

# Utility Asset Management and Preventive Maintenance (PM) Program Optimization at Washington Suburban Sanitary Commission (WSSC)



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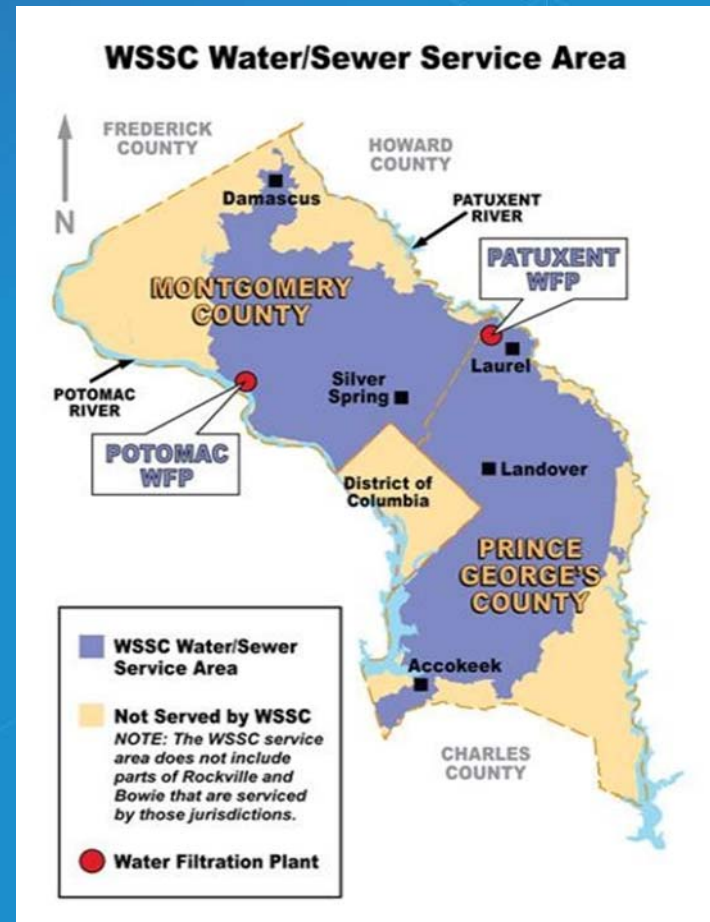
# Agenda

- **Organization Overview**
- **Current Challenges**
- **Project Overview**
- **Objective**
- **Methodology**
- **Results/Findings**
- **Performance Review**



# Organization Overview

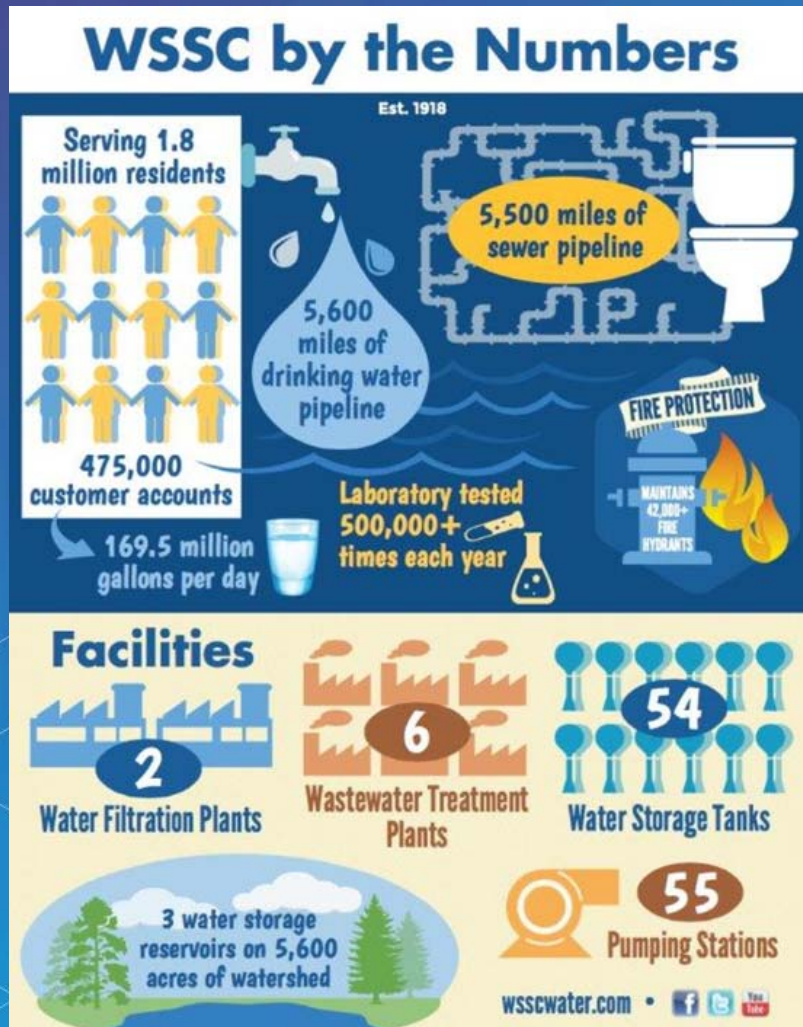
- Established in 1918
- 8th largest water/wastewater utility in the U.S.
- Service area/population - 1.8 million residents in Montgomery and Prince George's Counties, Maryland



Picture: WSSC

# Organization Overview

## Asset Profile



Picture: WSSC

- Serves 1,000-square-mile area in Montgomery and Prince George's Counties
- Primarily a gravity sewer system with 29 major sewer basins
- Sewer systems mainly installed in the late 1940s and early 1950s

# Organization Overview

## Background Information

**WSSC entered into a Consent Decree Agreement with the USEPA, the State of Maryland and conservation groups. The Consent Decree action plan includes the following:**

- ❖ **Preparation and submission of SR3(Sewer Repair, Replacement & Rehabilitation) plan for each sewer basin**
- ❖ **Identify and evaluate the type, frequency and effectiveness of Preventive Maintenance (PM) practices in reducing grease and root blockages**
- ❖ **Cleaning and inspection of sewers**
- ❖ **Annual updates on SSOs and BBKs**
- ❖ **Performance Assessment (PA) of basins**

# Organization Overview

## Preventive Maintenance Program (PMP)

### WSSC's Preventive Maintenance

Periodic Cleaning (JET)

Chemical Root Control (CRC)

Grease

Debris

Slope

SSO,  
backups

Other  
causes

Root  
intrusions

Cleaning Frequency varies from 1 to 36 months

Cleaning Frequency  
24 months





# Organization Overview

## Preventive Maintenance Program (PMP)

<i>Metric</i>	<i>Value</i>
Length of pipes in PMP	738 miles
Monthly average of PM work orders	1,365
Monthly PM backlog	843 work orders

# Current Challenges

- SSO data analysis/management
- Data Integration
- PM workorder backlog
- Inconsistencies in PM optimization criteria and decision matrix



Example of SSO



Backups



Maintenance backlog



# Project Overview

## I. Effectiveness of WSSC's Preventive Maintenance Program on SSO

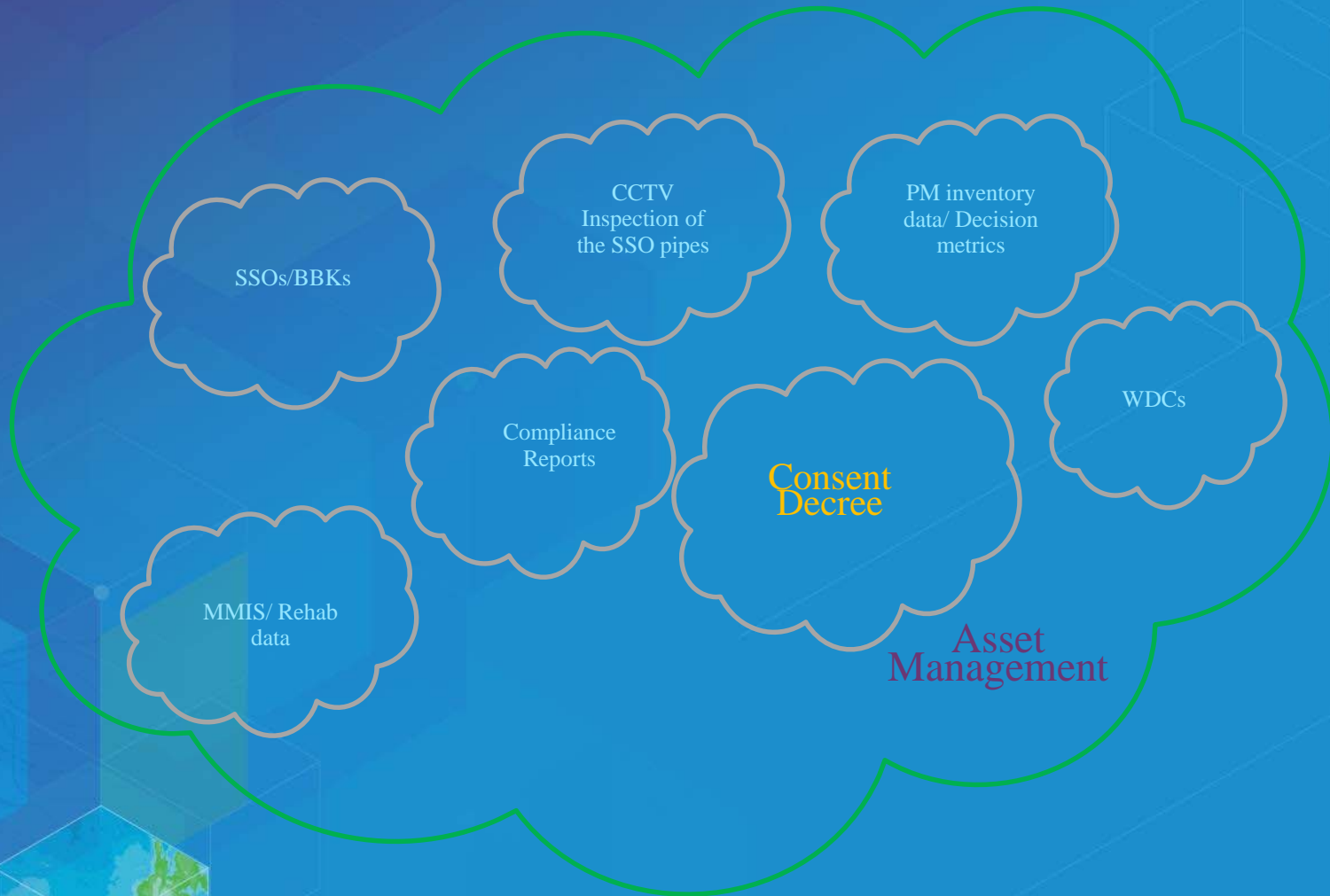
- Data collection and analysis
  - History of pipes regarding repair/rehab
  - Geographic pattern
  - Major causes of SSOs
  - CCTV inspection
  - Status of PM program (if any)
- Identify gaps (if any)

## II. Preventive Maintenance (PM) Program Optimization

- Analyze WSSC current PM program
- Optimize the program and provide recommendation

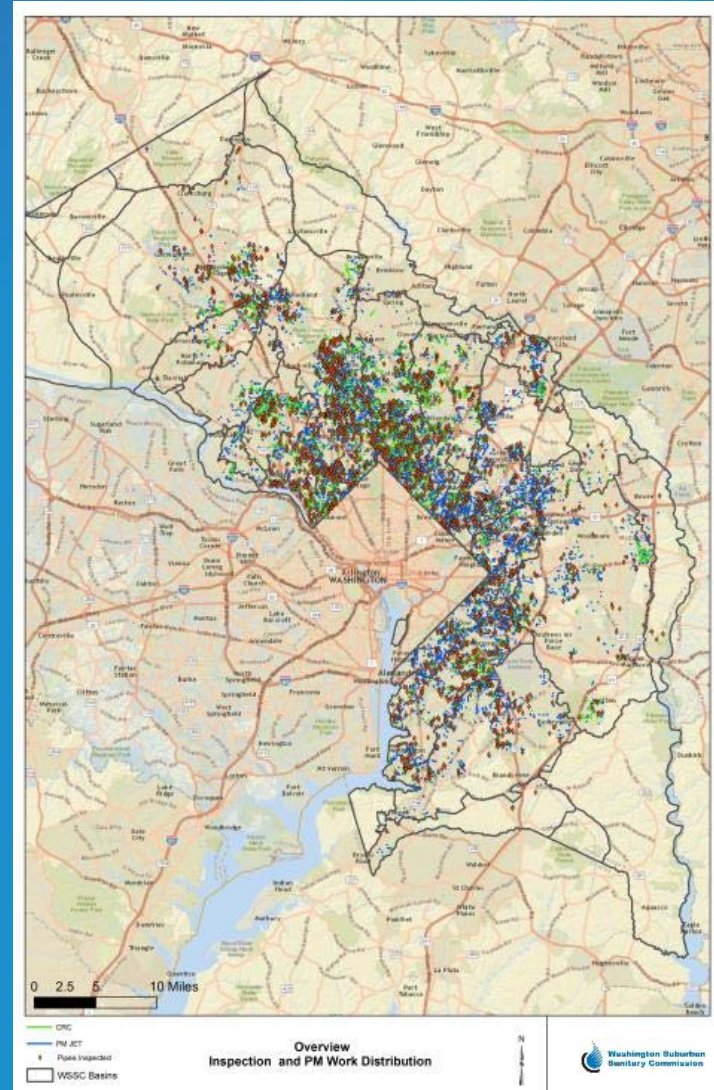
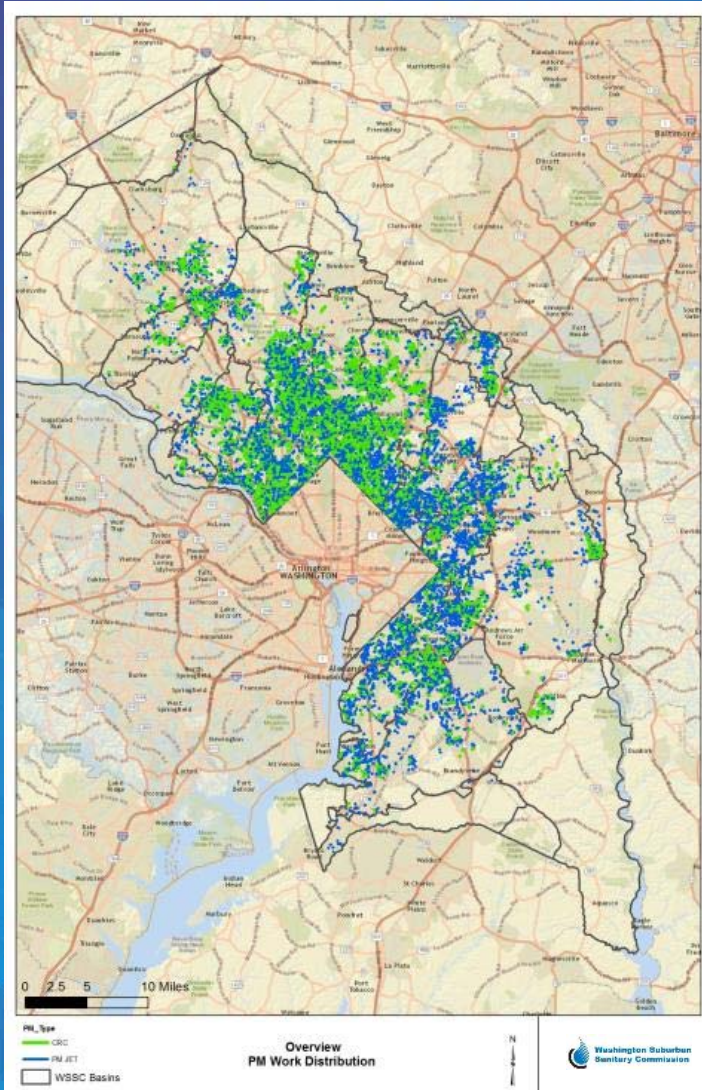
# Project Overview

## Integration / Management



# Project Overview

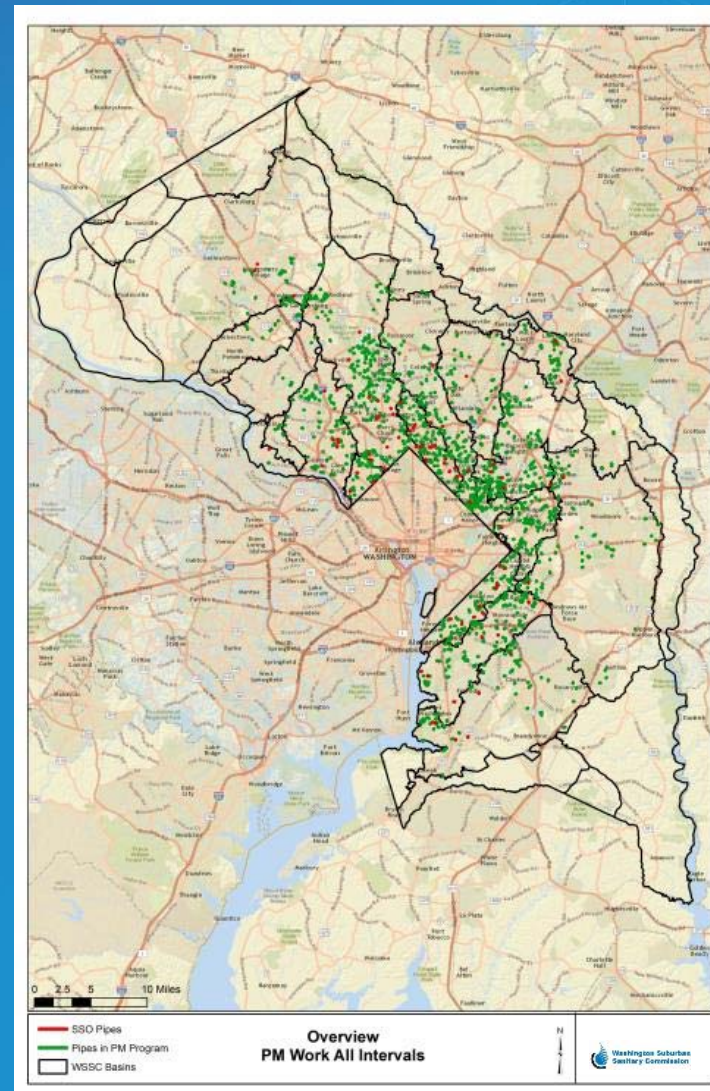
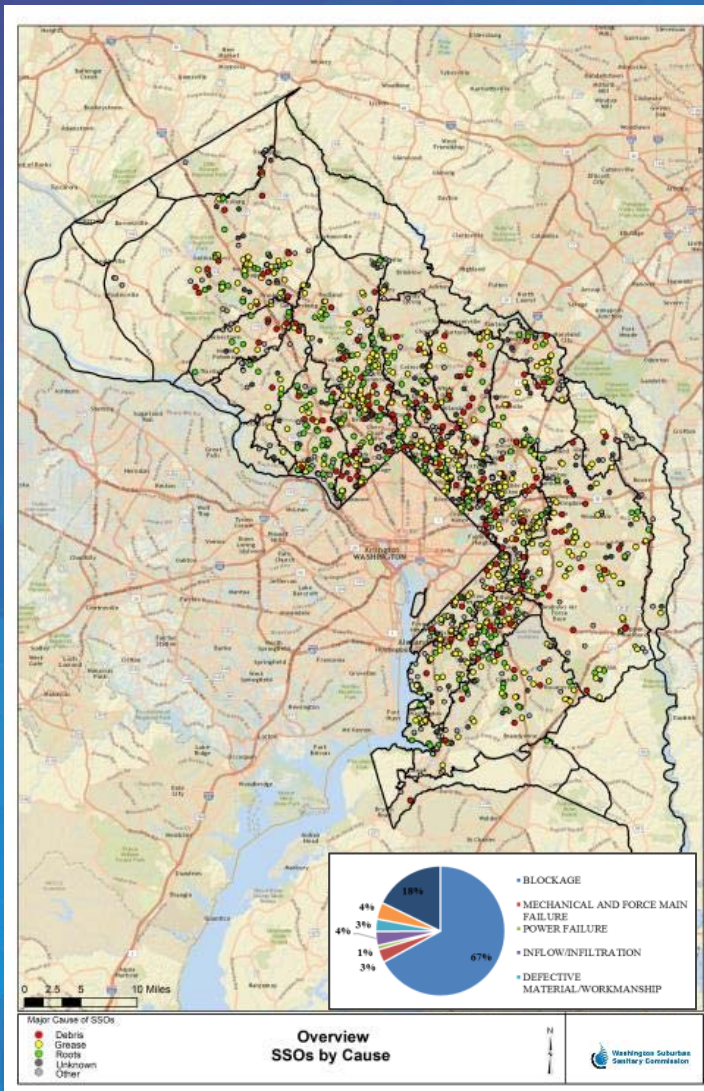
## Mapping PM Work and Inspection





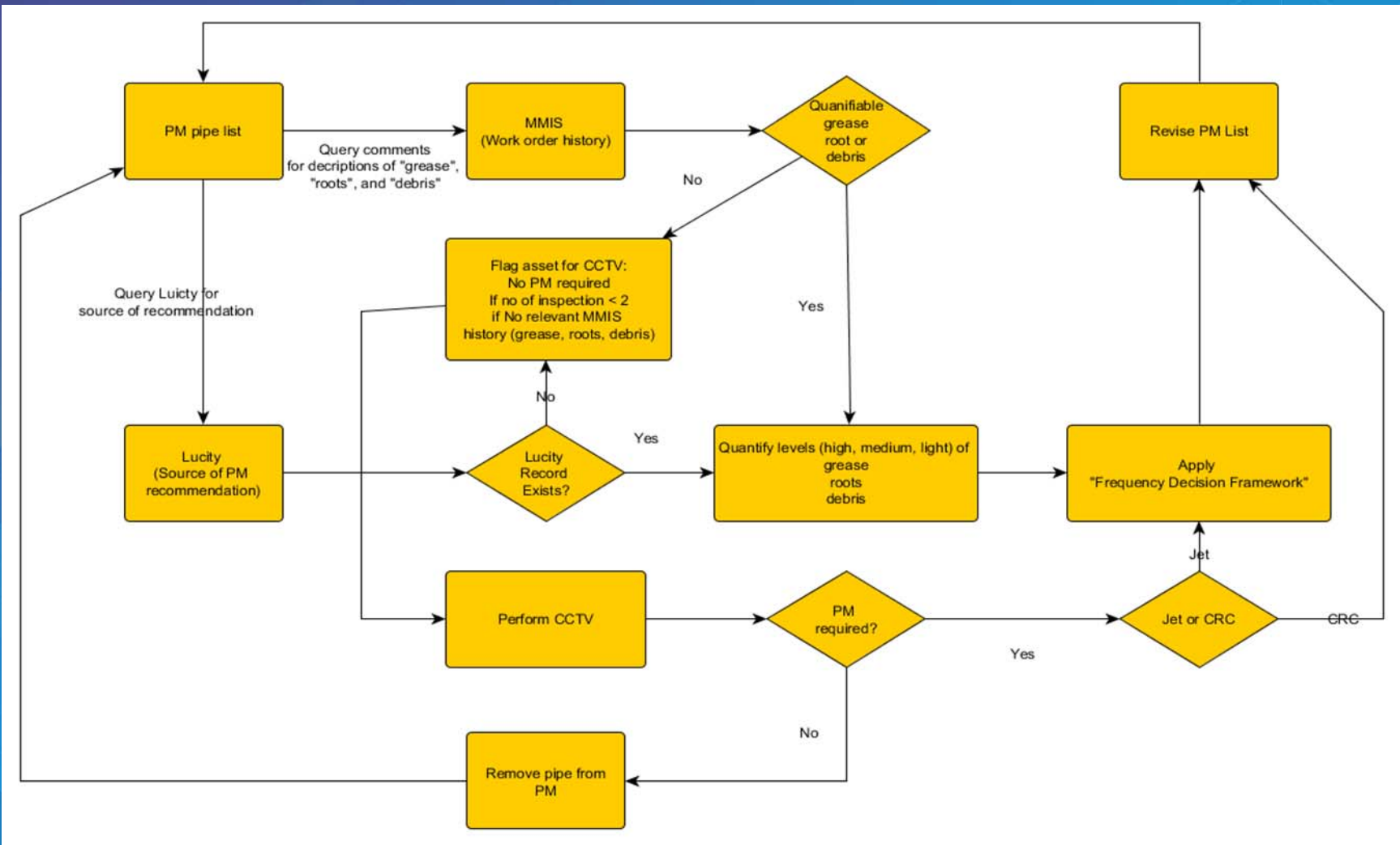
# Project Overview

## Mapping SSO distribution and PM work



# Project Overview

## PMP Process Mapping



# Objective

- **Optimize the current PM program**
- **Integrate data that affect the PM work**
- **Identify gaps**
- **Suggest changes that should not result in SSO/backups at mainlines**



# Methodology

## Optimization Framework

Grease			
	Heavy	Medium	Light
PACP Code	DAGS	DAGS	DAGS
Percentage	>35	>10 and <=35	<=10

Debris			
	Heavy	Medium	Light
PACP Code	MWLS, DAR, DAZ, DSC, DSF, DSGV, DSZ, OBR	MWLS, DAR, DAZ, DSC, DSF, DSGV, DSZ, OBR	MWLS, DAR, DAZ, DSC, DSF, DSGV, DSZ, OBR
Percentage	>=50	>20 and <50	<=20

Grease			
	Heavy	Medium	Light
PACP Code	DAGS	DAGS	DAGS
Percentage	>35	>10 and <=35	<=10

- Pipes with light roots and debris: change in PM interval
- Pipes in PM JET with no findings of grease, debris and only light roots: CRC with interval of 24 months
- CRC pipes listed on the rehabilitation database: remove from the PM program
- Pipes with inspection records < 2 : Inspect based on the following assumptions:
  - Records with next PM date = Current PM Date+ current intervals
  - Records without next PM date = Date when the program was run + current interval



# Methodology

## Decision Support Tools

PM, MMIS  
and pipe  
data with  
WDCs

Rehab info.

Special  
flags

Final PM  
recommendation

Quantify  
Roots,  
Grease and  
Debris

SSO info.

Apply suggested  
interval



# Methodology

## Suggested Optimized Cleaning Frequency

Existing Frequency (months)	New Frequency			Less than 2 CCTV in last 5 years
	High: Grease, Roots, Debris	Medium: Grease, Roots, Debris	Light: Grease, Roots, Debris	
1	<	3	3	CCTV
2	3	3	3	CCTV
3	<	<	6	CCTV
4	3	6	6	CCTV
6	<	<	12	CCTV
9	6	6	12	CCTV
12	<	<	24	CCTV
24	<	<	36	CCTV
36	<	<	48	CCTV



# Results/Findings

## Reduce Preventive Maintenance

- Removed approximately 150 pipes from the chemical root control program
- Increased interval on 57 pipes in the cleaning program
- Reduced work orders by approximately 670 in a six year period

## Prevent Preventive Maintenance

- Equipped stakeholders to evaluate and decide the “best alternative to PM” or the appropriate PM type and interval



# Project Overview

## Decision Support Tools

### Improve Preventive Maintenance Program

- Developed decision support tools
  - Identified approximately 11,000 ( 476 miles) pipes with potential for removal from PMP pending verification (CCTV inspection)

# Results/Findings

## Framing the Solution

### Prevent

- ✓ Find root cause
- ✓ Fix root cause
- ✓ Best alternative to PM

### Preventive Maintenance Program

### Reduce

- ✓ Remove unnecessary PM work
- ✓ Schedule efficiently

### Improve

- ✓ Record accurate feedback, information and data
- ✓ Pilot and implement
- ✓ Revise framework
- ✓ Repeat



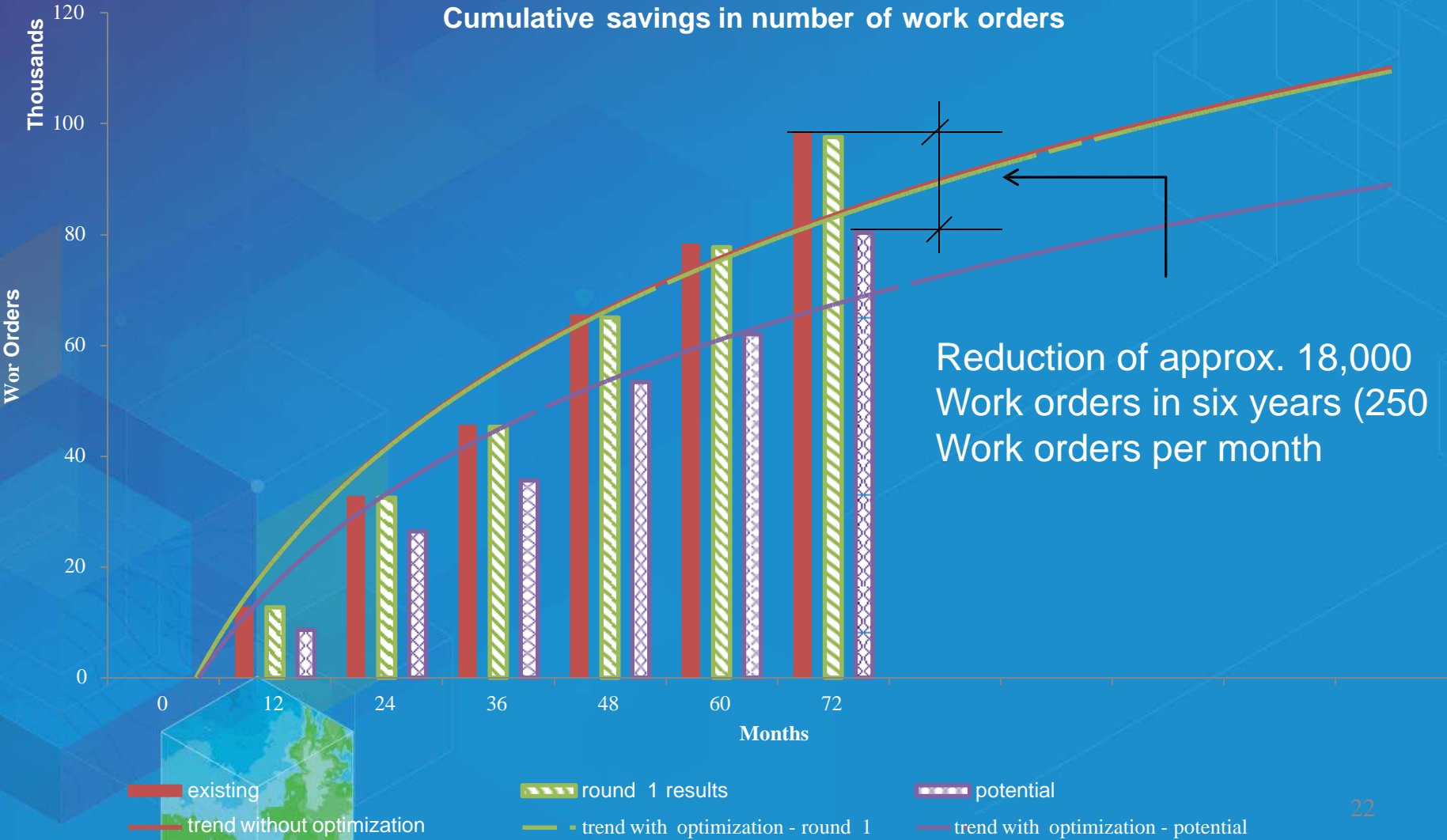
## Results/Findings

- Potentially more PM work scheduled
- PM decision support criteria inconsistencies
- Inefficient PM work schedule



# Results/Findings

## Potential of PM Optimization Effort



# Performance Review

## Phase I Execution

- 57 assets subjected to PM Optimization program
- Period of June 2014 to March 2016

### ***Validation:***

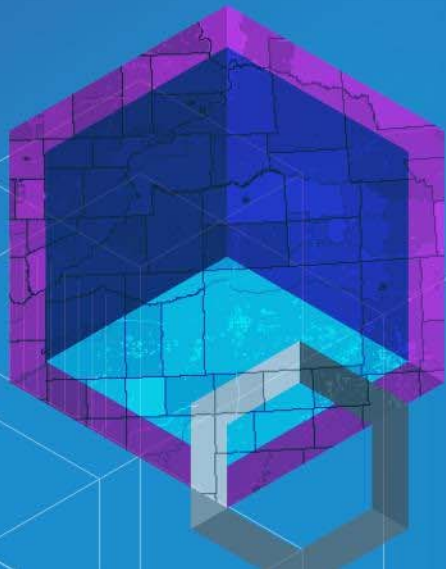
- ✓ Number of CCTV
- ✓ Mainline SSO/backups
- ✓ Work order queries
- ✓ Asset location

### ***Results***

- 36 work orders removed
- No performance failures ( ssos or backups)



Questions??



Thank you for your time..