Detroit Water and Sewerage Department

Wastewater Operations Group

Asset Management Program

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TABLE OF CONTENTS

ATTACHMENT II: PREVENTIVE MAINTENANCE PLAN II

ATTACHMENT III: PREDICTIVE MAINTENANCE PLAN II

ATTACHMENT IV: ANNUAL SCHEDULED REPLACEMENT PLAN (SRP) UPDATE NOVEMBER 27, 2013 II

ATTACHMENT V: SCHEDULED REPLACEMENT PROGRAM REPORT FOR CSO FACILITIES AND WASTEWATER PUMPING STATIONS II

1. INTRODUCTION 3

DWSD's Asset Management Vision 3

2. AM READINESS ASSESSMENT 4

2.1 Overview of Assessment Process 4

2.2 Overall Findings 5

3. AM PROGRAM FUNCTIONAL DESIGN.....9

3.1 Key AM Principles for DWSD 9

3.2 Proposed AM Framework..... 10

3.2.1 Decision Making (Line of Sight) 12

3.2.2 Monitoring and Review.....13

3.2.3 Enablers 14

3.3 SOPs Guiding Processes in the AM Framework 15

3.4 Organizational Design to Support AM Framework 16

3.5 Asset Level – Maintenance Decision Practices 17

4. AM IMPROVEMENT PROGRAM ROADMAP 17

4.1 Program Objectives..... 18

4.2 Implementation Arrangements 19

APPENDIX A: DWSD WASTEWATER MDEQ DISCHARGE PERMIT EXTRACT 20

APPENDIX B: WWOG AM READINESS ASSESSMENT REPORT 21

APPENDIX C: DWSD'S AM INITIATIVE SUMMARIES 22

ATTACHMENT II: PREVENTIVE MAINTENANCE PLAN

ATTACHMENT III: PREDICTIVE MAINTENANCE PLAN

ATTACHMENT IV: ANNUAL SCHEDULED REPLACEMENT PLAN (SRP) UPDATE NOVEMBER 27, 2013

ATTACHMENT V: SCHEDULED REPLACEMENT PROGRAM REPORT FOR CSO FACILITIES AND WASTEWATER PUMPING STATIONS

1. INTRODUCTION

This document incorporates the findings of Asset Management Readiness Assessments conducted for DWSD. It provides a roadmap for implementing DWSD's Asset Management Program and to further develop the organization's capabilities in line with best practice.

In March 2013, the Michigan Department of Environmental Quality (MDEQ) issued a Permit Number MI0022802 effective May 1, 2013 to Detroit Water and Sewerage Department (DWSD) in accordance with NPDES requirements. Included in the permit specification was a requirement that DWSD prepare and implement an 'approvable Asset Management Program'[1] (see Appendix A). DWSD is required to prepare and submit an Asset Management (AM) Program to MDEQ for review and approval by January 1, 2014. Upon approval, DWSD will proceed with a phased implementation of its AM program. The following sections detail the process followed by DWSD to design their AM program to meet the requirements stated in the MDEQ permit.

DWSD's Asset Management Vision

At DWSD, asset management is the systemic integration of sustainable and information driven management techniques to minimize asset lifecycle costs, optimize asset life, and provide quality service to our customers. DWSD will achieve this by:

Table 1: Elements of DWSD's AM Vision Statement

Vision Elements	How will Asset Management Achieve it?
Sustainable and Information Driven Management Techniques	Implementing asset management business processes to improve efficiency and effectiveness throughout the organization.
	Collect data accurately and completely, and utilize it for asset management decision making.
Provide Quality Service to Customers	Engage Customers in defining levels of service (reliability, quality, and associated costs), while providing levels of service exceeding regulatory and industry standards.

[1] Permit MI0022802, Part I, Section A, Paragraph 12.C.1 (Page 29)

Minimize asset lifecycle costs and optimize asset life	Manage our assets by optimizing operations, maintenance and capital investments to sustain asset performance and reduce business risks.
	Use asset management information to better forecast capital needs and costs (short and long term).

The AM program comprises a roadmap for improvement in DWSD's current state of asset management readiness, obtained by performing an organization-wide readiness assessment, to meet best appropriate practice standards and achieve the asset management vision stated above. Objectives of the AM program are to:

- Discuss highlights of the DWSD AM readiness assessment report(s);
- Lay out the key elements of the functional design of DWSD's AM program; and
- Propose a phased AM program improvement roadmap.

2. AM READINESS ASSESSMENT

2.1 Overview of Assessment Process

In order to better understand the current situation at the DWSD with respect to asset management and their related competencies, EMA performed an Asset Management Readiness Assessment of the Wastewater Operations Group (WWOG) using the WERF Strategic Asset Management (SAM) GAP assessment framework.

The SAM GAP assessment questions were posed to the DWSD Asset Management Team members in a group setting. These questions concern the following areas of AM:

- Managing Demand Analysis
- Managing Knowledge of Assets
- Accounting and Costing Methods Current in Place
- Strategic Planning Process
- Capital Expenditure Evaluation Process
- Business Risk Assessment Management
- Asset Creation and Acquisition
- Asset Disposal and Policies
- Operations Management
- Maintenance Management
- Work and Resource Management

- Continuous Improvement

The team was asked to ascertain the level of effort being performed currently in each of these areas for a total of 75 questions. For instance, regarding historic records of customer and stakeholder demands on the utility system, the team was asked: “How does the organization determine what data, that reflects historical demand, to collect, how it is to be maintained, and who should be responsible to maintain it?” The team was then to give the organization a ranking from 1-5 on the level to which it is performed, 1 being innocence, and 5 being world-class, and again rank the extent to which practices are performed ranging from “never done” to “systematic, fully documented, always executed”. Finally the team was asked to give a score of 1-4 to how important they felt each activity identified in the question was to the overall AM plan. Here, 1 is most critical and 4 is not applicable. The first two scores were then added to show areas of needed improvement; the top score for any assessment item would be 10 for comparison purposes, and gaps/opportunities for improvement are illustrated by the differences between actual scores and possible top scores. In addition, the importance ranking illustrated where improvement efforts should be focused.

All questions were read aloud, discussed, clarified and responded to by the team members. Scores and key notes were captured during the workshop. The assessment scores were presented for each statement and all notes were also included.

The following section highlights key findings from the assessment. For details, refer to the stand-alone assessment report submitted to DWSD (see Appendix B).

2.2 Overall Findings

EMA’s findings suggest that DWSD’s approach to asset management is inconsistent across the organization. There is a need to establish and define clear leadership and set the strategic direction for DWSD’s assets. Connection between the service outcome and necessary asset delivery was not considered to be sufficiently robust to support asset management decision making.

The absence of good cost information is universal across DWSD, which hinders the organization from making effective whole life asset management decisions. The lack of AM plans is considered to be one of the root causes for problems DWSD faces. An AM plan would encourage a more connected approach to whole life asset management decisions. It would identify information needs, including demonstrating why good cost information is so important,

and ultimately reinforce the 'line of sight[2]' from DWSD's strategic framework through to asset work plans which it is currently lacking.

To further support a consistent and quality approach to AM decision making it is recommended that DWSD develop a management system for AM. This would set out how the various life cycle decision processes link together, and would enable the introduction of improved risk management processes across all functions. It was also recognized that to introduce more efficient and effective AM training is essential for developing capability across the organization and providing the necessary tools and techniques.

Based on specific findings from the assessment, multiple initiatives were framed by DWSD that address areas of AM and contribute to the design of their AM program. Table 2 identifies the subset of the initiatives that relate specifically to the Wastewater AM program elements as specified in the MDEQ Permit. Current AM Elements that have been developed to date are identified as well as future AM Initiatives that are planned. In the last column, a qualitative "Assessment of Completeness" provides a visual indicator of progress to date for the Wastewater Asset Management Program.

[2] 'Line of Sight' is a key concept according to PAS 55 which defines the requirements for an integrated and cohesive AM system, providing a clear "line of sight" from organization direction and goals down to individual, day-to-day activities.

Table 2: DWSD AM Initiatives that Fulfil MDEQ Permit AM Program Requirements

MDEQ Permit AM Program Elements	Current AM Elements as of Dec 2013	Future DWSD AM Initiatives[3]	Assessment of Completeness
Comprehensive fixed asset inventory that is maintained, managed, and updated within a CMMS	• CMMS Inventory in EMPAC -- See Attachment 1 for Asset Hierarchy and example entry	• 1.02.01.A – Define Asset Registers Structures and Asset Identification Protocols • 3.0 – Collect Assets & MMIs[4] Data	
Comprehensive inventory of collection system fixed assets and collection system map	• CMMS Inventory in EMPAC -- See Attachment 1 for Asset Hierarchy and example entry	• 1.02.01.A – Define Asset Registers Structures and Asset Identification Protocols • 3.0 – Collect Assets & MMIs Data	
Preventive Maintenance Program that may include predictive and reliability centered maintenance	• Preventive Maintenance Plan submitted July 31, 2012 – See Attachment 2 • Predictive Maintenance Plan – See Attachment 3	• 1.04.01.A – Develop Reliability Centered Maintenance Asset Evaluation Program • 1.04.01.B – Develop Preventive Maintenance Optimization Program	
Needs Assessment updated at least every 3 years – to include condition assessment and service level review	• Needs Assessment Program in place • 2013 Needs Assessment submitted to DEQ on Sept 30, 2013	• 1.12.02.C – Define Protocols for Using the Asset Renewal Valuation Tool • 1.02.03 – Define Asset Condition, Performance, and Reliability Assessment Protocols • 1.01.04 – Define Minimum Required Level of Service at the Asset Level • 1.04.06 – Develop Processes for Producing Annual Asset Management Plans	

[3] AM Initiative templates can be found in Appendix C. Initiatives are by section number from the readiness assessment instrument, e.g. 1.10.08.
[4] MMI – Maintenance Managed Item

Criticality assessment and risk management	• Criticality Codes included in EMPAC CMMS – See Attachment 1, Figure 4	• 1.03.02 – Define Asset Effective and Remaining Useful Lives • 1.03.06 – Define Asset Business Risk Exposure	
Capital planning process	• Capital Improvement Plan submitted to DEQ Dec 20, 2011	• 1.12.02.C – Define Protocols for Using the Asset Renewal Valuation Tool • 1.12.02.B – Define Protocols for Conducting Business Case Evaluations	
Scheduled Replacement Program (SRP) for assets	• SRP Update submitted Nov 27, 2013 – See Attachment 4 • SRP Report for CSO and Pump Stations - See Attachment 5	• 1.12.02.C – Define Protocols for Using the Asset Renewal Valuation Tool • 1.04.06 – Develop Processes for Producing Annual Asset Management Plans	
Monitoring and periodic performance evaluation using KPIs	• KPI Reports developed and distributed monthly	• 1.02.03 – Define Asset Condition, Performance, and Reliability Assessment Protocols • 1.01.04 – Define Minimum Required Level of Service at the Asset Level • 1.04.06 – Develop Processes for Producing Annual Asset Management Plans	
Management oversight of system performance	• Limited Management Oversight	• 1.04.06 – Develop Processes for Producing Annual Asset Management Plans • 1.12.02.A – Develop Asset Management Process Diagrams and Procedure	

3. AM PROGRAM FUNCTIONAL DESIGN

The functional design defines the target state for DWSD's AM Program.

Based on the assessment, EMA recommends the introduction of an Asset Management Framework for DWSD. The following sections set out a proposed framework that considers DWSD's functions, organizational design and the documentation of the framework. This is defined as the functional design for asset management and is the target state for DWSD's AM Program. It is derived from and in line with current best practice and consistent with the AM requirements of PAS-55:2008.

The functional design is not intended to provide a detailed manual for how DWSD should operate, but rather the high level architectural blueprint that provides guidance and puts the proposed AM program into context.

3.1 Key AM Principles for DWSD

An essential concept of good practice AM is 'Line of Sight'. DWSD should apply this concept throughout the organization.

Line of sight is the golden thread of rationale which ultimately justifies every asset related activity DWSD undertakes. It enables the maintenance technician at the asset-face of the organization to trace the rationale for what he or she is doing, upwards through a clear set of plans, objectives, strategic statements and policies to DWSD's topmost organizational strategic goals. It explains the need for activity, cost and condition information to be captured at a lower level to support asset management decision making. It provides the direct link between asset delivery and service outcome, and enables decision makers and other stakeholders to have a clear view of what is actually happening, the impact of their decisions, and the justification for resources.

To achieve this concept at DWSD, the following key AM principles[5] should be applied:

A. ***Service delivery*** *needs are to guide asset practices and decisions*. DWSD should undertake asset management activities within an asset management framework that is driven by the strategic goals of the organization and service delivery needs.

B. ***Asset planning and management*** is to integrate with corporate and business planning, budgetary and reporting processes. Planning, budgeting for, and reporting on assets are to be integrated with broader planning processes, across DWSD.

C. ***Asset management decisions*** should be based on the combined implications of managing all aspects rather than a silo approach. This includes the combination of

[5] The principles are based on similar guidance given to water/wastewater utilities, and are consistent with guidance set out in PAS-55:2008 and ISO:55000 draft guidance.

different asset classes across DWSD's Wastewater Operations, Drinking Water and Field Services groups, including the functional interdependencies of assets within asset systems, and the different asset lifecycle phases and corresponding activities.

D. ***Asset management decisions*** are to be based on evaluations of alternatives that take into account full life cycle costs, benefits and risks of assets. Capital expenditure decisions are to be based on rigorous and documented economic appraisals of options that include financial as well as non-financial parameters. The economic appraisals should be evaluated by a party other than the proponent of the project.

E. ***Ownership, control,*** accountability and reporting requirements for assets are to be established, clearly communicated and implemented. Ownership and control of all assets are to be fully defined. Accountability and reporting requirements for both ownership and control are to be determined and clearly communicated.

F. ***Asset management activities*** are to be undertaken within an integrated DWSD wide asset management framework. DWSD asset management is to be based on best practice in government and industry.

G. ***Asset management decisions*** should be sustainable and demonstrate consideration of long-term consequences of short term activities. DWSD asset management is to ensure that adequate provision is made for future requirements and obligations, including economic and environmental sustainability (recognizing the impact of the assets and the operation on the environment and the impact of the environment on the assets), system performance, societal responsibility and other longer term objectives.

3.2 Proposed AM Framework

The AM framework is the collection of products and processes that must be undertaken in order to deliver services in the most efficient, effective and economical way. The framework provides the management structure within which to enable the efficient delivery of water treatment, transmission and distribution as well as wastewater collection, treatment and discharge services to DWSD's customers. It sets out the relationship between operations, maintenance, capital planning and other core functions across DWSD, and defines the scope of AM information systems and information requirements to support AM decision making. It demonstrates the importance of the 'line of sight' concept by linking DWSD's strategic goals through to its AM policy, AM strategy and objectives, AM plan, and on to the lifecycle activities as part of the implementation stage.

AM can only be described as good, successful or effective if there is a clear understanding of what it is meant to achieve. This in turn requires an understanding of the underlying objectives of the organization.

AM is an inherently integrated approach and cannot be successfully implemented by managing individual assets or different life cycle stages (such as maintenance) in isolation. Therefore it is important that DWSD develop an overall business model for all of its assets and ensure this covers all life cycle stages and organization functions.

EMA has over the years established a best practice AM program philosophy that encompasses business practices, technology and organizational issues across the entire utility. A successful framework requires more than a set of business rules or a software tool – it requires that people change the way in which they work and the way in which work is completed. The proposed AM framework for DWSD in Figure 1 incorporates EMA's Organization – Practices – Technology philosophy and best practice frameworks from many of the world's leading utilities.

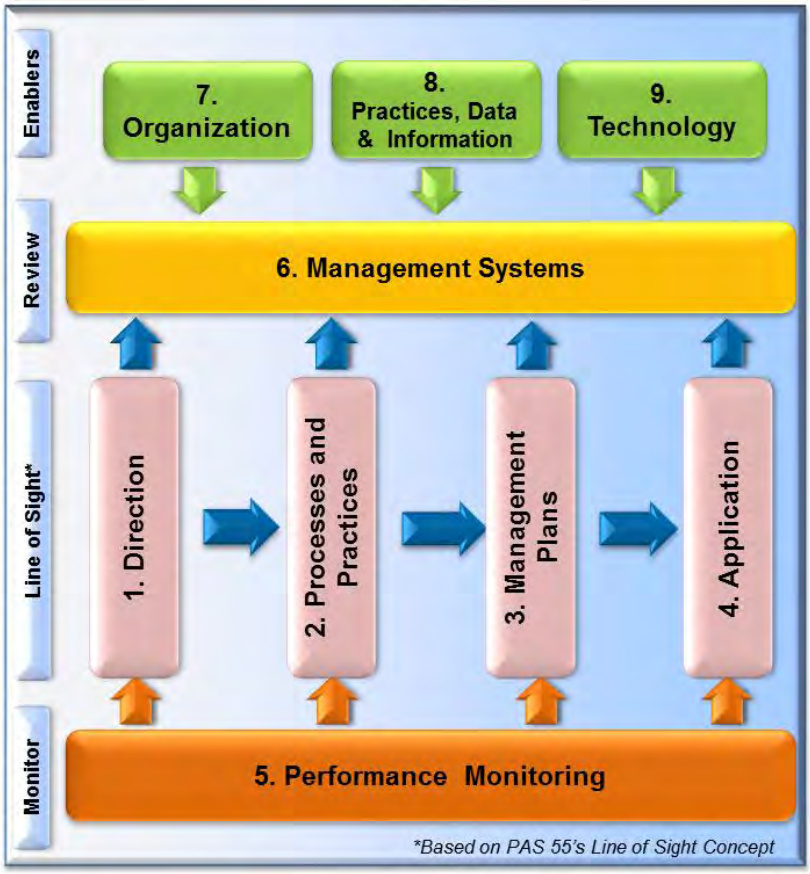

Figure 1: Proposed DWSD's Asset Management Framework

The asset management framework is divided into four main areas:

1. ***Decision Making*** *(Line of Sight):* There are four key levels to decision-making that drives the organization to address the DWSD's strategic objectives and ultimately ensure that the service needs are delivered in the most efficient, effective and economical manner.
2. ***Monitoring and Review***: Monitoring provides the feedback loop between the asset intervention and the condition and performance it delivers. A distinction should be made between monitoring the performance of the assets (Performance Monitoring) and the performance of the systems used to manage the assets (Management Systems). Both are critical to assuring the successful outcome of the asset management decision making process.

3. ***Enablers:*** The effectiveness of the asset management decision making process is dependent on the capability of DWSD's most valuable resource - people, and the practices that support data creation through information and technology tools to support business processes.

3.2.1 Decision Making (Line of Sight)

In level one the focus is on setting the long-term *Direction* for asset delivery in respect of what will be done to the physical assets within known constraints to meet stated service level requirements. The objective of this level is to set out the overall framework that enables DWSD to determine the direction and corresponding AM actions that best serve the aims it is obliged to fulfil. In other words the outputs address the "*The Why and the How*" of AM.

While at this level activities are generally conducted by senior management led teams, it is nonetheless critical to the overall success of the business model that engagement across and through the business occurs. The outputs from this stage include the *AM Policy* and *AM Strategy and Objectives*. AM is holistic and consequently the strategy should therefore consider the whole picture rather than just an individual asset class's contribution.

In level two the direction provided is laid out through designing the necessary business processes and practices to achieve the desired state of the asset portfolio. In this level, it is about the capability within DWSD to analyze asset capability and develop the necessary work programs. It is not simply the programs themselves, which are the documented output from the process. The output from this level is often in the form of a set of *Asset Strategies* setting out what needs to done to each asset class to achieve the long-term desired state of the network. This provides a further level of decomposition from DWSD wide *AM Strategy* to asset focused *Asset Strategy*.

In level three the preparation of projects and work packages is undertaken, translating the work programs into tangible work activities. It is important to consider the different types of assets DWSD manages and how different failure patterns result in different approaches to maintenance (this is discussed further in Section 3.5). Part of this capability is to present the output in the necessary forms to enable DWSD to undertake and procure asset activities, including for example: design material, work schedules, specifications and contract documents. The key output from this level is the *AM Plans* which describe the implementation of DWSD's AM Strategy and Asset Strategies in terms of "*The What, When and Where*". They present the work programs for maintenance and renewal along with the cost tables.

In level four the focus is on the implementation of work plans to achieve the desired state of the asset portfolio within budget and operational constraints. This is a capability to schedule and deliver projects and work packages within the DWSD operational environment. This entails translating the work plans into schedules for actual delivery. The outcome is not the work plans, but the facility to implement them to achieve the required output.

The two-way linkage between these four levels is absolutely critical to ensuring decisions deliver their intended benefits and where it does not, appropriate actions can be taken.

For example, the 'Processes and Practices' level has to have direction in terms of where it is trying to steer the asset system, which is expressed in the strategy, but it also needs to be informed by empirical evidence and extrapolated projections of what is actually happening in terms of service and asset capacity. The linkage throughout the framework is necessary for success. To further illustrate the holistic asset management perspective, the 'Processes and Practices' level functions of strategic planning, etc. are dependent on lower level information captured at the implementation stage, which is why cost codes need to be addressed and why all forms of monitoring have to be more effectively integrated.

3.2.2 Monitoring and Review

Supporting the four levels of AM decision making described above there needs to be an appropriate level of asset monitoring. DWSD should include a mix of condition and performance assessment and analysis, which is driven by the asset characteristics and their failure mechanisms, to ensure that intervention decisions are optimal from a cost, risk and performance perspective.

A comprehensive suite of leading and lagging performance indicators should also be developed to provide a measure of how effective each stage of DWSD's AM decision making process is. For example the use of monthly "AMP[6]'s on a page" to review the delivery of work volumes compared to the AMP and AM Strategy. It also should provide impacts of the implementation of the AM system on the performance of the assets including condition, failures, capability, etc.

Outputs from the AM decision making processes are controlled by a set of guiding principles which are subject to management review. These generally include:

- An AM Manual setting out the operating model and management procedures for DWSD. This is commonly referred to as the 'AM system'. It is noted that an AM system is not the EMPAC or Oracle WAM (forthcoming at DWSD) information technology system used for managing assets, although this is an important enabler.
- A Contracting Model for Strategy Plan delivery, which includes developing supply chain contracts for stock and spares.
- A set of Delivery Manuals which establish standards for data management, work delivery etc.
- A set of Standard Operating Procedures for maintenance activities, etc.

[6] AMP – Asset Management Plan

Effective AM will involve many parts of the DWSD organization and requires a disciplined approach to provide best possible value for utility customers and other stakeholders. Separate functional silos and uncoordinated contributions, as currently experienced does result in conflicting priorities, wastage and ineffectiveness. An AM system is the means by which all the contributions are harnessed and controlled towards a common purpose – the delivery of the DWSD's vision and strategic objectives.

A key part of the management review cycle is the identification and management of both business and asset risks. Risk and risk review is a fundamental building block to sustainable AM decision making and essential to enabling DWSD to maximize value. The purpose of risk management is to inform the AM decision-making process, it provides the guiding principles of DWSD's tolerances to risk in terms of safety, environmental, financial, reputational, and performance. Risk management has to occur within a disciplined framework in order to be effective. Often organizations will develop risk registers and processes to support the life cycle management of risks from identification through quantification, mitigation and closure. Management of risks may happen at a more local level with escalation of high probability or high consequence risks moving from an 'asset level' to 'business level'.

3.2.3 Enablers

Successful sustained AM requires competent people and an organization that facilitates implementation of the AM principles with clear direction and leadership, staff understanding, competency, commitment and cross-functional coordination, including good change management and effective relationships with key external resources and service providers. Unless a clearly articulated organizational direction and set of priorities are provided, it is very difficult to determine how best to manage the assets. As such for DWSD, it is critical that the organizational structure is considered as part of the functional design (this is discussed further in a Section 3.4).

A vital enabler to coordinated AM is the capture, availability and usage of adequate practices, data and information, and knowledge of asset condition, performance, risks and costs, and the interrelationships between these. Suitable systems and processes should aid understanding of what information is needed, for what purpose, and how it should be acquired, managed and used.

Enterprise AM systems provide the technology to support organizational changes to better plan and manage work delivery. Through the use of systems such as DWSD's EMPAC and Oracle WAM (forthcoming), DWSD should gain better insight across all of their assets, enabling fault analysis to improve reliability and reduce asset downtime through improved preventative maintenance regimes, more efficient work delivery, and more efficient spares management. While EMPAC is currently focused at the sharp end of DWSD's maintenance delivery, any future system should also provide support at the second (Processes and Practices) and third (Management Plans) levels of the AM decision making process.

3.3 SOPs Guiding Processes in the AM Framework

The outcomes of the AM Framework are guided, controlled and monitored by documents developed as outputs from each AM decision making stage. There is an important distinction between undertaking the work (such as the development of a work program) and the application of a structured process to prepare the work program, which also establishes the basis for control and assurance. The documentation of the AM framework therefore is part of the DWSD control and assurance of the framework.

The AM Policy acts as the first stage of the 'line of sight' by describing how DWSD's AM framework will deliver the overall strategic goals of the organization. Policy is a statement of "What and Why", and provides a context for decision-making.

The AM Strategy acts as the second stage of decomposition of the 'line of sight' and should describe what DWSD intends to achieve from its AM activities and by when. Often the AM Strategy is split into two. Strategy is a statement of "the Why and the How" of AM". It is typical in diverse AM organizations like DWSD for the AM strategy to be developed in two levels:

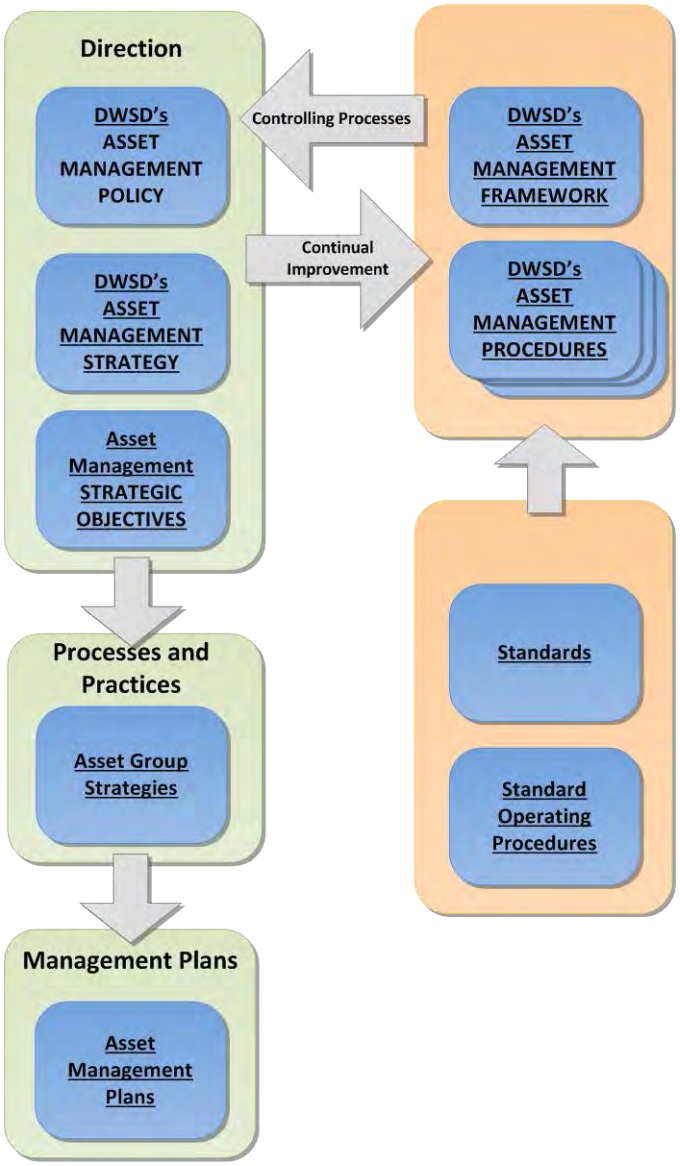

Figure 2: AM Framework

1. A generic strategy which applies across all asset groups, referred to as the Asset Management Strategy (AMS), and

2. Asset group specific strategies, referred to as the Asset Group Strategies (AGS). The AGS explain how the AMS is applied to a particular asset group and identify asset group specific.

The AM Plan is the third level of decomposition of the 'line of sight'. It is at this stage that DWSD's workforces are guided on the necessary activities in order to meet the strategic goals and the AM policy. The AM Plan is a statement of "The What, When and Where". They present the work programs for maintenance and renewal along with the cost tables for each of the asset classes. AM Plans are not always a singular document, and should be considered as a 'living' plan. They should contain both:

- **Asset Work Plans** – including routine maintenance, planned maintenance, renewal and overhaul and assessment of risks driving reactive maintenance.
- **Capital Projects** – including service improvements and enhancements.

3.4 Organizational Design to Support AM Framework

One of the hardest elements of establishing an effective and efficient AM system is breaking down departmental silos and conflicting functional contributions. Yet this is also one of the most important features, yielding some of the biggest organizational performance benefits.

There are currently divisions of responsibility for different life cycle activities across DWSD, with separate budgets and localized performance measures assigned. The AM system should provide the means of collaboration across such functional divides.

The organization is to be led by a powerful champion for AM at operating board level. The individual will lead an AM Division who will act as the asset advocate within the organization – ensuring the management of the asset is optimized through its life cycle stages. Being separate from operations, maintenance or capital, the Division will be able to ensure cost, risk and performance is optimized and contributions are harnessed and controlled towards a common purpose.

The AM Division will develop policy and strategy in consultation with the DWSD Board of Commissioners, and other Stakeholders. They will also develop AM Plans for Wastewater Operations, Drinking Water and Field Services. The policy and strategy effectively becomes the Public Service Contract between the Board and the AM Division, while the AM Plans effectively become the Service Level Agreements between the AM Division and the Asset Delivery teams.

Reliability Engineering Analysis team(s) are formed and merged into DWSD's AM Division to lead performance monitoring, support maintenance decision making and provide guidance on revised maintenance practices. A Professional Head is appointed within the AM Division for each of the asset classes to oversee the introduction of good practice maintenance management and provide authority and assurance.

Monthly asset performance review meetings are to be held between AM (Chair), Maintenance, and Capital Delivery to review delivery of work volumes as compared to the AMP and AM

Strategy, review condition and performance, and discuss arising issues identified through trend analysis. These meetings report into a Divisional AM Meeting which focuses on system wide issues. The process ensures a holistic approach is taken to management of DWSD's assets by considering life cycle management of individual asset classes and the system wide management of the asset base.

3.5 Asset Level – Maintenance Decision Practices

As stated earlier, it is important to consider the different types of assets DWSD manages and how different failure patterns result in different maintenance regimes. The maintenance regime can be defined in two distinct parts:

- **Maintenance Specification** – which sets out how the organization decides on intervention options for each asset in order to meet a defined level of service
- **Categorization** – which applies the specification and along with a categorization of assets (generally risk) establishes a maintenance framework for the asset to ensure service and business objectives are met

The flow diagram in Figure 3 demonstrates the steps necessary to safely introduce new maintenance practices within DWSD.

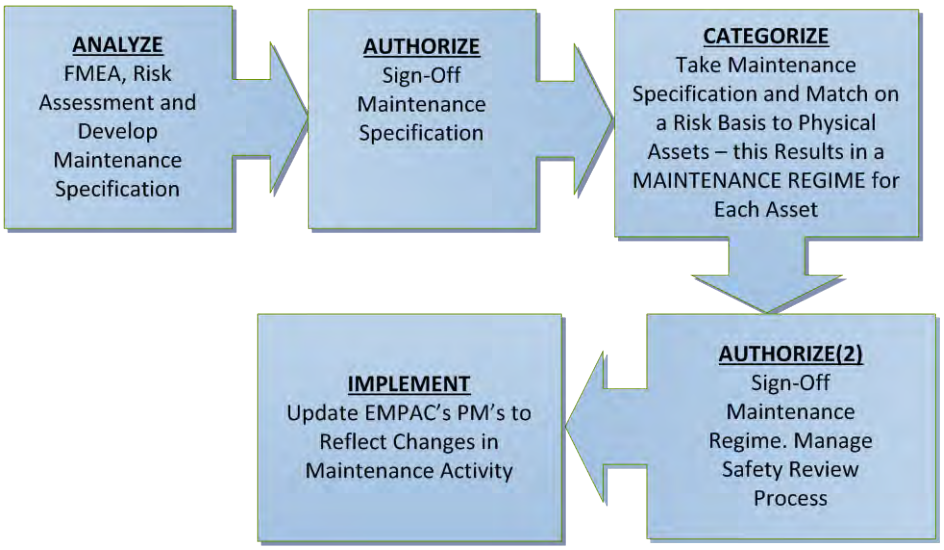

Figure 3: Introducing Maintenance Practices at DWSD

4. AM IMPROVEMENT PROGRAM ROADMAP

A readiness assessment is key to any change management strategic development process. The assessment measures an organization's current practices ('As Is') and relates this to the desired future operations within a specific time period (the 'To Be'). Priority improvements are generated in relation to the size of the gap and the relative importance of that element to the success of the business. The following program and implementation strategy result from the readiness

assessment conducted for DWSD and draws on EMAs experience in establishing similar improvement programs for other asset intense businesses.

4.1 Program Objectives

Good AM is essential for the sustainable delivery of public utility assets. The principal objective of this program is the implementation of best appropriate practice AM for all of DWSD's assets. The program is designed to develop the organization from its "Low Practice Level" maturity state to a "Substantial Practice Level" state as described in the AM Functional Design described in Section 3.

Priority areas for development should focus on achieving the AM principles set out in the Functional Design. Table 3 sets out the AM principles and alignment against the recommended actions from the readiness assessments.

Table 3: Priority Areas for Improvement

AM Principles Set Out in the Functional Design	DWSD Readiness Assessment Gaps (Recommended Initiatives)
A. Service delivery needs are to guide asset practices and decisions.	Need for an asset management policy, strategy and asset management objectives. (Initiative: 1.01.04)
B. Asset planning and management is to integrate with corporate and business planning, budgetary and reporting processes.	Need for improved accounting processes and communication of DWSD conventions. (Initiative: 1.04.04, 1.04.06, 1.12.02.C, 1.12.02.B)
C. AM decisions should be based on the combined implications of managing all aspects rather than a silo approach.	Need for maintenance policies to be established and the need for Asset Management Plans. (Initiative: 1.10.02, 1.10.08, 1.04.01.A, 1.04.01.B, 1.04.06, 1.12.02.A)
D. AM decisions are to be based on evaluations of alternatives that take into account full life cycle costs, benefits and risks of assets.	Risk based approaches need to be developed for maintenance, and risk management procedures developed and implemented. (Initiative: 1.03.06, 1.06.01, 1.04.04)
E. Ownership, control, accountability and reporting requirements for assets are to be established, clearly communicated and implemented.	Need to establish clear leadership and an organization to develop asset management capability. (Initiative: 1.04.06, 1.12.02.A)

F. AM activities are to be undertaken within an integrated DWSD wide asset management framework.	Development of an AM 'management system' and related practices and procedures. (All Initiatives)
G. AM decisions should be sustainable and demonstrate consideration of long-term consequences of short term activities.	Need for a strategic planning process. (Initiative: 1.04.06)

4.3 Implementation Arrangements

The Asset Management Improvement Plan (AMIP) sets out a significant step-change to the way DWSD will manage its asset portfolio in the future. Such a transition necessitates equipping members of staff with new skills, tools and techniques that support an improved AM Framework. Consequently there is an emphasis within the improvement program to improve DWSD's people as much as introducing new processes, technology and information.

To prepare for this, it is recommended that DWSD undertake a organization-wide Awareness Training program to both brief staff on good practice asset management and the scope of the AMIP.

The training needs to be delivered as part of an overall communication strategy to develop the understanding, introduce best practice and engage the 'hearts and minds' of the business in a new way of working. Typically, a handbook detailing the rationale and scope of the AMIP needs to be developed and distributed widely across DWSD and its stakeholders to support buy-in and encourage involvement.

It is important that adequate support is provided through delivery of the change program. As such, it is recommended that AMT undertake training, mentoring and monitoring to maintain engagement with the 'hearts and minds' of the business and ensure success.

DWSD Wastewater MDEQ Discharge Permit Extract

PERMIT NO. MI0022802

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Water Pollution Control Act, as amended, (33 U.S.C. 1251 *et seq.*) (the "Federal Act"), Michigan Act 451, Public Acts of 1994, as amended (the "Michigan Act"), Parts 31 and 41, and Michigan Executive Order 2011-1,

City of Detroit Water and Sewerage Department
735 Randolph
Detroit, Michigan 48226

is authorized to discharge from the **Detroit Wastewater Treatment Plant** located at

9300 West Jefferson Avenue
Detroit, Michigan 48209

designated as **Detroit WWTP**

to the receiving water named the Detroit River and the Rouge River, and from combined sewer overflow facilities to the receiving waters named the Detroit River, the Rouge River, and Conner Creek in accordance with effluent limitations, monitoring requirements, and other conditions set forth in this permit.

This permit is based on a complete application submitted on July 3, 2012.

This permit takes effect on May 1, 2013. The provisions of this permit are severable. After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked in whole or in part during its term in accordance with applicable laws and rules. On its effective date this permit shall supersede NPDES Permit No. MI0022802, expiring October 1, 2012.

This permit and the authorization to discharge shall expire at midnight, October 1, 2017. In order to receive authorization to discharge beyond the date of expiration, the permittee shall submit an application which contains such information, forms, and fees as are required by the Department of Environmental Quality (Department) by April 1, 2017.

Issued March 1, 2013

Philip Argiroff, Chief
Permits Section
Water Resources Division

PART I

Section A. Limitations and Monitoring Requirements

12. Facilities Improvement Program

The permittee shall continue to meet the sludge dewatering, conveyance, and final disposal requirements; submit and implement the solids disposal plans; correct the alum sludge issue; submit the WWTP shutdown schedules; and develop and implement the asset management program as detailed below.

a. WWTP Solids Processing Requirements and Corrections

1) Capacity for sludge dewatering, conveyance, and final disposal; Required maximum solids inventory loads.

The permittee shall ensure that sludge dewatering equipment, sludge conveyance equipment, and final sludge disposal capability is available at the Detroit WWTP as follows:

a) The permittee shall ensure that the WWTP sludge dewatering equipment, sludge conveyance equipment, and final sludge disposal capability are maintained for use; and in good operational working order to meet the following requirements over the time periods specified:

(1) Average capacity of 500 dry tons per day (dtpd), calculated as a calendar monthly average;

(2) Upon completion of replacement of C-I and C-II belt filter presses (BFPs) as required by Part I.A.12.a.2). of this permit, peak capacity of 850 dtpd, calculated as a 10-day average;

(3) The permittee shall maintain the average monthly capacity and the peak 10-day average (once applicable). The peak 10-day average shall be available during any wet weather event when the Detroit WWTP is operated in the "Storm Period" of the currently approved WWTP Wet Weather Operational Plan as required by Part I.A.11.

The permittee shall also:

(4) Notify the Department within one business day if solids are recycled from the gravity thickeners to the head of the WWTP for more than 72 hours and provide an explanation for the recycled solids. Recycled solids are defined as a TSS overflow concentration of 1000 mg/l or greater;

(5) Maintain a monthly average solids inventory of less than 750 dtpd, when there are less than 5 days of discharge from Outfall 049A during the month, and maintain a calendar quarterly average solids inventory not to exceed 1000 dtpd. Solids inventory is defined as the total solids in gravity thickener complexes A and B, determined daily in dtpd; and

(6) The permittee is allowed to submit to the Department for review and approval a request to modify the numerical levels specified in Part I.A.12.a. of this permit. This modification request shall include supporting rationale for the revised numerical levels.

PART I

Section A. Limitations and Monitoring Requirements

2) Solids Management Plan

a) The permittee submitted to the Department for review and approval a short-term Solids Management Plan. This Solids Management Plan is designed to ensure the availability of sufficient sludge dewatering equipment and sludge disposal capability to meet the capacity requirements specified in Parts I.A.12.a.1).a).(1)&(2) of this permit. The permittee shall implement the short-term and near long-term actions of the Solids Management Plan improvements to C-I and C-II dewatering and incineration in accordance with the following schedule:

The detailed Basis of Design Report for the replacement of C-I and C-II BFPs and the Facilities Management Plans and Specifications were approved by the Department on December 22, 2010. Construction has commenced

(1) On or before November 30, 2014, the permittee shall complete repairs to C-I and C-II incinerators under PC-774;

(2) On or before January 1, 2016, the permittee shall complete construction and place into full operation and service the C-I and C-II BFPs;

b) On or before March 1, 2013, the permittee shall submit to the Department for review and approval a schedule for development of a Long-Term Solids Disposal Plan (LTSDP). The LTSDP shall include provisions to ensure long-term compliance with all requirements of this permit, including but not limited to, necessary redundancy and contingencies for effective solid disposal or reuse. Upon Department approval, the LTSDP development schedule shall be incorporated by reference into this permit. The permittee is advised that implementation of individual elements of the LTSDP may require Part 41 wastewater construction permits or may require other Department approvals.

3) Alum Sludge Correction

The permittee shall develop and implement a plan to correct the solids dewatering concerns at the WWTP due to alum sludge discharges from DWSD water treatment plants (WTPs) into the collection system. The plan can use a combination of structural and/or operational controls at the WWTP and the WTPs to accomplish this requirement, and shall be based on ensuring that all solids dewatering, disposal, and solids inventory requirements in the permit are met. The permittee shall develop and implement this plan in accordance with the following schedule:

a) On or before October 1, 2013, the permittee shall submit to the Department an approvable WTP alum sludge discharge correction plan (plan) to meet the conditions described above.

b) Upon approval by the Department, the permittee shall begin implementation of the plan.

c) On or before March 1, 2015, the permittee shall complete implementation of the approved plan.

d) On or before September 1, 2015, the permittee shall submit a report to the Department describing if the implemented plan met the conditions specified above between March 1 and August 1, 2015.

e) Annually, on or before September 1st (starting September 1, 2016), the permittee shall submit a report to the Department describing if the implemented plan continued to meet the conditions specified above for the preceding DWSD fiscal year (July 1 – June 30).

Part 41 construction permits at the WWTP and/or Act 399 construction permits at the specific WTPs may be needed depending on the components of the approved plan.

PART I

Section A. Limitations and Monitoring Requirements

b. WWTP Quarterly Shutdown Schedules

Quarterly, on or before December 1, March 1, June 1, and September 1, the permittee shall submit quarterly Wastewater Treatment Plant Shutdown Schedules, until notified in writing by the Department. Consistent with the quarterly dates indicated above, these schedules shall be submitted to the Department in a mutually agreeable format one month prior to the start of each calendar quarter for review and approval. Each quarterly schedule shall detail the primary treatment capacity, secondary treatment capacity, and sludge processing capacity that is planned to be available during the upcoming quarter, considering coordinated shutdowns necessary to complete all rehabilitation and other projects. The shutdown schedules shall be proposed to minimize environmental impact and maximize available treatment during construction of all projects, consistent with the requirements of the rules associated with Act 451, Part 41, being 299.2943 and 299.2955(1) and (3).

c. Operation, Maintenance & Replacement/Asset Management

The permittee shall at all times properly operate and maintain all facilities (i.e., sewer system, treatment works, as defined in Part 41 of Act 451, 1994 as amended, and control systems) that are installed or used by the permittee to operate the treatment works and sewer system and achieve and maintain compliance with the conditions of this permit (also see Part II.D.3 of this permit). The requirements of an asset management program listed below contain goals of effective performance, adequate funding, and adequate operator staffing and training. Asset management is a planning process focused on gaining optimum value for each asset and providing the financial resources to rehabilitate and replace them when necessary; and typically includes five core elements which identify: the current state of the asset, the desired level of service (e.g., per the permit, or for the customer), the most critical asset(s) to sustain performance, the best life cycle cost, and the long-term funding strategy to sustain service and performance.

1) The permittee shall prepare and implement an approvable Asset Management Program that addresses the following items:

- A comprehensive fixed asset inventory that is maintained, managed, and updated within a computerized maintenance management system (CMMS),
- A comprehensive inventory of the collection system fixed assets and collection system map,
- A Preventive Maintenance Program that may include predictive and reliability centered maintenance,
- A Needs Assessment updated at least every three years, including condition assessment and evaluation of service level,
- An assessment of asset criticality and risk management,
- A capital planning process,
- A Scheduled Replacement Program (SRP) for assets,
- Monitoring and periodic performance evaluation through Key Performance Indicators (KPIs),
- Management oversight of system performance.

The permittee shall prepare its Asset Management Program and provide a copy of the Program to the Department for review and approval by January 1, 2014. The program shall be implemented upon approval.

A Staffing Plan, as required by ACO-00131, has been approved by the Department. The permittee shall provide an adequate staffing level, in accordance with the approved Staffing Plan, to carry out the operation, maintenance, repair, and testing functions required to ensure compliance with the terms and conditions of this permit. During the term of ACO-00131, a change in the minimum staffing level may be requested by the Permittee by submittal of a revised Staffing Plan, including training requirements, and may be revised only by mutual agreement in writing between the permittee and the Department.

The permittee shall also prepare and submit a description of its purchasing procedures by June 30, 2013, in conjunction with the submittal of the Asset Management Program.

WWOG AM Readiness Assessment Report

1.0 INTRODUCTION

In order to better understand the current situation at the Detroit Water and Sewerage Department (DWSD) Wastewater Operations Group (WWOG) with respect to Asset Management (AM) and the related competencies, EMA performed an Asset Management Readiness Assessment using the WERF Strategic Asset Management (SAM) GAP assessment framework.

The WWOG is responsible for 10 pump stations, six combined sewer overflow retention treatment basins, and three screening and disinfection facilities, totaling some 7,500 assets in all.

The SAM GAP assessment questions were posed to the DWSD Asset Management team members in a group setting. The questions relate to the following areas of asset management practices:

- Managing Demand Analysis
- Managing Knowledge of Assets
- Accounting and Costing Methods Current in Place
- Strategic Planning Process
- Capital Expenditure Evaluation Process
- Business Risk Assessment Management
- Asset Creation and Acquisition
- Asset Disposal and Policies
- Operations Management
- Maintenance Management
- Work and Resource Management
- Continuous Improvement

The team was asked to judge the level of effort currently being applied in each of these areas by responding to a total of 75 questions. For instance, regarding a practice for “historic records of customer and stakeholder demands on the utility system”, the team was asked: “How does the organization determine what data that reflects historical demand to collect, how it is to be maintained, and who should be responsible to maintain it?”. The team first ranked the organization regarding the level to which the practices were developed using a scoring scale from 1-5, with 1 being “innocence” and 5 being “world-class”. Then, the team ranked the organization regarding the extent to which the practices are performed using a scoring scale from 1-5, with 1 being “never done” and 5 being “systematic, fully documented, always executed”. Finally the team ranked each practice regarding how important the nature of the practices were to the overall AM program using a scoring scale of 1-4, with 1 being “critical” and 4 being “not applicable”.

The first two scores were added to provide a composite score relative to each practice, and given that the top possible score for any assessment item would be 10 for comparison, gaps/opportunities for improvement are illustrated by the differences between actual scores and top possible scores. In addition, the importance ranking illustrates where improvement efforts should be prioritized. These are signified in Section 2 with a burning bar graph above the individual practice item numbers.

All questions were read aloud, discussed, clarified and responded to by the team. Scores and key comments were captured during the workshop. The assessment scores for each practice statement, including all comments, are presented in Section 2. At the end of each assessment sub-section, the scores are tabulated in a graph format to illustrate gaps/opportunities for improvement.

2.0 ASSESSMENT RESULTS

1.01 Demand Analysis

1.01.01 For managing historic records of customer and stakeholder demands on the utility system. (E.g. How does the organization determine what data that reflects historical demand to collect, how it is to be maintained, and who should be responsible?)

Comment: Assets included in this evaluation are wastewater treatment plants and Combined Sewer Overflow Basins. Primary "customers" considered are the regulatory agencies.

LEVEL	EXTENT	RANKING
0 = Innocence	0 = Never done	4 = Not applicable
1 = Aware but no practice	1 = Ad hoc process rarely executed	3 = Not important
2 = Low practice level	2 = Ad hoc process occasionally executed	2 = Important
3 = Modest practice level	3 = Mixture of ad hoc and systematic	1 = Critical
4 = Substantial practice level	4 = Mostly systematic process, pretty well documented	
5 = World class practice level	5 = Systematic, fully documented, always executed	

1.01.02 For breaking up customer demand for services into key drivers and understanding their influences on future demand

Comment: Rate determinations done annually for the board; quarterly for internal purposes.

LEVEL	EXTENT	RANKING
0 = Innocence	0 = Never done	4 = Not applicable
1 = Aware but no practice	1 = Ad hoc process rarely executed	3 = Not important
2 = Low practice level	2 = Ad hoc process occasionally executed	2 = Important
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5 = World class practice level	5 = Systematic, fully documented, always executed	

1.01.03 For undertaking, analyzing and responding to customer and stakeholder surveys. (E.g. are surveys conducted and information reported on for future demand forecasting analysis?)

Comment: Surveys are not done by WWOG - done by other groups.

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0 = Innocence	0 = Never done	4 = Not applicable
1 = Aware but no practice	1 = Ad hoc process rarely executed	3 = Not important
2 = Low practice level	2 = Ad hoc process occasionally executed	2 = Important
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1.01.04 For defining levels of service. (E.g. customer response time, permit compliance, odor levels, etc. Are "Customer Charters or Contracts" developed and maintained? Are customer survey results used to set levels of service?)

Comment: No specific comment

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1.01.05 For predicting future trends in demand for services based on historic and external influences. (E.g. Does the organization undertake demand predictions developing pessimistic and optimistic scenarios?)

Comment: No specific comment

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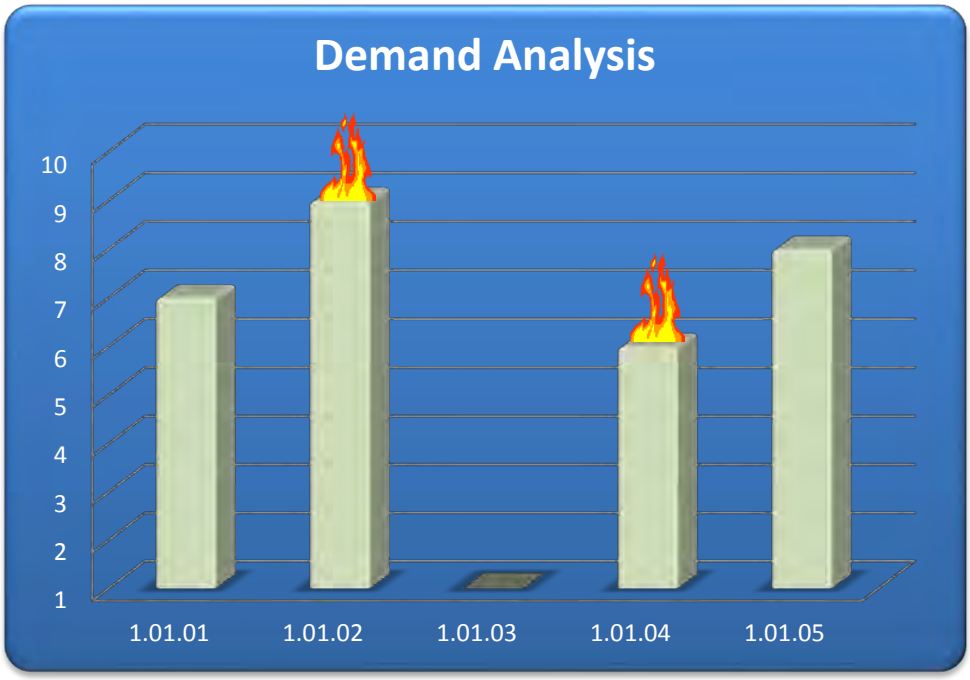

1.02 Knowledge of Assets

1.02.01 For defining the structure of the asset register and the level of detail of asset information that is collected and managed down to the maintenance managed item (MMI). (E.g. is there a defined hierarchical registry structure that is followed consistently? Is the structure and level of detail regularly reviewed?).

Comment: No specific comment

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0 = Innocence	0 = Never done	4 = Not applicable
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1.02.02 For defining the collection and management of asset attribute information.
(E.g. is there a data standard defining this and how is the standard maintained? Is it clear what information is required to be collected on assets?)

Comment: Last looked at in depth in 2004.

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3 = Modest practice level	3 = Mixture of ad hoc and systematic	1 = Critical
4 = Substantial practice level	4 = Mostly systematic process, pretty well documented	
5 = World class practice level	5 = Systematic, fully documented, always executed	

1.02.03 For defining what assets to collect condition data on, when these assessments, should be undertaken, and for determining the potential remaining useful lives of the assets.

Comment: Condition assessments on CSO basins, sewage pumping stations and disinfection equipment/facility are in progress and scheduled to complete in October 2013. Condition assessment data is being captured using the modified version of a spreadsheet template developed in 2004. Needs assessments (every 3 years) should consider condition, but may not always do so. Dye penetrant testing is conducted on high lift pumps but frequency of testing is unknown.

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4 = Substantial practice level	4 = Mostly systematic process, pretty well documented	
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1.02.04 For determining what assets to collect performance and reliability data on and for undertaking the collection. (E.g. Does the organization know how well the asset is performing? How reliable it is? Is there a data standard defining this? Is there a systematic review of performance and reliability?)

Comment: Although production data is captured in SCADA and in the shift report, it is not analyzed for performance/reliability purposes. Some assessments were done in 2004.

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1.02.05 For determining what assets to collect utilization on and for undertaking the collection. (E.g. How often or extensively is an asset used? Is there a data standard defining this? Is there a systematic review of utilization?)

Comment: Utilization data (run times) are captured in SCADA, but are not analyzed for utilization.

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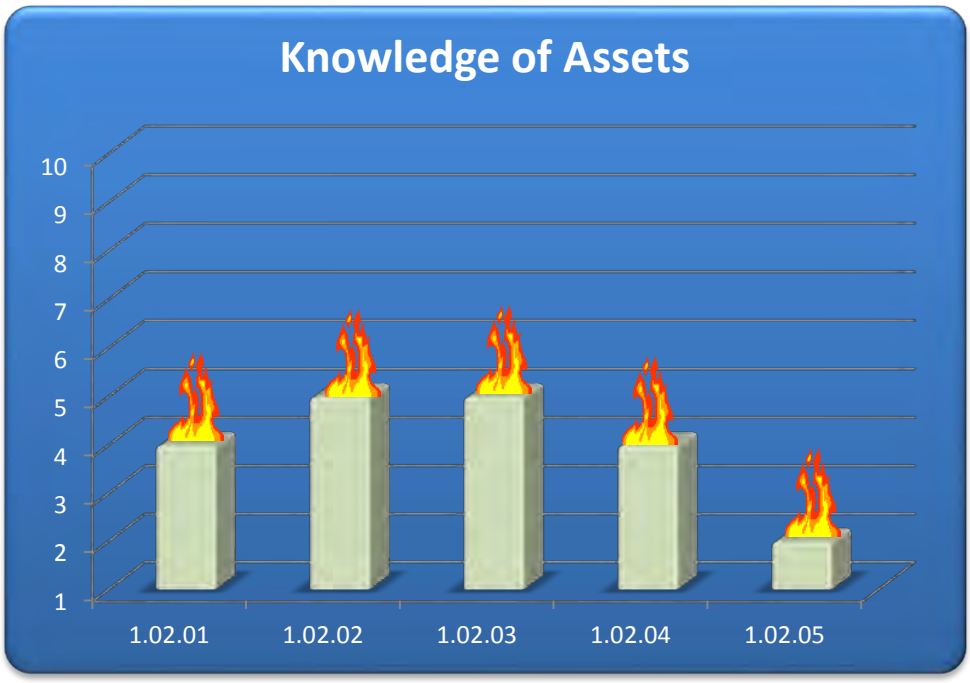

1.03 Accounting and Costing

1.03.01 Processes for undertaking asset valuations. (E.g. are asset valuations undertaken and is the method documented? Is there a method to assess the quality of that valuation?)

Comment: Finance conducts/tracks "fiscal" asset valuations. Significant asset rehab/replacement may get capitalized.

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0 = Innocence	0 = Never done	4 = Not applicable
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1.03.02 Processes for determining the effective lives or remaining useful lives of all assets in the register. (E.g. are effective lives determined for each asset? Are remaining useful lives calculated on a periodic basis? Do these lives reflect the asset's actual operating environment?)

Comment: The Scheduled Replacement Program (SRP) captures effective life and estimates remaining life, but the SRP does not address all assets on a regular basis.

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0 = Innocence	0 = Never done	4 = Not applicable
1 = Aware but no practice	1 = Ad hoc process rarely executed	3 = Not important
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1.03.03 Processes for tracking and reporting operational costs. (E.g. are these costs capable of being aggregated from a suitably low asset level up to a facility level and reported on?)

Comment: Operational costs are tracked at high level, but cannot readily be allocated to lower levels of assets

LEVEL	EXTENT	RANKING
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1.03.04 Processes for tracking and reporting maintenance costs. (E.g. are these costs available at a "maintenance managed item" (work-order) level? Are they capable of being rolled-up to a facility or asset level and being reported on?)

Comment: Some maintenance costs are tracked at asset level through work orders but practice is inconsistent. Costs can be rolled up using reports/database queries.

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1.03.05 Processes for determining future renewal liabilities. (E.g. is the projected future expected expenditure for renewal of assets calculated for at least the next 10 - 20 years?)

Comment: SRP program performs this function, but not for all assets (replacement costs, intervals, etc.)

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1.03.06 Processes for determining residual business risk exposure (E.g. is predicted operational risk exposure that is due to the aging and consumption of assets calculated? Is it incorporated into the organization's budget process?)

Comment: SRP takes aging/remaining useful life into consideration, but it does not include all assets. Likelihood of failure and BRE is not adjusted as part of the process.

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1.03.07 Processes for determining what historical cost data should be collected on individual assets and how should this be archived. (E.g. can all historic costs associated with a critical asset be retrieved and reported?).

Comment: Operational costs are tracked at high level, but cannot readily be allocated to lower levels of assets. Some maintenance costs tracked at asset level through work orders but practice is inconsistent.

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0 = Innocence	0 = Never done	4 = Not applicable
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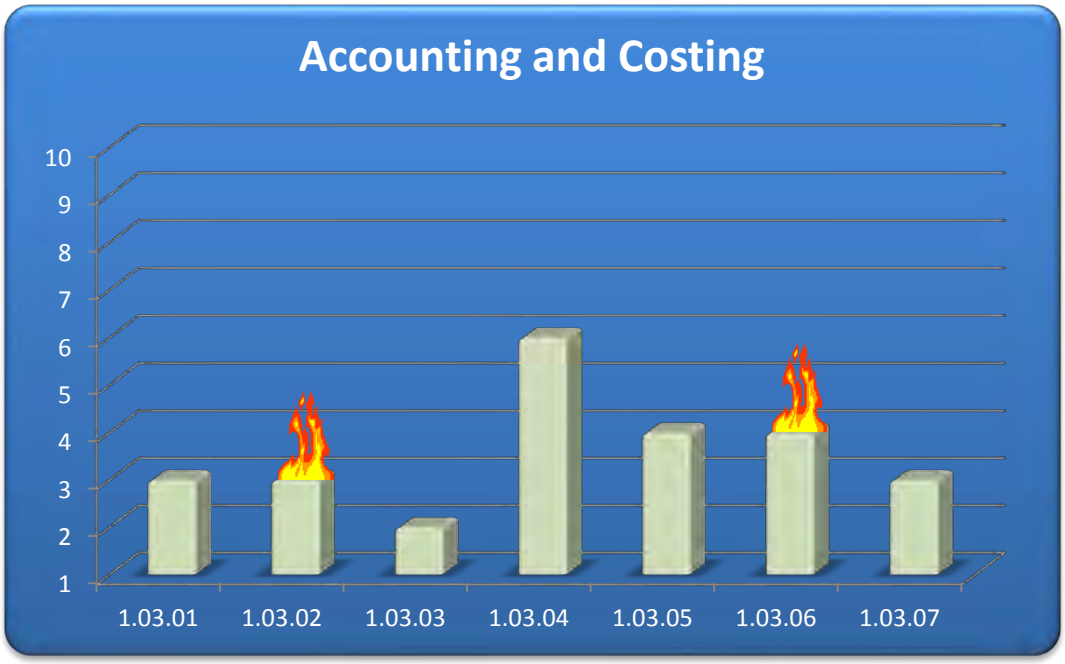
Accounting and Costing
10
9
8
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1
1.03.01
1.03.02
1.03.03
1.03.04
1.03.05
1.03.06
1.03.07

1.04 Strategic Planning

1.04.01 Processes for predicting expected failure modes for all assets. (E.g. Does the organization understand the likely failure modes – that is, how the asset is likely to fail - for individual assets? Does it understand which of the major failure modes is most imminent? Does it link the imminent failure mode with projecting remaining useful life?)

Comment: No specific comment

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1.04.02 Processes for undertaking risk assessments of asset failure for inclusion within the planning process. (E.g. what is the probability and consequence of a particular asset failing?).

Comment: No specific comment

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4 = Substantial practice level	4 = Mostly systematic process, pretty well documented	
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1.04.03 Processes for making optimized asset renewal decisions by identifying the most economical renewal (repair, refurbish, replace) solution and point in time to renew an asset. (E.g. Does the process include all feasible options for life extension? Does it include life cycle cost analysis?)

Comment: No specific comment

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2 = Low practice level	2 = Ad hoc process occasionally executed	2 = Important
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4 = Substantial practice level	4 = Mostly systematic process, pretty well documented	
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1.04.04 Processes for assessing the life cycle cost of new assets. (E.g. are all capital, maintenance, and operational costs that are associated with a specific asset systematically accounted for? Are these costs archived in a readily retrievable manner?).

Comment: Capital costs for new assets may be provided and itemized by contractors, but the data does not get entered into the CMMS. Operational costs are tracked at high level, but cannot readily be allocated to lower levels of assets. Some maintenance costs are tracked at the asset level through work orders, but the practice is inconsistent.

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0 = Innocence	0 = Never done	4 = Not applicable
1 = Aware but no practice	1 = Ad hoc process rarely executed	3 = Not important
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3 = Modest practice level	3 = Mixture of ad hoc and systematic	1 = Critical
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5 = World class practice level	5 = Systematic, fully documented, always executed	

1.04.05 Processes to identify cost reduction or service level improvement opportunities. (E.g. Do the budget and rate setting processes specifically and systematically consider the trade-offs among level of service, cost of service, and business risk?).

Comment: No specific comment

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1.04.06 Processes for producing Asset Management Plans from a strategic perspective (the quality of these plans are dealt with elsewhere). (E.g. is the generation of a periodic enterprise asset management plan a systematic and efficient process? For facility asset management plans?).

Comment: No specific comment

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1.04.07 Processes for working with customers, regulators and other stakeholders during long term strategic planning. (E.g. is there a systematic process for informing customers and stakeholders of strategic asset issues and investment alternatives and for seeking and incorporating feedback from them?)

Comment: Some issues may be reported to regulators. Symposiums related to de-watering and incineration issues were organized by WWOG. A long term Capital Improvement Plan (CIP) (both water & sewer) is published on the web and includes spending forecasts. The WWOG meets with customers twice a year to talk about CIPs and to solicit feedback.

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1.04.08 Processes for linking capital and O&M expenditure programs with overall business goals in triple bottom line terms (social, economic and environment). (E.g. are there clear and demonstrable links between the asset management program and organizational budgets? Between organizational Levels of Service targets and their impact on the community, financial condition of the utility, and environmental impact?)

Comment: No specific comment

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1.04.09 Processes for budget rationalization (e.g. is the asset management plan with its forecasted expenditures systematically matched with available financial resources? Does the Asset Management Plan actually tie to the organization's budget at the line item level?).

Comment: No specific comment

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1.05 Capital Expenditure Evaluation

1.05.01 Policy for the evaluation of capital expenditure projects (CIP). (E.g. does an organization-wide uniform policy and clear CIP process exist? Does it ensure a businesslike approach to capital investment decision making? Does it define roles and responsibilities for key activities?).

Comment: CIP proposals are prepared by engineering (includes an alternatives analysis), and goes to Capital Management Group (CMG) for evaluation and processing (likely does not include business case evaluation).CMG has protocols for scoring CIP and prioritizing CIPs for implementation.

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1.05.02 Processes for categorizing the strategic drivers of capital expenditure. (E.g. are capital expenditure categorized into growth, renewal, regulations / levels of service and business efficiency investment categories?).

Comment: No specific comment

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1.05.03 Processes for linking the sophistication and extent of the evaluation processes for a specific project to the level of expenditure and the risk it represents to the organization. (E.g. are more extensive evaluation techniques used for larger investments and higher risks to the business?)

Comment: CMG has protocols for scoring CIP and prioritizing CIPs for implementation. Thresholds are defined within those protocols to drive the levels/rigor of evaluation that may be needed.

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1.05.04 Processes for linking service demand with the level of expenditure necessary to achieve long term sustainability. (E.g. Has the organization developed a funding model that allows each project to be reported in terms of its impact on the business in terms of meeting service demand and generating income on a long term sustainable basis?).

Comment: No specific comment

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1.05.05 Processes for evaluating supply or program delivery options. (E.g. are various methods of delivery - such as Internal or external resources, private / public partnerships, design and construct - considered and evaluated for each project?).

Comment: These processes are included in the CIP proposal development process.

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1.05.06 Processes to ensure the appropriate quality of operation and maintenance expenditure cost estimates (budgets) used in capital expenditure evaluation. (E.g. are maintenance and operation costs related to a specific CIP project forecast over the expected life of the asset?)

Comment: These processes are included in the CIP proposal preparation phase.

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1.05.07 Processes for investigating and recording alternative options to the lowest life cycle cost option for capital expenditure projects for use in budget rationalization activities. (E.g. Are "out of the box" solutions such as "do nothing", project deferral, "manage the risk", and "non-asset" solutions and the like considered and recorded as options?)

Comment: Alternatives analysis actions are documented.

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1.05.08 Processes for economic evaluation of all capital and recurrent investment projects, including a clear policy by which each project should be evaluated. (E.g. Are Internal Rate of Return, Benefit Cost Ratios, and the like in present value terms considered for all projects?)

Comment: No specific comment

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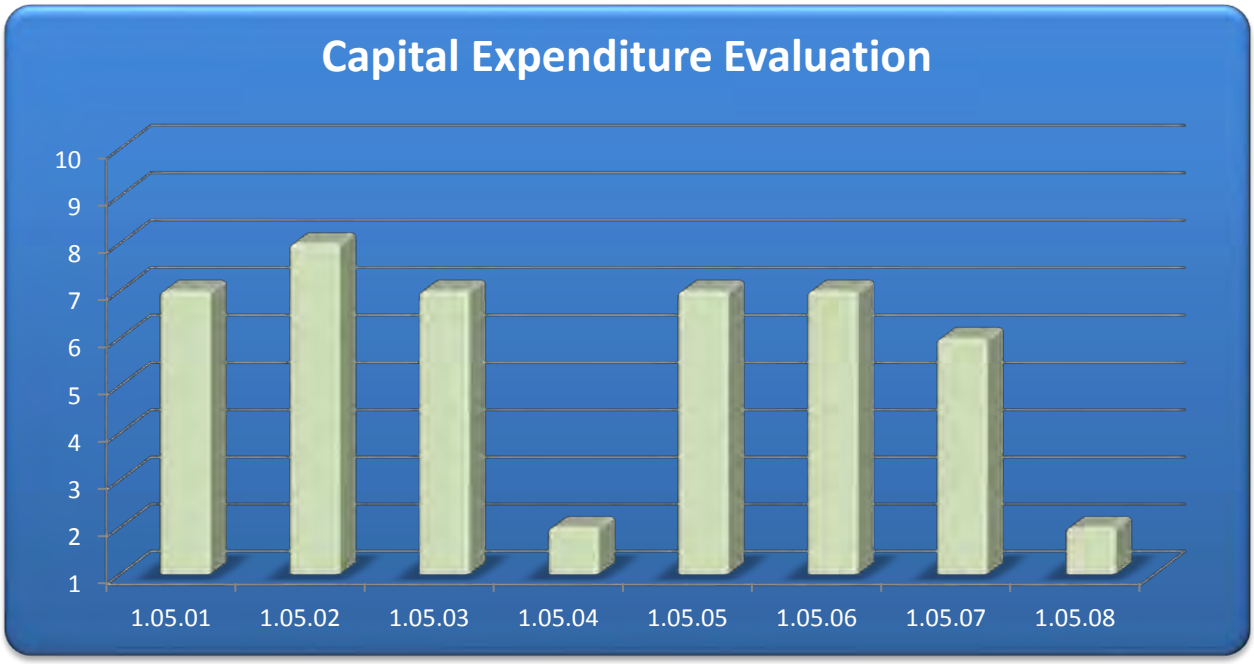
Capital Expenditure Evaluation
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1.05.01
1.05.02
1.05.03
1.05.04
1.05.05
1.05.06
1.05.07
1.05.08

1.06 Business Risk Management

1.06.01 Policy for the evaluation of all business risk exposure on an organization wide basis. (E.g. Does a corporate wide business risk management policy exist? Does it clearly define roles and responsibilities for the key risk areas of strategy, finance, and operations?)

Comment: No specific comment

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1.06.02 Processes for risk identification relevant to each business unit or for the entire organization. (E.g. Do the risks considered include at a minimum strategic, financial, information technology, engineering, and operational?)

Comment: No specific comment

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1.06.03 Processes for quantifying probability and consequences of failure. (E.g. is this a simple point score or are full economic costs considered?)

Comment: Criticality scale 1 to 5 represents consequence of failure, but does not consider probability of failure.

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1.06.04 Processes for analyzing risks, including the understanding of its makeup and the ranking of the risks. (E.g. Which part of the business represents the greatest risk? What is the greatest risk?)

Comment: No specific comment

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1.06.05 Processes for managing risk reduction, including the assessment of mitigation options. (E.g. Are identified risks linked to specific mitigation strategies and responsibilities? Are the risks and associated mitigation strategies tracked and reported?)

Comment: No specific comment

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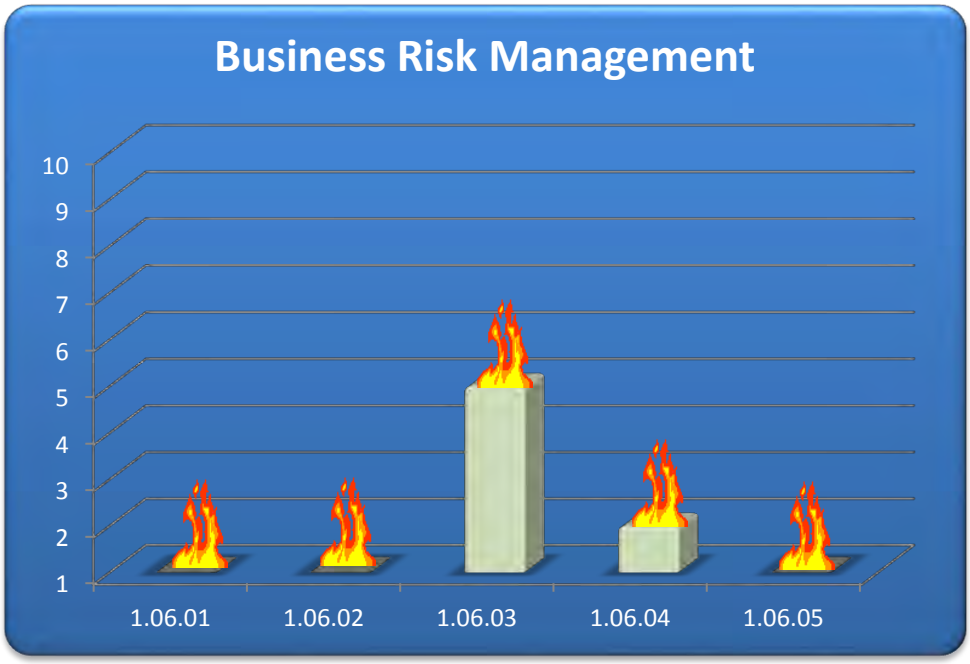
Business Risk Management
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1.06.01
1.06.02
1.06.03
1.06.04
1.06.05

1.07 Creation and Acquisition

1.07.01 Processes for the successful program management of the asset creation or acquisition program. (E.g. are projects systematically tracked from the strategic planning stage (project identification) through to the final service delivery including commissioning and handover?)

Comment: When CIP projects near the end of their construction phase, assets that are created through the CIP projects get entered into EMPAC. Asset replacements made by O&M as part of preventive maintenance or corrective maintenance are not consistently updated.

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1.07.02 Processes for Contract Administration. (E.g. are processes in place for managing all the contractors necessary for the projects and their interface with the asset owner?)

Comment: Process related to CIP work is well established. Non-CIP contracts are not managed consistently (e.g. maintenance, rehab services).

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1.07.03 Processes for Project Management. (E.g. are systematic processes in place for the financial cost control and timely delivery of a project and the mitigation of risks involved)

Comment: Processes are well implemented for CIP projects. However, guidelines are not followed consistently for internal projects.

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1.07.04 Processes for Value Engineering. (E.g. Does the organization systematically incorporates "value engineering"? How is the optimum design assessed and adopted?)

Comment: Sometimes opportunities for design/redesign options are restricted due to physical space restrictions where assets are/or will be located. Value Engineering is sometimes performed, but it is not a routine practice that is consistently applied.

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1.07.05 Processes that ensure the optimum maintainability / operability of new assets is achieved. (E.g. are design reviews systematically and thoroughly undertaken by the operations and maintenance staff prior to final design. Are these reviews carefully assessed and appropriately incorporated?)

Comment: O&M reviews are sometimes delayed due to resource availability, but O&M review is a routine practice.

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1.07.06 Processes for ensuring appropriate construction standards and quality control is achieved in all asset creation and acquisition work. (E.g. are contractor audits and other quality control mechanisms used?)

Comment: Construction inspections are carried out during construction.

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1.07.07 Processes for asset commissioning and handover. (E.g. Is all required operational and maintenance information collected at time of commissioning, including as-constructed drawings, operations/maintenance procedures and manuals, and maintenance programs? Is the initial "burn-in" performance of the asset reviewed and recorded?)

Comment: Asset data for updating CMMS is manually input into EMPAC by DWSD resources.

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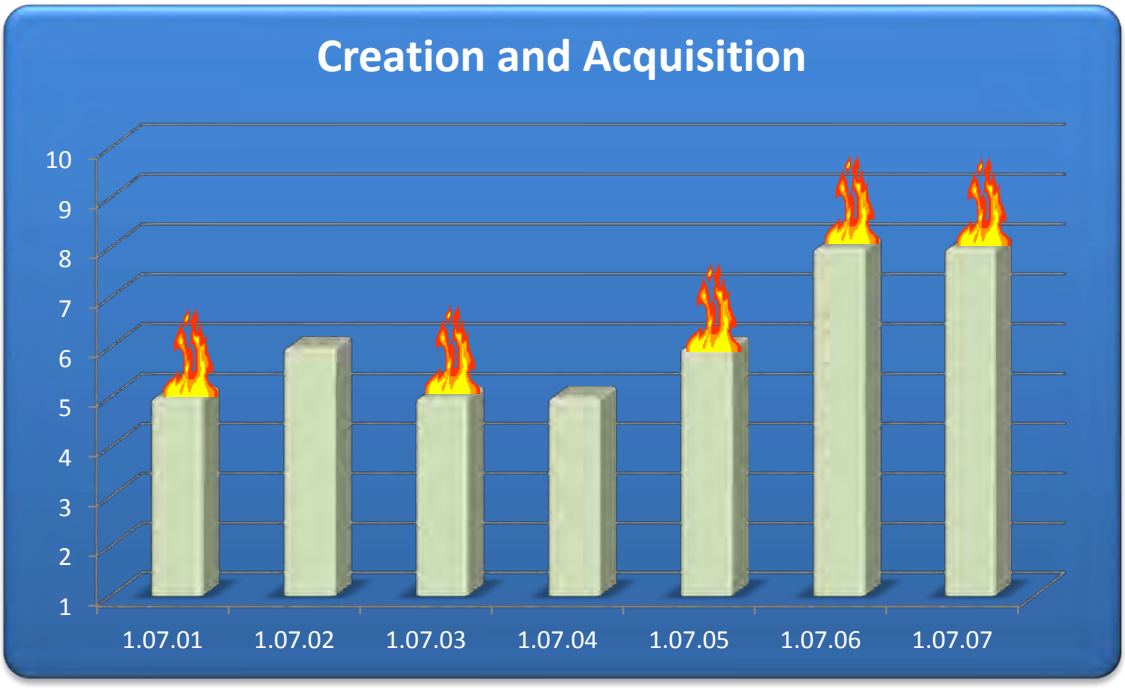

1.08 Rationalization and Disposal

1.08.01 Processes for rationalizing the existing asset portfolio and disposal of unwanted assets. (E.g. are assets periodically and systematically reviewed to identify assets for disposal, mothballing, or transfer to improve business effectiveness, to reduce risk and cost, and to release funds for other purposes?)

Comment: No specific comment

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1.08.02 Processes for disposing of assets. The processes for good governance and ethical behavior in the release of assets. (E.g. are these assets removed from the asset register and on other asset systems, - e.g. financial records, CMMS, GIS - in a timely manner?)

Comment: No specific comment

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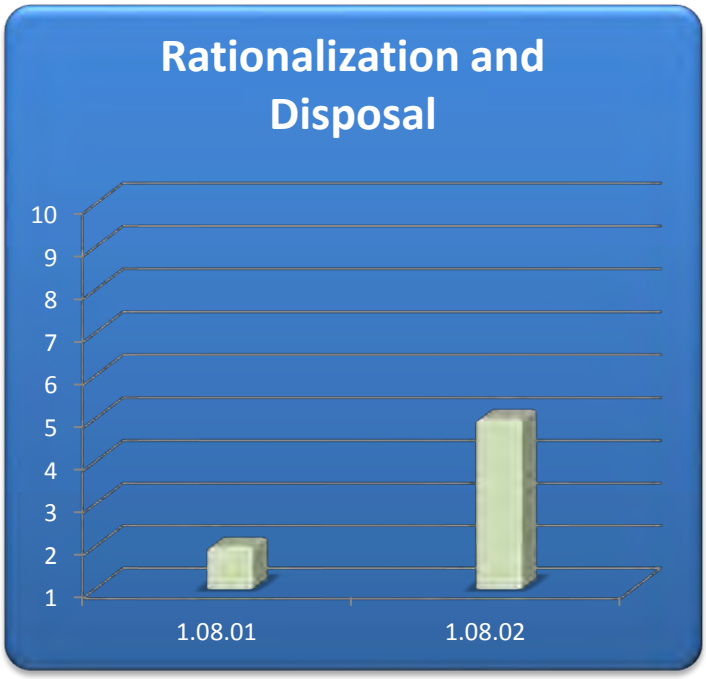
Rationalization and Disposal
10
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1.08.01
1.08.02

1.09 Operations

1.09.01 Processes for developing and maintaining operating procedures. (E.g. are operating procedures periodically reviewed with respect to lowest life cycle cost at a target level of service/performance and risk?). Are new assets automatically added to the review?)

Comment: Need processes for updating O&M manuals.

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1.09.02 Processes for the successful operation of all assets during normal and emergency operations. (E.g. Do such procedures exist, and do they cover all areas and assets down to the maintenance managed item level?)

Comment: Processes exist at major asset level (e.g. belt press), but not for maintenance managed level assets. Operations manuals are available on internal SharePoint.

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1.09.03 Processes for developing and maintaining operation manuals. (E.g. are new assets automatically included; are they periodically updated and purged?)

Comment: Manuals for new assets are provided under CIP processes. Process is not in place for assets replaced by O&M.

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1.09.04 Processes to assure the quality of Operating Manuals and Standards. (E.g. are all manuals clear, complete, graphically effective, current, and relevant? Are updates timely?)

Comment: No specific comment

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1.09.05 Processes for handling customer and stakeholder complaints. (E.g. are these tracked through the business from receipt to resolution? Is the customer kept informed of the progress of the complaint?)

Comment: Not all customer complaints are routed through customer service.

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1.09.06 Processes for the development and maintenance of Emergency Response Plans, including for what events and against what level and criticality of asset the plans are to be completed. (E.g. are new assets automatically included? How often are the Plans reviewed? Are “triggers” for the need for upgrades identified?)

Comment: Emergency Response Plans are on SharePoint. Review process is not triggered - done on an ad hoc basis.

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1.09.07 Processes to assure quality of the actual Emergency Response Plans. (E.g. do such quality assurance processes exist and cover all asset services? Are they to the appropriate level of detail? Are they quickly available to relevant staff? Is staff trained in the Plans?)

Comment: No specific comment

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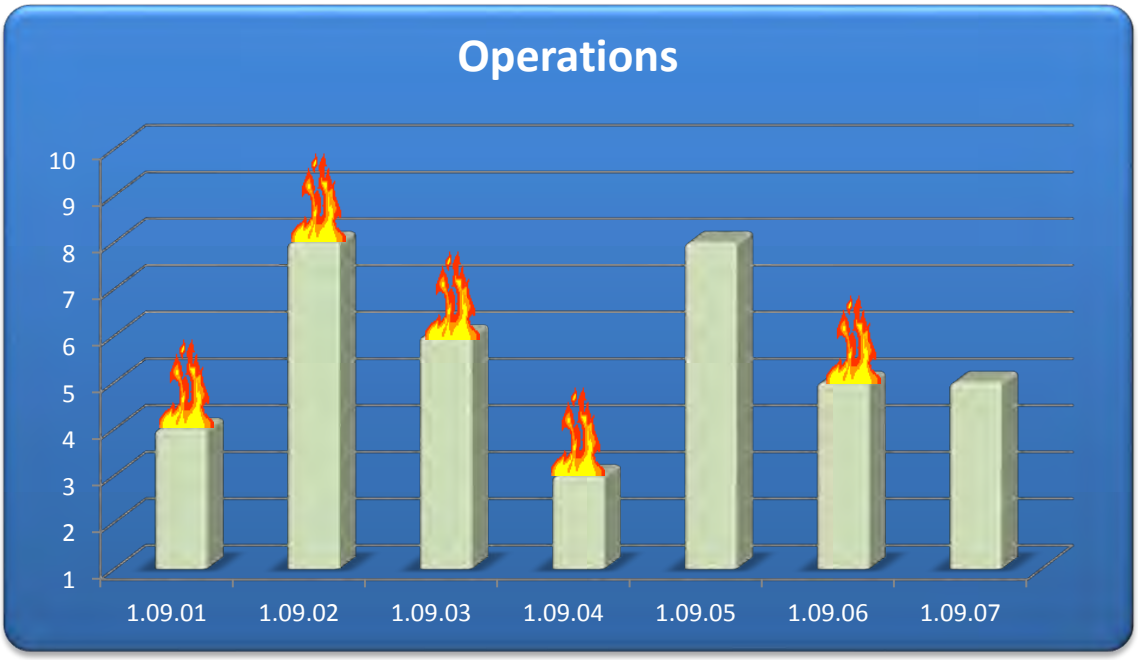

1.10 Maintenance

1.10.01 Processes for setting a strategic level maintenance framework (such as Reliability Centered Maintenance, Zero Breakdown Maintenance, Six Sigma, etc.) that defines how the organization undertakes maintenance of its assets. (E.g. Does such a corporate wide policy exists and is it tied to business goals and cost analysis?)

Comment: No specific comment

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1.10.02 Processes for maintenance planning. (E.g. is there a process for defining how each asset / asset type will be maintained? Is the basis for determining the maintenance procedure or activity for a single asset clear? Does this process cover all assets?)

Comment: No specific comment

LEVEL	EXTENT	RANKING
0 = Innocence	0 = Never done	4 = Not applicable
1 = Aware but no practice	1 = Ad hoc process rarely executed	3 = Not important
2 = Low practice level	2 = Ad hoc process occasionally executed	2 = Important
3 = Modest practice level	3 = Mixture of ad hoc and systematic	1 = Critical
4 = Substantial practice level	4 = Mostly systematic process, pretty well documented	
5 = World class practice level	5 = Systematic, fully documented, always executed	

1.10.03 Processes for maintenance scheduling. (E.g. Does the organization have a clear process to determine maintenance schedules or intervals for the prescribed maintenance activity for each asset?)

Comment: Rely predominantly on manufacturer recommendations for PMs.

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1.10.04 Processes for monitoring and controlling the maintenance program. (E.g. is there adequate reporting and feedback from field staff and information systems to enable the complete understanding of what is happening to the assets?)

Comment: Feedback is inconsistently provided.

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1.10.05 Processes for recording and reporting maintenance costs down to the maintenance managed item level. (E.g. are asset costs reported and accessible? Is there a clear methodology on what is required?)

Comment: Labor and parts/materials costs can be linked to work orders. Labor costs are consistently captured, but parts/materials is less consistent.

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1.10.06 Processes for developing and maintaining contents of maintenance manuals and instructions. (E.g. are new assets automatically included and how often are they reviewed? What is the process by which the responsible staff can update them? Is the format specified?)

Comment: No specific comment

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1.10.07 Processes for assuring the quality of maintenance manuals and instructions. (E.g. Do these exist and cover all business units/divisions and assets types?)

Comment: No specific comment

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1.10.08 Processes for reviewing and analyzing maintenance programs.
(E.g. Have key maintenance performance indictors been adopted and reported? Are maintenance trigger points understood by all? Are maintenance strategies matched to condition and stage in the life cycle? Are “problem assets” periodically identified and associated failure modes assessed? Are failure codes relevant to the class of asset incorporated in the work order process? Is the condition and other asset attributes data updated as work orders are executed and closed? Is the “return on maintenance investment” regularly calculated and reported?)

Comment: No specific comment

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1.10.09 Processes for developing maintenance strategies that incorporate the overall business drivers for maintenance, capital investment, and system performance. (E.g. do strategic Levels of Service link directly to required asset performance levels and subsequently to maintenance planning and scheduling?)

Comment: No specific comment

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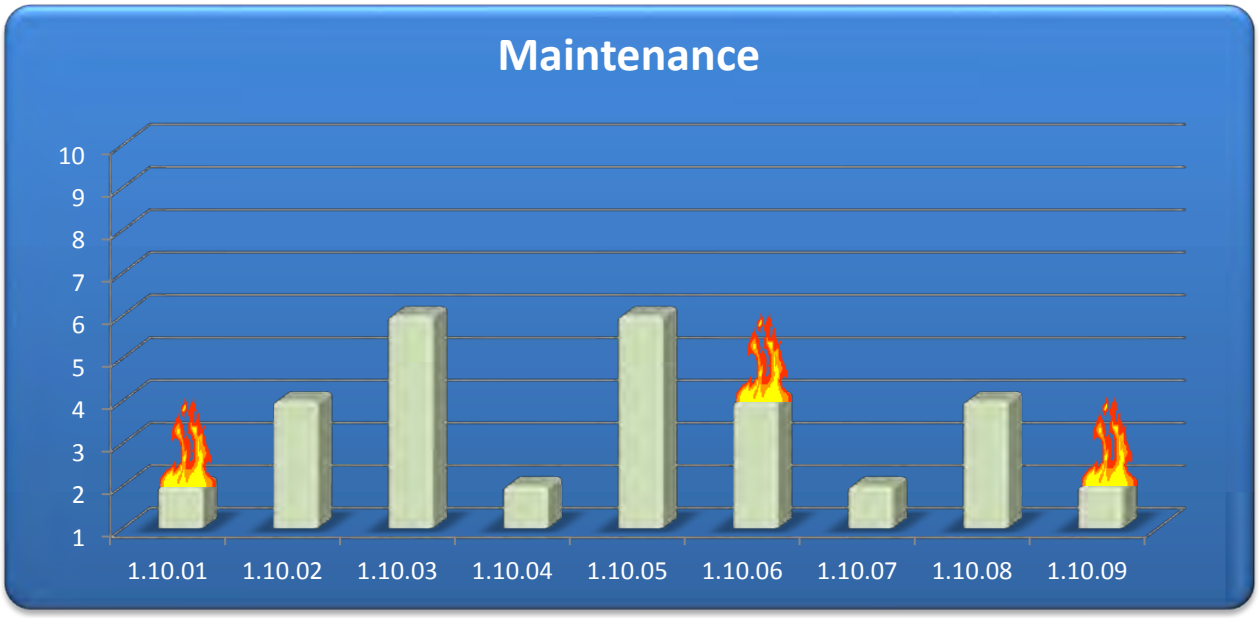

1.11 Work and Resource Management

1.11.01 Processes for matching skills to the demand for services / activities and allocating resources across the organization. (E.g. is resource demand for designated maintenance skills matched with available supply? Is it across the organization?)

Comment: No specific comment

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1.11.02 Processes for prioritizing work orders. (E.g. are work orders allocated based on a criticality score that measures the probability and consequence of failure?)

Comment: No specific comment

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1.11.03 Processes for managing larger projects that involve multiple tasks and tracking of those costs. (E.g. are work orders recorded in a timely manner? Can cost tracking be assigned to a project in a manner accessible by users?)

Comment: No specific comment

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1.11.04 Processes for controlling inventory or stock. (E.g. are work orders linked to the required spare parts? Are these spare parts ordered in advance of completing the work order?)

Comment: No specific comment

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1.11.05 Processes for planning future work load and required resources. (E.g. Does the organization predict and balance future work load for different skills and numbers of staff for all life cycle functions?)

Comment: No specific comment

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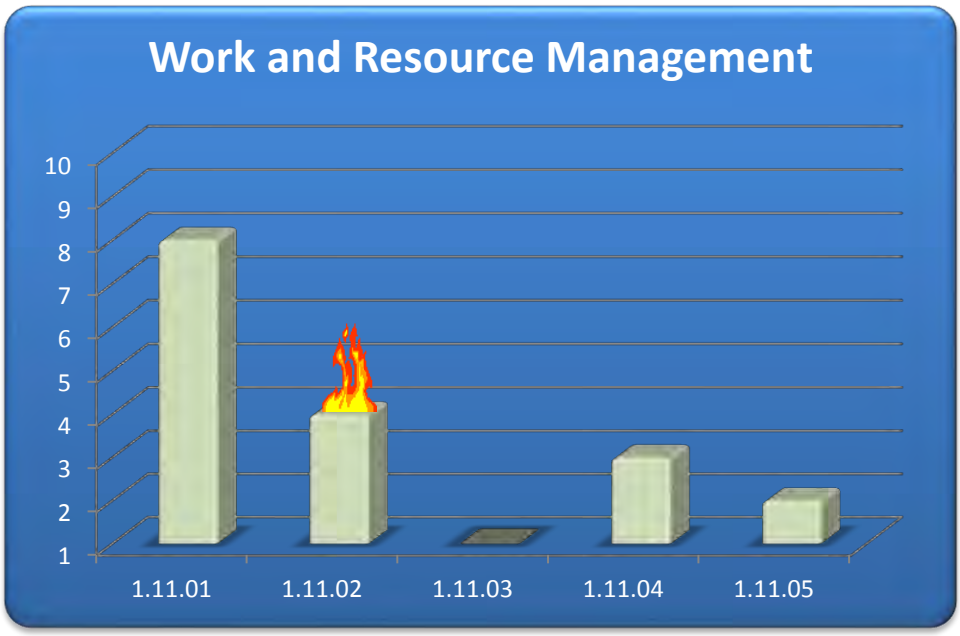

1.12 Continuous Improvement

1.12.01 A knowledge management system that contains all the processes and practice materials described previously that is available to practitioners (e.g. Does such a knowledge base exist – in paper or digital form? Does it cover all life cycle Asset Management functions and best practices? Is it periodically updated?)

Comment: No specific comment

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1.12.02 Asset Management Process Diagrams and Flowcharts (e.g. are internal Asset Management processes mapped? Do they cover all Asset Management functions? Are they readily available to staff?)

Comment: No specific comment

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1.12.03 Processes for internal quality assurance. (E.g. Are Internal review processes that ensure the best appropriate practices adopted by the business are followed across all business units in place?)

Comment: No specific comment

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1.12.04 Processes for externally reviewing and benchmarking Asset Management practices for both input (process) and output (cost activity) benchmarking. (E.g. Does the organization undertakes external input and output benchmarking for asset management best practices?)

Comment: No specific comment

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1.12.05 Processes followed for identifying cost reduction opportunities (e.g. is this a random or systematic process? Does the organization have a process by which new ideas and suggestions are reviewed?)

Comment: No specific comment

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1.12.06 Processes for implementing and reporting on the progress achieved with approved Asset Management improvement programs. (E.g. does the organization measure and track the progress of these programs?)

Comment: No specific comment

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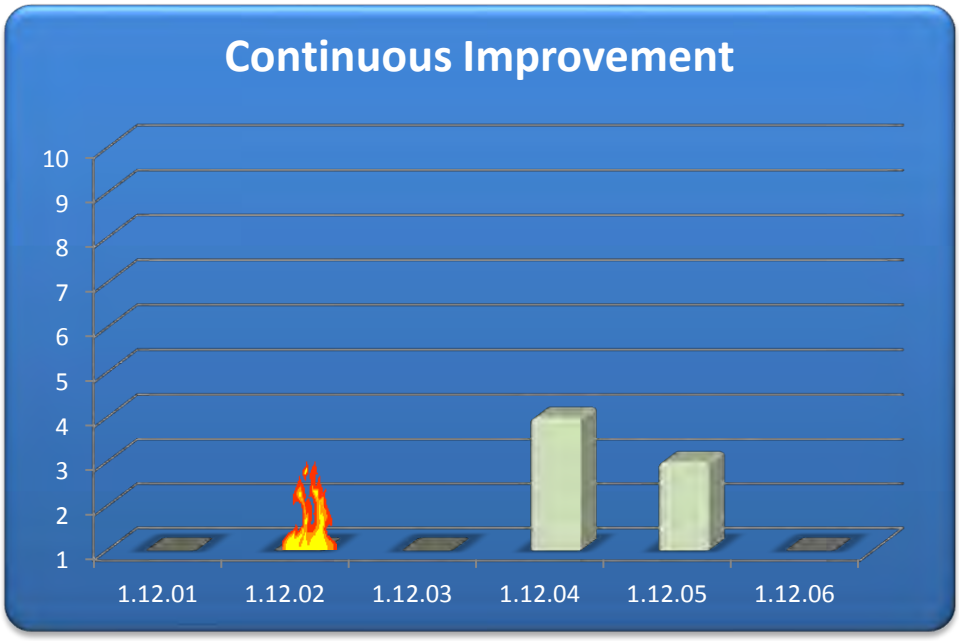
Continuous Improvement
10
9
8
7
6
5
4
3
2
1
1.12.01
1.12.02
1.12.03
1.12.04
1.12.05
1.12.06

DWSD's AM Initiatives

Number	Title
1.01.04*	**Define Minimum Required Level of Service at the Asset Level**
1.02.01.A*	**Define Asset Registers Structures and Asset Identification Protocols**
1.02.01.B	Link Preventive Maintenance Rules & Activities to MMIs
1.02.02	Define Attribute Information to be Collected for Assets & MMIs
1.02.03*	**Define Asset Condition, Performance, and Reliability Assessment Protocols**
1.03.02*	**Define Asset Effective and Remaining Useful Lives**
1.03.06*	**Define Asset Business Risk Exposure**
1.04.01.A*	**Develop Reliability Centered Maintenance Asset Evaluation Program**
1.04.01.B*	**Develop Preventive Maintenance Optimization Program**
1.04.04	Develop Asset Life Cycle Costs Management Processes
1.04.06*	**Develop Processes for Producing Annual Asset Management Plans**
1.06.01	Develop Policy for Organization-wide Business Risk Management
1.07.01.A	Define Protocols for Asset Acquisition, Commissioning, and Turnover
1.07.01.B	Refine and Re-implement Records Management Policy
1.09.01	Define Protocols for Developing and Maintaining Operating Procedures
1.10.02	Define Protocols for Maintenance Planning and Scheduling, and Monitoring and Controlling Maintenance Program Activities
1.10.08	Define Processes for Evaluating Return on Maintenance Investments
1.12.02.A*	**Develop Asset Management Process Diagrams and Procedure**
1.12.02.B*	**Define Protocols for Conducting Business Case Evaluations**
1.12.02.C*	**Define Protocols for Using the Asset Renewal Valuation Tool**
2.0	Asset Management Program Rollout
3.0*	**Collect Assets & MMIs Data**

* = Initiative that relates specifically to the AM program elements as specified in the MDEQ Permit

Initiative 1.01.04: Define Minimum Required Level of Service at the Asset Level

OVERVIEW:

This initiative will define an asset minimum required level of service scoring scale (e.g. customer response time, permit compliance, odor levels, service reliability, etc.), and define protocols for evaluating and scoring assets to assign minimum required level of service ratings at the asset level.

EXISTING INITIATIVES AND INVESTMENTS:

- Initiatives are currently underway in the Wastewater Operating Group for noise and odor control
- DWSD has historically performed an overall outreach to the public via advertising, online surveys, and public forum meetings
- DWSD has sought to maintain the aesthetics of its properties
- A current goal is to keep customer response times below an hour
- A recent undertaking placed stickers on vehicles giving DWSD contact information and a promise to give a response within 24 hours (511 for emergency/311 otherwise)
- Online surveys are available on the DWSD website soliciting customer feedback
- A customer satisfaction survey from 10/17/2013 includes feedback from wholesale customers on the level of service (LOS), and feedback shows that the LOS is at a high or acceptable level

PRIORITY: High	**TIMING:** To Be Determined

COST RANGE: $X – Y K + internal staff time

DURATION:

- To develop Standard Operating Procedure (SOP): ~ 2 to 4 weeks
- To conduct data collection: included in estimates for Initiative 3.0

TEAM MEMBER ROLES AND RESPONSIBILITIES:

- To develop SOP: 1-FTE AMT Coordinator, .25-FTE AMT Reviewer
- To conduct data collection: included in estimates for Initiative 3.0

Note: 1-FTE = the full time equivalent of one person versus only one person full time

DESCRIPTION:

This initiative will be tasked to do the following:

- Develop an SOP defining a scoring scale for assigning the minimum required level of service (MRLoS) ratings for assets (this includes enhancing definitions provided in the Asset Renewal Evaluation Tool as needed for different asset groups, classes, types, etc.)
- Within the SOP, define protocols for determining MRLoS ratings for assets (including protocol variations as needed for different asset groups, classes, types, etc.)

• Within the SOP, define protocols for conducting quality control reviews (e.g. how done and documented), as applicable • Develop templates as needed to support data collection • Evaluate and score assets to assign MRLoS ratings
DEPENDENCIES: None
KEY DELIVERABLES: • SOP with clearly defined asset MRLoS scoring scale • MRLoS ratings assigned for assets
SUSTAINABILITY NEEDS: Initiative 3.0 Collect Assets & MMIs Data
OUTCOMES AND BENEFITS: Focusing on MRLoS at the asset level will aid in aligning future asset management activities with goals for delivering quality and reliable service to customers
AM READINESS ASSESSMENT CROSS REFERENCES: 1.01.04

Initiative 1.02.01.A: Define Asset Registers Structures and Asset Identification Protocols

OVERVIEW:

This initiative will define the structures of the asset registers for various asset groups (e.g. plants, pump/booster stations, basins, linear assets, etc.); including the level of detail or granularity necessary to represent lowest level maintenance managed items within the registers. In addition, standardized identification protocols will be defined.

EXISTING INITIATIVES AND INVESTMENTS:

- Asset registers (hierarchies) are currently captured in existing information systems, but do not reflect associated lower level maintenance managed items (MMIs) as unique entities
- Numbering conventions have been followed for asset identification, but they are not captured in one comprehensive guideline for uniform use throughout DWSD

PRIORITY: High	**TIMING:** To Be Determined

COST RANGE: $X – Y K + internal staff time

DURATION:

- To update existing Standard Operating Procedure (SOP): ~ 2 to 4 weeks
- To update asset registers (determine the MMIs needed & update CMMS):
  - WW Plant ~ .25hr/asset x 4000 assets = ~ 1000hrs
  - CSO Basins ~ .25hr/asset x 1300 assets total = ~ 325hrs total
  - Water Plants ~ .25hr/asset x 600 assets/plant = ~ 150hrs/plant
  - Pump/Booster Stations ~ .25hr/asset x 50 to 75 assets/station = ~ 12.5hrs to 18.75hrs/station
  - Facilities assets – most facilities are included in estimates for plants, basins and stations. However, there are 14 additional facilities ~ .25hr/asset x 500 assets total = ~ 125hrs
  - Control Structures and Equipment – (*assets inputs needed*)
  - Fleet assets ~ .25hr/asset x 500 to 700 fleet vehicles = ~ 125hrs to 175hrs
  - GIS represented assets – *NOTE: linear assets & a GIS interface are not part of the first phase of the WAM implementation, so updating related to linear assets may need to be addressed in a second phase of this initiative*

TEAM MEMBER ROLES AND RESPONSIBILITIES:

- To update existing SOP: 1-FTE AMT Coordinator, .25-FTE AMT Reviewer
- To update asset registers: 1-FTE AMT Coordinator, 1-FTE CMMS Subject Matter Expert

Note: 1-FTE = the full time equivalent of one person versus only one person full time

DESCRIPTION:

This initiative will be tasked to do the following:

- Update an existing SOP to define MMI, what will be considered to be MMIs (e.g. lowest maintainable unit vs. materials/spare parts used in performing maintenance activities), and levels of granularity expected to identify MMIs within asset registers
- Determine whether MMIs will be identified as “assets” or “components”
- Within the SOP, capture alphanumeric asset identification conventions previously used and that are intended to be carried forward
- Within the SOP, define new alphanumeric asset identification conventions as appropriate for other asset groups (possibly some linear assets). *NOTE: it may not be feasible to apply an alphanumeric numbering scheme for the wastewater plant, since one was never used and all work history is tied to existing asset numbering*
- Within the SOP, define protocols for conducting quality control reviews (e.g. how done and documented), as applicable
- Develop templates as needed to support data collection
- Review current asset hierarchies to identify improvements or modifications to create asset management-centric hierarchies, and retrofit existing asset registers based on the new MMIs identification standards

DEPENDENCIES: None

KEY DELIVERABLES:

- SOP with clearly defined standards for asset register structures and MMIs representation
- Defined asset identification conventions
- Updated asset registers incorporating the new MMIs identification standards

SUSTAINABILITY NEEDS: Ongoing adherence to SOP

OUTCOMES AND BENEFITS:

- Promotes uniform asset representation and identification
- Promotes better granularity of work history for more refined asset management decision evaluations and analyses

AM READINESS ASSESSMENT CROSS REFERENCES: 1.02.01

Initiative 1.02.01.B: Link Preventative Maintenance Rules & Activities to MMIs

OVERVIEW:

This initiative will link preventive maintenance rules and future work history to the maintenance managed items identified within asset registers (as appropriate).

EXISTING INITIATIVES AND INVESTMENTS:

Preventive maintenance (PM) rules are currently captured in existing information systems, but are not associated directly with lower level maintenance managed items (MMIs).

PRIORITY: High	**TIMING:** To Be Determined

COST RANGE: $X – Y K + internal staff time

DURATION:

- WW Plant ~ .50hr/asset x 4000 assets = ~ 2000hrs
- CSO Basins ~ .50hr/asset x 1300 assets total = ~ 650hrs
- Water Plants ~ .50hr/asset x 600 assets/plant = ~ 300hrs/plant
- Pump/Booster Stations ~ .50hr/asset x 50 to 75 assets/stations = ~ 25hrs to 37.5hrs/station
- Facilities assets – most facilities are included in estimates for plants, basins and stations. However, there are 14 additional facilities ~ .50hr/asset x 500 assets total = ~ 250hrs
- Control Structures and Equipment – (*assets inputs needed*)
- Fleet assets ~ .50hr/asset x 500 to 700 fleet vehicles = ~ 250hrs to 350hrs
- GIS represented assets – *NOTE: linear assets & a GIS interface are not part of the first phase of the WAM implementation, so asset register updating under Initiative 1.02.01.A and linking PM rules to MMIs may need to be addressed in a second phase of this initiative*

TEAM MEMBER ROLES AND RESPONSIBILITIES:

1-FTE AMT Coordinator, 1-FTE CMMS Subject Matter Expert

Note: 1-FTE = the full time equivalent of one person versus only one person full time

DESCRIPTION:

This initiative will be tasked to do the following:

- Confirm that PM rules and work orders can be linked to and scheduled from components rather assets in WAM
- Make considerations for when PM rules linkage and scheduling at the asset vs. MMI level is still appropriate (e.g. if the PM is not related to a specific MMI)
- Investigate being able to suppress PMs that trigger at the same time for the same asset/MMI (e.g. monthly and quarterly for the same asset/MMI)
- Review and modify PM rules linkages from current assets to new MMIs as appropriate

DEPENDENCIES: • Initiative 1.02.01.A Define Asset Registers Structures and Asset Identification Protocols • If MMIs are to be identified as components within Oracle WAM, implementation of WAM is necessary, since PM rules cannot be linked to components within the current CMMS
KEY DELIVERABLES: PMs linked to MMIs rather assets (as appropriate)
SUSTAINABILITY NEEDS: None
OUTCOMES AND BENEFITS: Promotes better granularity of work history for more refined asset management decision evaluations and analyses
AM READINESS ASSESSMENT CROSS REFERENCES: 1.02.01

Initiative 1.02.02: Define Attribute Information to be Collected for Assets & MMIs

OVERVIEW:

This initiative will define the standards for attribute information to be collected for assets and maintenance managed items identified in asset registers.

EXISTING INITIATIVES AND INVESTMENTS:

- Attribute standards for many asset classes are represented by nameplate data templates within the current computerized maintenance management system (CMMS), and/or by GIS data standards for the various asset feature classes
- Asset data exists to some extent within the current information systems

PRIORITY: High	**TIMING:** To Be Determined

COST RANGE: $X – Y K + internal staff time

DURATION:

- To develop Standard Operating Procedure (SOP): ~ 2 to 4 weeks
- To conduct data collection: included in estimates for Initiative 3.0

TEAM MEMBER ROLES AND RESPONSIBILITIES:

- To develop SOP: 1-FTE AMT Coordinator, .25-FTE AMT Reviewer
- To conduct data collection: included in estimates for Initiative 3.0

Note: 1-FTE = the full time equivalent of one person versus only one person full time

DESCRIPTION:

This initiative will be tasked to do the following:

- Develop an SOP defining standards and templates for attribute data to be collected for individual classes/types of assets and MMIs
- Within the SOP, define protocols for collecting and continuously updating attribute data
- Redesign existing nameplate data templates to align with new MMIs standards (attributes for “components” are currently compiled within asset based templates)
- Review and modify existing nameplate data templates as needed to capture additional attribute information, and create new templates as needed for other asset types
- Determine what data exists in current systems and what needs to be modified
- Within the SOP, define protocols for conducting quality control reviews (e.g. how done and documented), as applicable
- Coordinate data collection and information systems updating to retrofit the new data collection standards and data to the updated asset registers

DEPENDENCIES: None

KEY DELIVERABLES: • SOP with clearly defined standards for asset/MMI attribution • Updated/new nameplate data templates
SUSTAINABILITY NEEDS: Initiative 3.0 Collect Assets & MMIs Data
OUTCOMES AND BENEFITS: • Promotes consistent collection of quality and accurate asset/MMI attribute data • Nameplate data templates support uniform collection of attribute data • Improved confidence in CMMS asset attribute data
AM READINESS ASSESSMENT CROSS REFERENCES: 1.02.02

Initiative 1.02.03: Define Asset Condition, Performance, and Reliability Assessment Protocols

OVERVIEW:

This initiative will define scoring scales for asset condition, performance, and reliability, and define protocols for conducting assessments and scoring assets to assign condition, performance, and reliability ratings for assets/maintenance managed items.

EXISTING INITIATIVES AND INVESTMENTS:

- A version of a condition assessment data collection template is currently used for CSO basins and sewage pumping stations under the Scheduled Replacement Program
- A CCTV inspection program for sewers is in place that uses Pipeline Assessment Condition Protocol (PACP) coding to rate condition of sewers
- Advanced condition assessment techniques such as vibration analysis, oil analysis, thermography, and electrical testing are conducted at the wastewater plant

PRIORITY: High	**TIMING:** To Be Determined

COST RANGE: $X – Y K + internal staff time

DURATION:

- To develop Standard Operating Procedure (SOP): ~ 2 to 4 weeks
- To conduct data collection: included in estimates for Initiative 3.0

TEAM MEMBER ROLES AND RESPONSIBILITIES:

- To develop SOP: 1-FTE AMT Coordinator, .25-FTE AMT Reviewer
- To conduct data collection: included in estimates for Initiative 3.0

Note: 1-FTE = the full time equivalent of one person versus only one person full time

DESCRIPTION:

This initiative will be tasked to do the following:

- Develop an SOP defining the scoring scales for assigning condition, performance, and reliability ratings for assets (this includes enhancing definitions provided in the Asset Renewal Evaluation Tool as needed for different asset groups, classes, types, etc.)
- Within the SOP, define assessment protocols for determining condition, performance, and reliability ratings for assets (including protocol variations as needed for different asset groups, classes, types, etc.)
- Within the SOP, define methods for prioritizing which assets are subject to assessment (e.g. based on risk), and frequencies for when assets are subject to re-assessment
- Within the SOP, define protocols for conducting quality control reviews (e.g. how done and documented), as applicable
- Develop templates as needed to support conducting assessments and data collection

• Assess and score assets to assign condition, performance, and reliability ratings
DEPENDENCIES: None
KEY DELIVERABLES: • Clearly defined asset condition, performance, and reliability scoring scales • Condition, performance, and reliability ratings assigned for assets
SUSTAINABILITY NEEDS: Initiative 3.0 Collect Assets & MMIs Data
OUTCOMES AND BENEFITS: • Promotes consistent collection of quality and accurate asset condition, performance, and reliability ratings • Provides data for more accurately forecasting asset renewal/replacement needs, and supporting CIP planning and annual budgeting processes
AM READINESS ASSESSMENT CROSS REFERENCES: 1.02.03, 1.02.04

Initiative 1.03.02: Define Asset Effective and Remaining Useful Lives

OVERVIEW:

This initiative will define typical asset effective life for broad high level asset classes, and how remaining asset useful life is determined to support renewal/replacement forecasting.

EXISTING INITIATIVES AND INVESTMENTS: None

PRIORITY: High	**TIMING:** To Be Determined

COST RANGE: $X – Y K + internal staff time

DURATION:

- To develop Standard Operating Procedure (SOP): ~ 2 to 4 weeks
- To conduct data collection: included in estimates for Initiative 3.0

TEAM MEMBER ROLES AND RESPONSIBILITIES:

- To develop SOP: 1-FTE AMT Coordinator, .25-FTE AMT Reviewer
- To conduct data collection: included in estimates for Initiative 3.0

Note: 1-FTE = the full time equivalent of one person versus only one person full time

DESCRIPTION:

This initiative will be tasked to do the following:

- Develop an SOP defining the typical effective life for assets based on broad classifications of assets (this includes enhancing asset class definitions provided in the Asset Renewal Evaluation Tool as needed for different asset groups, classes, types, etc.)
- Within the SOP, define protocols for making adjustments to effective life and remaining useful life (calculated within the Asset Renewal Evaluation Tool), including how adjustment assumptions are to be documented
- Within the SOP, define frequencies for when effective and remaining useful lives are reevaluated (e.g. based on risk)
- Within the SOP, define protocols for conducting quality control reviews (e.g. how done and documented), as applicable
- Develop templates as needed to support data collection
- Assign assets effective lives

DEPENDENCIES: None

KEY DELIVERABLES:

- SOP with clearly defined typical effective asset lives based on asset classes
- Estimated effective lives and remaining useful lives of assets

SUSTAINABILITY NEEDS: Initiative 3.0 Collect Assets & MMIs Data
OUTCOMES AND BENEFITS: • Promotes consistent determination of asset effective life, calculation of remaining useful life, and protocols for making lives adjustments • Provides data for more accurately forecasting asset renewal/replacement needs, and supporting CIP planning and annual budgeting processes
AM READINESS ASSESSMENT CROSS REFERENCES: 1.03.02

Initiative 1.03.06: Define Asset Business Risk Exposure

OVERVIEW:

This initiative will define an asset consequence of failure scoring scale, and how asset business risk exposure is determined to support prioritization of asset related activities and decisions.

EXISTING INITIATIVES AND INVESTMENTS:

A criticality rating system (based on consequence of failure) is currently used to rate assets, and the ratings are captured in the CMMS

PRIORITY: High	**TIMING:** To Be Determined

COST RANGE: $X – Y K + internal staff time

DURATION:

- To develop Standard Operating Procedure (SOP): ~ 2 to 4 weeks
- To conduct data collection: included in estimates for Initiative 3.0
- To get business risk exposure (BRE) ratings into the CMMS: ~ 1 to 2 weeks (likely will use existing criticality data field on asset records to hold BRE values)

TEAM MEMBER ROLES AND RESPONSIBILITIES:

- To develop SOP: 1-FTE AMT Coordinator, .25-FTE AMT Reviewer
- To conduct data collection: included in estimates for Initiative 3.0
- To get BRE ratings into the CMMS: 1-FTE AMT Coordinator, 1-FTE IT Subject Matter Expert

Note: 1-FTE = the full time equivalent of one person versus only one person full time

DESCRIPTION:

This initiative will be tasked to do the following:

- Develop an SOP defining the scoring scale for assigning a consequence of failure (CoF) rating for assets (this includes enhancing definitions provided in the Asset Renewal Evaluation Tool as needed for different asset groups, classes, types, etc.)
- Within the SOP, define how BRE is calculated
- Within the SOP, define protocols for making adjustments to likelihood of failure (LoF) ratings (calculated within the Asset Renewal Evaluation Tool), including how adjustment assumptions are to be documented
- Within the SOP, define frequencies for when BREs are reevaluated (e.g. based on risk)
- Within the SOP, define protocols for conducting quality control reviews (e.g. how done and documented), as applicable
- Develop templates as needed to support data collection
- Evaluate and score assets to assign CoF ratings and calculate BRE ratings

• Migrate BRE ratings into the CMMS
DEPENDENCIES: None
KEY DELIVERABLES: • SOP with clearly defined asset CoF scoring scale • CoF and BRE ratings assigned for assets
SUSTAINABILITY NEEDS: Initiative 3.0 Collect Assets & MMIs Data
OUTCOMES AND BENEFITS: • Promotes consistent determination of asset CoF and BRE, and protocols for making adjustments to LoF ratings • Provides asset BRE ratings that should be used to prioritize all asset related activities and decision making
AM READINESS ASSESSMENT CROSS REFERENCES: 1.03.06

Initiative 1.04.01.A: Develop Reliability Centered Maintenance Asset Evaluation Program

OVERVIEW:

This initiative will develop protocols for conducting asset reliability centered evaluations in order to determine expected failure modes and appropriate detection and/or mitigation maintenance tactics.

EXISTING INITIATIVES AND INVESTMENTS:

Wastewater Operations has prior experience conducting reliability centered maintenance (RCM) evaluations, but the location of files/outputs of those efforts is unknown

PRIORITY: High	**TIMING:** To Be Determined

COST RANGE: $X – Y K + internal staff time

DURATION:

- To develop SOP: ~ 4 to 6 weeks
- To conduct RCM evaluations: ~ 2 to 3 weeks/asset (based on asset versus maintenance managed item level for estimating purposes). Overall level of effort TBD based on outcomes of business risk exposure work.

TEAM MEMBER ROLES AND RESPONSIBILITIES:

- To develop SOP: 1-FTE AMT Coordinator, .25-FTE AMT Reviewer
- To conduct RCM evaluations: 1-FTE AMT Coordinator, .5-FTE Operator, 1.5-FTE Maintenance Tech

Note: 1-FTE = the full time equivalent of one person versus only one person full time

DESCRIPTION:

This initiative will be tasked to do the following:

- Develop an SOP defining the protocols to be followed for conducting RCM evaluations and incorporating evaluation outcomes into the maintenance tactics for evaluated assets
- Within the SOP, define methods for prioritizing which assets are subject RCM evaluation (e.g. based on risk)
- Within the SOP, define triggers that will initiate review of previous RCM evaluations and previously established maintenance tactics (e.g. based on analysis of actual failures, or notable decline in asset condition, performance, or reliability ratings)
- Within the SOP, define where documented RCM evaluations will be stored for retrieval and/or subsequent updating
- Within the SOP, define protocols for conducting quality control reviews (e.g. how done and documented), as applicable
- Develop templates as needed for documenting RCM evaluations
- Determine which asset failure modes/causes should be included in the CMMS to support better/more accurate failure reporting in work order updating processes

• Conduct RCM evaluations of appropriate assets • Update CMMS maintenance tactics based on RCM evaluation outcomes
DEPENDENCIES: Initiative 1.03.06 Define Asset Business Risk Exposure
KEY DELIVERABLES: • SOP with clearly defined protocols for conducting RCM evaluations • Enhanced failure reporting codes within the CMMS • RCM evaluations of appropriate assets • Updated CMMS maintenance tactics based on RCM evaluation outcomes
SUSTAINABILITY NEEDS: Ongoing adherence to SOP
OUTCOMES AND BENEFITS: • Provides a standardized methodology for determining asset specific maintenance tactics based on the operating context and environment of a given asset • Promotes optimizing asset maintenance tactics based on a defined evaluative process rather than staff intuition and manufacturer recommendations
AM READINESS ASSESSMENT CROSS REFERENCES: 1.04.01

Initiative 1.04.01.B: Develop Preventive Maintenance Optimization Program

OVERVIEW:

This initiative will develop protocols for conducting asset preventive maintenance optimization evaluations in order to evaluate the appropriateness of existing preventive maintenance tactics for assets that are not subjected to reliability centered maintenance evaluations.

EXISTING INITIATIVES AND INVESTMENTS:

Wastewater Operations has a Preventive Maintenance Plan in place, but the plan is more focused on conducting asset reliability centered maintenance (RCM) evaluations rather than preventive maintenance optimization (PMO) evaluations

PRIORITY: High	**TIMING:** To Be Determined

COST RANGE: $X – Y K + internal staff time

DURATION:

- To develop SOP: ~ 4 to 6 weeks
- To conduct PMO evaluations: ~ 2 to 3 weeks/asset (based on asset versus maintenance managed item level for estimating purposes). Overall level of effort TBD based on outcomes of business risk exposure and RCM work.

TEAM MEMBER ROLES AND RESPONSIBILITIES:

- To develop SOP: 1-FTE AMT Coordinator, .25-FTE AMT Reviewer
- To conduct PMO evaluations: 1-FTE AMT Coordinator, .5-FTE Operator, 1.5-FTE Maintenance Tech

Note: 1-FTE = the full time equivalent of one person versus only one person full time

DESCRIPTION:

This initiative will be tasked to do the following:

- Develop an SOP defining the protocols to be followed for conducting PMO evaluations and incorporating evaluation outcomes into existing maintenance tactics for evaluated assets
- Within the SOP, define methods for prioritizing which assets are subject PMO evaluation (e.g. based on risk)
- Within the SOP, define triggers that will initiate review of previous PMO evaluations and previously established maintenance tactics (e.g. based on analysis of actual failures, or notable decline in asset condition, performance, or reliability ratings)
- Within the SOP, define where documented PMO evaluations will be stored for retrieval and/or subsequent updating
- Within the SOP, define protocols for conducting quality control reviews (e.g. how done and documented), as applicable
- Develop templates as needed for documenting PMO evaluations

- Determine which asset failure modes/causes should be included in the CMMS to support better/more accurate failure reporting in work order updating processes
- Conduct PMO evaluations of appropriate assets
- Update CMMS maintenance tactics based on PMO evaluation outcomes

DEPENDENCIES:

- Initiative 1.03.06 Define Asset Business Risk Exposure
- Initiative 1.04.01.A Develop Reliability Centered Maintenance Asset Evaluation Program

KEY DELIVERABLES:

- SOP with clearly defined protocols for conducting PMO evaluations
- Enhanced failure reporting codes within the CMMS
- PMO evaluations of appropriate assets
- Updated CMMS maintenance tactics based on PMO evaluation outcomes

SUSTAINABILITY NEEDS: Ongoing adherence to SOP

OUTCOMES AND BENEFITS:

- Provides a standardized methodology for evaluating existing asset maintenance tactics based on the expected failure modes of a given asset
- Promotes optimizing asset maintenance tactics based on a defined evaluative process rather than staff intuition and manufacturer recommendations

AM READINESS ASSESSMENT CROSS REFERENCES: 1.04.01

Initiative 1.04.04: Develop Asset Life Cycle Costs Management Processes	
OVERVIEW: This initiative will develop protocols for capturing and periodically reviewing asset life cycle costs.	
EXISTING INITIATIVES AND INVESTMENTS: None	
PRIORITY: High	**TIMING:** To Be Determined
COST RANGE: $X – Y K + internal staff time	
DURATION: • To develop Standard Operating Procedure (SOP): ~ 2 to 4 weeks • To periodically review life cycle costs (LCCs): on-going implementation of SOP	
TEAM MEMBER ROLES AND RESPONSIBILITIES: • To develop SOP: 1-FTE AMT Coordinator, .25-FTE AMT Reviewer • To periodically review LCCs: To Be Determined *Note: 1-FTE = the full time equivalent of one person versus only one person full time*	
DESCRIPTION: This initiative will be tasked to do the following: • Develop an SOP defining the protocols for managing asset LCCs • Within the SOP, define what asset related cost components comprise LCCs, and in what information systems those components will be maintained • Within the SOP, define methods for prioritizing which assets will be subject to LCCs evaluation (e.g. based on risk), and frequencies for when LCCs are subject to review	
DEPENDENCIES: None	
KEY DELIVERABLES: SOP defining protocols for LCCs capture and periodic review	
SUSTAINABILITY NEEDS: Ongoing adherence to SOP	
OUTCOMES AND BENEFITS: • Provides a documented methodology for identifying and capturing LCCs • Promotes periodic review of LCCs to support asset renewal/replacement decisions	
AM READINESS ASSESSMENT CROSS REFERENCES: 1.04.04, 1.10.05	

Initiative 1.04.06: Develop Processes for Producing Annual Asset Management Plans

OVERVIEW:

This initiative will define the processes for producing annual asset management plans from a strategic perspective.

EXISTING INITIATIVES AND INVESTMENTS:

- A needs assessment study is conducted every three years to determine specific capital needs related to wastewater assets
- A Scheduled Replacement Program report is prepared annually regarding wastewater plant, CSO basins, and sewer pump station assets; the report forecasts 20 year asset replacements
- A ten year master plan exists for the department

PRIORITY: High	**TIMING:** To Be Determined

COST RANGE: $X – Y K + internal staff time

DURATION:

- To develop Standard Operating Procedure (SOP): ~ 4 to 6 weeks
- To prepare 1st annual plan: ~ 4 to 6 months
- To prepare annual updates: ~ 2 to 3 months

TEAM MEMBER ROLES AND RESPONSIBILITIES:

- To develop SOP: 2-FTE AMT Coordinator, 1-FTE AMT Reviewer
- To prepare 1st annual plan: 6-FTE AMT Coordinator, 2-FTE AMT Reviewer
- To prepare annual updates: 6-FTE AMT Coordinator, 2-FTE AMT Reviewer

Note: 1-FTE = the full time equivalent of one person versus only one person full time

DESCRIPTION:

This initiative will be tasked to do the following:

- Develop an SOP defining the protocols for producing annual asset management plans
- Within the SOP, define the time frame cycle for preparing the plans (e.g. draft plan in advance of fiscal planning; final plan based on outcomes of fiscal planning budget limitations and rationalization)
- Within the SOP, define protocols for linking capital and O&M expenditure programs with overall business goals in triple bottom line terms (e.g. social, economic, and environment)
- Within the SOP, define protocols for matching forecast renewal/replacement expenditures with available fiscal resources (e.g. budget rationalization)
- Within the SOP, define protocols for conducting quality control reviews (e.g. how done and documented)

DEPENDENCIES: All initiatives
KEY DELIVERABLES: • SOP defining protocols for producing annual asset management plans • 1st Annual Asset Management Plan • Annual updates to the AM Plan
SUSTAINABILITY NEEDS: Continued adherence to all other initiatives
OUTCOMES AND BENEFITS: • Provides a documented methodology for producing asset management plans • Associates long term budgeting and planning with details of the asset management plan
AM READINESS ASSESSMENT CROSS REFERENCES: 1.04.06, 1.04.08, 1.04.09

Initiative 1.06.01: Develop Policy for Organization-wide Business Risk Management	
OVERVIEW: This initiative will define the policy for evaluating and managing business risk exposure from a strategic perspective and on a broad organization-wide basis.	
EXISTING INITIATIVES AND INVESTMENTS: A Risk Management function has been formed within the Finance Department, and a Risk Manager position has been advertised.	
PRIORITY: High	**TIMING:** To Be Determined
COST RANGE: $X – Y K + internal staff time	
DURATION: ~ 4 to 6 weeks	
TEAM MEMBER ROLES AND RESPONSIBILITIES: 2-FTE AMT Coordinator, .25-FTE AMT Reviewer *Note: 1-FTE = the full time equivalent of one person versus only one person full time*	
DESCRIPTION: This initiative will be tasked to do the following: • Develop a business risk management policy that defines protocols for managing risk from an organization-wide perspective • Define roles and responsibilities for identifying, documenting, and communicating risk within key risk areas of strategy, finance, and operations, as well as within individual business units • Define the processes for quantifying risk events (e.g. consequence and likelihood of occurrence) • Define the processes for assessing risk mitigation options and managing risk reduction	
DEPENDENCIES: Initiative 1.03.06 Define Asset Business Risk Exposure	
KEY DELIVERABLES: Policy document for evaluating and managing business risk exposure on an organization-wide basis	
SUSTAINABILITY NEEDS: Ongoing adherence to policy	
OUTCOMES AND BENEFITS: This initiative will provide an organization-wide policy and protocols for evaluating and managing BRE on an organization-wide basis, to ensure that risk is managed holistically and considers implications	

from strategic, fiscal, information technology, engineering, and operational perspectives.
AM READINESS ASSESSMENT CROSS REFERENCES: 1.06.01 thru 1.06.05

Initiative 1.07.01.A: Define Protocols for Asset Acquisition, Commissioning, and Turnover

OVERVIEW:

This initiative will define protocols for managing asset acquisition, commissioning, and turnover practices to facilitate more timely and accurate tracking of assets within the asset management program.

EXISTING INITIATIVES AND INVESTMENTS:

- There are master specifications used to define requirements for contracts and projects
- There are also provisional specifications that can be used to supplement master specification requirements for contracts and projects
- There is also a project manager's manual defining protocols for managing various project and project closeout activities/tasks
- A template exists identifying data to be entered into the CMMS; this needs to be completed by contractors/internal staff at the time of assets turnover

PRIORITY: High	**TIMING:** To Be Determined

COST RANGE: $X – Y K + internal staff time

DURATION: ~ 4 to 6 weeks

TEAM MEMBER ROLES AND RESPONSIBILITIES:

3-FTE AMT Coordinator, .5-FTE AMT Reviewer

Note: 1-FTE = the full time equivalent of one person versus only one person full time

DESCRIPTION:

This initiative will be tasked to do the following (applies for internal as well as CIP projects):

- Develop a standard operating procedure (SOP) defining protocols for asset acquisition, commissioning, and turnover standards to ensure appropriate asset information is being provided to support timely asset management program tracking of new assets
- Update master specifications to include language to ensure provisional specifications are invoked when new equipment is being provided to DWSD
- Update provisional specifications to ensure they include all the appropriate asset specification data templates (ref. Initiative 1.02.02) to be used for compiling and providing asset data to DWSD
- Update the project manager's manual to ensure project closeout activities include provisions for ensuring necessary asset information and data is provided, and that pertinent fiscal data is provided to the financial system
- Develop quality control procedures (e.g. similar to inspection procedures), to be applied for acceptance of construction work done by DWSD internally

DEPENDENCIES: Initiative 1.02.02 Define Attribute Information to be Collected for Assets & MMIs
KEY DELIVERABLES: SOP with clearly defined protocols for successful management of asset acquisition, commissioning, and turnover processes
SUSTAINABILITY NEEDS: Ongoing adherence to SOP
OUTCOMES AND BENEFITS: • Documented standard protocols for managing asset acquisition, commissioning, and turnover practices to better support asset management program information needs • Broader communication and awareness of asset data needs to support asset management • More timely identification and creation of asset records to support more accurate asset tracking of appropriate asset information • Clearly defined protocols for acceptance of construction work done by DWSD internally
AM READINESS ASSESSMENT CROSS REFERENCES: 1.07.01 thru 1.07.07

Initiative 1.07.01.B: Refine and Re-implement Records Management Policy

OVERVIEW:

This initiative will refine existing records management protocols for asset related information, and re-implement the protocols to ensure the information is readily accessible to support asset management program business needs.

EXISTING INITIATIVES AND INVESTMENTS:

- A records management policy exists, but the owner of the policy is unknown
- Investment was made in setting up a SharePoint site and several internal file servers to act as a repositories for key records related to department asset

PRIORITY: High	**TIMING:** To Be Determined

COST RANGE: $X – Y K + internal staff time

DURATION:

- To update existing records management policy: ~ 4 to 6 weeks
- To re-implement and retrofit policy for existing assets: TBD

TEAM MEMBER ROLES AND RESPONSIBILITIES

- To update existing policy: 1-FTE AMT Coordinator, .25-FTE AMT Reviewer
- To re-implement and retrofit policy for existing assets: TBD

Note: 1-FTE = the full time equivalent of one person versus only one person full time

DESCRIPTION:

This initiative will be tasked to do the following:

- Review and refine the existing records management policy to ensure it addresses all standard operating procedures, operations & maintenance manuals, drawings, specifications, reports, etc.
- Within the policy, identify requirements for records retention periods, and periodic reviews and updating
- Within the policy, define where and how records are to be stored to support ready access, retrieval, and updating
- Develop a plan to re-implement and retrofit policy protocols for existing assets

DEPENDENCIES: None

KEY DELIVERABLES:

- Updated policy for records management protocols
- Plan to re-implement and retrofit policy protocols for existing assets

SUSTAINABILITY NEEDS: Ongoing adherence to policy
OUTCOMES AND BENEFITS: • Clearly defined protocols for managing records supporting asset management program activities • Re-compiled repositories for critical records • Promotes uniform and consistent processing of critical records to ensure ready accessibility for retrieval and updating
AM READINESS ASSESSMENT CROSS REFERENCES: 1.07.01 thru 1.07.07

Initiative 1.09.01: Define Protocols for Developing and Maintaining Operating Procedures	
OVERVIEW: This initiative will define the protocols for developing, maintaining, and updating operations and maintenance manuals.	
EXISTING INITIATIVES AND INVESTMENTS:	
PRIORITY: High	**TIMING:** To Be Determined
COST RANGE: $X – Y K + internal staff time	
DURATION: ~ 2 to 4 weeks	
TEAM MEMBER ROLES AND RESPONSIBILITIES: 2-FTE AMT Coordinator, .25-FTE AMT Reviewer *Note: 1-FTE = the full time equivalent of one person versus only one person full time*	
DESCRIPTION: This initiative will be tasked to do the following: • Develop an umbrella procedure document to define protocols for developing, maintaining, and updating operations and maintenance manuals; including standard operating procedures (SOPs), standard equipment maintenance procedures (SEMPs), etc. • Within the procedure, include provisions for conducting annual reviews of manuals, procedures, etc.	
DEPENDENCIES: None	
KEY DELIVERABLES: Procedure defining protocols for developing, maintaining, and updating operations and maintenance manuals; including standard operating procedures (SOPs), standard equipment maintenance procedures (SEMPs), etc.	
SUSTAINABILITY NEEDS: Continued adherence to procedure	
OUTCOMES AND BENEFITS: Procedure with clearly defined protocols for developing, maintaining, and updating operations and maintenance manuals, etc. to ensure their current relevance to asset management program activities and goals	
AM READINESS ASSESSMENT CROSS REFERENCES: 1.09.01	

Initiative 1.10.02: Define Protocols for Maintenance Planning and Scheduling, and Monitoring and Controlling Maintenance Program Activities	
OVERVIEW: This initiative will define the protocols for conducting maintenance planning and scheduling, and for monitoring and controlling maintenance program activities.	
EXISTING INITIATIVES AND INVESTMENTS: There are several documents addressing protocols for managing maintenance activities and work orders processing.	
PRIORITY: High	**TIMING:** To Be Determined
COST RANGE: $X – Y K + internal staff time	
DURATION: ~ 4 to 6 weeks	
TEAM MEMBER ROLES AND RESPONSIBILITIES: 1-FTE AMT Coordinator, 1-FTE AMT Reviewer *Note: 1-FTE = the full time equivalent of one person versus only one person full time*	
DESCRIPTION: This initiative will be tasked to do the following: • Update existing standard operating procedures (SOP) for work management processes to clarify expectations for proper work order processing (e.g. screening, planning, scheduling, updating, and maintenance staff feedback protocols) • Within the SOPs, define protocols for conducting quality control reviews (e.g. how done and documented), as applicable • Within the SOP, clarify intentions to use asset business risk exposure (ref. Initiative 1.03.06) in conjunction with work order priority to calculate an overall work priority	
DEPENDENCIES: Initiative 1.03.06 Define Asset Business Risk Exposure	
KEY DELIVERABLES: Updated SOPs with clearly defined protocols for work management processes, and monitoring and controlling maintenance program activities	
SUSTAINABILITY NEEDS: Continued adherence to SOPs	
OUTCOMES AND BENEFITS: Promotes uniform and consistent work management processes to ensure work management activities	

are conducted in a manner best serving the goals of the asset management program
AM READINESS ASSESSMENT CROSS REFERENCES: 1.10.02 thru 1.10.04

Initiative 1.10.08: Define Processes for Evaluating Return on Maintenance Investments	
OVERVIEW: This initiative will define the processes to periodically review and analyze return on maintenance program investments.	
EXISTING INITIATIVES AND INVESTMENTS: None	
PRIORITY: High	**TIMING:** To Be Determined
COST RANGE: $X – Y K + internal staff time	
DURATION: • To develop Standard Operating Procedure (SOP): ~ 4 to 6 weeks • To conduct pilot implementation: ~ 4 to 6 weeks	
TEAM MEMBER ROLES AND RESPONSIBILITIES: 1-FTE AMT Coordinator, 1-FTE AMT Reviewer *Note: 1-FTE = the full time equivalent of one person versus only one person full time*	
DESCRIPTION: This initiative will be tasked to do the following: • Develop an SOP defining the processes for periodic review and analysis of return on maintenance program investments • Within the SOP, define the nature of the analysis, its frequency, and complete a pilot implementation of the SOP	
DEPENDENCIES: None	
KEY DELIVERABLES: • SOP with clearly defined processes for reviewing and analyzing return on maintenance program investments • Pilot implementation of the SOP	
SUSTAINABILITY NEEDS: Continued adherence to SOP	
OUTCOMES AND BENEFITS: Promotes regular review of maintenance program activities and investments to ensure investments align with overall asset management program goals, asset renewal/replacement plans, and budgetary restrictions forecasting	

AM READINESS ASSESSMENT CROSS REFERENCES: 1.10.08

Initiative 1.12.02.A: Develop Asset Management Process Diagrams and Procedure	
OVERVIEW: This initiative will develop asset management process diagrams, and a corresponding procedure to provide supplemental guidance for process implementation.	
EXISTING INITIATIVES AND INVESTMENTS: Process diagrams have already been developed	
PRIORITY: High	**TIMING:** To Be Determined
COST RANGE: $X – Y K + internal staff time	
DURATION: • To develop process diagrams: already done • To develop Standard Operating Procedure (SOP): ~ 3 to 4 weeks	
TEAM MEMBER ROLES AND RESPONSIBILITIES: • To develop process diagrams: already done • To develop SOP: 3-FTE AMT Coordinator, .25-FTE AMT Reviewer *Note: 1-FTE = the full time equivalent of one person versus only one person full time*	
DESCRIPTION: This initiative will be tasked to do the following: • Develop process diagrams identifying asset management process steps, and functional roles and responsibilities for implementing the processes • Develop an SOP that supplements and provides guidance for implementing the processes represented by the diagrams • Within the SOP, define protocols for conducting quality control reviews (e.g. how done and documented), as applicable • Within the SOP, define how process outcomes feed into the capital improvement project planning and budgeting processes • Develop templates as needed to support data collection/migration	
DEPENDENCIES: None	
KEY DELIVERABLES: Asset management process diagrams and SOP to support implementation	
SUSTAINABILITY NEEDS: Continued adherence to SOP	
OUTCOMES AND BENEFITS:	

• Promotes uniform and consistent implementation of asset management program processes • Supports uniform training and rollout of the asset management program
AM READINESS ASSESSMENT CROSS REFERENCES: 1.12.02

Initiative 1.12.02.B: Define Protocols for Conducting Business Case Evaluations	
OVERVIEW: This initiative will define protocols for how to conduct and document a business case evaluation.	
EXISTING INITIATIVES AND INVESTMENTS: A simplistic form of project rationalization process exists for major CIP projects	
PRIORITY: High	**TIMING:** To Be Determined
COST RANGE: $X – Y K + internal staff time	
DURATION: ~ 4 to 6 weeks	
TEAM MEMBER ROLES AND RESPONSIBILITIES: 2-FTE AMT Coordinator, .25-FTE AMT Reviewer *Note: 1-FTE = the full time equivalent of one person versus only one person full time*	
DESCRIPTION: This initiative will be tasked to do the following (applies for internal as well as CIP projects): • Develop a standard operating procedure to define the processes for conducting and documenting a business case evaluation (BCE) • Within the SOP, define triggers/criteria that identify when a BCE should be performed • Within the SOP, define how results of the BCE will be utilized in asset management decision making • Develop templates as needed to support preparing and documenting a BCE	
DEPENDENCIES: None	
KEY DELIVERABLES: • SOP with clearly defined guidelines for how to conduct, document and utilize a BCE in asset management decision making • Templates as needed for documenting a BCE	
SUSTAINABILITY NEEDS: Continued adherence to SOP	
OUTCOMES AND BENEFITS: • Promotes uniform and consistent development of BCEs • Institutionalizes using formal BCEs as part of asset management decision evaluation processes for internal as well as CIP projects	

AM READINESS ASSESSMENT CROSS REFERENCES: 1.12.02

Initiative 1.12.02.C Define Protocols for Using the Asset Renewal Valuation Tool

OVERVIEW:

This initiative will define protocols for using the asset renewal valuation tool to forecast asset renewal/replacement needs.

, including how outputs feed into the budget planning process and the annual asset management plan.

EXISTING INITIATIVES AND INVESTMENTS:

- Wastewater Operations has a needs assessment process that is conducted on 3-year cycles
- Wastewater Operations has a schedule replacement program that provides 20-year forecasting of proposed asset renewals/replacements

PRIORITY: High	**TIMING:** To Be Determined

COST RANGE: $X – Y K + internal staff time

DURATION: ~ 2 to 4 weeks

TEAM MEMBER ROLES AND RESPONSIBILITIES:

1-FTE AMT Coordinator, .25-FTE AMT Reviewer

Note: 1-FTE = the full time equivalent of one person versus only one person full time

DESCRIPTION:

This initiative will be tasked to do the following:

- Develop a standard operating procedure (SOP) that provides guidance for populating and using the asset renewal valuation tool that has been provided to DWSD
- Within the SOP, define procedures for updating/modifying the analysis variables in the spreadsheet tool and documenting the changes
- Within the SOP, define how outputs feed into the budget planning, capital improvement planning, and annual asset management plan preparation processes

DEPENDENCIES:

- Initiative 1.01.04 Define Minimum Required Level of Service
- Initiative 1.02.03 Define Asset Condition, Performance, and Reliability Assessment Protocols
- Initiative 1.03.02 Define Asset Effective and Remaining Useful Lives
- Initiative 1.03.06 Define Asset Business Risk Exposure

KEY DELIVERABLES: SOP for using the asset renewal valuation tool

SUSTAINABILITY NEEDS:

• Initiative 3.0 Collect Assets & MMIs Data • Continued adherence to SOP
OUTCOMES AND BENEFITS: • Promotes consistently prepared and uniformly documented processes for methodically forecasting asset renewal/replacement needs based on a 100 year horizon • When fully implemented, forecasts prepared using the tool should be able to replace Wastewater's needs assessment and scheduled replacement program processes
AM READINESS ASSESSMENT CROSS REFERENCES: 1.12.02

Initiative 2.0: Asset Management Program Rollout	
OVERVIEW: This initiative will develop a presentation and training delivery plan to support rollout of the asset management program design.	
EXISTING INITIATIVES AND INVESTMENTS: None	
PRIORITY: High	**TIMING:** To Be Determined
COST RANGE: $X – Y K + internal staff time	
DURATION: ~ 6 to 8 weeks	
TEAM MEMBER ROLES AND RESPONSIBILITIES: 3-FTE AMT Coordinator, 1-FTE AMT Reviewer *Note: 1-FTE = the full time equivalent of one person versus only one person full time*	
DESCRIPTION: This initiative will be tasked to do the following: • Develop a presentation to support rollout of the asset management program design • Deliver the presentation to all appropriate work groups • Develop a training delivery plan to provide training to appropriate staff for the various procedures, protocols, process diagrams, etc. developed in preparation for implementing an asset management program	
DEPENDENCIES: All other Initiatives	
KEY DELIVERABLES: • Asset management program design presentation and delivery • Training development plan	
SUSTAINABILITY NEEDS: All other initiatives	
OUTCOMES AND BENEFITS: • Promotes consistent and uniform communication of the asset management program intentions • Provides a logical plan for delivering training to appropriate staff regarding roles and responsibilities to support implementing the asset management program	
AM READINESS ASSESSMENT CROSS REFERENCES: None specifically	

Initiative 3.0: Collect Assets & MMIs Data

OVERVIEW:

This initiative will collect the attribute information and data elements defined by other initiatives for assets and maintenance managed items identified in asset registers.

EXISTING INITIATIVES AND INVESTMENTS:

- Attribute standards for many asset classes are represented by nameplate data templates within the current computerized maintenance management system (CMMS), and/or by GIS data standards for the various asset feature classes
- Asset data exists to some extent within the current information systems

PRIORITY: High	**TIMING:** To Be Determined

COST RANGE: $X – Y K + internal staff time

DURATION:

Estimated 1 to 2 hours per maintenance managed item (MMI), which includes: a physical visit to collect condition & nameplate data; and a desktop review (documents, subject matter experts, Oracle) to collect performance, reliability, minimum required level of service, consequence of failure, redundancy, confined space flag, year installed, original cost and expected life data. The following list outlines the estimated number of MMI per DWSD department:

- WW Plant – 4000 assets = ~ 12,000 to 16,000 MMI total
- CSO Basins (9) – 1300 assets total = ~ 3900 to 5200 MMI total
- Water Plant (5) – 600 assets/plant = ~ 1800 to 2400 MMI/plant = ~ 9000 to 12,000 MMI total
- Pump/Booster Station (30) – 50 to 75 assets/station = ~ 150 to 375 MMI/station = ~ 4500 to 11,250 MMI total
- Facilities assets – most facilities are included in estimates for plants, basins and stations. However, there are 14 additional facilities – 500 assets total = ~ 5000 MMI total
- Control Structures and Equipment – (*assets and MMIs inputs needed*)
- Fleet assets – 500 to 700 fleet vehicles = ~ 5000 to 7000 MMI total
- GIS represented assets – *NOTE: linear assets & a GIS interface are not part of the first phase of the WAM implementation, so data collection related to linear assets may need to be addressed in a separate phase of this initiative. In addition, data collection for existing assets is typically limited to a desktop review of available data, and supplemented as assets are exposed through ongoing maintenance activities. Data for new assets should be captured during assets commissioning and acceptance.*

TEAM MEMBER ROLES AND RESPONSIBILITIES:

To conduct data collection for vertical assets: 1-FTE AMT Coordinator, 1-FTE Operator, 1-FTE Maintenance Tech, 2-FTE Maintenance Tech for 20% of the assets (those in confined space, those

requiring ladders access, those with other safety considerations)

Note: 1-FTE = the full time equivalent of one person versus only one person full time

DESCRIPTION:

This initiative will be tasked to do the following: Coordinate data collection and information systems updating to retrofit the new data collection standards and data to the updated asset registers

DEPENDENCIES:

- Initiative 1.01.04 Define Minimum Required Level of Service at the Asset Level
- Initiative 1.02.01.A Define Asset Registers Structures and Asset Identification Protocols
- Initiative 1.02.02 Define Attribute Information to be Collected for Assets & MMIs
- Initiative 1.02.03 Define Asset Condition, Performance, and Reliability Assessment Protocols
- Initiative 1.03.02 Define Asset Effective and Remaining Useful Lives
- Initiative 1.03.06 Define Asset Business Risk Exposure
- Initiative 1.12.02.C Define Protocols for Using the Asset Renewal Evaluation Tool

KEY DELIVERABLES:

- Data collection supporting other initiatives
- Updated assets/MMIs attribute data

SUSTAINABILITY NEEDS:

Continued adherence to SOPs developed under initiatives identified as dependencies

OUTCOMES AND BENEFITS:

- Promotes consistent collection of quality and accurate asset/MMI data that supports asset management decision processes
- Improved confidence in CMMS asset attribute data

AM READINESS ASSESSMENT CROSS REFERENCES:

1.01.04, 1.02.01 thru 1.02.03, 1.03.02, 1.03.06, 1.12.02