Seismic Resiliency for the City of Newport

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Newport's Big Creek Dams and Water System Resiliency

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Newport
Seismic Resiliency

Overview

- The Newport Earthquake Hazard
- History of the Dam Deficiencies
- Corrective Action Alternatives
- Statistics/Watersheds/Water Rights
- Steps Towards Water System Resiliency
- Integrated Water Resources Planning

The Newport Earthquake Hazard

The Newport Earthquake Hazard

- The New Yorker article July 20th 2015 “The Big One”

THE NEW YORKER

- OPB Documentary October 2015 “Unprepared: An Oregon Field Guide Special”

OPB

- Geotechnical Experts have increasingly been aware about the risk since the 1990

Importance of the Water System Resiliency

- Overall Goal: provide a reliable drinking water source for Newport
- After the earthquake isolation for a long time due to road closures caused by landslides and bridges collapsing

History of the Dam Deficiencies

Siteplan Overview

Discovery of the Foundation Material Problem

Existing Intake on Big Creek #1 & New WTP

Outcome of the Exploration Programs

- The 1st Round of Samples (just one sample):
  1. There appears to be a problem!

- The 2nd Round of Samples:
  1. Post-earthquake factors of safety indicate overall safety is deficient
  2. Additional site characterizations were suggested to determine the level of necessary modifications and to refine the engineering models

- The 3rd Round of Samples:
  1. Phase 3 explorations and engineering analyses confirmed significant seismic deficiencies
  2. Analysis indicated both dams are unsafe due to excessive deformations

Project Timeline

Timeline		Activity
April 2011	→	1st boring sample– discovered the issue
Dec 2011	→	2nd round of sampling
Jan - May 2012	→	Laboratory testing of 2nd round samples
Feb 2013	→	Report “Geotechnical Investigation & Seismic Evaluation”
Nov 2013	→	3rd round of sampling
Jan - June 2014	→	Laboratory testing of 3rd round samples
June 2015	→	Report “Engineering Evaluation & Corrective Action Alternatives”
Jan - May 2016	→	Topographic Survey

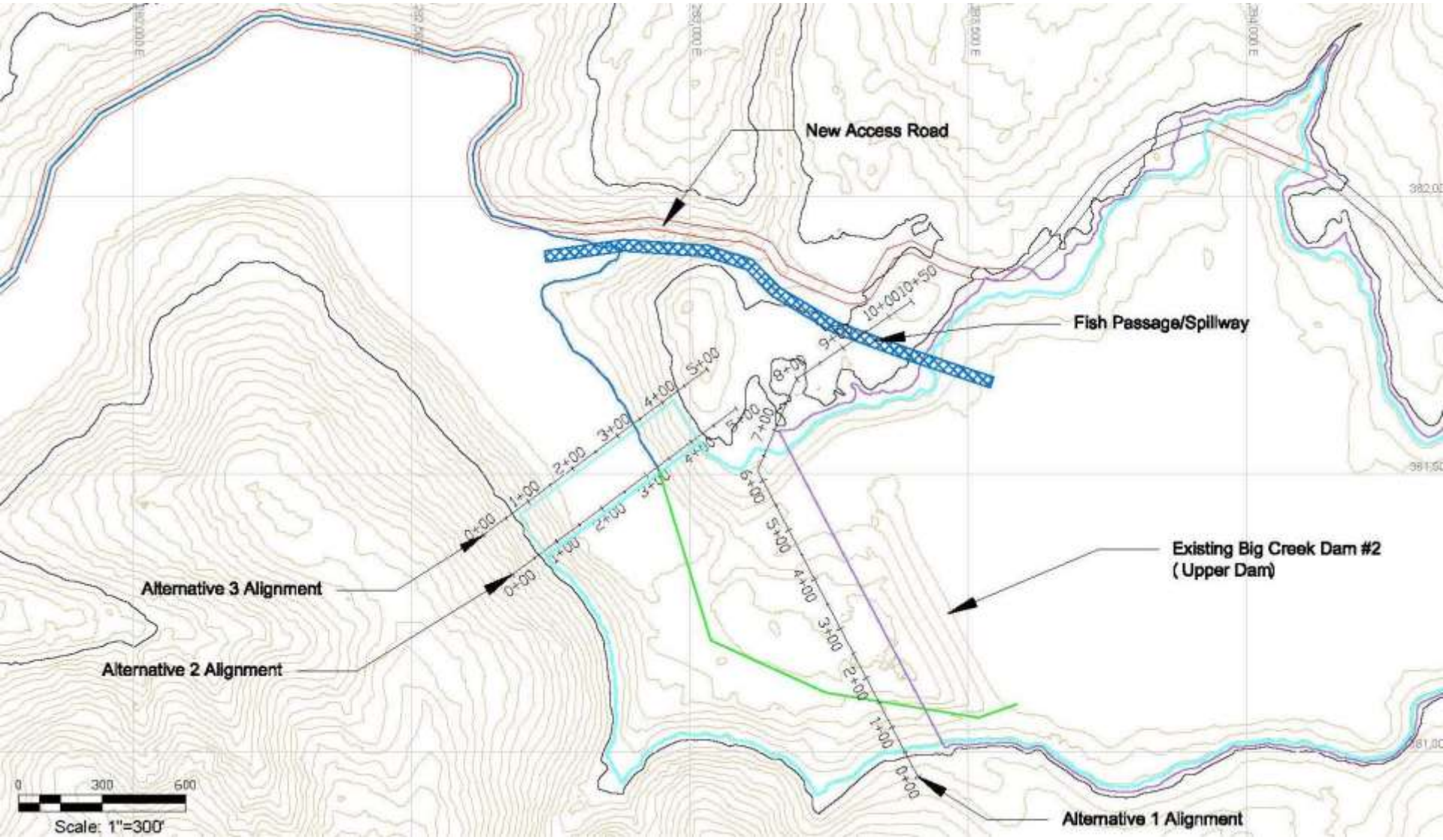
Corrective Action Alternatives

Three Alternatives

Lower dam (BC-1) not economically feasible to save – rehabilitation or decommissioning will be required by the state

- Alternatives 1 – Raising & Modifying Existing Dam (BC2)
- Alternatives 2 – RCC Dam (Roller Compacted Concrete)
- Alternatives 3 – New Embankment Dam

Alternatives for Corrective Actions – 3 Options



All Alternatives – Related Structures

- Intake structure/sloping intake pipe
- Low level dam safety outlet w/ stilling basin
- Raw water pipeline to Water treatment plant
- Spillway (for embankment option only)
- Fish Ladder
- Access road to and around reservoir

All Alternatives – Comparison

- Constructability
- Excavation volume
- Construction material
- Foundation conditions
- Spillway design
- Intake structure
- Outlet works
- Dewatering
- Seismic resiliency
- Hydraulic resiliency
- Environmental impacts
- Maintenance
- Total costs

Recommendations

Based on cost estimate & advantages/disadvantages:

Alternative 2 – New RCC Dam

- Constructability
- Spillway included
- Less construction time
- Less footprint – less excavation
- Less environmental impacts
- Better intake structure
- Better seismic resiliency
- Less maintenance

Present & Future Work

Pre-Design = Comprehensive characterization of new dam site

- **Comprehensive survey of dam site and access road site**
- Define dam failure consequences
- Identify appropriate design criteria
- Geotechnical verification
- Budgetary Cost estimate
- Begin of environmental permitting process

Additional modeling per state requirements:

- To determine design requirements for dam

Update of Emergency Action Plan

City of Newport Statistics/Watersheds/ Water Rights

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Statistics

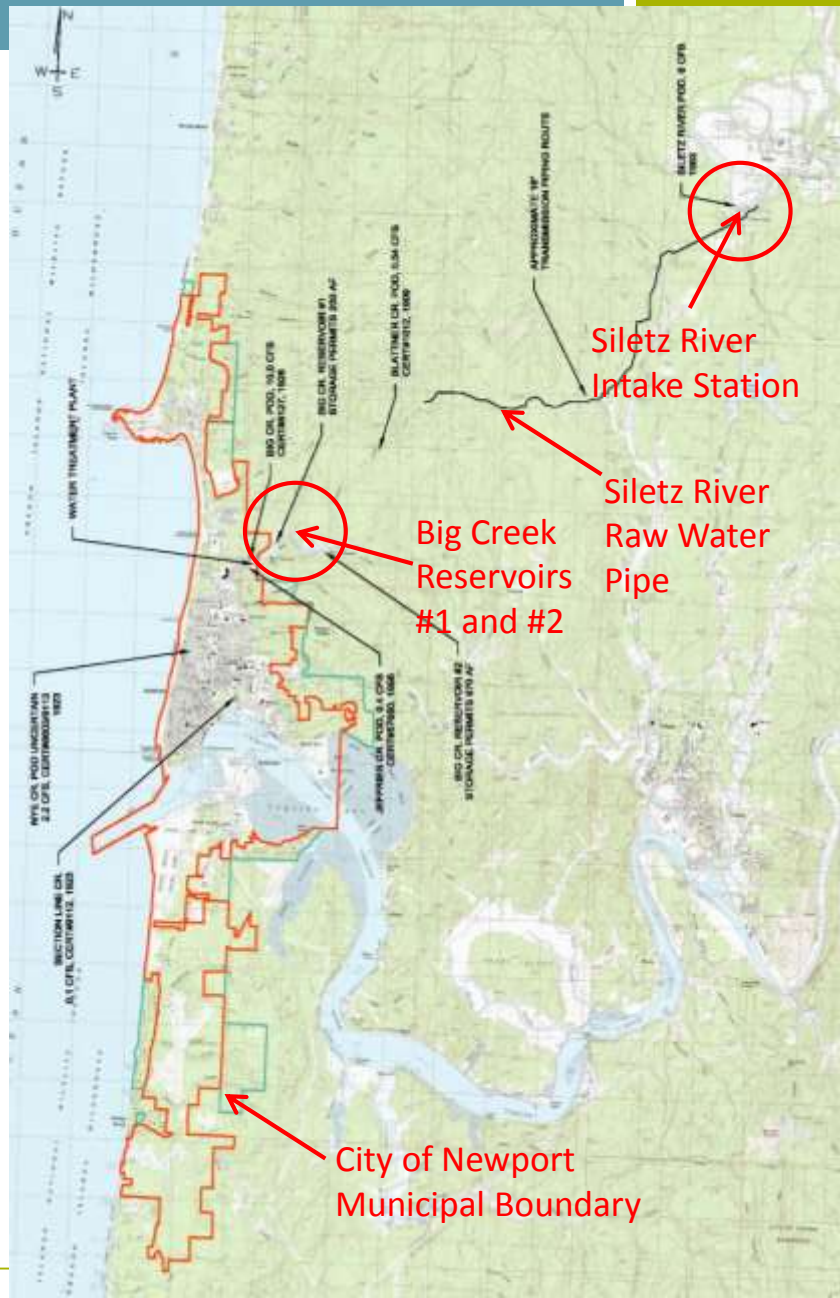
- Population
  - 10,000 regular residents
  - Up to 50,000 with tourists
- Production
  - 726 MG last year (97 MCF/2,228 ACFT)
  - Fill an area 460'x460'x460'
  - Average 2 MGD, max 5 MGD
- Large water dependant industrial base

Watersheds

- Primary Watersheds:
  - Siletz River Watershed (200 sq mi)
  - Big Creek Watershed (3.3 sq mi)

Water Rights

- Water rights in 10 different locations
- Primary water rights:
  - Siletz River – 6 CFS (3.88 MGD)



City of Newport's Water Sources Have Significant Risk

Siletz Raw Water Line

- 5.7 miles of pipe
- 550' of elevation change
- 1.9 miles of open channel flow
- Total Distance from intake to reservoir: 7.6 miles

City of Newport's Water Sources Have Significant Risk

In 2012 the City of Newport lost the ability to provide water south of Yaquina Bay after tree floating in the bay struck he City's 12" water main on the bay floor. Through the intertie, Seal Rock Water District provided water to the City until repairs were completed.

Steps Towards Water System Resiliency

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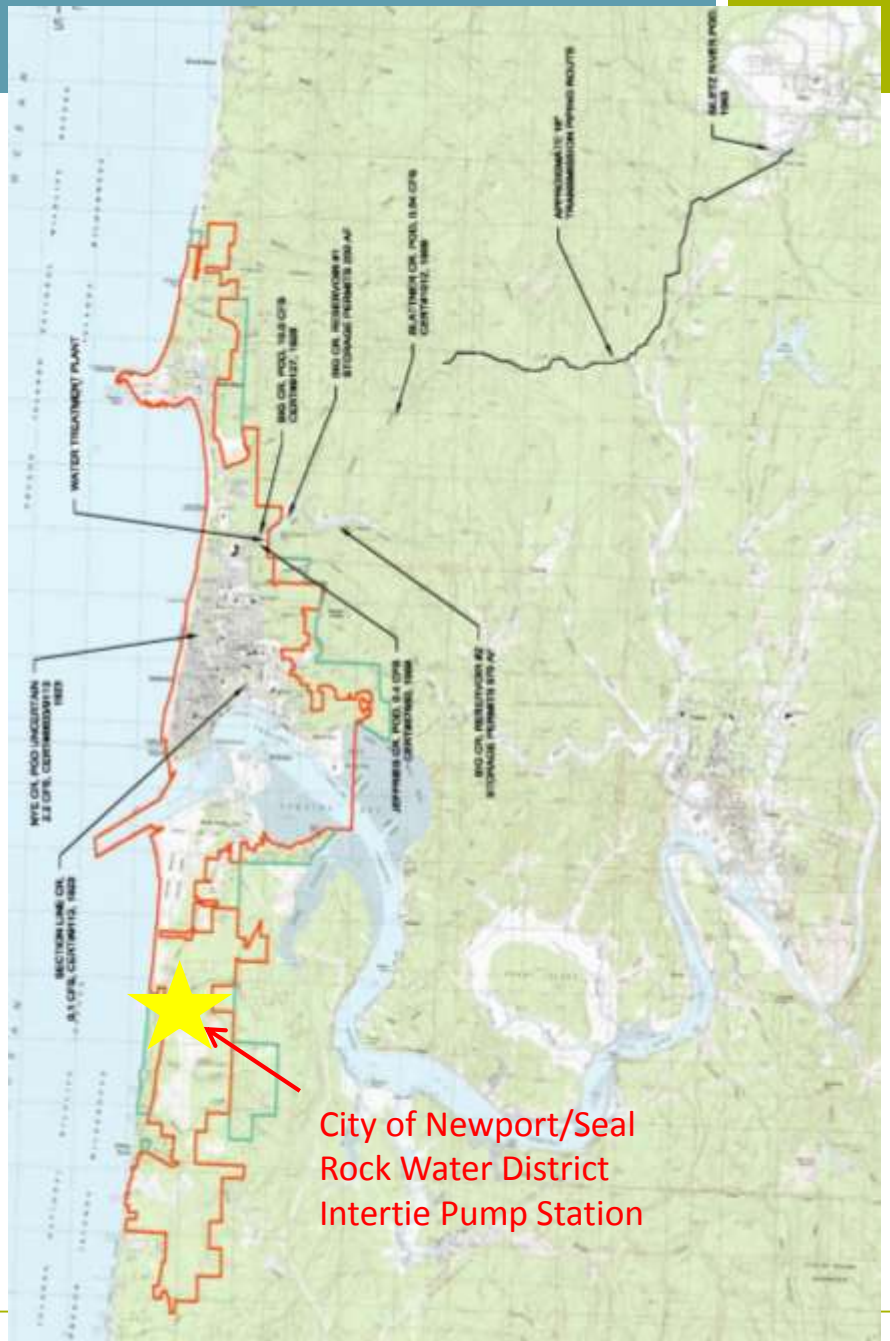
City of Newport/Seal Rock Water District Water Intertie Pump Station

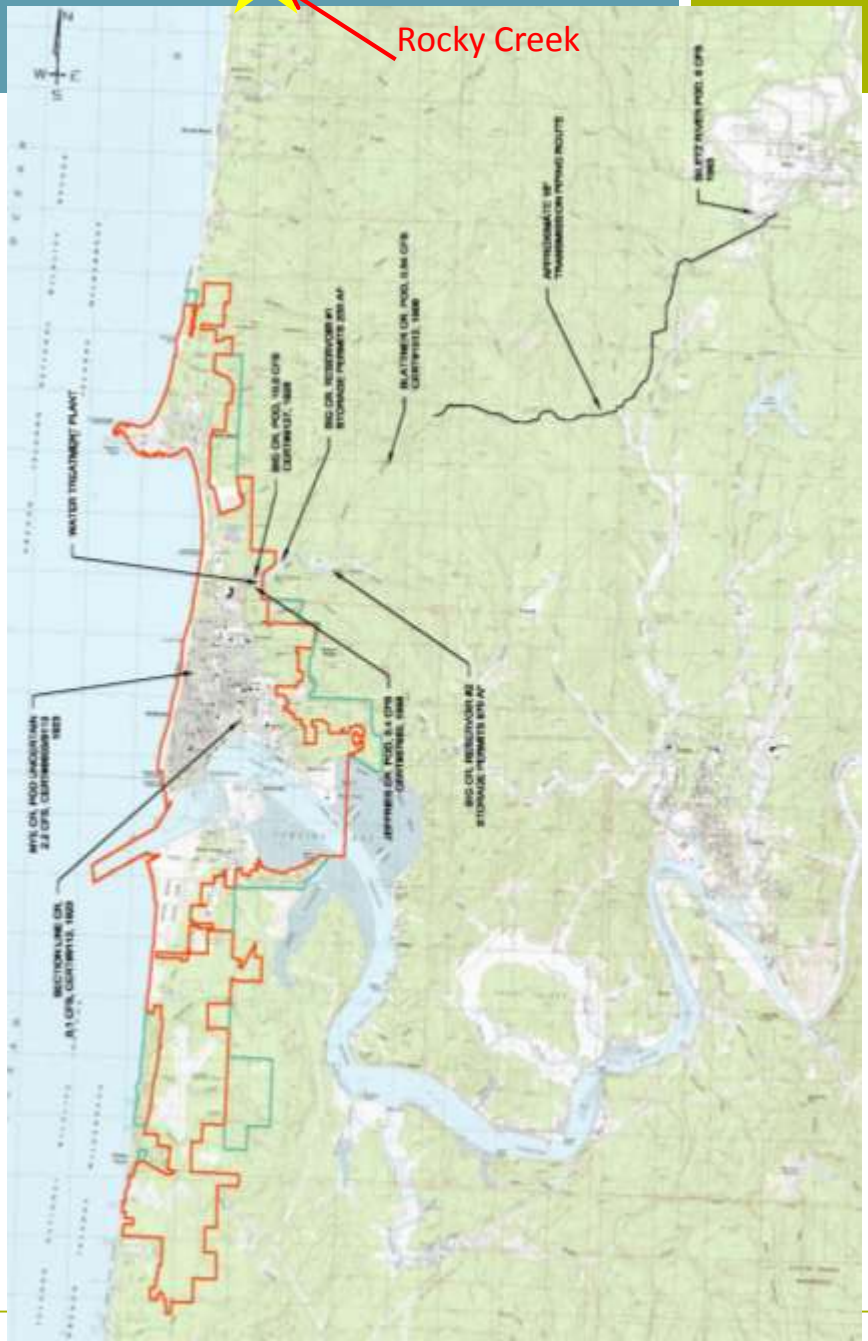
- In 2015 the City of Newport partnered with Seal Rock Water District to install in intertie between the two water systems.
- Funded through a FEMA Mitigation Grant, the project allows the two water system to provide treated water to each other in emergency situations



Steps Toward Water System Resiliency

Rocky Creek Water Rights Application

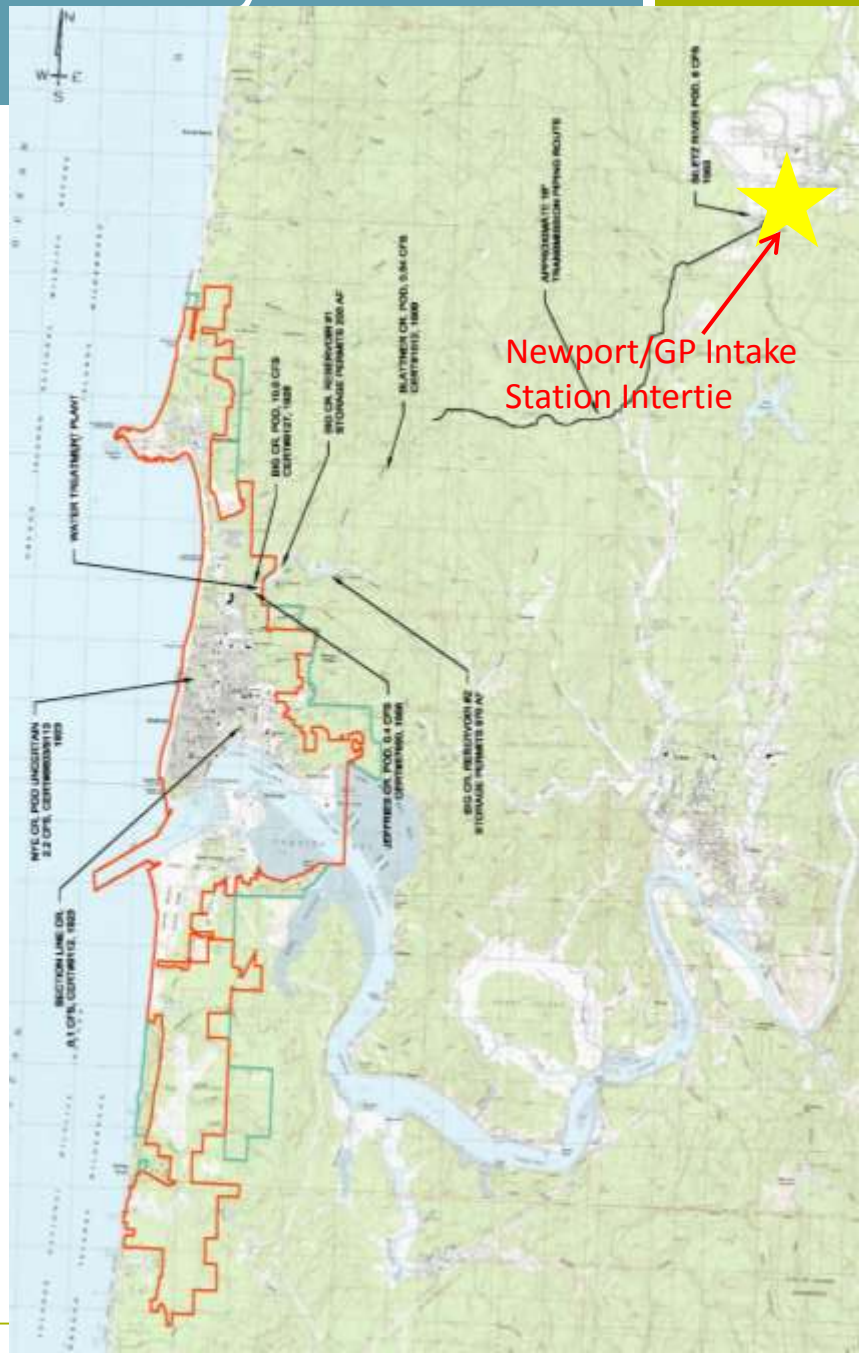
- In 2015 the City of Newport submitted a water rights application to store water at Rocky Creek.
- Rocky Creek is undeveloped watershed that discharges water via a 30’ waterfall to the ocean. No indigenous fish passage.



Steps Toward Water System Resiliency

City of Newport/Georgia Pacific Intake Station Intertie

- In the summer of 2015, Georgia Pacific, a large employer in the region, was days from closing its doors due to lack of water
- Intake stations for Newport/Toledo/GP right next to each other on Siletz River
- GP has junior right and must shut intake down when Siletz elevation drops
- City of Toledo and GP completed an MOU and constructed an intertie between their water systems to provide GP with emergency water
- City of Newport and GP working on inter-connection MOU and future connection between intake stations



Steps Toward Water System Resiliency

City of Newport/Georgia Pacific Intake Station Intertie

Place-Based Integrated Water Resources Planning

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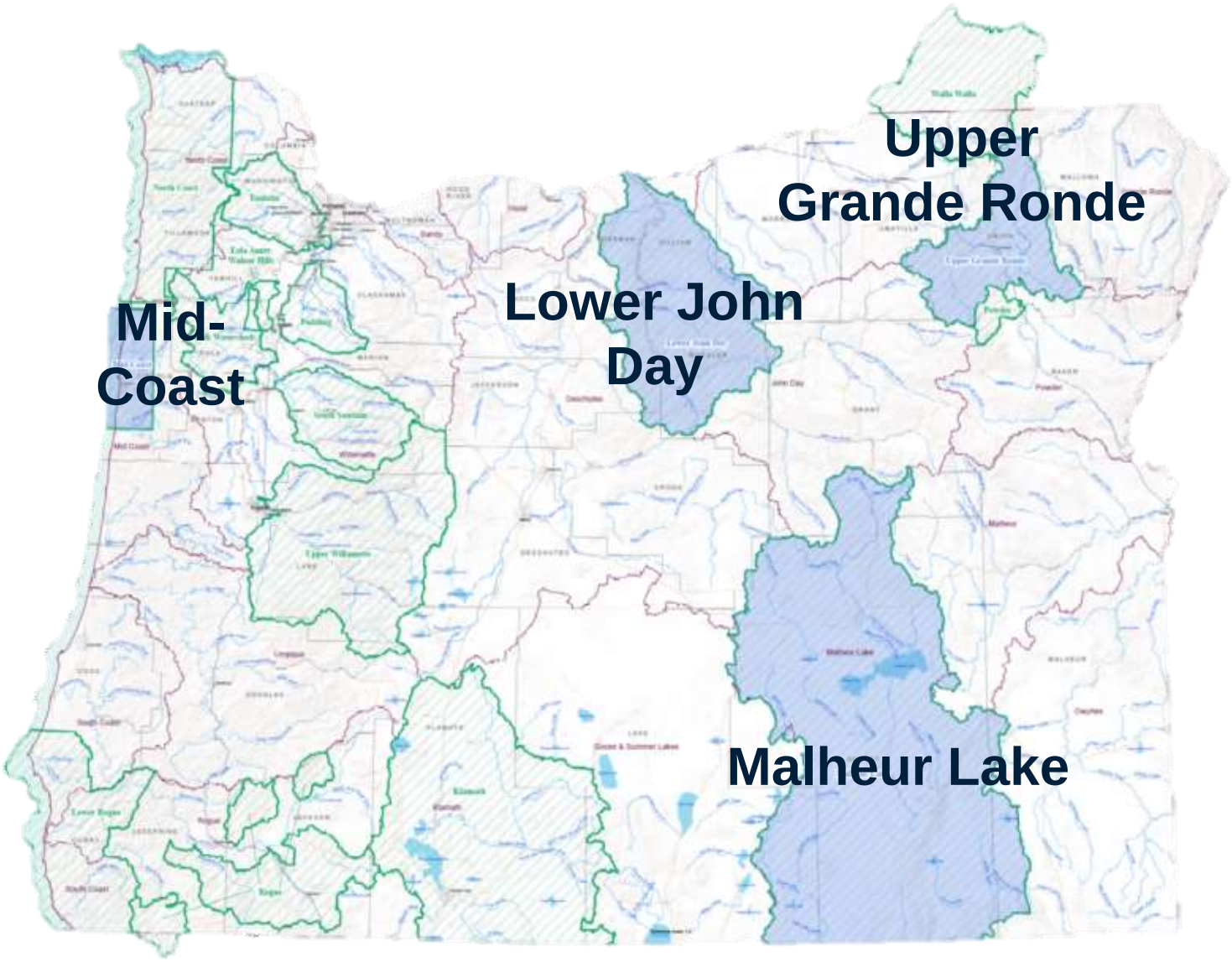
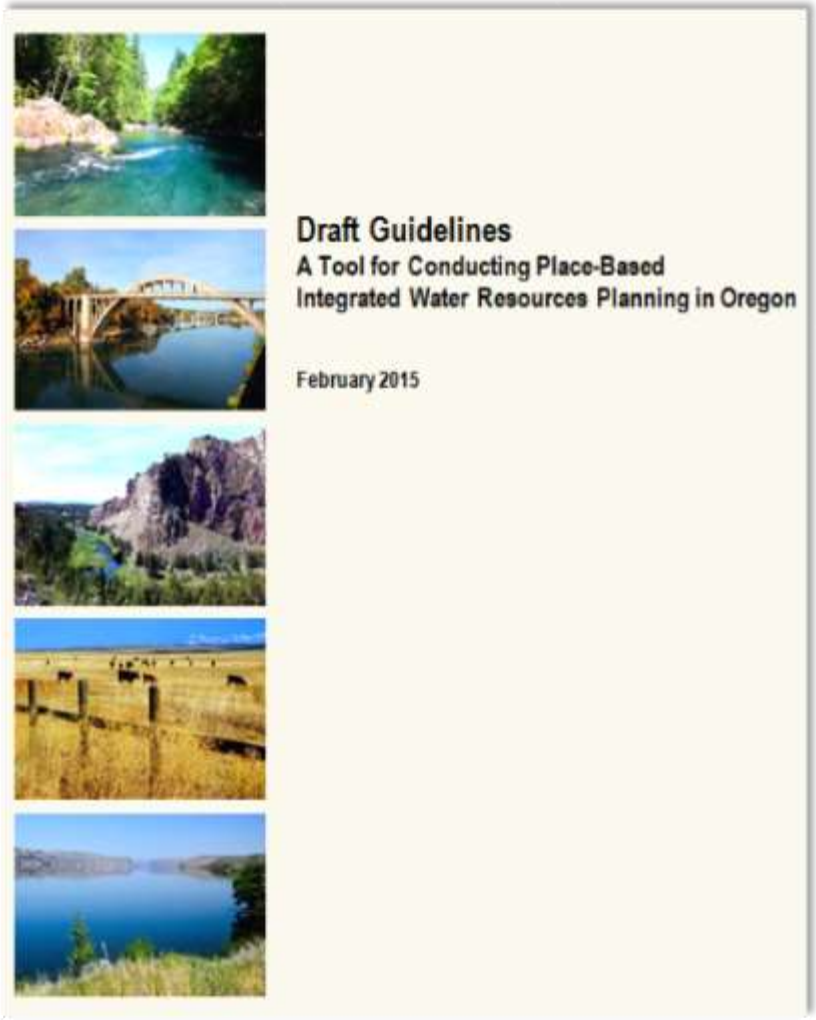


Five Planning Steps



1. Build a collaborative and inclusive process
2. Gather information to understand current water resources and identify gaps in knowledge
3. Examine current and future water needs for people, the economy, and the environment
4. Develop and prioritize strategic and integrated solutions to meet water needs
5. Create a local integrated water resources plan

Mid-Coast

Convener: City of Newport

OWRD invited to co-convene

Awarded partial funding - $135,000

Transferrable lessons for discrete water systems

Clear local momentum and active stakeholder engagement

Commitment to track progress against established metrics

Project Team

City of Newport
HDR
Cornforth Consultants
Western States
Cardno

Questions?

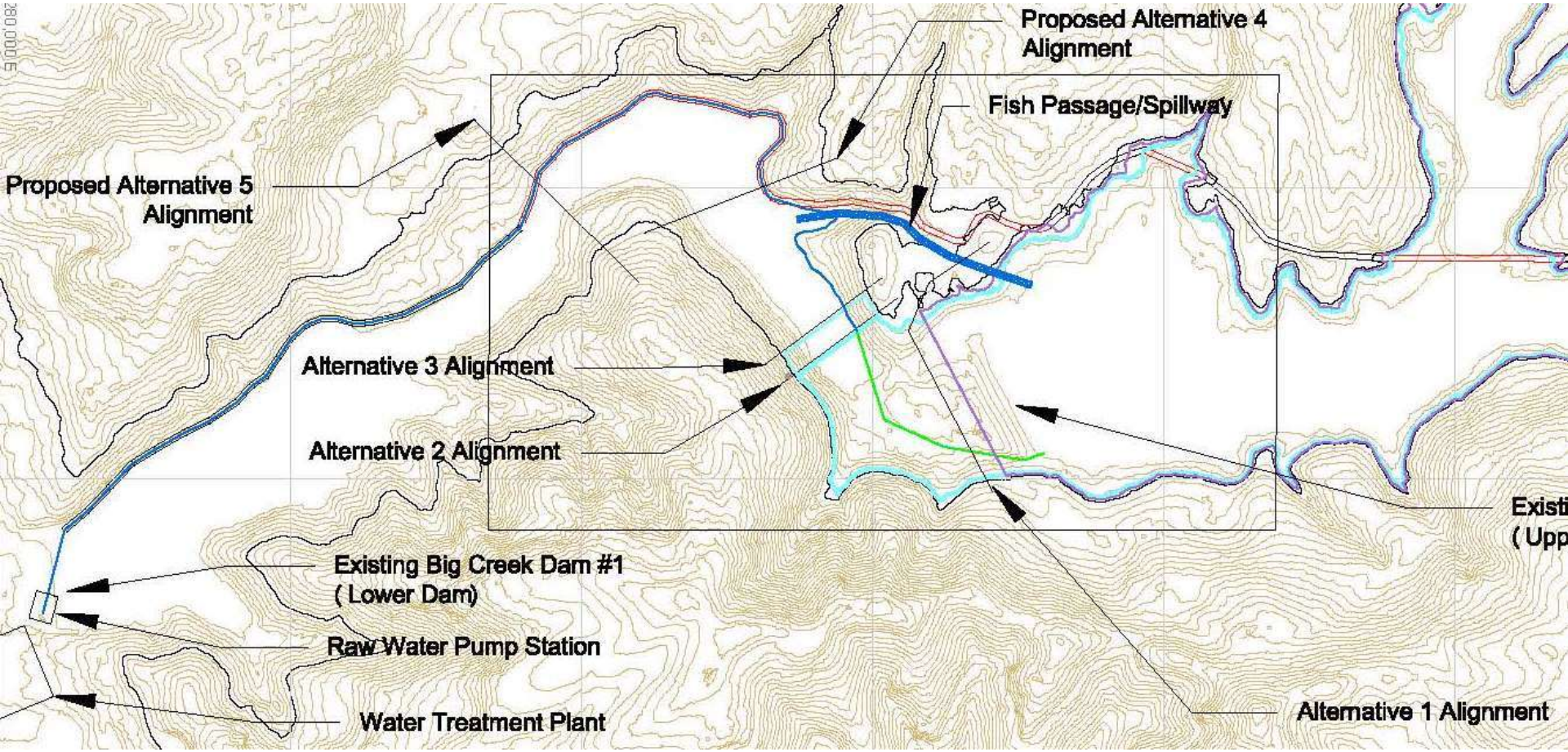
Engineering Analysis/Deficiency Verification

- BC-1:
  - Will fail by settlement and overtopping during a large earthquake.
  - Smaller earthquakes will result in significant damage to the dam, outlet works, water supply pump station, and ability to operate the reservoir
  - Foundation material is very deep. Remediation is challenging and expensive.
  - Small amount of storage in the reservoir and the very large anticipated remediation costs, rehabilitation of this dam is judged as non-feasible.

Engineering Analysis/Deficiency Verification

- BC-2:
  - Unacceptable deformations large earthquake events
  - Likely to fail due to overtopping and/or seepage through transverse cracks after the shaking
  - Significant damage during more frequent seismic events
  - Deformations of the upstream slope will be significant for the larger earthquakes resulting in damage or failure of the outlet works, intake structure, and discharge pipeline (similar to BC1)

Alternatives for Corrective Actions – 5 Options



Principal Seismic Sources in Oregon

- Cascadia Subduction Zone (CSZ)
- Crustal Faults