Understanding How Asset Management Works: The Steps

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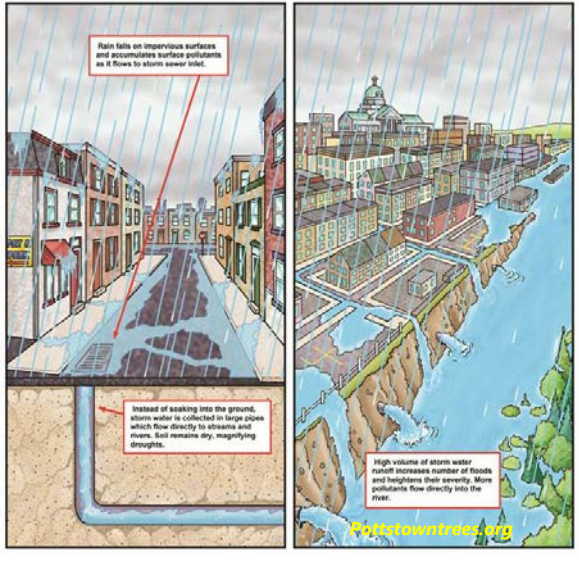
SACRAMENTO STATE
Office of Water Programs

ENVIRONMENTAL FINANCE CENTER
AT SACRAMENTO STATE

But First!
Remember The Evolution of Stormwater Management?



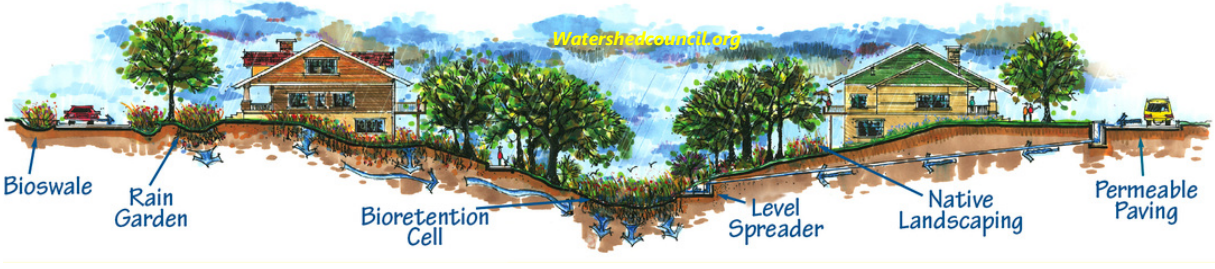
❖ ***Drainage***

❖ ***Pollution Prevention***
❖ ***Source Control***
❖ ***Treatment BMPs***

❖ **A Resource for Multiple Benefits**

- Improve Water Quality
- Supplement Water Supply
- Control Flooding
- Protect Environmental Systems
- Enhance Communities

Sustainable Communities



❖ ***Low Impact Development***
❖ ***Green Infrastructure***
❖ ***Hydromod. Management***

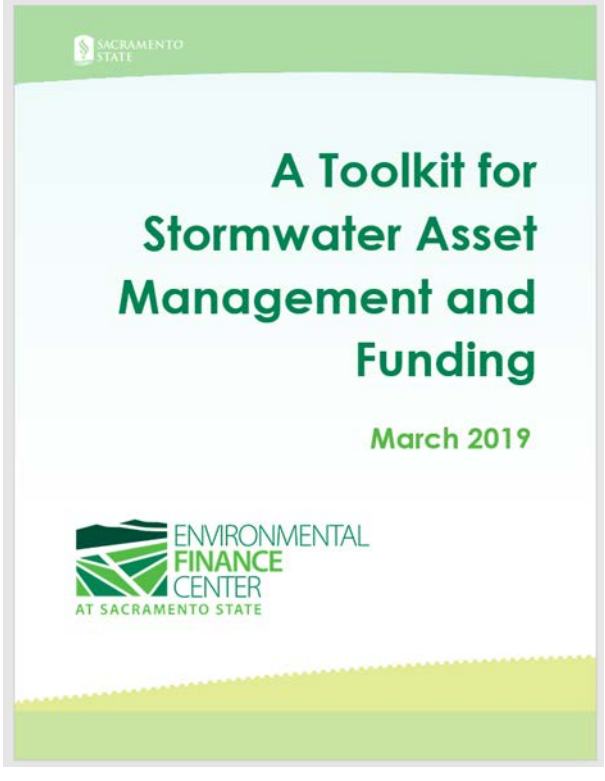
Asset Management for Sustainable Communities

- Asset Management Can
  - Track O&M
  - Prioritize O&M Needs
  - Plan for Replacements
  - Estimate Costs
  - Identify Funding
  - Communicate
    - Intent
    - Plans
    - Progress

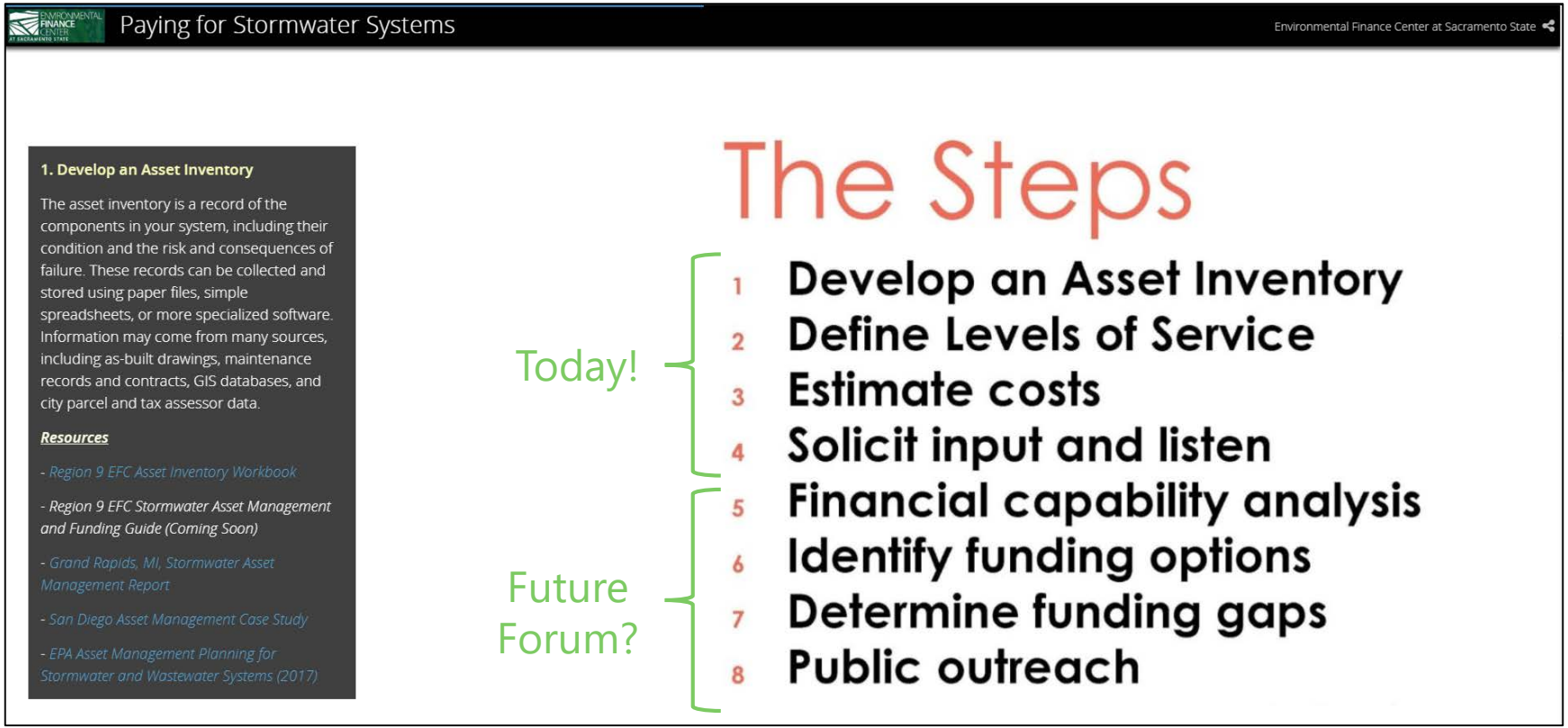
https://www.epa.gov/smartgrowth/enhancing-sustainable-communities-green-infrastructure

The Process

- Compile Data
- Estimate Costs
- Engage Stakeholders
- Assemble Funding



The Steps



http://www.efc.csus.edu/stormwater_storymap/

Step 1. Develop an Asset Inventory

- Compile Asset Characteristics
- Evaluate Risk of Failure
- Rank Assets for Repair & Replacement

Step 1. Develop an Asset Inventory

❖ Compile Asset Characteristics

- ➢ Asset Types
  - Grey infrastructure
  - Green infrastructure
  - Equipment
- ➢ Material
- ➢ Location
- ➢ Year of Install
- ➢ Estimated Effective Life
- ➢ Structural Condition
- ➢ Proximity to Key Community Features

Step 1. Develop an Asset Inventory

- Compile Asset Characteristics
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Step 1. Develop an Asset Inventory

❖ Evaluate Risk of Failure

- Probability of Failure (POF)
  - Remaining life
  - Structural condition
- Consequence of Failure (COF)
  - General rating (negligible, moderate, high)
  - Depth & size of asset (influences cost of replacement)
  - Proximity to important community features:
    (floodplains, environmental hazards, buildings, roadways)
- Redundancy (R)
  - Duplicate asset serving as back-up

Risk = POF x COF x R

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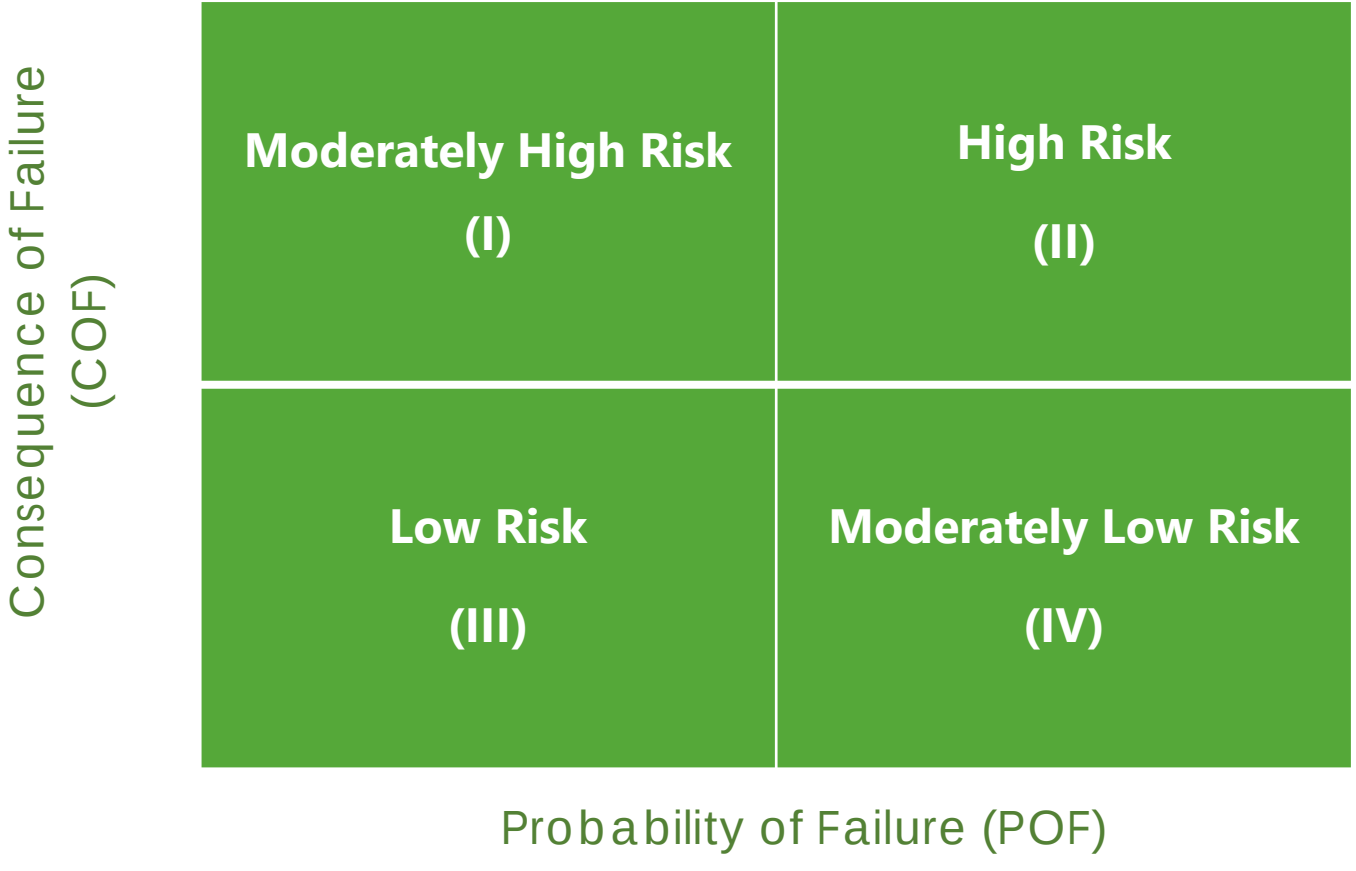
Step 1. Develop an Asset Inventory

❖ Rank Assets for Repair & Replacement



Step 2. Define Level(s) of Service

❖ What is Level of Service?

"a measure of the quality or expected reliability that must be provided by an agency to meet a community's basic needs and expectations"

-Grand Rapids, MI 2016

"extent of O&M activities performed"

-OWP EFC at Sacramento State 2019

❖ Degrees of LOS

- ➢ Reactive

  Meet maintenance and repair needs as they arise

- ➢ Preventive

  Proactively undertake system maintenance and renewal activities prior to failures

- ➢ Mixed

  Assign some assets reactive maintenance, and others preventive

Step 2. Define Level(s) of Service

Baseline level of service (Grand Rapids 2016)

Asset	Inspection	Corrective Maintenance	Preventive Maintenance	System Renewal
Gravity Mains	---	Respond to failures and complaints for all sewer components.	---	---
Force Mains	Visual inspection every 2 weeks during pump station inspection.	---	---	---
Catch Basins	---	Clean 2,500 annually and perform corrective maintenance.	---	---
Outfalls	---	---	---	---
Detention Basins	---	---	---	---
Culverts	---	Clean debris and perform corrective maintenance.	---	---

Step 2. Define Level(s) of Service

Moderate level of service (Grand Rapids 2016)

Asset	Inspection	Corrective Maintenance	Preventive Maintenance	System Renewal
Gravity Mains	PACP[1] CCTV[2] inspect pipes greater than 75 years old over 10 years.	Replace 15% of assets that have reached end of EEL over 10 years.	Perform rehabilitation to extend EEL for 10% of inspected sewers over 10 years.	Replace every 150 years.
Force Mains	Visual inspection every 2 weeks during pump station inspection. PACP CCTV inspect every 15 years.	---	---	Replace every 100 years.
Catch Basins	Clean and inspect 25% annually (approx. 4,264). Record and monitor debris levels for cleaning	Clean 2,500 annually and perform corrective maintenance.	Replace 15% of assets that have reached end of EEL over 10 years.	Replace every 100 years.
Outfalls	Inspect all outfall points every 5 years per MS4[3] requirements.	Replace top 10% by POF each cycle.	Stabilize bank and erosion control at 5% of assets each cycle.	Replace every 150 years.
Detention Basins	Complete site inspection 3 times annually including routine maintenance.	---	---	Facility renovation every 100 years. Includes regrading, seeding, renew inlet/outlet structures.
Culverts	CCTV/walk/inspect 50% of culverts annually.	Replace/rehabilitate top 5% by POF.	Clean 20% of all assets annually.	Replace every 150 years.

Step 2. Define Level(s) of Service

Advanced level of service (Grand Rapids 2016)

Asset	Inspection	Corrective Maintenance	Preventive Maintenance	System Renewal
Gravity Mains	PACP CCTV inspect pipes greater than 50 years old over 10-year period.	Replace 30% of assets that have reached end of EEL over 10 years.	Perform rehabilitation to extend EEL for 10% over 10 years. Clean 20% of all assets annually.	Replace every 125 years.
Force Mains	Visual inspection every 2 weeks during pump station inspection. PACP CCTV inspect every 10 years.	---	---	Replace every 100 years.
Catch Basins	Clean and inspect 35% annually (approx. 5,969). Record and monitor debris levels for cleaning	Replace 30% of assets that have reached end of EEL over 10 years.	Perform rehabilitation to extend EEL for 10% of inspected catch basins over 10 years.	Replace every 75 years.
Outfalls	Inspect all outfall points every 3 years to satisfy MS4 requirements.	Replace top 10% by POF each cycle.	Stabilize bank and erosion control at 10% of assets each cycle.	Replace every 125 years.
Detention Basins	Complete site inspection 3 times annually including routine maintenance.	---	---	Facility renovation every 75 years. Includes regrading, seeding, renew inlet/outlet structures.
Culverts	CCTV/walk/inspect 50% of culverts annually.	Replace/rehabilitate top 10% by POF.	---	Replace every 125 years.

Step 3. Estimate Costs

- O&M of existing assets
- Permit compliance activities
- Capital & O&M for future infrastructure
- Tally costs across multiple years

Step 3. Estimate Costs

❖ O&M of existing assets

Baseline LOS annual cost (Grand Rapids 2016)

Asset	Inspection	Corrective Maintenance	Preventive Maintenance	System Renewal	Total
Gravity Mains	$0	$200,000	$0	$1,537,000	$1,737,000
Force Mains	Same as pump station inspections	$0	$0	$0	$0
Catch Basins	$0	$600,000	$0	$0	$600,000
Outfalls	$0	$0	$0	$0	$0
Detention Basins	$0	$0	$0	$0	$0
Culverts	$0	$20,000	$0	$0	$20,000
Subtotal of Asset Classes	***$0***	***$820,000***	***$0***	***$1,537,000***	***$2,357,000***
O&M (inspection, corrective and preventive maintenance)					$820,000
Capital Renewal (system renewal)					$1,537,000
Total					**$2,357,000**

Step 3. Estimate Costs

❖ O&M of existing assets

Low-moderate LOS annual cost (Grand Rapids 2016)

Asset	Inspection	Corrective Maintenance	Preventive Maintenance	System Renewal	Total
Gravity Mains	$110,000	$299,000	$647,000	$2,439,000	$3,495,000
Force Mains	$200			$1,000	$1,200
Catch Basins	$639,000	$24,000	$14,000	$560,000	$1,237,000
Outfalls	$28,000	$66,000	$1,200	$12,000	$107,200
Detention Basins	$6,500			$11,300	$17,800
Culverts	$9,700		$43,000	$11,000	$63,700
Subtotal of asset classes	***$793,400***	***$389,000***	***$705,200***	***$3,034,300***	***$4,921,900***
O&M (inspection, corrective and preventive maintenance)					$1,887,600
Capital Renewal (system renewal)					$3,034,300
Total					**$4,921,900**

Step 3. Estimate Costs

❖ O&M of existing assets

Advanced LOS annual cost (Grand Rapids 2016)

Asset	Inspection	Corrective Maintenance	Preventive Maintenance	System Renewal	Total
Gravity Mains	$482,000	$996,000	$3,252,000	$8,388,000	$13,118,000
Force Mains	$500	$0	$0	$1,800	$2,300
Catch Basins	$1,276,500	$80,000	$94,000	$1,119,000	$2,569,500
Outfalls	$47,000	$142,000	$27,000	$1,700	$217,700
Detention Basins	$6,500	$0	$0	$22,500	$29,000
Culverts	$19,300	$0	$86,000	$17,000	$122,300
Subtotal of Asset Classes	***$1,831,800***	***$1,218,000***	***$3,459,000***	***$9,550,000***	***$16,058,800***
O&M (inspection, corrective and preventive maintenance)					$6,508,800
Capital Renewal (system renewal)					$9,550,000
Total					**$16,058,800**

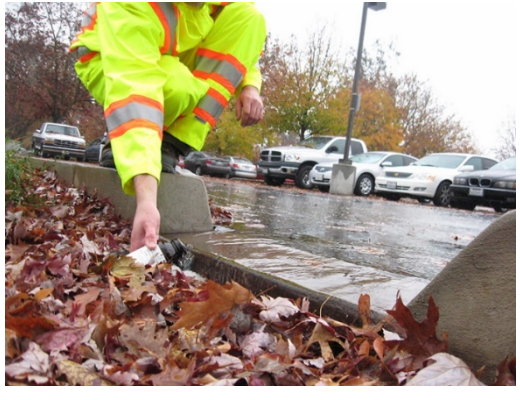
Step 3. Estimate Costs

- O&M of existing assets
- Permit compliance activities
- Capital & O&M for future infrastructure
- Tally costs across multiple years

Step 3. Estimate Costs

❖Permit Compliance Activities

- ➢ Labor & Equipment
  - MCMs
  - Water Quality Monitoring
  - Program Management



OWP at Sacramento State

Linkedin.com

EPA Region 6, 2014 MS4 Conference

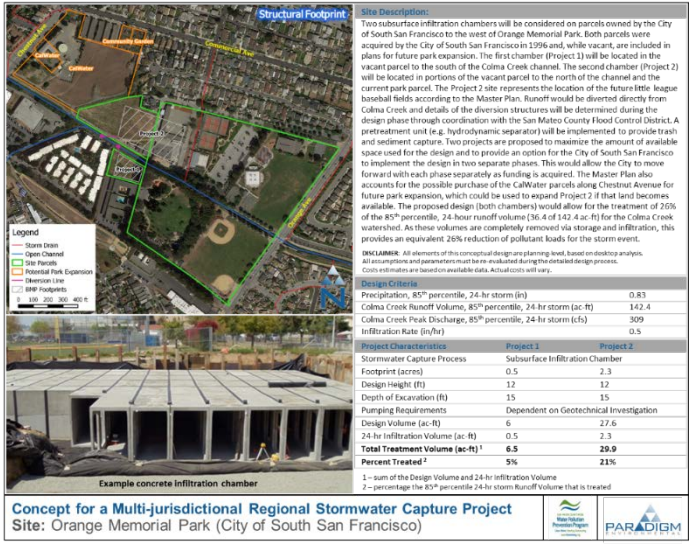
Step 3. Estimate Costs

- O&M of existing assets
- Permit compliance activities
- Capital & O&M for future infrastructure
- Tally costs across multiple years

Step 3. Estimate Costs

❖ Capitol & O&M for Future Buildout

- ➢ Projects for TMDLs, EWMPS, WMPS, SWRPs
- ➢ Infrastructure needed for future development
  - Include costs even if development fees apply
- ➢ Include inflation factors

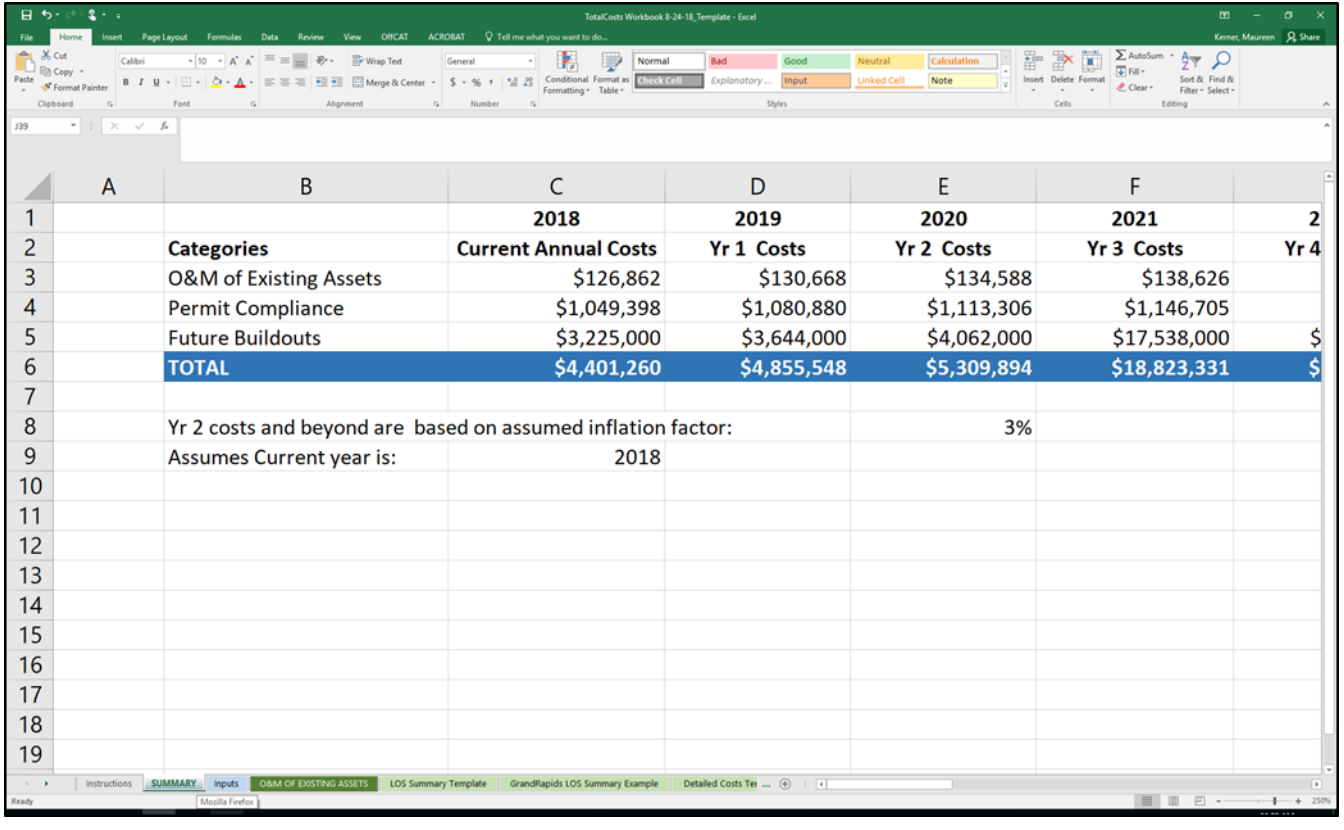


Step 3. Estimate Costs

- O&M of existing assets
- Permit compliance activities
- Capital & O&M for future infrastructure
- Tally costs across multiple years

Step 3. Estimate Costs

❖ Tally All Costs Across Multiple Years



	A	B	C	D	E	F	
1			2018	2019	2020	2021	2
2		Categories	Current Annual Costs	Yr 1 Costs	Yr 2 Costs	Yr 3 Costs	Yr 4
3		O&M of Existing Assets	$126,862	$130,668	$134,588	$138,626	
4		Permit Compliance	$1,049,398	$1,080,880	$1,113,306	$1,146,705	
5		Future Buildouts	$3,225,000	$3,644,000	$4,062,000	$17,538,000	$
6		TOTAL	$4,401,260	$4,855,548	$5,309,894	$18,823,331	$
7							
8		Yr 2 costs and beyond are based on assumed inflation factor:			3%		
9		Assumes Current year is:	2018				
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							

Step 4. Solicit Input and Listen

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

Review and Refine these Decisions and Assumptions

Opportunities!

Prepare to Evaluate Funding Needs and Options

What's Next?

- Feeling Like Don Music?
- Its OK! More to come:
  - Case studies
  - Tool examples
  - Cost resources
  - Practice problem

It's like beginning yoga:
The steps are simple, but not easy.

Getting started is the hardest part…

Links

EPA Region 9 Environmental Finance Center:

http://www.efc.csus.edu

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