King County
Wastewater Treatment Division

Long-term Rate and Capital Planning Study

December 13, 2023

consor

RAFTELIS

RWQC Motion 2023.0257.1

Forecast Methodology Requested: the proposed motion requests WTD to **research and identify methodologies to forecast the long-term costs of its capital improvement needs** and **to seek comment and an advisory recommendation on the methodologies from the Metropolitan Water Pollution Abatement Advisory Committee (MWPAAC)**.

Forecast Requirements: the forecast should include, but not be limited to the following capital improvement categories: **asset management; capacity improvements including projects for population growth and those projects addressing infiltration and inflow; and known and potential regulatory requirements**.

Includes language recognizing that forecasts **beyond the standard six-year capital improvement program will have increasing levels of uncertainty with each year**.

The recommended methodologies should allow for **forecast periods of up to 75 years**. The methodology should also **allow for changes in various assumptions** including growth capacity and known and projected regulatory requirements such that forecast scenarios can be compared using different assumptions.

Long-Term Capital Needs Methodologies

Task 1

Assess WTDs current methodologies for long-term capital investment forecasting (ongoing)

Task 2

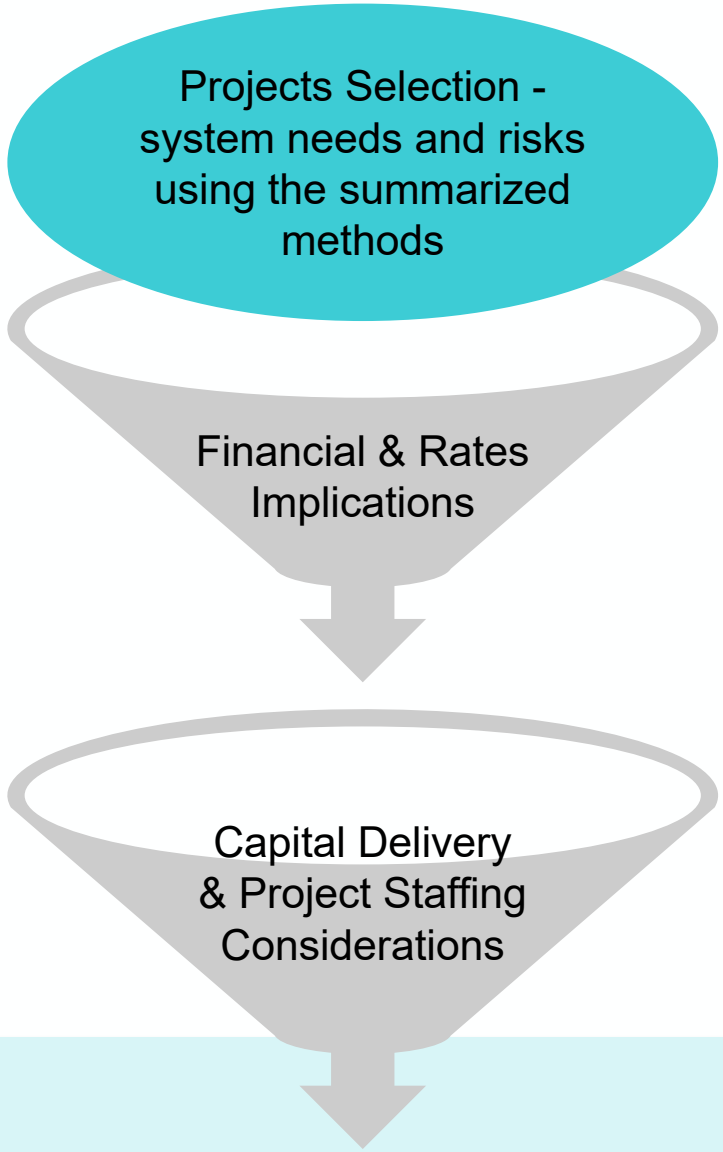
Recommend alternative methods applicable to WTD (today's presentation)

Key Findings:

1. Peer agencies are doing long-term capital forecasting – generally 30-40 years into the future. Only forecasting rates for typically 5-years due to uncertainties.
2. No peers are performing 75-year long-range capital planning or forecasts.
3. Can generally be of value to forecast capital costs to 20-40 years depending on available data & cost assumptions.
    - Asset management costs can be forecasted longer than 40 years depending on data and assumptions.
4. Methods for developing projects and forecasting costs is unique to each project category, i.e., asset management, growth, consent decree, new regulations, etc.
5. Long-term capital forecasting is a balance of needs and available resources.

Long-Term Capital Needs Methodologies Recommendations

Developing long-term capital investment and rate forecasts is a balance of 3 elements…



Outcome: Short and long-term capital forecast that meets the Utility's goals, is affordable for the ratepayers, and able to be delivered/projects completed.

Long-Term Capital Needs Methodologies Balance of:

1. **System needs and risk-based priorities**
   - Projects selected, prioritized and ranked based on addressing:
     - Risk of failure,
     - Consequence of failure,
     - Immediate and long-term regulatory requirements,
     - Growth/Capacity Needs,
     - Community input & priorities,
   - Methods for developing and selecting projects varies by project category.

Projects identified then balanced with:

2. Financial and rates implications

- Peer utilities set capital spending limits generally based on regulatory obligations, asset risk profiles, & community's ratepayer's affordability.
  - Rates often forecasted for 5-yrs but capital funding considerations extend further
- Projects from Step 1 selected to fit within the identified rate and spending limitations.
- Project capital costs developed at planning level with defined cost contingencies appropriate for level of project information available.
  - Greater certainty for 5- to 10-year projected capital budgets. Cost uncertainty increases for forecasting beyond a 10-year period.
  - Peers generally use 5- to 10-year intervals to update master plans and long-term financial forecasts.

Selected projects balanced with spending target then balanced with:

3. **Capital delivery & project staffing considerations**
   - Annual CIP spending and 5- to 10-year capital budgets forecasting selected to be realistic.
   - Fit within the utility's capital delivery capabilities and available staffing.
   - If increased capital delivery to meet annual CIP spending targets was identified:
     - Evaluate current capital delivery processes and staffing,
     - Identify limitations & realistic achievable recommended improvements,
     - Implement changes to meet capital delivery targets.

Key Outcomes: Short & long-term capital forecasts that meets the utility's goals, is affordable for the ratepayers, and able to be delivered/projects completed.

Financial and Rates Implications Example

What is the right amount of capital we need to spend over the next 5 years?

Scenario 1: If $X Billion (2024$) is spent over 5-years:

- ❑ What Regulatory Obligations will not be fulfilled?
- ❑ What Extreme and High-risk assets will fail?
- ❑ What Community priorities will not be achieved?

Scenario 2: If $2X Billion is spent over 5-years:

- ❑ What Regulatory Obligations will not be fulfilled?
- ❑ What Extreme and High-risk assets will fail?
- ❑ What Community priorities will not be achieved?

Scenario 3: If $3X Billion is spent over 5-years….

$ investment for each scenario informed by community affordability and/or target spending limit

Financial and Rates Implications Example cont'd:

What is the right amount of capital we need to spend over the next 5 years?

The same process is followed for subsequent planning periods.

Project Category[1]	Annual Spend
1. Consent Decree to meet required schedules	$A
2. Asset Management based on reducing risk scores	$B
3. Regulatory/Permit Requirements a. New Regulations. i.e., nutrients b. Emerging Contaminants, i.e., PFAS, pharmaceuticals, etc.	$C
4. Growth/Capacity Limitations	$D
5. Planning and Administration	$E
Total	Target Annual Spend ($A + $B + $C + $D +$E)[2]

[1] All project categories would include relevant design criteria to address Resiliency items - natural hazards and climate change, such as seismic, sea level rise, flooding. etc.

[2] If the 5 above project categories don't exceed the target annual spend then add in projects from Operational Enhancements, Resource Recovery, other resiliency projects, etc.

Long Range Capital Program Forecasting Methods Vary by Category

Categories	1-5 Years	6-10 Years	11-20 Years	20+ Years
Asset Renewal/Replacement: Sewers/Conveyance	**Methods:** 1 *More Detailed,* 2, and/or 3 *Less Detailed*			
Asset Renewal/Replacement: WWTP/Remote Facilities Equipment	**Methods:** 1 *More Detailed,* and/or 2 *Less Detailed*			
New Infrastructure: Consent Decree/IWM Plan	**Methods:** 1			
New Infrastructure: Growth	**Methods:** 1			
New Regulations – i.e., Nutrients, PFAS, Biosolids	**Methods:** 1			
Emerging Contaminants – i.e., Pharmaceuticals, Endocrine Disruptors, etc.	**Methods:** 1			
Climate Change	**Methods:** 1			
Operational Enhancements*	**Methods:** 1			

** For illustration purposes. Operational Enhancements could include residual upgrades and energy recovery projects or those projects could be added in separate categories, as appropriate. Projects and costs definition would be similar to the above categories.*

Long Range Capital Program Forecasting Methodology Recommendation

Asset Renewal/Replacement: Sewers/Conveyance

Methods	1-5 Years	6-10 Years	11-20 Years	20+ Years
1 *More Detailed*	• Target annual renewal/replacement (R/R) rate - at least 1% by total system length tailored to the Utility. • Projects selected from Business Risk Exposure (BRE) risk scoring (condition & consequence of failure scores) to address Extreme & High-Risk assets. • Accurate costs - Association for the Advancement of Cost Engineering (AACE) Class 4 estimates or better. • Defined cost contingencies.	• Target annual R/R rate - at least 1% by total system length tailored to the Utility. • Projects selected from BRE risk scores. • Complete addressing Extreme Risk assets; continue addressing High-Risk assets. • Scopes & costs basis similar to Years 1- 5. • Larger cost contingencies if there are more unknowns.	• Continue at 1% annual R/R rate by length tailored to the Utility. • Sewers R/R based on available condition & risk scoring data. • Focus on addressing remaining High-Risk assets, then Medium Risk assets. • Cost basis = historical costs with contingencies.	• Same as Years 11 - 20, except completing any remaining Medium Risk assets and continuing R/R on at least 1% annual rate by length.
2			• Continue at 1% annual R/R rate by length tailored to the Utility. • Sewer condition data not available: R/R based on Risk scores from available age, material & useful life data. • Budget for condition assessment costs to fill gaps. • Focus on addressing remaining High-Risk assets, then Medium Risk assets. • Cost basis = historical costs with contingencies.	• Same as Years 11 - 20, except completing any remaining Medium Risk assets and continuing R/R on at least 1% annual rate by length.
3 *Less Detailed*			• Continue at 1% annual R/R rate by length tailored to the Utility. • Sewer condition, age or material data not fully available. • Use assumptions based on available data; include an annual allowance for R/R costs based on the assumptions. • Budget for condition assessment costs to fill gaps. • Cost basis = historical costs with contingencies.	• Same as Years 11 - 20.

Long Range Capital Program Forecasting Methodology Recommendation

Asset Renewal/Replacement: WWTP/Remote Facilities Equipment

Methods	1-5 Years	6-10 Years	11-20 Years	20+ Years
1 *More Detailed*	• Projects selected primarily from BRE risk scoring to address Extreme & High-Risk assets. • Implement reliability centered maintenance approaches to inform ongoing O&M & triggers for asset replacement. • Accurate costs - AACE Class 4 estimates or better. • Defined cost contingencies.	• Projects selected primarily from BRE risk scoring to complete addressing Extreme Risk assets; continue addressing High-Risk assets. • Scopes & costs basis similar to Years 1- 5. • Larger cost contingencies if there are more unknowns.	• Equipment R/R based on available condition and risk scoring data. • Focus on addressing remaining High-Risk assets, then Medium Risk assets. • Cost basis = historical costs with contingencies.	Same as Years 11 - 20.
2 *Less Detailed*			• Equipment R/R based on Risk scores from available age and useful life data. • Budget for condition assessment costs to fill in gaps. • Focus on addressing remaining High-Risk assets, then Medium Risk assets. • Cost basis = historical costs with contingencies.	Same as Years 11 - 20.

Asset Renewal/Replacement: Sewers/Conveyance/Facilities Equipment

Primary steps to build the budgets:

- Evaluate WTD's applicable asset classes, available asset condition, age & attribute data, and expected lifecycles/remaining useful life.
- Establish an existing baseline of assets needing R/R, available BRE scores (Extreme, High, Medium, Low). Define assumptions for missing data.
- Establish recent history of WTD's projects, level of service, and what assets still need R/R.
- Develop BRE scores for missing assets using available data on likelihood & consequence of failure factors.
- Use WTD recent project bid data, available design cost estimates, and regional project cost data to support the development of expenditure ranges for assets by class and prioritized by BRE scores. Include cost estimates for gathering missing data.
- Develop short and long-term forecast of expenditures based on BRE scores, cost data and defined assumptions (to address missing data).

Long Range Capital Program Forecasting Methodology Recommendation

New Infrastructure: Consent Decree/IWM Plan

Methods	1-5 Years	6-10 Years	11-20 Years	20+ Years
1	• Specific projects based on Long Term Control Plan (LTCP) or integrated watershed plan. • Cost estimates defined with appropriate contingencies for the implementation years.	Same as Years 1 - 5.	Same as Years 1 - 5, except cost contingencies may be larger if there are additional unknowns.	• Dependent on length of LTCP or integrated watershed plan. • If there may be additional overflow or pollutant reduction projects after year 20, historical costs are used where available, i.e., dollars per overflow gallon reduced. • Detailed projects & cost estimates not performed unless included in LTCP.

New Infrastructure: Consent Decree/IWM Plan

Primary steps to build the budget:

- Evaluate WTD's applicable LTCP projects, costs, and schedule data. Define cost assumptions & any need for cost refinements.
- Determine regulatory obligations/milestone schedule dates and community priorities.
- Define necessary assumptions based on uncertainties or limited data.
- Use the project scopes, cost data/cost allowances (depending on assumptions), & schedules, to develop expenditure ranges and timeframes for LTCP implementation.

Long Range Capital Program Forecasting Methodology Recommendation

New Infrastructure: Growth

Methods	1-5 Years	6-10 Years	11-20 Years	20+ Years
1	• Specific projects based on known growth areas. • Accurate costs - AACE class 4 or better. • Defined cost contingencies. • Growth assumptions reviewed & adjusted annually to implement projects "just in time".	• Specific projects based on anticipated growth. • Scopes & costs may change based on future annual review of growth assumptions. • Larger cost contingencies depending on level of unknowns.	• General projects based on master plans & growth trends with less specific scopes. • If master plans examine different growth scenarios, the range of projects and costs included per scenario. • Allowance costs, if growth projections have not occurred beyond 10-years, based on best available information & defined assumptions. • Cost basis = historical costs. • Contingencies, dependent on level of unknowns.	Same as Years 11 - 20.

New Infrastructure: Growth

Primary steps to build the budget:

- Evaluate WTD's applicable growth and system build-out master plans. Develop project lists, costs, and schedule data. Define cost assumptions & any need for cost refinements.
- Determine any adjustments based on new information & community priorities.
- Determine need for new growth evaluations or updates to master plans and likely costs for those study projects.
- Define necessary assumptions based on uncertainties or limited data.
- Use the project scopes, cost data/cost allowances (depending on assumptions), & schedules, to develop expenditure ranges and timeframes for growth projects implementation.

Long Range Capital Program Forecasting Methodology Recommendation

New Regulations – i.e., Nutrients, PFAS, Biosolids

Methods	1-5 Years	6-10 Years	11-20 Years	20+ Years
1	• Project alternatives, scopes and costs developed if new regulation(s) is likely to be required in next 5 years. Costs are AACE Class 4 or better. • Allowance cost based on best available information included where studies and costs have not yet been completed. Assumptions clearly defined.	• Same as Years 1 – 5, if new regulation(s) is likely to be required in next 10 years. • Costs may be AACE Class 4 or Class 5 depending on number of unknowns.	• Project scopes and cost estimates generally based on high level planning estimates and assumptions. • Allowance cost based on best available information and defined assumptions where studies and costs have not yet been completed. • Costs are order of magnitude AACE Class 5 and subject to large changes.	Same as Years 11 - 20.

Emerging Contaminants – i.e., Pharmaceuticals, Endocrine Disruptors, etc.

Methods	1-5 Years	6-10 Years	11-20 Years	20+ Years
1	• Projects and costs not defined, unless new regulations & timing are well defined.	• Project scopes and cost estimates generally based on high level planning allowances and assumptions. • Costs are order of magnitude AACE Class 5 and subject to large changes.	• Same as Years 6 - 10. • Project timing adjusted based on information available for likely schedule of pollutant limits.	• Same as Years 6 - 10. • Project timing adjusted based on information available for likely schedule of pollutant limits.

New Regulations & Emerging Contaminants

Primary steps to build the budget:

- Confirm likely timeframes for the new regulations and clearly define those assumptions.
- Evaluate WTD's available past or ongoing studies/analyses for needed projects scopes & costs. Define cost assumptions & any need for cost refinements.
- Determine where additional studies/analyses may be required to determine project scopes and costs. Determine costs for those study projects.
- Develop list of potential projects & cost allowances. If studies have not yet been completed discuss with qualified staff/outside engineer(s) likely treatment processes needed and appropriate cost allowances.
- Use the project scopes, cost data/cost allowances (depending on assumptions), & schedules, to develop expenditure ranges and timeframes for projects implementation.

Long Range Capital Program Forecasting Methodology Recommendation

Climate Change

Methods	1-5 Years	6-10 Years	11-20 Years	20+ Years
1	• Projects developed to account for estimated climate change impacts. • Studies/evaluations performed to understand likely climate change impacts. • Determine appropriate design criteria for projects. • Design criteria included in future applicable facility & system asset R/R projects. • Projects generally follow schedules for asset management & new infrastructure projects. • Costs are generally AACE Class 4 or better.		• Project scopes and cost estimates generally based on high level planning allowances or historical spending, and defined assumptions.	Same as Years 11 - 20.

Operational Enhancements*

Methods	1-5 Years	6-10 Years	11-20 Years	20+ Years
1	• Business case evaluations performed to identify projects to increase efficiencies & reduce costs across the asset classes. • Projects include reduction of power costs, income generation, reduction in O&M costs, etc. • Projects scheduled based on return on investments, scheduled timing of asset R/R projects, & available capital funding. • Costs are generally AACE Class 4 or better.		• Project scopes and cost estimates generally based on high level planning allowances or historical spending, and defined assumptions.	Same as Years 11 - 20.

** For illustration purposes. Operational Enhancements could include residual upgrades and energy recovery projects or those projects could be added in separate categories, as appropriate. Projects and costs definition would be similar to the above categories.*

Climate Change

Primary steps to build the budget:

- Evaluate WTD's available past or ongoing studies/analyses for applicable design criteria for projects scopes & costs.
- Determine where additional studies/analyses may be required. Determine costs for those studies. If studies have not yet been completed discuss with qualified staff/outside engineer(s) likely cost allowances.
- Determine appropriate climate change-related design criteria to include in current projects. Clearly define scope & cost assumptions. Update design guidance documents as applicable.
- Confirm applicable facility & system asset R/R projects include climate change-related design criteria. Update project scopes and costs, if needed.
- Projects will generally follow schedules for asset management & new infrastructure projects (from the other categories).
- Develop expenditure ranges and timeframes for studies/other projects implementation.

Operational Enhancements

Primary steps to build the budget:

- Evaluate WTD's available past or ongoing studies/analyses for projects to increase efficiencies & reduce costs across the asset classes, i.e., power costs, income generation, O&M costs, etc.
- Develop lists of applicable projects, costs and return on investments. Define cost assumptions & any need for cost refinements.
- Determine where additional studies/analyses may be required. Determine costs for those studies. If studies have not yet been completed discuss with qualified staff/outside engineer(s) likely cost allowances.
- Develop expenditure ranges and timeframes for projects/additional studies implementation based on return on investments, & scheduled timing of associated asset R/R projects.

Key Findings:

1. Peer agencies are doing long-term capital forecasting – generally 30-40 years into the future. Only forecasting rates for typically 5-years due to uncertainties.
2. No peers are performing 75-year long-range capital planning or forecasts.
3. Can generally be of value to forecast capital costs to 20-40 years depending on available data & cost assumptions.
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Long-Term Capital Needs Methodologies

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Task 2

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Next Steps

- Continue assessing WTD current methodologies.
- Develop long-term forecast template spreadsheet(s) based on WTD available data according to recommended methodology
- Test rate implications of recommended capital forecast


Q&A

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Thank you!

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