

## **Climate Change Adaptation & Resiliency**

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**Focus Area:** Environment & Public Health  
**Strategic Objective:** Anticipate, adapt to change  
**Owner:** Paul Fleming, Corporate Asset Management Division

### **Summary of proposed action**

Improve SPU's ability to anticipate changing climatic conditions, enhance our understanding of the implications of these conditions on SPU's built and natural infrastructure and services, and develop adaptation strategies to address those implications. If implemented, this proposal will:

- Provide O&M funding to assess climate impacts on the drainage & wastewater and watersheds, develop an adaptation strategy for the DWW LOB, obtain new climate data and implement a Tier 1 adaptation option for the drinking water systems;
- Provide capital funding to implement a "Tier 1" adaptation as part of our drinking water supply delivery system.

Benefits of investment: Taken together, these investments represent the next phase in SPU's climate program, The investments will improve our climate preparedness by implementing adaptation options for the water LOB that should mitigate some of the effects of climate change on our drinking water supply. They also will lead to a better understanding of how sea level rise and changes in precipitation could affect our DWW LOB services and the development of a strategy to address and mitigate those effects. Given that our understanding of climate change is continually involving, these investments will enable us to obtain and use the best available science over time.

### **Description of the problem this action solves**

Changes in the timing and intensity of rainfall and snowpack accumulation may dramatically affect SPU's built and natural utility infrastructure, and the reliability of the services that depend upon those systems. Sea level rise also has implications for the location and functioning of SPU's infrastructure, especially storm and sewer pipes and pump stations.

While we have enhanced our understanding over the past several years of the implications of climate change on SPU's systems, we have an incomplete and inadequate understanding of those implications. There is considerable uncertainty regarding the exact nature, magnitude and timing of those climate impacts; this uncertainty challenges SPU's ability to implement appropriate management and adaptation strategies. Continuing to strengthen and enhance our understanding of climate change will enable us to make sound infrastructure investments and develop resilient utility systems that support the reliability of the overall system, our services, and ultimately, Seattle's livability.

### **More detailed description of the proposed action**

As described below, this proposal builds on existing work to complete an evaluation that will enhance our understanding of the exposure and sensitivity of our drainage and wastewater (DWW) systems to sea level rise and changes in precipitation patterns. This product will set the stage for the development of subsequent products, including an adaptation strategy for the DWW LOB, as well as the updating of Intensity, Duration and Frequency (IDF) curves, which are used to inform the design of capital projects, as well as obtaining the next generation of climate data. In addition, this proposal will

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further our understanding of the vulnerability of our drinking water watersheds to climate change. All of the aforementioned work will be funded via O&M at a cost of roughly \$120,000/year on average.

The proposal also includes the implementation of two adaptation options for the drinking water LOB that were identified and evaluated as Tier 1 options (i.e., options that would be implemented first) in 2007:

- The first Tier 1 option is the Chester Morse refill, which allows us to fill the lake to a higher elevation but also requires significant analysis to address the regulatory needs of the State Dam Safety Office. Chester Morse refill would be funded by O&M.
- The second Tier 1 option, improvements to overflow dike, would be funded via CIP dollars, and augments the effectiveness of the Chester Morse refill project. These two adaptation options would significantly enhance our ability to store additional water, which will help us deal with the year to year climate variability that we face now as well as longer term climate change. The following proposed activities build on existing practices<sup>1</sup> to help us adapt to climate-related threats and continue to meet our customers' expectations for service levels into the future.

### **Drainage and Wastewater**

- Identify precipitation thresholds for basins not influenced by Puget Sound tides. This identifies how sensitive our piped drainage and wastewater network is to changes in precipitation,
- Evaluate a portfolio of adaptation strategies (operational, maintenance, new or renovated infrastructure, etc.) that can be implemented to improve preparedness for increased frequency and severity of urban flooding, higher sea levels and sewer back-ups,

### **Drinking Water**

- Evaluate climate-related vulnerabilities of the Tolt and Cedar watershed ecosystems (including water supply, forest fires, habitat, and wildlife) and develop adaptation strategies. Fund 0.2FTE for this work.
- Make improvements to the overflow dike separating Masonry Pool and Chester Morse Lake in the Cedar Watershed and modifying reservoir operations will increase our ability to manage flood events, water storage, and downstream flow concerns related to changing precipitation patterns.

### **SPU-wide – Institutionalize best practices.**

- Update climate change projections in 2019 to keep SPU's climate impacts assessment current and provide a common climate framework across SPU.

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<sup>1</sup> Current baseline climate-related activities include: obtaining and using the current generation of climate projections, improving storm event and overall weather forecasting capabilities, collaborating with other City departments on a city-wide adaptation strategy, interacting climate considerations in SPU's capital planning; evaluation of a portfolio of adaptation strategies for inclusion in the 2019 Water System Plan and participating in water-industry and federal government climate initiatives.

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### Implementation plan and timeline

| O&M: Gap Action Plan (excluding 0.2 FTE cost)                    | 2015    | 2016    | 2017   | 2018   | 2019   | 2020  |
|--|---------|---------|--------|--------|--------|-------|
| Non-tidal basin study (DWW Climate Resiliency Study)             | \$60K   |         |        |        |        |       |
| DWW adaptation study and strategy                                |         | \$150K  | \$100K | \$100K | \$100k |       |
| Update of Intensity, Duration, Frequency curves                  | \$40K   | x       | x      | x      | x      | \$40K |
| Watershed vulnerabilities studies                                | \$20K   | x       |        |        |        |       |
| Implementation of Tier 1 adaptation option: Chester Morse refill | \$490K  | \$500K  |        |        |        |       |
| <b>CIP: Gap Action Plan</b>                                      |         |         |        |        |        |       |
| Implementation of Tier 1 adaptation option: Overflow Dike        | \$1480K | \$2053K |        |        |        |       |

### Budget and FTE Changes (in \$000s)

Fund: Drainage & Wastewater AND Drinking Water Funds

|                              | 2015           | 2016           | 2017         | 2018         | 2019         | 2020        | Total          |
|------------------------------|----------------|----------------|--------------|--------------|--------------|-------------|----------------|
| O&M Labor                    | 20             | 20             | 20           | 20           | 20           | 20          | \$120          |
| O&M Non-Labor                | 610            | 650            | 100          | 100          | 100          | 40          | \$1,600        |
| <b>O&amp;M Subtotal</b>      | <b>630</b>     | <b>670</b>     | <b>120</b>   | <b>120</b>   | <b>120</b>   | <b>60</b>   | <b>\$1,720</b> |
| CIP                          | 1,480          | 2,053          |              |              |              |             | \$3,533        |
| <b>Total O&amp;M and CIP</b> | <b>\$2,110</b> | <b>\$2,723</b> | <b>\$120</b> | <b>\$120</b> | <b>\$120</b> | <b>\$60</b> | <b>\$5,253</b> |
| FTE                          | 0.2            | 0.2            |              |              |              |             |                |

### Plan for evaluating success or progress

- This proposal includes developing reporting metrics in 2015.