Smart Management for Small Water Systems

Long-Term Capital Planning

EFCN environmental finance center network

American Water Works Association

UNC ENVIRONMENTAL FINANCE CENTER

This program is made possible under a cooperative agreement with EPA.

Session Objectives

- Learn about two aspects of long-term system planning: asset management and capital planning

- Figure out how to pay for the future needs

In the old days...

- Water systems took advantage of the federal government's ambitious construction grants program of the 1970s

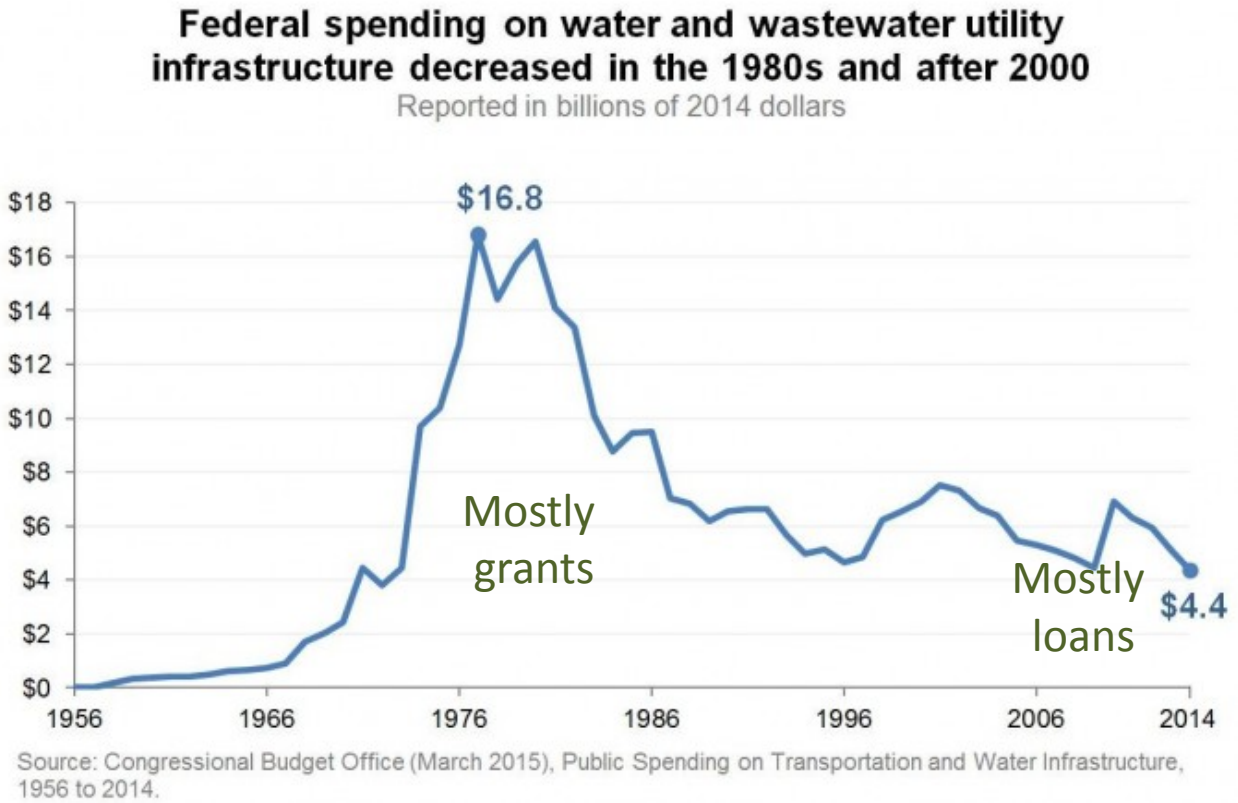
- Everybody loved their "free" money

Capital Finance Today

- The money never really was “free”—it came from tax dollars

- Today, the financial burden has been shifted away from federal and state tax dollars (grants) to funds raised by the water system itself (customer sales and loans). For example...

Federal funding has declined

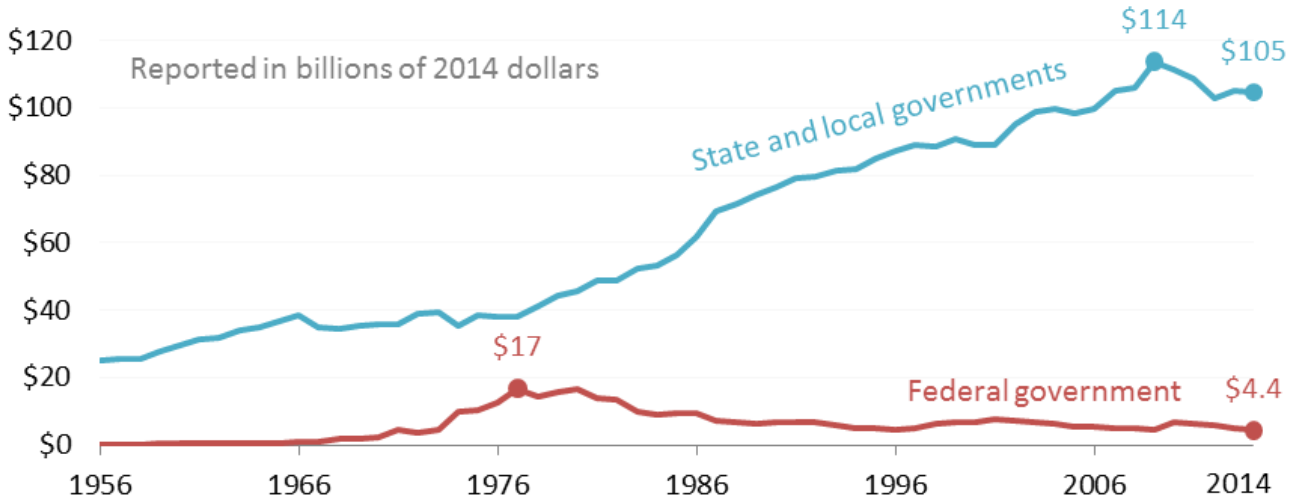


http://efc.web.unc.edu/2015/05/14/federal-funding-trends-for-water-and-wastewater/

State and local spending increased

State and local government spending on water and wastewater utilities continued to grow while federal spending declined since the 1980s

State and local governments spent 24 times as much as the federal government in 2014

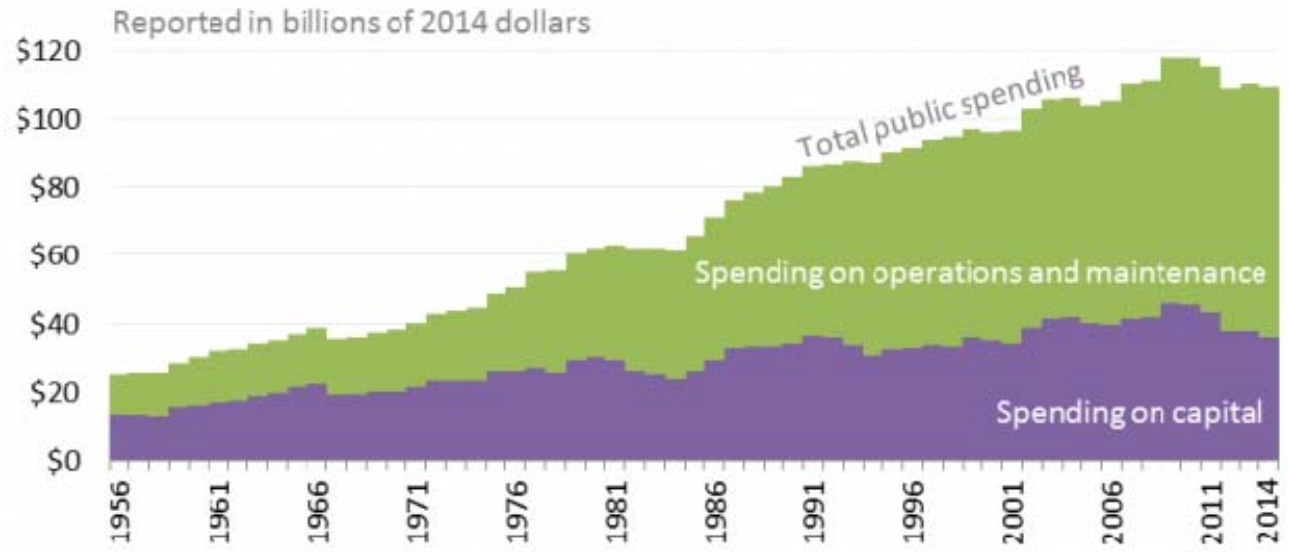


Graphed by the Environmental Finance Center at the University of North Carolina, Chapel Hill.
Source: Congressional Budget Office supplemental data for the *Public Spending on Transportation and Water Infrastructure, 1956 to 2014* report (March 2015). Displays public spending on supply systems for distributing potable water as well as wastewater and sewage treatment systems and plants. Real spending is shown after adjusting nominal spending to their 2014 dollar equivalent using infrastructure-specific price indexes.

http://efc.web.unc.edu/2015/09/09/four-trends-government-spending-water/

...And Mostly for O&M, not Capital

Federal, state and local government spending on water and wastewater utilities, 1956 - 2014



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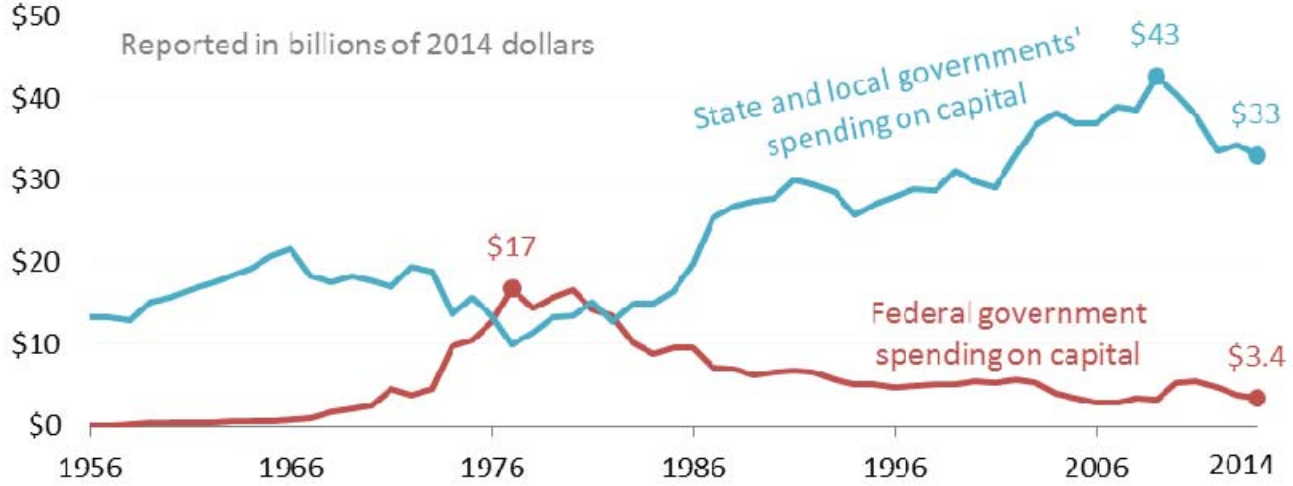
Feds Used to Spend More on Capital

Spending on capital infrastructure for water and wastewater utilities has increasingly been provided by state and local governments while federal spending on capital infrastructure declined since the 1980s

Over 90% of capital spending occurs by state and local governments



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In other words: you pay

Two things all water systems should (or even must) do:

Asset Management Planning
&
Capital Improvement Planning

Mike Daly, White Cliffs, NM Video Profile

What does this type of analysis take?

- Nothing more than following a systematic approach for managing the assets
- 5 core components of Asset Management

Five Core Components of AM

Current State of the Assets

Level of Service

Criticality

Life Cycle Costing

Long-Term Funding

NC Asset Management Requirements for Funding

Don’t confuse the AM 5 Core Components with the 4 specific components of an AMP as required by the NC DWI for priority points for funding. These include:

- Inventory of assets
- Condition assessment
- A 10-year C.I.P. with projected cost estimates for 5 years
- An Operation and Maintenance Plan

Start by listing what you have

- Pipes
- Wells
- Pumps
- Treatment plant
- Tanks
- Service equipment: trucks, etc.
- Valves
- Meters – master and standard

Current State of the Assets

- What do I own?
- Where are the assets?
- What condition are they in?
- How much useful life is remaining?
- What is the replacement value?

Example of an Asset Inventory

Asset Inventory

ID Number	Category	Type	Size	Manufacturer	Serial Number	Location	Installation Date	Condition	Energy user Y/N (if Yes, see Energy Inventory)	Comments

Source: A.M. KAN Work!

Example System Inventory Worksheet						
Date Worksheet Completed/Updated: *8/14/02*						
Asset	**Expected Useful Life**	**Condition**	**Service History**	**Adjusted Useful Life**	**Age**	**Remaining Useful Life**
Well 1 (1993)	30	Good		30	9	21
Well 1 pump	10	Good	Rehab (1996)	10	9	1
Well 2 (1993)	30	Good		30	9	21
Well 2 pump	10	Good	Rehab (1998)	10	9	1
Pumphouse (1993)	30	Good		30	9	21
Electrical components	10	Some corrosion	Rehab (1994)	10	9	1
Chlorinator (1993)	10	Good	Rehab (1998)	5	3	2
Storage tank 1 (1993)	40	Good	Rehab (2000) - $17,000	40	9	31
Storage tank 2 (1993)	40	Good	Rehab (2000) - $17,000	40	9	31
Storage tank 3 (2000)	40	Almost new		40	2	38
Distribution System:						
Hydrants (15)	40	Unknown		40	9	11
Valves (45)	40	Unknown	6 valves don't work	40	9	11
6-inch (PVC)	60	Unknown		60	9	51
4-inch (PVC)	60	Unknown		60	9	51
2-inch (PVC)	60	Unknown	Repair breaks (2/year)	60	9	51

Source: EPA's "Asset Management: A Handbook for Small Systems"

Asset Management: A Handbook for Small Water Systems

One of the Simple Tools for Effective Performance (STEP) Guide Series

http://www.epa.gov/safewater/smallsystems/pdfs/guide_smallsystems_asset_mgmnt.pdf

EPA United States Environmental Protection Agency

Taking Stock of Your Water System

A Simple Asset Inventory for Very Small Drinking Water Systems

http://www.epa.gov/safewater/smallsystems/pdfs/final_asset_inventory_for_small_systems.pdf

How Long Will it Last?

Typical Life Expectancies of Water System Equipment

Component	Worksheet	Useful Life
Wells and Springs	Drinking Water Source	25 years
Intake Structures		35 years
Pumping Equipment		10 years
Disinfection Equipment	Treatment System	5 years
Hydropneumatic Tanks	Tanks	10 years
Concrete and Metal Storage Tanks		30 years
Transmission Structures (Pipes)	Distribution System	35 years
Valves	Valves	35 years
Mechanical Valves		15 years
Computer Equipment/Software	Electrical Systems	5 years
Transformers/Switchgears/ Wiring		20 years
Motor Controls/Variable Frequency Drives		10 years
Sensors		7 years
Buildings	Buildings	30 years
Service Lines	Service Lines	30 years
Hydrants	Hydrants	40 years

Note: These expected useful lives are drawn from a variety of sources. The estimates assume that assets have been properly maintained. The adjusted useful life of an asset will be equal to or less than typical useful life.

Level of Service

Involve Customers

Involve Staff

Measurable Goals: Internal and External

Track Progress Towards Meeting Goals

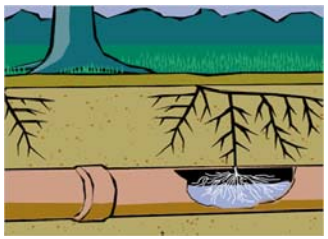
What would my customers want?

Asset Criticality – Part 1

What is the probability or likelihood that a given asset will fail?

How do my assets fail?

What's the condition of my assets?



Asset Criticality – Part 2

What is the **consequence** if the asset does fail?

What is the cost of the repair?

Are there legal consequences, environmental consequences, social consequences?

Are there redundant assets?

Group Exercise: Assess the condition and criticality of the following assets

- Based on description of the asset, give your opinion on its condition, thinking about how likely/soon the asset might fail

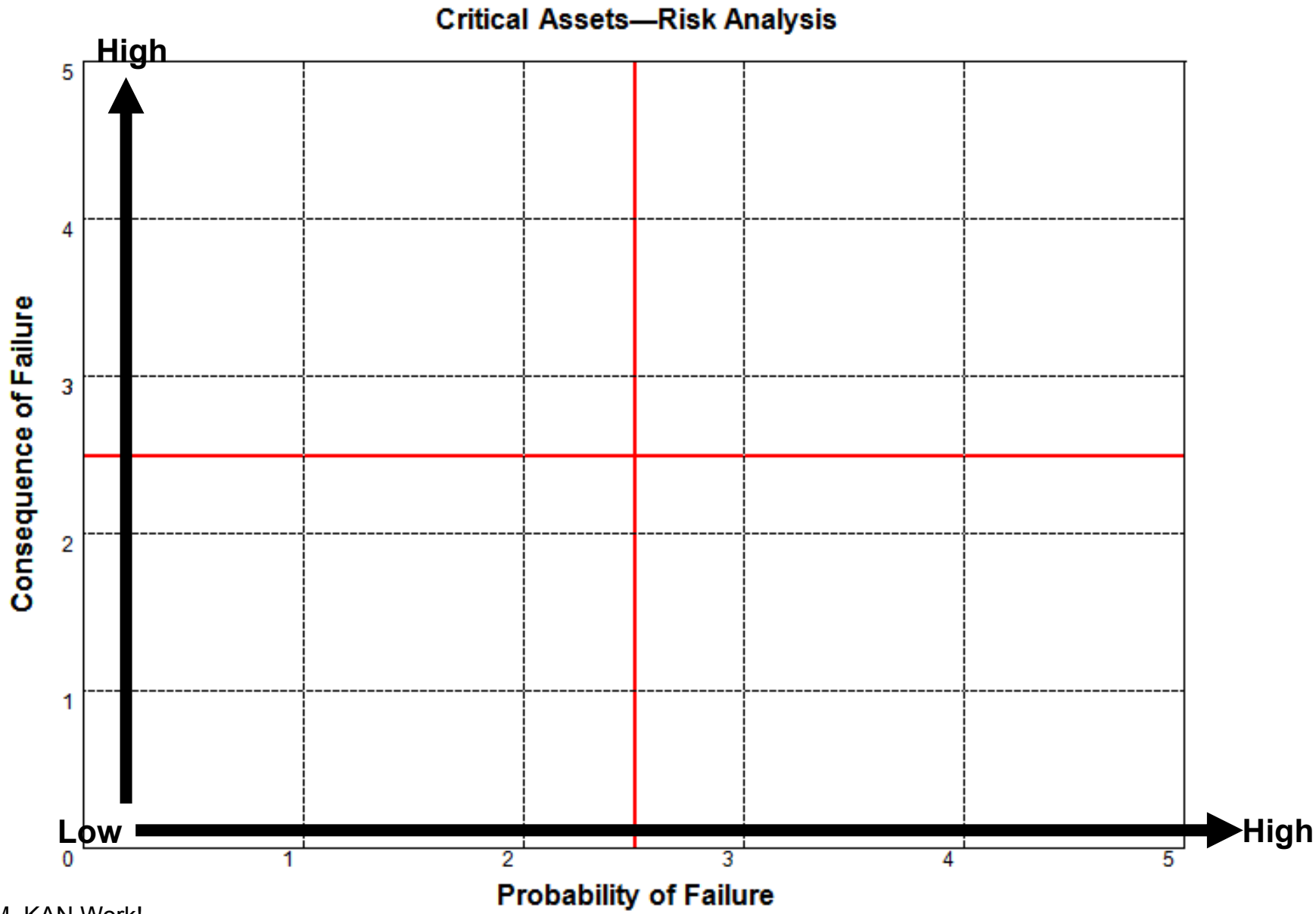
  Horizontal axis. 1 = very low ☺, 5 = very high ☹

- Give your opinion on its importance, thinking about consequence or cost if failure occurs

  Vertical axis. 1 = very low ☺, 5 = very high ☹

- Mark on the handout where you would place that asset

Place the assets on the risk analysis chart



Source: A.M. KAN Work!

Asset 1: Elevated Storage Tank

- The only storage tank in small groundwater system.
- Installed in 1985. Inspected, sand blasted and repainted in 2002.
- Annual visual inspection shows no observable problems. No structural issues noted.
- Don’t know how long it will last.
- Many customers complaining of low pressure.
- Possible to pump water directly to customers but would have problems meeting peak demands and will have no fire flow

Source: A.M. KAN Work!

Asset 2: Well Pump #1

- 1 of 2 well pumps. Each can supply entire system, but system uses this pump more frequently (the second pump is less reliable).
- Pump located in the well.
- Installed in 1992. No major rehab work since then.
- Manufacturer expects pump to last 25 years.
- Operating within design specifications but is not as efficient as it used to be. Operator not noticing any other visible or audible problems. Routine maintenance is being performed.

Source: A.M. KAN Work!

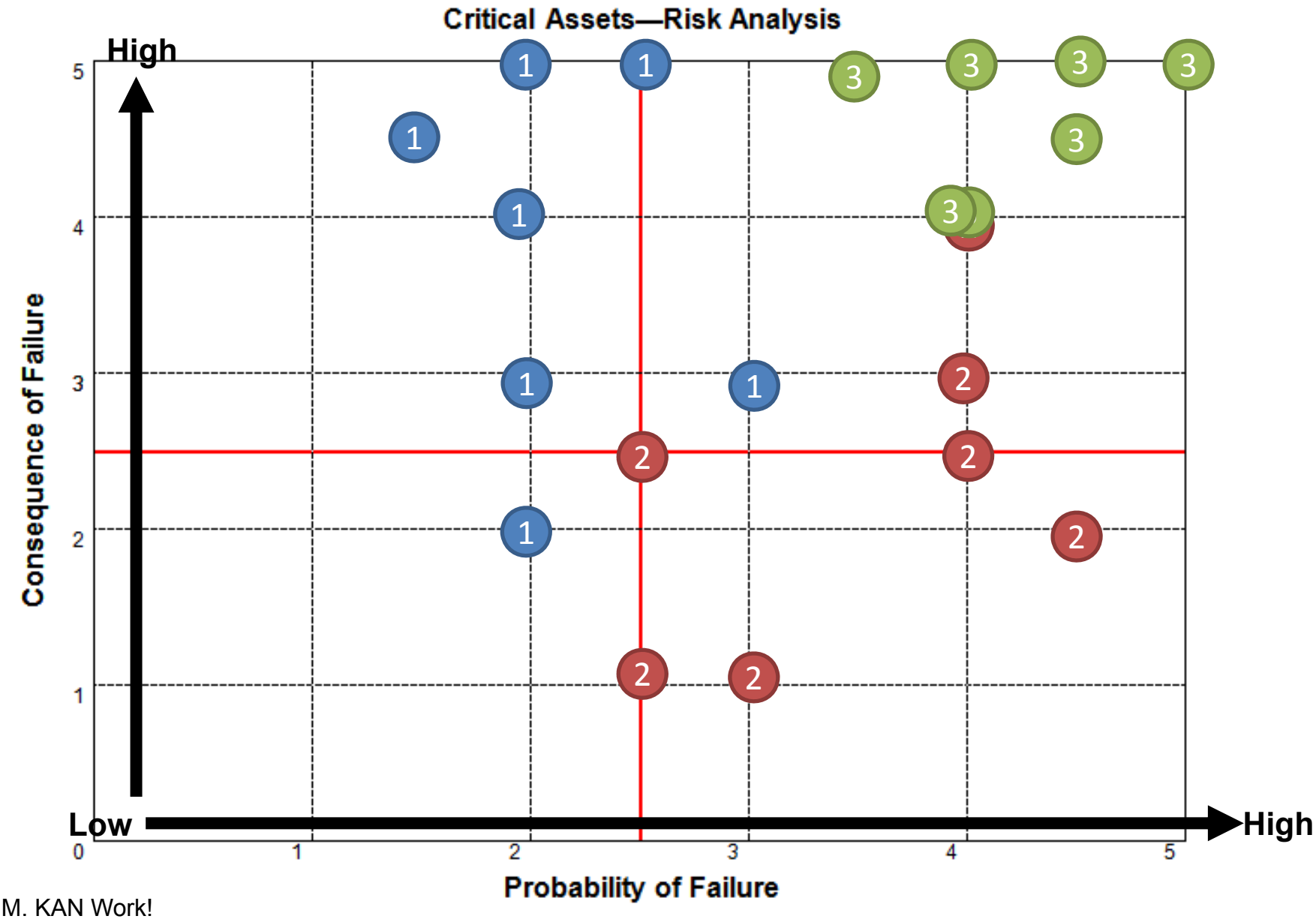
Asset 3: Water Main on Elm St.

- Main serving half of the system's customers.
- No record of when it was installed. Homes in that area were built in the 1950s.
- Operator and owner cannot recall any major rehab or replacement work since they took over in the 1990s.
- Had 5 breaks in the past 2 years, and numerous leaks.

Asset 4: Your Choice!

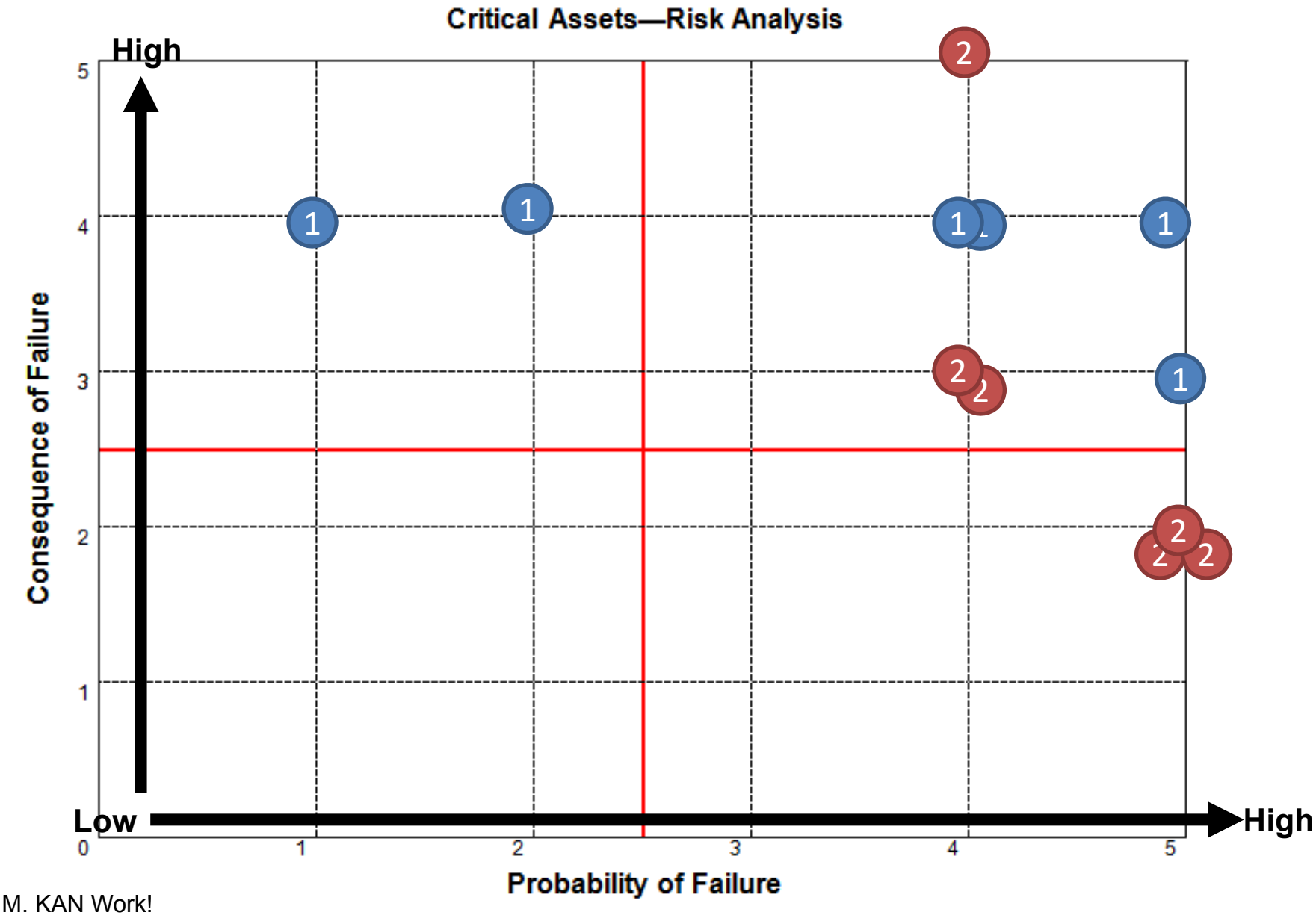
- Pick any asset from YOUR water system. Describe it to the group and decide on an appropriate condition and criticality score.

Results from Washington NC: 12/2016



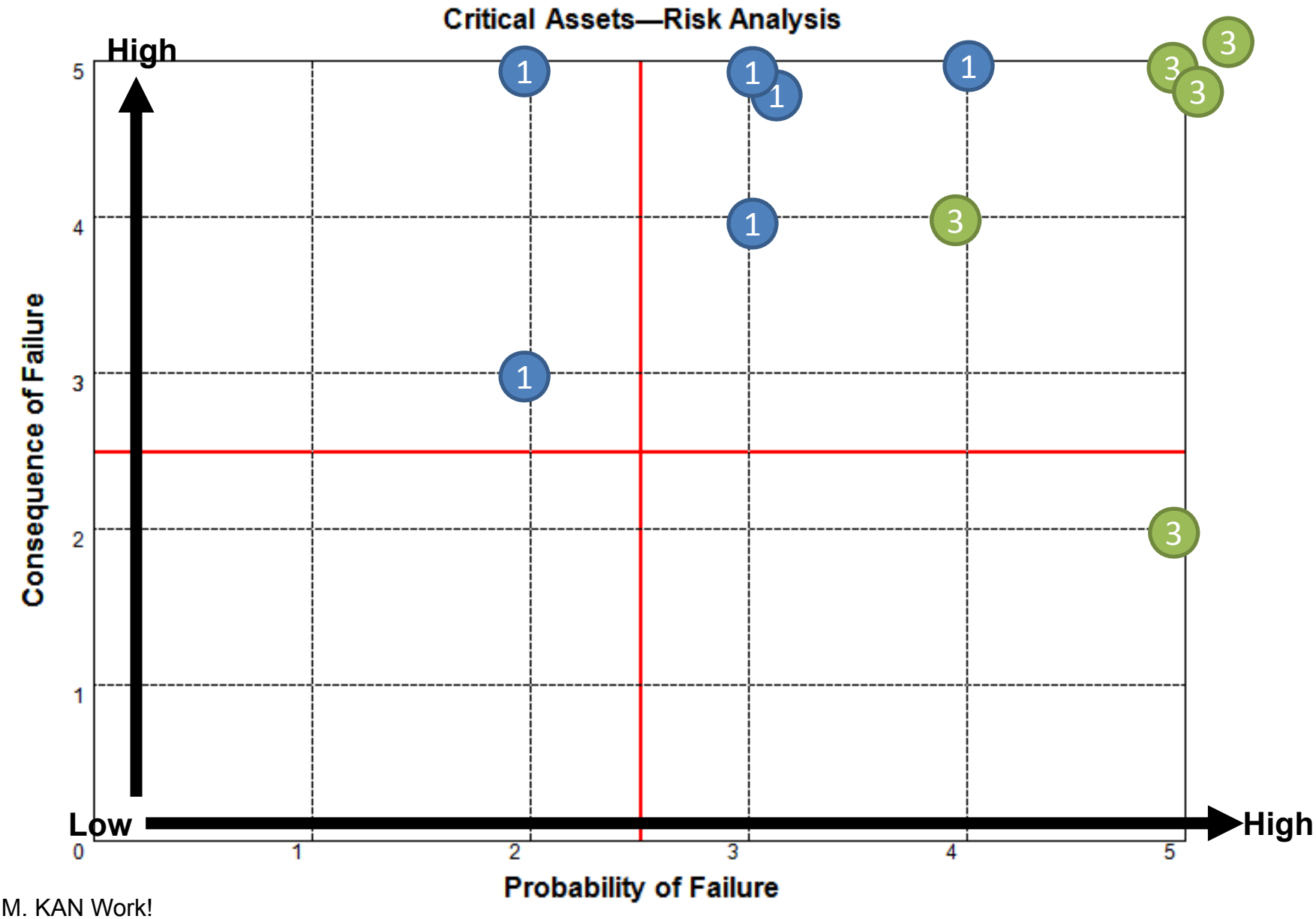
Source: A.M. KAN Work!

Results from Raleigh NC: 10/2014



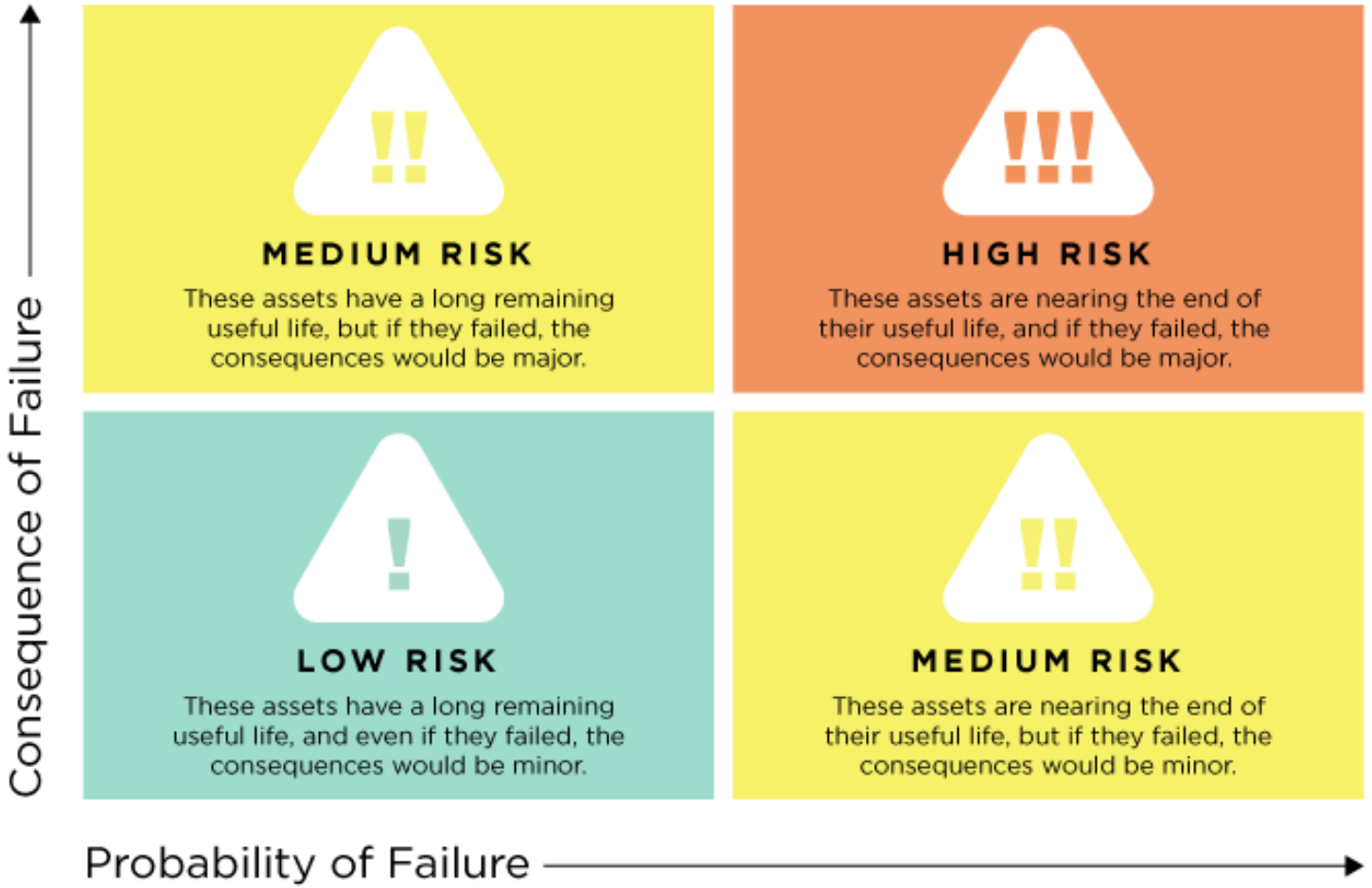
Source: A.M. KAN Work!

Results from Cullowhee, NC: 6/2015

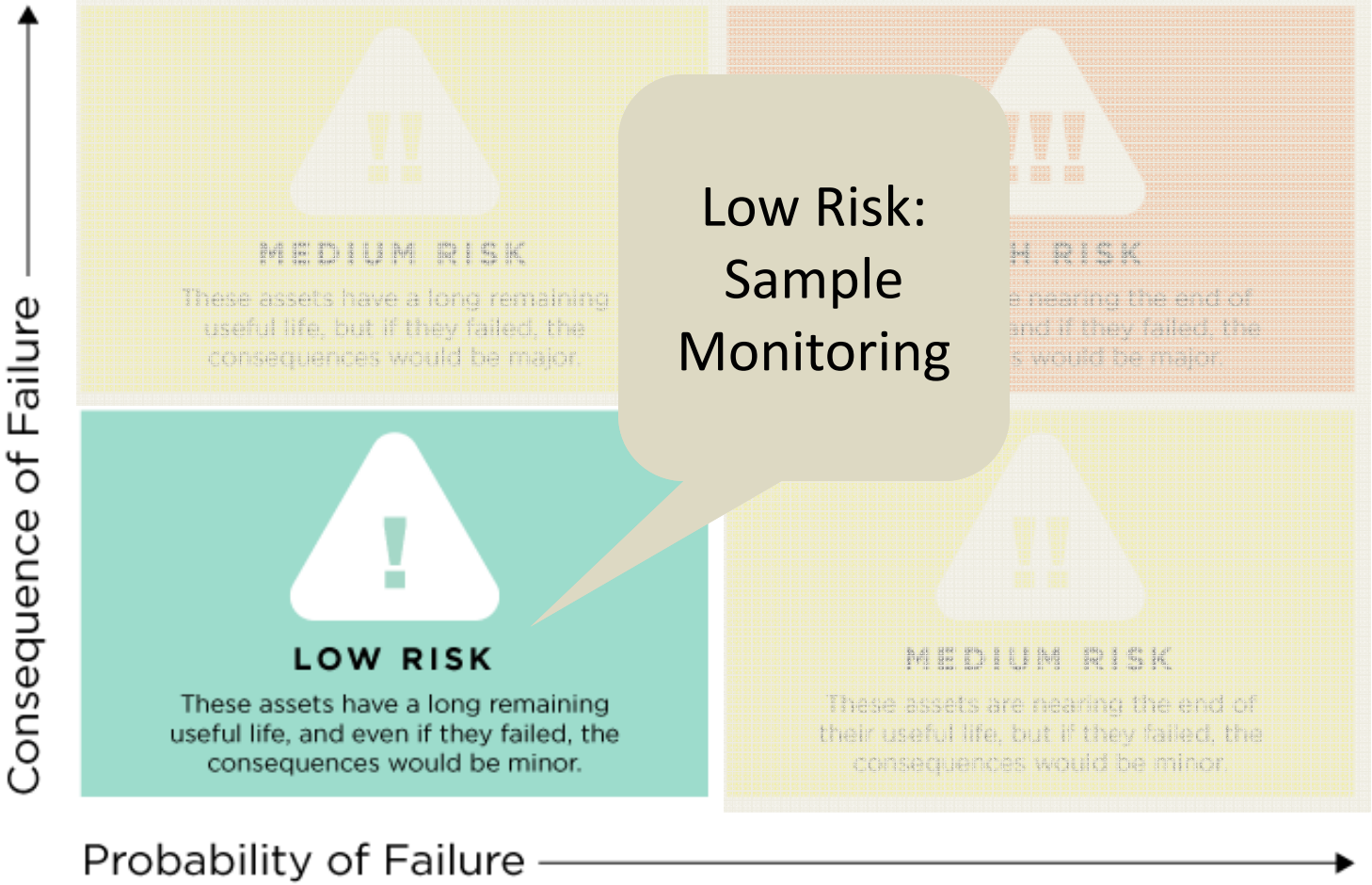


Source: A.M. KAN Work!

Asset Criticality

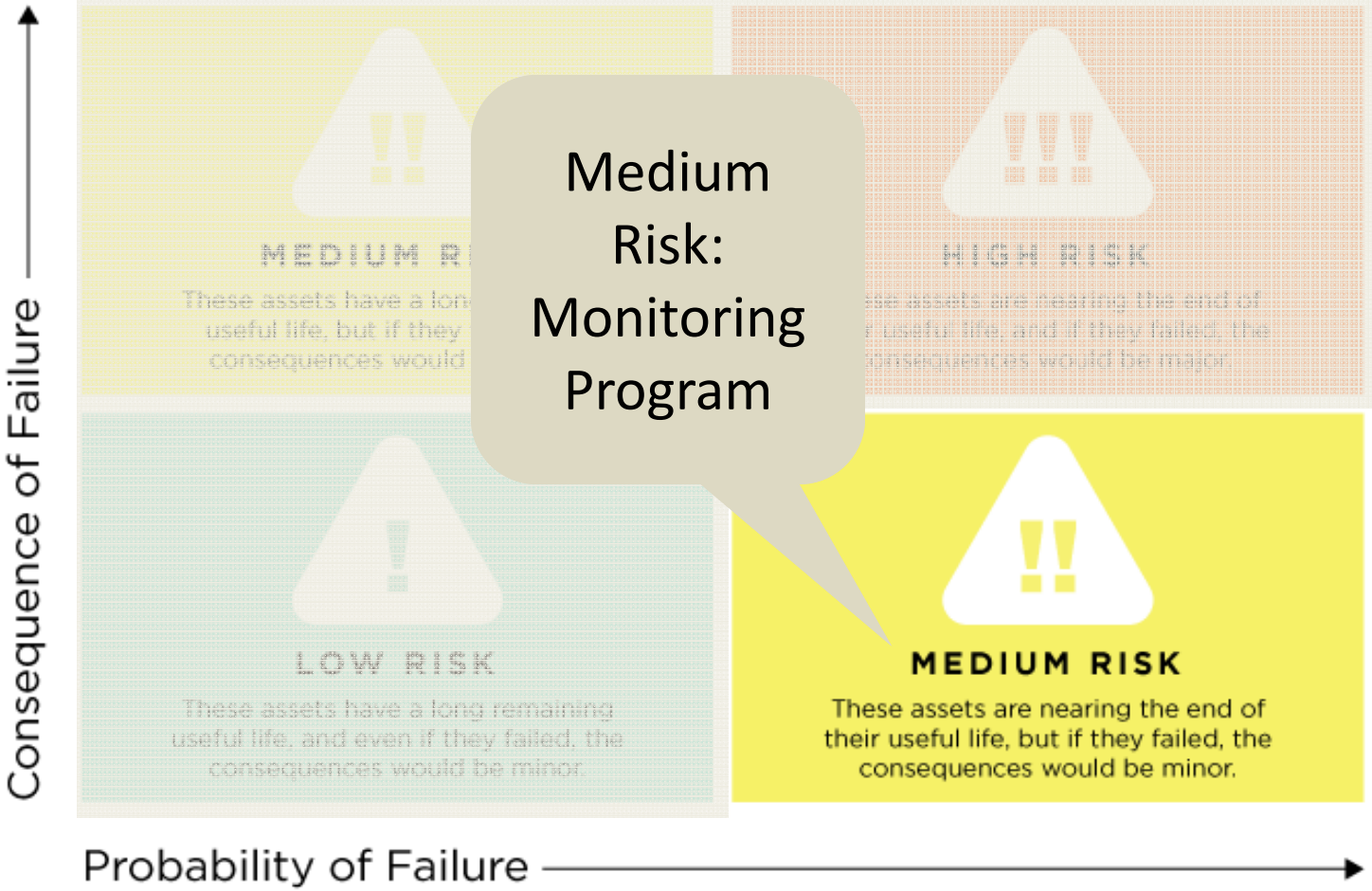


Asset Criticality

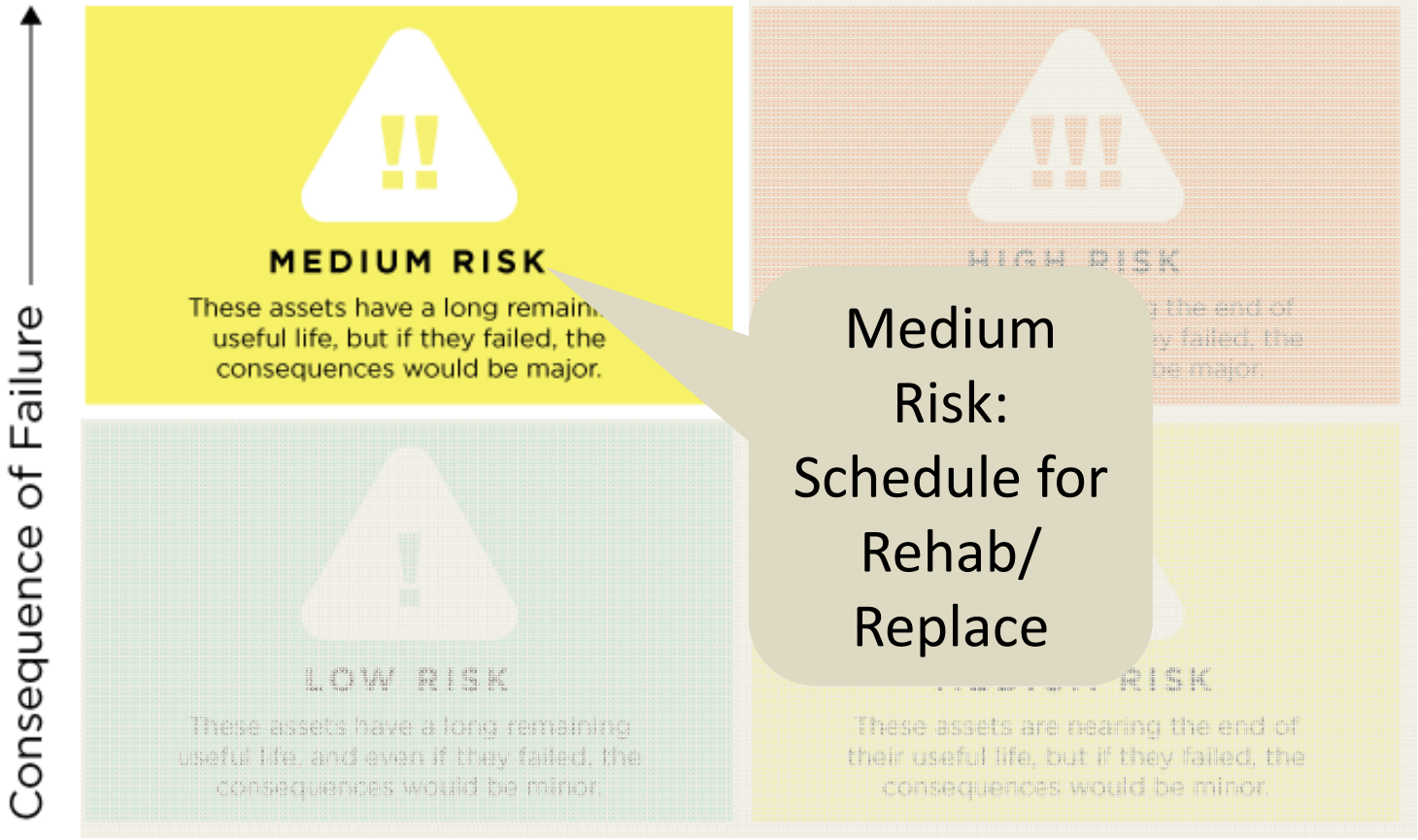


Low Risk: Sample Monitoring

Asset Criticality

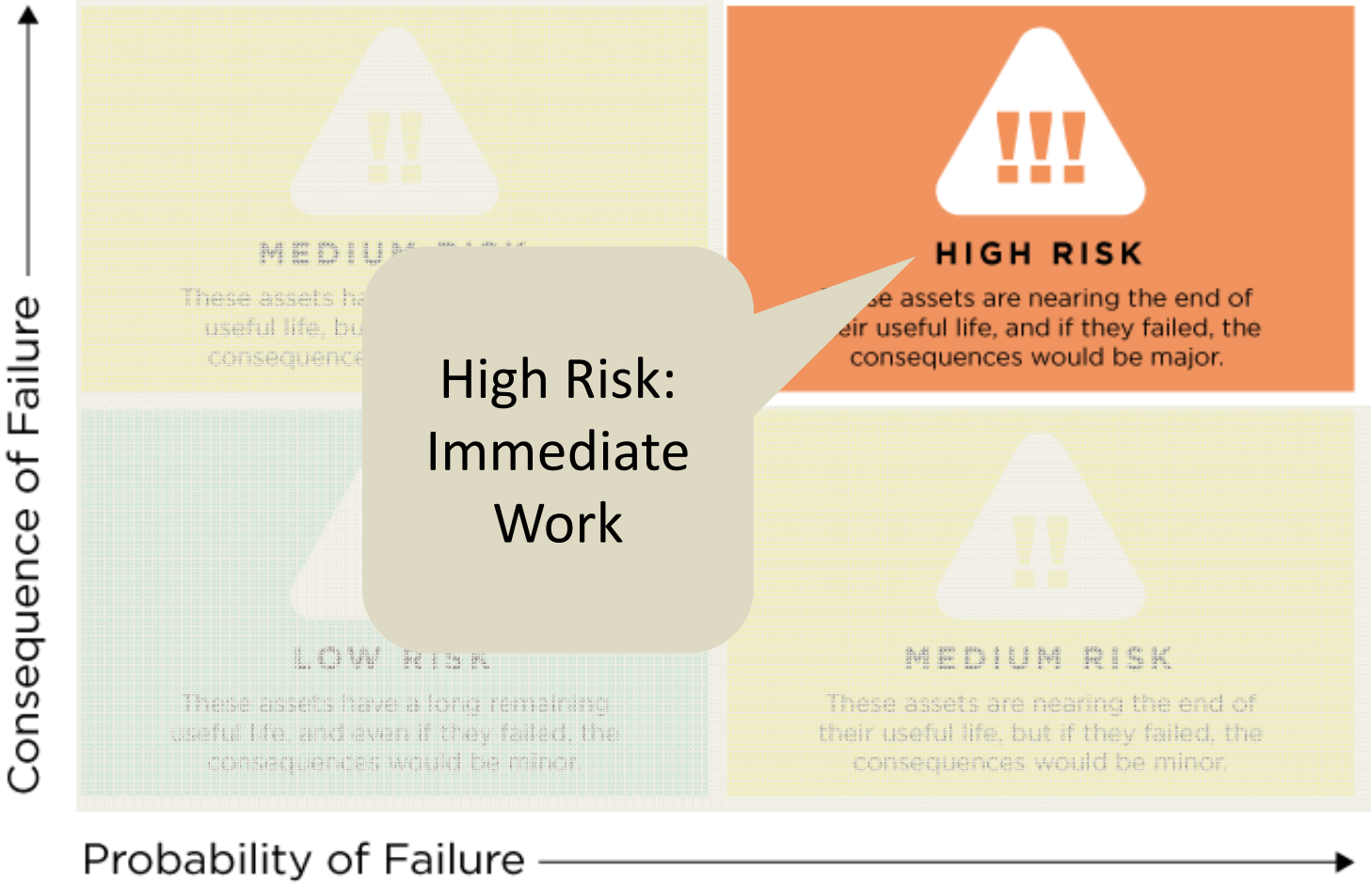


Asset Criticality



Medium Risk: Schedule for Rehab/ Replace

Asset Criticality



Prioritize Asset Rehab. / Replacement

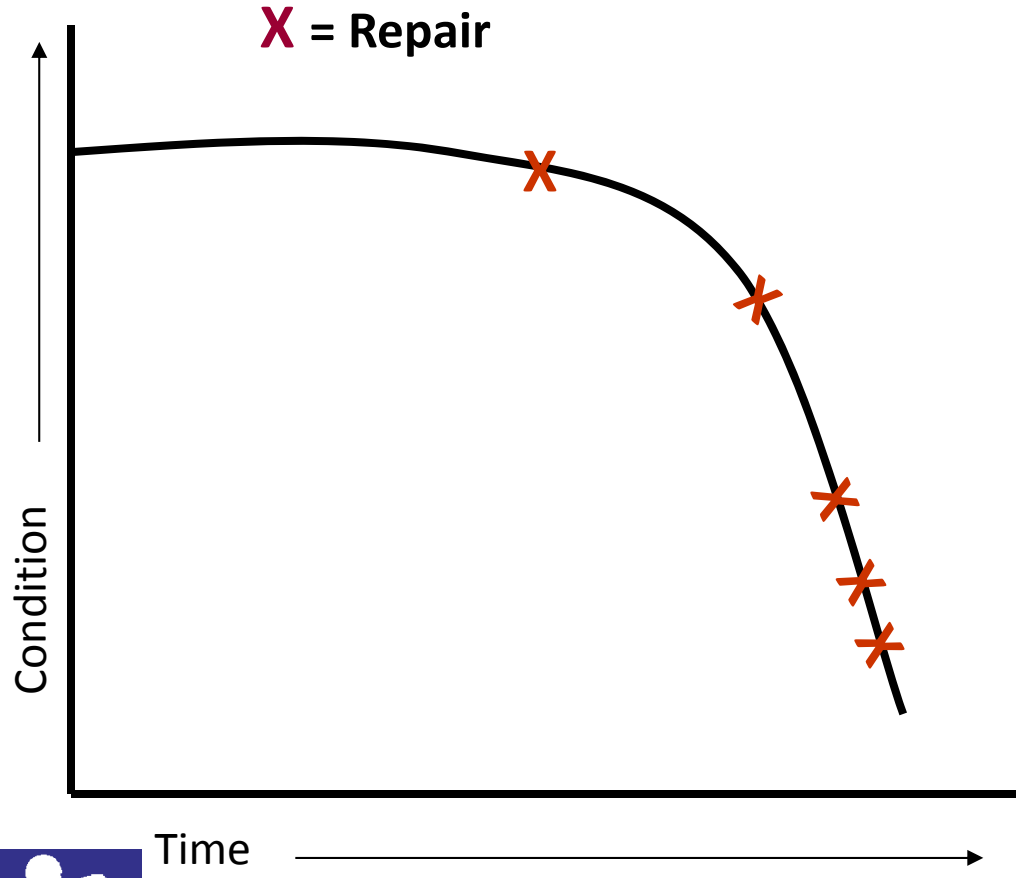
EXAMPLE Prioritization Worksheet

Date Worksheet Completed/Updated: 8/14/02

Asset	Remaining Useful Life	Importance	Redundancy	Priority (1 is high)
Well 1 (1993)	21	Needed for service	Other well, but need backup	6
Well 1 pump	1	Needed for service	Other well, but need backup	3
Well 2 (1993)	21	Needed for service	Other well, but need backup	6
Well 2 pump	1	Needed for service	Other well, but need backup	3
Pumphouse (1993)	21	Needed for service	Other well, but need backup	6
Electrical components	1	Needed for control	No redundancy - corrosion	2
Chlorinator (1993)	2	Mandatory	No redundancy - need backup	1
Storage tank 1 (1993)	31	Need for fire flow and demand	Other tanks	6
Storage tank 2 (1993)	31	Need for fire flow and demand	Other tanks	6
Storage tank 3 (2000)	38	Need for fire flow and demand	Other tanks	6
Distribution System:				
Hydrants (15)	11	Needed for public safety	Other hydrants	5
Valves (45)	11	Needed for isolation	Other valves, but some are out of service	4
6-inch (PVC)	51	Needed for delivery	No redundancy	6
4-inch (PVC)	51	Needed for delivery	No redundancy	6
2-inch (PVC)	51	Needed for delivery	No redundancy	6

Source: EPA's "Asset Management: A Handbook for Small Systems"

Life Cycle Costing: Replacement of Assets

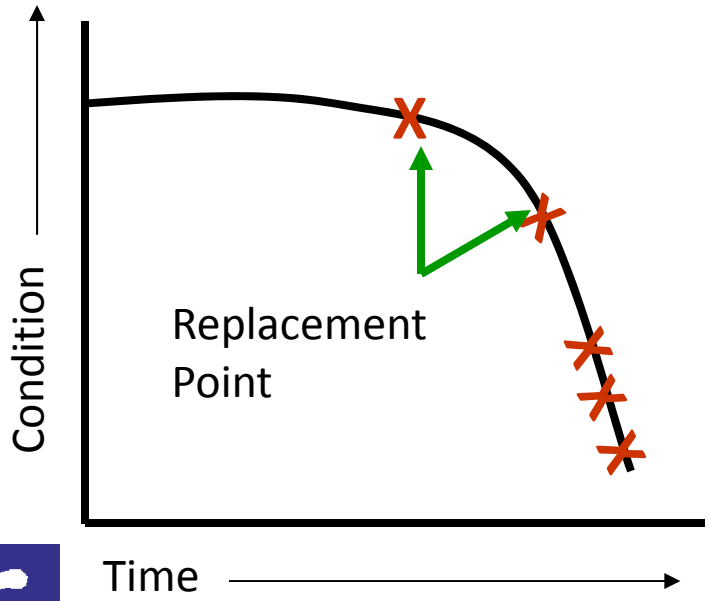


As asset ages, condition will deteriorate more rapidly, and require more (and more expensive) repairs.

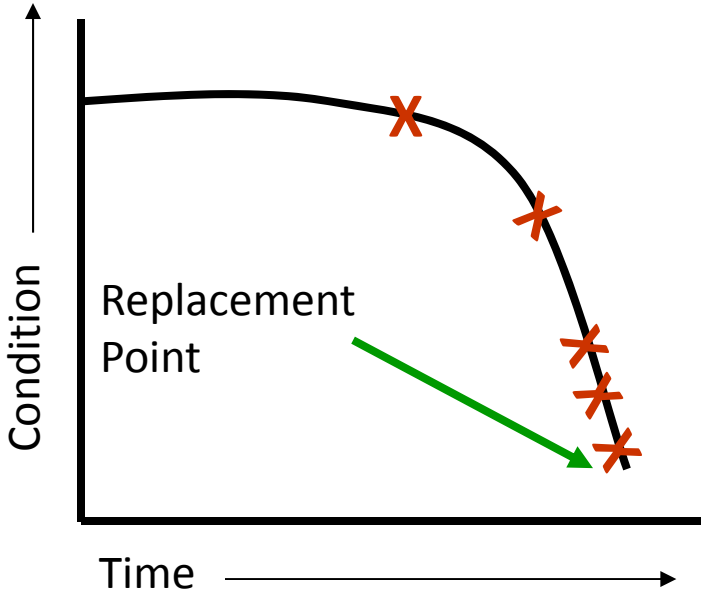
So when do you replace that asset?

Life Cycle Costing & Risk

High risk assets: replace assets early, before failure



Low risk assets: run to failure and replace afterwards



Long Term Funding

- This is where capital planning comes in

- Once you figure out how to get the longest life out of your assets, plan to have the money you need to replace them when necessary

Capital Improvement Plan

- This is strongly related to asset management

- An official multi-year document that identifies and prioritizes capital projects, identifies funding sources, and sets timelines

Capital Improvement Program

- Identify regulatory deficiencies (discuss with regulatory agencies, look at proposed regulations, talk to consultants), in a 10-20 year window
- Identify growth needs, expansion

Capital Improvement Program

- Identify deferred maintenance problems or where current service is inadequate
- Prioritize based on need realizing that “hidden” infrastructure tends to be ignored

Capital Improvement Program - Timelines

- Use **Asset Management Plan** to plan for infrastructure rehabilitation and replacements in the long term (20+ years)

Capital Improvement Program - Timelines

- Create a **Capital Improvement Plan** with a narrower timeline (5-10 years) in more detail. Specify the projects and accurate estimates of cost. Plan where money will come from.

Capital Improvement Program - Timelines

- Create a **Capital Improvement Budget** with an even narrower timeline (1 – 2 years) committing funds for the planned capital projects. Get it approved/adopted.

Example Capital Improvement Plan (CIP)

	Planning Years (Values in 000s)						
Project Name	**FY 02**	**FY 03**	**FY 04**	**FY 05**	**FY 06**	**Future**	**Total**
Water Supply & Treatment							
Water Treatment Objective							
Lime pumps and slakers	740						740
Chemical Enclosures		500					500
Filter 7-18 Control			330				330
Filter Gallery Rehab	1,140						1,140
High Service Pumps		1,500					1,500
Upgrade or Replace Reclaim System Drier	200						200
New Membrane Skids				5,700			5,700
Sodium Hypochlorite Plant	2,000						2,000
Additional Storage Tanks					5,000	3,300	8,300
Repair R/O Capacity		150					150
Filter Gallery Mech Parts	300						300
MMIS						150	150
VFDs - HSP		344					344
Membrane Replacement		1,600					1,600
Painting of Water Plant						3,000	3,000
Phase II Emergency Power Generator						1,500	1,500
Portable Generator - South Well Field				150			150
Repalcement of Fuel Tanks			170				170
Upgrade of Existing Control System @ WTP						580	580
Water Treatment Total	4,380	4,094	500	5,850	5,000	8,530	28,354

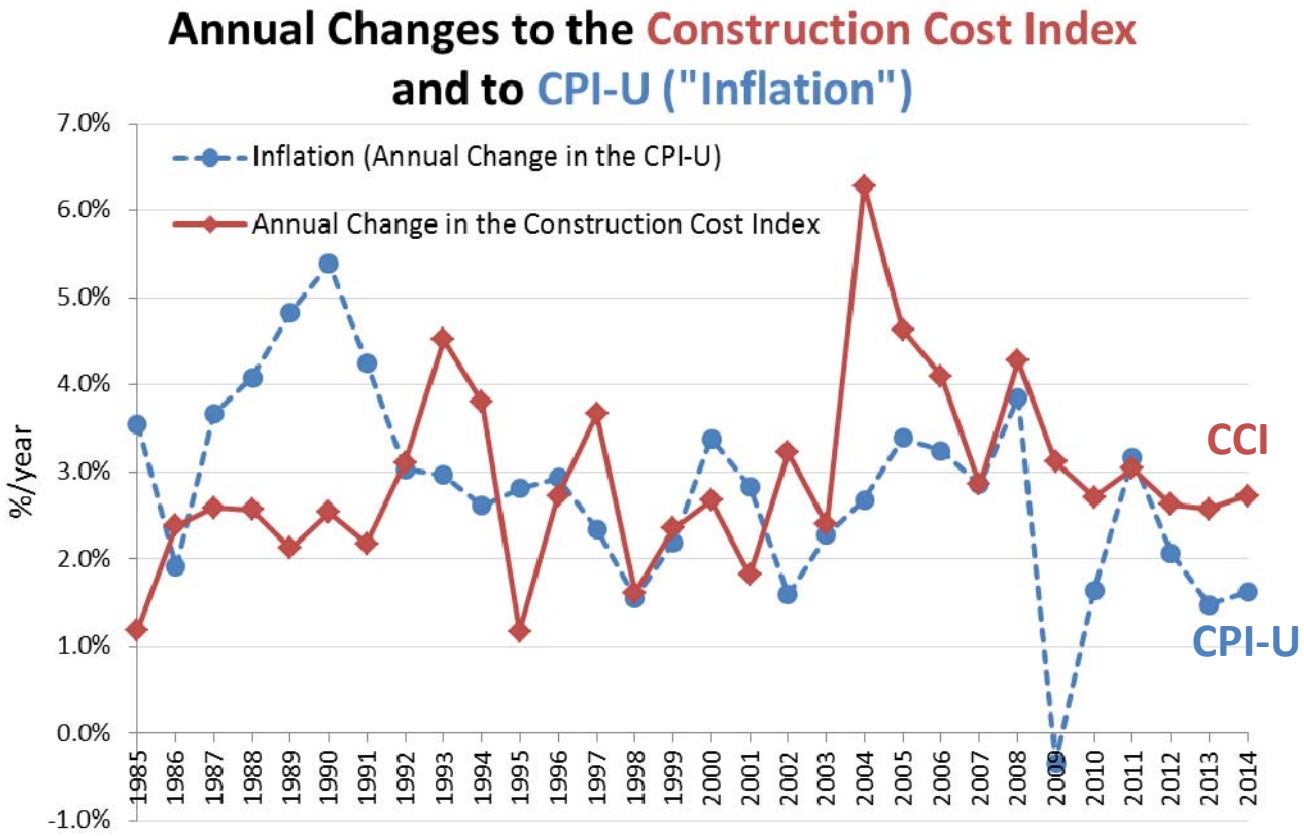
Where Can You Find the Prices?

- Call a vendor. Actually, call a few.
- Ask other systems
- Look at past expenses but adjust for increases in costs

Measures of Inflation

- Consumer Price Index (CPI)—measure of the average change over time in the prices paid by urban consumers for a market basket of consumer goods and services
- Construction Cost Index (CCI)—average prices for labor and key construction materials from 20 cities across the United States

- Instead of looking at Consumer Price Index, look at **Construction Cost Index** (CCI).
- ~3%/year.



Data analyzed by the Environmental Finance Center at the University of North Carolina, Chapel Hill.
Data Sources: Bureau of Labor Statistics, Engineering News-Record ENR.com, InflationData.com, USDA Natural Resources Conservation Services.

http://efc.web.unc.edu/2012/09/26/using-an-index-to-help-project-capital-costs-into-the-future/

Drive Down the CIP Cost

- Is it possible to
  - Eliminate projects?
  - Defer projects?
  - Repair or refurbish instead of replace?
  - Find a non-asset solution?
  - Find collaboration/partnerships alternatives with neighboring systems?
  - Improve balance of cash vs. debt-financed?

- Re-evaluate water demands of your customers. Many systems are now noticing that *total* demand is *decreasing* over time.

How to pay for capital projects

Ways To Pay

- Pay as you go (current receipts)
- Save in advance and pay
- Pay later (someone loans you money)
- Grants (let someone else pay)

Total Funding Needed

Determine How Much Internal Funding Will Be Used

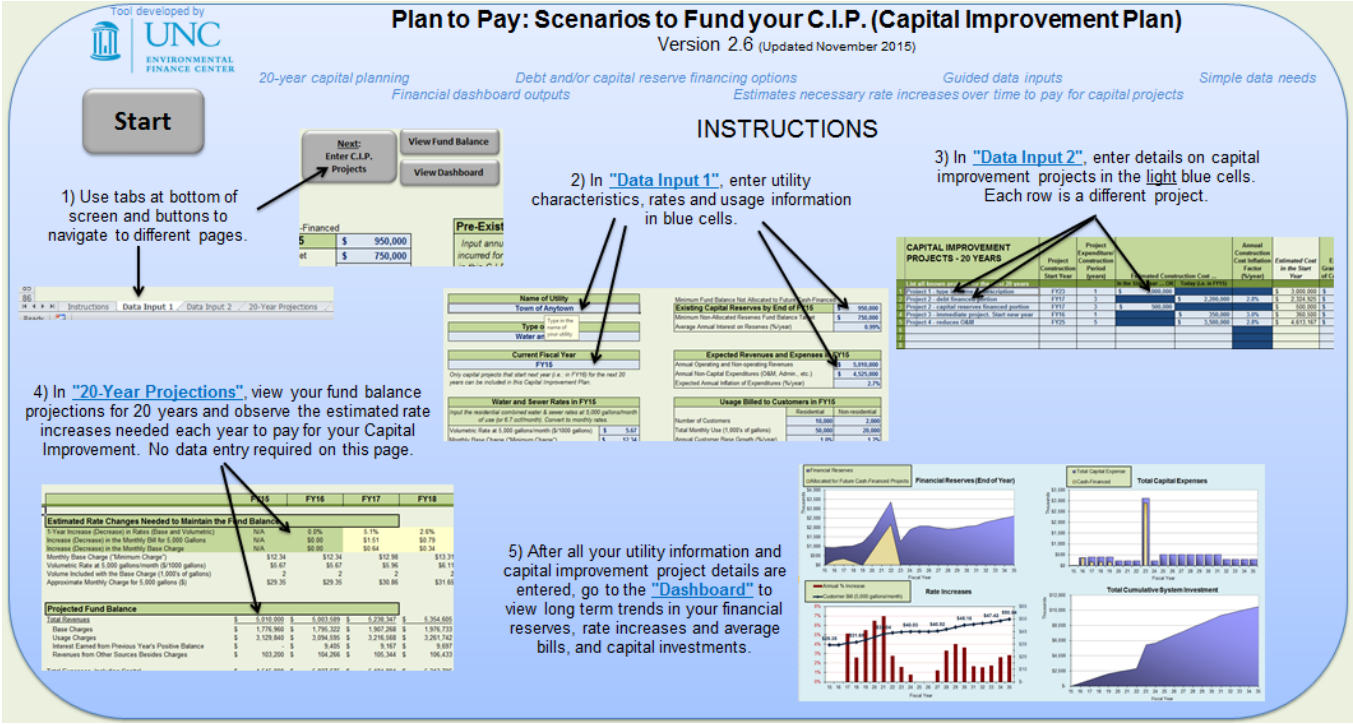
Determine How Much External Funding Will Be Used

- Replacement Reserves
- Utility Expansion Charges or Similar
- Customer Rates/Revenues

Plan to Pay: Scenarios to Fund your C.I.P.

http://efc.sog.unc.edu/ Find it in Resources / Tools

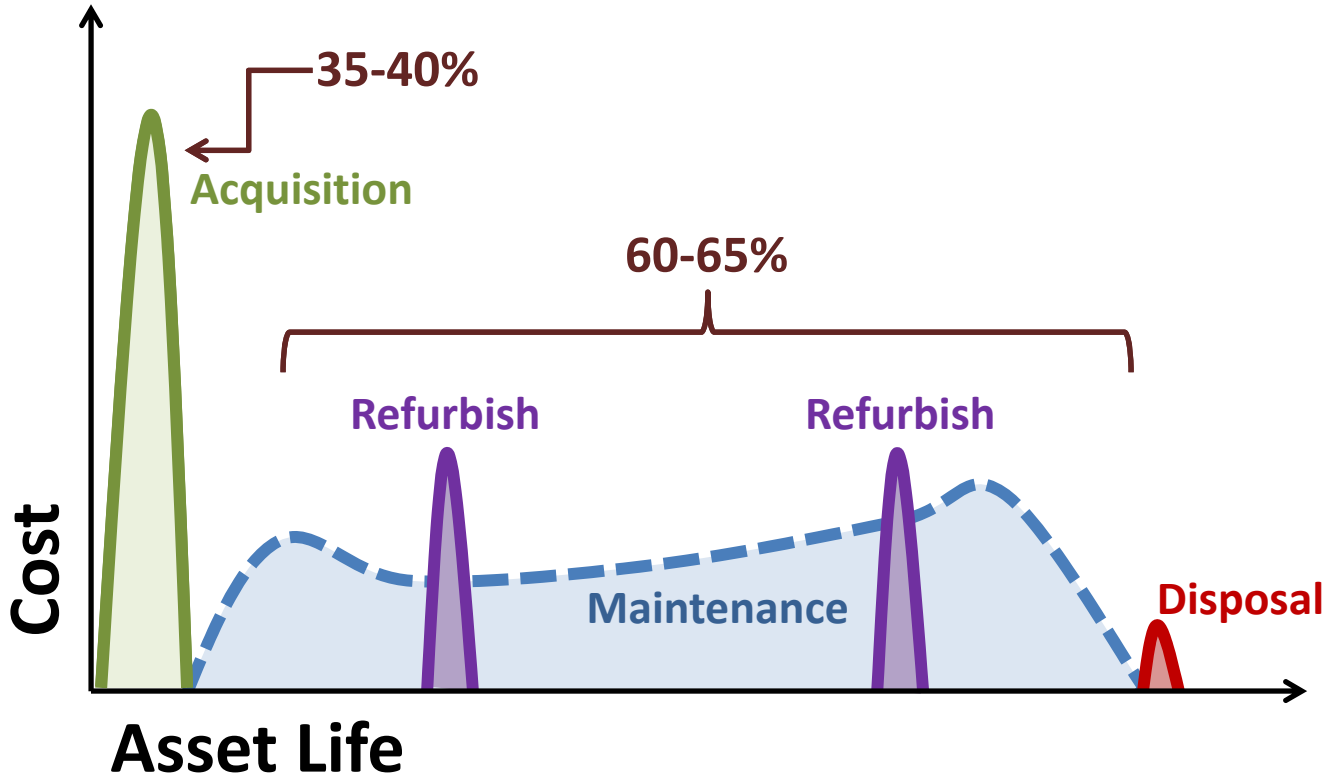
Free, simplified Excel tool allowing you to list your capital projects and plans for funding them, and automatically estimates rate increases



Reminder: Life Cycle Costing

- Purchase Price ≠ Total Price

Capital Investments are Just the Tip of the Iceberg…



Source: Adapted from Steve Allbee, USEPA

Resource Webpage for Capital Planning

www.efc.sog.unc.edu/ Search for "Capital Planning"

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About Services Programs Resources Eve

Mission Statement

We work to enhance the ability of governments and other organizations to provide environmental programs and services in fair, effective and financially sustainable ways.

Project Tools

User-friendly Capital Improvement Plan (CIP) Tool for Water & Wastewater Utilities

Calculator, 03/20/2014 (MS Excel, 802 Kb)

Enter in all capital projects and this tool will project your fund balance (revenues, expenses and reserves), and necessary rate increases for the next 20 years, and more!

What to Include in your Capital Plan:

PROJECT

CAPITAL PLANNING

AND WASTEWATER

This project, p
Support projec
Department of
together many
water and wast
creation of a C
Management P

Blog Post on "Using an Index to I Future"

Read a short blog post on selecting an appropri

Summary of

"What to Include in Your Capital Plan: A Reference Guide for NC Water and Wastewater Utilities"

Last updated: February 2011

Categories	EPA's "Asset Management: A Handbook for Small Water Systems"	Jack Vogt (SOG Faculty)'s "Capital Budgeting and Finance Guide"	DENR PWSS Capacity Development Program	DENR PWSS Loans and Grants	DENR DWQ Construction Grants and Loans	G.S. 159G-23	USDA Loans and Grants	NC Rural Economic Development Center	Local Government Commission 108-C Form	EPA Drinking Water Needs Survey	DENR DWR Local Water Supply Plans	EPA Software: CUPSS
Goal statement/Introduction to your capital plan		☑						☑				☑
Date of documentation of capital plan	☑			☑						☑		☑
Capital planning time period	☑	☑	☑	☑	☑	☑	☑	☑		☑	☑	☑
Description of systems			☑	☑	☑		☑	☑			☑	☑
Existing capacity and demand			☑	☑	☑	☑	☑	☑			☑	☑
Description of customers			☑	☑	☑	☑	☑	☑	☑		☑	☑
Inventory of existing assets (details on each asset)	☑		☑	☑	☑			☑			☑	☑
Condition of systems			☑	☑	☑	☑	☑	☑	☑		☑	☑
Project-specific details (complete for each project in every year)	☑	☑	☑	☑	☑	☑	☑	☑		☑		☑
Financial planning (complete for each year in time period)	☑	☑	☑	☑	☑	☑	☑	☑	☑			☑
Long-term planning descriptions (may be not project-specific)			☑	☑	☑	☑		☑			☑	☑
Approvals		☑		☑	☑	☑	☑	☑		☑		
Updating the capital plan	☑		☑			☑		☑		☑		☑
Ties or links to other studies	☑			☑	☑	☑	☑	☑			☑	

For updates and to view details in each category, go to http://www.efc.unc.edu/projects/capitalplanning.html

Created by the Environmental Finance Center at the UNC School of Government

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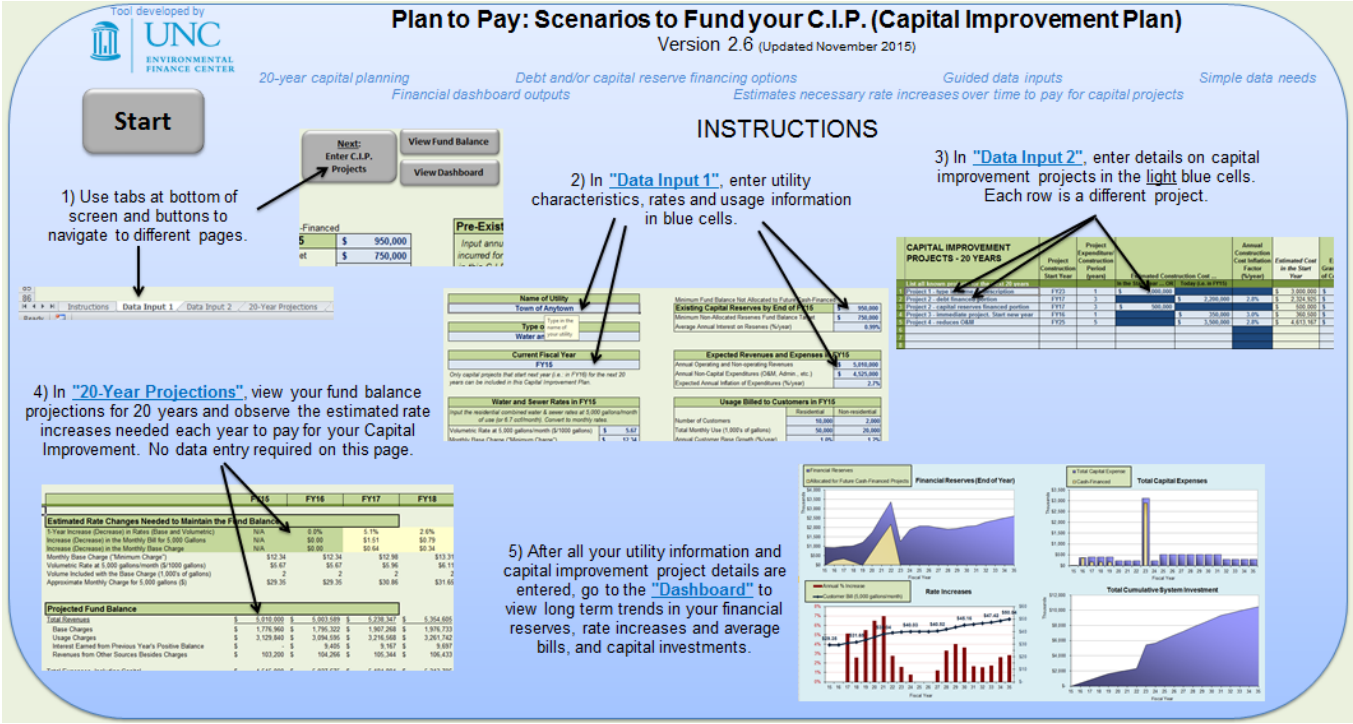
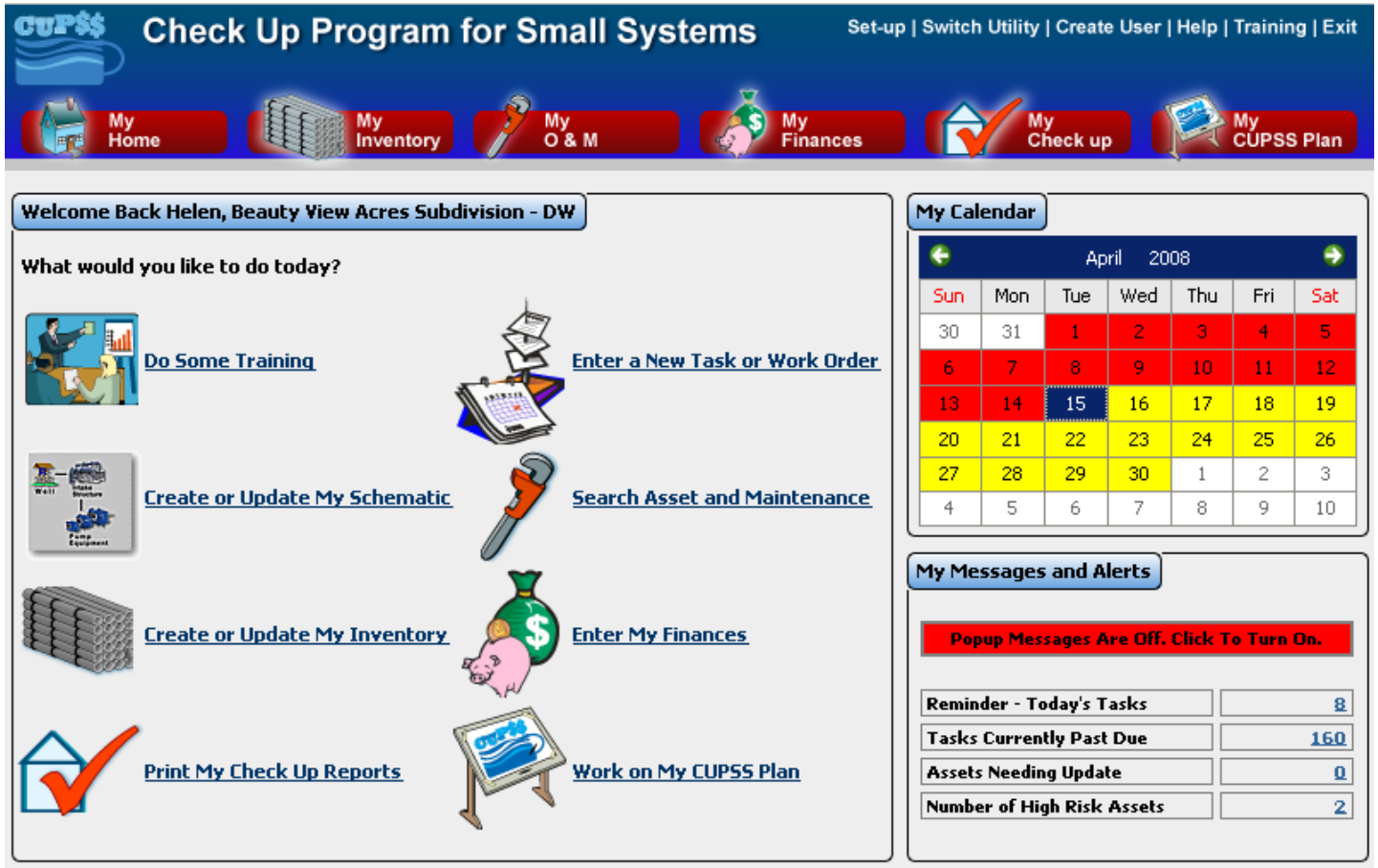


Software: CUPSS (EPA)

http://www.epa.gov/cupss/



For More Information

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