



CITY OF BEND

# Utilities Public Advisory Group

October 2, 2024 • 11 am–12:30 pm

Hybrid Meeting • MS Teams or Bend Utilities Department Deschutes Conference Room

Lori Faha, P.E., Environmental Resources Manager

Elisabeth O'Keefe, Stormwater Program Manager

Austin Somhegyi, PE, Stormwater Master Plan Project Manager

Trista Kobluskie, Stormwater Master Plan Consultant Lead

Anna Murphy & Daniele Spirandelli, Stormwater Master Plan Consultant Team

Aubrie Koenig, Facilitator

# Purpose & Agenda

*Discuss and collect input on potential climate-related recommendations in Stormwater Master Plan and share master plan progress updates and stormwater program regulatory updates.*

1. Introduction
2. Stormwater Master Plan & Climate Change
3. Stormwater Master Plan Updates
  - CIP Prioritization Criteria
  - Drillhole and Outfall Prioritization
4. Stormwater Regulatory Updates
  - Updated UIC Standards
  - Erosion Control Requirements
5. UPAG Discussion
6. Summary and Closing



# September meeting reflections: Stormwater Master Plan capital project prioritization criteria feedback

- **Conveyance and flooding:** suggest increased weighting for flooding to capture known public safety hazards (e.g., ice following downtown winter flooding)
- **Water quality improvements:** support current weightings with higher emphasis on subcategory for protection of groundwater as a drinking water source
- **Multiple benefits:**
  - Consider modifying/adding line item(s) to reflect ecological services, improved recreation/access to green spaces, community greening and aesthetics, and/or related subcategories not currently captured
  - Potentially weight all subcategories equally or consider one weighting for people benefit and one for infrastructure benefit subcategories
- **Recognized priority projects:** support having category that reflects staff's operational knowledge of known issues in the field
- **Feasibility and cost:** support for current weighting and subcategories



# Stormwater Master Plan

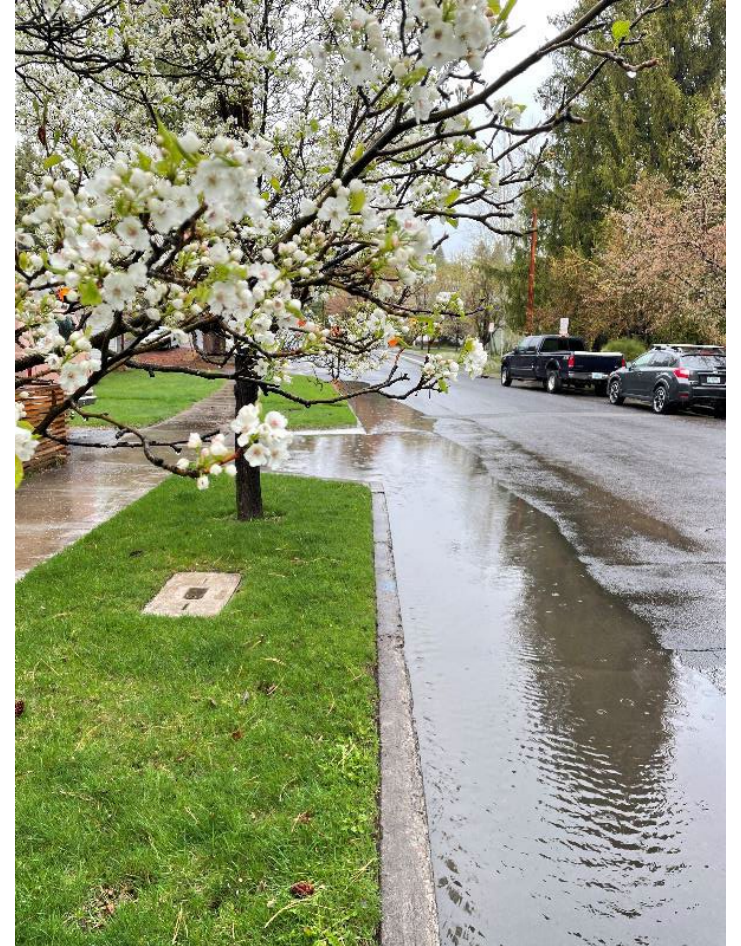
# Stormwater Master Plan purpose and overview

- Update conveyance and drainage projects from 2014 Stormwater Master Plan
- Identify and assess new conveyance/drainage issues
- Create a long-term plan for reducing risk to groundwater from drill holes and drywells (UICs)
- Create a plan for improving the quality of runoff discharged to the Deschutes River through the City's outfalls
- Develop a capital program incorporating conveyance/drainage projects, UIC retrofits, and outfall retrofits



# Stormwater Master Plan development and areas for UPAG input

- Visioning – what is most important to you and the community?
- Visioning – what is the story of stormwater in Bend?
- Solution Priorities – how will we prioritize stormwater capital improvements?
- Policy Solutions – what are the opportunities and impediments to regional facilities?
- Policy Solutions – what are the opportunities and impediments to managing runoff from private properties in the rights-of-way?
- Policy Solutions – how much emphasis on climate change in the next SMP?



# Stormwater Master Plan & Climate Change

# Bend Stormwater Master Plan

## Climate Change Review

Anna Murphy and Daniele Spirandelli





# Projected Climate Changes in Bend



Increases (~6%) in overall annual precipitation by 2100

Less precipitation: April – October  
More precipitation: December – March  
More rain and less snow in winter



Increase in frequency and intensity of storms

Especially during winter months  
Increased intensity of atmospheric rivers



Decline in snowpack

Decrease in overall mountain snowpack  
Earlier snowmelt means decreased streamflow in summer



Increased severity and duration of drought

Increased annual number of dry days (from 186 in 1990s to 192 by 2050)

# Climate Change Challenges to Bend's Stormwater System

Inappropriately sized design storms for existing conditions

Climate change causing increased intensity and frequency of storm events

Drier summer impacts on water quality

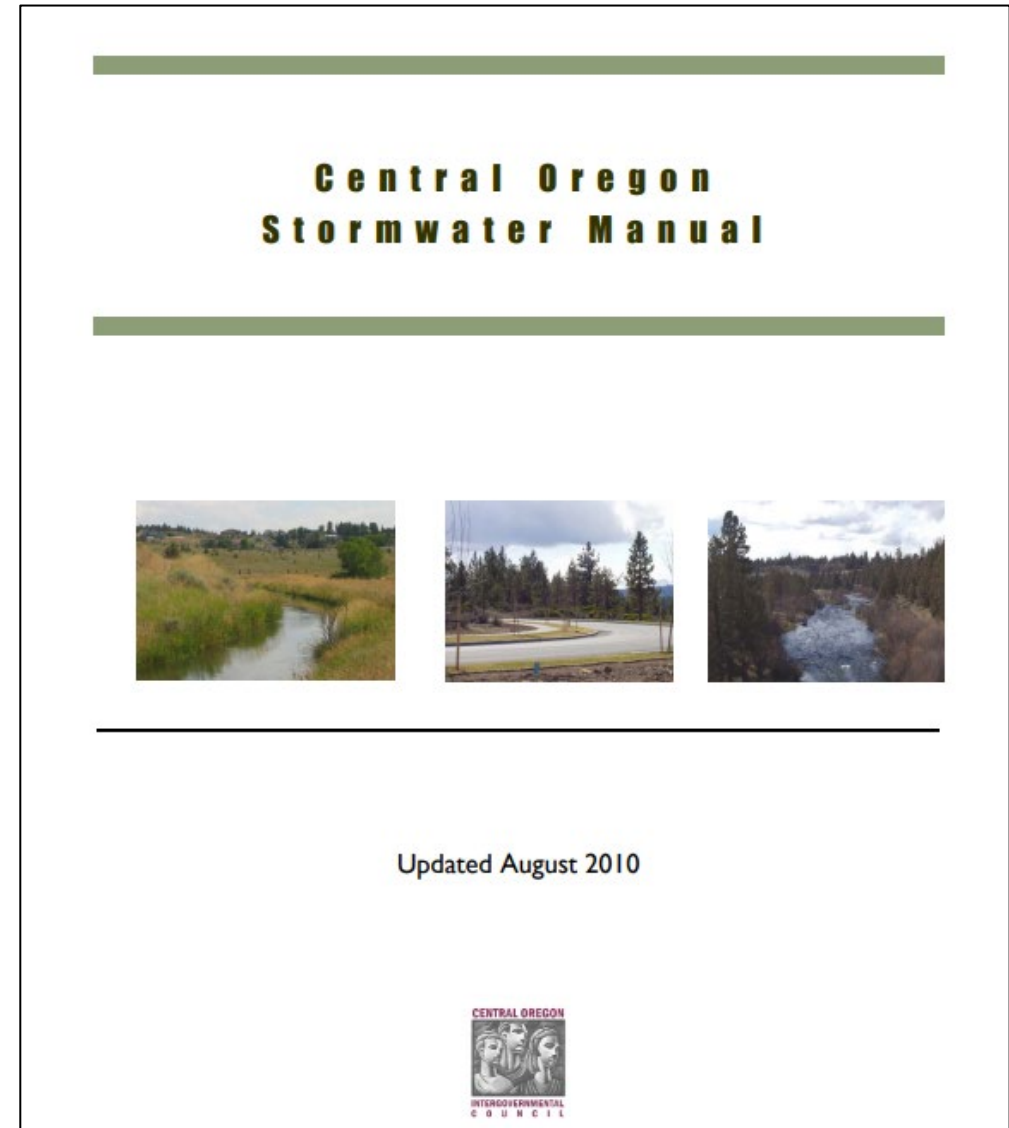
Sedimentation from winter road sanding

Winter precipitation and ice storms clogging drain inlets and causing flooding

Increasing rapid urban development exacerbating impacts

# Design Guidelines and Rainfall Data

- Current design storms
  - Water Quality: 6-month 24-hour storm
  - Flow Control: 25-year 24-hour storm with safe overflow to convey 100-year storm
- NOAA Atlas 2
  - Last updated in 1973
  - Atlas 14 is not available for Oregon, Idaho, Montana, Washington, Wyoming
- Stormwater design standards assume historical rainfall intensity, frequency and duration
- Recent studies indicate storms are expected to become more severe
- Need to incorporate climate projections into design storms



Sources: Central Oregon Intergovernmental Council. (2010). *Central Oregon Stormwater Manual*. <https://www.coic.org/stormwater/>

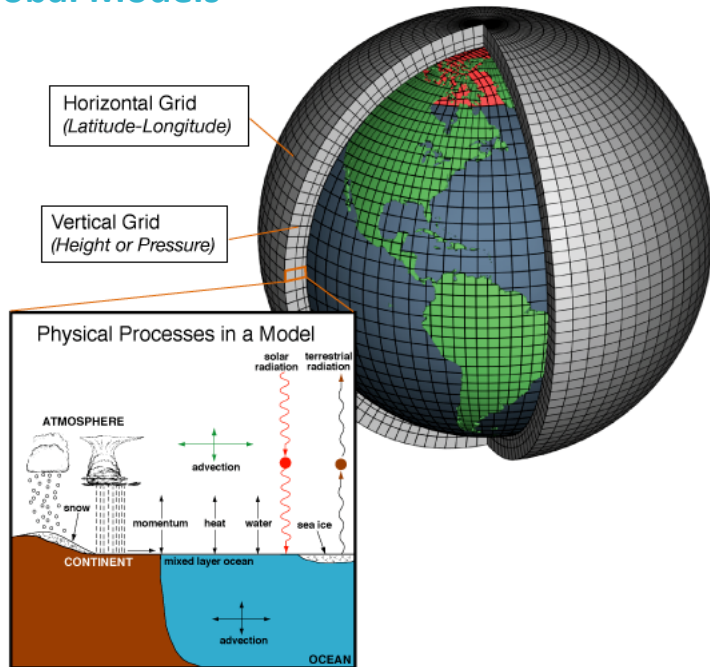
Sommer, Lauren. (2022, Feb 9). An unexpected item is blocking cities' climate change prep: obsolete rainfall records. *NPR/OPB*. [NPR-Obsolete Rainfall Records](#)

Source: Hathaway et. al. (2023). A synthesis of climate change impacts on stormwater management systems: designing for resiliency and future challenges. DOI: [10.1061/JSWBAY.SWENG-533](https://doi.org/10.1061/JSWBAY.SWENG-533).

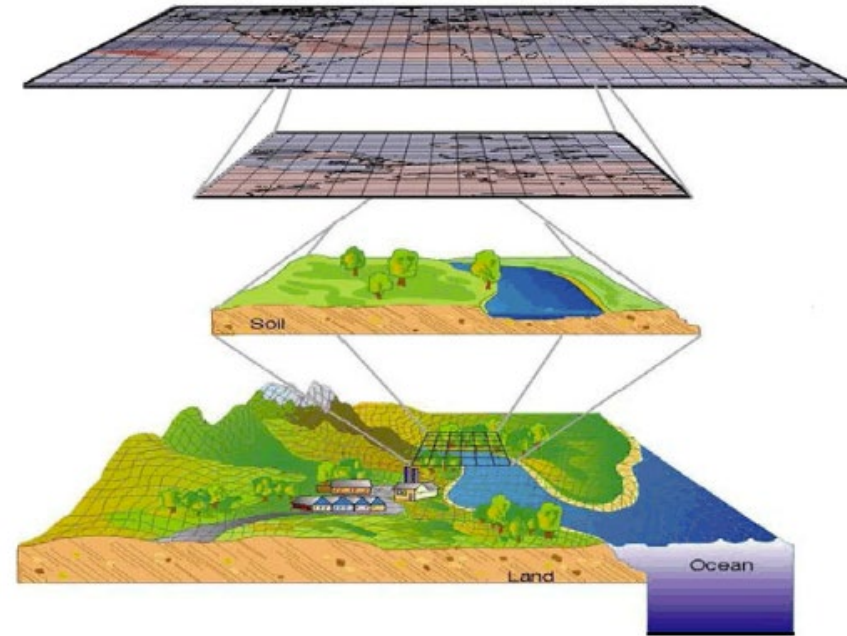
# Global Climate Models

- Global models simulate future climate given set of scenarios
  - Scenarios of greenhouse gases, aerosols, assumptions of land use change
  - Most recent CMIP6 models (2024) associated with IPCC 6<sup>th</sup> Assessment Report
  - Models get downscaled for local & regional impact assessments

## Global Models



## Regional Models

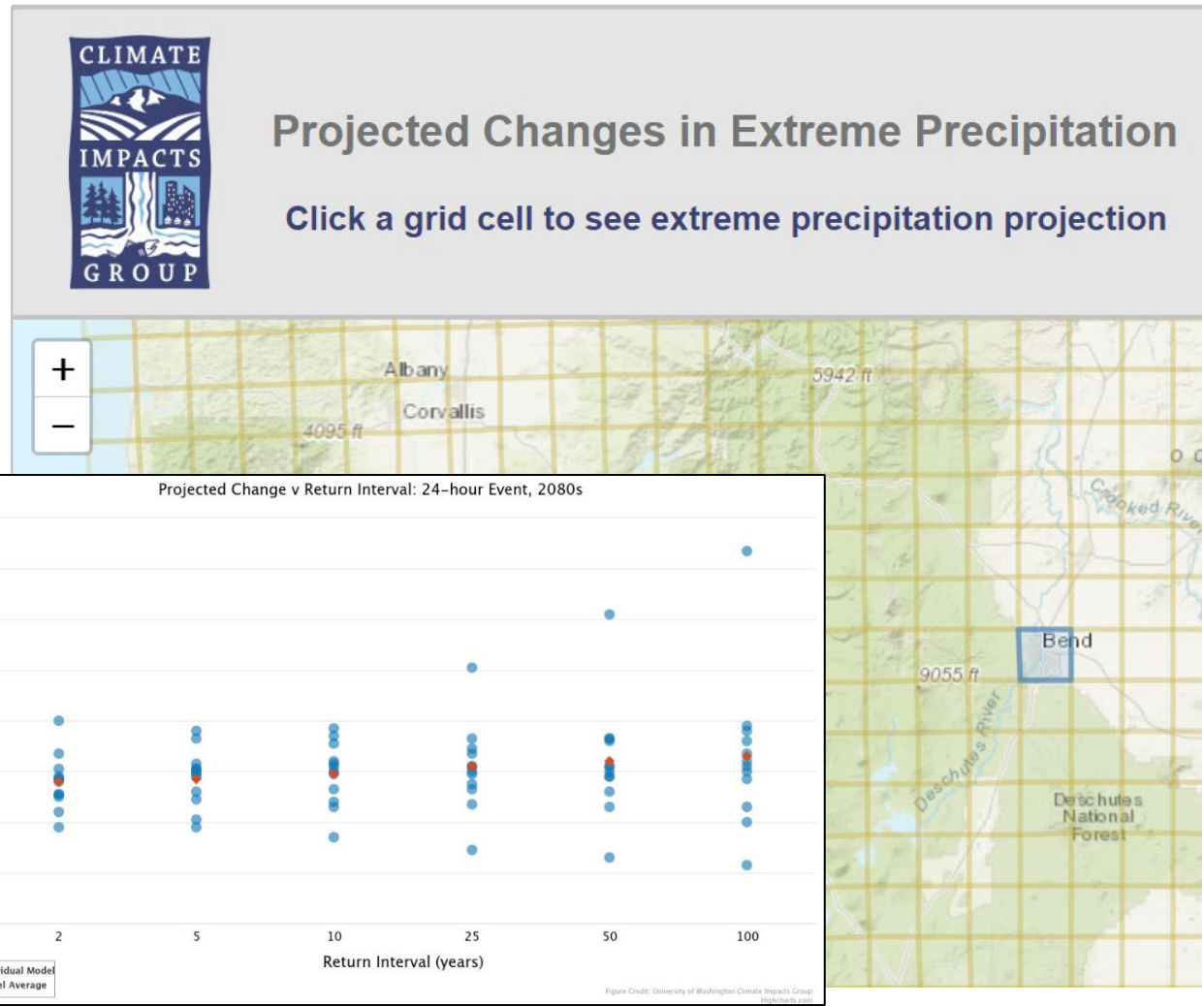


Khan and Pilz (2018)

Source: NOAA Climate.gov. (2024). Climate Models. <https://www.climate.gov/maps-data/climate-data-primer/predicting-climate/climate-models#:~:text=Climate%20models%2C%20also%20known%20as,the%20ocean%2C%20atmosphere%2C%20land.>

# University of Washington, Projected Changes in Extreme Precipitation

- Analysis covers Oregon, Washington, Idaho and portions of Montana, Wyoming, Utah, Nevada, and southwestern Canada
- 10 different climate models plus all-model average
- CMIP5 Dynamic downscaling
- 12 km<sup>2</sup> resolution, Model years: 1980-2099
- Business-as-usual greenhouse gas emissions scenario (i.e. RCP8.5)
- This data used climate model output to calculate the projected change (2030s-2080s) in duration and return interval of storms



Source: Morgan, H., Mauger, G., Won, J., Gould, D. 2021 *Projected Changes in Extreme Precipitation Web Tool*. University of Washington Climate Impacts Group. <https://doi.org/10.6069/79CV-4233>



# Case Study: City of Virginia Beach DPW

## Scenario:

- Study assessed changes in heavy rainfall frequency and intensity using historical observations and future projections following 3 large storms in 2016 led to 33 inches of rain over 6 weeks, and heavy flooding.
- Atlas 14 precipitation values were found to be 7-10% below observed precipitation data from local rain gauges.
- Projections of the 10-year storm event showed an increase in precipitation of 24-27% from 2000 to 2060 for RCP 8.5 scenario.

## Outcome:

- City recommended 20% increase in extreme precipitation based on combination of historical data and projections to 2060 for RCP8.5 assuming a 40-year life for infrastructure
- Revised design guidelines increase Atlas 14 design storm rainfall depths by 20% and require the use of dynamic (SWMM) modeling for design and analysis of pre vs post development conditions



# Key Takeaways and Recommendations



- Build accurate historical rainfall data:
  - Increase data collection with more gauges
  - Build a robust monitoring network.
- Integrate climate change precipitation with downscaled data
- Update design standards; requires time, expertise, and resources.
- An interim approach and prioritization of key projects based on city objectives can help where resources are limited.
- Combine multiple approaches, both quantitative and qualitative.
- Work regionally, across jurisdictions, with universities and Federal agencies to pool resources and coordinate research.
- The science and data is continually evolving and improving. Now is the time to begin!

# Next Steps and Areas of Further Research

- Evaluate rain gauge network and historical precipitation data for right-sizing stormwater and predicting localized flooding
- Study comparable cities in the PNW that have updated storm data
- Study creative ways to increase storage
  - i.e. easements for storage on private properties
- Study how to incorporate climate change data into regional stormwater design standards





# Funding Sources for Climate Change Impact Assessment

## Federal

- FEMA - [Building Resilient Infrastructure for Communities \(BRIC\) Grants](#)
- USDOT - [Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation Program \(PROTECT\) Grants](#)
- EPA - [Community Change Grants](#)
- EPA - [Water Infrastructure Finance and Innovation Act \(WIFIA\) Loans](#)
- US Bureau of Reclamation - [WaterSMART Applied Science Grants](#)

## State

- DLCDC - [Community Green Infrastructure Grant Program](#)

## Philanthropic

- The Funders Network - [Urban Water Funders](#)
- National Fish and Wildlife Foundation - [America the Beautiful Challenge](#)

# UPAG discussion



- Do you think there is a need for climate-related policy or program recommendations in the Stormwater Master Plan?

# Stormwater Master Plan Updates

# Relative Category Scores

Category	Max Score	Discussion
Conveyance and Flooding	20	<ul style="list-style-type: none"> <li>Increased from 10 to 20 points</li> </ul>
Water Quality Improvements	20	
Multiple Benefits	20	<ul style="list-style-type: none"> <li>Projects unlikely to receive all 20 points</li> <li>Includes a new “Green Infrastructure / Ecosystem Services” criterion which gives points to projects that may have an above-ground vegetated facility</li> <li>Exact scoring criteria and terminology for “Increases Equitable Distribution of Public Assets” criterion will be discussed with Long Range Planning before solidifying language</li> </ul>
Recognized Priority Projects	10	<ul style="list-style-type: none"> <li>Reduced from 15 to 10 points</li> <li>UPAG priority criterion removed because we will seek UPAG input on final project ordering later in the planning process</li> </ul>
Feasibility and Cost	10	
<b>Total Points Available</b>	<b>80</b>	

# Outfall Retrofit Needs Assessment

- What is an Outfall Retrofit?
- Outfalls have been prioritized for further investigation to find opportunities to add water quality treatment facilities.
- Outfalls that serve a larger area, handle runoff from more polluting land uses, and have known capacity or structural issues in their drainage systems have been prioritized.
- Does the approach make sense?



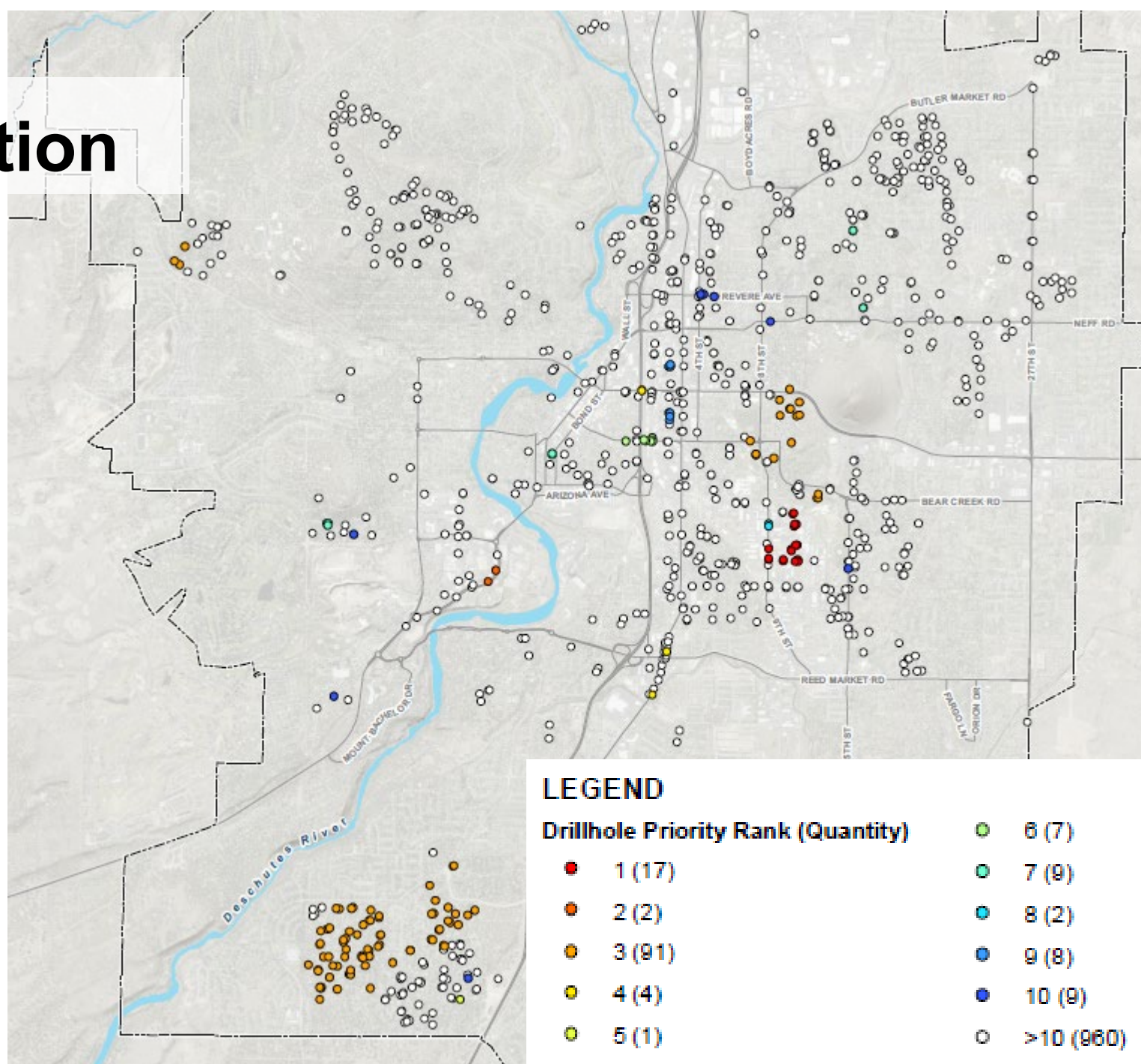
Newport Outfalls  
Retrofits





# Drillhole Prioritization

- What is a drillhole?
- Drillholes have been prioritized for retrofit or decommissioning if they pose a risk to groundwater, already are failing or structurally compromised, and/or are located where spills or high pollution is likely.
- There are 17 high-priority drillholes. How quickly should the City address them? 5 years? 10 years? 20 years?



# UPAG focus questions



- Do you have any questions about the updated CIP prioritization criteria?
- How quickly should the City address the 17 high priority drillholes? 5 years? 10 years? 20 years?
- Does the outfall prioritization approach make sense to you?



# Stormwater Program Regulatory Update

# Underground Injection Control (UIC) Specifications Update



City discussing modified deep drywells in certain locations using tech memo and UPAG subcommittee input

May involve a formal exception process with technical justification and additional spill control in certain locations



Update for all UIC standards (traditional drywells and modified):

Calendar year 2025



# Small Construction Site Erosion Control

DEQ stormwater permit requirement for all projects with  $\geq 5,000$  sq ft of land disturbance

- Nov 1, 2024 implementation deadline
- City Code updated in August 2024
  - Applies to development not already under the existing grading permit process (single family and 1-4 unit housing)
- **CityView building permit process changes effective Nov 1, 2024**



# Small Site Erosion Control Plan



- Template provided by the City
- Sign and submit with (1-4 unit) building permit application packets

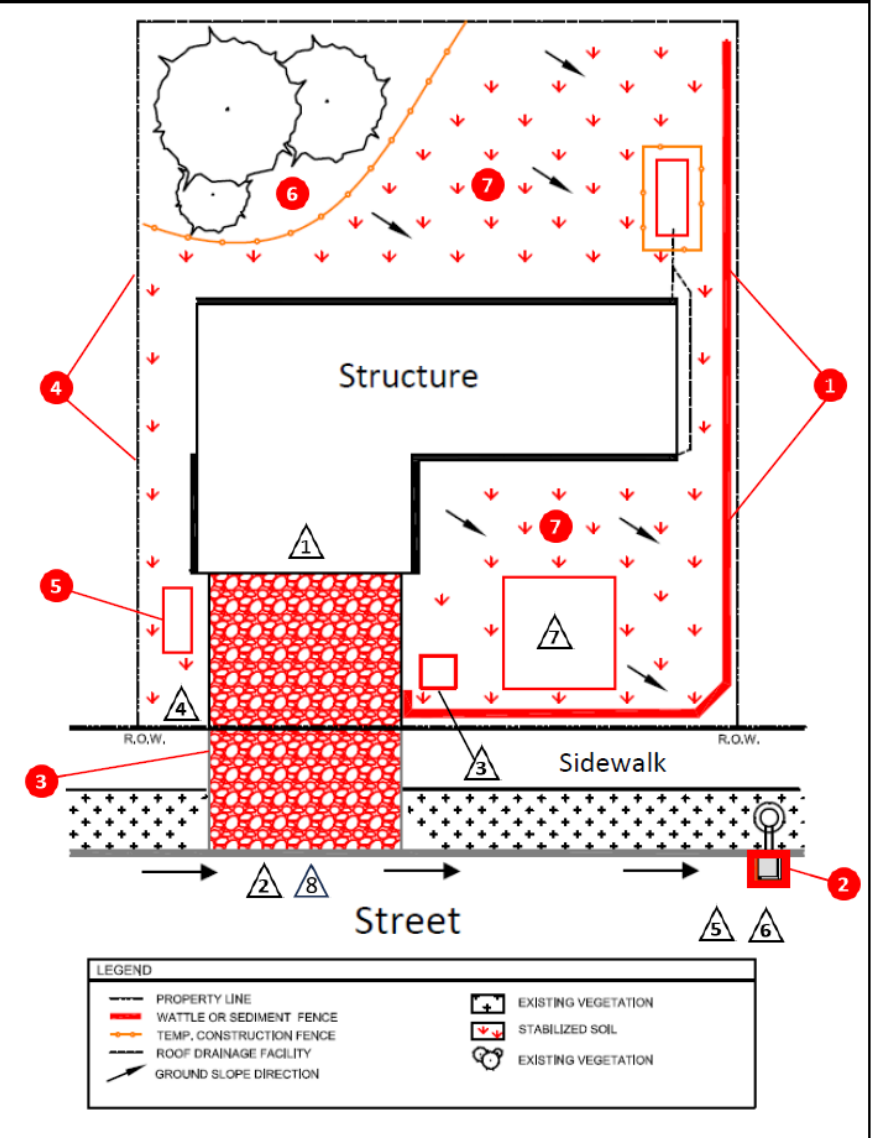
**Standard Erosion and Sediment Control Plan**  
1 – 4 Unit Development

- Erosion Control Requirements & BMPs #**
1. Protect all downslope areas by providing perimeter control
  2. Protect adjacent storm drains by installing inlet protection
  3. Mitigate tracking of sediment onto paved surfaces by providing a rocked construction entrance
  4. Minimize dust to the extent possible by providing dust control
  5. Contain concrete waste for proper disposal by providing a concrete management facility
  6. Protect trees and vegetation by installing tree protection fencing
  7. Stabilize soil not actively being worked

- General Housekeeping Requirements #**
1. This plan shall be available on site and updated as necessary.
  2. Sweep sediment found offsite daily. Sediment ramps are not allowed for curb access.
  3. Do not dump or wash material into a storm drain, dispose of trash in dumpster.
  4. Keep portable toilets out of the street and sidewalk.
  5. Inspect and maintain BMPs for the duration of the project.
  6. Remove temporary BMPs once disturbed areas are stabilized.
  7. Locate stockpiles within perimeter control for the project.
  8. Clean spills promptly using dry cleanup methods.

*By signing this plan, I agree to meet each requirement and implement all necessary erosion, sediment and pollution control measures as outlined above to prevent erosion, sedimentation, and pollutants from leaving the site to the maximum extent practical. I understand that BMPs must be maintained, and they may need to change during construction to prevent erosion and prevent sediment, sediment laden water, and pollutants from leaving the site to the maximum extent practical. I understand that the City may inspect my project, and that failure to install or maintain adequate measures may result in re-inspection fees, fines, or other enforcement actions including a stop work order.*

Tax Lot ID: \_\_\_\_\_  
 Site Address: \_\_\_\_\_  
 Name: \_\_\_\_\_  
 Signature: \_\_\_\_\_ Date: \_\_\_\_\_



# Small Site Erosion Control Plan



## Erosion and Sediment Control Best Management Practices (BMPs) for Inspection

BMP	Description	Standard Drawings/Reference
1. Perimeter Control	Physical sediment barrier downslope of disturbed areas such as wattles, subgrade barrier, or sediment fence.	E-1, E-10 and E-4
2. Inlet Protection	Prefabricated sediment filtration for curb and grated inlets/catch basins.	E-2A, E-2B and E-2C
3. Construction Entrance	Open graded rock placed at designated construction access point to stop sediment transfer.	E-8
4. Dust Control	Water available on site to control dust to the maximum extent practicable.	Bend Code Title 16.10.070(A)12
5. Concrete Management Facility	Provide a plastic lined concrete washout to ensure concrete waste is contained.	E-7
6. Tree Protection	Fencing to delineate protection areas surrounding designated trees.	E-3
7. Stabilization	Temporarily stabilize all soils, including stockpiles within 10 days of inactivity and permanently prior to issuance of Certificate of Occupancy.	E-5B, and E9
<p><i>All applicable Best Management Practices (BMPs) shall be in conformance with <u>City of Bend Standards and Specifications</u>. Alternative measures and practices are allowed when approved by City of Bend – Erosion Control Inspection Staff.</i></p> <p><a href="https://www.bendoregon.gov/government/departments/engineering/standards-and-specifications">https://www.bendoregon.gov/government/departments/engineering/standards-and-specifications</a></p>		

## BMP Maintenance

1. Remove sediment from behind bio bags, straw wattles, and other barriers when it has reached a height of 2 inches and prior to removal of control measures.
2. Remove sediment from behind sediment fence when it has reached a height of 1/3 the fence height and prior to fence removal.
3. Replace catch basin inserts when sediment has filled half of the sump area and prior to insert removal.
4. Remove accumulated dried concrete from the concrete management facility as needed to maintain adequate capacity. Completely remove debris prior to project completion.
5. Replace temporary BMPs as needed to maintain good working condition.

## Resources

1. BMP Installation and Maintenance Videos:  
<http://www.bendoregon.gov/government/departments/utilities/erosion-control>
2. Construction Site Management Fact Sheets and Guidance Documents:  
<https://www.bendoregon.gov/government/departments/utilities/stormwater-utility/stormwater-public-education-and-outreach/stormwater-best-management-practices>
3. For questions contact the Utility Department at 541-317-3000 ext. 2 or [stormwater@bendoregon.gov](mailto:stormwater@bendoregon.gov)

# CityView Building Permits



Lot size triggers new requirement

Condition under building permit to submit erosion control Best Management Practice (BMP) photos for City review (virtual inspection)

Condition must be approved before building inspections can be requested (footings/foundation).

1 onsite inspection later in the project

No new permit fees, additional inspection fees for escalated enforcement

# CityView Building Permit Condition (draft)

Deposits & Bonds ☒

Inspections ☒

Conditions ☑

▼ Guidelines For Electronically Submitting Documents:

- Submitted documents should be under 40MB in size.
- Accepted file extensions:
  - pdf, dwg, jpg, jpeg, png, tif, xlsx, xls, wav, mp4, mov
- Documents can be uploaded against certain conditions.
- Recommended naming conventions:
  - Keep filename consistent.
  - Avoid the use of non-friendly filenames. (ex. k9dk38fj3.pdf)
  - Avoid inappropriate language in filenames.

Once you have chosen the files you wish to upload, please click the 'Upload Documents' button located at the bottom of the Conditions table to complete your submission.

Condition	Status	Department	Category	Expiration Date	Due Date
Erosion Control - Small Project Erosion and Sediment Control	Open	Utility Department	Prevent Scheduling Inspections		
<p><b>Description:</b> Erosion and sediment control is required under Bend Municipal Code Title 16.35 Erosion Control Requirements. When you are ready for your erosion control inspection, upload photos to this condition. Refer to this website for upload instructions and guidance: (TBD link). By following the instructions and guidance you can pass your inspection the first time. The erosion and sediment control condition must be complete before any additional building inspections can be requested. For questions related to this process please email <a href="mailto:stormwater@bendoregon.gov">stormwater@bendoregon.gov</a>.</p>					
Documents:			Browse..		
TEST COVER					

Upload Documents

- After building permit application
- Portal to upload photos of installed BMPs
- Must be completed and reviewed by City staff prior to requesting any building inspections

# Online Guidance and Resources (draft)

## Requested photos

#1 Perimeter Control

#2 Inlet Protection

#3 Construction Entrance

#4 Site Identification

## Small Project Erosion and Sediment Control Condition Requirements

### Instructions for Condition Submittal:

**Step 1:** Install the following three erosion and sediment control best management practices (BMPs) on your project site per the signed erosion and sediment control template (1-4 units). For installation guidance please refer to the [guidance videos](#) and the [stormwater standard drawings for erosion](#).

- **BMP#1 Perimeter Control:** Physical sediment barrier at the project perimeter, downslope of disturbed areas. Can include wattles, subgrade barrier, or sediment fence. See standard drawings E-1, E-9, and E-4.
- **BMP #2 Inlet Protection:** Prefabricated sediment filtration for curb and grated inlets/catch basins adjacent to the project site. See standard drawings E-2A, E-2B, and E-2C.
- **BMP #3 Construction Entrance:** Open graded rock placed at the designated construction access point to stop sediment transfer into the right of way. See standard drawing E-8.
- **4<sup>th</sup> Photo- Site Identification:** The fourth photo must include a picture of the lot including site identification (building permit # or address and lot number) of the project on written paper.

**Step 2:** Take 1 photograph for each of the installed best management practices on your project site. Upload the photos to the condition for City review. *\*A fourth photo must include site identification (building permit # or address and lot number) and of project on written paper.*

### *Examples of Acceptable Photos for Submission:*

#### *Best Management Practices #1 - Perimeter Control*





# Example BMP Photos



Perimeter Control

Inlet Protection

Construction Entrance



# BMP Guidance Videos



- 5 two-minute videos for specific BMP installation and maintenance
- 10 informational, short 30-second videos
- Will be available and linked on the City's stormwater public website

# Example Short Video- What are BMPs?

[COB BMPs Social.mp4](#)



# UPAG focus questions



- Is the draft guidance and resources for small developers understandable?
- Are there any guidance areas that may require more support?

# Discussion & Feedback

# Look ahead



**November 6, 2024: Water Conservation Program**

11am-12:30pm Hybrid Meeting (Boyd Acres or MS Teams)

*Outcome: Input on water conservation program planning for 2025.*

**December 4, 2024: Stormwater Master Plan & UPAG Annual Review**

11am-12:30pm Hybrid Meeting (Boyd Acres or MS Teams)

**Thank you!**

# Accommodation Information for People with Disabilities



To obtain this information in an alternate format such as Braille, large print, electronic formats, etc. please contact Lori Faha at [lfaha@bendoregon.gov](mailto:lfaha@bendoregon.gov) or (541) 317-3025; Relay Users Dial 7-1-1.