

An Overview of Asset Management, Estimating Costs, and Funding

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Understanding Some Terms

- **Asset Management:** Organized process improve your systems and spend money wisely.
- **Master Plan:** Description of activities and long-term investments to meet management goals.
- **Financial Plan:** Detailed analysis of current and future revenues, expenses, rates, and cash flow
- **Program:** The institutions (personnel, departments, \$\$ accounts) that will carry out plans.

Asset Management

Asset Management for Water Systems

- A process for maintaining reliable system operations
 - Outlined through plans
- Identified need, especially in small systems

Includes technical, managerial, and financial aspects:

Evaluate system needs:
Infrastructure and management
(O&M, permit compliance,
future buildouts)

Evaluate financial needs:
Estimating costs and revenues
(component costs, staff and labor,
funding options)

Asset Management and Financial Planning: Steps



1. Develop an Asset Inventory

The asset inventory is a record of the components in your system, including their condition and the risk and consequences of failure. These records can be collected and stored using paper files, simple spreadsheets, or more specialized software. Information may come from many sources, including as-built drawings, maintenance records and contracts, GIS databases, and city parcel and tax assessor data.

Resources

- [Region 9 EFC Asset Inventory Workbook](#)
- [Region 9 EFC Stormwater Asset Management and Funding Guide \(Coming Soon\)](#)
- [Grand Rapids, MI, Stormwater Asset Management Report](#)
- [San Diego Asset Management Case Study](#)
- [EPA Asset Management Planning for Stormwater and Wastewater Systems \(2017\)](#)

The Steps

- 1 **Develop an Asset Inventory**
- 2 **Define Levels of Service**
- 3 **Estimate costs**
- 4 **Solicit input and listen**
- 5 **Financial capability analysis**
- 6 **Identify funding options**
- 7 **Determine funding gaps**
- 8 **Public outreach**

What Is In Your System?

- Asset Inventory: Detailed data on components of a system and condition

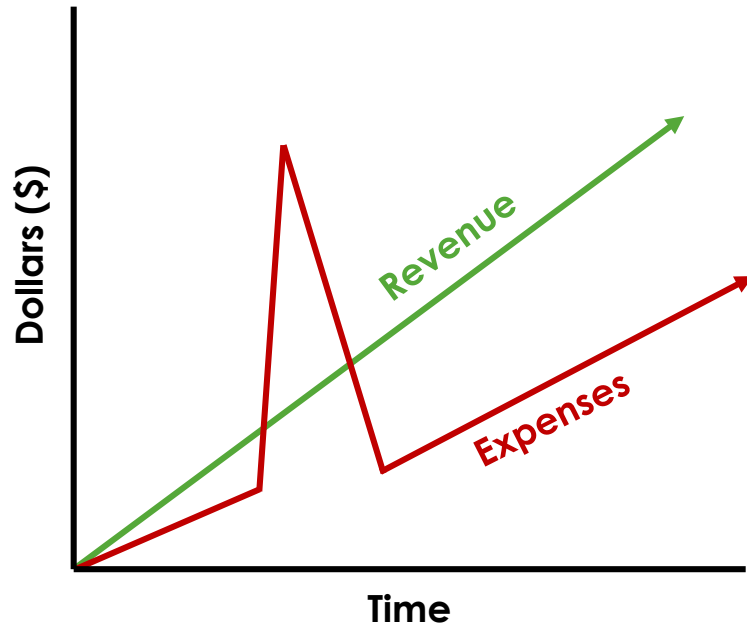


- Level of Service: Maintenance and replacement targets to provide a reliable system for residents

An asset inventory is key to asset management and financial planning

Why is Prioritization Important?

- Asset inventories help you prioritize needs and avoid cash flow crunches



Big Equipment Failure

Need Reserves!

Asset Management Tools

- Paper
- Spreadsheets
- Commercial software
- Free software

New Asset - v1.0.3

+ New Asset My Assets Export

+ Basic information

+ Status and Condition

+ Cost and Maintenance

+ Manufacturer and Supplier

Select for batch export

Alias

Add picture Create

Reset



Check Up Program for Small Systems (CUPSS)

Check Up Program for Small Systems Setup | Switch Utility | Create User | Help | Training | Exit

My Home My Inventory My O & M My Finances My Check Up My CUPSS Plan

Welcome Back Brendan, WIRSS Assets Mobile App

What would you like to do today?

Do Some Training Enter a New Task or Work Order

Create or Update My Schematic Search Asset and Maintenance

Create or Update My Inventory Enter My Finances

Print My Check Up Reports Work on My CUPSS Plan

My Calendar

Sun	Mon	Tue	Wed	Thu	Fri	Sat
26	27	28	29	30	31	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	1	2	3	4	5	6

My Messages and Alerts

Printing Messages Are On. Click To Turn Off!

Reminder - Today's Tasks

Tasks Currently Past Due

Assets Pending Update

Number of High Risk Assets

Version 1.3.9 November 20, 2015

EPA's Check-Up Program for Small Systems (CUPSS) & Mobile Assistant

Environmental Finance Center Network (EFCN)

- EFCN can help with asset management and planning



- One EFC in each of EPA's 10 regions

<https://efcnetwork.org>

Estimating Costs

Types of Costs

- Existing infrastructure
(operations and maintenance)
- New infrastructure
- Program management
- Permit compliance

Example Cost Categories

Labor

Materials

Operations

Contingencies

Planning

Permitting

Existing System Maintenance Costs

- An example with activities:
 - Inspection
 - Corrective and preventative maintenance
 - Replacement/renewal

Asset	Inspection	Corrective Maintenance	Preventive Maintenance	System Renewal	Total
Gravity Mains	\$82,000	\$99,000	\$352,000	\$838,000	\$1,371,000
Force Mains	\$500	\$0	\$0	\$1,800	\$2,300
Catch Basins	\$176,500	\$80,000	\$9,000	\$119,000	\$384,500
Outfalls	\$47,000	\$14,000	\$17,000	\$1,700	\$79,700
Detention Basins	\$6,500	\$0	\$0	\$22,500	\$29,000
Culverts	\$19,300	\$0	\$86,000	\$17,000	\$122,300
Subtotal of Asset Classes	\$181,800	\$118,000	\$359,000	\$950,000	\$1,608,800
O&M (inspection, corrective and preventive maintenance)					\$658,800
Capital Renewal (system renewal)					\$950,000
Total					\$1,608,800

Costs for New Infrastructure

- Many municipalities are facing significant costs for new infrastructure
- Requires new funding sources and partnerships
 - Financing vs. pay-as-you go
 - Grants, loans, collaborations
- Design considerations
 - Current vs. future needs?



Funding and Financing

Funding and Financing



Lake Oroville, 2017, Source: DWR

Financing: Act of obtaining funds or capital to support a need

Funding: Actual revenue used to pay for infrastructure and activities

Sources of Funding and Financing

- Revenues from utility rates
- Bonds
- Loans
- Grants
- General funds
- Dedicated fees
- Public-Private Partnerships (P3's)
- Joint projects

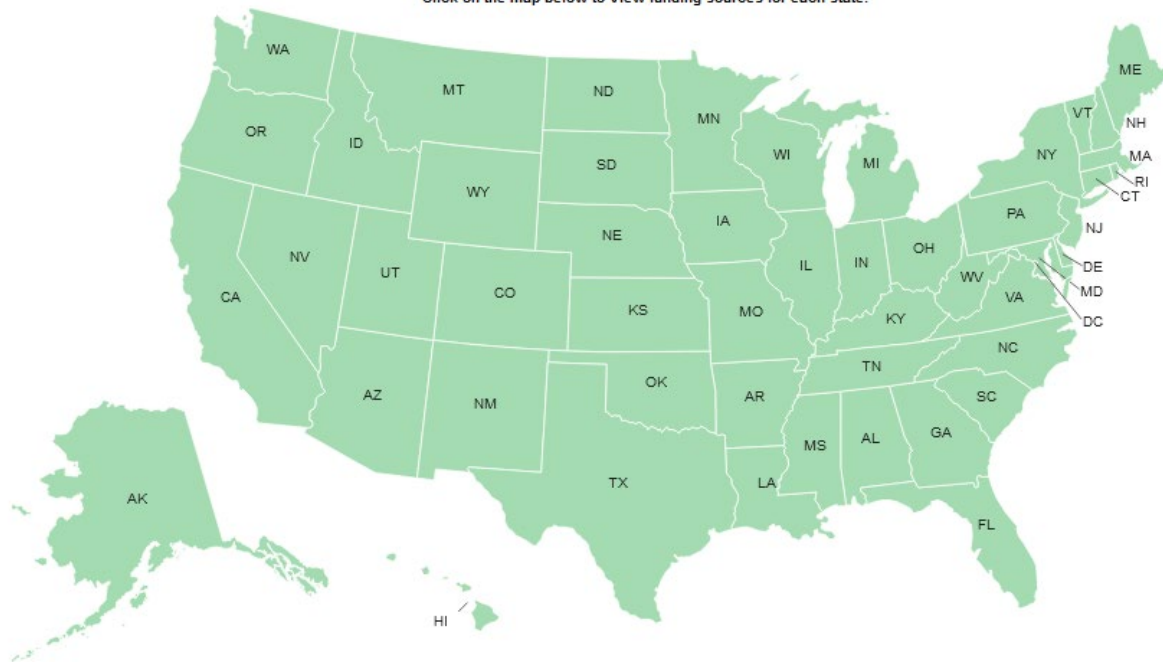


**Source: Truckee Meadows
Water Authority**

Funding Sources by State or Territory

Note: Some states or territories may have additional resources listed below the map.

Click on the map below to view funding sources for each state:



Water Funding and Financing Sources by State

<https://efcnetwork.org>

Links

EPA Region 9 Environmental Finance Center:

<http://www.efc.csus.edu>

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Level of Service

Baseline LOS									
Asset Type	Inspection		Corrective Maintenance		Preventative Maintenance		Replacement		Total Cost
	Activities & Frequencies	Cost Summary	Activities & Frequencies	Cost Summary	Activities & Frequencies	Cost Summary	Activities & Frequencies	Cost Summary	
Gravity Mains	Visually Inspect 25 ft weekly; TV 25 additional 25 ft twice/month	\$ 26,452	Hydro-jet 250 ft monthly	\$ 13,476	Repair 10 ft quarterly	\$ 69,870	Replace 100 ft annually	\$ 17,064	\$ 126,862
Force Mains									\$ -
Catch Basins									\$ -
Outfalls									\$ -
Detention Basins									\$ -
Culverts									\$ -
Total		\$ 26,452		\$ 13,476		\$ 69,870		\$ 17,064	\$ 126,862
O&M (inspection, corrective and preventative maintenance)									\$ 109,798
Capital Renewal (system renewal)									\$ 17,064

For each class of assets:

Unit Cost x # Hours



Equipment + Labor + Services = **Total Cost**



Unit Cost x Asset Number/Size

Stormwater Asset Management and Funding

Costs

Revenues

Collect data on stormwater system assets

Asset Inventory Workbook

Identify desired maintenance regime

Level of Service: Existing System

Permit Compliance Costs

Future Buildout Cost Estimates

Compile costs together

Total Costs Workbook

Land Use Characteristics



Average Water Costs



Household Characteristics

Rate Structure Analysis Workbook

Utility Finance Structure and Funding Gap

Evaluating Risk and Defining Level of Service

❖ Develop an asset inventory

- Probability of Failure (POF)
- Consequence of Failure (COF)
- Redundancy (R)

$$\text{Risk} = \text{POF} \times \text{COF} \times \text{R}$$

❖ Define Level of Service

- Reactive
- Preventative

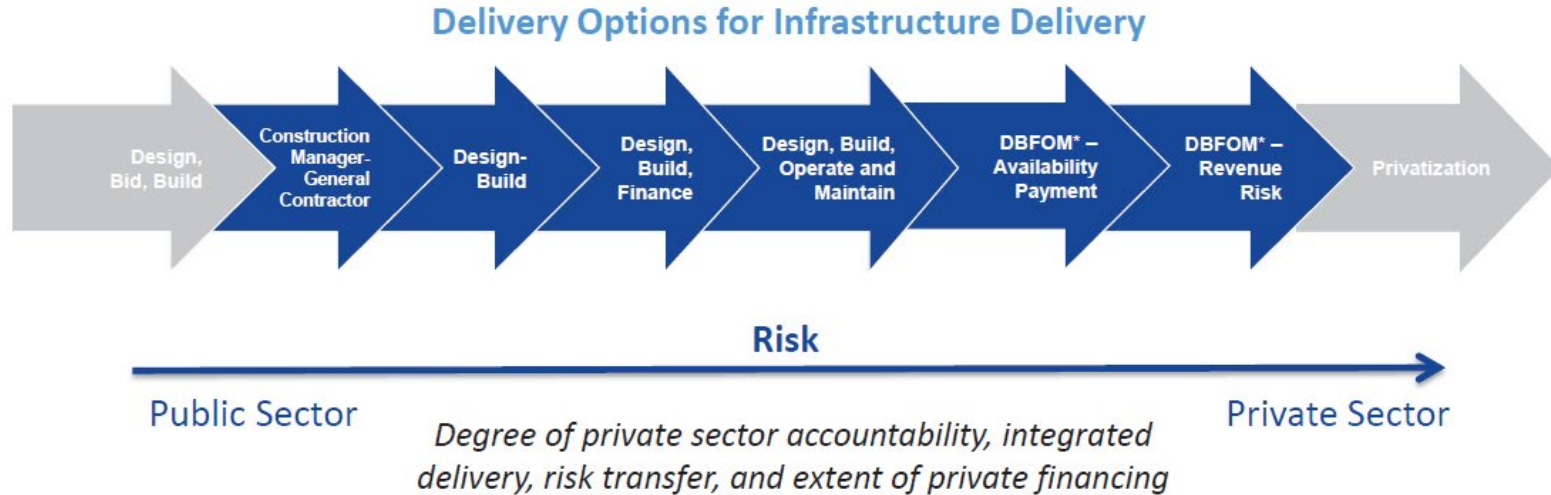
What are Public-Private Partnerships (P3s)?

- A method for delivering projects
- An opportunity to combine financing with contractor performance
- A potential to share risk
- A new flavor of an old idea?
- A broad term for many types of agreements
 - *Alternative delivery vehicles, Performance-Based Contracts*



Source: Honolulu Star-Advertiser (2018)

Many Types of P3 Arrangements



Source: Association for the Improvement of American Infrastructure, Hawaii P3 Workshop, 2017

- P3 novelty comes from private industry including some or all aspects of operating/maintaining infrastructure with traditional roles to build and finance

Prioritizing Based on Failure Risk

- Probability of Failure (POF): likelihood of an asset failing
- Consequence of Failure (COF): effects of an asset failing



Asset 1: Pumps in station



Asset 2: Concrete pipe



Asset 3: Recycled water pump

Asset	Effective Life	Structural Condition	POF	COF	Rank
Pumps in station	30 years	Excellent	Low	High	Medium
Concrete water pipe	100 years	Poor	High	Medium	High
Recycled water pump	20 years	Good	Medium	Low	Low

Collecting Data

Example of an **Asset Inventory** for a Water Treatment Plant

Process Unit	Number of Units	Approximate Date of Installation	Typical Lifespan (Years)	Remaining Life Span (as of 2011)	Approximate Replacement Cost or Original Cost (Unit Cost)	Total Cost	Current Replacement Cost/Remaining Life in Years	
RAW WATER PUMPSTATION								
450gpm/25 hp Raw Water Intake Pump/Motor	2	1992	10 - 15	10	14,000	28,000	2,800	
Raw Water Vacuum Pump	1	2000	3	1	1,500	1,500	1,500	
Intake and Raw Water Line (600 feet of 10" PVC Pipe with concrete casing)	1	1992	35 - 45	15	45,000	45,000	3,000	
Transmission Line from Pump Station to SWTP (~3,100 feet of 8" PVC C900 Pipe)	1	1992	35 - 40	20	22,500	22,500	1,125	
SURFACE WATER TREATMENT PLANT								
Ozone System:								
Ozone Contactor Tower	1	1992	30 - 60	10	320,000	320,000	32,000	
Ozone Generator (25 lbs/day)	2	1992	10 - 15	1	125,000	250,000	250,000	
Air Compressor	2	1992	10 - 15	1	20,000	40,000	40,000	
Air Dryer	2	1992	10 - 15	1	20,000	40,000	40,000	
Ozone off-gas Destruction Unit	1	1992	10 - 15	1	35,000	35,000	35,000	
Ozone alarm system	1	1992	5 - 10	2	52,000	52,000	26,000	
Coagulant Feed System:								
Chemical Feed Pump (14.4 gal/day)	2	2005	5 - 10	3	3,500	7,000	2,333	
Chemical Feed Day Tank	1	1992	10 - 15	10	15,000	15,000	1,500	
							Needed CIP/yr	\$ 1,259,195
							Needed CIP/(mo*600 conn)	\$ 175

Note: This does not include inflation, pre-treatment addition, intertie to sewer, or additional storage.

Probability of Failure

General Asset Info					Effective Life							Structural Condition				Probability of Failure
Index	Asset Category	Asset Type	Material	Length (ft)	Year of Install	Age (years)	Estimated Effective Life	Adjusted Effective Life	Percent Consumed	Weight (0-10)	Weighted Value	Rating	Score	Weight (0-10)	Weighted Value	POF (0-10)
1	Distribution	Gravity Mains	Corrugated Metal		1968	51	65	65	78%	6	4.71	3 - Fair	0.6	4	2.40	7
2	Other	Detention Basins			1872	147	50	50	100%	2	2.00	4 - Poor	0.8	8	6.40	8
3	Green	Green Street			1999	20		30	67%	8	5.33	2 - Good	0.4	2	0.80	6
4	Distribution	Culverts	Corrugated Metal		1950	69	65	70	99%	5	4.93	4 - Poor	0.8	5	4.00	9
5	Distribution	Culverts	Corrugated Metal		1986	33	65	1000	3%	10	0.33	1 - Excellent	0.2	0	0.00	0
6																
7																

Material Age
Effective Life
Condition



Probability
of Failure

Consequence of Failure

General Asset Info							Consequence of Failure					Prioritization	
Index	Asset Category	Asset Type	Material	Length (ft)	Year of Install	Age (years)	Use Single or Multi Factor COF?	Single Factor COF			Multi Factor COF (0-10)	Redundancy	Priority Score (0-100)
								Rating	Score	Weight (0-10)			
1	Distribution	Gravity Mains	Corrugated Metal		1968	51	Multi Factor				10	No	71
2	Other	Detention Basins			1872	147	Single Factor	2 - Low	0.4	10	4	No	34
3	Green	Green Street			1999	20	Single Factor	1 - Negligible	0.2	10	2	No	12
4	Distribution	Culverts	Corrugated Metal		1950	69	Multi Factor				4	No	39
5	Distribution	Culverts	Corrugated Metal		1986	33	Multi Factor				1	Yes	0
6													
7													
8													
9													
10													
11													

Location
Proximity to Infrastructure
Depth
Size
Cost



Consequence of Failure

Ranking Assets

- Prioritize investments based on criteria

Water Treatment Plant: Reordered List

Process Unit	Number of Units	Approximate Date of Installation	Typical Lifespan (Years)	Remaining Life Span (as of 2011)	Approximate Replacement Cost or Original Cost (Unit Cost)	Total Cost	Current Replacement Cost/Remaining Life in Years	POF	COF	Rank
RAW WATER PUMPSTATION										
Transmission Line from Pump Station to SWTP (~3,100 feet of 8" PVC C900 Pipe)	1	1992	35 - 40	20	22,500	22,500	1,125	8	9	9
Raw Water Vacuum Pump	1	2000	3	1	1,500	1,500	1,500	9	5	7
Intake and Raw Water Line (600 feet of 10" PVC Pipe with concrete casing)	1	1992	35 - 45	15	45,000	45,000	3,000	4	9	7
450gpm/25 hp Raw Water Intake Pump/Motor	2	1992	10 - 15	10	14,000	28,000	2,800	3	9	6

Invest in This Asset First

