

What's the Status of Your Assets?

Use Repeatable Condition Assessment to Track Changes Over Time

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ch2m.SM

What's the Status of Your Assets?

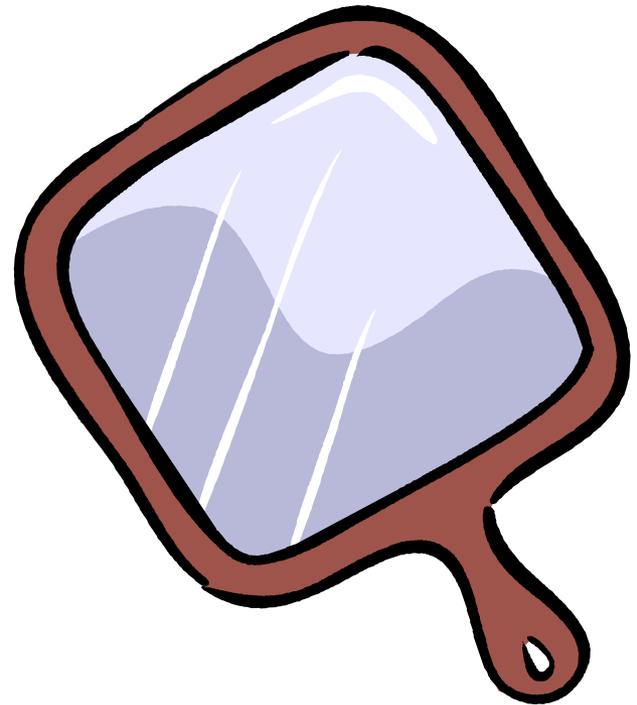
Use Repeatable Condition Assessment to Track Changes Over Time

- More Rationale for an Asset Management Program
- Assessing condition of assets
- Repeating condition assessment – replicating
- Lessons from recent experience
- Questions

What about you?

- What organizations?
- How much have you heard about Asset Management?
- What are you hoping to hear?

(Relative to Asset Management)



Rationale for an Asset Management Program

Strategies Identified to Ensure Resiliency

1. Financial policies
2. Pricing and sales innovation
3. Planning and cost control
4. Communication



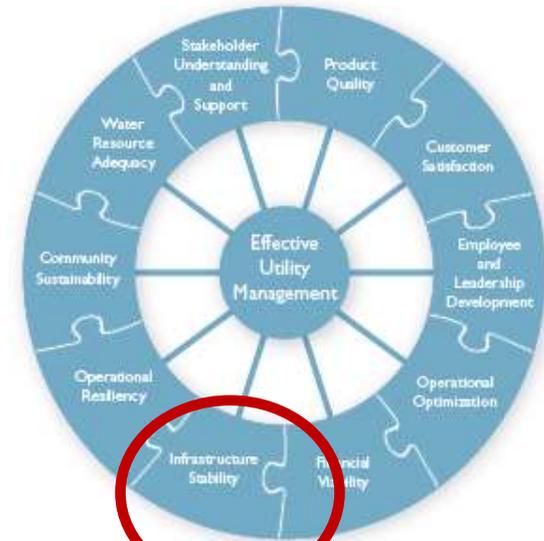
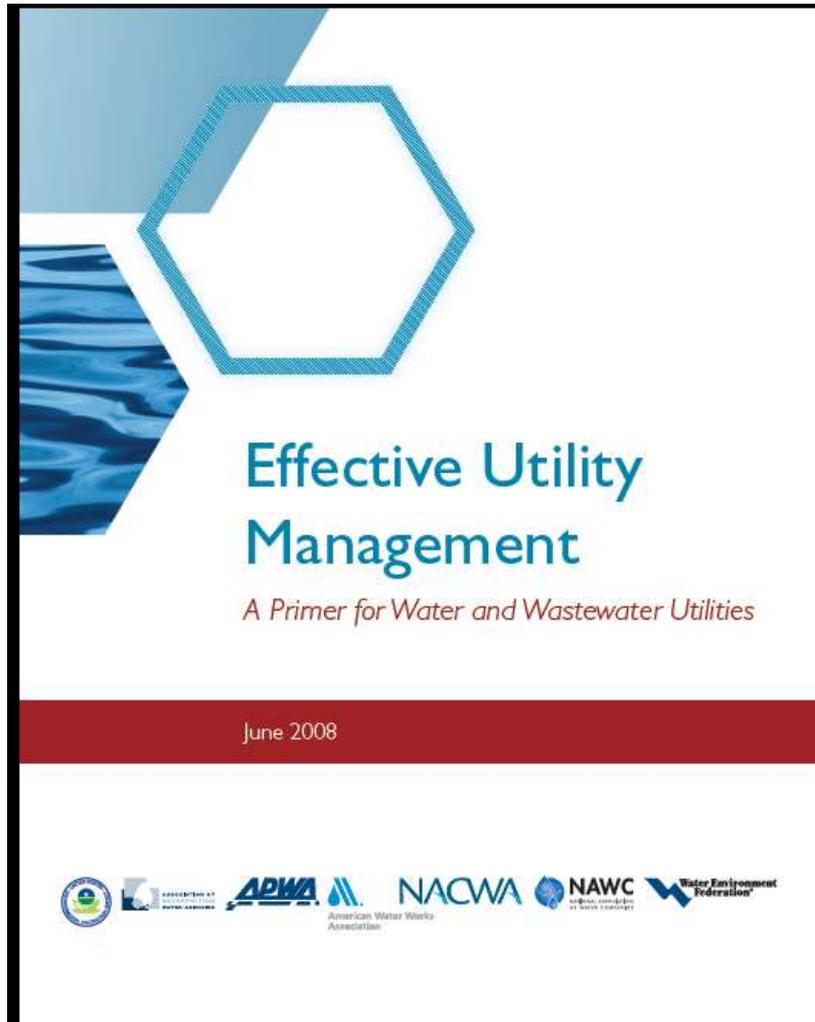
An Important Value of Asset Management

It's an extremely valuable communication tool

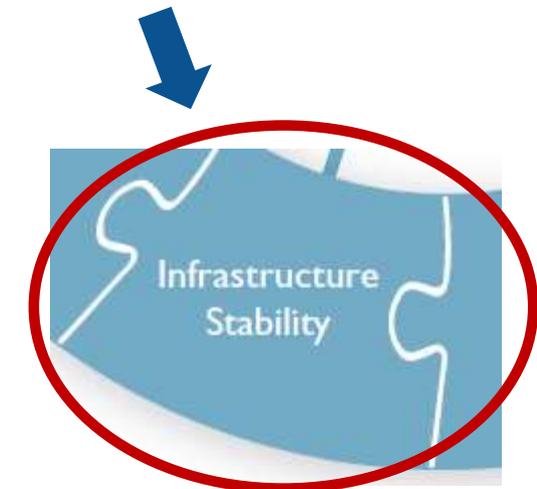
Helps tell the story of what we need



Infrastructure Stability is one of 10 Key Attributes of Effective Utility Management



Ten Attributes of Effective Utility Management



An Example of Implementing an Asset Management Program

*Use Repeatable Condition Assessment
to Track Changes Over Time*

Timeline of Condition Assessment and Risk Evaluation for Hoodland Service Area

YEAR	ACTIVITIES
2009	Hierarchy created for CCSD #1 Collection System Risk evaluation for all CCSD #1 Collection System – “Top-Down” Field Condition Assessment of 6 pump stations – Updated Risk

Timeline of Condition Assessment and Risk Evaluation for Hoodland Service Area

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2015	Begin Master Plan process for Hoodland System Conduct Condition Assessment of Hoodland Water Pollution Control Plant (WPCP) Review CCTV inspection records to assign condition scores to pipe segments Add WPCP Assets to Hierarchy Update Risk Assessment on Hoodland System assets

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2015	Begin Master Plan process for Hoodland System Conduct Condition Assessment of Hoodland Water Pollution Control Plant (WPCP) Review CCTV inspection records to assign condition scores to pipe segments Add WPCP Assets to Hierarchy Update Risk Assessment on Hoodland System assets
2016	Expand Asset Hierarchy to include Tri City assets

Asset Hierarchy was Created in Earlier Study, Included All of CCSD #1 System

ASSETS				Health & Safety of public and employees	Financial impact on Utility	Public confidence	Environmental compliance	System reliability	Consequence Score	Physical Condition	Performance	External and internal physical factors	O&M Protocols	Reliability History: Estimate of proactive maintenance	Likelihood Score	RISK SCORE	
				24%	17%	15%	20%	24%		30%	35%	20%	5%	10%			
Wastewater System																	
Treatment Facilities																	
Conveyance System																	
Gravity Collection System																	
			Hoodland	4	4	4	4	7	4.7	7	1	7	4	7	4.8	22.5	
Base			HWY 26/Zigzag/ Rhododendron	10	4	10	7	7	7.7	2	1	4	4	7	2.7	20.3	
			Learning	4	1	4	4	4	3.5	4	1	4	4	7	3.3	11.3	
			Golf Club Terrace	4	4	1	4	4	3.6	7	1	7	4	7	4.8	16.9	
			South Welches	4	4	4	4	4	4.0	4	1	4	4	7	3.3	13.0	
			Arrah Wanna	4	4	4	4	7	4.7	4	1	4	4	7	3.3	15.4	
			Timberline Rim	4	4	1	4	4	3.6	7	1	7	4	7	4.8	16.9	
Base			Sandy River Lane	7	4	4	7	7	6.0	7	1	7	4	7	4.8	28.7	
Pump Stations																	
			Timberline Rim	1	4	7	7	7	5.0	7	4	1	4	4	4.3	21.6	
			Sandy River Lane	1	1	4	4	10	4.2	1	1	1	1	1	1.0	4.2	
			Mt. Creek Circle	1	1	4	4	10	4.2	1	1	1	1	1	1.0	4.2	
			Golf Club Terrace	1	1	1	1	7	2.5	2	1	1	4	1	1.5	3.6	

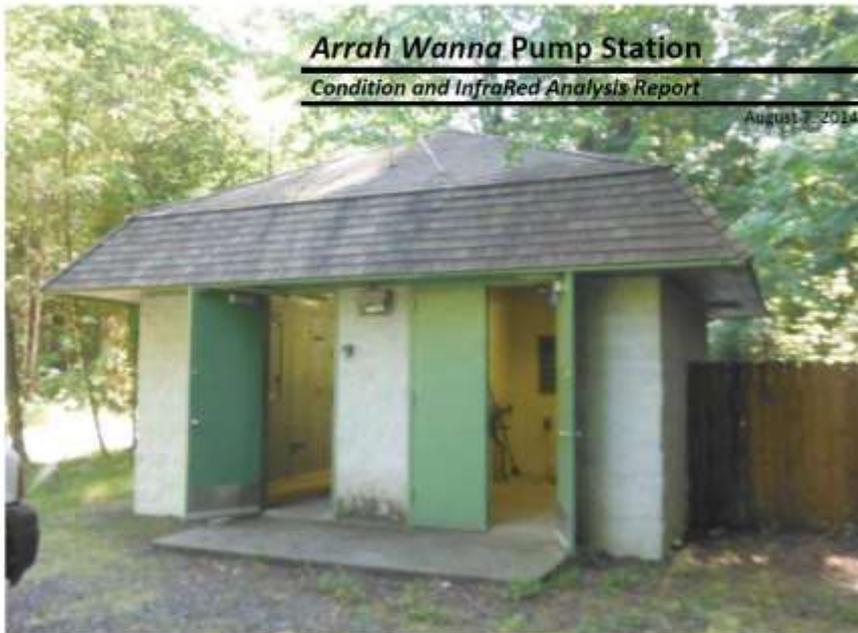
Condition Assessment Used to Update Risk Evaluation

ASSETS		Health & Safety of public and employees	Financial impact on Utility	Public confidence	Environmental compliance	System reliability	Consequence Score	Physical Condition	Performance	External and internal physical factors	O&M Protocols	Reliability History: Estimate of proactive maintenance	Likelihood Score	RISK SCORE
		24%	17%	15%	20%	24%		30%	35%	20%	5%	10%		
Wastewater System														
Treatment Facilities														
Conveyance System														
Gravity Collection System														
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Base	HWY 26/Zigzag/ Rhododendron	10	4	10	7	7	7.7	2	1	4	4	7	2.7	20.3
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	Golf Club Terrace	4	4	1	4	4	3.5	7	1	7	4	7	4.8	16.9
	South Welches	4	4	4	4	4	4.0	4	1	4	4	7	3.3	13.0
	Arrah Wanna	4	4	4	4	7	4.7	4	1	4	4	7	3.3	15.4
	Timberline Rim	4	4	1	4	4	3.5	7	1	7	4	7	4.8	16.9
Base	Sandy River Lane	7	4	4	7	7	6.0	7	1	7	4	7	4.8	28.7
Pump Stations														
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	Mt. Creek Circle	1	1	4	4	10	4.2	1	1	1	1	1	1.0	4.2
	Golf Club Terrace	1	1	1	1	7	2.5	2	1	1	4	1	1.5	3.6

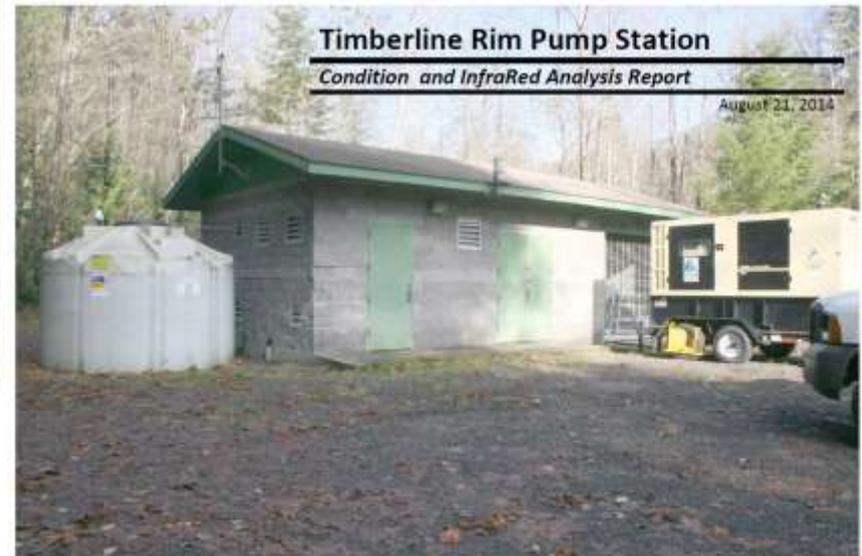
Pump Station Condition Assessment

YEAR	ACTIVITIES
2009	Hierarchy created for CCSD #1 Collection System Risk evaluation for all CCSD #1 Collection System – “Top-Down” Field Condition Assessment of 6 pump stations – Updated Risk
2013	WES updates Condition Assessment of Pump Stations WES conducts CCTV inspection of Hoodland Collection System

WES used 2008 Format to Perform Condition Assessment on Hoodland Pump Stations

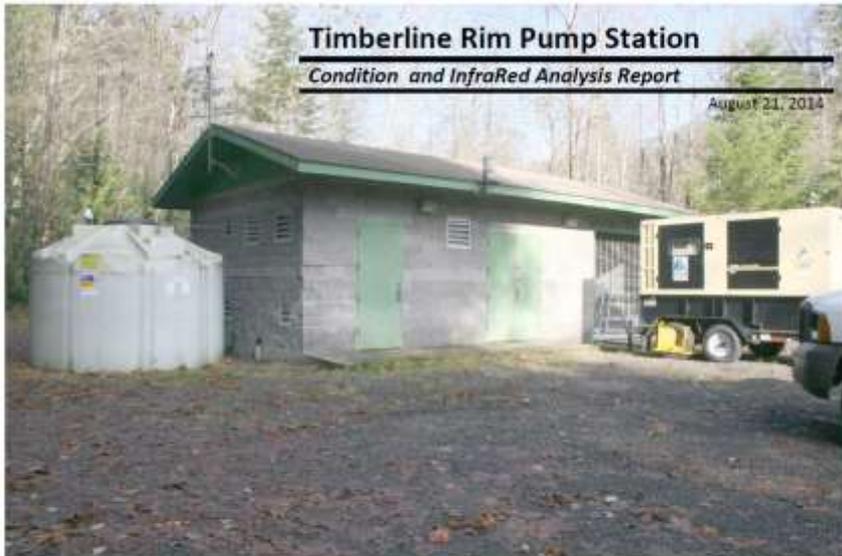


Prepared by
Kris Sayre, KRS Consulting
Zach Koellermeier, WES - Collection Systems Tech 2
Erin Duffy, WES- Microcomputer Programmer Analyst



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Assessment, Scoring, and Documentation were Similar to 2008 Assessment



Prepared by
 Zach Koellermeier, WES - Collection Systems Tech 2
 Erin Duffy, WES- Microcomputer Programmer Analyst

Timberline Rim Pump Station Control Panel – Motor Control Center #1

Comments (if applicable)

Condition Question	Answer	NA	Flag*	Comments
Absence of Burn Marks	5 - No			
Acceptable Noise	5 - No			
Acceptable Smell or Heat	1 - Yes			
All Components	1 - Yes			
All Safety Features Present	5 - No			
Operating at Inspection	1 - Yes			
Appearance (Carbon Dust)	3 - Moderate			
Control Gauges (Hour Meters Volts & Amps)	3 - Operational			
Control Lamps	3 - Operational			
Control Switches	3 - Operational			
Corrosion - Structural Metals	2 - Slight staining/small chips/holes in coating			
Good House Keeping	5 - No			
Good Wire Labeling	5 - No			
Grounding	1 - Yes			
Infrared	2 - Normal			
Installation/ Accessibility	3 - Moderate Defects			
Main Breaker	3 - Moderate Defects			
Proper Drawings Accessible	5 - No			
Structural Integrity (panel)	3 - Moderate Wear			
Condition Score: 3.105	Condition Category			



Lessons Learned in Updating Pump Station Condition Assessment

- Use the same questions
 - No more, no less, unless specific information needed
- Pay close attention to the scoring questions
- Use the same weights

TABLE 2

Example of Possible Answers and Ranges for Control Panel "Corrosion" Criterion

Question	Weight	Answer	Score
Corrosion	3	Like new	1
		Slight staining/small chips/holes in coating	2
		Corrosion with little metal loss	3
		Pitting and uniform corrosion	4
		Severe pitting and uniform corrosion with metal loss	5

The more measurable a question is, the more likely subsequent assessments can be repeated over time with the same degree of accuracy

Example:

- ◆ Vibration: Smooth less than 0.05 inches/sec
Good = 0.05 and 0.1 inches/sec

Instead of

- ◆ Vibration: Smooth, Good

Results of Pump Station Condition Assessment Review Documented



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Review of Pump Station Condition Assessment

Collection System Condition Assessment

YEAR	ACTIVITIES
2009	Hierarchy created for CCSD #1 Collection System Risk evaluation for all CCSD #1 Collection System – “Top-Down” Field Condition Assessment of 6 pump stations – Updated Risk
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Results of CCTV Inspection Detailed in Report

HOODLAND CONDITION ASSESMENTS 2013

CLACKAMAS COUNTY, WATER ENVIORNMENT SERVICES



Clackamas County, Water Environment Services

Hoodland TV Inspection 2013

Executive Summary

In 2013, Clackamas County, Water Environment Services, conducted a comprehensive TV inspection of the Hoodland sanitary system. This system comprises of 7 basins, and the purpose of the inspections was to perform a condition assessment on the assets. The average age of the sanitary system is 40 years old, predominantly consisting of 8" concrete pipe. The substrate is comprised of sandy loam and river rock, topped with a dense layer of trees. Due to the nature of the soil, most of the concrete pipe was laid at minimal depth, therefore causing it to be in a higher risk area. The issues observed were cracks, fractures, holes, separated/offset joints, infiltration and extensive root intrusion. These issues will be intensified exponentially if left alone.

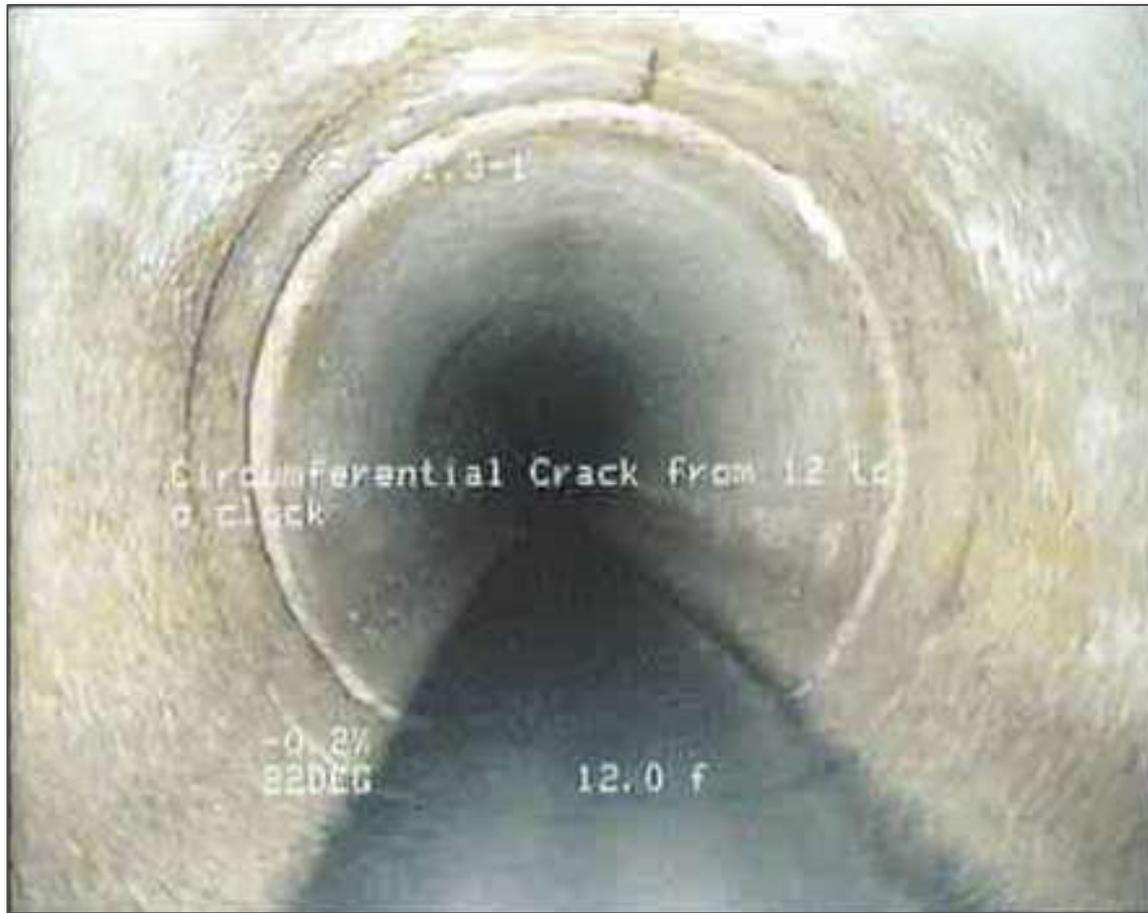
Report information was Reviewed using Clear Definitions Created for each Condition Score

TABLE 1
Pipe Condition Scores

Condition Score	Description
1—Very Good	Pipe in sound condition. No defects were observed.
2—Good	Pipe in generally good condition. Minor to moderate maintenance-related defects were observed, and/or minor structural deficiencies.
3—Fair	Isolated structural defects were observed that could lead to pipe failure if left unabated, and/or maintenance issues that impede hydraulic performance.
4—Poor	Several continuous structural defects and/or major maintenance issues. The pipe may not yet be in a failed state but has limited remaining useful life.
5—Very Poor	Pipe already in a failed state or failure is imminent.

250 Segments Inspected with CCTV

186 Pipe Segments were found to have no defects – Condition Score = 1



Reports Prepared for 64 Segments with Defects



Results of Collection System Condition Assessment Review Documented



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Condition Assessment of Gravity Sewer Pipelines

Hoodland Water Pollution Control Plant (WPCP) Condition Assessment

YEAR	ACTIVITIES
2009	Hierarchy created for CCSD #1 Collection System Risk evaluation for all CCSD #1 Collection System – “Top-Down” Field Condition Assessment of 6 pump stations – Updated Risk
2013	WES updates Condition Assessment of Pump Stations WES conducts CCTV inspection of Hoodland Collection System
2015	Begin Master Plan process for Hoodland System Conduct Condition Assessment of Hoodland Water Pollution Control Plant Review CCTV inspection records to assign condition scores to pipe segments Add WPCP Assets to Hierarchy Update Risk Assessment on Hoodland System assets

Approach and Structure for WPCP are same as used in 2008 Pump Station Condition Assessments

1. Gather/update asset data
2. Develop/confirm questions and possible answers
3. Upload required data into ACES tool
4. Conduct field condition assessment
5. Use Condition Scores in Risk Evaluation

New Asset Types were needed for WPCP

TABLE 4
Asset Types

Asset Types Shown in Bold Were Used at Hoodland WPCP				
Air Compressor	Conveyor	Generator - Hypochlorite	Pump - Diaphragm	Sub Pump
ATS	Door Roll Up	Grinder	Pump - Positive Displacement	Support Facilities
Auger	Drive	Hoist	Pump Screw	Tank
Backflow	Dryer	Instrument	Pump - Split Case	Vacuum System
Barscreen	Electrical Equipment	MCC	Pump Vertical Turbine	Valve
Basin	Fan	Mixer	RBC	Valve Slide
Blower	Filter	Motor	Remote Telemetry Unit	Vault
Boiler	Flume	Motor - Diesel	Safety	VFD
Building	Fuel Tank	Odor Equip	Sampler	Wet Well
Clarifier	Furnace	Pipe	Site	
Classifier	Gearbox	Pump	Station	
Control Panel	Generator	Pump - Centrifugal	Structure	

ATS = automatic transfer switch; MCC = motor control center; RBC = rotating biological contactors; VFD = variable frequency drives.

Approach and Structure are same as used in 2008 Pump Station Condition Assessments

TABLE 1
Example of Condition Criteria for Control Panel

Condition "Question" (Criteria)	Condition Weight	Range of "Condition Answers"
Acceptable Noise	1	Yes/No
All Components	2	Yes/No
Appearance	2	Excellent to Poor
All Safety Features Present	3	Yes/No
Absence of Burn Marks	1	Yes/No
Acceptable Smell or Heat	1	Yes/No
Control Gauges (Hour Meters for Volts and Amps)	1	Excellent to Not Operational
Control Lamps	1	All Working to Not Operational
Control Switches	1	Excellent to Not Functional/Missing
Corrosion	3	None to Severe
Good Housekeeping	1	Yes/No
Good Wire Labeling	1	Yes/No
Grounding	1	Yes/No
Infrared	3	Negligibly Ambient to Significant
Installation	2	Excellent Access to Unacceptable Access
Main Breaker	2	Normal to Failure Imminent
Operating at Inspection	1	Yes/No
Proper Drawings Accessible	2	Yes/No
Structural (Panel)	2	Excellent to Failure Imminent

Approach and Structure are same as used in 2008 Pump Station Condition Assessments

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Possible Answers were developed for All Questions with Variable Answers

TABLE 2

Example of Possible Answers and Ranges for Control Panel “Corrosion” Criterion

Question	Weight	Answer	Score
Corrosion	3	Like new	1 (None)
		Slight staining/small chips/holes in coating	2
		Corrosion with little metal loss	3
		Pitting and uniform corrosion	4
		Severe pitting and uniform corrosion with metal loss	5 (Severe)

Measurable Questions are Preferred

The more measurable a question is, the more likely subsequent assessments can be repeated over time with the same degree of accuracy

Example:

◆ Vibration: Smooth = less than 0.05 inches/sec

Good = 0.05 and 0.1 inches/sec

Instead of

◆ Vibration Smooth

Good

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Instead of

- ◆ Vibration: Smooth

Good

Asset Data is Uploaded into ACES¹

- Asset list
- Asset types
- Asset Condition questions



¹ACES[®] is an asset management reporting and data collection software application for storing and analyzing asset condition and risk assessment information

Field assessment data is captured in ACES

CONTROL PANEL, Pump Control Panel

General Condition Questions Risk Questions Photos and Documents

Save Changes Cancel

Question	Answer	N/A	Flag	Comment
Absence of Burn Marks	<input type="radio"/> yes <input type="radio"/> no	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Acceptable Noise	<input type="radio"/> yes <input type="radio"/> no	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Acceptable Smell or Heat	<input type="radio"/> yes <input type="radio"/> no	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
All Components	<input type="radio"/> yes <input type="radio"/> no	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
All Safety Features Present	<input type="radio"/> yes <input type="radio"/> no	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Good House Keeping	<input type="radio"/> yes <input type="radio"/> no	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Good Wire Labeling	<input type="radio"/> yes <input type="radio"/> no	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Grounding	<input type="radio"/> yes <input type="radio"/> no	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Operating at Inspection	<input type="radio"/> yes <input type="radio"/> no	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Proper Drawings Accessible	<input type="radio"/> yes <input type="radio"/> no	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Appearance (Carbon Dust)	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Control Gauges (Hour Meters Volts & Amps)	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Control Lamps	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Control Switches	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Corrosion - Structural Metals	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Infrared	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Installation	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Main Breaker	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>

Internet

Condition Data is Collected for each Asset Component, then “rolled up” to Asset/Facility level

Asset Name	Asset Type	Description	Location	Attribute Weight	Percent Weight	Condition Score	Weighted Condition Score	Total Score	Weighted Total Score
51-0001	SUB PUMP	Pump #1	51-Clackamas	1	2.174	1.4	0.03	0.561	0.012
51-0002	SUB PUMP	Pump #2	51-Clackamas	1	2.174	1.4	0.03	0.561	0.012
51-0003	SUB PUMP	Pump #3	51-Clackamas	1	2.174	1.4	0.03	0.561	0.012
51-0004	CONTROL PANEL	Pump Control Panel	51-Clackamas	1	2.174		0		0
51-0005	AIR COMPRESSOR	Bubbler #1	51-Clackamas	1	2.174	1.55	0.034	0.786	0.017
51-0006	AIR COMPRESSOR	Bubbler #2	51-Clackamas	1	2.174	1.55	0.034	0.786	0.017
51-0007	VAULT	Valve Vault	51-Clackamas	1	2.174	1.44	0.031	0.561	0.012
51-0008	WET WELL	Wet Well	51-Clackamas	1	2.174	1.91	0.042	0.786	0.017
51-0009	REMOTE TELEMETRY UNIT	Telemetry Equipment	51-Clackamas	1	2.174	1.56	0.034	0.786	0.017
51-0010	VALVE	ARV #1 82nd Street	51-Clackamas	1	2.174	1.3	0.028	0.561	0.012
51-0011	VALVE	ARV #2 Edgewater	51-Clackamas	1	2.174	1.3	0.028	0.561	0.012
51-0012	VALVE	ARV #3 High Rock	51-Clackamas	1	2.174		0		0
51-0013	VALVE	ARV #4 By Bridge	51-Clackamas	1	2.174	1.3	0.028	0.561	0.012
51-0014	VALVE	ARV #5 Agness Street	51-Clackamas	1	2.174	1.3	0.028	0.561	0.012
51-0015	VALVE	Vacuum Relief Valve #1	51-Clackamas	1	2.174	1.25	0.027	0.561	0.012
51-0016	VALVE	Vacuum Relief Valve #2	51-Clackamas	1	2.174	1.25	0.027	0.561	0.012
51-0017	VALVE	Vacuum Relief Valve #3	51-Clackamas	1	2.174	5	0.109	2.581	0.056
51-0018	VALVE	Check Valve #1	51-Clackamas	1	2.174	1.25	0.027	0.561	0.012
51-0019	VALVE	Check Valve #2	51-Clackamas	1	2.174	1.25	0.027	0.561	0.012
51-0020	VALVE	Check Valve #3	51-Clackamas	1	2.174	1.25	0.027	0.561	0.012
51-0021	SITE	Pump Station Site	51-Clackamas	1	2.174	1.33	0.029	0.561	0.012
51-0022	VALVE	Isolation Valve #1	51-Clackamas	1	2.174	1.23	0.027	0.561	0.012

Utility Staff Participation is Essential – and has other benefits



Assets at Hoodland Water Pollution Control Plant Added to Existing Hierarchy

ASSETS	CONSEQUENCE						LIKELIHOOD					RISK
	Health & safety of public and employees	Financial impact on Utility	Public confidence	Environmental compliance	System reliability	Consequence Score	Physical Condition	Performance	External and Internal Physical Factors Affecting the Asset	O&M Protocols/ Maintenance	Likelihood Score	RISK SCORE
	26%	15%	15%	18%	26%		35%	30%	15%	20%		
Wastewater System												
Treatment Facilities												
Hoodland WPCP (HSTP)	4	4	4	7	10	6.1	1	4	4	2	2.6	15.6
Pre-treatment												
MEVA Step Screen												
MEVA Step Screen Control Panel	4	4	4	1	4	3.5	1	1	1	2	1.2	4.2
MEVA Step Screen Compactor Motor	4	1	4	1	1	2.2	1	1	1	2	1.2	2.7
MEVA Step Screen Compactor	4	4	4	1	1	2.7	1	1	1	2	1.2	3.2
MEVA Step Screen	4	7	4	1	1	3.1	2	7	1	2	3.4	10.5
Grit Classifier	4	4	1	1	1	2.2	2	1	1	2	1.6	3.5
Primary Treatment												
Primary Clarifier Pump 1												
Primary Clarifier 1	4	7	4	1	1	3.1	2	1	1	2	1.6	4.9
Primary Clarifier 2	4	7	4	1	1	3.1	2	1	1	2	1.6	4.9
Primary Sampler	1	4	4	1	1	1.9	1	1	1	2	1.2	2.3
Secondary Treatment												
RBC 1A	4	7	4	4	4	4.5	2	1	1	2	1.6	6.9
RBC 1B	4	7	4	4	4	4.5	2	1	1	2	1.6	6.9
RBC 1C	4	7	4	4	4	4.5	2	1	1	2	1.6	6.9
RBC 2A	4	7	4	4	4	4.5	2	1	1	2	1.6	6.9
RBC 2B	4	7	4	4	4	4.5	2	1	1	2	1.6	6.9
RBC 2C	4	7	4	4	4	4.5	2	1	1	2	1.6	6.9
Process Air Blower 1												
Process Air Blower 1	4	7	4	1	1	3.1	2	1	1	2	1.6	4.9
Process Air Blower 1 Motor	4	7	4	1	1	3.1	2	1	1	2	1.6	4.9
Process Air Blower 2												
Process Air Blower 2	4	7	4	1	1	3.1	2	1	1	2	1.6	4.9
Process Air Blower 2 Motor	4	7	4	1	1	3.1	1	1	1	2	1.2	3.8

Assets at Hoodland Water Pollution Control Plant Added to Existing Hierarchy

ASSETS	CONSEQUENCE						LIKELIHOOD					RISK
	Health & safety of public and employees	Financial impact on Utility	Public confidence	Environmental compliance	System reliability	Consequence Score	Physical Condition	Performance	External and Internal Physical Factors Affecting the Asset	O&M Protocols/ Maintenance	Likelihood Score	RISK SCORE
	26%	15%	15%	18%	26%		35%	30%	15%	20%		
Wastewater System												
Treatment Facilities												
Hoodland WPCP (HSTP)	4	4	4	7	10	6.1	1		4	2	2.6	15.6
Pre-treatment												
MEVA Step Screen												
MEVA Step Screen Control Panel	4	4	4	1	4	3.5	1	1	1	2	1.2	4.2
MEVA Step Screen Compactor Motor	4	1	4	1	1	2.2	1	1	1	2	1.2	2.7
MEVA Step Screen Compactor	4	4	4	1	1	2.7	1	1	1	2	1.2	3.2
MEVA Step Screen	4	7	4	1	1	3.1	2	7	1	2	3.4	10.5
Grit Classifier	4	4	1	1	1	2.2	2	1	1	2	1.6	3.5
Primary Treatment												
Primary Clarifier Pump 1												
Primary Clarifier 1	4	7	4	1	1	3.1	2	1	1	2	1.6	4.9
Primary Clarifier 2	4	7	4	1	1	3.1	2	1	1	2	1.6	4.9
Primary Sampler	1	4	4	1	1	1.9	1	1	1	2	1.2	2.3
Secondary Treatment												
RBC 1A	4	7	4	4	4	4.5	2	1	1	2	1.6	6.9
RBC 1B	4	7	4	4	4	4.5	2	1	1	2	1.6	6.9
RBC 1C	4	7	4	4	4	4.5	2	1	1	2	1.6	6.9
RBC 2A	4	7	4	4	4	4.5	2	1	1	2	1.6	6.9
RBC 2B	4	7	4	4	4	4.5	2	1	1	2	1.6	6.9
RBC 2C	4	7	4	4	4	4.5	2	1	1	2	1.6	6.9
Process Air Blower 1												
Process Air Blower 1	4	7	4	1	1	3.1	2	1	1	2	1.6	4.9
Process Air Blower 1 Motor	4	7	4	1	1	3.1	2	1	1	2	1.6	4.9
Process Air Blower 2												
Process Air Blower 2	4	7	4	1	1	3.1	2	1	1	2	1.6	4.9
Process Air Blower 2 Motor	4	7	4	1	1	3.1	1	1	1	2	1.2	3.8

Results of Hoodland WPCP Condition Assessment Documented



DRAFT TECHNICAL MEMORANDUM 4.5

CH2MHILL

Hoodland Water Pollution Control Plant Condition Assessment

If Nothing Else, Remember This

When doing condition assessment and to make it repeatable over time:

1. Use well-defined questions
2. Use clear definitions for scores
3. Apply all questions consistently

Timberline Rim Pump Station

Control Panel – Motor Control Center #1

Comments (if applicable)

Condition Question	Answer	NA	Flag*	Comments
Absence of Burn Marks	5 - No			
Acceptable Noise	5 - No			
Acceptable Smell or Heat	1 - Yes			
All Components	1 - Yes			
All Safety Features Present	5 - No			
Operating at Inspection	1 - Yes			
Appearance (Carbon Dust)	3 - Moderate			
Control Gauges (Hour Meters Volts & Amps)	3 - Operational			
Control Lamps	3 - Operational			
Control Switches	3 - Operational			
Corrosion - Structural Metals	2 - Slight staining/small chips/holes in coating			
Good House Keeping	5 - No			
Good Wire Labeling	5 - No			
Grounding	1 - Yes			
Infrared	2 - Normal			
Installation/ Accessibility	3 - Moderate Defects			
Main Breaker	3 - Moderate Defects			
Proper Drawings Accessible	5 - No			
Structural Integrity (panel)	3 - Moderate Wear			
Condition Score: 3.105	Condition Category			



Discussion

Thank you!

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Scores for *Consequence* Factors Clearly Defined in Earlier Study – and Refined

Consequence by Level of Service Category					
LOS Category	Wt.	Negligible = 1	Low = 4	Moderate = 7	Severe = 10
Health & safety of public and employees	26%	Routine work. Does not involve confined space entry. No potential human contact.	Involves exposure to increased hazards, such as raw sewage in the street, or one of the following: - Confined space - Biohazard →20 feet above ground - Energized power >240v but <600v - Trench >10 ft. deep - Pipe adjacent to, or crossing arterial/major road, or bridge/river/stream crossing	Involves exposure to increased hazards such as raw sewage backup into dwellings or residential property, or two or more of the following: - Confined space - Biohazard →20 feet above ground - Energized power >240v but <600v - Trench >10 ft. deep - Pipe adjacent to, or crossing arterial/major road, or bridge/river/stream crossing	Involves exposure to extreme adverse conditions or hazards requiring significant challenges, such as: - Energized power ≥600v - Gases such as Cl ₂ , NH ₃ , HF, or explosive atmosphere - Very high concentrations of H ₂ S resulting in significant O ₂ deficiency - Gas main within trench
Financial impact on Utility	15%	Able to be absorbed in O&M budget's applicable cost center. Does not affect other O&M activities	Requires Director approval	Requires Board approval	May require new borrowing or impact rates
Public confidence	15%	No odor complaints. Minor disruption (e.g., traffic, dust, noise). No adverse media coverage. Minor service interruption, service restored without public reaction.	Localized odor complaints. Minor disruption (e.g., traffic, dust, noise). No adverse media coverage. Minor service interruption, service restored without public reaction.	Substantial increase in odor complaints. Substantial but short-term disruption. Adverse media coverage due to public impact.	Long-term impact. Area-wide disruption. Widespread adverse media coverage. Public outcry of dissatisfaction with utility services.
Environmental compliance	18%	Full compliance with NPDES and State permits	Some regulatory enforcement but no fines. (e.g. NOVs, formal notification to State). No environmental impact.	Probable enforcement action with fines. Short-term environmental impact that can be mitigated quickly.	Enforcement action with directed change in program(s) and redirection of priorities. Long-term environmental impact that cannot easily be mitigated.
System reliability	26%	No loss of treatment or system effectiveness. No loss of capacity. No SSOs. No flows to surface waters. Effluent/reuse and biosolids meet contractual requirements.	Potentially result in loss of treatment or system effectiveness if action is not taken quickly. Loss of <20% of system capacity but can still meet current flow conditions.. SSO, but not to stormwater infrastructure or surface waters. Effluent/reuse and biosolids meet contractual requirements.	Will immediately result in loss of treatment or system effectiveness, but with possible mitigation. Loss of ≥20% but <40% of system capacity impacting ability to meet peak flows SSO confined to stormwater infrastructure Effluent/reuse and biosolids does not meet contractual requirements.	Will immediately result in loss of treatment or system effectiveness, which cannot be easily reversed or mitigated. Loss of >40% system capacity impacting ability to meet average day flows. SSO to waters of the State Effluent/reuse and biosolids cannot be disposed of by normal processes.

Scores for *Likelihood* Factors Clearly Defined in Earlier Study – and Refined (Physical Condition)

Likelihood by Category						
Likelihood Category	Wt.	Negligible = 1	Unlikely = 2	Possible = 4	Likely = 7	Very Likely = 10
Physical Condition (General)		<p>Very good (Condition Grade 1).</p> <p>No deficiencies</p> <p>Needs no corrective maintenance</p> <p>Presently not a safety hazard</p>	<p>Good (Condition Grade 2).</p> <p>Few minor deficiencies</p> <p>Needs minimal amount of corrective maintenance</p> <p>Presently not a safety hazard</p>	<p>Fair (Condition Grade 3).</p> <p>Several minor deficiencies.</p> <p>Needs moderate amount of corrective maintenance.</p> <p>Presently not a safety hazard.</p>	<p>Poor (Condition Grade 4).</p> <p>Major deficiencies.</p> <p>Needs substantial amount of corrective maintenance or partial rehabilitation.</p> <p>Presently a potential safety hazard.</p>	<p>Very poor (Condition Grade 5).</p> <p>Asset may be unserviceable.</p> <p>Needs replacement or major rehabilitation.</p> <p>Presently a safety hazard.</p>
Physical Condition (Mechanical/ Electrical Equipment)		<p>No apparent damage or deterioration except for possible surface staining or discoloration</p> <p>Instrumentation is periodically calibrated with data documented and trended</p>	<p>Showing some wear and tear; some minimal damage or deterioration (e.g., a minor leak) although protective coatings are intact</p> <p>Instrumentation is periodically calibrated with data documented but not trended</p>	<p>Obvious damage or deterioration (e.g., moderate leak, abnormal vibration, some surface corrosion).</p> <p>Instrumentation is periodically calibrated but data not documented nor trended.</p>	<p>Considerable damage or deterioration (e.g., major leak, excessive vibration, corrosion affecting more than the surface, perforations).</p> <p>Instrumentation is periodically calibrated but data not documented nor trended.</p>	<p>Significant damage or deterioration; severe corrosion.</p> <p>Frequent breakdowns,</p> <p>Instrumentation is rarely calibrated, and data not documented nor trended</p>
Physical Condition (Structures)		<p>Sound structure with no apparent damage nor deterioration except for possible surface staining or discoloration</p> <p>Buildings are secure and weatherproof</p> <p>Appears well-maintained</p>	<p>Sound structure but showing minor wear and tear with some minimal damage or deterioration (e.g., minor spalling but no corrosion staining)</p> <p>Building is secure and weatherproof</p> <p>Needs some minor corrective maintenance</p>	<p>Sound structure but showing some obvious damage or deterioration (e.g., minor cracking, peeling coatings, moderate spalling with some corrosion staining, minor leak).</p> <p>Building has a minor leaks but otherwise secure.</p> <p>Needs corrective maintenance.</p>	<p>Structure is functioning but showing considerable damage or deterioration (e.g., significant cracking, spalling, major corrosion affecting a structural member, major leak, missing components, loss of stability, marked deformation).</p> <p>Building has several minor leaks or a major leak, but otherwise secure.</p> <p>Needs substantial corrective maintenance or partial rehabilitation.</p>	<p>Serious structural problems.</p> <p>Buildings are not secure nor weatherproof.</p> <p>Needs major rehabilitation or replacement.</p>
Physical Condition (Gravity Sewers)	35%	<p>No damage or deterioration with no evidence of internal or external degradation and no structural defects.</p>	<p>Slight deterioration such as circumferential cracking or minor joint defects.</p>	<p>Some minor defects (both O&M and structural) over not more than 25% of the length; structural defects 5% of the length.</p> <p>Exposed aggregate on concrete pipe; several misaligned joints; root intrusion.</p> <p>Deformation 0 to 5%.</p>	<p>Some moderate defects (both O&M and structural) over not more than 25% of the length; structural defects (including missing or collapsed liner) >5%, ≤10% of the length.</p> <p>Numerous misaligned joints; cracks, leaking, significant root intrusion.</p> <p>Visible I/I.</p> <p>Deformation 5% to 10% .</p>	<p>Significant defects (both structural and O&M) for over 25% of the length; structural defects (including missing or collapsed liner) >10% of the length; missing or collapsed liner.</p> <p>Deformation >10%.</p>
Physical Condition (Manholes)		<p>Sound structure well maintained with no problems with the structure, cover, frame, shelf and invert pipe entries</p> <p>No sediment or clogging</p>	<p>Structure showing minor wear and tear and minor deterioration, such as some surface damage but no corrosion staining, cracking or loss of stability</p> <p>Minor wear and tear of cover or frame, but good alignment.</p> <p>Sediment occasionally found, but no clogging</p>	<p>Structure showing some obvious damage or deterioration, such as minor cracking, peeling coatings, moderate spalling with some corrosion staining, minor leak, significant sedimentation, signs of vegetation.</p> <p>Obvious wear and tear of cover or frame, and/or some minor misalignment</p> <p>Sediment frequently found, and/or occasional clogging</p>	<p>Structure is functioning but showing considerable damage or deterioration, such as infiltration, loss of stability or deformation</p> <p>Cover, frame or steps showing signs of corrosion and/or significant misalignment</p> <p>Frequent clogging</p>	<p>Serious structural problems with structure, cover, frame and/or significant misalignment.</p>
Physical Condition (Force Mains)		<p>No damage or deterioration, and no evidence of internal or external degradation</p> <p>No history of pipe wall nor joint failures/breaks</p>	<p>No damage but evidence of slight external or internal degradation</p> <p>No history of pipe wall nor joint failures/breaks</p>	<p>Some damage or moderate external or internal degradation</p> <p>1-2 pipe wall or joint failures/breaks in past 10 years (per 1,000± feet of pipe)</p>	<p>Significant pipe wall or joint failures or evidence of significant external or internal degradation.</p> <p>More than 2 pipe wall or joint failures/breaks in past 10 years (per 1,000± feet of pipe).</p>	<p>Extensive external or internal degradation</p> <p>Frequent pipe wall or joint failures/breaks in the past 10 years</p>

Scores for *Likelihood* Factors Clearly Defined in Earlier Study – and Refined (Others)

Likelihood by Category						
Likelihood Category	Wt.	Negligible = 1	Unlikely = 2	Possible = 4	Likely = 7	Very Likely = 10
Performance	30%	<p>Meets all functional requirements with normal O&M procedures under all demand conditions (e.g., average and maximum day flow and peak design flow).</p> <p>Appropriate utilization and function.</p> <p>No surcharge in collection system.</p>	<p>Meets all functional requirements under all demand conditions (e.g., average and maximum day flow and peak design flow) but occasionally requires increased attention from O&M staff during extreme conditions.</p> <p>Inefficient due additional resource requirements (e.g. energy, labor, chemicals).</p> <p>No surcharge in collection system.</p>	<p>Meets functional requirements under most conditions (e.g., average and maximum day but not peak design flow).</p> <p>Occasionally unstable or difficult to operate without increased attention from O&M staff.</p> <p>Some components are obsolete with spare parts difficult to obtain.</p> <p>During peak design flow event, hydraulic grade line (water surface elevation) greater than 8 feet from ground but pipes are surcharged (pressurized).</p> <p>Force main may have insufficient capacity or must operate at significantly high pressures.</p>	<p>Meets functional requirements only under normal conditions (e.g., average day but not maximum day or peak design flow).</p> <p>Frequently unstable or difficult to operate without increased attention from O&M staff.</p> <p>Most or all components are obsolete with spare parts difficult to obtain.</p> <p>During peak design flow event, hydraulic grade line (water surface elevation) 2 feet to 8 feet of ground or basement elevations for 1 hour or greater.</p> <p>Pipes surcharged (pressurized).</p>	<p>Unable to meet current average capacity requirements.</p> <p>Does not meet functional requirements under normal conditions.</p> <p>Very unstable or difficult to operate even with increased attention from O&M staff.</p> <p>Water surface elevation within 2 feet of ground occurs for the peak design flow event</p>
External and Internal Physical Factors Affecting the Asset	15%	<p>Stable foundation and support.</p> <p>Appropriate installation and construction.</p> <p>Non-corrosive soils and flows.</p>	N/A	<p>Sewer crosses creek or river below grade with potential for undermining or washout.</p> <p>or</p> <p>Susceptible to flooding</p> <p>or</p> <p>Suspended pipeline or soils or flows somewhat corrosive to asset.</p>	<p>Unstable foundation and/or support; historical landslide; questionable construction</p> <p>Highly corrosive flows or highly corrosive soils</p>	<p>Unstable foundation, poor support and questionable construction</p> <p>Located within defined channel migration zone</p>
O&M Protocols/ Maintenance	20%	<p>Complete, up-to-date, written/ online, easily accessible.</p> <p>Appropriate maintenance over life.</p> <p>Ratio of planned maintenance hours to total maintenance hours is $\geq 70\%$.</p> <p>Planned maintenance activities rarely find needed corrective maintenance.</p> <p>Mean time between failure (MTBF) is acceptable and steady or trending higher.</p>	<p>Complete, written/ online, up-to-date, but not easily accessible.</p> <p>Ratio of planned maintenance hours to total maintenance hours is $<70\%$ but $\geq 60\%$.</p> <p>Planned maintenance activities rarely find needed corrective maintenance.</p> <p>MTBF is acceptable but trending lower.</p>	<p>Written/online but not complete or not up-to-date.</p> <p>General or broad written protocols.</p> <p>Recent or inadequate appropriate maintenance over life.</p> <p>Ratio of planned maintenance hours to total maintenance hours is $<60\%$ but $\geq 40\%$.</p> <p>Planned maintenance activities frequently find needed corrective maintenance.</p> <p>MTBF is unacceptable but trending higher.</p>	<p>Written/online but outdated or location unknown.</p> <p>Ratio of planned maintenance hours to total maintenance hours is $<40\%$ but $\geq 30\%$.</p> <p>Planned maintenance activities frequently find needed corrective maintenance.</p> <p>MTBF is unacceptable but steady.</p>	<p>No written or online protocols.</p> <p>No appropriate maintenance over life.</p> <p>Ratio of planned maintenance hours to total maintenance hours is $<30\%$.</p> <p>Planned maintenance activities always find needed corrective maintenance.</p> <p>MTBF is unacceptable and trending lower.</p>