King County

Wastewater Treatment Division

Executive Summary

RWSP Update – Policy Memo #6: Asset Renewal and Replacement (Asset R&R)

This executive summary provides a synopsis of the policy questions, problem statement, issues and challenges, and the options developed for the Asset R&R topic of the Regional Wastewater Services Plan (RWSP).

Policy Questions

1. How proactive vs. reactive should WTD be when deciding to refurbish or replace aging infrastructure?
2. What level of redundancy of critical systems should WTD have?
3. What level of risk tolerance should WTD accept?
4. What approach should WTD use to fund Asset R&R projects?

Problem Statement

WTD has identified more than 15,000 assets as "critical," which means failure will result in serious consequences. At least 7% (1,100) of critical assets located in plants and pump stations have a high likelihood of near-term failure. Forty-five miles of WTD's 383 miles of conveyance pipe are also identified as critical, and approximately 10% (4.4 miles) of this critical pipe is identified as highly likely to fail. It is important to renew or replace critical assets before they become likely to fail. Asset R&R projects compete for capital funding within WTD's entire capital portfolio. Budget requests are ultimately influenced by overall funding limits, regulatory requirements, and competing project priorities, which delay some Asset R&R projects moving forward. The result is that many of WTD's assets and facilities stay in service beyond their normal end of life, successfully kept in operation through increased maintenance and repair efforts. Because of these circumstances, WTD is largely reactive in managing its Asset R&R program. This increases operational risk as older assets are kept in service beyond their expected useful lives.

Policy Issues, Challenges, and Opportunities

Sewer rate increases over the next decade are driven by large regulatory projects. The expense of these regulatory projects is a concern, and overall cost pressures could pull money away from the Asset R&R program, even though assets will continue to wear out just the same as they always do. Efficiently managing Asset R&R projects is thus essential to

minimize the high costs of reacting to failures and address how a large project backlog can cause future rate spikes.

Policy Options

To summarize the policy options at a high level, decision makers will confront choices across four fundamental variables: 1) timing, 2) annual Asset R&R funding level, 3) protection of Asset R&R funds, and 4) prioritization of Asset R&R projects within WTD's capital program.

In regards to timing, policy makers will need to decide how quickly WTD modernizes – i.e. should it continue in its current reactive mode, delaying asset replacement and buying spare parts, if available, for its old and discontinued assets; or should WTD transition quickly over the next 10-15 years to a more proactive mode for its critical assets, or do so more gradually over the next 30 years. These choices offer unique risk tolerances and rate impact tradeoffs.

Once the timing decision is made, the annual level of Asset R&R funding will need to be addressed, and these funds will need a "fence" around them to ensure funds are only used for Asset R&R projects. Finally, to ensure that critical Asset R&R projects are completed, a policy should be adopted that prioritizes these projects based on data-informed risk and protects them from delay and impingement from other capital demands.

More detail for the policy options that answer the questions are described below.

Policy question #1: *How proactive vs. reactive should WTD be when deciding to refurbish or replace aging infrastructure?*

a. Delay asset renewal and replacement beyond the assets' useful lives until risk is deemed unacceptable.
    - *Outcome:* Increasing risk; the backlog of Asset R&R projects past their optimal renewal or replacement timing will steadily increase.
b. Gradually (over next 30 years) shift from reactive to proactive approach for critical Asset R&R.
    - *Outcome:* Decreased systemic risk over time; gradual reduction in the Asset R&R backlog (backlog reduced 50% after 15 years, no backlog after 30 years)
c. Quickly transition (over next 15 years) to proactive approach for Asset R&R so all critical assets are refurbished or replaced prior to failure.
    - *Outcome:* Decreased systemic risk. No Backlog after 15 years.

Policy question #2: *What level of redundancy of critical systems should WTD have?*

a. Minimal / moderate level of redundancy - implement redundancy only where needed to maintain permit compliance.

- *Outcome:* Higher risk; System redundancy is increased upon clear indication redundancy is insufficient.

b. Increased level of redundancy - systematically prioritize and add redundant capacity for many/most critical functions to significantly reduce risk.
    - *Outcome:* Reduced risk; improved system availability, reliability and resiliency; reduced overflows.

Policy question #3: *What level of risk tolerance should WTD accept?*

a. Higher risk tolerance - Implement Asset R&R projects based on mix of best professional judgment and whether failure has occurred or is imminent.
b. Lower risk tolerance - Use comprehensive data-driven risk analysis to identify optimal timing for each Asset R&R project.

Policy question #4: *What approach should WTD use to fund Asset R&R projects?*

Addressing the fourth question will require a three-phase process, with some phases having multiple policy options. All three phases should be treated collectively as a package. The policy options within these phases would be administrative, or internal WTD policies, rather than actual code-level changes.

Phase 1: Adopt a cash-funding approach in the sewer rate model that more closely aligns with true Asset R&R spending needs. Options include:

a. Ensure minimum required funding for Asset R&R critical assets through status quo approach.
b. Ensure adequate funding for asset R&R through transparent and efficient means, with potential future higher spending levels.
c. Ensure adequate funding for asset R&R through transparent and efficient means with potentially significantly higher future spending levels.

Phase 2: Adopt a financial policy that preserves cash funding for Asset R&R vs. other portfolio categories. Options include:

a. Prioritize flexibility and rate management.
b. Prioritize intergenerational equity while allowing for some moderate flexibility and opportunity to manage rates.
c. Prioritize intergenerational equity.

Phase 3: Adopt a portfolio policy that prioritizes Asset R&R projects based on risk and protects them from the impingement of other portfolio categories and drivers.

Tradeoffs and measurable outcomes for each of these policy options are described in the associated tables starting on page 17 of the document. Cost estimates and a complete evaluation of impacts and outcomes for the policy options will be provided in the Step #2 analysis in early 2027.

Asset R&R Relationship to other RWSP Topics

Asset R&R is a foundational part of the RWSP Update and is essential for sustaining the regional wastewater system into the future. As such, it intersects with many RWSP topics as described below.

Natural hazard resiliency: Asset R&R investments strengthen seismic resilience, flood protection, power reliability, and equipment reliability, increasing the likelihood that service can continue during an emergency.

Climate adaptation: Asset R&R provides regular system modernization through climate-informed design standards. This modernization continually improves the system's capability to handle intense storms, heat, and sea-level rise, adapting the system as time progresses.

Treatment planning: Asset R&R supports day-to-day treatment reliability by converting planning forecasts into routine, sequenced capital work that avoids emergency treatment process workarounds.

Conveyance system (separated & combined): Asset R&R is foundational to a reliable system of pipes. Also, pump station and wet weather treatment facilities must operate autonomously, on short notice, when called on.

Finance & Rate Setting: Asset R&R is a large but predictable capital cost driver. Coordinating Asset R&R with rates, cash funding strategy, and debt strategy can help avoid rate spikes. Buying down the Asset R&R backlog with near-term cash funding avoids deferring these expenses to future generations.

Equity & Social Justice (underserved populations & intergenerational equity): Asset R&R policies will allow WTD to address historical inequities by prioritizing renewals in frontline communities, reducing spill risks in vulnerable areas, improving air/noise/odor conditions, and supporting intergenerational equity by avoiding costly deferred maintenance.

RWSP Update – Asset Renewal and Replacement

Policy Memo #6

A. Policy Questions

This memo is focused on policy questions related to the Asset Renewal and Replacement (Asset R&R) topic of the Regional Wastewater Services Plan (RWSP) Update. The policy questions analyzed in this memo are as follows:

1. How proactive vs. reactive should WTD be when deciding to refurbish or replace aging infrastructure?
2. What level of redundancy of critical systems should WTD have?
3. What level of risk tolerance should WTD accept?
4. What approach should WTD use to fund Asset R&R projects?

Policy questions #2 and #3 are combined in the RWSP Scoping Document, but they are answered separately in this memo.

B. Problem Statement

Buildings, structures, equipment, piping, and electrical and mechanical devices become less reliable with age, depending on the severity of the operating environment. Cleaning wastewater is hard on assets, even assets specifically designed for that purpose. Wastewater assets deteriorate at different rates depending on usage, maintenance access, maintenance performed, and other factors like corrosion and erosion. Wastewater utilities want equipment and facilities to operate safely for as long as possible. Knowing that assets eventually need to be refurbished or replaced, it is important to predict the Asset R&R timing as accurately as possible.

Adequately maintaining wastewater infrastructure is a challenge for most wastewater service providers throughout the United States. Every four years, the American Society of Civil Engineers (ASCE) publishes an "infrastructure report card" and assigns a letter grade to 18 infrastructure categories. For the 3rd consecutive report, wastewater infrastructure nationwide was assigned a grade of "D+." This is a slight improvement from the low of "D-" in 2005. The ASCE report is an indication of the difficulties wastewater utilities throughout the nation face in renewing and replacing aging infrastructure, including King County Wastewater Treatment Division (WTD).[1]

[1] American Society of Civil Engineers: A Comprehensive Assessment of America's Infrastructure; 2025 Report Card, p. 221.

WTD has identified more than 15,000 "critical" assets which, if they fail, will result in serious consequences for system operation.[2] At least 7% (1,100) of critical assets located in plants and pump stations have a high likelihood of near-term failure. Forty-five miles of WTD's 383 miles of total pipe are also identified as critical, and approximately 10% (4.4 miles) of this critical pipe is identified as highly likely to fail.[3]

Managing assets to obtain maximum value through appropriate maintenance and timely replacement is the desired outcome of an effective asset management program. The challenge is to obtain the maximum useful life from critical assets by maintaining them appropriately and replacing them before they fail.

Within WTD, Asset R&R projects compete for capital funding within the entire capital portfolio. This may result in Asset R&R projects being delayed beyond their expected end of life. Asset R&R projects are not guaranteed funding – there is currently no WTD policy statement that unilaterally or absolutely guarantees funding for Asset R&R projects. While the criteria for ranking projects within the asset management capital investment category include outdated technology consideration, asset condition, and organizational impacts, this does not guarantee placement within the final capital improvement program given other constraints and requirements. Budget requests are ultimately influenced by overall funding limits, staff capacity, regulatory requirements, and competing project priorities, which may delay some Asset R&R projects moving forward.

As a result, WTD is largely reactive in managing its assets – that is, assets are typically not replaced until they are past their design life and are being kept in service through constant repair efforts. This increases operational risk and maintenance expense as older assets are kept in operation. Asset R&R projects that should move forward often don't because of general budget pressures, or other capital projects receiving a higher priority.

Managing risk, including redundancy, is an important best practice to enable utilities to achieve the highest overall value from their assets. Determining the amount of risk an asset-intensive organization such as WTD is willing to accept should be an intentional, data-driven decision.[4] As a practical matter, the amount of acceptable risk is often heavily influenced by the cost associated with reducing risk. WTD does not currently have an adopted risk matrix to define what risk is acceptable, making risk reduction more

[2] From ISO 55000: ". . . asset having the potential to significantly impact the achievement of an organization's objectives." Within wastewater utilities, critical assets are those assets that, if they fail, threaten the ability of the utility to function properly, and potentially cause permit violations, public health and safety concerns, environmental degradation, or employee safety concerns.
[3] From data contained in WTD's maintenance management system database, extracted from HDR Asset R&R Long Range Forecast Tool, April 2026.
[4] ISO 55001:2024 (en) p. 13.

subjective and complicating efforts to achieve an appropriate level of service at the lowest lifecycle cost.

Related to risk, providing redundancy is expensive and is an exercise in optimization by balancing the cost and need for redundancy. Ideally, system components would be sized to handle modeled flows and processes, operate without incident when required, and no redundancy would be needed. As a practical matter, some critical asset systems are so important that redundancy is expected. Currently, WTD does not have a redundancy policy.

C. Contextual and Baseline Information

i. What is known about the topic and current conditions

What is Asset R&R?

Asset R&R, in the context of this document and the RWSP is a category of capital investment within WTD's CIP portfolio. This category encompasses the renewal and replacement of WTD's assets that have reached the end of their useful lives. Asset R&R projects include a wide range of assets (e.g., all the facilities and equipment in the three regional wastewater treatment plants, as well as the offsite pump stations and the two small treatment plants at Vashon Island and Carnation). Asset R&R also includes conveyance system facilities and almost 400 miles of pressure and gravity lines.[5] Renewing or replacing critical assets at the point where they have achieved their maximum value to the organization is a key tenet of asset management and essential to maintaining the safe, reliable, and efficient operation of the regional wastewater system.

Level of Service

Defined levels of service are foundational to a wastewater utility because these definitions set service expectations, which in turn guide Asset R&R decisions. WTD's defined levels of service are outlined in its 2018 Strategic Asset Management Plan:

- 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

[5] Memorandum, WTD Portfolio Management, Asset Management – Plants, Category Package, September 2024 and Memorandum, WTD Portfolio Management, Asset Management – Conveyance, Category Package, September 2024.

- Maintain financial strategies that meet organizational priorities and manage operational risks in a cost-effective manner
- Provide equitable service to customers 24 hour/day; seven days a week
- Continually develop and maintain a highly trained, safe, and diverse workforce
- Equitably operate, manage, and maintain WTD infrastructure to minimize near neighbor impacts
- Leverage resource recovery to enhance sustainability and generate revenue

WTD's Assets

As of February 2026, WTD's asset database showed 65,455 registered, active assets. Of these, 55,373 were classified as "vertical" assets (assets located within treatment plants, pump stations or off-site facilities), and 10,082 were classified as "horizontal" assets (pressure and gravity pipe segments, maintenance holes, conveyance structures).[6]

About 27 percent of WTD's vertical assets are rated as "critical" (criticality rating of 4 or 5), meaning that if these assets fail, serious consequences involving safety, environmental degradation, or system operation are likely. This is somewhat higher than the industry standard of 20 percent. Managing asset renewal and replacement is focused on the critical assets because they need to be replaced prior to failure to maintain the minimum level of service expected. System-wide, minimum expected service levels include meeting regulatory requirements, and zero untreated or partially treated sewer spills.

Current State of WTD's Assets

For Asset R&R, age is an attribute that heavily influences the likelihood of failure. For vertical assets, the average age by facility program is as follows:[7]

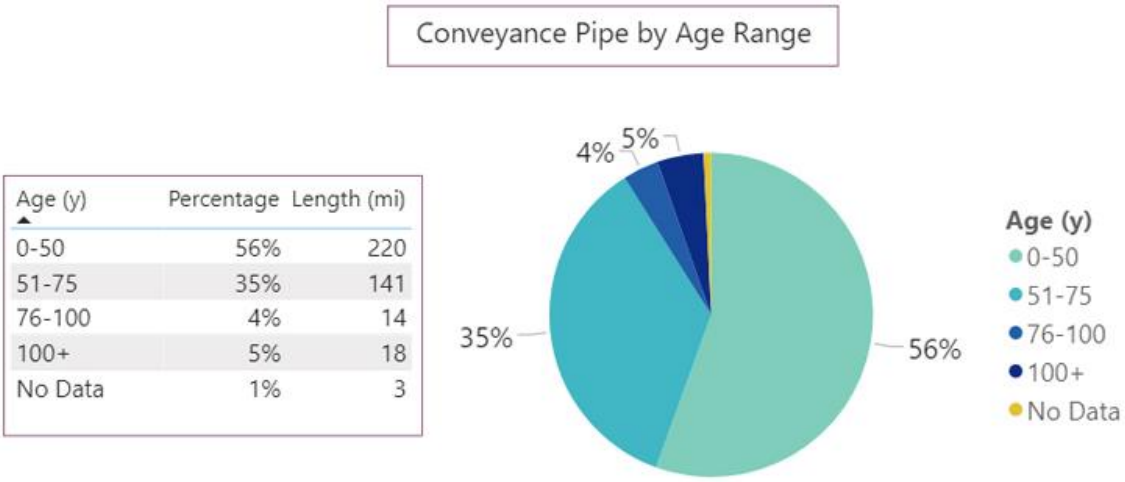
- South Plant, 21 years
- West Point, 17 years
- East Offsite, 16 years
- West Offsite, 16 years
- Brightwater, 13 years

The average expected useful life of all registered vertical assets is 24 years.[8] At least 7% (1,100) of the 15,000 critical vertical assets have a high likelihood of near-term failure. WTD

[6] Information extracted from WTD's asset management database 2/25/2026.
[7] Information extracted from WTD's asset management database 3/6/2026.
[8] From WTD's Maximo asset management database, 3/12/2026.

recently undertook an asset condition assessment effort, which will be incorporated into its enterprise asset management system in 2027.

For horizontal assets, WTD maintains a sewer collection and transmission system composed of 383 miles of conveyance pipe (4,742 segments), ranging in diameter from 12 inches to 204 inches. Of these, 45 miles (564 segments) are considered critical due to factors including population density, distance to a water course, distance to a wetland, and the volume of sewage flow. Of the 45 miles of critical segments, 4.4 miles (42 segments) have been identified as highly likely to fail at any time.[9] Additional condition assessment for WTD's sewer collection and transmission system is ongoing.[10] For these pipe assets, the graphic below summarizes age, with over half of conveyance pipes falling between 0-50 years and 44% over 50 years old:[11]



The average age of WTD's horizontal assets is approximately 50 years.[12] The expected useful life of WTD's horizontal assets varies between 40 and 80 years, although it is not uncommon for pipes to remain in serviceable condition for longer than expected. An ongoing (but not yet completed) condition assessment effort, based on 1,257 segments, estimates the average system remaining useful life at 20 years.[13]

To inform Asset R&R project selection in the decades to come, WTD is currently undertaking a significant upgrade to its enterprise asset management system software. Initially, this new software will utilize data generated from a baseline condition assessment

[9] Draft Linear Asset Renewal and Replacement Forecasting Tool, HDR, April 2026.
[10] Ibid.
[11] Information extracted from WTD's asset management database 7/23/2025.
[12] Draft Linear Asset Renewal and Replacement Forecasting Tool, HDR, April 2026.
[13] Draft Linear Asset Renewal and Replacement Forecasting Tool, HDR, April 2026. See "assessed lifespan" column.

of critical assets.[14] Later, condition information and other asset attribute information will be entered into the system as maintenance is performed by operations and maintenance (O&M) staff. Further in the future, critical assets will be retrofitted with sensors to collect information on asset condition and feed that information into the enterprise asset management system. As this asset condition and maintenance database becomes more robust, the system will gradually help O&M staff, engineers, and planners better predict remaining useful life, optimize maintenance intervals, and will result in increasingly more precise forecasting for the Asset R&R project portfolio going forward.

Characteristics of WTD's Asset Renewal and Replacement Capital Program

Renewing and replacing assets is a continuous process, from pre-design efforts, through design, contracting, construction, commissioning, and closeout. The scope of Asset R&R projects varies widely. The time needed to complete an Asset R&R project can vary from just a few weeks for small projects involving a single asset, to a decade or longer for large projects involving multiple assets or systems.

WTD has a backlog of identified Asset R&R projects. The Asset R&R backlog is composed of those known, unfunded and undelivered critical facilities or individual assets known to be past their useful lives and which may fail at any time (high-risk assets). Projects to address these aged facilities and individual assets are requested, scoped, validated[15] and eventually prioritized high enough for funding. WTD tracks every validated Asset R&R project that is awaiting funding so that the projects can be prioritized within the broader capital program. Most unfunded Asset R&R projects are requested because the assets involved have exceeded their useful lives and their condition, performance or risk exceed acceptable thresholds. As of November 2025, there were 75 large Asset R&R projects awaiting funding, with an estimate at completion in 2026 dollars of $2.2 billion, resulting in an average estimate at completion of $29.3 million.[16] In addition, WTD has six dedicated programs for smaller asset replacement projects, with about $80 million/year forecasted

[14] From ISO 55000: critical asset: asset having the potential to significantly impact the achievement of an organization's objectives.
Note 1 to entry: Assets can be safety-critical, environment-critical or performance-critical and can relate to legal, regulatory or statutory requirements.
Note 2 to entry: Critical assets can refer to those assets necessary to provide services to critical customers.
Note 3 to entry: Asset systems can be distinguished as being critical in a similar manner to individual assets
From WTD's Strategic Asset Management Plan, 2018: 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.
[15] In this context, "validated" means that the project has undergone a formal review process by subject matter experts and accepted into WTD's portfolio of future Asset R&R projects.
[16] WTD's Prism portfolio management database: Asset Management-Plants and Asset Management-Conveyance. 3/13/2026.

over the next 10 years. These programs currently have 135 projects in active delivery, and 236 planned projects.[17]

ii. Current policies in code, contract, or in practice

King County Code (K.C.C. 28.86, Wastewater Treatment) guides asset renewal and replacement and levels of service expected from the regional wastewater conveyance and treatment system. The Wastewater Services policies specific to Asset R&R are:

Relevant Policies in K.C.C.	Wastewater Services Policy (WWSP)
28.86.110 WWSP-9	To ensure the region's multibillion-dollar investment in wastewater facilities, an asset management program shall be established that provides for appropriate ongoing maintenance and repair of equipment and facilities. The wastewater maintenance budget, staffing levels and priorities shall be developed to reflect the long-term useful life of wastewater facilities as identified by the asset management program.
28.86.110 WWSP-10	The asset management program shall establish a wastewater facilities assets management plan, updated annually, establishing replacement of worn, inefficient and/or depreciated capital assets to ensure continued reliability of the wastewater infrastructure.

The Wastewater Services policies related to Levels of Service are:

Relevant Policies in K.C.C.	Wastewater Services Policy (WWSP)
28.86.110 WWSP-1	King County shall provide wastewater services to fulfill the contractual commitments to its component agency customers in a manner that promotes environmental stewardship, recognizes the value of wastewater in the regional water resource system and reflects a wise use of public funds.
28.86.110 WWSP-6, 7, 8,11	WWSP-6: King County shall operate and maintain its facilities to protect public health and the environment, comply with regulations and improve services in a fiscally responsible manner.

[17] Ibid.

	WWSP-7: King County shall plan, design and construct wastewater facilities in accordance with standards established by regulatory agencies and manuals of practice for engineering. WWSP-8: King County shall construct, operate and maintain facilities to prevent raw sewage overflows and to contain overflows in the combined collection system. In the event of a raw sewage overflow, the county shall initiate a rapid and coordinated response including notification of public health agencies, the media, the public and the affected jurisdiction. Preserving public health and water quality shall be the highest priority, to be implemented by immediately initiating repairs or constructing temporary diversion systems that return flow back to the wastewater system. WWSP-11: King County shall design, construct, operate and maintain its facilities to meet or exceed regulatory requirements for air, water and solids emissions as well as to ensure worker, public and system safety.

Current Practice: Identification and Prioritization of Asset R&R Capital Projects

Most new Asset R&R projects are identified by O&M staff and Conveyance Inspection staff. WTD's O&M staff are most familiar with the condition and performance of facilities and equipment and are most likely to recognize when an asset is failing and in need of replacement. Some asset R&R projects are identified by capital delivery project managers or planners and represent critical assets perceived to be at high risk of failure. Asset R&R may also be conducted as a "fortunate opportunity" in conjunction with other capital projects initiated for other reasons, or by other jurisdictions.

The current methodology to determine when an asset is at the end of its life is from the objective information contained in the asset database and through input from subject matter experts. The future methodology for scheduling Asset R&R projects is expected to increasingly rely more on objective information produced by WTD's enterprise asset management system, a software program that tracks asset information and predicts asset performance. As the new enterprise asset management system accumulates more asset information, it will have the ability to predict the remaining useful life of an asset as well as the maintenance regimen to optimize its value during its life.

Like all categories of capital improvements, Asset R&R projects adhere to an extensive governance process involving WTD senior leadership to ensure projects are essential, timely, appropriately scoped, and properly resourced. Formal decision gates, overseen by

a Board structure, ensure every stage of every capital project and consultant selection is briefed, understood, and given the go-ahead (or not) at every stage of the project. This process also ensures wide, in-depth knowledge of WTD capital projects among WTD leadership and subject matter experts.

iii. The system "must-dos"

WTD must meet its federal, state and local regulatory requirements, including firm pump capacity[18], and provide the level of sewer service expected by its member agencies. As such, keeping critical assets reliable is essential to meeting federal, state, and local regulatory requirements and to continue providing the essential service of cleaning wastewater.

iv. Planned and budgeted expenditures

As part of the 2027 Sewer Rate adoption process, WTD presented a 20-year forecast of its Capital Improvement Program that included about $8.1 billion of investments in capital projects to address asset renewal and replacement needs.[19] The first decade of this forecast consists of both active and planned capital projects ranging in status from active construction to long-range identified concepts. Asset R&R is 28% of WTD's first decade forecast ($2.8 B). The second decade of the forecast is determined by a long-range model that leverages accounting data and assumptions regarding remaining useful life to forecast a portfolio-level annual spend. Because of the varying level of definition between active capital projects, planned capital projects, and long-range model assumptions, the Capital Improvement Plan annual forecast contains significant uncertainty, particularly beyond the 6-year forecast window that WTD daylights as part of its biennial budget proposal process.

Below is a list of currently active and appropriated WTD asset renewal and replacement capital projects as of the 2026/2027 biennial budget adoption by King County council in November 2025. Projects planned to begin in 2028 and beyond are not included in this list and their relative timing is subject to change based on WTD's evaluated priorities at the time of subsequent sewer rate and budget proposal forecasts. It should also be noted that there are likely assets in WTD's backlog that are not addressed by currently planned or active capital projects, and improvements in tools and processes are underway to improve WTDs comprehensive identification and prioritization of asset renewal and replacement needs as described above.

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[18] Firm capacity is the pumping capacity of the facility with the largest pump out of service.

[19] Presentation to the King County Regional Water Quality Committee (RWQC), "2027 Sewer Rate Proposal," slide 21. RWQC packet page 203.

WTD Active and Appropriated Asset Renewal and Replacement Capital Projects/Programs (as of the Adopted 2026/27 Biennium Budget)
Asset R&R - Conveyance
Cathodic Protection Program
Conveyance System H2S Corrosion Rehabilitation
Coordinate with WSDOT on I-405N
Division Wide Force Main Inspection Access Program
ESI Section 8 Rehabilitation
Interbay Force Main & Odor Control
Lake Hills Boulevard Siphon Replacement
Lake Hills Interceptor Rehabilitation Phase II
M Street Trunk Rehabilitation
Murray Forcemain Rehabilitation
Odor / Corrosion Control
Pipeline Replacement
South Interceptor Rehabilitation
SPC Yarrow Bay PS Overflow Pipe Rehabilitation
SPO Eastgate Interceptor Rehabilitation Phase IV
Asset R&R - Plants
Biosolids Agricultural Equipment
Biosolids Forestry Equipment
Biosolids Site Development
Biosolids Transportation
Brightwater Neuros NX-300 Blower Replacement
Brightwater Operations Center Roof & HVAC Replacement
Chinook Research Vessel Replacement
Division Wide Offsite Level Controls and Communication Upgrade
Division Wide VFD Replacement Program
Division-Wide UPS Replacement Program
Electrical / I&C
Environmental Lab LIMS Upgrade
Hidden Lake PS Raw Sewage Pump Replacement
HVAC Replacements and Refurbishments
Jameson/Arcweld Buildings Replacement
Environmental Laboratory Capital Asset Management Program
Lakeland Hills Install Generator
Lakeland Hills PS Facility Replacement
Matthews Park PS Odor Control Replacement
Mechanical Upgrade & Replacement
Medina PS MCC & Generator Replacement
Offsite Standby Generator Retrofit with Load Bank Connections
Ovation Evergreen Control Systems Lifecycle Management Program

PIMS Replacement
Richmond Beach PS MCC and Switchboard Replacement
Roof Replacements for WTD Facilities
Small Generator Replacement at Various Offsite Stations
South Plant Barscreen Upgrade
South Plant Chemical ORT System and Dewatering Carbon Scrubber Improvements
South Plant Electrical Improvements
South Plant Influent Gates & Actuators Replacement
South Plant Raw Sewage Pump #3 Replacement
SP Biogas and Heat Systems Improvements
SP DAFT Tank Rehabilitation
STP RAS Pods 1-4 Piping and Component Replacement
Structures / Site Improvement
West Point Electrical Improvements
West Point EPS Isolation Gate Rehabilitation
West Point IPS / EPS Pump Refurbishment Program
WPTP Critical Gate Refurbishment Program
WPTP Grit Classifier Replacement
WPTP Instrument & Service Air Replacement
WPTP LSG Piping Replacement
WPTP Oxygen Generation System Refurbishment
WPTP PE and RAS Pipe Restoration/Replacement
WTD CMMS Upgrade
WTD Ovation Control Systems Upgrades
WTD Roofing Program 2024-2028

v. Summary of science/data

Asset Management as a Best Practice

Determining the optimal time to replace aging assets is essential for efficient operation of the regional wastewater collection and treatment system. A substantial body of asset management best practice has developed over several decades and now includes well-accepted principles and guidance in continually improving asset management programs.[20]

WTD has an established asset management program and continually strives to improve. In 2018, WTD's program was evaluated by an outside expert and received a maturity rating of 2.2, indicating a "developing" asset management program. In 2025, another maturity assessment was conducted, resulting in a rating of 2.5, indicating the program is maturing

[20] See ISO 55000 series publications; The International infrastructure Management Manual; The Institute of Asset Management publications; numerous others.

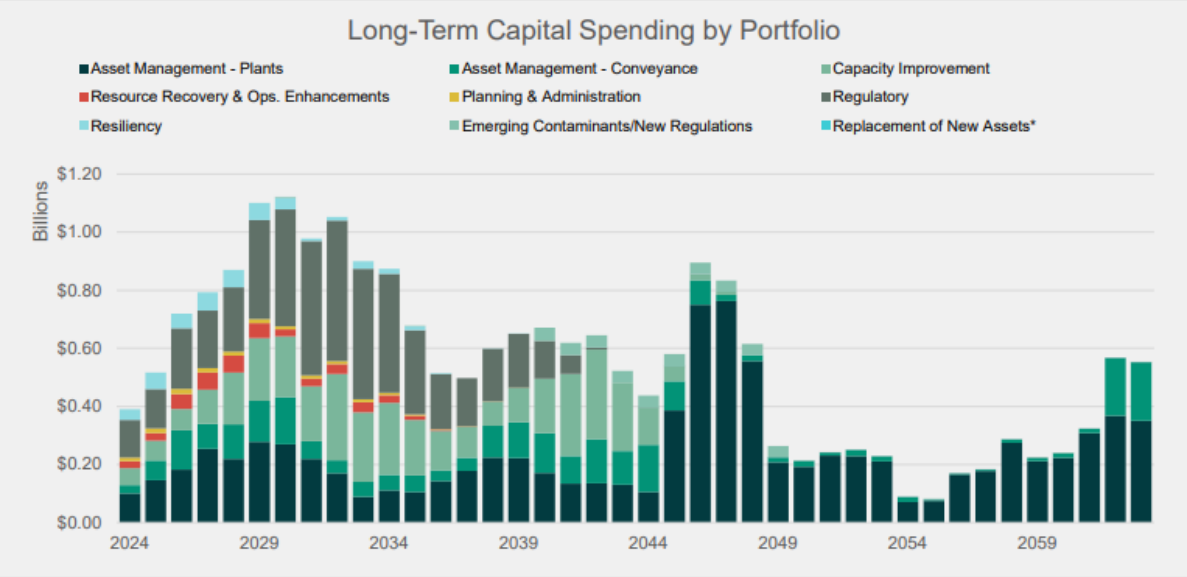
toward “competent” in accordance with the standards developed by the Institute of Asset Management.

Asset Renewal and Replacement Forecasting

WTD recently completed a long-term financial and sewer rate forecasting tool.[21] This tool was prepared to satisfy the requirements of King County Council Motion 16449 and was developed to forecast the long-term costs of its capital improvement needs, including asset renewal and replacement needs. The tool uses a spreadsheet model with various inputs including customer account information; operating and maintenance (O&M) costs across WTD; existing long-term debt obligations; planned capital improvement program (CIP) needs, and other miscellaneous system revenues. More specifically for Asset R&R, the Tool functions using three main inputs: the current CIP, the capital forecast used in the sewer rate model developed and maintained by WTD staff, and the register (accounting records) of assets currently in service.

To meet the requirements of Motion 16449, the long-term financial forecasting model can be modified to produce financial forecasts of up to 75 years; however, the report notes that “a forecast of this duration should not be used for any activity other than macro analyses and big-picture evaluations of future needs.”[22]

The first 40 years of the projection are shown below:[23]



[21] Raftelis/Consor “Long-Term Financial & Sewer Rate Forecast Executive Summary,” Final Report August 2026. Briefing presented to the Regional Water Quality Committee September 3rd, 2025.
[22] Raftelis/Consor “Long-Term Financial & Sewer Rate Forecast Executive Summary,” Final Report August 2026. Briefing presented to the Regional Water Quality Committee September 3rd, 2025, p. 10.
[23] Ibid.

Supplementing this Raftelis forecasting tool, a complementary modeling effort is underway, using a different methodology, based on WTD's detailed asset inventory and condition information. This effort by HDR is currently under review. When complete, the model will provide a second basis for long range Asset R&R projections.

Over the past 10 years, WTD has likely underinvested in Asset R&R – over that time, spending has averaged about $90 million/year in 2025 dollars (although in 2025, the investment rose to $164 million). Looking forward, WTD's estimated Asset R&R spend, based on a combination of identified and modeled potential project costs that have been prioritized for funding availability and resource capacity, is about $385 million/year.[24] The "right level" of Asset R&R investment will be studied further in Step 2 of the RWSP planning process.

D. Example Practices from Other Jurisdictions/Industry

WTD peer agencies were identified in the Raftelis/Consor capital program forecasting body of work:

- Massachusetts Water Resource Authority
- Milwaukee Metropolitan Sewerage District
- Los Angeles County Sanitation Districts
- Philadelphia Water Department

Each of these peer agencies manage their asset renewal and replacement programs through different processes.

The Massachusetts Water Resources Authority (MWRA) operates both a water and wastewater system and is a wholesale water and wastewater service provider, similar to WTD. MWRA serves 61 communities with a combined population of 2.6 million. MWRA operates the second largest wastewater treatment facility in the nation, designed to treat 1.2 billion gallons per day, significantly more than WTD. A 2002 estimate of the total value of MWRA assets was $10.25 billion.[25] MWRA prioritizes its Asset R&R projects similarly to WTD.[26] Its Wastewater System Master Plan, completed in 2018, identifies approximately

[24] Presentation to the King County Regional Water Quality Committee (RWQC), "2027 Sewer Rate Proposal," slide 21. RWQC packet page 203.
[25] Ibid. See also, Massachusetts Water Resources Authority: Wastewater System Master Plan, December 1,2018, p. 6-1.
[26] Ibid. See also, MWRA Board of Directors Report on Key Indicators of MWRA Performance First Quarter FY2026

$1.1 billion in Asset R&R needs between 2024 and 2038.[27] This is less than WTD, even though MWRA's system is larger than WTD. The agency has an active asset management program and has been using IBM Maximo™ as its computerized maintenance management system since before 2018.[28] WTD converted to this same asset maintenance management system in 2025.

The Milwaukee Metropolitan Sewerage District (MMSD) provides sewer and flood management services for 29 municipalities and over 1.1 million people in the greater Milwaukee area, covering 423 square miles.[29] Inflows average 105 million gallons per day (about half of WTD's average inflows). MMSD prioritizes its Asset R&R projects similarly to WTD.[30] MMSD's long range Asset R&R program (2025-2050) identifies 46 major projects or programs, estimated to cost $1.457 billion.[31]

The Los Angeles County Sanitation Districts (LACSD) is composed of 24 independent special districts and provides sanitation, wastewater, and electrical generation services to 5.5 million people in Los Angeles County. The districts cover a land surface area of 850 square miles and include 78 cities, as well as unincorporated areas.[32] This is about twice the size of WTD. LACSD has a projected 2023-2024 capital improvement program of $331 million and an O&M budget of $403 million, also about twice as large as WTD.[33] The Sanitation Districts also utilize a computerized maintenance management system for all maintenance tasks. Similar to WTD, LACSD planned to replace its current maintenance management system with the Maximo™ Application Suite.[34]

The Philadelphia Water Department (PWD) provides wastewater collection and treatment for Philadelphia and adjacent areas, consisting of approximately 2.5 million residents, similar to WTD. In addition, PWD also provides water to Philadelphia's 1.6 million residents, as well as stormwater management.[35] Similar to WTD, a major focus of the Department is its combined sewer system, and it is operating under an EPA consent decree to reduce combined sewer overflows.[36] The sewer system includes three major

[27] Massachusetts Water Resources Authority: Wastewater System Master Plan, December 1,2018, p. 4
[28] Massachusetts Water Resources Authority: Wastewater System Master Plan, December 1,2018, p. 6-12.
[29] Black and Veatch: Milwaukee Metropolitan Sewerage District 2050 Facilities Plan - Amendment May 2025, p. vii.
[30] Black and Veatch: Milwaukee Metropolitan Sewerage District 2050 Facilities Plan - Amendment May 2025, p. 70.
[31] Milwaukee Metropolitan Sewerage District, May 2025 Amendment to the 2050 Facilities Plan, Appendix D, Table 3
[32] Los Angeles County Sanitation Districts, 2024 Annual Report, p. 5.
[33] Ibid, p. 23.
[34] Ibid, p. 10.
[35] Philadelphia Water Department Fiscal Year 2026 Budget Testimony, April 2, 2025.
[36] CSO Long Term Control Plan – Philadelphia Water Department

treatment plants which together treat approximately 470 million gallons of wastewater per day, more than double WTD's average.[37] The Department projects its capital program out six years, and is projecting a six-year wastewater Asset R&R budget of $2.64 billion for 2026 to 2031.[38]

WTD also uses Orange County Sanitation as a peer agency (OC San); OC San owns and operates wastewater collection system and treatment infrastructure. It serves 2.6 million people with a collection system including 380 miles of regional sewer pipelines, 15 pump stations and two sewer treatment plants, with an average daily wastewater flow of 184 million gallons.[39] OC San values its facilities at $15 billion.[40] Its 10-year capital improvement program totals $3.5 billion, of which $498 million is earmarked for Asset R&R, although a good portion of the remaining capital investments appear to meet WTD's definition of Asset R&R.[41]

E. Policy Issues, Challenges, and Opportunities

Significant projected sewer rate increases over the next decade are driven, in part, by large regulatory projects which must be completed by 2037. Not only is the expense of these large regulatory projects a concern, there is also a concern that overall cost pressures will pull money away from the Asset R&R program, which will make the program even more reactive (rather than proactive), resulting in higher Asset R&R expenses in the future. Pushing Asset R&R projects further into the future results in those projects becoming more expensive over time. Prioritizing Asset R&R projects is thus an important component of moderating sewer rate increases by preventing inflationary cost growth.

Managing the regional wastewater system is asset intensive. WTD is currently transitioning to a more data-driven approach which includes migrating to a new enterprise asset management system (EAMS) (IBM Maximo™) to better inform long term asset renewal and replacement timing and costs. The updated EAMS tool will support WTD's ability to optimize life cycle expenses, demonstrating to MWPAAC member agencies that ratepayer investments are providing the maximum value possible while also ensuring the system is sustainable in the long run.

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[37] Waterandwastewater.com, "Philadelphia Wastewater Treatment Plant," September 10, 2025.
[38] City of Philadelphia Six-Year Capital Program For Fiscal Years 2026-2031; 2026 Approved Capital Program and Budget, pp. 246; 251. Estimated assuming wastewater totals are 50% of combined utilities line item on p. 251.
[39] Orange County Sanitation District: Asset Management Plan 2025, p. ES-1.
[40] Orange County Sanitation District Capital Improvement Program Annual Report 24/25, p. 12.
[41] Ibid, p. 42.

F. Range of policy options with associated actions and considerations

The policy options presented below describe potential choices and Asset Renewal and Replacement actions that could be implemented to address the following policy questions. Each policy question will be considered in turn.

1. How proactive vs. reactive should WTD be when deciding to refurbish or replace aging infrastructure?
2. What level of redundancy of critical systems should WTD have?
3. What level of risk tolerance should WTD accept?
4. What approach should WTD use to fund Asset R&R projects?

Asset Renewal and Replacement Policy Question #1: **How proactive vs. reactive should WTD be when deciding to refurbish or replace aging infrastructure?**

Policy Option	Goal	Description	Asset R&R Actions	Outcomes/Examples	Tradeoffs
Option #1	Delay asset renewal and replacement beyond the assets' useful lives until risk is deemed unacceptable. High risk tolerance	Primarily implement Asset R&R projects after failure occurs or when failure is imminent.	**Critical Assets** – Maintain a backlog[42] of critical assets that are past their projected end of useful life by continuing to focus on refurbishing or replacing assets after failure or when failure is imminent while also proactively refurbishing or replacing some critical assets nearing end of life. **Non-Critical Assets** – Renew or replace non-critical assets only after asset failure unless part of a larger capital project.	The backlog of Asset R&R projects past their optimal renewal or replacement timing will steadily increase. Risk will steadily increase. Unscheduled maintenance will increase, resulting in higher operating expenses. Less programmatic renewal/ replacement will occur (for example: roof replacements, variable frequency drive replacements, programmable logic controller replacements), losing efficiencies as replacement decisions focus on individual assets.	Deferred expenses today will result in higher costs in the future. Lower impact on rates in the near term but higher systemic risk. As noted in the definition 'Critical Assets' are: 'those assets that, if they fail, threaten the ability of the utility to function properly, and potentially cause permit violations, public health and safety concerns, environmental degradation, or employee safety concerns.' This option chooses to wait for failure or imminent failure to renew. This option chooses a high likelihood of these events.
Option #2	Gradually shift (over 30 years) from reactive to proactive approach for critical Asset R&R. Medium/lower risk tolerance	Increasingly implement Asset R&R projects before failure occurs while continuing to address some assets after failure or when failure is imminent. Shift Asset R&R focus over the planning period (30 years) to fully fund each new year's annual Asset R&R requirement, while gradually reducing the existing Asset R&R backlog.	Increase the number of critical Asset R&R projects implemented annually so that by the end of the RWSP planning horizon (2060) there is no backlog of critical assets needing refurbishing or replacing that are past their projected end of useful life. Increasingly transition to more data-driven decision-making, utilizing technology and better condition assessment. Take advantage of opportunities in adjacent projects or right of way projects to replace non-critical assets.	<u>Measurable outcomes:</u> Gradual reduction in the Asset R&R backlog. Backlog reduced by 50% after 15 years and no backlog after 30 years. Gradually decreased systemic risk over time. Increasingly data-driven decision-making, including condition assessment and predictive maintenance recommendations, supplemented with and checked by front line expert staff will enable more optimal asset renewal or replacement decisions and improve system reliability.	Additional funding above the current baseline will be necessary to implement this policy option. See question #4. This option makes intentional strides toward sustainable operations, service continuity, and cost effective management of infrastructure, while recognizing the investment need and stretching that investment over time to smooth impacts to customers.

[42] The Asset R&R backlog in this context is composed of those critical facilities or individual assets known to be past their useful lives and which may fail at any time.

Policy Option	Goal	Description	Asset R&R Actions	Outcomes/Examples	Tradeoffs
Option #3	Quickly transition (over next 10-15 years) to a proactive approach for Asset R&R so all critical assets are refurbished or replaced prior to failure. Low/lowest risk tolerance	Consistently implement, within next 10 years, Asset R&R projects for critical assets *before* failure becomes likely. While transitioning to a proactive approach, simultaneously reduce the existing Asset R&R backlog, Asset R&R "must do" projects are identified, prioritized, funded, and completed before risk thresholds are exceeded. WTD resources are reserved for "must do" Asset R&R projects.	Substantially increase the number of critical Asset R&R projects implemented annually so that by 2040 there is no backlog of critical assets needing refurbishing or replacing that are past their projected or adjusted end of useful life. After 2040, continue to implement critical Asset R&R prior to end of useful life. Provide increased resources and services – scoping, design, construction, commissioning – in the near term to reduce the backlog of R&R projects. Develop and continually improve an Asset R&R project forecast that assigns projects to specific program years for a 75-year planning horizon. Create a portfolio category for Asset R&R projects that are nearing end of life but have not yet failed – Proactive R&R.	<u>Measurable outcomes:</u> No Backlog after 15 years. Decreased systemic risk. Asset R&R projects are assigned a specific year for renewal/replacement based on remaining useful life projections and condition assessments, Large Asset R&R projects are scheduled many years in advance and commissioned in accordance with their assigned renewal/replacement timing. After transition, WTD's critical assets will reliably provide the level of service necessary to maintain acceptable levels of risk. Asset R&R critical projects do not need to compete for funding; instead, funding is projected years in advance and provided when needed.	An immediate transition to a proactive Asset R&R represents a significant policy shift. This transition will require additional staff time and money in the near term. This will add expense above the status quo. These near term expenses will not be recouped directly, but will lead to more efficient and optimal management of WTD assets in the long term. Significant additional funding above the current baseline will be necessary to implement this policy option.

Asset Renewal and Replacement Policy Question #2: **What level of redundancy of critical systems should WTD have?**

Policy Option	Goal	Description	Asset R&R Actions	Outcomes/Examples	Tradeoffs
Option #1	Minimal / moderate level of redundancy for limited set of critical facilities. Higher risk.	Focus redundancy on investments essential to powering a <u>limited set</u> of critical facilities and/or responding to peak system flows. Implement redundancy only where needed to maintain Department of Ecology requirements and permit compliance.	Redundancy actions focus on: a. Providing power backups at pump stations. b. Adding reserve pumping capacity to meet peak flows. c. Adding communication so that unmanned critical facilities can still be monitored and controlled from the main plants if one communication mode is lost.	Systems continue to be designed considering peak flow projections and the associated statistical analysis of return intervals. <u>Measurable outcomes:</u> System redundancy is increased upon clear indication redundancy is insufficient (Example: West Point Power Quality project).	Higher risk Lower impact on sewer rates.
Option #2	Increased level of redundancy across many/most critical facilities. Reduced risk, improved reliability and resiliency.	Systematically prioritize and add redundant capacity for <u>many/most</u> critical functions (essential to power critical facilities and/or respond to peak flows) to significantly reduce risk. Additionally, pursue redundancy where renewal and replacement projects present the opportunity.	In conjunction with the development of an enterprise risk management framework: a. Evaluate horizontal and vertical asset systems and add redundant capacity based on maintenance requirements and the value of reduced risk. b. When developing the scope of Asset R&R projects, look for opportunities to add redundancy. Adding redundancy as part of a larger project can be less expensive than adding redundancy as a smaller project later.	Reduced risk from unexpected equipment failures or statistical outlier flows. <u>Measurable outcomes:</u> 1. Reduced overflows/spills 2. Reduced hours on individual pumps/motors 3. Ability to exceed pump station's firm capacity in statistically rare events 4. Reduction in after-hours emergency callouts 5. Higher overall system availability	Increased level of redundancy will significantly lower risk, but will be more expensive and have a greater impact of sewer rates (adds both capital and O&M expense). The benefit will be improved system reliability, safety, and reduced risk.

Asset Renewal and Replacement Policy Question #3: What level of risk tolerance should WTD accept?

The answer to this question is linked to the options in questions #1 (proactive/reactive) and #2 (level of redundancy) described above. For example, a low risk tolerance is linked with a quick transition to a proactive approach to Asset R&R coupled with increased level of redundancy across most critical facilities; a high risk tolerance is linked with delaying asset renewal and replacement beyond the assets' useful lives coupled with minimal redundancy across a limited set of critical facilities. In addition to these considerations, when evaluating the optimal level of risk it is important to consider the two options described below.

Policy Option	Goal	Description	Asset R&R Actions	Outcomes/Examples	Tradeoffs
Option #1	Higher risk tolerance	Rely on existing practices and professional judgment to manage asset risk. Consider risk (with the goal of reducing risk) as Asset R&R projects are scoped and implemented.	Implement projects based on mix of best professional judgment and whether failure has occurred or is imminent.	Significant information gaps about the risks posed by critical assets will continue to exist, resulting in unknown/high levels of risk. Critical asset condition information insufficient to drive objective renewal/replacement decisions. No systematic approach for managing risk is implemented.	Higher risk tolerance. Modernization to more data-driven risk practice is underway, however this option could result in lack of confidence from member agencies. This option requires no new resources.
Option #2	Lower risk tolerance Optimize Asset R&R based on real-time data	Use comprehensive data-driven risk analysis to identify optimal timing for each Asset R&R project. Consider multiple risk factors (such as external, regulatory, political, social and financial) in addition to cost when determining risks and assessing when to implement Asset R&R projects.	Define and adopt a comprehensive approach for managing risk. Critical assets retrofitted to provide real-time condition information. This condition information is continually updated. Deliver critical asset refurbishment or replacement before the year risk is projected to exceed tolerance.	Minimized failure of critical assets to the maximum extent possible. Renewal/replacement timing for critical assets is based on data generated by the assets themselves. Enterprise asset management software predicts appropriate maintenance intervals, including major maintenance/renewal timing.	Lower risk tolerance; optimized Asset R&R based on real-time data. Additional resources needed, however additional resources are not expected to be substantial in relation to the benefit achieved.

Asset Renewal and Replacement Policy Question #4: What approach should WTD use to fund Asset R&R projects?

As a reminder of the problem definition inherent to this question, high risk Asset R&R projects are not guaranteed funding. Asset R&R projects compete for capital funding within WTD's entire capital portfolio. This often results in Asset R&R projects being delayed beyond their expected end of life. Currently there is no policy statement ensuring Asset R&R projects are funded.

The goal of any modification to funding approach would be to more closely align available cash funding, and subsequent spending of that cash on Asset R&R, with an actual data-informed asset replacement forecast based on risk.

Current cash funding approach has been sufficient given **current spending levels**, but current spending levels are **insufficient** and are not effectively addressing asset risk or the backlog of Asset R&R projects. There are multiple reasons for this historic underspending of needs, including the lack of a protection mechanism for Asset R&R projects, overall optimization of the capital portfolio, and other resource constraints. If WTD changes its prioritization policy and prioritizes Asset R&R spending (therefore increasing asset R&R spending levels), the current cash funding approach may not be sufficient. Policy options must recognize that future Asset R&R spending levels (optimized for risk, replacement cycles, etc.) will likely be higher and require a higher amount of cash funding directly generated by the sewer rate. Long-term, a reactive Asset R&R funding policy where assets are utilized until failure would also likely not result in lower sewer rates as assets are required to be replaced on an emergency basis.

WTD's annual renewal and replacement spending over the past 10 years:

WTD Cash Funding vs R&R ($ '000)	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	10-Year Total
Annual R&R ("Asset Management") Spending	63,856	41,144	52,323	73,857	50,369	46,965	62,252	94,629	100,582	163,827	**749,805**
Annual Cash Funding from Revenues	82,631	74,533	108,733	137,751	88,342	143,101	166,800	186,000	207,070	189,944	**1,384,905**
Cash Funding as % of R&R Spending	***129%***	***181%***	***208%***	***187%***	***175%***	***305%***	***268%***	***197%***	***206%***	***116%***	***185%***
O&M Expenditures	138,698	142,263	139,585	143,835	154,513	138,166	158,816	191,217	191,678	218,707	1,617,478
Debt Service Expenditures	235,437	238,688	246,227	248,024	243,507	243,611	234,191	240,136	242,499	274,273	2,446,593
Capital Expenditures	149,150	192,197	231,197	212,206	196,073	205,420	258,618	361,117	312,597	428,999	2,547,574
Asset R&R as % of Total Spending	***12%***	***7%***	***8%***	***12%***	***8%***	***8%***	***10%***	***12%***	***13%***	***18%***	***11%***

Addressing the fourth question will require a three-phase process, with some phases having multiple policy options. All three phases should be treated collectively as a package, as individually they will not guarantee the desired goal stated above. The policy options within these phases could be administrative, or internal WTD policies, rather than actual code-level changes.

Phase 1: Adopt a cash-funding approach in the sewer rate model that more closely aligns with true Asset R&R spending needs.

Phase 2: Adopt a financial policy that preserves cash funding for Asset R&R vs other portfolio categories.

Phase 3: Adopt a portfolio policy that prioritizes Asset R&R projects based on risk and protects them from the impingement of other portfolio categories and drivers.

Asset Renewal and Replacement Policy Question #4: What approach should WTD use to fund Asset R&R projects?

Phase #1: Adopt a cash-funding approach in the sewer rate model that more closely aligns with true Asset R&R spending needs.

Phase #1 Administrative Policy Options:

Policy Option	Goal	Description	Asset R&R Actions	Outcomes/Examples	Tradeoffs
Option #1	Ensure minimum required funding for Asset R&R critical assets through status quo approach.	Status Quo: Use **original cost depreciation** to determine the amount of Asset R&R cash funding to collect through rates.	Provide monetary resources to fund the Asset R&R capital program based on original cost depreciation regardless of identified R&R requirements. Use a mix of cash-flow and bond sales to fund Asset R&R projects.	Asset R&R funds are available but *may* not be sufficient to meet all Asset R&R needs if future spending levels are significantly higher than current levels.	May require a higher debt burden for WTD relative to other options and potentially does not recover sufficient rate funds for cash-funding all Asset R&R projects, depending on annual spending levels.
Option #2	Ensure adequate funding for asset R&R through transparent and efficient means, with potential future higher spending levels.	Interim Approach: Use **annual Asset R&R spending OR original cost depreciation**, whichever is higher, to determine the amount of Asset R&R cash funding to collect through rates.	Cash fund Asset R&R based on annual R&R spending or depreciation, whichever is higher.	Asset R&R funds are available and *may be* closer than Option #1 to meeting all Asset R&R needs.	'Middle-path' between options #1 and #3, potentially higher sewer rates than option #1, but not necessarily providing the desired level of funding (still undetermined).
Option #3	Ensure adequate funding for asset R&R through transparent and efficient means with potentially significantly higher future spending levels.	Optimum Approach: Use **replacement cost depreciation** to determine the amount of Asset R&R cash funding to collect through rates.	Cash fund Asset R&R based on replacement cost depreciation.	Asset R&R funds are available and match the true need.	Sewer rates are likely higher than for options #1 and #2.

<u>Phase #1:</u> Adopt a cash-funding approach in the sewer rate model that more closely aligns with true Asset R&R spending needs.

Considerations

There are multiple approaches to determining the amount of cash funding that a utility uses for its capital program. WTD's current approach is tied to original cost depreciation, which represents an annualized amount of spending on existing assets. However, it does not take capital cost inflation into account over time or prioritize funding asset repair and replacement projects over other capital needs.

While it represents a common industry approach, alternative approaches aim to address these deficiencies, such as cash funding based on actual projected Asset R&R spending, or inflating the original cost depreciation to replacement cost depreciation to cash fund the amount it would take to replace assets in year of expenditure dollars. In practice, both of these approaches are likely to result in higher immediate sewer rates than the status quo approach.

Asset Renewal and Replacement Policy Question #4: **What approach should WTD use to fund Asset R&R projects?**

Phase #2: Adopt a financial policy that preserves cash funding for Asset R&R vs other portfolio categories.

Phase #2 Administrative Policy Options:

Policy Option	Goal	Description	Asset R&R Actions	Outcomes/Examples	Tradeoffs
Option #1	Prioritize flexibility and rate management.	Asset R&R is cash funded. Cash over and above Asset R&R spending is used to offset spending in the entire capital portfolio – reducing WTD's overall debt burden.	• Revenues are reinvested in the system every year without the need to put them aside in a reserve and "wait" for Asset R&R projects.	Status quo This approach reduces the amount of debt issued in that year and effectively puts the money to a better use—the avoided interest rates in 30-year bonds are higher than the returns on investments from cash in a reserve.	No guarantee that cash funding is used to fund Asset R&R projects.
Option #2	Prioritize intergenerational equity while allowing for some moderate flexibility and opportunity to manage rates.	Maintain Asset R&R funding (in a reserve) based on long-term spending forecast (based on risk/ replacement cycle as described in related policy). Excess cash over and above that forecast does not have to be held in the reserve and can be used to decrease debt issuance costs or other upcoming capacity needs.	• Revenues collected via the monthly sewer rate are deposited in an Asset R&R reserve. • A long-term forecast for Asset R&R spending is created and maintained. • The reserve balance is maintained based on that long-term forecast. • Cash over and above Asset R&R spending plus long-term forecast may be used to decrease debt issuance for other capital needs.	Cash remaining in the reserve earns a very modest amount in interest, and any excess cash can be used to avoid interest rates on bonds or other forms of debt. Short-term rate increases could still result depending on timing and rollout of implementation but could be better moderated long-term and allow for some flexibility in WTD financial management.	Could result in higher sewer rates if less cash funding is available for non-Asset R&R projects (along with higher Asset R&R spending than previous).
Option #3	Prioritize intergenerational equity.	Excess cash above Asset R&R spending goes into a reserve (and is not used for non-Asset R&R projects).	• Revenues collected via the monthly sewer rate are deposited in an asset R&R reserve. • Cash over and above asset R&R spending in a given year remains in the reserve.	Cash remaining in the reserve earns a very modest amount in interest, but debt service costs likely increase. Short-term rate increases could result depending on the timing and rollout of implementation in conjunction with other needs. Interested parties have a high level of transparency into Asset R&R funding availability.	Could result in higher sewer rate if less cash funding is available for non-Asset R&R projects. Less flexibility in managing short-term rate increases ('smoothing').

Phase #2: Adopt a financial policy that preserves cash funding for Asset R&R vs other portfolio categories

Considerations

An Asset R&R Reserve is not the only mechanism to maintain adequate funding for R&R projects. In large utilities with ongoing capital programs, revenues can be reinvested in the system every year without the need to put them aside in a reserve and "wait" for asset R&R projects. This approach reduces the amount of debt issued in that year and effectively puts the money to a better use as the avoided interest rates in 30-year bonds are higher than the returns on investments from cash in a reserve.

While in practice, excess cash being used to fund other portfolio categories in place of issuing debt saves WTD more money than interest on a reserve would earn (see above explanation), this could potentially obfuscate (future, theoretical) challenges with cash funding levels or Asset R&R being deprioritized.

An Asset R&R funding policy cannot be separated from intergenerational equity, the concept that the users who benefit from the system over time should pay a proportionate charge to the costs of the system over time. Most assets will be replaced several decades after they have been originally installed and provide benefits to WTD for that asset's entire life cycle. Because the replacement of assets does not generally expand the capacity of performance of the system, it is generally considered that they should be paid for immediately, rather than financed through debt. Debt financing of replacement projects penalizes future ratepayers for maintenance of the existing system. Debt financing of capital projects should conceptually be limited to projects that either expand the system capacity or enhance the system's function (for example, by treating wastewater to a higher standard than previously). However, this results in higher rates in the immediate term to avoid penalizing future ratepayers.

Phase #3: Adopt a portfolio policy that prioritizes Asset R&R projects based on risk and protects them from the impingement of other portfolio categories and drivers.

Justification

The first two Asset R&R financial policy phases should be paired with a portfolio prioritization policy to be effectual. This policy should ensure that Asset R&R spending levels are based on replacement cycles/risk/etc. and cannot be deprioritized due to other spending needs such as major regulatory projects or set by percentages of portfolio based on pairwise comparison etc.

Considerations

This policy can only be fully realized with sufficient cash funding (as a result of phases 1 and 2 above) over an extended period of time.

If this policy is enacted but other spending levels (based on large regulatory projects or otherwise) must stay the same it could require the issuance of more debt, at least in certain time periods, at a higher cost than cash (along with higher cash needs), which could trigger rate increases. This can be transitioned into slowly/over-time to reduce rate burden.

Portfolio mechanisms can be designed to follow the asset management risk tolerance threshold or how this would dictate what projects happen when. The Asset R&R share of portfolio is determined by risk threshold – i.e. all projects above said threshold are funded.

This policy change does not have a suite of choices. While wording could vary, an internal administrative policy (not in code) would in all forms create the same outcome – **Asset R&R share of portfolio is determined by risk threshold – all projects above said threshold are funded.**

G. Interested and affected parties WTD will engage to gather input

WTD's component agencies and MWPAAC are the primary audiences that need to be engaged on Asset Renewal and Replacement policy options.

H. Rate structure considerations (if applicable)

There are no known rate structure considerations beyond the discussion in this policy memo.

I. Relationship to contracts

There are no known contract implications for this policy question.

J. Equity and Social Justice (ESJ) impacts

Based on the definition of equity and social justice in the King County Equity and Social Justice Plan 2016-2022, there are equity considerations related to formulating Asset R&R funding policies. Effective Asset R&R funding policies will allow WTD to address historical inequities by prioritizing renewals in frontline communities, reducing spill risks in vulnerable areas, improving air/noise/odor conditions, and supporting intergenerational equity by avoiding costly deferred maintenance, as outlined in question #4 above.

K. Planning Level Cost Estimates

This section will be added into the policy memo as the "Step 2" analysis later.

L. Evaluation of outcomes: identify impacts and outcomes of each option

This section will be added into the policy memo as the "Step 2" analysis later.