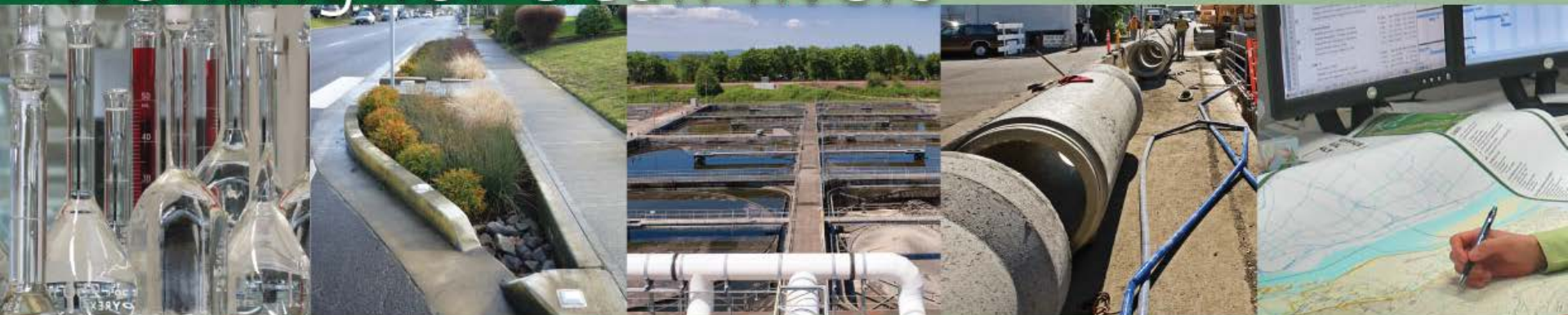


working for clean rivers



BES Resiliency Master Plan

BES Project Number ESEN000019

Jennifer Belknap Williamson

Division Manager, Asset Systems Management

Bureau of Environmental Services

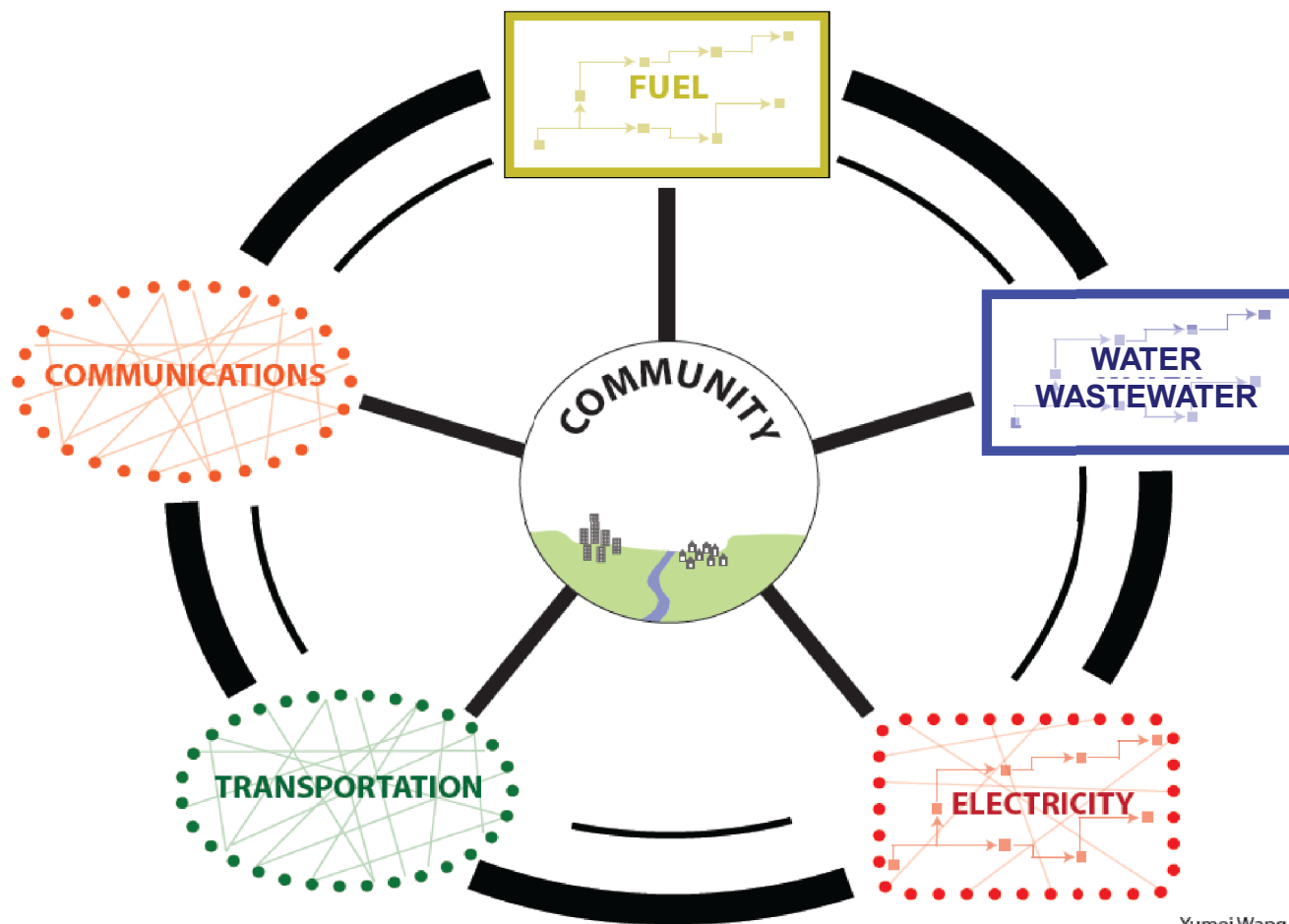
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ENVIRONMENTAL SERVICES
CITY OF PORTLAND

NICK FISH, COMMISSIONER
MICHAEL JORDAN, DIRECTOR

BES Resiliency Master Plan – Improving community resiliency



Yumei Wang
DOGAMI 2014



BES Resiliency Master Plan - Overview

Develop prioritized improvements to system resiliency to **earthquakes** and **climate change**

- **Reduce risk of infrastructure failure** due to earthquakes and climate change
- **Increase our ability to bounce back** to provide services after a natural disaster

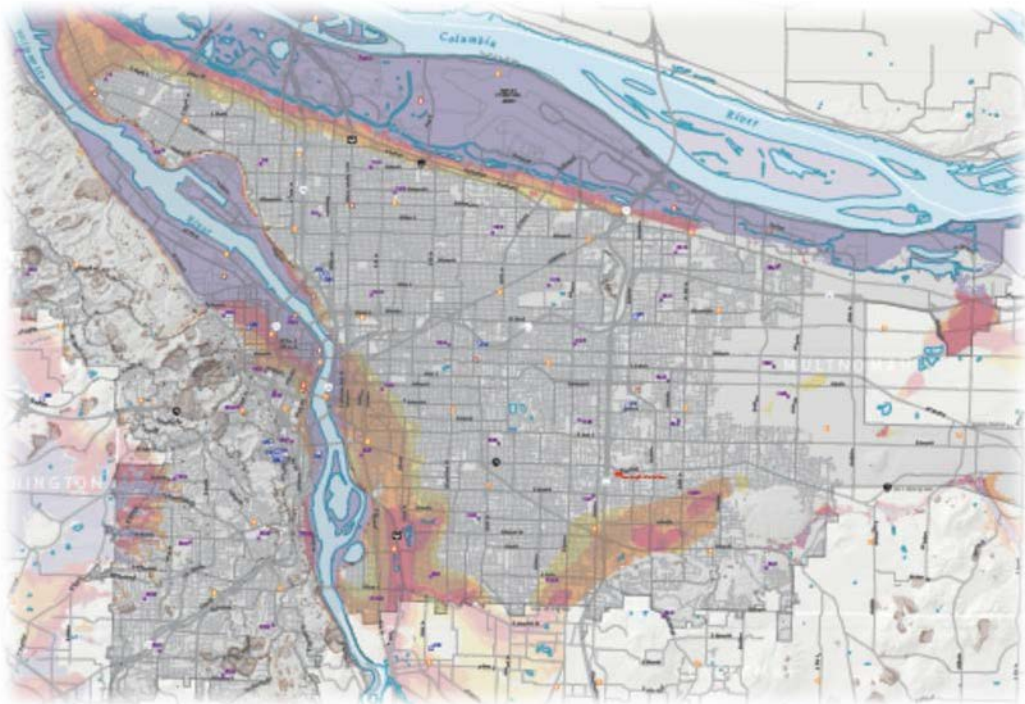


BES Resiliency Master Plan – Scope

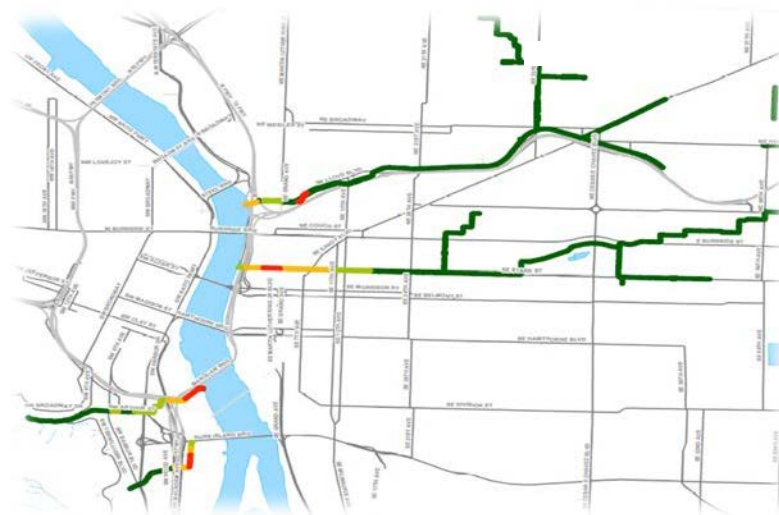
1. **Seismic risk assessment** for large “backbone” infrastructure
2. **Climate Change risk assessment** for meeting levels of service
3. **Identify actions** to reduce system vulnerability to natural disaster risks
4. **Prioritize** risk reduction, evaluate costs and benefits, minimize rate impacts
5. **Implementation Strategy** for CIP and operating recommendations



Seismic Risks - Backbone Infrastructure



Liquefaction risk from PWB study



Fragility Analysis of Large Diameter Backbone Pipes



Seismic Risks - Backbone Infrastructure



Assessing Seismic Risks at
Columbia Blvd Wastewater Treatment Plant
and Tryon Creek Wastewater Treatment Plant



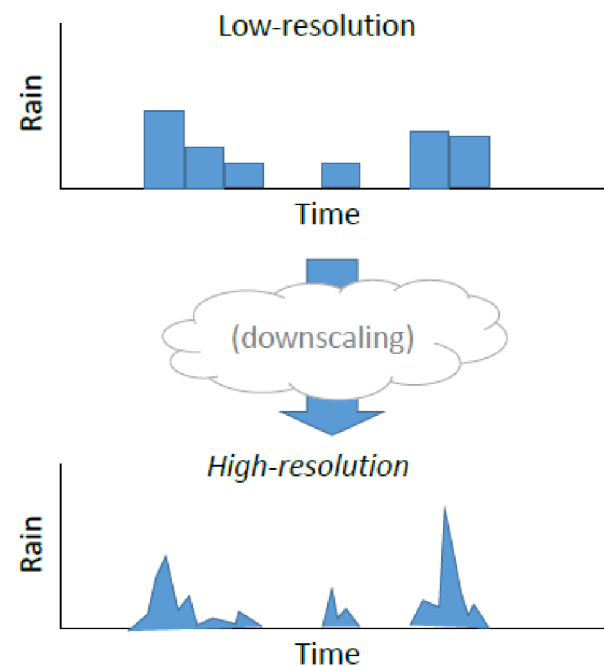
Climate - Risks for meeting Service Levels

- **Rainfall changes**
- **Flooding risks**
- **Other Impacts**
 - Vegetation impacts
 - Urban heat
 - Landslides and erosion
 - Water quality and discharge standards

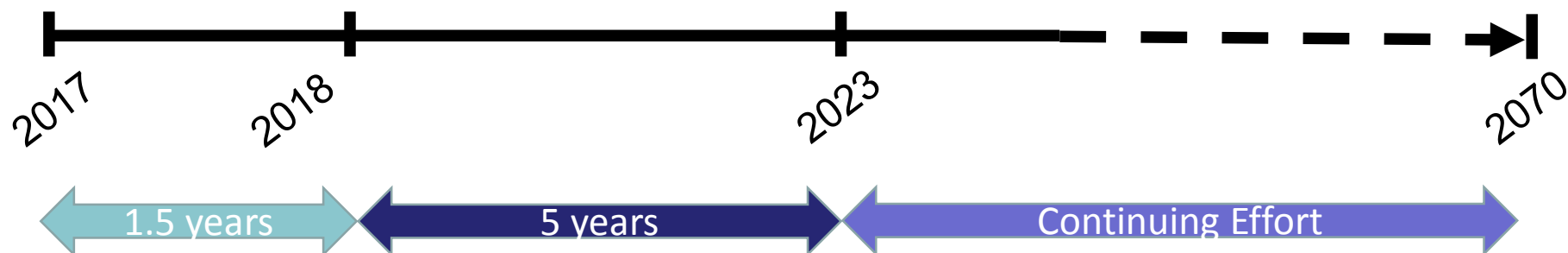


Climate – Risks for meeting Service Levels

- **Rainfall changes**
 - Historical data
 - Downscale future climate models
 - BES Collections System Models
 - Stormwater design criteria approaches
 - Adaptation measures to reduce risk



BES Resiliency Master Plan Project Schedule



Master Plan Project

- Risk Assessment
- Policy & design rec's
- Develop CIP projects
- Implementation Plan

Initial Implementation

- CIP projects
- Operations
- Update design policies

Ongoing Implementation

- CIP projects, Operations
- New technologies, new data
- Continue to 50-year goal



BES Resiliency Master Plan - Goals

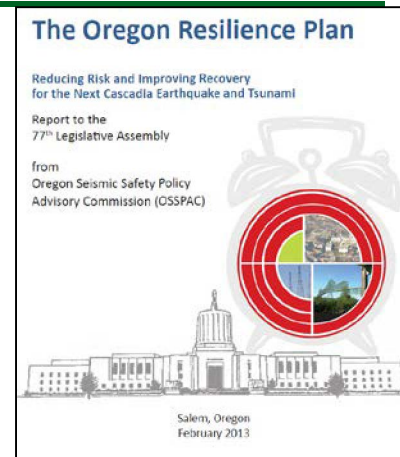
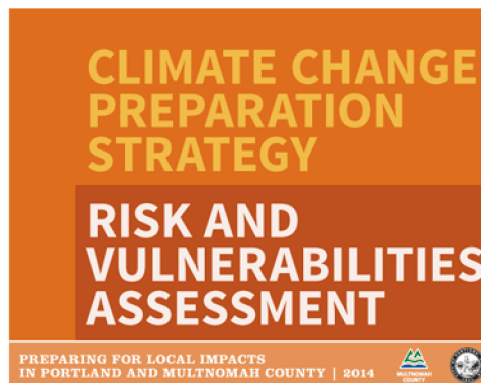
1. **Protect community** while managing rate impacts
2. **Improve BES infrastructure resiliency** over 50-year planning horizon, identify short term priority investments
3. **Integrate resiliency** further into BES CIP and operational practices
4. **Build BES staff expertise** in resiliency



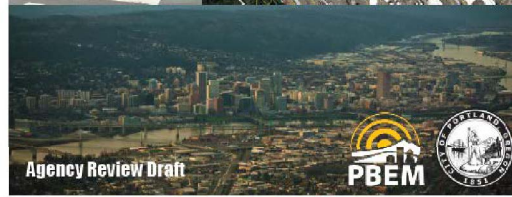
BES Resiliency Master Plan - Goals

Support and Build
Upon City, Regional,
State efforts

- ✓ Oregon Resilience Plan
- ✓ Climate Change Preparation Strategy
- ✓ Emergency Operations and Response Planning
- ✓ Mitigation Action Plan



2016 MITIGATION ACTION PLAN (THE MAP)



Big Steps Before the Big One:
How the Portland area can bounce back after a major earthquake

City Club of Portland Bulletin, Vol. 99, No. 2, Feb 14, 2017

City Club members will vote on this report between Friday, Feb. 24 and Wednesday, March 1, 2017. Until the membership votes, City Club of Portland does not have an official position on this report. The outcome of the vote will be reported in the City Club of Portland Bulletin Vol. 99, No. 3, dated March 2, 2017, and online at cityclub.org

