



Stormwater Asset Management: Letting your Green Infrastructure Assets Work for You

Green Infrastructure Webcast Series

June 14, 2022

Housekeeping

- This presentation is being recorded and will be made available via <https://www.epa.gov/green-infrastructure/green-infrastructure-webcast-series>
- All participants are muted to minimize background noise.
- Technical issues or questions?
 - Contact us via the Q&A Box.





Green Infrastructure Operations and Maintenance Webcast Series

2022 Upcoming Green Infrastructure Webcasts



Challenges:

- July 22nd: Let's talk about Heat Challenge
 - <https://www.epa.gov/innovation/lets-talk-about-heat-challenge>

Webinars:

- June 23rd: Building Equity into Nature-Based Solutions for Massachusetts Communities
 - https://usepa.zoomgov.com/webinar/register/WN_IPY6qTRcTdyd9KVfDAAlfq
- June 23rd: AAAS Regional Reflections on Green Infrastructure and Nature-Based Solutions: Gulf Coast and Southeast
 - <https://www.aaas.org/events/regional-reflections-green-infrastructure-and-nature-based-solutions-gulf-coast-and>

Operations and Maintenance Webcast Series:

- Summer 2022: Green Infrastructure Asset Management
- Fall 2022: Green Infrastructure Jobs
- Fall/Winter 2022: Green Infrastructure in MS4 Permits
- Previous webcast available: Going Green for Good: Long-Term Considerations for Operations and Maintenance of Green Infrastructure: <https://www.epa.gov/green-infrastructure/going-green-good-long-term-considerations-operations-and-maintenance-green>
- Recordings available online: <https://www.epa.gov/green-infrastructure/green-infrastructure-webcast-series>



Stay in touch: GreenStream List Serve

join-greenstream@lists.epa.gov

Today's Speakers

Heather Himmelberger, Director of the Southwest Environmental Finance Center

Randall Wakumoto, Storm Water Quality Program Administrator for the City and County of Honolulu, Oahu, Hawaii

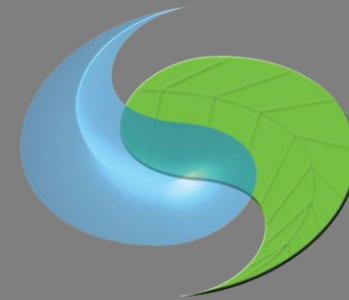
Kirk Lambrecht, Environmental Specialist with Metropolitan St. Louis Sewer District in St. Louis, Missouri





Integrating Green and Natural Assets into an Asset Management Framework

Heather Himmelberger, P.E.
Southwest EFC
May 14, 2022



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FINANCE CENTER



Asset Management in One Slide.....



Assets

Service

Criticality

Life Cycle

Funding

Starting at the beginning...
What is an asset?

Something that has actual or
potential value

What do we usually think of as an asset?

Man-made physical stuff



We call these “gray” assets.



With this definition in mind, let's consider some items that at first may not appear to be assets.

Are these assets?



My Answer: **Yes**

What would that be based on?

Does the “asset” have value?

Is it intended to serve a particular purpose for the entity?

Does it require “management” in order to do that?

Does the “asset” have value?

The cost of the plants, vegetation or other “green” aspects of the overall asset.

The cost of “gray” components of the overall asset.

Non-monetary values (social or environmental values)

Is it intended to serve a particular purpose?

Stormwater Management (quantity and quality)



Source Water and/or
Source Water
Protection
Stormwater
Conveyance



Aesthetics, climate
change
considerations,
health, Other



Does it require
“management”
in order to do
that?

O&M Activities

Repair

Rehabilitation

Replacement

Funding

We term these elements “Green Infrastructure”

My categories:

A Natural Asset (Already exists, just being used to serve a purpose)

A Green Asset (Use of natural materials, engineered to serve a purpose)

Engineered Green Asset (Use of gray materials or mixtures of green & gray to mimic natural processes)

Natural



Rivers, lakes, streams, forests, land around well heads

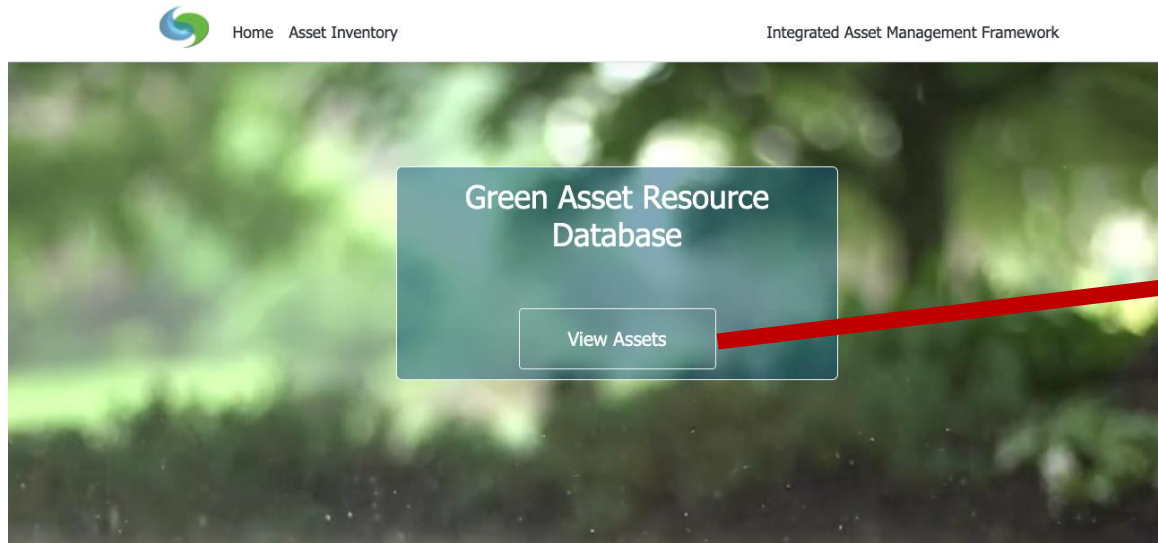
Green



Engineered Green



A list of green assets can be found in our database (free to anyone)





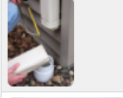



About This Site

This green infrastructure database serves as an introduction for those looking to learn more about green and natural assets that are used in water, wastewater, and stormwater systems. It will give users a basic understanding of the design, construction, O&M, costs, and benefits associated with each of these assets. It also provides some relative comparisons

Green Asset Resource Database

Show 10 entries Search:

	Name	Asset Type	Construction Rank	O&M Difficulty	Action
	-- Select --	-- Select --	-- Select --	-- Select --	Reset Filters
	Bioretention Areas	Enhanced	2	2	View
	Blue Roof	Engineered	3	3	View
	Constructed Wetlands	Natural	5	2	View
	Curb and Gutter Elimination	Engineered	2	1	View
	Downspout disconnection	Engineered	1	N/A	View
	Drainage Ditch or Channel	Enhanced	2	2	View

<https://swefcapps.unm.edu/gardb>

If we agree that these green elements are assets, next step: how to best manage them?

Incorporate green assets into a traditional AM strategy

Green Gray AM Framework



SOUTHWEST
ENVIRONMENTAL
FINANCE CENTER

Free and available to all

Created with funding from Spring Point Partners

Will be continually updated

Only available as an on-line resource to enable easy updates, additions, etc.

Working with utilities/municipalities to add additional information

Green Gray Framework



The screenshot displays a web interface for the Integrated Asset Management Framework. On the left, a dark blue sidebar contains a navigation menu with the following items: "Introduction", "Level of Service", "Current State of the Assets", "Criticality", "Life Cycle Costing", and "Long-Term Funding". Below the menu is a section titled "Green Asset Resource DB" with a search input field and a "Search" button. The main content area features a blurred background image of a forest with a central blue box containing the text "Integrated Asset Management Framework: Combining Green and Gray Assets". At the bottom of the page, there are three logos: the Southwest Environmental Finance Center logo, the Spring Point logo, and the Southwest Environmental Finance Center contact information.

Integrated Asset Management Framework:
Combining Green and Gray Assets

Introduction
Level of Service
Current State of the Assets
Criticality
Life Cycle Costing
Long-Term Funding

Green Asset Resource DB
Search

 SOUTHWEST ENVIRONMENTAL FINANCE CENTER

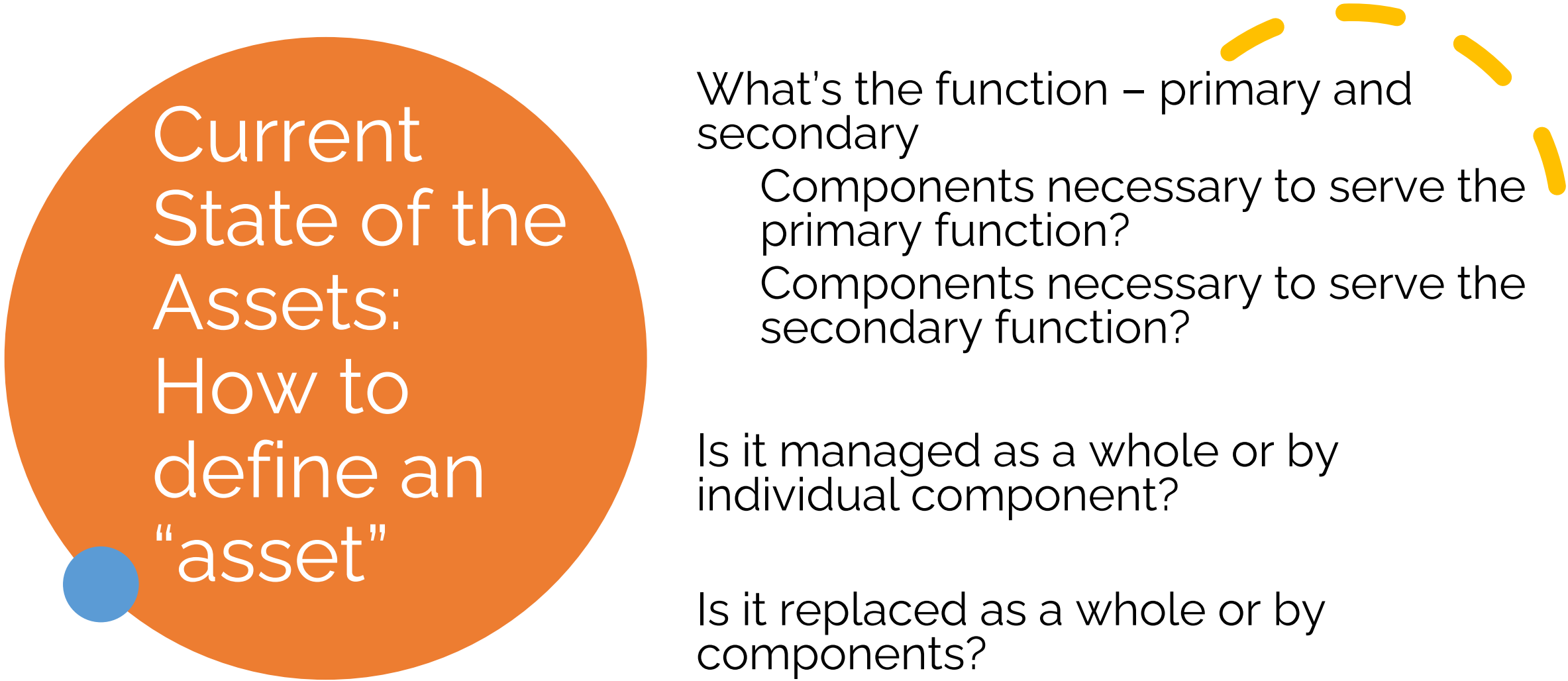
 spring point

Southwest Environmental Finance Center
Phone: (505) 277-0644
Email: swefc@unm.edu

<https://swefc.unm.edu/iamf/>

Not a perfect fit, but
best option

Some Considerations
w/ Green Assets



Current
State of the
Assets:
How to
define an
“asset”

What's the function – primary and secondary

Components necessary to serve the primary function?

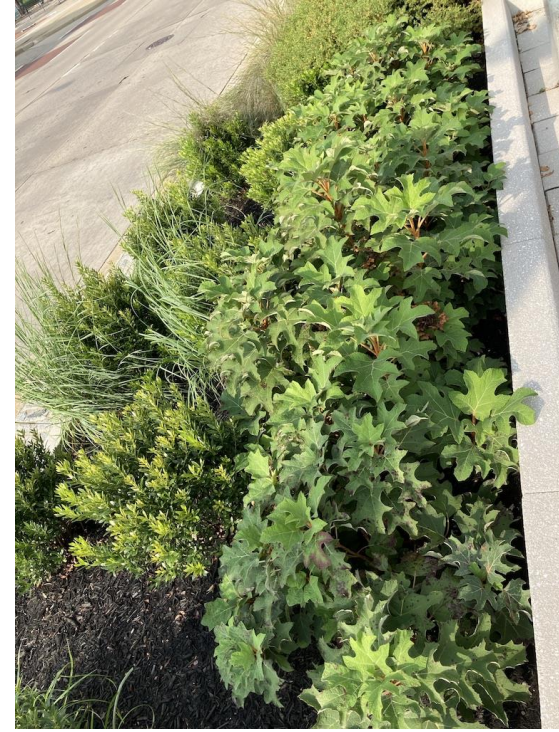
Components necessary to serve the secondary function?

Is it managed as a whole or by individual component?

Is it replaced as a whole or by components?

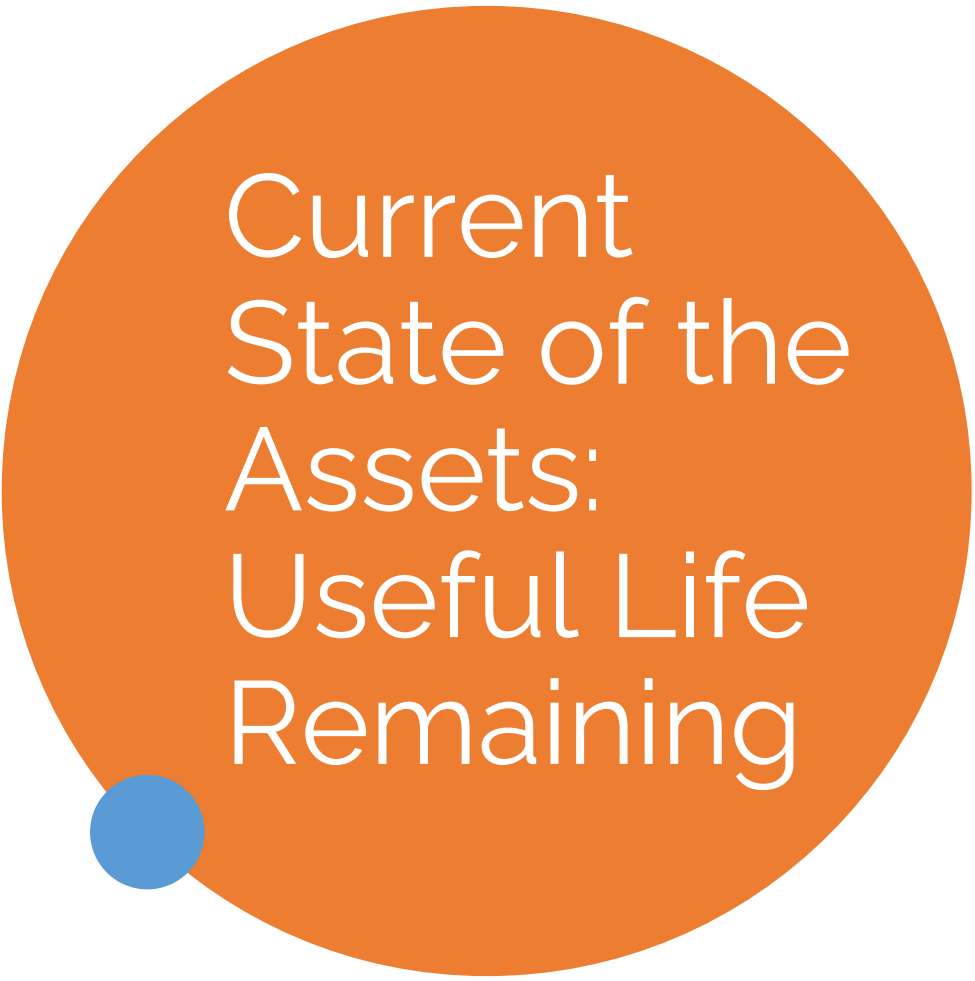
Is it a large size?

The asset can be broken into components



Or it can be just one asset





Current
State of the
Assets:
Useful Life
Remaining



Big difference between green and gray

Natural assets lifetime can be indefinite

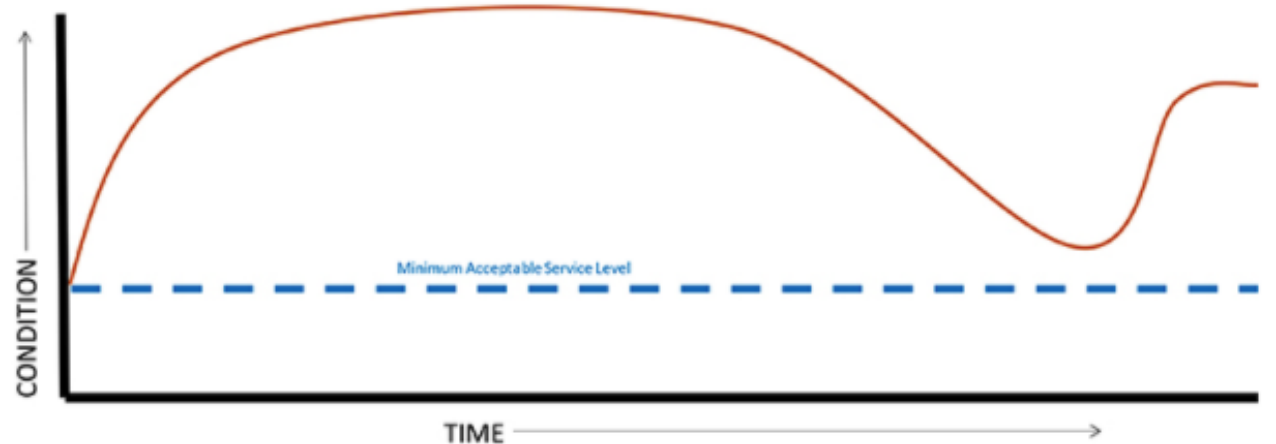
Green Assets – may need to replace soils/plants after a period of time

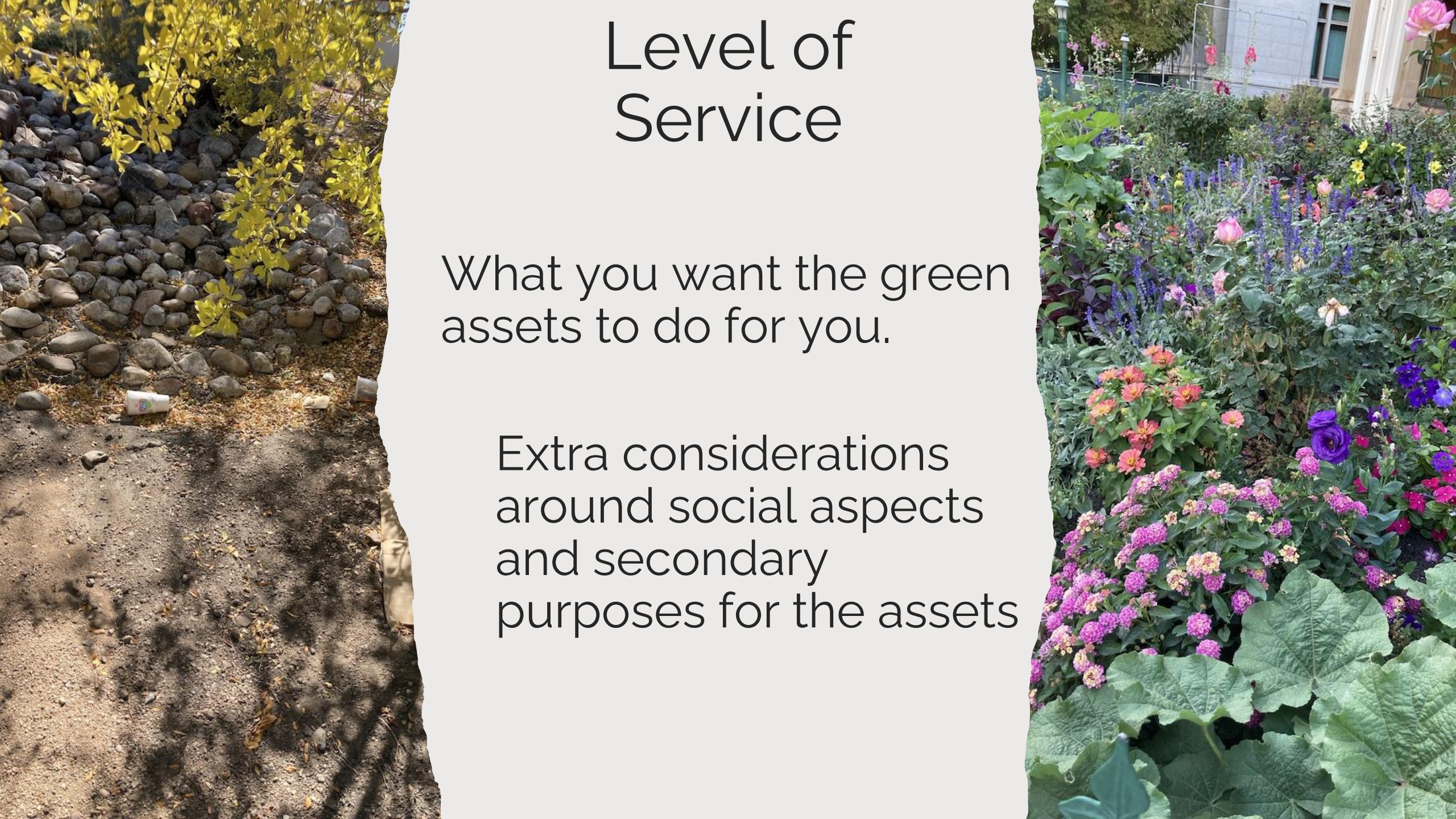
Engineered Green - Green and gray components can have very different lives

Current State of the Assets: Condition

Green asset condition can improve over time (plants mature, roots take hold)

The condition pattern looks different





Level of Service

What you want the green assets to do for you.

Extra considerations around social aspects and secondary purposes for the assets



Considerations

Managers/Leaders/Decision-Makers may not care about secondary benefits

Goals must be measurable (some aspects hard to measure, data may be hard to get)

Goals should not be overly complicated

Criticality

Can be unsatisfying for owners/managers

Why?

Green assets are often not high consequence of failure assets
Probabilities of failure are usually low as well

The overall rating for green assets compared to gray is usually lower

Criticality

But, if green infrastructure is lower risk, using it can decrease overall risk profile of the organization



Failure Modes

Need to define how assets can “fail”

Bioretention asset: vegetation death, invasive species infiltration, inlet blocked, debris clogging drain, broken curbs, compacted soils

Permeable Pavement: clogged joints or pores, ponding, underdrain deteriorated, vegetation growing through cracks



Criticality: Considerations

Very few entities have performed criticality assessments for their green assets

Asset, or portions of asset, can fail but the asset can still function

Multi-asset vs. single asset failures

Life Cycle Costing



The costs of various life stages are difficult to estimate



Natural assets don't have some of the costs (generally don't have to purchase and they won't be replaced)



Green assets can be owned by different entities than manage them



Green assets can appreciate over time where gray depreciate

Maintenance

May take a different skill set & may need different staff

Less knowledge about maintenance needs of green assets

Can be done by outside contractor



Life Cycle Costing – Repair/Rehabilitation /Replacement

Natural assets - may need some repair/rehabilitation but not “replacements”

Green Assets – Typically need periodic rehabilitation

Green – Engineered Green – need replacement of gray components and rehabilitation of green ones



Life Cycle Costing: Considerations



Standard costs for GI hard to develop because costs so site specific

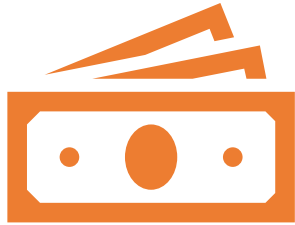


Life cycle costs not well understood yet (over time will improve; even with gray assets, O&M costs not well documented during beginning stages)

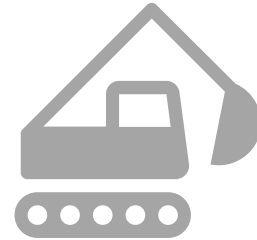


Understanding a "complete life cycle" can be more challenging

Long-Term Funding



Funding is in its infancy
with green assets



Hard to develop a long-
term funding plan

Construction costs very site specific
Maintenance costs not yet well-known
Operation costs generally low to zero
Costs of repair/rehab/replacement – not
well known & vary from place to place
End of life difficult to estimate

Long-Term Funding



One problem with limited knowledge of funding, green infrastructure is not being used to the extent it should be



Green infrastructure options may be removed from consideration because of a belief that it “costs more” without actual proof that over time it does

If you have green assets, consider including them in your strategy.

You'll get the most efficient and effective results if all options (green and gray are considered)

CONTACT INFORMATION



SOUTHWEST ENVIRONMENTAL FINANCE CENTER

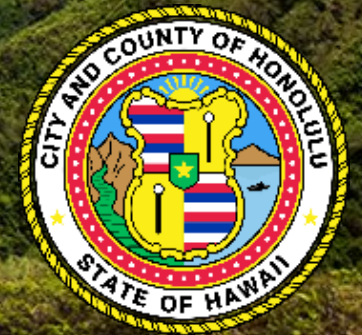
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City and County of Honolulu

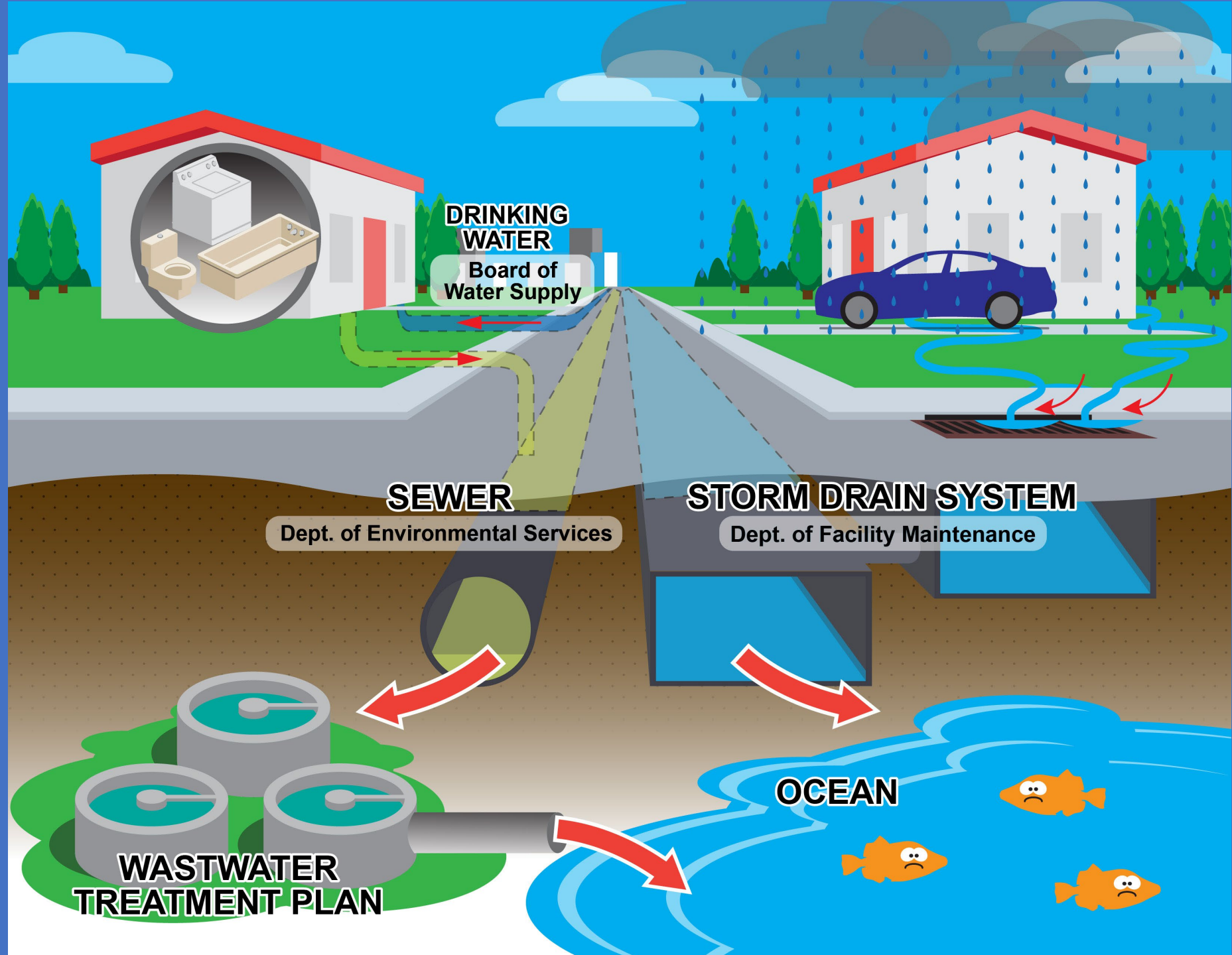
Stormwater Asset Management Letting your Green Infrastructure Assets Work for You (EPA Webinar)

Tuesday, June 14, 2022



Oahu is served by a municipal *Separate Storm Sewer System* (MS4) of drains and pipes...

...but the storm water system also includes uplands, streams, swales and beach mouths





Managing Oahu's Storm Water: Environmental Challenges

- **Aging Infrastructure** – Much of Oahu's system is near its 50 year design life
- **Localized Flooding** – Becoming more frequent with a changing climate and increased development
- **Water Supply Security** – Capturing, cleaning & re-charging our fresh water supplies
- **Sea Level Rise** – affects coastal storm drainage infrastructure, especially pipe outfalls



O'ahu's Storm Water Program



- 10 City & County Departments manage an **Island-wide** system
- 309 full-time employees + 154 *un-filled positions*

49.8% Vacancies

OAHU'S STORM WATER SYSTEM BY THE NUMBERS

190,000 linear feet/yr of drainline inspections and maintenance

36,000 miles/yr of street sweeping

27,946 catch basins

~4,000 green infrastructure features to maintain – with more to come

>2,000 construction projects inspected

1,563 miles of culverts

1,553 miles of drainage pipe

361 enforcement actions in 2019

~100 streams require cleaning

97 City industrial facilities

Current Annual Cost:

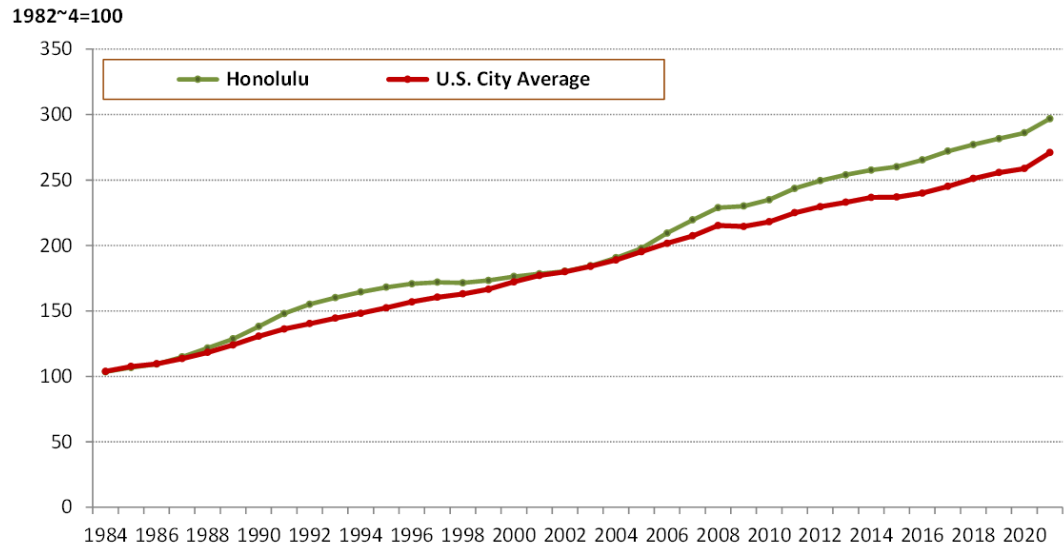
~\$91.6M

Funding:

~\$70M Property Tax +

~\$22M Highway Fund

Consumer Price Index, "All Items"
(Honolulu vs. U.S. City Average)



Source: U.S. Bureau of Labor Statistics

Population County of Honolulu (2021): 1,000,890
Island of Oahu: 597 sq. mi.

Hawaii's cost of living index is 193.3, the **highest in the nation**, meaning the cost of living in the state is nearly twice the average. The state is also the most expensive in the U.S. across all metrics except healthcare. Hawaii's housing costs are three times the national average, with a typical single-family home averaging **\$730,511**. Renters pay an average of \$1,651 for a two-bedroom apartment in the state. Groceries also cost 50% more than the national average, as most goods have to be shipped to the island.

(World Population Review)

Honolulu County

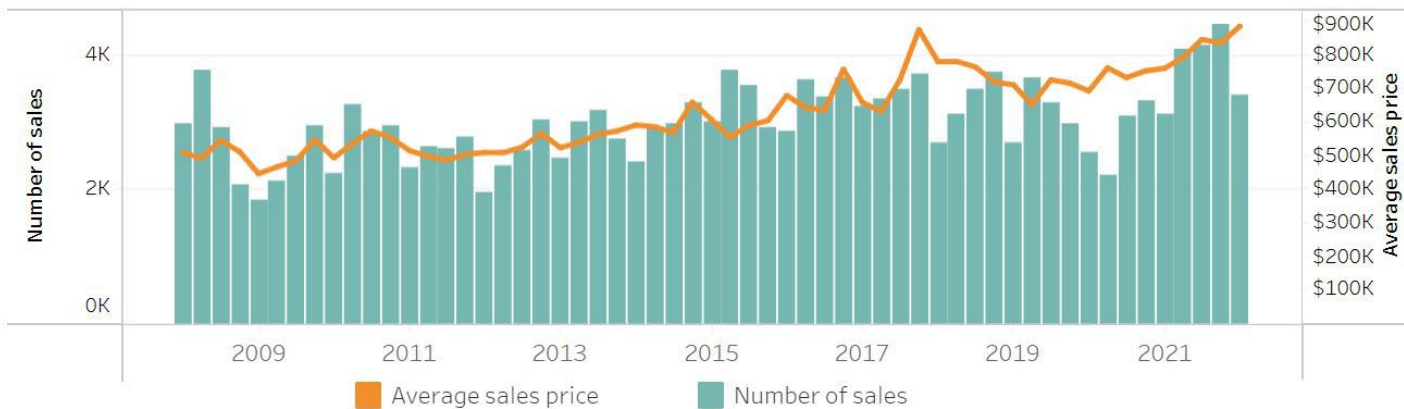
Select type of home

- Both
- Single Family
- Condo

Select residency of buyer

- All buyers
- Local
- Mainland
- Foreign

Number of sales and average sales price



Area: Honolulu County
Period: 2022 Q1
Type of Home: Both
Buyer's residency*: All buyers

Number of sales: 3,394
Average Sales Price: \$881K

*based on the residency of buyer reported on the recorded conveyance

Lessons Learned and Key Considerations

Leadership

Developing a Plan

Financial Stability

Community Engagement

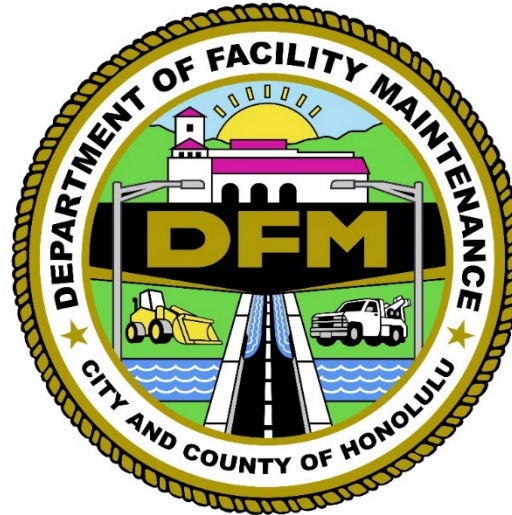


Leadership

Identifying your Champions



City's Storm Water Management Program

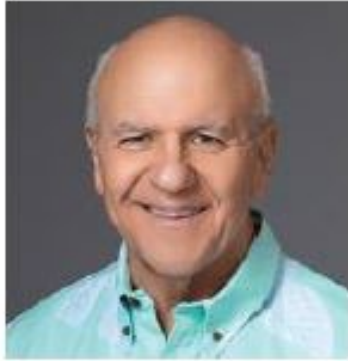


Permittee



Leadership Team

CURRENT



Rick Blangiardi
Mayor of Honolulu



Dawn Szewczyk, P.E.
Director & Chief Engineer

FORMER



Roger W. Babcock, Ph.D.,
Director & Chief Engineer



Kirk Caldwell
Former Mayor of Honolulu



Ross S. Sasamura, P.E.
Director & Chief Engineer

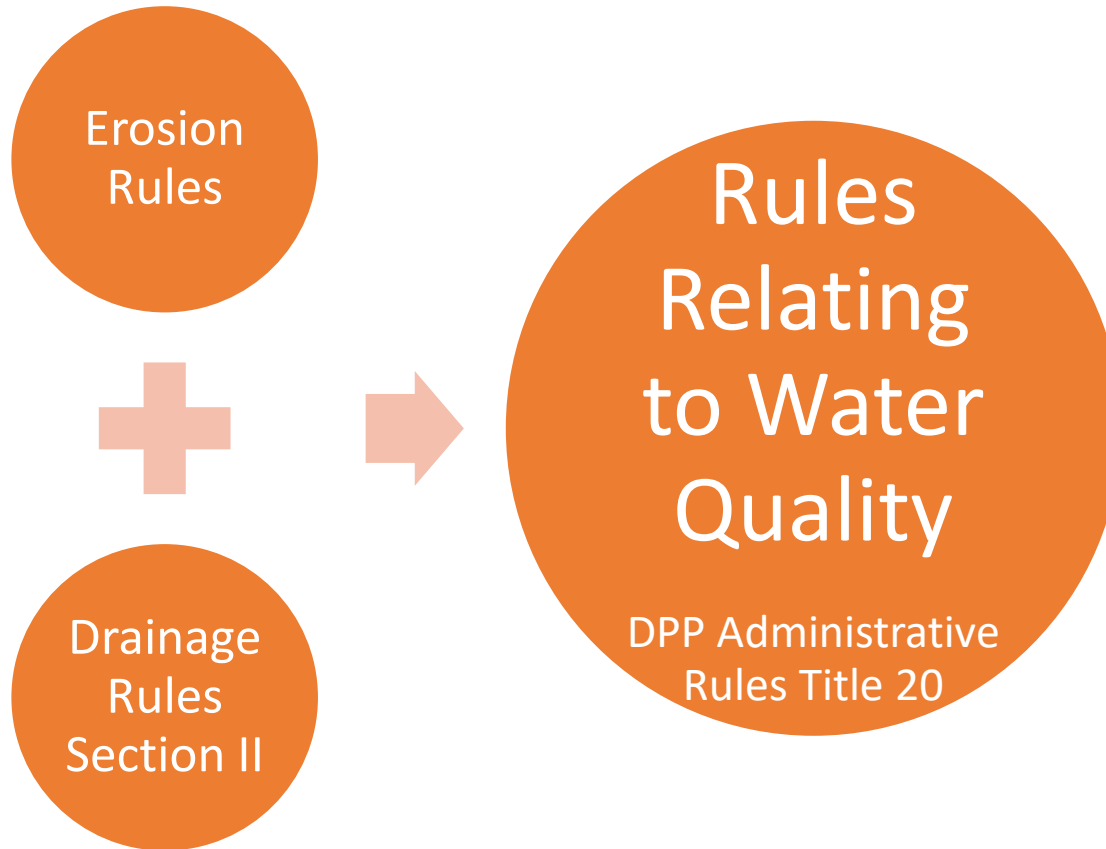
Developing a Plan

Laying the Foundation



Rules Relating to Water Quality (Rules)

Adopted in 2016 and put into effect in August 2017



- ✓ Rules regulates all projects that require obtaining a building, grading, stockpiling, trenching permit issued by the department
- ✓ Any project over 1 acres requires implementing Low Impact Development (LID) designs to infiltrate, retain and/or reuse storm water
- ✓ Regulates certain re-development projects over 5,000 sq. ft. of impervious area to implement LID designs

Flood control requirements will remain separate

Post-Construction Storm Water Management in New and Redevelopment

Post Construction BMPs include:

LID Site Design Strategies

Site and facility design strategy to reduce the post-project runoff, control the sources of pollutants, which reduce the amount of runoff that must be treated.

Source Control BMPs

Preventing pollutants from coming in contact with runoff preventing polluted runoff from discharging into the MS4.

LID Retention BMPs

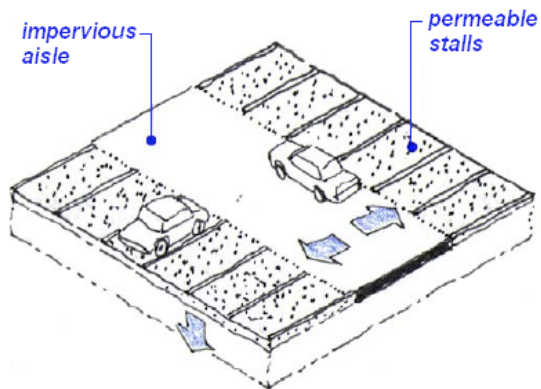
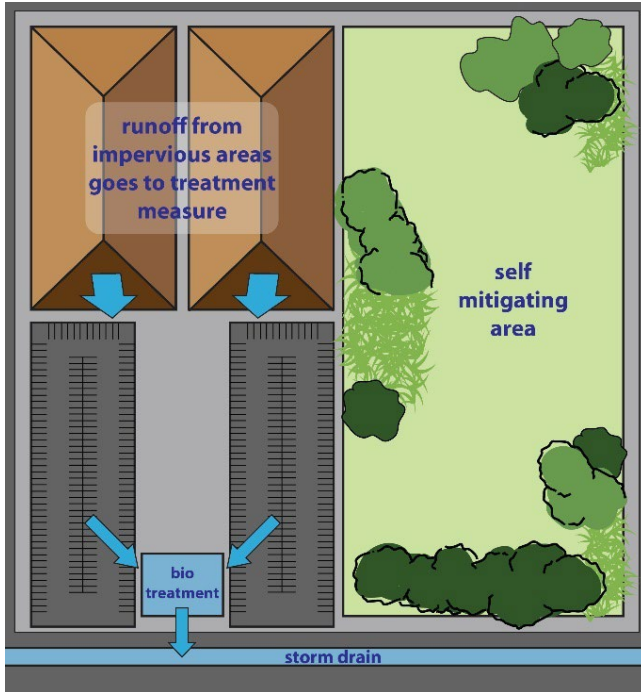
Retaining runoff on-site with no off-site discharge, by infiltration, evapotranspiration, and/or harvesting/reuse

LID Biofiltration BMPs

Removing pollutants from runoff by filtering storm water through vegetation and soils.

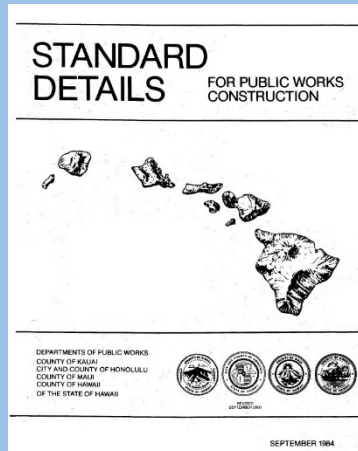
Alternative Compliance BMPs

Removing pollutants from runoff by detention, settling, filtration and vortex separation.



Revised Public Work Standard Details and Specifications

DPW Standards



1984

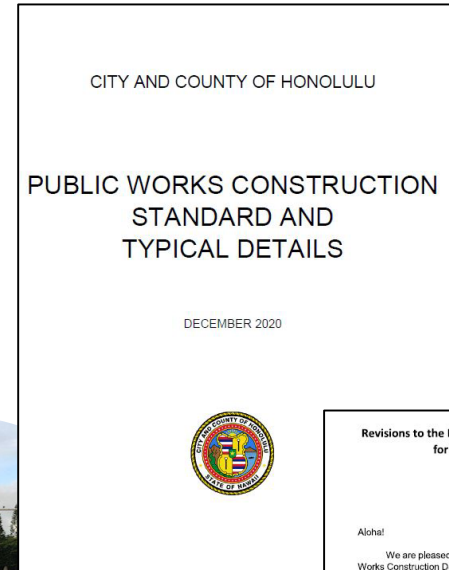
Drainage



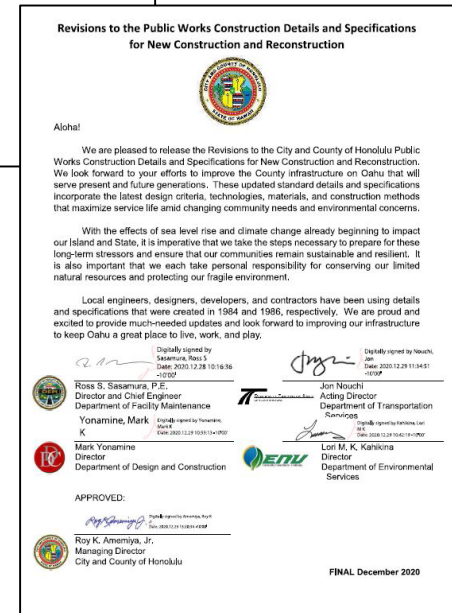
Transportation



NEW!
Green Stormwater
Infrastructure

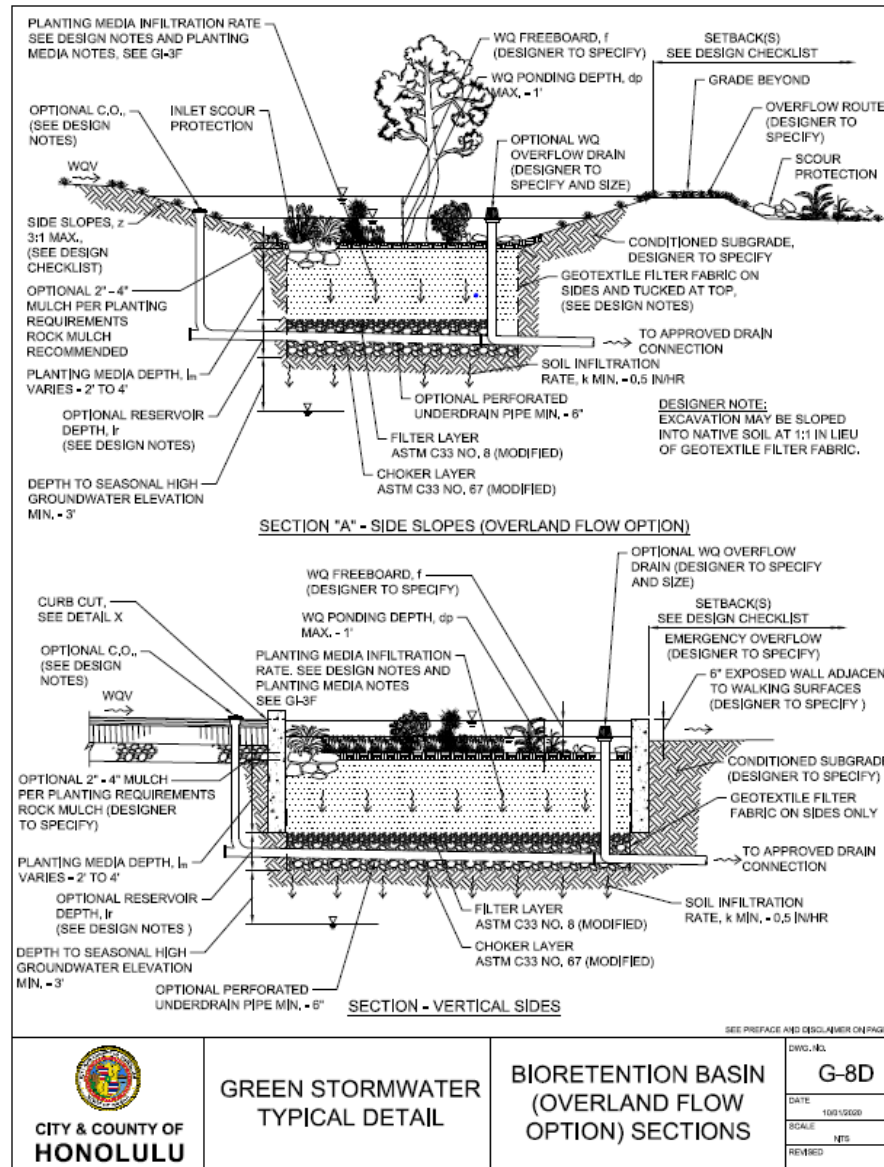


2020



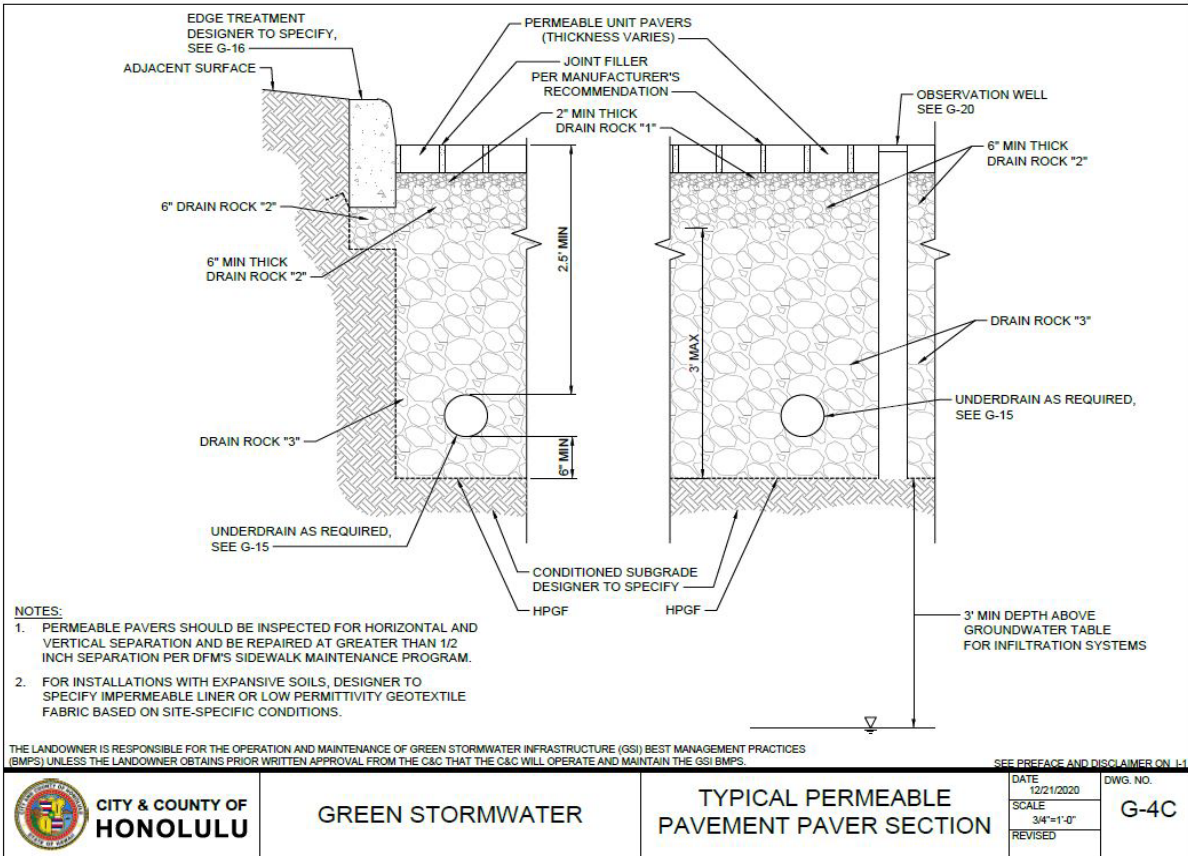
Typical Details – Bioretention Basin

Bioretention Basin at Ala Wai Neighborhood Park



Biofiltration Swale at HPD Police Station

Typical Details – Permeable Pavement



Permeable Pavement at Ala Wai Golf Course

New!







STORM WATER STRATEGIC PLAN 2021-2025

Public Review Draft May 2022

Mission




The City storm water program's mission is to work for:

-  Clean water by managing storm water runoff, improving water quality, and preventing pollution;
-  Healthy and safe environment through mauka to makai conservation, managing stream channels, and protecting ocean waters;
-  Community involvement in deciding how funds are spent, ensuring accountability, and meeting local needs; and
-  Shared responsibility where the City departments work together and everyone makes a difference.

Vision

The storm water program is innovative and proactive. It continually maintains and improves the City's built and natural storm water systems through the application of technology and best practices. With continuous workforce development, its engaged and creative staff are leading by example, and responding effectively to community needs, concerns, and ideas.

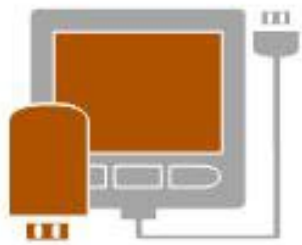
Strategic Direction

	 <p>ENHANCED WATER QUALITY</p> <p>Support better water quality island-wide using a mauka to makai (watershed) approach, furthering partnerships, and implementing coordinated and sustained monitoring efforts.</p>	 <p>FLOODING ADAPTATION & PREVENTION</p> <p>Implement a mix of properly-sized natural (green) and constructed (gray) solutions to reduce damage from flooding and promote strategies that encourage learning to "live with water".</p>	 <p>TIMELY & CONSISTENT ASSET RENEWAL</p> <p>Develop an effective plan for storm water infrastructure that can be used to prioritize, fund, and implement capital projects to further community goals and avoid costly emergency repairs.</p>	 <p>FINANCIAL ACCOUNTABILITY & TRANSPARENCY</p> <p>Maintain strong fiscal management and provide accountability through transparent and thorough financial reporting to the community.</p>
GOALS	 <p>COMMUNITY ENGAGEMENT</p> <p>Ensure community awareness and engagement by providing effective, meaningful, and varied opportunities and information pathways.</p>	 <p>PARTNERSHIPS & COORDINATION</p> <p>Maximize the program's community impact by leveraging resources and funding through external partnerships as well as inter- and intra-agency coordination, guided by O'ahu's One Water approach.</p>	 <p>EQUALITY EQUITY</p> <p>Engage with partners in O'ahu's socially vulnerable communities to assess and actively remedy storm water-related deficiencies by investing in multi-benefit solutions such as green storm water infrastructure.</p>	 <p>WORKFORCE EXCELLENCE</p> <p>Become an employer of choice by recruiting and retaining talent, recognizing excellence, and aligning goals of diversity, equity, and inclusion in employee and overall workforce development.</p>



STORM WATER PROGRAM
CITY AND COUNTY OF HONOLULU

Storm Water Asset Management/Master Plan Study



Data and Analytics



Watershed Modeling



CIP Project
Identification &
Prioritization



Grants and
Partnerships

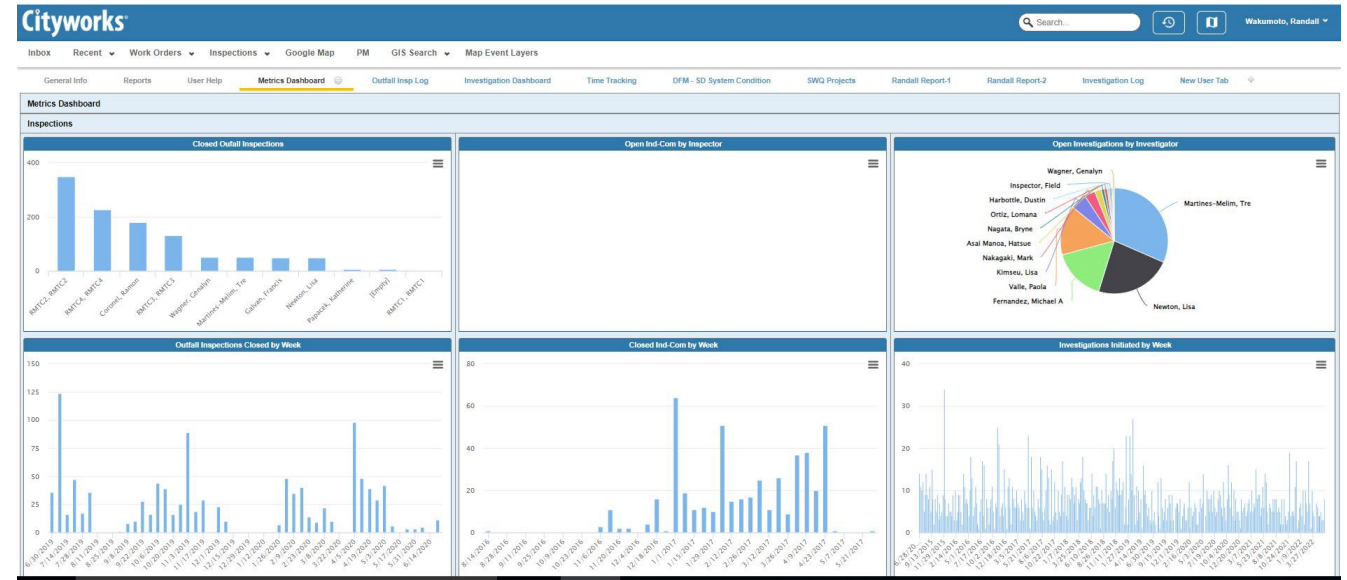


Workforce
Development

Current Technology – Asset Management

This collage features several key technologies used in the asset management system:

- Microsoft Power BI:** Data visualization tool.
- Microsoft Power Platform:** A low-code platform for building business solutions, including Power Apps, Power Automate, and Power Virtual Agents.
- SharePoint:** Microsoft's cloud-based content management system.
- Cityworks Empowering GIS:** A GIS-based asset management software.
- ArcGIS ESRI:** A leading provider of GIS software and services.
- Microsoft SQL Server:** A relational database management system.



DEPARTMENT OF FACILITY MAINTENANCE
CITY AND COUNTY OF HONOLULU
STORM WATER QUALITY DIVISION
100 ALA IHA STREET, SUITE 210, HONOLULU, HAWAII 96817
PHONE: (808) 768-5258 • FAX: (808) 768-4848

RICK BLANGUARD, MAYOR
ROGER BACOCK, JR., Ph.D., P.E.
DIRECTOR AND CHIEF ENGINEER
OSWALD
TULERE K. BUSHAWA, P.E.
ACTING CHIEF ENGINEER
OSWALD
OSWALD & WANGRATTO, P.E.
PROFESSIONAL ADMINISTRATOR

SWQR INSPECTION

Inspection ID: 177039 Inspection Date: 9/25/20

Site General Information

Facility Name:

Facility Address:

TMC:

SWQR No.:

Drain Connection License (DCL) Required:

Facility Status:

Site Point of Contact (POC) Information

Name:

Title:

Primary Phone No.:

Initial Walkthrough Attendee Information (if different from POC)

Name:

Title:

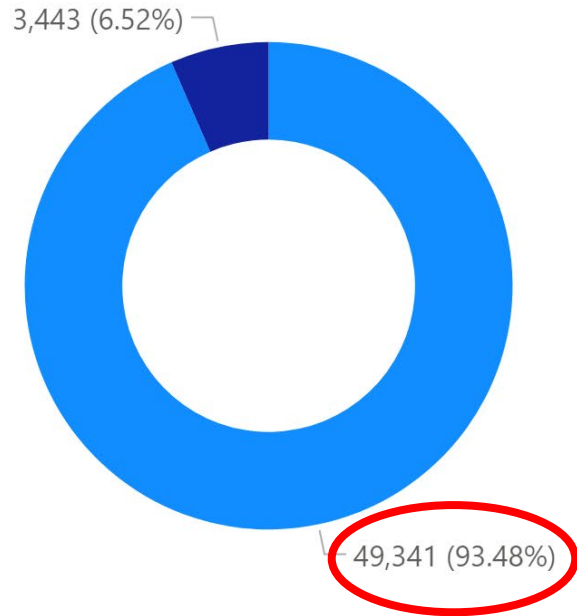
Primary Phone No.:

Email:



Inspected vs Not-Inspected Conduits

Inspection Status ● Not Inspected (by STORMPipe) ● Inspected (by STORMPipe)

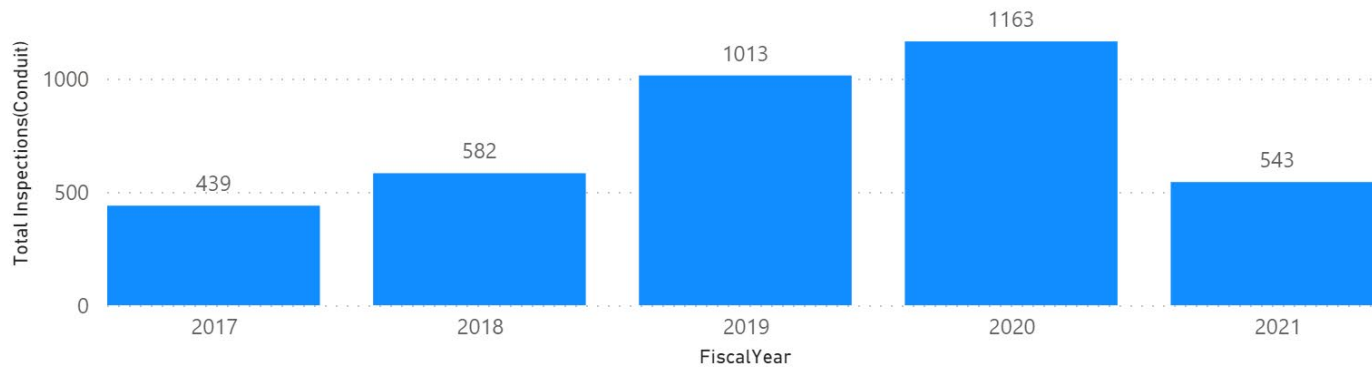


Inspected Pipes (STORMPipe)



Total Inspections (STORMPipe) by FiscalYear

INSPTEMPLATENAME ● STORMPipe



Pipe Type	Inspected (STORMPipe)
Box Culvert	88
Channel	4
Corrugated Metal Pipe	28
Ditch	6
Other	8
Reinforced Concrete Pipe	3,306
Swale	3
Total	3,443

Cityworks Insights and Business Risk Exposure (BRE)

- **POF - Probability of Failure**

The POF score indicates how likely failure will happen to an asset.

- **COF - Consequence of Failure**

The COF score indicates the real or hypothetical results associated with the failure of an asset.

- **BRE = POF × COF**

The BRE score indicates the priority of an asset for maintenance /repair.

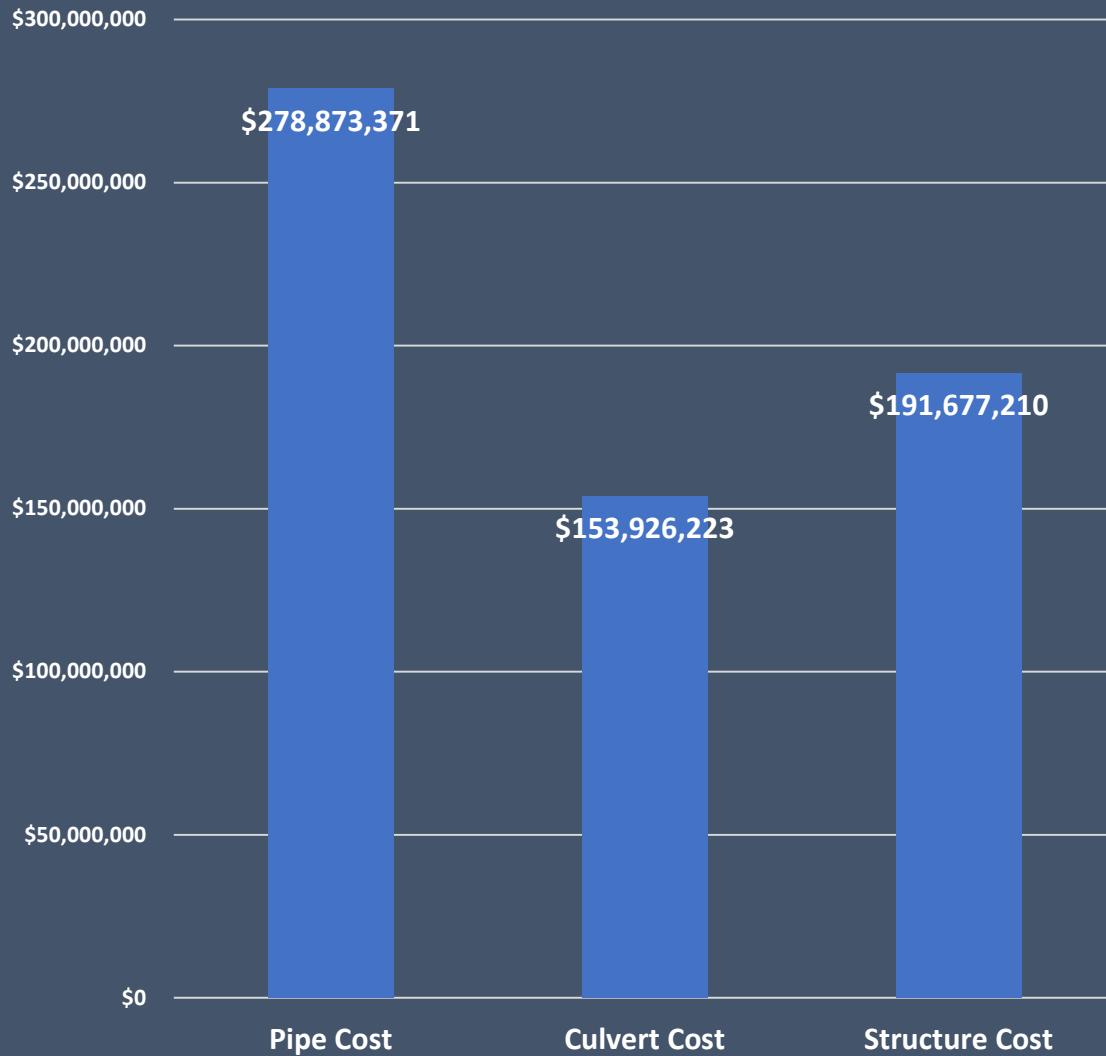
- **No Data**

The current configuration will assign the Min. score

POF	Weight %	Score		Weighted Score	
		Min	Max	Min	Max
Overall Structural Condition	30	1	4	0.30	1.20
Type (of pipe)	20	1	4	0.20	0.80
ConstDate	20	1	10	0.20	2.00
Erosion Condition	15	1	4	0.15	0.60
Tidally Influenced?	10	1	3	0.10	0.30
Odor?	5	1	3	0.05	0.15
POF score range				1.00	5.05

COF	Weight %	Score		Weighted Score	
		Min	Max	Min	Max
Major Economic Impact Area?	30	1	3	0.30	0.90
Major or Heavily Used Road?	20	1	3	0.20	0.60
High Replacement Costs?	20	1	3	0.20	0.60
TMDLs in Place?	10	1	3	0.10	0.30
Major Gathering Place?	10	1	3	0.10	0.30
Discharge to Impaired Waters?	10	1	3	0.10	0.30
COF score range				1.00	3.00

Infrastructure Cost Estimates Based on Current BRE



Total: \$624,476,804

Cost Estimates Include:

- Design/ Permit
- Material
- Installation
- Mobilization/ Demobilization
- Temporary BMPs
- TCP
- Contingency
- Easements

Limitations:

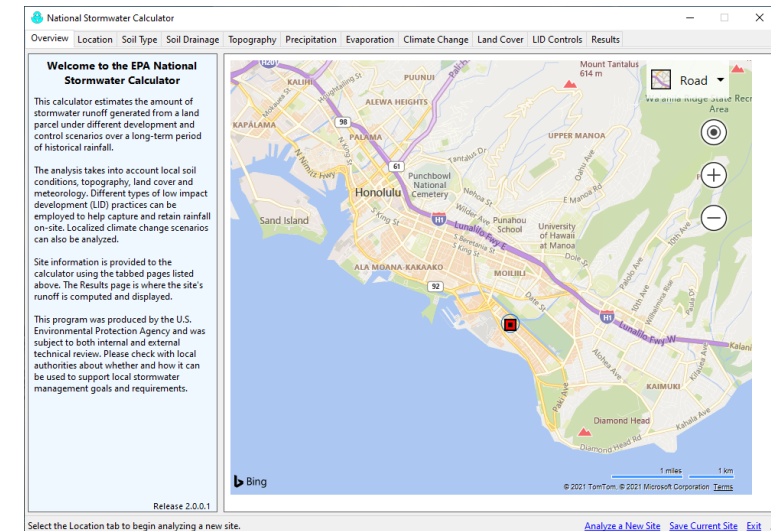
- Limited inspection data (i.e. no/minimum BRE).
- Cursory Condition Assessment (no CCTV)



National Stormwater Calculator



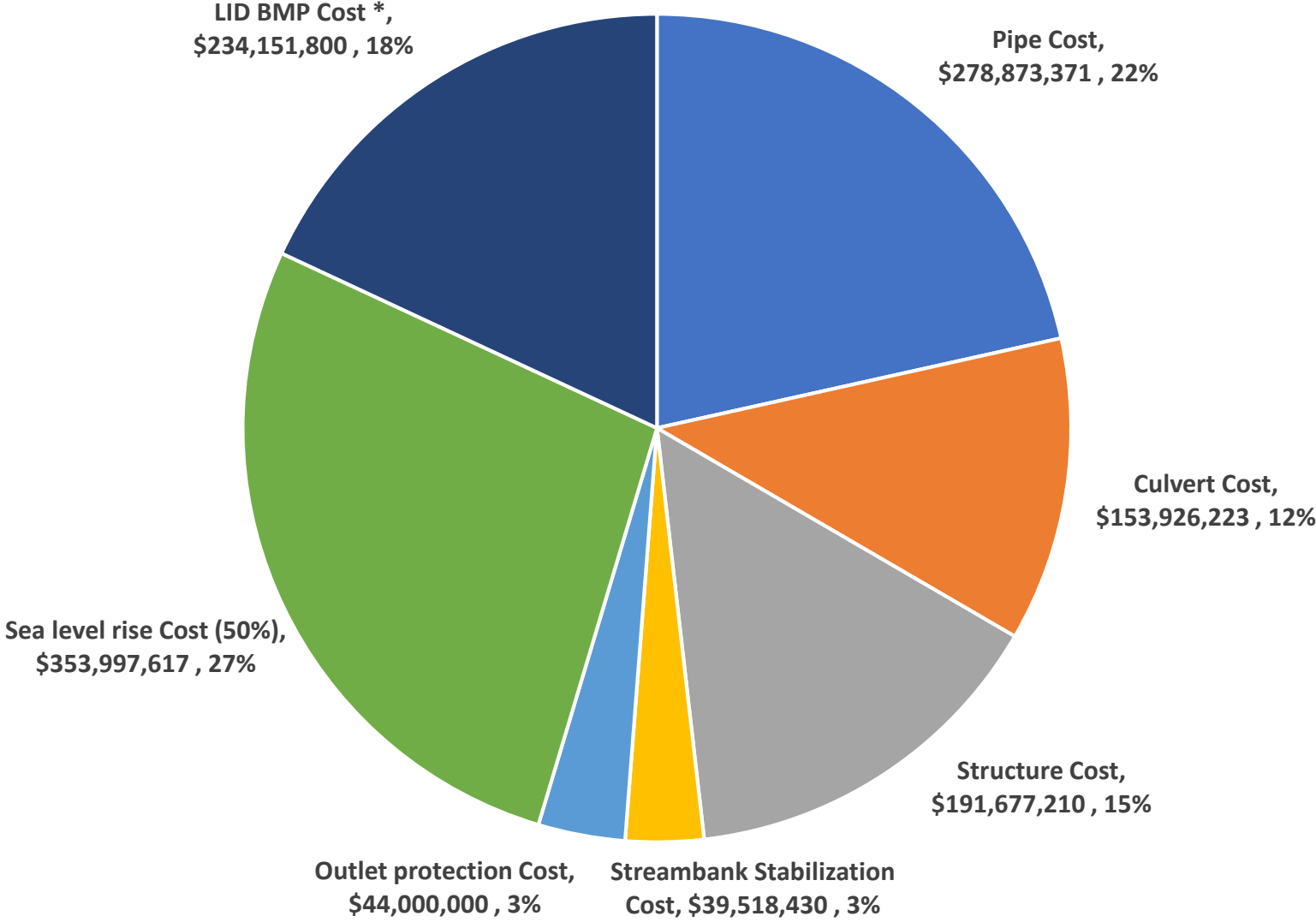
- Uses EPA Storm Water Management Model (SWMM) as its computational engine
- A simple tool for computing small site hydrology based on local soil conditions, slope, land cover, and meteorology
- Includes 7 common types of Green Stormwater Infrastructure (GSI) practices
- Estimates the amount of stormwater runoff under different scenarios
- Provides planning level estimates of capital and maintenance costs with adjustment factors for locations, including Honolulu



Summary of projected costs: Infrastructure and Green Stormwater Infrastructure (GSI)

Total= \$1,296,144,651

- Annual Cost over 30 years
- Year 1= **\$43,204,822**



Notes: * Assume GSI BMP Costs are not impacted by sea level rise.

Financial Stability

(Storm Water Utility Feasibility Study)



Evaluating Feasibility with Stakeholder Input: A Direct Result of the Fresh Water Initiative

A Blueprint for Action Water Security for an Uncertain Future

2016-2018



Looking Ahead: The Path to a Stormwater Utility for the City and County of Honolulu

December 2017



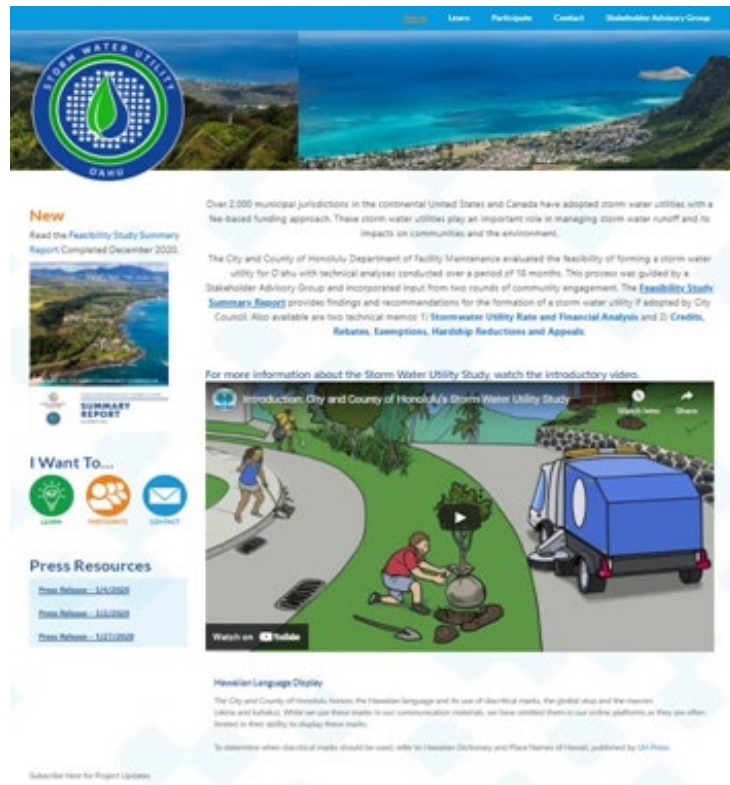
Prepared For: Hawaii Community Foundation & City and County of Honolulu
Prepared By: Hawaii Pacific University and One World One Water

- **2015:** Fresh Water Council designed and **advocated for Hawaii Act 42 (HB 1325)**, allowing Counties to form storm water utilities
- **2017:** Fresh Water Initiative & HPU/OWOW storm water utility study, funded by the Hawaii Community Foundation, provided a road map on what steps the City may want to take into consideration with developing a utility
- **2019:** City & County of Honolulu Department of Facility Maintenance in partnership with the Hawaii Community Foundation funded a **Stakeholder Advisory Group process** (August 2019 – October 2020)

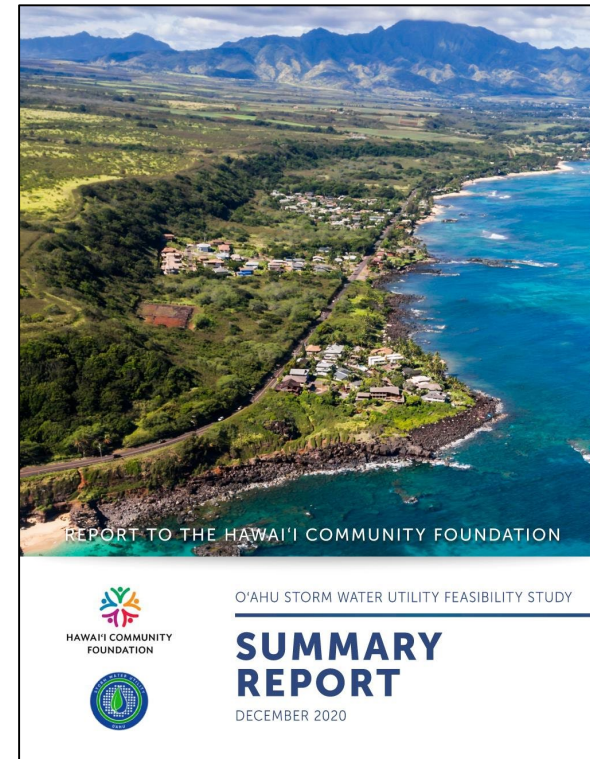


What is a Storm Water Utility?

A storm water utility would be a **dedicated, fee-based method of funding the services and investments needed to maintain O'ahu's storm water system and protect O'ahu's streams and nearshore waters.**



The screenshot shows the website's header with a logo for 'STORM WATER UTILITY OAHU' and navigation links: 'Learn', 'Participate', 'Contact', and 'Stakeholder Advisory Group'. Below the header is a 'New' section titled 'Read the Feasibility Study Summary Report Completed December 2020'. It includes a small image of the report cover and a text block stating: 'Over 2,000 municipal jurisdictions in the continental United States and Canada have adopted storm water utilities with a fee-based funding approach. These storm water utilities play an important role in managing storm water runoff and its impacts on communities and the environment. The City and County of Honolulu Department of Facility Maintenance evaluated the feasibility of forming a storm water utility for O'ahu with technical analyses conducted over a period of 18 months. This process was guided by a Stakeholder Advisory Group and incorporated input from two rounds of community engagement. The **Feasibility Study Summary Report** provides findings and recommendations for the formation of a storm water utility if adopted by City Council. Also available are two technical memos: 1) **Stormwater Utility Rate and Financial Analysis** and 2) **Credits, Rebates, Exemptions, Hardship Reductions and Appeals**. For more information about the Storm Water Utility Study, watch the introductory video.' Below this is a video player thumbnail for 'Introduction, City and County of Honolulu's Storm Water Utility Study'. To the left of the video are icons for 'Learn', 'Participate', and 'Contact'. Below the video is a 'Press Resources' section with three links: 'Press Release - 1/15/2021', 'Press Release - 1/15/2021', and 'Press Release - 1/17/2021'. At the bottom left, there is a 'Hawaiian Language Display' section with a small text block and a 'Watch on YouTube' button.



The cover features a large aerial photograph of a coastal area with green hills, a road, and a blue ocean. At the bottom, it reads 'REPORT TO THE HAWAII COMMUNITY FOUNDATION'. Below the photo is the 'HAWAII COMMUNITY FOUNDATION' logo and the text 'O'AHU STORM WATER UTILITY FEASIBILITY STUDY'. The main title is 'SUMMARY REPORT' in large, bold letters, with 'DECEMBER 2020' underneath. A small version of the 'STORM WATER UTILITY OAHU' logo is also present.

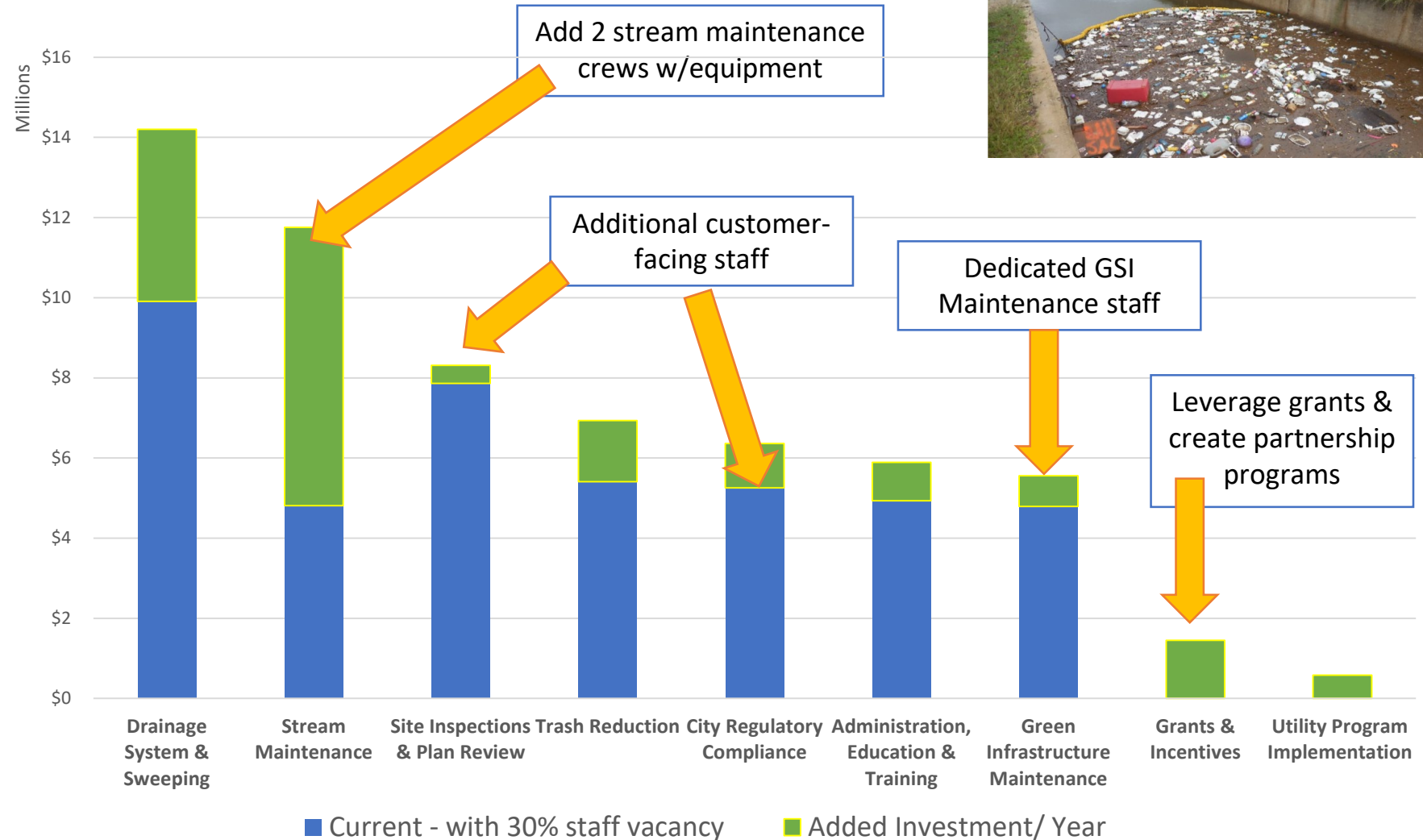
www.StormWaterUtilityOahu.org

Operating Expenses

Current + Proposed



What Benefit Will Citizens See from this Change?



Community Engagement



Stakeholder Advisory Group: 18 Organizations + 9 Neighborhood Boards

Meeting since August 2019 – Quarterly meetings after October 2020

- AARP Hawaii
- Amer. Council of Engineering Companies – HI
- Appleseed Policy Center
- Building Owners & Managers Association (BOMA)
- Fresh Water Council
- Hawaii Association of Watershed Partnerships
- Hawaii Auto Dealers Association
- Hawaii Reserves, Inc.
- Honolulu Board of Water Supply
- I’olani School (Student Member)
- Kamehameha Schools
- Kua’Aina Ulu ‘Auamo (KUA)
- NAIOP Commercial Real Estate Development Association - HI
- Oahu Resource Conservation and Development Council
- Sustainable Coastlines
- The Nature Conservancy – HI
- University of Hawaii – Manoa Dept. of Civil Engineering
- Waikiki Business Improvement District



Community Meetings

Meeting Announcements in the Media

Star-Bulletin & Midweek

CITY AND COUNTY OF HONOLULU
STORM WATER UTILITY
VIRTUAL MEETINGS *this May*

Help shape the future and funding of storm water management on O'ahu

Participate in an online meeting!

May					
Mon.	Tues.	Wed.	Thur.	Fri.	Sat.
		20	21	22	23
		5:30 pm	2:00 pm	10:00 am	10:30 am
25	26	27	28		30
2:00 pm	5:30 pm	8:00 am	8:00 pm		2:00 pm

Share input and suggestions for the storm water utility study

For more information on the study and meetings:

StormWaterUtilityOahu.org

Paid for by the taxpayers of the City and County of Honolulu



Email Announcements to Neighborhood Board Members



Facebook Posts



Spectrum PSA

Newsletter

O'ahu Storm Water Utility Study

Storm Water Utility Study Response to COVID-19
 The COVID-19 pandemic crisis has impacted our island communities and will continue to affect us into the future. As we work together to overcome these challenges, we look for new ways to build a stronger, more resilient island community.

The Department of Facility Maintenance is proposing a revised approach to the introduction of a storm water utility, including a proposal to delay any new fees and to include a strong equity plan for our kōpuna, low-income families, and nonprofits. This will be addressed in upcoming meetings.

We are still seeking input to inform the recommendations to City Council. Please join us for an upcoming virtual meeting as we continue to explore the formation of a storm water utility as a reliable funding mechanism for our island's storm water management.

SAVE THE DATE!

Attend a Virtual Community Meeting at your convenience!

May					
Mon.	Tues.	Wed.	Thur.	Fri.	Sat.
		20	21	22	23
		5:30 pm	2:00 pm	10:00 am	10:30 am
25	26	27	28		30
2:00 pm	5:30 pm	8:00 am	8:00 pm		2:00 pm

Meetings will feature:
 Short presentation | Q&A "Talk Story"
 Live, interactive polling

Join a meeting at StormWaterUtilityOahu.org

NOW AVAILABLE!

Community Feedback

THANK YOU

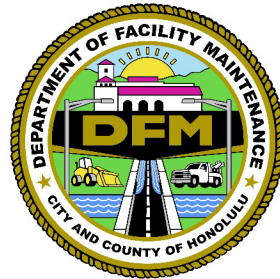
RANDALL WAKUMOTO, PROGRAM ADMINISTRATOR

Storm Water Quality Division

Ph: (808) 768-3242

Email: rwakumoto@honolulu.gov

**City & County of Honolulu
Department of Facility
Maintenance**

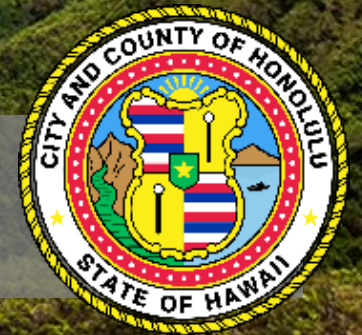


**Environmental Concern
Line**

(808) 768-3300

Mahalo!

Storm Water Asset Management: EPA Webinar
June 14, 2022



Managing Stormwater Green Infrastructure Assets in St. Louis, Missouri

Kirk Lambrecht
Environmental Specialist
Division of Environmental Compliance
Metropolitan St. Louis Sewer District

June 14, 2022



Topics

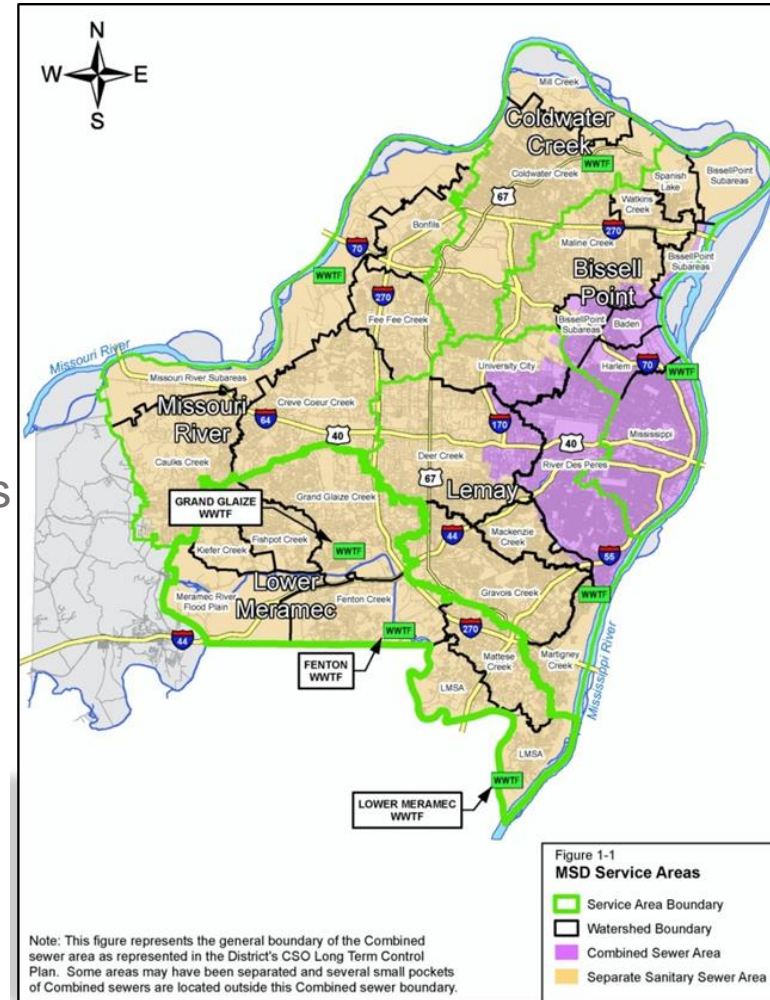
- MSD's Stormwater Green Infrastructure Programs
- Green Infrastructure Assets
 - Types
 - Ownership
- Managing Assets
 - Inspections
 - Maintenance
 - Education & Enforcement
 - Reporting
 - Data systems



Metropolitan St. Louis Sewer District Overview



- Two utilities in one
 - Sanitary
 - Stormwater
- Service Area
 - 535 sq. miles
 - 1.3 million people
 - 93 Municipalities
- Sewer Stats
 - 3,000 miles of storm sewers
 - 50 miles of improved channels
 - 4,800 miles of sanitary sewer
 - 1,800 miles combined sewers
 - 7 WWTPs
 - 278 pump stations



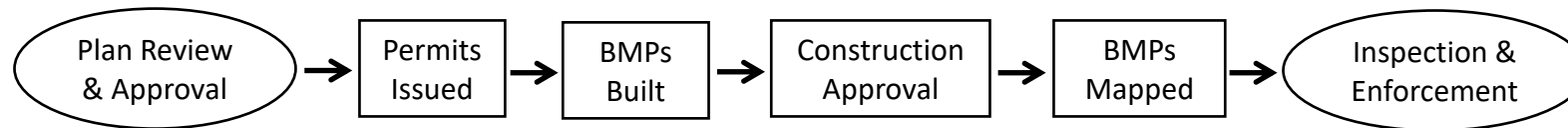
Stormwater Green Infrastructure Capital Programs

1. MS4 Program
 - Requirements for development
2. CSO GI Program
 - Retrofit
 - Development
3. Rainscaping Grants Program



Private Development Program

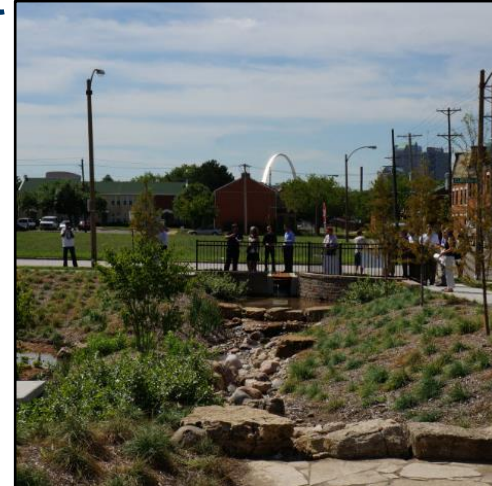
- Includes CSO GI and MS4 Programs
- MSD establishes requirements to address the quality of stormwater runoff from new and redevelopment projects ≥ 1 acre.



- Following project approval, constructed BMPs are entered into the Inspection and Compliance Program.
 - Field Inspections
 - Annual Reports due

CSO Green Infrastructure Program

1. Development “Indirect” Project
2. Direct Projects
3. Demolition
4. Cityshed Program
5. Education and Outreach



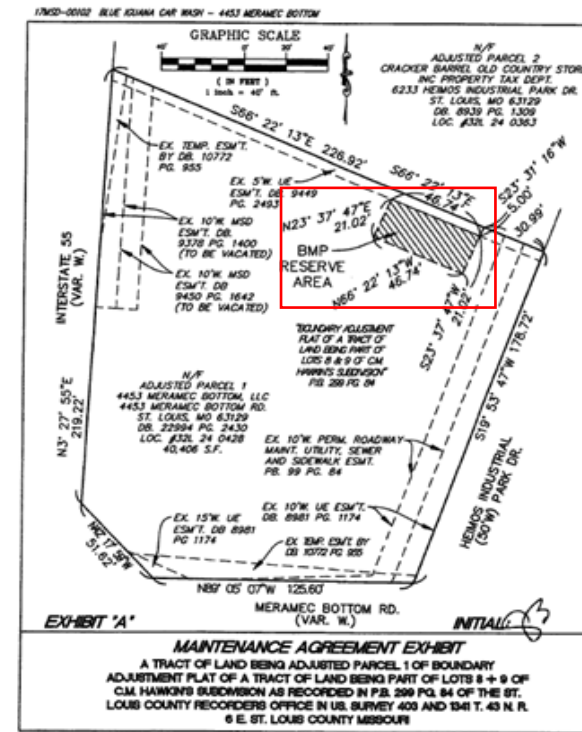
- 405 to 500 acres of drainage area connected to GI practices



Maintenance Agreements

Prior to approving plans the owner enters into a Maintenance Agreement with MSD. The MA includes the following:

- Requires owner to maintain facility in good working order;
- References SWMFR O&M which describes requirements for inspections, maintenance, and reporting;
- Reserve area for each BMP;
- Authority for MSD to make repairs should the owner fail to properly maintain the BMP; and,
- Agreement is to continue in perpetuity.



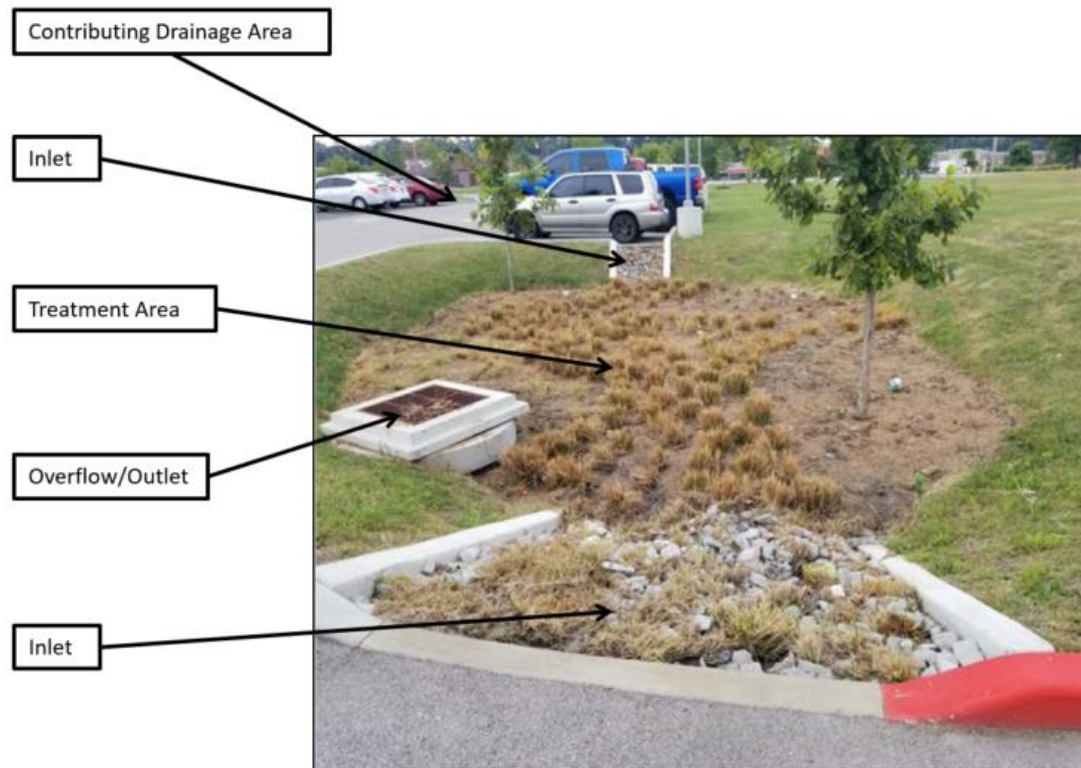
Asset Summary

Asset Type	Count
Bioretention/Raingarden	2,379
Permeable Pavement	979
Amended Soils	591
Hydrodynamic Separator	346
Above Ground Detention Basin	243
Underground Detention Basin	203
Sand Filter	169
Open Channel Use	92
Swales (Wet & Dry)	87
Disconnects (Rooftop)	62
Proprietary BMP Filter	53
Ponds & Wetlands (ED included)	52
Sheet Flow to Buffer	41
Infiltration Basin & Trench	36
Organic Filter	31
Cistern & Rain Barrels	21
Green Roof	12
Natural Area Conservation	8
Dry Well	1
Total	5,406

Inspections

1. Routine
 - 3 year cycle (+1,800/yr)
2. Concerns/Complaints
3. Annual Report Non-Submittals
4. Assistance/Education

STORMWATER MANAGEMENT FACILITY MAINTENANCE INSPECTION CHECKLIST		
BIORBIOS: BIORETENTION/RAIN GARDEN		
Location:	P Job Number:	
Owner Change since last inspection? Yes No	Inspector:	
Owner Name:	Date of Inspection:	
Owner Address:	Owner Phone Number:	
Site Conditions:		
INSPECTION RATING SYSTEM 0 = Good condition. Well maintained, no action required. Satisfactory Performance. 1 = Moderate condition. Should monitor. Satisfactory Performance. 2 = Degraded condition. Routine maintenance and repair needed. Unsatisfactory Performance. 3 = Serious condition. Immediate need for repair or replacement. Unsatisfactory Performance.		
NOTE TO INSPECTOR: All personnel entering any confined spaces must take appropriate safety measures and follow applicable OSHA regulations.		
INSPECTION ITEMS	RATING	COMMENTS
Overall Drainage Area Conditions:		
A. INLETS (if not piped, identify as overland flow)		
Provide stable conveyance into facility?	0 1 2 3 N/A	
Excessive trash/debris/sediment accumulation?	0 1 2 3 N/A	
Evidence of erosion?	0 1 2 3 N/A	
B. PRETREATMENT (if applicable)		
Excessive trash/debris/sediment accumulation?	0 1 2 3 N/A	
Evidence of standing water? (Ponding, Noticeable Odors, Water Stains, Algae)	0 1 2 3 N/A	
Evidence of clogging?	0 1 2 3 N/A	
Dead vegetation/exposed soil?	0 1 2 3 N/A	
Evidence of erosion?	0 1 2 3 N/A	
C. TREATMENT AREA AND VEGETATION		
Excessive trash/debris/sediment accumulation?	0 1 2 3 N/A	
Signs of erosion or movement of mulch (or pea gravel)?	0 1 2 3 N/A	
Evidence of oil/chemical accumulation?	0 1 2 3 N/A	
Evidence of standing water? (Ponding, Noticeable Odors, Water Stains, Algae)	0 1 2 3 N/A	
Underdrain system (if equipped) broken/clogged?	0 1 2 3 N/A	
Adequate plant covering present?	0 1 2 3 N/A	
Is vegetation overgrown? Invasive, overgrown weeds, woody vegetation?	0 1 2 3 N/A	
Dead vegetation/exposed soil?	0 1 2 3 N/A	
Signs of mulch layer thinning (or pea gravel)?	0 1 2 3 N/A	
D. OVERFLOW/OUTLET STRUCTURE		
Stable conveyance out of facility provided?	0 1 2 3 N/A	
Excessive trash/debris/sediment accumulation?	0 1 2 3 N/A	
Evidence of erosion at/around?	0 1 2 3 N/A	
E. HAZARDS		
Complaints from local residents? (describe if any)	0 1 2 3 N/A	
Any public hazards observed? (describe if any)	0 1 2 3 N/A	
F. CORRECTIVE ACTIONS*		

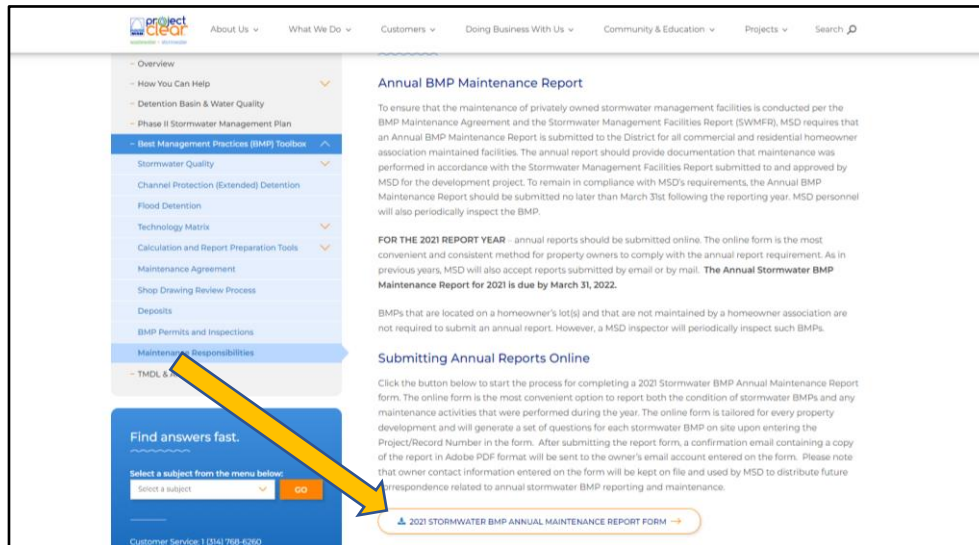
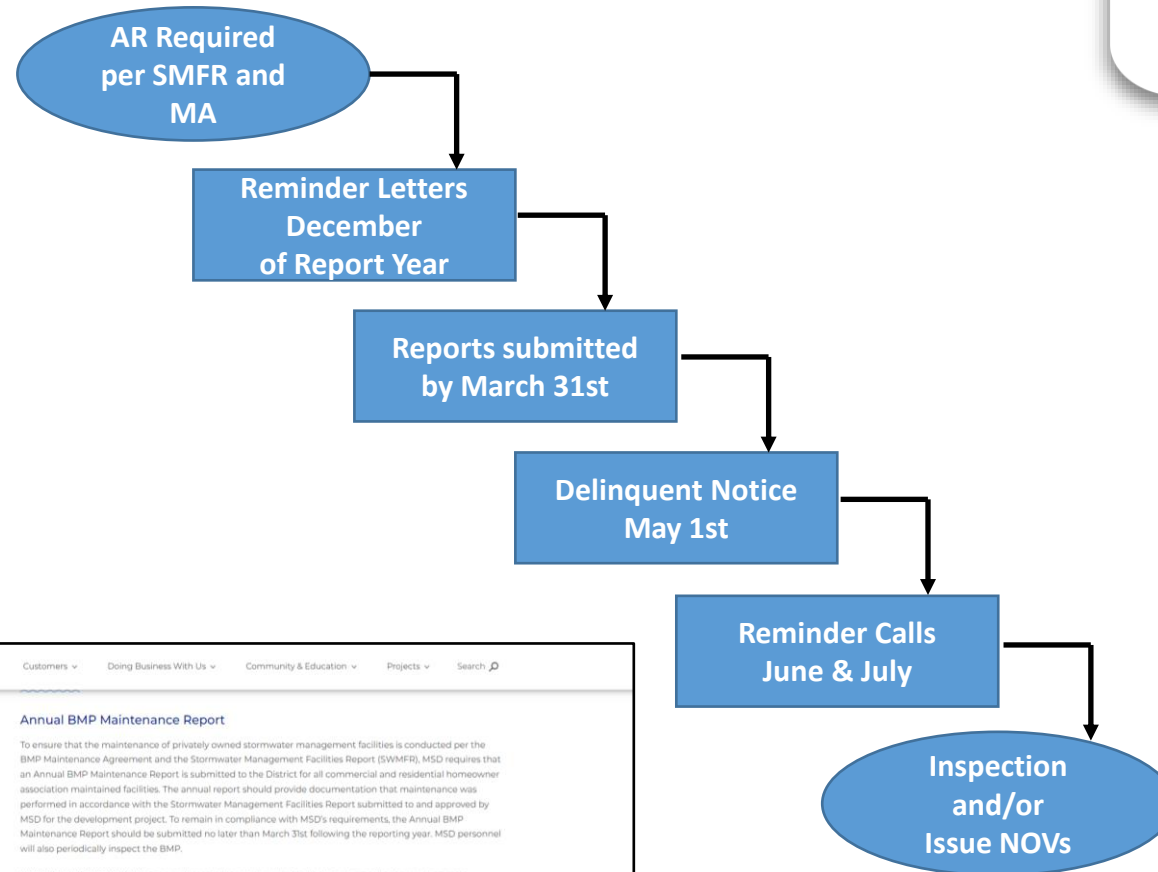


Maintenance

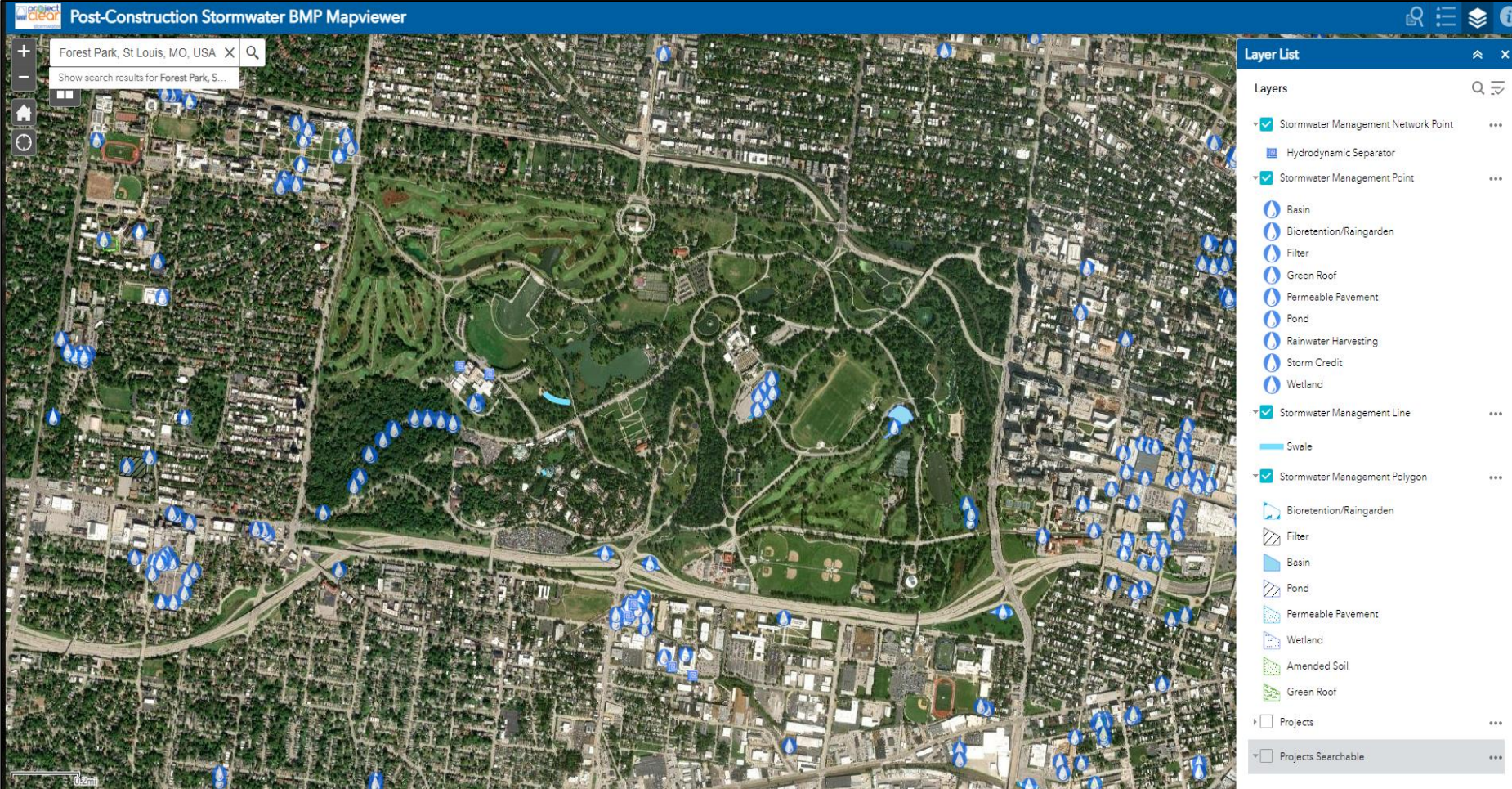
- Excessive erosion
- Excess debris or sediment accumulation
- Clogging or inadequate drainage
- Invasive or overgrown vegetation
- Failing structural components
 - Permeable pavements with excessive spalling or compaction



Annual Maintenance Reports



BMP Mapviewer



Post-Construction Stormwater BMP Mapviewer

Forest Park, St Louis, MO, USA

Show search results for Forest Park, S...

Layer List

Layers

- Stormwater Management Network Point
- Hydrodynamic Separator
- Stormwater Management Point
 - Basin
 - Bioretention/Raingarden
 - Filter
 - Green Roof
 - Permeable Pavement
 - Pond
 - Rainwater Harvesting
 - Storm Credit
 - Wetland
- Stormwater Management Line
 - Swale
- Stormwater Management Polygon
 - Bioretention/Raingarden
 - Filter
 - Basin
 - Pond
 - Permeable Pavement
 - Wetland
 - Amended Soil
 - Green Roof
- Projects
- Projects Searchable

Asset Management Systems



- IBM® Maximo® Asset Management (Maximo)

1. Used by Operations for managing gray infrastructure
2. Integrated with MSD's GIS
3. Supports day to day business processes

- Maximo Utilization

1. Asset characterization and location
2. Scheduling inspections
3. Documenting inspection results along with asset condition and maintenance needs
4. Tracking enforcement actions and compliance
5. Recording annual maintenance reports
6. Generate reports

The screenshot displays the IBM Maximo web interface for an 'ENGINEERING INSPECTOR'. It shows a list of work orders with columns for Work Order, Description, Asset, Location, Status, Reported Date, Owner, and Reported By. The data is filtered for 'DEC BMP Basins, C/OPH Completed Work Orders'.

Work Order	Description	Asset	Location	Status	Reported Date	Owner	Reported By
4860945	BMP INSPECTION/DEC Inspection for BMP, OTHER, 2	GIS-BMP-2024	SWB-CHEVE COULES CREEK-BMPS	COMP	11/24/21 11:08 AM	8078	7956
4861049	BMP INSPECTION/DEC Inspection for BMP, OTHER, 2	GIS-BMP-2246	SWB-CITY BRANCH-BMPS	COMP	11/24/21 11:09 AM	8078	7956
4861151	BMP INSPECTION/DEC Inspection for BMP, EXCESS, WEEDS, 2	GIS-BMP-2240	SWB-CHEVE COULES CREEK-BMPS	COMP	11/24/21 11:10 AM	8078	7956
4861278	BMP INSPECTION/DEC Inspection for BMP, OTHER, 2	GIS-BMP-1499	SWB-DEER CREEK-BMPS	COMP	11/24/21 11:11 AM	8078	7956
4861272	BMP INSPECTION/DEC Inspection for BMP, OTHER, 2	GIS-BMP-1500	SWB-DEER CREEK-BMPS	COMP	11/24/21 11:12 AM	8078	7956
4861276	BMP INSPECTION/DEC Inspection for BMP, EXCESS, WEEDS, 2	GIS-BMP-1075	SWB-DEER CREEK-BMPS	COMP	11/24/21 11:12 AM	8078	7956
4861495	BMP INSPECTION/DEC Inspection for BMP, EXCESS, PROBLEMS, 2	GIS-BMP-3116	SWB-FEE FEE CREEK-BMPS	COMP	11/24/21 11:14 AM	8078	7956
4871903	BMP INSPECTION/DEC Inspection for BMP, EXCESS, CHANNELS, 1	GIS-BMP-4397	SWB-COVMORE CREEK-BMPS	COMP	11/21/21 2:27 PM	7970	7956
4871991	BMP INSPECTION/DEC Inspection for BMP, EXCESS, CHANNELS, 1	GIS-BMP-4064	SWB-GRAVUS CREEK-BMPS	COMP	11/21/21 2:28 PM	8612	7956
4871948	BMP INSPECTION/DEC Inspection for BMP, OTHER, 1	GIS-BMP-4181	SWB-COLMANER CREEK-BMPS	COMP	11/21/21 2:28 PM	8612	7956

Asset Management Systems for MSD Owned GI

- Assets are managed in Maximo
- Inspected and maintained the same as assets under private ownership
- Lack maintenance agreements and reporting requirements
- Inspection findings are communicated directly to Operations if maintenance is required. Repairs are made promptly through internal work orders. Environmental Specialist is notified of completed work.



Questions?



Kirk Lambrecht, Environmental Specialist
Metropolitan St. Louis Sewer District
Division of Environmental Compliance
Phone: (314) 436 8758
Email: klambrecht@stlmsd.com



msdprojectclear.org