RISK SELF ASSESSMENT

Austin Water Utility Facility Engineering Division

August 25, 2009

Office of the City Auditor
Austin, Texas

SUMMARY

The Office of the City Auditor facilitated a risk self assessment workshop for the Facility Engineering division of the Austin Water Utility. The workshop participants identified a total of 40 risks, 17 of which were rated as high risks, 6 as medium risk, 15 as low risk and 2 as acceptable risk. The highest-rated risk areas included the Supervisory Control and Data Acquisition (SCADA) system, project management and implementation, records management system, cost for retrofitting of substandard facilities at annexation and insufficient design standards for water pump stations, and collaboration and communication among workgroups that regularly interacts with Facility Engineering division. The risk self assessment results have been shared with AWU management for their consideration and appropriate action. Furthermore, the Office of the City Auditor will consider the highest-rated risk areas as input in the development of its annual risk-based audit service plan.

BACKGROUND

As part of the Office of the City Auditor's (OCA) approved FY 2009 Service Plan, we performed a risk assessment at the Austin Water Utility (AWU). OCA first initiated a risk assessment of AWU in 2006 and identified risk areas that have since been addressed in various OCA audits. In November 2008, the City's Corporate Internal Audit group within the Financial and Administrative Services Department also conducted a risk self assessment survey of AWU business units and divisions. The Corporate Internal Audit survey concluded that AWU's Facility Engineering division was one of five divisions that were rated high risk based on predetermined criteria in the survey. We also performed our own risk analysis using the Corporate Internal Audit survey results as starting point, and Facility Engineering emerged as a high risk area based on our analysis as well. This was our basis for focusing on the Facility Engineering division for the 2009 risk self assessment.

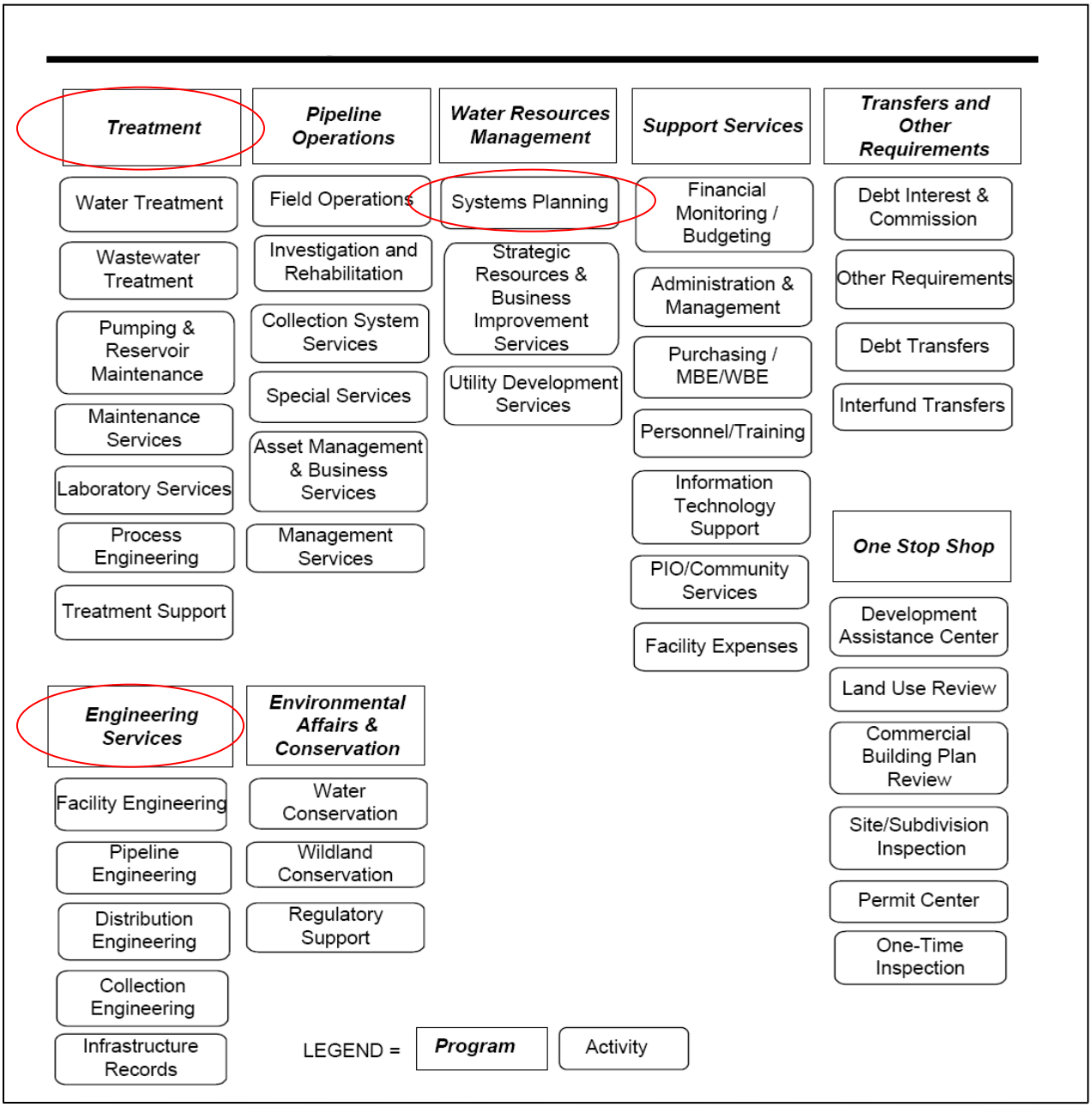
The Facility Engineering division is a part of the Engineering Services group of AWU. The Facility Engineering division is responsible for:

- managing the implementation of AWU's water and wastewater facilities through Capital Improvement Plan (CIP) projects;
- providing electrical and mechanical engineering support services to the treatment plants, water pump stations, wastewater lift stations, and bio-solids management facilities;
- providing plan review services for lift station and pump station CIP projects, including coordinating with the Public Works and Transportation Department for the implementation of the facility CIP projects; and

- providing specialized engineering support services such as managing the Supervisory Control and Data Acquisition (SCADA) systems in the treatment plants, Lift Stations and Pump Stations.

The Facility Engineering division continuously interacts with other divisions of the utility. It provides support for divisions within the Treatment group and the Systems Planning division within the Water Resource Management group. See Exhibit 1 for an overview of AWU programs and activities.

EXHIBIT 1
Austin Water Utility — 2008-09



SOURCE: FY09 City Budget Documents

OBJECTIVES, SCOPE, AND METHODOLOGY

Objectives:
To provide input for developing OCA's risk-based audit plan for AWU, and inform AWU management and the City Council of current risk levels in the Facility Engineering division.

Scope:
The Facility Engineering division's current processes, along with related interface processes with the:

- divisions under the Treatment group, such as Maintenance Services, Process Engineering, Water and Wastewater Treatment Plants, Pump Stations and Reservoir Maintenance, and Lift Stations and Remote Facilities; and
- Asset Management function, a unit under the Systems Planning division within the Water Resources Management group.

Methodology:
To accomplish this work, we:

- reviewed background information on AWU strategic plans and objectives, the AWU program and activity structure, and the Facility Engineering division's objectives and performance measures.
- obtained and analyzed the results of the Corporate Internal Audit group's risk assessment survey of AWU, and developed a risk-based analytical approach for AWU activities using these survey results as a starting point.

In order to identify, assess and rate risks within the Facility Engineering division, we facilitated a Risk Self Assessment (RSA) with AWU staff. There are several RSA models that are used extensively and are widely accepted tools for risk-based audit planning and risk management. RSA is a technique that allows the employees actually involved in an operation to examine and evaluate the operation. It taps the knowledge of the organization and focuses on organizational objectives, risks and controls. RSAs may be performed by questionnaire, survey, interview, facilitated workshop, or a combination of any of these options.

We used the facilitated RSA workshop approach for the Facility Engineering division because it:

- opens communication and interaction among knowledgeable participants, which creates a broad picture of potential events and related business impact;
- provides efficient use of time;
- improves employee understanding of how their activities are related to the activities of other employees or workgroups;
- raises awareness of the most significant exposures or risks and existing controls to mitigate the risks;
- builds consensus around priority risks and their impact; and
- increases the ability to manage priority risks identified in the workshop.

For this risk self assessment, we:

- grouped the division processes into four major processes:
  - CIP Planning and Prioritization;
  - Project Management and Implementation;
  - Engineering Design and Technical Support Services; and
  - Operations and Maintenance Support Services.

  We also included the Control Environment as an additional risk area for our risk assessment, because the control environment represents the tone of the organization, sets the foundation for how strategies and objectives are established, and reflects how controls and risks are viewed and addressed by management and staff.

- developed a Risk Self Assessment (RSA) approach and plan for this project, including a participant's handbook on the RSA workshop that was furnished to participants prior to the workshop to serve as a guide for the RSA process;
- met with the RSA participants prior to the RSA workshop to familiarize them with RSA vocabulary, risk identification and risk rating characteristics, and workshop ground rules;
- used an Audience Response System (ARS) during the RSA sessions to allow anonymous voting on risk ratings; and
- summarized and analyzed the RSA results, including development of:
  - a Risk Matrix of risks levels categorized by major processes;
  - a Risk Dashboard containing a risk profile showing the high, medium and low risk areas of the Facility Engineering division as a whole and for each of its major processes, including the control environment; and
  - an overview of the key risk issues that emerged as highest risk through the RSA overall, to inform management of the potential audit focus areas based on the RSA results.

The participants in the facilitated RSA workshop were composed of process owners and supervisors chosen by AWU management from the Facility Engineering division, as well as from groups Facility Engineering regularly interfaces with related to treatment and systems planning:

No.	**Position**	**Operating Group**
5	Supervising Engineer	Engineering Services
2	Engineer	Engineering Services
1	Analyst	Engineering Services
1	Division Manager	Treatment
1	Superintendent	Treatment
3	Supervisor	Treatment
1	Supervising Engineer	Water Resource Management

In the workshop sessions, the participants:
- identified critical controls in place;
- identified remaining risk that existed despite the presence of identified controls (or the residual risk); and
- assessed and prioritized the risks, rating each risk as high, medium, or low risk, both in terms of business impact and the likelihood of occurrence.

This Risk Self Assessment is a non-audit service provided by the Office of the City Auditor. The results of the RSA are not audit findings but assertions of the workshop participants that were confirmed by the other participants in the workshop. The RSA results are based on testimonial evidence, which we would validate through other types of evidence, if these areas were selected for further audit work, in order to develop audit findings.

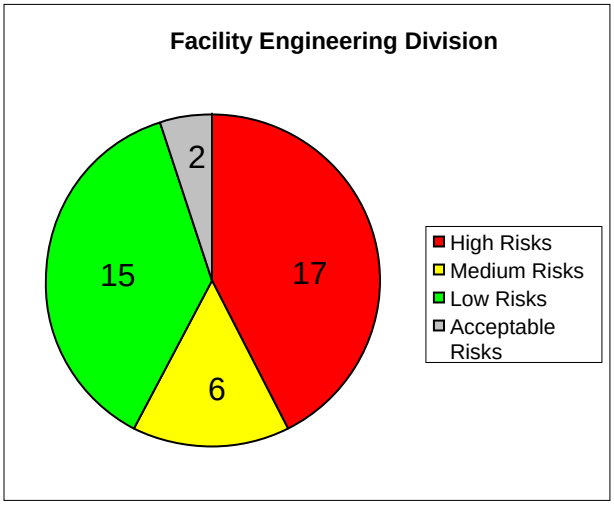
RISK SELF ASSESSMENT RESULTS

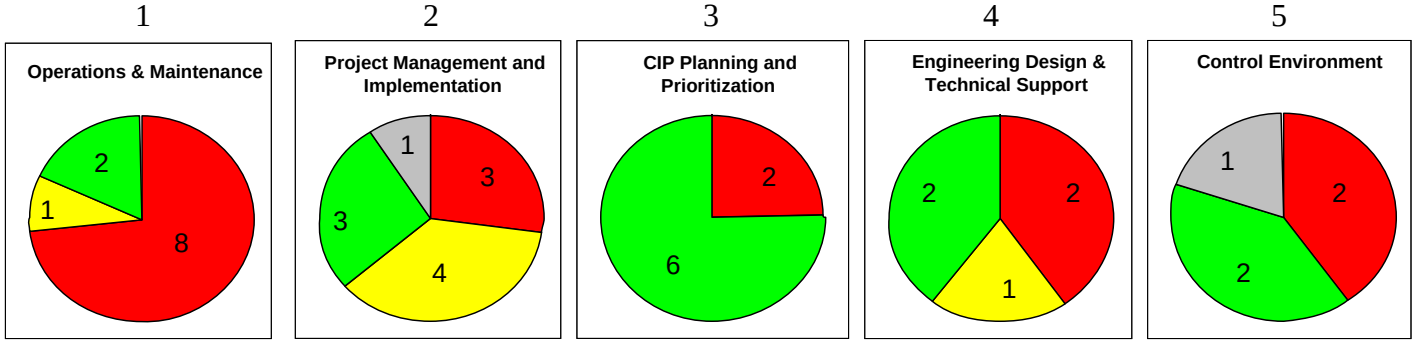
The RSA participants identified a total of 40 risks related to the division's process areas and assessed the likelihood of those risks occurring. Of these, 58% (23 risks) were rated as low or medium risk, indicated that management has taken action to address many of the risks. After participants identified and rated the highest risks, we reviewed the identified risks and summarized them into issue areas. Many of these issue areas spanned more than one process area and included the utility's automation and monitoring systems; management and implementation of CIP projects; records management; costs for retrofitting facilities acquired at annexation; lack of design standards for water pump stations; and collaboration and communication among working groups.

Risk Dashboard

The RSA workgroup identified a total of 40 risks, of which 17 were rated as high risk, 16 as medium risk, 15 as low risk and 2 as acceptable risk, as shown in Exhibit 2. Of the 17 high-rated risks, eight were in the Operations and Maintenance Support Service process; three were in the Project Management and Implementation process; and two each were in the CIP Planning and Prioritization process, the Engineering Design and Technical Support process, and the Control Environment.

EXHIBIT 2
RISK DASHBOARD – FACILITY ENGINEERING DIVISION





Key: Risk profile description and suggested risk responses

Risk Ratings*	Color	Risk Response
HH, HM		Managers, supervisors, and staff should continuously manage and monitor the risks, and an audit may be necessary.
HL, MH		Managers, supervisors, and staff should manage and monitor but an audit is considered optional.
MM, ML, LH		Supervisors and staff should monitor the risks.
LM, LL		Accept, but staff should ensure they are using correct policies

H = High, M = Medium, L = Low; For risk rating, the first letter refers to risk rating on impact, and the second letter refers to the rating of probability.

Exhibit 2 illustrates the Facility Engineering division Risk Dashboard, including the related risk profile descriptions and suggested risk responses. The large pie chart represents the risk profile of the Facility Engineering division as a whole, while the smaller pie charts represent the risk profiles of each of its four major processes, along with the control environment overall. The numbers identified within each color of the pie charts represent the number of risks identified at each risk level for each process area.

The highest-rated risks are those risks whose potential negative consequence or impact would, for example, jeopardize public safety, result in a significant financial loss (of $250,000 or more), or loss of credibility or public support; and whose likelihood of occurring was high, either because of several weaknesses in internal control, or because management was not aware or had no corrective action in progress. Risks rated as medium likelihood had some weaknesses in internal control which management was aware of and had plans underway to address the weakness.

Exhibit 2 also identifies the suggested risk management actions that are appropriate for each risk level. For example, for high-rated risks, managers, supervisors, and staff should continuously monitor and manage the risk, and an audit may be necessary. Medium-rated risks should be monitored and managed but may not need to be audited, and low-rated risks should be monitored to ensure the risk level does not increase.

A matrix of all risks by process is shown in Exhibit 3. (See next page.)

EXHIBIT 3
Facility Engineering Division Risk Matrix

#	PROCESSES AND CONTROL ENVIRONMENT		RISKS 1		2		3		4		5		6		7		8		9		10		11
1	Operations and Maintenance Support Services	HH	Absence of efficient records management system for Plans, drawings and CDs	HH	Inadequate SCADA manpower support staff	HH	Insufficient funding for selected SCADA software and hardware upgrades	HH	Outdated SCADA system for the distribution and lift station system	HH	Unavailable vendor technical support for outdated SCADA software and hardware components	HH	Unclear process owner for records management of plans, drawings and CDs	HM	Insufficient interaction from both management and staff of concerned units to identify and prioritize replacement, repairs and maintenance	HM	Insufficient communication among concerned units about the records management system being developed	MH	Insufficient training on efficient records management	MM	Insufficient asset condition assessment and maintenance plan	MM	Unclear delineation of roles and responsibilities for asset management function
2	Project Management and Implementation	HH	Higher Engineering Costs	HH	Inadequate staffing to support project management in the field	HH	Insufficient Training on eCapris system	MH	Absence of records management for vertical projects	MH	eCapris system not providing needed information for Project Management	MH	Lack of training for new hires on Project Management Standards	MH	Outdated project information - eCapris system	MM	Insufficient interaction and teamwork among Facility Engr., Treatment and Systems Planning	MM	Lack of effective communication-Project Management Standards updates	ML	Lack of training on Project Management Standards	LL	Inadequate accounting system for allocating project management labor hours
3	CIP Planning and Prioritization	HM	Absence of effective information and records capture impacting previously set CIP priorities	HM	Insufficient interaction and teamwork among Facility Engr., Treatment and Systems Planning/Asset Mgt.-CIP Projects	MM	Insufficent asset condition assessment and maintenance plan	MM	Absence of clear formal process for project identification	MM	Lack of criteria for project prioritization	MM	Ongoing division restructuring and new hires	MM	Over reliance on consultants for "cure all" initiatives	MM	Unclear process owner for project identification among cross-workgroup interactions	-	n/a	-	n/a	-	n/a
4	Engineering Design and Technical Support Services	HH	Excessive cost for retrofitting substandard facilities acquired at annexation	HM	Absence of Design Standards for Water Pump Station	MH	Insufficient interaction and teamwork among Facility Engr., Treatment and Systems Planning/Asset Mgt	MM	Insufficient training on INFOR (Enterprise Asset Management System)	MM	Outdated information in INFOR (Enterprise Asset Management System)	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a
5	Control Environment	HH	Loss of institutional knowledge	HM	Outdated Facility Engineering objective statement	MM	Management perceived as unresponsive to operating staff/treatment facilities' needs	MM	Unclear reporting structure	LL	Perceived project funding biases	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a

HH, HM = **Manage, monitor, and audit (Manager, Supervisors, Staff)**
HL, MH = **Manage and Monitor (Manager or a designee, Supervisors, Staff)**
MM, ML, LH = **Monitor (Supervisors, Staff)**
LM, LL = **Accept (staff)**

Use for Risk Management Plan:

Audit work may be performed and the Division Manager should perform the oversight controls to ensure that supervisory & execution controls are working.
The Division Manager (or a designee) should perform oversight controls to ensure that the supervisory and execution controls are working.
Supervisors should perform oversight function to see that supervisory and execution controls are working.
Staff should ensure they are using correct policies and procedures in their area.

Highest-Rated Risks and Potential Audit Areas
We summarized the highest-rated risks for all process areas by issue. The high-risk issue areas that emerged from the RSA included the SCADA process control and monitoring systems; project management and implementation of CIP projects; records management; costs for retrofitting substandard facilities acquired at annexation and lack of design standards for water pump stations; and collaboration and communication among working groups. Additional details are provided below.

Supervisory Control and Data Acquisition (SCADA) System

This risk area was rated high in both business impact and likelihood of occurrence in the Operations and Maintenance Support Services process. The SCADA system is used to remotely monitor and control process automation systems in both water and wastewater treatment plants, water distribution and wastewater collections systems, including pump stations and lift stations, respectively. The SCADA system collects data from various sensors and sources at the plants, remote locations, or network, and transmits this data to a real-time Information Management platform which then utilizes and controls the data. The RSA participants indicated that the SCADA system has several outdated software and hardware components that are no longer supported by the vendor.

The participants indicated that one of the reasons that the system is outdated is that funding for SCADA software and hardware upgrades has not been prioritized. There have been CIP projects planned to address improvements and future replacements for a number of years, but most of those projects have been deferred for several years by AWU management. RSA participants indicated that fiscal year 2009 is the first year in which funding has been made available for SCADA upgrades. A planned $4.2M SCADA upgrade on the water distribution control system and lift station telemetry is in progress, but this upgrade will not address all outdated components. Another reason cited for the delays in upgrading the system was the absence of mechanisms to track software and hardware lifecycles, including warranties. SCADA staff use spreadsheets to track some of the equipment and software ages and warranties, but the spreadsheets are not routinely kept up-to-date. The SCADA group also has pilot applications developed to help track hardware and software inventory and warranties, but these pilot applications are not currently in production.

AWU management clarified that they have invested in SCADA improvements continuously in the past, but they were mostly related to wastewater collection system but not in the water distribution system. Also, the SCADA engineering section will be working with Information Technology division to incorporate the SCADA equipment into INFOR, a maintenance management system, to help track software and hardware lifecycles.

Project Management and Implementation

This is an area in which three key risks were rated high in both business impact and likelihood of occurrence: higher engineering costs, inadequate staffing to support effective project management in the field, and insufficient training on the City of Austin Project Reporting and Information System (eCapris).

- Participants indicated that engineering costs exceeds industry benchmarks. The project managers from Public Works and/or engineers from AWU manage costs, negotiate rates, and award engineering contracts for AWU Facility Engineering projects. Participants cited that based on national averages, engineering cost for complex projects typically range from 10% - 15% of total project costs, while the AWU spends approximately 20% to 25% for engineering costs. One of the reasons cited is that the environmental requirements of the City of Austin drive up engineering costs. Another reason for the high engineering costs is insufficient detailed information concerning the complexity and size of each project; having sufficient information would provide a better basis for determining the appropriate engineering fees.

- In addition, although management indicates that there will soon be an initiative to evaluate the organization structure and sufficiency of resources to deliver projects, RSA participants pointed out that there has been a lack of adequate staffing resources and sufficient funding to support effective project management done by Facility Engineering in the field.

- The participants also identified a lack of sufficient eCapris training to keep users informed about the information available in eCapris and how to use the system to aid project management. eCapris is a customized, web-based CIP information system that has been used Citywide to assist project managers in budgeting, planning and tracking CIP projects. The RSA participants also indicated that project managers do not have additional project management tools and are unable to obtain detailed project management information, like a breakdown of project schedules and milestones, from eCapris. This risk was rated medium in business impact but high in likelihood of occurrence. Also, eCapris information is not being updated regularly by the engineers and others responsible for projects, partly because the updating of eCapris information is not being monitored and measured by AWU management.

  AWU management indicated that a review of engineering costs for projects will include upper management review. AWU has set up a system that provides for review by a team of senior level managers. Moreover, AWU is working with the Public Works Department to initiate eCapris training, and will acquire server based Microsoft Project software (a project management tool) the next fiscal year for project managers' use. AWU management clarified that the Public Works Department provides project management support to most of the AWU projects and is mostly responsible for the upkeep of the project progress and updates in the eCapris system. Moreover, AWU will work with Public Works to streamline updates and will send reminders to update eCapris on a quarterly basis, and will also include the eCapris updates as part of the performance appraisal of AWU project managers and engineers.

Records Management System

This risk area was rated high in both business impact and likelihood of occurrence, for both the Operations and Maintenance Support Services and CIP Planning and Prioritization processes. The risk was rated medium in terms of business impact for the Project Management and Implementation process, but high in likelihood of occurrence. RSA participants were concerned about the absence of an effective records management system for efficiently retaining and retrieving drawings, plans, and compact discs (CDs) containing this information. Participants indicated that plans and drawings are very difficult to find, and many hours are spent just to retrieve these records. While there are CDs for some drawings and plans, there is no centralized location for the CDs, and staff cannot find the CDs when needed. The Infrastructure Records and Surveying Division (IR&SD) of AWU's Engineering Services group has started developing a records management system but has not yet communicated with all involved units in the system development.

AWU management indicated that IR&SD has initiated plans to have Facility Engineering projects use the same Utility processes being used for underground utilities. This will provide for issuing Utility Project Identification Numbers for tracking, completing as-built drawings, and incorporating the projects on the Utility record system. AWU management also indicated that IR&SD has initiated a project to incorporate all existing Facility project records in a centralized standard Utility Record system for easy access by authorized AWU staff.

Cost of Retrofitting Facilities and Design Standards for Water Pump Stations

These two risk areas in the Engineering Design and Technical Support Service process were rated high risk in business impact and high/medium risk, respectively, for likelihood. RSA participants indicated that sometimes in the City's process of annexing new areas into its jurisdiction there is no mechanism in place for the inspection and evaluation of existing facilities prior to annexation. As a result, the City may incur significant costs for retrofitting substandard facilities acquired at annexation.

AWU management clarified that this risk reflects an earlier annexation in Anderson Mill, and stressed that annexations the Utility has been part of in recent years had a significant condition assessment prior to actual annexation. Furthermore, annexation is a Citywide initiative for a specific area where the Utility provides input, but decisions are based on Citywide impacts or benefits, and not just AWU requirements.

Furthermore, the RSA participants indicated that there are no design standards for water pump stations, which could potentially lead to increased costs because of different designs used for each pump station. The participants indicated that while there are design standards for wastewater lift stations, none are in use for water pump stations.

Management, however, is working on developing formal design standards for water pump stations.

Collaboration and Communication Among Facility Engineering, Treatment, and Systems Planning

This risk area was rated high in terms of business impact and medium in likelihood of occurrence, in both the Operations and Maintenance Support Service and the CIP Planning and Prioritization processes. For the Operations and Maintenance Support Service process, insufficient and untimely coordination among involved units have negatively impacted the prioritization of resource allocation for equipment replacement, repair, and maintenance. The participants indicated that although not across the board, Facility Engineering, Treatment, and Systems Planning are starting to communicate with each other.

In addition, the lack of sufficient teamwork, coordination, and clear communication flow to capture information timely among workgroups in Systems Planning, Facility Engineering, and Treatment could negatively impact the achievement of previously-set priorities and cause delays in CIP projects. According to participants, a process has been identified to better standardize the prioritization process but has not yet been implemented.

AWU management pointed out that there are regular formal and informal update meetings among Engineering, Water Resources Management, Treatment, and Pipeline Operations leadership, and routinely at the staff level across divisions. The Division Manager of Facility Engineering Division is required to meet with the Operations Divisions on a regular basis to communicate and coordinate activities. This requirement is in the Division Manager's performance appraisal. The Wastewater group has a formal monthly scheduled meeting. Assistant Directors of Engineering, Water Resources Planning and Pipeline Operations, and Treatment meet weekly one-on-one to discuss.

Austin City Council

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