium Funds.

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

**Strategic Planning** – An organization's process of defining its strategy, or direction, and making decisions on allocating its resources to pursue this strategy, including its capital and people.

**Stream Revitalization/Restoration** – Stream restoration projects employ a wide range of designs and techniques to stabilize eroding stream banks and to restore the natural and productive aquatic habitats. Where feasible, some projects involve restoration of the stream and its entire floodplain, changing a straight-cut-ditch back into its original form of meandering stream.

**Stormwater Department Goals** – Goals identified by the Stormwater Department:

> **Protecting safe, clean water**: To protect our local streams, rivers, bays, and beaches from pollution and degradation and maintain the highest possible standards of water quality that are critical to our health and safety of residents and visitors.
>
> **Safeguarding our communities from floods**: To improve our infrastructure, ensure public safety, and protect our communities from flooding through proactive maintenance and innovation.
>
> **Using stormwater as a resource**: To increase our capacity for stormwater capture and reuse in an effort to boost our local water supply.
>
> **Providing community benefits**: To safeguard outdoor recreation opportunities by preventing pollution and improving water quality for activities such as swimming, fishing, and surfing. To create multi-benefit green spaces and partner with community members to enhance parks, increase access to open space, and otherwise transform our urban environment.
>
> **Restoring the environment**: To use the best science and technology available to restore local waterways by reducing the negative impact of pollution and urbanization on our watersheds and ensuring that local habitats remain beautiful, clean, and safe for generations to come.
>
> **Encouraging public partnership**: To empower every resident, business, and visitor with the tools and resources to become part of an informed and active community of water guardians, where we share our expertise, seek feedback and engage in an active dialogue with community members.

**Stormwater system** – The entire system that conveys stormwater, including streets, inlets, pipes, channels, culverts, basins, and waterbodies.

**Strategic Document** – A strategy document explains the strategy. It documents the strategy. A strategic plan details the plans to achieve that strategy. It documents the how plans for how the strategy will be implemented.

**Systems Applications and Products in Data Processing (SAP)** – Name of the ERP (Enterprise Resource Planning) software as well as the name of the company.

**TransNet Funds** – TransNet, a one-half cent local sales tax, is used for traffic congestion relief and transportation improvements. In addition to roadway enhancements, TransNet Funds are utilized for bikeway and pedestrian projects. TransNet includes a Maintenance of Effort provision to guarantee that the City spends a certain amount of discretionary funds on the maintenance and

improvement of the public right-of-way. The City utilizes TransNet cash for projects as much as possible in an attempt to minimize the issuance of bonds due to added costs of debt service.

**TransNet Commercial Paper** – TransNet Commercial Paper is a borrowing tool that can be used to raise cash needed to cover cash-flow deficits and is generally viewed as a lower-cost alternative to bank loans. To further minimize debt service costs, the issuance of TransNet Commercial Paper may be utilized when feasible.

**Unidentified Funding** – Some projects may lack sufficient identified funding to complete the project, which is reflected in the Annual CIP Budget.

**Unplanned Maintenance** – Maintenance carried out to no predetermined plan.

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

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

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

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

**Watershed** – An area of land that drains water into a stream, lake, river, or other receiving water. The City manages watersheds using Watershed Management Areas (WMAs) (See definition below).

**Watershed Asset Management Plan (WAMP)** – The City's living planning document that outlines the stormwater projects, tasks, actions, program elements, and funding needs within City jurisdiction. In 2013, WAMP 1.0 was developed to integrate planning, implementation, and assessment of flood risk management and water quality protection programs. WAMP 2.0 was updated in 2020 to reflect an expanded list of City assets, improved performance, and new systems. The WAMP summarizes the current state of assets (e.g., asset inventory, valuation, condition, risk) and projects the long-range asset renewal (rehabilitation and replacement) requirements for the City of San Diego Stormwater Division.

**Watershed Management Area (WMA)** – A specified geographic area for which MS4 Permit Copermittees must develop a WQIP. Ten WMAs have been specified in Table B-1 of the San Diego Region MS4 Permit. The City is a Copermittee for six WMAs: the San Dieguito River, Peñasquitos, Mission Bay, San Diego River, San Diego Bay, and Tijuana River WMAs.

**Water Quality Improvement Plan (WQIP)** – The Water Quality Improvement Plans are watershed scale plans developed to meet the requirements of the Municipal Permit. Each watershed has its unique WQIP developed by the responsible agencies that have jurisdiction in the watershed. The Stormwater Division has led the City's efforts to update six WQIPs that are located within the City's

jurisdiction. Each WQIP identifies the highest priority water quality condition(s), or problems, and the corresponding numeric goals, strategies, and schedules to address those problems.

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# Asset Definitions

## Physical Assets

| Asset Class | Asset | Definition |
|---|---|---|
| Conveyance | An open or closed conduit that transports stormwater from one point to another. | |
| | Brow Ditch | A small ditch constructed to intercept and convey minor surface drainage runoff. These are usually private drainage facilities. |
| | Channel | An open graded or lined waterway wider than 8 feet across the bottom which is used to convey stormwater. Channels can be concrete or earthen. |
| | Culvert | A drainage conduit extending only under a roadway and open at both ends. |
| | Drain | A system of closed drainage conduits connected by cleanouts, inlets, catch basins, and other appurtenances. Also known as pipe. |
| Structures | A non-conduit object used in the transport of stormwater (alt definition: a non-conduit object within a drain network). | |
| | Cleanout | A structure that provides access to a drain for cleaning. |
| | Drop Manhole (Inlet) | The manhole constructed to connect high-level drain to a low-level drain with minimum hydraulic disturbance is called drop manhole. |
| | Energy Dissipator | A structure used to mitigate discharge velocity to minimize erosion and other adverse effects. |
| | Headwall | A small retaining wall placed at the inlet or outlet of a drain or culvert and used to protect the area surrounding the inlet or outlet and the asset itself from erosion damage over time. |
| | Inlet | A structure through which stormwater runoff may enter. |
| | Outlet | A structure through which water may escape. |
| | Spillway | A passage for surplus water from a dam. |
| | Tidegate | An opening through which water flows freely when the tide moves in one direction, but which closes automatically and prevents water from flowing in the opposite direction. Tide gates are intended to prevent water from entering outfalls into receiving waters and causing flooding of upstream areas during high tide or heavy rainfall events. |
| Levee | The National Flood Insurance Program (NFIP) defines a levee in Title 44, Chapter 1, Section 59.1 of the Code of Federal Regulations (44 CFR 59.1) as “a man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to reduce risk from temporary flooding.” The NFIP regulations define a levee system as “a flood protection system which consists of a levee, or levees, and associated structures, such as closure and drainage devices, which are constructed and operated in accordance with sound engineering practices.” For the purposes of this document, levees and levee systems are referred to as “levees.” | |

| Asset Class | Asset | Definition |
|---|---|---|
| Pump Stations | A stormwater pump station is an intermediate collection tank for stormwater with a submersible pump at the bottom. Instead of relying on gravity to cause the water to flow to the discharge point, the pump provides the additional pressure needed to overcome the difference in head pressure. | |
| Structural BMP | A general term that encompasses the pollutant control best management practices (BMP) and hydromodification management BMPs required for priority development projects (PDP) under the MS4 Permit. A structural BMP may be a pollutant control BMP, a hydromodification management BMP, or an integrated pollutant control and hydromodification management BMP. Hydromodification management BMPs are also referred to as flow control BMPs. | |
| | Baffle Box | Baffle box is a concrete or fiberglass structure containing a series of sediment settling chambers separated by baffles. |
| | Bioretention | Vegetated surface water systems that filter stormwater through vegetation and soil, or engineered media prior to infiltrating into native soils. |
| | Detention Basin | A detention basin or retarding basin is an excavated area designed to temporarily store stormwater runoff and release it in a controlled manner to reduce or eliminate flooding or other adverse effects downstream. |
| | Downspout Filter | A screening device installed in-line on a downspout to remove debris and particles from rainwater prior to entering a rain barrel. |
| | Drainage Insert | Drainage inserts are manufactured filters, fabrics, or screens that are placed in inlets to remove contaminants from stormwater runoff. |
| | Filterra | Filterra is an engineered high-performance bioretention system (proprietary), that operates similar to traditional bioretention but its high flow media allows for a reduction in footprint of up to 95% versus traditional bioretention practices. |
| | Filtration Systems | Filtration systems are stormwater pollutant removal systems that often utilize a customized gradation of filtration media or porous membranes. |
| | Flow-Through Planter Box | Flow through planter boxes are hard-edged stormwater treatment features that collect stormwater and filter out pollutants as water percolates through the vegetation, growing medium, and gravel, and then is slowly released to the storm drain system |
| | Green Roof | A vegetative layer grown on a roof (rooftop garden) |

| Asset Class | Asset | Definition |
|---|---|---|
| | Hydrodynamic Separation Systems | Circular flow-through structures that use a vortex action to separate course sediment and floatables (trash, debris, and oil) from stormwater |
| | Infiltration Basin or Trench | Shallow impoundment over permeable soil that captures stormwater, stores it, and allows it to infiltrate, using the natural filtering ability of the soil to remove stormwater pollutants |
| | Modular Wetlands System | A free-water surface constructed wetland aims to replicate the naturally occurring processes of a natural wetland, marsh, or swamp. As water slowly flows through the wetland, particles settle, pathogens are destroyed, and organisms and plants utilize the nutrients. |
| | Pervious Surface | A surface that allows infiltration of stormwater runoff. |
| | Swale | A vegetated open channel designed to treat, attenuate, and convey stormwater runoff. |
| | Vault | Underground stormwater storage tank typically made of reinforced concrete that is designed to accommodate a permanent water pool |
| | Vegetated Filter Strip | Vegetative filter strips are land areas of either planted or indigenous vegetation, situated between a potential pollutant-source area and a surface-water body that receives runoff. |
| | Interceptor Pump Stations | An interceptor pump station is a small pump station with a wet well to collect low flow from dry weather runoff. |
| | Low Flow Diversion Valves | Valves that divert dry weather flows to the sanitary sewer system. |

## Programmatic Assets

| Asset Class | Asset | Definition |
|---|---|---|
| Best Available Science | Alternative Compliance Program | The City's optional framework to allow for stormwater treatment offsite from a Priority Development Project site, provided the offsite project is located within the same watershed and within City jurisdiction. The offsite project would be required to provide a greater water quality benefit to the watershed as compared to onsite treatment. |

| Asset Class | Asset | Definition |
|---|---|---|
| | Integrated Planning Framework | Integrated Planning Framework is a voluntary opportunity for a municipality to propose to meet multiple CWA requirements by identifying efficiencies from separate wastewater `and stormwater programs and sequencing investments so that the highest priority projects come first. This approach can also lead to more sustainable and comprehensive solutions, such as green infrastructure, that improve water quality and provide multiple benefits that enhance community vitality. Alternate definition - An EPA program that provides a framework for municipalities to develop a comprehensive plan to address all Clean Water Act requirements; prioritizing those that focus on human and health and water quality. An Integrated Plan must conduct a Financial Capability Assessment to demonstrate that a municipality's Clean Water Act funding needs exceed ratepayer affordability thresholds. Integrated Plans may be used to justify extensions to regulatory compliance schedules. |
| | Stormwater Harvesting | The intentional collection of stormwater (e.g., via detention basins, rain barrels or other methods) for eventual reuse and/or to augment water supply. The Stormwater Division has a dedicated Stormwater Harvesting Program meant to advance the management of stormwater as a resource. |
| Construction Management | Construction Site Inspections | Construction Site Inspections are inspections performed by the Public Works Division staff on active construction projects to ensure that construction site BMPs are implemented as designed and specified in the design plans. |
| Development Planning | Development & Construction Standards | Development and Construction Standards are prescribed performance standards established by the Development Planning Program for structural BMPs in accordance with the Municipal Permit. These standards are implemented by the City through the City's Stormwater Standards Manual, which is part of the City's Land Development Manual. It is enforceable via the San Diego Municipal Code, including Sections 43.0307, 129.0104, and 142.0210 and administered to reduce the negative impacts of urban development. |
| | Plan Check | Plan Check refers to review and approval of development projects, performed through procedures for reviewing and approving all development projects (public and private), to ensure that they meet the BMP requirements described in the Stormwater Water Standards Manual and comply with the Municipal Permit. |
| Enforcement Response | Code Enforcement | Code enforcement is the procedure through which municipalities enforce their legal authority for all development projects, existing development, and inventoried construction sites, as necessary, to achieve compliance with the requirements of the Permit. |
| | Parking Enforcement | Parking Enforcement is the procedure through which the City enforces parking by issuing citations to vehicles parked on the street sweeping routes. |

| Asset Class | Asset | Definition |
|---|---|---|
| Existing Development Management | Catch Basin Inspection and Cleaning | Catch Basin Inspection and Cleaning is the City's program for inspecting catch basins located in the public right of way and cleaning them off debris and other foreign material. |
| | Industrial and Commercial Facility Inspections | Industrial and Commercial Facility Inspections are stormwater inspections performed of businesses throughout the City to visually inspect for stormwater violations. The City conducts follow-up investigations when issues are identified. |
| | Low Flow Diversion Operation and Maintenance | Low Flow Diversion Operation and Maintenance refers to activities performed to operate and maintain the low flow diversions that divert dry weather flow to the sanitary sewer. |
| | Non-TMDL Modeled Non-Structural | Non-structural measures implemented in non-TMDL watersheds to comply with receiving water quality limitations are referred to as Non-TMDL Modeled Non-Structural. |
| | Rebate Program | Rebate Programs refer to programs through which rebates are issued to businesses and residences to encourage implementation of water quality measures and water conservation. |
| | Street Sweeping | Street Sweeping is the sweeping of paved parking lots, roads, and driveways is performed to remove sediment and trash, e.g. fine particles zinc, metals and to improve water quality and help with flood management. |
| | Structural BMP Inspections | Structural BMP Inspections are inspections performed on Priority Development Projects (PDP) to ensure that structural BMPs on the PDP were properly constructed and adequately maintained, to remove pollutants in stormwater to the maximum extent practicable. |
| | Structural BMP Maintenance | Structural BMP Maintenance refers to maintenance of City-owned Structural BMPs such that pollutants in stormwater are removed to the maximum extent practicable. |
| | Trash Implementation Program | Trash Implementation Program is the program through which the City implements the Statewide Trash Policy and meets trash reduction goals. |
| Monitoring and Assessment | Compliance Monitoring Program | Compliance Monitoring Program includes monitoring and assessment activities performed by the City in compliance with Permit Provision II.D. |
| | Special Studies | Special Studies are studies conducted by the City to monitor and assess water quality of receiving waters in accordance with Permit Provision II.D. |
| Permit Management and Compliance | CIP Planning and Management | Planning and management of capital improvement projects that are associated with improving water quality and providing flood risk management functions is referred to as CIP Planning and Management. |

| Asset Class | Asset | Definition |
|---|---|---|
| | ERP Functions and EAM Data Management | The City undertakes activities to integrate WAMP 2.0 database and functionality to EAM to facilitate implementation of the asset management program; these activities are collectively referred to as ERP Functions and EAM Data Management. |
| | GIS Support | GIS Support refers to GIS related needs to update the database as new asset information is developed. |
| | Masterplans (Technical Studies, Structural BMP Plan) | Masterplans (Technical Studies, Structural BMP Plan) are plans developed to assess the City's infrastructure needs to address flooding and improve water quality. |
| | Permit Management and Compliance Reporting | Permit Management and Compliance Reporting activities are performed by the City to comply with NPDES Permit and Waste Discharge Requirements for Discharges from the MS4 by effectively prohibiting non-stormwater discharges into the MS4s, and implementing controls to reduce the discharge of pollutants in stormwater from the MS4s to the MEP. |
| | Policy Development & Permit Negotiation | Policy Development and Permit Negotiations - The MS4 Permit requirements are negotiated to be consistent with the Clean Water Act and the Porter-Cologne Act. Policy is developed to comply with new regulatory requirements. |
| | Regulatory Review | Regulatory Review refers to reviews of regulations, permits, policies, and CEQA documents to provide comments to protect the citizens of San Diego's interests. |
| | Watershed Asset Management | Watershed Asset Management Plan is a plan developed to inventory the City's asset information, identify the broad investments required to maintain the City's stormwater management system, and prioritize the projects. |
| Public Education and Participation | Education & Outreach Activities | Division's education and outreach activities inform the public regarding pollution prevention, meet regulatory/permit requirements and engage community members as partners etc. |
| | Public Information & Research | The City also conducts research when they receive requests for information from the public and needs to respond to those requests. |
| Channel Inspection and Prioritization | | The channel inspection and prioritization program provides guidance on how channels shall be inspected, frequency of inspections and maintenance, and prioritization criteria for channel maintenance based on results of the inspections. |
| Channel Maintenance Program | Lagoon Management | The City maintains the Los Penasquitos Lagoon following guidance in the Los Penasquitos Lagoon Enhancement Plan and the Los Penasquitos Watershed Master Plan. |

| Asset Class | Asset | Definition |
|---|---|---|
| | MWMP Program Management | Municipal Waterways Maintenance Plan (MWMP) is a document that provides guidance and parameters for maintenance and repair of the stormwater conveyance system in areas where potential local, state, and federally regulated impacts may be necessary to provide flood control. Activities related to management and implementation of the MWMP are referred to as MWMP Management. |
| Basin Maintenance | | Basin maintenance is the routine maintenance of detention basins by vegetation control, trash reduction, and erosion and sediment control in addition to upkeep of basins' mechanical parts. |
| Floodplain Management | | The strategies and programs employed to manage flooding and prevent loss of life and property is referred to as floodplain management. |
| Habitat Restoration and Mitigation | | Habitat restoration and mitigation refers to planning and implementation of projects that restore natural habitat to allow for stormwater percolation, wetland creation/maintenance, parks enhancement, and stream restoration. |
| Levee Management | | Activities undertaken to manage levees so that they continue to successfully perform their flood risk management functions are collectively referred to as levee management. |
| Pump Station Operation & Maintenance | | The City owns several pump stations, the operation and maintenance of which is a programmatic asset under the flood risk management asset class. |
| Storm Drain Repairs and Replacement | | Replacement of storm drain infrastructure is required when infrastructure reaches the end of its useful life or when it is no longer able to convey storm flows due to an increase in flows or reduction in capacity. Similarly, repair of the storm drainage infrastructure may be needed in case of a leak or other malfunction. Replacement of the underserving storm drains ensures that adequate conveyance of storm flows will be maintained and serves an important function towards flood risk management. |
| Storm Patrol | | Storm patrol includes activities that the City's teams perform prior to and during storms to inspect and prepare the storm drainage infrastructure and ensure that key components like pumps are fully functioning and protecting the streets and homes from flooding. |
| Tide Gate Operation and Maintenance | | Tide gates are located at the storm drain outfalls to San Diego Bay and San Diego River. The tide gates perform an important function of protecting the City and its infrastructure from rising tides. Operation and maintenance of tide gates is categorized as a programmatic asset under the flood risk management asset class. |
| Accounts Payable | | Accounts payable refers to activities pertaining to the Division's accounts management, and payments to consultants, vendors, and Division employees. |

| Asset Class | Asset | Definition |
|---|---|---|
| Budget Development and Management | | Activities and actions that the Division performs to develop and manage its budget are tracked as a programmatic asset in the WAMP database. |
| Clerical/Admin Support | | Clerical and administration support activities that the Division performs are tracked as a programmatic asset in the WAMP database. |
| Contracts | | The Division's functions are supported by consultants and vendors that perform contracted services or furnish equipment and materials for the Department. Contracts management relates to initiation, management, and closure of the Division's contracts with consultants and vendors. |
| Grants | | Grants are funds that the Division sometimes seeks grants to perform studies or support project development. |
| Payroll | | Payroll refers to staff payroll and fringe benefit obligations performed by the Division as part of its administrative functions. |
| Cleanup & Abatement | | Cleanup and abatement orders may be issued by the RWQCB, resulting in the Division's actions to comply with these orders. |
| Investigative Orders | | RWQCB may issue Investigative Orders (IO) for the City to investigate certain water quality issues in receiving waters within the City's jurisdiction. The Division will then need to take actions to comply with the investigative order. |
| Litigation | | The Division may occasionally be involved in lawsuits that are handled by the City's Attorney's office. Litigation refers to the Department's activities needed to support the Litigation Department. |
| Vehicles and Equipment | | Operation and maintenance costs related to vehicles and equipment owned by the Department are captured under this programmatic asset. |

# Watershed Asset Management Plan

This main body of the report presents the general approach taken to develop the Asset Management Plan and update it from WAMP 1.0 that was developed in 2013. Significant updates have been made to WAMP 1.0 to bring it to this current WAMP 2.0 version in terms of data collection, organization, and analysis methodology. Appendix A presents the Business Risk Exposure criteria. Appendix B summarizes the assumptions made during the development of WAMP 2.0 and completes this document.

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

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# Executive Summary

## Purpose

The Watershed Asset Management Plan (WAMP) is a planning document that develops the projects, tasks, actions, program elements, and levels of investment needed within all City of San Diego watersheds to manage the watersheds' assets to meet levels of service. The WAMP is a living document that is modified when there are changes to asset information or when constraints, such as budgetary limitations or changes in regulations, arise. The initial WAMP (WAMP 1.0) has been used by the City of San Diego Stormwater Division (Division) to plan necessary projects and program elements to meet their goals and levels of service within each watershed since its development in 2013.

The City's list of assets has continued to evolve since the WAMP 1.0 was developed. In addition, the Division is regularly innovating and improving the condition and performance of their assets. Capturing this new information in the WAMP, real-time, is critical to leveraging the benefits of this system. The City of San Diego recently adopted an Enterprise Asset Management (EAM) system City-wide. As a result, the Division has endeavored to update the WAMP and fully integrate the updated system into their daily operations. The first step in the Division's process of developing the overall asset management planning strategy was to formally define the Division's mission and goals.

*An updated asset hierarchy was developed that categorizes the City's assets into physical and programmatic assets. Physical Assets are human made items that one can touch and see that provides a level of service. Programmatic Assets are human-created intangible activities that cannot be touched or seen, but which provide a level of service.*

The Division's goals are: protecting safe, clean water; safeguarding our communities from floods; using stormwater as a resource; providing community benefits; restoring the environment; and encouraging public partnership. The Division's goals are shown in ***Figure 1***.

**Figure 1:** Division's Goals


WAMP 2.0 has been developed to reflect the current conditions (e.g., new assets, failure modes, cost functions, updated levels of service).It is a state-of-the-art program that sets the City apart from others in the country. WAMP 2.0 enables modeling investment of human capital at a strategic level to improve asset health. This is made possible by categorizing management, operations, and maintenance programs as "Programmatic Assets" and their treatment as such. Additional details of "Programmatic Assets" are discussed below. Investments and goals are mapped allowing line-of-sight visibility from vision and goals through Key Performance Indices (KPIs) and investments planned for watersheds, assets, and programs. This mapping helps with identification and prioritization of projects and actions that provide the most benefits early in the capital investment time period.

The holistic inclusion of asset and programmatic information provides a single point of truth and enables visibility into decision-making and consistent reporting to stakeholders. Inclusion of existing assets and future assets also enables more accurate long-term maintenance and capital planning. Managing for the complete life cycle of assets and using asset management principles can provide the benefit of immediate cost savings, while deferred investments can result in expensive repairs later in the life cycle of the asset.

Managing assets using asset management principles ensures that emergency investments are minimized later on through adaptive management practiced now.

## Key Upgrades to WAMP 1.0

Updating the WAMP 1.0 to WAMP 2.0 included tasks to update the WAMP database (to align with SAP and EAM) as well as updates to the WAMP document. Overall, the WAMP 2.0 incorporates the following updates:

- **Revised Goals** for the Stormwater Division which now include Providing Community Benefits, Encouraging Public Partnership, and Restoring the Environment
- **An updated asset hierarchy** that categorizes City's assets into physical and programmatic assets
  - **Physical Assets** are human made items that one can touch and see that provides a level of service (LOS)
  - **Programmatic Assets** are human- created actions and activities which provide a level of service. The new asset hierarchy consolidates soft assets and certain natural assets under the programmatic asset category, which makes it easier to measure the LOS of programmatic assets
- **An updated asset registry** within each watershed is organized by class and hierarchy
- **Updated LOS** for physical and programmatic assets
- **An assessment of the criticality of the assets** performed through the Business Risk Exposure (BRE) analysis of the consequence of an asset failing to meet a LOS and the probability of an asset meeting a LOS
- **Planning tasks to be accomplished** in the next year to identify projects to meet LOS
- **Key information from the technical studies**, Municipal Waterways Maintenance Plan, programs, and activities have been incorporated to better define the assets and their LOSs
- **National Pollutant Discharge Elimination System (NPDES) compliance program** elements specific to each watershed
- **Refinement of assets and their LOSs** so that their implementation and costs are measurable and can be tracked
- **Centralized** data management
- **Data reporting protocols** to identify what has been done, what needs to be done, and at what cost
- **Strategic plans linked to assets** so that achievement of LOS can be tracked

## Key Components of the WAMP

The key components of the WAMP 2.0 are summarized below.

- **Asset Inventory—"What Do We Own?"** (Section 2) describes the asset hierarchy, presents the methods employed to obtain asset information, and the general assumptions used where information was not available. An inventory summary of the assets in each watershed is presented in the respective watershed-specific appendix.
- **Asset Hierarchy and Relationship with the Division's Goals** (Section 2) describes how each asset category relates to the Division's goals
- **What Assets Are Critical?** (Section 3) Describes the methods used to determine the assets' criticality based on Business Risk Exposure analysis of the consequence of and the probability of failure of an asset failing to meet its LOS

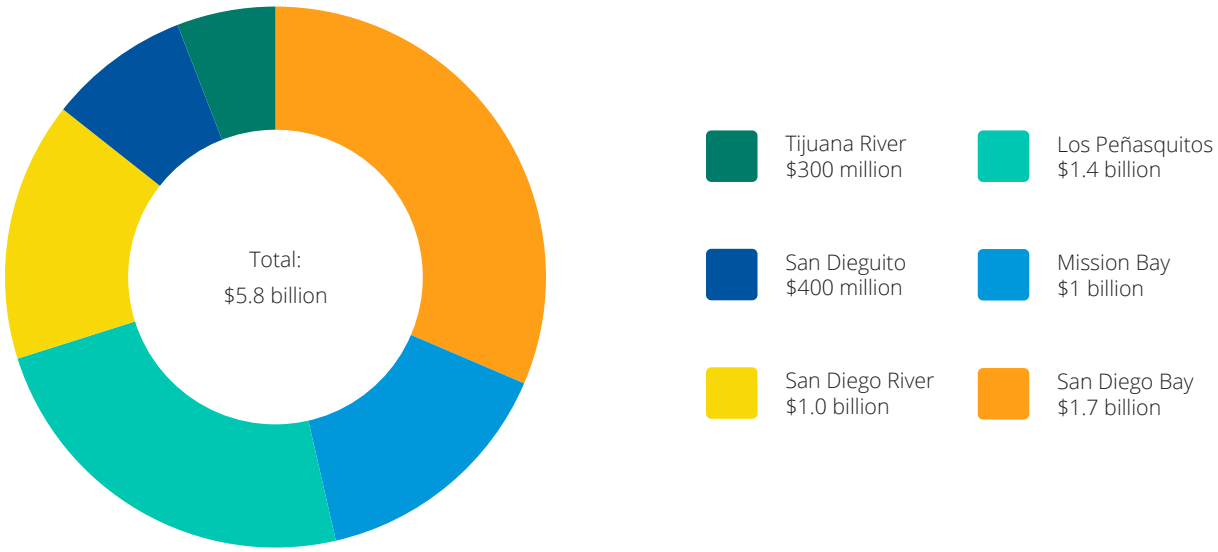
- **What Are Our Optimized Management Strategies?** (Section 4) Documents the current LOS that, to the best knowledge of the Division, the regulators require and citizens desire from the assets
- **How Much Will It Cost?** (Section 4) presents long-term costs, the cost assumptions made, and the cost models that were used. The actual costs estimated for each watershed are presented in its respective watershed-specific appendix
- **Funding Strategies—"What Do We Need to Do to Fund It?"** (Section 5) discusses the Division's historic expenditure and current funding levels. Detailed discussion of funding strategy is provided in "Stormwater Division Funding Strategy"
- **Confidence Level Assessment** (Section 6) presents the confidence-level rating, which measures the current asset management practice, and identifies and prioritizes future improvements
- **Recommendations** (Section 7) provides recommendations for the assets within each watershed regarding the actions to be taken and projects to be completed to manage the assets to achieve the desired LOS

## Asset Valuation

Asset valuations are an integral part of asset management. Based on the currently available asset data, the estimated replacement cost of the Division's existing physical assets is approximately $5.8 billion estimated in 2020 dollars. It is not necessary to replace all the City's physical assets immediately. Each physical asset has a remaining useful life that may be used to estimate the current condition of the physical assets. For example, if a physical asset has a useful life of 100 years when new, costs $1 million to replace, and is 50 years old, then one may say that 50% of the physical asset has been consumed. Therefore, the current financial condition of the physical asset is $500,000 or 50% of its replacement cost. Physical asset replacement costs for each watershed are shown in ***Figure 2.***

Programmatic assets include programs that the City has in place to meet their water quality and flood risk management levels of service. Programmatic assets do not have replacement costs. Their valuation within this WAMP is generally based on the cost to manage the programmatic assets so that they continue to achieve their LOS, and are only analyzed on a citywide basis.

**Figure 2:** Replacement Cost of Existing Physical Asset by Watershed (presented in 2020 Dollars)



## What Assets Are Critical?

The physical and functional condition of each asset exposes the Division to a certain business risk. In order to determine what assets are critical to the Division, the Division performed a BRE analysis, as shown in ***Figure 3,*** for each physical and programmatic asset. The BRE is based on the probability that an asset will fail and the consequence of that asset's failure. An asset will fail by one or more of the pre-determined failure modes of capacity, mortality, efficiency or level of service. Consequences of failure of the Division's assets may be seen as a flood due to channels not conveying the required flow or beaches not being accessible due to poor water quality. The combination of probability of failure and consequence of failure provides insight to the BRE due to an asset's failure.

*For physical assets, failure occurs through structural mortality or does not have sufficient capacity whereas for programmatic assets, failure occurs when the assets can no longer meet their required level of service.*

**Figure 3:** Citywide Physical and Programmatic Risk Matrix

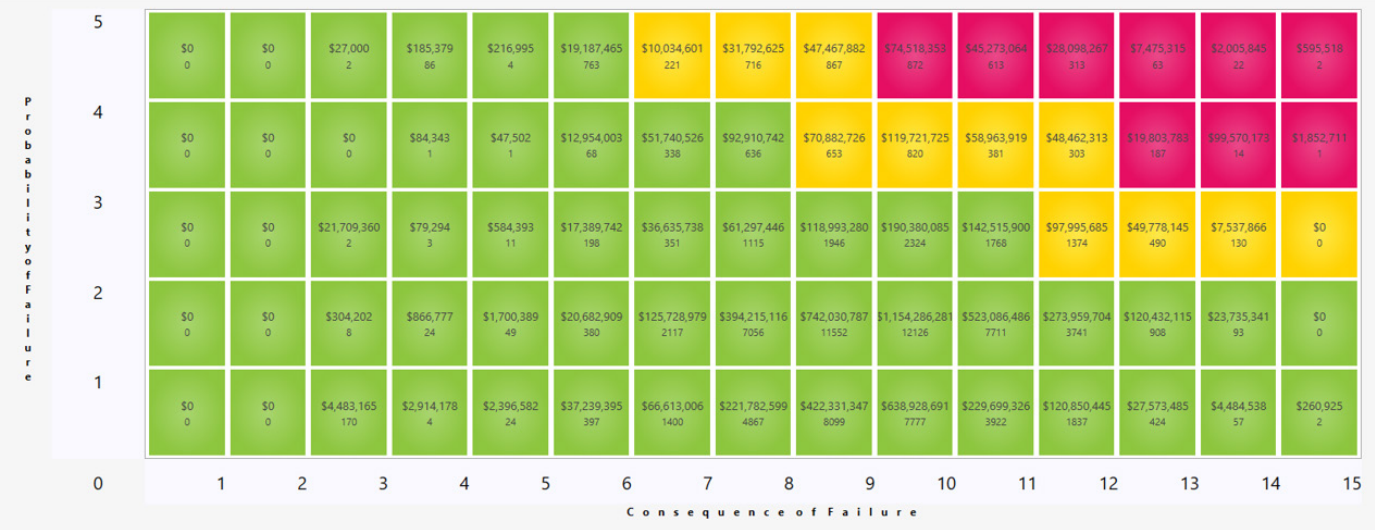
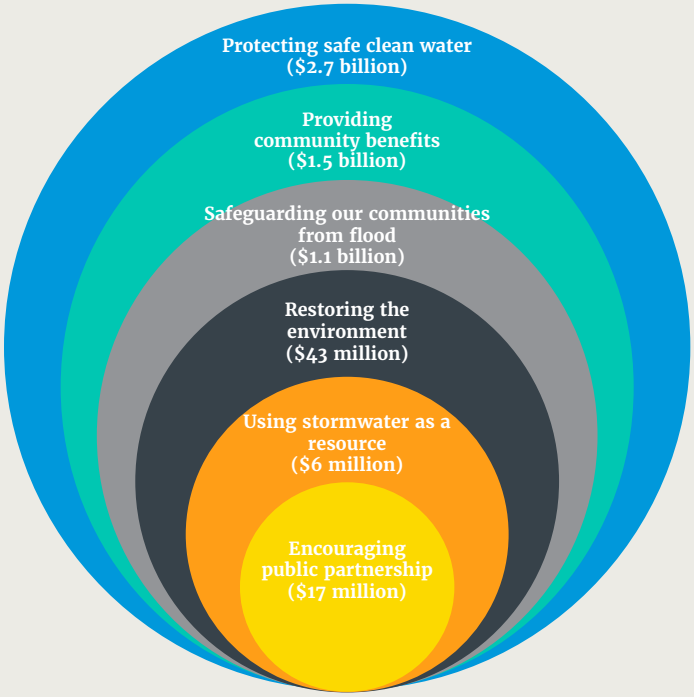


**Figure 4:** Stormwater Division's 20-Year Projected Investment to Meet its Goals

The Division's assets, both physical and programmatic, work towards helping the Division meet its goals. Meeting these goals requires significant investment in the capital infrastructure and implementing the programs, policies, and practices. It is estimated that the Division will need to invest approximately $5.5 billion (in 2020 dollars) over the next 20-year planning horizon to meet its goals. Approximately $4.4 billion will be needed to be invested to meet water quality and related goals, and $1.1 billion will be needed to meet flood risk reduction goals (all in 2020 dollars). The Division's projected 20-year investment needed towards its goals is presented in ***Figure 4***.



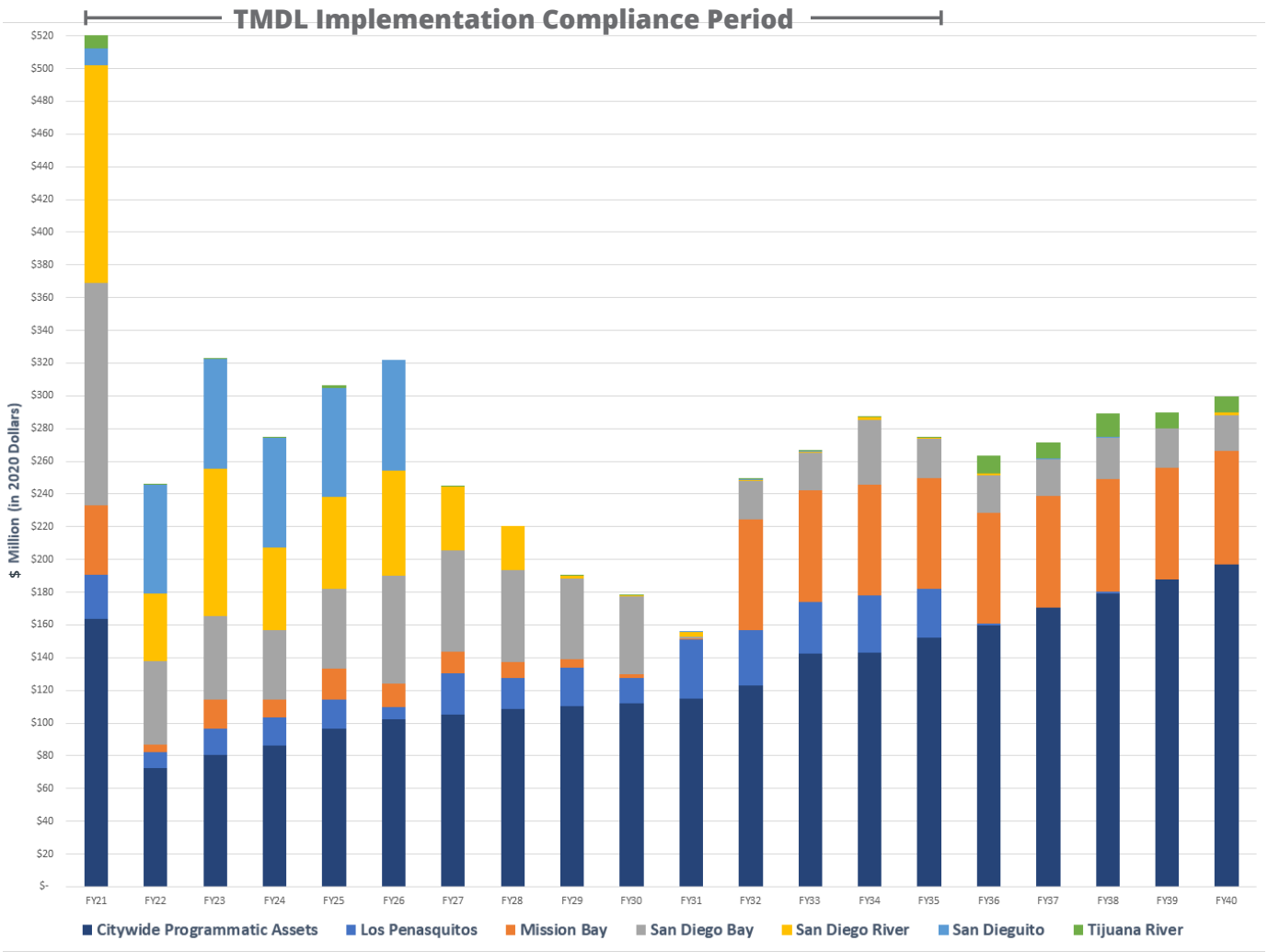

## Future Asset Management/ Program Funding Requirements

The Division's future program funding requirements through 2040 are presented in ***Figure 5***. The funding needs are differentiated by major City watersheds. The costs in the figure are the projected program costs in 2020 dollars for managing the assets in each watershed to achieve their LOS. The average annual costs is $274 million. The following costs are driving the shape of the funding needs graph through 2040:

- Significant investment to address deferred maintenance of existing stormwater infrastructure is needed from FY22 through FY25
- Significant investment to comply with the Chollas Creek and the Los Peñasquitos Lagoon TMDLs is needed from FY21 through FY35
- Investment to comply with Receiving Water Quality Limits in non-TMDL watersheds is needed from FY22 and beyond.

The output from the WAMP model can then be used by the Division to estimate the funding needs in a more realistic way. For example, Figure 5 shows a funding level for FY21 that cannot be met. Further analyses of funding strategies can be found in "Stormwater Division Audit Recommendation #5 Funding Strategy" January 2021.

**Figure 5:** Future Physical and Programmatic Asset Funding Requirement (in 2020 dollars)



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# Abbreviations and Acronyms

| | |
|---|---|
| ACP | Alternative Compliance Program |
| AMP | Asset Management Planning |
| ASBS | Areas of Special Biological Significance |
| BAS | Best Available Science |
| BMP | Best Management Practice |
| BRE | Business Risk Exposure |
| CCTV | Close-caption Television |
| CIP | Capital Improvements Program |
| City | City of San Diego |
| CLR | Comprehensive load reduction |
| CLRP | Comprehensive Load Reduction Plan |
| CMMS | Computerized Maintenance Management System |
| CoF | Consequence of Failure |
| County | County of San Diego |
| CWA | Clean Water Act |
| DSD | Development Services Department |
| EAM | Enterprise Asset Management |
| ECP | Engineering and Capital Projects (formerly Public Works Department) |
| ERP | Enterprise Resource Planning |
| ESD | Environmental Services Department |
| FTE | Full-time Equivalent |
| HA | Hydrologic Area |
| HSA | Hydrologic Subarea |
| HU | Hydrologic Unit |
| IC/ID | Illicit Connections and Illicit Discharges |
| IDDE | Illicit Discharge Detection and Elimination |
| IO | Investigative Order |

| | |
|---|---|
| IPF | Integrated Planning Framework |
| JURMP | Jurisdictional Urban Runoff Management Program |
| JRMP | Jurisdictional Runoff Management Plan, City of San Diego, 2019 |
| LID | Low Impact Development |
| LOS | Level of Service |
| MEP | Maximum Extent Practicable |
| MS4 | Municipal Separate Storm Sewer System |
| NPDES | National Pollutant Discharge Elimination System |
| O&M | Operations and Maintenance |
| PoF | Probability of Failure |
| PUD | Public Utilities Department |
| PWD | Public Works Department (now Engineering and Capital Projects) |
| RA | Responsible Agency |
| RE | Resident Engineer |
| READ | Real Estate Assets Department |
| ROW | Right of Way |
| RWQCB | Regional Water Quality Control Board |
| SWD | City of San Diego Stormwater Division |
| SWRCB | State Water Resources Control Board |
| TMDL | Total Maximum Daily Load |
| WAMP | Watershed Asset Management Plan |
| WERF | Water Environment Research Foundation |
| WMA | Watershed Management Area |
| WMAA | Watershed Management Area Analysis |
| WQIP | Water Quality Improvement Plan |

# 1 Introduction

The City of San Diego (City) is moving into the next generation of its asset management program to foster sustainable delivery of its services, promote efficient financial and physical resource investments, prolong the life of stormwater infrastructure, and track performance in meeting Levels of Service (LOS). Development of Watershed Asset Management Plan (WAMP) 1.0 was a first step in which the City of San Diego Stormwater Division (Division) began efforts to optimize its business processes and practices by integrating its planning, implementation and assessment of flood risk management and water quality protection programs. Since the development of WAMP 1.0, the Division has made progress towards optimizing its business practices and processes that have necessitated upgrading WAMP 1.0 to WAMP 2.0. The data, methodology, and assumptions employed to develop WAMP 2.0 and the results are presented in this document.

WAMP 2.0 is a state-of-the-art program that sets the City apart from others in the country. WAMP 2.0 enables modelling investment of human capital at a strategic level to improve asset health. This is made possible by categorizing maintenance programs as "Programmatic Assets" and their treatment as such. Investments and goals are mapped allowing line-of-sight visibility from vision and goals through Key Performance Indices (KPI) and investments planned for watersheds, assets, and programs. This mapping helps with identification and prioritization of projects and actions that provide the most benefits early in the capital investment time period. The holistic inclusion of asset and programmatic information provides a single point of truth and enables visibility into decision-making and consistent reporting to stakeholders. Inclusion of existing assets and future assets also enables more accurate long-term maintenance and capital planning. Managing for the complete life cycle of assets and using asset management principles can provide the benefit of immediate cost savings, while deferred investments can results in expensive repairs later in the life cycle of the asset. Managing assets using asset management principles ensure that emergency investments are minimized later on through adaptive management practiced now.

In 2008, the City reorganized its Division to respond to a new National Pollutant Discharge Elimination System (NPDES) permit regulating discharges into and from its Municipal Separate Storm Sewer System (MS4). This reorganization increased the size of the Division more than four-fold and brought numerous operations previously under management by other City Departments into the Department, such as storm drain operations and maintenance, and street sweeping. The Division grew from being an organization primarily responsible for NPDES compliance program management and reporting to a Division responsible for managing City drainage and flood risk management systems. Concurrently, the City began to transition to a zero-based budgeting approach. In this new framework, there were no historical budgets upon which future Division budgets could be based. Instead, Division staff were required to show justifications for each budget dollar requested each year.

In response to these fundamental changes, the Division developed an asset management program for managing its activities. This asset management program defined each activity the Division needed to perform as a LOS that it was required to meet either under its NPDES permit, or through the expectations of citizens regarding functions of the storm drain system and the quality of water and related services to be maintained in streams, estuaries, and at beaches. The asset management

program provided a clear relationship between services enjoyed by the citizens of San Diego that were provided by the receiving waters and drainage system and the funding needs of the Division. This relationship allows the City to make rational budgeting decisions for this program and provides transparency for elected officials and citizens.

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

The first step in the Division's process of developing the overall asset management planning strategy was to formally define the Division's mission and goals. These mission and goals embodied what all believed would fulfill the regulators requirements under the MS4 NPDES permit, and the citizens of San Diego desires from their drainage system, receiving waters, and beaches. This initially took place in 2008 and was memorialized in WAMP 1.0. To do this, the Division conducted a series of workshops with Division staff, with staff in other City departments, and with a focus group comprised of key influential members of the public, and business, regulatory, and environmental communities. The goals and vision were revised during workshops conducted during the years 2019-2020 to advance the WAMP. Figure 1-1 shows the City's updated mission and goals.


**Figure 1-1. San Diego Stormwater Division Mission and Goals**

The goals are further described as:

**Protecting safe, clean water:** To protect our local streams, rivers, bays, and beaches from pollution and degradation and maintain the highest possible standards of water quality that are critical to our health and safety of residents and visitors.

**Safeguarding our communities from floods:** To improve our infrastructure, ensure public safety, and protect our communities from flooding through proactive maintenance and innovation.

**Using stormwater as a resource:** To increase our capacity for stormwater capture and reuse in an effort to boost our local water supply.

**Providing community benefits:** To safeguard outdoor recreation opportunities by preventing pollution and improving water quality for activities such as swimming, fishing, and surfing. To create multi-benefit green spaces and partner with community members to enhance parks, increase access to open space, and otherwise transform our urban environment.

**Restoring the environment:** To use the best science and technology available to restore local waterways by reducing the negative impact of pollution and urbanization on our watersheds and ensuring that local habitats remain beautiful, clean, and safe for generations to come.

**Encouraging public partnership:** To empower every resident, business, and visitor with the tools and resources to become part of an informed and active community of water guardians, where we share our expertise, seek feedback and engage in an active dialogue with community members.

The goals align with Department's fundamental responsibilities of flood risk management and NPDES compliance, as shown in Figure 1-2. Note that some goals overlap the NPDES compliance and flood risk management goals. The goal identified as "Using Stormwater as a Resource," when achieved, will advance NPDES compliance and maintenance of adequate capacity in flood risk management channels by reducing the volume of stormwater that ultimately makes its way to channels.

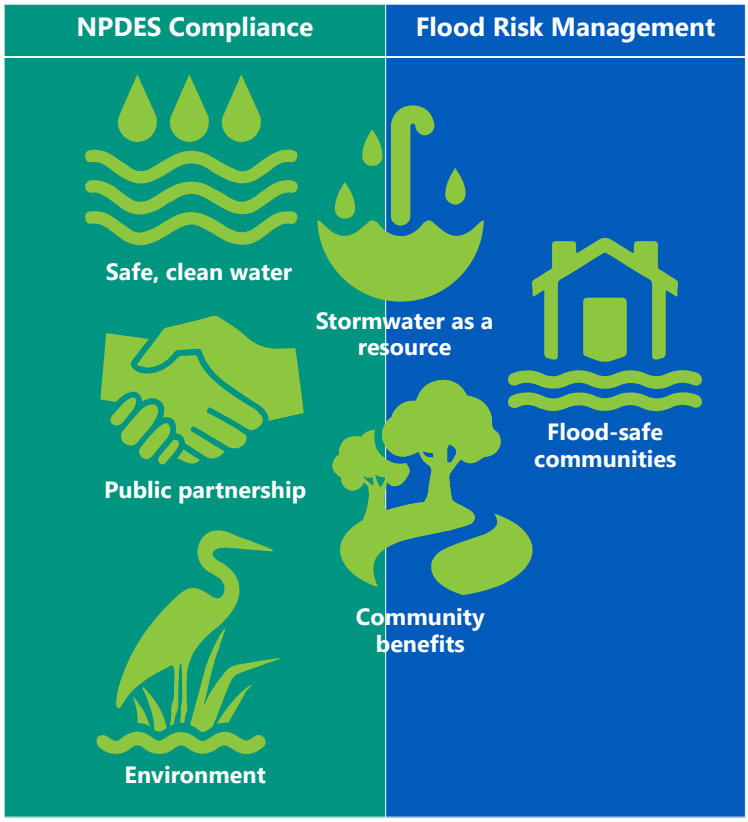


**Figure 1-2. Alignment of Goals with National Pollutant Discharge Elimination System Compliance and Flood Risk Management**

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

Once the goals were defined, the Division then identified and categorized the assets it is required to manage such as storm drainage infrastructure, channels, streams, and beaches. A LOS was then developed for each of the Division's assets, and business processes and organizational capabilities needed to fulfill those LOS were evaluated. Specific capabilities and projects that are required to fulfill the LOS required by regulators and desired by citizens were then identified.

During the development of WAMP 1.0, the City elected to align asset management plans with watershed management plans, which include total maximum daily load (TMDL) implementation plans where necessary. Each watershed management plan was termed a Watershed Asset Management Plan (WAMP) and identified the assets owned or managed by the Division. The information was presented in the WAMP documents for each of the six watersheds (San Dieguito, Los Peñasquitos, Mission Bay and La Jolla, San Diego River, San Diego Bay, and Tijuana River) located within the City. The boundaries of each watershed are presented in Figure 1-3. Each WAMP served as a road map to ensure that actions and activities that address flood risk management and water quality align across City departments. These plans provided a vehicle to identify and prioritize potential water quality and flood risk management challenges. The WAMPs also evaluated opportunities for integrating water quality and flood risk management into City projects and operations and maintenance activities within the watershed. Finally, the WAMPs provided information that was used to develop the Water Quality Improvement Plans (WQIP), which are required under Order No. R9-2013-0001, as amended by Order Nos. R9-2015-0001 and R9-2015-0100 - National Pollutant Discharge Elimination (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4) Draining the Watersheds Within the San Diego Region (Municipal Permit). Development of the WQIPs for each of the six Watershed Management Areas (WMA) was accomplished in 2016 and WQIPs were submitted to the California Regional Water Quality Control Board San Diego Region (San Diego Water Board) by the Responsible Parties.

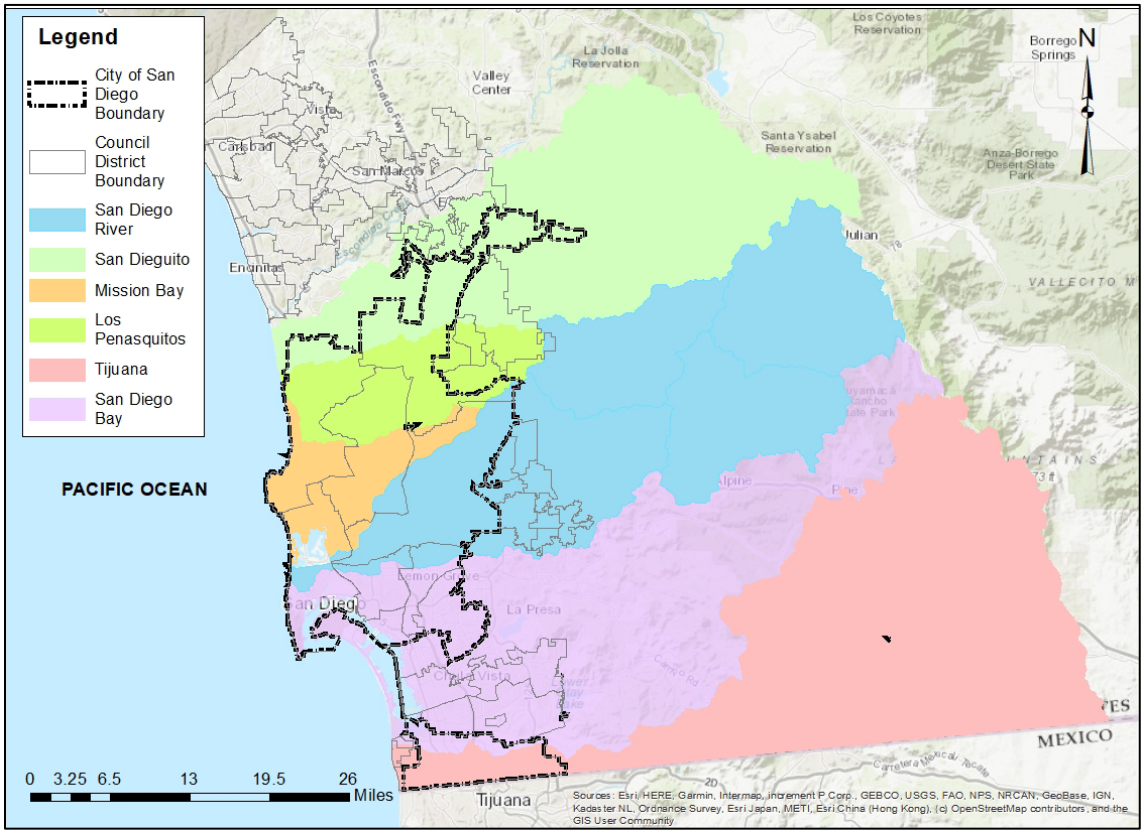


**Figure 1-3. City of San Diego Watershed Management Areas**

## 1.1 City of San Diego Stormwater Division Responsibilities

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

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

City Policy states that the City will generally only accept responsibility for maintenance of public drainage facilities that are designed and constructed to City standards, and that are located within a public street or drainage easement dedicated to the City. The Division is responsible for the stormwater facilities within the public rights-of-way and drainage easements dedicated to the City, and other City Departments, such as Parks and Recreation Department and Public Utilities Department. Facilities located on private property or within another agencies' jurisdiction or easements would not be the Department's responsibility to maintain.

## 1.2 City of San Diego Stormwater Division Organizational Capabilities

Organizations typically contain the functional capabilities to support and deliver the LOS to ultimately achieve established goals and objectives. Functional capabilities were largely defined by the senior stormwater managers in the Division, with some assistance from the consultants. Figure 1-4 presents the organizational structure of the Division. Table 1-1 lists and defines the functional capabilities that were identified.

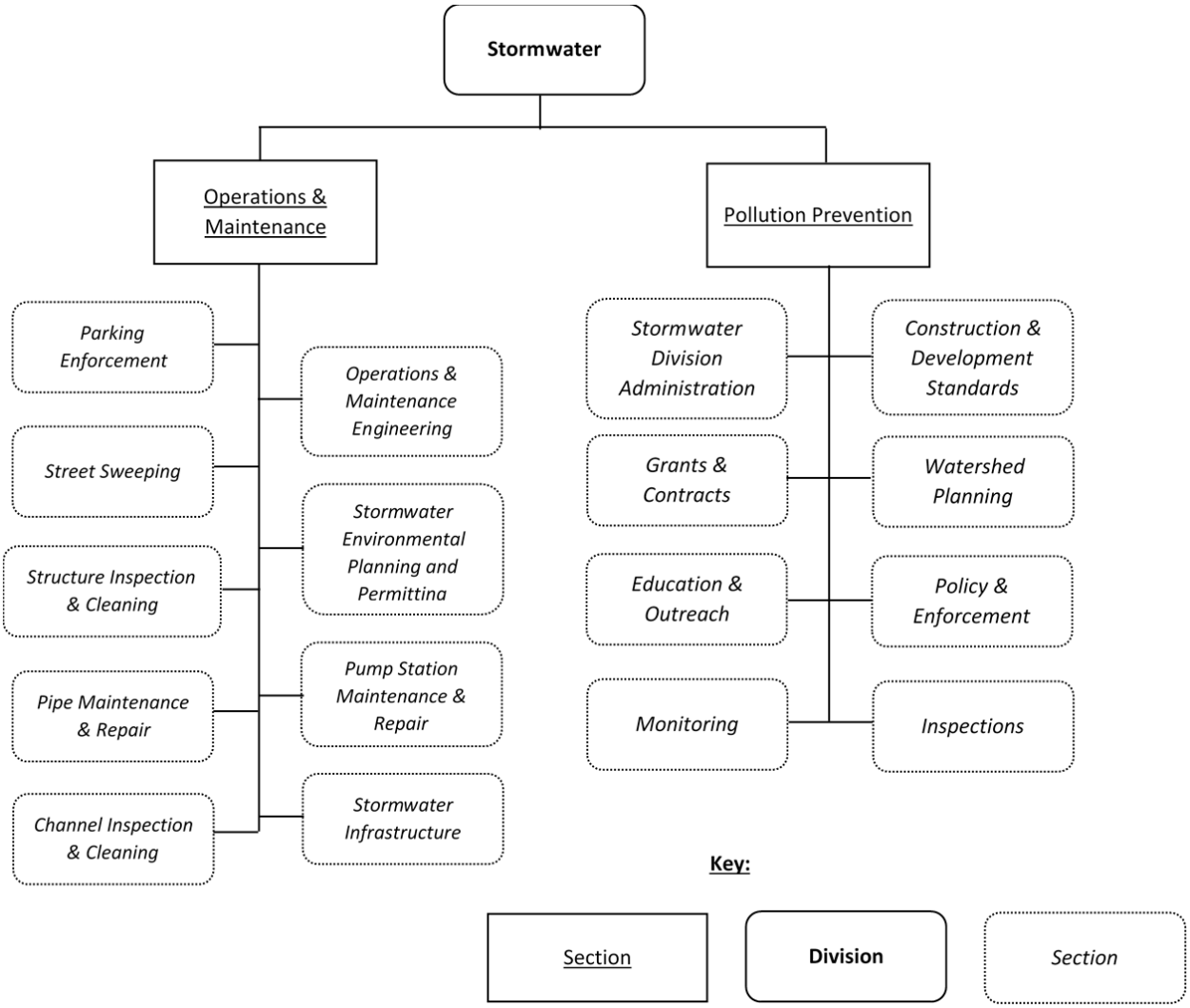


**Figure 1-4. Stormwater Division Organizational Structure**

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

| Function | Description |
|---|---|
| Administration | Preparing reports, handling telephone calls, preparing correspondence, performing filing, routing, and office management activities. |
| Asset Management | Effectively and sustainably managing assets at a desired level of service for the lowest lifecycle cost, manage storm drain assets and function as the business process coordinator representing the Division. Asset management provides needed information on existing assets, such as condition and desired level of service, so that City staff can develop optimal strategies for maintenance and rehabilitation of assets. |
| Information Technology | Servicing computers, laptops, computer servers, software licenses, specialized software, and specialized computer hardware. |
| Construction Management | Providing engineering oversight and performing inspections of construction activities. Managing construction activities. Performing scheduling and implementing project controls. |
| Contract Management | Developing, enforcing, and managing compliance with contracts. |
| Database Administration | Performing data entry, database management, database programming, and data manipulation. |
| Dispatch | Directing field crews regarding inspections, repairs, and emergencies. |
| Enforcement | Responds to and inspects complaints. Issuing citations, processing citations and appeals, communicating with violators, and providing educational materials to violators. Inspection of residential areas. |
| Engineering | Completing designs, developing projects and standards for development and redevelopment, completing reviews of plans and water quality management plans, developing standards for construction controls, completing reviews and inspections of construction projects, and negotiating permit requirements associated with water quality controls. |
| Management | Leading and making final decisions and provides policy direction pertaining to the Division. |
| Finance | Performing cost estimating, preparing budget analyses, grants management, and developing budgets for proposals and presentations. |
| GIS | Managing, analyzing, and mapping computer-based geographic data. |
| Hydrogeology | Applying professional expertise to understanding groundwater systems. |
| Inspection | Inspecting facilities for water quality violations; inspecting public works infrastructure to identify maintenance and repair requirements. |
| Laboratory | Analyzing water and other media to identify concentrations of various chemicals. |
| Landscape Architecture | Developing plans and specifications and overseeing the construction of landscapes. |
| Legal | Performing legal tasks. Advises the Division on civil and criminal matters. |
| Modeling | Using mathematical models to predict flows and pollutant loads based on rainfall, land use, and other physical, chemical, and biological processes. |
| Monitoring | Collecting samples of water and other media and analyzing the media to determine the concentrations of various chemicals. Includes the skills and tools to capture and store the data collected for future use. |
| O&M | Inspecting, maintaining, repairing, and replacing infrastructure. |

**Table 1-1. Functional Capability Definitions (contd.)**

| Function | Description |
|---|---|
| Planning | Developing overall goals and objectives and developing projects to meet those goals and objectives. Includes professionals skilled at evaluating the impacts of projects and planning decisions, weighing the different impacts, costs, and benefits, and making rational choices for project selection and development. Also includes the ability to communicate the reasoning behind planning decisions, listen to the concerns of stakeholders and elected officials, and adjust plans to meet the needs of parties to the extent practicable. |
| Policy | Evaluating the impacts of policy decisions on municipal and other operations and developing policies and procedures to optimize municipal and other operations. Requires knowledge of environmental legislation and an understanding of how state or federal implementation policies will affect municipal costs and economic conditions. |
| Project Management | Achieving scope, quality, schedule, and budget goals in delivering a project. Usually associated with a capital improvement project but can include studies and technical projects. |
| Public Outreach | Understanding, communicating with, and measuring the attitudes and behavior of the public. |
| Regulatory | Understanding and applying regulations, particularly environmental regulations. Understanding what the regulatory requirements are, and what options are available for compliance with regulations. Includes expertise in the regulatory process for how regulations are developed, how they are enforced, and what the compliance risks are. |
| Science | Applying scientific methods to projects in the physical, chemical, and/or biological sciences arenas. Includes skills in how to design experiments, how to study designs, how to analyze and assess data, how to statistically analyze data and understand the uncertainty in the data, how to draw conclusions, and how to present those conclusions in light of how the experiment or study was conducted and what uncertainties exist. Includes knowledge of the underlying first principle theories of the scientific principles on which conclusions are based. |

## 1.3 History

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

The City embarked on its first application for a master stormwater facility maintenance permit in the mid-1990s after a state-wide initiative to educate local governments regarding the environmental

regulations associated with maintaining urban stormwater infrastructure. In 2002, this effort was postponed after the City and regulatory agencies recognized that a programmatic approach to stormwater maintenance would provide a more thorough and comprehensive analysis of the environmental impacts of the proposed program.

In July 1990, the San Diego RWQCB issued a municipal stormwater permit (Order No. 90-42) to the San Diego Region, including the City of San Diego, for its urban runoff discharges. This permit was in response to the federal Clean Water Act (CWA) amendment in 1987 that required municipalities throughout the United States to obtain NPDES permits for discharges of urban runoff from their MS4s. Order No. 90-42 was reissued by the RWQCB on February 21, 2001 as Order No. 2001-01. The regulatory approach incorporated into Order No. 2001-01 was a significant departure from the regulatory approach incorporated into Order No. 90-42 and identified detailed specific requirements that outlined the minimum level of implementation required for the Copermittees' (including the City's) programs.

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

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

On May 8, 2013, Order No. R9-2013-0001 (amended by Order Nos. R9-2015-0001 and R9-2015-0100 on February 11, 2015 and November 18, 2015, respectively), (Regional MS4 Permit or Municipal Permit) was adopted and shifts the focus of the permit requirements from a minimum level of actions to be implemented by the Copermittees (including San Diego, Orange, and Riverside County Copermittees) to identifying outcomes to be achieved by those actions. The Regional MS4 Permit represents an important paradigm shift in the approach for MS4 permits within the San Diego Region. Through the jurisdictional runoff management programs, the focus has shifted to the development and implementation of WQIPs, which became a requirement for permit compliance. A WQIP was developed for each WMA by the Copermittees with jurisdiction within the boundary of the WMA. The City of San Diego is the lead on the WQIP development for the San Dieguito, Los Peñasquitos and Mission Bay WMA. The City is also a participating agency in the San Diego River, San Diego Bay and Tijuana River WMAs. WQIPs for all six WMAs were submitted to the RWQCB in

2016 and the Copermittees are currently implementing the WQIPs both through their jurisdictional runoff management programs and activities that are separate from the JRMP activities. Figure 1-5 depicts the relationship of the WQIPs and the jurisdictional runoff management program.

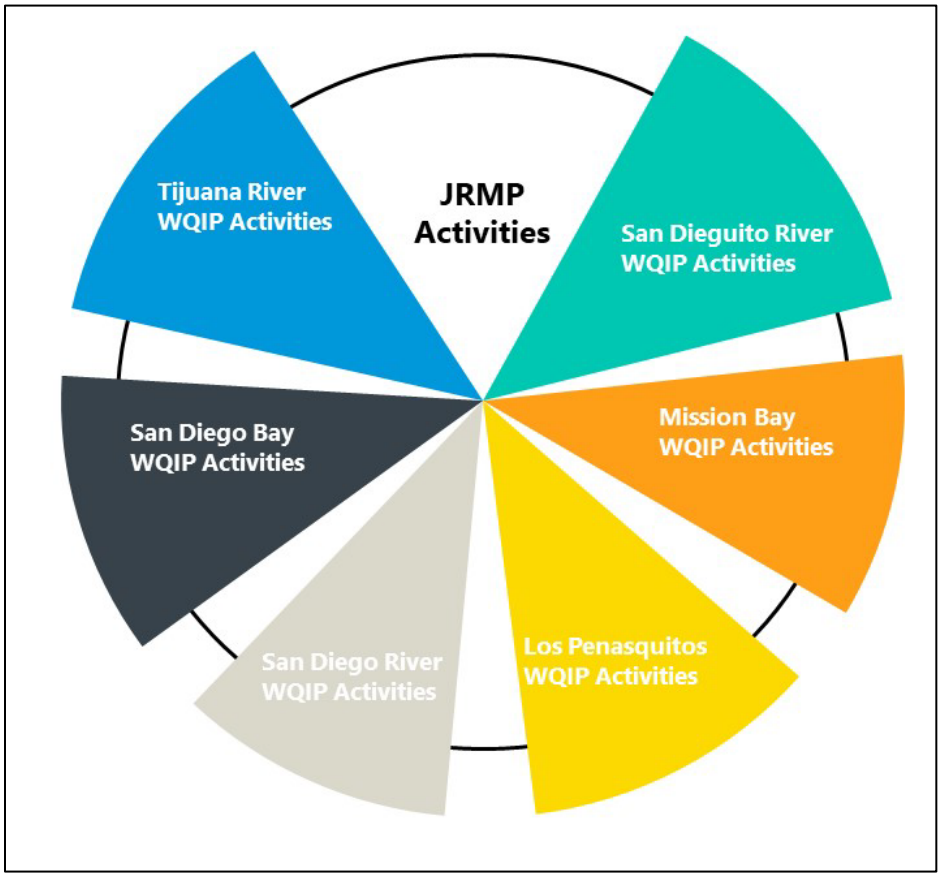


**Figure 1-5. Water Quality Improvement Plan and Jurisdictional Runoff Management Program**

The overall approach for stormwater management as defined in the Regional MS4 Permit with respect to the jurisdictional runoff management programs does not differ significantly from the earlier permits.

The most significant difference in the approach for compliance with the 2013 Regional MS4 Permit is the specific manner of implementation for those jurisdictional runoff management programs. JRMP is now implemented through compliance activities specified in the WQIPs; compliance activities vary for each watershed specific to each watershed's specific issues.

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

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

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

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

## 1.4 Storm Drain System

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

During rain events or wet weather conditions, stormwater from impervious surfaces, such as buildings, rooftops, paved driveways, and improved streets, is typically conveyed downstream via the City's stormwater system. When runoff cannot infiltrate into the ground, precipitation will follow drainage patterns, typically to the lowest point, collecting contaminants, sediment, or debris along

the way. Stormwater and urban runoff can also erode unstable soil, carrying sediment downstream. Typically, non-storm water runoff from sources, such as irrigated landscaped areas, is the surface water that also flows through the stormwater system during periods of dry weather. Non-storm water runoff results from human activities rather than the natural hydrological cycle. Non-storm water runoff contaminants include: oil and grease from parking lots; pesticides, herbicides, and fertilizers from lawns and landscaped areas; soapy water from carpet cleaning and restaurant washdown; and vehicle washing; sediment from construction projects; trash such as cigarette butts and bottles; and many other sources associated with everyday activities. However, some non-stormwater discharges, such as water line flushing of the drinking water system, are allowed under the Municipal Permit.

## 1.5 Asset Management Planning

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


**Figure 1-6. Seven Core Elements of Asset Management**

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

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

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

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

## 1.6 Components of the Watershed Asset Management Plan

The initial version of the Division's WAMP (WAMP 1.0) focused on developing and identifying areas for enhancement. Since the WAMP 1.0 was developed, the City has performed actions towards implementation by refining their business processes and practices and improving data collection, inventory processes. WAMP 2.0 incorporates refined implementation of each core process. The following sections describe the questions that were addressed during the development of the WAMP 2.0.

### 1.6.1 What Is An Asset Management Plan?

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

- Identifying assets that the Division owns and manages,
- Defining current and proposed LOS,
- Forecasting future financial commitments required,
- Analyzing the business risk exposure,
- Applying risk-based approach to prioritizing needs, and
- Linking business objectives and service levels.

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

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

Some of the Division's infrastructure assets are beginning to reach maturity. Aging assets are reaching a time in which they are beginning to fail, and, in some cases, are failing with significant consequences. In years past, there were far fewer assets to manage. Assets were often visible and younger. However, with the rapid development that has occurred in the City, the number of assets required to meet the growing demand has increased exponentially. As a result, assets can no longer

be managed effectively by relying on the historical management practices. Operation and maintenance (O&M) staff are often faced with having to manage in a reactive mode.

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

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

An asset management plan is intended to answer the preceding questions. An asset management plan enables an organization to have the information required to make the right decision, at the right time, at the right cost, for the right reason. By implementing core asset management processes, the Division will gain knowledge of the assets owned, the remaining useful life, the amount of investment required to maintain and/or replace, and the business risk it faces from probability of failure of asset. The WAMP 2.0 will provide the Division with a foundation to promote sustainable management practices.

### 1.6.3 Where Has Asset Management Been Applied Successfully?

The following are some examples of asset management applied successfully.[2]

1. **Ross Valley Sanitation District** has used asset management to eliminate unnecessary capital projects recommended from traditional capital planning efforts. A single project, eliminated by use of asset management, reduced the total cost of the District's capital program by approximately $4 million. By utilizing asset management, the District revamped its $100 million capital program to reevaluate and ultimately eliminate multiple poorly defined and improperly prioritized projects, and helped ensure the funds went to projects with the highest return to the level-of-service goals established by the District during the asset management process.
   - The District has also found that having a sound AMP is valuable for communicating the basis for major capital programs and related rate increases to ratepayers. By having a sound AMP, the District was able to approve a 5-year schedule of rate increases, totaling over 40%, with minimal public opposition.
2. In its initial Asset Management Implementation Plan in 2014, the **Central Contra Costa Sanitary District** anticipated a cost of $5 million over 5 years to expand and improve its AMP. The District employs six full-time equivalents in its Asset Management Group, which includes all GIS administration and support and technical support of the CMMS, closed-circuit television software, and other relational software such as Infoworks hydraulic model

[2] Asset Management Programs for Stormwater and Wastewater Systems: Overcoming Barriers to Development and Implementation, USEPA, 2017

and Infomaster for asset replacement planning. By presenting the business needs and benefits to customers, District staff have obtained the support of management and board members for necessary investments in the AMP.

- Since 2002, the **Central Contra Costa Sanitary District** has reduced SSOs by approximately 70% by implementing a closed-circuit television sewer inspection program and increasing maintenance staff and equipment. Data obtained from the AMP is used for capital improvements and preventive maintenance scheduling.

3. **Case Study: Collection System Asset Management Program South Placer Municipal Utility District**

   - Using an AMP for its collection system has enabled the District to allocate the necessary personnel to the most critical needs while deferring less-immediate projects. This has reduced the needed number of employees by 10 percent per mile of pipe.

4. **Case Study: Collection System Asset Management Program City of Folsom**

   - In 2006, the California State Water Resources Control Board adopted the Statewide General Waste Discharge Requirements for Sanitary Sewer Systems, which require municipalities to develop and implement SSMPs to ensure proper funding and management of sanitary sewer systems. The City developed and implemented an SSMP that established five specific goals:

     - Provide uninterrupted service.
     - Minimize the risk of SSOs; mitigate unforeseen SSOs determined to be preventable through adequate system inspection and maintenance.
     - Ensure adequate sewer line capacities throughout the service area.
     - Sustain the aging sewer infrastructure by developing and implementing an AMP to extend asset lifecycle.
     - Ensure adequate funding support and resources to sustain long-term asset management.

   Implementing an AMP — integrating capital improvement projects, condition assessments, funding, operation and maintenance, and risk and service levels — was critical in achieving these goals. Afterward, the City experienced a number of benefits, including a reduction in the number of sewer spill events by 80 percent since 1998 and an average spill rate well below the regional and state averages. A 2012 audit of the program by the Central Valley Water Board concluded that the collection system was in good operating condition and that the system has adequate capacity for sewage flow, indicating a substantial improvement in operations since a 2000 spill.

5. Recognizing a difference in cost between near- and long-term maintenance needs, the **San Francisco Public Utilities Commission** developed a cost forecasting scenario, comparing the costs of projects to be performed in 5, 10, and 15 years, as well as those completed, no longer

needed, or to be completed within other projects. The results have helped to refine the scope and priority of capital and repair and replacement projects (Bonitz et al. 2015).

6. The **City of Grand Rapids** developed its AMP in response to the need to eliminate its combined sewer overflows and update its aging stormwater infrastructure (West Michigan Environmental Action Council 2014). Through the support of a citizen's stakeholder group, the West Michigan Environmental Action Council, the City was able to channel its need for an AMP into community outreach and win support for the initial investment. The City began developing its stormwater AMP in 2008 and was able to finance its initiative through a voter-approved income tax increase in 2010. Of a Commission-approved budget of $450,000, the City invested approximately $382,000 to complete its asset management plan, which serves as the base for its stormwater infrastructure and capital program.
7. The **Zone 7 Water Agency** includes AMP for on-going implementation and 5-year updates in the CIP as projects funded from the renewal and replacement fund. When there was insufficient funding for all of the desired tasks in a recent AMP update scope, the tasks were prioritized. For example, rather than performing a condition assessment on as many assets as possible, the Agency assessed a few key assets and used the remaining resources to develop a condition assessment program that staff could carry out throughout the year and in the course of their work. The Agency is a water wholesaler, so funding comes from existing customers of its retailers through water rates. Having an AMP helps to justify and secure funding for the program through transfers from water sales to the renewal and replacement fund.
8. The **City of Minneapolis** has implemented a stormwater utility fee for residents since 2005, identified as a line item on utility bills. The stormwater utility fee provides funding for stormwater management, including the City's asset management system. The City was able to garner support of its stormwater asset management system from elected officials, which helped increase support from other parts of the City's management. The fee depends on work completed and the City's ability to meet the six motivating factors:
   - Improve the system
   - Identify criticality of system components
   - Identify life-cycle costs
   - Improve documentation/recordkeeping
   - Improve future decision-making as a result of data and analysis
   - Take a proactive versus a reactive approach
9. The **City of Paso Robles** funds its wastewater AMP through individual enterprise funding mechanisms. It has no dedicated funding source (enterprise fund) for its stormwater program, so it does not have the funding necessary to develop a robust AMP for its stormwater system. A certain percentage is carved out of the annual budget to fund asset depreciation. The City's representatives believe that developing an AMP for the stormwater program would allow them to understand the number and age of the assets. This would allow their staff to better

understand what assets would need replacement or repair, set aside depreciation funding, and prepare a 5- to 10-year CIP to systematically improve the infrastructure.

10. The **City of South Lake Tahoe** appropriated funds in its 2015 budget cycle for the cost of the contract to develop its AMP and for additional data collection. Specific funding was requested for an asset management system. (The City already had a robust GIS program, whose data were migrated into the AMP.) The AMP was still in its infancy, but City representatives anticipated that it would increase efficiency and response time as well as reporting and future budgeting. Given the increased efficiency of their staff, they are hoping to save on costs through asset management in the future and allocate those funds elsewhere. The AMP will be used to provide a more structured justification for CIP approvals from the City Council.

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

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

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

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

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

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

### 1.6.5 Stormwater Division Assets

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

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

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

After brainstorming with Division staff, it was determined that the Division is tasked with managing more than the storm drain system that includes pipes, inlets, outfalls etc. In addition, the Division must comply with water quality regulatory requirements and flood risk management, which requires the coordination of numerous efforts, such as relationships, regulatory policy, and behaviors.

It is understood that the Division needs to manage regulatory policies to meet goals and objectives, therefore, these elements should be classified as "assets." They can degrade with time if no effort is made to maintain them, and additional investment is required to improve them. Specific goals and objectives cannot be achieved without City staff complying with stormwater requirements, and without the public willingly complying and taking extra steps to modify their behavior.

An asset hierarchy was established to keep track of assets, asset LOS, the conditions of the assets, and activities necessary to maintain the desired LOS. This hierarchy is geographical and based on watershed units. Upon evaluating the managerial responsibilities of the Division, it was determined that decisions are made within each watershed independently of the needs of other watersheds. This aligns with the technical aspects of the Division's responsibilities to manage water quality and quantity, which depends on conditions that are specific to a watershed, subwatershed, or sub-drainage area within a watershed. The asset hierarchy was refined during development of WAMP 2.0 as additional data was obtained regarding the City's storm drain infrastructure, and regulatory requirements related to flood risk management and protection of water quality evolved through revision of the Regional MS4 Permit. The Division's assets are now categorized as physical assets and programmatic assets.

### *Physical Assets*

*Physical Assets* ***are human made items that one can touch and see that provides a level of service.*** The Division's physical assets include basins, conveyance structures, pump stations, structural BMPs, and structures located in the City's right of way (ROW) and owned by the City in each of the WMAs under the City's jurisdiction.

### *Programmatic Assets*

*Programmatic assets* ***generally include programs that the City has in place to meet their stormwater quality and flood risk management levels of service. Their valuation within this WAMP is based on the cost to manage the programmatic assets so that they continue to achieve their LOS.*** Activities covered under the JRMP, WQIP, flood risk management, Best Available Science, Program Administration and Litigation, Settlement, and Cleanup Actions are all examples of programmatic assets. Programmatic assets do not have replacement costs.

Physical assets are managed at granular levels in the hierarchy, such as a Hydrologic Subarea (HSA), Hydrologic Area (HA), or entire watershed. Assets in this category include much of the storm drain system consisting of conveyances, pump stations, structures and structural BMPs. Programmatic assets are generally managed at the Department level.

It should be noted that compensatory mitigation for projects is included in both CIP and O&M activities. For new projects, compensatory mitigation is associated with the permitting costs. For assets that require mitigation, compensatory mitigation is included in the O&M activities and covered under habitat restoration and mitigation.

Additional detail about the Division's assets are presented in Section 2.

## 1.6.6 Watershed Asset Management Plan Development Process

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

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

The Division's WAMP was developed based on the five fundamental issues regarding asset management presented above. Figure 1-7 presents the core processes (10 steps) used to develop the WAMP with respect to the five fundamental questions of asset management.

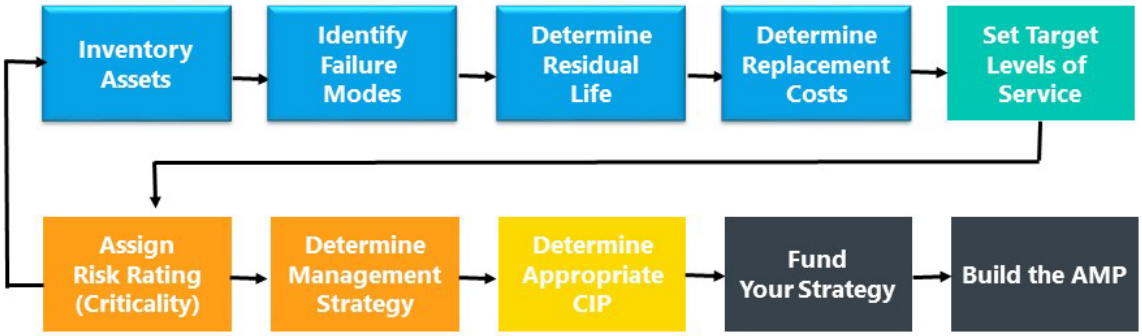


**Figure 1-7. Core Processes for Asset Management Plan Development**

### 1.6.7 Watershed Asset Management Plan Outline

An outline and a brief description of each section of the Division's WAMP 2.0 are presented below. The main body of this document describes the methodology and approach that was used.

**Acknowledgement.** Recognizes the individuals involved in creating this WAMP 2.0.

**Glossary of Terms**. Lists terminology used in this WAMP 2.0 and provides definitions.

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

**Section 1: Introduction.** Section 1 explains Division's overall mission and goals, and overall purpose of the WAMP. The Division's organizational structure and some of the roles and responsibilities of different positions with respect to using the WAMP 2.0, updating the WAMP 2.0, and managing the assets are described in this section. Advancements in the asset hierarchy and WAMP 2.0 implementation strategies are also noted in this Section.

**Section 2: Asset Inventory – "What Do We Own/Manage?"** The asset register and hierarchy are described, and the methods employed to obtain asset information are presented.

**Section 3: What Assets Are Critical?** The methods used to determine the assets' criticality are described. For an asset to fail, it must either reach the end of its useful life (mortality failure mode),

not meet the necessary ability to convey adequate flows (capacity failure mode), not meet other requirements (LOS failure mode), or be less expensive on a life cycle cost basis to manage using a different management strategy (financial failure mode). This section documents the updated LOS that, to the best knowledge of the Department, the regulators require and citizens of San Diego desire from the assets.

**Section 4: "What are My Optimized Management Strategies"?** Division's optimized management strategies are presented. Implementation of these strategies ensures that assets continue to perform to their desired LOS.

**Section 5: Funding Strategies – "What Do I Need To Do To Fund It"**? Various budgetary scenarios and general funding strategies are described.

**Section 6: Confidence Level Assessment** – The confidence level rating, which measures the current asset management practice, and identifies and prioritizes future improvements, are presented.

**Section 7: Recommendations** – Overall recommendations for WAMP update and implementation and asset inventory are presented.

**References:** Includes any reference documents necessary to support the WAMP 2.0.

**Appendices:** The City-wide WAMP 2.0 summary, watershed specific WAMP summary, and assumptions are presented.

## 1.7 Document Updates

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

## 1.8 Asset Management Implementation

Since the original WAMP was created in 2013, the asset inventory database has become outdated and the data necessary to support the Capital Improvement Program (CIP) planning is often not enough. The Division has taken on responsibility for assets and programs previously managed by other entities. As a result, the City continues to update its current asset inventory to account for the newly acquired assets, as well as planned, previously unknown, or incorrectly categorized assets. Often, asset ownership and as-built information is difficult to attain, adding burden across Division Programs to locate this information. The City also acknowledged that the Division has developed numerous plans, both in response to regulatory requirements and to assist with internal planning and organization. An important relationship is at play between these plans and the assets to efficiently track the City's progress with respect to services provided or needs met with these plans. The City has specific business processes in place for its assets and will need to develop plans that memorialize the processes and allow for integration of the plans and assets into the City's Enterprise Asset Management (EAM) system.

Successful implementation of the asset management system involves efficient and effective integration of the Division's plans and assets into the EAM with clear mapping of the plans and assets between EAM and WAMP. The integration of WAMP into EAM has also necessitated the following improvements to the WAMP as it relates to the EAM:

1. Consolidate, refine, revise, integrate, and organize assets, LOS, and business risk exposure (BRE) criteria to be transparent and align with SAP/GIS/Riva AMP.
2. Transfer WAMP logic (BRE criteria, maintenance strategy, etc.) into Riva AMP.
3. Update asset condition assessment data in GIS
4. Centralize management and monitoring of assets within the WAMP utilizing data from SAP/GIS/Riva AMP, and ATLAS.

This section provides a brief discussion for the WAMP implementation process. The road map in Figure 1-8 shows the steps necessary to implement the integration of WAMP and EAM.

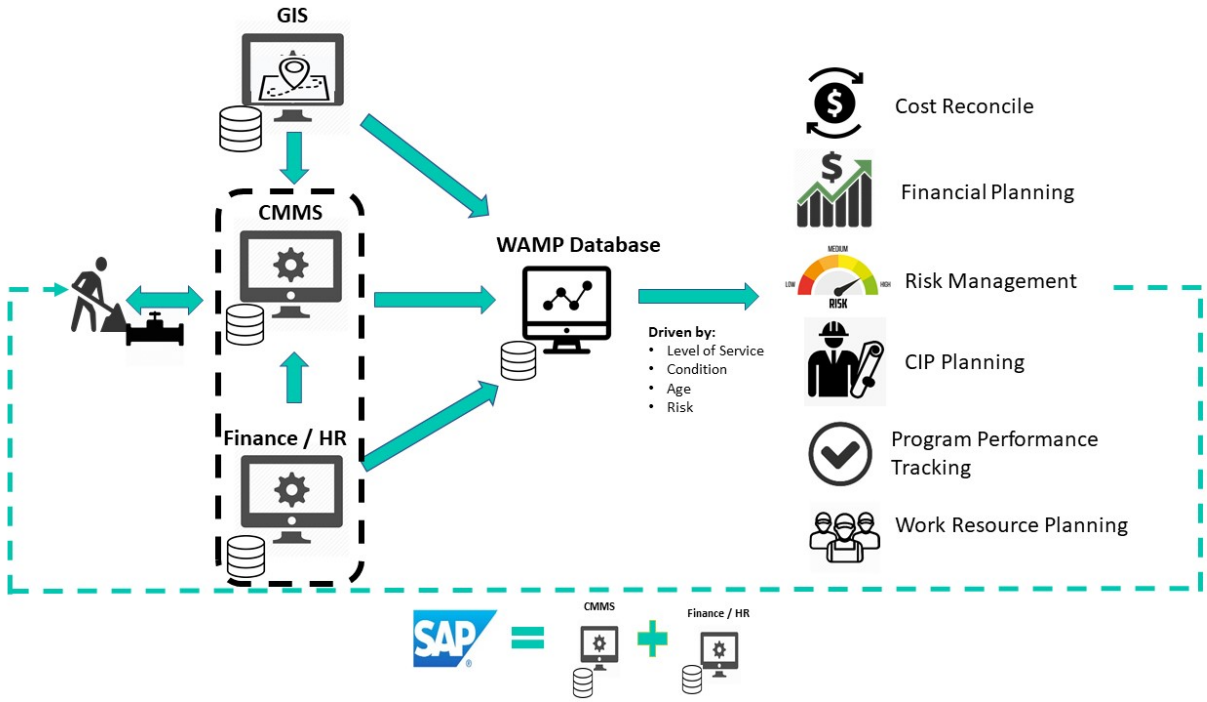


**Figure 1-8. WAMP and EAM Integration Road Map**

### 1.8.1 Governing Stormwater Division Plans

The Division's program has been guided by the evolution of regulatory requirements, expanding responsibilities, and emerging public safety needs. As such, the program's assets and activities are outlined in a series of plans specifically designed to meet individual regulatory or planning requirements. Further, the data contained in these plans is not regularly pushed into the WAMP by any repeatable business process. As a result, many assets and activities are influenced by multiple plans and some are not outlined in any plans at all, causing potential inefficiencies, redundancies, and gaps in WAMP data.

To address these concerns, the following updates were made to the WAMP to incorporate the plans and studies and link them to assets:

1. Created a roadmap that relates each individual activity and asset back to a plan or plans – this effort will identify redundancies, overlap, and/or gaps between the plans themselves.
2. Worked with Division staff to evaluate the results of the mapping exercise and collaborate to define and select program-streamlining options that will close gaps and eliminate redundancy.
3. Outlined specific protocols and/or business processes for each plan to guide the plan development process, govern data transfer into the WAMP, and determine what information is suitable for public consumption.

It is anticipated that the mapping may need revising if significant changes are made to the plans and their related assets.

### 1.8.2 Enterprise Asset Management System

The City has adopted an EAM across all the City's departments. The City's EAM comprises of a set of information management systems that map the physical assets, track financial data related to work and personnel management, and maintain an inventory of the asset's attributes, risk assessment and renewal planning. The City uses ESRI ArcGIS to map location and record physical attributes of assets. Financial data is recorded in SAP ERP system and the WAMP database holds the key to integrating and mapping data across all platforms and producing meaningful results that help in decision-making. Table 1-3 identifies each of the integrated systems that make up WAMP, its primary function, and the data it records.

**Table 1-3. WAMP Components**

| Information System | Software | Primary Function | Data Recorded |
|---|---|---|---|
| **GIS** | ESRI ArcGIS | Maps Location of Physical Assets | Asset Attributes (e.g., location, size, length) |
| **CMMS** | SAP EAM | • Work management | • Asset attributes (e.g., size, manufacturer, condition)<br>• Work activities/histories (e.g., replace, rehab, maintain, inspect) |
| **Finance / HR** | SAP ERP | • Cost tracking<br>• HR management | • Project cost data<br>• HR data |
| **AMP Database** | Riva AMP | • Inventory of Physical and Programmatic Assets<br>• Asset renewal planning<br>• Risk management<br>• Cost reconciliation<br>• FTE analysis<br>• Tracking programs | • Management strategies (e.g., useful life, refurbishment activities)<br>• Asset cost data<br>• Decay curves<br>• Program performance |

Key:
FTE = full-time equivalent
HR = Human Resources
WAMP = Watershed Asset Management Plan

The information management systems in the City's EAM and their inter-relationship is shown in Figure 1-9. The GIS system is connected to the City's financial accounting system such that when work orders are created/completed in SAP or City personnel perform work on a certain asset (perform inspection, repair, replacement), it is tracked in the GIS (as a new attribute if asset is replaced, updated attribute if maintenance is performed. The WAMP Database then uses the year refurbished and recalculates the remaining life or the condition data collected during inspection and use it to adjust or recalculate the remaining life. This information helps WAMP make future decisions about that particular asset (risk management, asset renewal planning). This constant feedback loop enables the Division to track its assets and make informed decisions.

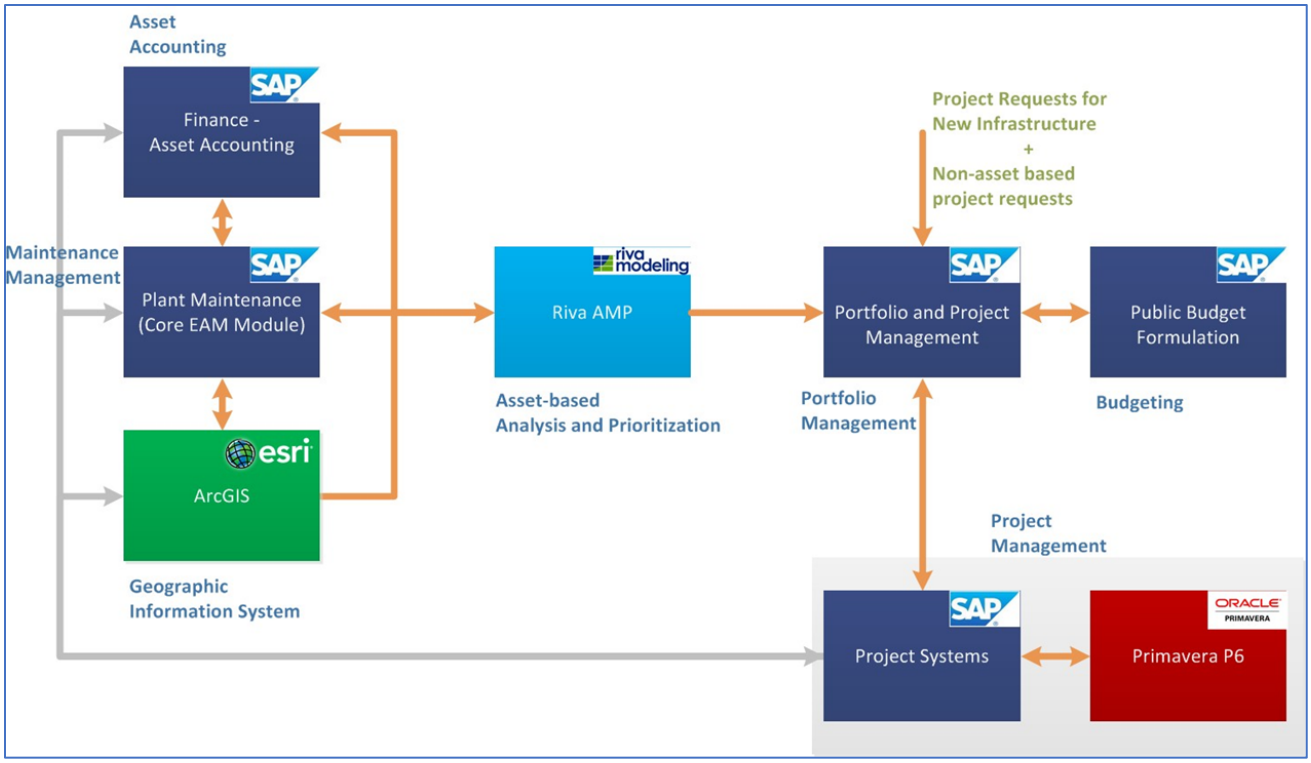


**Figure 1-9. Components of Enterprise Asset Management**

### 1.8.3 Implementation

Two aspects that control successful implementation of the WAMP are tracking information and instructions on how to accurately track the information. This concept is graphically depicted in Figure 1-10.

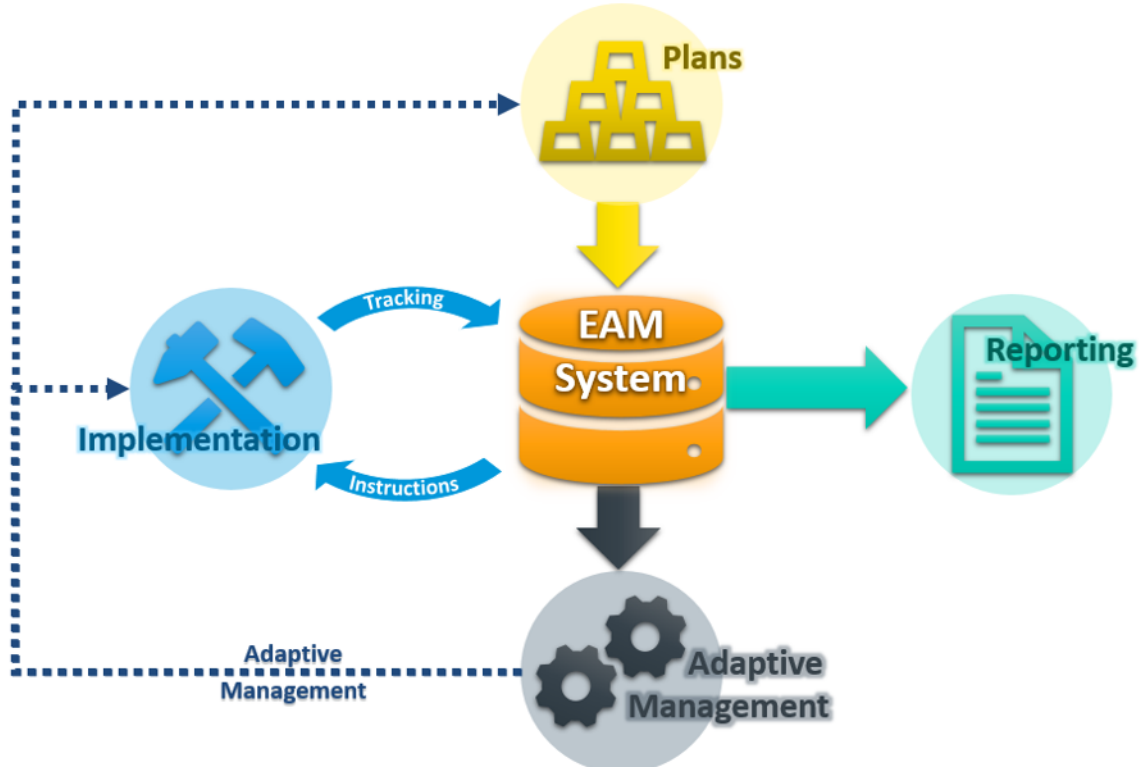


**Figure 1-10. WAMP Implementation**

### *Tracking*

Asset attribute data and work history data are recorded in GIS and SAP, respectively. The WAMP Database holds data related to life-cycle cost activities (e.g., replacement, refurbishment). SAP data folds information such as asset attributes, work history, maintenance/refurbishment schedule, activity frequency etc. The GIS data holds physical attribute data such as physical asset identification (ID), location, material, size, as applicable. Tracking of asset data across these systems requires maintaining a common asset ID such that any data collected about the asset and actions performed on the asset (inspection, replacement) is tracked across all platforms (GIS, SAP, WAMP).

The key to operationalizing the WAMP is to ensure that the reporting requirements and adaptive management objectives define the need for data tracking for implementation and asset-oriented activities. The pathway for data transfer from plan initiation to the WAMP database to the tracking tools to the reporting modules and ultimately to the adaptive management platforms must be unbroken and efficient for each individual asset. While the overarching objectives for this WAMP system are universal, the types of data (and associated business processes, dashboards, and tools) needed to successfully implement such a program are highly specific to each individual asset.

### *Instructions*

The instructions constitute a suite of business processes that will accurately track the activities (or management strategies) that are performed on or on behalf of the Division's assets and feed the updated information back into the WAMP. The instructions will ensure that there are no disconnections between capturing what was instructed and what was executed in the real world and prevent the WAMP from becoming dated and losing its functionality. The instructions will provide

repeatable, reliable guidance to Division staff to execute day-to-day, month-to-month, and year-to-year operations.

### 1.8.4 Reporting and Budgeting

Accurate reporting of data is one of the primary and most valuable functions of any asset management program. Therefore, it is imperative that the reporting requirements and desires drive the functionality of the WAMP. To accomplish this, the reporting needs of the program need to be defined. If the assets and activities are accurately portrayed in the Plans and all data is accurately updated and fed into the WAMP, the options and usefulness of the reports are boundless.

The WAMP Database will provide asset-by-asset cost projections to help the City in the annual budgeting process, while the BRE scores will help the City to prioritize the spending. Asset replacements can then be bundled together into CIP projects. Once CIP projects are formally created, the WAMP database should be updated to provide references that link CIP projects to the individual assets included. This process will ensure the continuous update of the WAMP database for the next budgeting cycle.

### 1.8.5 Adaptive Management (Analytics and Optimization)

Ultimately, a robust asset management program will open a world of possibilities for adaptive management. Having accurate data at the appropriate resolution will allow for unprecedented data analytics and optimization opportunities for the Division program. Much like the reporting functionality, it is important for the adaptive management objectives of the program to drive the functionality of the WAMP.

A suite of analytics, optimization, and reporting outcomes must be defined that will become possible with up-to-date data. Tools (e.g., applications, dashboards) must be created to facilitate the adaptive management functionality.

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# 2 Asset Inventory – "What Do We Own / Manage?"

The current state of the Division's assets was established in WAMP 1.0 by answering the following questions:

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

Knowledge of the assets owned and managed by the Division is required to answer these questions. The Division conducted an inventory of assets and activities that it is responsible for and identified the following assets and activities:

- The City's storm drain system, which is comprised of built structures including inlets, pipes, culverts, brow ditches, swales, pump stations, low flow diversions, and outfalls. These built structures have defined useful lives and replacement costs and are required to achieve specified service levels to adequately convey storm flows and manage flood risk within the City.
- Perform O&M activities, and construct improvements to the City's storm drainage system. This includes permitting and mitigation for maintenance and capital improvements to the system.
- Ensure compliance with the NPDES permit for the MS4, issued to the City by the RWQCB.
- Conduct the following additional activities from time to time, as needed:
  - review the water quality sections of California Environmental Quality Act documents,
  - provide support for other enforcement actions such as Investigative Orders, and Cleanup and Abatement Orders issued by the RWQCB for discharges of pollutants through the City's assets, and
  - participate in the development of public policy at the state or local level regarding environmental regulations.

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

In order to capture the assets that the Division must manage to fulfill its responsibilities, the assets are categorized into physical assets and programmatic assets. This is a significant departure from the WAMP 1.0 asset hierarchy that categorized assets into hard assets, soft assets, and natural

assets. Natural assets consisted of both structural and non-structural assets to comply with pending TMDL requirements. These assets have now been integrated into physical and programmatic assets accordingly. All assets are now categorized into physical and programmatic assets to incorporate the following efficiencies into asset management and tracking:

- LOS of programmatic assets are measurable as compared to the LOS of some of the assets originally categorized as soft and natural assets (public behavior, relationships with other City departments)
- Consolidation of soft and natural assets under physical or programmatic assets makes it more efficient to track LOS

The Division's assets as described in detail in Section 2.1. Figure 2-1 shows the Division's asset hierarchy.

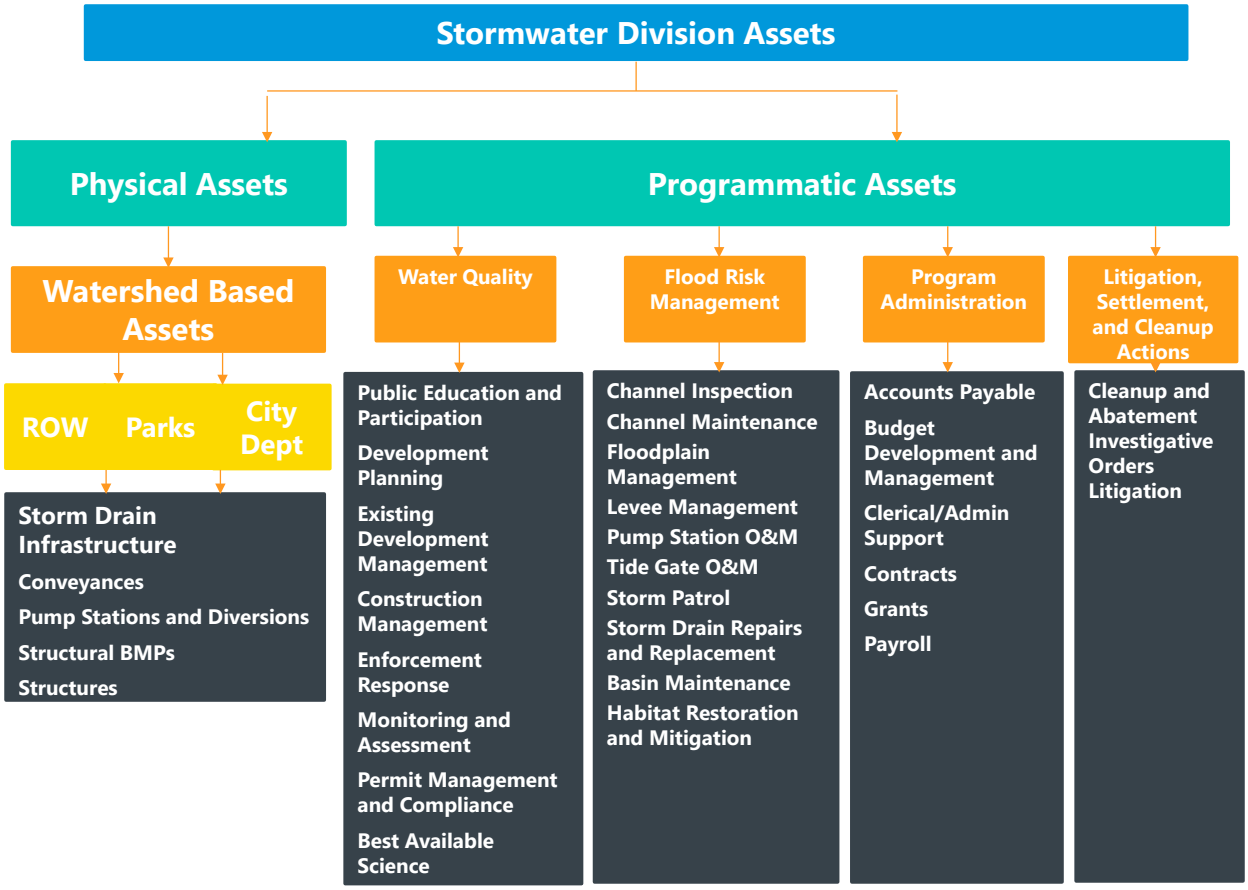


**Figure 2-1. Asset Classifications**

## 2.1 Stormwater Division Assets

The Division's assets are broadly classified into physical assets and programmatic assets. The assets are comprised of programs that the City is responsible for in order to meet their water quality and flood risk management obligations, Municipal Permit requirements, and the storm drainage infrastructure that provides the physical pathway to meeting these requirements.

### 2.1.1 Physical Assets

**Physical Assets** are human made items that one can touch and see that provides a level of service. With exception of pump station components, the storm drain system and equipment that costs more than $5,000 to replace are categorized as physical assets. Physical assets are generally purchased or constructed, have defined lives, and can be replaced. Setting the replacement cost requirement at $5,000 or greater for equipment is a step taken to simplify tracking and managing physical assets and can have a significant budgetary impact. The Division's physical assets include basins, conveyance structures, pump stations (and their components), structural BMPs, and structures located in the City's ROW and owned by other City departments in each of the WMAs under the City's jurisdiction. Items like computers, printers etc., that cost less than $5,000 are generally not managed as individual assets.

### 2.1.2 Programmatic Assets

**Programmatic Assets** are human-created intangible experiential elements that cannot be touched or seen, but which provide a level of service. Programmatic assets generally include programs that the City has in place to meet their stormwater and flood risk management levels of service. Activities covered under water quality improvement, flood risk management, program administration, and litigation, settlement, and cleanup actions are programmatic asset classes to which the City's assets belong. Programmatic assets do not have replacement costs. Their valuation within this WAMP is based on the cost to manage the programmatic assets so that they continue to achieve their LOS.

## 2.2 Asset Hierarchy

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

Figure 2-2 shows the Division's asset hierarchy. As represented by the hierarchy, some assets are tracked at the Division level (e.g., water quality, flood risk management), while others are tied to a specific watershed, HU, HA, HSA, or mainstem outfall drainage area (storm drain infrastructure). The hierarchy indicates that assets can be managed efficiently at any level. This enables the Division to assess conditions, performance, and valuation at any level of the hierarchy. More importantly, the hierarchy establishes an organized structure to track costs (e.g., O&M, capital, monitoring). These costs will allow the Division to understand the true cost of providing the LOS. Some watersheds may not require the same level of effort to achieve a given LOS. Therefore, the resources devoted to an

activity that manages a particular asset within one watershed may differ from other watersheds. The specific assets for each watershed are summarized in the appendices.

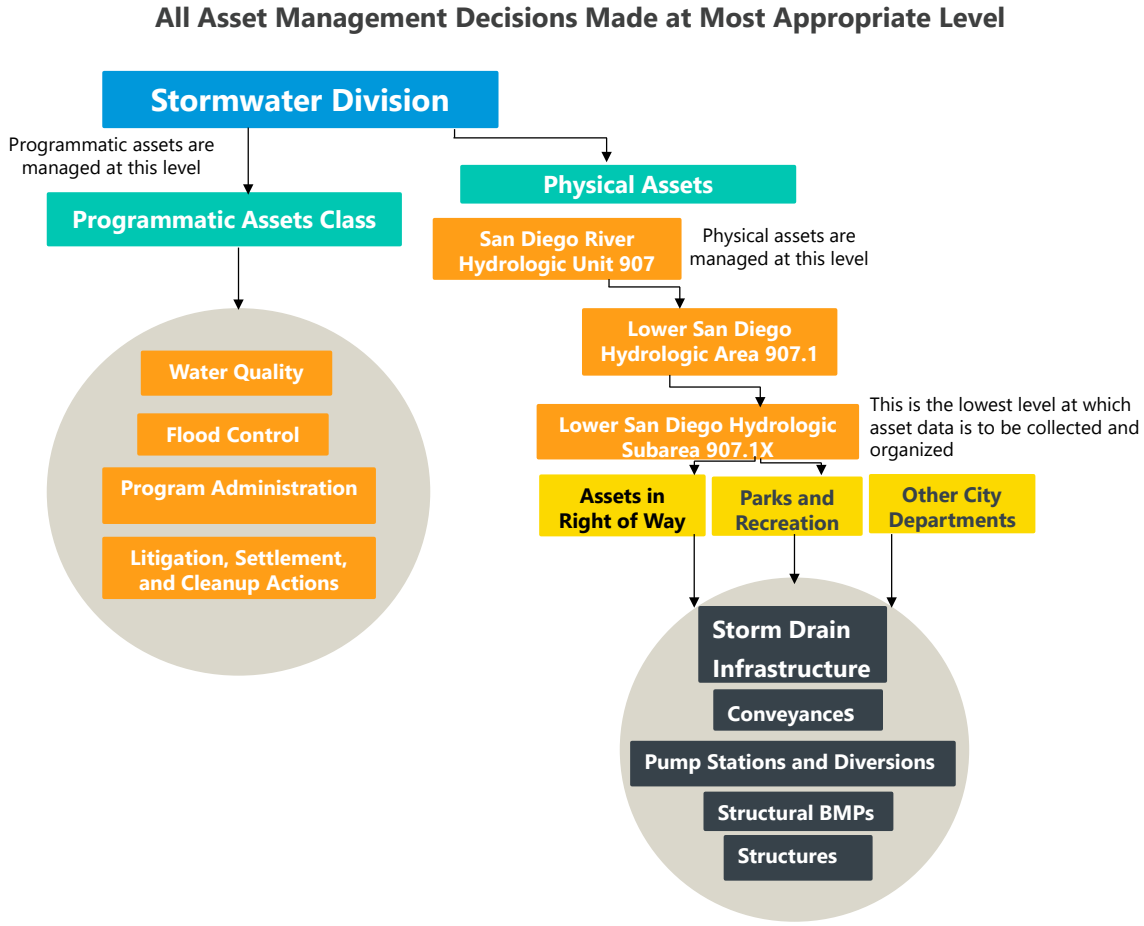


**Figure 2-2. Asset Hierarchy**

## 2.3 Data Sources and Asset Inventory Method

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

- Applications that manage physical asset data such as storm drains, channels, inlets (i.e., City EAM system).
- California State Water Resources Control Board (State Water Board) receiving-water GIS data for HUs, HAs, and HSAs.
- California SWRCB receiving-water GIS data for 2014 and 2016 Impaired Waterbodies.
- RWQCB GIS data for WMAs as defined in the NPDES permit.
- San Diego county-wide GIS data for general mapping information, such as City boundary data, streets, and land uses.
- San Diego County parcel data for multiple-habitat planning areas, City parcels, and non-City parcels.

- The Division's BMP inspection database for City-owned structural treatment control BMPs.
- Tacit knowledge of Department staff regarding the condition of assets, areas where flooding occurs, achievement of levels of service, cost projections for additional actions to achieve levels of service, consequence of failure, probability of failure, and other needed asset condition information.
- Phase I and Phase II Comprehensive Load Reduction Plans (CLRP) produced by City and County of San Diego (County) consultants that presented BMP opportunities for TMDL compliance. These documents have been updated or replaced by the WQIPs.
- California Office of Environmental Health Hazard Assessment data for Disadvantaged Communities and Low-Income Housing Communities
- California Department of Water Resources Disadvantaged Communities Mapping Tool
- Water Quality Improvement Plans (WQIP) for the six watersheds under the City's jurisdiction, developed in 2016
- City of San Diego Jurisdictional Runoff Management Plan, updated 2019
- Watershed Management Plans (i.e., IDEAS documents)
- Numerous planning-level documents
- Department Implementation Strategies database
- Knowledge from City Department interviews

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

## 2.4 Asset Summary

The Division's assets across the City are described in the next subsections.

### 2.4.1 Physical Assets

The City's MS4 infrastructure is categorized as a physical asset. The storm drain system includes conveyance structures, pump stations and diversion structures, and structural BMPs that convey storm flows and dry weather urban runoff from City-incorporated public rights-of-way and other City department owned/managed facilities such as parks. It does not include street curb and gutter features that convey storm flows, and roof gutters and downspouts from City-owned buildings and structures. Table 2-1 summarizes the assets within each of the asset classes.

**Table 2-1. Assets in Storm Drain Infrastructure Asset Class**

| Asset Class | Asset Type |
|---|---|
| Conveyance | Brow Ditch<br>Culverts<br>Channel – Concrete<br>Channel – Earthen<br>Drains |
| Pump Stations | Pump Stations |
| Structural BMPs | Baffle Box<br>Bioretention<br>Detention Basin<br>Desilting Basin<br>Drainage Insert<br>Downspout Filter<br>Filterra<br>Filtration System<br>Flow-through Planter Box<br>Green Roof<br>Hydrodynamic Separation System<br>Infiltration Basin<br>Infiltration Trench<br>Modular Wetland System<br>Pervious Pavement<br>Swale<br>Vault<br>Vegetated Filter Strip<br>Interceptor Pump Station<br>Low Flow Diversion |
| Structures | Cleanout<br>Drop Manhole (Inlet)<br>Energy Dissipator<br>Headwall<br>Inlet<br>Outlet<br>Spillway<br>Tidegate |

### 2.4.2 Programmatic Assets (Water Quality)

***Public Education and Participation***

The Municipal Permit requires the City to develop and implement public education and participation programs to educate residents about stormwater pollution controls and solicit feedback. The City has developed the following strategies that the WAMP 2.O tracks related to Public Education and Participation:

- Outreach to commercial, industrial, municipal, and residential property owners regarding minimum BMP requirements. May include onsite education at the time of inspections, City staff training, and mailers to business owners and prospective business owners. Additional outreach occurs when the Minimum BMPs are updated with new Municipal Permit updates. This includes public workshops, presentations to industry groups and opportunities to comment.
- Provide technical education and outreach to the development community on the design and implementation requirements of the MS4 Permit and Water Quality Improvement Plan requirements; includes outreach on design standards, Storm Water Standards Manual, the WMAA (Watershed Management Area Analysis, Statewide Construction General Permit, and Drinking Water Systems Discharges Permit).
- Outreach to power washing companies, property managers, and trash haulers to emphasize power washing as a pollutant source. Emphasis will be placed on proper use of BMPs and enforcement for those that do not comply with requirements.
- Promote and encourage implementation of minimum BMPs for residential areas through incentives such as education and training, and generous rebates for grass replacement, downspout disconnection and rainwater harvesting.
- **Education and Outreach Activities**

  Division's education and outreach activities inform the program's public education and participation program by providing feedback. For example, Division staff will conduct a thorough education and outreach effort beginning months in advance of the expansion of sweeping routes. Staff will work with the affected Council offices, community stakeholders, non-governmental organizations, and community groups to build community awareness and acceptance of the enhanced sweeping program.

  In particular, the Department aims to implement the following strategies:

  – Department staff will conduct a thorough education and outreach effort beginning months in advance of the expansion of sweeping routes. Staff will work with the affected Council offices, community stakeholders, non-governmental organizations, and community groups to build community awareness and acceptance of the enhanced sweeping program.

  – Pet Waste Program shall include outreach on "Scoop the poop," installation of posts for dispensers, distribution of lawn signs, and attendance at dog-related community activities.

  – Department staff shall provide education and outreach on BMPs for commercial businesses and industrial facilities; to occur city-wide in non-residential areas.

  – Expand outreach to homeowners' association (HOA) common lands and HOA.

  – Incentivize maintenance districts to adopt water-conserving/efficiency and stormwater-reduction changes to their landscapes, irrigation, and maintenance; conducting workshops with property managers; providing supplemental standards, inspection, or

enforcement for HOA-managed properties - approaches to consider include offering incentives to HOAs.

- Develop a targeted education and outreach program for homeowners with orchards or other agricultural land uses on their property.
- Enhance school and recreation-based education and outreach –develop curriculum and establish distribution in public schools. Includes education on water conservation.
- Develop education and outreach to reduce irrigation runoff – example approaches to reduce or eliminate irrigation runoff may include fact sheets, social media posts, public service announcement videos, webpages, and enhanced enforcement of existing prohibitions through residential patrols.
- Creating and implementing a Communications Plan that includes updating the Think Blue outreach campaign with updated logos and messaging, materials, and webpages.
- Stencil or otherwise mark city storm drains indicating that they drain to our rivers, bays and oceans. Enforce stenciling of private drains through the inspection program.
- Provide education and outreach materials in multiple languages and providing outreach and educational activities in Spanish speaking neighborhoods.
- Participate in community events to educate the public about Stormwater and pollution prevention activities.
- Provide opportunities to get feedback from the public and stakeholders through community meetings, workshops, and events.
- Conduct surveys and focus groups to refine stormwater messaging to increase effectiveness.

- **Public Information and Research**

  From time to time, the City receives requests from the public for information (Public Records Requests). Public Records requests may be used to obtain "agency records," which include a wide variety of documents and other materials (including print, photographic, and electronic formats) that were created or obtained by a city agency and are, at the time the request is filed, in the Division's possession and control. The City staff respond to these requests by performing research and providing appropriate responses.

### *Development Planning*

The Municipal Permit requires the City to establish a development planning program to ensure all development projects incorporate minimum BMPs in accordance with Section E.3. The Permit prescribes minimum source control BMP requirements and site design LID requirements for all projects regardless of the size. Additionally, the Permit requires Priority Development Projects (PDP) to incorporate pollutant control BMPs and hydromodification management BMPs. WAMP 2.O tracks all activities related to Development Planning under the following distinct programmatic assets:

- **Development and Construction Standards**

  The Development Planning Program establishes development requirements and prescribes performance standards for structural BMPs in accordance with the Municipal Permit. This program is implemented by the City through the City's Stormwater Standards Manual, which is part of the City's Land Development Manual. It is enforceable via the San Diego Municipal Code, including Sections 43.0307, 129.0104, and 142.0210 and administered to reduce the negative impacts of urban development.

- **Plan Check**

  Development Projects Review and Approval is performed through procedures for reviewing and approving all development projects (public and private) to ensure that they meet the BMP requirements described in the Stormwater Water Standards Manual and comply with the Municipal Permit.

### *Existing Development Management*

The Municipal MS4 Permit requires that each Copermittee implement an existing development management program in accordance with the strategies in the Water Quality Improvement Plan described pursuant to Provision B.3.b.(1). WAMP 2.O tracks all activities related to Existing Development Management under the following distinct programmatic assets:

- **Catch Basin Inspection and Cleaning**

  Catch Basins located in the public rights of way and on City owned parcels managed by the Stormwater Division and Park and Recreation Department are inspected and cleaned of debris or other foreign material.

- **Industrial and Commercial Facility Inspections**

  Stormwater inspections of businesses throughout the City are performed to visually inspect for stormwater violations, and follow-up investigations are conducted of businesses when issues are identified. Escalating enforcement actions are taken with those that are non-compliant.

- **Rebate Program**

  Rebates are available for businesses and residences to encourage implementation of water quality measures and water conservation.

- **Street Sweeping**

  Sweeping of paved public parking lots, roads, and driveways is performed to remove sediment and trash, and to improve water quality.

- **Structural BMP Inspections**

  Structural BMPs on each PDP are inspected to ensure they were properly constructed and adequately maintained, to remove pollutants in stormwater to the maximum extent practicable. Escalating enforcement actions are taken with those that are non-compliant.

- **Structural BMP Maintenance**

  City-owned Structural BMPs are maintained to remove pollutants in stormwater to the maximum extent practicable.

- **Trash Implementation Program**

  Trash Implementation Program is implemented to comply with the Statewide Trash Policy.

- **Non-TMDL Modeled Non-Structural BMPs**

  Non-structural measures are implemented in non-TMDL watersheds to comply with receiving water quality limitations.

- **Low Flow Diversion Operation and Maintenance**

  Low flow diversions are maintained to divert dry weather flow to the sanitary sewer.

### *Construction Management*

- **Construction Site Inspections**

  Construction and grading activities have the potential to adversely impact receiving waters due to the presence of pollutants on construction sites. The Municipal Permit requires the City to establish and implement a Construction Management Program to control and reduce the discharge of pollutants from construction sites and entering the City's conveyance system. Under the Construction Management Program, staff from the Code Enforcement Team, Development Services Department (DSD) and the Engineering and Capital Projects Department (ECP) perform construction site inspections during wet weather to ensure that construction site BMPs are implemented as designed, and take escalating enforcement actions on sites that have discharge to the MS4.

### *Enforcement Response*

The Municipal MS4 Permit requires each Copermittee to develop and implement an Enforcement Response Plan (ERP) as part of its jurisdictional runoff management program document. The Enforcement Response Plan describes the applicable approaches and options to enforce its legal authority established pursuant to Provision E.1, as necessary, to achieve compliance with the requirements of the Municipal MS4 Permit. WAMP 2.O tracks all activities related to Enforcement Response under the following distinct programmatic assets:

- **Code Enforcement**

  The Municipal Permit requires each Copermittee to enforce its legal authority for all development projects, existing development, and inventoried construction sites, as necessary, to achieve compliance with the requirements of the Permit.

- **Parking Enforcement**

  The City enforces parking by issuing citations to vehicles parked on the street sweeping routes.

### *Monitoring and Assessment*

The Municipal MS4 Permit requires each Copermittee to monitor and assess the impact on the conditions of receiving waters caused by discharges from the Copermittees' MS4s under wet weather and dry weather conditions. The goal of the monitoring and assessment program is to inform the Copermittees about the nexus between the health of receiving waters and the water quality condition of the discharges from their MS4s. This goal will be accomplished through monitoring and assessing the conditions of the receiving waters, discharges from the MS4s, pollutant sources and/or stressors, and effectiveness of the water quality improvement strategies implemented as part of the Water Quality Improvement Plans. WAMP 2.O tracks all activities related to Monitoring and Assessment under the following distinct programmatic assets:

- **Compliance Monitoring Program**

  The Division implements a monitoring and assessment program in compliance with Permit Provision II.D. Activities related to monitoring and assessment are tracked under the compliance monitoring program asset.

- **Special Studies**

  The Division conducts at least two special studies each permit term as required by the permit. Additional studies are performed as needed, and investment made for special studies is tracked under the special studies' programmatic asset.

### *Permit Management and Compliance*

The Division represents the City on stormwater and National Pollutant Discharge Elimination System stormwater permit issues before the Co-permittee, the County Department of Environmental Health, and the Regional Water Quality Control Board. In addition, the Division provides technical expertise and guidance to all City departments to ensure implementation and compliance with the Permit. Furthermore, the City of San Diego submits WQIP and JRMP annual reports to the San Diego Water Board and certifies that the City is in compliance with all Permit requirements. Compliance with the Permit requirements is tracked and monitored by the Division and the San Diego Water Board through the annual reporting process, self-assessments, certifications, Stormwater Program audits and inspections, and San Diego Water Board audits and inspections. WAMP 2.O tracks all activities related to Permit Management and Compliance under the following distinct programmatic assets:

- **Permit Management and Compliance Reporting**

  The City implements actions to comply with NPDES Permit and Waste Discharge Requirements for Discharges from the MS4 by effectively prohibiting non-storm water discharges into the MS4s, and implementing controls to reduce the discharge of pollutants in stormwater from the MS4s to the MEP.

- **CIP Planning and Management**

  Capital improvement projects that are associated with improving water quality and providing flood risk management are planned and managed.

- **Enterprise Resource Planning (ERP) functions and EAM Data Management**

  Integration of WAMP 2.0 database and functionality to EAM are implemented to facilitate an implementation of the asset management program.

- **GIS Support**

  GIS data is routinely updated as new asset information is developed.

- **Masterplans (WMP, IDEA Document, Structural BMP Plan)**

  Plans are developed to assess the City's infrastructure and needs to address flooding and improve water quality.

- **Policy Development and Permit Negotiations**

  The MS4 Permit requirements are reviewed and negotiated when necessary to be consistent with the Clean Water Act and the Porter-Cologne Act. City and Division Policy is developed to comply with new regulatory requirements.

- **Regulatory Review**

  Regulations, permits, policies, and CEQA documents are reviewed to provide comments to protect the citizens of San Diego's interests.

- **Watershed Asset Management**

  The Watershed Asset Management Plan is routinely updated to reflect the latest asset information, and is used to establish funding needs, and to prioritize work.

### *Best Available Science*

Cities and Counties are directed by the legislation to use Best Available Science where enough information does not exist to make a scientific judgment regarding the risk to a critical resource. In the context of this WAMP, the City's critical resource is the receiving waters and policies and practices that are implemented to protect waterways in the area. The following programmatic assets, while not required by the Permit, are promoted by the Division to enhance water quality and provide community benefits.

- **Alternative Compliance Program (ACP)**

  An alternative compliance pathway option has been incorporated in the Municipal Permit. The November 2015 adopted order describes the principal criteria and requirements that must be met for a Priority Development Project to utilize alternative compliance pathway for stormwater treatment measures design and installation. The Division has developed a specific Offsite Alternative Compliance Option to implement the ACP.

- **Integrated Planning Framework**

  An integrated planning approach offers a voluntary opportunity for a municipality to propose to meet multiple CWA requirements by identifying efficiencies from separate wastewater `and stormwater programs and sequencing investments so that the highest priority projects come first. This approach can also lead to more sustainable and

comprehensive solutions, such as green infrastructure, that improve water quality and provide multiple benefits that enhance community vitality.

- **Stormwater Harvesting**

  Stormwater harvesting is a BMP that reduces runoff from entering the storm drain and instead, stormwater is harvested and stored for non-potable uses (irrigation, flushing). This provides water quality benefits, uses the stormwater as a resource and provides community benefits. The Division's programs to implement stormwater harvesting are tracked in this asset category.

### 2.4.3 Programmatic Assets (Flood Risk Management)

The City is responsible for protection of communities from flood risk. The Division fulfills its flood risk management responsibilities through implementation of the following programs that are categorized as programmatic assets. Each of these programmatic assets has a measurable level of service that Department seeks to provide through implementation of flood risk management programs.

#### *Channel Inspection and Prioritization*

The channel inspection and prioritization program provides guidance on how channels shall be inspected, frequency of inspections and maintenance, and prioritization criteria for channel maintenance based on results of the inspections.

#### *Channel Maintenance Program*

Municipal Waterways Maintenance Plan (MWMP) is a document that provides guidance and parameters for maintenance and repair of the stormwater conveyance system in areas where potential local, state, and federally regulated impacts may be necessary to provide flood control. Activities related to management and implementation of the MWMP are referred to as MWMP Management. Additionally, the City maintains the Los Penasquitos Lagoon following guidance in the Los Penasquitos Lagoon Enhancement Plan and the Los Penasquitos Watershed Master Plan. The MWMP Program and Lagoon maintenance activities are tracked as the Channel Maintenance Program programmatic asset.

#### *Floodplain Management*

The City of San Diego is a participant in the National Flood Insurance Program (NFIP) administered by the Federal Emergency Management Agency (FEMA). This program provides subsidized flood insurance for all property owners, provided that the local government institutes adequate land use and development control measures for preventing and reducing property damage from flooding. In addition, the City must ensure that projects within or fringing on a floodway or floodplain comply with FEMA regulations and requirements. This programmatic asset deals with activities that Division performs towards NFIP. The floodplain management program also includes management and maintenance of the City's levees.

#### *Levee Management*

Since the development of WAMP 1.0, Department has assumed maintenance responsibility for additional assets such as levees and storm drainage infrastructure in the parks. The management of

levees is essential to successful management of flood risk and is performed under the levee management program.

### *Pump Station Operation and Maintenance*

The City owns several pump stations, the operation and maintenance of which is a programmatic asset under the flood risk management asset class.

### *Tide Gate Operation and Maintenance*

Tide gates are located at the storm drain outfalls to San Diego Bay and San Diego River. The tide gates perform an important function of protecting the City and its infrastructure from rising tides. Operation and maintenance of tide gates is categorized as a programmatic asset under the flood risk management asset class.

### *Storm Patrol*

Prior to and during storms, our team is dispatched to inspect and prepare our infrastructure to ensure key components like pumps are fully functioning and protecting our streets and homes from flooding.

### *Storm Drain Repairs and Replacement*

Storm drain infrastructure, in good repair, helps mitigate flood risk through adequate conveyance of storm flows. When storm drain infrastructure reaches the end of its useful life or when it is no longer able to convey storm flows due to an increase in flows or reduction in capacity, replacement is necessary. Replacement of the underserving storm drains ensures that adequate conveyance of storm flows will be maintained and serves an important function towards flood risk management. Both repair and replacement activities are tracked as programmatic assets in the flood risk management asset class.

### *Basin Maintenance*

Basins owned and managed by the Division fulfill important water quality enhancement and flood control functions. The Division performs routine maintenance of detention basins by vegetation control, trash reduction, and erosion and sediment control in addition to upkeep of basins' mechanical parts. The operation and maintenance activities are tracked as one of the Division's programmatic assets.

### *Habitat Restoration and Mitigation*

The Division undertakes several habitat restoration and mitigation efforts that help meet the City's flood risk management and water quality goals. These programs involve projects that restore natural habitat to allow for stormwater percolation, wetland creation/maintenance, parks enhancement, stream restoration, and provides for compensatory mitigation to enable other projects to advance.

## 2.4.4 Programmatic Assets (Program Administration)

The following activities are categorized as programmatic assets under the program administration asset class.

### *Accounts Payable*

The accounts payable department is responsible for accounts management, payments consultants, vendors, and the Division employees. Activities performed to manage and pay accounts are categorized as a programmatic asset.

### *Budget Development and Management*

Activities and actions that the Division performs to develop and manage its budget are tracked as a programmatic asset in the WAMP database.

### *Clerical/Admin Support*

Clerical and administration support activities that the Division performs are tracked as a programmatic asset in the WAMP database.

### *Contracts*

The Division's functions are supported by consultants and vendors that perform contracted services for the Division. Activities related to initiation, management and closure of those contracts are tracked as a programmatic asset.

### *Grants*

The Division sometimes seeks grants to perform studies or fund projects. Activities related to procuring grants are covered under the program administration asset class.

### *Payroll*

Staff payroll and fringe benefit obligations are tracked as a programmatic asset under the program administration asset class.

## 2.4.5 Programmatic Assets (Litigation, Settlement, and Cleanup Actions)

This section provides a brief description of activities (i.e., programmatic assets) required to be performed under the litigation, settlement, and cleanup action asset class.

### *Cleanup and Abatement*

Cleanup and abatement orders may be issued by the San Diego Water Board. Activities performed by the Department to comply with these orders are tracked as a programmatic asset in the WAMP database.

### *Investigative Orders*

RWQCB may issue Investigative Orders (IO) for the City to investigate certain water quality issues in receiving waters within the City's jurisdiction. Investigative Orders often lead to Clean up and Abatement Orders. The actions that Department will need to take to comply with the investigative order are tracked as programmatic assets in the WAMP.

### *Litigation*

Department may occasionally be involved in lawsuits that are handled by the City's Attorney's office. Activities that the Division needs to perform to support the Litigation Department are tracked as programmatic assets.

## 2.5 Alignment of Assets with City Goals

The City's mission and goals were presented in Section 1. The development of WAMP 2.0 asset hierarchy, in alignment with the City's goals, was also introduced. The discussion of the asset hierarchy and assets classes presented in Section 2 advanced the idea that each Division asset functions to meet one or more of the City's six goals. Figure 2-3 shows the relationships of physical assets and programmatic assets in conjunction with City goals.

As is seen in Figure 2-3, the majority of physical assets aligns with Division's goals of protecting safe, clean water and flood protection. These assets include pump stations, detention basins, drop inlets, energy dissipators, and headwalls. Many assets also collectively serve goals of providing community benefits and protecting safe clean water. These assets are primarily green infrastructure, that provide water quality treatment while also providing community benefits such as park features, landscape features, surface ponds etc. Infiltration type BMPs (infiltration basin, infiltration trench) provide water quality treatment while also recharging the groundwater basins, and thus serve to enhance water quality and develop stormwater as a resource.

Storm drainage infrastructure such as interceptor pump stations, low flow diversions, baffle boxes, drainage inserts, downspout filters, hydrodynamic separators and vaults are primarily used to protect safe clean water by reducing pollutant loads from entering the storm drainage network and ultimately discharging to San Diego Bay and the Pacific Ocean. Drainage inlets, outfalls, head walls, and conveyance type structures such as ditches, culverts, concrete, or earthen channels capture, convey and store stormwater runoff and protect communities from flooding. Modular wetland structures serve the sole purpose of providing community benefits in the form of wetland habitat for parks, recreation, and habitat enhancement purposes.

Finally, the goals of encouraging public partnership and restoring the environment, require plans and procedures, rather than physical assets, as discussed in the next section.

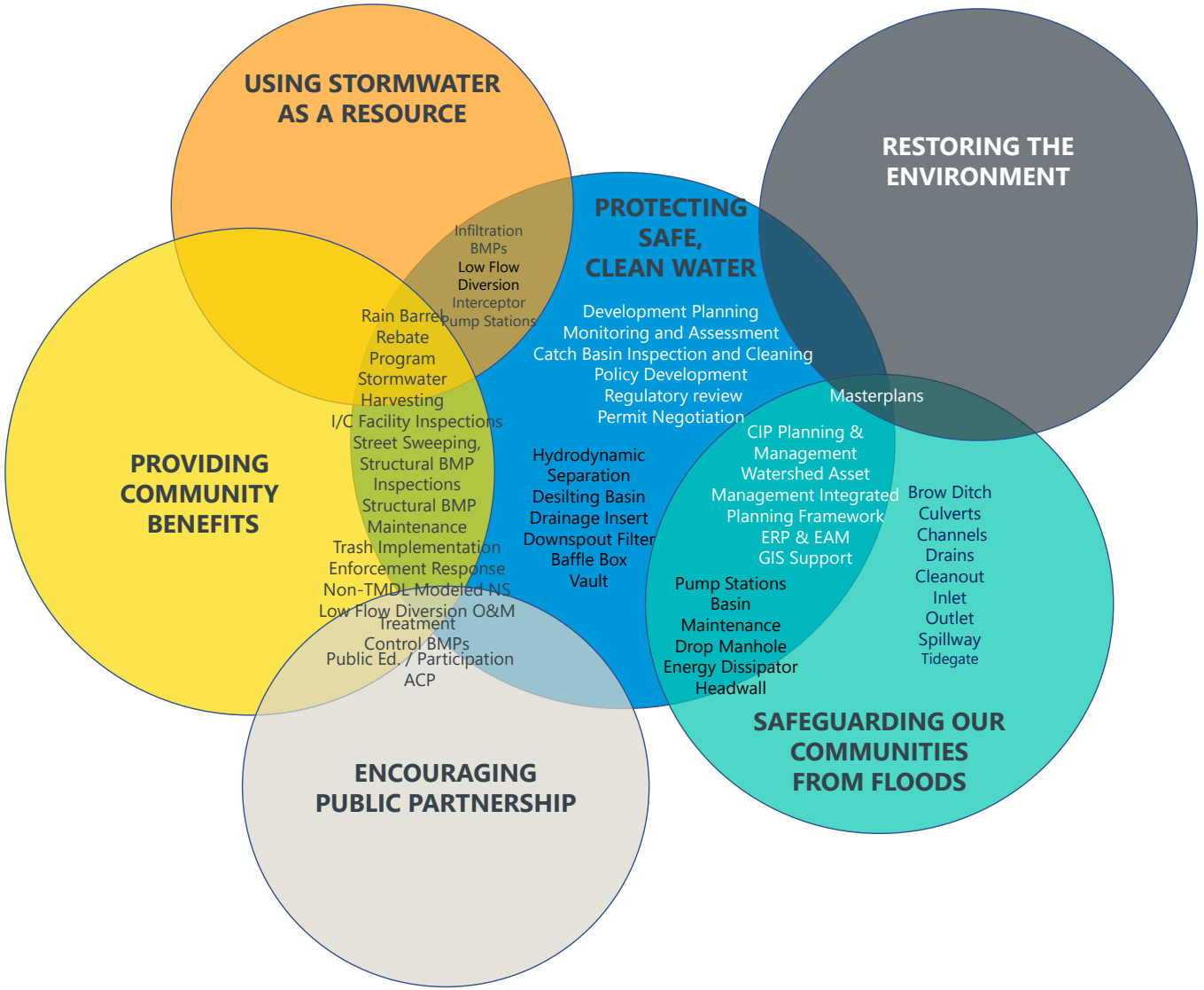


**Figure 2-3. Alignment of Physical and Programmatic Assets with Division Goals**

Figure 2-3 also shows that multiple Division goals are met by certain programmatic assets. As an example, Division's rebate program and stormwater harvesting program help develop stormwater as a resource, while also providing community benefits (enhanced water supply, reduction in use of potable water), and protect safe, clean water. Similarly, implementation of the Division's technical studies, Structural BMPS Plans and Projects help Division with flood control, protecting safe, clean water, and restoring the environment. Education and outreach events, public information and alternative compliance programs provide community benefits, encourage partnerships with the public, and protect safe, clean water by engaging the public to help in reducing pollution.

Capital Improvement Planning and Management, Watershed Asset Management, Integrated Planning Framework, and ERP/ EAM management are all programmatic assets that the Division maintains towards flood control and water quality goals. A wide variety of monitoring, maintenance inspection and enforcement actions help Division protect safe, clean water, while also providing community benefits. Programs that support permit negotiation, regulatory review and policy development, post construction stormwater control (both during design and post development), compliance monitoring program and special studies enable Division to advance its goal of providing safe, clean water.

## 2.6 Alignment of Assets with JRMP and WQIP

The City's JRMP and WQIPs for all six watershed management areas provide guidelines to implement the Municipal Permit and perform water quality enhancement programs for the Division. The relationship between Municipal Permit, WQIPs and JRMP was described in Section 1 and will be further elaborated in Section 3 when levels of services of programmatic assets are described. A brief description of the JRMP and WQIP is provided below.

### 2.6.1 Jurisdictional Runoff Management Plan (JRMP)

The Municipal Permit requires that the San Diego Region Copermittees develop JRMP documents to plan, develop, and implement actions to comply with the Permit. The purpose of JRMP documents is to guide implementation of programs and strategies to reduce pollutants discharged from each Copermittee's storm drain system to receiving waters. The JRMP provides guidance on implementation of the Municipal Permit and specifies actions that the City needs to take to meet its regulatory requirement. JRMP strategies and activities are tracked as various programmatic assets in WAMP 2.0.

### 2.6.2 Water Quality Improvement Plan

The Municipal Permit requires San Diego Region Copermittees in each of the region's watersheds, to develop WQIPs. that guide the Copermittees' jurisdictional runoff management programs towards achieving the outcome of improved water quality in MS4 discharges and receiving waters. In response to the Permit requirement, WQIPs were developed by Copermittees for the San Diego Region Copermittees for WMAs within their jurisdiction. The goal of the WQIPs is to further the Clean Water Act's objective to protect, preserve, enhance, and restore the water quality and designated beneficial uses of waters of the state. This goal will be accomplished through an adaptive planning and management process that identifies the highest priority water quality conditions within a watershed and implements strategies through the jurisdictional runoff management

programs to achieve improvements in the quality of discharges from the MS4s and receiving waters. WQIP strategies and activities are tracked as various programmatic assets in WAMP 2.0.

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# 3 What Assets Are Critical?

The criticality of any asset is a measure of business risk that the asset will expose the City to in the event of failure. The more critical the asset, the higher the risk to which the City is exposed. This risk may come in the form of flooding, reduced access to clean water, and impairment of water bodies in the case of physical assets such as pipes, pump stations, etc. The risk in the case of programmatic assets is different, but significant regardless. This risk may manifest in the form of permit violations, fines, or cleanup and abatement orders that become a cumbersome and expensive liability. It is important to understand which assets are critical to sustain the desired performance; this involves an examination of how the asset does/can fail, what is the likelihood of failure, what is the cost to repair and what is the consequence of failure.

The risk is calculated by Business Risk Exposure (BRE) analysis. BRE analysis is the determination of business risk by using the combination of probability of failure (PoF) and consequence of failure (CoF), as shown in Figure 3-1 below.

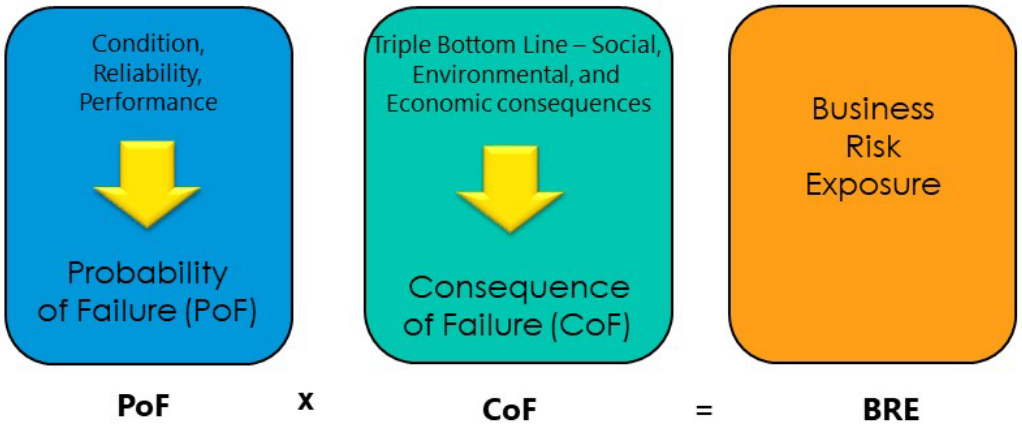


**Figure 3-1. Business Risk Exposure Analysis**

The probability of failure is informed by data such as asset condition, asset residual life, and capacity. The consequence of failure depends on the social, environmental, and economic impacts of an asset failing.

Once the conditions of the assets have been determined, and an assessment of the actions needed for the assets to achieve their LOS has been completed, it is necessary to evaluate the criticality of the assets and the priority of the actions necessary to achieve their LOS. It is generally infeasible to complete necessary actions simultaneously and bring assets up to their LOS in a short time frame. Therefore, a risk-based approach to prioritizing and scheduling actions is taken. The risk-based approach is based on identifying the service that the asset needs to provide, defining the failure modes of the asset, evaluating asset condition or performance, and determining the PoF based on asset condition or performance. As much as practicable, PoF criteria have been developed such that they can be represented in GIS shapefiles to minimize subjectivity in assessing the score.

## 3.1 Failure Mode

For an asset to fail, it must either reach the end of its useful life (mortality failure mode), not meet the necessary ability to convey adequate flows (capacity failure mode), not meet compliance or programmatic targets (LOS failure mode), or be less expensive on a life cycle cost basis to manage using a different management strategy (financial failure mode). The mortality and capacity failure modes generally apply only to physical assets because programmatic assets generally do not have a defined useful life or required capacity to convey flows. Physical assets can also fail under the LOS and financial failure modes. However, for the purpose of WAMP, only the capacity and mortality failure modes are explored. The LOS and financial failure modes are the only failure modes that would apply to programmatic assets. The failure mode that results in the highest risk is used as the PoF mode that drives asset management decisions and expenditures.

The four modes of asset failures are presented in Table 3-1. Sections 3.2 through 3.4 describe processes that inform asset failure methods and the probability of an asset failing.

**Table 3-1. Modes of Failure**

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

## 3.2 Condition

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

condition assessment information and the program will continue to mature over time, including collecting the data in SAP. Asset condition assessment data was updated in the WAMP database in GIS.

A condition assessment is a time- and resource-intensive process that involves extensive field work. As such, it can be costly. However, in some cases, it may not be necessary. In order to cost effectively and efficiently assess the current conditions and identify areas where assets may be damaged or failing, a risk-based condition assessment approach can be used. Condition assessment data was utilized in WAMP for the asset classes for which it was available. The Division's condition assessment methodology utilized to develop this WAMP was based on a multi-step approach (Level 1, Level 2, and Level 3). Level 1 assessment is of the order of desktop assessment that is performed for 100% of the assets. Based on the results of the desktop assessment, a smaller percentage of assets is selected for further evaluation (Level 2). Detailed analysis (Level 3) is performed on only a select group of assets that are most critical. This multi-stepped approach is illustrated in Figure 3-2 below.

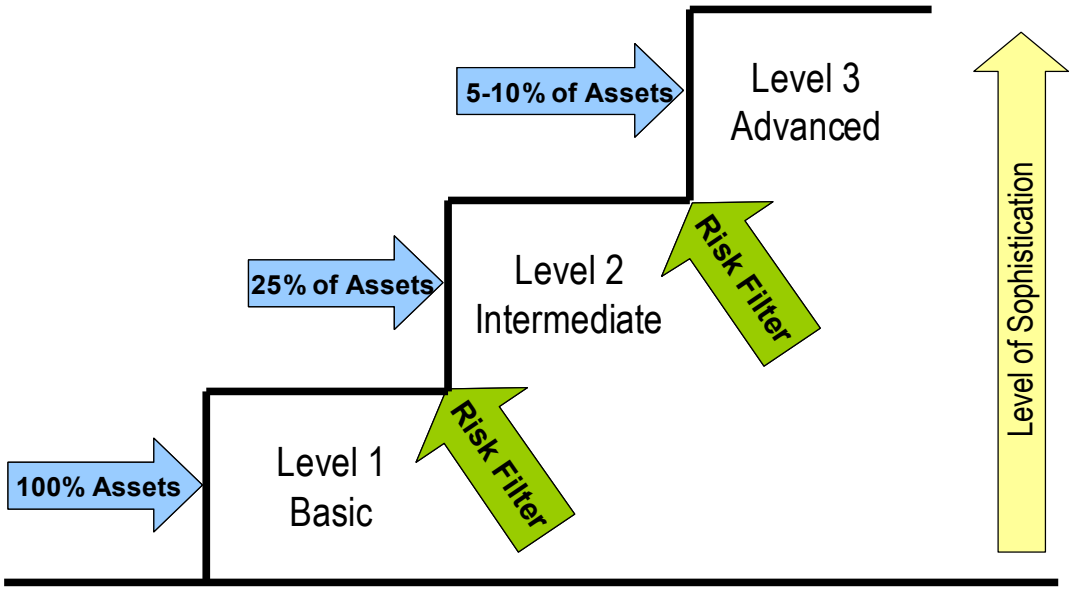


**Figure 3-2. Risk-Based Condition Assessment Methodology**

Condition assessment has gained considerable attention in recent years amongst municipalities as a component of an asset management program. It can be used to prioritize infrastructure projects based on relative risk, thereby easing the financial burden on their customers. A variety of processes have been developed for performing condition assessments, ranging from simple to complex. They generally follow a similar progression of steps: setting objectives for the condition assessment, identification of assets and available data, asset inspection, data analysis, and decision making.

### 3.2.1 Program Development

The development of a condition assessment program must first consider the program drivers and objectives. The drivers may include regulatory compliance, operation and maintenance efficiency, risk management, and/or financial budgeting forecast. Often, the primary driver for municipalities is investigating high risk pipes that have potential for a catastrophic failure, which could lead to extensive service disruptions and environmental damage. A risk-based condition assessment

program focuses on specific pipes that present these types of risk. Objectives for performing the condition assessment should be explicitly stated, so that the program's effectiveness can be evaluated. The objectives will also establish how the results of the condition assessment will be used in the decision-making process, the final step of condition assessment. Key performance indicators (KPI), metrics used to determine the Division's progress to defined goals, should be defined at this step. Objectives for performing a condition assessment could be to understand the structural condition, performance, and/or progression of deterioration (i.e., remaining service life) of the asset. The costs of conducting condition assessment must be documented and compared to the anticipated benefits in order to justify the program. The costs are typically easier to quantify but should include both the direct costs of inspection and the indirect costs to the Division. The benefits are more difficult to quantify and derive mainly from the reduction in the risk of failure (likelihood times consequences of failure) and from the knowledge that allows maintenance, rehabilitation and replacement to be carried out on the most cost-effective schedule. More specifically, the costs of condition assessment include:

- Equipment and labor costs to conduct field inspections including excavation, traffic control, road surface restoration, monitoring equipment and data collection.
- Labor costs before and after field work for planning, data analysis and reporting.
- Cost of service disruptions due to inspection work.
- Specific benefits of a condition assessment program may include:
- Avoided emergency repair costs.
- Avoided costs of extended service disruptions due to a catastrophic failure.
- Avoided restoration costs due to environmental and property damage from a catastrophic failure.
- Avoided public health costs (i.e. injury, death, disease transmission) from catastrophic failure.
- Improved planning and prioritization of rehabilitation and replacement projects due to condition assessment information and improved estimates of service life.
- Avoided costs of premature pipe replacement or rehabilitation.

When performing condition assessment, it is essential to compile an inventory of assets and existing system data (i.e., pipe material, size, age, maintenance history, inspection records). The Division should understand the content and form of existing data and should identify data gaps at this step. System maps and geographic information system (GIS) databases should be used. Inspection and testing records may include flow data, smoke testing, flow isolation studies, and/or dye tracer studies. Failure data from within the system or from research on similar conditions (e.g., soil bedding type, material, age) within the City can be used to define risk of failure. Data gaps identified in this step are used to plan the inspection program. A key difficulty in developing a rational inspection, condition assessment, and asset management program is that some of the most critical elements of the storm drain infrastructure are the most difficult and expensive to inspect. For example, large diameter storm drains may have continuous flow that make bypassing the storm

drain difficult. They may contain large debris that hinder inspections unless the pipes are cleaned first, and they may not have been inspected for decades.

### 3.2.2 Asset Inspection

The primary purpose of an inspection is to define the current condition of an asset, in order to detect and evaluate the progression of deterioration and to make informed decisions on asset management. A well-developed inspection plan will maximize the value of the program, while minimizing the cost of inspection. A detailed work plan and quality assurance project plan should also be established at this step to outline how the proposed inspection program would meet the program objectives. The inspection plan should focus on what assets to inspect, when they should be inspected, and what technologies will be used for inspection. Ideally, an inspection would occur at a point prior to failure where an intervention could effectively renew the asset. For a buried pipeline, there is limited ability to obtain a warning indicator as to the appropriate time and location to perform an inspection. It is this unknown state that is the inherent risk in managing buried assets.

#### *Selection of Assets for Inspection*

It may be considered cost prohibitive to inspect every linear foot of a storm drain system especially when confronting the need to inspect a large system with little prior inspection history. It is for this reason that condition assessment programs generally use a planned approach to focus on high consequence/high risk pipes or to utilize statistical sampling to select assets for inspection. Decisions on which assets to inspect should be related to the objectives and KPIs defined in the program development phase of the condition assessment process. For example, if the objective or KPI is to reduce risk of failure of high consequence pipes, then the Division should focus on pipes with higher impact and probability of failure, and not inspect service laterals, as they are not high risk or high consequence.

#### *Prioritization of Assets*

Two models for prioritizing assets for inspection are described below:

- The National Research Council's approach utilizes an "impact assessment" to prioritize assets for inspection. Impact assessment is a weighted average of six separate impact factors: location, soil support, size, depth, storm drain capacity, and seismic factors. Impact assessment can then be directly calculated in a uniform approach based on a weighted average.
- SCRAPS (Sewer Cataloging, Retrieval, and Prioritization System) is based on the general approach of defining risk factors based on consequence of failure and likelihood of failure. The same terminology can also be applied to the decision-making process used in applying condition assessment to asset management. The impact of a failure must be understood and quantified. If the impact can be quantified in dollars, then it can be compared to both the cost of condition assessment and the cost of replacement and/or rehabilitation.

#### *Asset Inspection*

The type of inspection performed depends on the objective of the condition assessment program. The selected inspection technique needs to be consistent with the type of asset to be inspected and provide the information and data required to support decision making. Flow monitoring is usually utilized to evaluate hydraulic capacity and determine hydraulic restrictions. CCTV is the most

commonly used method of inspecting sewers for structural defects; however, there are a variety of technologies available for this type of inspection. A detailed work plan and quality assurance project plan should be established; these documents ideally would outline how the proposed inspection program would meet the program objectives.

### 3.2.3 Data Management

A successful condition assessment program as part of an asset management program requires that the data collected are organized, analyzed, and maintained in a database system. This important step allows the Division to develop an understanding of trends. There are three general approaches to database management that have varying degrees of cost and complexity but all of which use commercially available software:

- Software specifically designed for condition assessment and asset management.
- Database software that is not specifically designed for condition assessment.
- Spreadsheet software.

There are numerous commercially available data management programs for condition assessment that range in level of complexity and cost. The primary component is a database to store defect coding on pipe segments both spatially and over time. The commercially available systems can also incorporate additional elements such as cost accounting, develop work orders for maintenance calls, and order parts to maintain required spare parts. Another useful feature is the incorporation of GIS functionality into the system. The GIS component highlights the geo-spatial distribution of the data, and can provide a very effective tool for the utility to plan subsequent inspections and/or rehabilitation activities. The benefit of the commercially available programs is that they are designed specifically for the intended purpose. However, the cost of system maintenance can be significant, as can licensing costs, depending upon system complexity.

Another type of commercially available software is designed to summarize the results of a CCTV inspection and the resulting defect code data. This has become standard practice in the industry. The National Association of Sewer Service Companies (NASSCO) licenses software programs to be consistent using the PACP and Manhole Assessment Certification Program (MACP) rating systems. The certification programs allow commercial providers to submit their pipe assessment software for evaluation and certification to ensure that their software adheres to NASSCO standards. It is important to verify the software has been approved to decrease the set-up time required to enter ranking and coding information. Pipeline inspection software is used simultaneously with pipeline inspection hardware to accurately document the status of sewer pipe, storm drains, or water pipelines. The software gives access to text data, video, and still photos all of which help the user identify the condition of the pipe and precisely complete a pipeline inspection. Defects can be quickly categorized by location, type, and severity. The software compiles this data into a searchable database which can be distributed into printed reports.

### 3.2.4 Data Analysis

The data resulting from inspection may quantify the level of service and/or structural defects. It does not, however, provide any ability to reduce risk or define the significance of the finding. The follow-up step is to process and analyze the inspection data. There are two general analysis methods used,

based on the type of inspection performed. If flow monitoring was employed as the inspection technology, an analysis of hydraulic capacity is performed, using hydraulic modeling techniques. If an inspection of structural defects utilizing CCTV or one of the other non-destructive technologies was performed, analysis is generally performed by coding defects in accordance with one of the various methods available, such as NASCCO's PACP and MACP programs.

#### *Hydraulic Capacity/Hydraulic Restrictions*

Hydraulic capacity is the primary performance measure for a storm drain system. The real value of flow monitoring data of storm drains is developing a database on long-term historic trends in order to determine seasonal variations and impacts of wet weather. Flow data provide the direct correlation needed to determine if performance measures are being attained. Flow data are also useful as a screening tool to determine problems areas of a system that require further study by other means.

The traditional method of viewing flow data is hydrographs, which reveal information on condition upstream of flow meters. Alternatively, flow data can be viewed as scattergraphs, which provide information on hydraulic conditions downstream, or in the vicinity of, a flow meter.

#### *Structural Condition*

For storm drain systems, analysis of inspection data generally involves coding the defects based on both the type and severity of defects. Structural pipe defects and hydraulic restrictions encountered during the inspection need to be ranked by severity level based on the potential to negatively impact the system's hydraulic capacity. In 2001, NASSCO developed a set of coding standards that have successfully become the industry standard for coding pipe defects. NASSCO has also developed the MACP, which is similar to PACP but applies to manholes instead of pipelines. The PACP coding system categorizes defects and features into five sections: continuous defect coding, structural defect coding, operational and maintenance coding, construction features coding, and miscellaneous features coding.

### 3.2.5 Decision Making

Decision making for condition assessment of a storm drain system entails understanding the possible risks and determining at what point a utility should intervene to avoid a failed condition with an unacceptable cost and/or consequence. It is important to note that condition assessment alone does not provide any benefit in risk reduction. The follow-up decision making process that leads to prioritization ranking and rehabilitation ranking followed by action to fix problems and upgrade the system is what leads to risk reduction. The purpose of this section is to highlight and summarize the decision-making process, the final step in the condition assessment process. In addition to inspection data, the Division will need supplemental data on long-term asset performance to aid in the decision-making process. Following are questions that need to be addressed to provide the required information for decision making:

- What are the consequences of asset failure? What are the costs to replace/rehabilitate the assets?
- What alternatives exist, given the results of the condition and performance assessment (e.g., replacement, deferment, rehabilitation, non-structural maintenance)? Important definitions to consider are failed condition and service life.

- Technical service life – period of time until an unacceptable condition is reached.
- Functional service life – period of time until the system element no longer provides functional service.
- Economic service life – period of time until it becomes economically more effective to replace or rehab than to continue to operate in its current condition.

The objective for the decision-making model is to understand risk and to determine when to intervene to avoid unacceptable consequences (e.g., economic, socio-economic, environmental). However, it is not possible to have a robust decision-making model without obtaining sufficient condition data to track pipe deterioration and to understand the pipe or system failure modes. In general terms, decisions on pipe rehabilitation/replacement can be made based on one or more of the following: engineering calculations, probability of failure, and remaining life estimation.

- **Engineering Calculations**: Inspection data are interpreted deterministically. An example would be to calculate structural condition of a pipe segment directly based on measured minimum wall thickness, actual loading conditions, and existing soil bedding. A second example of this methodology is the calculation of hydraulic capacity. Flow data can provide direct measurement of actual flow conditions; and then be interpolated using a hydraulic model to calculate hydraulic capacity of a pipe segment under current or projected conditions. Both examples illustrate a direct calculation of the condition or performance of the pipe segment. If it does not meet the required design conditions or performance conditions, then replacement or rehabilitation is required.
- **Probability of Failure**: This type of output would ideally provide a direct forecast of pipe deterioration over time. If a there is data to support this type of forecast, then an intervention could be implemented before an unacceptable level of service occurred. In practice, it is difficult and potentially costly to directly determine the probability of failure. Repeated data collection and analysis over time are required to obtain the decay curves based on the different paths to failure and the system or environmental conditions that exacerbate each failure mode.
- **Remaining Life Estimation:** Remaining life estimation is commonly used to characterize condition of buried assets. Remaining life is defined as the duration of time until an unacceptable condition exists, or an asset no longer meets its primary function. Standard coding systems are used to define condition and performance. An impact assessment is defined as a weighted average of six separate impact factors: location, soil support, size, depth, sewer function, and seismic factors.

## 3.3 Residual Life

Programmatic assets generally exist indefinitely or until the governing regulations that form the basis of the programs change or are modified. As an example, most of the Division's programmatic assets are developed to meet the requirements of the Municipal Permit. The City's JRMP outlines the strategies and processes the City will implement to reduce the discharge of pollutants from its storm drain system to the MEP in accordance with the Municipal Permit. WQIPs developed for the WMAs within City's jurisdiction outline additional actions that must be performed to improve water quality

in their respective watersheds. Programmatic assets that align with JRMP and WQIP will exist until the time that the Municipal Permit, JRMP and WQIP are revised or modified such that some of the programmatic assets become outdated. The expected service life of physical assets depends on the material of which the asset was constructed.

Figure 3-3 shows how the condition of assets change over time. It is observed that programmatic assets continue to operate, although at a lower than desired level of service. Physical assets, however, reach their useful life after a certain period of time.

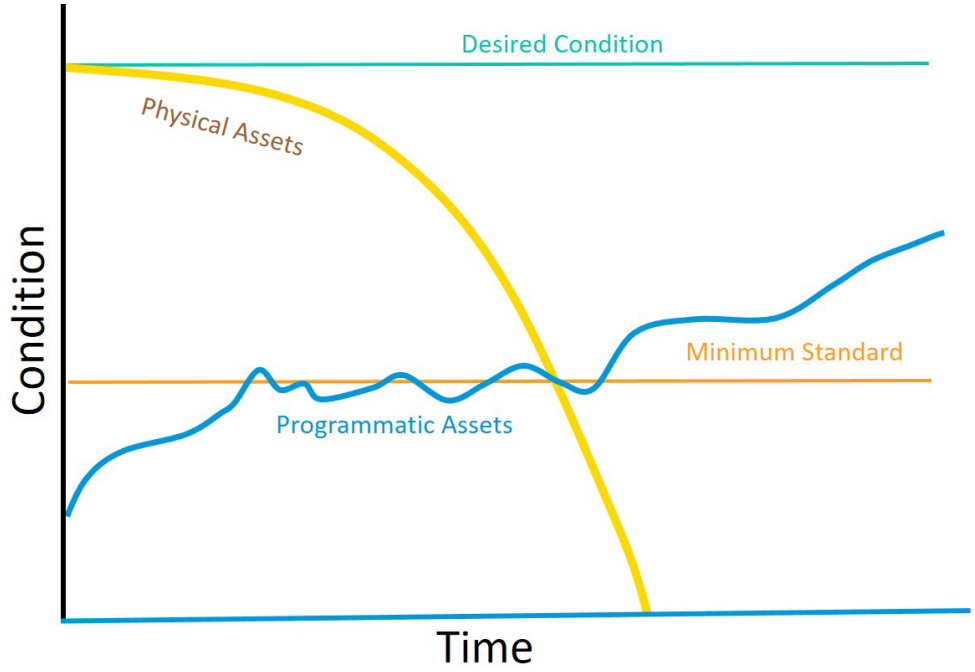


**Figure 3-3. Asset Failure Relative to Condition and Time**

Table 3-2 lists the useful lives for different asset classes. The useful life was estimated based on the age of the infrastructure and installation date. Where age or installation data was not available, assumptions about age of the infrastructure were made using available data about assets in the vicinity.

**Table 3-2. Asset Useful Lives**

| Category | Asset Class | Material | Useful Life (Years) |
|---|---|---|---|
| Conveyance | Brow Ditch | | 100 |
| Conveyance | Drain | ABM | 100 |
| Conveyance | Drain | ABS | 50 |
| Conveyance | Drain | ACP | 100 |
| Conveyance | Drain | AL | 50 |
| Conveyance | Drain | ASPCN | 100 |
| Conveyance | Drain | CAP | 100 |
| Conveyance | Drain | CI | 50 |

**Table 3-2. Asset Useful Lives (contd.)**

| Category | Asset Class | Material | Useful Life (Years) |
|---|---|---|---|
| Conveyance | Drain | CIP | 100 |
| Conveyance | Drain | CIPCP | 100 |
| Conveyance | Drain | CMP | 35 |
| Conveyance | Drain | CMPB | 35 |
| Conveyance | Drain | CMPC | 35 |
| Conveyance | Drain | CONC | 100 |
| Conveyance | Drain | CPEP | 50 |
| Conveyance | Drain | CSP | 50 |
| Conveyance | Drain | EARTH | 100 |
| Conveyance | Drain | HDPE | 100 |
| Conveyance | Drain | IP | 50 |
| Conveyance | Drain | PEP | 50 |
| Conveyance | Drain | PP | 50 |
| Conveyance | Drain | PVCP | 100 |
| Conveyance | Drain | RC | 100 |
| Conveyance | Drain | RCP | 100 |
| Conveyance | Drain | SCMP | 50 |
| Conveyance | Drain | SPRIB | 50 |
| Conveyance | Drain | SRMPC | 50 |
| Conveyance | Drain | SSPP | 50 |
| Conveyance | Drain | STEEL | 50 |
| Conveyance | Drain | VCP | 100 |
| Structural BMP | Vault | | 25 |
| Structural BMP | Vegetated Filter Strip | | 25 |
| Structural BMP | Wet Pond | | 25 |
| Structural BMP | Green Infrastructure | | 25 |
| Structural BMP | Green Streets | | 25 |
| Structural BMP | MUTA | | 25 |
| Pump Station | Actuator | | 20 |
| Pump Station | Automatic Transfer Switch | | 30 |
| Pump Station | Circuit Breaker | | 30 |
| Pump Station | Disconnect Switch | | 30 |
| Pump Station | Engine | | 60 |
| Pump Station | Gearbox | | 40 |
| Pump Station | HMI | | 10 |
| Pump Station | Level Instruments | | 10 |

**Table 3-2. Asset Useful Lives (contd.)**

| Category | Asset Class | Material | Useful Life (Years) |
|---|---|---|---|
| Pump Station | Local Control Panel | | 20 – 25 |
| Pump Station | Motor Control Unit | | 20 – 50 |
| Pump Station | Motor | | 10 – 40 |
| Pump Station | Panelboard | | 20 |
| Pump Station | PLC | | 10 |
| Pump Station | Protective Relays | | 15 |
| Pump Station | Pump Assembly | | 5 |
| Pump Station | Pump | | 5 – 40 |
| Pump Station | Service Pedestal | | 25 |
| Pump Station | Submersible Pump | | 3 – 10 |
| Pump Station | Telemetry Gateway | | 10 |
| Pump Station | Transformer | | 20 – 30 |
| Pump Station | UPS | | 5 |
| Pump Station | Valve | | 7 – 30 |

## 3.4 Required Levels of Service

The LOS is generally what the regulators require and what the citizens' desire. It is a balance between citizen desires, citizen willingness to bear costs, and the City's risk tolerance in the event of failure. This delicate balance is depicted by Figure 3-4.

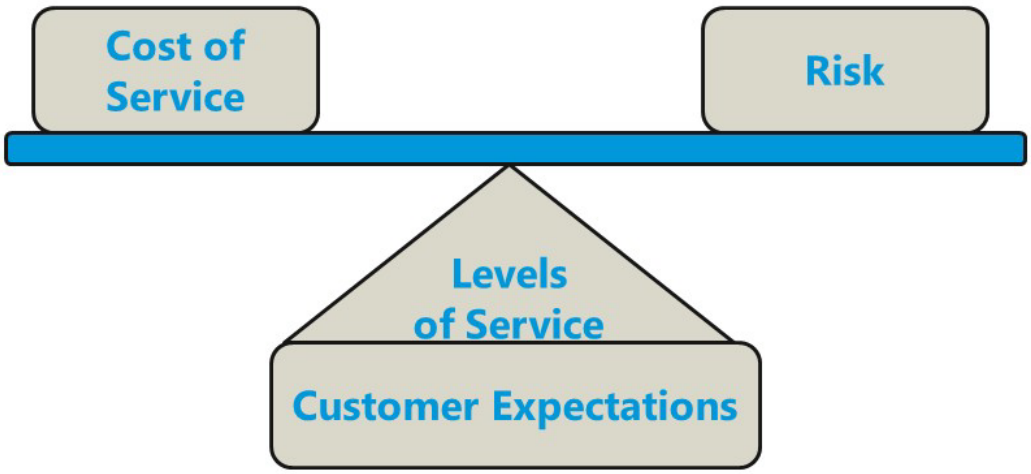


**Figure 3-4. Levels of Service**

The WAMP database derives its decision-making capability from tracking the Division's programs and activities towards meeting its LOS which are developed based on the City's goals and Municipal Permit. During the development of WAMP 2.0, it was recognized that LOS need to be measurable in order to completely realize the decision-making ability of the WAMP database. Additionally, the

Division desired to have fewer LOS to reduce redundancy. More than one program or activity may be performed to meet the same LOS, and therefore, multiple programmatic assets may have the same LOS.

These LOS should be re-evaluated from time-to-time to ensure they reflect current regulatory requirements and the citizens' desire. Information regarding whether the assets are achieving their specified LOS, when they will fail to achieve their LOS, and what actions are needed for the assets to achieve their LOS are presented in the appendices. Specifically, schedules for specific actions to achieve the LOS can be interpreted as the times when costs are incurred to perform operation and maintenance activities or when there is a capital expenditure. Table 3-3 shows the LOS for each programmatic asset within each specific asset class.

**Table 3-3. Levels of Service for Programmatic Assets**

| Programmatic Asset Class | Programmatic Asset | Level of Service |
|---|---|---|
| Public Education and Participation | Education & Outreach Activities | • Provide educational activities to reduce stormwater pollutants associated with the application of pesticides, herbicides, fertilizers, and other pollutants of concern.<br>• Provide education/training for target audiences.<br>• Provide educational activities to facilitate the proper management and disposal of used oil and toxic materials.<br>• Track and submit data for Annual Report Forms, track and report estimated fiscal year budget expenditures.<br>• For target audiences, provide outreach/education driven by negotiation agreements, program or project requirements, or audit requirements |
| | Public Information and Research | • Complete Public Records requests (PRA requests) received from the City Clerk's office within10 days; if additional time is needed, respond within 10 days to advise when the request will be completed |
| Development Planning | Development & Construction Standards | • Prescribe general, source control, and LID BMP requirements, as outlined in the Permit, during the planning process for all development projects.<br>• Identify the roles and responsibilities of its various municipal departments in implementing the structural BMP requirements, including each stage of a project from application review and approval through BMP maintenance and inspections. |
| | Plan Check | • In addition to the BMP requirements for all development, require each PDP to implement onsite structural BMPs to control pollutants in stormwater, and manage hydromodification that may be caused by stormwater discharged from a project.<br>• Require and confirm that prior to occupancy and/or intended use of any portion of the PDP, each structural BMP is inspected to verify that it has been constructed and is operating in compliance with all of its specifications, plans, permits, ordinances, and the requirements of the Municipal Permit. |

**Table 3-3. Levels of Service for Programmatic Assets (contd.)**

| Programmatic Asset Class | Programmatic Asset | Level of Service |
|---|---|---|
| Existing Development Management | Catch Basin Inspection and Cleaning | • Catch Basins located in the public rights of way and on City owned parcels managed by the Stormwater Division and Park and Recreation Department will be inspected and cleaned of debris or other foreign material generally annually. In accordance with the strategies listed in the Water Quality Improvement Plan, some inlets may be inspected and cleaned less frequently in exchange for more frequent inspection and cleaning of targeted areas. |
| | Industrial and Commercial Facility Inspections | • Maintain, and update at least annually, a watershed-based inventory and map of the existing development within its jurisdiction that may discharge a pollutant load to and from the municipal separate storm sewer system (MS4; hereafter, "storm drain system"). The inventory must include the required descriptions listed in the Municipal Permit.<br>• Designate a minimum set of best management practices (BMP) required for all inventoried existing development, including special event venues. The City must also require the implementation, operation, and maintenance of BMPs by commercial areas and industrial facilities.<br>• Conduct inspections at frequencies as described in the Municipal Permit, e.g., annually perform onsite inspections of an equivalent of at least 20 percent of its inventoried existing development, inspect inventory at least once every five years.<br>• Inspections performed by the City must satisfy the minimum inspection content requirements listed in the Municipal Permit.<br>• Track all inspection and re- inspections. All inspection records must retain the minimum requirements listed in the Municipal Permit.<br>• Track and submit data for Annual Report Forms, track and report estimated fiscal year budget expenditures. |

**Table 3-3. Levels of Service for Programmatic Assets (contd.)**

<table>
<tr><th>Programmatic Asset Class</th><th>Programmatic Asset</th><th>Level of Service</th></tr>
<tr><td rowspan="5">Existing Development Management (contd.)</td><td>Rebate Program</td><td>• Maximize distribution of funding from Water Conservation Rebate Program (Rain Barrels, Rain Gutters, and Downspout Redirects, etc.); For example, FY21 $200,000; anticipated future FY funding is approximately $300,000</td></tr>
<tr><td>Street Sweeping</td><td>• Sweep paved parking lots, roads, and driveways based on the threat level, utilizing the following schedule as a baseline:
<table>
<tr><th>Debris Volume</th><th>Frequency</th></tr>
<tr><td>High</td><td>Up to twice/month</td></tr>
<tr><td>Medium</td><td>Monthly</td></tr>
<tr><td>Low</td><td>Once/year</td></tr>
</table>
• In accordance with strategies listed in the Water Quality Improvement Plans, some areas may be swept less frequently in exchange for more frequent sweeping of targeted areas. Additional discussions of the Water Quality Improvement strategies related to this Minimum Municipal BMP are provided in Section 7.3.16.</td></tr>
<tr><td>Structural BMP Inspection</td><td>• Develop, maintain, prioritize, and update at least annually, a watershed-based database to track and inventory all PDPs and associated structural BMPs within its jurisdiction.<br>• Verify that structural BMPs on each PDP are adequately maintained, and continue to operate effectively to remove pollutants in stormwater to the maximum extent practicable through inspections, self-certifications, surveys, or other equally effective approaches.<br>• Track and submit data for Annual Report Forms, track and report estimated fiscal year budget expenditures.</td></tr>
<tr><td>Structural BMP Maintenance</td><td>• Maintain structural BMPs at least once annually</td></tr>
<tr><td>Trash Implementation Program</td><td>• Identify install, and monitor 1500 trash capture catch basin inserts by 2030<br>• By 2030 City must be removing 204 tons of trash annually through a combination of trash capture catch basin inserts and nonstructural activities including street sweeping and catch basin cleaning.</td></tr>
</table>

**Table 3-3. Levels of Service for Programmatic Assets (contd.)**

| Programmatic Asset Class | Programmatic Asset | Level of Service |
|---|---|---|
| Existing Development Management (contd.) | Non-TMDL Modeled Non-Structural BMPs | • Comply with Provision B.3.c of the NPDES MS4 Permit, which provides a rigorous and transparent alternative compliance pathway that allows Copermittees appropriate time to comply with receiving water limitations (RWL) without being in violation of the RWLs during implementation of the compliance alternative. Non-structural measures will be implemented by the following dates:<br>○ Area above Lake Hodges (San Dieguito WMA) - 2027<br>○ Rose Canyon watershed (Mission Bay WMA) - 2041<br>○ Areas outside of Chollas watershed (San Diego Bay WMA) - 2041<br>○ Tijuana River WMA – 2045 |
| | Low Flow Diversion Operation and Maintenance | • Maintain low flow diversions so that there is no bypass of dry weather flows. |

**Table 3-3. Levels of Service for Programmatic Assets (contd.)**

<table>
<tr><th>Programmatic Asset Class</th><th>Programmatic Asset</th><th>Level of Service</th></tr>
<tr><td>Construction Management</td><td>Construction Site Inspections</td><td>
<ul>
<li>Maintain, and update, at least quarterly, an inventory of construction sites within its jurisdiction, and identify sites that represent a high threat to downstream surface water quality.</li>
<li>Implement, or require the year-round implementation of effective, site specific, seasonally appropriate, and construction phase appropriate BMPs to reduce discharges of pollutants in stormwater from construction sites to the maximum extent practicable, and effectively prohibit non-storm water discharges from construction sites into the municipal separate storm sewer system (MS4).</li>
<li>Ensure construction requirements are met through the project authorization or approval process prior to issuance of any local permit(s) that allows the commencement of construction projects that involve ground disturbance or soil disturbing activities that can potentially generate pollutants in stormwater runoff.</li>
<li>Perform Construction Inspections in accordance with the following frequencies:
<table>
<tr><th>Site Priority</th><th>Criteria</th><th>Rainy Season</th><th>Dry Season</th></tr>
<tr><td>ASBS</td><td>Projects located within the ASBS watershed</td><td>Weekly</td><td>Quarterly</td></tr>
<tr><td>High (High Threat to Water Quality)</td><td>Risk Level 2 & 3<br>LUP Type 2 & 3</td><td>Bi-weekly</td><td>Quarterly</td></tr>
<tr><td>Medium</td><td>Risk Level 1 (outside ASBS)<br>LUP Type 1 (outside ASBS)<br>WPCP projects within Peñasquitos WMA</td><td>Monthly</td><td>Quarterly</td></tr>
<tr><td>Low</td><td>All WPCP projects not determined to be Medium Priority</td><td>Quarterly</td><td>As Needed</td></tr>
</table>
</li>
</ul>
</td></tr>
</table>

**Table 3-3. Levels of Service for Programmatic Assets (contd.)**

| Programmatic Asset Class | Programmatic Asset | Level of Service |
|---|---|---|
| Construction Management (contd.) | Construction Site Inspections (contd.) | • Conduct construction site inspections to require and confirm compliance with its local permits and applicable local ordinances, and the requirements of the Permit. Priority for site inspections must consider threat to water quality, as well as the nature of the construction activity, topography, and the characteristics of soils and receiving water quality.<br>• Track and submit data for Annual Report Forms, track and report estimated fiscal year budget expenditures. |
| Enforcement Response | Code Enforcement | • Enforce its legal authority established for all development projects, as necessary, to achieve compliance with the requirements of the Permit.<br>• Enforce its legal authority established for all its inventoried existing development, as necessary, to achieve compliance with the requirements of the Municipal Permit.<br>• Enforce its legal authority established for all its inventoried construction sites, as necessary, to achieve compliance with the requirements of the Permit.<br>• Complete approximately 4,000 cases per year within in 30 days of reporting date.<br>• Inspect residential areas once every 5 years |
| | Parking Enforcement | • Enforcement of 40 routes annually. |
| Monitoring and Assessment | Compliance Monitoring Program | • Implement a monitoring and assessment program in compliance with Permit Provision II.D. |
| | Special Studies | • Conduct two special studies in each watershed each permit term and additional as needed. |

**Table 3-3. Levels of Service for Programmatic Assets (contd.)**

| Programmatic Asset Class | Programmatic Asset | Level of Service |
|---|---|---|
| Permit Management and Compliance | Permit Management and Compliance Monitoring | • Comply with National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4) Draining the Watersheds within the San Diego Region by effectively prohibiting non-storm water discharges into the MS4s, and implementing controls to reduce the discharge of pollutants in stormwater from the MS4s to the MEP so that no violations are issued. |
| | CIP Planning and Management | • Completion of 14 initiated capital projects in 5 years. |
| | ERP Functions and EAM Data Management | • Integrate WAMP database and functionality to EAM by FY23. Update WAMP databases on a quarterly basis until EAM is fully functional. |
| | GIS Support | • Update and publish backlogged changes to GIS shapefiles on a quarterly basis. |
| | Masterplans (WMP, IDEA Document, Structural BMP Plan) | • Complete one IDEA every two years. |
| Permit Management and Compliance | Policy Development & Permit Negotiation | • Negotiate the MS4 Permit requirements to be consistent with the Clean Water Act (33 USC §1342) and the Porter-Cologne Act (CWC §13263) whereby the Division is able to make decisions on how to utilize and focus their resources, along with the ability to establish a better-defined monitoring and assessment program to inform its water quality management decisions.<br>• Develop policies to be consistent with the provisions of the MS4 Permit and other regulations. |
| | Regulatory Review | • Review and provide comments on regulations, permits, policies, and CEQA documents within the specified public review period. |
| | Watershed Asset Management | • Update the Watershed Asset Management Plan on an annual basis to improve data quality and confidence levels. |

**Table 3-3. Levels of Service for Programmatic Assets (contd.)**

| Programmatic Asset Class | Programmatic Asset | Level of Service |
|---|---|---|
| Best Available Science | Alternative Compliance Program | • At the discretion of each Copermittee, Priority Development Projects may be allowed to participate in an alternative compliance program in lieu of implementing the onsite structural BMP performance requirements of Provisions E.3.c.(1) and E.3.c.(2)(a)<br>• Establish the Alternative Compliance Program to fund and deliver 6 projects per year. |
| | Integrated Planning Framework | • Subsequent to issuing of the next permit, determine if the Division should proceed with developing an Integrated Plan, which is codified in the Clean Water Act (CWA)(HR 7279) and a mechanism to comply with CWA obligations. The Integrated Plan is a means to develop, prioritize, and implement programs and projects with the greatest benefits to public health and the environment. |
| | Stormwater Harvesting | • By Q4 FY21, complete the development of a Stormwater Harvesting Case Study for Dry Weather Flow Diversion<br>• By Q4 FY21, perform in-depth analysis for Stormwater Diversion for Indirect Potable Use and Recycled Water to determine technical, regulatory, and funding constraints<br>• In FY23, develop specific opportunities for stormwater harvesting and diversion through a feasibility study<br>• Gather stakeholder input throughout this process to maximize stormwater capture potential, improve water quality, and support water supply considerations. |

## Table 3-3. Levels of Service for Programmatic Assets (contd.)

<table>
<tr><th>Programmatic Asset Class</th><th>Programmatic Asset</th><th>Level of Service</th></tr>
<tr><td rowspan="5">Flood Risk Management</td><td>Channel Inspection and Prioritization</td><td rowspan="2">• Inspect and maintain 26 miles of channels, 7 Basins, and 10 Inlet/Outlet structures in critical flooding areas in accordance with the Municipal Waterways Maintenance Plan (MWMP).</td></tr>
<tr><td>Channel Maintenance Program</td></tr>
<tr><td>Floodplain Management</td><td>• Participate in the Community Rating System (CRS) Program by FY22.<br>• Review up to 4 CLOMR/LOMR per month.</td></tr>
<tr><td>Levee Management</td><td>• Inspect and maintain levees to at least the minimally acceptable standard to remain eligible for federal rehabilitation assistance through the USACE Rehabilitation and Inspection Program (PL 84-99).</td></tr>
<tr><td>Pump Station Operation and Maintenance</td><td>•
<table>
<tr><th rowspan="2">Pump Station</th><th rowspan="2">Capacity (gpm)</th><th colspan="4">Level of Service/Flooding Time (Minutes)</th></tr>
<tr><th>15yr-12hr</th><th>5yr-1hr</th><th>10yr-3hr</th><th>100yr-1hr 50yr-3hr</th></tr>
<tr><td>A</td><td>750</td><td>0</td><td>0</td><td>0</td><td>17</td></tr>
<tr><td>B to D</td><td>1,800</td><td>-</td><td>-</td><td>-</td><td>71</td></tr>
<tr><td>B to L</td><td>3,000</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>C</td><td>1,700</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>D</td><td>130,400</td><td>-</td><td>-</td><td>-</td><td>>123</td></tr>
<tr><td>E No Bypass</td><td>11,000</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>E with Bypass</td><td>11,000</td><td>0</td><td>0</td><td>0</td><td>75</td></tr>
<tr><td>F</td><td>8,490</td><td>-</td><td>-</td><td>-</td><td>107</td></tr>
<tr><td>G No Bypass</td><td>6,400</td><td>0</td><td>0</td><td>-</td><td>-</td></tr>
<tr><td>G with Bypass</td><td>6,400</td><td>872</td><td>341</td><td>821</td><td>647</td></tr>
<tr><td>H</td><td>98,250</td><td>-</td><td>12</td><td>55</td><td>156</td></tr>
<tr><td>I</td><td>3,400</td><td></td><td></td><td>13</td><td></td></tr>
<tr><td>J</td><td>3,400</td><td></td><td></td><td></td><td></td></tr>
<tr><td>K</td><td>3,400</td><td></td><td></td><td>62</td><td></td></tr>
<tr><td>L</td><td>18,000</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>N</td><td>64,000</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
</table></td></tr>
</table>

**Table 3-3. Levels of Service for Programmatic Assets (contd.)**

| Programmatic Asset Class | Programmatic Asset | Level of Service |
|---|---|---|
| Flood Risk Management (contd.) | Tide Gate Operation and Maintenance | • Maintain tide gates to open with minimum head on the back side of the gate and close when the water on the front side of the gate is of greater depth than that on the back side. |
| | Storm Patrol | • Adequately resource (people and equipment) to mobilize and manage critical locations during qualifying storm events. |
| | Storm Drain Repairs and Storm Drain Replacement | • Completion of 6 CIP projects annually and completion of 20 repairs monthly. |
| | Detention Basin Maintenance | • Maintain detention basin so that its design volume is maintained, and it drains within the design drawdown time. |
| | Habitat Restoration and Mitigation | • Identify and develop plan for six sites per year based on prioritization process in Municipal Waterways Maintenance Plan (MWMP). Habitat restoration of sites to take place two years following planning and permitting. |
| Program Administration | Accounts Payable | • Pay 80% of invoices to all vendors and consultant invoices on-time (500/month). |
| | Budget Development and Management | • Manage the annual SWD budget, develop a spending plan using the WAMP to guide decisions, and develop expenditure and revenue projections. |
| | Clerical/Admin support | • Provide clerical and administrative support to the program. |
| | Contracts | • Manage allocations and spending of Division contracts to maximize annual funding. |
| | Grants | • Fund grant management activities (grant writing, administration etc) to $20,000 per year to identify and pursue $30,000,000 in grants per year. Win a minimum of $3,000,000 in grants. |
| | Payroll | • Payroll to be paid on time each pay period. |
| Litigation, Settlement and Cleanup Actions | Cleanup & Abatement | • Comply with Cleanup & Abatement Orders, violations, etc. |
| | Investigative Orders | • Comply with Investigative Orders. |
| | Litigation | • Minimize liability. |

## 3.5 Business Risk Assessment

The criticality of the assets is assessed through the BRE analysis. BRE is calculated by multiplying the probability of failure occurring by the consequence of failure. The PoF criteria was revised during workshops with the Division staff and updated for inclusion in WAMP 2.0. It was noted earlier that mortality and capacity are considered the primary failure modes for the Division's physical assets. PoF scores ranging from 1 to 5 are assigned to physical assets with a mortality failure mode. These scores are driven by asset age, asset useful lifespan, condition assessment (inspections), site conditions, asset materials and as-built information. A new asset or existing asset with no known issues is assigned a PoF of 1, whereas an asset that has reached its useful life or an asset with critical defects as noted during condition assessments (with or without regard to useful life), is assigned a PoF of 5. It is noteworthy that multiple data points may be used to determine the PoF. If an asset has multiple modes of failure, the mode of failure with the highest PoF prevails. BRE analysis is used for prioritization of activities with limited funding. WAMP 2.0 uses BRE as the only methodology to prioritize projects so that available funding can be used efficiently. The logic used to assign PoF scores to each physical asset type is summarized in Appendix A.

Logic of % remaining useful life is based on "time" needed to manage failure. PoF 4 with 15% of life left will result in the following time for planning:

- Structural BMP (30-year life): 25 x 0.15 = 3.75 years (Sufficient time to plan and manage before failure)
- Hard assets (100-year life): 100 x 0.15 = 15 years (Sufficient time to manage any large CIP projects)

PoF scores ranging from 1 to 5 are assigned to physical assets with a capacity failure mode. These scores are driven by asset capacity and H&H analyses. PoF scores range from 1 to 5 based on the asset's ability to convey storms from 100-year design storm to 10-year. IDEAS documents provided a prioritized ranking for future flood control projects which has been reflected in Appendix A. Future projects related to flood control have been assigned PoF scores in accordance with the IDEAS project ranking. The logic used to assign PoF scores to each physical asset type with capacity failure mode is summarized in Appendix A.

Efficiency and LOS are the primary failure modes for Division's programmatic assets. The PoF scores for efficiency failure mode were assigned using input from Division staff about asset's ability to add benefit to or enhance current operation. The greater the benefit, the higher is the probability of failure of the asset. The logic used to assign an efficient PoF score to programmatic assets is summarized in Appendix A.

Inability of an asset to meet its required LOS is the fourth type of failure mode considered for the Division's assets. PoF scores for this failure mode are assigned based on the ability of programmatic assets to meet Municipal Permit requirements or water quality goals. The PoF scores range from 1 to 5 depending on the full delivery of program requirements to none of the program requirements being met. The logic used to assign an efficient PoF score to programmatic assets is summarized in Appendix A.

The other variable of the BRE equation is consequence of failure (CoF). Generally, CoF is calculated by reviewing and ranking the potential consequences for the public, environment, equipment, personnel, etc. in the event of asset failure. The triple bottom line approach was used to guide the process of determining CoF. Using the triple-bottom-line approach makes projects sustainable in that the decisions made in selecting and developing projects, prioritizing investments, and developing actions are less likely to be resisted, and more likely to be funded, maintained, and used. For this WAMP, a balanced approach was used to weigh the environmental, social, and economic consequences of failure. Each of these three major evaluation criteria was subdivided into two more evaluation criteria. Figure 3-5 depicts the triple bottom line in a graphic form.

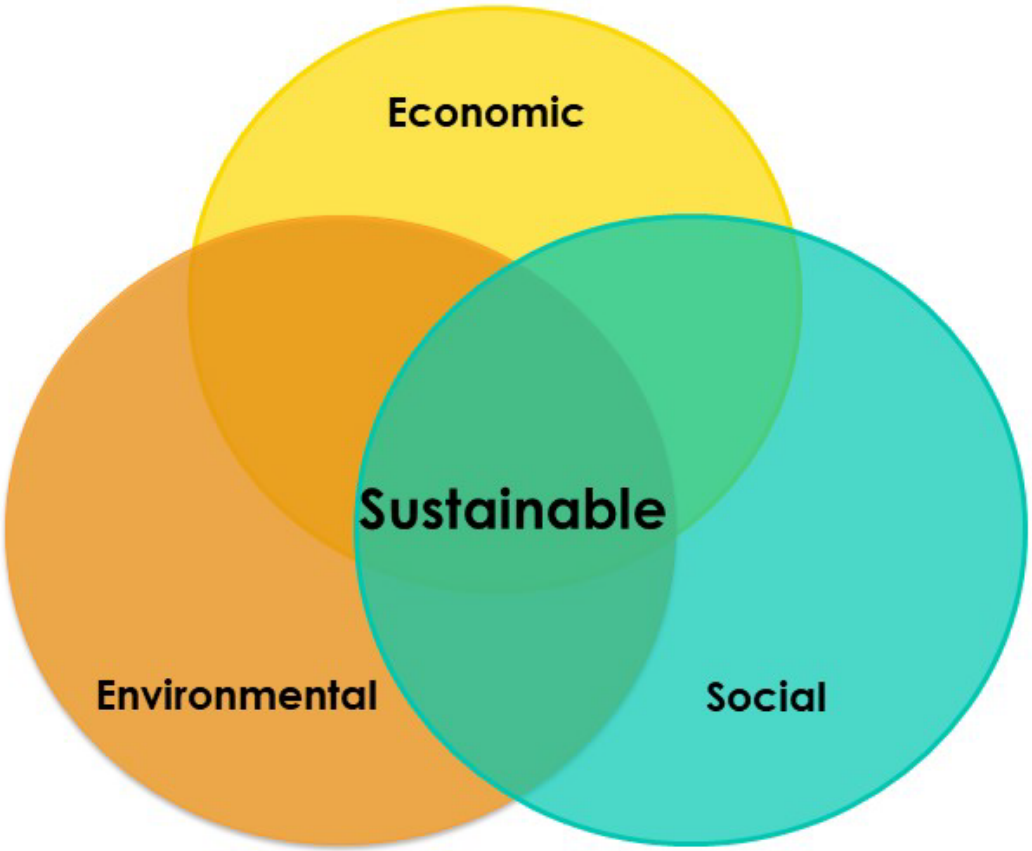


**Figure 3-5. Triple Bottom Line**

Two environmental criteria, two social criteria, and one economic criteria were identified against which the consequences of failure were evaluated. Economic criteria differ for existing non-channel assets, existing channel assets, existing brow ditches, park and other City Department assets, and future assets. Table 3-4 presents a summary of the evaluation criteria, Detailed criteria is provided in Appendix A.

**Table 3-4. Definitions of Consequence of Failure Categories**

| Category | Subcategory | Description |
|---|---|---|
| Social | Public Perception | Public perception, public trust, and equity of City's performance declines. This includes external or non-quantifiable potential economic costs associated with a decline in public perception of City performance.<br><br>Public perception also accounts for the proximity of the asset in a Disadvantages Community (DAC). |
| | Public Health and Safety | Injuries, death, or property damage occurs. This includes external or non-quantifiable potential economic costs associated with increased health or safety risks to citizens. |
| Environmental | Regulatory | Regulators take action for non-compliance with the MS4 permit. This includes external or non-quantifiable economic costs associated with a deterioration in trust of the regulators for which the City is taking appropriate actions to achieve compliance with a permit that is not explicit. |
| | Environmental Quality | Measurements of environmental quality show declines (e.g., ecosystem health declines, standards are no longer met). This includes external or non-quantifiable economic costs associated with a degrading or degraded environmental quality or condition. Such economic costs could include reduction in property values, reductions in tourism, loss of jobs, and resulting reductions in tax revenues. |
| Economic | Financial | Cost to manage physical assets whether by replacement or being new to the asset register. Increased regulatory compliance costs, increased City of San Diego Stormwater Division requirements, increased costs to pay for fines, settlements, and third-party lawsuits. |

Each of the subcategories were weighted to account for its relative importance within the major categories. Each major category was given the same weight. Appendix A shows the relative weights assigned to the CoF for each subcategory and major category.

A CoF score of 1 to 5 was assigned to each subcategory. This CoF was multiplied by the weight of the subcategory to achieve the overall CoF for the category. The ultimate CoF for a category can range from 1 to 5. The CoF for each of the three categories are then added together, ranging from a score of 3 to 15, and multiplied by the PoF, ranging from 1 to 5. Overall, the BRE score could range from 3 to 75, with 75 representing the highest BRE score.

Figure 3-6 shows the BRE matrix. Assets in the green cells are deemed low risk, assets in the yellow cells are deemed medium risk, and assets in the red cells are high risk. The assets in the upper right corner have the highest PoF and CoF scores. These assets need immediate attention, and as such, resources should be prioritized accordingly. The green shading represents the area where assets have a low PoF and low CoF. Resources can be diverted from these assets as well because of the low consequence of failure. As assets are managed using this approach, they will ultimately plot along medium risk band shaded as yellow. The appendices present the number of assets in the low, medium, and high-risk categories based on the BRE scores calculated using PoF and CoF. Priorities

are developed for the City as well as individual watersheds. Priorities can be viewed Citywide basis or watershed by watershed basis. In regard to specific projects that have been identified, criticality is brought into this analysis based on ranking in the technical studies (see Appendix A). Deeper analysis of packaging the high-risk assets into bundles of one or few projects that are in the same area and can be co-located is a strategy that can be used to address the high-risk assets more efficiently.

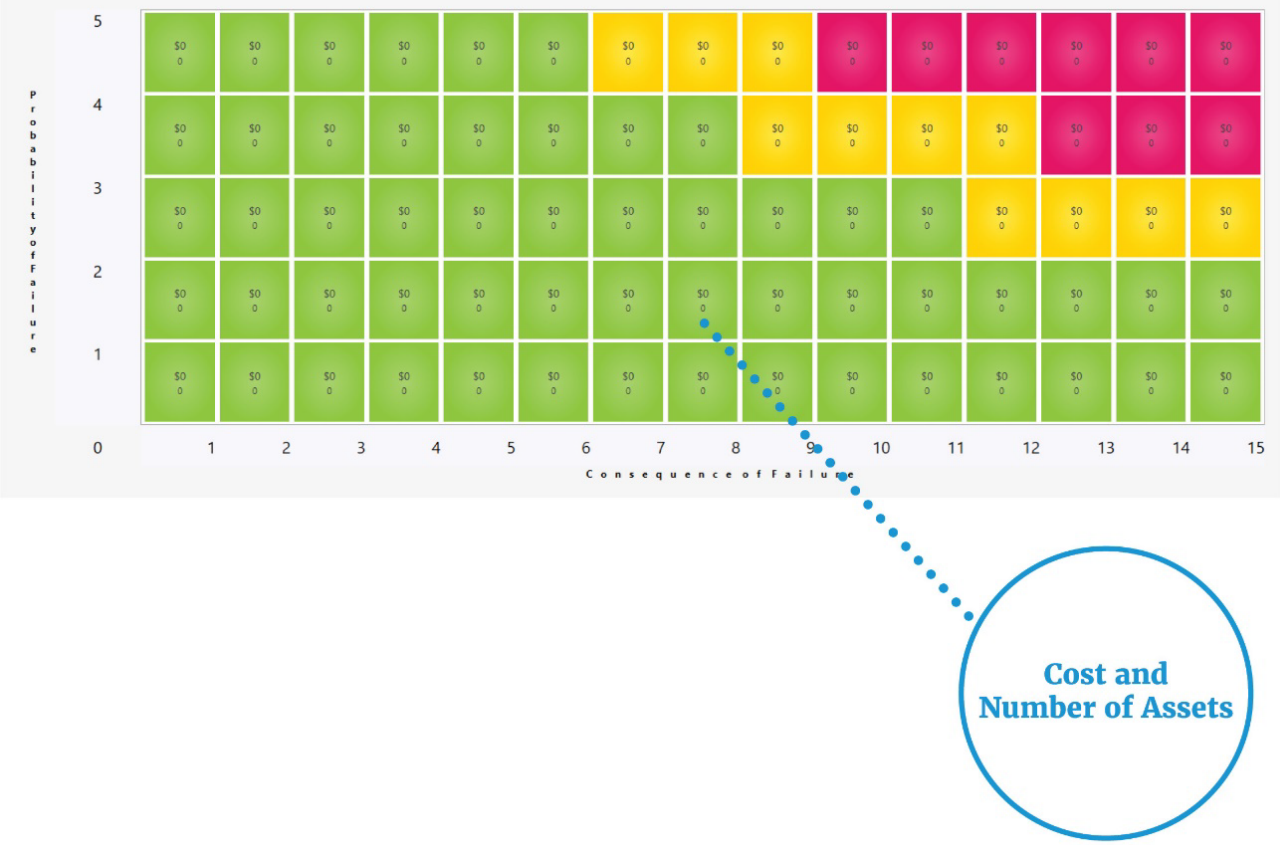


**Figure 3-6. Business Risk Exposure Matrix**

## 3.6 Efficiencies

During interviews and workshops with Division staff, the staff acknowledged that certain practices within their programs (or programmatic assets) were currently not completely aligned with assets' current levels of service and management strategies for implementation of programs was not as efficient as desired. The staff also highlighted some strategies that have been more efficient. As an example, IC/ID inspections for facilities are now performed on a parcel-by-parcel basis rather than facility basis to make the inspections more efficient. Staff input was used to identify opportunities to make the program implementation more efficient. BRE of each opportunity was calculated by applying the PoF and CoF criteria for programmatic assets. BRE scores were used to prioritize the opportunities for efficiency and recommended for adoption in Section 7-Recommendations.

# 4 What Are My Optimized Management Strategies?

## 4.1 Optimized Management Strategies

The Division's assets are managed at various levels. Physical assets are managed at the detailed watershed level, but programmatic assets are managed at the Division level. Each of the program elements that programmatic assets belong to have to meet a certain LOS to continue to meet the Municipal Permit requirements. The City and Division have developed strategies to meet the requirements specified by the Municipal Permit. A wide majority of strategies are JRMP requirements that include specific approach developed by each department to implement the minimum BMPs required by the permit. In accordance with the Permit the Copermittees have developed strategies to meet the specific requirements in each watershed's WQIP. Through adaptive management, the City should review their management strategies and optimize them over time. This section briefly discusses a summary of select strategies in place to manage the programmatic assets such that they continue to meet their LOS. Management strategies are presented in detail in Table 4-1.

### 4.1.1 Physical Assets

In general, asset replacement or rehabilitation are two optimized management strategies for physical assets. Some assets may require replacement as soon as failure due to capacity or mortality is achieved. Mechanical or electrical parts of pump stations are an example. For other assets, rehabilitation may be most cost effective in the long term until failure is imminent and, at that time, replacement is necessary. For example, the Division is investigating opportunities to rehabilitate corrugated metal pipe instead of replacement. Rehabilitation will be done through pipe lining, potential saving significant costs. Until specific studies have been accomplished, WAMP 2.0 assumes that infrastructure will be replaced when it reaches its useful life.

### 4.1.2 Programmatic Assets

In the preceding section, the Division's programmatic assets were presented, and a connection was made between the assets and their desired level of service necessary to fulfill the Municipal Permit requirements and meet Division's goals. Having made the link between Division's assets, their LOS, and the business risk exposure of the assets, the question arises – What are we going to do about the risk or how do we manage the risk. The Division has developed a set of management strategies across all aspects of the Municipal Permit. The management strategies are detailed in the City's JRMP document and range from baseline "minimum" BMPs and practices which, the City must perform, to "enhancement" activities which go above and beyond what is required at the minimum level, and help the City meet the watershed specific water quality goals highlighted in the WQIP.

Table 4-1 provides a summary of the programmatic assets, their associated levels of service, and all management strategies. The programmatic asset class column presents each programmatic asset class, followed by its primary level of service as defined in the Permit. The programmatic asset column presents each asset within the asset class, followed by a specific secondary level of service which is often quantified. The management strategy column presents the JRMP ID of the management strategies for the programmatic assets, and finally, the optimized management strategy is described in the optimized management strategy column.

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**Table 4-1. Management Strategies**

| Programmatic Asset Class | Objective | Programmatic Asset | Level of Service | Management Strategy | Optimized Management Strategy[1] |
|---|---|---|---|---|---|
| Public Education and Participation | Each Copermittee must implement, individually or with other Copermittees, a public education and participation program in accordance with the strategies identified in the Water Quality Improvement Plan to promote and encourage the development of programs, management practices, and behaviors that reduce the discharge of pollutants in stormwater to the MEP, prevent controllable non-storm water discharges from entering the MS4, and protect water quality standards in receiving waters | Education & Outreach Activities | • Provide educational activities to reduce stormwater pollutants associated with the application of pesticides, herbicides, fertilizers, and other pollutants of concern.<br>• Provide education/training for target audiences.<br>• Provide educational activities to facilitate the proper management and disposal of used oil and toxic materials.<br>• Track and submit data for Annual Report Forms, track and report estimated fiscal year budget expenditures. | CSD-JRMP-03 | Outreach to impacted commercial, industrial, municipal, and residential development regarding minimum BMP requirement updates.<br>May include onsite education at the time of inspections, city staff training, and mailers to business owners and prospective business owners. |
| | | | | CSD-JRMP-06 | Provide technical education and outreach to the development community on the design and implementation requirements of the MS4 Permit and Water Quality Improvement Plan requirements. This includes outreach on design standards, City design manuals, and the WMAA. |
| | | | | CSD-JRMP-19 | Outreach to property managers and trash haulers to elevate the emphasis of power washing as a pollutant source.<br>Emphasis will be placed on non-compliant washing as an enforceable violation. Will occur city-wide in residential, commercial, and industrial areas. |
| | | | | CSD-JRMP-22* | Promote and encourage implementation of designated BMPs for residential and non-residential areas.<br>Residential incentives can include education and training, and aggressive subsidies or rebates for grass replacement and rainwater harvesting. |
| | | | | CSD-JRMP-33 | Outreach to street sweeping enhancement-targeted areas.<br>Division staff will conduct a thorough education and outreach effort beginning months in advance of the expansion of sweeping routes. Staff will work with the affected Council offices, community stakeholders, non-governmental organizations, and community groups to build community awareness and acceptance of the enhanced sweeping program. |
| | | | | CSD-JRMP-42 | Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce the discharge of pollutants in stormwater prioritized by high-risk behaviors, pollutants of concern, and target audiences. |
| | | | | CSD-JRMP-43 | Continue implementation of a Pet Waste Program.<br>Pet Waste Program includes outreach on "Scoop the poop," installation of posts for dispensers, distribution of lawn signs, and attendance at dog-related community activities. |
| | | | | CSD-JRMP-44 | Promote and encourage implementation of designated BMPs in commercial and industrial areas.<br>Provide education and outreach on BMPs for commercial businesses and industrial facilities. Will occur city-wide in non-residential areas. |
| | | | | CSD-JRMP-45* | Expand outreach to homeowners' association (HOA) common lands and HOA incentives.<br>Approaches to consider include offering incentives to HOAs and maintenance districts to adopt water-conserving/efficiency and stormwater-reduction changes to their landscapes, irrigation, and maintenance; conducting workshops with property managers; providing supplemental standards, inspection, or enforcement for HOA-managed properties. |
| | | | | CSD-JRMP-46* | Develop an outreach and training program for property managers responsible for HOAs and maintenance districts.<br>Approaches to engage HOAs and property managers include: conducting workshops with property managers, providing supplemental standards, inspections or enforcement around HOA properties, and offering incentives to HOAs and maintenance districts to adopt changes to landscapes, irrigation, or maintenance which promote water conservation or stormwater reduction. Property managers are also a target for enhanced outreach. |

**Table 4-1. Management Strategies (contd.)**

| Programmatic Asset Class | Objective | Programmatic Asset | Level of Service | Management Strategy | Optimized Management Strategy[1] |
|---|---|---|---|---|---|
| | | | | WMA-13 | Participation in Watershed Council:<br>If a Watershed Council is re-established, the City of San Diego, County of San Diego and potentially other Responsible Agencies will participate. Watershed Councils are typically locally organized, voluntary, non-governmental organizations, and are intended to broadly represent various stakeholders in the WMA. Goals of Watershed Councils may vary, but they generally promote protecting the watershed and sustaining natural resources. This coordination could assist in selecting WMA projects, identifying potential funding opportunities, and promoting communication among community groups and regulated agencies. Resources necessary to implement this strategy include participating jurisdictional staff to coordinate with the regional effort and the development of an agreement (e.g. MOU, JPA) among participating entities, which may take up to one year to coordinate. Projected funding needs may be met through grant funding, support from community groups or other institutions, or jurisdictional General Funds. General Funds are contingent on approval of the annual budget by City Council or appropriate legislative body. Participation is dependent on funding availability and continued benefit to watershed. |
| Public Education and Participation (contd.) | Each Copermittee must implement, individually or with other Copermittees, a public education and participation program in accordance with the strategies identified in the Water Quality Improvement Plan to promote and encourage the development of programs, management practices, and behaviors that reduce the discharge of pollutants in stormwater to the MEP, prevent controllable non-storm water discharges from entering the MS4, and protect water quality standards in receiving waters | Education & Outreach Activities | • Provide educational activities to reduce stormwater pollutants associated with the application of pesticides, herbicides, fertilizers, and other pollutants of concern.<br>• Provide education/training for target audiences.<br>• Provide educational activities to facilitate the proper management and disposal of used oil and toxic materials.<br>• Track and submit data for Annual Report Forms, track and report estimated fiscal year budget expenditures. | WMA-14 | Participation in San Diego Integrated Regional Water Management Program.<br>The City of San Diego, County of San Diego, and San Diego County Water Authority form the Regional Water Management Group (RWMG) and administer and implement the San Diego IRWM Program. The Regional Advisory Committee (RAC) includes rotating members from various functional areas related to water management. In San Dieguito River WMA, two integrated projects, funded through Proposition 50 and 84, target water quality in Lake Hodges: 1) San Dieguito Watershed Management Plan Implementation – Lake Hodges Natural Treatment System Conceptual Design and 2) Lake Hodges Water Quality and Quagga Mitigation Measures. Along with grant funding, the City of San Diego Public Utilities Department, City of Escondido, San Dieguito River Valley Conservancy, Santa Fe Irrigation District, and the San Diego County Water Authority are providing local match or in-kind services. All General Funds are secured on an annual basis and are contingent upon annual budget approval by each participating Responsible Agency. |
| | | | | WMA-15 | Collaboration with Federal, State and Local Agencies<br>RAs will work collaboratively to implement projects within the WMA that improve water quality. These collaborations include working with the following: U.S. IBWC, Binational Task Force; U.S EPA Border 2020; Good Neighbor Environmental Board (GNEB); and TRNERR advisory council |

**Table 4-1. Management Strategies (contd.)**

| Programmatic Asset Class | Objective | Programmatic Asset | Level of Service | Management Strategy | Optimized Management Strategy[1] |
|---|---|---|---|---|---|
| Public Education and Participation (contd.) | Each Copermittee must implement, individually or with other Copermittees, a public education and participation program in accordance with the strategies identified in the Water Quality Improvement Plan to promote and encourage the development of programs, management practices, and behaviors that reduce the discharge of pollutants in stormwater to the MEP, prevent controllable non-storm water discharges from entering the MS4, and protect water quality standards in receiving waters. | Education & Outreach Activities | • Provide educational activities to reduce stormwater pollutants associated with the application of pesticides, herbicides, fertilizers, and other pollutants of concern.<br>• Provide education/training for target audiences.<br>• Provide educational activities to facilitate the proper management and disposal of used oil and toxic materials.<br>• Track and submit data for Annual Report Forms, track and report estimated fiscal year budget expenditures. | CSD-JRMP-47 | Develop a targeted education and outreach program for homeowners with orchards or other agricultural land uses on their property.<br>Educate residents on practices of small-scale or on-site composting to protect local water quality. May include targeted education of owners of chickens to address bacteria. Outreach can be coordinated through the San Diego County Agriculture, Weights, and Measures division. |
| | | | | CSD-JRMP-48 | Enhance school and recreation-based education and outreach.<br>Develop curriculum and establish distribution in public schools. Includes education on water conservation. |
| | | | | CSD-JRMP-49 | Develop education and outreach to reduce irrigation runoff.<br>Example approaches to reduce or eliminate irrigation runoff may include education and outreach, prohibition, enhanced enforcement of existing prohibitions, and pilot projects such as the City of Del Mar's pilot door hanger project. |
| | | | | CSD-JRMP-50* | Develop and distribute regional training materials for water-using mobile businesses.<br>Consider development of supplemental standards for mobile businesses including: covered trash enclosures, careful review of washing areas (grading, drainage, landscaping, sanitary sewer system connectivity), and appropriate signage (either through zoning for retrofits or "best fix" approaches, or through BMP Design Manual standards). Businesses may include carpet cleaners, tile installers, plumbers, etc. |
| | | | | CSD-JRMP-51* | Enhance education and outreach based on results of effectiveness survey and changing regulatory requirements.<br>Use effectiveness surveys to enhance existing education and outreach programs while proactively keeping up with and incorporating changing regulatory requirements. |
| | | | | CSD-JRMP-52 | Continue to promote and encourage implementation of Integrated Pest Management (IPM) for residents and businesses.<br>The City will continue to provide education on IPM techniques during presentations and on the City's Think Blue website. |
| | | | | CSD-JRMP-53* | Improve consistency and content of websites to highlight enforceable conditions and reporting methods.<br>Websites will be updated to provide a user-friendly format and clarity for stormwater violations, conditions which citizens can and should report, and how to make such reports. Examples of reports for common incidents will be developed and posted which may vary locally and regionally. Photographs of allowable practices as well as illegal practices should be shown for utmost clarity. Displaying hotline numbers prominently on the website and near the photographs of illegal practices will ensure that those seeking to report will be able to do so easily. Also ensure hotline number and website are searchable and can be retrieved by simple internet searches. |
| | | | | CSD-NS-11 | Enhance and expand trash cleanups through community-based organizations involving target audiences.<br>Increase effectiveness and reach of trash/beach cleanups and community-based efforts by engaging community groups to self-define and carry-out trash clean-ups. Longstanding partnerships and sponsorships with I Love A Clean San Diego and others are recommended to be continued and enhanced. To effectively target stream clean-up efforts, focus on partnerships with community organizations which provide strong engagement with target audiences and communities. Cleanups target trash, however, a reduction in trash also reduces other pollutants such as bacteria and nutrients that can attach to food waste wrappers and yard waste. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council. |

**Table 4-1. Management Strategies (contd.)**

| Programmatic Asset Class | Objective | Programmatic Asset | Level of Service | Management Strategy | Optimized Management Strategy[1] |
|---|---|---|---|---|---|
| Public Education and Participation (contd.) | Each Copermittee must implement, individually or with other Copermittees, a public education and participation program in accordance with the strategies identified in the Water Quality Improvement Plan to promote and encourage the development of programs, management practices, and behaviors that reduce the discharge of pollutants in stormwater to the MEP, prevent controllable non-storm water discharges from entering the MS4, and protect water quality standards in receiving waters. | Education & Outreach Activities | • Provide educational activities to reduce stormwater pollutants associated with the application of pesticides, herbicides, fertilizers, and other pollutants of concern.<br>• Provide education/training for target audiences.<br>• Provide educational activities to facilitate the proper management and disposal of used oil and toxic materials.<br>• Track and submit data for Annual Report Forms, track and report estimated fiscal year budget expenditures. | CSD-NS-54 | Collaboration with Federal, State and Local Agencies -<br>Collaborate with RAs to implement projects within the WMA that improve water quality. These collaborations include working with the following: U.S. IBWC, Binational Task Force; U.S EPA Border 2020; United States Section of the International Boundary and Water Commission (USIBWC), United State Fish and Wildlife Services (USFWS), United States Geologic Survey (USGS), County of the San Diego and California State Parks; and TRNERR advisory council.<br>Resources necessary to implement this strategy includes participating jurisdictional staff, funding, support from international/community groups, other institutions, or jurisdictional General Funds. Participation is dependent on funding availability. |
| | | Public Information and Research | • Complete Public Records requests (PRA requests) received from the City Clerk's office within10 days; if additional time is needed, respond within 10 days to advise when the request will be completed | --- | Log each public information request, research data, and provide information in conformance with the specified schedule. |
| Development Planning | Each Copermittee must use their land use and planning authorities to implement a development planning program in accordance with the strategies in the Water Quality Improvement Plan described pursuant to Provision B.3.b.(1) | Development and Construction Standards | • Prescribe general, source control, and LID BMP requirements, as outlined in the Permit, during the planning process for all development projects.<br>• Identify the roles and responsibilities of its various municipal departments in implementing the structural BMP requirements, including each stage of a project from application review and approval through BMP maintenance and inspections. | CSD-JRMP-01 | Establish guidelines and standards for all development projects; provide technical support related to implementation of source control BMPs to minimize pollutant generation at each project and implement LID BMPs to maintain or restore hydrology of the area or implement easements to protect water quality, where applicable and feasible. Includes internal coordination and collaboration between City departments (DSD, PWD, and Engineering) to improve success and long-term benefits of BMPs.<br>Refer to JRMP Section 4. May include providing technical support and consultation for other City departments that review project submittals for compliance with Storm Water Standards Manual requirements. May also include review of City projects for compliance with Storm Water Standards Manual requirements. |
| | | | | CSD-JRMP-02 | Develop Design Standards for Public LID BMPs.<br>Improve quality of design to ensure efficiency and reliability in public designs. |

**Table 4-1. Management Strategies (contd.)**

| Programmatic Asset Class | Objective | Programmatic Asset | Level of Service | Management Strategy | Optimized Management Strategy[1] |
|---|---|---|---|---|---|
| Development Planning (contd.) | Each Copermittee must use their land use and planning authorities to implement a development planning program in accordance with the strategies in the Water Quality Improvement Plan described pursuant to Provision B.3.b.(1) | Development and Construction Standards | • Prescribe general, source control, and LID BMP requirements, as outlined in the Permit, during the planning process for all development projects.<br>• Identify the roles and responsibilities of its various municipal departments in implementing the structural BMP requirements, including each stage of a project from application review and approval through BMP maintenance and inspections.<br>• Track and submit data for Annual Report Forms, track and report estimated fiscal year budget expenditures. | CSD-JRMP-04* | Train staff on LID regulatory changes and LID practices.<br>Formal training is required for all staff involved in development plan review to increase knowledge of LID BMPs. Goal of training associated with LID practices and regulations is to promote LID implementation and to avoid adverse conditions such as trees planted within swales, or planned drainage patterns which obstruct or inhibit LID performance. |
| | | | | CSD-JRMP-05* | Amend municipal code and ordinances, including zoning ordinances, to facilitate and encourage LID opportunities to support compliance with the MS4 Permit and TMDLs in a reasonable manner. Ensure consistency with the City of San Diego's BMP Design Manual. Update the Storm Water Standards Manual accordingly.<br>Municipal codes and ordinances will be brought to City Council for consideration to encourage LID implementation (e.g., runoff detention and filtration using natural filters and stormwater retention for reuse). LID stormwater management will be encouraged in proposed codes and ordinances associated with development and redevelopment projects, which are brought to City Council for consideration. |

**Table 4-1. Management Strategies (contd.)**

| Programmatic Asset Class | Objective | Programmatic Asset | Level of Service | Management Strategy | Optimized Management Strategy[1] |
|---|---|---|---|---|---|
| Development Planning (contd.) | Each Copermittee must use their land use and planning authorities to implement a development planning program in accordance with the strategies in the Water Quality Improvement Plan described pursuant to Provision B.3.b.(1) | Development and Construction Standards | • Prescribe general, source control, and LID BMP requirements, as outlined in the Permit, during the planning process for all development projects.<br>• Identify the roles and responsibilities of its various municipal departments in implementing the structural BMP requirements, including each stage of a project from application review and approval through BMP maintenance and inspections.<br>• Track and submit data for Annual Report Forms, track and report estimated fiscal year budget expenditures. | CSD-JRMP-07 | For PDPs, administer a program and provide technical support to other City departments to ensure implementation of on-site structural BMPs to control pollutants and manage hydromodification by developing City wide stormwater development standards and design guidelines. |
| | | | | CSD-JRMP-09 | Update Storm Water Standards Manual to determine nature and extent of stormwater requirements applicable to development projects and to identify conditions of concern for selecting, designing, and maintaining appropriate structural BMPs. Perform minor update every 2 years and major update every 7-8 years.<br>Storm Water Standards Manual will be updated in accordance with the Permit and made available on the City's website. |
| | | | | CSD-JRMP-11* | Amend BMP Design Manual for animal-related facilities, such as such as animal shelters, "doggie day care" facilities, veterinary clinics, breeding, boarding and training facilities, groomers, and pet care stores.<br>Amend BMP Design Manual and zoning requirements (including retrofits) to provide supplemental standards for animal facilities (including animal shelters, dog daycares, veterinary clinics, groomers, pet car stores, and breeding, boarding, and training facilities). Supplemental standards may include requiring covered trash enclosures, identification of landscaped relief areas on site plans, ensuring drainage connections and treatment swales for areas that will not drain to the sanitary sewer, as well as inspection of grading, drainage, and landscaping for outdoor exercise areas. |
| | | | | CSD-JRMP-12* | Amend BMP Design Manual for nurseries and garden centers.<br>Amend BMP Design Manual to provide supplemental standards for plant nurseries and garden centers. Standards will focus on reducing irrigation runoff, and loading of sediment, pesticides, and nutrients. Measures may include covered outdoor storage, green waste management BMPs, improved irrigation efficiency to reduce dry-weather runoff, and containment of runoff from impervious areas where plants and materials are stored. |
| | | | | CSD-JRMP-13* | Amend BMP Design Manual for auto-related uses.<br>Amend BMP Design Manual to provide supplemental standards for automotive-related uses to reduce loading of metals, oils, grease, and trash. Measures may include: four-sized covered trash enclosures, and careful review of auto-related usage areas (e.g. garage bays at repair shops) for grading, drainage, and drain connections to sanitary sewer systems. |
| | | | | CSD-JRMP-15 | Administer a program to oversee implementation of temporary BMPs that control sediment and other pollutants during the construction phase of projects. Includes requirements to inspect at appropriate frequencies and effectively enforce requirements through process controlled by other City departments.<br>Inspections performed by the City or City staff provide verification that each site is in conformance with the Construction Stormwater BMP Performance Standards in the Storm Water Standards Manual. Inspections are tracked to ensure that they meet the minimum inspection frequencies. High priority active and inactive sites are inspected bi-weekly during the rainy season. Medium priority sites are inspected monthly during the rainy season. Low priority sites are inspected as needed during the rainy season. All sites are inspected as needed during the dry season. |
| | | | | CSD-NS-02 | Investigation and research of emerging BMP technology.<br>Annually the Construction & Development Standards Group identifies new tasks to conduct literature review, communication with researchers outside of the City, physical testing and experimentation of new or emerging technologies, and other research with the goal of updating tools available for reducing pollutant loads from development and redevelopment sites. |
| | | | | CSD-NS-03 | Approve and implement a green infrastructure policy. The City will develop a policy that will increase the green infrastructure requirements for City CIP projects. This policy will be coordinated with ongoing efforts to update City design manuals and LID design standards for public LID BMPs. |

**Table 4-1. Management Strategies (contd.)**

| Programmatic Asset Class | Objective | Programmatic Asset | Level of Service | Management Strategy | Optimized Management Strategy[1] |
|---|---|---|---|---|---|
| Development Planning (contd.) | Each Copermittee must use their land use and planning authorities to implement a development planning program in accordance with the strategies in the Water Quality Improvement Plan described pursuant to Provision B.3.b.(1) | Development and Construction Standards | • Prescribe general, source control, and LID BMP requirements, as outlined in the Permit, during the planning process for all development projects.<br>• Identify the roles and responsibilities of its various municipal departments in implementing the structural BMP requirements, including each stage of a project from application review and approval through BMP maintenance and inspections.<br>• Track and submit data for Annual Report Forms, track and report estimated fiscal year budget expenditures. | CSD-NS-04 | Create a manual that outlines right-of-way design standards.<br>Create a manual that includes flood control performance standards, permanent BMP elements design standards, design standards for green streets and other BMPs, and maintenance access. Provides drainage and streets design standards. Opportunity to merge various existing manuals and provide consistency. |
| | | | | CSD-NS-47 | Coordinate with Development Services Department to prohibit introduction of invasive plants in new development and redevelopment projects.<br>Coordinate with the City's Development Services Department to continue to prohibit introduction of invasive species such as Arundo donax and Cortaderia selloana for new development or redevelopment projects as specified in the City's municipal code for landscape. |
| | | | | CSD-PDP-01 | Priority Development Project BMPs in Los Peñasquitos WMA.<br>Per the Storm Water Standards Manual, all non-exempt public PDPs are subject to requirements to construct and maintain permanent BMPs. See WQIP Annual Report for updated PDP BMP Inventory. |
| | | | | CSD-PDP-02 | Priority Development Project BMPs in Mission Bay WMA.<br>Per the Storm Water Standards Manual, all non-exempt public PDPs are subject to requirements to construct and maintain permanent BMPs. See WQIP Annual Report for updated PDP BMP Inventory. |
| | | | | CSD-PDP-03 | Priority Development Project BMPs in San Diego Bay WMA.<br>Per the Storm Water Standards Manual, all non-exempt public PDPs are subject to requirements to construct and maintain permanent BMPs. See WQIP Annual Report for updated PDP BMP Inventory. F |
| | | | | CSD-PDP-04 | Priority Development Project BMPs in San Diego River WMA.<br>Per the Storm Water Standards Manual, all non-exempt public PDPs are subject to requirements to construct and maintain permanent BMPs. See WQIP Annual Report for updated PDP BMP Inventory. |
| | | | | CSD-PDP-05 | Priority Development Project BMPs in San Dieguito River WMA.<br>Per the Storm Water Standards Manual, all non-exempt public PDPs are subject to requirements to construct and maintain permanent BMPs. See WQIP Annual Report for updated PDP BMP Inventory. |
| | | | | CSD-PDP-06 | Priority Development Project BMPs in Tijuana River WMA.<br>Per the Storm Water Standards Manual, all non-exempt public PDPs are subject to requirements to construct and maintain permanent BMPs. See WQIP Annual Report for updated PDP BMP Inventory. |
| | | | | CSD-GI-01 | Green lot of 0.6 acres includes infiltrative treatment systems (porous pavement and bioretention areas) to treat a drainage area of 8.9 acres. Maintenance of the BMP shall be performed as expected by O&M Plan. |
| | | | | WMA-21 | Coordinate with Development Services Department to implement Sustainable Landscapes Program to encourage landscape retrofits. Implementation of this strategy may be triggered if (1) an interim goal has not been met, (2) it has been determined though adaptive management that implementation is necessary, and (3) all the resources have been identified and secured. The following resources must be secured for each fiscal year that this program is implemented: (1) Partners must be identified and each partner must agree to terms of partnership, (2) funding must be identified and secured by each of the partners for their portion of the overall cost, (3) staff resources must be identified and secured, (4) the scope of the program (target location(s), type and value of incentives, etc.) must be identified, and (5) consensus and community support has been achieved. |

**Table 4-1. Management Strategies (contd.)**

| Programmatic Asset Class | Objective | Programmatic Asset | Level of Service | Management Strategy | Optimized Management Strategy[1] |
|---|---|---|---|---|---|
| Development Planning (contd.) | Each Copermittee must use their land use and planning authorities to implement a development planning program in accordance with the strategies in the Water Quality Improvement Plan described pursuant to Provision B.3.b.(1) | Plan Check | • In addition to the BMP requirements for all development, require each PDP to implement onsite structural BMPs to control pollutants in stormwater, and manage hydromodification that may be caused by stormwater discharged from a project.<br>• Require and confirm that prior to occupancy and/or intended use of any portion of the PDP, each structural BMP is inspected to verify that it has been constructed and is operating in compliance with all of its specifications, plans, permits, ordinances, and the requirements of the Municipal Permit.<br>• Track and submit data for Annual Report Forms, track and report estimated fiscal year budget expenditures. | CSD-JRMP-07 | For PDPs, administer a program and provide technical support to other City departments to ensure implementation of on-site structural BMPs to control pollutants and manage hydromodification by developing City wide stormwater development standards and design guidelines.<br>Administer a program in coordination with other City departments to promote and confirm a thorough understanding of requirements for implementing structural BMPs that control pollutants and manage hydromodification. Includes requirements to confirm proper design and construction through processes controlled by other City departments. |
| Existing Development Management | Each Copermittee must implement an existing development management program in accordance with the strategies in the Water Quality Improvement Plan described pursuant to Provision B.3.b.(1) | Catch Basin Inspection and Cleaning | • Catch Basins located in the public rights of way and on City owned parcels managed by the Stormwater Division and Park and Recreation Department will be inspected and cleaned of debris or other foreign material generally annually. In accordance with the strategies listed in the Water Quality Improvement Plan, some inlets may be inspected and cleaned less frequently in exchange for more frequent inspection and cleaning of targeted areas.<br>• Track and submit data for Annual Report Forms, track and report estimated fiscal year budget expenditures. | CSD-JRMP-23 | Implementation of operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, channels as allowed by resource agencies, detention basins, pump stations, etc.) for water quality improvement and for flood control risk management.<br>Refer to JRMP Section 7. Storm drain inlets are inspected generally annually and cleaned when accumulated materials are present. Other MS4 and related structures are inspected as needed. On-going CB cleaning, BMPs cleaned before/after rainy season; wet well cleaning on request (1-2x/year) |
| | | | | CSD-JRMP-24* | Enhanced catch basin cleaning to increase pollutant removal (up to 4 times per year) in the rainy season as specified in the WQIP.<br>To increase pollutant load removal, catch basins will be cleaned up to four times per year in the rainy season. The City of San Diego's pilot study found that major pollutants may vary from neighborhood to neighborhood (yard waste versus trash and sediment). Implementation may be adapted based on catch basin record keeping and cleaning optimization. Increase in frequency will be phased over 4 Fiscal Years. On-going CB cleaning, BMPs cleaned before/after rainy season; wet well cleaning on request (1-2x/year) |
| | | | | CSD-JRMP-25* | Enhanced catch basin cleaning to increase pollutant removal (between 2-4 times per year in medium priority areas in the rainy season).<br>To increase pollutant load removal, catch basins will be cleaned between 2-4 times per year in medium priority areas in the rainy season. The City of San Diego's pilot study found that major pollutants may vary from neighborhood to neighborhood (yard waste versus trash and sediment). Implementation may be adapted based on catch basin record keeping and cleaning optimization. Increase in frequency will be phased over 4 Fiscal Years. |

**Table 4-1. Management Strategies (contd.)**

| Programmatic Asset Class | Objective | Programmatic Asset | Level of Service | Management Strategy | Optimized Management Strategy[1] |
|---|---|---|---|---|---|
| Existing Development Management (contd.) | Each Copermittee must implement an existing development management program in accordance with the strategies in the Water Quality Improvement Plan described pursuant to Provision B.3.b.(1) | Industrial and Commercial Facility Inspections | • Maintain, and update at least annually, a watershed-based inventory and map of the existing development within its jurisdiction that may discharge a pollutant load to and from the municipal separate storm sewer system (MS4; hereafter, "storm drain system"). The inventory must include the required descriptions listed in the Municipal Permit.<br>• Designate a minimum set of best management practices (BMP) required for all inventoried existing development, including special event venues. The City must also require the implementation, operation, and maintenance of BMPs by commercial areas and industrial facilities.<br>• Conduct inspections at frequencies as described in the Municipal Permit, e.g., annually perform onsite inspections of an equivalent of at least 20 percent of its inventoried existing development, inspect inventory at least once every five years.<br>• Inspections performed by the City must satisfy the minimum inspection content requirements listed in the Municipal Permit.<br>• Track all inspection and re- inspections. All inspection records must retain the minimum requirements listed in the Municipal Permit.<br>• Track and submit data for Annual Report Forms, track and report estimated fiscal year budget expenditures. | CSD-JRMP-17 | Administer a program to require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types, and PGAs, as appropriate. Includes inspection of existing development at appropriate frequencies and using appropriate methods.<br>Refer to JRMP Sections 6, 7, and 8. All industrial and commercial areas are inspected once within five years. At a minimum, 20 percent of industrial and commercial areas receive onsite inspections every year. Municipal facilities are inspected twice annually, once prior to the rainy season, and once during the rainy season. Residential management areas (RMA) within the City are to be inspected once within five years, at a minimum. Please see Attachment 1 for details on updated minimum BMPs that will be implemented to address sources causing or contributing to the HPWQC. |
| | | | | CSD-JRMP-20 | Implement property-based inspections.<br>Property-based inspections increase awareness and responsibility for individual properties to tackle issues associated with trash, landscapes, and parking areas. Expanding beyond the business-level inspections will achieve different and more effective opportunities for education, outreach, inspection, and enforcement to encourage water conservation strategies. Inspection frequency dependent on type of facility. See CSD-9 for inspection frequency. |
| | | | | CSD-JRMP-37 | Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education. |
| | | Rebate Program | Maximize distribution of funding from Water Conservation Rebate Program (Rain Barrels, Rain Gutters, and Downspout Redirects, etc.); For example, FY21 $200,000; anticipated future FY funding is approximately $300,000 | CSD-NS-06 | Residential and Commercial BMP: Rain Barrel<br>The existing PUD rebate program will continue for residential properties and expand for commercial properties for water collection, conservation, and reuse with rain barrels. Will occur city-wide in residential areas. |
| | | | | CSD-NS-07 | Residential and Commercial BMP: Grass Replacement<br>The existing PUD grass replacement cash rebate program will continue and expand for residential and commercial properties. Program encourages a reduction in water use through the conversion of non-artificial grass to water wise plant material, while maintaining a high level of living landscape to benefit the environment. Program does not allow for conversion to artificial turf. Will occur city-wide in residential and commercial areas. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council. |
| | | | | CSD-NS-08 | Residential and Commercial BMP: Downspout Disconnect<br>Disconnecting downspouts provide alternate runoff pathways from rooftops, sidewalks, driveways, and roads. Disconnecting downspouts from residential areas to pervious land can allow for depression storage and infiltration. Will occur city-wide in residential and commercial areas. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council. |

**Table 4-1. Management Strategies (contd.)**

<table>
<tr><th>Programmatic Asset Class</th><th>Objective</th><th>Programmatic Asset</th><th>Level of Service</th><th>Management Strategy</th><th>Optimized Management Strategy[1]</th></tr>
<tr><td rowspan="6">Existing Development Management (contd.)</td><td rowspan="6">Each Copermittee must implement an existing development management program in accordance with the strategies in the Water Quality Improvement Plan described pursuant to Provision B.3.b.(1)</td><td rowspan="4">Rebate Program</td><td rowspan="4">• Maximize distribution of funding from Water Conservation Rebate Program (Rain Barrels, Rain Gutters, and Downspout Redirects, etc.); FY21 $200,000.</td><td>CSD-NS-09</td><td>Residential and Commercial BMP: Micro-irrigation<br>The existing PUD micro-irrigation rebate program will continue and increase for residential and commercial properties. Application of micro-irrigation aims to improve the efficiency of landscape irrigation through the precise application of water. Will occur city-wide in residential areas. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.</td></tr>
<tr><td>CSD-NS-10</td><td>Provide Onsite Water Conservation Surveys.<br>Provide free onsite water conservation surveys to commercial and residential customers to reduce overirrigation and to encourage water conservation. Will occur city-wide in residential and commercial areas. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.</td></tr>
<tr><td>CSD-NS-60</td><td>Coordinate with Development Services Department to implement Sustainable Landscapes Program to encourage landscape retrofits.<br>Collaborate with other San Diego River WMA Responsible Agencies to implement a Sustainable Landscapes Program. Implementation of this strategy may be triggered if (1) an interim goal has not been met, (2) it has been determined though adaptive management that implementation is necessary, and (3) all the resources have been identified and secured. The following resources must be secured for each fiscal year that this program is implemented: (1) Partners must be identified and each partner must agree to terms of partnership, (2) funding must be identified and secured by each of the partners for their portion of the overall cost, (3) staff resources must be identified and secured, (4) the scope of the program (target location(s), type and value of incentives, etc.) must be identified, and (5) consensus and community support has been achieved.</td></tr>
<tr><td>WMA-21</td><td>Coordinate with Development Services Department to implement Sustainable Landscapes Program to encourage landscape retrofits.</td></tr>
<tr><td rowspan="4">Street Sweeping</td><td rowspan="4">• Sweep paved parking lots, roads, and driveways based on the threat level, utilizing the following schedule as a baseline:<br><table><tr><th>Debris Volume</th><th>Frequency</th></tr><tr><td>High</td><td>Up to twice/month</td></tr><tr><td>Medium</td><td>Monthly</td></tr><tr><td>Low</td><td>Once/year</td></tr></table>In accordance with strategies listed in the Water Quality Improvement Plans, some areas may be swept less frequently in exchange for more frequent sweeping of targeted areas. Additional discussions of the Water Quality Improvement strategies related to this Minimum Municipal BMP are provided in Section 7.3.16.</td><td>CSD-JRMP-34*</td><td>Enhance street sweeping through equipment replacement (replace mechanical sweepers with regenerative air sweepers) and route optimization (sweep all routes twice per month) in targeted areas per the WQIPs.<br>Following outreach and posting, street sweeping efforts will be increased in target areas (those with sediment or metals as a highest priority water quality conditions). Replacement of street sweeping equipment with high-efficiency regenerative air and vacuum-assisted sweepers over time is expected to further increase load reductions (even if current routes and frequencies remain unchanged).</td></tr>
<tr><td>CSD-JRMP-35*</td><td>Initiate sweeping of medians on high-volume arterial roadways. Medians of roadways are also a potential source of pollutants. Consider implementing or increasing sweeping of medians. Consider mechanical and hand sweeping techniques.</td></tr>
<tr><td>CSD-JRMP-59*</td><td>Focused enforcement of sweeping and maintenance of private roads and parking lots in targeted areas.</td></tr>
<tr><td>CSD-JRMP-32</td><td>Implement operation and maintenance activities for public streets, unpaved roads, paved roads, and paved highways.</td></tr>
</table>

**Table 4-1. Management Strategies (contd.)**

| Programmatic Asset Class | Objective | Programmatic Asset | Level of Service | Management Strategy | Optimized Management Strategy[1] |
|---|---|---|---|---|---|
| Existing Development Management (contd.) | Each Copermittee must implement an existing development management program in accordance with the strategies in the Water Quality Improvement Plan described pursuant to Provision B.3.b.(1) | Structural BMP Inspection | • Develop, maintain, prioritize, and update at least annually, a watershed-based database to track and inventory all PDPs and associated structural BMPs within its jurisdiction.<br>• Verify that structural BMPs on each PDP are adequately maintained and continue to operate effectively to remove pollutants in stormwater to the maximum extent practicable through inspections, self-certifications, surveys, or other equally effective approaches.<br>• Track and submit data for Annual Report Forms, track and report estimated fiscal year budget expenditures. | CSD-JRMP-08 | Institute a program to verify and enforce maintenance and performance of treatment control BMPs.<br>Refer to JRMP Section 4.5. The Stormwater Division is responsible for annually verifying that all structural BMPs within its inventory are being properly maintained. The Stormwater Division performs verification through an Annual Maintenance Verification mailing and a direct maintenance inspection program. Parties responsible for maintenance of structural BMPs are required to complete and sign the Annual Maintenance Verification, certifying that the structural BMPs are being properly maintained. Direct maintenance inspections will be performed at all projects for which an Annual Maintenance Verification Form was not completed. All high priority projects will be inspected annually prior to the rainy season. 20 percent of all projects will be inspected annually. Inspect additional BMPs as needed. Medium and low priority projects will not require inspection if they have completed their Annual Maintenance Verification form, unless they are part of the 20 percent of projects that are annually inspected.<br>20 percent of all projects will be inspected annually (prioritize oldest sites on list and new sites that have not been inspected); send maintenance verification forms every year; inspect all high priority sites by 10/1. |
| | | Structural BMP Maintenance | • Maintain structural BMPs at least once annually | --- | Maintain structural BMPs at least once annually in accordance with its operation and maintenance plan. |
| | | Trash Implementation Program | • Identify install, and monitor 1500 trash capture catch basin inserts by 2030<br>• By 2030 City must be removing 204 tons of trash annually through a combination of trash capture catch basin inserts and nonstructural activities including street sweeping and catch basin cleaning. | CSD-JRMP-10* | Amend BMP Design Manual for trash areas. Require full four-sided enclosure, siting away from storm drains and cover. Consider the retrofit requirement.<br>Amend BMP Design Manual and zoning standards/requirements which address reduction of pollutants for common areas of trash build-up (e.g. restaurants, supermarkets, "big box" retail stores with food, pet stores). Most effective method for source control of bacteria and trash is to employ four-sized trash enclosures with a cover over trash areas. |
| | | | | CSD-NS-13 | Coordinate with Parks and Recreation Department on trash mitigation in the western portion of the Otay River HU.<br>Longstanding partnerships and sponsorships with I Love A Clean San Diego and Otay Valley Regional Park (OVRP) will be continued and enhanced. The City of San Diego has a Joint Exercise Powers Agreement with the City of Chula Vista and the County of San Diego to manage the OVRP. City of San Diego park rangers perform regular maintenance of the Western OVRP including, but not limited to: overseeing all contract services; patrolling the Park and keeping it as clean and safe as possible; providing educational opportunities for visitors; providing consistent public outreach; maintaining the grounds and facilities; and coordinating with various agencies, public utilities, and other organizations. The park rangers work with WildCoast to educate the local community, and WildCoast supports OVRP's educational programs, such as brochure development and public outreach events like OVRP Day, I Love A Clean San Diego cleanup, and various other events throughout the year. |

**Table 4-1. Management Strategies (contd.)**

| Programmatic Asset Class | Objective | Programmatic Asset | Level of Service | Management Strategy | Optimized Management Strategy[1] |
|---|---|---|---|---|---|
| Existing Development Management (contd.) | | Non-TMDL Modeled Non-Structural BMPs | • Comply with Provision B.3.c of the NPDES MS4 Permit, which provides a rigorous and transparent alternative compliance pathway that allows Copermittees appropriate time to comply with receiving water limitations (RWL) without being in violation of the RWLs during implementation of the compliance alternative. Non-structural measures will be implemented by the following dates:<br>o Area above Lake Hodges (San Dieguito WMA) - 2027<br>o Rose Canyon watershed (Mission Bay WMA) - 2041<br>o Areas outside of Chollas watershed (San Diego Bay WMA) – 2041<br>o Tijuana River WMA - 2045 | --- | Implement nonstructural activities such as enhanced catch basin cleaning and enhanced street sweeping. |
| | | Low Flow Diversion Operation and Maintenance | • Maintain low flow diversions so that there is no bypass of dry weather flows. | --- | Maintain Low Flow Diversions at least once annually in accordance with its operation and maintenance plan. |

**Table 4-1. Management Strategies (contd.)**

<table>
<tr><th>Programmatic Asset Class</th><th>Objective</th><th>Programmatic Asset</th><th>Level of Service</th><th>Management Strategy</th><th>Optimized Management Strategy[1]</th></tr>
<tr>
<td>Construction Management</td>
<td>Each Copermittee must implement a construction management program in accordance with the strategies in the Water Quality Improvement Plan described pursuant to Provision B.3.b.(1)</td>
<td>Construction Management</td>
<td>
<ul>
<li>Maintain, and update, at least quarterly, an inventory of construction sites within its jurisdiction, and identify sites that represent a high threat to downstream surface water quality.</li>
<li>Implement, or require the year-round implementation of effective, site specific, seasonally appropriate, and construction phase appropriate BMPs to reduce discharges of pollutants in stormwater from construction sites to the maximum extent practicable, and effectively prohibit non-storm water discharges from construction sites into the municipal separate storm sewer system (MS4).</li>
<li>Ensure construction requirements are met through the project authorization or approval process prior to issuance of any local permit(s) that allows the commencement of construction projects that involve ground disturbance or soil disturbing activities that can potentially generate pollutants in stormwater runoff.</li>
<li>Perform Construction Inspections in accordance with the following frequencies:</li>
</ul>
<table>
<tr><th>Site Priority</th><th>Criteria</th><th>Rainy Season</th><th>Dry Season</th></tr>
<tr><td>ASBS</td><td>Projects located within the ASBS watershed</td><td>Weekly</td><td>Quarterly</td></tr>
<tr><td>High (High Threat to Water Quality)</td><td>Risk Level 2 & 3<br>LUP Type 2 & 3</td><td>Bi-weekly</td><td>Quarterly</td></tr>
<tr><td>Medium</td><td>Risk Level 1 (outside ASBS)<br>LUP Type 1 (outside ASBS)<br>WPCP projects within Peñasquitos WMA</td><td>Monthly</td><td>Quarterly</td></tr>
<tr><td>Low</td><td>All WPCP projects not determined to be Medium Priority</td><td>Quarterly</td><td>As Needed</td></tr>
</table>
<ul>
<li>Conduct construction site inspections to require and confirm compliance with its local permits and applicable local ordinances, and the requirements of the Permit. Priority for site inspections must consider threat to water quality, as well as the nature of the construction activity, topography, and the characteristics of soils and receiving water quality.</li>
<li>Track and submit data for Annual Report Forms, track and report estimated fiscal year budget expenditures.</li>
</ul>
</td>
<td>CSD-JRMP-16</td>
<td>Administer a program to oversee implementation of temporary BMPs that control sediment and other pollutants during the construction phase of projects. Includes requirements to inspect at appropriate frequencies and effectively enforce requirements through process controlled by other City departments.<br>Inspections performed by the City or City staff provide verification that each site is in conformance with the Construction Stormwater BMP Performance Standards in the Storm Water Standards Manual. Inspections are tracked to ensure that they meet the minimum inspection frequencies. High priority active and inactive sites are inspected bi-weekly during the rainy season. Medium priority sites are inspected monthly during the rainy season. Low priority sites are inspected as needed during the rainy season. Any construction site in an area draining to the La Jolla ASBS will be inspected weekly during the rainy season. All sites are inspected as needed during the dry season.</td>
</tr>
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**Table 4-1. Management Strategies (contd.)**

| Programmatic Asset Class | Objective | Programmatic Asset | Level of Service | Management Strategy | Optimized Management Strategy[1] |
|---|---|---|---|---|---|
| Enforcement Response | Copermittee to enforce its legal authority established pursuant to Provision E.1, and in accordance with its Enforcement Response Plan to compel compliance with the requirements of Permit Provision E.5 and ensure the pollutants in stormwater discharges from the MS4 are reduced and continue to be reduced to the MEP | Code Enforcement | • Enforce its legal authority established for all development projects, as necessary, to achieve compliance with the requirements of the Permit.<br>• Enforce its legal authority established for all its inventoried existing development, as necessary, to achieve compliance with the requirements of the Municipal Permit.<br>• Enforce its legal authority established for all its inventoried construction sites, as necessary, to achieve compliance with the requirements of the Permit.<br>• Complete approximately 4,000 cases per year within in 30 days of reporting date. | CSD-JRMP-54 | Continue to implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Stormwater Code Enforcement Unit's Standard Operating Procedures (SOP) - Enforcement Response Plan. |
| | | | | CSD-JRMP-55* | Focused enforcement policies against irrigation runoff will be established in tandem with the education and outreach programs on how these actions lead to pollutant loading. By shifting to property-based inspections irrigation runoff can be handled as enforceable violations once the public is well-informed. |
| | | | | CSD-JRMP-56* | Focused enforcement of water-using mobile businesses. In addition to education, pollution associated with mobile business sources can be handled through policy, code development, inspections of business practices, and enforcement. |
| | | | | CSD-JRMP-57* | Focused enforcement of all minimum BMPs for existing residential, commercial, and industrial development. |
| | | | | CSD-JRMP-58* | Focused enforcement associated with property-based inspections.<br>Shifting inspections from businesses-specific to property-based will increase effectiveness and sense of responsibility and ownership. Education and outreach must be followed up with inspection and enforcement of regulations to encourage proper landscape and water conservation strategies. |
| | | | | CSD-JRMP-60* | Focused identification and enforcement of actionable erosion and slope stabilization issues on private property and require stabilization and repair.<br>Eroding and unstable slope areas on private property (excluding construction sites) will be identified as potential sediment loading sources and subject to enforcement. In the short term, this will target enhanced inspection and enforcement programs to ensure inspectors address erosion and slope instability for the purpose of education. |
| | | Parking Enforcement | Enforcement of 40 routes annually. | --- | Street sweeping is an effective non-structural measure to remove pollutants that have accumulated in the gutter. Implement parking enforcement during street sweeping as a measure to penalize the offender. |

**Table 4-1. Management Strategies (contd.)**

| Programmatic Asset Class | Objective | Programmatic Asset | Level of Service | Management Strategy | Optimized Management Strategy[1] |
|---|---|---|---|---|---|
| Monitoring and Assessment | Monitor and assess the impact on the conditions of receiving waters caused by discharges from the Copermittees' MS4s under wet weather and dry weather conditions. The goal of the monitoring and assessment program is to inform the Copermittees about the nexus between the health of receiving waters and the water quality condition of the discharges from their MS4s. This goal will be accomplished through monitoring and assessing the conditions of the receiving waters, discharges from the MS4s, pollutant sources and/or stressors, and effectiveness of the water quality improvement strategies implemented as part of the Water Quality Improvement Plans. | Compliance Monitoring Program | • Implement a monitoring and assessment program in compliance with Permit Provision II.D. | --- | • Perform the following monitoring:<br>○ Receiving water monitoring<br>○ MS4 Outfall Discharge Monitoring<br>• Evaluate the data collected pursuant to Provisions D.1, D.2 and D.3, and information collected during the implementation of the jurisdictional runoff management programs required pursuant to Provision E, to assess the progress of the water quality improvement strategies in the Water Quality Improvement Plan toward achieving compliance with Provisions A.1.a, A.1.c and A.2.a. |
| | | | | CSD-JRMP-30 | • Coordinate with other City departments (PUD) to implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers. |
| | | | | CSD-JRMP-40 | • Implement Illicit Discharge, Detection, and Elimination (IDDE) Program per the JRMP. Requirements include maintaining an MS4 map, using municipal personnel and contractors to identify and report illicit discharges, maintaining a hotline for public reporting of illicit discharges, monitoring MS4 outfalls, and investigating and addressing any illicit discharges. |
| | | | | CSD-JRMP-41 | • Implement Illicit Discharge, Detection, and Elimination (IDDE) Program per the JRMP. Requirements include maintaining an MS4 map, using municipal personnel and contractors to identify and report illicit discharges, maintaining a hotline for public reporting of illicit discharges, monitoring MS4 outfalls, and investigating and addressing any illicit discharges. |
| | | Special Studies | • Conduct two special studies in each watershed each permit term and additional as needed. | CSD-NS-16 | Conduct a Comprehensive Benefits Analysis to identify benefits other than water quality that are applicable to each of the specific WQIP strategies.<br>The analysis identifies which other benefits apply to each strategy, and documents the assumptions making those linkages. The delineation of other benefits to strategies includes a general description of each benefit, and a listing of the assumptions that were made to link those benefits to strategies. In addition, the other benefits are characterized with respect to who is directly affected: the city, residents, local businesses, or visitors. This analysis may be used as part of the adaptive management process to modify future strategies. |
| | | | | CSD-NS-23 | Conduct special studies.<br>Special studies will be conducted to gather data to identify pollutant sources, appropriate targets, or other information. Includes collaboration with universities. |
| | | | | CSD-NS-24 | Lower Tijuana River WMA Sediment Source Characterization Study<br>The study will provide an inventory and descriptions of sediment sources in the lower Tijuana River Watershed Management Area. The study will utilize a combination of pre-and post-storm visual observations and sediment load measurements. The study will focus on municipal properties; unmaintained yards; dirt roads, trails, and unpaved alleys; large commercial areas; and other significant developed or impervious areas. The study will build upon the findings of the Tijuana River Watershed Technical Support Document for Solids, Turbidity and Trash TMDLs (2010). |
| | | | | CSD-NS-25 | Los Peñasquitos Watershed Special Study<br>Los Peñasquitos WMA special study will assess sediment loads in the watersheds upstream of the Draft Sediment TMDL compliance monitoring locations. Includes the analysis of sediment water column loads, stream bedload, and air monitoring. Implemented in a phased approach. Monitoring will occur first in the Carroll Canyon subwatershed. The Los Peñasquitos Creek and Carmel Valley Creek subwatersheds will be monitored in subsequent phases. |

**Table 4-1. Management Strategies (contd.)**

| Programmatic Asset Class | Objective | Programmatic Asset | Level of Service | Management Strategy | Optimized Management Strategy[1] |
|---|---|---|---|---|---|
| Monitoring and Assessment (contd.) | Monitor and assess the impact on the conditions of receiving waters caused by discharges from the Copermittees' MS4s under wet weather and dry weather conditions. The goal of the monitoring and assessment program is to inform the Copermittees about the nexus between the health of receiving waters and the water quality condition of the discharges from their MS4s. This goal will be accomplished through monitoring and assessing the conditions of the receiving waters, discharges from the MS4s, pollutant sources and/or stressors, and effectiveness of the water quality improvement strategies implemented as part of the Water Quality Improvement Plans. | Special Studies | • Conduct two special studies in each watershed each permit term and additional as needed. | CSD-NS-26 | Participate in Reference Watershed Study.<br>The San Diego Regional Reference Stream Study (currently being conducted by the Southern California Coastal Water Research Project). The study will develop numeric targets that account for "natural sources" to establish the concentrations or loads from streams in a minimally disturbed or "reference" condition. Refer to Section 5.1 for further details. Will occur region wide. |
| | | | | CSD-NS-27 | Participate in Reference Beach Study.<br>The San Diego Regional Reference Beach Study (currently being conducted by the Southern California Coastal Water Research Project) will develop numeric targets that account for "natural sources" to establish the concentrations or loads from the beach in a minimally disturbed or "reference" condition. The purpose of this monitoring program is to advise the public of potential health risks that could occur with water contact recreation at local beaches. DEH will post a health advisory notice or close a beach when FIB results are above REC-1 water quality standards. Will occur region-wide in the Los Peñasquitos, San Dieguito River, Mission Bay, and San Diego River WMAs. |
| | | | | CSD-NS-28 | Tecolote Creek Quantitative Microbial Risk Assessment (QMRA).<br>The Tecolote Creek Quantitative Microbial Risk Assessment (QMRA) was conducted in response to the Bacteria TMDL. The study is designed to characterize the predominance of non-human sources in the watershed, quantify the potential risks associated with water contact recreation (e.g., swimming), and, if appropriate, calculate WQOs to reflect the watershed's site-specific conditions. |
| | | | | CSD-NS-29 | San Dieguito Source Identification and Prioritization Process<br>Assess sources of bacteria in the watersheds using the San Diego Bacteria Source Identification and Prioritization Process developed in 2012 as part of the MS4 Permit Report of Waste Discharge process. Focus is on the beach/lagoon area of the San Dieguito River WMA, with inputs from the upper watershed also considered where relevant and necessary to identify sources of bacteria to the beach/lagoon. |
| | | | | CSD-NS-30 | Collaborate with City of San Diego PUD and other watershed stakeholders in the Lake Hodges Water Quality Concentration Study. Study will characterize conditions and identify sources.<br>The City of San Diego's Public Utilities Department will conduct studies that can characterize the nutrient budget or "loading rate" for Lake Hodges. The proper characterization of nutrient loads to Lake Hodges include two components: (1) Uninterrupted sampling during storm events or high-water flow to Lake Hodges; and (2) Independent characterizations of nitrogen and phosphorus loads to the reservoir. This strategy will include collaboration with other watershed stakeholders. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. |

**Table 4-1. Management Strategies (contd.)**

| Programmatic Asset Class | Objective | Programmatic Asset | Level of Service | Management Strategy | Optimized Management Strategy[1] |
|---|---|---|---|---|---|
| Monitoring and Assessment (contd.) | Monitor and assess the impact on the conditions of receiving waters caused by discharges from the Copermittees' MS4s under wet weather and dry weather conditions. The goal of the monitoring and assessment program is to inform the Copermittees about the nexus between the health of receiving waters and the water quality condition of the discharges from their MS4s. This goal will be accomplished through monitoring and assessing the conditions of the receiving waters, discharges from the MS4s, pollutant sources and/or stressors, and effectiveness of the water quality improvement strategies implemented as part of the Water Quality Improvement Plans. | Special Studies | • Conduct two special studies in each watershed each permit term and additional as needed. | CSD-NS-56 | Tijuana River Valley Recovery Team (TRVRT) Project Tier I Strategy: Brown Property Restoration<br>Collaborate with Tijuana River WMA Responsible Agencies, the Regional Board, other TRVRT members, and the US Army Corps of Engineers to develop a hydrology study for the Brown Property on Holister Avenue.<br>Historic placement of unauthorized fill has resulted in significant impacts to the hydrologic function of the Tijuana River. Removal of the unauthorized fill and restoration of the site to riparian forest floodplain at the Brown Property on Hollister Avenue would substantially improve the hydrology of the Tijuana River Valley and reduce flooding risk. Resources necessary to implement this strategy include a focused hydrology study, CEQA review and permitting of the fill removal and restoration to ensure impacts are mitigated and an appropriate, sustainable, post-project design is developed for the restoration of the site, and funding; through grants, or jurisdictional General Funds. General funds are contingent on approval of the annual budget by City Council or appropriate legislative body (e.g. the Board). Participation is dependent on funding availability.<br>Additional planning activities are needed to secure funding, prepare a hydrology study, prepare a feasibility study, develop preliminary design plans, perform a CEQA review, and develop final construction documents. Once these steps are complete, additional resources will be needed to begin fill removal and other restoration work and manage the restored property. The Regional Board has requested $300,000 to prepare a hydrology study, feasibility study, and environmental documents. The City of San Diego, with support from the other Tijuana River WMA Responsible Agencies and other TRVRT members, is working with the US Army Corps of Engineers to develop a scope of work for a hydrology study. This process is estimated to be 24-36 months. |
| | | | | CSD-NS-57 | Tijuana River Valley Recovery Team (TRVRT) Project Tier I Strategy: Preparation of a Sediment Management Plan for the Tijuana River Valley<br>Collaborate with the County of San Diego, California State Parks, and other NGOs to continue excavating sediment and trash in several locations throughout the Tijuana River Valley. Sediment disposal is currently conducted at landfills at a cost of approximately $100/ton. A number of sediment management options may be explored as part of a comprehensive sediment management plan including reclamation of the Nelson Sloan quarry, beach replenishment, construction and other fill and potential cooperative agreements with Mexico for cost-efficient reuse. Resources necessary to implement this strategy includes participating jurisdictional staff. Project funding needs may be met through grant funding (e.g. California Coastal Conservancy), support from International/community groups, other institutions, or jurisdictional General Funds. General funds are contingent on approval of the annual budget by City Council or appropriate legislative body (e.g. the Board). Participation is dependent on funding availability.<br>The Regional Board's CAA request included $300,000 to prepare the sediment management plan. This funding is needed to identify regulatory requirements, processing and costing options. |
| | | | | CSD-NS-58 | Tijuana River Valley Recovery Team (TRVRT) Project Tier I Strategy: Tijuana River Valley Recovery Team Mission Support<br>Collaborate with other Tijuana River WMA Responsible Agencies and the Regional Board to provide dedicated administrative services, facilitation, translation, website enhancements, and mapping are needed to support the multi-agency needs of the Recovery Team. Project funding needs may be met through grant funding (e.g. California Coastal Conservancy), support from International/community groups, other institutions, or jurisdictional General Funds. Th Regional Board's CAA $300,000 request will fund contractor support for administration, facilitation, and translation needs for a period of two years. |

**Table 4-1. Management Strategies (contd.)**

| Programmatic Asset Class | Objective | Programmatic Asset | Level of Service | Management Strategy | Optimized Management Strategy[1] |
|---|---|---|---|---|---|
| Monitoring and Assessment (contd.) | Monitor and assess the impact on the conditions of receiving waters caused by discharges from the Copermittees' MS4s under wet weather and dry weather conditions. The goal of the monitoring and assessment program is to inform the Copermittees about the nexus between the health of receiving waters and the water quality condition of the discharges from their MS4s. This goal will be accomplished through monitoring and assessing the conditions of the receiving waters, discharges from the MS4s, pollutant sources and/or stressors, and effectiveness of the water quality improvement strategies implemented as part of the Water Quality Improvement Plans. | Special Studies | • Conduct two special studies each permit term and additional as needed. | CSD-NS-59 | Tijuana River Valley Recovery Team (TRVRT) Project Tier I Strategy: Targeted Sediment and Trash Removal Projects<br>Collaborate with the County of San Diego and Imperial Beach to participate in various sediment and trash removal projects, both through financial and staff contributions.<br>Resources necessary to implement this strategy includes NGO coordination, volunteers, and funding, through grants, or jurisdictional General Funds. General funds are contingent on approval of the annual budget by City Council or appropriate legislative body (e.g. the Board). Participation is dependent on funding availability.<br>The Regional Board's CAA request included $150,000 to support additional cleanup activities. It is anticipated that this approach may provide synergy with other sediment and trash source control efforts and lead to long-term improvements to water quality. |
| | | | | WMA-16 | Tijuana River Valley Recovery Team (TRVRT) Project Tier I Strategy: Reclamation of the Nelson Sloan Quarry<br>The City of San Diego, County of San Diego, and California State Parks, in collaboration with NGOs, will partner together to continue excavating sediment and trash in several locations throughout the Tijuana River Valley. Sediment disposal is currently conducted at landfills at a cost of approximately $100/ton. A number of sediment management options may be explored as part of a comprehensive sediment management plan including reclamation of the Nelson Sloan quarry, beach replenishment, construction and other fill and potential cooperative agreements with Mexico for cost-efficient reuse. Resources necessary to implement this strategy includes participating jurisdictional staff. Project funding needs may be met through grant funding (e.g. California Coastal Conservancy), support from International/community groups, other institutions, or jurisdictional General Funds. General funds are contingent on approval of the annual budget by City Council or appropriate legislative body (e.g. the Board). Participation is dependent on funding availability.<br>The Regional Board's CAA request included $300,000 to prepare the sediment management plan. This funding is needed to identify regulatory requirements, processing, and costing options. |
| | | | | WMA-17 | Tijuana River Valley Recovery Team (TRVRT) Project Tier I Strategy: Brown Property Restoration<br>Historic placement of unauthorized fill has resulted in significant impacts to the hydrologic function of the Tijuana River. Removal of the unauthorized fill and restoration of the site to riparian forest floodplain at the Brown Property on Hollister Avenue would substantially improve the hydrology of the Tijuana River Valley and reduce flooding risk. Resources necessary to implement this strategy includes a focused hydrology study, CEQA review and permitting of the fill removal and restoration to ensure impacts are mitigated and an appropriate, sustainable, post-project design is developed for the restoration of the site, and funding; through grants, or jurisdictional General Funds. General funds are contingent on approval of the annual budget by City Council or appropriate legislative body (e.g. the Board). Participation is dependent on funding availability.<br>Additional planning activities are needed to secure funding, prepare a hydrology study, prepare a feasibility study, develop preliminary design plans, perform a CEQA review, and develop final construction documents. Once these steps are complete, additional resources will be needed to begin fill removal and other restoration work and manage the restored property.<br>The Regional Board has requested $300,000 to prepare a hydrology study, feasibility study, and environmental documents. The City of San Diego, with support from the other Tijuana River WMA Responsible Agencies and other TRVRT members, is working with the US Army Corps of Engineers to develop a scope of work for a hydrology study. This process is estimated to be 24-36 months. |

**Table 4-1. Management Strategies (contd.)**

| Programmatic Asset Class | Objective | Programmatic Asset | Level of Service | Management Strategy | Optimized Management Strategy[1] |
|---|---|---|---|---|---|
| Monitoring and Assessment (contd.) | Monitor and assess the impact on the conditions of receiving waters caused by discharges from the Copermittees' MS4s under wet weather and dry weather conditions. The goal of the monitoring and assessment program is to inform the Copermittees about the nexus between the health of receiving waters and the water quality condition of the discharges from their MS4s. This goal will be accomplished through monitoring and assessing the conditions of the receiving waters, discharges from the MS4s, pollutant sources and/or stressors, and effectiveness of the water quality improvement strategies implemented as part of the Water Quality Improvement Plans. | Special Studies | • Conduct two special studies each permit term and additional as needed. | WMA-18 | Tijuana River Valley Recovery Team (TRVRT) Project Tier I Strategy: Preparation of a Sediment Management Plan for the Tijuana River Valley<br>The City of San Diego, County of San Diego, and California State Parks, in collaboration with NGOs, will partner together to continue excavating sediment and trash in several locations throughout the Tijuana River Valley. Sediment disposal is currently conducted at landfills at a cost of approximately $100/ton. A number of sediment management options may be explored as part of a comprehensive sediment management plan including reclamation of the Nelson Sloan quarry, beach replenishment, construction and other fill and potential cooperative agreements with Mexico for cost-efficient reuse. Resources necessary to implement this strategy includes participating jurisdictional staff. Project funding needs may be met through grant funding (e.g. California Coastal Conservancy), support from International/community groups, other institutions, or jurisdictional General Funds. General funds are contingent on approval of the annual budget by City Council or appropriate legislative body (e.g. the Board). Participation is dependent on funding availability.<br>The Regional Board's CAA request included $300,000 to prepare the sediment management plan. This funding is needed to identify regulatory requirements, processing, and costing options. |
| | | | | WMA-19 | Tijuana River Valley Recovery Team (TRVRT) Project Tier I Strategy: Tijuana River Valley Recovery Team Mission Support<br>Dedicated administrative services, facilitation, translation, website enhancements, and mapping are needed to support the multi-agency needs of the Recovery Team. Project funding needs may be met through grant funding (e.g. California Coastal Conservancy), support from International/community groups, other institutions, or jurisdictional General Funds. Th Regional Board's CAA $300,000 request will fund contractor support for administration, facilitation, and translation needs for a period of two years. |
| | | | | WMA-20 | Tijuana River Valley Recovery Team (TRVRT) Project Tier I Strategy: Targeted Sediment and Trash Removal Projects<br>The City of San Diego, County of San Diego, and Imperial Beach will continue to participate in various sediment and trash removal projects, both through financial and staff contributions.<br>Resources necessary to implement this strategy includes NGO coordination, volunteers, and funding, through grants, or jurisdictional General Funds. General funds are contingent on approval of the annual budget by City Council or appropriate legislative body (e.g. the Board). Participation is dependent on funding availability.<br>The Regional Board's CAA request included $150,000 to support additional cleanup activities. It is anticipated that this approach may provide synergy with other sediment and trash source control efforts and lead to long-term improvements to water quality. |

**Table 4-1. Management Strategies (contd.)**

| Programmatic Asset Class | Objective | Programmatic Asset | Level of Service | Management Strategy | Optimized Management Strategy[1] |
|---|---|---|---|---|---|
| Permit Management and Compliance | Comply with the CWA requirements to effectively prohibit non-storm water discharges into the MS4s and require controls to reduce the discharge of pollutants in stormwater from the MS4s to the MEP. | Permit Management and Compliance Reporting | • Comply with National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4) Draining the Watersheds within the San Diego Region by effectively prohibiting non-storm water discharges into the MS4s, and implementing controls to reduce the discharge of pollutants in stormwater from the MS4s to the MEP so that no violations are issued. | CSD-JRMP-18 | Update minimum BMPs for existing residential, commercial, and industrial development. Specific updates to BMPs include required street sweeping, catch basin cleaning, and maintenance of private roads and parking lots in targeted areas. |
| | | | | CSD-NS-15 | Coordinate and work with Parks and Recreation, where appropriate, to ensure that the City is not creating erosion issues. The Stormwater Division will work and coordinate with the Parks and Recreation Open Space Division, where appropriate, to address erosion issues. May include the continued maintenance of brow ditches. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council. |
| | | | | CSD-NS-18 | Continue participating in source reduction initiatives. Source reduction initiatives are ultimately the most effective measure to remove pollutants from surface waters, where feasible. Bans or progressive phase-outs that may be considered include plastic bags and architectural copper (generally a legacy issue), as well as prohibiting or more aggressively regulating vehicle washing. Additional source reduction initiatives to consider include pesticide sales at hardware stores and irrigation supply stores. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council. |
| | | | | CSD-NS-19 | Coordinate with Fleet Services to replace City-owned vehicle brake pads with copper-free brake pads as they become commercially available.<br>Consider legislative mandate and cooperative implementation of copper-free brake pads on city-owned vehicle to reduce pollutant deposition. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. |
| | | | | CSD-NS-22 | Coordinate with appropriate City Departments that monitor for erosion, and complete minor repair and slope stabilization on municipal property. |
| | | | | CSD-NS-61 | Implement wastewater management program to prevent sanitary sewer overflows.<br>Collaborate with other San Diego River WMA Responsible Agencies to implement wastewater management strategies targeting Fats, Oils, and Grease (FOG) to reduce sanitary sewer overflows (SSO). Develop and print guidance materials that address septic system maintenance and FOG management. Conduct workshops, training sessions, and other media outreach. This effort will require community support and partnerships to be established. Resources and funding include Grant funding from Proposition 1. |
| | | | | WMA-22 | Implement wastewater management program to prevent sanitary sewer overflows. Develop and print guidance materials that address septic system maintenance and Fats, Oils, and Grease (FOG) management. Conduct workshops, training sessions, and other media outreach. This effort will require community support and partnerships to be established. Resources and funding include Grant funding from Proposition 1. |

**Table 4-1. Management Strategies (contd.)**

| Programmatic Asset Class | Objective | Programmatic Asset | Level of Service | Management Strategy | Optimized Management Strategy[1] |
|---|---|---|---|---|---|
| Permit Management and Compliance (contd.) | | CIP Planning and Management | • Completion of 14 initiated capital projects in 5 years. | --- | Establish a BRE score and ID for each project before it advances to Capital Planning. Connect Project elements to individual assets. Advance projects from a feasibility study phase to design by Public Works. |
| | | ERP Functions and EAM Data Management | • Integrate WAMP database and functionality to EAM by FY23. Update WAMP databases on a quarterly basis until EAM is fully functional. | --- | Coordinate with ERP staff to establish process to integrate WAMP database into EAM. |
| | | GIS Support | • Update and publish backlogged changes to GIS shapefiles in City SDE spatial data enterprise (ATLAS)<br>• Backlog data edits should be performed quarterly<br>• Updates should be performed monthly or more frequent<br>• Additional FTE's are needed to meet management strategy and level of service. | --- | Implement the GIS & EAM Management Program Pilot recommendations. |
| | | Masterplans (Technical studies, Structural BMP Plan) | • Complete one technical study every two years. | --- | Assess the hydraulic capacity of the storm drain infrastructure and identify under-capacity areas and the degree to which they are under capacity. |

**Table 4-1. Management Strategies (contd.)**

| Programmatic Asset Class | Objective | Programmatic Asset | Level of Service | Management Strategy | Optimized Management Strategy[1] |
|---|---|---|---|---|---|
| Permit Management and Compliance (contd.) | Comply with the CWA requirements to effectively prohibit non-storm water discharges into the MS4s and require controls to reduce the discharge of pollutants in stormwater from the MS4s to the MEP. | Policy Development and Permit Negotiation | • Negotiate the MS4 Permit requirements to be consistent with the Clean Water Act (33 USC §1342) and the Porter-Cologne Act (CWC §13263) whereby the Division is able to make decisions on how to utilize and focus their resources, along with the ability to establish a better-defined monitoring and assessment program to inform its water quality management decisions.<br>• Develop policies to be consistent with the provisions of the MS4 Permit. | CSD-JRMP-21 | Review policies and procedures to ensure discharges from swimming pools meet permit requirements.<br>Verify and bring to City Council for consideration an update (as needed) for the City's Municipal Code (43.0301) to meet new permit requirements for swimming pool discharges. |
| | | | | CSD-NS-31 | Using adaptive management, delist the beach segment from the TMDL and Attachment E of the MS4 Permit.<br>Using the adaptive management process outlined in Section 6, remove 303(d) delisted beach segments from the Bacteria TMDL and Attachment E of the MS4 Permit. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council. |
| | | | | CSD-NS-51 | Collaboration with the Regional Board.<br>The Responsible Agencies will work with the Regional Board to identify solutions and address sources of potential water quality impairments. Priorities include 1) enforcement of the Industrial General Permit, 2) enforcement of the Ag Waiver, 3) enforcement of other non-MS4 dischargers, and 4) Bacteria TMDL updates, as appropriate for each WMA. Discussions with the Regional Board were initiated in FY15. Collaboration will continue in FY16 to identify an appropriate path forward, including a more detailed timeline. Funding and resources have been secured for FY16. Funding for future fiscal years is contingent on annual budget approval by each Responsible Agency. |
| | | | | CSD-NS-52 | Collaborate with Metals TMDL RPs and the Regional Board to Adopt Site Specific Objectives<br>Collaborate with the Metals TMDL RPs, the Regional Board, and water stakeholders to determine site-specific water-effect ratios (WER) for copper and zinc. The collaborative effort will continue through adoption of the site-specific WERs for Chollas Creek. Funding and resources have been secured for FY16. Funding for future fiscal years is contingent on annual budget approval by each Responsible Agency. |
| | | | | CSD-NS-53 | Refinement of Water Quality Regulations: Collaborate with other Responsible Agencies and the Regional Board to refine the accuracy of regulations to ensure that Non-MS4 dischargers are regulated appropriately. The goal of this exercise is to begin a dialog with the Regional Board that may lead to the following outcomes: 1) Removal of Non-MS4 discharges and the associated BMPs needed to treat those discharges from the Responsible Agencies' burden, 2) amendment of current TMDLs and the MS4 Permit to correctly assign responsibilities for Non-MS4 discharges to the appropriate entities, and 3) strengthening of Non-MS4 NPDES permits that are directly tied to the requirements of existing and future TMDLs. Discussions with the Regional Board were initiated in FY15. |
| | | | | WMA-5 | Collaboration with the Regional Board.<br>The Responsible Agencies will work with the Regional Board to identify solutions and address sources of potential water quality impairments. Priorities include 1) enforcement of the Industrial General Permit and 2) enforcement of other non-MS4 dischargers. Discussions with the Regional Board were initiated in FY15. Collaboration will continue in FY16 to identify an appropriate path forward, including a more detailed timeline. Funding and resources have been secured for FY16. Funding for future fiscal years is contingent on annual budget approval by each Responsible Agency. |

**Table 4-1. Management Strategies (contd.)**

| Programmatic Asset Class | Objective | Programmatic Asset | Level of Service | Management Strategy | Optimized Management Strategy[1] |
|---|---|---|---|---|---|
| Permit Management and Compliance (contd.) | Comply with the CWA requirements to effectively prohibit non-storm water discharges into the MS4s and require controls to reduce the discharge of pollutants in stormwater from the MS4s to the MEP. | Policy Development and Permit Negotiation | • Negotiate the MS4 Permit requirements to be consistent with the Clean Water Act (33 USC §1342) and the Porter-Cologne Act (CWC §13263) whereby the Division is able to make decisions on how to utilize and focus their resources, along with the ability to establish a better-defined monitoring and assessment program to inform its water quality management decisions.<br>• Develop policies to be consistent with the provisions of the MS4 Permit. | WMA-7 (City-wide (San Dieguito River WMA specific)) | Collaboration with the Regional Board.<br>The Responsible Agencies will work with the Regional Board to identify solutions and address sources of potential water quality impairments. Priorities include 1) enforcement of the Ag Waiver, 2) enforcement of other non-MS4 dischargers, and 3) bacteria TMDL updates. Discussions with the Regional Board were initiated in FY15. Collaboration will continue in FY16 to identify an appropriate path forward, including a more detailed timeline. Funding and resources have been secured for FY16. Funding for future fiscal years is contingent on annual budget approval by each Responsible Agency. |
| | | | | WMA-8 (City-wide (Los Penasquitos WMA specific)) | Collaboration with the Regional Board.<br>The Responsible Agencies will work with the Regional Board to identify solutions and address sources of potential water quality impairments. Priorities include 1) enforcement of the Ag Waiver, 2) enforcement of other non-MS4 dischargers, and 3) bacteria TMDL updates. Discussions with the Regional Board were initiated in FY15. Collaboration will continue in FY16 to identify an appropriate path forward, including a more detailed timeline. Funding and resources have been secured for FY16. Funding for future fiscal years is contingent on annual budget approval by each Responsible Agency. |
| | | | | WMA-9 (City-wide (Mission Bay and San Diego River WMA specific)) | Collaboration with the Regional Board.<br>The Responsible Agencies will work with the Regional Board to identify solutions and address sources of potential water quality impairments. Priorities include 1) enforcement of the Ag Waiver, 2) enforcement of other non-MS4 dischargers, and 3) bacteria TMDL updates. Discussions with the Regional Board were initiated in FY15. Collaboration will continue in FY16 to identify an appropriate path forward, including a more detailed timeline. Funding and resources have been secured for FY16. Funding for future fiscal years is contingent on annual budget approval by each Responsible Agency. |
| | | | | WMA-10 (City-wide (Tijuana River WMA specific)) | Collaboration with the Regional Board.<br>The Responsible Agencies will work with the Regional Board to identify solutions and address sources of potential water quality impairments. Priorities include 1) enforcement of the Ag Waiver, 2) enforcement of other non-MS4 dischargers, and 3) bacteria TMDL updates. Discussions with the Regional Board were initiated in FY15. Collaboration will continue in FY16 to identify an appropriate path forward, including a more detailed timeline. Funding and resources have been secured for FY16. Funding for future fiscal years is contingent on annual budget approval by each Responsible Agency. |
| | | | | WMA-11 | Collaborate with Metals TMDL RPs and the Regional Board to Adopt Site Specific Objectives<br>Studies to develop site-specific water quality objectives (SSO) for Chollas Creek in accordance with the Metals TMDL are currently underway. The TMDL RPs will continue to work collaboratively with the Regional Board and watershed stakeholders to determine site-specific water-effect ratios (WER) for copper and zinc. The collaborative effort will continue through adoption of the site-specific WERs for Chollas Creek. Funding and resources have been secured for FY16. Funding for future fiscal years is contingent on annual budget approval by each Responsible Agency. |

**Table 4-1. Management Strategies (contd.)**

| Programmatic Asset Class | Objective | Programmatic Asset | Level of Service | Management Strategy | Optimized Management Strategy[1] |
|---|---|---|---|---|---|
| Permit Management and Compliance (contd.) | Comply with the CWA requirements to effectively prohibit non-storm water discharges into the MS4s and require controls to reduce the discharge of pollutants in stormwater from the MS4s to the MEP. | Policy Development and Permit Negotiation | • Negotiate the MS4 Permit requirements to be consistent with the Clean Water Act (33 USC §1342) and the Porter-Cologne Act (CWC §13263) whereby the Division is able to make decisions on how to utilize and focus their resources, along with the ability to establish a better-defined monitoring and assessment program to inform its water quality management decisions.<br>• Develop policies to be consistent with the provisions of the MS4 Permit. | WMA-12 | Refinement of Water Quality Regulations<br>The Responsible Agencies will collaborate with the Regional Board to refine the accuracy of regulations to ensure that Non-MS4 dischargers are regulated appropriately. The goal of this exercise is to begin a dialog with the Regional Board that may lead to the following outcomes: 1) Removal of Non-MS4 discharges and the associated BMPs needed to treat those discharges from the Responsible Agencies' burden, 2) amendment of current TMDLs and the MS4 Permit to correctly assign responsibilities for Non-MS4 discharges to the appropriate entities, and 3) strengthening of Non-MS4 NPDES permits that are directly tied to the requirements of existing and future TMDLs. Discussions with the Regional Board were initiated in FY15. Collaboration will continue in FY16 to identify an appropriate path forward, including a more detailed timeline. Resources to implement this strategy include staff time and are currently secured. |
| | | Regulatory Review | • Review and provide comments on regulations, permits, policies, and CEQA documents within the specified public review period. | --- | Review regulations, permits, policies, and CEQA documents and provide comments that are in the best interest of the citizens of San Diego. |
| | | Watershed Asset Management | • Update the Watershed Asset Management Plan on an annual basis to improve data quality and confidence levels. | --- | Update the Watershed Asset Management Plan to improved asset inventory, data quality, hierarchy, asset replacement costs, management strategies, business risk exposure, and levels of service so that more reliable and confident stormwater management decisions can be made.<br>Conduct a Cost of Service Study that will examine the full cost of flood control and stormwater strategies needed to comply with stormwater regulations for the City of San Diego. The City of San Diego's Watershed Asset Management Plan will be used as the basis for the study. |
| Best Available Science | Application of well-informed decision-making in natural resource and land-use planning, policy, and management. Scientific inquiry provides a pathway for understanding natural systems and for tracking changes in order to better understand causative factors and potential future conditions | Alternative Compliance Program | • At the discretion of each Copermittee, Priority Development Projects may be allowed to participate in an alternative compliance program in lieu of implementing the onsite structural BMP performance requirements of Provisions E.3.c.(1) and E.3.c.(2)(a)<br>• Establish the Alternative Compliance Program to fund and deliver 6 projects per year. | CSD-JRMP-14* | Offsite Alternative Compliance Option<br>WMAA and Water Quality Equivalency Study were completed in FY15. Phase I, applicant implemented projects, were anticipated to be in effect by the end of FY16 contingent on Regional Board's approval of the WQIPs. Phase II, the expansion of the program to include other alternative compliance options, was expected to begin in FY16. |
| | | | | CSD-JRMP-38 | Development of a strategy and identification of candidate areas of existing development necessary for implementing retrofit projects and facilitate the implementation of such projects.<br>Refer to JRMP Appendix XIX. The Offsite Alternative Compliance Program will include methods for identifying and assessing potential retrofit projects in existing development areas. Retrofit project selection will be based upon a variety of factors including proximity to high priority water quality conditions, potential pollutant load removal effectiveness, and feasibility of implementation. The program will include protocols related to funding mechanisms for project construction and long-term maintenance, payment and credit structures, and water quality equivalency standards. Specific retrofit projects are included in the Non-JRMP, Structural Strategies categories. |

**Table 4-1. Management Strategies (contd.)**

| Programmatic Asset Class | Objective | Programmatic Asset | Level of Service | Management Strategy | Optimized Management Strategy[1] |
|---|---|---|---|---|---|
| Best Available Science (contd.) | Application of well-informed decision-making in natural resource and land-use planning, policy, and management. Scientific inquiry provides a pathway for understanding natural systems and for tracking changes in order to better understand causative factors and potential future conditions | Alternative Compliance Program | • At the discretion of each Copermittee, Priority Development Projects may be allowed to participate in an alternative compliance program in lieu of implementing the onsite structural BMP performance requirements of Provisions E.3.c.(1) and E.3.c.(2)(a)<br>• Establish the Alternative Compliance Program to fund and deliver 6 projects per year. | CSD-JRMP-39 | Development of a strategy and identification of candidate areas necessary to implement stream, channel, or habitat rehabilitation projects and facilitate implementation of such projects.<br>Refer to JRMP Appendix XIX. The Offsite Alternative Compliance Program will include methods for identifying and assessing potential stream, channel, or habitat rehabilitation projects in existing development areas. Rehabilitation project selection will be based upon a variety of factors including existing stream or habitat degradation, potential future cumulative stream or habitat impacts, and feasibility of implementation. The program will include protocols related to funding mechanisms for project construction and long-term maintenance, payment and credit structures, and water quality equivalency standards. |
| | | | | WMA-6 | Offsite Alternative Compliance Option<br>The WMAA provides alternative compliance methods in lieu of meeting structural BMP design standards and/or hydromodification management criteria on the project site. The San Diego County Copermittees have collectively funded and provided guidance for development of a regional WMAA. Copermittees compiled a list of candidate projects that consider the numeric goals of the WMAs as well as projects previously identified in JRMPs and other regulatory documents. Next steps include submittal of the water quality equivalency standards final document, which was submitted and approved in FY 2016. Following this approval, jurisdictions can formally implement an optional Alternative Compliance Program by February 2016 (time coincident with implementation of standards set forth in the regional BMP Design Manual and local Stormwater Standards Manuals). |
| | | Integrated Planning Framework | • Subsequent to issuing of the next permit, determine if the Division should proceed with developing an Integrated Plan, which is codified in the Clean Water Act (CWA)(HR 7279) and a mechanism to comply with CWA obligations. The Integrated Plan is a means to develop, prioritize, and implement programs and projects with the greatest benefits to public health and the environment. | --- | Conduct an analysis to determine if the Division should proceed with an integrated plan. An integrated plan is a process that identifies efficiencies from separate wastewater and stormwater programs to best prioritize capital investments and achieve our human health and water quality objectives. This approach can also lead to more sustainable and comprehensive solutions, such as green infrastructure, that improve water quality and provide multiple benefits that enhance community vitality. |
| | | Stormwater Harvesting Program | • By Q4 FY21, complete the development of a Stormwater Harvesting Case Study for Dry Weather Flow Diversion<br>• By Q4 FY21, perform in-depth analysis for Stormwater Diversion for Indirect Potable Use and Recycled Water to determine technical, regulatory, and funding constraints:<br>• In FY23, develop specific opportunities for stormwater harvesting and diversion through a feasibility study<br>• Gather stakeholder input throughout this process to maximize stormwater capture potential, improve water quality, and support water supply considerations.<br>○ | --- | Advance the stormwater harvesting study to assess the efficacy of harvesting stormwater including development of a benefit/cost analysis. |

**Table 4-1. Management Strategies (contd.)**

| Programmatic Asset Class | Objective | Programmatic Asset | Level of Service | Management Strategy | Optimized Management Strategy[1] |
|---|---|---|---|---|---|
| Flood Risk Management | Reduce the human and socio-economic losses caused by flooding while taking into account benefits from floods. | Channel Inspection and Prioritization | • Inspect and maintain 26 miles of channels, 7 Basins, and 10 Inlet/Outlet structures in critical flooding areas in accordance with the Municipal Waterways Maintenance Plan (MWMP). | CSD-JRMP-27 | Implement additional BMPs in coordination with Master Maintenance Plan Enhancements.<br>For each channel segment, City will either 1) implement landscape retrofits on one residential property, 2) increase street sweeping frequency by prioritizing high traffic commercial routes adjacent to maintained channel, 3) construct and maintain a stormwater management BMP (e.g. biofiltration system, permeable pavement, vegetated swale, restored wetlands), or 4) increase frequency of catch basin inspection and as-needed cleaning for one year after maintenance. |
| | | Channel Maintenance Program | | CSD-NS-17 | Address and clean up trash from transient encampments with collaboration from the Environmental Services Department, which consults with the Homeless Outreach Team.<br>Coordinate with the Environmental Services Department, in conjunction with the Homeless Outreach Team, to respond to transient encampment trash complaints |
| | | Floodplain Management | • Participate in the Community Rating System (CRS) Program by FY22.<br>• Review up to 4 CLOMR/LOMR per month. | --- | Participate in the CRS Program, which is a voluntary, incentive-based community program that recognizes, encourages, and rewards local floodplain management activities that exceed the minimum standards of the National Flood Insurance Program (NFIP). CRS provides a framework and a variety of technical resources to help participating communities implement a comprehensive flood risk management program designed to reduce and avoid flood losses and to strengthen the insurance aspects of the NFIP. In return, flood insurance rates for existing policy holder's community-wide are discounted to reflect the reduced flood risk resulting from community actions. |
| | | Levee Management | • Inspect and maintain levees to at least the minimally acceptable standard to remain eligible for federal rehabilitation assistance through the USACE Rehabilitation and Inspection Program (PL 84-99). | --- | Inspect and maintain levees so that they are at least Minimally Acceptable, which means one or more inspection items are rated as Minimally Acceptable or one or more items are rated as Unacceptable and an engineering determination concludes that the Unacceptable inspection items would not prevent the segment/system from performing as intended during the next flood event. |

**Table 4-1. Management Strategies (contd.)**

<table>
<tr><th>Programmatic Asset Class</th><th>Objective</th><th>Programmatic Asset</th><th>Level of Service</th><th>Management Strategy</th><th>Optimized Management Strategy[1]</th></tr>
<tr><td rowspan="5">Flood Risk Management (contd.)</td><td rowspan="5">Reduce the human and socio-economic losses caused by flooding while taking into account benefits from floods.</td><td>Pump Station Operation and Maintenance</td><td>
<ul><li>
<table>
<tr><th>Pump Station</th><th>Capacity (gpm)</th><th colspan="4">Level of Service/Flooding Time (Minutes)</th></tr>
<tr><th></th><th></th><th>15yr-12hr</th><th>5yr-1hr</th><th>10yr-3hr</th><th>100yr-1hr 50yr-3hr</th></tr>
<tr><td>A</td><td>750</td><td>0</td><td>0</td><td>0</td><td>17</td></tr>
<tr><td>B to D</td><td>1,800</td><td>-</td><td>-</td><td>-</td><td>71</td></tr>
<tr><td>B to L</td><td>3,000</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>C</td><td>1,700</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>D</td><td>130,400</td><td>-</td><td>-</td><td>-</td><td>>123</td></tr>
<tr><td>E No Bypass</td><td>11,000</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>E with Bypass</td><td>11,000</td><td>0</td><td>0</td><td>0</td><td>75</td></tr>
<tr><td>F</td><td>8,490</td><td>-</td><td>-</td><td>-</td><td>107</td></tr>
<tr><td>G No Bypass</td><td>6,400</td><td>0</td><td>0</td><td>-</td><td>-</td></tr>
<tr><td>G with Bypass</td><td>6,400</td><td>872</td><td>341</td><td>821</td><td>647</td></tr>
<tr><td>H</td><td>98,250</td><td>-</td><td>12</td><td>55</td><td>156</td></tr>
<tr><td>I</td><td>3,400</td><td></td><td></td><td>13</td><td></td></tr>
<tr><td>J</td><td>3,400</td><td></td><td></td><td></td><td></td></tr>
<tr><td>K</td><td>3,400</td><td></td><td></td><td>62</td><td></td></tr>
<tr><td>L</td><td>18,000</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>N</td><td>64,000</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
</table>
</li></ul>
</td><td>---</td><td>Inspect, maintain, and upgrade the pump stations to meet the level of service of minimizing the amount of flooding time.</td></tr>
<tr><td>Tide Gate Operation and Maintenance</td><td><ul><li>Maintain tide gates to open with minimum head on the back side of the gate and close when the water on the front side of the gate is of greater depth than that on the back side.</li></ul></td><td>---</td><td>Inspect and maintain tide gates in accordance with their O&M Manual so that they properly function.</td></tr>
<tr><td>Storm Patrol</td><td><ul><li>Adequately resource (people and equipment) to mobilize and manage critical locations during qualifying storm events.</li></ul></td><td>---</td><td>Mobilize staff and equipment during qualifying events to patrol areas critical locations where flooding is prone.</td></tr>
<tr><td rowspan="2">Storm Drain Repairs and Storm Drain Replacement</td><td rowspan="2"><ul><li>Completion of 6 CIP projects annually and completion of 20 repairs monthly.</li></ul></td><td>CSD-AddOp-02</td><td>Through adaptive management and additional analysis in the future, the City will identify and implement one or more of the following opportunities to meet numeric goals: 1) MS4 outfall repair and relocation, 2) slope stabilization, 3) stream restoration, 4) implementation of sediment detention basins upstream of Los Peñasquitos Lagoon or 5) new strategies not yet identified. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council.</td></tr>
<tr><td>CSD-JRMP-28</td><td>Proactively repair and replace MS4 components to provide source control from MS4 infrastructure.<br>In order to limit inflow of pollutants and reduce pollutant loads, proactive measures will be taken to improve, repair, and replace MS4 components. The City of San Diego will start a multi-year program of repairing and replacing storm drain pipes to reduce sediment loading to the MS4. Development of an assessment management program and bond issues will be addressed. Exploration of daylighting pipes will take place where feasible and appropriate.</td></tr>
</table>

**Table 4-1. Management Strategies (contd.)**

| Programmatic Asset Class | Objective | Programmatic Asset | Level of Service | Management Strategy | Optimized Management Strategy[1] |
|---|---|---|---|---|---|
| Flood Risk Management (contd.) | Reduce the human and socio-economic losses caused by flooding while taking into account benefits from floods. | Storm Drain Repairs and Storm Drain Replacement | • Completion of 6 CIP projects annually and completion of 20 repairs monthly. | CSD-JRMP-29 | Replacement of hard assets. -Includes needed replacement of storm drains and structures. |
| | | | | CSD-JRMP-31* | Identify sewer leaks and areas for sewer pipe replacement prioritization.<br>Risk assessment to include identifying targeted areas (age, location, proximity to MS4), coming up with methodology, pilot, desktop exercise/analysis. |
| | | | | CSD-NS-01 | Conduct a special study on outfall repair/relocation. Implement fourth phase of a special study which will identify priority locations for outfall repair/relocation and sediment load reductions. Funding and resources have been secured for FY2016. |
| | | Detention Basin Maintenance | • Maintain detention basin so that its design volume is maintained, and it drains within the design drawdown time. | --- | Inspect and maintain detention basis in accordance with their O&M Manual on an annual basis. |
| | | Habitat Restoration and Mitigation | • Identify and develop plan for six sites per year based on prioritization process in Municipal Waterways Maintenance Plan (MWMP). Habitat restoration of sites to take place two years following planning and permitting. | CSD-NS-49 | Los Peñasquitos Wetland Restoration Project<br>Collaborate with Copermittees on the region-wide North Coast Corridor (NCC) Program, led by Caltrans and SANDAG. The program is intended to improve coastal transportation (including Interstate 5 and the coastal rail and transit system) while protecting and restoring coastal habitats throughout the corridor. The 27-mile-long project stretches across the cities of Oceanside, Carlsbad, Encinitas, Solana Beach, Del Mar, and San Diego and provides improvements for six coastal lagoons, including Los Peñasquitos Lagoon. The NCC Program is implementing construction in phases from 2010 through 2040. The program is a $6.5 billion investment in the region that will be paid for through a combination of federal, state, and local funds. The NCC program is part of TransNet, the voter-approved, half-cent sales tax initiative that helps fund transportation projects in the region. Resources necessary to implement this strategy include City staff to coordinate with the regional effort. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. |
| | | | | CSD-NS-50 | San Dieguito Wetland Restoration Project<br>Collaborate with Copermittees and organizers of the San Dieguito River Park (SDRP) to restore the San Dieguito coastal wetlands and lagoon system. The 150-acre wetland restoration work has been primarily accomplished by Southern California Edison (SCE) and partner owners of the San Onofre Nuclear Generating Station (SONGS), including San Diego Gas & Electric (SDG&E), City of Riverside, and City of Anaheim. Construction began in fall 2006 and the $90 million Restoration Project was officially dedicated in 2011. Funding for monitoring and managing the wetlands is ongoing. Resources necessary to implement this strategy include City staff to coordinate with the regional effort. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. |

**Table 4-1. Management Strategies (contd.)**

| Programmatic Asset Class | Objective | Programmatic Asset | Level of Service | Management Strategy | Optimized Management Strategy[1] |
|---|---|---|---|---|---|
| Flood Risk Management (contd.) | Reduce the human and socio-economic losses caused by flooding while taking into account benefits from floods. | Habitat Restoration and Mitigation | • Identify and develop plan for six sites per year based on prioritization process in Municipal Waterways Maintenance Plan (MWMP). Habitat restoration of sites to take place two years following planning and permitting. | CSD-NS-55 | Tijuana River Valley Recovery Team (TRVRT) Project Tier I Strategy: Reclamation of the Nelson Sloan Quarry<br>Collaborate with the County of San Diego to reclaim the Nelson Sloan Quarry using sediment excavated in the Tijuana River Valley, a viable alternative to current sediment management transport and disposal practices. Resources necessary to implement this strategy includes participating jurisdictional staff, development of a maintenance and operation plan, development of preliminary design plans, CEQA review, and development of final construction documents. Project funding needs may be met through grant funding (e.g. California Coastal Conservancy), support from international/community groups, other institutions, or jurisdictional General Funds. General funds are contingent on approval of the annual budget by City Council or appropriate legislative body (e.g. the Board). Participation is dependent on funding availability.<br>Once these steps have been completed, additional funding and other logistical support will be needed to construct the site for sediment deposition, management, and operation. The Regional Board, with support from the Responsible Agencies and the other TRVRT members, submitted a $500,000 request to the State Board for Cleanup and Abatement Account (CAA) activities. |
| | | | | CSD-STRUCT-01 | Restoration of natural areas to allow water percolation, and installation of site appropriate drainage devices to protect Sunset Cliffs Natural Park from soil erosion<br>A feasibility study is being conducted to assess the potential to restore natural areas in Sunset Cliffs Natural Park from erosion. If the study provides feasible results, the following resources, funds, and steps are needed to implement this strategy:<br>1. Identify project locations and drainage improvements (2 years)<br>2. Secure funds in the form of general funds, bonds, or grants (2 years)<br>3. Obtain City Council approval of Capital Improvement Projects budget, City Site Development Permit and Coastal Development Permit (1 year)<br>4. Initiate preliminary engineering to narrow project scope (1 year)<br>5. Hire design consultant to develop detailed construction plans and construction cost estimates (1 year)<br>6. Complete construction contractor bid and award process for construction phase<br>7. Construct project (2-4 years).<br>8. Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget |
| | | | | CSD-STRUCT-02 | San Diego River Restoration and Trash Removal Project: The City of San Diego will implement a project involving restoration of native habitat and trash removal along 5,750 feet of the San Diego River covering approximately 57 acres. Work on this project is scheduled to begin in 2016 and be completed by 2022.<br>The City of San Diego will implement a project that will restore native habitat and involve trash removal along 5,750 feet of the San Diego River. The City will be completing the project design and obtaining the necessary permits and approval from City Council in FY 16. The following resources, funds, and steps are needed to implement the project by the end of FY 16:<br>1) Hire design consultant to develop detailed construction plans and construction cost estimates<br>2) Complete construction contractor bid and award process for construction phase<br>3) Construct project<br>4) Operation and maintenance will be in perpetuity. Funds and staff resources for this function will be approved by City Council as part of the City's annual budget |

**Table 4-1. Management Strategies (contd.)**

| Programmatic Asset Class | Objective | Programmatic Asset | Level of Service | Management Strategy | Optimized Management Strategy[1] |
|---|---|---|---|---|---|
| Flood Risk Management (contd.) | Reduce the human and socio-economic losses caused by flooding while taking into account benefits from floods. | Habitat Restoration and Mitigation | • Identify and develop plan for six sites per year based on prioritization process in Municipal Waterways Maintenance Plan (MWMP). Habitat restoration of sites to take place two years following planning and permitting. | CSD-AddOp-01 | Participate in restorative efforts for the Los Peñasquitos Lagoon in collaboration with TMDL Responsible Parties and other stakeholders.<br>Collaborate with TMDL Responsible Parties and other stakeholders to promote and support the restoration of the Los Peñasquitos Lagoon. Efforts will be coordinated with the Lagoon Enhancement Program currently being updated by the Los Peñasquitos Lagoon Foundation. This effort will require that 1) funding to address MS4 discharges is identified and secured, 2) staff resources are identified and secured, 3) partners are identified and formal MOUs are developed and executed, 4) permits required by regulatory agencies are secured, and 5) consensus and community support are achieved. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. |
| | | | | WMA-1 | Watershed Collaboration for Los Peñasquitos Lagoon Restoration<br>Collaborate with stakeholders to promote the restoration of salt marsh areas and overall improvements in estuarine and other beneficial uses within the Los Peñasquitos Lagoon. Benefits of this strategy include more efficient targeting and prioritization of lagoon restoration activities, increased cost-effectiveness of selected BMP strategies in the watershed, and development of partnerships across the MS4 jurisdictions and other TMDL responsible parties. These efforts will be coordinated with the Lagoon Enhancement Program currently being updated by the Los Peñasquitos Lagoon Foundation and will require that (1) funding to address MS4 discharges and dry weather input of freshwater is identified and secured, (2) staff resources are identified and secured, (3) partners are identified and formal memoranda of understanding (MOU) are developed and executed, (4) permits required by regulatory agencies are secured, and (5) consensus and community support are achieved. Resources necessary to implement this strategy include City staff to coordinate with the regional effort. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. Implementation is in perpetuity if funding is available. |
| | | | | WMA-2 | Los Peñasquitos Wetland Restoration Project<br>Collaborate with Copermittees on the region-wide North Coast Corridor (NCC) Program, led by Caltrans and SANDAG. The program is intended to improve coastal transportation (including Interstate 5 and the coastal rail and transit system) while protecting and restoring coastal habitats throughout the corridor. The 27-mile-long project stretches across the cities of Oceanside, Carlsbad, Encinitas, Solana Beach, Del Mar, and San Diego and provides improvements for six coastal lagoons, including Los Peñasquitos Lagoon. The NCC Program is implementing construction in phases from 2010 through 2040. The program is a $6.5 billion investment in the region that will be paid for through a combination of federal, state, and local funds. The NCC program is part of TransNet, the voter-approved, half-cent sales tax initiative that helps fund transportation projects in the region. |
| | | | | WMA-3 | San Dieguito Wetland Restoration Project<br>The Cities of San Diego and Del Mar are collaborating organizers of the San Dieguito River Park (SDRP) to restore the San Dieguito coastal wetlands and lagoon system. The 150-acre wetland restoration work has been primarily accomplished by Southern California Edison (SCE) and partner owners of the San Onofre Nuclear Generating Station (SONGS), including San Diego Gas & Electric (SDG&E), City of Riverside, and City of Anaheim. Construction began in fall 2006 and the $90 million Restoration Project was officially dedicated in 2011. The Restoration Project has enhanced southern California's unique coastal and marine environment as the restoration has provided adequate tidal flushing and circulation to support biologically diverse habitats. Beyond protecting endangered species and providing habitat to hundreds of bird species and fish, the restoration project has also added a coastal segment to the Coast to Crest Trail, allowing public enjoyment of the wetlands area while protecting sensitive habitat and vegetation. Funding for monitoring and managing the wetlands is ongoing. |

**Table 4-1. Management Strategies (contd.)**

| Programmatic Asset Class | Objective | Programmatic Asset | Level of Service | Management Strategy | Optimized Management Strategy[1] |
|---|---|---|---|---|---|
| Flood Risk Management (contd.) | Reduce the human and socio-economic losses caused by flooding while taking into account benefits from floods. | Habitat Restoration and Mitigation | • Identify and develop plan for six sites per year based on prioritization process in Municipal Waterways Maintenance Plan (MWMP). Habitat restoration of sites to take place two years following planning and permitting. | WMA-4 | Collaborative Approach to Irrigation Reduction<br>Responsible Agencies are collaborating with water agencies to encourage implementation of water conservation efforts. Water conservation that attempts to reduce irrigation and minimize stormwater runoff can also improve water quality of receiving waterbodies. MWD's SoCal Water$mart Program supports conservation efforts by offering incentives in the form of rebates for rain barrels, rotating sprinkler nozzles, weather-based irrigation controllers, soil moisture sensor systems, and turf replacement. |
| Program Administration | Plan, organize, and direct overall operations, resources, and activities of the Division to attainment of goals and objectives. | Accounts Payable | • Pay 80% of invoices to all vendors and consultant invoices on-time (500/month). | --- | Efficiently follow Accounts Payable procedures to pay vendors and consultants in accordance with contract payment terms. |
| | | Budget Development and Management | • Manage the annual SWD budget, develop a spending plan using the WAMP to guide decisions, and reconcile actuals 4 times per year. | --- | Apply the WAMP to develop annual budget requests, and prioritized list of projects based on asset criticality. |
| | | Clerical/Admin Support | • Provide clerical and administrative support to the program. | --- | Plan for and allocate funding to support the necessary clerical resource FTEs. |
| | | Contracts | • Manage allocations and spending of Division contracts to maximize annual funding. | --- | Implement Task Order Initiation Forms to plan and deliver vendor and contract work. Maximize use of funding to pool of qualified consultants. |
| | | Grants | • Fund grant management activities (grant writing, administration etc.) to $20,000 per year to identify and pursue $30,000,000 in grants per year. Win a minimum of $3,000,000 in grants. | --- | Identify, position, and coordinate grant opportunities with projects. Prepare grant applications for eligible projects and track performance. |
| | | Payroll | • Payroll to be paid on time each pay period. | --- | Efficiently follow current payroll practices and procedures. |
| Litigation, Settlement and Cleanup Actions | | Cleanup & Abatement | • Comply with cleanup & abatement orders, violations, etc. | --- | Review and assess regulatory actions, communicate with regulators, and develop and implement plans to address issues. |
| | | Investigative Orders | • Comply with investigative orders | --- | Review and assess investigative orders, communicate with regulators, and develop and implement plans to investigate the issue. |
| | | Litigation | • Minimize liability. | --- | Contact City Attorney, collect information, review vulnerability, develop legal strategy, and resolve. See Management Strategy ID CSD-JRMP-27 under Channel Maintenance Program which related to Settlement Agreement |

Notes:
* Denotes JRMP Enhanced Strategy.
[1] Management strategies were obtained from the spreadsheet titled "Strategy by SW Group 2017" and document titled "FY19 City Strategies" provided by Brianna Menke via email on April 22, 2020

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## 4.2 How Much Will it Cost?

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 developed, and the lowest lifecycle cost can be tracked against the assets. Asset management costs include replacement costs for physical assets and programmatic costs of service for the programmatic assets. It is important to note that programmatic 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 physical assets. However, because physical 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.

This section documents the amount of investment required to meet and maintain the LOS for the Division's stormwater infrastructure system. The probable cost estimation methodology and long-range investment projection for physical and programmatic assets is presented.

### 4.2.1 Probable Cost Estimation Methodology

A summary of the Division's estimated physical asset replacement costs and the overall physical asset replacement costs for each watershed was developed for the WAMP development. Probable cost estimation methodology for Division's physical and programmatic assets is discussed in this section. The unit cost basis, O&M cost basis and FTE assumptions are briefly discussed herein, and detailed assumptions for each asset class are provided in Appendix B.

The Division has developed projections of probable costs for the actions identified to manage both physical and programmatic assets to keep assets functional and achieve their specified LOS. Projections for two types of costs are developed:

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

It is important to note that planning, permitting, design, and mitigation costs of O&M activities may be budgeted as part of an operating budget and not as part of a capital budget within the Division. It is recommended that future WAMPs make that distinction and account for costs in the appropriate category.

The projected opinions of costs were developed using different methods, depending on the type of asset and the types of actions specified. The different methods are as follows:

### *Probable Cost Estimation Methodology of Physical Assets*

Valuation of physical assets in the asset register was based on an estimated replacement cost in 2020 dollars and includes the capital cost of construction and a 93% overhead cost that allows for contingency and mobilization, construction management, and planning and design. Standard construction unit costs for certain physical asset classes were provided by the Division staff. These costs were based on Division's recent projects and procurement. The estimated costs included, among others, planning, design, and construction. This replacement cost methodology is applied to the following asset classes:

- Conveyance
- Pump Stations and Diversion
- Structural BMPs
- Structures

Standard construction unit costs applied to the physical assets are presented in Table 4-2. Cost estimation assumptions are presented in Appendix B.

**Table 4-2. Physical Asset Unit Costs**

| Asset | Unit | Unit Cost[1] | Reference |
|---|---|---|---|
| Cleanout | EA | $15,000 | City Master Unit Cost[2] |
| Drop Manhole | EA | $12,500 | City's Technical Studies |
| Headwall | EA | $13,000 | City Master Unit Cost |
| Inlet | EA | $13,500 | City Master Unit Cost |
| Outlet | EA | $40,000 | City's Technical Studies |
| Energy Dissipator | EA | $38,600 | City Master Unit Cost |
| Spillway | EA | $17,000 | WAMP 1.0 |
| Tidegate | EA | $30,000 | WAMP 1.0 |
| Drains | LF | $730 | City Master Unit Cost |
| Culvert | LF | $1,800 | City's Technical Studies |
| Channel - Concrete | LF | $1,400 | City's Technical Studies |
| Channel - Earthen; Concrete | LF | $1,400 | City's Technical Studies |

**Table 4-2. Physical Asset Unit Costs (contd.)**

| Asset | Unit | Unit Cost[1] | Reference |
|---|---|---|---|
| Channel - Earthen | LF | $300 | City's Technical Studies |
| Brow Ditch | LF | $90 | WAMP 1.0 |
| Levee | MI | $6,157,000 | WAMP 1.0 |
| Baffle Box | EA | $56,500 | Project Clean Water[3] |
| Bioretention | EA | $50,000 | City of Los Angeles SCM Costs Survey Results[4] |
| Biofiltration | EA | $50,000 | City of Los Angeles SCM Costs Survey Results |
| Detention Basin | EA | $480,200 | City of Los Angeles SCM Costs Survey Results |
| Downspout Filter | EA | $6,000 | Conversation with vendor on 4/30/2020 |
| Drainage Insert | EA | $1,100 | Project Clean Water[4] |
| Filterra | EA | $15,000 | http://prj.geosyntec.com/npsmanual/treeboxfilters.aspx |
| Filtration Systems | EA | $20,000 | USEPA Opti-Tool[5] |
| Flow-Through Planter Box | EA | $15,000 | http://prj.geosyntec.com/npsmanual/treeboxfilters.aspx |
| Green Roof | EA | $100,000 | https://www.lid-stormwater.net/greenroofs_cost.htm |
| Hydrodynamic Separation Systems | EA | $56,500 | Project Clean Water[4] |
| Infiltration Basin or Trench | EA | $39,000 | City of Los Angeles SCM Costs Survey Results |
| Modular Wetlands System | EA | $398,000 | Costs obtained from a recent project quoted by Bio Clean. |
| Pervious Pavement | EA | $76,700 | City of Los Angeles SCM Costs Survey Results |
| Pervious Surface | EA | $76,700 | City of Los Angeles SCM Costs Survey Results |
| Swale | EA | $10,500 | City of Los Angeles SCM Costs Survey Results |
| Vault | EA | $131,000 | USEPA Opti-Tool |
| Vegetated Filter Str | EA | $3,040 | https://fortress.wa.gov/ecy/publications/othersupplements/1303009other.pdf |
| Wet Pond | EA | $75,700 | USEPA Opti-Tool |
| Actuator | EA | $15,000 | Conversations with City staff and sources such as cost records and purchase orders |
| Automatic Transfer Switch | EA | $50,000 – $300,000 | Conversations with City staff and sources such as cost records and purchase orders |
| Circuit Breaker | EA | $8,000 – $50,000 | Conversations with City staff and sources such as cost records and purchase orders |
| Disconnect Switch | EA | $1,000 | Conversations with City staff and sources such as cost records and purchase orders |
| Engine | EA | $100,000 | Conversations with City staff and sources such as cost records and purchase orders |

**Table 4-2. Physical Asset Unit Costs (contd.)**

| Asset | Unit | Unit Cost | Reference |
|---|---|---|---|
| Gearbox | EA | $30,000 | Conversations with City staff and sources such as cost records and purchase orders |
| HMI | EA | $3,000 | Conversations with City staff and sources such as cost records and purchase orders |
| Level Instruments | EA | $3,000 | Conversations with City staff and sources such as cost records and purchase orders |
| Local Control Panel | EA | $1,000 – $55,500 | Conversations with City staff and sources such as cost records and purchase orders |
| Motor | EA | $4,000 – $30,000 | Conversations with City staff and sources such as cost records and purchase orders |
| Motor Control Unit | EA | $2,000 – $75,000 | Conversations with City staff and sources such as cost records and purchase orders |
| Panelboard | EA | $2,000 | Conversations with City staff and sources such as cost records and purchase orders |
| PLC | EA | $3,000 | Conversations with City staff and sources such as cost records and purchase orders |
| Protective Relays | EA | $4,000 | Conversations with City staff and sources such as cost records and purchase orders |
| Pump[6] | EA | $8,000 – $150,000 | Conversations with City staff and sources such as cost records and purchase orders |
| Pump Assembly[6] | EA | $1,000 | Conversations with City staff and sources such as cost records and purchase orders |
| Service Pedestal | EA | $10,000 | Conversations with City staff and sources such as cost records and purchase orders |
| Submersible Pump | EA | $1,000 – $45,000 | Conversations with City staff and sources such as cost records and purchase orders |
| Telemetry Gateway | EA | $2,500 | Conversations with City staff and sources such as cost records and purchase orders |

**Table 4-2. Physical Asset Unit Costs (contd.)**

| Asset | Unit | Unit Cost | Reference |
|---|---|---|---|
| Transformer | EA | $5,000 – $50,000 | Conversations with City staff and sources such as cost records and purchase orders |
| UPS | EA | $1,000 | Conversations with City staff and sources such as cost records and purchase orders |
| Valve | EA | $1,500 – $20,000 | Conversations with City staff and sources such as cost records and purchase orders |

Notes:
[1] Where a range of unit costs is provided in the unit cost table, a specific cost was applied to each discrete asset based on the size and capacity of the asset, as appropriate.
[2] City Master Unit Costs were obtained from spreadsheet titled "2019-12-27 Master Unit Cost Spreadsheet," provided by Michael Phillips, City of San Diego, on March 6, 2020.
[3] http___www.projectcleanwater.org_download_trash-ad-hoc-workgroup__ind=1557520937237&filename=a2_device_appendix_rev04aug17.pdf
[4] (Source: "Los Angeles Sustainable Water Project: Ballona Creek Watershed," UCLA, November 2015)
[5] https://www.epa.gov/tmdl/opti-tool-epa-region-1s-stormwater-management-optimization-tool
[6] Pump station unit costs information was provided by City staff during interviews and cost information provided in Michael Baker Pump Station Assessment Reports.

Future O&M cost estimates for physical assets were estimated based on staff input during workshops. For each type of maintenance activity, labor requirements were identified at FTE level, contract requirements were identified, and equipment requirements were identified. In addition, the list of channel sections to be maintained (hotspots) was identified based on channel's Master Maintenance Program (MMP), and history of channel maintenance in the past 5 years.

### *Probable Cost Estimation Methodology of Programmatic Assets*

For current O&M costs for physical assets, the Division's budgets were used to estimate the O&M costs for each asset type. For programmatic assets, the ongoing and projected O&M lifecycle costs were estimated. These costs may fluctuate based on the asset criticality and type. For capital and additional O&M costs for programmatic assets (e.g., building up program elements to respond to future flood risk management and compliance needs), staff input was used regarding the number of full-time equivalents (FTE), professional services, or other costs that would be required. The valuation process will be improved as better data becomes available. For estimating TMDL compliance costs, a cost model was developed for future non-structural and structural strategies. Cost of non- structural strategies are evaluated using similar estimation methodology as programmatic assets. Costs of future structural strategies are estimated as the burdened construction cost of the BMPs.

Probable costs of programmatic assets were developed using estimates of the number of full-time equivalents (FTE), equipment costs, professional services, or other costs that would be required to ensure that assets meet their LOS requirements.

### 4.2.2 Long Range Forecast

This section introduces the long-range renewal projection for the assets used to update to City's WAMP 2.0. The information in this section is based on the inputs, assumptions, and logic presented in the previous sections. The long-range forecast is a look at the future investment needs for the City. It provides a snapshot of the future based on the current knowledge and historical practices. Understanding the long-range investment needs is a key step in making sustainable and proactive management decisions.

Using the asset data in the asset register, asset replacement cost, and management strategies, a 20-year renewal and O&M projection was generated. A 20-year planning horizon was used to capture the full lifecycle of collection system assets to the end of the compliance period. For proper asset management planning, a long-range planning horizon was required to fully capture the cyclic nature of the installation and replacement trends. A short-range (e.g., 5-year, 10-year) planning horizon often fails to consider the large capital requirement that may lie just beyond the analysis window. Due to the enormous capital investment needs of infrastructure assets, without a long-range consideration, an organization will not be able to financially prepare for renewal requirements.

Life-cycle cost calculations take place in the context of a management strategy. A management strategy characterizes the life-cycle behavior of an asset (e.g., how long will it last, how it will deteriorate over time) and the management actions (e.g., inspection, maintenance, refurbishment, replacement) and their associated costs required to sustain the delivery of the services. Every asset is assigned a management strategy. The figure below illustrates the relationship between asset condition, management activities, and life-cycle cost. After the installation, asset condition will decrease with time. In order to maintain the condition, an investment in the form of maintenance or rehabilitation will be required. Eventually, at the end of its useful life, the asset will need to be replaced, and the cycle will repeat.

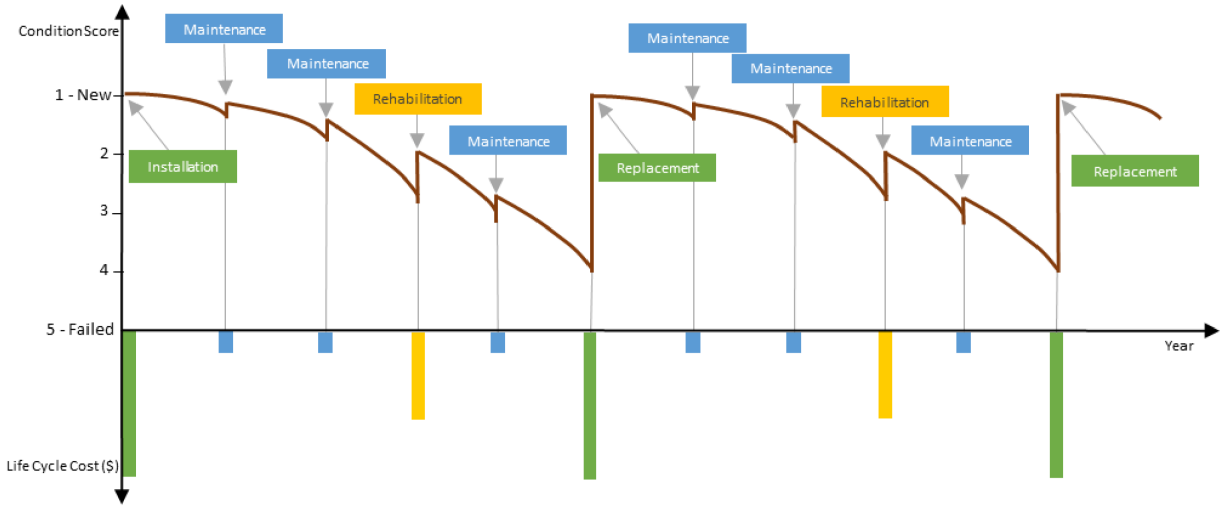


**Figure 4-1. Management Strategy Methodology**

Using a life-cycle cost assessment will allow the City to proactively manage its assets and be able to predict which assets are nearing the end of their useful lives. This leads to a more proactive plan for replacement of high-risk assets to prevent failure. Reacting to a high-risk asset failure typically

results in the highest expense. With life-cycle cost analysis, the City will also understand the work and budget required for future years and proactively plan ahead to minimize risks and costs. These estimations will be used to prepare the budget and resources required to sustain the delivery of services. When budget and resource limitations exist, the City will be able to prioritize the needs by risk to ensure the budget is first spent on high-risk assets. The City will be able to maximize investment with respect to risk reduction.

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

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# 5 What Do I Need To Do To Fund It?

The preceding sections have discussed the nature of both the physical and programmatic assets managed by the Division, the condition of those assets, optimized management strategies and the approach to estimating costs for long-term asset management. This section provides a high-level overview of the Division's historical and forecasted expenditure levels associated with managing those assets, as well as a discussion of potential funding mechanisms to meet the Division's expenditure needs. The information presented in this section represents a snapshot of current expenditures and funding levels, as well as potential sources for additional funding. The Division's continues to refine its funding strategy through continued analyses and stakeholder engagement efforts. A comprehensive funding strategy that will consider viable sources of funding from within the City, as well as alternative forms of a dedicated funding source to meet all or a portion of the Division's long-term funding need is developed and presented in the document "Stormwater Division Funding Strategy" (2020).

## 5.1 Historical Expenditure Levels

The Division must meet a number of expenditure needs, including administrative and operations and maintenance costs (O&M) as well as capital investments. These spending categories are referred to as Programmatic Assets and Physical Assets in the WAMP, respectively. Historically these spending levels have averaged just over $75.0 million per year. Figure 5-1 presents the actual expenditures for FY 2016 through FY 2020 and budgeted expenditures for FY 2021.

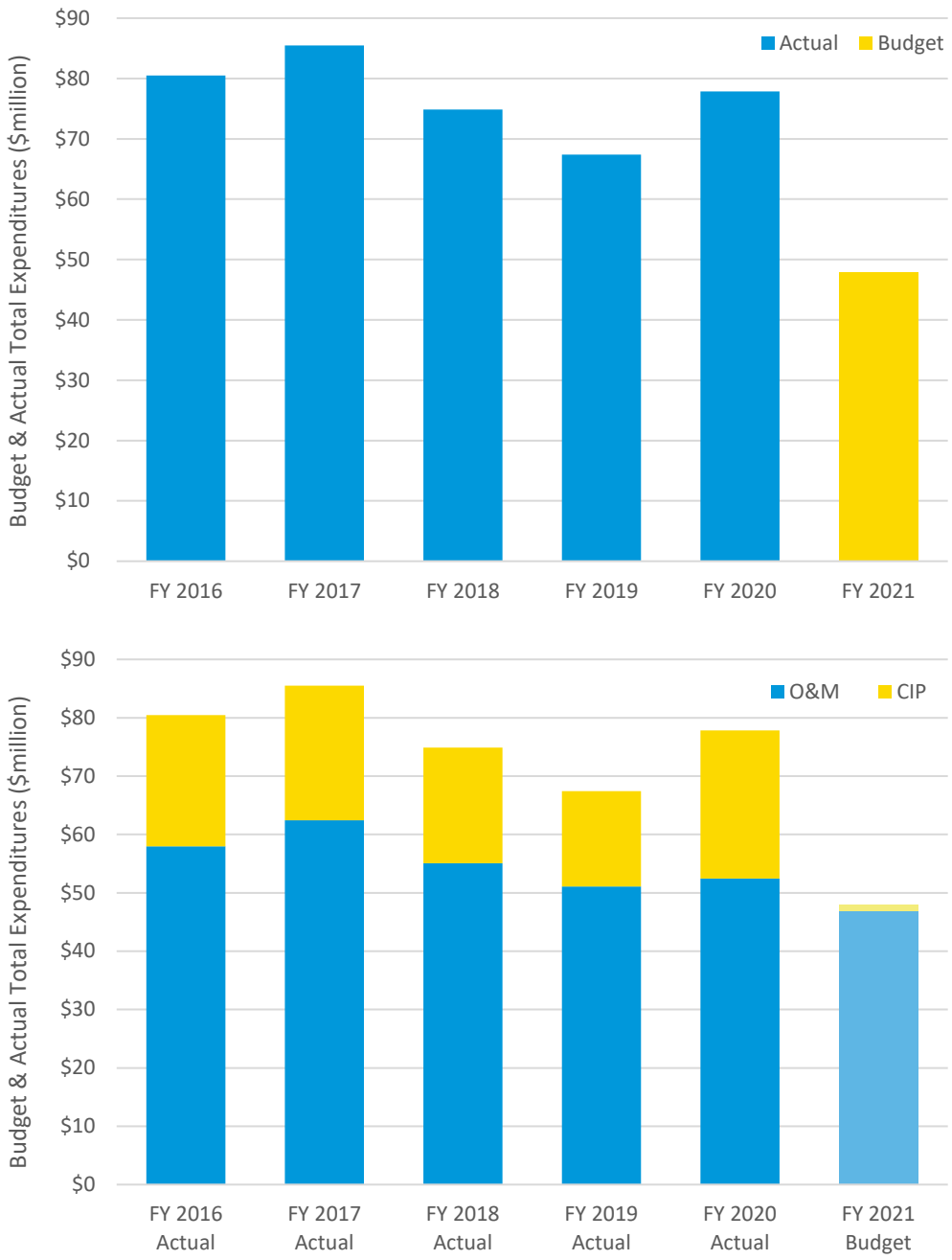


**Figure 5-1. Historical O&M and CIP Total Expenses**

As illustrated in Figure 5-1, total expenses have varied over the previous five years with a general trend downward since FY 2017. The details of the O&M and capital costs that make up these total Division expenses are further described in subsequent sections.

### 5.1.1 Operation & Maintenance

The Division O&M budget supports daily operations, including salaries, benefits, supplies, and administrative costs, among others. The Division O&M budget includes costs categorized as

Programmatic Assets within the WAMP. Division O&M activities include, but are not limited to, the activities outlined below:

- Vehicle and equipment maintenance
- Flood risk management
  - Channel inspection, prioritization, and maintenance
  - Detention basin maintenance
  - Floodplain management
  - Habitat restoration and mitigation
  - Levee management
  - Pump station maintenance
  - Storm Patrol
- Water Quality
  - Best available science
  - Construction management
  - Enforcement
  - Existing development management
  - Monitoring and assessment
  - Permit management and compliance
  - Public education and participation
- Program Administration
- Litigation, Settlement and Cleanup Actions

Historical budget and actual O&M expenditure levels are presented in Figure 5-2.

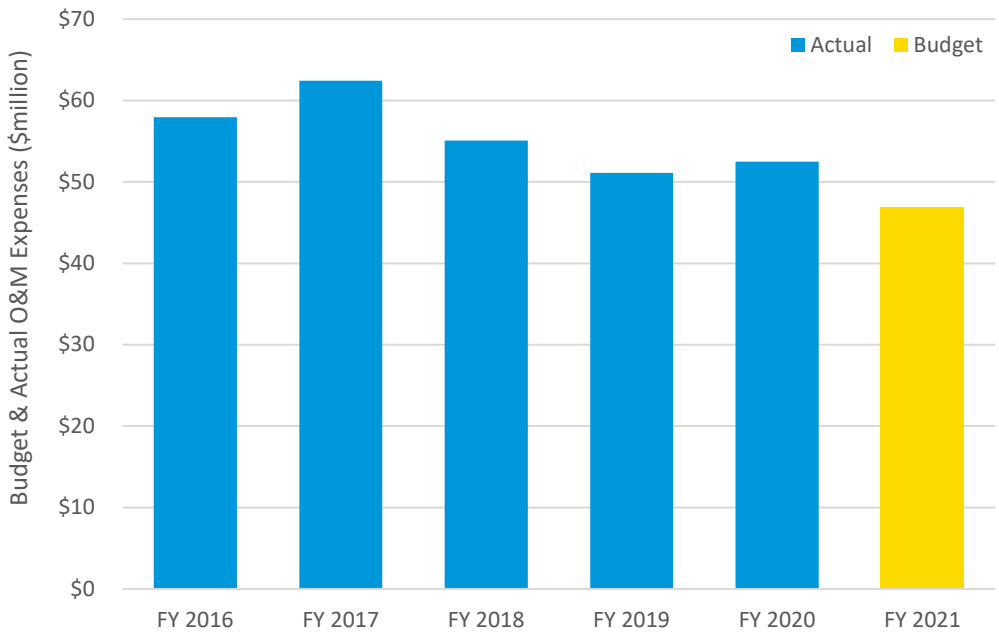


**Figure 5-2. Historical Operations and Maintenance Expenses**

As illustrated in Figure 5-2, actual O&M expenses have trended down by almost 10% per year since FY 2017 before leveling off in FY 2019 and FY 2020. This decline is a result of funding limitations leading Division staff to prioritize the most important areas of O&M expenditures while identifying and implementing efficiency measures to operate within its limited budget.

### 5.1.2 Capital Investment

Historical Division capital investment levels have averaged approximately $20 million per year over the last five years. Historically, capital projects have been generally classified into the following categories.

- Water Quality Improvements
- Flood Risk Management
- Jurisdictional Runoff Management

The Division's level of capital investment in the City's drainage infrastructure has been constrained by funding limitations. Figure 5-3 illustrates the budgeted and actual capital investment levels over the previous five years.

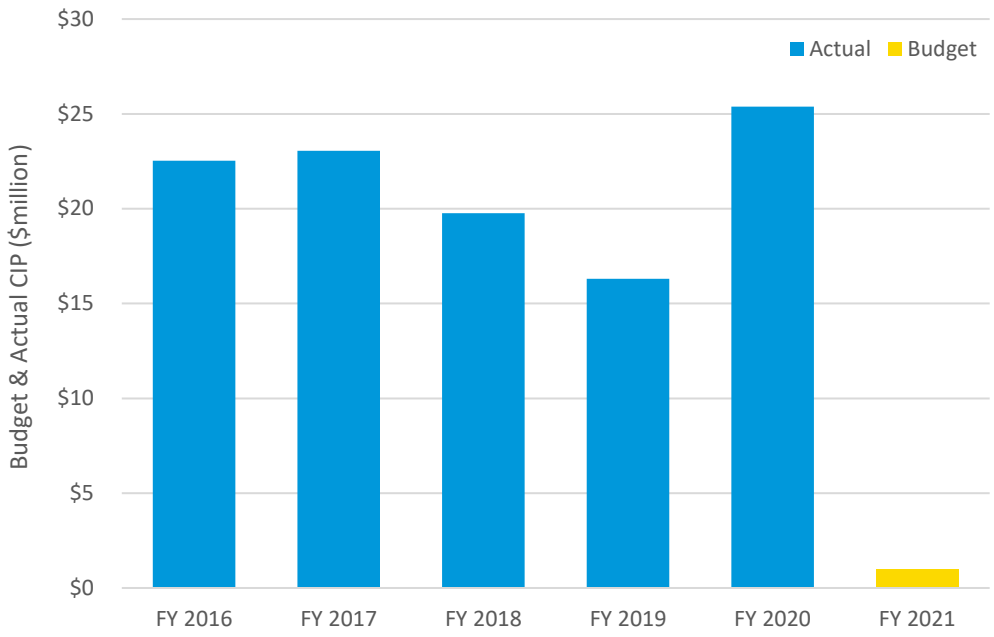


**Figure 5-3. Historical Budget and Actual Capital Improvement Plan Expenditures**

Similar to the trend in O&M expenses presented in Figure 5-2, actual CIP expenditures have trended down since FY 2017. Again, this downward trend is not an indication of a reduction in investment needs, but rather a function of funding limitations and actions taken by the Division to prioritize investments and maximize the efficacy of capital projects with the funding available.

## 5.2 Current Funding Levels

The Division has historically been funded by internal sources of revenue, as well as other General Fund contributions to meet the O&M and capital needs outlined in the previous sections. These historical sources of funding are described in the subsequent sections.

### 5.2.1 Annual Revenue

The City currently relies on three key sources of revenue to fund Division O&M activities and system capital investments. These revenues are generally considered General Fund revenues but have been, and are expected to be, dedicated to the Division to meet stormwater O&M and capital needs. These sources of revenue are detailed below:

- **Storm Drain Fee Revenue** – The Division currently generates approximately $5.4 million to $5.7 million per year in revenue from the existing Storm Drain Fee. This fee is charged to City parcels on a monthly basis as a $0.95 per parcel fee to residential parcels, and a $0.0647 per hundred cubic feet (HCF) fee to commercial parcels. Rates have not been adjusted since the fee became effective in 1996. These fee revenues are currently treated as General Fund revenues and have historically been wholly allocated to the Division. The City could, in theory, allocate these revenues elsewhere, further limiting Division funding.
- **Parking Citations** – The Division issues parking citations on posted routes within the City. Like Storm Drain Fee revenue, revenue generated from parking citations is currently treated as a General Fund revenue and has historically been allocated to the Division. The Division

currently receives $40 per citation issued, with additional fines for delinquent payments. Parking citations yield approximately $4.0 million to $5.2 million per year with a high degree of variability from year to year. These revenues have been generally trending downward over the last four years.

- **Stormwater Enforcement** – The Division issues fines as an enforcement measure for stormwater violations within the City. Although the City has historically budgeted about $125,000 - $150,000 in revenue from these enforcement measures, actual revenue has rarely surpassed $100,000.

Figure 5-4 presents a five-year history of actual and budgeted Division revenue by source.

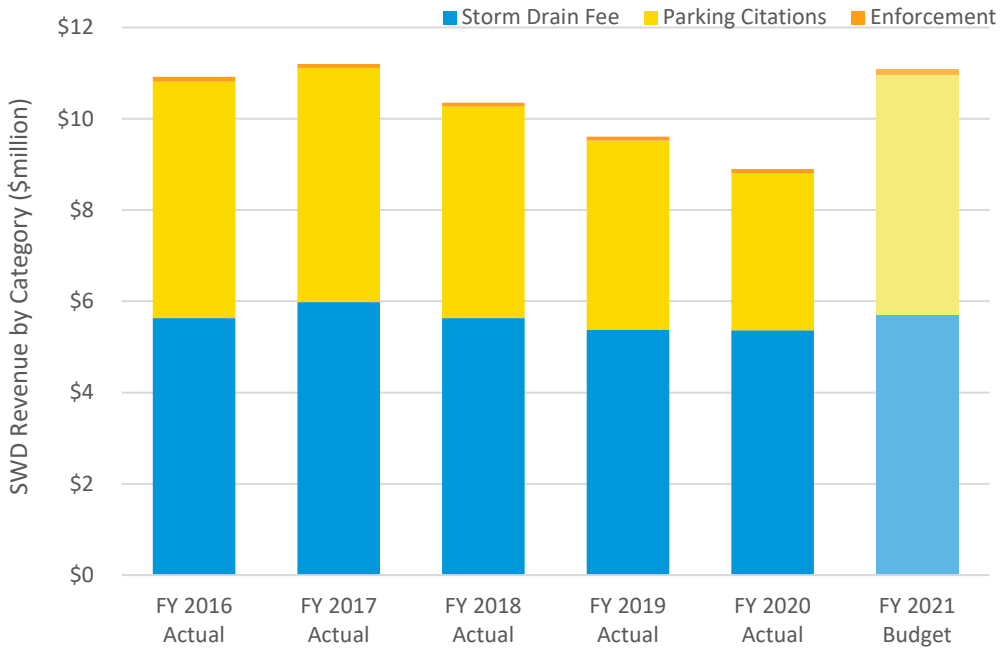


**Figure 5-4. Historical Division Revenue by Category**

Figure 5-4 illustrates the decrease in Division revenue from key funding sources over the last four years of actual revenues. This decline is evident in both Storm Drain Fees and Parking Citations, the two primary sources of revenue to the Division.

In addition to these revenues, the Division's O&M expenditures are currently funded by other General Fund revenue sources. These sources can come from a number of General Fund revenue streams and are allocated to Division funding needs on an annual basis. These contributions have tracked with the O&M expenses described in Section 5.1.1. Figure 5-5 presents the level of actual other General Fund sources to the Division over the period FY 2016 to FY 2020 and budgeted other General Fund sources for FY 2021.

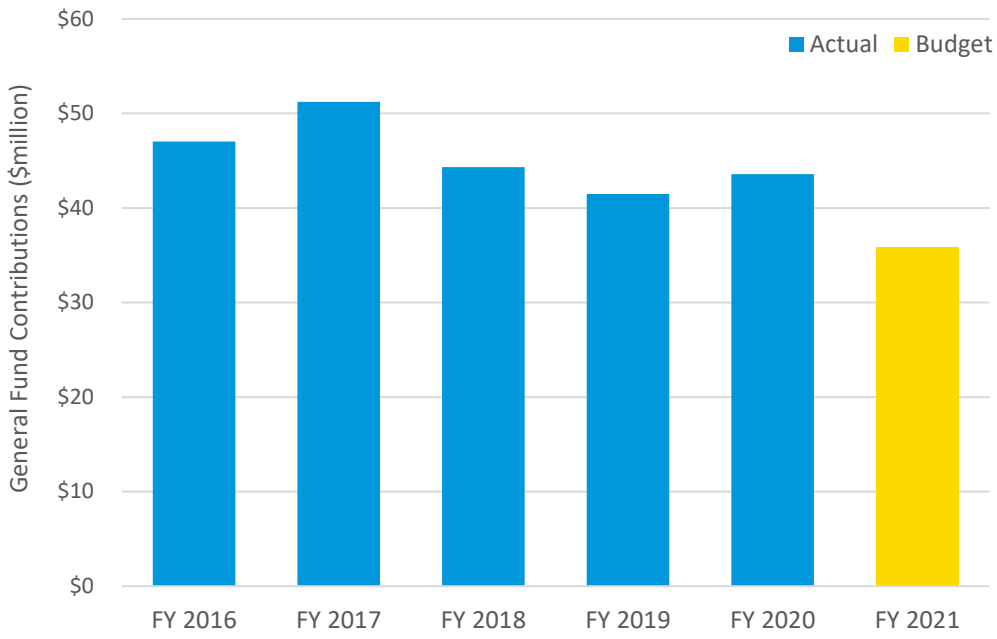


**Figure 5-5. Historical General Fund Contributions to Division**

Other General Fund sources have declined since FY 2017, leveling off in FY 2019 and FY 2020. This recent decline is representative of the variability in General Fund revenues for stormwater needs. Variability can be expected to continue in the future to address competing needs while taxes and other General Fund revenues are driven by ever-changing economic conditions.

### 5.2.2 Capital Funding

In addition to the revenues described in Section 5.2.1, Division capital investments have historically been funded from a number of other City sources. The following list outlines and describes the key City sources of Division capital funding.

- **Infrastructure Fund** – The Infrastructure Fund has historically been used to meet a portion of the City's stormwater infrastructure investment needs. The City is not currently planning further allocations from the Infrastructure Fund for Division capital needs, and the Infrastructure Fund is set to be dissolved after FY 2022. As such, future funding is not expected from the Infrastructure Fund.[3]
- **TransNet Fund** – Funding from the City's TransNet Fund has historically been used to meet a small portion of the City's stormwater infrastructure investment needs. The City currently anticipates allocations of approximately $1.0 million per year[4] for stormwater infrastructure investment from the TransNet Fund.
- **Impact Fees and Facilities Benefit Assessments** – Funding from Impact Fees and Facilities Benefit Assessments is intended to be used for projects associated with serving new

[3] Department of Finance

[4] Department of Finance

development. As such, development-related stormwater infrastructure projects have historically been funded from these two sources. Funding from these two sources are project specific and highly variable. Future funding of stormwater capital investments could vary from approximately $2.0 million to $20.0 million in any given year.[5]

- **Other City Funds** – The City has funded a portion of the stormwater infrastructure investment needs through a number of other funds, including, but not limited to, the Capital Outlay Fund, Transient Occupancy Tax Fund, and Regional Parks Improvement Districts. Capital investments funded by these funds are commonly restricted or limited to certain types of projects, or projects that benefit specific areas or functions in the City. As such, funding has been variable from year to year, depending on the nature of projects and availability of monies from each of these sources.
- **Grant Funding** – The Division is continually tracking and pursuing grant funding to help meet a portion of stormwater capital investment needs. Recent grant funding for projects has included State and Federal grant programs. Recent grant funding includes State funding from the State Water Resources Control Board (SWRCB) Division of Financial Services, California Natural Resources Agency, and Department of Water Resources (DWR). Recent federal grant funding has been provided by the US Environmental Protection Agency (EPA) States and Tribal Assistance Grants (STAG) program.
- **Financing** – The City has leveraged debt financing to meet additional capital investment needs by distributing costs for long-life assets over the life of the assets. Department capital projects have historically been included in a list of City CIP projects financed by previous bond issuances. General Fund Lease Revenue Bonds have been the primary mechanism for debt financing of Division capital investments.

## 5.3 Current SWD Funding Needs

Based on the asset information in the WAMP database as of October 23, 2020, the BRE criteria listed in Appendix A, and the data assumptions provided in Appendix B, the CoF and PoF of the Division's physical and programmatic assets have been calculated. Each individual asset's CoF and PoF places it on a two-dimensional risk "heatmap" as shown below in Figure 5-6. In this figure, the dollar amount showing in each cell is the sum of the current replacement value or activity value of the assets within the cell and the single number shows the number of assets within the cell. This risk heatmap has been sub-divided into a grid that is 15 cells wide by 5 cells high. The cells that contain the projects with the highest CoF and PoF scores are in the upper right corner of the grid. The cells have been assigned to areas of Red, Amber, and Green risks by City staff for purposes of allowing high-level prioritization of the projects and activities. The purpose of the risk visualization of assets is to enable the Division to prioritize the projects and activities that result in the largest risk reduction early in the program.

[5] Department of Finance

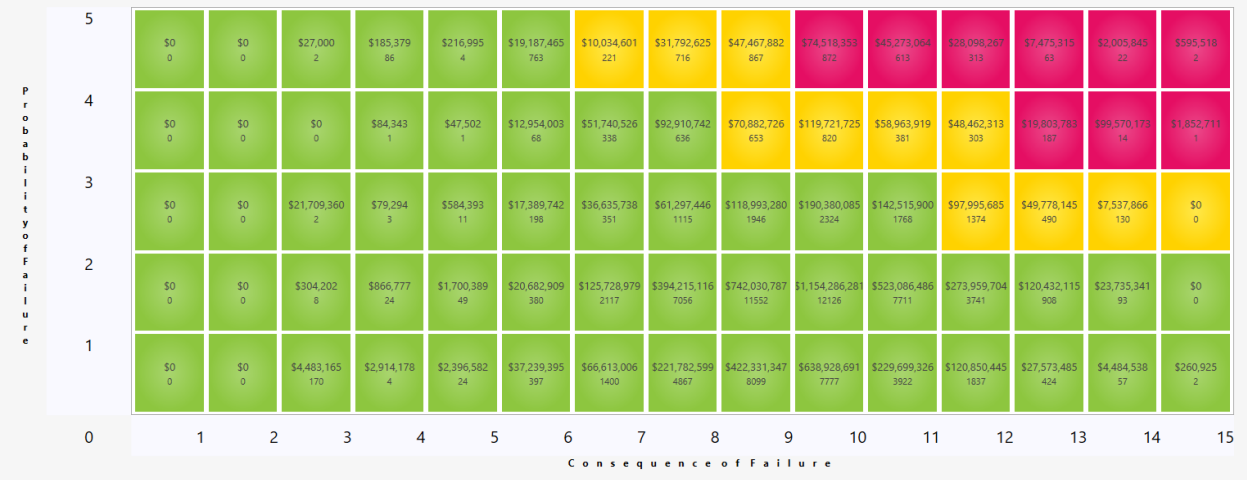


**Figure 5-6. Risk Heatmap Output of WAMP Model in 2020 Dollars**

The top level of the risk heatmap consists of physical assets that have documented failures and those assets the WAMP model predicts have failed, or are about to fail, due to age. These assets form a backlog of projects that need to be completed to maintain an operational stormwater management system.

The output of the WAMP model also creates a future projection of the Division's funding needs as shown in Figure 5-7 below. The WAMP model output is in 2020 dollars, does not include escalation in future years, and does not include any smoothing or distribution of costs to account for actual Division budgets.

In Figure 5-7, the future costs have been separated per the Division's major goals of:

- Flood risk reduction; and
- Water quality and related goals.

The initial spike in FY21 of flood risk reduction projects and activities represents the backlog of projects that have not been completed prior to FY21. This includes both the replacement of failed flood risk reduction assets (the majority of which are failed drain pipes) as well as the backlog of routine channel maintenance (clearing and repair) that has not been performed due to budget limitations prior to FY21. In addition, the Division's technical documents indicate the need to continue the planning, design, and construction of water quality improvement assets to meet the regulatory milestones.

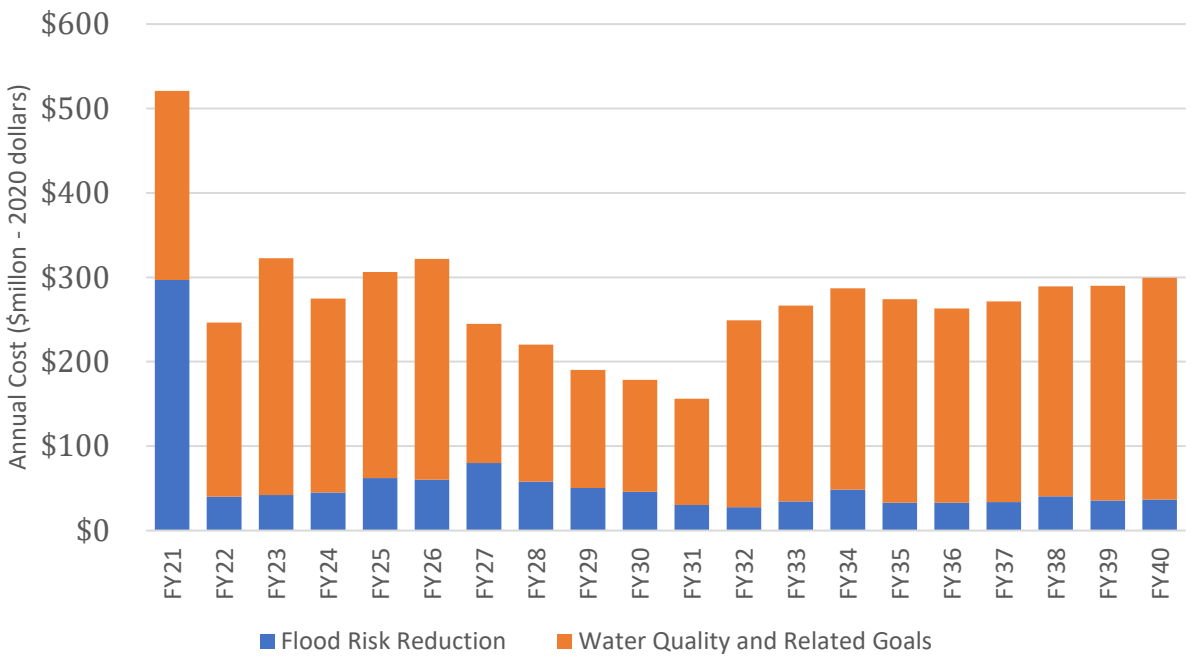


**Figure 5-7. Future Physical and Programmatic Assets Funding Requirement (in 2020 dollars)**

The WAMP output can be further reviewed by dividing the costs into the separate segments of CIP projects and O&M costs, as shown in Figure 5-8 below. In this graph, the initial spike of O&M costs in FY21 represents the need to perform channel maintenance activities that have been deferred from previous years due to budgetary limitations. The costs shown in the graph are in 2020 dollars, and do not include escalation or any distribution of costs to meet budget limitations.

Figure 5-8 also shows that as more of the future water quality improvement assets are constructed, there will be a need for additional O&M resources (City staff or contractors) to properly operate and maintain the additional water quality assets.

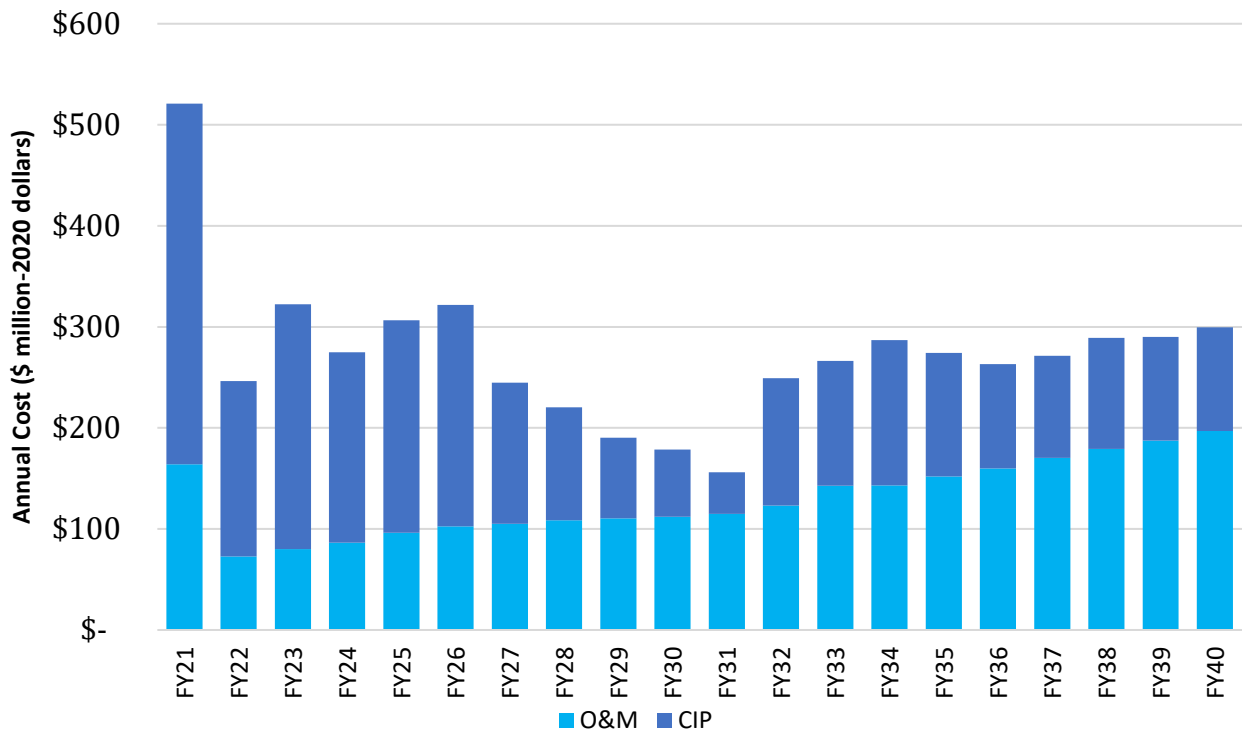


**Figure 5-8. WAMP Cost Profile Segmented Between CIP and O&M Costs (in 2020 dollars)**

As another example of how the WAMP output can be used to better understand the Division's future needs to meet its goals, Figure 5-9 below provides the WAMP model output by year (in 2020 dollars) with the renewal and construction of physical assets segmented by the six San Diego watersheds. In this example, the total cost of O&M is combined into a single segment referred to as "Citywide Programmatic Assets." The graph shows the relative investment amounts and timing of projects that will be needed to address the flood risk reduction and water quality goals within each watershed.

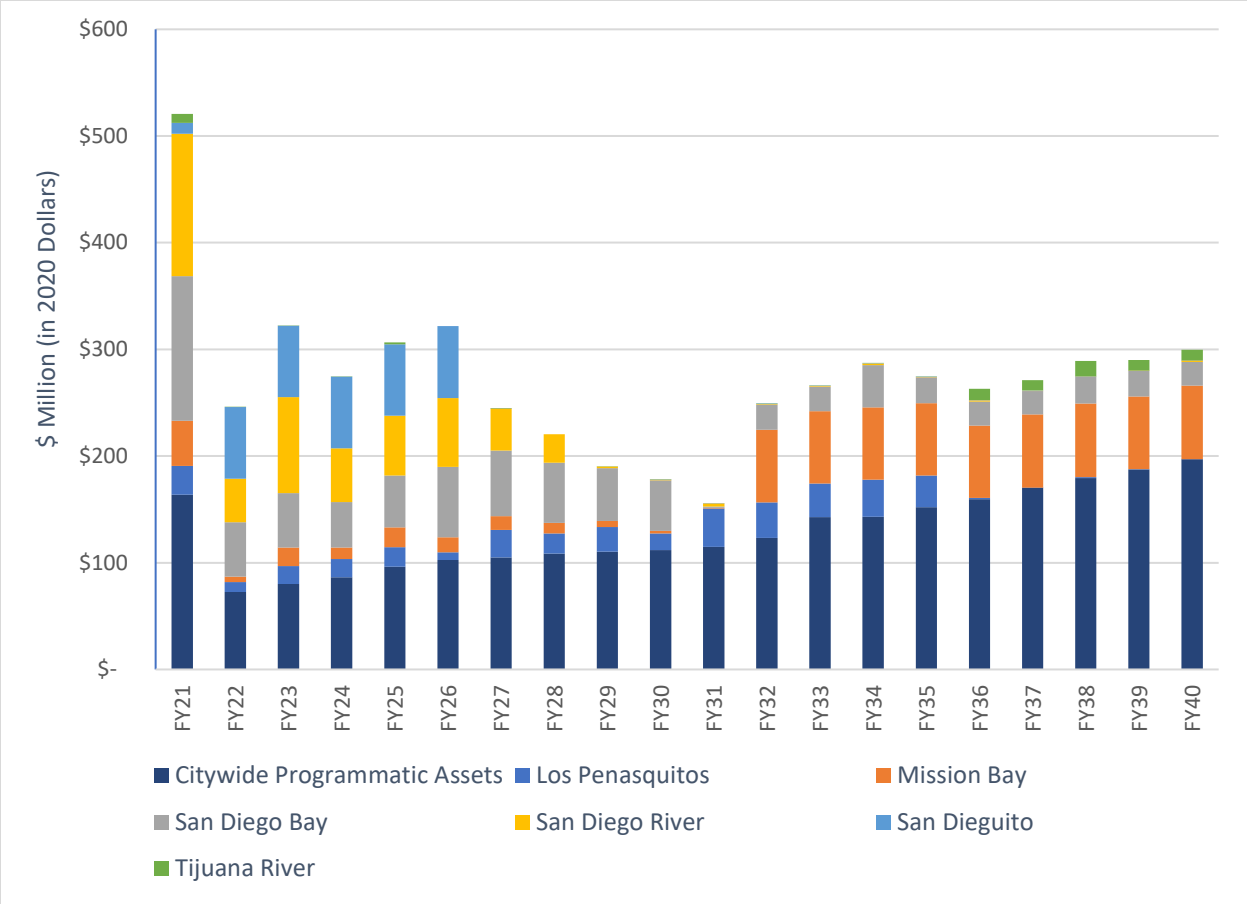


**Figure 5-9. Future Funding Needs Predicted by WAMP Model Segmented by Major City Watershed (in 2020 dollars)**

Historical Division funding levels indicate that the funding needs as shown in Figures 5-7 through 5-9 above are unlikely to be achieved, particularly in FY21 where the actual budget is much lower. To make the future funding needs graph more realistic, additional assumptions can be used to distribute the future projects and therefore reduce the near-term costs. The document "Stormwater Division Audit Recommendation #5 Funding Strategy" (January 2021) provides examples of future potential cost profiles as examples of how the Division's needs can be met assuming various funding strategies are utilized. It should be noted however that the WAMP model predicts that further delay in the completion of projects does result in additional risk of assets failing or not constructed in time to meet regulatory requirements.

# 6 Confidence Level Assessment

To ensure the Division's assets and operations provide their desired level of service into the future, this WAMP must be regularly evaluated and further developed. The WAMP is iterative in nature — multi-faceted processes that evolve as the Division further understand its systems' needs, catalogs its experiences, reviews input from stakeholders, and resulting successes and failures. Additionally, access to more data, improved data analysis techniques, and updates to fiscal forecasting methods further inform and progress the Division's WAMP. Changes to policy and regulatory requirements also serve to shape and develop the WAMP. For example, data record and reporting outputs from EAM may be aligned with new permit or regulation requirements (e.g., asset inspections, maintenance activities, compliance with TMDLs) to help streamline reporting processes for the Division. The following section describes the components of the Asset Management Improvement Plan.

## 6.1 Confidence Level Rating

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

As illustrated in Figure 6-1, asset management is a process of continuous improvement. The Division can make improvements to the WAMP as the quantity and quality of data improves. The Division realized that data were not available across the asset types and classes and may not be as accurate as desired. Through the WAMP development and update processes, the Division gained a better understanding of the data gaps and developed mitigation plans to improve the overall data quality. Any assumed data will be superseded by actual data when it becomes available. As the first iteration, it is typical that the WAMP has a confidence level rating score of 70 percent or greater. In addition, the confidence level varies over the planning horizon, as the planning period is extended (short-range versus long-range), the accuracy of the predictions decreases. For example, the confidence level for a 10-year projection will be much higher than with a projection of 80 to 100 years. It is important to have a high confidence level in early years (years 1 through 10), as the WAMP will form the basis for future capital and operational investment programs.

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

1. Asset Inventory – Measures the completeness of the asset data. (Did the asset register include the assets owned or managed by the Division?)
2. Data Quality – Measures the quality and completeness of the data attributes used to develop the WAMP. (How many data assumptions were used to complete the WAMP?)
3. Asset Hierarchy – Measures the quality of the asset hierarchy used to develop the WAMP. (How effective and efficient is the asset hierarchy used to develop the WAMP?)
4. Asset Replacement Cost – Measures the accuracy of the estimated replacement costs of the assets and systems. (How accurate is the estimated replacement cost of the asset?)

5. Management Strategies – Measures the accuracy of the management strategies and renewal strategies used in the WAMP. (How representative is the useful life?).
6. Business Risk Exposure – Measures the accuracy of the risk assessment performed. (Is the risk assessment representative of the actual risks facing the organization?).
7. Levels of Service – Measures the quality and efforts of developing the LOS to track the performance of the WAMP. (Were the levels of service identified across major asset systems? Do the levels of service link to actual asset performance?).
8. Staff Participation & Buy-In – Captures the personnel involvement in developing the WAMP and their acceptance in the quality of the asset management plan. (During the update, were key members of the Division's staff involved? Is the staff accepting the results of the asset management plan?).

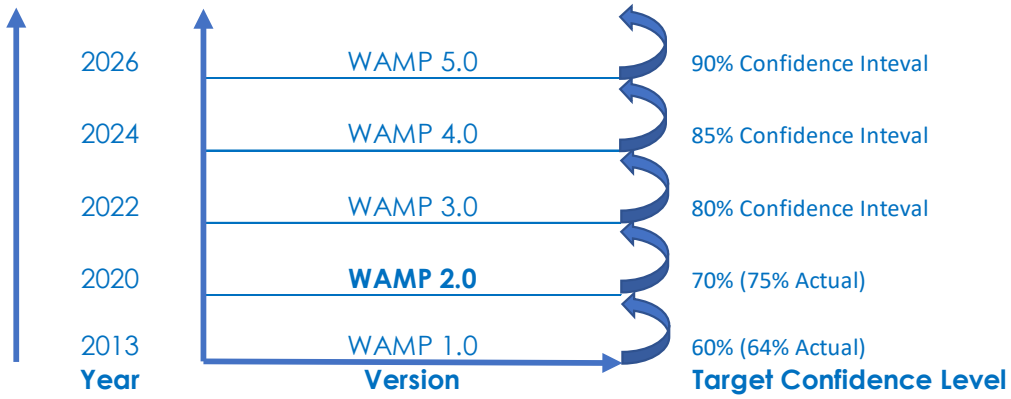


**Figure 6-1. Continuous Improvement Process**

Each CLR element listed above is assigned a weighting factor. The weighting factor quantifies the criticality of the key element with respect to the overall accuracy and quality of the WAMP. For example, the weighting of asset hierarchy is much lower than data quality, since the asset hierarchy only affects the organization of data and does not directly impact the accuracy of the future renewal funding requirement projections. Table 6-1 presents the primary weighting for each of the key CLR elements.

**Table 6-1. Primary Weighting**

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

A secondary weighting was used to reflect the magnitude (i.e., counts and funding) of the different asset types (i.e., physical assets and programmatic assets) with respect to one another within the same key element.

The confidence level rating is assessed at the asset type level. Each of the key confidence level elements has a maximum score of 100 percent (full confidence). The tables are color coded to aid the reader in understanding the confidence level for each asset's confidence element. The confidence level of each color is as follows:

- Green – Greater than 70 percent
- Yellow – Between 60 and 70 percent
- Red – Less than 60 percent

For physical assets, the overall confidence level rating is 81 percent. For programmatic assets, the overall confidence level rating is 68 percent.

Table 6-2 shows the summary of confidence level ratings of the Division's WAMP 2.0 compared with the confidence level rating of WAMP 1.0. The average confidence level rating score of WAMP 2.0 for all asset types is 75 percent compared to 64 percent for WAMP 1.0. This score is within the expected range for a first iteration of asset management plan. This can be attributed to the fact that physical and programmatic assets have significantly lower data quality. The current asset valuation gets a lower rating due to data limitation (i.e., more assumption made during asset valuation). It is recommended that the SWD focus on enhancing the natural asset inventory and improve the data valuation (better define the individual treatment control BMPs needed to comply with TMDLs and establish more confident cost estimates).

Figure 6-2 presents the aggregate confidence level rating results for each key element organized by asset types. This figure can be used to track the performance of each key element for each asset type. In general, the confidence level for asset inventory, data quality, and levels of service are lower than other key elements. However, the Division has good asset hierarchy, asset valuation, and

strong staff participation. By continuing the efforts to improve asset inventory and data quality, the Division should be able to improve the overall confidence level rating in the next iteration.

## Table 6-2. Overall Confidence Level Rating

| Key Confidence Level Elements | Primary Weighting | WAMP 1.0 CLR By Asset Type | | | | WAMP 2.0 CLR By Asset Type | | |
|---|---|---|---|---|---|---|---|---|
| | | Hard Assets | Soft Assets | Natural Assets | Weighted CLR | Physical Assets | Programmatic Assets | Weighted CLR |
| **Asset Inventory** | 15% | 81% | 90% | 66% | 79% | 68% | 54% | **61%** |
| **Data Quality** | 15% | 58% | 79% | 54% | 64% | 67% | 52% | **60%** |
| **Asset Hierarchy** | 5% | 85% | 90% | 34% | 70% | 100% | 100% | **100%** |
| **Asset Valuation** | 15% | 58% | 43% | 53% | 51% | 90% | 66% | **78%** |
| **Management Strategies** | 20% | 58% | 59% | 67% | 61% | 80% | 51% | **66%** |
| **Business Risk Exposure** | 10% | 50% | 60% | 60% | 57% | 90% | 90% | **90%** |
| **Levels of Service** | 10% | 60% | 60% | 54% | 58% | 55% | 59% | **57%** |
| **Staff Participation & Buy-In** | 10% | 73% | 80% | 80% | 78% | 100% | 72% | **86%** |
| **Average CLR** | **100%** | **63%** | **68%** | **61%** | **64%** | **81%** | **68%** | **75%** |

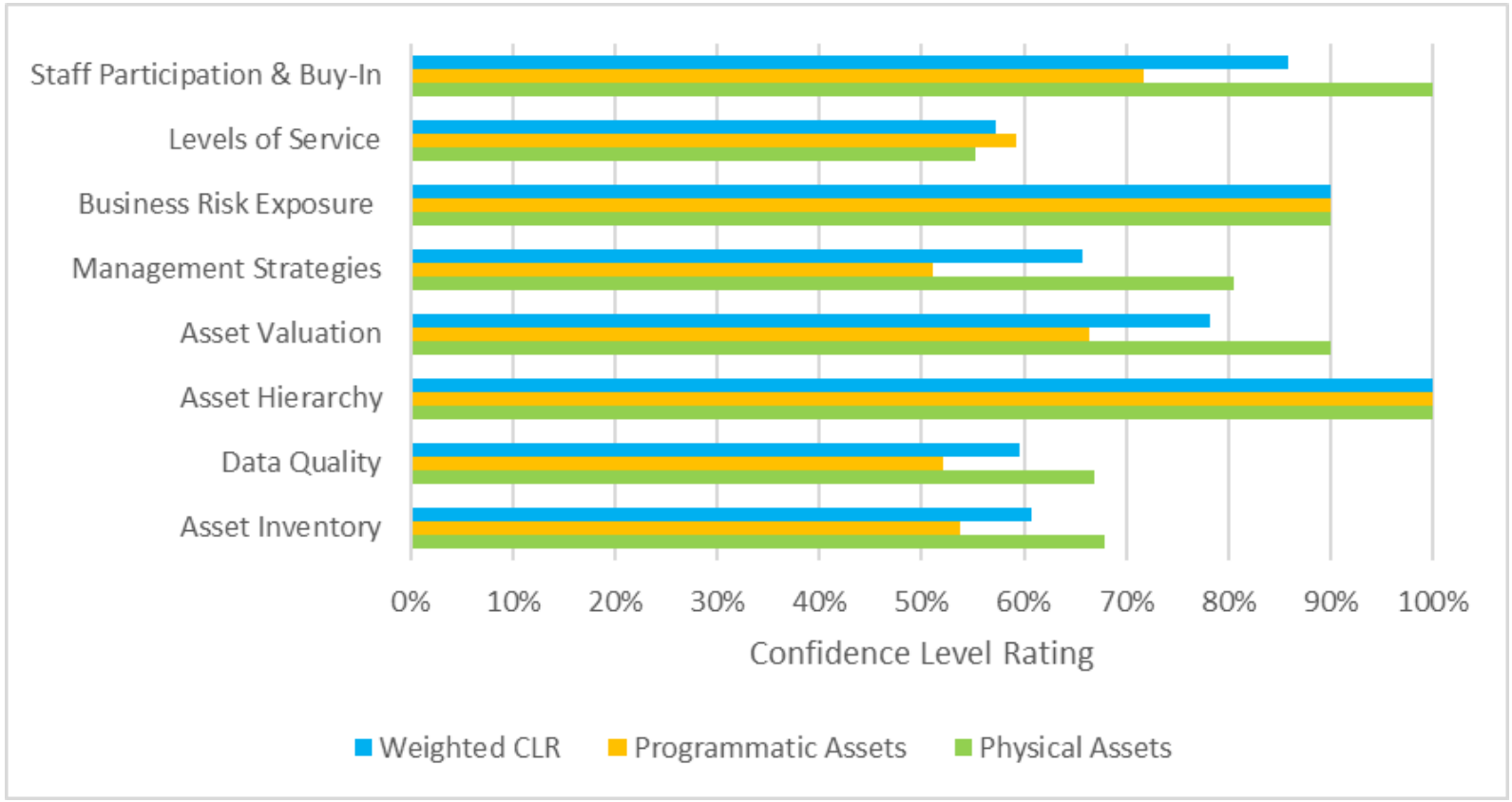


**Figure 6-2. 2020 Confidence Level Rating**

# 7 Recommendations

Based on information presented in Sections 1 through 6 of this WAMP, the consultant team involved in the WAMP project has developed recommendations for future actions to be taken and projects to be completed for the assets within each watershed. These actions and projects were identified to help effectively manage the assets to achieve the LOS. The consultant team's recommendations are:

1. Apply the WAMP to prioritize work and investments to achieve LOS and to proactively drive future decisions and actions.
2. Continue to update the catalog of existing and planned assets that have current or future cost impacts.
3. Continue to improve the asset management plan on an annual basis by refining asset data to increase the CLR, and to effectively manage assets at the appropriate hierarchy. This will increase the accuracy of the asset register, provide an accurate picture of the current condition of assets, and increase the level of confidence in the WAMP's ability to help make sound planning decisions.
4. Continue to assess the hydraulic capacity of the storm drain pipes and inlets and identify under-capacity areas and the degree to which they are under capacity. The continuous assessment of storm drainage structure capacity and the resulting PoF and CoF scores will help strengthen the BRE analysis for the storm drainage infrastructure, which will allow the Division to focus on the highest priority storm drain assets.
5. During all planning efforts – flood risk management, NPDES compliance, and TMDL implementation, etc., create cross-functional teams that seek out opportunities to find synergy between projects and program elements that achieve multiple benefits of flood risk management and water quality improvements, if feasible. This synergistic approach will provide maximum benefit and ensure efficient use of the Division's limited resources.
6. Integrate WAMP into EAM so that WAMP's asset mapping, LOS tracking, reporting, and decision-making capability can be harnessed through EAM.
7. Integrate and reconcile the WAMP with existing City IT infrastructure (SAP, AMP, GIS)
8. While doing routine field inspections, measure the following and input the following information into the EAM system:
   - inlet size and material,
   - pipe size, invert depths, and material,
   - channel size, geometry, material, and depths.

   Substantiating the asset registry with physical attributes will enhance WAMP's decision making capability.
9. Determine ownership of physical assets (private vs public) so that responsibilities can be appropriately identified and attributed.

10. Continue to conduct condition assessments of assets (e.g., outfalls) and incorporate the results into future WAMP updates. This will make the PoF score more accurate resulting in increased accuracy of the BRE score.
11. Allocate budgets by asset categories and watershed to the extent practicable. Set up a staff charging system that aligns staff time and expenses to specific assets.
12. Refine cost categories during future WAMP updates to allocate planning and design costs, which include environmental document development and reviews, for capital and maintenance projects into operations and maintenance and program budgets rather than capital budgets, as appropriate.
13. Document business process flows (e.g., Division budget planning process, etc.) and capture critical asset data and processes. By doing so, the Division will be able to identify areas of potential efficiency gains and specific resources needed to perform the activities.
14. Continue refining the asset inventory (i.e., specific assets) and apply the process down to the appropriate level of the asset hierarchy with a focus on assets in the parks and other City departments.
15. Review high risk (based on BRE score) assets and invest as appropriate to lower risk. This will avoid emergency expenditures of large number of assets when they fail suddenly. This will enable the Division to plan for replacement of critical assets.
16. Identify assets where additional maintenance or rehabilitation would effectively extend that asset's useful life. Then, identify costs for adequate and timely maintenance to preserve the asset's useful life.
17. Educate and train staff on the implementation of the WAMP. This will bring about a cultural shift and staff will integrate their work practices with WAMP's data needs to provide the required capability.
18. City to investigate potential funding resources and close the funding gap
19. City staff to change input to their time sheets to align with each asset type. This will accurately track the investment that the Division makes into each asset type and help in development of more accurate budgets.
20. Implement efficiencies presented in Table 7-1 in operations.

## Table 7-1. Opportunities for Efficiency

| Efficiency Opportunities | | | |
|---|---|---|---|
| **Opportunity** | **Description** | **BRE Score** | **Priority** |
| 1 | **Tracking and Reporting** | 20 | 13 |
| | Develop centralize data management system | | |
| | Centralized geodatabase for all assets | | |
| | Centralized tracking for JRMP/WQIP Strategies | | |
| | Centralized system for CIP tracking and management | | |
| | Centralized geodatabase of all maintenance/CIP activities requiring mitigation | | |
| | Centralized geodatabase of all potential mitigation/restoration opportunities | | |
| | Centralized tracking system for CIP projects assigned to Public Works | | |
| | **Monitoring** | | |
| 2 | Coordinate Section-specific needs with special study obligations | 15 | 15 |
| | **BMP Inspections** | | |
| 3 | Train REs to be proficient in inspecting BMPs or shift responsibilities to Stormwater Division | 36 | 4 |
| 4 | Establish internal service agreements so that the Stormwater Division can support other departments with construction and design standards | 12 | 16 |
| 5 | Implement digital submission process for developers | 16 | 13 |
| | **Regulatory Considerations** | | |
| 6 | Implementation of IPF | 30 | 7 |
| 7 | Effectively negotiate permit requirements | 24 | 12 |
| | **CIP** | | |
| 8 | Assign BRE to projects prior to submitting to CIP so that projects can be prioritized appropriately | 12 | 16 |
| 9 | Link individual asset components to projects | 12 | 16 |
| 10 | Increase CIP bundling efforts with PUD | 35 | 5 |
| | **Street Sweeping/Parking Enforcement** | | |
| 11 | Prioritize routes based on water quality benefits (i.e., some routes swept based on resident request and signage) | 32 | 5 |
| 12 | Update street inventory to include all streets | 25 | 9 |
| 13 | Replace broken and mechanical sweepers with high efficiency sweepers | 25 | 9 |

**Table 7-1. Opportunities for Efficiency (contd.)**

| Efficiency Opportunities | | | |
|---|---|---|---|
| **Opportunity** | **Description** | **BRE Score** | **Priority** |
| | **Structure Cleaning** | | |
| 14 | Improve tablets to increase productivity | 12 | 13 |
| 15 | O&M to be involved during BMP design to provide maintenance input (access, specialized equipment needs, BMP-specific training) | 30 | 6 |
| 16 | Implement a new structure cleaning team/vactor dedicated to BMP maintenance | 30 | 6 |
| | **Structure Repair** | | |
| 17 | Implement additional in-house pipe repair team | 45 | 2 |
| 18 | Implement CMP lining instead of replacement where appropriate | 45 | 2 |
| | **Pump Station Electrical/Mechanical** | | |
| 19 | Install/program SCADA to inform maintenance activities | 16 | 9 |
| | **Channel Inspection and Maintenance** | | |
| 20 | Collaborate with DSD to revise City policy to be consistent with other regulatory requirements when minimal maintenance activities can fall below a threshold for compensatory mitigation. | 50 | 1 |

# 8 References

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California Regional Water Quality Control Board, San Diego Region, Order NO. R9-2013-0001, AS AMENDED BY ORDER NOS. R9-2015-0001 AND R9-2015-0100

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NPDES NO. CAS0109266, National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from The Municipal Separate Storm Sewer Systems (MS4) Draining the Watersheds Within The San Diego Region

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# Watershed Asset Management Plan Version 2.0

## Transportation and Stormwater Department, Stormwater Division

## City of San Diego

# **Appendix A –Business Risk Exposure**

**January 2021**

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# Table of Contents



# List of Figures



# List of Tables

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# 1 Four Major Failure Modes

| Mode | Definition | Tactical Aspects | Management Strategy |
|---|---|---|---|
| 1. Capacity | Volume of demand exceeds design capacity | Growth, system expansion | Redesign |
| 2. Level of Service | Functional requirements exceed design capability | Codes/permits: OSHA, water quality, life safety, ecosystem services, service, delays, etc. | Redesign |
| 3. Mortality | Consumption of asset | Physical deterioration due to age, usage (including operator error), acts of nature | O&M, Renewal |
| 4. Efficiency | Performs ok, but cost of operation exceeds that of feasible alternatives | "Pay-back" period | Replace |

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# 2 WAMP Probability of Failure (PoF) Criteria

**Table 2-1. Mortality**

| Asset Type | Data Source | PoF = 1 (New) | 2 | 3 | 4 | PoF = 5 (Failure) |
|---|---|---|---|---|---|---|
| **Physical Assets**<br>• Conveyance (Channels, Pipes, Culverts)<br>• Struct. BMPs<br>• Pump Stat.<br>• Levees<br>• Structures | - Asset Age<br>- Asset Useful Lifespan<br>- Condition Assessments (Inspections)<br>- Site Conditions<br>- Asset Material<br>- As-builts<br>- SWQMP | **New asset**, no structural issues observed. | Asset is between **>0% and 35%** of its useful life or few minor defects are observed. | Asset is between **>35% and 65%** of its useful life or several minor defects are observed. | Asset is between **>65% and 85%** of its useful life or critical defects observed requiring repair/rehabilitation. | Asset is between **>85% and 100%** of its useful life or critical defects observed requiring replacement. |

Logic of % remaining useful life is based on "time" needed to manage failure. PoF 4 with 15% of life left will result in the following time for planning:

- Structural BMP (30-year life): 25 x 0.15 = 3.75 years (Sufficient time to plan and manage before failure)
- Hard assets (100-year life): 100 x 0.15 = 15 years (Sufficient time to manage any big CIP projects)

**Table 2-2. Capacity**

| Asset Type | Data Source | PoF = 1 (New) | 2 | 3 | 4 | PoF = 5 (Failure) |
|---|---|---|---|---|---|---|
| **Physical Assets**<br>• Channels<br>• Pipes<br>• Inlets/Outlets<br>• Pumps<br>• F.C. Basins<br>• Surface Drainage | - Asset capacity<br>- H&H analyses | Asset can sufficiently convey greater than or equal to the 100-year storm event flow without causing flooding greater than the curb height.<br>**≥100-year flow** | Asset can sufficiently convey greater than or equal to the 50-year storm event flow without causing flooding greater than the curb height.<br>**≥50-year flow** | Asset can sufficiently convey greater than or equal to the 25-year storm event flow without causing flooding greater than the curb height.<br>**≥25-year flow** | Asset can sufficiently convey greater than or equal to the 10-year storm event flow without causing flooding greater than the curb height.<br>**≥10-year flow** | Asset cannot convey the 10-year storm event flow without causing flooding greater than the curb height.<br>**<10-year flow)** |
| **Future Flood Control Asset Unassociated with Existing Assets – Chollas Creek Watershed** | - IDEA Project Ranking | **IDEA Rank 81 - 100** | **IDEA Rank 61-80** | **IDEA Rank 41-60** | **IDEA Rank 21-40** | **IDEA Rank 1-20** |
| **Future Flood Control Assets Unassociated with Existing Assets – Los Penasquitos Watershed** | - IDEA Project Ranking | **IDEA Rank 40-50** | **IDEA Rank 31-40** | **IDEA Rank 21-30** | **IDEA Rank 11-20** | **IDEA Rank 1-10** |

## 2.1 Drainage Design Manual, January 2017 Edition

### 2.1.1 Section 2.2 Design Storm Frequency

1. Within floodplain and floodplain fringe areas as defined by FEMA, the runoff criteria shall be based upon a 100-year frequency storm.
2. For all drainage channels and storm water conveyance systems, which will convey drainage from a tributary area equal to or greater than one (1) square mile, the runoff criteria, shall be based upon a 100-year frequency storm.
3. For tributary areas under one (1) square mile:
   a. The storm water conveyance system shall be designed so that the combination of storm drain system capacity and overflow (streets and gutter) will be able to carry the 100-year frequency storm without damage to or flooding of adjacent existing buildings or potential building sites.
   b. The runoff criteria for the underground storm drain system shall be based upon a 50-year frequency storm.

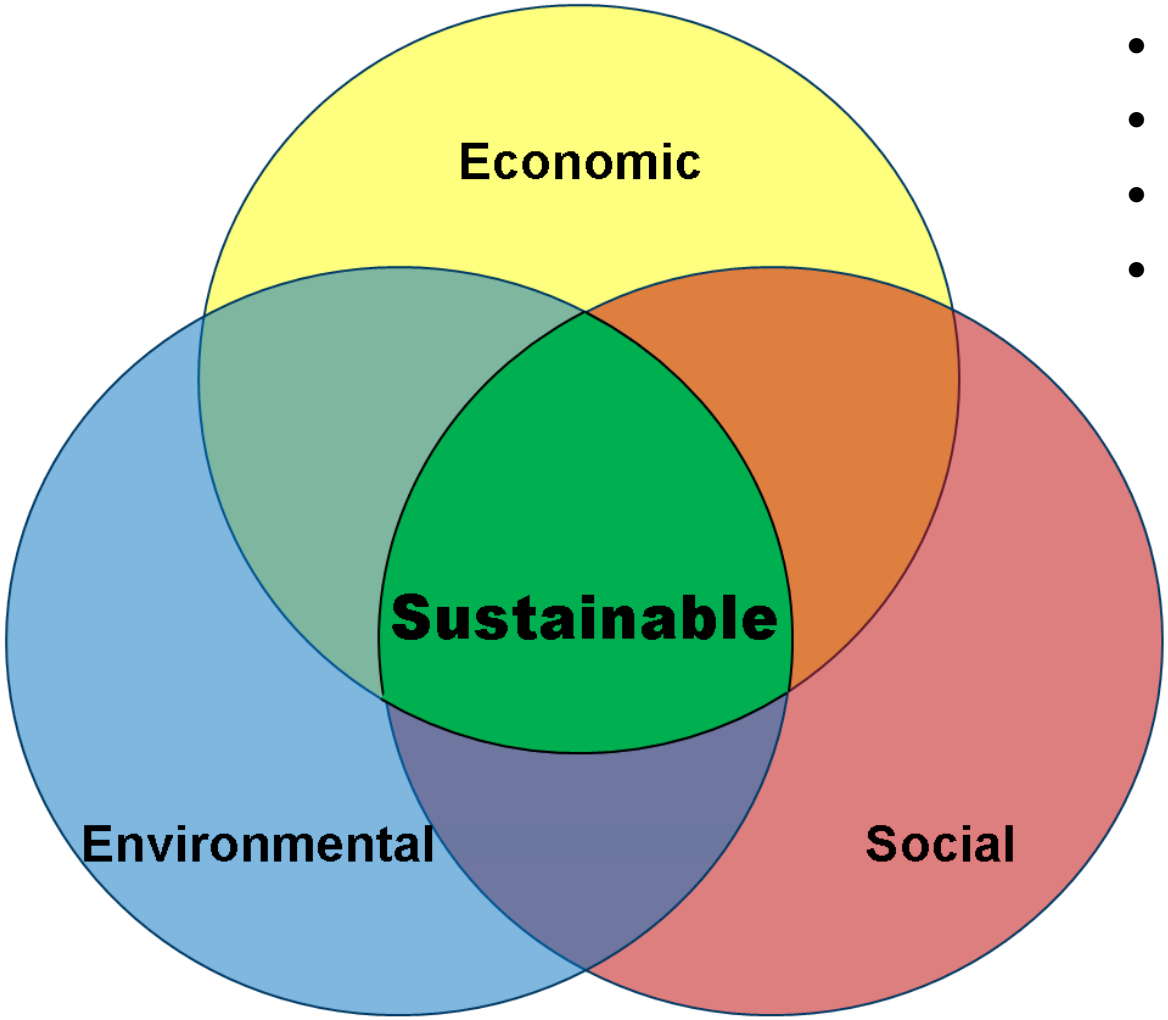
**Table 2-3. Level Of Service**

| Asset Type1 | Data Source | PoF = 1 (New) | 2 | 3 | 4 | PoF = 5 (Failure) |
|---|---|---|---|---|---|---|
| **Programmatic Assets** | - Compliance targets (numerical permitting)<br>- Planned program targets<br>- Ecological Function / Services (Did the plants grow?) | Full delivery of program requirements/targets. (If JRMP & WQIP requirements align, then 100% of WQIP)<br>Met performance standards.<br>**100% target** | | Program requirements/targets partially met.<br>**50% target** | | None of the program requirements/targets met. Did not meet performance standards.<br>**0% target** |
| **Future Water Quality Structural Assets** | - Compliance Schedule | **No timeline, over 20 years** | **16-20 years** | **11-15 years** | **6-10 years** | **0-5 years** |

**Table 2-4. Efficiency**

| Asset Type | Data Source | PoF = 1 | 2 | 3 | 4 | PoF = 5 |
|---|---|---|---|---|---|---|
| **Programmatic Assets** | - Financial data<br>- Overtime hours | Asset provides debatable benefit to current operation. | Asset provides break-even benefit to current operation. | Asset provides potential benefit to current operation | Asset provides clear/added benefit to current operation | Asset provides significant benefit to current operation. |

# 3 Triple Bottom Line (TBL) For Consequence of Failure (CoF)




- Balanced
- Transparent
- Recognizes all concerns
- Doesn't borrow from future generations

**Figure 3-1. TBL for CoF**

# 4 WAMP Consequence of Failure (CoF) Criteria

**Table 4-1. Social**

| Category | Category Weight | Subcategory | Programmatic Asset Subcategory weight | Physical Asset Subcategory weight | Data Source/Criteria | CoF = 1 (Minimum) | 2 | 3 | 4 | CoF = 5 (Maximum) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Social** | 1 | Public Perception | 0.10 | N/A | • Attention/ Liability (repetitive and known locations) | No complaints or media | Localized complaints or potential claims | Media coverage | Council, mayoral, or NGO attention | Established liability (e.g., fines and claims) |
| | | | 0.10 | 0.20 | • California Department of Water Resources Disadvantaged Community (DAC) Mapping | Not a DAC | | DAC | | Severely DAC |
| | | Public Health and Safety | 0.8 | 0.8 | • Proximity of project location to key zoning area (public services, business zone, airport and tourist attraction and school) | ≥1/2 mile (≥2,640 ft) | <1/2-1/4 mile (<1,320-2640 ft) | <1/4-1/8 mile (<660-1,320 ft) | <1/8-1/16 mile (<330-660 ft) | <1/16 mile (<330 ft) |

## Table 4-2. Environmental

| Category | Category Weight | Subcategory | Programmatic Subcategory weight | Physical Subcategory weight | Data Source/ Criteria | CoF = 1 (Minimum) | 2 | 3 | 4 | CoF = 5 (Maximum) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Environmental** | 1 | Regulatory | 0.7 | N/A | • Environment regulatory consequences<br>• FEMA regulatory consequences<br>• Other regulatory agencies (USACE, NFWS) | No regulatory consequence | Verbal warning, investigative order (IO), or notice of violation (NOV) | Cleanup and abatement order | Cease and desist order | Monetary violation, lawsuit, or disqualification from National Flood Insurance Program (NFIP) |
| | | Environmental Quality | 0.3 | 1.0 | • Receiving Waters<br>- TMDL (type and timeline)<br>- 303d list<br>- Observed exceedances | No observed environmental issues | Observed exceedances | 303d listed waterbody | Total Maximum Daily Load (TMDL) with no schedule or of lower priority | TMDL with compliance schedule within 5 years |

## Table 4-3. Economic – Existing Non-Channel Assets

| Category | Category Weight | Sub-category | Physical Subcategory weight | Data Source/Criteria | CoF = 1 (Minimum) | 2 | 3 | 4 | CoF = 5 (Maximum) |
|---|---|---|---|---|---|---|---|---|---|
| **Economic** | 1 | Financial | 0.3 | • Repair Cost Factor (Refer to Attached Matrix<br>- Pipe Size (<=12"/>12")<br>- Bad (20-ft from Centerline or Edge of Receiving Waters polygon if Available)/Good Ground<br>- Depth of Pipe | Score 1-8.5 | Score 9-16 | Score 17-24 | Score 25-32 | Score 33-40 |
| | | | 0.1 | • Proximity to Canyon | Outside of Canyon | --- | --- | --- | Within Canyon |
| | | | 0.1 | • Pipe Size | ≤12" | >12"-18" | >18" – 24" | >24" – 36" | >36" |
| | | | 0.5 | • Impacts to Adjacent Properties | Open space/ unimproved | Paved areas, non-roads | Residential Roads (20-ft from Centerline of Road) | Collector Roads (40-ft from Centerline of Road) or Arterial Roads (50-ft from Centerline of Road) | Structures (10-ft from Edge of Structure) or Freeways (100-ft from Centerline of Freeway) |

**Table 4-4. Repair Cost Factor Matrix (Based on Pipeline Condition Assessment Strategy and Renewal Forecast, June 30, 2010)**

| Small Diameter Pipes (≤ 12") | | | | | | | Large Diameter Pipes (>12") | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bad Ground | | | Good Ground | | | | Bad Ground | | | Good Ground | | |
| RCF | Upper Depth (ft) | Lower Depth (ft) | RCF | Upper Depth (ft) | Lower Depth (ft) | | RCF | Upper Depth (ft) | Lower Depth (ft) | RCF | Upper Depth (ft) | Lower Depth (ft) |
| **1.5** | 3 | 6 | **1.0** | 3 | 6 | | **5.5** | 3 | 6 | **4** | 3 | 6 |
| **2.5** | 6 | 9 | **2.0** | 6 | 9 | | **9** | 6 | 9 | **7** | 6 | 9 |
| **3.5** | 9 | 12 | **3.0** | 9 | 12 | | **16** | 9 | 12 | **13** | 9 | 12 |
| **5.0** | 12 | 15 | **4.0** | 12 | 15 | | **24** | 12 | 15 | **19** | 12 | 15 |
| **6.5** | 15 | 18 | **5.5** | 15 | 18 | | **31** | 15 | 18 | **26** | 15 | 18 |
| **8.5** | 18 | 21 | **7.0** | 18 | 21 | | **40** | 18 | 21 | **33** | 18 | 21 |

## Table 4-5. Economic – Existing Channel Assets

| Category | Category Weight | Subcategory | Physical Subcategory weight | Data Source/Criteria | CoF = 1 (Minimum) | 2 | 3 | 4 | CoF = 5 (Maximum) |
|---|---|---|---|---|---|---|---|---|---|
| **Economic** | 1 | Financial | 0.3 | • Proximity to Road Class | Everything Else | Residential Roads (20-ft from Centerline of Road) | Collector Roads (40-ft from Centerline of Road) | Arterial Roads (50-ft from Centerline of Road) | Freeway (100-ft from Centerline of Freeway) |
| | | | 0.2 | • Channel Size (Bottom Width) | ≤8 ft | --- | --- | --- | >8 ft |
| | | | 0.5 | • Flooding of Adjacent Properties<br>- Primary Data (except when overridden by City direction)<br>- FEMA Floodplain Maps (1% Annual Chance Flood [100-year Flood])<br>- Chollas and Penasquitos IDEAS, Maple Canyon and Famosa Slough Studies<br>- Secondary Data (except when overridden by City direction)<br>- Channel Data (CSA Layer Channels)<br>- Small Impact (1-3 houses [2,000 sq. ft. - 6,000 sq. ft.] or equivalent structures)<br>- Medium Impact (4-8 houses [8,000 sq. ft. - 16,000 sq. ft.] or equivalent structures)<br>- Large Impact (>8 houses [>16,000 sq. ft.] or equivalent structures)<br>- Where Primary and Secondary Data is Unavailable, the CoF = 2 | 0 Structures or No Flooding of Structures | 1-3 Structures or Small Impact or Where Primary and Secondary Data is Unavailable | 4-8 Structures or Medium Impact | --- | >8 Structures or Large Impact |

## Table 4-6. Economic – Existing Brow Ditches

| Category | Category Weight | Subcategory | Physical Subcategory weight | Data Source/Criteria | CoF = 1 (Minimum) | 2 | 3 | 4 | CoF = 5 (Maximum) |
|---|---|---|---|---|---|---|---|---|---|
| **Economic** | 1 | Financial | 0.3 | • Proximity to Road Class | Everything Else | Residential Roads (20-ft from Centerline of Road) | Collector Roads (40-ft from Centerline of Road) | Arterial Roads (50-ft from Centerline of Road) | Freeway (100-ft from Centerline of Freeway) |
| | | | 0.2 | • Channel Size (Bottom Width) | ≤8 ft | --- | --- | --- | >8 ft |
| | | | 0.5 | • Flooding of Adjacent Properties | --- | 2 | --- | --- | --- |

## Table 4-7. Economic – Park and Other City Department Assets

| Category | Category Weight | Subcategory | Physical Subcategory weight | Data Source/Criteria | CoF = 1 (Minimum) | 2 | 3 | 4 | CoF = 5 (Maximum) |
|---|---|---|---|---|---|---|---|---|---|
| **Economic** | 1 | Financial | 0.3 | • Repair Cost Factor (Refer to Attached Matrix<br>- Pipe Size (<=12"/>12")<br>- Bad (20-ft from Centerline or Edge of Receiving Waters polygon if Available)/Good Ground<br>- Depth of Pipe | Score 1-8 | --- | --- | --- | --- |
| | | | 0.1 | • Proximity to Canyon | Outside of Canyon | --- | --- | --- | Within Canyon |
| | | | 0.1 | • Pipe Size | ≤12" | --- | --- | --- | --- |
| | | | 0.5 | • Impacts to Adjacent Properties | Open space/ unimproved | --- | --- | --- | --- |

### Table 4-8. Economic – Future Assets

| Category | Category Weight | Subcategory | Physical Subcategory weight | Data Source/Criteria | CoF = 1 (Minimum) | 2 | 3 | 4 | CoF = 5 (Maximum) |
|---|---|---|---|---|---|---|---|---|---|
| **Economic** | 1 | Financial | 1.0 | • New Asset Capital Cost | <$1M | $1M - <$3M | $3M - <$5M | $5M - <$7M | ≥$7M |

### Table 4-9. Economic – Programmatic Assets

| Category | Category Weight | Subcategory | Programmatic Subcategory weight | Data Source/Criteria | CoF = 1 (Minimum) | 2 | 3 | 4 | CoF = 5 (Maximum) |
|---|---|---|---|---|---|---|---|---|---|
| **Economic** | 1 | Financial | 1.0 | • Fines/ settlements<br>• Compliance cost<br>• Departmental requirements and costs | <$50K (Handled Internally) | $50K - <$250K | $250K - <$1M | $1M - <$5M | ≥$5M |

Watershed Asset Management Plan
Version 2.0

Transportation and Stormwater Department, Stormwater Division

City of San Diego

# Appendix B – WAMP 2.0 Database Development Assumptions

**January 2021**
**Last Update: January 08, 2011**

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# 1 Existing Physical Assets

## 1.1 Replacement Cost

- Whenever available, the City's Master Unit Costs was used as main source of unit cost. An additional markup of 93% was added to account for the City's soft costs. The 93% markup is based on Chollas Creek WMP Cost Changes 10-11-2019 as follows:

| Cost Category | Existing | Updated | Source |
|---|---|---|---|
| **Owner's Construction Contingency** | 40% | 45% | The City requested that the percentage be updated with a recent cost estimate completed at the end of FY19 for the Auburn Reach 1a Concept Design. Note these values were not included in the Statewide Benchmarking Cost Guidance as those estimates were based on actual construction costs and were not at the conceptual planning phase like the Master Plans. |
| **Planning & Design** | 30% | 26% | The City requested that the Planning and Design percentages be updated with the standard percentages set in the 2018 California Statewide Benchmarking Costs for 80th Percentile Range Pipe System Projects. |
| **Construction Management** | 0% | 22% | The City requested that Construction Management costs be added based on the standard percentages set in the 2018 California Statewide Benchmarking Costs for 80th Percentile Range Pipe System Projects. |

- If the unit cost was not available in City's Master Unit Costs list, WAMP used the average value from Chollas Watershed WMP. The number was used as is because they are already included the 93% markup.
- If the unit cost was not available in City's Master Unit Costs or Chollas Watershed WMP, the unit cost from 2013 WAMP escalated to 2020 will be used. No additional markup added because markup was already included.

## 1.2 Conveyances

| Category | Assumptions |
|---|---|
| **Data Source/ Assumptions** | • Base conveyance inventory from Wood GIS (2019; Source: CD of Wood deliverable, Feature Class: City_of_SD_stormwater_conveyance_6_14_2019) and OM Engineering data for MWMP channels (Source: CSA_Channels_Basins_v2.shp)<br>• Asset register includes only City-owned (S), active (A) assets<br>• Per City instructions, the asset register does not include assets from the Wood data marked as channels with the following materials following the assumption that these are mislabeled:<br>  ○ CIPCP<br>  ○ CMP<br>  ○ RCP<br>  ○ SPRIB<br>  ○ Steel |
| **Hierarchy** | • Included under Physical Assets >Watershed > Conveyances |
| **ID** | • Used "C" + Drain # for assets from Wood data with City ID<br>• Used "C" + Drain # + Sequential Number for assets from Wood data where multiple segments have the same City ID<br>• Used "C" + Object ID + "-99" for assets from Wood data without City ID |
| **Install Year** | • For assets in Wood data with install year, used Wood data<br>• For assets in Wood data with City ID without install year, used WAMP 1.0 assumed install (original proximity analysis (i.e., nearby drain install year))<br>• For assets in Wood data with no City ID (assume new/newly discovered asset), used proximity analysis (i.e., nearby drain install year)<br>• Assets with assumed install year are marked in comments<br>• Overall, 44% of conveyance assets are assigned an assumed install year |
| **Material** | • For assets in Wood data with material, used Wood data<br>• For assets in Wood data with City ID without material, used WAMP 1.0 assumed material (nearby asset)<br>• For assets in Wood data with no City ID (assume new/newly discovered asset), used nearby drain material<br>• Assets with assumed material are marked in comments<br>• Overall, there are 6% of pipe (drains) with assumed material |
| **Size** | • Wood: Used Actual Length (ACT_LENGTH)<br>• Channels: Estimated length for value estimate; used square footage for maintenance |
| **Cost** | • Used approved costs from City<br>• Any replacement backlog will be shown on the first year of analysis (FY 21) |

## 1.3 Structures

| Category | Assumptions |
|---|---|
| **Data Source/ Assumptions** | • Base conveyance inventory from Wood GIS (2019; City_of_SD_stormwater_structures_6_14_2019)<br>• Asset register includes only City-owned (S), active (A) assets<br>• Does not include the following types<br>  ○ Cap<br>  ○ Connector/Sewer connector<br>  ○ Pump station (Replaced with pump station inventory)<br>  ○ Low flow diversion (Replaced with pump station inventory)<br>  ○ Weep sump<br>  ○ Unknown |
| **Hierarchy** | • Included under Physical Assets >Watershed > Structures |
| **ID** | • Used Drain # for assets from Wood data with City ID<br>• Object ID + "-99" for assets from Wood data without City ID |
| **Install Year** | • For assets in Wood data with install year, used Wood data<br>• For assets in Wood data with City ID without install year, used WAMP 1.0 assumed install (original proximity analysis (i.e. nearby drain install year))<br>• For assets in Wood data with no City ID (assume new/newly discovered asset), used proximity analysis (i.e. nearby drain install year)<br>• Assets with assumed install year are marked in comments<br>• Overall, 41% of structures are assigned an assumed install year |
| **Cost** | • Used approved costs from City<br>• Any replacement backlog will be shown on the first year of analysis (FY 21) |

## 1.4 Levees

| Category | Assumptions |
|---|---|
| **Data Source/ Assumptions** | • WAMP 1.0 database (verified by GIS data during COSS update 2019) |
| **Inventory** | • Includes all levees |
| **Hierarchy** | • Included under Physical Assets > Levees |

## 1.5 Pump Stations

| Category | | Assumptions |
|---|---|---|
| **Source** | | Asset Register: TO31 Pump Stations SAP Assistance<br>Future upgrade: MBI 173785 Project Cost Estimation V2 (Oct. 2019) |
| **Data Incorporated** | General | • Equipment are listed as asset with the new SAP classification<br>• Future upgrade is modeled as activity at pump station level |
| **Year** | | • Future upgrade is distributed 2021-2025 (5-year period) |

## 1.6 Structural BMP

| Category | Assumptions |
|---|---|
| **Source** | TO032_Task4_TCBMP.gdb |
| **Data Incorporated** | • Included all Public structural BMPs<br>• Used Structural BMP type<br>• Used BMP ID<br>• Used install year from data |
| **Hierarchy** | • Included under Physical Assets > Structural BMPs |
| **Install Year** | • If no install year, used WAMP 1.0 assumptions or nearby projects<br>• If no nearby projects, assumed recent project (2019) |

## 1.7 Parks (Municipal Facilities List)

| Category | Assumptions |
|---|---|
| **Data Source/ Assumptions** | • Use the municipal facilities list to identify City-owned parks<br>• Use **# of structures** and **miles of pipe** per acre from the Mission Bay and Balboa Park (Regional Parks) and Carmel Valley Community Park inventories<br>• Apply those assumptions on the acreage and park type of each identified City park |
| **Inventory** | • One line item/asset each for structures and conveyances per park |
| **Hierarchy** | • Included under Physical Assets > Parks and Recreation |
| **Install Year** | • Proximity analysis with Wood conveyances |
| **Cost** | • $733/LF for conveyances (drain cost), $15,000/EA for structures (inlet cost)<br>• Based on approved costs from City |

The assumed length of pipe (drains) and numbers of structures in each park are determined based criteria listed in the following table.

| Designation | Conveyance | Unit | Structure | Unit |
|---|---|---|---|---|
| **Cemetery** | 400 | LF/ACRE | 1 | EA/ACRE, Min Qty 2 |
| **Community Park** | 400 | LF/ACRE | 1 | EA/ACRE, Min Qty 2 |
| **Mini Park** | 400 | LF/ACRE | 1 | EA/ACRE, Min Qty 2 |
| **Neighborhood Park** | 400 | LF/ACRE | 1 | EA/ACRE, Min Qty 2 |
| **Open Space < 20 acres** | 10 | LF/ACRE | 0.25 | EA/ACRE, Min Qty 2 |
| **Open Space 20 - 200 acres** | 5 | LF/ACRE | 0.15 | EA/ACRE |
| **Open Space 200 - 400 acres** | 2 | LF/ACRE | 0.075 | EA/ACRE |
| **Open Space 400 - 1000 acres** | 2 | LF/ACRE | 0.05 | EA/ACRE |
| **Open Space > 1000 acres** | 1 | LF/ACRE | 0.02 | EA/ACRE |
| **Regional Park < 5 acres** | 400 | LF/ACRE | 1 | EA/ACRE, Min Qty 2 |
| **Regional Park 5 - 100 acres** | 50 | LF/ACRE | 0.25 | EA/ACRE |
| **Regional Park > 100 acres** | 12 | LF/ACRE | 0.05 | EA/ACRE |
| **Skate Park** | 400 | LF/ACRE | 1 | EA/ACRE, Min Qty 2 |
| **Dog Park** | 400 | LF/ACRE | 1 | EA/ACRE, Min Qty 2 |

## 1.8 Facilities (Municipal Facilities List)

| Category | Assumptions |
|---|---|
| **Data Source/ Assumptions** | • Use municipal facilities list to identify City facilities<br>• Base **# of structures** and **ft of pipe** on approximate impervious surface size (estimated using high-resolution satellite imagery)<br>• Develop 3 categories of parcel impervious surface size<br>  ○ Small (<1 acre)<br>  ▪ Assume 3 inlets/structures, 200 ft of pipe/acre (minimum 200 ft)<br>  ○ Medium (1-5 acres)<br>  ▪ Assume 6 inlets/structures, 200 ft of pipe/acre<br>  ○ Large (>5 acres)<br>  ▪ Assume 9 inlets/structures, 200 ft of pipe/acre |
| **Inventory** | • One line item/asset each for structures and conveyances per facility |
| **Hierarchy** | • Included under Physical Assets > Other Facilities |
| **Install Year** | • Proximity analysis with Wood conveyances |
| **Cost** | • $733/LF for conveyances (drain cost), $15,000/EA for structures (inlet cost)<br>• Based on approved costs from City |

The assumed length of pipe (drains) and numbers of structures in each facility are determined based criteria listed in the following table

| Impervious (acres) | Conveyance | Unit | Structures | Unit |
|---|---|---|---|---|
| **Small (<1 acre)** | 200 | LF/ACRE, Min 200 LF | 3 | EA/Facility |
| **Medium (1-5 acres)** | 200 | LF/ACRE | 6 | EA/Facility |
| **Large (>5 acres)** | 200 | LF/ACRE | 9 | EA/Facility |

# 2 Future Physical Assets

## 2.1 Cost

The cost assumptions for future physical assets are summarized in the following table.

| Project Sources | Cost Adjustment |
|---|---|
| Chollas WMP/IDEA | Used project costs in WMP without additional markup |
| Los Penasquitos WMP/IDEA | Used project costs in WMP without additional markup |
| Maple Canyon WMP | Used project costs in WMP without additional markup |
| South Mission Beach WMP | Used project costs in WMP without additional markup |
| WQIP | The cost is escalated to 2020 $s. No additional markup added. |
| DRAFT – Receiving Water Limitations Implementation Costs (01/19/2016) | The cost is escalated to 2020 $s. No additional markup added. |

## 2.2 Chollas IDEA

### 2.2.1 Conduits

| Category | | Assumptions |
|---|---|---|
| **Source** | | CARTO_CHOLLAS_WMP_07012019.gdb\<br>Flood_Control_Proposed\<br>Conduits_Prop |
| **Data Incorporated** | General | • Attached Project ID to existing asset from Wood data<br>• Only incorporated pipes with Project_ID |
| | Drains w/ Drain ID Match in Wood and S Owner | • Add Project ID to asset attributes |
| | Drains w/ Drain ID Match in Wood and Other/ Unknown Owner | • Not incorporated into WAMP database |
| | Drains w/o Drain ID Match and Status "New" | • Add asset to WAMP database as future recommended project<br>• Used "FacIdRick" |
| **Other Assumptions** | | • Other attributes (material, install year, etc) kept in line with Wood/proximity analysis (see Conveyances)<br>• Used projected cost from IDEA (WMP_FC_Project Costs.xlsx) for new projects |

### 2.2.2 Junctions

| Category | | Assumptions |
|---|---|---|
| **Source** | | CARTO_CHOLLAS_WMP_07012019.gdb\<br>Flood_Control_Proposed\<br>Junctions_Prop |
| **Data Incorporated** | General | • Attached Project ID to existing asset from Wood data<br>• Only incorporated structures with Project_ID<br>• Only incorporated structures of type included from Wood data (e.g., no connectors) |
| | Structures w/ Drain ID Match in Wood and S Owner | • Add Project ID to asset attributes |
| | Drains w/ Drain ID Match in Wood and Other/ Unknown Owner | • Not incorporated into WAMP database |
| | Drains w/o Drain ID Match and Status "New" | • Add asset to WAMP database as future recommended project<br>• Used "FacIdRick" |
| **Other Assumptions** | | • Other attributes (install year, etc) kept in line with Wood/proximity analysis (see Structures)<br>• Used projected cost from IDEA (WMP_FC_Project Costs.xlsx) for new projects |

### 2.2.3 Storage

| Category | | Assumptions |
|---|---|---|
| **Source** | | CARTO_CHOLLAS_WMP_07012019.gdb\<br>Flood_Control_Proposed\<br>Storage_Prop |
| **Data Incorporated** | General | • Included as new projects<br>• Only included assets with Project ID<br>• Assumed asset class = detention basin<br>• Included under Structural BMP hierarchy<br>• Used Shape Area<br>• Used projected cost from IDEA (WMP_FC_Project Costs.xlsx) for new projects |
| **Install Year** | | • Assumed install distributed to 2030 |

### 2.2.4 Water Quality – GI

| Category | | Assumptions |
|---|---|---|
| **Source** | | CARTO_CHOLLAS_WMP_07012019.gdb\<br>Water_Quality_Recommendations\<br>Distributed_GI_Footprints |
| **Data Incorporated** | General | • Included as new projects<br>• Included type as attribute<br>• Used Shape Area (will use WAMP 2.0 cost database)<br>• Used project costs<br>• Added O&M costs based on IDEA projection to programmatic asset database |
| **Install Year** | | • Assumed install distributed to 2030 |

### 2.2.5 Water Quality – MUTA

| Category | | Assumptions |
|---|---|---|
| **Source** | | CARTO_CHOLLAS_WMP_07012019.gdb\<br>Water_Quality_Recommendations\<br>MUTA_Footprint_Areas_Drainage_Areas |
| **Data Incorporated** | General | • Only included items with Project ID<br>• Included as new projects<br>• Included type as attribute<br>• Used Shape Area (will use WAMP 2.0 cost database) |
| **Install Year** | | • Assumed install distributed to 2030 |

## 2.3 Los Penasquitos IDEA

### 2.3.1 Conduits

| Category | | Assumptions |
|---|---|---|
| **Source** | | LosPenMaster.gdb\<br>Flood_Control_Needs\<br>Conduits_Prop |
| **Data Incorporated** | General | • Only incorporated projects with Fac_ID |
| | Drains w/ Location Match in Wood and S Owner | • Add Fac_ID (Project ID) to asset attributes |
| | Drains w/ Drain ID Match in Wood and Other/ Unknown Owner | • Not incorporated into WAMP database |
| **Other Assumptions** | | • Other attributes (material, etc) kept in line with Wood/proximity analysis |

### 2.3.2 Junctions

| Category | | Assumptions |
|---|---|---|
| **Source** | | LosPenMaster.gdb\<br>Flood_Control_Needs\<br>Junctions_Prop |
| **Data Incorporated** | General | • Only incorporated structures with Name (Project ID) |
| | Structures w/ Structure Location Match | • Junctions within 20 feet of Wood structure assumed to be realigned; project ID tied to asset |
| | Structures w/o Structure Location Match | • Junctions with no nearby Wood structure (within 20 feet) assumed to be proposed structure; added separately to database |
| **Install Year** | | • Assumed install distributed to 2030 |

### 2.3.3 Water Quality - GI

| Category | | Assumptions |
|---|---|---|
| **Source** | | LosPenMaster.gdb\<br>Water_Quality\<br>Distributed_GI_Footprints |
| **Data Incorporated** | General | • Approved projects included |
| **Install Year** | | • Assumed install distributed to 2035 |

### 2.3.4 Water Quality - MUTA

| Category | | Assumptions |
|---|---|---|
| **Source** | | LosPenMaster.gdb\<br>Water_Quality\<br>MUTA_Footprint_Areas |
| **Data Incorporated** | General | • Approved projects included |
| **Install Year** | | • Assumed install distributed to 2035 |

### 2.3.5 Floodplain Enhancements (and Lagoon Restoration)

| Category | | Assumptions |
|---|---|---|
| **Source** | | LosPenMaster.gdb\<br>Water_Quality\<br>Floodplain Enhancements |
| **Data Incorporated** | General | • Approved projects included |
| **Install Year** | | • Lagoon Restoration Phase 1 distributed 2023 to 2025<br>• Lagoon Restoration Phase 2 distributed 2028 to 2032<br>• Carroll Canyon and Flanders Enhancements distributed 2027 to 2029<br>• Hanson Mine Stream distributed 2030 to 2032<br>• Vulcan Mine Stream distributed 2033 to 2035 |

### 2.3.6 Additional Opportunities

| Category | | Assumptions |
|---|---|---|
| **Source** | | Los Penanquitos IDEA, Table 4-14 |
| **Data Incorporated** | | Cost distributed 2031 to 2035 |

## 2.4 Maple Canyon WMP

### 2.4.1 Water Quality – GI

| Category | | Assumptions |
|---|---|---|
| **Source** | | MapleCanyon.gdb\Water_Quality\Distributed_GI_Footprints |
| **Data Incorporated** | General | • All projects included |
| **Install Year** | | • Cost distributed 2032 to 2041 |

### 2.4.2 Water Quality – MUTA

| Category | | Assumptions |
|---|---|---|
| **Source** | | MapleCanyon.gdb\Water_Quality\MUTA_Footprint_Areas |
| **Data Incorporated** | General | • All projects included |
| **Install Year** | | • Cost distributed 2032 to 2041 |

## 2.5 South Mission Beach WMP

| Category | | Assumptions |
|---|---|---|
| **Source** | | South Mission Beach Watershed Master Plan (2019) report, Integrated Multi-Benefit Projects |
| **Data Incorporated** | General | • All projects included |
| **Install Year** | | • Project IP-120001: 2023<br>• Project IP-120002: 2025 |

## 2.6 Trash Capture Devices

| Category | Assumptions |
|---|---|
| **Data Source/ Assumptions** | • Draft Trash Capture Systems Workplan by LWA. The following summary table and unit cost were provided by Jim Harry on 03/19/2020 email. Source of assumptions is April 2020 Trash Full Capture Systems Work Plan." |
| **Hierarchy** | • Included under Physical Assets > Structural BMP |
| **Install Year** | • Installation distributed per year until compliance year (10 years) |
| **Cost** | • $1,600 each |

| Watershed | Subwatershed | Number of Devices |
|---|---|---|
| Los Penasquitos | | 650 |
| San Diego Bay | Chollas | 375 |
| Tijuana River | | 475 |

## 2.7 Non-TMDL Assets and Cost Assumptions

| Category | | Assumptions |
|---|---|---|
| **Source** | | DRAFT – Receiving Water Limitations Implementation Costs (01/19/2016) |
| **Data Incorporated** | General | • Incorporated costs for GI, GS, MUTA, and Non-Structural based on Table 4<br>• Original cost was adjusted to 2020 dollars<br>• O&M cost assumption based on Chollas IDEA (% of Capital Cost) |
| **Year** | | • Distributed costs for GI, GS, and MUTA as follows:<br>  ○ San Dieguito: 2022-2026 (5-year period)<br>  ○ Mission Bay/Rose Creek: 2032-2041 (10-year period)<br>  ○ San Diego Bay Non-Chollas: 2032-2041 (10-year period)<br>  ○ Tijuana River: 2035-2045 (10-year period)<br>• Costs for Modeled NS distributed over same time frame as above with staggered implementation<br>  ○ Tijuana River, Mission Bay, and San Diego Bay: 10% increase per year through 10-year distribution, 100% thereafter<br>  ○ San Dieguito: 20% increase per year through 5-year distribution, 100% thereafter |

# 3 Programmatic Assets

## 3.1 FTE Requirements

| Programmatic Assets | Fund Center | Job Class | Job Name | # of FTE | Contract |
|---|---|---|---|---|---|
| **Accounts Payable** | | | | | |
| | 2114110001 | 1104 | Account Clerk | 1 | |
| | | 1106 | Senior Management Analyst | 0.1 | |
| | | 1107 | Administrative Aide 2 | 0.5 | |
| | 2114120001 | 1104 | Account Clerk | 1 | |
| | | 1106 | Senior Management Analyst | 0.1 | |
| | | 1107 | Administrative Aide 2 | 0.5 | |
| **Alternative Compliance Program** | | | | | |
| | 2114120016 | Contract (PO) | | | 225,000 |
| | | 1153 | Assistant Engineer-Civil | 1 | |
| | | 1221 | Associate Engineer-Civil | 0.4 | |
| | | 1855 | Senior Civil Engineer | 0.4 | |
| | | 2214 | Deputy Director | 0.1 | |
| **Brow Ditch Maintenance** | | | | | |
| | 2114110013 | 1961 | Public Works Supervisor | 0.1 | |
| | | 1979 | Utility Worker 2 | 0.3 | |
| | 2114110017 | 1153 | Assistant Engineer-Civil | 0.1 | |
| | | 1221 | Associate Engineer-Civil | 0.1 | |
| | 2114110018 | 1186 | Development Project Manager 3 | 0.1 | |
| | | 1227 | Associate Planner | 0.25 | |
| | | 1872 | Senior Planner | 0.25 | |
| | | 2103 | Management Intern | 0.2 | |
| **Budget Development and Management** | | | | | |
| | 2114110001 | 1106 | Senior Management Analyst | 0.15 | |
| | | 1218 | Associate Management Analyst | 1 | |
| | | 2270 | Program Manager | 0.5 | |
| | 2114120001 | 1106 | Senior Management Analyst | 0.15 | |
| | | 1218 | Associate Management Analyst | 1 | |
| | | 2270 | Program Manager | 0.5 | |
| **Catch Basin Inspection and Cleaning** | | | | | |
| | 2114110015 | Contract (PO) | | | 350,000 |
| | | 1439 | Equipment Operator 1 | 3.25 | |
| | | 1961 | Public Works Supervisor | 1.7 | |
| | | 1977 | Public Works Superintendent | 0.4 | |

| Programmatic Assets | Fund Center | Job Class | Job Name | # of FTE | Contract |
|---|---|---|---|---|---|
| | | 1978 | Utility Worker 1 | 9.1 | |
| | | 1979 | Utility Worker 2 | 7.8 | |
| | | 2250 | Assistant Deputy Director | 0.125 | |
| | | 2270 | Program Manager | 0.07 | |
| **Channel Inspection and Prioritization** | | | | | |
| | 2114110013 | 1440 | Equipment Operator 2 | 0.1 | |
| | | 1445 | Equipment Operator 3 | 0.1 | |
| | | 1512 | Heavy Truck Driver 2 | 0.1 | |
| | | 1961 | Public Works Supervisor | 0.05 | |
| | | 1974 | Utility Supervisor | 0.05 | |
| | | 1977 | Public Works Superintendent | 0.14 | |
| | | 1978 | Utility Worker 1 | 0.5 | |
| | | 1979 | Utility Worker 2 | 0.15 | |
| | | 2250 | Assistant Deputy Director | 0.14 | |
| | | 2270 | Program Manager | 0.14 | |
| | 2114110017 | Contract (PO) | | | 685,000 |
| | | 1153 | Assistant Engineer-Civil | 1 | |
| | | 1221 | Associate Engineer-Civil | 2 | |
| | | 1855 | Senior Civil Engineer | 0.15 | |
| | | 2103 | Management Intern | 1.4 | |
| | | 2250 | Assistant Deputy Director | 0.1 | |
| **Channel Maintenance Program Management** | | | | | |
| | 2114110013 | Contract (PO) | | | 1,800,000 |
| | | 1153 | Assistant Engineer-Civil | 0.7 | |
| | | 1221 | Associate Engineer-Civil | 0.7 | |
| | | 1465 | Field Representative | 0.1 | |
| | | 1977 | Public Works Superintendent | 0.333 | |
| | | 2250 | Assistant Deputy Director | 0.125 | |
| | | 2270 | Program Manager | 0.14 | |
| | 2114110017 | Contract (PO) | | | 100,000 |
| | | 1153 | Assistant Engineer-Civil | 0.5 | |
| | | 1221 | Associate Engineer-Civil | 1 | |
| | | 1855 | Senior Civil Engineer | 0.15 | |
| | | 2103 | Management Intern | 0.5 | |
| | 2114110018 | Contract (PO) | | | 2,965,000 |
| | | 1186 | Development Project Manager 3 | 0.6 | |
| | | 1227 | Associate Planner | 4.2 | |
| | | 1872 | Senior Planner | 3.6 | |

| Programmatic Assets | Fund Center | Job Class | Job Name | # of FTE | Contract |
|---|---|---|---|---|---|
| | | 2103 | Management Intern | 0.5 | |
| | | 2214 | Deputy Director | 0.05 | |
| **Channel Minor Maintenance** | | | | | |
| | 2114110013 | 1440 | Equipment Operator 2 | 0.2 | |
| | | 1512 | Heavy Truck Driver 2 | 0.2 | |
| | | 1979 | Utility Worker 2 | 0.4 | |
| **CIP Planning & Management** | | | | | |
| | 2114110019 | Contract (PO) | | | 300,000 |
| | | 1153 | Assistant Engineer-Civil | 0.9 | |
| | | 1855 | Senior Civil Engineer | 0.9 | |
| | | 2103 | Management Intern | 0.9 | |
| | | 2250 | Assistant Deputy Director | 0.25 | |
| | 2114120015 | 1123 | Storm Water Compliance Manager | 0.2 | |
| | | 1227 | Associate Planner | 0.1 | |
| | | 1872 | Senior Planner | 0.1 | |
| | 2114120016 | Contract (PO) | | | 50,000 |
| | | 1221 | Associate Engineer-Civil | 0.25 | |
| | | 1855 | Senior Civil Engineer | 0.2 | |
| | | 2214 | Deputy Director | 0.05 | |
| **Cleanup & Abatement** | | | | | |
| | 2114110013 | Contract (PO) | | | 70,000 |
| | 2114120021 | Contract (PO) | | | 10,000 |
| | | 1356 | Code Compliance Officer | 0.6 | |
| | | 1357 | Code Compliance Supervisor | 0.1 | |
| | | 2270 | Program Manager | 0.05 | |
| **Clerical; Admin support** | | | | | |
| | 2114110001 | 1105 | Administrative Aide 1 | 0.5 | |
| | | 1106 | Senior Management Analyst | 0.1 | |
| | | 1107 | Administrative Aide 2 | 0.2 | |
| | | 1746 | Word Processing Operator | 0.5 | |
| | 2114120001 | 1105 | Administrative Aide 1 | 0.5 | |
| | | 1106 | Senior Management Analyst | 0.1 | |
| | | 1107 | Administrative Aide 2 | 0.2 | |
| | | 1746 | Word Processing Operator | 0.5 | |
| | | Contract (PO) | | | 1,208,000 |
| | 2114110017 | Contract (PO) | | | 18,000 |
| **Code Enforcement** | | | | | |
| | 2114110015 | 1439 | Equipment Operator 1 | 0.05 | |

| Programmatic Assets | Fund Center | Job Class | Job Name | # of FTE | Contract |
|---|---|---|---|---|---|
| | | 1961 | Public Works Supervisor | 0.04 | |
| | | 1978 | Utility Worker 1 | 0.14 | |
| | | 1979 | Utility Worker 2 | 0.12 | |
| | 2114120021 | Contract (PO) | | | 50,000 |
| | | 1356 | Code Compliance Officer | 5 | |
| | | 1357 | Code Compliance Supervisor | 0.9 | |
| | | 2270 | Program Manager | 0.35 | |
| **Compliance Monitoring Program** | | | | | |
| | 2114120018 | Contract (PO) | | | 6,430,000 |
| | | 1621 | Storm Water Environmental Specialist | 4.83 | |
| | | 2103 | Management Intern | 4 | |
| | | 2214 | Deputy Director | 0.05 | |
| | | 2270 | Program Manager | 0.25 | |
| **Construction Site Inspections** | | | | | |
| | 2114110017 | Contract (PO) | | | 72,000 |
| | | 1153 | Assistant Engineer-Civil | 0.343 | |
| | | 1221 | Associate Engineer-Civil | 0.0343 | |
| | | 1855 | Senior Civil Engineer | 0.0069 | |
| **Contracts** | | | | | |
| | 2114110018 | 1186 | Development Project Manager 3 | 0.2 | |
| | | 1227 | Associate Planner | 0.5 | |
| | | 1872 | Senior Planner | 1 | |
| | | 2103 | Management Intern | 1 | |
| | 2114120001 | Contract (PO) | | | 1,325,000 |
| | | 1751 | Project Officer 1 | 0.75 | |
| | | 1752 | Project Officer 2 | 0.4 | |
| **Development & Construction Standards** | | | | | |
| | 2114120016 | Contract (PO) | | | 75,000 |
| | | 1153 | Assistant Engineer-Civil | 0.2 | |
| | | 1221 | Associate Engineer-Civil | 0.25 | |
| | | 1855 | Senior Civil Engineer | 0.2 | |
| | | 2214 | Deputy Director | 0.05 | |
| **Education & Outreach Activities** | | | | | |
| | 2114120015 | 1227 | Associate Planner | 0.2 | |
| | 2114120018 | 1621 | Storm Water Environmental Specialist | 0.06 | |
| | 2114120020 | 1872 | Senior Planner | 0.4 | |
| | | 2103 | Management Intern | 1 | |
| **Education & Outreach Contract** | | | | | |

| Programmatic Assets | Fund Center | Job Class | Job Name | # of FTE | Contract |
|---|---|---|---|---|---|
| | 2114120015 | Contract (PO) | | | 100,000 |
| | 2114120017 | Contract (PO) | | | 1,685,000 |
| **ERP Functions and EAM Data Management** | | | | | |
| | 2114110019 | Contract (PO) | | | 18,000 |
| | | 1153 | Assistant Engineer-Civil | 0.25 | |
| | | 1221 | Associate Engineer-Civil | 0.5 | |
| | | 1855 | Senior Civil Engineer | 0.35 | |
| | | 2103 | Management Intern | 0.65 | |
| | | 2250 | Assistant Deputy Director | 0.05 | |
| | 2114120001 | 1751 | Project Officer 1 | 0.25 | |
| | | 1752 | Project Officer 2 | 0.5 | |
| | | 2103 | Management Intern | 1 | |
| **Existing Mitigation Monitoring** | | | | | |
| | 2114110018 | Contract (PO) | | | 700,000 |
| | | 1186 | Development Project Manager 3 | 0.2 | |
| | | 1227 | Associate Planner | 1 | |
| | | 1872 | Senior Planner | 1 | |
| **Floodplain Compliance** | | | | | |
| | 2114110019 | 1221 | Associate Engineer-Civil | 1 | |
| | | 1855 | Senior Civil Engineer | 1 | |
| | | 2103 | Management Intern | 0.4 | |
| | | 2214 | Deputy Director | 0.05 | |
| | | 2250 | Assistant Deputy Director | 0.2 | |
| **GIS Support** | | | | | |
| | 2114110019 | Contract (PO) | | | 18,000 |
| | | 1153 | Assistant Engineer-Civil | 0.1 | |
| | | 1221 | Associate Engineer-Civil | 0.5 | |
| | | 1855 | Senior Civil Engineer | 0.25 | |
| | | 2103 | Management Intern | 0.5 | |
| | 2114120018 | 1624 | Biologist 2 | 0.2 | |
| **Grants** | | | | | |
| | 2114110019 | 1153 | Assistant Engineer-Civil | 0.5 | |
| | | 1227 | Associate Planner | 0.1 | |
| | | 1855 | Senior Civil Engineer | 0.5 | |
| | | 2103 | Management Intern | 0.25 | |
| | | 2250 | Assistant Deputy Director | 0.25 | |
| | 2114120001 | 1752 | Project Officer 2 | 0.1 | |
| **Habitat Restoration & Mitigation** | | | | | |

| Programmatic Assets | Fund Center | Job Class | Job Name | # of FTE | Contract |
|---|---|---|---|---|---|
| | 2114110013 | Contract (PO) | | | 95,000 |
| | 2114110018 | Contract (PO) | | | 1,782,000 |
| | | 1186 | Development Project Manager 3 | 0.2 | |
| | | 1227 | Associate Planner | 4.2 | |
| | | 1872 | Senior Planner | 2 | |
| | | 2103 | Management Intern | 1.9 | |
| | | 2250 | Assistant Deputy Director | 0.15 | |
| **Industrial Inspections** | | | | | |
| | 2114120019 | Contract (PO) | | | 85,000 |
| | | 1124 | Supervising Storm Water Inspector | 1 | |
| | | 1125 | Storm Water Inspector 3 | 1 | |
| | | 1126 | Storm Water Inspector 2 | 5.6 | |
| | | 2270 | Program Manager | 0.3 | |
| **Integrated Planning Framework** | | | | | |
| | 2114120015 | Contract (PO) | | | 300,000 |
| | | 1123 | Storm Water Compliance Manager | 0.2 | |
| | | 2214 | Deputy Director | 0.1 | |
| | | 2250 | Assistant Deputy Director | 0.1 | |
| **Investigative Orders** | | | | | |
| | 2114120020 | Contract (PO) | | | 3,300,000 |
| | | 1621 | Storm Water Environmental Specialist | 1 | |
| | | 1872 | Senior Planner | 0.1 | |
| | | 2270 | Program Manager | 0.25 | |
| **Levee Maintenance** | | | | | |
| | 2114110013 | 1440 | Equipment Operator 2 | 1.2 | |
| | | 1445 | Equipment Operator 3 | 1 | |
| | | 1512 | Heavy Truck Driver 2 | 2.2 | |
| | | 1961 | Public Works Supervisor | 1.05 | |
| | | 1978 | Utility Worker 1 | 4 | |
| | | 1979 | Utility Worker 2 | 4.3 | |
| | | | Supplies & Services | | 2,156,163 |
| | 2114110017 | 1153 | Assistant Engineer-Civil | 1 | |
| | | 1221 | Associate Engineer-Civil | 0.5 | |
| | | 1855 | Senior Civil Engineer | 0.1 | |
| | 2114110018 | 1186 | Development Project Manager 3 | 0.1 | |
| | | 1227 | Associate Planner | 0.25 | |
| | | 1872 | Senior Planner | 0.5 | |
| | | 2103 | Management Intern | 0.2 | |

| Programmatic Assets | Fund Center | Job Class | Job Name | # of FTE | Contract |
|---|---|---|---|---|---|
| **Levee Management** | | | | | |
| | 2114110019 | Contract (PO) | | | 474,000 |
| | | 1153 | Assistant Engineer-Civil | 1 | |
| | | 1221 | Associate Engineer-Civil | 0.2 | |
| | | 1227 | Associate Planner | 1 | |
| | | 1727 | Principal Engineering Aide | 1 | |
| | | 1855 | Senior Civil Engineer | 0.1 | |
| | | 2103 | Management Intern | 0.4 | |
| **Litigation** | | | | | |
| | 2114120020 | Contract (PO) | | | 330,000 |
| | | 1872 | Senior Planner | 0.05 | |
| | | 2214 | Deputy Director | 0.05 | |
| | | 2270 | Program Manager | 0.15 | |
| **Low Flow Diversion Operation and Maintenance** | | | | | |
| | 2114110014 | 1436 | Equipment Technician 1 | 2.3 | |
| | | 1438 | Equipment Technician 2 | 3.45 | |
| | | 1439 | Equipment Operator 1 | 1.15 | |
| | | 1465 | Field Representative | 0.075 | |
| | | 1666 | Plant Process Control Electrician | 2.63 | |
| | | 1668 | Plant Process Control Supervisor | 0.525 | |
| | | 1961 | Public Works Supervisor | 0.575 | |
| | | 1977 | Public Works Superintendent | 0.075 | |
| | | 1978 | Utility Worker 1 | 0.575 | |
| | | 2250 | Assistant Deputy Director | 0.07 | |
| | 2114110015 | 1439 | Equipment Operator 1 | 0.025 | |
| | | 1961 | Public Works Supervisor | 0.02 | |
| | | 1978 | Utility Worker 1 | 0.07 | |
| | | 1979 | Utility Worker 2 | 0.06 | |
| | 2114110017 | 1221 | Associate Engineer-Civil | 0.5 | |
| | | 1855 | Senior Civil Engineer | 0.1 | |
| | | 2103 | Management Intern | 0.2 | |
| **Maintain street sweeping vehicles** | | | | | |
| | 2114110012 | Contract (PO) | | | 2,545,865 |
| **Masterplans** | | | | | |
| | 2114110018 | 1186 | Development Project Manager 3 | 0.4 | |
| | | 1227 | Associate Planner | 0.2 | |
| | | 1872 | Senior Planner | 0.75 | |
| | | 2103 | Management Intern | 0.1 | |

| Programmatic Assets | Fund Center | Job Class | Job Name | # of FTE | Contract |
|---|---|---|---|---|---|
| | 2114110019 | Contract (PO) | | | 750,000 |
| | 2114120015 | 1872 | Senior Planner | 0.2 | |
| | 2114120016 | 1221 | Associate Engineer-Civil | 0.25 | |
| | | 1855 | Senior Civil Engineer | 0.25 | |
| **Parking Enforcement** | | | | | |
| | 2114110011 | Contract (PO) | | | 170,000 |
| | | 1630 | Parking Enforcement Officer 2 | 0.95 | |
| | | 1639 | Parking Enforcement Supervisor | 0.95 | |
| | | 1640 | Parking Enforcement Officer 1 | 9.5 | |
| | | 1977 | Public Works Superintendent | 0.1 | |
| | | 2250 | Assistant Deputy Director | 0.1 | |
| **Payroll** | | | | | |
| | 2114110001 | 1106 | Senior Management Analyst | 0.05 | |
| | | 1107 | Administrative Aide 2 | 0.15 | |
| | | 1648 | Payroll Specialist 2 | 1 | |
| | 2114120001 | 1106 | Senior Management Analyst | 0.05 | |
| | | 1107 | Administrative Aide 2 | 0.15 | |
| | | 1648 | Payroll Specialist 2 | 1 | |
| **Permit Management and Compliance Reporting** | | | | | |
| | 2114120015 | Contract (PO) | | | 785,000 |
| | | 1123 | Storm Water Compliance Manager | 0.5 | |
| | | 1227 | Associate Planner | 1.6 | |
| | | 1872 | Senior Planner | 1.6 | |
| | | 2103 | Management Intern | 0.7 | |
| | | 2214 | Deputy Director | 0.1 | |
| | | 2250 | Assistant Deputy Director | 0.25 | |
| **Plan Check** | | | | | |
| | 2114110017 | 1221 | Associate Engineer-Civil | 0.5 | |
| | | 1855 | Senior Civil Engineer | 0.2 | |
| | | 2103 | Management Intern | 0.2 | |
| | 2114120016 | Contract (PO) | | | 40,000 |
| | | 1153 | Assistant Engineer-Civil | 1.5 | |
| **Policy Development & Permit Negotiation** | | | | | |
| | 2114120001 | 2270 | Program Manager | 0.5 | |
| | 2114120015 | Contract (PO) | | | 1,090,000 |
| | | 1123 | Storm Water Compliance Manager | 0.3 | |
| | | 1872 | Senior Planner | 0.2 | |
| | | 2214 | Deputy Director | 0.1 | |

| Programmatic Assets | Fund Center | Job Class | Job Name | # of FTE | Contract |
|---|---|---|---|---|---|
| | | 2250 | Assistant Deputy Director | 0.1 | |
| | 2114120016 | 1855 | Senior Civil Engineer | 0.1 | |
| | | 2214 | Deputy Director | 0.1 | |
| | 2114120020 | Contract (PO) | | | 103,000 |
| | | 1872 | Senior Planner | 0.25 | |
| | | 2103 | Management Intern | 0.7 | |
| | | 2270 | Program Manager | 0.25 | |
| **Public Information & Research** | | | | | |
| | 2114110001 | 1106 | Senior Management Analyst | 0.1 | |
| | | 1107 | Administrative Aide 2 | 0.15 | |
| | | 1776 | Public Information Clerk | 1 | |
| | 2114110017 | 1153 | Assistant Engineer-Civil | 0.75 | |
| | | 1221 | Associate Engineer-Civil | 0.5 | |
| | | 2103 | Management Intern | 0.25 | |
| | 2114110019 | 1221 | Associate Engineer-Civil | 0.5 | |
| | | 1855 | Senior Civil Engineer | 0.1 | |
| | | 2103 | Management Intern | 0.4 | |
| | 2114120001 | 1106 | Senior Management Analyst | 0.1 | |
| | | 1107 | Administrative Aide 2 | 0.15 | |
| | | 1776 | Public Information Clerk | 1 | |
| **Pump Station Operation and Maintenance** | | | | | |
| | 2114110014 | Contract (PO) | | | 3,228,000 |
| | | 1436 | Equipment Technician 1 | 3 | |
| | | 1438 | Equipment Technician 2 | 4.5 | |
| | | 1439 | Equipment Operator 1 | 0.65 | |
| | | 1465 | Field Representative | 0.025 | |
| | | 1666 | Plant Process Control Electrician | 1.875 | |
| | | 1668 | Plant Process Control Supervisor | 1 | |
| | | 1961 | Public Works Supervisor | 0.8 | |
| | | 1977 | Public Works Superintendent | 0.025 | |
| | | 1978 | Utility Worker 1 | 0.325 | |
| | | 2250 | Assistant Deputy Director | 0.05 | |
| | | 2270 | Program Manager | 0.14 | |
| | 2114110015 | 1439 | Equipment Operator 1 | 0.025 | |
| | | 1961 | Public Works Supervisor | 0.02 | |
| | | 1978 | Utility Worker 1 | 0.07 | |
| | | 1979 | Utility Worker 2 | 0.06 | |
| | 2114110017 | Contract (PO) | | | 25,000 |

| Programmatic Assets | Fund Center | Job Class | Job Name | # of FTE | Contract |
|---|---|---|---|---|---|
| | | 1221 | Associate Engineer-Civil | 1.5 | |
| | | 1855 | Senior Civil Engineer | 0.1 | |
| | | 2103 | Management Intern | 0.1 | |
| **Rebate Program** | | | | | |
| | 2114120015 | Contract (PO) | | | 250,000 |
| | | 1227 | Associate Planner | 0.1 | |
| | | 1872 | Senior Planner | 0.05 | |
| | | 2103 | Management Intern | 0.15 | |
| **Regulatory Review** | | | | | |
| | 2114110018 | Contract (PO) | | | 80,000 |
| | | 1186 | Development Project Manager 3 | 0.05 | |
| | | 1227 | Associate Planner | 0.8 | |
| | | 1872 | Senior Planner | 0.5 | |
| | 2114120001 | 2270 | Program Manager | 0.5 | |
| | 2114120020 | 1227 | Associate Planner | 0.9 | |
| | | 1872 | Senior Planner | 0.25 | |
| | | 2103 | Management Intern | 0.7 | |
| | | 2270 | Program Manager | 0.35 | |
| **Special Studies** | | | | | |
| | 2114120015 | 1872 | Senior Planner | 0.2 | |
| | 2114120018 | 1621 | Storm Water Environmental Specialist | 5 | |
| | | 2270 | Program Manager | 0.15 | |
| | 2114120019 | 1124 | Supervising Storm Water Inspector | 0.2 | |
| | | 1125 | Storm Water Inspector 3 | 0.5 | |
| | | Supplies & Services | | | 55,000 |
| **Storm Drain Repairs and Replacement** | | | | | |
| | 2114110013 | Contract (PO) | | | 30,000 |
| | 2114110016 | Contract (PO) | | | 900,000 |
| | | 1293 | Cement Finisher | 2.5 | |
| | | 1439 | Equipment Operator 1 | 0.9 | |
| | | 1440 | Equipment Operator 2 | 1.8 | |
| | | 1445 | Equipment Operator 3 | 0.9 | |
| | | 1512 | Heavy Truck Driver 2 | 3.6 | |
| | | 1961 | Public Works Supervisor | 0.75 | |
| | | 1974 | Utility Supervisor | 0.75 | |
| | | 1977 | Public Works Superintendent | 0.3 | |
| | | 1978 | Utility Worker 1 | 1.5 | |
| | | 1979 | Utility Worker 2 | 1.5 | |

| Programmatic Assets | Fund Center | Job Class | Job Name | # of FTE | Contract |
|---|---|---|---|---|---|
| | | 1985 | Welder | 0.9 | |
| | | 2250 | Assistant Deputy Director | 0.125 | |
| | | 2270 | Program Manager | 0.14 | |
| | 2114110017 | Contract (PO) | | | 132,000 |
| | | 1153 | Assistant Engineer-Civil | 3 | |
| | | 1221 | Associate Engineer-Civil | 3 | |
| | | 1855 | Senior Civil Engineer | 0.3 | |
| | | 2103 | Management Intern | 1 | |
| | 2114110018 | Contract (PO) | | | 75,000 |
| | | 1186 | Development Project Manager 3 | 0.1 | |
| | | 1227 | Associate Planner | 1.2 | |
| | | 1872 | Senior Planner | 0.8 | |
| **Storm Patrol** | | | | | |
| | 2114110011 | 1630 | Parking Enforcement Officer 2 | 0.025 | |
| | | 1639 | Parking Enforcement Supervisor | 0.025 | |
| | | 1640 | Parking Enforcement Officer 1 | 0.25 | |
| | 2114110012 | 1465 | Field Representative | 0.1 | |
| | | 1512 | Heavy Truck Driver 2 | 0.2 | |
| | | 1618 | Motor Sweeper Supervisor | 0.2 | |
| | | 1625 | Motor Sweeper Operator | 1.9 | |
| | | 1961 | Public Works Supervisor | 0.1 | |
| | | 1977 | Public Works Superintendent | 0.05 | |
| | | 1978 | Utility Worker 1 | 0.1 | |
| | | 1979 | Utility Worker 2 | 0.2 | |
| | 2114110013 | 1293 | Cement Finisher | 0.05 | |
| | | 1440 | Equipment Operator 2 | 0.1 | |
| | | 1445 | Equipment Operator 3 | 0.1 | |
| | | 1512 | Heavy Truck Driver 2 | 0.35 | |
| | | 1961 | Public Works Supervisor | 0.05 | |
| | | 1974 | Utility Supervisor | 0.05 | |
| | | 1977 | Public Works Superintendent | 0.07 | |
| | | 1979 | Utility Worker 2 | 0.15 | |
| | | 2250 | Assistant Deputy Director | 0.07 | |
| | | 2270 | Program Manager | 0.07 | |
| | | | Supplies & Services | | 22,130 |
| | 2114110014 | 1436 | Equipment Technician 1 | 0.5 | |
| | | 1438 | Equipment Technician 2 | 0.75 | |
| | | 1439 | Equipment Operator 1 | 0.25 | |

| Programmatic Assets | Fund Center | Job Class | Job Name | # of FTE | Contract |
|---|---|---|---|---|---|
| | | 1465 | Field Representative | 0.025 | |
| | | 1666 | Plant Process Control Electrician | 0.625 | |
| | | 1668 | Plant Process Control Supervisor | 0.125 | |
| | | 1961 | Public Works Supervisor | 0.125 | |
| | | 1977 | Public Works Superintendent | 0.025 | |
| | | 1978 | Utility Worker 1 | 0.125 | |
| | | 2250 | Assistant Deputy Director | 0.0025 | |
| | | 2270 | Program Manager | 0.07 | |
| | 2114110015 | 1439 | Equipment Operator 1 | 0.75 | |
| | | 1961 | Public Works Supervisor | 0.05 | |
| | | 1978 | Utility Worker 1 | 2.1 | |
| | | 1979 | Utility Worker 2 | 1.8 | |
| | 2114110016 | 1293 | Cement Finisher | 0.25 | |
| | | 1439 | Equipment Operator 1 | 0.125 | |
| | | 1440 | Equipment Operator 2 | 0.25 | |
| | | 1445 | Equipment Operator 3 | 0.125 | |
| | | 1512 | Heavy Truck Driver 2 | 0.25 | |
| | | 1961 | Public Works Supervisor | 0.125 | |
| | | 1974 | Utility Supervisor | 0.125 | |
| | | 1977 | Public Works Superintendent | 0.07 | |
| | | 1978 | Utility Worker 1 | 0.25 | |
| | | 1979 | Utility Worker 2 | 0.375 | |
| | | 1985 | Welder | 0.125 | |
| | | 2214 | Deputy Director | 0.07 | |
| | | 2270 | Program Manager | 0.07 | |
| | 2114110017 | 1855 | Senior Civil Engineer | 0.1 | |
| | | 2103 | Management Intern | 0.1 | |
| | 2116110011 | 1766 | Public Works Dispatcher | 0.0309135 | |
| | | 1767 | Public Works Dispatch Supervisor | 0.0014423 | |
| | 2116110013 | 1293 | Cement Finisher | 1.5605288 | |
| | | 1440 | Equipment Operator 2 | 0.8679327 | |
| | | 1445 | Equipment Operator 3 | 0.1556731 | |
| | | 1512 | Heavy Truck Driver 2 | 2.1199038 | |
| | | 1579 | Laborer | 0.3578846 | |
| | | 1961 | Public Works Supervisor | 0.3978365 | |
| | | 1978 | Utility Worker 1 | 0.5927885 | |
| | | 1979 | Utility Worker 2 | 0.6000481 | |
| | 2116110014 | 1439 | Equipment Operator 1 | 0.0793269 | |

| Programmatic Assets | Fund Center | Job Class | Job Name | # of FTE | Contract |
|---|---|---|---|---|---|
| | | 1579 | Laborer | 0.0819712 | |
| | | 1626 | Traffic Striper Operator | 0.4294231 | |
| | | 1961 | Public Works Supervisor | 0.0384615 | |
| | | 1978 | Utility Worker 1 | 0.3346635 | |
| | | 1979 | Utility Worker 2 | 0.911875 | |
| | 2116110015 | 1293 | Cement Finisher | 0.1216346 | |
| | | 1440 | Equipment Operator 2 | 0.8504327 | |
| | | 1445 | Equipment Operator 3 | 0.0759615 | |
| | | 1512 | Heavy Truck Driver 2 | 1.1770192 | |
| | | 1579 | Laborer | 0.0432692 | |
| | | 1961 | Public Works Supervisor | 0.2463942 | |
| | | 1978 | Utility Worker 1 | 0.7804327 | |
| | | 1979 | Utility Worker 2 | 0.5391827 | |
| | 2116110022 | 1978 | Utility Worker 1 | 0.0067308 | |
| | 2116110023 | 1978 | Utility Worker 1 | 0.0632212 | |
| | | 1979 | Utility Worker 2 | 0.2677885 | |
| **Stormwater Harvesting** | | | | | |
| | 2114110019 | Contract (PO) | | | 150,000 |
| | | 1153 | Assistant Engineer-Civil | 0.1 | |
| | | 1855 | Senior Civil Engineer | 0.1 | |
| | | 2103 | Management Intern | 0.1 | |
| | | 2214 | Deputy Director | 0.05 | |
| | 2114120016 | 1221 | Associate Engineer-Civil | 0.1 | |
| | | 1855 | Senior Civil Engineer | 0.05 | |
| **Street Sweeping** | | | | | |
| | 2114110012 | Contract (PO) | | | 2,860,131 |
| | | 1465 | Field Representative | 0.8 | |
| | | 1512 | Heavy Truck Driver 2 | 3.2 | |
| | | 1618 | Motor Sweeper Supervisor | 1.6 | |
| | | 1625 | Motor Sweeper Operator | 15.2 | |
| | | 1961 | Public Works Supervisor | 0.8 | |
| | | 1977 | Public Works Superintendent | 0.4 | |
| | | 1978 | Utility Worker 1 | 0.8 | |
| | | 1979 | Utility Worker 2 | 3.2 | |
| | | 2250 | Assistant Deputy Director | 0.1 | |
| | | 2270 | Program Manager | 0.07 | |
| **Structural BMP Inspections** | | | | | |
| | 2114120019 | Contract (PO) | | | 5,000 |

| Programmatic Assets | Fund Center | Job Class | Job Name | # of FTE | Contract |
|---|---|---|---|---|---|
| | | 1124 | Supervising Storm Water Inspector | 1 | |
| | | 1125 | Storm Water Inspector 3 | 1 | |
| | | 1126 | Storm Water Inspector 2 | 2.4 | |
| | | 2270 | Program Manager | 0.3 | |
| **Structural BMP Maintenance** | | | | | |
| | 2114110015 | 1439 | Equipment Operator 1 | 2.5 | |
| | | 1961 | Public Works Supervisor | 1 | |
| | | 1978 | Utility Worker 1 | 2.5 | |
| | | 1979 | Utility Worker 2 | 2.5 | |
| | 2114110017 | 1153 | Assistant Engineer-Civil | 0.95 | |
| | | 1221 | Associate Engineer-Civil | 0.7 | |
| **Tide Gate Operation and Maintenance** | | | | | |
| | 2114110014 | 1436 | Equipment Technician 1 | 0.2 | |
| | | 1438 | Equipment Technician 2 | 0.3 | |
| | | 1439 | Equipment Operator 1 | 0.1 | |
| | | 1465 | Field Representative | 0.05 | |
| | | 1666 | Plant Process Control Electrician | 0.25 | |
| | | 1668 | Plant Process Control Supervisor | 0.05 | |
| | | 1961 | Public Works Supervisor | 0.05 | |
| | | 1977 | Public Works Superintendent | 0.05 | |
| | | 1978 | Utility Worker 1 | 0.05 | |
| | | 2270 | Program Manager | 0.14 | |
| **Trash Implementation Program** | | | | | |
| | 2114120015 | Contract (PO) | | | 150,000 |
| | | 1227 | Associate Planner | 0.2 | |
| | | 1872 | Senior Planner | 0.25 | |
| **Vehicle Assignment Fee** | | | | | |
| | 2114110001 | Contract (PO) | | | 13,365 |
| | 2114110011 | Contract (PO) | | | 49,454 |
| | 2114110012 | Contract (PO) | | | 661,965 |
| | 2114110013 | Contract (PO) | | | 277,512 |
| | 2114110014 | Contract (PO) | | | 17,959 |
| | 2114110015 | Contract (PO) | | | 311,231 |
| | 2114110016 | Contract (PO) | | | 53,151 |
| | 2114110017 | Contract (PO) | | | 4,062 |
| | 2114110018 | Contract (PO) | | | 3,391 |
| | 2114120018 | Contract (PO) | | | 18,603 |
| | 2114120019 | Contract (PO) | | | 29,734 |

| Programmatic Assets | Fund Center | Job Class | Job Name | # of FTE | Contract |
|---|---|---|---|---|---|
| | 2114120021 | Contract (PO) | | | 16,691 |
| **Vehicle Usage Fee** | | | | | |
| | 2114110001 | Contract (PO) | | | 30,523 |
| | 2114110011 | Contract (PO) | | | 89,565 |
| | 2114110012 | Contract (PO) | | | 1,289,832 |
| | 2114110013 | Contract (PO) | | | 309,936 |
| | 2114110014 | Contract (PO) | | | 37,701 |
| | 2114110015 | Contract (PO) | | | 287,802 |
| | 2114110016 | Contract (PO) | | | 85,107 |
| | 2114110017 | Contract (PO) | | | 11,085 |
| | 2114110018 | Contract (PO) | | | 5,704 |
| | 2114120018 | Contract (PO) | | | 30,984 |
| | 2114120019 | Contract (PO) | | | 57,939 |
| | 2114120021 | Contract (PO) | | | 34,887 |
| **WAMP** | | | | | |
| | 2114110019 | Contract (PO) | | | 1,430,000 |
| | | 1221 | Associate Engineer-Civil | 0.1 | |
| | | 1855 | Senior Civil Engineer | 0.2 | |
| | | 2214 | Deputy Director | 0.1 | |
| | | 2250 | Assistant Deputy Director | 0.1 | |

## 3.2 Vehicles and Equipment

| Category | | Assumptions |
|---|---|---|
| **Source** | | FY2020 Usage and Assignment - Storm Water<br>Fund Center adjusted to match FY21 Cost Center |
| **Data Incorporated** | General | • Incorporated as programmatic assets because the City pays annual usage and assignment fees and will not be responsible for replacement<br>• Asset Name=Equipment Type-License Number<br>• Management Strategy ID: Serial Number |
| **Cost** | | Annual cost |

## 3.3 Channel Routine Maintenance Cost Assumptions

Maintenance Responsibility & Impact Area:

- MWMP channels maintenance responsibility is based on impact area and easement
- Non-MWMP channels maintenance responsibility is based on the average MWMP impact area compared to the CSA area. The average is 53% of total SF of channel polygon.

Maintenance Cost for MWMP Channels:

- MWMP channels routine maintenance cost is calculated based on FTE estimates and duration provided by O&M staff. The FTE and duration vary by individual segments.

Maintenance Cost for Non-MWMP Channels:

- Non-MWMP channels routine maintenance cost is calculated based on the median cost/SF of MWMP channel maintenance ($4.32/SF). The FTE breakdown is as follows.

| Job Class | Description | FTE/SF |
|---|---|---|
| **1445** | Equipment Operator 3 | 0.000004171443 |
| **1440** | Equipment Operator 2 | 0.000008342886 |
| **1512** | Heavy Truck Driver 2 | 0.000016685772 |
| **1979** | Utility Worker 2 | 0.000012514329 |
| **1974** | Utility Supervisor | 0.000004171443 |

Maintenance Cost for San Diego River Channels:

- San Diego River channels routine maintenance cost is calculated based on the 2011 cost estimate for the San Diego River Dredging CIP project. The cost was adjusted to 2020 dollars. The unit cost is $2.53/SF.
- Based on previous maintenance record, it is assumed all San Diego River channel routine maintenance will be done by contractor.

## 3.4 Future O&M Cost Assumptions for WMP Projects

General Assumptions:

- 20-Year O&M Cost Assumption: 25.2% of Capital Cost
- Source: Chollas IDEA (Average)

| Project Type | Job Class | FTE/acre/Year |
|---|---|---|
| **Green Infrastructure** | Cement Finisher - 1293 | 0.000001485939330106 |
| | Equipment Operator 2 - 1440 | 0.000001822626653845 |
| | Equipment Operator 3 - 1445 | 0.000001742986969524 |
| | Heavy Truck Driver 2 - 1512 | 0.000006266237281378 |
| | Public Works Supervisor - 1961 | 0.000000718968320403 |
| | Utility Worker 2 - 1979 | 0.000001536852901744 |
| **MUTA** | Cement Finisher - 1293 | 0.000008101965449288 |
| | Equipment Operator 2 - 1440 | 0.000009937726175775 |
| | Equipment Operator 3 - 1445 | 0.000009503497161381 |
| | Heavy Truck Driver 2 - 1512 | 0.000034166158013425 |
| | Public Works Supervisor - 1961 | 0.000003920117310994 |
| | Utility Worker 2 - 1979 | 0.000008379567629911 |
| **Proposed Storage** | Cement Finisher - 1293 | 0.000008101965449288 |
| | Equipment Operator 2 - 1440 | 0.000009937726175775 |
| | Equipment Operator 3 - 1445 | 0.000009503497161381 |
| | Heavy Truck Driver 2 - 1512 | 0.000034166158013425 |
| | Public Works Supervisor - 1961 | 0.000003920117310994 |
| | Utility Worker 2 - 1979 | 0.000008379567629911 |

## 3.5 Future O&M Cost Assumptions for Non-TMDL Projects

General Assumptions:

- 20-Year O&M Cost Assumption: 25.2% of Capital Cost
- Source: Chollas IDEA (Average)

### 3.5.1 San Dieguito

| Project Type | Job Class | FTE/acre/Year |
|---|---|---|
| **MUTA** | Cement Finisher - 1293 | 0.0000535467042718431 |
| | Equipment Operator 2 - 1440 | 0.0000642560451262117 |
| | Equipment Operator 3 - 1445 | 0.0000642560451262117 |
| | Heavy Truck Driver 2 - 1512 | 0.0002149031609572300 |
| | Public Works Supervisor - 1961 | 0.0000256809277343890 |
| | Utility Worker 2 - 1979 | 0.0000535467042718431 |
| **Green Infrastructure** | Cement Finisher - 1293 | 0.0000363043403603962 |
| | Equipment Operator 2 - 1440 | 0.0000435652084324754 |
| | Equipment Operator 3 - 1445 | 0.0000435652084324754 |

| Project Type | Job Class | FTE/acre/Year |
|---|---|---|
| | Heavy Truck Driver 2 - 1512 | 0.0001457030382357040 |
| | Public Works Supervisor - 1961 | 0.0000174115130691666 |
| | Utility Worker 2 - 1979 | 0.0000363043403603962 |
| **Green Street** | Cement Finisher - 1293 | 0.0003950996842209420 |
| | Equipment Operator 2 - 1440 | 0.0004741196210651310 |
| | Equipment Operator 3 - 1445 | 0.0004741196210651310 |
| | Heavy Truck Driver 2 - 1512 | 0.0015856843513884000 |
| | Public Works Supervisor - 1961 | 0.0001894892799909130 |
| | Utility Worker 2 - 1979 | 0.0003950996842209420 |
| **Modeled Non-Structural** | Equipment Operator 1 - 1439 | 0.001131240 |
| | Public Works Supervisor - 1961 | 0.000591726 |
| | Utility Worker 1 - 1978 | 0.003167473 |
| | Utility Worker 2 - 1979 | 0.002714977 |
| | Field Representative - 1465 | 0.000278459 |
| | Heavy Truck Driver 2 - 1512 | 0.000556918 |
| | Motor Sweeper Supervisor - 1618 | 0.000556918 |
| | Motor Sweeper Operator - 1625 | 0.005290723 |
| | Public Works Supervisor - 1961 | 0.000278459 |
| | Utility Worker 1 - 1978 | 0.000278459 |
| | Utility Worker 2 - 1979 | 0.000556918 |

### 3.5.2 Mission Bay (Rose Canyon)

| Project Type | Job Class | FTE/acre/Year |
|---|---|---|
| **MUTA** | Cement Finisher - 1293 | 0.0000535467042718431 |
| | Equipment Operator 2 - 1440 | 0.0000642560451262117 |
| | Equipment Operator 3 - 1445 | 0.0000642560451262117 |
| | Heavy Truck Driver 2 - 1512 | 0.0002149031609572300 |
| | Public Works Supervisor - 1961 | 0.0000256809277343890 |
| | Utility Worker 2 - 1979 | 0.0000535467042718431 |
| **Green Infrastructure** | Cement Finisher - 1293 | 0.0000363043403603962 |
| | Equipment Operator 2 - 1440 | 0.0000435652084324754 |
| | Equipment Operator 3 - 1445 | 0.0000435652084324754 |
| | Heavy Truck Driver 2 - 1512 | 0.0001457030382357040 |
| | Public Works Supervisor - 1961 | 0.0000174115130691666 |
| | Utility Worker 2 - 1979 | 0.0000363043403603962 |
| **Green Street** | Cement Finisher - 1293 | 0.0003950996842209420 |
| | Equipment Operator 2 - 1440 | 0.0004741196210651310 |
| | Equipment Operator 3 - 1445 | 0.0004741196210651310 |

| Project Type | Job Class | FTE/acre/Year |
|---|---|---|
| | Heavy Truck Driver 2 - 1512 | 0.0015856843513884000 |
| | Public Works Supervisor - 1961 | 0.0001894892799909130 |
| | Utility Worker 2 - 1979 | 0.0003950996842209420 |
| **Modeled Non-Structural** | Equipment Operator 1 - 1439 | 0.001130315 |
| | Public Works Supervisor - 1961 | 0.000591241 |
| | Utility Worker 1 - 1978 | 0.003164881 |
| | Utility Worker 2 - 1979 | 0.002712755 |
| | Field Representative - 1465 | 0.000278231 |
| | Heavy Truck Driver 2 - 1512 | 0.000556463 |
| | Motor Sweeper Supervisor - 1618 | 0.000556463 |
| | Motor Sweeper Operator - 1625 | 0.005286394 |
| | Public Works Supervisor - 1961 | 0.000278231 |
| | Utility Worker 1 - 1978 | 0.000278231 |
| | Utility Worker 2 - 1979 | 0.000556463 |

### 3.5.3 San Diego Bay (Non-Chollas)

| Project Type | Job Class | FTE/acre/Year |
|---|---|---|
| **MUTA** | Cement Finisher - 1293 | 0.0000234365335388375 |
| | Equipment Operator 2 - 1440 | 0.0000281238402466050 |
| | Equipment Operator 3 - 1445 | 0.0000281238402466050 |
| | Heavy Truck Driver 2 - 1512 | 0.0000940596663766053 |
| | Public Works Supervisor - 1961 | 0.0000112401301320043 |
| | Utility Worker 2 - 1979 | 0.0000234365335388375 |
| **Green Infrastructure** | Cement Finisher - 1293 | 0.0000442542974431222 |
| | Equipment Operator 2 - 1440 | 0.0000531051569317467 |
| | Equipment Operator 3 - 1445 | 0.0000531051569317467 |
| | Heavy Truck Driver 2 - 1512 | 0.0001776092205075140 |
| | Public Works Supervisor - 1961 | 0.0000212243018506479 |
| | Utility Worker 2 - 1979 | 0.0000442542974431222 |
| **Green Street** | Cement Finisher - 1293 | 0.0001141099474792850 |
| | Equipment Operator 2 - 1440 | 0.0001369319369751420 |
| | Equipment Operator 3 - 1445 | 0.0001369319369751420 |
| | Heavy Truck Driver 2 - 1512 | 0.0004579663443984680 |
| | Public Works Supervisor - 1961 | 0.0000547269781556169 |
| | Utility Worker 2 - 1979 | 0.0001141099474792850 |
| **Modeled Non-Structural** | Equipment Operator 1 - 1439 | 0.001403576 |
| | Public Works Supervisor - 1961 | 0.000734178 |
| | Utility Worker 1 - 1978 | 0.003930013 |

| Project Type | Job Class | FTE/acre/Year |
|---|---|---|
| | Utility Worker 2 - 1979 | 0.003368583 |
| | Field Representative - 1465 | 0.000345496 |
| | Heavy Truck Driver 2 - 1512 | 0.000690991 |
| | Motor Sweeper Supervisor - 1618 | 0.000690991 |
| | Motor Sweeper Operator - 1625 | 0.006564417 |
| | Public Works Supervisor - 1961 | 0.000345496 |
| | Utility Worker 1 - 1978 | 0.000345496 |
| | Utility Worker 2 - 1979 | 0.000690991 |

### 3.5.4 Tijuana River

| Project Type | Job Class | FTE/acre/Year |
|---|---|---|
| **MUTA** | Cement Finisher - 1293 | 0.0000396760887922083 |
| | Equipment Operator 2 - 1440 | 0.0000476113065506500 |
| | Equipment Operator 3 - 1445 | 0.0000476113065506500 |
| | Heavy Truck Driver 2 - 1512 | 0.0001592351389653850 |
| | Public Works Supervisor - 1961 | 0.0000190285991063635 |
| | Utility Worker 2 – 1979 | 0.0000396760887922083 |
| **Green Infrastructure** | Cement Finisher - 1293 | 0.0000202773887819209 |
| | Equipment Operator 2 - 1440 | 0.0000243328665383051 |
| | Equipment Operator 3 - 1445 | 0.0000243328665383051 |
| | Heavy Truck Driver 2 - 1512 | 0.0000813808245428264 |
| | Public Works Supervisor - 1961 | 0.0000097250085328678 |
| | Utility Worker 2 - 1979 | 0.0000202773887819209 |
| **Green Street** | Cement Finisher - 1293 | 0.0000638976800451100 |
| | Equipment Operator 2 - 1440 | 0.0000766772160541320 |
| | Equipment Operator 3 - 1445 | 0.0000766772160541320 |
| | Heavy Truck Driver 2 - 1512 | 0.0002564455386425820 |
| | Public Works Supervisor - 1961 | 0.0000306452418677886 |
| | Utility Worker 2 - 1979 | 0.0000638976800451100 |
| **Modeled Non-Structural** | Equipment Operator 1 - 1439 | 0.0007836768267232540 |
| | Public Works Supervisor - 1961 | 0.0004099232632090870 |
| | Utility Worker 1 - 1978 | 0.0021942951148251100 |
| | Utility Worker 2 - 1979 | 0.0018808243841358100 |
| | Field Representative - 1465 | 0.0001929050650395700 |
| | Heavy Truck Driver 2 - 1512 | 0.0003858101300791410 |
| | Motor Sweeper Supervisor - 1618 | 0.0003858101300791410 |
| | Motor Sweeper Operator - 1625 | 0.0036651962357518400 |
| | Public Works Supervisor - 1961 | 0.0001929050650395700 |

| Project Type | Job Class | FTE/acre/Year |
|---|---|---|
| | Utility Worker 1 - 1978 | 0.0001929050650395700 |
| | Utility Worker 2 - 1979 | 0.0003858101300791410 |

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# 4 Analysis

## 4.1 BRE Criteria

The complete list of BRE criteria is provided in WAMP Report, Appendix A – Business Risk Exposure Criteria (attached).

## 4.2 Environmental Assumptions – Receiving Waters and Assets in Impacted Watersheds

| Water Body Name | CoF (June 2020) | CoF Final – Waterbody (October 2020) | CoF Final – Watershed (October 2020) | COF Justification | TMDL Adoption / Approval Date | Compliance Milestone Attachment E of MS4 Permit |
|---|---|---|---|---|---|---|
| Chollas HSA (908.22) - Chollas Creek Diazinon TMDL | 5 | 1 | 4 | Adopted TMDL; City has demonstrated final TMDL compliance and therefore, waterbody CoF is 1. However, metals and bacteria TMDL for Chollas Creek governs the CoF of 4 assigned to the watershed. | August 14, 2002 | 12/31/2010 |
| Chollas HSA (908.22) - Chollas Creek Copper, Lead, and Zinc TMDLs | 5 | 4 | | Adopted TMDL; Chollas Creek is assigned CoF of 4 because the TMDL compliance milestone deadline is more than 5 years from Year 2020. | June 13, 2007 | 10/22/2028 |
| Shelter Island Yacht Basin Dissolved Copper TMDL | 5 | 1 | 3 | Adopted TMDL; City has demonstrated final TMDL compliance and therefore, waterbody CoF is 1. Watershed is assigned CoF 3 due to impairment of San Diego Bay based on City's Direction. | February 9, 2005 | 12/2/2005 |
| Indicator Bacteria: Revised Project I - Twenty Beaches and Creeks in San Diego Region (including Tecolote Creek) | 5 | 4 | 4 | Adopted TMDL; CoF is 4 because TMDL compliance milestone deadline is more than 5 years from Year 2020. | February 10, 2010 | 4/4/2031 |

| Water Body Name | CoF (June 2020) | CoF Final – Waterbody (October 2020) | CoF Final – Watershed (October 2020) | COF Justification | TMDL Adoption / Approval Date | Compliance Milestone Attachment E of MS4 Permit |
|---|---|---|---|---|---|---|
| San Dieguito HU (905.00) - Pacific Ocean Shoreline, San Dieguito HU | | 4 | 4 | See explanation above for Indicator Bacteria- Revised Project 1 | | 4/4/2031 |
| Miramar Reservoir HA (906.10) - Pacific Ocean Shoreline, Miramar Reservoir HA | | 4 | 4 | | | 4/4/2031 |
| Scripps HA (906.30) - Pacific Ocean Shoreline, Scripps HA | | 4 | 4 | | | 4/4/2031 |
| Tecolote HA (906.50) - Tecolote Creek | | 4 | 4 | | | 4/4/2031 |
| Mission San Diego HSA (907.11) - Forester Creek | | 4 | 4 | | | 4/4/2031 |
| Mission San Diego HSA (907.11) - San Diego River (Lower) | | 4 | 4 | | | 4/4/2031 |
| Santee HSA (907.12) - Pacific Ocean Shoreline, San Diego | | 4 | 4 | | | 4/4/2031 |
| Chollas HSA (908.22) Chollas Creek | | 4 | 4 | | | 4/4/2031 |
| Indicator Bacteria: Project II - Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay | 4 | 1 | 3 | Adopted TMDL is San Diego Unified Port District's Jurisdiction and therefore, the waterbody is assigned a CoF of 1. However, the watershed CoF is 3 due to impairment of San Diego Bay based on City's Direction. | June 11, 2008 | 12/31/2012 |
| Los Peñasquitos Lagoon Sediment TMDL | 5 | 4 | 4 | Adopted TMDL, compliance milestone deadline is more than 5 years from Year 2020. | June 13, 2012 | 12/31/2034 |

| Water Body Name | CoF (June 2020) | CoF Final – Waterbody (October 2020) | CoF Final – Watershed (October 2020) | COF Justification | TMDL Adoption / Approval Date | Compliance Milestone Attachment E of MS4 Permit |
|---|---|---|---|---|---|---|
| Famosa Slough Nutrient TMDL | 5 | 4 | 4 | Approved Alternative Approach TMDL; CoF is 4 because the TMDL compliance milestone deadline is more than 5 years from Year 2020. | October 31, 2017 [1] | 12/31/2027 |
| San Diego Bay above San Diego Airport | | 3 | 3 | Assigned 3 due to impairment of San Diego Bay based on City Direction – SQRCB TMDL mapping tool maps this area as 1 | | |
| Other 303 (d) Listed Waterbodies within City of San Diego Boundary | 3 | 3 | 3 | 303(d) Listing | | NA |
| All other Waterbodies within City of San Diego Boundary | 1 | 1 | 1 | No observed environmental issues | | NA |

Source of Impacted Receiving Waters (State Water Resources Control Board Integrated Report Database IntegratedReport_1416_Impaired_Final.gdb

## 4.3 Channel and Brow Ditch – City Assets – CoF

| Category | Assumptions |
|---|---|
| **Data Source/ Assumptions** | • Base conveyance inventory from Wood GIS (2019; Source: CD of Wood deliverable, Feature Class: City_of_SD_stormwater_conveyance_6_14_2019) and OM Engineering data for MWMP channels (Source: CSA_Channels_Basins_v2.shp)<br>• Asset register includes only City-owned (S), active (A) assets<br>• Flooding information from SanGIS (FLOOD_PANEL.shp, FLOOD_PLAIN.shp, FLOODPLAIN_100_YEAR_CN.shp)<br>• Flooding information from City of San Diego WMP Data Layers (CARTO_CHOLLAS_WMP_07052018.gdb, Chollas_WMP_Existing_07312019.gdb, FAMOSA_WMP_05032019.gdb, LosPenMaster.gdb, MapleCanyon.gdb, Mission Bay.gdb)<br>• Building Outlines from SanGIS (BUILDING_OUTLINES.shp)<br>• MWMP Channels Inspection and Prioritization Matrix (Preliminary_Prioritization_Channels.xlsx, provided by Tetra Tech via email 9-25-2020)<br>• Disadvantaged Communities Shapefile (https://data.cnra.ca.gov/dataset/disadvantaged-communities-by-census-tract-2016-dwr-ds28861; Disadvantaged_Communities_by_Census_Tract_-_2016_-_DWR_%5Bds2886%5D-shp) |
| **Size** | • If width of channel is available, use as is<br>• If width is not available but diameter is available, Width assumed = Diameter<br>• If no width or diameter is available, then used size attributes for nearest channel using proximity analysis<br>• If width of brow ditch is available, use as is<br>• If width of brow ditch is not available, then used size attributes for nearest non-channel using proximity analysis |
| **Flooding Impact** | • If Channel is located within FEMA or WMP 100-year floodplain, use # of structures in floodplain to assign Flooding_CoF<br>• If channel is not located in FEMA or WMP 100-year floodplain, but Preliminary_ Prioritization_Channels.xls (City of San Diego) data exists and channel lies in CSA layer, then CSA Layer Polygon is used to determine the CoF based on "Amount of Infrastructure Damage"<br>• If a channel is not located in FEMA or WMP Floodplain, nor in CSA Polygon Layer (CSA_Channels_Basins_v2.shp), i.e., no inspection data is available, Flooding_CoF = 2<br>• All Brow Ditches, Flooding_CoF=2 |

A small subset of CSA Layer Channels was assigned a CoF = 5 because of an override by the City based on flooding record. The information was provided by Maggie McCormick by emails on 9/30/2020 and 10/7/2020). These channels are listed below:

| WAMP Asset ID | Name | Flooding CoF |
|---|---|---|
| 2-03-000-MAINT | Soledad Canyon Creek - Sorrento | 5 |
| 2-03-100-MAINT | Soledad Canyon Creek - Flintkote | 5 |
| 2-03-150-MAINT | Soledad Canyon Creek - Dunhill | 5 |
| 5-04-004-MAINT | Chollas Creek – National | 5 |
| 5-04-241-MAINT | Auburn Creek – Wightman | 5 |
| 5-05-006-MAINT | South Chollas Creek - Southcrest | 5 |
| 5-05-008-MAINT | South Chollas Creek - Southcrest | 5 |
| 5-04-239-MAINT | Auburn Creek – Wightman | 5 |
| 3-02-130-MAINT | Mission Bay - Mission Bay Drive | 5 |
| 4-07-004-MAINT | Alvarado Canyon Creek - Mission Gorge | 5 |
| 2-01-122-MAINT | Los Penasquitos Lagoon - Industrial | 5 |
| 3-04-055-MAINT | Tecolote Creek – Chateau | 5 |
| 5-02-162-MAINT | Mission Hill Canyon Creek - Titus | 5 |
| 5-04-006-MAINT | Chollas Creek – National | 5 |
| 4-07-009-MAINT | Alvarado Canyon Creek - Mission Gorge | 5 |
| 4-07-021-MAINT | Alvarado Canyon Creek - Alvarado | 5 |
| 6-01-100-MAINT | Tijuana River – Pilot and Smuggler's Gulch | 5 |
| 6-01-020-MAINT | Tijuana River – Pilot and Smuggler's Gulch | 5 |

Note:

*City has noted that City has inundation mapping that shows the areas adjacent to these flood areas

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## 4.4 Non-Channel – City Assets – CoF

| Category | Assumptions |
|---|---|
| **Data Source/ Assumptions** | • Base conveyance inventory from Wood GIS (2019; Source: CD of Wood deliverable, Feature Class: City_of_SD_stormwater_conveyance_6_14_2019)<br>• Asset register includes only City-owned (S), active (A) assets |
| **Ground Elevation** | • Assigned ground elevation to each from/to point of non-channel asset based on associated DEM data from: https://gis.sandag.org/sdgis/rest/services/Elevation/SanDiego_Regional_DEM/ImageServer<br>o Merged Digital Elevation Model (DEM) data derived from Quality Level 2 LiDAR (USGS Base Specification) LiDAR acquired through the San Diego regional partnership acquisition projects in 2014 and 2016/2017, and the FEMA acquisition project in 2015. Class 2 (ground) LiDAR points in conjunction with the hydro breaklines were used to create 2.5-foot hydro-flattened raster DEMs from which contour lines were generated. Geographic Extent: San Diego County in southwestern California, covering approximately 4,475 total square miles. |
| **Size (Small/Large)** | • If diameter is available, pipe categorized as small if diameter ≤ 12";<br>• If diameter is available, pipe categorized as large if diameter > 12"<br>• If diameter is not available, but height and/or width is available, pipe categorized as small if height and width ≤ 12"<br>• If diameter is not available, but height and/or width is available, pipe categorized as large if height and width > 12"<br>• If no diameter, height and/or width is available, then used size attributes of nearest non-channel using proximity analysis |
| **Depth to Pipe (Depth to Bottom of Pipe)** | • Calculated Depth to Pipe (DTP) by subtracting Ground Elevation from available "From_Elev" or "To_Elev" of the non-channel.<br>• Determined "Assumed DTP" for the non-channel by selecting the max of the "From DTP" and "To DTP". If "From_Elev" and "To_Elev" were not available for an asset, then used DTP of nearest non-channel asset.<br>• Revised the DTP as needed by performing the following steps:<br>o 1) Determined revised DTP for DTPs that were negative by using the DTP of nearest non-channel asset that was positive. (If DTP was positive, the DTP remained the same.)<br>o 2) Determined revised DTP for DTPs that were ≥ 40' by selecting nearest DTP that was less than 40'. (If DTP was less than 40', the DTP remained the same.)<br>o 3) Determined revised DTP for DTPs where the DTP was less than the (pipe height + 1') by selecting nearest non-channel where DTP was greater than (pipe height + 1'). (If DTP was ≥ the (pipe height + 1'), the DTP remained the same.)<br>▪ Pipe height is determined based on the pipe's diameter or height attribute.<br>o 4) Manually determined the DTP for DTPs that remained less than the (pipe height + 1') after the proximity analysis. The DTP of adjacent pipes was selected if the DTP would be greater than the non-channel's (pipe height + 1'). If adjacent pipes were less than the (pipe height + 1'), the DTP was assumed to be equal to the non-channel's (pipe height + 1'). |
| **Bad Soil (20-feet within RW)** | • Used City_SanDiego_COF_Waterbodies.zip |
| **Impacts to Adjacent Properties** | • Open Space / unimproved<br>o **City Open Space** – provided by City on 9/29<br>▪ No query applied<br>o **Land use Current** – downloaded from SANGIS<br>▪ Query: Landuse = 'Open Space Park or Preserve' OR Landuse = 'Landscape Open Space' OR Landuse = 'Undevelopable Natural Area' OR Landuse = 'Vacant and Undeveloped Land'<br>o **Zoning_Base_SD** – downloaded from SANGIS<br>▪ Query: ZONE_NAME = 'AG-1-1' OR ZONE_NAME = 'AR-1-1' OR ZONE_NAME = 'AR-1-2' OR ZONE_NAME = 'CCPD-OS' OR ZONE_NAME = 'CVPD-OS' OR ZONE_NAME = 'OC-1-1' OR ZONE_NAME = 'OF-1-1' OR ZONE_NAME = 'OP-1-1' OR ZONE_NAME = 'OP-2-1' OR ZONE_NAME = 'OR-1-1' OR ZONE_NAME = 'OR-1-2' OR ZONE_NAME = 'OTOP-1-1' OR ZONE_NAME = 'OTOP-2-1'<br>o **Zoning Unincorporated** – downloaded from SANGIS<br>▪ Query: LEGEND = 'Agricultural' OR LEGEND = 'Agriculture'<br>• Paved areas, non-roads<br>o **Land use Current** – downloaded from SANGIS<br>▪ Query: Landuse = 'Airstrip' OR Landuse = 'Park and Ride Lot' OR Landuse = 'Parking Lot - Surface' OR Landuse = 'Racetrack'<br>o **Runways** – downloaded from SANGIS<br>▪ No query applied<br>• Residential Roads<br>• **Roads_all** – downloaded from SANGIS<br>▪ Query: FUNCLASS = 'Local Street/Cul-de-sac' OR FUNCLASS = 'Rural Light Collector/Local Rd'<br>• Collector Roads |

| Category | Assumptions |
|---|---|
| | ○ **Roads_all** – downloaded from SANGIS<br>▪ Query: FUNCLASS = 'Collector/4-Lane Collector St' OR FUNCLASS = 'Rural Collector Road' OR FUNCLASS = 'Light (2-Lane) Collector St'<br>• Arterial Roads<br>○ **Roads_all** – downloaded from SANGIS<br>▪ Query: FUNCLASS = 'Major Road/4-Lane Major Road' OR FUNCLASS = 'Prime (Primary) Arterial' OR FUNCLASS = 'Rural Mountain Road' OR FUNCLASS = 'Six-Lane Major Street' OR FUNCLASS = 'Two-Lane Major Street'<br>• Freeways<br>○ **Roads_all** – downloaded from SANGIS<br>▪ Query: FUNCLASS = 'Freeway' OR FUNCLASS = 'Expressway' OR FUNCLASS = 'Freeway-To-Freeway Ramp' OR FUNCLASS = 'Freeway/Expressway On/Off Ramp'<br>• Buildings<br>• **Buildings_Outlines** – downloaded from SANGIS<br>○ No query applied<br>• **When non-channels were not selected using above queries, channels were assigned a property impact based on the current land use. These assets are tracked with a "YES" in the "COF_Prop_Impact_NULLS" attribute column and the associated land use is noted in the "Land_Use_Assumpt" attribute column.** |

## 4.5 Programmatic Asset PoF and CoF

| Programmatic Assets | PoF Rating | CoF Rating | | | | | CoF Score | PoF Score | BRE Score |
|---|---|---|---|---|---|---|---|---|---|
| | | 0.2 | 0.8 | 0.7 | 0.3 | 1 | | | |
| | | Public Perception | Public Health Safety | Regulatory | Environmental Quality | Financial | | | |
| Vehicles and Equipment | 1 - 100% target | 1-No complaints or media | 1-No safety issues | 1-No regulatory consequence | 1-No observed environmental issues | 1-<$50K (Handled Internally) | 3 | 1 | 3 |
| Channel Inspection and Prioritization | 1 - 100% target | 2-Localized complaints or potential claims | 3-High impact to non-critical infrastructure | 2-Verbal warning, IO, or notice of violation | 3-303d listed waterbody | 2-$50K - $250K | 7.1 | 1 | 7.1 |
| Basin Maintenance | 5 - 0% target | 4-Council, mayoral, or NGO attention. | 5-Loss of life | 5-Monetary violation, lawsuit, or NFIP disqualification | 5-TMDL with compliance schedule within 5 years | 5->$5M | 14.8 | 5 | 74 |
| Floodplain Management | 1 - 100% target | 5-Established liability (e.g., fines and claims) | 5-Loss of life | 5-Monetary violation, lawsuit, or NFIP disqualification | 1-No observed environmental issues | 4-$1M - $5M | 12.8 | 1 | 12.8 |
| Habitat Restoration and Mitigation | 5 - 0% target | 3-Media coverage. | 2-Low impact to non-critical infrastructure | 5-Monetary violation, lawsuit, or NFIP disqualification | 5-TMDL with compliance schedule within 5 years | 5->$5M | 12.2 | 5 | 61 |
| Levee Management | 4 - 25% target | 5-Established liability (e.g., fines and claims) | 5-Loss of life | 5-Monetary violation, lawsuit, or NFIP disqualification | 1-No observed environmental issues | 4-$1M - $5M | 12.8 | 4 | 51.2 |
| Levee Maintenance | 4 - 25% target | 5-Established liability (e.g., fines and claims) | 5-Loss of life | 5-Monetary violation, lawsuit, or NFIP disqualification | 1-No observed environmental issues | 4-$1M - $5M | 12.8 | 4 | 51.2 |
| Low Flow Diversion Operation and Maintenance | 3 - 50% target | 3-Media coverage. | 1-No safety issues | 2-Verbal warning, IO, or notice of violation | 4-TMDL with no schedule or of lower priority | 2-$50K - $250K | 6 | 3 | 18 |
| Pump Station Operation & Maintenance | 1 - 100% target | 5-Established liability (e.g., fines and claims) | 3-High impact to non-critical infrastructure | 5-Monetary violation, lawsuit, or NFIP disqualification | 2-Observed exceedances | 4-$1M - $5M | 11.5 | 1 | 11.5 |
| Storm Drain Repairs and Replacement | 4 - 25% target | 4-Council, mayoral, or NGO attention. | 4-Impacts to critical roads or facilities | 1-No regulatory consequence | 2-Observed exceedances | 4-$1M - $5M | 9.3 | 4 | 37.2 |
| Storm Patrol | 3 - 50% target | 3-Media coverage. | 5-Loss of life | 1-No regulatory consequence | 2-Observed exceedances | 5->$5M | 10.9 | 3 | 32.7 |
| Tide Gate Operation and Maintenance | 3 - 50% target | 3-Media coverage. | 1-No safety issues | 1-No regulatory consequence | 1-No observed environmental issues | 2-$50K - $250K | 4.4 | 3 | 13.2 |
| Alternative Compliance Program | 1 - 100% target | 2-Localized complaints or potential claims | 2-Low impact to non-critical infrastructure | 1-No regulatory consequence | 2-Observed exceedances | 1-<$50K (Handled Internally) | 4.3 | 1 | 4.3 |
| Integrated Planning Framework | 4 - 25% target | 1-No complaints or media | 1-No safety issues | 2-Verbal warning, IO, or notice of violation | 1-No observed environmental issues | 1-<$50K (Handled Internally) | 3.7 | 4 | 14.8 |
| Stormwater Harvesting | 4 - 25% target | 1-No complaints or media | 1-No safety issues | 2-Verbal warning, IO, or notice of violation | 3-303d listed waterbody | 1-<$50K (Handled Internally) | 4.3 | 4 | 17.2 |
| Construction Site Inspections | 1 - 100% target | 4-Council, mayoral, or NGO attention. | 2-Low impact to non-critical infrastructure | 2-Verbal warning, IO, or notice of violation | 2-Observed exceedances | 1-<$50K (Handled Internally) | 5.4 | 1 | 5.4 |
| Development & Construction Standards | 1 - 100% target | 4-Council, mayoral, or NGO attention. | 2-Low impact to non-critical infrastructure | 1-No regulatory consequence | 2-Observed exceedances | 1-<$50K (Handled Internally) | 4.7 | 1 | 4.7 |
| Plan Check | 1 - 100% target | 2-Localized complaints or potential claims | 2-Low impact to non-critical infrastructure | 2-Verbal warning, IO, or notice of violation | 2-Observed exceedances | 1-<$50K (Handled Internally) | 5 | 1 | 5 |
| Code Enforcement | 2 - 75% target | 3-Media coverage. | 4-Impacts to critical roads or facilities | 5-Monetary violation, lawsuit, or NFIP disqualification | 5-TMDL with compliance schedule within 5 years | 5->$5M | 13.8 | 2 | 27.6 |
| Parking Enforcement | 2 - 75% target | 2-Localized complaints or potential claims | 1-No safety issues | 1-No regulatory consequence | 1-No observed environmental issues | 5->$5M | 7.2 | 2 | 14.4 |

| Programmatic Assets | PoF Rating | CoF Rating | | | | | CoF Score | PoF Score | BRE Score |
|---|---|---|---|---|---|---|---|---|---|
| | | 0.2 | 0.8 | 0.7 | 0.3 | 1 | | | |
| | | Public Perception | Public Health Safety | Regulatory | Environmental Quality | Financial | | | |
| Catch Basin Inspection and Cleaning | 3 - 50% target | 3-Media coverage. | 4-Impacts to critical roads or facilities | 5-Monetary violation, lawsuit, or NFIP disqualification | 2-Observed exceedances | 5->$5M | 12.9 | 3 | 38.7 |
| Industrial and Commercial Facility Inspections | 3 - 50% target | 4-Council, mayoral, or NGO attention. | 2-Low impact to non-critical infrastructure | 2-Verbal warning, IO, or notice of violation | 2-Observed exceedances | 1-<$50K (Handled Internally) | 5.4 | 3 | 16.2 |
| Non-TMDL Modeled Non-Structural | 5 - 0% target | 4-Council, mayoral, or NGO attention. | 1-No safety issues | 2-Verbal warning, IO, or notice of violation | 2-Observed exceedances | 2-$50K - $250K | 5.6 | 5 | 28 |
| Rebate Program | 3 - 50% target | 3-Media coverage. | 2-Low impact to non-critical infrastructure | 2-Verbal warning, IO, or notice of violation | 2-Observed exceedances | 2-$50K - $250K | 6.2 | 3 | 18.6 |
| Street Sweeping | 3 - 50% target | 4-Council, mayoral, or NGO attention. | 1-No safety issues | 2-Verbal warning, IO, or notice of violation | 4-TMDL with no schedule or of lower priority | 2-$50K - $250K | 6.2 | 3 | 18.6 |
| Structural BMP Inspections | 4 - 25% target | 4-Council, mayoral, or NGO attention. | 2-Low impact to non-critical infrastructure | 5-Monetary violation, lawsuit, or NFIP disqualification | 2-Observed exceedances | 2-$50K - $250K | 8.5 | 4 | 34 |
| Structural BMP Maintenance | 1 - 100% target | 3-Media coverage. | 3-High impact to non-critical infrastructure | 5-Monetary violation, lawsuit, or NFIP disqualification | 2-Observed exceedances | 2-$50K - $250K | 9.1 | 1 | 9.1 |
| Trash Implementation Program | 1 - 100% target | 4-Council, mayoral, or NGO attention. | 2-Low impact to non-critical infrastructure | 2-Verbal warning, IO, or notice of violation | 4-TMDL with no schedule or of lower priority | 3-$250K - $1M | 8 | 1 | 8 |
| Compliance Monitoring Program | 1 - 100% target | 4-Council, mayoral, or NGO attention. | 2-Low impact to non-critical infrastructure | 2-Verbal warning, IO, or notice of violation | 5-TMDL with compliance schedule within 5 years | 3-$250K - $1M | 8.3 | 1 | 8.3 |
| Special Studies | 1 - 100% target | 1-No complaints or media | 1-No safety issues | 1-No regulatory consequence | 1-No observed environmental issues | 1-<$50K (Handled Internally) | 3 | 1 | 3 |
| CIP Planning and Management | 5 - 0% target | 5-Established liability (e.g., fines and claims) | 4-Impacts to critical roads or facilities | 5-Monetary violation, lawsuit, or NFIP disqualification | 5-TMDL with compliance schedule within 5 years | 5->$5M | 14.2 | 5 | 71 |
| ERP Functions and EAM Data Management | 4 - 25% target | 2-Localized complaints or potential claims | 3-High impact to non-critical infrastructure | 1-No regulatory consequence | 1-No observed environmental issues | 2-$50K - $250K | 5.8 | 4 | 23.2 |
| GIS Support | 4 - 25% target | 2-Localized complaints or potential claims | 3-High impact to non-critical infrastructure | 1-No regulatory consequence | 1-No observed environmental issues | 2-$50K - $250K | 5.8 | 4 | 23.2 |
| Masterplans (WMP, IDEA Document, Structural BMP Plan) | 4 - 25% target | 4-Council, mayoral, or NGO attention. | 4-Impacts to critical roads or facilities | 3-Cleanup and abatement order | 5-TMDL with compliance schedule within 5 years | 3-$250K - $1M | 10.6 | 4 | 42.4 |
| Permit Management and Compliance Reporting | 1 - 100% target | 4-Council, mayoral, or NGO attention. | 1-No safety issues | 5-Monetary violation, lawsuit, or NFIP disqualification | 1-No observed environmental issues | 3-$250K - $1M | 8.4 | 1 | 8.4 |
| Policy Development & Permit Negotiation | 1 - 100% target | 4-Council, mayoral, or NGO attention. | 1-No safety issues | 1-No regulatory consequence | 5-TMDL with compliance schedule within 5 years | 5->$5M | 8.8 | 1 | 8.8 |
| Regulatory Review | 2 - 75% target | 4-Council, mayoral, or NGO attention. | 2-Low impact to non-critical infrastructure | 1-No regulatory consequence | 2-Observed exceedances | 2-$50K - $250K | 5.7 | 2 | 11.4 |
| Watershed Asset Management | 1 - 100% target | 4-Council, mayoral, or NGO attention. | 1-No safety issues | 1-No regulatory consequence | 1-No observed environmental issues | 4-$1M - $5M | 6.6 | 1 | 6.6 |
| Education & Outreach Activities | 3 - 50% target | 3-Media coverage. | 2-Low impact to non-critical infrastructure | 2-Verbal warning, IO, or notice of violation | 2-Observed exceedances | 3-$250K - $1M | 7.2 | 3 | 21.6 |
| Public Information & Research | 1 - 100% target | 4-Council, mayoral, or NGO attention. | 1-No safety issues | 1-No regulatory consequence | 2-Observed exceedances | 1-<$50K (Handled Internally) | 3.9 | 1 | 3.9 |
| Accounts Payable | 1 - 100% target | 4-Council, mayoral, or NGO attention. | 4-Impacts to critical roads or facilities | 3-Cleanup and abatement order | 2-Observed exceedances | 5->$5M | 11.7 | 1 | 11.7 |

| Programmatic Assets | PoF Rating | CoF Rating | | | | | CoF Score | PoF Score | BRE Score |
|---|---|---|---|---|---|---|---|---|---|
| | | 0.2 | 0.8 | 0.7 | 0.3 | 1 | | | |
| | | Public Perception | Public Health Safety | Regulatory | Environmental Quality | Financial | | | |
| Budget Development and Management | 1 - 100% target | 4-Council, mayoral, or NGO attention. | 4-Impacts to critical roads or facilities | 3-Cleanup and abatement order | 2-Observed exceedances | 5->$5M | 11.7 | 1 | 11.7 |
| Clerical/Admin Support | 1 - 100% target | 4-Council, mayoral, or NGO attention. | 4-Impacts to critical roads or facilities | 3-Cleanup and abatement order | 2-Observed exceedances | 5->$5M | 11.7 | 1 | 11.7 |
| Contracts | 1 - 100% target | 3-Media coverage. | 1-No safety issues | 1-No regulatory consequence | 1-No observed environmental issues | 4-$1M - $5M | 6.4 | 1 | 6.4 |
| Grants | 2 - 75% target | 1-No complaints or media | 1-No safety issues | 1-No regulatory consequence | 1-No observed environmental issues | 1-<$50K (Handled Internally) | 3 | 2 | 6 |
| Payroll | 1 - 100% target | 4-Council, mayoral, or NGO attention. | 4-Impacts to critical roads or facilities | 3-Cleanup and abatement order | 2-Observed exceedances | 5->$5M | 11.7 | 1 | 11.7 |
| Cleanup & Abatement | 1 - 100% target | 5-Established liability (e.g., fines and claims) | 4-Impacts to critical roads or facilities | 5-Monetary violation, lawsuit, or NFIP disqualification | 5-TMDL with compliance schedule within 5 years | 5->$5M | 14.2 | 1 | 14.2 |
| Investigative Orders | 1 - 100% target | 5-Established liability (e.g., fines and claims) | 4-Impacts to critical roads or facilities | 5-Monetary violation, lawsuit, or NFIP disqualification | 5-TMDL with compliance schedule within 5 years | 5->$5M | 14.2 | 1 | 14.2 |
| Litigation | 1 - 100% target | 3-Media coverage. | 5-Loss of life | 1-No regulatory consequence | 2-Observed exceedances | 5->$5M | 10.9 | 1 | 10.9 |

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## 4.6 Storm Pump Stations CoF

| Major Asset Group | Asset Class | Pump Stations | | | |
|---|---|---|---|---|---|
| | | D,G,H,N | F | A, B, C, E, I, J, K, L, CC | M |
| PS General | Pump station | 10 | 7 | 6 | 4 |
| PS General | WAMP Asset | 10 | 7 | 6 | 4 |
| Mechanical/Electrical | Motor Control Unit | 12 | 9 | 8 | 6 |
| Mechanical/Electrical | Valve | 12 | 9 | 8 | 6 |
| Mechanical/Electrical | Pump | 12 | 9 | 8 | 6 |
| Mechanical/Electrical | Motor | 12 | 9 | 8 | 6 |
| Mechanical/Electrical | Level Instruments | 12 | 9 | 8 | 6 |
| Mechanical/Electrical | PLC | 12 | 9 | 8 | 6 |
| Mechanical/Electrical | Submersible Pump | 12 | 9 | 8 | 6 |
| Mechanical/Electrical | HMI | 12 | 9 | 8 | 6 |
| Mechanical/Electrical | UPS | 12 | 9 | 8 | 6 |
| Mechanical/Electrical | Transformer | 12 | 9 | 8 | 6 |
| Mechanical/Electrical | Automatic Transfer Switch | 12 | 9 | 8 | 6 |
| Mechanical/Electrical | Circuit Breaker | 12 | 9 | 8 | 6 |
| Mechanical/Electrical | Panelboard | 12 | 9 | 8 | 6 |

## 4.7 Interceptor Pump Stations CoF

| Major Asset Group | Asset Class | All IPSs |
|---|---|---|
| PS General | Pump station | 4 |
| Mechanical/Electrical | Service Pedestal | 6 |
| Mechanical/Electrical | Valve | 6 |
| Mechanical/Electrical | Submersible Pump | 6 |
| Mechanical/Electrical | Local Control Panel | 6 |
| Mechanical/Electrical | Level Instruments | 6 |
| Mechanical/Electrical | PLC | 6 |
| Mechanical/Electrical | Telemetry Gateway | 6 |
| Mechanical/Electrical | HMI | 6 |
| Mechanical/Electrical | UPS | 6 |
| Mechanical/Electrical | Pump | 6 |
| Mechanical/Electrical | Motor | 6 |

## 4.8 Low Flow Diversion Valves CoF

| Major Asset Group | Asset Class | All DVs |
|---|---|---|
| PS General | Low Flow Diversion Station | 4 |
| Mechanical/Electrical | Valve | 6 |
| Mechanical/Electrical | Actuator | 6 |
| Mechanical/Electrical | Local Control Panel | 6 |
| Mechanical/Electrical | Service Pedestal | 6 |
| Mechanical/Electrical | PLC | 6 |
| Mechanical/Electrical | Telemetry Gateway | 6 |
| Mechanical/Electrical | HMI | 6 |
| Mechanical/Electrical | UPS | 6 |
| Mechanical/Electrical | Pump Assembly | 6 |

# 5 IPF and ACP Projects

## 5.1 IPF (Integrated Planning Framework) Projects

The following project types are eligible for IPF consideration:

- Los Pen IDEA - Junctions
- Los Pen IDEA - GI
- Los Pen IDEA - MUTA
- Los Pen IDEA - Floodplain
- Los Pen IDEA - Additional Opportunities
- Chollas IDEA - Conveyance
- Chollas IDEA - Structures
- Chollas IDEA - Storage
- Chollas IDEA - GI
- Chollas IDEA - MUTA
- Non-TMDL - GI
- Non-TMDL - GS
- Non-TMDL - MUTA
- WQIP - GI
- WQIP - GS
- WQIP - MUTA

## 5.2 ACP (Alternative Compliance Program) Projects

The following project types are eligible for ACP consideration:

- Los Pen IDEA - GI
- Los Pen IDEA - MUTA
- Los Pen IDEA - Floodplain
- Los Pen IDEA - Additional Opportunities
- Chollas IDEA - GI
- Chollas IDEA - MUTA
- Non-TMDL - GI
- Non-TMDL - GS
- Non-TMDL - MUTA

- WQIP - GI
- WQIP - GS
- WQIP – MUTA