City of Anacortes Water Treatment Plant Climate Change Mitigation

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CITY OF ANACORTES
WATER TREATMENT PLANT
Climate Change Mitigation
Largest single source of potable water in Skagit County and Island County

• 29 million gallons a day

Approximately 56,000 customers

Major customers:
Shell and Tesoro Refineries
City of Oak Harbor
NAS Whidbey
Town of LaConner
Shelter Bay Community
Skagit PUD
Swinomish Tribal Nation
March Point complex
Anacortes
Del Mar Water Association, The Pointe
New Water Treatment Plant

- $56 million construction contract
- 2 ½ year project
- Completed in March 2013

2007 - 2009 Project scoping
2009 - 2010 Design
2010 - 2013 Construction
The Skagit Climate Science Consortium is a group of research scientists from universities and federal, municipal, and tribal governments and agencies working in the Skagit Basin. SC2 seeks to understand how the landscape, plants, animals and people may be affected by changes in the patterns of rain, snow, temperature, storms and tides.

Our vision is to reduce the vulnerability of human communities and ecosystems in the Skagit River basin to the impacts of a changing climate.

Eric Grossman PhD
Dr. Tarang Khangaonkar
Dr. Alan Hamlet
Larry Wasserman Swinomish Tribe
Carol Macilroy
SKAGIT RIVER PREDICTIONS

- **REDUCTIONS IN SNOWFALL ARE EXPECTED DUE TO HIGHER TEMPERATURES (THE PRECIPITATION WILL FALL AS RAIN), NO CHANGE IN THE AMOUNT OF PRECIPITATION IS EXPECTED.**

- **ANNUAL FLOWS WILL PROBABLY STAY ABOUT THE SAME OR MAY EVEN INCREASE SLIGHTLY ON AVERAGE. BY THE 2080S, PEAK MONTHLY RIVER FLOW IS PROJECTED TO SHIFT FROM JUNE TO DECEMBER IN THE LOWER BASIN.**
Hydrographs of projected monthly streamflows on the Skagit River at Mt. Vernon (starting in October). The lines represent simulations for the historical (blue), the 2020s (yellow), the 2040s (green) and the 2080s (red).
Skagit River Flooding

100 YEAR FLOOD

CLEAR WELL
Flooding Issues
Flood protection

Climate change will increase the flood interval

- Existing measures
  - Ring dikes and dewater pump system
  - Significant sand bag effort, volunteers and Navy personnel

- New Design Elements
  - Elevated structures
  - Water tight construction
  - Water proof membrane below 40 foot elevation
  - No/minimal penetrations below 100 flood elevation
  - Electrical switch gear located above 100 year flood level
Waterproof Membrane

City of Anacortes Public Works
"Essential Services for our Community"
Elevated Switch Gear

Watertight Construction
City of Anacortes Public Works
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Sediment Load
City of Anacortes Public Works
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Sediment Load
City of Anacortes Public Works
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Sediment Load
We remove more than 20,000 cubic yards of river sediment every year.
Skagit River Sediment Load

Increase in sediment load is expected

• Existing treatment
  • Gravity based traditional sediment removal basin

• New treatment plant design elements
  • Specified a ballasted sand sediment removal system
    • Krueger “ACTI FLOW” system
  • Constructed a dual train redundant sediment removal process
Old Sed. Basin

New sedimentation process
Krueger “ACTI FLOW” system

**Coagulation stage:** a coagulant such as an iron or aluminium salt is added to the raw water.

**Injection tank:** the flocs produced during the coagulation stage are ballasted by the dense microsand, which is continuously reinjected into the process.

**Maturation tank:** fitted with a mixer designed to produce the optimum velocity gradients, it allows flocs to swell and mature.

**Recirculation:** the sludge is pumped to the hydrocyclone to be separated from the microsand. The clean microsand is returned into the injection tank to minimize loss; the sludge is continuously removed for further processing.

**Clarified water**
City of Anacortes Public Works
“Essential Services for our Community”

0.02 NTU

2000 NTU
Future issues

Sediment load composition

• We would like to have a better understand of the anticipated composition of the sediment.
  • Silt Sand Clay
Future issues

Salinity

• Currently tidal influence on the Skagit River reaches upstream to Mount Vernon, near Blade Chevrolet.
• With combined pressures of sea level rise and predicted lower summer flows we were concerned about a salt water wedge reaching our raw water intake at some point in the future.

Dr. Tarang Khangaonkar recently completed preliminary modelling that indicates this is not an immediate concern.
Recent Experience
The recent landslide event on the Stillaguamish River
Resulting in increased turbidity for extended time period
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Water Treatment Plant
Completed March 2013