Maturing Your Asset Management Program: *Lessons from the front line, to the bottom line.*

PNCWA Conference,
Portland, OR
Session 27A
September 11, 2019

CLARK
REGIONAL
WASTEWATER
DISTRICT

JACOBS

Laying the foundation
for a **vibrant economy**
and **healthy environment**

Presentation Overview

- **Section 1 – Background & Context**

- **Section 2 – Early Efforts**

- **Section 3 – Asset Management Roadmap**

- **Section 4 – Initial Condition and Criticality Assessment (ICCA)**

- **Section 5 – Lessons Learned/Takeaway Messages**

Section 1 – Background & Context

Background & Context
Discovery Clean Water Alliance

King County Wastewater System
King County, WA

Cascade Water Alliance
Pierce County, WA
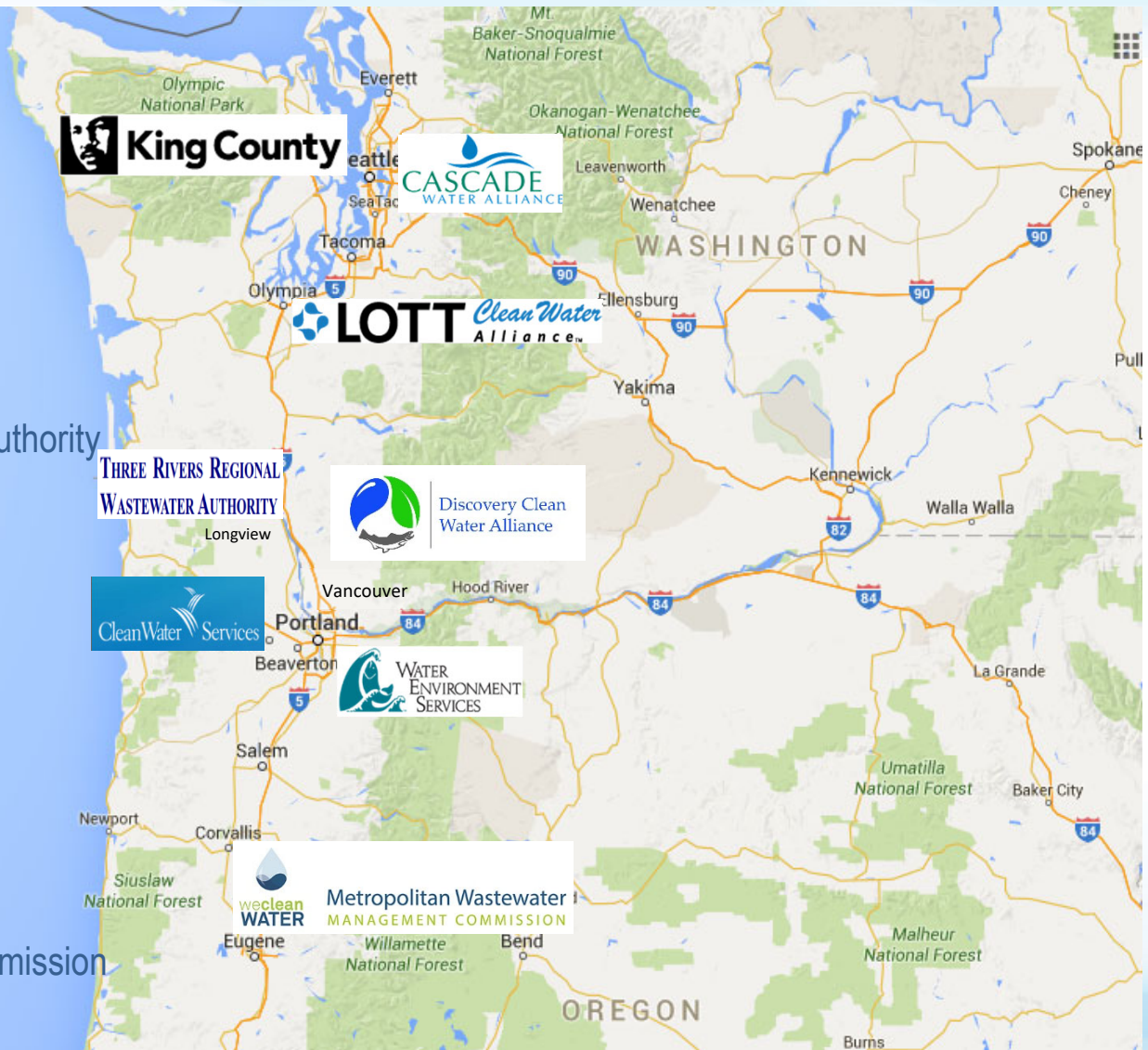
LOTT Clean Water Alliance
Thurston County, WA

Three Rivers Regional Wastewater Authority
Cowlitz County, WA

Discovery Clean Water Alliance
Clark County, WA

Clean Water Services
Washington County, OR

Water Environment Services
Clackamas County, OR

Metropolitan Wastewater Mgmt. Commission
Lane County, OR

Background & Context Discovery Clean Water Alliance

- **Regional Wastewater Transmission & Treatment Utility**
  - Formed under Joint Municipal Utility Services Act (JMUSA) – 39.106 RCW
    - ✓ New Washington State statute – 2011
    - ✓ Second agency to form under statute
- **Four Alliance Members**
  - City of Battle Ground
  - City of Ridgefield
  - Clark County
  - Clark Regional Wastewater District

Background & Context
Discovery Clean Water Alliance

- **Located in central Clark County, WA**
  - ○ Currently approximately 125k customers served
  - ○ Mostly urban areas north of City of Vancouver

- **10 regional assets**
  - ○ Regional gravity interceptors
  - ○ Regional pump stations/force mains
  - ○ Regional treatment plants
  - ○ Primary Asset ➡ Salmon Creek Treatment Plant

Background & Context
Discovery Clean Water Alliance

District's Role – Administrative Lead

- **Executive & Administrative Services**
- **Financial & Treasury Services**
- **Engineering & Capital Program**
  - New assets
    - ✓ Capacity management
    - ✓ Regulatory drivers
  - Existing assets (asset management)
    - ✓ Condition assessment
    - ✓ Repair and replacement

Background & Context
Discovery Clean Water Alliance

Starting Point for Alliance AM Program

- Inherit infrastructure from 3 different agencies
- Post-recession environment (limited investment)
- No intentional asset management program (focus had been OEM recommended maintenance)
- Major repairs had been addressed with past expansion projects
- Some on-demand failures occurring
- Known deficiencies/needs, but no formal process/program to address

Section 2 –
Early Efforts

Early Efforts

First Budget Period
(2013-2014 planning for 2015-2016 budget)

- **Process – introduce key concepts**
  - Needs: look for needs in available documentation
  - Solutions: turn needs or concerns into defined projects
  - Prioritize projects
    - ✓ Review all known projects/needs
    - ✓ Prioritization exercise – risk-based assessment
      - ❑ Risk of failure, consequence of failure scoring
      - ❑ Reviewed with 3 Alliance committees

Early Efforts

First Budget Period
(2013-2014 planning for 2015-2016 budget)

- **Outcomes**
  - Agree to acceptable funding level
    - ✓ Limited debt issuance to help "catch up"
  - Start making progress (6-year look ahead)
    - ✓ 11 projects
    - ✓ $13M
  - Budgets/projects supported by all Alliance Members

Early Efforts

Second Budget Period
(2015-2016 planning for 2017-2018 budget)

- **Process – continued investigation into known issues**
  - o Needs: more studies/reports/evaluations
  - o Solutions: improved list of projects/costs
  - o Prioritize Projects: similar to previous process

Early Efforts

Second Budget Period
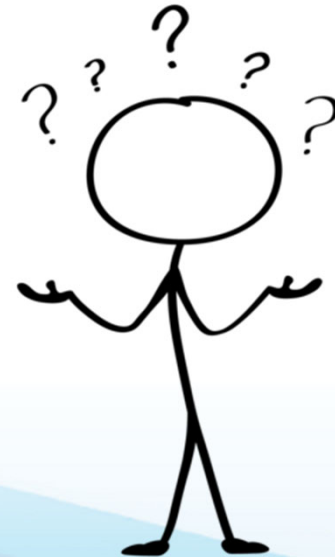## *(2015-2016 planning for 2017-2018 budget)*

- **Outcomes**
  - Transition to "pay as you go financing"
  - Updated project definition (6-year look ahead)
    - ✓ 15 projects
    - ✓ $13M
  - Budget/projects supported by all Alliance Members

Early Efforts

Third Budget Period
(2017-2018 planning for 2019-2020 budget)

- **Process – continued past processes but also address need for complete efforts**
  - No systematic evaluation of all systems
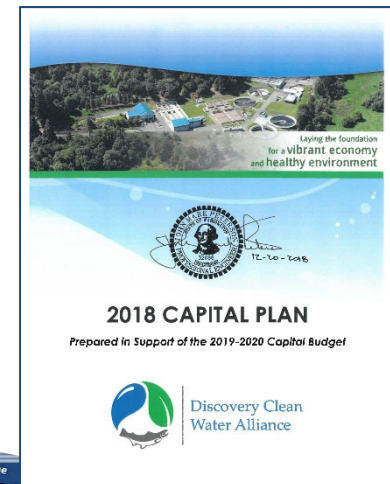 - Limited amount of condition assessment information
  - Still many unknowns…

Early Efforts

Third Budget Period
(2017-2018 planning for 2019-2020 budget)

- **Outcomes**
  - Two important steps forward
    - ✓ Asset management roadmap – overall assessment of asset management program status
    - ✓ Initial Condition and Criticality Assessment (ICCA) – first systematic assessment of all major equipment systems

Section 3 –
Asset Management Roadmap

Asset Management Roadmap
Evolution of Modern Asset Management

Restructuring of water sector in Australia and the UK
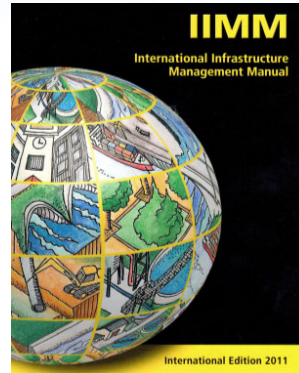
Comprehensive International Guidance
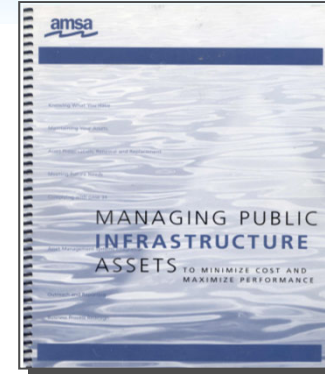
Comprehensive U.S. Guidance
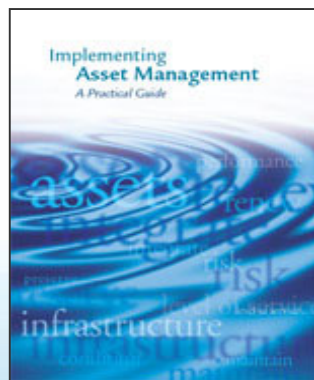
The Risk-Based Approach

UK Asset Management Specification (PAS 55)
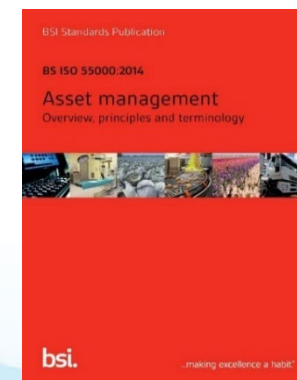
New International Standard for Asset Management (ISO 55000)

Asset Management Roadmap

Top 5 Benefits From Asset Management Approach

Improved Ability to Explain and Defend Budgets/Investments to Governing Bodies

88%

76%

Better Focus on Priorities

70%

Better Understanding of Risks/Consequences of Alternative Investment Decisions

65%

54%

34%

Non-Cost Savings Business Benefits

63%

51%

34%

Increased Ability to Balance Between Capital and Operating Expenditures

52%

46%

36%

● **High Involvement**
● **Medium Involvement**
● **Low Involvement**

SmartMarket Report

McGraw_Hill CONSTRUCTION

Water Infrastructure Asset Management:
Adopting Best Practices to Enable Better Investments

Premier Corporate Partner:
CH2MHILL.

Association Research Partners:
APWA · NACWA · NAWC
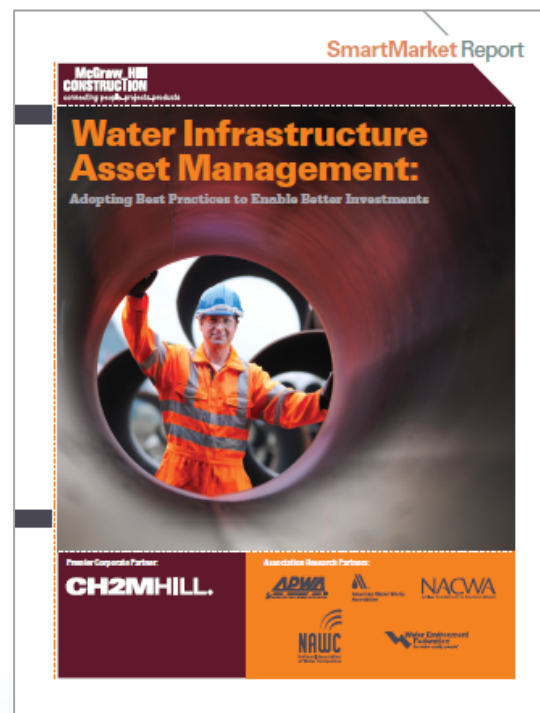
451 responding utilities

Source: McGraw-Hill Construction, 2012

Asset Management Roadmap

2017 Process

- ISO 55000 (2014)
  - Overview, Asset management system requirements, guidelines for application
- Key focus areas
- *Comprehensive Asset Management Review and Assessment (CAMRA)* developed as structured process to evaluate current and desired maturity for water utilities

Asset Management Roadmap

Evaluation of Key Focus Areas

- **Multi-disciplinary and involves leadership, management, finance, planning, engineering, operations and maintenance**
  1. Organizational context
  2. Asset management vision and leadership
  3. Asset management objectives and targets
  4. Asset management information requirements
  5. Planning to achieve asset management objectives
  6. Operational planning and control
  7. Asset management enablers and support

Asset Management Roadmap

Assess Position Along the AM Maturity Spectrum

- **Maturity assessment – Evaluate 38 themes spread across seven Key Focus Areas**

Learning	Applying	Embedding	Optimizing/Integrating	Continuous Improvement

Level 1	Level 2	Level 3	Level 4	Level 5
Innocence	Awareness	Development	Competence	Excellence
The need for AM has not been recognized and/or there is no evidence of a commitment to put it in place	The need for AM has been identified, and there is evidence of intent to implement.	Plans are in place to systematically and consistently achieve AM principles and practices are documented	The organization can demonstrate it systematically and consistently achieves relevant requirements set out in AM standards	The organization can demonstrate it is systematically and consistently optimizing its Asset Management practice, in line with the organization's objectives and operating context.

Asset Management Roadmap

2017 Process: Comprehensive Asset Management Review & Assessment

- **Preparation – background, facility tours, coach participants**
- **Conduct workshop**
  - Staffing, CMMS, finance

Asset Management Roadmap
CAMRA – *Jacobs' Assessment Tool – Scores AM Maturity in the 7 Key Focus Areas*

2 Questions → **Organizational Context**
- Strategic Plan
- Strategic Goals
- Stakeholders

6 Questions → **AM Vision & Leadership**
- AM Policy
- SAMP
- Governance

3 Questions → **AM Objectives & Targets**
- AM Objectives
- Levels of Service
- Future Trends

6 Questions

6 Questions

6 Questions

9 Questions

6 Questions

Planning to Achieve AM Objectives
- AM Strategies
- Risk Framework
- Lifecycle Costing
- Asset Management Plans
- DIP Development & Governance

AM Information Requirements
- AM Information Strategy
- Asset Inventory
- Asset Information Stds.
- Information Mgmt.
- Data Analysis

Operational Planning & Control
- Project Lifecycle
- Operations Mgmt.
- Maintenance Mgmt.
- Emerg. Preparedness
- Major Failure Analysis
- Shutdown/Outage Mgmt.

AM Enablers and Support
- IT Systems
- Documentation Control
- Knowledge Retention
- QA/QC
- Communication
- Change Management
- Continuous Improvement

23

Asset Management Roadmap

Example: Scoring Guidance for Each of 38 Themes

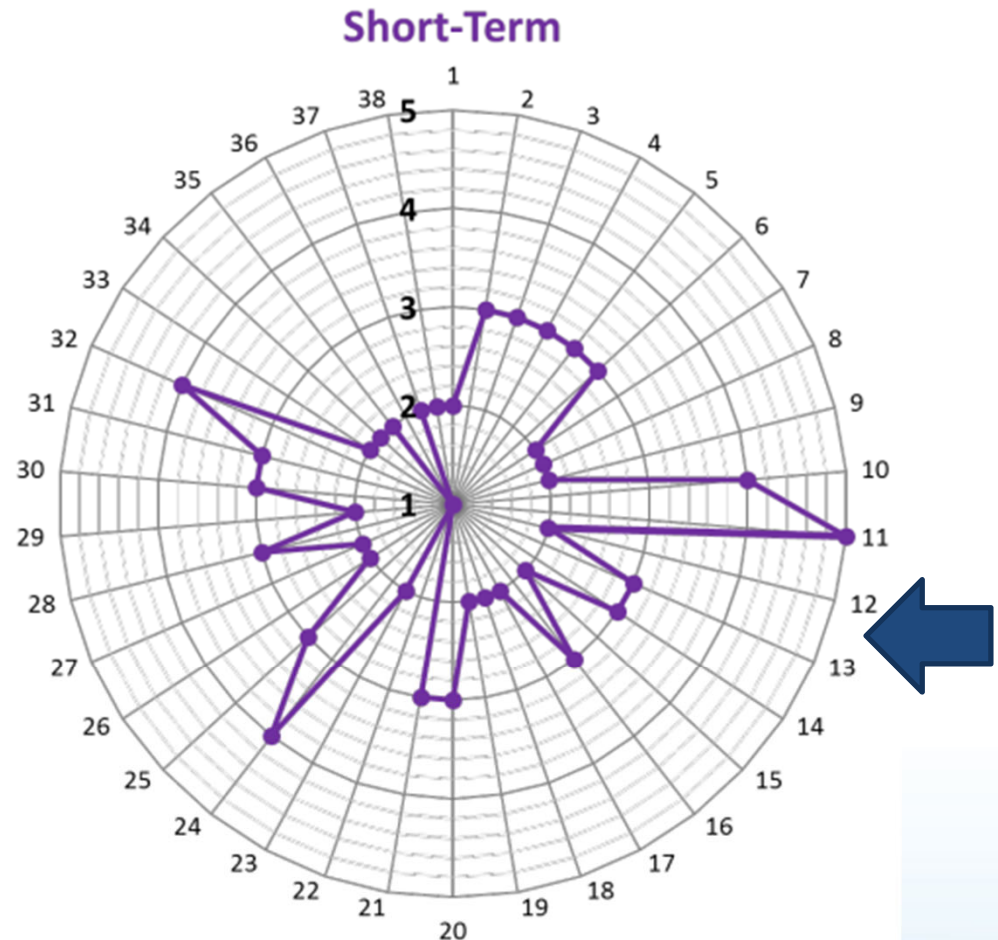| Key Focus Area	Theme	Score Descriptions				
		1	**2**	**3**	**4**	**5**
Asset Management Information Requirements	13 Asset Inventory	There is no documented asset inventory in place and therefore it is not clear what assets are owned by the Alliance.	• The Alliance has some asset records although these may not be formally structured, located in different databases and have significant gaps in coverage or accuracy. • Records are created and maintained in an ad hoc manner. • Asset information is only captured at a high level (e.g. facility/site level) with little or no associated attributes. • Coverage and currency of assets in the inventory would generally be poor.	• The Alliance has developed a formal asset inventory which is only accessible by a limited number of staff. • There is a defined asset hierarchy in place, although the hierarchy is not consistently populated to the level that would be considered fully accurate or complete. • Coverage and currency of assets in the inventory would generally be considered fair.	• The Alliance has comprehensive asset inventory that has been reviewed to ensure it meets AM needs. • Access to the asset inventory is easily available and accessible to all appropriate staff. • The asset inventory is structured to capture assets at the appropriate level in the asset hierarchy and coverage and currency is considered good. • The asset inventory fully supports financial reporting requirements.	• The Alliance's asset inventory is fully integrated with other relevant information systems to enable data to be easily accessed, shared and leveraged for improving O&M and capital decision-making. • The updating of asset inventory data is monitored and actions are consistently taken to ensure that data accuracy and coverage is kept to a high standard. • Coverage and currency is considered excellent.

Asset Management Roadmap
Current Maturity (2017)

Key Focus Areas		Theme	
1	Organizational Context	1	Organizational Strategic Plan & Organizational Objectives
		2	Understanding the Needs of Stakeholders
2	Asset Management Vision & Leadership	3	Asset Management Policy & Strategic Asset Management Plan
		4	Asset Management Leadership & Governance
		5	Asset Management Roles & Responsibilities
		6	Prioritized Plan for The Development of Asset Management Business Processes & Procedures
		7	Prioritized Plan for the Development of Asset Management Skills & Competences
		8	Prioritized Plan for Information Technology Functional Requirements
3	Asset Management Objectives & Targets	9	Asset Management Objectives - Performance Metrics/Levels of Service
		10	Future Trends (Impact of Growth)
		11	Legal, Regulatory & Statutory Requirements
4	Asset Management Information Requirements	12	Asset Information Strategy & Asset Information Improvement Plan
		13	Asset Inventory
		14	Asset Information Standards
		15	Asset Information
		16	Information Management
		17	Asset Knowledge/Analysis of Data
5	Planning to Achieve Asset Management Objectives	18	Asset Strategies
		19	Risk Framework - Strategic Level
		20	Risk Framework - Asset Level
		21	Optimized Asset Intervention Planning
		22	Asset Management Plans
		23	Capital Investment Plan Development & Governance
6	Operational Planning & Control	24	Capital Projects - Planning, Design, Construction & Commissioning
		25	Operations Management
		26	Maintenance Management
		27	Investigation and Recording of Routine Asset Failures & Reactive Work
		28	Contracted Operations & Maintenance
		29	Materials Management
		30	Emergency Preparedness & Response
		31	Investigation of Major Asset Failures & Incidents
		32	Shutdown and Outage Management
7	Asset Management Enablers & Support	33	Asset Information Systems Implementation plan
		34	Control of Documented Information
		35	Knowledge Retention & Succession Planning
		36	Asset Management Quality Assurance & Management Review
		37	Continual Improvement Culture
		38	Communication & Change Management

Current

Asset Management Roadmap
Short-Term Maturity Objectives (2020)
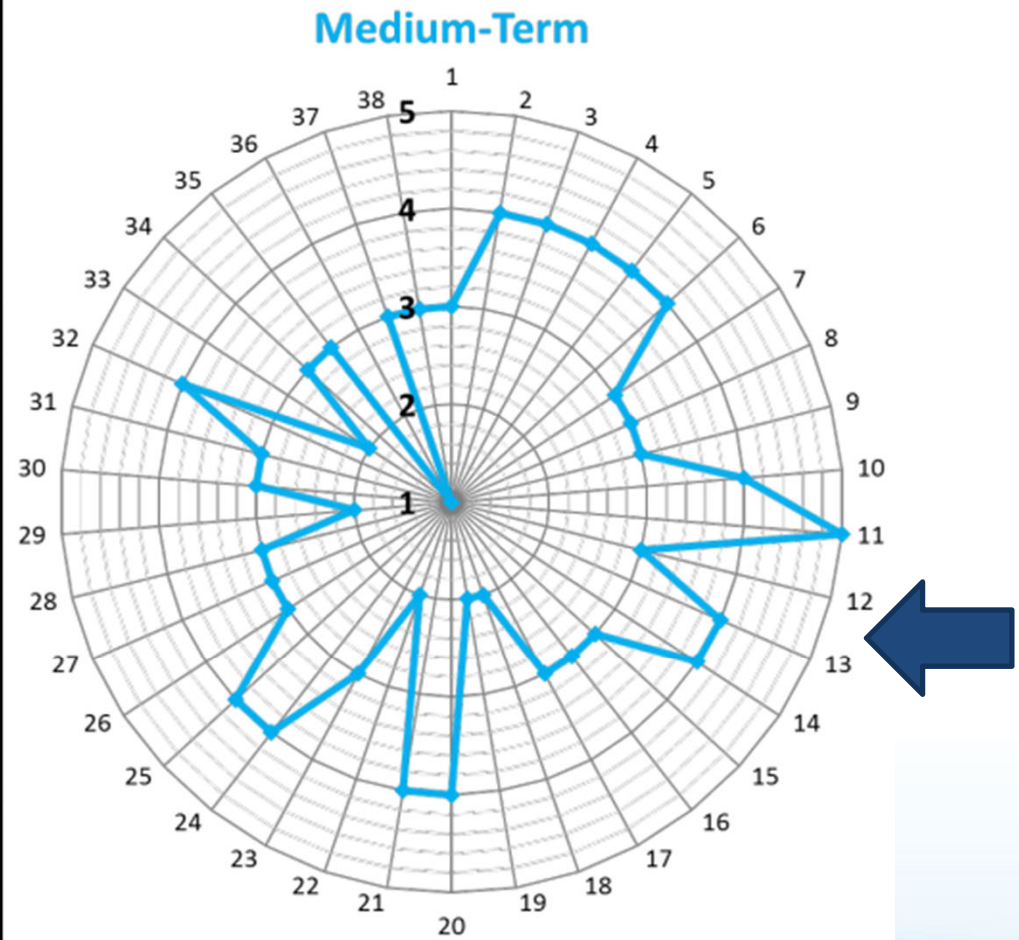
Key Focus Areas		Theme	
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Short-Term

Asset Management Roadmap

Medium-Term Maturity Objectives (2022)
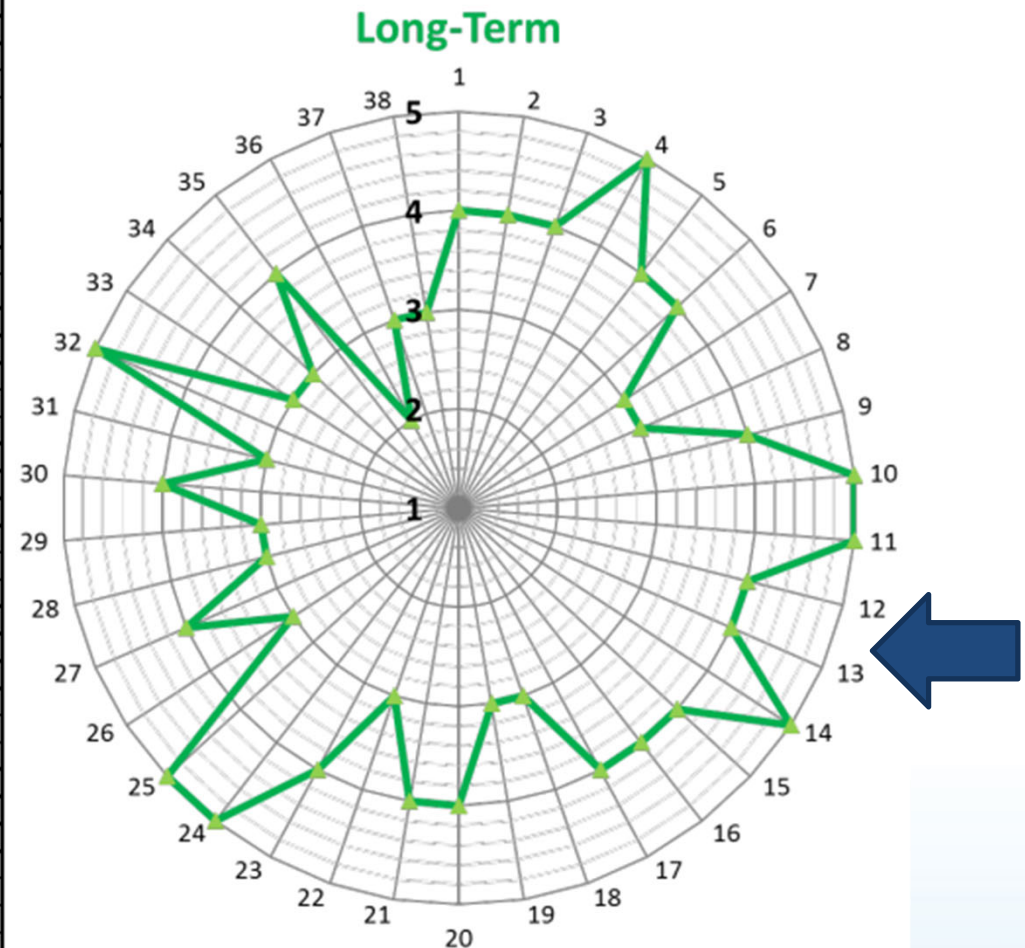
Key Focus Areas		Theme	
1	Organizational Context	1	Organizational Strategic Plan & Organizational Objectives
		2	Understanding the Needs of Stakeholders
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		37	Continual Improvement Culture
		38	Communication & Change Management

Medium-Term

Asset Management Roadmap
Long-Term Maturity Objectives (2022)

Key Focus Areas			Theme
1	Organizational Context	1	Organizational Strategic Plan & Organizational Objectives
		2	Understanding the Needs of Stakeholders
2	Asset Management Vision & Leadership	3	Asset Management Policy & Strategic Asset Management Plan
		4	Asset Management Leadership & Governance
		5	Asset Management Roles & Responsibilities
		6	Prioritized Plan for The Development of Asset Management Business Processes & Procedures
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Long-Term

Asset Management Roadmap

Prioritization for Action – Score Each Theme Area

- Target increase in maturity (1 – 9)
- Prerequisites (1 – 3)
- Perceived resources required (1 – 3)

Combined product for each theme area results in a prioritization for action

Asset Management Roadmap

Tier 1 – Implementation List

Table 3-2. Themes in Order of Initial Priority for Improvement
Prior to Considering Prerequisites and Other Qualitative Issues

	Theme	Priority Score				Initial Priority Tier	Comments
		Criterion No. 1	Criterion No. 2	Criterion No. 3	Overall Priority		
1	Organizational Strategic Plan and Organizational Objectives	2	1	1	2		
3	Asset Management Policy and Strategic Asset Management Plan (SAMP)	1	2	1	2		Dependent on Themes 2, 9, and 20
2	Understanding the Needs of Stakeholders	3	1	1	3		
6	Prioritized Plan for the Development of Asset Management Business Processes and Procedures	1	1	3	3	1	
7	Prioritized Plan for the Development of Asset Management Skills & Competences	2	1	2	4		
4	Asset Management Leadership and Governance	3	2	1	6		Dependent on Themes 1 and 2
13	Asset Inventory	3	1	3	9		
20	Risk Framework - Asset Level	3	2	2	12		Dependent on Theme 9 Moved from Tier 2 to support SAMP (Theme 3)
9	Asset Management Objectives - Performance Metrics/ Levels of Service	6	2	2	24		Moved from Tier 3 to support Risk Framework at the Asset Level (Theme 2)

Asset Management Roadmap

Action Plan and Schedule

- Tier 1, 2 and 3
- Task, timing, duration, outcome
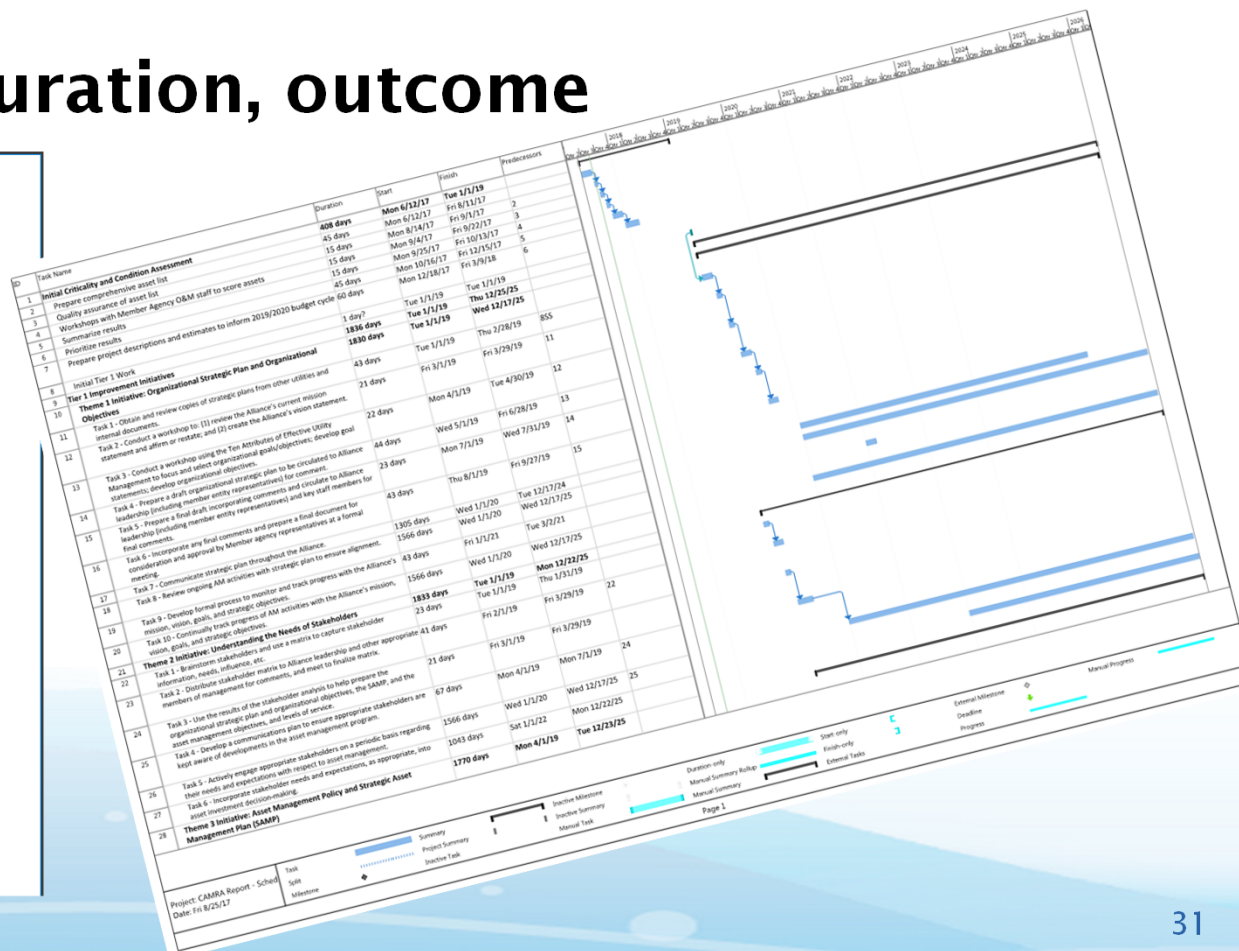
Asset Management Roadmap

2017 Process

- **Roadmap in Hand! Where to next?**
- **Barrier to immediate implementation**
- **Interim need for planning and budgeting**
- **Parallel path**
  - Initial Criticality & Condition Assessment
  - Roadmap implementation
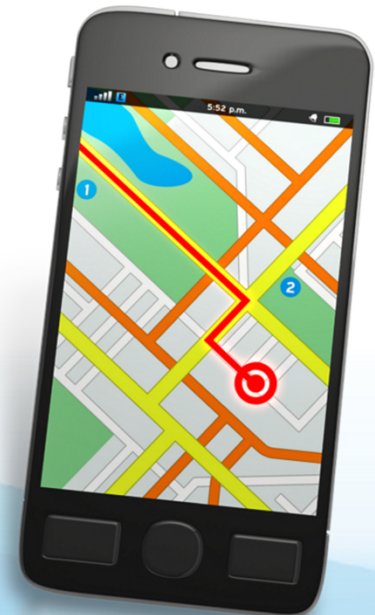
Section 4 – Initial Condition and Criticality Assessment (ICCA)

ICCA

Why Not Just Follow the Roadmap?

- **Primary asset – Salmon Creek Treatment Plant**
  - Operated by Clark County
  - Legacy MMS setup for OEM maintenance
  - No way to connect MMS to County financial software at the time
  - County vs. District MMS/financial systems
- **Staff workload**
- **Budget constraints**

ICCA

The 80/20 Principle

- **Discovered in 1897 by Italian economist Vilfredo Pareto**
  - 20% of population had 80% of wealth
- **"…a minority of causes, inputs, or effort usually lead to a majority of the results, outputs, or rewards."**
- **"…for many events, roughly 80% of the effects come from 20% of the causes."**

Pareto Principle

20% of the input (time, resources, effort) accounts for 80% of the output (results, rewards)

ICCA

The ICCA Plan (80/20 Approach)

- **Develop scoring matrix for risk of failure (ROF) and consequence of failure (COF)**
- **Create comprehensive asset list**
  - To the pump/valve level, not light switches!
- **Assess likelihood and consequence of failure for those assets**
  - Based on staff knowledge and some engineering analysis
  - No formal data collection

ICCA

The ICCA Plan (80/20 Approach)

- Calculate risk = ROF x COF
- Develop project profiles
- Develop R&R program
- Set the stage for future incremental improvements by identifying where more formal or specialized assessments are needed for next biennium
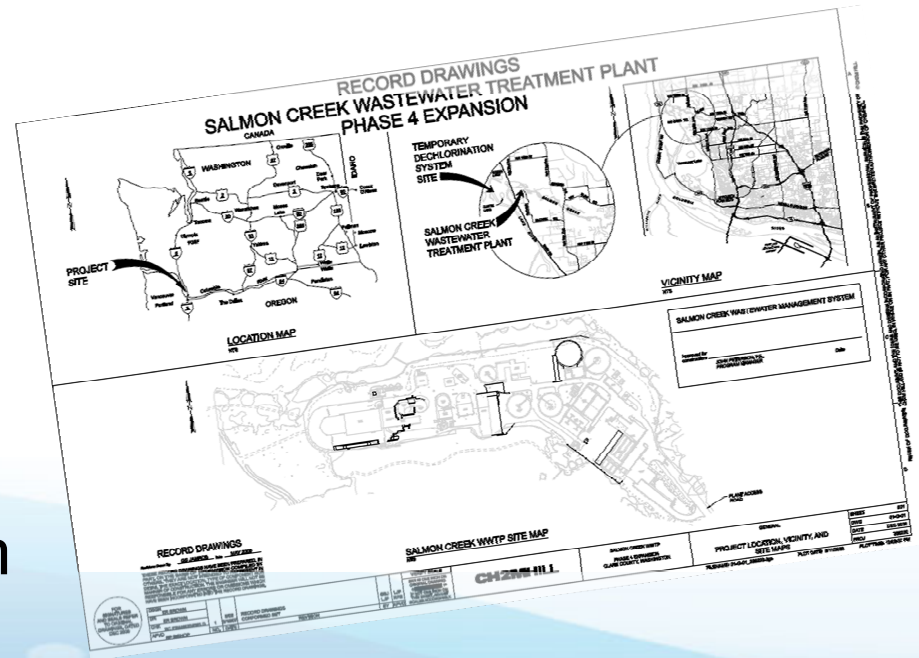
ICCA

The Scoring Matrix

- **Key to ensuring consistent assessment of ROF and COF**

RISK OF ASSET FAILURE					
Category	Negligible = 1	Low = 3	Moderate = 5	High = 7	Very High = 10
Physical Condition	Condition Grade 1 (Very Good) No deficiencies AND Needs no corrective maintenance AND Presently not a safety hazard	Condition Grade 2 (Good) Few minor deficiencies AND/OR Needs minimal amount of corrective maintenance BUT Presently not a safety hazard	Condition Grade 3 (Fair) Several minor deficiencies AND/OR Needs moderate amount of corrective maintenance BUT Presently not a safety hazard	Condition Grade 4 (Poor) Major deficiencies AND/OR Needs substantial amount of corrective maintenance or partial rehabilitation AND/OR Presently a potential safety hazard	Condition Grade 5 (Very Poor) Asset may be unserviceable AND/OR Needs replacement or major rehabilitation AND/OR Presently a safety hazard
Performance	Meets all functional requirements with normal O&M procedures under all demand conditions (e.g., avg and max day flow and peak hour flow; high and low temperatures)	Meets all functional requirements under all demand conditions (e.g., avg and max day flow and peak hour flow; high and low temperatures) but occasionally requires increased attention from O&M staff during extreme conditions AND/OR Inefficient due additional resource requirements (e.g. energy, labor)	Meets functional requirements under most conditions (e.g., avg and max day but not peak hour) AND/OR Occasionally unstable or difficult to operate without increased attention from O&M staff AND/OR Some components are obsolete with spare parts difficult to obtain	Meets functional requirements only under normal conditions (e.g., avg day but not max day or peak hour) AND/OR Frequently unstable or difficult to operate without increased attention from O&M staff AND/OR Most or all components are obsolete with spare parts difficult to obtain	Does not meet functional requirements under normal conditions AND/OR Very unstable or difficult to operate even with increased attention from O&M staff
Maintenance History	Ratio of planned maintenance hours to total maintenance hours is ≥ 70% AND Planned maintenance activities rarely find needed corrective maintenance AND Mean time between failure (MTBF) is acceptable and steady or trending higher	Ratio of planned maintenance hours to total maintenance hours is <70% but ≥60% AND Planned maintenance activities rarely find needed corrective maintenance AND MTBF is acceptable but trending lower	Ratio of planned maintenance hours to total maintenance hours is <60% but ≥40% AND/OR Planned maintenance activities frequently find needed corrective maintenance AND/OR MTBF is unacceptable but trending higher	Ratio of planned maintenance hours to total maintenance hours is <40% but ≥30% AND/OR Planned maintenance activities frequently find needed corrective maintenance AND/OR MTBF is unacceptable but steady	Ratio of planned maintenance hours to total maintenance hours is <30% AND/OR Planned maintenance activities always find needed corrective maintenance AND/OR MTBF is unacceptable and trending lower

CONSEQUENCE OF ASSET FAILURE					
	Negligible = 1	Low = 3	Moderate = 5	High = 7	Very High = 10
Regulatory Compliance and Environmental Impact	Full compliance with regulatory requirements and permits	If not addressed, will create potential for permit or regulatory violation	Potential for permit or regulatory violation	Potential for exceedance of permit limits	Permit or regulatory violation, with an exceedance of permit limits
System Reliability	No loss of treatment or system effectiveness Full automated redundancy	No loss of treatment or system effectiveness but need to use redundant systems Manual operation of equipment required Manual redundancy Deviation from standard process	Potentially result in loss of treatment or system effectiveness if action is not taken within the return to service time for the asset Additional staff time required Eventual damage to equipment	Will immediately result in loss of treatment or system effectiveness but with possible mitigation Immediate damage to equipment Flooding / overflows on site	Will immediately result in loss of treatment or system effectiveness and cannot be easily reversed or mitigated No redundancy Flooding / overflow off site
Health and Safety	Routine work not requiring emergency response	Routine work requiring emergency response	Facility employees exposed to increased hazards (i.e. confined space, biohazard, heights >20 ft above ground, > 10 ft deep trench)	Facility employees exposed to multiple increased hazards (i.e. confined space, biohazard, heights >20 ft above ground, > 10 ft deep trench) Safety hazards contained on site	Employee exposure to extreme adverse conditions or hazards requiring non-routine activities (i.e. energized power, explosive atmosphere, O_2 deficient atmosphere) Off site public safety hazard

ICCA

Create the Asset List

- **Record Drawings used to create initial lists**
- **Systematic building/structure review with key staff**
  - Identify key components or assets to assess
  - Identify both operational and maintenance issues for each component
  - No formal data collection

ICCA

Create the Asset List

ICCA

Assess Likelihood & Consequence of Failure

- **Facilitated workshops**
  - Review each asset and choose ROF and COF based on scoring matrix
  - Follow-up engineering and vendor input to address questions
- **Scoring matrix was crucial to ensure consistency**

ICCA

Calculate Risk = ROF x COF

- **359 assets scored**

Building No.	Process	Name	Discipline	Equipment Type	Consequence of Failure (1 - 10)	Risk of Failure (1 - 10)	Composite Score
1	Primary Treatment	Influent Pump Station	Mechanical	Precast Valve Vault	3	1	3
2	Primary Treatment	Influent Pump Station	Mechanical	Triple Leaf hatch	3	1	3
3	Primary Treatment	Influent Pump Station	Mechanical	Checkered PL Cover	3	1	3
4	Primary Treatment	Influent Pump Station	Mechanical	Baffle PL	3	1	3
5	Primary Treatment	Influent Pump Station	Mechanical	Submersible pump	7	3	21
6	Primary Treatment	Influent Pump Station	Mechanical	Check valve	7	1	7
7	Primary Treatment	Influent Pump Station	Mechanical	SS Guide Rails	7	5	35
8	Primary Treatment	Influent Pump Station	Mechanical	SS Float Hanger	5	1	5
9	Primary Treatment	Influent Pump Station	Mechanical	Level transducer	7	1	7
10	Primary Treatment	Influent Pump Station	Mechanical	High Water Alarm Float	7	1	7
11	Primary Treatment	Influent Pump Station	Mechanical	Low Water Alarm Float	7	1	7
12	Primary Treatment	Influent Pump Station	Mechanical	Pipe Supports	1	1	1
13	Primary Treatment	Influent Pump Station	Structural	Structure over IPS Control Panel	1	1	1

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Develop Project Profiles

- **Of 359 assets scored, 8% scored over and 25 were defined into Project Profiles**

Discovery Clean Water Alliance
CAPITAL PROJECT PROFILE

Project Name: Upper Salmon Creek Interceptor Repair
Project Number: RA01-16-1
Form Prepared/Updated: April 2014

Project Type: Existing Asset – Repair ☒
Existing Asset – Replacement ☐
New Asset – Capacity ☐
New Asset – Regulatory ☐
New Asset – Level of Service ☐

Project Definition:

Objective. The project will repair extensive corrosion in the Salmon Creek Interceptor due to the discharge of hydrogen sulfide (H2S) from the Battle Ground Force Main between 1993 and 2006, and due to pressurization from the St. Johns Interceptor.

Scope of Work. The project will re-line approximately 2,174 feet of 21-inch diameter concrete pipe and 351 feet of 24-inch concrete pipe in Salmon Creek Avenue near the I-205 overpass. This piping was originally installed in 1975. A trenchless technology will be used to re-line the pipe from inside, eliminating the need for major excavation. The project will also provide for repair of service laterals connected to the damaged pipe, coordinate traffic control in Salmon Creek Avenue, bypass pump sewer flows around the work area during construction and provide for public engagement of the residents near the project.

Cost Allocation. A project-specific cost allocation structure is being utilized for this project based on an assessment of several factors that contributed to the deterioration of the pipeline. The resulting cost allocation is 50.9% of total project costs to Battle Ground, and 49.1% to the District. See supplemental information section (reverse side) for additional detail. For additional information related to this project, see *The Clark Regional Wastewater District, 2012 Inspections Report, Brown & Caldwell, May 2013.*

Photos *(if available)*:

Erosion in the Pipe – Near Corbin Road   Salmon Creek Avenue   Crack in the Pipe – South of 127th Street

Budget Information:

Project Cost Estimate
Total Project Cost: $790,000
Construction Cost: $610,000
Basis of Estimate –
Year Completed: 2014
Project Definition: 5% design (Class 4)

Project Cost Allocation
Battle Ground: 50.9% $402,000
Clark County: 0.0% $0
District: 49.1% $388,000
Ridgefield: 0.0% $0
Total: 100.0% $790,000

Schedule Information:

Activity   Year
Planning   Completed
Permitting   2015
Real Property/ROW N/A
Design   2014-2015
Bid   2016
Construction   2016

Schedule Note:
A portion of the design work is budgeted to be completed in 2014. As a result, the total project costs carried forward in the Capital Budget will be $740,000.

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Develop R&R Program

- **Focus on first 6 years**
- **Balance priorities, schedules, and costs**

Repair and Replacement (R&R) Program (all costs are in 2018 dollars)

Year	Spent to-Date	1 2019	2 2020	3 2021	4 2022	5 2023	6 2024
Project Name							
Expenditures							
R&R Projects							
#1-80 Klineline Interceptor Manhole Repair	-	27	244	-	-	-	-
#2-IC SCTP Digester Maintenance and Modifications	-	324	-	-	-	-	-
#3-70 SCTP Boiler Exhaust Stack Replacement	-	130	-	-	-	-	-
#4-70 SCTP Biosolids Cake Transfer Screw Replacement	-	390	-	-	-	-	-
#5-70 SCTP HVAC Systems Replacement	-	300	336	185	142	142	142
#6-70 SCTP Fire Alarm System Replacement	-	-	120	1,281	137	-	-
#7-56 SCTP Boiler Gas Boosters	-	20	185	-	-	-	-
#8-50 SCTP Sludge Blend Tank Slope Stabilization	-	-	-	-	123	-	-
#9-35 SCTP Primary Sludge Pump Replacement	-	-	-	-	428	-	-
#10-35 SCTP Access Road and Asphalt Repair	-	-	-	-	-	286	-
#11-30 SCTP Fire Pump Controller Replacement	-	-	-	-	-	272	-
#12-P6 SCTP Influent Screen Replacement (Phase 6)	-	-	-	-	-	33	33
#13-P6 SCTP UV System Replacement (Phase 6)	-	-	-	-	-	165	165
#14-P6 SCTP Dewatering Equipment Replacement (Phase 6)	-	-	-	-	-	167	167
#15-50 RTP Aeration Basin Mixer Support/Concrete Repair	-	74	-	-	-	-	-
Annual R&R Allowance	-	125	125	125	125	125	125
Total Annual R&R Projects Expenditures	-	1,390	1,010	1,591	955	1,190	632

9 | New Projects Identified Through 2017-2018 ICCA Process
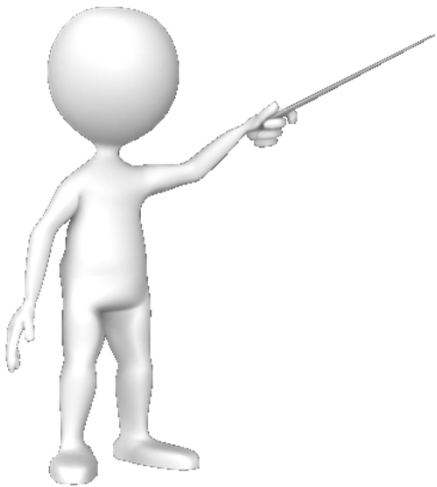
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Future Assessments

- **Systems that require better understanding**
  - Instrumentation & controls
  - Medium voltage electrical systems
  - Yard piping
  - SCADA network
- **Budgeted for next biennium (currently being completed)**

Section 5 –
Lessons Learned/
Takeaway Messages

Lessons Learned/Takeaway Messages

- **Use simple tools to achieve meaningful results**
- **For relatively low investment get large value**
- **Wide variety of opinions**
    - Driving consistency through use of agreement of common scoring guidance

Lessons Learned/Takeaway Messages

- **Use these tools to battle against institutional inertia or inaction or reputation**

- **Change over to Alliance**
  - Changed management resulted in changed asset management practices and priorities

Lessons Learned/Takeaway Messages

- **Items from process Operations was not aware of (let's just fix this!)**
  - Generator breaker doesn't work; here are washers that must be replaced all the time
  - RAS piping flow capacity; Alliance perspective, need to fix it; not band-aid it
  - Line level staff know things that the wastewater treatment plant operations management staff may not know
  - Have right people in room kicking tires

Lessons Learned/Takeaway Messages

- **Continuous improvement – grow the program a small step each year**
  - ○ Long term to address systematic changes to fully implement asset management (i.e., financial systems), but can make meaningful progress

- **Quality document and presentations for stakeholders**
  - ○ Alliance Capital Plan: https://www.discoverycwa.org/docs/2018_Capital_Plan_Adopted_122118.pdf

Questions & Answers

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Thank you!

PRESENTATION MATERIALS

- Complete presentation available at:
  www.crwwd.com/presentations.html