King County

Asset Management Program Overview
Wastewater Treatment Division

Presented to the Metropolitan Water Pollution Abatement Advisory Committee

December 7, 2022

King County
Department of Natural Resources and Parks
Wastewater Treatment Division

Overview

- What is an Asset
- Asset Criticality and How It's Used
- History of WTD's Asset Management Program
- Strategic Asset Management Plan (SAMP) / Work Plan
- Asset Tracking
- Capital Program Management (PgM)
- Portfolio Management (PfM) Overview and Processes

What is an Asset

WTD's Definition

- A physical component of a facility that has value, enables services to be provided, and has an economic life greater than 12 months.
  - Vertical asset - Assets existing in highly visible and multi-tiered hierarchical facilities with process interdependencies.
  - Linear asset - (i.e. Horizontal Assets) Assets that convey the wastewater from local collection agencies to treatment plants and facilities.

Asset vs Component

Assets are buildings, equipment, piping, and software.

- All assets are entered into the Computerized Maintenance Management System (CMMS).

Components are parts of an asset such as pump impellers and generator crankshafts.

- Not assigned asset numbers
- Tracked in CMMS as a part

Asset vs Component

Special Case Assets – Complete centrifuge rotating assembly, raw sewage pump rotating assembly

- Expensive long lead assemblies for critical assets
- Assigned asset numbers and tracked in CMMS

Asset Criticality and How It's Used

Criticality

- Numerical measure of the probability and potential consequences of an asset's unexpected failure.

- Critical (Crit) assets are classified as those for which the financial-, business-, or service-level consequences of failure are sufficiently severe to justify proactive inspection and rehabilitation.

Asset Criticality and How It's Used

Used to prioritize how an asset is managed

- Crit 1, 2 and some 3 – Preventative Maintenance (PM) / Predictive Maintenance (PdM) / parts support / spare units / reliability metrics for lifecycle management
- Crit 3 and 4 – Few PMs/some parts support/some lifecycle management
- Crit 5 – run to fail/no parts support/no PMs/no lifecycle management

Asset Criticality and How It's Used

Prioritize capital replacements and refurbishments

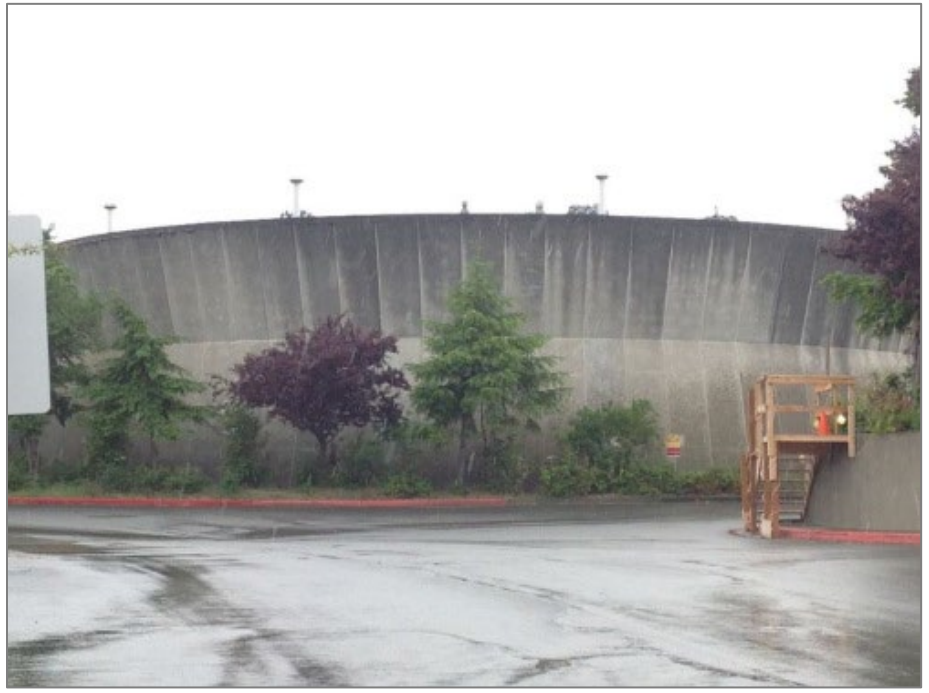
- Higher criticality assets and systems receive priority funding and staffing
- Expected useful life of critical assets is tracked
- Condition of critical assets is monitored

History of WTD's AM program

- 1998: Computerized Maintenance Management System acquired

- 2002: WTD establishes a formal Asset Management Program

- 2005: RWSP amended to establish and implement an Asset Management Program
  - •Asset Management Steering Committee (AMSC) established
  - •First WTD Strategic Asset Management Plan (SAMP)
  - •Asset hierarchy formalized



History of WTD's AM program

- 2010: SAMP Updated
  - Defined asset criticality
  - Established Maintenance Best Practice (MBP) program
  - Initiated scheduled asset refurbishments
  - Created Asset Management (AM) Program Key Performance Indicators (KPIs)
- 2015: SAMP Updated – Work plan update
- 2017: Independent review of SAMP after West Point flooding event

History of WTD's AM program

- 2018: SAMP and Work plan updated
  Priorities:
  - Complete full asset inventory (ongoing since 2005)
  - Develop risk assessment framework to link level of service goals to asset criticality
  - Improve tools to better manage asset data
- 2019: Portfolio Management established
- 2020: Program Management established
- 2021: Hired first Asset Management Supervisor

History of WTD's AM program

Framework

- 2018 SAMP update is based on the International Infrastructure Management Manual (IIMM) 2015 edition, International Organization for Standardization (ISO) 55000 series, and Society of Maintenance and Reliability Professionals (SMRP) body of knowledge.
  - Environmental Protection Agency (EPA) recognizes ISO 55000 series and IIMM as industry best practices for water and wastewater infrastructure management

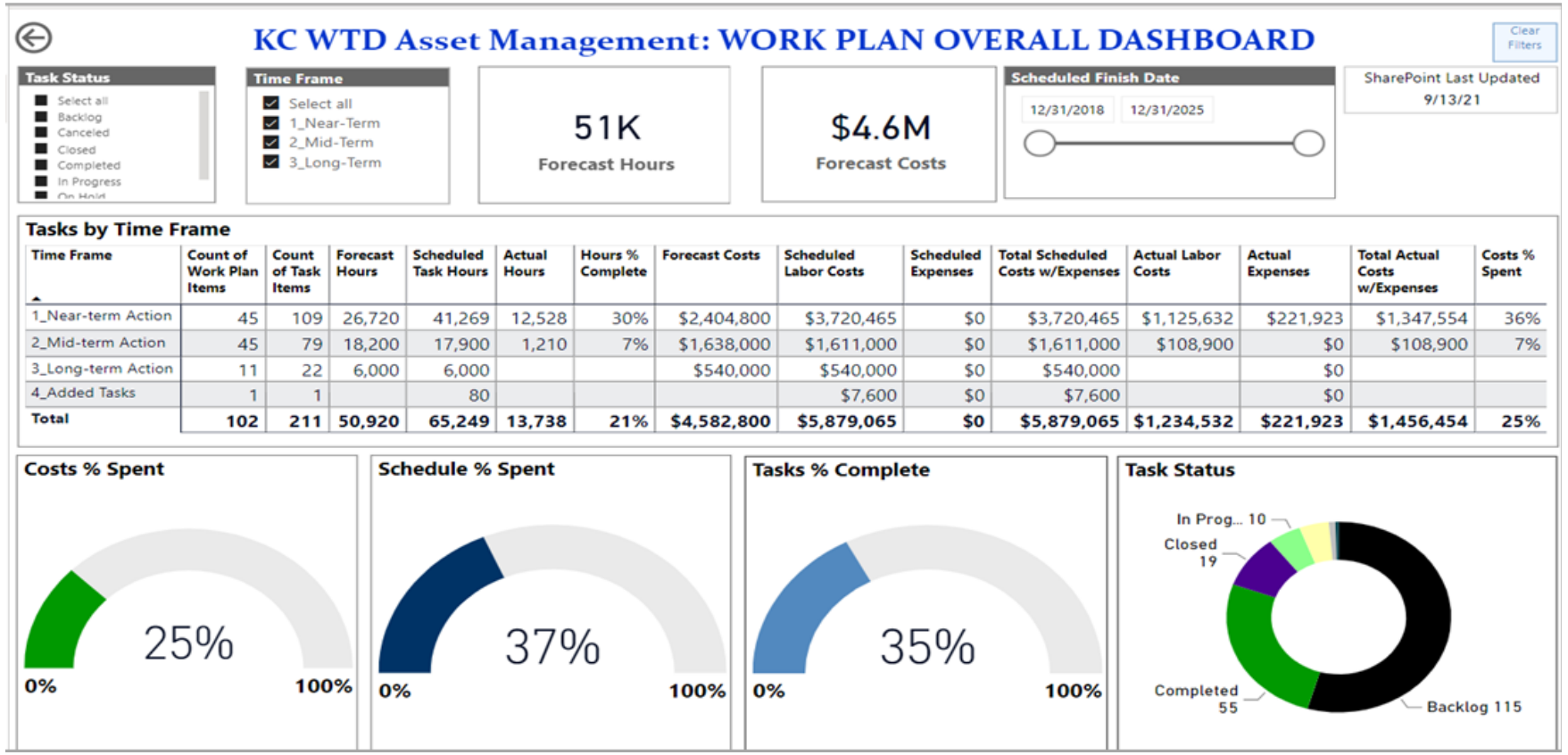
Strategic Asset Management Plan / Work Plan

Level of Service Targets

- Operate WTD's infrastructure to meet all county, state, and federal policies and regulations to protect public health and the environment.
- Optimize WTD's infrastructure and operational resiliency to meet present and future demands as defined by King County policies.
- Maintain financial strategies that meet organizational priorities and manage operational risks in a cost-effective manner.
- Provide equitable service to customers 24 hours/day, 7 days a week.
- Continually develop and maintain a highly trained, safe, and diverse work force.
- Equitably operate, manage, and maintain WTD infrastructure to minimize near neighbor impacts.
- Leverage resource recovery to enhance sustainability and generate revenue.

Strategic Asset Management Plan / Work Plan

- **Third Party reviewed in 2018**
- **Includes Tactical work plan**



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Asset Tracking – Condition Assessment

Asset Condition Weight Scoring

- **Total Cost Lifetime**
- **Last 6 Years Cost**
- **Last Year Cost**
- **Reactive Hours Lifetime**
- **Last 6 Years Reactive Hours**
- **Last Year Reactive Hours**
- **Replacement Date**

Asset Tracking - Metrics

Metrics

Accomplishment rate (weekly meetings)

Preventive Maintenance/Corrective Maintenance Ratio

Reliability Analysis

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Capital Program Management (PgM)

Site Specific Programs – Location focused

- West Point Upgrade Program
  - Includes all projects onsite
  - Increased coordination with Operations
  - Increased contractor coordination

Capital Program Management (PgM)

- Asset Lifecycle Programs – Asset/System focused
  - Roof, Variable Frequency Drive, Uninterruptable Power Supply, Raw Sewage Pump, Ovation Control System, Brightwater Membrane Cassettes, Backup Power Systems/Generators
- Lifecycle Program drivers:
  - Obsolesce
  - Hidden failure mode (time-based replacement)
  - Environmental impacts
  - Critical systems (Program Safety Management/Life Safety)

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Portfolio Management Background

WTD delivers **$200+ million** in capital projects each year. With an **aging system** and a **backlog of projects,** how do we make best use of our **limited capital and human resources**?

New & Existing Projects

+

Limited Resources

=

Need to continuously make smart, informed choices

Portfolio Management is a disciplined approach to deliver the **right projects** at the **right time** for the **right reasons**.

WTD Portfolio Management Objectives

- Clearly define strategic direction for the capital portfolio
- Evaluate and prioritize capital project requests, concepts, opportunities and existing programs and projects in development and delivery
- Provide regular data-driven monitoring and reporting
- Manage limited resources in a transparent, balanced, and efficient manner
- Demonstrate the value added to the public by the capital investments to the system
- Establish and maintain strategic and rigorous parameters, weighted multi-attribute criteria, and well documented assumptions
- Develop and deliver the right projects and programs at the right time for the right reasons

WTD Portfolio Categories

Asset Management – Plants and Conveyance

Capacity Improvements

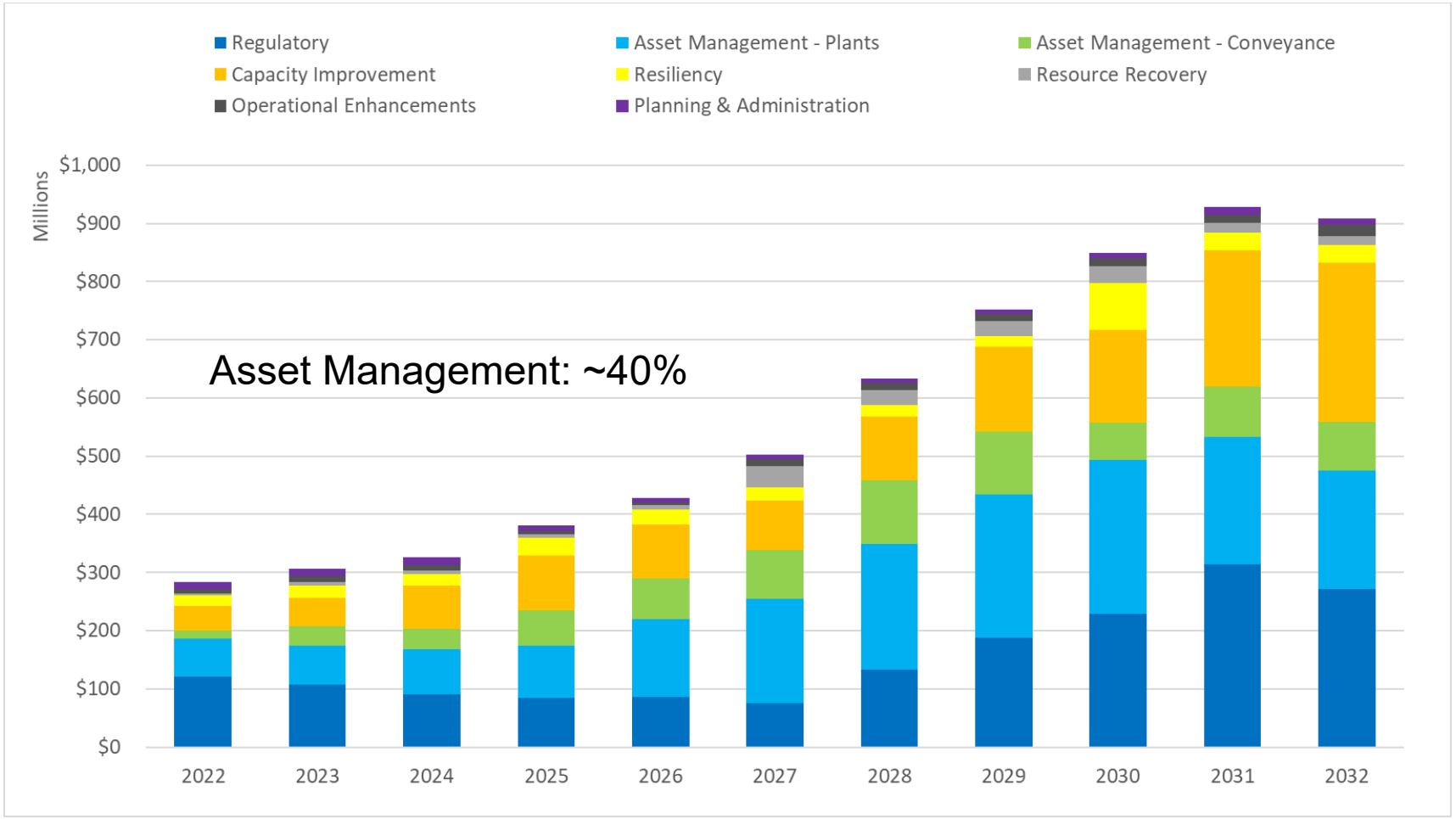
Operational Enhancements

Regulatory

Resiliency

Resource Recovery

2023 Sewer Rate Ten-Year Forecast Capital Investments by Portfolio Category



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Asset Management Subcategories

Conveyance

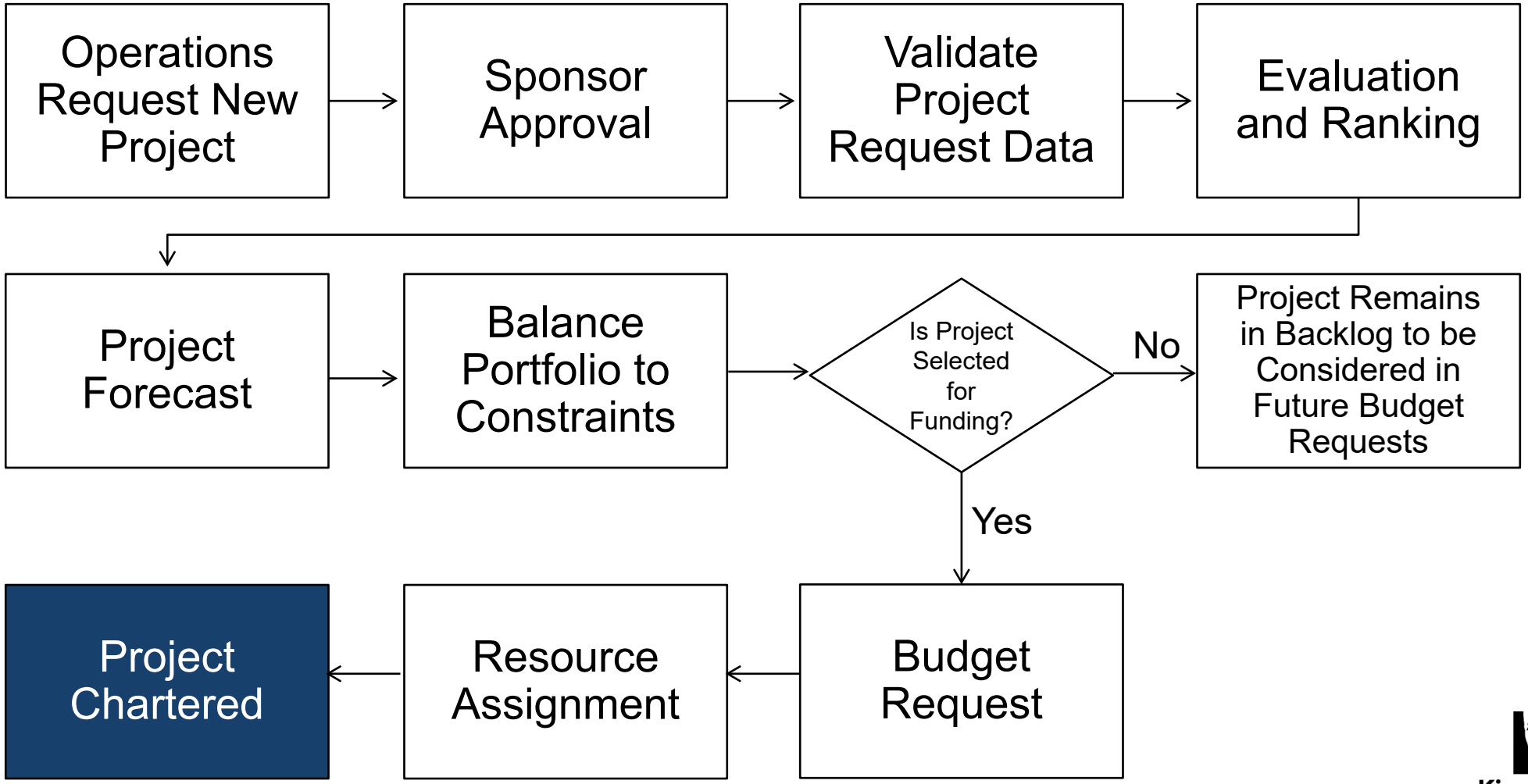
- Linear conveyance assets and supporting structures

Plants

- Equipment, process piping, structures, tanks, and building envelopes

- Useful life of existing assets and systems to maintain level of service
- Driven by asset condition and/or obsolescence
- Projects without condition or obsolescence as primary drivers are placed in other portfolio categories

Project Initiation



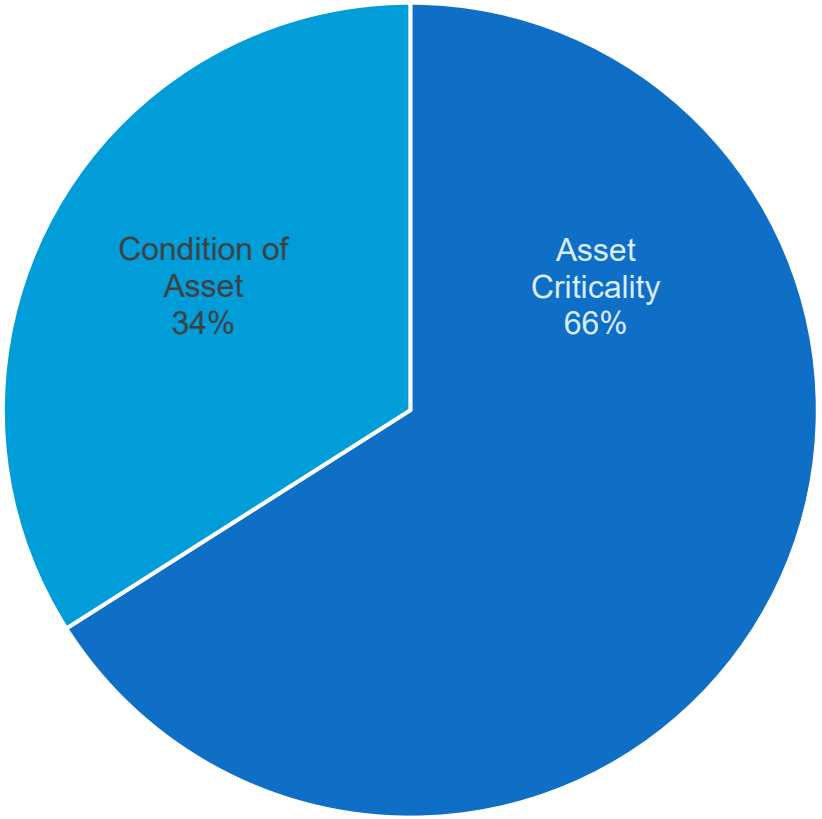
AM Conveyance Prioritization Criteria

Asset Criticality

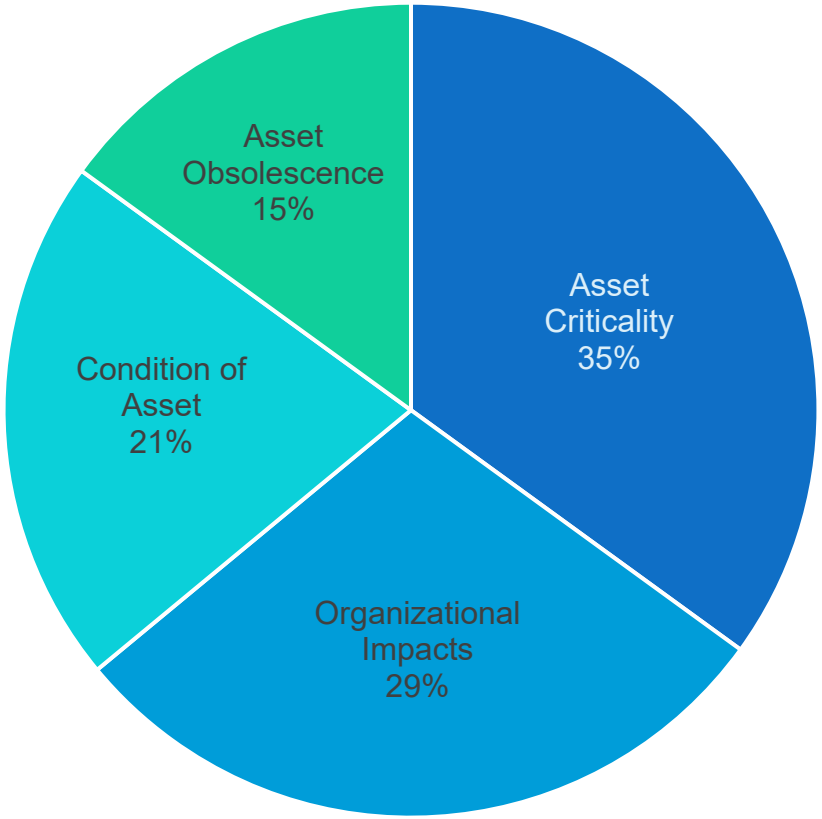
- Degree of risk mitigation in terms of likelihood and consequence of failure.
- Considers system, life safety, environment, and community impacts.

Condition of Asset

- Considers defects and WTD Pipeline Assessment Certification Program (PACP)* defect coding.



Asset Management Plants Prioritization Criteria



Asset Criticality

- Degree of risk mitigation in terms of likelihood and consequence of failure. Considers system, life safety, environment, and community impacts.

Asset Obsolescence

- Considers availability of parts, vendor support, support hardware, software version/support, and cyber security.

Condition of Asset

- Largely based on condition assessments and historical maintenance data. When asset can't be assessed, based on the engineered end of life.

Organizational Impacts

- Impact of asset failure on operations, other capital projects, organizational reputation, reporting, fines, or litigation, etc.

Questions?

Bruce Kessler

WTD Deputy Director

Asset Management Steering Committee Chairperson

Bruce.Kessler@kingcounty.gov