



CITY OF DETROIT  
WATER AND SEWERAGE DEPARTMENT  
WASTEWATER TREATMENT PLANT

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October 1, 2014

Laura Verona  
Water Resources Division  
Department of Environmental Quality  
Southeast Michigan District Headquarters  
27700 Donald Court  
Warren, Michigan 48092-2793



**RE: DWSD's Asset Management Program Implementation Annual Report**

Dear Ms. Verona:

I have enclosed the Annual Report regarding DWSD's Asset Management Program implementation. Please note Attachment – F of the document is not being submitted in its entirety via hard-copy due to the document's size. However, a full electronic version will be submitted via email for your records.

I can be reached at (313) 297-0300, if additional information is required.

Respectfully submitted,

A handwritten signature in cursive script that reads "Wendy Barrott".

Wendy Barrott  
General Manager – W & S

WB/dehm

Enclosure

Cc: S. McCormick  
C. Porter  
B. Benton  
M. Khan  
R. Zdonkiewicz  
J. Peace  
Ed Hogan  
File

DWSD Asset Management Program Implementation  
Annual Report

FY July 1, 2013 – June 30, 2014

Detroit Water and Sewerage Department

NPDES Permit No. MI000022802

October 1, 2014

## **Background**

In accordance with the provisions established in Part I, Section 12(c) (2) of NPDES permit no. MI 0022802, DWSD is required, to submit an annual report by October 1 covering implementation of the Asset Management Program during the prior fiscal year. This report is the first of such submittals and covers the fiscal year July 1, 2013 – June 30, 2014.

## **Program Implementation**

On January 1, 2014, the DWSD Asset Management Program was submitted to MDEQ for review and approval. DWSD received conditional approval of the submitted Asset Management Program from MDEQ, on January 17, 2014. The conditional approval set dates for submittal of additional plans that addressed numerous specific areas of the submitted program and a quarterly status report. In a letter to MDEQ dated February 19, 2014, DWSD identified the existing permit requirement for annual progress reporting, and the agreement to provide status updates during the monthly NPDES and ACO compliance meetings. In lieu of the conditions set forth in the Program approval, MDEQ requested that DWSD prepare a document establishing the Program focus with associated Gant Chart indicating schedule implementation. Attachment A contains the submitted program focus outline and accompanying Gant Chart.

During the prior fiscal year, DWSD converted from the existing, obsolete "EMPAC" CMMS (computerized maintenance management system) to Oracle WAM (Work and Asset Management). The cut over date was June 1, 2014. The WAM CMMS is currently on line and DWSD is continuing to fully implement the WAM modules and customize them as needed. This conversion will increase our asset management capabilities.

DWSD is undergoing an optimization process which will ultimately lead to an Office of Asset Management located within the yet to be established Department-wide Systems Planning Group. This long-term AM organization structure will not be in place for at least 3 years (reference Attachment B). Due to the criticality of implementing a robust asset management program at the WWTP, an interim asset management work group was established August 11, 2014 (reference Attachment C). This interim work group is a dedicated full time team of 9 staff comprised of five DWSD employees with maintenance backgrounds (engineers -2, maintenance planner -1, maintenance in the field -2), one professional service consultant with a strong maintenance and asset management background and 3 asset management consultants. A detailed multi track implementation plan has been developed which is consistent with and expands upon the submitted Program focus outline. This implementation plan is a living document and is provided in Attachment D.

The Interim AM Work Group is now fully engaged in the process of asset management program development and implementation. In keeping with the AM Program focus, the Work Group has begun preparation of Standard Operating Procedures (SOPs) to provide for consist and uniform implementation. Preparation is underway for the first significant SOP - Work Order Entry, Planning, Scheduling, Execution and Closing.

Concurrently, 12 DWSD staff was trained in the principles of RCM (Reliability Centered Maintenance). This 3 day course was held June 17 – 19, 2014. The trained staff then participated in two facilitated RCM analyses conducted at the WWTP; the Intermediate Lift Pumps and the Complex I Belt Filter Presses. The RCM reports have been finalized and the AM Work Group is using the results to identify opportunities to adjust maintenance practices applicable to those specific asset assemblies.

The AM Work Group is also engaged in the analysis of Business Risk Exposure (BRE) for all initially identified equipment included as part of the “red and green reports”. Once completed, the information provided through the BRE analysis will assist in defining asset criticality: which will establish the priority for determining implementation of the on-going RCM Program.

The AM Work Group has also been reaching out to other utilities that have used WAM’s capabilities for asset management. The AM Work Group have planned travel arrangements to visit with staff from Northeast Ohio Sanitary Sewer District (NEORSO) in Cleveland, OH the week of September 29th for 2 and a half days of interactive learning how the District implemented asset management and how it configured various WAM modules.

The remainder of this document specifically responds to the required report elements delineated in Section 12.c.2) as follows:

- a) A description of the staffing levels maintained during the year.

The most current description of DWSD staffing levels are found in the recently submitted Interim Staffing Plan dated September 19, 2014 and included as Attachment E.

- b) A Summary of inspections and maintenance activities conducted and corrective actions taken during the previous year.

Attachment F is a printout of one page of the CM, PM summary supplied by EMPAC (the CMMS application in place during this time period). It covers July 1, 2013 – May 31, 2014. A complete file is included with the DWSD electronic submittal. The complete file includes the WWTP and CSO basins. WAM was not capable in June 2014 of reporting on these parameters. Future annual reports will access WAM for this information.

- c) Expenditures for collection system maintenance activities, treatment works maintenance activities, corrective actions and capital investment during the previous year.

The expenditures for operations and maintenance for FY 13-14 were \$117,429,531.

The CIP expenditures for FY 13-14 were \$91,837,500.

- d) A summary of asset/areas identified for inspection/action (including capital improvement) in the upcoming year.

The FY 2014/2015 Scheduled Replacement Plan, dated November 27, 2013 and previously submitted, is included in Attachment G. The reporting program that will be able to pull the inspection and scheduled work orders from WAM has not yet been developed, but is expected to be available for future annual reports.

- e) A maintenance budget and capital improvement budget for the upcoming year, taking into account implementation of an effective asset management program meeting the core elements.

The budget expenses for operation and maintenance for FY 14-15 are \$127,816,000. The CIP budget for FY 2014-2015 is \$150,000,000.

- f) An updated estimate of the revenue necessary to complete the anticipated OM&R activities, the associated rate schedule impact, and an assessment of the adequacy of the revenue to perform necessary OM&R work.

DWSD conducts an annual revenue review based upon budgeted expenditures and the Capital Improvement Plan. The next review will be for FY 2015-2016. This will begin early calendar year 2015.

# ATTACHMENT - A



## Wastewater Operations Asset Management Program Focus

In the September of 2013, DWSD began planning and design of comprehensive department-wide Asset Management Program. DWSD has developed the asset management vision statement. DWSD has completed asset management readiness assessment using WERF Strategic Asset Management GAP assessment framework. Based on specific findings from the assessment, multiple initiatives were framed by DWSD that address areas of asset management and contribute to the design and implementation of the asset management program. On December 30, 2013, the Asset Management (AM) Program for the Wastewater Treatment Plant, collection system, and CSO treatment facilities was submitted to MDEQ. The AM program will also provide consistency and continuity as it is implemented throughout the Department.

For Wastewater Operations, the directional focus for the next three years includes the following implementation phases:

Phase	Task	Effort	Goal
1	<b>Maintenance Management Practices</b> <ul style="list-style-type: none"> <li>a. Develop SOPs</li> <li>b. Training</li> <li>c. Implementation</li> <li>d. Review and adjustment</li> </ul>	6-12 months	Anticipated completion on or before June 2015
2	<b>Reliability Centered Maintenance (RCM)</b> <ul style="list-style-type: none"> <li>a. Training – overview and principles</li> <li>b. RCM analysis for critical asset assemblies</li> <li>c. Implementation of RCM analysis for critical asset assemblies</li> </ul>	12-18 months	Anticipated completion by the end of 2015
3	<b>Asset Management Program Development</b> <ul style="list-style-type: none"> <li>a. SOP development</li> <li>b. CMMS system configuration</li> <li>c. Continuous improvement through review and adjustment</li> </ul>	6-18 months	Anticipated completion by the end of 2016
4	<b>Implement Asset Management Program</b> <ul style="list-style-type: none"> <li>a. Confirm and update asset inventory and attributes in CMMS system</li> <li>b. Determine current state of assets by evaluating condition, performance and reliability</li> <li>c. Define minimum required level of service</li> <li>d. Perform risk analysis</li> <li>e. Determine appropriate maintenance strategy for assets</li> <li>f. Develop renewal/replacement profile for assets</li> <li>g. Develop asset management plan</li> </ul>	12-18 months	Anticipated completion by the end of June 2017

Throughout the course of 2014 and beyond, DWSD will implement the Asset Management Program to, minimize asset life cycle costs, optimize asset life and provide quality service to our customers. The AM Program will strive to implement asset management business processes to improve efficiency and effectiveness throughout the organization.



# ATTACHMENT – B

# DWSD's Office of Asset Management

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## Mission:

Asset Management at DWSD is the systematic integration of sustainable and information driven management techniques to minimize asset lifecycle costs, optimize asset life, and provide quality service to our customers. To achieve this we will:

- Implement 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
- Engage customers in defining levels of service (reliability, quality, and associated costs), while providing levels of service exceeding regulatory and industry standards
- 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)

## Organization:

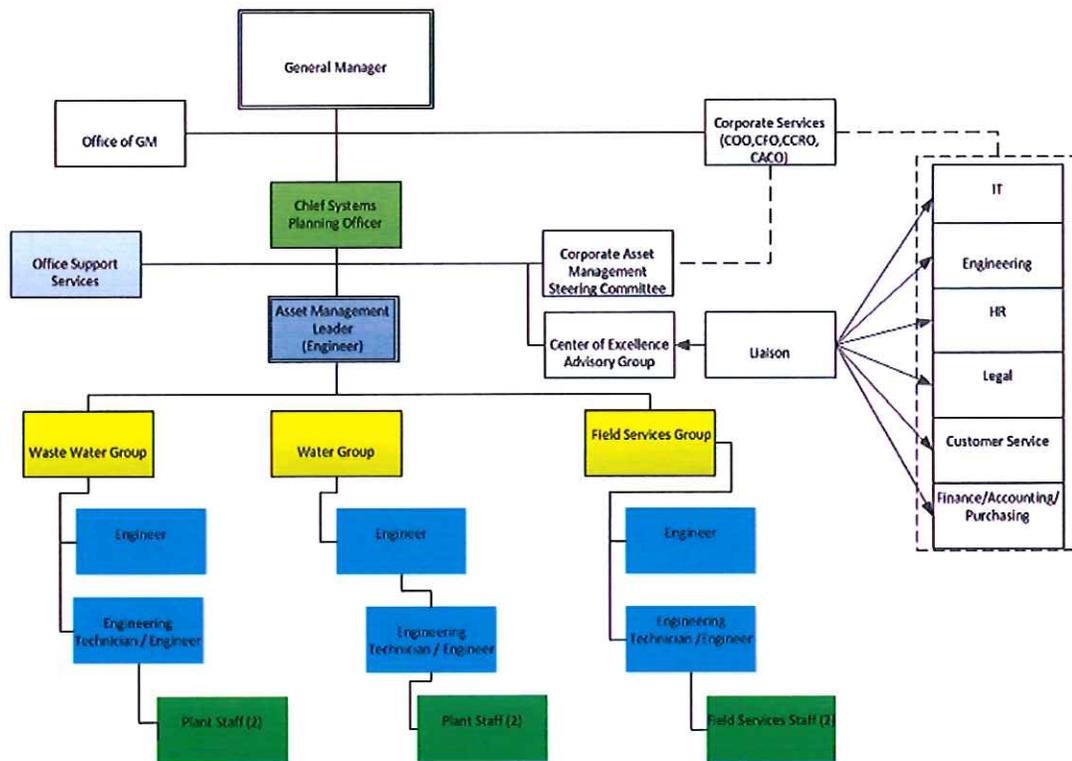
In order to establish a strategic, sustainable, and successful Asset Management Program at DWSD, the Office of Asset Management (OAM) will need to have a short term (0 – 3 years) and long term (> 3 years) organization structure. An initial impetus is required to introduce changes in management of assets, thus needing additional resources. After the first iteration of the Asset management Program implementation, a long term organizational structure can be established that can take charge of the Asset Management Program and ensure smooth transition and compliance with the policies, procedures and protocols.

The changes in the DWSD's business processes because of AM implementation throughout the organization could bring resistance and push backs. Success of AM program at DWSD shall require administration's support and backing.

### ***Long Term AM Organization Structure (> 3 years)***

The OAM shall be led by an Engineer who will be responsible for oversight and implementation of AM business processes, practices, protocols and Standard Operating Procedures (SOPs) at all three major divisions at DWSD – Wastewater Treatment, Water Treatment, and Field Services. The OAM shall staff three full time Engineers and three full time Engineering Technicians. In the event that an Engineering Technician is not available, the role can be staffed by

an Engineer I. Each of the three Divisions within OAM, Water, Wastewater and Field Services, will have a dedicated team comprising of an Engineer, Engineering Technician, and two full-time-equivalent subject matter experts (SME) from the plant(s) or field services. The OAM will coordinate with appropriate plant management regarding the schedule and skill-set requirements of the SMEs as and when they are required to assist with the AM activities. Figure 1 is a schematic of the long term organizational structure for the OAM.



**Positions: 7**

(Figure 1)

### **Interim OAM Organization Structure (0 – 3 years)**

The initial phase of the AM Program implementation will require higher resources than the steady state which is expected after the first 3 years. Thus, during the first 3 years of the AM Program, the OAM will need to be staffed with an interim organizational structure consisting of three additional engineers (two engineers and one engineering technician) as well as external resources (consultants).

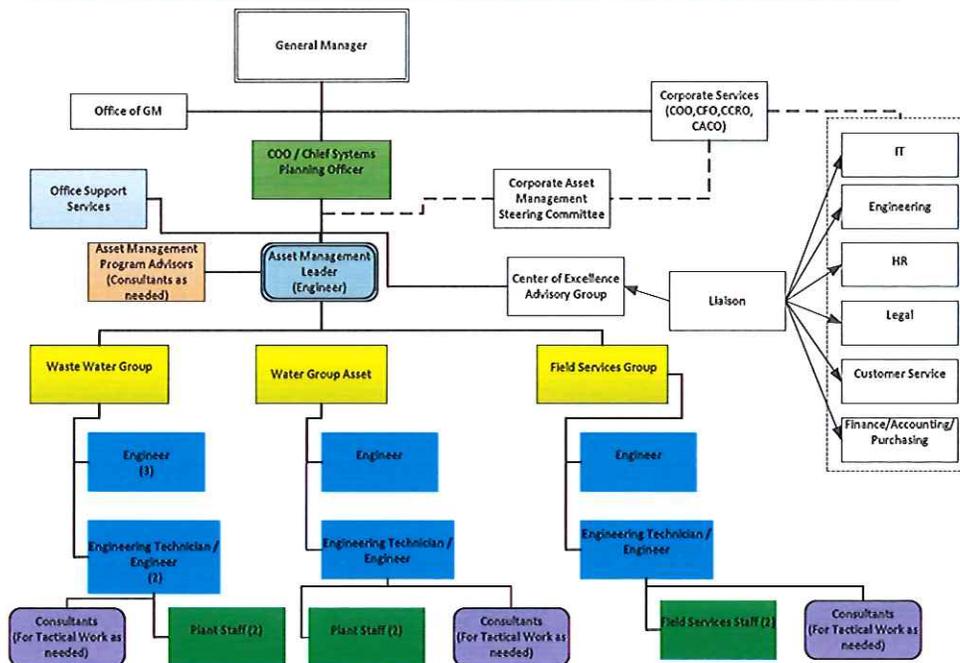
The OAM in the first three years of its existence will be involved with the following activities –

1. Assist Wastewater Division to meet several MDEQ deadlines related to AM requirements stated in the NPDES permit
2. Develop Standard Operating Procedures and policies
3. Provide requisite training for AM and plant staff to carry out AM related tasks
4. Collect asset data for AM tasks
5. Establish AM business processes throughout the organization
6. Develop first version of DWSD's organization-wide AM plan beginning with the Wastewater Treatment Plant Asset Management Plan

External resources (consultants) will be required to assist the OAM in developing the Asset Management Program components, implementation of business processes, practices and to provide mentoring and coaching to the OAM staff. They are required to help OAM make the transition from an interim to a long term organization that is fully functional and working towards making DWSD an asset-management centric organization.

The additional resources (three engineers and consultants) shall be initially employed to accomplish Wastewater division's AM related deadlines from MDEQ. Once this has been achieved, the additional resources shall be employed for rolling out the AM Program to other parts of the organization. Figure 2 is a schematic of the interim organizational structure for the OAM.

## DWSD AM ORGANIZATION MODEL (From June 2014 to December 2017)



Positions: 10

(Figure 2)

### OAM Responsibilities:

- Establish risk-based and fact-based methodologies to managing assets.
- Develop a comprehensive inventory of assets with appropriate asset hierarchy. Monitors the identification of assets, location of assets, and asset registry.
- Responsible for condition, performance and reliability assessment; residual life, business risk exposure, level of service, and appropriate operations and maintenance strategy and analysis.
- Monitor acquisition, commissioning, maintenance, upgrade, renewal/ replacement and salvage of assets.
- Involve in all new and replacement construction and maintenance projects to develop life-cycle costing and long-term asset management plans.
- Monitor business case evaluation process.
- Provide short and long range asset replacement schedules and budgets.
- Coordinate asset management program requirements with management, engineering, operations, maintenance and finance.

- Conduct as needed Reliability Centered Maintenance analysis and Preventive Maintenance Optimization analysis to develop and update maintenance strategy for assets.
- Coordinate all data on physical assets to include inspection, repairs, and failure history.
- Develop and implements computerized maintenance work order management system to collect data from all related systems with consistency and accuracy.
- Develop and documents process and standard operating procedures for asset management.
- Work with stakeholders to explain, interpret, and create DWSD asset management requirements and specifications.
- Develop asset management plan.
- Keep current on latest trends in utilities industry asset management principles, practices, procedures and technology; make recommendation for implementation; and assist in developing operational priorities, goals, and objectives related to asset management.

# ATTACHMENT – C



## Detroit Water & Sewerage Department

### interdepartmental MEMORANDUM

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**TO:** Team Leaders and Engineers

**FROM:** Wendy Barrott, General Manager – WWTP

*Wendy Barrott*

**DATE:** August 7, 2014

**RE:** WWTP Interim Asset Management Work Group

The Asset Management Pilot Team has successfully finished the first step, validating the process at the Water Works Plant and presentation of the final report on April 23, 2014.

To move the implementation of a world-class asset management program forward at DWSD, the Asset Management Pilot Team will be meeting only on an as needed basis. Over the next couple of months the primary focus of the AM pilot team will be ensuring consistency of the SOPs across DWSD; WWTP, WTP and Field Services.

An Interim Asset Management Work Group is being established at the WWTP to provide a solid foundation for the asset management program. A work plan has been developed for this Work Group which includes: development of SOPs, standardization of maintenance metrics, training, asset inventory verification, definition of Phase II WAM implementation needs and risk analysis of assets.

The Wastewater Treatment Plant has required NPDES permit completion dates for the implementation of an AM plan with a hard date of streamlined RCM completion by March 2015.

The WWTP Asset Management Work Group will be in action for 18 months to 2 years. At this time, the following individuals have agreed to accept this challenge:

- Ray Zdonkiewicz, Work Group Leader
- Robin Mortinger
- Robert King
- Dennis Church
- Sanjay K. Patel

The identified staff will begin transitioning full time to their roles on August 11 with 2 weeks to become 100% dedicated to the Asset Management Work Group. They will be joined by

3 fulltime asset management experts from EMA: Mark Baron, Karl Stein and Steve Welling.

The following reassignments are being made to take on the regular work assignments.

- Harold Robinson will assume the role of maintenance planner, Secondary team
- Wanda Brown will assume the CSO maintenance planning function
- Steve Shuck will assume the role of Electrical Foreman and assign a replacement for an electrician on the primary team
- Melvin Murphy and James Urbanik will assign a replacement for Robert King
- Alpesh Patel will continue performance of all electrical planning and assuming some administrative duties

Please join me in thanking this team for taking on this challenge, which is critical to the success of DWSD.

Cc: Sue McCormick  
Cheryl Porter  
Butler Benton

# ATTACHMENT – D

**NOTES FOR AM PROGRAM IMPLEMENTATION PLAN – 06/06/14 DRAFT**

Assume 5 primary tracks

1. Maintenance management practices
2. RCM Analysis for critical assets at WWTP (MDEQ commitments)
3. Develop SOPs for the AM Program
4. Implement AM Program
5. Develop MMIs and pre-final AM plans

(Note: OAM- Office of Asset Management)

**TRACK 1 – Maintenance Management Practices at WWTP and CSO Basins (Target start date June 16, 2014)**

Task	Lead	Support	Duration	FTE
Develop SOPs related to maintenance management				
1. SOP to define attributes info. to be collected for assets and MMIs	EMA	OAM	2 weeks	1.25
2. SOP for maintenance management processes - initiation, screening, planning, scheduling, execution, updating (labor, materials, tools, services costs, etc.), monitoring and controlling	EMA	OAM	1 – 2 weeks	2
Communicate to management before delivery to affected staff	OAM		2 hours	3
Communicate to the affected staff (presentation format)	OAM		1 day per plant (for multiple 1 hour sessions)	2
Training on SOPs and business processes (need to matrix which SOPs for which staff)	EMA	OAM	45 min/SOP	2
Implement SOPs and administer oversight and audit	EMA, OAM		On-going	2
Modify SOPs as needed based on lessons learned	OAM		2 days	1

**TRACK 2 – RCM Analysis for critical assets at WWTP and CSO Basins (MDEQ commitments: required by March 2015) (Target start date June 16, 2014)**

Task	Lead	Support	Duration	FTE
Develop SOPs that support risk analysis process (COF, LOF, BRE and Redundancy)	EMA	OAM	2 weeks	1.25

Expedite risk analysis of 330 assets already identified to MDEQ (One OAM and one plant staff FTE)	OAM	Plant staff, EMA	3 weeks	2
RCM training for each analysis team	APG (Trainer)	Plant staff, OAM	3 days	3 per process area, + Team Lead
Begin RCM analysis of most critical assets and update WAM (OAM/APG for 1 <sup>st</sup> 2-RCM analysis)	APG (Trainer)	Plant staff, OAM	2 weeks per asset	3 per asset
Confirm completeness of asset hierarchy for assets and update WAM	OAM	EMA	2 – 3 weeks	1.75
Expedite risk analysis of 5000 remaining assets (One OAM and one plant staff FTE per team)	OAM	Plant staff	8 weeks	6 teams of 2
Finalize list of assets that require RCM analysis (OAM)	OAM		1 day	1
Continue RCM analysis for most critical assets and update WAM (OAM & depends on option/approach applied)(estimate needing 3 teams running in parallel to meet deadline)	TBD		2 weeks per asset	3 per asset

**TRACK 3 – Develop SOPs for the AM Program (Target start June 16, 2014 and completion by August 31, 2014)**

Task	Lead	Support	Duration	FTE
SOP for protocols for AM renewal valuation tool	EMA	OAM	2 weeks	1.25
SOP to define scoring and assessment protocols for condition, performance and reliability	EMA	OAM	2 weeks	1.25
SOP to define asset effective and useful life	EMA	OAM	2 weeks	1.25
Update existing SOP asset registers and asset ID process	EMA	OAM	2 weeks	1.25
SOP to develop protocols for RCM program & analysis activities	EMA	OAM	2 weeks	1.25
SOP to develop protocols for PMO program & analysis activities	EMA	OAM	2 weeks	1.25
SOP for AM business processes	EMA	OAM	2 weeks	3.25
SOP for developing an asset management plan	EMA	OAM	4 weeks	2.25
SOP for asset acquisition, commissioning, turnover, disposal	EMA	OAM	2 weeks	3.50
SOP to develop protocols for life cycle costs	EMA	OAM	2 weeks	1.25

SOP for business case evaluation (Sanjay already has draft)	EMA	OAM	2 weeks	2.25
Policy for BRE (OAM)	OAM	Executive Management	4 – 6 weeks	2.25
SOP for defining level of service and protocols for evaluation and scoring assets	EMA	OAM	2 weeks	1.25
Update existing SOP for records management (note IT assessment findings on records management/document management system)	TBD	TBD	2 weeks	1.25
SOP for develop, maintain, update of O & M manuals	EMA	OAM	2 weeks	2.25
SOP for return on maintenance investment	EMA	OAM	4 – 6 weeks	2

**TRACK 4 - Implement AM Program (Target start date 1, September 2014, Phase I completion date December 31, 2014)**

Task	Lead	Support	Duration	FTE
Communication plan and presentation materials for the organization	EMA	OAM	3 days	1.5
Communicate to management before delivery to affected staff	OAM		2 hours	3
<b>Phase I – CSO Basins, Wastewater Treatment and Water Works Park Plants</b>				
Communicate to the affected staff (presentation format)	OAM		1 day per plant (for multiple 1 hour sessions)	3
Training on SOPs and business processes such as data collection, risk analysis, asset attributes (Need to matrix which SOPs for which staff)	EMA	OAM	45 min/SOP	2
<b>Roll out AM program to WWTP and Water Works Park assets</b>				
<b>Phase I A CSO Basins and Wastewater Treatment Plant</b>				
Define levels of service for highest risk assets	OAM	Plant staff	1 – 2 weeks	1.5
Training on PMO analysis (after RCM work is done after sometime in Feb 2014)	EMA	OAM	2 days	20
Conduct PMO analysis (2 assets) and determine appropriate maintenance strategies for risk zones 2 & 3 assets and update WAM. (One OAM/EMA, One MT, PT, EICT each FTE)	EMA OAM	Plant staff	1 week per asset group	4.25

Conduct PMO analysis (remaining assets) and determine appropriate maintenance strategies for risk zones 2 & 3 assets and update WAM (One OAM, One MT, PT, EICT each FTE)	OAM	Plant staff	1 week per asset group	4.25
Develop preliminary renewal/replacement profile {use existing PM and maintenance cost data (without some or most of RCM/PMO data)}	OAM	EMA	1 – 2 weeks	2
Develop preliminary asset management plan (target completion date December 31, 2014)	EMA	OAM	4 – 6 weeks	3
<i>Phase I B Water Works Park</i>				
Confirm completeness of asset hierarchy for assets and update WAM	OAM		2 weeks	1.75
Conduct risk analysis of all assets (One OAM staff and one plant staff per team)	OAM		3 weeks	3 teams of 2
Define levels of service for highest risk assets	OAM		1 week	1.5
Implement maintenance management practices SOPs and administer oversight and audit	OAM	EMA	On-going	1
Training on PMO analysis (for all water plants)	OAM EMA	Plant staff	2 days	15
Conduct PMO analysis (2 assets) for risk zones 1 thru 3 assets and determine appropriate maintenance strategies assets and update WAM (One OAM/EMA, One MT, PT, EICT each FTE)	OAM EMA	Plant staff	1 week per asset group	4.25
Conduct PMO analysis (remaining assets) for risk zones 1 thru 3 assets and determine appropriate maintenance strategies assets and update WAM. (One OAM, One MT, PT, EICT each FTE)	OAM	Plant staff	1 week per asset group	4.25
Develop renewal/replacement profile {use existing PM and maintenance cost data (without some or most of PMO data)}	OAM		1 – 2 weeks	2
Develop asset management plan (target completion date December 31, 2014)	OAM	EMA	4 – 6 weeks	3
Modify SOPs as needed based on lessons learned			2 days	1
<i>Phase II – Remaining Water Treatment Plants</i>				
Communicate to the affected staff (presentation format)	OAM		1 day per plant (for multiple 1 hour sessions)	3
Training on SOPs and business processes such as maintenance management practices, data collection, risk analysis, asset attributes (Need to matrix which SOPs for which staff)	OAM		45 min/SOP	2
<i>Roll out AM program to all remaining water treatment plants assets (based on pairwise analysis)</i>				
Confirm completeness of asset hierarchy for	OAM		2 weeks/plant	1.75

assets and update WAM				
Conduct risk analysis of all assets (One OAM staff and one plant staff per team)	OAM	Plant staff	3 weeks/plant	3 teams of 2
Define levels of service for highest risk assets	OAM		1 week/plant	1.5
Implement maintenance management practices SOPs and administer oversight and audit	OAM		On-going	1
Training on PMO analysis	OAM		See WW Park	
Conduct PMO analysis for risk zones 1 thru 3 assets and determine appropriate maintenance strategies assets and update WAM (One OAM, One MT, PT, EICT each FTE)	OAM	Plant staff	1 week per asset group	4.25
Develop renewal/replacement profile	OAM		1 – 2 weeks	2
Develop asset management plan	OAM		4 – 6 weeks	3
Modify SOPs as needed based on lessons learned	OAM		2 days	1
<b>Phase III – Booster Stations, Sewer Pumping Stations</b>				
Communicate to the affected staff (presentation format)	OAM		1 day per plant (for multiple 1 hour sessions)	3
Training on SOPs and business processes such as maintenance management practices, data collection, risk analysis, asset attributes (Need to matrix which SOPs for which staff)	OAM		45 min/SOP	2
<b>Roll out AM program to all remaining water treatment plants assets (based on pair wise analysis)</b>				
Confirm completeness of asset hierarchy for assets and update WAM	OAM		1 week/station	1.75
Conduct risk analysis of all assets (One OAM staff and one plant staff per team)	OAM	Station staff	1 week/station	1 team of 2
Define levels of service for highest risk assets	OAM		2 days/station	1.5
Implement maintenance management practices SOPs and administer oversight and audit	OAM		On-going	1
Training on PMO analysis	OAM		See WW Park	
Conduct PMO analysis risk zones 1 thru 3 assets and determine appropriate maintenance strategies for assets and update WAM (One OAM, One MT, PT, EICT each FTE)	OAM	Station staff	1 week per asset group	4.25
Develop renewal/replacement profile	OAM		1 – 2 weeks	2
Develop asset management plan	OAM		4 weeks	3
Modify SOPs as needed based on lessons learned	OAM		2 days	1
<b>Phase IV – Linear Assets (GIS Represented)</b>				

Communicate to the affected staff (presentation format)	OAM			3
Training on SOPs and business processes such as maintenance management practices, data collection, risk analysis, asset attributes (Need to matrix which SOPs for which staff)(future state)	OAM	Field staff	45 min/SOP	2
<b>Roll out AM program for linear assets</b>			TBD	
Confirm completeness of asset registry in GIS and interface with WAM (future state)	GIS OAM		In process	
Conduct risk analysis of all assets (One OAM staff and one field staff per team)	OAM	Field staff	TBD	
Define levels of service for highest risk assets	OAM		TBD	
Implement maintenance management practices SOPs and administer oversight and audit	OAM		On-going	
Training on PMO analysis	OAM	Field staff	TBD	
Conduct PMO analysis risk zones 1 thru 3 assets and determine appropriate maintenance strategies assets and update WAM (One OAM staff and field staff per team)	OAM	Field staff	TBD	
Develop renewal/replacement profile	OAM		TBD	
Develop asset management plan	OAM		TBD	
Modify SOPs as needed based on lessons learned	OAM		2 days	1
<b>Phase V – Other Organizational Units</b>				
Communicate to the affected staff	OAM		TBD	3
Training on SOPs and business processes such as asset acquisitions, turnover, salvage, life cycle cost, BCE analysis, O & M manual update, records management (need to matrix which SOPs for which staff)	OAM	Organizations staff	45 min/SOP	2
<b>Roll out AM program to all remaining organizational units</b>	OAM		TBD	TBD
Implement SOPs	OAM		TBD	TBD
Modify SOPs as needed based on lessons learned	OAM		TBD	TBD

#### Track 5 - Develop MMIs and Pre-Final AM plans

Task	Lead	Support	Duration	FTE
Phase I				

Develop MMIs for highest risk assets (One OAM, One MT, PT, EICT each FTE)	OAM	Plant staff	1 week per asset group	4.25
Conduct risk analysis at MMI level for highest risk assets (One OAM staff and one plant staff per team)	OAM	Plant staff	1 week per 100 MMI	2
Develop pre-final renewal/replacement profile	OAM		1 – 2 weeks	2
Develop pre-final asset management plan	OAM		4 – 6 weeks	3
<b>Phase II</b>				
Develop MMIs for highest risk assets (One OAM, One MT, PT, EICT each FTE)	OAM	Plant staff	1 week per asset group	4.25
Conduct risk analysis at MMI level for highest risk assets (One OAM staff and one plant staff per team)	OAM	Plant staff	1 week per 100 MMI	2
Develop pre-final renewal/replacement profile	OAM		1 – 2 weeks	2
Develop pre-final asset management plan	OAM		4 – 6 weeks	3