2018 Strategic Asset Management Plan Update

December 2018

King County

Department of
Natural Resources and Parks
Wastewater Treatment Division

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Department of
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2018 Strategic Asset Management Plan Update Approval

The 2018 Strategic Asset Management Plan Update (2018 SAMP Update) and associated Asset Management Work Plan (Work Plan) reflect the high priority and value the Wastewater Treatment Division places on asset management. The management of assets depends on all staff supporting and implementing, within their respective job duties, asset management tasks as described in the 2018 SAMP Update.

I hereby approve the 2018 SAMP Update and direct the Asset Management Steering Committee to provide the support and resources necessary to effectively implement the 2018 SAMP Update.

The 2018 SAMP Update is an update to an ongoing program that will continue to mature over time as Work Plan tasks are completed. The strategic plans for asset management will continue to be updated on a five-year cycle. The Work Plan may be amended or updated on an annual basis. Additions or changes to the 2018 SAMP Update or Work Plan shall be logged on the attached List of Revisions.

_____   4-3-19
Mark Isaacson   Date
Director
Wastewater Treatment Division

2018 SAMP and Asset Management Work Plan List of Revisions

Revision Date	Revised By	Description of Change

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Acronyms and Abbreviations

AMIS   Asset Management Information System

AMSC   Asset Management Steering Committee

BoM   Bill of Materials

CAD   Computer-aided design

CAMPS   Capital Asset Management Program Spreadsheet

CCTV   Closed-circuit television

CIFM   Conveyance Inspection and Flow Monitoring

CIP   Capital Improvement Program

CM   construction management

CMMS   Computerized maintenance management system

County   King County

CPC   Capital Project Coordinator

CSO   Combined sewer overflow

CST   Capital Systems Team

DCS   Distributed control system

DMS   Drawing Management System

DNRP   Department of Natural Resources and Parks

EBS   E-Business Suite Financials

FIRS   Facilities Information Retrieval System

GIS   Geographic information system

IIMM   International Infrastructure Management Manual

IMPS   Industrial Maintenance Program Specialist

ISO   International Standardization for Organization

IT   Information technology

KPI	Key performance indicator
KSC	King Street Center
LCCA	Life cycle cost analysis
MBP	Maintenance best practices
MBPSC	Maintenance Best Practices Steering Committee
MWPAAC	Metropolitan Water Pollution Abatement Advisory Committee
NPRF	New project request form
O&M	Operations and Maintenance (WTD Work Group)
PfM	Portfolio management
PIM3	Planning, Inspection, Modeling, Monitoring and Mapping
PRISM	Project Information Systems Management
PMU	Project Management Unit
PPD	Project Planning and Delivery
PWR	Project work request
RE	Reliability Engineer
RWSP	Regional Wastewater Services Plan
SAMP	Strategic Asset Management Plan
SME	Subject matter expert
SCADA	Supervisory control and data acquisition
SOP	Standard operating procedure
WTD	Wastewater Treatment Division
Work Plan	2018 Asset Management Work Plan

Glossary

Term	Definition
As-built drawings	The reflected changes to the original project design drawings made by the contractor in the field during the construction process.
Asset	A physical component of a facility that has value, enables services to be provided, and has an economic life greater than 12 months.
Asset class	A set of assets with similar characteristics that can be treated the same when estimating future rehabilitation and refurbishment requirements.
Asset hierarchy	A framework for segmenting assets into appropriate levels that show their process relationships to each other. The asset hierarchy can be based on asset function, asset type, or a combination of the two.
Asset registry	A complete listing of the number, type, and value of assets owned at a point in time. Asset attributes such as installation date, capacity, manufacturer, model, and serial number are included.
Asset management	A business best practice using LEAN principles to minimize costs of asset ownership while managing risks and meeting required service levels.
Asset management information system	A combination of processes, data, and software applied to provide the essential outputs for effective asset management such as reduced risk and optimum infrastructure investment.
Asset Management Steering Committee	A WTD leadership team designed to champion and be accountable for the implementation of the SAMP and the Work Plan.
Asset plan	A timeline of asset ownership costs, including best estimates of operation and maintenance strategies and expected capital expenditures, throughout the entire asset life cycle.
Bill of materials	A list of parts or components that are required to completely refurbish an asset. The BoM provides the manufacture's part number and the quantity needed for each component. The BoM is maintained in the CMMS.
Capital asset	Term used in capitalization process of assets for accounting to describe an asset with a useful life longer than one year that is not intended for sale in the regular course of the business's operation.
Capital expenditure	Expenditure used to create new assets or to increase the capacity of existing assets beyond their original design capacity or service potential. Capital expenditure increases the value of asset stock.
Computerized maintenance management system	An application for managing and tracking an inventory of vertical and linear assets with associated life cycle data and communicating maintenance information.
Condition assessment	The process of evaluating an asset to estimate its remaining useful life or probability of failure. The results of condition assessments are typically expressed numerically as a condition rating.
Condition monitoring	Continuous or periodic inspection, assessment, measurement, and interpretation of the resultant data to assess the condition of an asset and determine the need for preventive or remedial action.
Condition-based maintenance	Maintenance initiated as a result of knowledge of an item's condition from routine or continuous monitoring.
Conformed drawing set	The updated contract/bid drawing set with addendums incorporated; it is resubmitted to the contractor before construction.
Contract/bid drawing set	The final set of design drawings for a project submitted to contractors during the bid process.
Corrective maintenance (CM)	Rebuilding and repairing assets with problems identified through preventive and predictive maintenance or because the assets have failed; corrective maintenance may or may not be scheduled.

Term	Definition
Critical assets	Assets for which the financial-, business-, or service-level consequences of failure are sufficiently severe to justify proactive inspection and rehabilitation. Critical assets have a lower acceptable risk threshold for action than non-critical assets.
Criticality	A numerical measure of the probability and potential consequences of an asset's unexpected failure in terms of measures such as economic cost, service levels, community cost, and safety.
Data warehouse	A system that centralizes a group of disparate databases to facilitate access into each of those databases.
Depreciation	The wearing out, consumption, or other loss of value of an asset, whether arising from use, passing of time, or obsolescence through technological and market changes. It is accounted for by the allocation of the cost (or revalued amount) of the asset less its residual value over its useful life.
Disposal	The sale or other ultimate disposition of an asset that has been demolished or replaced. Also, the activities necessary to dispose of decommissioned assets.
Economic life	The length of time an asset is expected to remain actively in service before it is deemed to be more cost-effective to replace the asset rather than continuing to maintain it.
Facility	A complex comprising many assets (e.g., a hospital, water treatment plant, recreation complex, etc.) that represents a single management unit for financial, operational, maintenance, or other purposes.
Facility drawings	Living drawings that are constantly being updated to reflect the current existing configuration of the facility. These drawings should be used at the start of any project or configuration change, and should be updated with all changes upon project completion from the Record Drawing Set or following any configuration change. Facility drawings, along with all other drawings, shall be maintained in the DMS in accordance with the Drawing Management Plan.
Failure mode	The manner by which a function of an asset fails.
Gap analysis	A method of assessing the gap between a business's current asset management practices and the future desirable asset management practices. Also called "needs analysis" or "improvement planning."
Gate	A management check-in point administered by either the Capital Systems Team or the Project Work Request Committee to ensure the right information on a project is provided at the right time to manage scope, schedule, and budget risks.
Geographic information system	Software that provides a means of spatially viewing, searching, manipulating, and analyzing an electronic database.
Key performance indicator	A key or high-level qualitative or quantitative measure of a service or activity used to compare actual performance against a standard or other established target.
Level of service	The defined service quality for a particular activity or service area against which service performance shall be measured.
Life	A measure of the anticipated life of an asset or component, such as time, number of cycles, distance intervals, and so on.
Life cycle	The cycle of activities that an asset (or facility) goes through while it retains an identity as a particular asset. The life cycle spans planning, design, construction, commissioning, operation and maintenance, repair, modification, replacement, decommissioning, and disposal of an asset.
Life cycle cost	The total cost of owning an asset over its economic life, including planning, design, construction, acquisition, operation and maintenance, rehabilitation, and disposal costs.
Life cycle cost analysis	A process of estimating and assessing the total costs of owning, operating, and maintaining an asset during its projected economic life. Typically used when comparing alternative equipment design or purchase options.

Term	Definition
Linear asset	(i.e. Horizontal Assets) Linear assets move or convey water, air, and power from one place to another. In wastewater treatment, linear assets are those that convey the wastewater from local collection agencies to treatment plants and facilities.
Maintenance	All actions necessary for retaining an asset as near as practicable to its original condition, but excluding rehabilitation or renewal. Fixed interval maintenance is used to express the maximum interval between operational maintenance tasks.
Maintenance best practices	A set of asset management and Reliability Centered Maintenance (RCM) processes, techniques, or innovative uses of resources for operations and maintenance.
Maintenance Best Practices Program	A program to improve current maintenance practices in WTD and to move closer to a desired best practices standard. Five areas are identified for improvement: leadership, maintenance work processes and practices, computerized maintenance management system, stores management, and documentation.
Maintenance Best Practices Steering Committee	A committee that oversees the development and implementation of the Maintenance Best Practices Program and acts as the business owner of the maintenance and work management processes ensuring alignment with SAMP and applicable Section Work Plan tasks.
Maintenance standards	The standards set for the maintenance service, typically contained in preventive maintenance schedules, operation and maintenance manuals, codes of practice, estimating criteria, statutory regulations, and mandatory requirements, in accordance with maintenance quality objectives.
Management of change	A best practice used to ensure that safety, health, and environmental risks and hazards are properly controlled when an organization makes changes to its facilities, operations or maintenance plans in critical systems..
Operations and maintenance	The normal day-to-day activities to operate, maintain, and repair an infrastructure system. Operations and maintenance activities are typically funded from the operating budget and treated as current-period expenses in financial reporting.
Operation	The active process of using an asset that will consume resources such as labor, energy, chemicals, and materials. Operation costs are part of the life cycle costs of an asset.
Predictive maintenance (PdM)	A relatively non-intrusive technological defect inspection strategy that uses indicators such as vibration analysis, lubricant analysis, and ultrasonic or thermal signatures to predict future problems before they can be detected by human senses and long enough in advance to properly plan and schedule repairs to prevent catastrophic outages.
Preventive maintenance (PM)	Replacing or restoring components, or wearable parts, of an asset at a fixed interval, regardless of their condition at the time.
Record drawing	The final, completed set of drawings at the closeout of a project, with all addendums, change orders, and as-built information incorporated.
Refurbishment	Reinvesting in an asset so that it can reach its target useful life. Refurbishments are typically long-interval activities whose costs may be capitalized. Often used synonymously with "rehabilitation" and "restoration".
Rehabilitation	Rebuilding or replacing parts or components of an asset to restore it to a required functional condition and achieve its target useful life.
Reliability-centered maintenance (RCM)	A process for optimizing maintenance based on the reliability characteristics of the asset.
Reliability Centered Maintenance Engineer (RCME)	A staff member whose prime responsibility is to ensure that maintenance techniques are effective, equipment is designed and modified to improve availability and maintainability, ongoing technical maintenance problems are investigated, and appropriate corrections and improvements are made.

Term	Definition
Renewal	Works to replace existing assets or facilities of equivalent capacity or performance capability.
Repair	Returning the capability of an asset that has failed to a level of performance not greater than its original maximum capability. Typically funded in operations.
Replacement	The complete replacement of an asset that has reached the end of its useful life, so as to provide a similar, or agreed alternative, level of service.
Restoration	Returning the capability of an asset to a level of performance not greater than its original maximum capacity. Can be funded in operations or capital.
Retirement	The removal of an asset from service.
Risk management	Decisions made regarding actions to prevent possible negative consequences of failure events. Risk is often described as the product of conditional probability of a failure event and the consequences of the event.
Root-cause failure analysis (RCA)	Structured data collection and analysis to determine the true source of the failure in order to prevent recurrence of that failure or similar failures.
Routine maintenance	Day-to-day operational activities to keep the asset operating (e.g., replacement of light bulbs, cleaning of drains, repairing leaks, etc.) and which, for part of the annual operating budget, include preventive maintenance.
Service level	Any utility service that a customer perceives as valuable, as defined and measured. A mature asset management organization understands the service levels its customers (or the environment) require and manages itself to meet those service levels at the lowest cost.
Strategic plan	A plan containing the long-term goals and strategies of an organization. Strategic plans have a strong external focus; cover major portions of the organization; and identify major targets, actions, and resource allocations relating to the long-term survival, value, and growth of the organization.
Useful life	The interval between when an asset is placed in service and the expected date of replacement, typically when the number of failures begins to increase dramatically.
Vertical asset	Assets existing in highly visible and multi-tiered hierarchical facilities with process interdependencies as opposed to "linear assets" such as roadways, storm sewers, and portable assets. In wastewater treatment, vertical assets typically refer to the structures and processes at treatment plants and facilities.

Executive Summary

The 2018 Strategic Asset Management Plan Update (2018 SAMP Update) is an update to King County (County) Wastewater Treatment Division's (WTD) asset management program. WTD has had a formal asset management program since 2002, and developed its first Strategic Asset Management Plan (SAMP) in 2005, establishing the goals, direction, and strategies of the program. The SAMP was updated in 2010 and again in 2015, incorporating new objectives and strategies as the needs of the program developed.

On February 9, 2017, WTD's West Point Treatment Plant experienced a severe equipment failure, resulting in major internal flooding within the plant and untreated, combined wastewater and stormwater discharges to Puget Sound. A post-incident evaluation was tasked with reviewing WTD's SAMP and assessing whether revisions to the plan could strengthen its focus on system critical infrastructure while continuing to address the wastewater system as a whole. The findings were documented in the *Evaluation of the Wastewater Treatment Division's Strategic Asset Management Plan* (2017 Evaluation) and submitted to the King County Council in January 2018.

The 2017 Evaluation of the asset management program outlined both the strengths of the existing program and opportunities for improvement. One of the main recommendations from the 2017 Evaluation was to update WTD's SAMP to better define the strategies and actions necessary to improve the effectiveness of asset management. The 2018 SAMP Update builds upon the attributes of the existing program that were determined to be working well while incorporating the 2017 Evaluation recommendations.

The 2018 SAMP Update is a strategic document aligning the goals, objectives and strategies of the program and directing specific actions to meet those goals. The associated 2018 Asset Management Work Plan (Work Plan) identifies tasks and aligns with the strategic direction of the program identified within the 2018 SAMP Update. The 2018 SAMP Update documents actions from previous SAMPs that were completed and proposes new actions to improve the current state of WTD's asset management program.

The 2018 SAMP Update outlines the principal goals of the asset management program that support WTD's goals. To accomplish the asset management program goals, each goal has multiple objectives, which provide measurable outcomes for the program as a whole. Each objective, in turn, may have multiple strategies that, when completed, further lead toward accomplishment of the goal. The strategies are implemented by discrete, measurable action items listed in the Work Plan (see Appendix B). Chapter 2 contains detailed information on asset management goals, objectives, and strategies to accomplish the goals.

The remainder of the 2018 SAMP Update describes goals and strategies that focus on enhancing program implementation. The highest priority of WTD's asset management program is completing the asset registry for two foundational benefits: (1) to ensure a complete inventory of assets in the system and (2) to have accurate attributes for assets to inform future asset planning and decision-making. The second highest priority is to improve the framework for renewal, replacement, and refurbishment needs. Identifying renewal and replacement needs will be enhanced by increasing the flow of information between work groups.

The management of assets is a division-wide effort that is a continuous process, as demonstrated by the program's first formal plan in 2005. In addition to incorporating the key findings and recommendations from the 2017 Evaluation, the 2018 SAMP Update includes staff recommendations to further implement asset management. The responsibility for assets ultimately resides with WTD's Asset Management Steering Committee (AMSC). Periodic reporting to AMSC by the asset manager will increase program accountability. The 2018 SAMP Update provides the overall direction for further development of the asset management program while taking advantage of opportunities to learn from the 2017 Evaluation.

The successful implementation of the 2018 SAMP Update will lead to the following outcomes for WTD:

- WTD will be able to manage critical assets using a more robust risk profile.
- WTD will be able to better quantify how every dollar spent (in both operations and capital) eliminates a measureable amount of risk.
- All WTD staff will have greater knowledge of their role in managing WTD assets.
- Critical elements of the asset management program will be measured and communicated to all applicable stakeholders.

Chapter 1

Introduction

The 2018 Strategic Asset Management Plan Update (2018 SAMP Update) represents the most current version of the King County (County) Wastewater Treatment Division (WTD) Strategic Asset Management Plan (SAMP). WTD first developed a formal SAMP in 2005 and has made updates to the plan every five years since the original report. The 2018 SAMP Update provides a roadmap for WTD as it continues to implement its asset management program.

1.1   Background

WTD collects and treats wastewater from 34 local sewer agencies in the Central Puget Sound region. The division serves about 1.7 million people within a 420-square-mile service area, which includes most urban areas of King County and parts of south Snohomish County and northeast Pierce County.

The majority of the County's wastewater treatment and conveyance system was built in the 1960s. Improvements and expansions since then have added a substantial number of facilities and assets to be managed. The daily round-the-clock collection, treatment, recycling, and disposal of wastewater and its byproducts require management and maintenance of hundreds of miles of pipes; equipment, instruments, and controls; and the land and buildings that house the equipment.

WTD has had a formal asset management program since 2002 and wrote its first SAMP in 2005 to establish and guide the goals, direction, and strategies of the program. The SAMP was updated in 2010 and again in 2015, incorporating new objectives and strategies as well as identifying new action items as the needs of the asset management program developed.

On February 9, 2017, WTD's West Point Treatment Plant (West Point) experienced a severe equipment failure, resulting in major internal flooding at the plant and untreated, combined wastewater and stormwater discharges to Puget Sound. In the wake of the incident, the King County Council passed Motion 14883, directing an evaluation and report on WTD's SAMP. The evaluator was tasked with reviewing WTD's SAMP and assessing whether revisions to the plan could strengthen its focus on system critical infrastructure while continuing to address the wastewater treatment and conveyance system as a whole.[1] The report's findings were documented in the *Evaluation of the Wastewater Treatment Division's Strategic Asset Management Plan* (2017 Evaluation)[2], an independent assessment submitted to the King County Council in January 2018.

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[1] See *King County Council Motion 14883*, March 2017

[2] The *Evaluation of the Wastewater Treatment Division's Strategic Asset Management Plan* incorporated the applicable findings from the *West Point Treatment Plant Independent Assessment, Final Report, July 18, 2017*, AECOM.

1.2   2017 SAMP Evaluation Recommendations

The recommendations in the 2017 Evaluation guided the 2018 SAMP Update. One of the primary recommendations was to update the SAMP two years earlier than the next scheduled update in 2020. This document is the result of that recommendation. Other recommendations include:

- Align asset management program goals to WTD goals.
- Describe and prioritize goals and strategies.
- Categorize SAMP strategies to align with core asset management elements.
- Prioritize strategic actions for the future and integrate them with other WTD priorities and ongoing activities.

Of the 73 action items recommended in the 2017 Evaluation, the following five are designated as "early action items":

- Develop a risk assessment framework that incorporates comprehensive risk factors to improve risk-based asset planning.
- Develop and apply standard criteria for identifying renewal needs.
- Improve processes and tools for searching through electronic drawings and documents.
- Improve asset definitions and establish the information to be collected for various asset classes.
- Improve the asset hierarchy to allow for analysis of condition and cost data.

These early action items were significant drivers for the development of strategies and proposed actions in the 2018 SAMP Update and 2018 Asset Management Work Plan (Work Plan).

The 2017 Evaluation also recommended that the 2018 SAMP Update be developed and framed within the guidelines of the International Infrastructure Management Manual (IIMM) for Asset Management 2015 (see Section 1.5).

1.3   Changes Made to the 2018 SAMP Update

Changes to the 2018 SAMP Update build upon work completed since the last SAMP update, lessons learned from the West Point incident on February 9th, 2017, and recommendations and guidance from the 2017 Evaluation.

The 2018 SAMP Update is a strategic document, with asset management program goals and objectives more clearly aligned with WTD's overall goals and objectives. Program elements are described with cross references to IIMM, and reflect the specific and robust asset management program at WTD in Table 1-1. Work Plan Action Items (see Appendix B) are aligned to the SAMP to implement strategies and objectives, and are prioritized and sequenced with preliminary estimates of work hours for each task to inform the staffing needs for the asset management program. Completion of the prioritized Work Plan will lead to desired outcomes of the program, as described in Section 2.3.

The 2018 SAMP Update also outlines the structure and governance of the asset management program (see Section 7.1), providing more guidance for implementation of the program given the maturity of asset management since the 2005 SAMP.

Based on the 2017 Evaluation and division-wide staff input, the focus of the asset management program for the next two years is on (1) asset registry and (2) early action items. Verification of asset attributes and renewal and refurbishment needs reflects guidance from the program review process. A complete and accurate asset registry is imperative and provides a solid foundation for the program.

1.4 Organization of the 2018 SAMP Update

The 2018 SAMP Update provides an overview of the goals, objectives, strategies, and priorities in Chapter 2, and describes each of the five program goals in more detail in Chapters 3 through 7. Each of these chapters begins by describing the goal and how the goal's objectives align with IIMM standards, as recommended in the 2017 Evaluation. The subsections in Chapters 3 through 7 correspond to the objectives listed in Section 2.1. The prioritized strategies for each goal are listed in each chapter. New strategies and strategies that are currently underway are included within those subsections.

The following is a summary of the chapters and appendices in the 2018 SAMP Update:

- **Chapter 1, Introduction**, provides background to the structure of the SAMP and the changes to the 2018 SAMP Update.
- **Chapter 2, Goals, Objectives and Strategies of program**, provides an overview, in table format, of the goals, objectives, strategies, and actions of the 2018 SAMP Update and how they align with WTD goals.
- **Chapter 3, Asset Registry and Data Management (Goal 1)**, addresses WTD's asset registry and data collection and management.
- **Chapter 4, Minimizing Risk (Goal 2)**, presents methods and strategies for WTD to manage risk in assets and provides a high-level overview of the processes and programs in the asset management plan that work to minimize risk in the system.
- **Chapter 5, Integrating Finance and Asset Management (Goal 3)**, links the SAMP to financing asset management, and integrates financial data to asset management data and decision-making.
- **Chapter 6, Communication (Goal 4)**, outlines the communication plan to inform staff and stakeholders of the asset management program.
- **Chapter 7, Implementing Asset Management (Goal 5)**, outlines implementation of the SAMP, the Work Plan, and how the SAMP is integrated with other WTD programs and actions.
- **Appendix A** provides an overview of WTD's asset management program, including a brief history of asset management within WTD and the scope and structure of the program.
- **Appendix B** presents the 2018 Work Plan that outlines the priorities and responsibilities for implementing the program over the next six years.

- **Appendix C** provides a summary of the completed actions from the previous SAMPs.

1.5   Alignment of 2018 SAMP Update to Industry Standard

The 2018 SAMP Update was developed and framed within the guidelines of IIMM, as recommended by the 2017 Evaluation. The IIMM was developed to align with the International Standardization for Organization (ISO) standards, namely ISO 55000 and ISO 55001, which guide the development of an industry-standard asset management program and a SAMP. The 2018 SAMP Update used the IIMM as a benchmark to guide the development of the asset management program as the IIMM is the recognized industry standard of asset management principles. Table 1-1 provides a crosswalk between each of the goals and objectives of the 2018 SAMP Update and IIMM guidelines.

Table 1-1. Crosswalk of SAMP Chapters to IIMM Standards

SAMP Chapter	IIMM Section
Chapter 3 Goal 1: Asset Registry and Data Management	Section 2.4, *Collecting Asset Information (Asset Knowledge)* Section 2.5, *Monitoring Asset Performance and Condition* Section 4.3, *Management Systems* Section 4.4, *Asset Management Information Systems and Tools*
Chapter 4 Goal 2: Minimizing Risk	Section 2.2, *Establishing Levels of Service* Section 2.5, *Life Cycle Decision Methods* Section 3.2, *Managing Risk* Section 3.3, *Operational Planning*.
Chapter 5 Goal 3: Integrating Finance and Asset Management	Section 3.1, *Life Cycle Decision Methods* Section 3.4, *Capital Investment Planning* Section 3.5, *Financial Planning*
Chapter 6 Goal 4: Communication	Section 4.2, *Asset Management Plans*
Chapter 7 Goal 5: Implementing Asset Management	Section 4.1, *Asset Management Leadership and Teams* Section 4.5, *Service Delivery Models*

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Chapter 2

Goals, Objectives, and Strategies of the Asset Management Program

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2.1   Purpose, Goals, and Objectives

The purpose of the 2018 SAMP Update is to identify the goals, objectives, and strategies to direct and inform WTD's asset management program. These goals, objectives, and strategies align the asset management program with the goals of WTD, and prioritize and inform the strategies that feed the Work Plan. Specific actions to meet the goals with measurable outcomes are reflected in the Work Plan (see Appendix B).

Past asset management plans guided the development of the 2018 SAMP Update goals and objectives. In addition, current WTD and DNRP vision and goals, along with King County's Strategic Plan, were considered in the development of the 2018 SAMP Update goals and objectives to ensure alignment of the asset management program with broader departmental efforts.

The 2018 SAMP Update goals, along with corresponding objectives are:

Goal 1.   Know what assets WTD owns, where they are, and their condition.

Objective 1.1: Asset Definition: The definition of an asset is standardized and used by all work groups.

Objective 1.2: Asset Registry/Data Collection: A complete and accurate digital registration of all assets including condition and location with attribute data reflected on the most critical assets.

Objective 1.3: Data Management: Information is easily accessible to staff to perform job functions.

Objective 1.4: Asset Management Information Systems: Information systems seamlessly link across business software(s).

Goal 2.   Minimize WTD system risk.

Objective 2.1: Risk Assessment Framework: WTD uses a risk assessment framework that incorporates comprehensive risk factors to improve risk-based asset planning.

Objective 2.2: Procurement and Spare Parts Improvements: WTD implements asset management knowledge and information in the procurement of critical equipment and the acquisition of spare parts.

Objective 2.3: Maintenance Best Practices (MBP): Continuous progress is made toward a standardized approach to MBP in support of the asset management program.

Objective 2.4: Renewal-Needs Planning: Standard criteria for identifying renewal needs is developed and applied.

Goal 3. Incorporate financial data into asset life cycle management decision-making.
    Objective 3.1: Life Cycle Cost Management: Life cycle cost analysis (LCCA) is incorporated into capital project and operational decision-making.
    Objective 3.2: Funding Sources for Asset Management: Asset management projects are funded as scheduled and the budget plan supports the goals of the asset management program.

Goal 4. Communicate with staff and stakeholders to ensure uniform understanding and universal commitment to the success of managing assets to meet service level commitments.
    Objective 4.1: Internal Communication: The SAMP is used as an internal communication tool.
    Objective 4.2: External Communication: WTD engages with stakeholders as to how assets in the system are managed.

Goal 5. Ensure the SAMP and Work Plan are aligned with service levels and effectively guide program success.
    Objective 5.1: Asset Management Steering Committee (AMSC): Senior management is accountable for the governance of the asset management program.
    Objective 5.2: Resourcing Strategy: Asset management is staffed and resourced to complete Work Plan items in the time periods established by the AMSC.
    Objective 5.3: Asset Management Planning: The asset management Work Plan is completed in a prioritized fashion.
    Objective 5.4: Integration into other WTD Efforts: Asset management is seamlessly and collaboratively integrated across the division.

Chapters 3 through 7 address the five asset management program goals listed above. Chapter subsections correspond to specific objectives to achieve the goal. The chapters also present the strategies that are currently underway to support each of the goals and objectives.

2.2   Alignment to WTD Framework and Mission

WTD's mission is to operate a wastewater utility to protect public health and enhance the environment by collecting and treating wastewater while recycling valuable resources for the Puget Sound region.[3]

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[3] See WTD's *Utility of the Future: Vision Mission and Goals*, 2014.

WTD's mission is supported by the following strategic division goals:

- Stimulate innovation.
- Build a sustainable and resilient future.
- Educate and engage customers.
- Grow employees.
- Advance resource recycling.
- Maximize financial performance.

Lastly, the 2018 SAMP Update supports and aligns with division goals in the following ways:

- Stimulate innovation can be described generally as built into all the asset management program goals. The asset management program continuously improve processes, REs look for new technologies to solve equipment problems, and project planning and delivery seeks to find ways to implement asset management in every step of the project life cycle.
- Asset management helps build a sustainable and resilient future while protecting the ratepayer expectations thru knowing the status of assets, where they are, and their condition (Goal 1). Asset information enables WTD to make informed decisions about its system and helps complete the risk profile of the entire system. Minimizing system risk (Goal 2) builds resiliency and enables delivery of a sustainable process for conveying and treating wastewater.
- WTD maximizes financial performance by incorporating financial data into asset management decision-making (Goal 3). Implementing the SAMP and aligned Work Plan (Goal 5) also maximizes financial performance by giving the program measureable outcomes to show how effectively managed infrastructure works toward optimal use of operations and capital budgets.
- Asset management educates and engages customers by external communication of the asset management program (Goal 4), increasing understanding of WTD's products, services, and rates.
- Employees grow with effective internal communication (goal 4), integrating asset management into capital, operations, and financial processes.
- Advancing resource recycling relies on all aspects of asset management to achieve the goals of the resource recovery program and to improve the resource recovery process.

Table 2-1 summarizes WTD's goals and shows how the 2018 SAMP Update goals, objectives, and strategies implement those goals.

Table 2-1. Goals, Objectives, Strategies, and Actions for the Asset Management Program

WTD GOALS[a]	PROGRAM GOALS[b]	OBJECTIVES[c]	STRATEGIES[d]
Build a sustainable and resilient future	**1: Know what assets WTD owns, where they are, and their condition**	**1.1) Asset Definition**: The definition of an asset is standardized and used by all work groups	**1a)** Improve asset definitions and establish information to be collected for asset groups[e]
			1b) Create asset hierarchy definitions for consistent use across work groups and sections[f]
		1.2) Asset Registry/Data Collection: A complete and accurate digital registration of all assets including condition and location	**1c)** Maintain a complete and up-to-date asset registry in the computerized maintenance management system (CMMS)
			1d) Establish data collection protocols for new projects
			1e) Standardize asset condition monitoring methodology
			1f) Perform and collect condition assessment data for defined asset groups
			1g) Assure quality of asset data
		1.3) Data Management: Information is easily accessible to staff to perform job functions	**1h)** Upgrade CMMS to satisfy business needs
			1i) Improve processes and tools for maintaining and searching through electronic documents and drawings[g]
	1: Know what assets we own, where they are, and their condition	**1.4) Information Systems:** Information systems seamlessly link across Capital and O&M business software(s)	**1j)** Design an Asset Management Information System (AMIS)
			1k) Create an IT architecture that integrates asset management data across WTD

WTD GOALS[a]	PROGRAM GOALS[b]	OBJECTIVES[c]	STRATEGIES[d]
Build a sustainable and resilient future	**2: Minimize WTD system risk**	**2.1) Risk Assessment Framework:** WTD uses a risk assessment framework that incorporates comprehensive risk factors to improve risk-based asset planning[h]	**2a)** Assign levels of service to critical assets and asset classes
			2b) Define and assign criticality of WTD assets
			2c) Incorporate Risk Assessment to Decision Making Framework
		2.2) Procurement and Spare Parts Improvements: WTD creates standardized procurement processes and spare parts inventory	**2d)** Determine processes and procedures for procurement of preferred equipment
			2e) Develop spare parts inventory though Bill of Materials to optimize acquisition and manage spare parts
		2.3) Maintenance Best Practices (MBP): Continuous progress toward a standardized approach to MBP in support of the asset management program	**2f)** Update 2015 MBP Strategic Plan
			2g) Continue incorporation of MBP to ensure continuous improvement and standardized approach to maintenance
			2h) Continue predictive maintenance program (PdM) implementation
			2i) Evaluate equipment performance data and adjust operational strategies
		2.4) Renewal Needs Planning: Develop and apply standard criteria for identifying renewal needs[i]	**2j)** Develop process to identify asset renewal needs
			2k) Establish renewal criteria for assets

WTD GOALS[a]	PROGRAM GOALS[b]	OBJECTIVES[c]	STRATEGIES[d]
Maximize Financial Performance	3: Incorporate financial data into asset life cycle management decision-making	3.1) **Life Cycle Cost Management:** Incorporate Life Cycle Cost Analysis into decision making	3a) Implement life cycle cost analysis into new capital projects
			3b) Incorporate existing asset's useful life and life cycle cost into new capital projects at the asset level
			3c) Use asset operations data to inform the life cycle cost for an asset
Maximize Financial Performance	3: Incorporate financial data into asset life cycle management decision-making	3.2) **Funding sources for asset management:** Projects are funded as scheduled and needed, and the budget plan supports the goals of asset management	3d) Review, improve, and coordinate process to align asset management decision-making with current county and WTD budget cycle
			3e) Define budget needs from the capitalized asset level to inform Capital Improvement Program (CIP)
			3f) Align asset management program with capital portfolio management data needs and 6-year CIP
Grow Employees	4: Communicate with staff and stakeholders to ensure uniform understanding and universal commitment to the success of managing assets to meet service level commitments	4.1) **Internal Communication:** Use SAMP as an internal communication tool	4a) Communicate application of work of the asset management program to each WTD staff member
			4b) Develop internal communication Plan
			4c) Develop, Implement and document process workflows as internal communication tools hosted on a central database (SharePoint)
Educate and engage customers		4.2) **External Communication**: WTD engages with stakeholders as to how the assets in the system are managed	4d) Develop, implement and document an external communication Plan
Maximize financial performance	5: Ensure the SAMP and Work Plan are aligned with	5.1) **Asset Management Steering Committee (AMSC):** Senior management is accountable for	5a) AMSC reviews key performance indicators of asset management program on an annual basis

WTD GOALS[a]	PROGRAM GOALS[b]	OBJECTIVES[c]	STRATEGIES[d]
	service levels and effectively guide program success	the governance of the asset management program	
Maximize financial performance	**5: Ensure the SAMP and Work Plan are aligned with service levels and effectively guide program success**	**5.2) Resourcing Strategy:** Staff and resource the asset management program to complete work plan items in the time periods desired	**5b)** Staff and resource completion of the tasks in the Asset Management Work Plan
		5.3) Asset Management Planning: Asset Management Work Plan will be completed in a prioritized fashion	**5c)** Incorporate prioritization of goals and strategies of asset management program and use to prioritize work plan items
		5.4) Integration into other WTD efforts: Asset Management is seamlessly integrated across the division	**5d)** Coordinate ongoing planning efforts with the asset management program
			5e) Incorporate system-wide comprehensive planning efforts into the asset management program

2.3   Priorities of the Asset Management Program

The 2018 SAMP Update provides the strategic framework to direct and prioritize the efforts of the asset management program. To implement the SAMP and effectively manage assets across the division, the asset management program and division staff will work to accomplish the Work Plan. The Work Plan actions are divided into three groups based on when the action will be initiated (near-term, mid-term, and long-term actions). The top priorities of the Asset Management Program are:

1. Complete the Asset Registry (Objectives 1.1 and 1.2)
2. Upgrade CMMS and install DMS (Objective 1.3)
3. Develop Risk Assessment Framework (Objective 2.1)

The highest priority actions in support of the asset management program in the Work Plan is to complete the asset registry and verify the information collected for all asset groups (Objectives 1.1 and 1.2). Performed continuously since 2005, new assets are added and old assets are retired in an ongoing process. Keeping the asset registry up to date is the responsibility of all staff involved in adding, removing, or refurbishing assets anywhere in the WTD's wastewater treatment system. Some equipment assets within the conveyance system and at West Point are known to be missing from the computerized maintenance management system (CMMS) database; a high-level effort will continue until all assets from each plant and off-site locations have the required information in the asset registry.

A second high priority action for the program near-term is to better manage asset data in the CMMS and the Drawing Management System (DMS) (Objective 1.3)[4]. Upgrades to both data management systems are necessary and will improve or result in more robust and easily accessible information on assets, leading to better asset decision-making. A DMS upgrade will allow for much greater access to digital drawings across the division and ensure better management of the various drawings and changes over time. An upgrade to the CMMS and a review and revision of the DMS were initiated in 2018.

A third priority action for the program is the development of a risk assessment framework that links level of service and criticality of assets (Objective 2.1). The risk assessment framework is being developed in coordination with a renewal needs framework to enable the division to make informed decisions on when to replace assets based on useful life remaining, associated risk, and level of service. The risk assessment and renewal needs frameworks (Objective 2.4) require an accurate and complete asset registry.

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[4] See *Appendix A, Program Overview and Current State* of this report for more information on the current state of these systems.

Figure 2-1 presents the goals and objectives of the asset management program, outlining the objectives and associated long-term outcomes. Ultimately, completion of the objectives will lead to long-term outcomes for WTD (listed in the right side of the figure). The long-term outcomes are:

- WTD will be able to manage critical assets using a more robust risk profile.
- WTD will be able to better quantify how every dollar spent (in both operations and capital) eliminates a measureable amount of risk.
- All WTD staff will greater knowledge of their role in managing WTD assets.
- Critical elements of the asset management program will be measured and communicated to all applicable stakeholders.

These outcomes are key to an effective, robust asset management program in line with WTD's goals, as outlined in Section 2.1.

Goals of Asset Management Program

Goal 1: Know what assets WTD owns, where they are, and their condition

Goal 2: Minimize WTD System Risk

Goal 3: Incorporate financial data into asset lifecycle decision-making

Goal 4: Communicate with staff and stakeholders

Goal 5: Ensure the SAMP and Work Plan align with service levels

Near-term Objectives

Asset Definition

Asset Registry

Risk Assessment Framework

Renewal Needs Framework

Life Cycle Cost Management

Funding Sources for Managing Assets

Internal Communication

External Communication

Asset Management Governance

Resourcing Strategy

Long-term Objectives

Data Management

Information Systems Management

Quantifying risk of assets

Tying risk to dollars spent

Integration into WTD Work

Asset Management Planning and Prioritization

Long-term Outcomes

Managing all assets using risk profile

Determining how every dollar spent eliminates a measurable amount of risk.

All staff know their role in managing assets

Programmatic success measured and communicated

Figure 2-1. Goals of the Asset Management Program Leading to Long-term Outcomes for WTD

Goal 1: Asset Registry and Data Management

WTD has an estimated 55,000 assets in the asset registry, and ongoing efforts are in place to ensure all assets are in the registry and updated accordingly. The accuracy of the registry and clarity on how to manage asset information is foundational to the success of the asset management program. This chapter outlines the objectives, strategies, and prioritization for data management and data system(s) infrastructure that are vital for the ongoing improvement of the asset management program and achieving *Goal 1 – Know what assets WTD owns, where they are, and their condition*.

In the process of updating the SAMP, WTD identified the following strategies as priorities of the asset management program in accordance with the goal of managing data and the objectives outlined below:

- Improve asset definitions and establish information to be collected for asset groups (see Section 3.1).
- Maintain a complete and up-to-date asset registry in the CMMS (see Section 3.3.1).
- Improve processes and tools for searching through electronic documents and drawings (see Section 3.3.2).

3.1 Objective 1.1: Asset Definition

Asset definitions describe what an asset is, what will be managed as an asset, and the detailed information that needs to be collected and maintained for every asset (i.e., asset attributes). Asset hierarchy is information that explains the relationship between assets within a location, such as pipes and valves in a pump station. Historically, WTD's Finance and Administration Section, Conveyance Inspection and Flow Monitoring (CIFM) group, asset management work group, and treatment plants each had their own definition for an asset, and asset hierarchy was infrequently used. To correct this situation, asset definition was identified as an early action recommendation in the 2017 Evaluation.

Defined asset criteria and hierarchies are to be used consistently across the division to assure the quality of asset information collected and reported. However, because of the different and unique requirements of the Accounting work group and other business functions such as Operations and Maintenance (O&M) and Project Planning and Delivery (PPD), two definitions of an asset are necessary. Therefore, WTD will use the following two definitions for an asset:

- For financial accounting capitalization of assets, as guided by general accounting practices, a ***capital asset*** is an asset with a useful life greater than 12 months that is used in normal operations and is not intended for sale in the regular course of the business's operation. Capital assets can be tangible (pumps, pipes, etc.) or intangible (rights, software, etc.)

- For non-finance purposes such as PPD and O&M, an **asset** is defined as a physical component of a facility that has value, enables services to be provided, and has an service life of greater than 12 months

Using these definitions as a standard is critical to predicting maintenance and replacement needs, developing risk assessment frameworks, performing trend analysis on asset performance, and planning the appropriate funding (operating or capital budget) for asset risk reduction.

Contingent upon a standardized asset definition is creating relationships between asset hierarchy definitions for all assets and asset groups. An asset hierarchy helps organize assets by describing the relationship between assets, and sets the foundation for efficient data management of assets. In a pump station, for instance, standard asset hierarchies will help staff understand the assets that are in each pump station and standardized information for each asset will help data collection and decision making. More information on asset hierarchies in the CMMS can help inform present and future operations decisions and improve the renewal needs and budgeting processes. Defining asset hierarchy and the relationships between assets is another early action recommendation in the 2017 Evaluation. Work is currently underway to develop policies to define asset hierarchy and the data required to define these relationships in the Work Plan.

3.2 Objective 1.2: Asset Registry/Data Collection

Completing the asset registry was first identified as an objective in the 2005 SAMP and has been an ongoing activity for the asset management program. Data collection goes hand in hand with the asset registry; as asset data are collected, they are input into the registry. The registry currently lives in a CMMS called Mainsaver. Asset data are collected by members of O&M, PPD Engineering, Asset Management, and the CIFM work groups. Work is ongoing to collect asset registry information for conveyance assets, off-site equipment, and vertical assets.

Associated with completing the asset registry is defining processes for quality control of asset data. With a system as large as WTD's, data quality assurance and control is an essential step that needs to be systematically implemented. This includes implementing a holistic asset registry management plan to explain what data are collected, where the data are located, and how the data are managed over time to accomplish different business needs.

Once the asset registry is complete, a significant effort will be required to keep the registry up to date. An asset registry management plan will outline the procedures and responsible parties to keep the asset registry current. The plan will define asset hierarchies and asset groups and will document responsibilities regarding collection and maintenance of each discrete asset.

3.2.1 Data Collection for New Assets

All new assets will have an asset number and a minimum set of asset attributes or data related to the asset that will be collected and documented on the 01 78 40-A form. WTD implemented its 01 78 40-A form for data collection of new assets in 2017, replacing the previous asset data acquisition form called 01725-A. From the beginning of the project design process to the end of construction, project engineers, the reliability engineer (RE), construction management (CM) and asset management staff work together to assign an asset identification number, provide

record drawings, and input asset attributes and asset groups for assets that are new to the system. Projects have specific check-in points, called "gates", which ensure a consistent process is followed from planning through project closeout. When new asset acquisition occurs, a project is not able to move beyond specific gates without completing the 01 78 40-A process.[5]

The 01 78 40-A form and the process to add, retire, or update assets must now be uniformly implemented by all capital or operationally funded projects as well as O&M staff who affect asset life cycle. Additionally, key responsibilities are and must continue to be communicated to all employees and staff involved in the process.

3.2.2 Asset Condition Assessment Data

WTD identified a strategy for linear asset condition monitoring based on asset groups. The condition assessment methodology includes the frequency of condition monitoring, condition assessment guidelines, and information collected for different asset groups in the linear system. WTD has implemented this strategy; thus, condition monitoring is now defined based on asset group and hierarchy. Standardized condition assessment information leads to better comparison and ranking of assets to inform the risk of failure and criticality.

Regular maintenance and work orders tracked against particular assets and stored in Mainsaver provide condition assessment data for vertical assets. BI-Cycle (software described in Appendix A) also can display condition assessment information by various asset groups, asset specification, or work area, showing the condition of an asset over time.

WTD rates the condition of linear assets based on the Pipeline Assessment Certification Program 1-5 color coding system, adopted in 2009. In cases where the asset cannot be physically assessed, the condition is based on the engineered end of life.

The CIFM group applies MBP principles to inspect, investigate, monitor, and report the condition of WTD's linear assets, including pipelines, siphons, maintenance holes, diversion/gate/outfall structures, and sand catcher/rock box debris collection systems at treatment plants and off-site facilities.

CIFM staff conduct visual inspections and use CCTV, sonar, remotely operated vehicles, and other technologies to monitor the conveyance system. Inspections may result in recommendations for further or more frequent monitoring, preventive measures such as lining and coating pipes, and capital projects to replace or repair pipelines or install odor and corrosion control systems.

Currently, the physical condition assessment of vertical assets (pumps, motors, valves, switches, etc.) in the conveyance system, pump stations, and treatment plants is achieved by monitoring the expected engineered end-of-life date and performing a RE review of each critical asset as it enters its final six years of life. During the review process, end-of-life dates are adjusted based on risk, and resources are identified to address needs.

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[5] For more information on gates and the project management process, see *Appendix A, Program Overview and Current State*.

3.3 Objective 1.3: Data Management

Data management and linked information technology (IT) systems are essential for accessing information on assets in a timely and efficient manner. The desired objective is that digital data will be easily accessible to WTD staff to perform job functions. Ideally, this increased efficiency in data management and information sharing can benefit both asset management and O&M staff with ease of access to key asset information while also improving data used in the planning and delivery of projects. There are two major efforts underway to support the asset management program in data management: the CMMS upgrade and the DMS upgrade.

3.3.1 CMMS Upgrade

The current CMMS system (Mainsaver) has undergone multiple version updates and customizations since its implementation in 1996. However, it lacks the required capacity and scalability to meet several critical business requirements. The customizations over time have created complexity. Therefore, work is underway to upgrade the CMMS system to a software system that will increase synergy between asset management tools and provide greater flexibility for data analysis. WTD is currently identifying the CMMS business needs (for both linear and vertical assets) and business processes required to transfer to the new software.

Upgrading the CMMS software will allow improvements to the asset registry, asset hierarchy, and asset management-related information systems, all of which are high-priority objectives for the asset management program. Preparation for the upgrade has begun, and work is currently slated for funding in the 2019 to 2020 biennial budget.

3.3.2 Document and Drawing Management

WTD is evaluating a DMS to potentially upgrade and standardize drawing records across the division. Key information required for consideration during the DMS evaluation is included in the Work Plan (see Appendix B). One significant consideration is the differentiation between an as-built drawing, record drawing, and facility drawing and their maintenance through the end of life for that asset. The evaluation of a DMS, scheduled for completion by the end of 2020, was recommended in the 2017 Evaluation as an early action item; it was also identified as a high-need item in the 2015 SAMP Update.

Once complete, the upgraded DMS would store and manage drawings and other documents related to assets for all treatment plants and off-site locations. Currently, drawing attributes and associated revisions are being managed independently across all the sections (East, West, and PPD), and do not conform to a central drawing control standard.

3.4 Objective 1.4: Asset Management Information Systems

Information system management entails coordinating and linking all of the information in the asset management program across all work groups and software to ensure full utilization of data for the best decision-making. The asset management program will develop its information and software systems as a fully integrated Asset Management Information System (AMIS). The

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AMIS will be planned and operated in coordination with subject matter experts (SMEs) for various software systems. Key components of the AMIS include:

- Create an inventory of all of the tools and systems, their current and future states, and clear roles and responsibilities regarding system or tool maintenance and management
- Integrate all systems and tools, including the systems that are not currently tied to the asset management system, but can inform asset management decision-making such as PRISM[6]
- Satisfy the business needs and interactions between O&M data and PPD decision-making
- Provide full access to data and information and transparency regarding process, decisions, and guidelines for field staff on mobile interfaces
- Provide system integration for better tracking of financial information on assets.
- Create a process to explore emerging software and IT needs
- Integrate the AMIS into a division-level information management strategy

The Work Plan (see Appendix B) contains more information on implementation of the AMIS.

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[6] PRISM is the division-wide project and contract management system. PRISM also works as a database for all capital project and contract information.

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Chapter 4

Goal 2: Minimizing Risk

WTD is exposed to multiple types of risk when operating its wastewater system and managing assets. These risks include public health and safety, environmental contamination, financial performance and rates, and ratepayer expectations, should WTD have unexpected equipment or process failures. A goal of WTD's asset management program is to minimize the risk of operating the system by using robust tools of risk management. Some tools to manage risk include a risk assessment framework, identifying and tracking level of service, and asset criticality. The asset management program has ongoing work to minimize risk with the tools.

In the process of drafting the 2018 SAMP Update, WTD has identified the following strategies as priorities for the asset management program in accordance with the goal of minimizing risk:

- Developing Risk Assessment in Asset Management Decision-Making Framework (see Section 4.1)
- Developing a Process to Identify Renewal Needs (see Section 4.4)

4.1 Objective 2.1: Risk Assessment Framework

A risk assessment framework is designed to identify, inform, and prioritize maintenance, inspection, and capital improvement needs of the wastewater system as a whole to reduce risk. The major objective of a risk assessment framework is quantifying risk and determining the acceptable amount of risk that WTD will bear given known resource restrictions. Implementing a risk assessment framework requires a complete asset registry, accurate asset condition data, life cycle costs, and key performance indicators (KPIs) for minimizing risk.

An early action item identified in the 2017 Evaluation is to use a risk assessment framework to incorporate risk assessment into the asset planning process. Understanding the individual and cumulative risks associated with assets through a comprehensive and systematic method will lead to better decision-making on capital and O&M budgets to minimize risk in the system.

Quantifying risk involves asset criticality coupled with determining the likelihood of asset failure, typically based on the condition assessment and asset registry information outlined in Chapter 3. Once a framework is established, WTD will be able to link the money spent on managing assets to a quantified level of risk. This information, in turn, will support the funding decisions of the asset management program to reduce risk. Developing a risk framework is identified as an action item in the Work Plan (see Appendix B)

4.1.1 Level of Service

A level of service defines the service quality for a particular activity or service area. Levels of service create standards against which service performance shall be measured. WTD has defined levels of service for wastewater management. The level of service assigned to an asset is part of the risk management decision-making for that asset or group of assets. By determining

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the level of service, the division can more accurately plan and analyze asset replacement and renewal needs for risk management. In 2018, WTD established seven levels of service. These defined levels of service, as well as their corresponding asset management activities, are explained in Table 4-1.

Table 4-1. Asset Management Program Levels of Service and Associated Activities

Level of Service	Asset Management-Related Practices
Operate WTD's infrastructure to meet all County, state, and federal policies and regulations to protect public health and the environment	Lean value mapping Plan to make data accessible Frequency and impact/acceptable risk Operation performance measures
Optimize WTD's infrastructure and operational resiliency to meet present and future demands as defined by King County policies	Learning process/education program Audit process/investigation Cost analysis/value engineering Failure analysis
Maintain financial strategies that meet organizational priorities and manage operational risks in a cost-effective manner	Financial performance indicators Output performance indicators Integration of information that relates to asset plans Start with smaller groups of assets—pilot study Maintain capital projects in asset management portfolio
Provide equitable service to customers 24 hours/day; seven days a week	Work order management Resource management Customer service performance indicators
Continually develop and maintain a highly trained, safe, and diverse workforce	Safety and training program Succession planning Staff onboarding process Knowledge-sharing programs Hiring practices to improve diversity
Equitably operate, manage, and maintain WTD infrastructure to minimize near neighbor impacts	Environmental performance measures Resource recovery tracking of incidents Tracking issues Costs of activities to prevent impacts Tracking customer issues Post-completion survey equity and social justice Inclusive community outreach
Leverage resource recovery to enhance sustainability and generate revenue	Value mapping of product/byproduct Goals of programs BRET Strategic Plans

4.1.2 Criticality

One element of assessing asset risk is assigning asset criticality to each individual asset. An asset's criticality is based on how its loss will impact the performance of WTD's primary functions. Criticality is based on the preservation of WTD's processes and meeting permit standards and WTD goals, not on the preservation of one particular asset. The purpose of using

criticality is to provide a tool for management to direct limited human and financial resources to manage the entire life cycle of assets in a manner that both minimizes the total costs of owning, maintaining, and operating WTD's system and to deliver a level of service described in Section 4.1.1. The level of criticality assigned to an asset determines the level of resources an asset will receive during its life cycle.[7]

WTD first developed asset criticality definitions and ranking in September 2013. Criticality is a combination of likelihood of failure coupled with the consequences of failure. Asset criticality is determined and documented on the new asset acquisition form (01 78 40-A). Criticality (crit) is denoted by a number between 1 and 5. A "crit 1" asset is an asset with the highest combination of consequence of failure and likelihood of failure. At the opposite end of the spectrum, a "crit 5" asset is one with a low likelihood and low consequence of failure. Strategically, the asset management program needs to focus its attention on assets with criticality assignments of 1 and 2 because of the consequence and likelihood of failure and limited resources. The Work Plan has a high-priority task to review criticality of assignments to ensure the highest criticality assets are labeled correctly and consistently.

Additionally, condition assessments can be used to influence likelihood of failure, in turn influencing an asset's criticality.

4.2   Objective 2.2: Equipment Procurement and Spare Parts

Effective management of spare equipment and the acquisition of spare parts is critical to the management of assets. The asset management program has an objective to document the procurement process for spare equipment and the means to acquire and manage spare parts based on MBP needs.

For the procurement of equipment, the asset management program will evaluate and modify existing procurement policies in coordination with O&M and engineering staff to facilitate more efficient purchases of standardized equipment. By specifying the optimal equipment for use by projects and justifying the decisions using life cycle cost analysis and MBP data, the WTD system will have less complexity, a cost-effective inventory of spare parts, and be more resilient to achieve desired levels of service.

The asset management program needs to coordinate with O&M staff to define and organize the inventory and acquisition of spare equipment and spare parts for each of the treatment plants. Taking into account the lead time and logistics of acquiring and transporting parts, on-site storage of critical spare parts will help in ease of operations. Standardizing the bill of materials (BoM) in the CMMS for new asset delivery will provide accurate information on spare part identification resulting in efficiencies, regardless of whether a part is maintained in inventory or not. Maintaining an accurate BoM and storeroom inventory in the CMMS will facilitate preventive maintenance and predictive maintenance programs, described further in Section 4.3.

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[7] See *WTD Criticality Ranking: A Common Definition of Purpose and Use*, 2013.

4.3   Objective 2.3: Maintenance Best Practices

MBP is a method to optimize maintenance strategies for critical equipment, harmonize WTD's business processes across all the plants and off-site facilities, and develop key business metrics to show measurable return on investment for maintenance. The 2005 SAMP described an objective of using MBP to further the goals of managing assets and minimizing risk in the system. MBP is an industry standard developed by The Society for Maintenance & Reliability Professionals as best practices for performing maintenance of infrastructure assets.

In 2008, the Maintenance Best Practices Steering Committee (MBPSC), comprised of REs, operators, and the asset manager, was chartered to initiate and provide direction and support to implement MBP. Since then, the MBPSC has worked to standardize and document the approach to maintenance across all plants and facilities. The MBPSC has implemented reliability-centered maintenance, developed predictive maintenance standard operating procedures (SOPs) for assets, assessed criticality of assets, and worked to create a schedule of deliverables for asset management from new projects.

In 2013, the MBPSC developed KPIs for the program to measure implementation of the MBP program.[8] The MBPSC formalized a strategic plan in 2015 that outlined seven strategies to implement MBP and corresponding work plan items. The planning horizon for the MBP strategic plan was three years, and it outlined tasks for completion from 2014 to 2017. Implementation of the seven strategies contained significant overlap with ongoing work items in the Work Plan. In 2017, MBPSC was replaced with MBP huddle meetings, which serve the purpose of continuing implementation of the work plan items of the 2015 MBP Strategic Plan. The 2015 MBP Strategic Plan is incorporated into the Work Plan and oversight is by the AMSC.

Reliability engineering involves the analysis of equipment performance and maintenance strategies to optimize equipment function and useful life and to minimize ownership costs. One key strategy of mature reliability engineering is to refine the predictive maintenance program. WTD began the predictive maintenance program in 2013. By formalizing the predictive maintenance program and creating consistency in its implementation, reliability engineering staff will have more data and the ability to link maintenance actions to drive down risk and cost. The future of predictive maintenance involves automating the collection of data (such as vibration testing data) to better inform maintenance of the needs of specific assets. Broad-scale implementation of predictive maintenance may require upgrades to IT infrastructure at off-site facilities.

As changes to the operational strategies of assets occur, operations and maintenance manual updates need to be made routinely and must be documented. Formalizing the process of performing and documenting these changes will help ensure accurate information and communication of work or changes made to an asset. In turn, this will increase the effectiveness of WTD's wastewater treatment system. The process of equipment replacement by O&M staff must include informing the RE and the industrial maintenance program specialist (IMPS) to ensure all maintenance requirements are documented and the appropriate life cycle data are input into CMMS.

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[8] More information on MBP KPIs can be found in *Management Level Maintenance Best Practices Key Performance indicators,* August 2013.

4.4 Objective 2.4: Renewal Needs Planning

Asset renewal involves assessment, repair, refurbish, replace, retire, or run-to-failure decisions for an asset at the correct time for the proper risk and cost. Renewal needs planning focuses on identifying which assets need to be replaced in a standardized fashion and how WTD performs the renewal or replacement of assets. Renewal needs planning for capital asset replacement(s) will reduce operation and maintenance costs associated with maintaining equipment that is obsolete or past its end of life, ultimately driving down risk in the system. Asset renewal needs planning was identified as an early action item in the 2017 Evaluation.

Currently, WTD uses the following information in making renewal/replacement decisions:

- Asset age and calculated "end of useful life"
- Chemical and energy use (can current equipment be replaced cost-effectively with equipment that reduces chemical or energy costs?)
- Expected material cost increases (replace it now before it becomes more expensive).
- Performance issues on a process unit (process-driven equipment changes).
- Obsolescence that results in incompatibility with relational assets or inadequate parts support
- Life and Process Safety Management procedures and findings[9]

By reviewing work order histories and replacement data on particular assets, the asset manager can use BI-Cycle to pull a list of vertical assets that are nearing end of life and require renewal or replacement decisions. For linear assets, the hydrogen sulfide monitoring program collects renewal needs information and prioritizes renewal needs based on asset criticality criteria. However, for the linear assets, there is a need to develop a process to translate renewal needs information into the Capital Improvement Program budget, which is being addressed with WTD's Portfolio Management Processes, which are currently under development.

To move the renewal needs planning process forward, the asset management program must identify the information needed for decision-making and then collect that information for all applicable assets. In addition, risk factors for assets, such as criticality and likelihood of failure, should be taken into account when performing renewal needs planning. The decisions on renewal and replacement must align to the County budget cycle, as described in Chapter 5. The asset management program has work underway, as identified in the Work Plan, to document the current renewal process, map the state of the process, and identify steps for improving the renewal needs process to link up with the budget cycle (see Chapter 5 for more information).

Renewal needs planning will incorporate data collected on individual assets and develop processes to apply that data to asset groups across the system. The process of applying renewal needs trends includes documenting and providing a workflow diagram of WTD's existing practice where critical assets are evaluated six years before their engineered end of life and "bad actor" exceptions are identified.

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[9] See *Process Safety Management and Risk Management Program*, January 2011. Includes Management of Change processes and Risk Management Program.

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Goal 3: Integrating Finance and Asset Management

The asset management program is funded by a combination of operating and capital funds. Maximizing financial performance by the appropriate use of funds is the program goal. From the beginning of the capital planning process and project formulation to the end of an asset's useful life, financial data collected on an asset are used to make informed, cost-effective decisions. This information is also analyzed for future projects to continually increase the effectiveness of the asset management program. Enhanced integration of financial data and financial decision-making with asset management data and asset management decision-making is an ongoing goal of the asset management program.

In the process of updating the SAMP, WTD has identified the following strategies as priorities in the development of the asset management program in accordance with the goal of integrating finance and asset management:

- Improve processes and data to align asset management decision-making with the County and WTD budget cycle (see Section 5.2)
- Ensure alignment of capital portfolio management needs with the asset management program (see Section 5.2.1)

5.1 Objective 3.1: Life Cycle Cost Management

In 2012, WTD initiated LCCA to better estimate the full cost, including operational costs, for capital projects for the lifetime of the asset. The objective of incorporating LCCA into decision-making is to inform the alternatives analysis of new capital projects as well as update operational budgets required to operate and maintain assets at the end of the project.

LCCA is a model that tallies the initial cost of the asset, installation, energy and material consumed in operation, cost of disposal, and the estimated operating cost to the end of useful life of the asset. LCCA is used, in part, as a tool to select design alternatives at Gate 2 (see Figure A-4) of project development. A project cannot proceed beyond Gate 2 without completion of an LCCA. Over time, the application of LCCA to assets will provide a database to compare the cost of alternative assets that meet the desired level of service. In April 2018, WTD launched an updated LCCA model to more accurately predict life cycle costs for decision-making. As of 2018, 11 Capital Systems Team (CST) projects have used the new model.[10] Four of those are direct asset management-related projects, incorporating financial data into design decision-making.

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[10] For more information regarding CST and funding asset management projects, see *Appendix A, Program Overview and Current State*.

Work continues on improving the LCCA model, including adding a basis of estimate for the maintenance and refurbishment costs. The estimate of a project's LCCA will be compared to actual costs over time to determine and improve the model's accuracy.

To implement LCCA in capital projects, WTD is capturing data from capital project teams to accurately represent all facets of an asset's cost. These data come from all work disciplines of the capital project team and are provided to WTD Finance and Administration for inclusion in the LCCA model. Training is underway to inform all applicable staff on the functions of the LCCA program and the role of each member of the capital project team in implementing LCCA.

Life cycle cost management can also be used for operational and renewal decision-making by incorporating existing assets' useful life and adjustments to life cycle cost based on observed asset information. The same model being developed for new capital projects will be applied to the cost of rehabilitation, refurbishment, and operations of an asset during its useful life. By using real performance data on assets, LCCA can be dynamically updated as asset information is collected, thereby continually increasing the effectiveness of the model.

5.2   Objective 3.2: Funding Sources for Managing Assets

The asset management program's objective is to use funds from approved sources, either operating or capital funding, to complete projects as scheduled and on budget. Completing projects when planned in the capital budget, and selecting appropriate projects at the appropriate time in capital planning, results in more accurate forecasting of capital dollar needs and fewer unplanned expenditures, thereby maximizing financial performance.

Whether using funding from capital or operations, WTD strives to continuously improve coordination between asset management decision-making and King County's biennial budget cycle. The asset management program informs the budget development process with future capital funding needs, the cost of operation and maintenance of those assets, and when the funding is needed.

Strategies to coordinate financial needs with the asset management program include:

- Review, improve, and coordinate the process to align asset management decision-making with the current County and WTD budget cycle
- Define budget needs from the asset level to inform the Capital Improvement Program (CIP), in part using the risk assessment framework and renewal needs planning (see Chapter 4)
- Coordinate capital and operating budgets to ensure asset management projects are being funded by the most financially sustainable methods and align with County standards and practices
- Develop KPI metrics and a risk assessment framework (see Section 4.1) to determine the success of budget building and budgeting over time
- Align the asset management program with capital portfolio management data needs and the six-year CIP

5.2.1 Portfolio Management

In 2018, WTD adopted an approach called capital portfolio management to prioritize and rank projects for selection in its CIP so that the right investments happen in the right place at the right time. A portfolio is a collection of programs and projects managed as a group. Portfolio management (PfM) is an approach to align an organization's strategic objectives with its capital project portfolio to make the best use of capital dollars. Its application is particularly useful in an organization such as WTD that has a large, complex, long-term capital program with competing needs for limited funds.

Asset management has been identified as two of seven categories within PfM being managed by WTD, split into Asset Management – Conveyance and Asset Management – Plants. The asset management category is divided into vertical and horizontal assets, each using separate prioritization criteria developed by the asset management team to rank and evaluate projects in the category. Asset management's inclusion as a category emphasizes the importance of dedicated funding for asset management projects. The same type of criteria and data used in the asset management program is used for ranking projects within PfM.

PfM will continue to align and integrate its criteria for the asset management category project ranking with the data and information from the asset management program, including condition assessment data, a risk assessment framework (criticality and risk of failure), and renewal-needs planning. The Work Plan includes actions to ensure the information collected on assets (described in Chapter 3) is relevant and useful for PfM. A focus of the work plan items is the coordination of the objectives and strategies outlined in this SAMP and the implementation in the PfM process, as well as measuring effectiveness of the PfM program using KPIs developed by the asset management program.

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Chapter 6
Goal 4: Communication

Internal and external communication strategies are crucial components for the success of the asset management program. Communication of the asset management program involves staff in and out of the program, as well as key stakeholders outside WTD.

In the process of updating the SAMP, WTD has identified the following strategies as priorities:

- Develop an internal communication plan (see Section 6.1)
- Develop an external communication plan (see Section 6.2)

6.1 Objective 4.1: Internal Communication of Asset Management

Internal communication of the asset management program helps WTD employees better understand the importance of the program, the influence an individual's efforts have on the program, and the value of asset management practices to staff and their programs. The management of assets is a division-wide effort that is a continuous process, as demonstrated by the program's first formal plan in 2005.

Working with the WTD communications team and a consultant team, the asset management program is currently developing an internal communications plan that highlights how to best build employees' investment in the program. Methods to communicate the asset management program include broadcast emails to the entire division; section, unit, and work group meetings to discuss interaction with asset management; and training opportunities for staff outside the asset management work group. The communications plan, included in the Work Plan, will further define the following processes:

- The 01 78 40-A form process and responsibilities for capital projects
- Operations data requirements for renewal-needs forecasting, and the role of O&M staff to input work order charged time and failure codes for the appropriate assets
- Asset management training opportunities for staff to build an understanding of asset management principles

6.1.1 Process Workflows

Process workflows are a communication tool for new and experienced staff to document, describe, and understand the asset management program and their role in managing assets. The asset management program has developed, and is developing, sets of business processes and workflow diagrams for various lines of work and tasks intended to communicate and understand the process. This will lead to a streamlining of the process to ensure delivery of asset information to the correct staff at the appropriate time.

The asset management program is currently mapping the following process workflows:

- Asset Management Work Plan dashboard update process
- Asset intake process
- Asset renewal identification process
- Forecasting asset renewal needs by asset class and system
- Measuring the effectiveness of asset management.

Other process workflows planned for the future that are in the Work Plan include:

- Treatment plant asset management information, how it is prioritized, and how decisions are made from these data
- New project request form process
- IT interdependencies for all asset management data systems
- SAMP workflow template
- Visualization of the definitions and applications of assets versus facilities versus equipment
- DMS connections between an as-built drawing, facility drawing, and record drawing
- Facility drawing maintenance
- Preventive maintenance core work process mapping

6.2 Objective 4.2: External Communication of Asset Management

WTD seeks to communicate asset management to key external stakeholders to demonstrate the progress of the asset management program and its continued effort to minimize risk in the regional wastewater system. External stakeholders with an interest in the asset management program include the Regional Water Quality Committee, the Metropolitan Water Pollution Abatement Advisory Committee (MWPAAC), MWPACC's Engineering and Planning Subcommittee, Department of Ecology and the public. These external bodies provide oversight and guidance to WTD as it implements programs. In turn, WTD provides periodic briefings to MWPACC and its Engineering and Planning Subcommittee. As an oversight body, MWPACC expects WTD to provide information on the asset management program.

WTD is currently developing an external communication plan to describe the initiatives and improvements of the asset management program. The plan may involve engaging external stakeholders and developing customer-facing service level measures. The external communication plan will be completed in 2019 as part of the Work Plan.

Chapter 7

Goal 5: Implementing Asset Management

The asset management program is responsible for effectively planning all the identified work for the program and meeting targets for implementation of the asset management Work Plan (see Appendix B). As work is completed in the Work Plan, actions or projects will be moved to the completed list (see Appendix C) and existing work may be reprioritized.

In the process of updating the SAMP, WTD has identified the following strategies as priorities in the development of the asset management program in accordance with the goal of effective implementation of the asset management program:

- Staff and resource asset management to complete the tasks in the Asset Management Work Plan (see Section 7.2.1)
- Incorporate prioritization of goals and strategies of the asset management program and use them to prioritize Work Plan items (see Section 7.3)

7.1 Objective 5.1: Asset Management Steering Committee

To provide a mechanism for management to support and implement the asset management program including the SAMP, the AMSC was chartered in spring 2009 to oversee and guide the asset management program. AMSC is composed of the division director of WTD; deputy division director of WTD; managers of the Finance, West and East Operations and PPD sections; the manager of the Project Management Unit (PMU) Engineering unit; and asset management staff. WTD's deputy division director chairs the AMSC.

The AMSC directs and supports all aspects of the asset management program by:

- Guiding and promoting the asset management program decision-making and program execution in the near term and directing additional management initiatives over the long term to further enhance the asset management program
- Communicating the AMSC's work and decisions across the division to ensure uniform acceptance
- Owning the implementation of the strategic and tactical elements of the program (SAMP and Work Plan)
- Managing performance metrics and taking needed corrective action to meet objective targets
- Ensuring compliance with King County Code Chapter 28.86, which requires WTD have an asset management program

AMSC is scheduled to meet regularly to track progress and affirm the direction of the asset management program. By developing KPIs and benchmarking the asset management program's success, AMSC will be able to track progress and drive effectiveness of the program

over time. A key objective of the 2018 SAMP Update and 2018 Work Plan is to enhance the reporting and accountability of asset management to AMSC. Elements of the 2018 Work Plan support this effort.

7.2   Objective 5.2: Resourcing Strategy

Resourcing involves allocating appropriate budget and staff time both inside and outside the asset management work group to accomplish the work plan tasks. Management of assets involves employees throughout WTD, some with more responsibility to ensure the program's success than others. The objective is to staff and resource the asset management program to complete work plan items in the time periods desired. Resourcing action items begins with accurately estimating the time needed to accomplish tasks and ultimately assigning appropriate staff to implement plans.

A resourcing tool is under development to describe the outstanding work and staff hours to complete and help facilitate the optimal use of staff resources for the highest priority work items. This resourcing tool will help asset management assign staff to tasks and track the progress of action items. The resourcing tool is set to be completed in March 2019.

7.2.1 Staffing and Resourcing Asset Management Program

Currently, the asset management program is staffed by three full-time employees and is supported by other work groups in WTD, including:

- CIFM (inspection)
- Engineering (asset registry, engineering specifications, drawings)
- PMU (completing the 01 78 40-A form and other project deliverables)
- Finance (financial data on assets, life cycle cost analysis, financial planning in asset management)
- Geographic information system (registry)
- O&M staff including REs, plant engineers, IMPSs, and maintenance technicians
- CM activities and staff

These work groups generate the data used to manage assets during their normal work. These groups will continue to coordinate with the asset management program to ensure the completion of the action items in Appendix B.

The Work Plan (see Appendix B) identifies an estimated level of effort and responsible staff members for each Work Plan item. In 2017, WTD identified the need for two additional staff positions in the asset management program and, as a result, the asset management program will receive two additional full-time staff in its 2019 to 2020 biennial budget. The planning-level estimate of the total level of effort for the Work Plan to be accomplished in the 0- to 2-year planning horizon is 23,000 hours, and 18,000 hours for the 3- to 6-year planning horizon. These staff hour estimates are anticipated to be assigned to asset management staff and various SMEs across the division, as appropriate. Time accounting for certain staff will need to be developed for tracking and charging time for programmatic asset management tasks. The new resourcing tool mentioned in Section 7.2 will ensure that work is scheduled and can be accommodated within staff capacity.

In addition, work is underway to create a visual dashboard to communicate the sequence and progress of Work Plan items. The Work Plan Dashboard is anticipated to be finalized in 2019 and will be an effective communication tool to share across the division.

7.3 Objective 5.3: Asset Management Planning and Prioritization

Through the development of 2018 SAMP Update and corresponding Work Plan, the asset management program has improved the alignment of its strategies and objectives with the goals of the division. The strategic direction provided by the SAMP guides the daily work performed by staff to complete Work Plan implementation to ensure that the goals of WTD are being met.

WTD will further communicate its goals, objectives, and strategies and the implementation of those corresponding action items by creating an asset management roadmap. The roadmap will outline prioritization of the asset management work plan tasks, as well as visually display the estimated level of effort and duration of various action items and strategies. This roadmap is a work plan item for 2019 and will be a useful tool for AMSC to track prioritization of work.

In addition, this update modifies the regular schedule for the updates to the SAMP. The SAMP was originally anticipated to be updated in 2020. With this 2018 update, the next update to the SAMP will occur in 2023. Regular review of the material and direction of this report will be performed by AMSC and the asset management program.

7.3.1 Managing the Asset Management Program

A strategic direction for asset management is to manage the asset management program similar to other WTD programs. Managing and operating asset management as other WTD programs entails using a framework for planning and implementation, including outlining policies, definitions, guidance from the SAMP, a budget, and assigned staff with specific deliverables over a defined time period.

As part of the framework, the asset management program needs to document key decisions. Some of these documents currently exist, such as *WTD Criticality Ranking: A Common Definition of Purpose and Use.* Many elements of the program, such as the asset definition and determination of relationships of asset hierarchies, still need to be developed (or if developed, formally affirmed), documented, and approved by the AMSC or the Technical Standards Committee to ensure consistency and provide written guidance for planning and implementation. Documentation of decisions is essential in program management and needs to be linked to the communication strategy described in Section 6.1 to ensure staff are aware of key changes, improvements, and developments; the asset management program SharePoint site would house all the necessary programmatic elements.

Other factors to include in programmatic management include:

- Define lead staff to own specific processes and procedures in the program
- Determine the best organizational structure to implement the SAMP and Work Plan
- Determine the review process for the development of the program
- Measure the progress of the program using defined KPIs

AMSC, working with the asset management program, will continue to develop and implement these programmatic aspects.

7.4 Integration into other WTD Efforts (Objective 5.4)

WTD has many ongoing efforts that integrate with, support, and rely on asset management program information and decision-making. These programs, projects, and plans include, but are not limited to:

- Portfolio Management (see Section 5.2.1)
- Conveyance System Improvement Plan
- Combined Sewer Overflow Long-Term Control Plan
- Treatment Plant Flows and Loads Study
- Technical Standards Committee
- Clean Water Plan (formerly called Systemwide Comprehensive Plan) (see Section 7.4.1)
- King County Energy Plan
- King County Equity and Social Justice Strategic Plan
- King County Strategic Climate Action Plan

Program managers of the above programs and plans will collaborate with asset management staff to share information and coordinate efforts so that asset management can be integrated into these efforts and vice versa.

7.4.1 Systemwide Comprehensive Plan

WTD is currently developing a Systemwide Comprehensive Plan to assess all the demands on the regional wastewater system and develop a path forward for WTD. The planning process will include comparison of investment approaches, analysis of water quality benefits relative to costs, and examination of wastewater rate affordability.

The plan, expected to be completed in 2024, will guide regional water quality investments made by WTD for the near term (up to 10 years) and long term (10 to 40 years). Asset management program needs will be considered during the systemwide comprehensive planning process. It is anticipated that asset management allocations in future budget cycles will be guided by the Systemwide Comprehensive Plan and through portfolio management.

7.5 Work Plan Development

The 2005 SAMP included a formalized work plan for the asset management program. The 2010 SAMP demonstrated progress and completion of these Work Plan items and added more items. Many of these items were also included in the 2015 SAMP Update.

The Work Plan (Appendix B), guided by this SAMP update, incorporates unfinished work items from previous SAMPs, the recommended items from the 2017 Evaluation, and recommended tasks from WTD staff. The Work Plan action items include staffing time estimates, which are preliminary estimates and are subject to change with further revision of scope and outcomes of the action items.

The Work Plan presents the complete set of tasks in a prioritized manner based on guidance by AMSC. Prioritization of tasks was completed in several phases:

- The 2017 Evaluation identified five early actions that were assigned a high priority.
- A workshop with AMSC in April 2018 reviewed the 72 action items in the 2017 Evaluation presented to the King County Council. The outcome of the workshop was a delineation of the priority, status, and grouping of all 72 recommendations.
- During development of the 2018 SAMP Update, AMSC once again reviewed the Work Plan to ensure its alignment with the strategic direction of the SAMP.

The Work Plan (Appendix B) reflects the work of the phases above, and presents the action items in three distinct planning horizons:

- **Near-term actions**: These Work Plan actions have been identified as foundational or critical to the ongoing success of the program. Many of these items are currently underway with associated projects or work orders. These highest priority actions are anticipated to be started in the next two years.
- **Mid-term actions**: These Work Plan items have the next level of priority and are considered critical for the development and improvement of the program, but are either dependent on the completion of other near-term actions are a large enough effort that they will be started in a horizon longer than two years. The planning horizon for these items is three to six years.
- **Long-term actions**: These Work Plan items were identified as items to improve the asset management program, and either need prerequisite action items completed or organizational definition and context described before being initiated. The planning horizon for these items is greater than six years.

The three planning horizons were selected because of the two-year omnibus participation in the biennial budget and the six-year CIP look-ahead, which link funding asset acquisition and the asset management planning process. The Work Plan will continue to be updated annually, informed by the 6-year CIP review, and incorporate new Work Plan items and progress made toward existing Work Plan items. The review and progress of the Work Plan will be communicated to AMSC on an annual basis.

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Appendix A
Program Overview and Current State

The purpose of the King County (County) Wastewater Treatment Division (WTD) asset management program is to manage the life cycle of WTD's assets to minimize the total costs of owning, maintaining, and operating them while delivering a level of service that meets regulatory requirements and ratepayer expectations. Asset management contributes to WTD's mission to protect public health and the environment by collecting and treating wastewater. This appendix provides the history of WTD's asset management program, the current structure and sections or work groups in WTD responsible for managing assets, and the systems and tools used to manage WTD's assets.

History of WTD Asset Management

King County's wastewater treatment and conveyance system (Figure A-1) is comprised of the following major assets:

- Three large regional treatment plants (West Point Treatment Plant [West Point] in the City of Seattle, South Treatment Plant [South Plant] in the City of Renton, and Brightwater Treatment Plant [Brightwater] near the City of Woodinville)
- Two small treatment plants (Vashon Island and Carnation)
- One community septic system on Vashon Island (Beulah Park and Cove)
- Four wet weather treatment stations in the City of Seattle (Alki, Carkeek, Mercer/Elliott West, and Henderson/Norfolk)
- More than 390 miles of pipes
- 25 regulator stations
- 47 pump stations
- 39 combined sewer overflow (CSO) outfalls.

The conveyance system was constructed over many decades. Some of the oldest conveyance pipes are over 100 years old. West Point and South Plant were both built in the 1960s and are over 50 years old. Two of the wet weather treatment stations (Alki and Carkeek) were built before the 1960s and upgraded to wet weather only treatment facilities in the 1990s.

In 1999, the King County Council adopted the Regional Wastewater Services Plan (RWSP) as an update to WTD's comprehensive wastewater plan. The RWSP outlines projects, programs, and policies for King County to implement through 2030 to continue to protect public health and water quality and ensure sufficient wastewater capacity to meet future growth. The RWSP is codified in King County Code Chapter 28.86 and was amended in 2005 to include policy guidance for the County to establish and implement an asset management program and develop asset replacement plans.

Consistent with the RWSP policies, WTD published its first Strategic Asset Management Plan (SAMP) and formalized an asset management program in 2005. The 2005 SAMP laid out eight

main strategies and 96 action items to achieve its goals and objectives. The eight strategies sought to develop, promote, and improve policies and practices related to asset management. As a result of the 2005 SAMP, WTD chartered the Asset Management Steering Committee, started a centralized asset registry, formalized asset hierarchy, and developed formal risk assessment tools, such as condition monitoring and work order tracking.
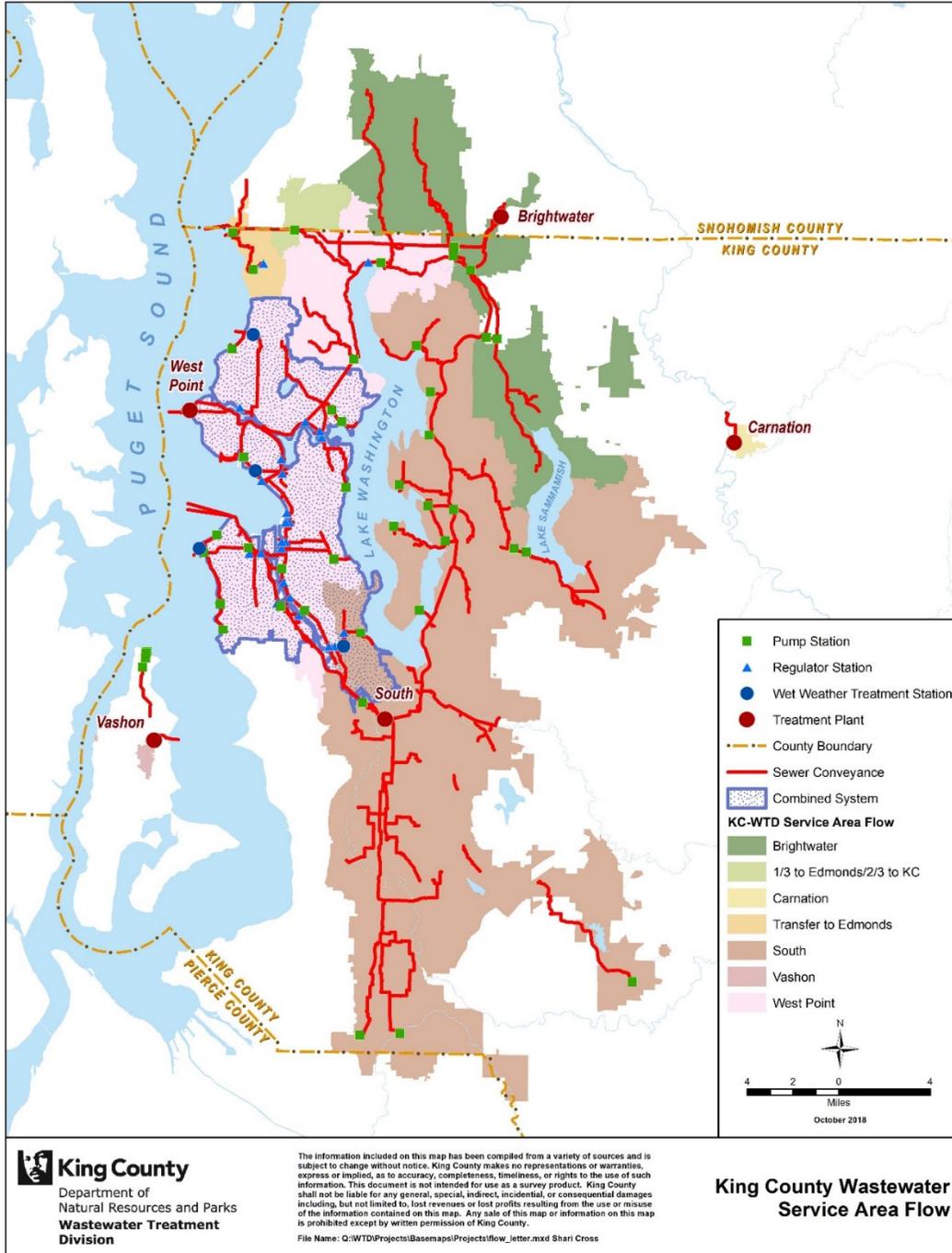
Figure A-1. King County Wastewater System

The SAMP was subsequently updated in 2010 and 2015. The 2010 SAMP included revised goals and objectives for the asset management program, catalogued progress made toward implementing the 2005 SAMP, and added 19 new action items to further the goals of WTD's asset management program. Significant advances from the 2010 SAMP include the implementation of the Maintenance Best Practices Program, a standard definition of criticality, and creation of key performance indicators (KPIs) for the asset management program.

The 2015 SAMP identified eight strategies and two new goals for asset management. The 2015 SAMP also documented progress made toward program implementation since the 2010 SAMP and added tasks geared toward the improvement of the program functions. Some accomplishments of the 2015 SAMP include the integration of linear asset data into the computerized maintenance management system (CMMS), the justification and introduction of standardized bill of materials, and implementation of preventive maintenance procedures.

The advancement and implementation of previous SAMP goals, objectives, and strategies demonstrates a maturation of the asset management program while incorporating industry standard elements into the program. The asset management program continues to mature and improve, in part because of the vision and direction set forth by the previous SAMPs.

WTD Sections and Work Groups Responsible for Asset Management

The daily, round-the-clock collection, treatment, recycling, and disposal of wastewater and its byproducts are asset-intensive. Maximizing the life and reliability of over 55,000 assets (equipment, instruments, control devices, and conveyance pipelines) as well as the buildings that house them requires planning, inspection, maintenance, repair, and replacement. Figure A-2 shows the asset life cycle continuum and the data or process completion needed at each step of the cycle.

Project Deliverables
- 01 78 40-A
    - Fixed Asset IDs
    - Lifecycle Data
    - Asset Attribute Data
    - Removed Asset Numbers
- O&M Manuals
- Drawings
- Capital Spares
- Maintenance Spare Parts
- Bill of Materials

Asset Lifecycle Continuum

CAPITAL PROJECT PHASE

O&M (MBP) PHASE

CAPITAL IMPROVEMENT PLANNING (CIP) & FINANCE PHASE

CIP/Budgeting Deliverables
- Six Year Plan
- Fixed Asset Inventory
- Bi-Annual Budget
- Long-term Capital Forecast

O&M (MBP) Deliverables
- Lifecycle Cost
- Condition Assessment
- SME Feedback
- Bad Actor Analysis
- MTBF/MTTR Analysis
- PWR/CST/Rollup Project Requests
- KPIs
- SME Equipment Selection Input
- Project Urgency
- Ranking Recommendation

Figure A-2. Simplified Asset Information Continuum

Multiple work groups within WTD are responsible for all the aspects of asset management through the life of the asset, from planning to repair or replacement. Figure A-3 presents a simplified WTD organizational chart and the asset management functions within each major work section. The three work sections that have significant asset management functions are: Project Planning and Delivery, Finance and Administration, and Operations and Maintenance (all are described in further detail in the subsequent sections).
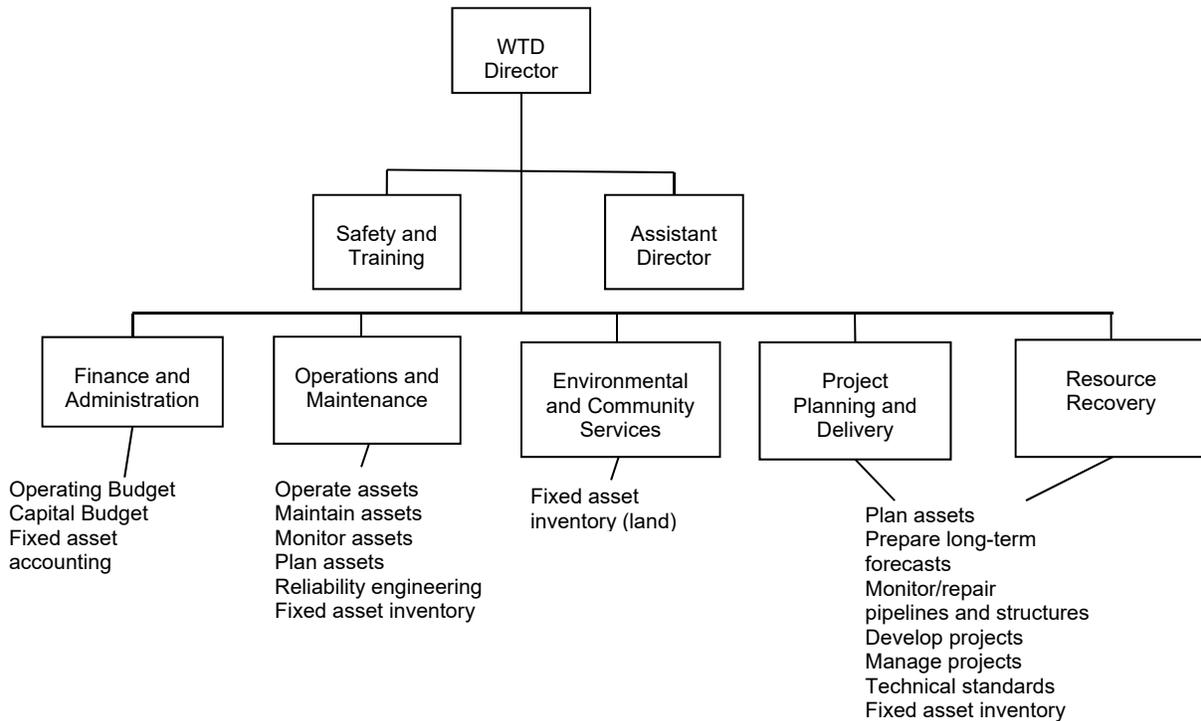
Figure A-3. Organizational Chart for WTD, Simplified to Include Pertinent Work Groups and their Asset Management Functions

Project Planning and Delivery Section

The Project Planning and Delivery (PPD) section identifies the need for new assets or improvements to existing assets based on asset condition, capacity, or regulatory needs to ensure that the wastewater system continues to function reliably, keep pace with growth, and meet permit requirements.

Units in the PPD section include Comprehensive Planning, Modeling, Engineering and Design, Construction Management (CM), and Conveyance Inspection Flow Monitoring (CIFM). These work units plan, develop, and deliver new assets; administer construction contracts; monitor and maintain pipelines and structures in the system; and develop and disseminate technical standards. All PPD units work closely with Operations and Maintenance (O&M) staff to ensure that operation and maintenance requirements, including life cycle costs, are considered in new project designs. PPD also stores record drawings for capital projects.

The asset management work group is assigned to the Project Management Unit (PMU) of PPD and consists of WTD's asset manager and two additional staff, with two more staff expected in 2019. The asset manager manages the entirety of the asset management program, which includes developing and managing a comprehensive forecast of equipment replacement and restoration needs based on equipment end of life, processing and reporting condition data of

assets, subject matter expert interviews, and coordinating asset management work in the division.

Project Management Unit

PMU consists of staff that manage very large capital projects with a cost of over $2.5 million. WTD adopted standards set forth by the Project Management Institute (PMI) for project management and uses a method of managing projects through thresholds, or "gates", with predefined information and data needed at each gate for a project under development.

WTD's gate policy defines management check-in points administered by either the Capital Systems Team (CST) or the Project Work Request Committee (PWR Committee) to ensure the correct information is provided on a project at the appropriate time in the project's development. At each gate, a project is required to provide certain information deliverables to the asset management program to help facilitate effective asset planning and life cycle decision-making.

Figure A-4 presents the phases and gates for WTD capital projects. Gates requiring asset management data deliverables are referenced in Section 3.2.1, Data Collection for New Assets, and Section 5.1, Objective 3.1: Life Cycle Cost Management.
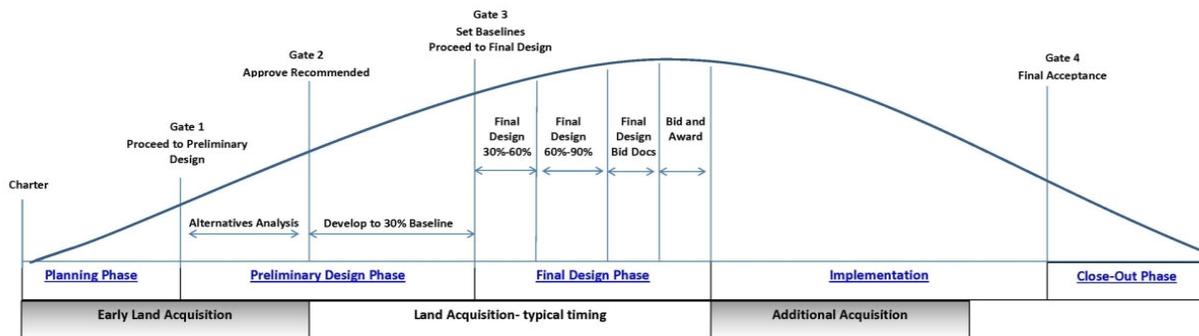
Figure A-4. Capital Project Phases and Gates within WTD's Project Management Unit

Conveyance Inspection and Flow Monitoring Work Group

The 16-member Conveyance Inspection and Flow Monitoring (CIFM) work group manages several comprehensive conveyance system inspection, testing, and monitoring programs, including flow monitoring, a closed-circuit television (CCTV) program for pipe inspection, hydrogen sulfide and cathodic protection, the One Call locating service, and sanitary sewer cleaning and repair. Additionally, CIFM administers several contracts to execute a robust condition assessment program for conveyance lines and other structures, and provides inspection data for use in planning and capital decision-making. CIFM staff also assist in implementing asset management by using maintenance best practices (MBP) for linear assets.

The inspection, testing, and monitoring results are used in recommendations for further monitoring, preventive measures such as lining and coating pipes, and capital projects to replace or repair pipelines or install odor and corrosion control systems. Section 3.2.2 presents more information on data collected in CIFM.

Finance and Administration Section

The Finance and Administration Section develops the capital and operating budgets, administers bond financing, oversees the capacity charge program, and reports on all facets of WTD's finances. The capital budget funds capital assets. The operating budget funds the operations of the division that are not associated with a capital asset. WTD's Finance and Administration staff are involved in the asset management program by capitalizing and depreciating assets for financial reporting related to bonds, allocating funding of labor and staff time to perform asset management, and projecting cash flow for capital and operations projects to perform repair, replacement, or retirement of assets.

Asset capitalization and depreciation for the purposes of financial statements related to bond reporting requirements necessitates a specific definition of an asset, categories of assets, and adherence to prescribed accounting rules for valuation and financial statements (see WTD's Assets Capitalization policy, WTD2014-001).

WTD uses its operating budget to fund operations of its system, such as chemicals and materials consumed with operating the system, electricity or water used to run the system, and staff time to operate all aspects of the regional system. The operations budget-building process requires written and verbal inputs from industrial maintenance program specialists (IMPSs), reliability engineers (REs), and plant managers to determine the funding needs of the division. A goal of asset management is to increase the use of data to develop the operating and capital budgets, which are used to finance the acquisition of an asset, ongoing maintenance and any work done that extends the life of an asset.

The majority of asset management projects are funded by capital funds divided into three cost categories:

- Capital Asset Management Program Spreadsheet (CAMPS) projects are derived from plant staff requests and are incorporated in the Capital Improvement Program six-year plan. CAMPS projects are generally small, uncomplicated projects that do not go into a full project planning cycle, and are managed by the maintenance supervisors in each section of operations. These projects generally require less than $300,000 to complete.
- Project Work Requests Rollups are asset management projects that cost between $300,000 and $2.4M to complete. These projects are organized into six categories and may address unforeseen needs or may be planned for delivery in one of the minor asset management programs during the budget cycle if the estimated budget is too small to move forward as a standalone project.
- Stand-alone capital projects with a value of $2.5M and above. These projects encompass the full PPD support process including planning, modeling, engineering, project design, and CM, managed with gates. These projects, also called CST projects, are standalone and funded in the capital budget.

The majority of capital projects in the asset management program are initiated with a PWR. For the treatment plants, generally, O&M staff deliver a PWR to the capital project coordinator (CPC). There is no CPC for the linear assets. Project worthiness is initially determined by the CPC. The CPC then completes a new project request form (NPRF) for the project that then moves to the division's PWR Committee for prioritization.

Section 5.2 and Section 7.2 contain more information on the financing of asset management projects and staffing the asset management program, respectively.

Operations and Maintenance Section

This section is composed of staff across WTD with specific duties to operate, collect data for, maintain, and monitor equipment. Operations and Maintenance (O&M) is divided into two sections: the West Section covers West Point and associated off-site facilities, such as pump stations, and the East Section covers South Plant, Brightwater, the Carnation and Vashon treatment plants, and associated off-site facilities.

After a project is completed and commissioned, ongoing operation, monitoring, and assessment provide important information on the condition of assets. O&M staff, Process Control, and the CIFM groups all have a shared role in collecting and communicating asset related data for asset management. The tasks take different processes and paths, but the intent is the same: a recommendation to either continue maintenance or upgrade/replace assets.

Maintenance is conducted on WTD's assets in part to comply with the following requirements and guidelines set forth by the U.S. Environmental Protection Agency and administered by the Washington State Department of Ecology:

- National Pollutant Discharge Elimination System permits, which set limits on the quality and quantity of discharges from treatment plants and CSO outfalls. The permits include conditions for operating, managing, and maintaining facilities in a manner that protects public health and the state's waters.
- Nine Minimum Controls (1994 CSO Control Policy), which focuses on ways to control the volume and frequency of CSO facilities other than by building large capital projects. The first control in this policy calls for proper operation and regular maintenance programs for the sanitary sewer system and CSO facilities.

Treatment Plant and Off-Site Operations and Maintenance Sections

A central component of the asset management program is performance of MBP by REs and IMPSs. MBP fundamentals include preventive, predictive, and corrective maintenance tasks that are overseen by the REs. The preventive maintenance program includes scheduled inspections, testing, parts replacement, cleaning, lubrication, and calibration of an asset. The predictive program monitors the condition of assets through vibration analysis and other methods. The IMPS schedule the maintenance and coordinate with other ongoing projects.

The corrective maintenance program performs repairs to assets when indicated by preventive and predictive maintenance or because they have failed. Corrective maintenance projects are typically conducted by plant staff, but may be turned over to PPD project managers depending on the cost (greater than $2.5 million) and complexity of a project (i.e., a project that needs advanced engineering) as described in *Finance and Administration Section* above.

REs analyze equipment performance and adjust maintenance strategies, where necessary, to optimize equipment function and useful life and to minimize ownership costs. They help develop standard operating procedures (SOPs) and analytical tools to track progress on meeting maintenance performance goals, and evaluate asset criticality and condition. The objective of reliability engineering is to ensure that equipment performs the correct functions and meets design life expectancy at the least cost.

Computer-based software tools used by WTD such as Mainsaver and BI-Cycle (described in *Asset Management Systems and Tools* below), enable REs to evaluate equipment performance and reliability over time. REs measure the effectiveness of preventive maintenance by tracking the quantity of work orders generated from preventive maintenance tasks. Predictive maintenance data allows for easy identification and visibility of the most common types of equipment failures prior to their occurrence. The program is modified as needed (e.g., new equipment, process, permit requirement, etc.), to improve equipment reliability, often measured as availability or uptime of an asset.

Operations Section

The Operations staff run the equipment and review operational data at the treatment plants and off-site facilities to help determine whether a recommendation should be made for evaluating maintenance practices, performing specific engineering tests or modifications, or rebuilding or replacing an asset. As such, operations staff have access to essential operation and setup data for critical assets and process units monitored through the Ovation distributed control system.

O&M staff use and update SOPs for high-criticality assets and associated equipment. SOPs consist of written instructions on how to operate, check, troubleshoot, and work safely with specific types of equipment. Additionally, operations and maintenance manuals serve as a reference for operators and engineers on how the plant and off-site systems work and how to operate them safely and efficiently. The manuals provide information on the location and layout of equipment and describe how system components relate to one another.

Process Control Unit

The overall functionality of the treatment plants to produce effluent or byproducts that meet permit conditions and level of service is monitored by Process Control. The staff in Process Control monitor the inputs and outputs of plant processes to ensure a plant is operating as intended and that regulatory requirements are met. Their monitoring can uncover problems with equipment that may result in work orders. Asset management projects are submitted and justified as a process improvement with the NPRF process.

Building Inspection and Maintenance Program

The Building Envelope Inspection and Maintenance Program includes two PPD program managers that assess repair or replacement needs identified through routine roof and coatings/sealant inspections or by asset failure complaints. Repairs are made through a construction work order or the capital replacement process.

WTD is currently assessing whether efficiencies can be gained by moving the building envelope and coatings data into the CMMS and applying MBP philosophies and life cycle management principles to track costs and assess business risk related to buildings.

Asset Management Systems and Tools

The asset management program uses a combination of systems and tools to collect, manage, analyze, and provide access to data and information for asset management. These systems use both automated and manual data entry for collecting asset information and tracking asset management KPIs. The systems and tools are described below.

Computerized Maintenance Management System (CMMS). A computer program called Mainsaver is a client server-based CMMS software application used by WTD for tracking and managing its vertical and linear assets and communicating maintenance information. Mainsaver provides the basic functionality necessary for tracking asset information, time and material costs, maintenance history, preventive maintenance schedules, parts inventory, and basic life cycle data. It also provides the ability to enter and submit purchase requests to Oracle E-Business Suite Financials (EBS), enter and submit timecard records to PeopleSoft, and import purchasing and inventory data from EBS.

To provide the ability to submit and import data between Mainsaver and EBS, several interfaces have been implemented and are maintained between the two systems. Data transfers also exist between Mainsaver and several other systems. To provide the ability to submit timecard records to PeopleSoft, a single interface has been implemented and is maintained between the two systems. These interfaces allow the allocation of staff billing time to specific assets.

In addition to these interfaces, various other interfaces and linkages have been implemented to facilitate the transfer of data between Mainsaver and other systems. These systems include Granite XP, Geographic Information Systems (GIS)/Facilities Information Retrieval System (FIRS), BI-Cycle, OTTO, Microsoft Power BI, SQL Server Reporting Services, OSI PI, and a tentative scheduling Web-based application. Figure A-5 illustrates these various information technology (IT) system interfaces and linkages.
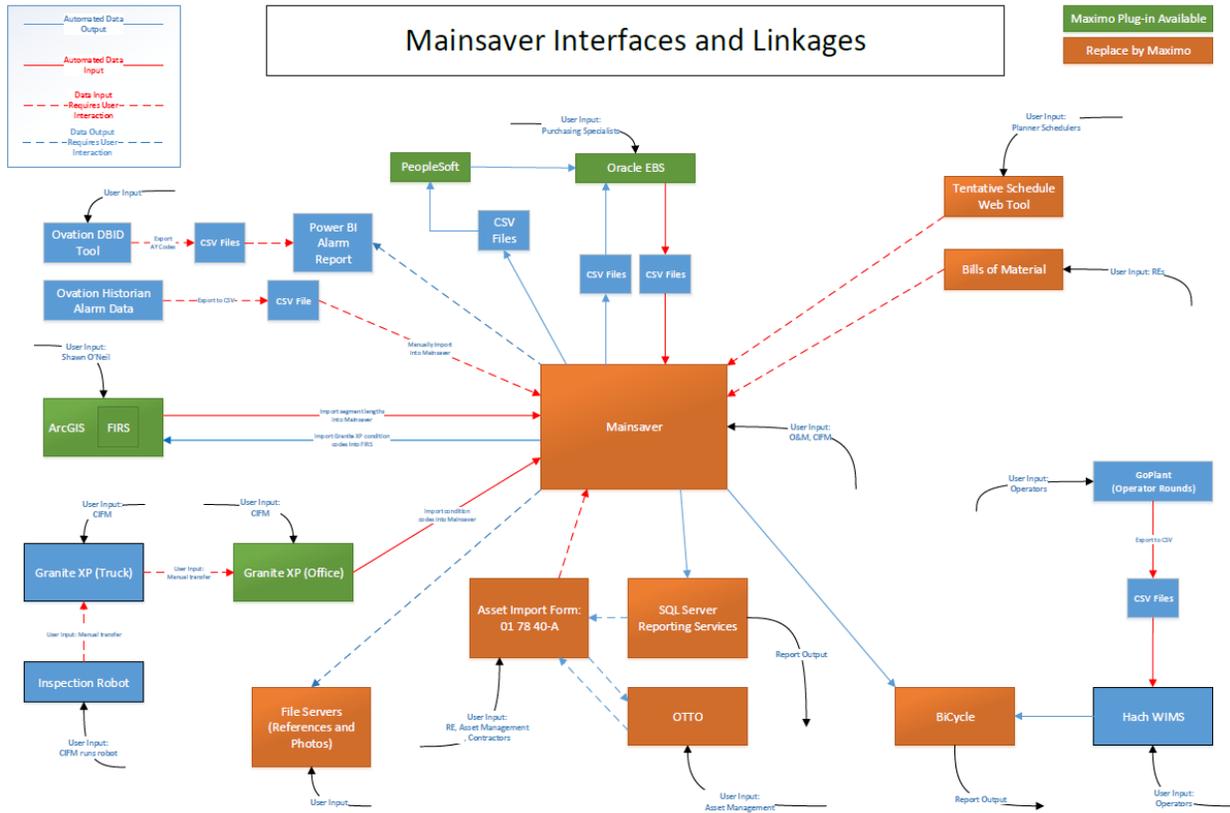
Figure A-5. Interfaces and Linkages of Mainsaver and Other Asset Management Information Technology Tools

Drawing Management System (DMS)—There is no current DMS used by all WTD work groups. Computer-aided design (CAD) drawings are managed by the individual CAD groups at the treatment plants and WTD's main office at King Street Center (KSC). The CAD group at KSC keeps records of all project CAD files on its server (via Windows Explorer). The record-drawing portable digital file sets are housed on a file transfer protocol site, managed by the Records Management Group, and accessed through a Web portal and Geographic Information Systems (GIS). The facility set drawings are managed by the plant engineers at West Point (West Section), South Plant (East Section), and Brightwater.

Granite XP—Granite XP is an application used by CIFM to capture the CCTV footage and staff observations of pipe inspections. In addition to other observations, the condition of each pipe is updated during each inspection. A condition code is then imported into Mainsaver for each pipe segment through a custom interface. No other interfaces currently exist between Granite XP and other systems.

BI-Cycle—BI-Cycle is a data warehouse for compiling and tracking metrics and key performance indicators related to asset management and maintenance activities. The metrics and key performance indicators are compiled by importing data through linked server connections with Mainsaver and Hach Water Information Management Solution (WIMS).

OSISoft PI—OSISoft PI is a time- and event-based data collection system that collects point data from the Ovation distributed control system (DCS). PI provides the tools necessary to

search, analyze, share, and visualize information to drive operational improvements and to troubleshoot and make proactive-based decisions. Various indicators can be collected through point data. A few examples include flows, levels, motor and engine speeds, statuses, run times, and gate positions. Although Mainsaver and BI-Cycle are both interfaced with PI, neither system is actively accessing or using PI data.

Hach WIMS—Hach WIMS is a water quality data management software that allows for data collection, reporting, user-defined alerts, graphing, and statistical analysis. Among other things, Hach WIMS provides compliance reports to outside regulatory agencies.

Ovation—Ovation is WTD's DCS for real-time monitoring and controlling plant and off-site processes and equipment. Ovation can also provide historical data for assessment of asset failure and alarm information to inform reliability engineering on vertical assets and facilities.

GoPlant—GoPlant is a mobile application for monitoring and documenting the status of equipment and various plant conditions. When an abnormal condition is detected, a comment is added in GoPlant with additional information and observations. Depending on the abnormal condition, a work request may also be manually created in Mainsaver to address the condition.

FIRS—FIRS is a GIS-based system that serves as a repository of information on the location, age, materials, and condition of conveyance pipelines and appurtenances. The system also includes information on local agency pipelines that connect to the County's system. FIRS, in conjunction with Mainsaver, serves as the source of inspection data history for linear assets. FIRS includes the results of inspections since the 1970s and contains approximately 8,000 records.

The IT interfaces and linkages of Mainsaver with other IT tools is currently being evaluated with a Work Plan action. Its goal is to simplify and streamline the systems to better meet business needs.

Appendix B
2018 Asset Management Work Plan

The priorities and responsibilities for asset management over the next six years are described in the 2018 Asset Management Work Plan (Work Plan). The Work Plan includes the following information for all the action items identified by the Asset Management Work Group:

- Action ID
- Source of the action item (if applicable). Some of these items were recommended by the *Evaluation of the Wastewater Treatment Division's Strategic Asset Management Plan*, or are a continuation of Work Plan items from previous Strategic Asset Management Plan Updates
- Action name
- Corresponding asset management objective and strategy
- Target outcome for each action item
- Staffing time estimate (a planning-level estimate of the effort needed to complete a task)
- Identified lead, both by name and job title
- Timeframe, typically broken up into 0- to 2-year, 3- to 6-year, and 6-plus-year planning horizons
- Status (typically underway, ongoing, or to be started) and characterization of staff needs (fully staffed, new staff required, no staff, or TBD)
- Sequencing, if other work items must be complete
- Characterization of staff needs

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Asset Management Work Plan

Work Plan ID	Staffing Time Estimate (Hours)	Action Item	Target Outcomes	Other Key Staff	Lead	Time Frame	Aligned SAMP Objective	Aligned SAMP Strategy	Status and Characterization of Staff needs	Sequencing
ACT_101	200	Definition of policy and procedure for using and assigning asset groups	Determination and differentiation of assets, asset classes, facilities, and equipment, and the interconnections between each defined term. Application of the asset component lists in the acquisition of new assets. When completed, information will be posted to Asset Management SharePoint site	Alden Wyma, John Conway	Donna Lund (asset management staff)	Near-term action	1.1) Asset Definition	1a) Improve asset definitions and establish information to be collected for asset classes	Not currently underway. New Staff Required	Foundational to Goal 1
ACT_102	500	Update and Create Consistency in Facility and Asset Hierarchies	All plants use the same facility hierarchies for assets. Standard procedures for setting hierarchy in CMMS. Hierarchy standardization by asset management and how it functions at each plant.	Donna Lund	Ron Dietze (WP Reliability Engineer)	Mid-term Action	1.1) Asset Definition	1b) Create and populate the asset hierarchy definitions consistently across work groups and sections	Work is underway. Conveyance (offsite) facility hierarchies improved.	To be fully completed after ACT_101 and ACT_113
ACT_104	2,200	Collect, enter and ensure preventive maintenance for conveyance equipment assets in the asset registry.	A completed asset registry for conveyance equipment assets. Maintain equipment assets within the conveyance system with a preventive maintenance program, including ARVs, gates, actuators, transmitters.	Peter Sutton, Janice Johnson	Todd Smith (asset management staff)	Near-term action	1.2) Asset Registry/Data Collection	1c) Maintain a complete and up-to-date asset registry in the CMMS	Ongoing; New staff required	
ACT_105	200	Adopt Naming Convention for new assets	All asset data is easily searchable and presents in similar fashion in Mainsaver	Doug Neal, Shaun O'Neil, Alden Wyma, Donna Lund, Todd Smith	Alden Wyma (Asset Manager)	Near-term action	1.2) Asset Registry/Data Collection	1d) Establish data collection protocols for new projects	May exist already; requires approval from Technical Standards Committee	
ACT_106	100	Develop Procedure for Data validation of New Asset Acquisition Form (01 78 40 A)	Process developed for new assets are checked for QA/QC and mapped for communication		Todd Smith (asset management staff)	Near-term action	1.2) Asset Registry/Data Collection	1d) Establish data collection protocols for new projects	Not underway; New Staff required	Priority in objective 1.2
ACT_107	500	Develop Plan, Process, and criteria to perform Vertical Facility Condition Assessment	Defined process to document current equipment level assessment methods and guidance to perform condition assessments on facility and process level assets. What is condition assessment, how its done (quantifying), how its used.	Alden Wyma	Tom Pann (Bi-Cycle Specialist)	Near-term action	1.2) Asset Registry/Data Collection	1e) Standardize asset condition monitoring methodology	In progress	To be completed after ACT_101 and ACT_102
ACT_108		Perform Condition Assessments for Vertical Assets	Condition assessments are performed routinely and strategically on vertical assets. When something fails on a force main, Write work request for ARV support.	O&M	Alden Wyma (Asset Manager)	Mid-term Action	1.2) Asset Registry/Data Collection	1f) Perform and collect condition assessment data for appropriate assets	Not currently underway or staffed	
ACT_109	100	Develop and Communicate Protocols for Documenting Work Activities in Building Envelopes In Mainsaver	Building Envelope maintenance and work activities included In Mainsaver, including roofs. Creation of Brightwater's non-process facilities asset lists		Bryon Slatten (Facilities Group)	Near-term action	1.2) Asset Registry/Data Collection	1f) Perform and collect condition assessment data for appropriate assets	Not currently in progress; can be allocated to staff	
ACT_110	500	Perform localized force main condition assessment	Perform localized force main condition assessment		Abraham Araya (CIFM Supervisor)	Mid-term Action	1.2) Asset Registry/Data Collection	1f) Perform and collect condition assessment data for appropriate assets	Not currently underway in CIFM work plan	After Item ACT_103 and ACT_104
ACT_111	160	Develop Process for CMMS to Track Abandoned, Rehabilitated and Expired Conveyance Assets and Archive Maintenance and Inspection History	Process developed to rename retired linear assets, track abandoned and expired conveyance assets and archive maintenance and inspection history. Any time the end of useful life is extended in a linear asset, the changes need to be communicated and recorded in CMMS.	Darrin DePew, Donna Lund	Shaun O'Neil (GIS Lead)	Near-term action	1.2) Asset Registry/Data Collection	1g) Assure quality of collected asset management data	In progress & Fully staffed	
ACT_112	500	Document Quality Assurance/Quality Control (QA/QC) for asset data entry into CMMS	Data in CMMS is reliable for use in risk-based assessments and asset management planning	Construction Management	Todd Smith (asset management staff)	Near-term action	1.2) Asset Registry/Data Collection	1g) Assure quality of collected asset management data		

Asset Management Work Plan

Work Plan ID	Staffing Time Estimate (Hours)	Action Item	Target Outcomes	Other Key Staff	Lead	Time Frame	Aligned SAMP Objective	Aligned SAMP Strategy	Status and Characterization of Staff needs	Sequencing
ACT_113	4,900	Upgrade CMMS	Find a system that will incorporate all business needs of a CMMS. CMMS will be able to communicate with all business systems. East and West CMMS databases will be combined. CMMS will store vertical condition assessment data CMMS Upgrade needs to access O&M Manuals from a work order	Dave Jurgens, Alden Wyma	Courtney Schaumberg (Project Management Unit)	Near-term action	1.3) Data Management	1h) Upgrade CMMS to satisfy business needs	In progress; analysis expected completion by mid-November 2018. Implementation to begin by Q2 2019	In 2019-2020 Biennium; 4 Year project
ACT_114	1,000	Implement a Drawing Management System (DMS) that meets business needs	A clear and definitive work flow process on creating and keeping up to date facility set drawings, identifying key roles, duties, and responsibilities at each step along the process. Identifying key roles and managers of the DMS system, such as "gate keepers", "controllers", or "librarians". This will define who gets access and editing privileges to certain documents. Identifying a list of categories we want the DMS to display, defining the searchable items within drawings. The process of how our current record management system(s) (King St, WPTP, STP, BWTP, Record Management) will merge into the new centralized DMS. Which documents will be entered into the new DMs. Only documents that are Facility Set approved; or also all old project record drawings under a separate category. The clear understanding of what an As-built vs Record Drawing vs Facility Drawing is, and where it should be stored. Consider GIS updates in DMS software needs	Project Team (write names here)	Alden Wyma (Asset Manager)	Near-term action	1.3) Data Management	1i) Improve process and tools for searching through electronic documents	Work is underway; to be completed in Q3 2019	High Priority
ACT_115	200	Develop an Approach to Tracks Assets on Projects	01 78 40 A coordinates with PRISM and other project-tracking software to provide information seamlessly from Project Management to Asset Management	Dave Jurgens, Hans Erickson	Alden Wyma (Asset Manager)	Mid-term Action	1.3) Data Management	1i) Improve process and tools for searching through electronic documents	Not currently underway or staffed	
ACT_116	200	Creating and maintaining numbering standard for assets so drawings can be accessed	Creating and maintaining Slot Number and Block for assets so drawings can be accessed		Kiko Martinez (Engineering/CAD designer)	Mid-term Action	1.3) Data Management	1i) Improve process and tools for searching through electronic documents	Under development as part of the DMS Project	
ACT_117	1,000	Leverage Analytical Functionality of GIS Mobile Solution for GIS Markups	GIS used to full capabilities, including mobile solution to support communication of GIS markups.		Shaun O'Neil (GIS Lead)	Near-term action	1.4) Information Systems	1j) Design an Asset Management Information System (AMIS)	In progress	
ACT_118	200	Evaluate Use of Building Information Modeling (BIM) and Develop Standards	Evaluate potential uses of BIM and based on the results, develop standards for internal and consultant use of BIM to support WTD's AMP	Shaun O'Neil	Alden Wyma (Asset Manager)	Mid-term Action	1.4) Information Systems	1j) Design an Asset Management Information System (AMIS)	Not Started	After DMS project
ACT_119		Develop Road Map to Implement "Smart" P&IDs	Develop a road map to implement "Smart" P&IDs for WTD facilities including the incorporation of criticality criteria into the P&IDs, which will be developed into the future		Alden Wyma (Asset Manager)	Long-term Action	1.4) Information Systems	1j) Design an Asset Management Information System (AMIS)	Not Started	
ACT_120	200	Define and map the relationships of all Asset Management systems	All Asset Management systems integrated and mapped	Doug Neal, Shaun O'Neil, Devin Barnes, John Conway	Alden Wyma (Asset Manager)	Near-term action	1.4) Information Systems	1j) Design an Asset Management Information System (AMIS)	Work Contract is underway and staffed	After Renewal Needs Planning Action Items

Asset Management Work Plan

Work Plan ID	Staffing Time Estimate (Hours)	Action Item	Target Outcomes	Other Key Staff	Lead	Time Frame	Aligned SAMP Objective	Aligned SAMP Strategy	Status and Characterization of Staff needs	Sequencing
ACT_121	100	Improve Asset Register Synchronization Between GIS, Mainsaver, and Granite XP	Registers of transactional, spatial and time databases are synchronized		Dave Jurgens (Operations)	Mid-term Action	1.4) Information Systems	1j) Design an Asset Management Information System (AMIS)	Not currently underway; considered for DMS project and CMMS Upgrade	To be completed just after ACT_113 and ACT_114
ACT_122	160	Standardize Procedure for GIS Updates	Standardize Procedure for GIS Updates		Shaun O'Neil (GIS Lead)	Near-term action	1.4) Information Systems	1j) Design an Asset Management Information System (AMIS)	In progress & Fully staffed	
ACT_124	2,000	GIS integration with other systems	Integrating GIS with PI, CCTV, CMMS, and GraniteXP		Shaun O'Neil (GIS Lead)	Mid-term Action	1.4) Information Systems	1j) Design an Asset Management Information System (AMIS)	Not currently underway or staffed	
ACT_125	500	Implement Technology Governance Policies	KCIT governance policies meet needs of AMIS; determination and documentation of responsibilites of KCIT with WTD IT infrastructure	Alden Wyma	TBD	Mid-term Action	1.4) Information Systems	1k) Create an IT architecture that integrates asset management data across WTD	To be revisited in 2019	
ACT_126	1,000	Information Technology Master Plan for WTD	Vision and direction for WTD IT set and actions identified to work toward vision	Alden Wyma	TBD	Mid-term Action	1.4) Information Systems	1k) Create an IT architecture that integrates asset management data across WTD	To be revisited in 2019	
ACT_128	500	Develop interdependency mapping of IT infrastructure across WTD	All software and databases in WTD IT are mapped and understood Answer the question: "What services are being provided by KCIT?"	Doug Neal, Shaun O'Neil, Devin Barnes	Alden Wyma (Asset Manager)	Mid-term Action	1.4) Information Systems	1k) Create an IT architecture that integrates asset management data across WTD	Not currently underway; work has begun to characterize IT systems (outside Asset Management Work Plan)	Can be done with ACT_120
ACT_201	200	Establish and Track Service Level KPIs	Establish Service Level KPIs that are capable of justifying capital projects to address aging infrastructure; e.g., miles of failed assets (conveyance), %/quantity of poor condition Criticality 1 and Criticality 2 assets (treatment plants/lift stations).	Support from consultant	Alden Wyma (Asset Manager)	Mid-term Action	2.1) Risk Assessment Framework	2a) Assign levels of service to critical assets and asset classes	In progress; part of Portfolio Management; due by next biennial budget	
ACT_202	200	Articulate the connection between levels of service and the corresponding Key Performance Indicators	Show each of the KPIs and how they are relating to our levels of service		Alden Wyma (Asset Manager)	Mid-term Action	2.1) Risk Assessment Framework	2a) Assign levels of service to critical assets and asset classes	Not currently underway or staffed	
ACT_203	1,000	Identify Critical Power Infrastructure	Infrastructure without bypass power sources have not been consistently identified for critical assets. Identify power infrastructure that has no redundancy or ability to bypass in a timely fashion in stations without adequate storage capacity.		Radiel Tumbokon (Engineering Supervisor)	Long-term Action	2.1) Risk Assessment Framework	2b) Define and assign criticality of WTD assets	Not currently underway or staffed	
ACT_204	100	Ensure consistency between criticality and risk ratings of assets between vertical and linear assets	All assets and decision-making criteria of assets (including Captial Portfolio Management) use the same scale and rating for all disciplines	Donna Lund	MBP Program	Mid-term Action	2.1) Risk Assessment Framework	2b) Define and assign criticality of WTD assets	Not currently underway or staffed	To be completed in coordination with Portfolio Management development
ACT_205	200	Define and document resiliency response plan for linear assets	Use resiliency plan information to communicate process of responding to linear asset failure		Alden Wyma (Asset Manager)	Mid-term Action	2.1) Risk Assessment Framework	2b) Define and assign criticality of WTD assets	Not currently underway or staffed	After criticality rating completion
ACT_206	500	Quantify System Risk and Link to Investment Levels	Implement a process and program to assess likelihood of failure (LOF) and consequence of failure (COF) to quantify asset risk for all critical (level 1 & 2) assets	Reliability Engineers, CIFM	Alden Wyma (Asset Manager)	Mid-term Action	2.1) Risk Assessment Framework	2c) Incorporate Risk Assessment to Decision Making Framework	In progress	Can only be performed after ACT_113, ACT_114, and ACT_206
ACT_207	500	Risk Mitigation on Critical Linear Assets	Develop a condition monitoring strategy or a plan to create redundancy for critical linear assets where bypass is not feasible.		Abraham Araya (CIFM Supervisor)	Near-term action	2.1) Risk Assessment Framework	2c) Incorporate Risk Assessment to Decision Making Framework	In progress	

Asset Management Work Plan

Work Plan ID	Staffing Time Estimate (Hours)	Action Item	Target Outcomes	Other Key Staff	Lead	Time Frame	Aligned SAMP Objective	Aligned SAMP Strategy	Status and Characterization of Staff needs	Sequencing
ACT_208	500	Develop an Updated Risk Assessment Framework	Review, update, and leverage existing risk data to create an updated risk assessment framework for both conveyance and facility assets.	AMSC	Alden Wyma (Asset Manager)	Mid-term Action	2.1) Risk Assessment Framework	2c) Incorporate Risk Assessment to Decision Making Framework	Not currently underway or staffed	Must be done before ACT_206
ACT_209	1,000	Identify Critical Spare Parts and Means to Acquire	All obsolete parts eliminated from storage Update specification to designate critical spare parts for critical equipment, as well as preferential spare parts	Bo Vestergaard-Hansen, Reliability Engineers	Hub Diehl (Reliability Engineer)	Near-term action	2.2) Procurement and Spare Parts Improvements	2d) Determine processes and procedures for critical spares and equipment	In progress, particularly in removing obsolete parts. Needs coordination with Technical Standards Committee	to be completed after ACT_101 and ACT_113 Can be done at same time as ACT_210
ACT_210	100	Develop Bill of Materials (BoM) for critical equipment that includes a gatekeeper for information	Update specification for Bill of Materials (BoM) for critical equipment that includes a gatekeeper for information	Bo Vestergaard-Hansen, Reliability Engineers	Alden Wyma (Asset Manager)	Near-term action	2.2) Procurement and Spare Parts Improvements	2d) Determine processes and procedures for critical spares and equipment	Not currently underway or staffed	Can be done at same time as critical spare spec
ACT_211	500	Evaluate vendor options for spare parts and create linkage from new parts purchased and new vendor in CMMS	Evaluate vendor options for spare parts and create linkage from new parts purchased and new vendor in CMMS	Devin Barnes, Doug Neal	Dave Jurgens (Operations)	Long-term Action	2.2) Procurement and Spare Parts Improvements	2d) Determine processes and procedures for critical spares and equipment	Not currently underway	
ACT_212	500	Develop logistics procedure for spare parts inventory	Determine methods for continuing library maintenance and updates to critical spare parts	Devin Barnes, Doug Neal	Dave Jurgens (Operations)	Long-term Action	2.2) Procurement and Spare Parts Improvements	2e) Develop spare parts inventory and management of acquisition of spare parts	Not currently underway	
ACT_213	500	Modify Procurement Procedures to Facilitate Equipment Standardization	Defining a Bill of Materials for high-criticality assets and linking to the asset record in the CMMS (Not necessarily targeting changing the low-bid environment) Reliability engineers involved in procurement process.		Ron Dietze (WP Reliability Engineer)	Mid-term Action	2.2) Procurement and Spare Parts Improvements	2d) Determine processes and procedures for critical spares and equipment	This currently exists for some assets. Work is underway to complete for entirity of high-criticality assets. 2019-2020	Done after ACT_214
ACT_214	500	Revisit technical standards and specifications to standardize sources of equipment	Sources of equipment standardized for AMP Procurement process revisits contracts on equipment outside of contracted vendor Explore contracts independent of County-wide contract options		Hub Diehl (Reliability Engineer)	Mid-term Action	2.2) Procurement and Spare Parts Improvements	2d) Determine processes and procedures for critical spares and equipment	This item is similar to HDR 57, and is more accessible	
ACT_215	500	Determine standard operating procedure for acquisition of spare parts	SOP for spare parts documented	Devin Barnes, Doug Neal	Dave Jurgens (Operations)	Long-term Action	2.2) Procurement and Spare Parts Improvements	2e) Develop spare parts inventory and management of acquisition of spare parts	Not currently underway or staffed	
ACT_216	100	Develop additional work items and strategic direction for MBP program as needed and include in future SAMP updates	MBP program rolled into asset management Work Plan	Alden Wyma	John Conway (comprehensive planning/asset management)	Near-term action	2.2) Maintenance Best Practice (MBP)	2f) Update 2015 MBP Strategic Plan	Not currently underway. New staff required	
ACT_217	100	Review 2015 MBP Strategic Plan and track progress			John Conway (comprehensive planning/asset management)	Near-term action	2.3) Maintenance Best Practice (MBP)	2f) Update 2015 MBP Strategic Plan	Not currently underway. New staff required	
ACT_218	1,000	Inspection and Maintenance Program for Facility Pipelines, Buildings, and Structures	Establish a condition assessment schedule and PM frequency for facility pipelines assets, buildings, and structures. Determine once an issue is identified in an asset in a building envelope, a procedure to transfer item into Renewal & replacement needs	Dave Jurgens, Reliability Engineers, Industrial Maintenance, Planner Schedulers	Alden Wyma (Asset Manager)	Mid-term Action	2.3) Maintenance Best Practice (MBP)	2g) Continue incorporation of MBP to ensure continuous improvement and standardized approach to maintenance	Inspection and maintenance currently performed; updates to program to be started by 2020	To be started after the completion of ACT_109
ACT_219	1,000	Develop KPI to measure spending on asset management is minimizing system risk	Being able to communicate the risk of aging infrastructure against the spending on asset management		Alden Wyma (Asset Manager)	Long-term Action	2.3) Maintenance Best Practice (MBP)	2g) Continue incorporation of MBP to ensure continuous improvement and standardized approach to maintenance	Not currently underway; requires further development of asset registry and risk assessment framework	Need to complete risk assessment framework
ACT_220	500	Develop Process to Link PdM Inspection Data to Assets	Develop a process for trending inspection data of assets to enhance PdM program; recommendation should also integrate PdM results into each asset's overall condition record.		Hub Diehl (Reliability Engineer)	Near-term action	2.3) Maintenance Best Practice (MBP)	2h) Refine predictive maintenance program implementation	No staff allocated or resourced	To be completed after ACT_113

Asset Management Work Plan

Work Plan ID	Staffing Time Estimate (Hours)	Action Item	Target Outcomes	Other Key Staff	Lead	Time Frame	Aligned SAMP Objective	Aligned SAMP Strategy	Status and Characterization of Staff needs	Sequencing
ACT_221	500	Implement improvements to vibration management program	Develop a process for vibration testing data of assets to enhance PdM program. Integrate vibration testing results into each asset's overall condition record in CMMS	Ron Dietze, Dave Jurgens	Hub Diehl (Reliability Engineer)	Near-term action	2.3) Maintenance Best Practice (MBP)	2h) Refine predictive maintenance program implementation	No staff currently allocated or resourced	
ACT_222	500	Efficiency Testing on High Energy Demand Assets	Perform efficiency and performance testing for assets with high energy demand, with the ultimate goal of effectively spending energy use		Carl Grodnik (energy lead)	Mid-term Action	2.3) Maintenance Best Practice (MBP)	2h) Refine predictive maintenance program implementation	Not Currently underway or staffed	
ACT_223	500	Implement improvements oil testing results program	Develop a process for trending oil testing data of assets to enhance PdM program. Integrate oil testing results into each asset's overall condition record in CMMS	Ron Dietze, Dave Jurgens	Hub Diehl (Reliability Engineer)	Near-term action	2.3) Maintenance Best Practice (MBP)	2h) Refine predictive maintenance program implementation	Piloting program at Brightwater and South due to wi-fi capabilities	
ACT_224	1,000	Implement thermal imaging technologies for predictive maintenance	Develop a program to perform thermal imaging testing. Integrate thermal imaging results into each asset's overall condition record in CMMS	Ron Dietze, Dave Jurgens	Hub Diehl (Reliability Engineer)	Mid-term Action	2.3) Maintenance Best Practice (MBP)	2h) Refine predictive maintenance program implementation	Program exists, improvements not currently underway	
ACT_225	200	Develop formal safety Valve management program for vertical facilities	Expand the current preventive maintenance program for ARVs inside vertical facilities. Track maintenance activities in Mainsaver.		Alden Wyma (Asset Manager)	Mid-term Action	2.3) Maintenance Best Practice (MBP)	2i) Evaluate equipment performance and adjust operational strategies	Assessing need for systematic program is currently underway	
ACT_226	1,000	Formal Process for Failure Modes and Effects Analysis	Develop a formal process for evaluating and documenting failure modes and effects. Include in specifications that contractors/vendors provide a list of failure definitions for equipment.	Reliability Engineers	Alden Wyma (Asset Manager)	Long-term Action	2.3) Maintenance Best Practice (MBP)	2i) Evaluate equipment performance and adjust operational strategies	Not currently underway or staffed	
ACT_227	200	Guidance for O&M Manual Update	Develop guidance and process for updating O&M manuals. The new CMMS will allow for updates to manuals to be mandatory, and link the Manuals to Work Orders	Technical publication library group	Alden Wyma (Asset Manager)	Long-term Action	2.3) Maintenance Best Practice (MBP)	2i) Evaluate equipment performance and adjust operational strategies	Not currently underway or staffed	Completed after CMMS Replacement
ACT_229	500	Motor circuit monitoring for high criticality assets	Trend data for large motors and track performance, particularly for offsite facilities		Hub Diehl (Reliability Engineer)	Mid-term Action	2.3) Maintenance Best Practice (MBP)	2i) Evaluate equipment performance and adjust operational strategies	Not currently underway or resourced	To be completed after completiuon of Ovation upgrade
ACT_230	200	Develop Contingency Plans for Assets with Limited Access	Two elements of work: - For existing assets, determine long-term strategy to improve access if feasible, coordinated with ongoing efforts with CIFM. Develop contingency plans and risk mitigation measures. - Design access to assets to perform inspection and maintenance during new project design. Assess risk associated with assets having limited access for inspection.	Abraham Araya	Bo Vestergaard-Hansen (Engineering)	Mid-term Action	2.3) Maintenance Best Practice (MBP):	2i) Evaluate equipment performance and adjust operational strategies	Not currently underway or staffed	
ACT_231	500	Develop and incorporate condition code into end-of-useful life calculation for renewal needs	Include condition code to describe the end of life and integrate condition code into end-of-life forecasting. Create trigger to use condition codes when a failure occurs in an asset to determine root cause of failure.	Tom Pann	Alden Wyma (Asset Manager)	Mid-term Action	2.4) Renewal Needs Planning	2j) Develop process to identify asset renewal needs	In Progress	
ACT_232	500	Use condition codes to improve accuracy to renewal needs cost forecasting	Improve the long-term renewal forecasting process to improve accuracy of the Life Cycle Forecast Tool in Bi-Cycle. Consider cost/benefit of generating a forecast for all assets/asset classes, and the level of detail or "robustness" for forecasts based on criticality.		Alden Wyma (Asset Manager)	Long-term Action	2.4) Renewal Needs Planning	2j) Develop process to identify asset renewal needs	In Progress	
ACT_233	500	Develop guidelines and optimize data collection for renewal decision-making of vertical assets based on risk	Specify data and process that will be used to make key asset management decisions, and optimize data collection to support that process.	Alden Wyma, Donna Lund	Portfolio management Vertical asset group	Near-term action	2.4) Renewal Needs Planning	2j) Develop process to identify asset renewal needs	In progress	

Asset Management Work Plan

Work Plan ID	Staffing Time Estimate (Hours)	Action Item	Target Outcomes	Other Key Staff	Lead	Time Frame	Aligned SAMP Objective	Aligned SAMP Strategy	Status and Characterization of Staff needs	Sequencing
ACT_234	2,000	Optimize Collection of Renewal Decision Data for linear assets	Specify data and process that will be used to make key asset management decisions, and optimize data collection to support that process.		Abraham Araya (CIFM Supervisor)	Near-term action	2.4) Renewal Needs Planning	2j) Develop process to identify asset renewal needs	In progress; new staff required for CIFM	
ACT_235	500	Optimize Collection of Renewal Decision Data for facilities	Specify data and process that will be used to make key asset management decisions for building envelopes, and optimize data collection to support that process		Bryon Slatten (Facilities Group)	Mid-term Action	2.4) Renewal Needs Planning	2j) Develop process to identify asset renewal needs	In progress; implementation requires PfM completion; staff allocation of facilities group contigent on PfM program decisions	To be completed after ACT_109
ACT_236	500	Develop Framework for Identifying R&R Needs	Develop framework for identifying asset R&R needs based on risk, condition, and other criteria, and inform budget with needs	Caitlyn Hall	Alden Wyma (Asset Manager)	Near-term action	2.4) Renewal Needs Planning	2j) Develop process to identify asset renewal needs	In progress; working with consultant	Foundational to AMP; identified as Early Action Item
ACT_237	500	Process to Review and Update Replacement Cost Assumptions	Implement a process and criteria for triggering review of replacement costs and tracking the date of the latest replacement cost estimate. Continuing to increase efectiveness of asset replacement costs	Donna Lund	Alden Wyma (Asset Manager)	Mid-term Action	2.4) Renewal Needs Planning	2k) Establish renewal criteria for assets	In progress	Critical to success of renewal needs forecasting; Must be completed following renewal decision data work item
ACT_238	600	Tools for Conveyance Renewal Decision Support - CIFM	Develop decision support tools to analyze inspection and GIS data and apply repair and renewal decision guidelines to support decision-making for conveyance asset remediation.		Abraham Araya (CIFM Supervisor)	Near-term action	2.4) Renewal Needs Planning	2k) Establish renewal criteria for assets	In progress; new staff required and requested in 2019-2020 Biennium by CIFM	
ACT_239	700	Tools for Conveyance Renewal Decision Support - GIS	Develop decision support tools to analyze inspection and GIS data and apply repair and renewal decision guidelines to support decision-making for conveyance asset remediation.		Shaun O'Neil (GIS Lead)	Near-term action	2.4) Renewal Needs Planning	2k) Establish renewal criteria for assets	In progress; new staff required and requested in 2019-2020 Biennium by CIFM	
ACT_240	700	Tools for Conveyance Renewal Decision Support - Asset Management Work Group	Develop decision support tools to analyze inspection and GIS data and apply repair and renewal decision guidelines to support decision-making for conveyance asset remediation.		Alden Wyma (Asset Manager)	Near-term action	2.4) Renewal Needs Planning	2k) Establish renewal criteria for assets	In progress; new staff required and requested in 2019-2020 Biennium by CIFM	
ACT_301	200	Guidance and training for life cycle cost analysis tools	All applicable staff in PPD has understanding of data required and provide appropriate data to LCCA team.		Mika Petaia (Finance)	Near-term action	3.1) Life Cycle Cost Management	3a) Implement life cycle cost analysis into new capital projects	Currently underway and staffed	
ACT_302	500	Process to update asset class assumptions for useful life	Implement a process for updating the overall assumption for Original Useful life assumption for asset classes, based on information on an individual asset	John Conway?	Alden Wyma (Asset Manager)	Mid-term Action	3.1) Life Cycle Cost Management	3b) Incorporate existing asset's useful life and life cycle cost into new capital projects at the asset level	Not currently underway or staffed	To be completed after ACT_303
ACT_303	200	Process to assess and track asset- level adjustments to remaining useful life	Implement a process for assessing and tracking adjustments to a specific asset's "Evaluated Remaining Useful Life" based on condition assessment findings.		Alden Wyma (Asset Manager)	Near-term action	3.1) Life Cycle Cost Management	3b) Incorporate existing asset's useful life and life cycle cost into new capital projects at the asset level	Process in place	Tied to ACT233, ACT_234, ACT_235, and ACT_236. Must be completed after those items
ACT_304	200	Assessment and review of capital and operations data for an asset to inform life cycle cost Process	A project team will use field operations and capital cost and performance data when making LCCA decisions on capital projects.		Mika Petaia (Finance)	Long-term Action	3.1) Life Cycle Cost Management	3c) Use asset operations data to inform the lifecycle cost for an asset	Not currently underway or staffed	

Asset Management Work Plan

Work Plan ID	Staffing Time Estimate (Hours)	Action Item	Target Outcomes	Other Key Staff	Lead	Time Frame	Aligned SAMP Objective	Aligned SAMP Strategy	Status and Characterization of Staff needs	Sequencing
ACT_305	500	Develop Guidance for incorporating cost of rehabilitation into Life Cycle Cost Forecasts	Develop guidance for how to factor rehabilitation costs into long term cost forecasts. Operating costs, parts and rehabilitation costs are incorporated consistently in the LCCA model.	Alden Wyma	Mika Petaia (Finance)	Mid-term Action	3.1) Life Cycle Cost Management	3c) Use asset operations data to inform the lifecycle cost for an asset	Not currently underway or staffed	To be completed after ACT_301
ACT_306	500	Develop KPI to demonstrate O&M activities include financial data	Measure effectiveness of renewal needs forecasting and Operations and maintenance of assets outside of the capital program		Alden Wyma (Asset Manager)	Near-term action	3.2) Funding sources for asset management	3d) Review, improve, and coordinate process to align asset management decision-making with current county and WTD budget cycle	Currently Underway; Work Order Contract procured to develop KPIs	
ACT_307	200	Coordinate detailed maintenance budget information to meet budget cycle process	O&M and AMP needs are provided to operations budget on the timeline defined by the County Budget Cycle Using risk assessment framework to determine replacement/repair of assets, and process to align observed asset needs as identified O&M staff with the risk assessment framework	REs and Plant Managers	Kim Charles (Finance Officer)	Near-term action	3.2) Funding sources for asset management	3d) Review, improve, and coordinate process to align asset management decision-making with current county and WTD budget cycle	Not currently underway	To be completed before the 2020/2021 Biennium
ACT_308	200	Updates to a predictive renewal of the assets on a quarterly basis	New CMMS will provide regular data for planning of asset replacement/repair and labor costs for operations budgeting	REs and Plant Managers	Danita Carter (Finance Officer)	Mid-term Action	3.2) Funding sources for asset management	3d) Review, improve, and coordinate process to align asset management decision-making with current county and WTD budget cycle	Not currently underway or staffed	This item should be coordinated with the CMMS Upgrade
ACT_309	200	Develop narrative to relate operating budget to maintenance needs	Writing down justification of operating budget for maintenance of items, using risk assessment framework Engineering and O&M coordinate programs (follow procedures of VFD program) Set up review of following year's work (3Q) and all forecasted projects and determine capitalization potential		Hub Diehl (Reliability Engineer)	Near-term action	3.2) Funding sources for asset management	3d) Review, improve, and coordinate process to align asset management decision-making with current county and WTD budget cycle	Not currently underway or resourced	To be completed after Risk Assessment Framework
ACT_310	200	Develop process for "fast-tracking" process for CAMPs projects that need project planning support	Intermediate step for projects that are small and need planning support but do not need to go thru the entire Capital Planning Process		Alden Wyma (Asset Manager)	Mid-term Action	3.2) Funding sources for asset management	3d) Review, improve, and coordinate process to align asset management decision-making with current county and WTD budget cycle	Not currently underway or staffed	
ACT_311	500	Analyze feasibility of alternative budget building methodologies and determine preferred method	Explore alternatives to cost plus budget methods for more accurate budgets	Asset Management staff and operating staff	Finance team	Long-term Action	3.2) Funding sources for asset management	3e) Define budget needs from asset level to inform capital improvement program	Not currently underway or staffed	Will be accomplished after budget cycle work items
ACT_312	200	Document procedures to provide information to portfolio management	Portfolio management ranking criteria and decision-making is coordinated with portfolio management, and the link to the two work groups is articulated. Procedures will be ensured thru New Project Request Form	Asset Management sub-portfolio	Alden Wyma (Asset Manager)	Near-term action	3.2) Funding sources for asset management	3f) Ensure alignment of capital portfolio management needs with asset management program	Currently Underway with the Capital Porftolio Management Effort	
ACT_313	200	Ensure asset replacements are submitted into new project request form inventory	All asset managment projects go thru a new project request form. Qualifying projects go thru the Captial Portfolio Management Process	Asset Management sub-portfolio	Alden Wyma (Asset Manager)	Near-term action	3.2) Funding sources for asset management	3f) Ensure alignment of capital portfolio management needs with asset management program	Currently Underway with the Capital Porftolio Management Effort	To be completed after ACT_312
ACT_314	500	Regularly review criteria for asset management sub-portfolio to reflect priorities	Regular reviews of the asset management sub-portfolios, measuring the effectiveness of the asset management plant category of portfolio management using KPIs	Asset Management sub-portfolio	Alden Wyma (Asset Manager)	Mid-term Action	3.2) Funding sources for asset management	3f) Ensure alignment of capital portfolio management needs with asset management program	Not currently underway or staffed	To be completed after ACT_312 and ACT_313
ACT_401	500	Update Project Management, Construction Management and Engineering manuals with new SOPs, workflows and AM deliverables checklist.	Project management, construction management and engineering have up-to-date asset management policies and procedures in their specifications and manuals	Alden Wyma, Donna Lund	Todd Smith (asset management staff)	Mid-term Action	4.1) Internal Communication	4a) Communicate application of work of the asset management program to each WTD staff member	Not currently underway or staffed	To be completed after foundational priorities list in SAMP
ACT_402	100	Design and implement an Asset Management training program	Applicable staff know and understand role in the asset management program.		Alden Wyma (Asset Manager)	Mid-term Action	4.1) Internal Communication	4a) Communicate application of work of the asset management program to each WTD staff member	Not currently underway or staffed	After ACT_403

Asset Management Work Plan

Work Plan ID	Staffing Time Estimate (Hours)	Action Item	Target Outcomes	Other Key Staff	Lead	Time Frame	Aligned SAMP Objective	Aligned SAMP Strategy	Status and Characterization of Staff needs	Sequencing
ACT_403	500	Develop an internal AMP Communication Plan	Work with Communications professionals to develop an AMP communication plan with messaging as well as internal communication initiatives		Rachael Hartman (Communications Specialist)	Near-term action	4.1) Internal Communication	4b) Develop internal communication Plan	In progress and staffed	Occurs prior to internal communcation
ACT_404	500	Develop Process Workflows for Renewal Needs Identification and Delivery	Create detailed-level business process workflows for facility and process and horizontal (pipelines) asset renewal needs assessment, prioritization, selection, project identification, etc., through project delivery.		Alden Wyma (Asset Manager)	Near-term action	4.1) Internal Communication	4c) Implement process workflows as internal communication tools	In progress and staffed	
ACT_405	500	Create dashboard to show progress of asset management work plan items	Dashboard created and used to determine success on projects	John Conway	Donna Lund (asset management staff)	Near-term action	4.1) Internal Communication	4c) Implement process workflows as internal communication tools	In progress and staffed	
ACT_406	200	Develop process workflows for treatment plant asset management information, how it is prioritized, and how decisions are made from these data	Create detailed-level business process workflows for treatment plant asset management information		Alden Wyma (Asset Manager)	Mid-term Action	4.1) Internal Communication	4c) Implement process workflows as internal communication tools	Not currently underway or staffed	
ACT_407	200	Develop process workflows for new project request form process	Create detailed-level business process workflows for 01 78 40A form use		Alden Wyma (Asset Manager)	Mid-term Action	4.1) Internal Communication	4c) Implement process workflows as internal communication tools	Not currently underway or staffed	
ACT_408	200	Develop process workflows for SAMP workflow and Work Plan template	Create detailed-level business process workflows for updating SAMP		Alden Wyma (Asset Manager)	Mid-term Action	4.1) Internal Communication	4c) Implement process workflows as internal communication tools	Not currently underway or staffed	
ACT_409	200	Develop process workflows for visualization of the definitions and applications of assets versus facilities versus equipment	Create detailed-level business process workflows for visualizations of assets and asset classes		Alden Wyma (Asset Manager)	Mid-term Action	4.1) Internal Communication	4c) Implement process workflows as internal communication tools	Not currently underway or staffed	
ACT_410	200	Develop process workflows for DMS connections between an as-built drawing, facility drawing, and record drawing	Create detailed-level business process workflows for DMS connections		Alden Wyma (Asset Manager)	Mid-term Action	4.1) Internal Communication	4c) Implement process workflows as internal communication tools	Not currently underway or staffed	
ACT_411	200	Develop process workflows for facility drawing maintenance	Create detailed-level business process workflows for facility drawing update processes		Alden Wyma (Asset Manager)	Mid-term Action	4.1) Internal Communication	4c) Implement process workflows as internal communication tools	Not currently underway or staffed	
ACT_412	200	Develop process workflows for preventive maintenance core work process mapping	Create detailed-level business process workflows for maintenance core work so that staff in and out of O&M understand processes		Alden Wyma (Asset Manager)	Mid-term Action	4.1) Internal Communication	4c) Implement process workflows as internal communication tools	Not currently underway or staffed	
ACT_413	500	Develop an external AMP Communication Plan	Work with Communications professionals to develop an AMP communication plan with messaging as well as external communication initiatives. Consider engaging external stakeholders and developing customer-facing service level measures. Determine standard information for MWPAAC	Steve Hirschey, John Conway	Rachael Hartman (Communications Specialist)	Near-term action	4.2) External Communication	4d) Develop external communication Plan	In progress and staffed	
ACT_501	500	Create and follow benchmarking for AM Governance with KPIs	Implement a management review process to review the asset management program implementation and effectiveness annually or at minimum biennially. This will involve KPIs that are dervied from agreed Level of Service targets	Alden Wyma	Bruce Kessler (assistant Division Director)	Mid-term Action	5.1) Asset Management Steering Committee (AMSC):	5a) AMSC reviews KPIs of Asset Management Program on a periodic basis	In progress and staffed	
ACT_502	100	Resourcing Strategy for Drawing Management	Identifying key roles, duties, and responsibilities in managing documents in DMS.		Alden Wyma (Asset Manager)	Near-term action	5.2) Resourcing Strategy	5b) Staff and resource asset management to complete the tasks in the Asset Management Work Plan	In progress and staffed	

Asset Management Work Plan

Work Plan ID	Staffing Time Estimate (Hours)	Action Item	Target Outcomes	Other Key Staff	Lead	Time Frame	Aligned SAMP Objective	Aligned SAMP Strategy	Status and Characterization of Staff needs	Sequencing
ACT_503	100	Resourcing Strategy for Asset Registry Validation	Determine the optimal timeline for performing an asset registry validation. Then evaluate the resources necessary to achieve the timeline. This is a foundational piece to an AMP.		Todd Smith (asset management staff)	Near-term action	5.2) Resourcing Strategy	5b) Staff and resource asset management to complete the tasks in the Asset Management Work Plan	Complete	
ACT_504	100	Resourcing Strategy for Conveyance Pipeline Asset Management	Assign/clarify responsibilities for conveyance pipeline asset management tasks.		Abraham Araya (CIFM Supervisor)	Near-term action	5.2) Resourcing Strategy	5b) Staff and resource asset management to complete the tasks in the Asset Management Work Plan	Complete	
ACT_505	100	Workload estimate and staffing/resourcing plan for asset management work group	Create a workload estimate for WTD AMP activities and Staffing/Resourcing Plan aligned with asset management strategy implementation objectives		Alden Wyma (Asset Manager)	Near-term action	5.2) Resourcing Strategy	5b) Staff and resource asset management to complete the tasks in the Asset Management Work Plan	In progress and staffed	
ACT_506	200	Resourcing Strategy for Programmatic Condition Assessment of Vertical Assets	Determine the resources required to support a programmatic condition assessment program for vertical assets, and engage additional support if required.	O&M Staff, Alden Wyma	Tom Pann (Bi-Cycle Specialist)	Mid-term Action	5.2) Resourcing Strategy	5b) Staff and resource asset management to complete the tasks in the Asset Management Work Plan	Not currently underway or staffed	After ACT_107 is completed
ACT_507	200	Develop an Asset Management Implementation Road Map	Develop a multi-year road map for Asset Management improvement activities along with a resourcing plan that reflects available staff resource capacity Prioritization work plan items	John Conway	Alden Wyma (Asset Manager)	Mid-term Action	5.3) Asset Management Planning	5c) Incorporate prioritization of goals and strategies of asset management program and use to prioritize work plan items	In progress and staffed	To be completed after Work Plan dashboard
ACT_508	100	Systemwide comprehensive planning effort incorporates the SAMP into its planning process	Systemwide comprehensive planning effort incorporates the SAMP into its planning process	Steve Tolzman	John Conway (comprehensive planning/asset management)	Mid-term Action	5.4) Integration into other WTD efforts	5d) Systemwide comprehensive planning effort incorporates the SAMP into its planning process	Systemwide Comprehensive Planning currently underway	

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Appendix C
Completed Work Plan Items

The Completed Work Plan Items listed in this appendix show the following information:

- Work Plan ID
- Source of the action item (if applicable). Some of these items were recommended by the *Evaluation of the Wastewater Treatment Division's Strategic Asset Management Plan*, or are a continuation of Work Plan items from previous Strategic Asset Management Plan (SAMP) Updates
- Action Item name, as provided in source.
- Corresponding asset management objective, strategy, and work subject matter strand (used in the 2005 SAMP). These items correspond to how actions were categorized in previous SAMP Reports.
- Note on Status provides any applicable information for each item moving forward. Some items were rolled into 2018 Work Plan Action Items.

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Completed Work Plan Items

Work Plan ID	Source of Action Item (or HDR ID)	Action Item	Aligned SAMP Objective	Aligned SAMP Strategy	Work strand/Target Outcomes	Note on Status
2005_A02	2005 SAMP	Develop performance targets for WTD sections for meeting service levels and productivity gains			Establish Sustainable Levels of Service	Current policy and practice
2005_A03	2005 SAMP	Report regularly on performance against service levels to WTD Director and to MWPAAC as required		Measure and report on performance against service levels to regulators as required. A reporting mechanism will be established to show staff how they have performed each quarter against relevant service levels and performance targets	Establish Sustainable Levels of Service	Current policy and practice
2005_B01	2005 SAMP	Review service levels and align them with customer expectations and regulatory requirements			Updating Process for Levels of Service	Current policy and practice
2005_C01	2005 SAMP	Track and estimate full costs of activities supporting LOS, including overhead, for use in BCEs and benchmarking	The benefits and costs of meeting various service level obligations will be identified and assessed so that customer expectations and the right level of service can be provided at the lowest long-term cost.	Ensure that financial and other systems are in place to track and report on performance and costs of maintaining current service levels.	Cost of Service Expectations	Current policy and practice
2005_C02	2005 SAMP	Track operating costs against budgets for major areas such as treatment plants and collection systems		Establish a good understanding of the future costs associated with operating, maintaining, refurbishing, and replacing assets and include them in a long-term financial projection.	Cost of Service Expectations	Current policy and practice
2005_C03	2005 SAMP	Track O&M costs against asset identification numbers where required to assess the right level and frequency of O&M activities		Investigate the impact on customers and the environment when poor performance, such as overflows or backups, take place to learn of actual impacts and costs associated with different levels of service.	Cost of Service Expectations	Current policy and practice
2005_C04	2005 SAMP	Collect data on component costs to estimate marginal costs of changing service levels when considering changes in service levels		Monitor service levels and information on community impacts and costs; develop a range of options for abating and ameliorating the impacts through operational, maintenance, and capital works responses; formulate best mix of actions with stakeholder input.	Cost of Service Expectations	Current policy and practice
2005_C05	2005 SAMP	Collect data on full costs of various activities to compare the cost of providing services in-house to providing through the private sector		Continue to meet with regulators to provide input on costs and benefits of different options to help regulatory agencies make decisions that balance customer expectations with economic, social, and environmental costs.	Cost of Service Expectations	Current policy and practice
2005_D01	2005 SAMP	Continue current planning process for meeting future demands and statutory requirements	Prepare plans that meet future demand for services to efficiently meet that demand and comply with statutory requirements		Future Demands	Implemented in program
2005_E01	2005 SAMP	Develop performance targets to track compliance with statutory requirements	Work with regulators to achieve sound social, environmental, and economic outcomes for its communities.		Regulatory Interface	Implemented in Division
2005_E02	2005 SAMP	Track costs for compliance with new statutory requirements and evaluate for various levels of annual activity			Regulatory Interface	Implemented in Division

Completed Work Plan Items

Work Plan ID	Source of Action Item (or HDR ID)	Action Item	Aligned SAMP Objective	Aligned SAMP Strategy	Work strand/Target Outcomes	Note on Status
2005_E03	2005 SAMP	Continue working with regulators to achieve sound social, environmental, and economic outcomes for communities			Regulatory Interface	Incorporated into goals of Division
2005_E04	2005 SAMP	Adopt easily understandable format for reporting to MWPAAC and the public on performance against service levels			Regulatory Interface	No change in current business practices is required
2005_F01	2005 SAMP	Provide reports on performance in an easily understandable format; make the same information available to the public through the Web and other means	Keep stakeholders informed of performance against service levels and long-term costs targets to ensure WTD reputation and ability to influence future levels of service	Develop a comprehensive communications strategy that includes open and frequent communication and special initiatives for proactively communicating on special regulatory or service level issues.	Internal and External Communications	Current policy and practice
2005_F02	2005 SAMP	Frequently distribute data comparing service level targets with actual performance			Internal and External Communications	Current policy and practice
2005_F03	2005 SAMP	Maintain excellent relationships with key stakeholders			Internal and External Communications	Current policy and practice
2005_F04	2005 SAMP	Maintain feedback mechanisms on stakeholder communications and ways of improving performance			Internal and External Communications	Current policy and practice
2005_F05	2005 SAMP	Identify communications roles and responsibilities			Internal and External Communications	Current policy and practice
2005_G01	2005 SAMP	Identify activities that can be readily compared with private sector activities	Improve efficiency of service by 2010 to become competitive with the private sector in terms of costs, risk control, and quality of services delivered		Competitiveness	Completed. May be considered again in the future
2005_G02	2005 SAMP	Set up a costing system to implement and integrate activity-based costing throughout WTD; train staff to provide input to the system		Perform planning, O&M, design and installation activities in a way that provides the best value for money and does not expose WTD to unacceptable risks.	Competitiveness	No longer applicable
2005_G03	2005 SAMP	Calculate costs of undertaking various activities and compare them with benchmarked private rates		Carry out benchmarking activities and comparative performance assessment on various components of WTD's business activities and pursue continuous improvement.	Competitiveness	No longer applicable
2005_G04	2005 SAMP	Focus on being cost competitive		Align the cost of conducting various activities	Competitiveness	No longer applicable
2005_H01	2005 SAMP	Establish goals and objectives associated with the risk program, including the acceptable level and type of risk related to delivering the expected level of service		Analyze how WTD assets operate to identify how WTD might fail to deliver its expected level of service. Identify failure modes for assets associated with delivering primary levels of service. Document high-level failure modes, those that directly impact WTD's primary levels of service. Document lower level failure modes that can result in high-level failure modes	Risk Management	Incorporated into 2018 SAMP Update

Completed Work Plan Items

Work Plan ID	Source of Action Item (or HDR ID)	Action Item	Aligned SAMP Objective	Aligned SAMP Strategy	Work strand/Target Outcomes	Note on Status
2005_H02	2005 SAMP	Assign responsibilities for identifying asset failure risks across all sections	WTD will understand risk in order to plan for impacts of an event, including potential failure events that could have an effect on achievement of service levels, legal compliance, regulatory requirements, financial obligations, and other business objectives. The risks associated with these failure modes define the risk profile.		Risk Identification	Completed in 2013 criticality study
2005_H03	2005 SAMP	Determine the level of detail needed for identifying these risks			Risk Identification	Completed in 2013 criticality study
2005_H04	2005 SAMP	Identify high level failure modes affecting delivery of level of service.			Risk Identification	Completed in 2013 criticality study
2005_H05	2005 SAMP	Document mechanisms by which high-level failure modes can occur			Risk Identification	Completed in 2013 criticality study
2005_H06	2005 SAMP	Assign a level of consequence to each failure mode	Risks will be analyzed to determine the likelihood and consequence of each identified risk and the magnitude of the risk.	Analyze the likelihood and consequences of failure of identified events and rank these events by magnitude of failure; quantify risks	Risk Analysis	May be considered in the future
2005_H07	2005 SAMP	For failure modes with a history of occurrence, use records to establish the likelihood of failure per year.			Risk Analysis	Incorporated in responsibilities of Reliability Engineer
2005_H08	2005 SAMP	For failure modes with no history, establish likelihood of failure from sources such as manufacturer reliability data, industry experience, and experienced judgment			Risk Analysis	Incorporated in responsibilities of Reliability Engineer
2005_H09	2005 SAMP	Determine for each risk whether a business case for the mitigation of the risk is possible and whether there is merit in evaluating it.	WTD will rank risks and mitigate risk events when and where a business case supports the mitigation effort.	High level risk events will be ranked and mitigation projects will be identified	Risk Mitigation	Incorporated into program
2005_H10	2005 SAMP	Establish an estimate of the cost to mitigate each risk by reducing the likelihood of occurrence through preventive measures or by reducing the consequences of occurrence through reactive measures like contingency plans.			Risk Mitigation	Incorporated into program
2005_H11	2005 SAMP	For approved risk event mitigation projects, assign responsibility, have funding approved, and evaluate the projects' effectiveness in reducing risk.			Risk Mitigation	Incorporated into program
2005_I01	2005 SAMP	Assign a key performance indicator (KPI) or similar metric to measure the performance of each service level	WTD procedures and processes will continually evolve to support WTD's vision of being the best public wastewater provider.	Each of the defined service levels will have key performance indicators (KPIs) or metrics in order to determine if each service level was met and these metrics will be coordinated with other WTD programs, such as WTD Balanced Scorecard and DNR Report.	Performance Management	Incorporated into program
2005_I02	2005 SAMP	Conduct an annual audit of asset management procedures and processes		Procedures and processes will need to be reviewed and updated to remain effective for the current state of the AM program	Performance Management	Not longer applicable;
2005_J01	2005 SAMP	Ensure that all ongoing costs associated with assets are recorded and maintained in a CMMS or other asset-based systems, and that cost histories are easily reported	Understanding all the costs of asset ownership through analysis of costs at each stage of an asset's life cycle	Estimate lifecycle costs for planned asset acquisitions, including costs of maintenance and operations strategies and rehabilitation and refurbishment plans	Lifecycle Planning	Added to 2018 Work Plan as ACT_109

Completed Work Plan Items

Work Plan ID	Source of Action Item (or HDR ID)	Action Item	Aligned SAMP Objective	Aligned SAMP Strategy	Work strand/Target Outcomes	Note on Status
2005_J02	2005 SAMP	Prepare procedures for updating asset lifecycle estimates during asset operation			Lifecycle Planning	Added to 2018 Work Plan as ACT_304
2005_J03	2005 SAMP	Prepare procedures for periodically comparing planned costs of ownership with actual costs incurred and for taking action when planned costs do not align with incurred costs			Lifecycle Planning	Added to 2018 Work Plan as ACT_304
2005_J04	2005 SAMP	Define the types of costs required for asset-based lifecycle analysis. Establish a repository of estimated costs and assign responsibility for updating it			Lifecycle Planning	Complete
2005_J05	2005 SAMP	Incorporate WTD's standard asset hierarchy in requirements for facility design and construction; ensure that contractor final billings express costs in the same terms and that delivered facility costs are maintained in asset-based systems and transmitted to Finance for financial reporting purposes			Lifecycle Planning	Added to 2018 Work Plan as ACT_102
2005_K01	2005 SAMP	Develop a flow chart that documents the approval process in funding the asset R/R decision	Establish a threshold for which asset decisions require lifecycle cost analysis and establish an approval process for asset decisions below the threshold		Asset Decision-Making	Added to 2018 Work Plan as ACT_404
2005_K02	2005 SAMP	Review the current decision approval methods for projects that do not meet the lifecycle cost analysis threshold to ensure existing methods require appropriate justification for the project.			Asset Decision-Making	Incorporated in Portfolio Management
2005_L01	2005 SAMP	Validate WTD asset financial records; compare with Finance section asset records	To support comprehensive, accurate, and transparent reporting of total life cycle costs	Improve accuracy of asset value and depreciation records	Financial Reporting	Completed
2005_L02	2005 SAMP	Prepare a plan for improving asset financial records			Financial Reporting	Completed
2005_L03	2005 SAMP	Review and improve asset capitalization and retirement process			Financial Reporting	Completed
2005_L04	2005 SAMP	Define financial reporting requirements, including current replacement value of assets, depreciation, estimated costs to maintain asset value and function, funding policies and plans			Financial Reporting	Completed
2005_M01	2005 SAMP	Establish a planning horizon	To support rate forecasting and financial planning through knowledge of WTD's future capital and operating costs.	Use lifecycle planning processes as the foundation for WTD's cost stream forecasting. Develop structured methods to identify and estimate the costs of likely future facilities not part of any current capital budget. Establish methods to estimate organizational costs not associated with specific facilities	Cost Stream Forecasting	Completed; planning horizon is 6 years for CIP and 2 years for budget cycle
2005_M02	2005 SAMP	Ensure that future facilities required by growth and regulatory changes are accounted as part of the facility planning process			Cost Stream Forecasting	Incorporated into program
2005_M03	2005 SAMP	Prepare unit cost estimates, where possible, for various types of projected facilities			Cost Stream Forecasting	Current policy and practice.

King County Wastewater Treatment Division

Completed Work Plan Items

Work Plan ID	Source of Action Item (or HDR ID)	Action Item	Aligned SAMP Objective	Aligned SAMP Strategy	Work strand/Target Outcomes	Note on Status
2005_M04	2005 SAMP	Prepare 30+ year forecasts based on unit cost estimates for new facilities arising from demand growth or regulatory changes			Cost Stream Forecasting	On Hold; done in conveyance as part of CSI program and CSO program
2005_M05	2005 SAMP	Develop assumptions regarding sources of available funding for various types of projects and adjust forecasts based on these assumptions			Cost Stream Forecasting	Recommendation outdated due to organizational change; conceptually included in life cycle Cost analysis
2005_M06	2005 SAMP	Combine cost estimates for future facilities with long-range ownership costs of existing facilities for ownership costs of current and planned facilities			Cost Stream Forecasting	Recommendation outdated due to organizational change; conceptually included in life cycle Cost analysis
2005_M07	2005 SAMP	Divide overhead costs into at least two categories— those related to the size of the system and those unrelated to system size. Identify future factors that will drive costs unrelated to system size			Cost Stream Forecasting	Recommendation outdated due to organizational change; conceptually included in life cycle Cost analysis
2005_M08	2005 SAMP	Forecast future cost levels related to system size based on current infrastructure replacement costs			Cost Stream Forecasting	Recommendation outdated due to organizational change; conceptually included in life cycle Cost analysis
2005_M09	2005 SAMP	Prepare separate analysis for costs unrelated to system size			Cost Stream Forecasting	Recommendation outdated due to organizational change; conceptually included in life cycle Cost analysis
2005_N01	2005 SAMP	Document asset hierarchies and label equipment appropriately so that cost and failure codes can be captured against the correct asset	WTD will understand its asset costs and reliability through data access and knowledge sharing	Capture asset inventories and hierarchies in a Computerized Maintenance Management System (CMMS). Classify assets so that costs and performance can be compared among like asset classifications. Create asset plans for some subsets of the asset inventory. An asset plan includes best estimates of the ownership costs throughout the entire asset lifecycle, including operations and maintenance strategies as well as rehabilitation and replacement plans.	Asset Knowledge	Included in 2018 Work Plan as ACT_102
2005_N02	2005 SAMP	Save asset hierarchy information in the CMMS			Asset Knowledge	Completed

Completed Work Plan Items

Work Plan ID	Source of Action Item (or HDR ID)	Action Item	Aligned SAMP Objective	Aligned SAMP Strategy	Work strand/Target Outcomes	Note on Status
2005_N03	2005 SAMP	Analyze costs and reliabilities captured against the assets in the hierarchy and adjust hierarchies if necessary			Asset Knowledge	Included in 2018 Work Plan as ACT_102
2005_N04	2005 SAMP	Create asset plans during the design phase of a capital project. The asset plan must list all capital assets, their expected useful lives, and the dates when they should be expected to need replacement			Asset Knowledge	Completed
2005_N05	2005 SAMP	Store asset plan details in an electronic system that can be easily updated and printed for review			Asset Knowledge	Incorporated in ACT_114
2005_N06	2005 SAMP	Use the asset plans to determine the effectiveness of preventive maintenance plans			Asset Knowledge	Incorporated in responsibilities of Reliability Engineer
2005_O01	2005 SAMP	Ensure the O&M strategies are justified through criticality assessment, reliability engineering, failure modes and effects analysis, or similar analytical methods	The O&M strategies employed by WTD are used to ensure that cost and reliability service levels for WTD assets are met		Operation and Maintenance Strategy	Incorporated in responsibilities of Reliability Engineer
2005_O02	2005 SAMP	Rate assets' criticalities using a matrix identifying relative risk of failure. The matrix will display likelihood of failure along one axis and consequences of failure along the other			Operation and Maintenance Strategy	Completed, and entered into CMMS for known assets
2005_O03	2005 SAMP	Use the criticality outcomes and a failure modes and effects analysis to review and update strategies		Maintenance strategies will be documented through reliability centered maintenance processes. Any changes will be approved and documented.	Operation and Maintenance Strategy	Incorporated in responsibilities of Reliability Engineer
2005_O04	2005 SAMP	Ensure that the O&M strategies are reviewed and modified often enough to achieve target cost and reliability outcomes		Maintenance strategies will be developed based on asset criticality rakings and on existing remote equipment's monitoring and control capabilities	Operation and Maintenance Strategy	Incorporated in responsibilities of Reliability Engineer
2005_O05	2005 SAMP	Track all operator time for work done on assets at both plants and offsite facilities			Operation and Maintenance Strategy	Completed
2005_O06	2005 SAMP	Store electricity consumption costs in Mainsaver, preferably costs for each asset			Operation and Maintenance Strategy	Completed
2005_O07	2005 SAMP	Store chemical costs in Mainsaver, preferably costs for each asset			Operation and Maintenance Strategy	Completed
2005_O08	2005 SAMP	Use root cause failure analysis to ensure that large equipment failures are adequately documented and understood			Operation and Maintenance Strategy	Completed
2005_O09	2005 SAMP	Develop a configuration management policy and procedure to document changes to equipment and materials, procedures, and operations			Operation and Maintenance Strategy	Included in 2018 Work Plan as ACT_227
2005_O10	2005 SAMP	Develop a checklist for contractors providing new or modified equipment to ensure as-builts, operations and maintenance computer systems, SOPs, and manuals are updated when new or modified equipment is brought online			Operation and Maintenance Strategy	Completed

Completed Work Plan Items

Work Plan ID	Source of Action Item (or HDR ID)	Action Item	Aligned SAMP Objective	Aligned SAMP Strategy	Work strand/Target Outcomes	Note on Status
2005_P01	2005 SAMP	Understand the costs and likely frequencies of major failures as a basis for comparison with asset condition monitoring costs.	WTD will use condition monitoring where developing failures can be detected using condition monitoring techniques to predict failures and intervene before catastrophic failures	Evaluate condition monitoring techniques for broad asset classes. Evaluate cost, effectiveness, and feasibility	Condition Monitoring	Condition monitoring is under way
2005_P02	2005 SAMP	Define the type of assets where condition monitoring may be considered			Condition Monitoring	Included in 2018 Work Plan as ACT_107
2005_P03	2005 SAMP	Document the condition monitoring techniques that will be used for different types of equipment and explain what information each technique provides			Condition Monitoring	Completed; source for ACT_221
2005_P04	2005 SAMP	Sum the costs of the condition monitoring techniques to be used for different types of assets including the frequency at which it will be applied, to calculate annual condition monitoring costs			Condition Monitoring	Incorporated into MBP; remaining pieces in ACT_108, ACT_110 and ACT_218
2005_P05	2005 SAMP	Determine how condition monitoring information can be used to change O&M practices or predict when assets need to be replaced			Condition Monitoring	Incorporated into MBP; remaining pieces in ACT_108, ACT_110 and ACT_218
2005_P06	2005 SAMP	Review the ability and appropriateness of Mainsaver for storing condition monitoring data			Condition Monitoring	Completed; mainsaver is now storing condition monitoring data
2005_Q01	2005 SAMP	Produce guidelines for the BCE process	BCEs will justify WTD operation and capital expenditures on specific projects		Business Case Evaluations	Incorporated in Portfolio Management
2005_Q02	2005 SAMP	Provide training for staff who will conduct BCEs			Business Case Evaluations	Incorporated in Portfolio Management
2005_Q03	2005 SAMP	Document the peer review process			Business Case Evaluations	Incorporated in Portfolio Management
2005_R01	2005 SAMP	Develop a restoration and replacement strategy for all assets and equipment	Asset replacement strategies will be done with the best available knowledge and in a structured business context	Asset replacements will take into account obsolescence and efficiency, and will be complementary to long-range planning efforts. Translate strategies for routine asset replacements into decision support models that ensure that decisions are consistent and made in a timely manner	Asset Replacement and Rehabilitation	Incorporated in Work Plan as ACT_236
2005_R02	2005 SAMP	Look broadly at the electrical/mechanical asset base and rank equipment according to selected parameters such as rate of failure or reactive maintenance costs; use ranking to generate a prioritized list of equipment, which will be subjected to further economic evaluation			Asset Replacement and Rehabilitation	Implemented in Criticality work (2013); responsibilities of reliability engineer

Completed Work Plan Items

Work Plan ID	Source of Action Item (or HDR ID)	Action Item	Aligned SAMP Objective	Aligned SAMP Strategy	Work strand/Target Outcomes	Note on Status
2005_R03	2005 SAMP	Lead a series of stakeholder interviews to review existing replacement information and ensure that all concerns about equipment are adequately raised; sections to be interviewed will include Asset Management, Operations, Maintenance, Planning			Asset Replacement and Rehabilitation	Been implemented
2005_R04	2005 SAMP	Evaluate the ongoing costs of ownership (including risk cost) of the existing asset versus the cost stream of a replacement asset			Asset Replacement and Rehabilitation	Completed; responsibilities of reliability engineer
2005_R05	2005 SAMP	Develop and use a decision support model when a piece of equipment's cost of ownership warrants a full end of economic life analysis and to document replacement decisions			Asset Replacement and Rehabilitation	Incorporated in Work Plan as ACT_236
2005_R07	2005 SAMP	Ensure that the data for asset replacement decisions are readily available			Asset Replacement and Rehabilitation	Incorporated in Work Plan as ACT_236
2005_S01	2005 SAMP	Provide guidelines for acquisition process			Asset Acquisition	Incorporated in to Project Management process and portfolio management
2005_S02	2005 SAMP	Provide examples of how to define the equipment that will be included in and excluded from a project			Asset Acquisition	Technical Standards Committee (TSC) incorporated in specifications of engineering group
2005_S03	2005 SAMP	Provide a procedure for calculating the opportunity cost for non-essential equipment, that is, the potential cost savings to include equipment in a project that is not directly related to the project. There may be opportunities for reduced mobilization costs, for example, if an approved project already provides access to other equipment also needing replacement but not included in the project			Asset Acquisition	Responsibilities of reliability engineer
2005_T01	2005 SAMP	Form an AM strategy team, composed of representatives from Operations, Maintenance, Planning, Information Technology, utility management, and either an AM manager or assistant manager, to create strategic awareness in WTD, monitor overall progress, and help align the various work groups to the overall business plan	The asset management strategic plan identifies WTD's goals and approach for reaching the goals for managing assets; a process will be developed for continual monitoring and updating as organizational and environmental changes occur	Document strategies, each with an objective or set of objectives with specified measurable actions, and document how the strategies are implemented.	Active Strategic Planning	Completed
2005_T02	2005 SAMP	Set up technical and management teams for each strategy, if deemed necessary, to keep up communication and momentum			Active Strategic Planning	Completed
2005_T03	2005 SAMP	Establish work teams or a responsible staff person to manage individual strategies and to involve staff in the planning process: communication, future cost stream, risk, knowledge sharing, and organization teams			Active Strategic Planning	Incorporated in 2018 Work Plan as ACT_507

Completed Work Plan Items

Work Plan ID	Source of Action Item (or HDR ID)	Action Item	Aligned SAMP Objective	Aligned SAMP Strategy	Work strand/Target Outcomes	Note on Status
2005_T04	2005 SAMP	Develop action plans for each team that follow the standard strategy planning process: select opportunity for improvement, collect data to define the problems, analyze root causes, develop a strategy, develop an action plan, implement the plan, monitor the results, take corrective action to standardize the solution			Active Strategic Planning	Incorporated in 2018 Work Plan as ACT_505
2005_U01	2005 SAMP	Maintain efficient methods of handling data and generating reports for complying with regulations	WTD will develop a knowledge sharing program to support the strategic framework of the asset management program and serve as a part of measuring organizational success	The knowledge sharing strategy is a combination of data, processes, and software technology strategies. Develop an asset information management system plan to facilitate knowledge sharing and support asset-based decisions that will reduce risks and optimize investments; the plan will define data needs, data standards, and AM system reports, include an AM information system resource plan, and document the actions that can best facilitate a knowledge sharing culture	Knowledge Sharing	Completed and used with Hach WIMS
2005_U02	2005 SAMP	Maintain an IT plan for technology improvements; make resources available to conduct an assessment of IT systems with feedback into the strategic planning process; estimate predetermined return on investment for all major IT projects; and systematically track estimated versus actual returns on investments			Knowledge Sharing	Incorporated in Work Plan as ACT_126
2005_U03	2005 SAMP	To integrate systems, maintain written standards and a CMMS architecture diagram showing data flow between the CMMS and other IT systems; document integration of non-standard systems			Knowledge Sharing	Completed for current CMMS; will need to be part of work plan after incorporation of new CMMS
2005_U04	2005 SAMP	Use business case evaluation process to determine where higher levels of productivity could be realized by converting from paper and manual methods to electronic methods for dealing with information that has traditionally been in hardcopy or spreadsheets			Knowledge Sharing	Complete
2005_U05	2005 SAMP	Obtain appropriate hardware such as data servers and electronic equipment such as handheld devices, pocket computers, laptops. Manage an equipment database to track capital investment and share resources for projects and operations			Knowledge Sharing	Partially complete; incorporated into 2018 Work Plan as ACT_126, ACT 127 amd ACT_128
2005_U06	2005 SAMP	Manage software and applications that have corporate licensing requirements			Knowledge Sharing	Complete

Completed Work Plan Items

Work Plan ID	Source of Action Item (or HDR ID)	Action Item	Aligned SAMP Objective	Aligned SAMP Strategy	Work strand/Target Outcomes	Note on Status
2005_V01	2005 SAMP	Include in staff resources all staff working on assignments associated with the AM program. • Identify required staff resources and costs for each action item; • Conduct a needs analysis to identify appropriate actions necessary to manage the AMP program goals and correct deviations from the plan as they are identified; • Schedule jobs with an indication of required resources, skills, and time; • Base decisions to use internal or external staff on the skill availability of staff.	Develop a resource management strategy that includes ensuring that there are adequate staff, equipment, and tools to meet the needs of the AM-based process	Define the roles and responsibilities of WTD workgroups necessary to support the core services. Maintain a system for scheduling equipment and tools to implement the AM plan	Resource Management	Incorporated appropriate elements into 2018 Work Plan as ACT_403
2005_V02	2005 SAMP	Include equipment and suppliers of resources outside of WTD in equipment management system			Resource Management	Incorporated into 01 78 40
2005_V03	2005 SAMP	Maintain standards for electronic resources to maintain digital informantion on servers.			Resource Management	Not applicable; KCIT responsibility
2005_W01	2005 SAMP	Enhance WTD's current employee development program in the following ways: • Develop a WTD employee development plan (EDP) that links an employee's role to the overall goals of the AM program; • Maintain training through a central budget that specifically distinguishes AM program training; • Design the staff development program as a continuous learning program; • Use the list of required competencies to hire and retain talent; • Budget conferences, seminars, and workshops to support roles of key positions as defined by the strategy team; • Maintain an ongoing training program that includes a description of the training, estimated frequency, and tracking Develop instructor and student training manuals for each training module		Develop a systematic approach for educating and motivating staff to encourage innovation, problem solving, and skills improvement at all levels	Employee Development	Implemented in the 2018 Asset Management Work Plan as ACT_402 & ACT_403
2010_001	2010 SAMP	Monitor key performance indicators (KPIs) for Maintenance Best Practices (MBP) program and capital project management process.			Management	Completed

Completed Work Plan Items

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2010_002	2010 SAMP	Modify KPIs as needed to continue meeting asset management objectives		Maintenance Best Practices Steering Committee (MBPSC) has been formed and meets monthly to implement MBP. Capital Systems Team (CST) and Project Work Request (PWR) Committee are monitoring project management practices and progress. Project management and MBP teams have developed performance indicators that they are measuring as they continue implementing their programs. MBP quarterly reporting to AMSC has begun. MBP quarterly reports will be due May 1, August 1, November 1, and February 1 (the first day of the second month following the end of the quarter). Annual reports will go into more detail and address barriers such as resources. Reporting on capital project management KPIs will occur annually.	Management	Incorporated into Asset Management Program's MBP program; MBPSC is now the MBP Huddle
2010_003	2010 SAMP	Improve documentation of the steps required to develop and perform quality review of project risk registers and lifecycle cost.			Management	Risk identification, quantification and qualification, and lifecycle cost documentation procedures are in place and are being used by the CST and PWR Committee for decision-making.
2010_004	2010 SAMP	Ensure that risk management and lifecycle costing elements are integrated into WTD planning process.			Management	Currently underway and in the PMU and PCE work groups
2010_005	2010 SAMP	Create communication tools for broad general awareness among staff on the asset management program and for disseminating asset management implementation progress including work flows, roles, and responsibilities.			Management	Currently underway ain ACT_402 and ACT_413
2010_006	2010 SAMP	Complete MBP initiatives in work management improvements, training, computerized maintenance management system (CMMS) improvements, criticality assessment and reliability, KPI development, and material management.			Management	Implemented in 2018 Work Plan as Objective 2.3
2010_007	2010 SAMP	Evaluate reliability-centered maintenance (RCM) analysis as a potential tool to be used by WTD for developing preventive maintenance strategies and identifying opportunities to improve safety and maintainability			Management	Currently implemented
2010_008	2010 SAMP	Establish operator tasks/recording methodologies that will provide data on equipment performance ("operator-driven reliability").			Operations	Currently implemented
2010_009	2010 SAMP	Establish communication process for Operations to send equipment performance data to OPS or the CMMS and to Maintenance personnel on a regular basis			Operations	Currently implemented in Ovation

Completed Work Plan Items

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2010_010	2010 SAMP	Train Operations staff on the importance of collecting and recording information and data to support the MBP program.			Operations	Incorporated into 2018 Work Plan
2010_011	2010 SAMP	Ensure that operational data and information on all equipment are recorded and communicated properly to Maintenance staff for warranty purposes and timely detection of failure symptoms			Operations	Currently implemented under Ovation
2010_012	2010 SAMP	Include Process Control Analysts in the MBP program			Process Control	Not applicable
2010_013	2010 SAMP	Establish a process for Process Control Analysts to communicate with the REs on equipment performance and to actively give input to condition assessments (failure modes, effects, and criticality analyses, in particular).			Process Control	Internal workflow to O&M;
2010_014	2010 SAMP	Develop long-term restoration and replacement plans for existing assets.			Planning and Project Development	Incorporated into 2018 Work Plan as ACT_236
2010_015	2010 SAMP	Develop a forecast model based on factors such as condition and repair			Planning and Project Development	Completed
2010_016	2010 SAMP	Incorporate replacement planning into long-term capital forecast model			Planning and Project Development	Incorporated into Capital Portfolio Management
2010_017	2010 SAMP	Ensure that asset data and information on newly acquired equipment are collected and populated into WTD information systems. Develop KPIs that track this process throughout project delivery			Planning and Project Development	Completed (01 78 40)
2010_018	2010 SAMP	Ensure effective use of CMMS data in the design process. Use REs to evaluate the performance of equipment at the plants and make recommendations regarding the maintainability and reliability of proposed equipment installations. Establish a standard for including involvement of the REs on technical project teams.			Planning and Project Development	Completed
2015_101	2015 SAMP	Populate data to feed asset refurbishment and replacement planning tool, equipment only. Determine the following: Engineered end-of-life date Installation date Asset initial cost Expected replacement cost Refurbish frequency Refurbish cost		Define and develop asset replacement and refurbishment needs projection reports		Currently underway
2015_201	2015 SAMP	Materials management: 1. Finish BoM table alignments. 2. Scrub West Point BoM database. 3. Load West Point BoM database. 4. Develop processes for tracking inventory management (minimum/maximum, critical spares, stock-outs).		Make accurate bill of materials (BoM) documentation available in the computerized maintenance management system (CMMS) for Criticality 1 and 2 assets, and efficiently manage parts inventory		Items 1-3 Completed. Item 4 in current work plan as ACT_209

Completed Work Plan Items

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2015_301	2015 SAMP	Complete refinement of existing KPIs (labor) and complete development of management level KPIs.		Key performance indicators (KPIs) are monitored and drive sustainability and efficiency		Completed
2015_302	2015 SAMP	Develop work processes to support populating data fields		Key performance indicators (KPIs) are monitored and drive sustainability and efficiency		Currently underway; Included in 2018 Work Plan as ACT_104
2015_303	2015 SAMP	Refine/develop asset KPIs (lifecycle costs by asset, determine bad actors)		Key performance indicators (KPIs) are monitored and drive sustainability and efficiency		Currently implemented and ongoing
2015_401	2015 SAMP	Develop, document, and implement a Management of Change (MOC) trigger and tracking mechanism beginning at the work request level and extending through the completion of requested work and drawing/system documentation updates		Plan, manage, and document all plant process system changes through management of change (MOC) processes		In place as MOC
2015_501	2015 SAMP	Condition (runtime) based maintenance. Open discussion/scope refinement: Automate usage data feed from Ovation to Mainsaver for PM generation or from AMS Suite to Mainsaver. Automate usage data feed to Mainsaver for PM generation		Generate preventive maintenance (PM) procedures and schedules based on asset condition (such as runtime, lifecycle, differential pressure, system temperatures) where appropriate		Curently Underway
2015_601	2015 SAMP	Develop and document predictive maintenance program goals		Predict and plan asset maintenance, where appropriate, through a division-wide Predictive Maintenance Program		Implemented in 2018 Work Plan as ACT_220, ACT_221, ACT_222, ACT_223 and ACT_224
2015_602	2015 SAMP	Assess assets for application of appropriate predictive maintenance technologies, according to the Predictive Maintenance Program				Implemented in 2018 Work Plan as ACT_220, ACT_221, ACT_222, ACT_223 and ACT_224
2015_603	2015 SAMP	Develop, document, and trend Predictive Maintenance Program performance indicators				Implemented in 2018 Work Plan as ACT_220, ACT_221, ACT_222, ACT_223 and ACT_224
2015_701	2015 SAMP	Documents are delivered prior to component/system testing to allow O&M time to develop PMs, enter parts into inventory, and develop standard operating procedures (SOPs), lockout/tagout, and health & safety planning		Develop and map process designed to ensure construction as-built drawings, Operations & Maintenance (O&M) manuals, BoM, and capital and maintenance spare parts are delivered to Operations & Maintenance prior to component/system testing		Completed
2015_702	2015 SAMP	BoM is delivered to O&M in electronic format prior to component/system testing; capital spares and maintenance spare parts are delivered to O&M prior to component/system testing				Implemented in 2018 Work Plan as ACT_210
2015_703	2015 SAMP	O&M documents are received and all as-built drawings, including drawings modified during construction, are accepted before a capital project can close				Completed
2015_704	2015 SAMP	Copy of redline drawings is provided to O&M prior to component/system testing				Completed

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2015_801	2015 SAMP	Implement work order based scheduling for all West-East section O&M staff, including shift, offsite, and building and grounds staff		Finalize operator-based maintenance program		Completed
2015_901	2015 SAMP	Collect and validate attribute data for existing assets as requested by O&M staff. Add validated data to the CMMS			Other Ongoing Work	Implemented in 2018 Work Plan as ACT_104
2015_902	2015 SAMP	Develop and implement a condition assessment program at the component, system, and station levels			Other Ongoing Work	Implemented in 2018 Work Plan as ACT_104
2015_903	2015 SAMP	Load conveyance inspection & flow monitoring (CIFM) assets into Mainsaver			Other Ongoing Work	Completed
2015_904	2015 SAMP	Manage the lifecycle of conveyance assets through the asset management forecast tool in Bi-Cycle			Other Ongoing Work	Completed
2015_905	2015 SAMP	Develop and document maintenance best practices (MBP) based planning and scheduling procedures for CIFM			Other Ongoing Work	Completed
		Standardize definition of an asset and communicate differences of asset definition between work groups	1.1) Asset Definition	1a) Improve asset definitions and establish information to be collected for asset classes	All work groups and sections use a consistent definition of an asset	Completed
		Establish information to be collected for asset classes	1.1) Asset Definition	1a) Improve asset definitions and establish information to be collected for asset classes	Complete	Completed
		Develop condition assessment guidelines and criteria for linear assets	1.2) Asset Registry/Data Collection	1e) Standardize asset condition monitoring methodology	Complete; we use PACP	Completed
		Finalize and implement across the division the New Asset Acquisition Form (Specification 01 78 40 A) and differentiate needs for asset classes	1.2) Asset Registry/Data Collection	1d) Establish data collection protocols for new projects	Maybe a footnote/link to the asset registry section and a description of how this form fits into an asset lifecycle?	Completed
	HDR 17	Resourcing Strategy for Maintenance Planning Support	5.2) Resourcing Strategy	5b) Staff and resource asset management to complete the tasks in the Asset Management Work Plan	Bringing in an additional Indutrial Maintenance Planner Scheduler in the 2019-2020 biennium (from 2 IMPS to 3 IMPS). Shop leads are able to know where the spare parts are located, and streamline the process for performing maintenance.	Complete
	HDR 3	Improve SAMP Alignment and Asset Management Planning	5.3) Asset Management Planning	5c) Incorporate prioritization of goals and strategies of asset management program and use to prioritize work plan items	Improve overall assessment and planning to align asset management policy, SAMP objectives and strategies, and Asset Management Plans with WTD's asset management resource capacity	This is accomplished by writing the SAMP - will need to work that into the SAMP somewhere (discussing the completion of this work item by revising the SAMP)
		Develop condition assessment guidelines and criteria for linear assets	1.2) Asset Registry/Data Collection	1e) Standardize asset condition monitoring methodology	Established guidelines for linear asset condition assessment	Complete; we use PACP
		Define criticality on a facility and system level with respect to resiliency	2.1) Risk Assessment Framework	2b) Define and assign criticality of WTD assets	Define criticality on a facility and system level with respect to resiliency	Completed in 2015
2005_A01	2005 SAMP	Document definitions for each primary service level and approve them	2.1) Risk Assessment Framework	2a) Assign levels of service to critical assets and asset classes	Document definitions for each primary service level and approve them	Completed in 2018

Completed Work Plan Items

Work Plan ID	Source of Action Item (or HDR ID)	Action Item	Aligned SAMP Objective	Aligned SAMP Strategy	Work strand/Target Outcomes	Note on Status
	HDR 56	Status Tracking of Assets on New Project Request form	4.1) Internal Communication	4c) Implement process workflows as internal communication tools	Develop a process to track the status of assets on PWR along with a means of communicating the decision outcomes of these assets.	Completed with portfolio management work
ACT_123	HDR 49	Improve Timeliness of GIS Updates	1.4) Information Systems	1j) Design an Asset Management Information System (AMIS)	GIS Updates come as needed from ESRI, and are updated with limited effort from WTD staff	No longer applicable