

# EMERGENCY WATER SUPPLY FOR HAZARD MITIGATION

City of Mercer Island  
Emergency Water System

Presented by:

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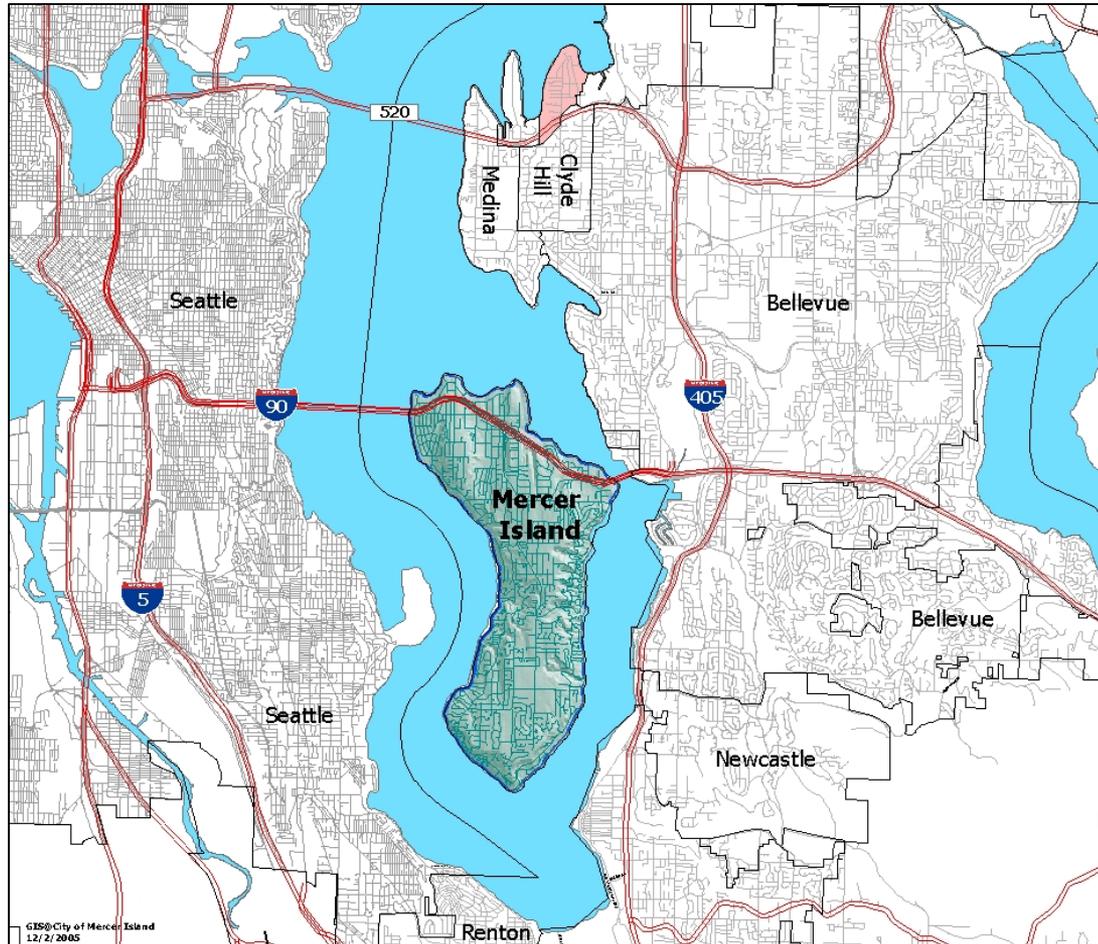
AWWA PNWS Spring Conference 2010

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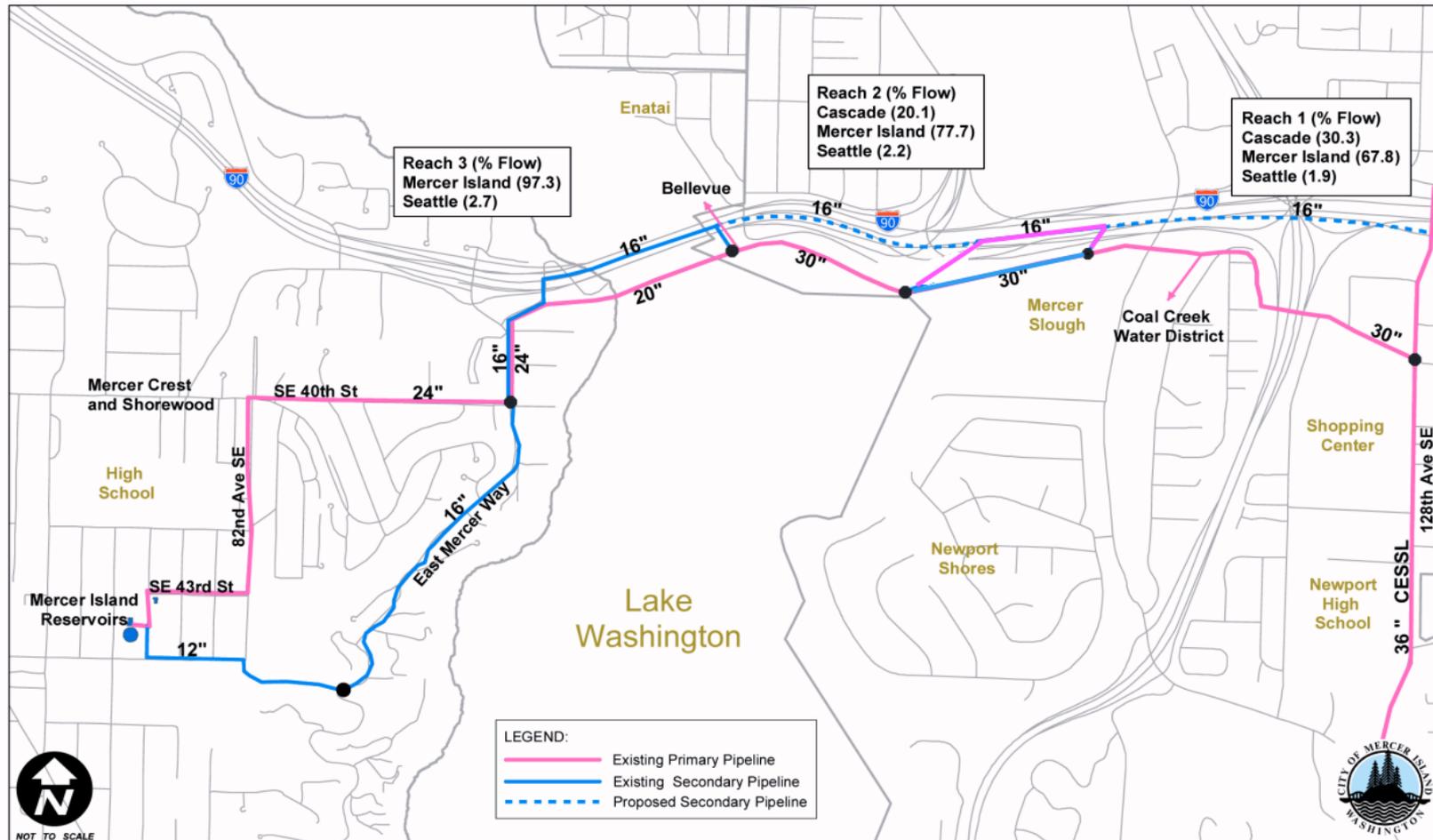
# Defining the Risk

- Geographic Setting
- Single off-island water supply
- 22,000 customers
- Risk identified by City in *Hazard Inventory and Vulnerability Assessment (HIVA)*, 2003
- Identified as a serious issues in EERI Earthquake Study, 2005

# Geographic Setting



# SPU Water Supply to Mercer Island



# Mercer Slough Supply Line

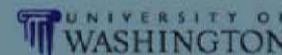




# Seattle Fault Earthquake Scenario

Conference

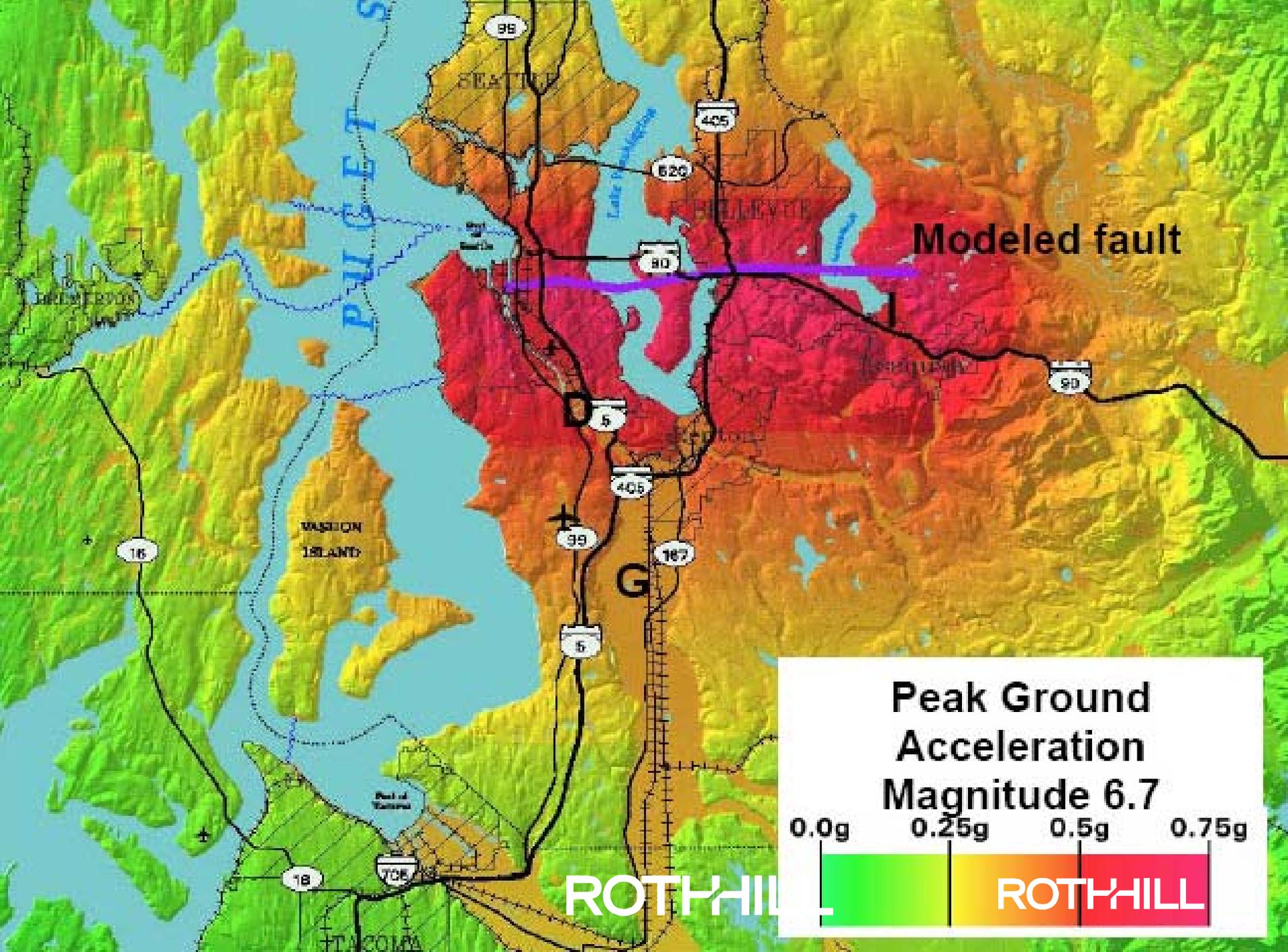
February 28, 2005



Earthquake Engineering  
Research Institute

# Seattle Fault Earthquake Scenario

- Considers a magnitude 6.7 earthquake
- 2001 Nisqually quake was 6.8
- Predicts Mercer Island water supply impacted by surface fault rupture
- Predicts a 6.5-foot fault offset
- Widespread utility outages immediately after the event for 1 –3 days
- Weeks-long utility outage in some areas



Modeled fault

Peak Ground  
Acceleration  
Magnitude 6.7

0.0g    0.25g    0.5g    0.75g



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# What Can We Do?

## Conduct an Alternatives Analysis

### Team included:

- Roth Hill engineering and planning
- City Engineers
- City Water Operations
- City Fire Department
- Tom Mortimer, Jr. – water rights attorney
- Burt Clothier – Robinson Noble hydrogeologist

# Alternatives Analysis Process

## Operational Considerations

- Reliability
- Ease of Operation
- Quantity required – settled on 5 gpcd
- Length of operation – SPU said maximum 7 days to restore service
  - Longer to fix broken pipes on the island

# Alternatives Analysis Process

1. Workshop setting
  - Developed alternatives
  - Defined important criteria
2. Design Team studied alternatives
3. Workshop setting
  - Reported on analysis
  - Applied criteria to alternatives
4. Workshop setting
  - Reported on alternative specifics
  - Selected preferred alternative

# Some of the alternatives considered

- Additional cross-lake pipelines
- Lake Washington supply source
- Wells
- Additional Storage
- Water Buffalos

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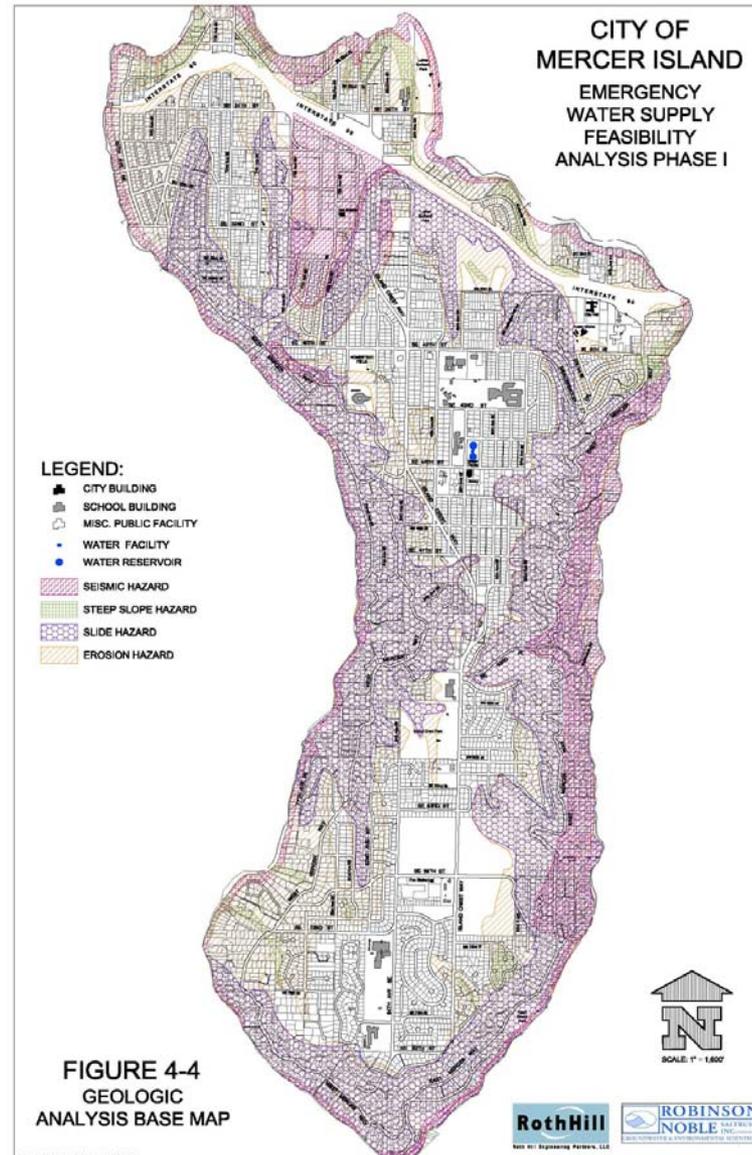
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- ❑ Additional cross-lake pipelines
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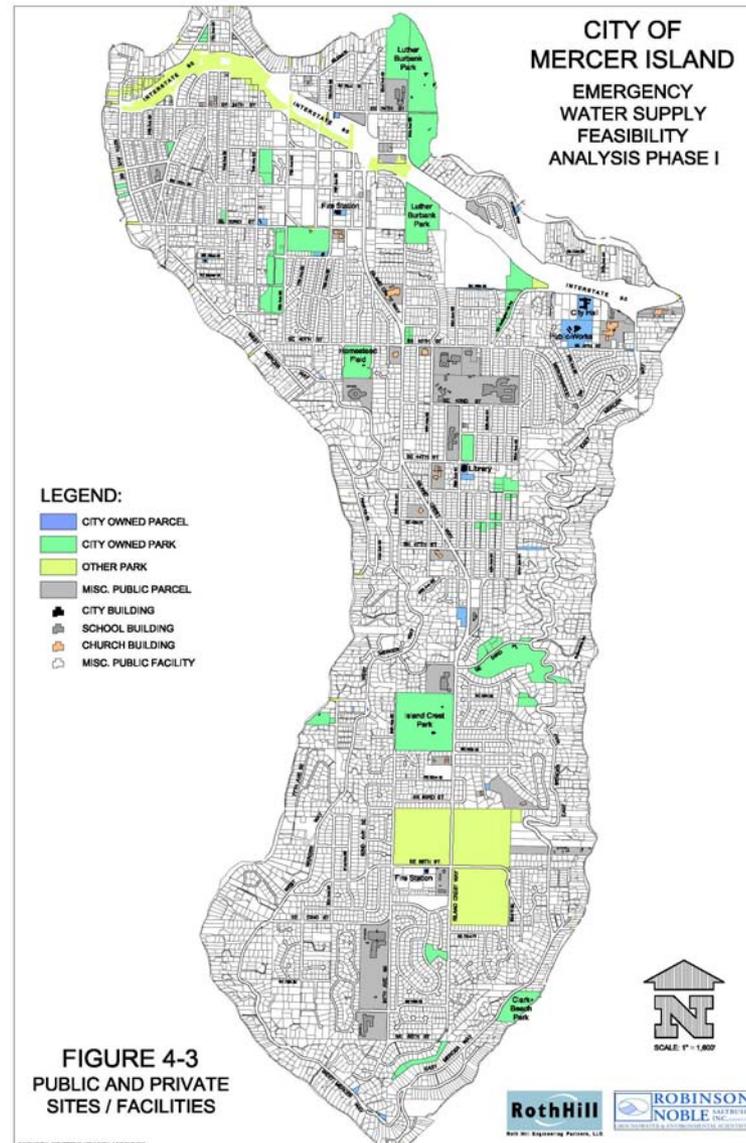
# Hazard Areas Analysis

- Seismic hazards
- Steep slopes
- Landslide hazards
- Erosion hazards



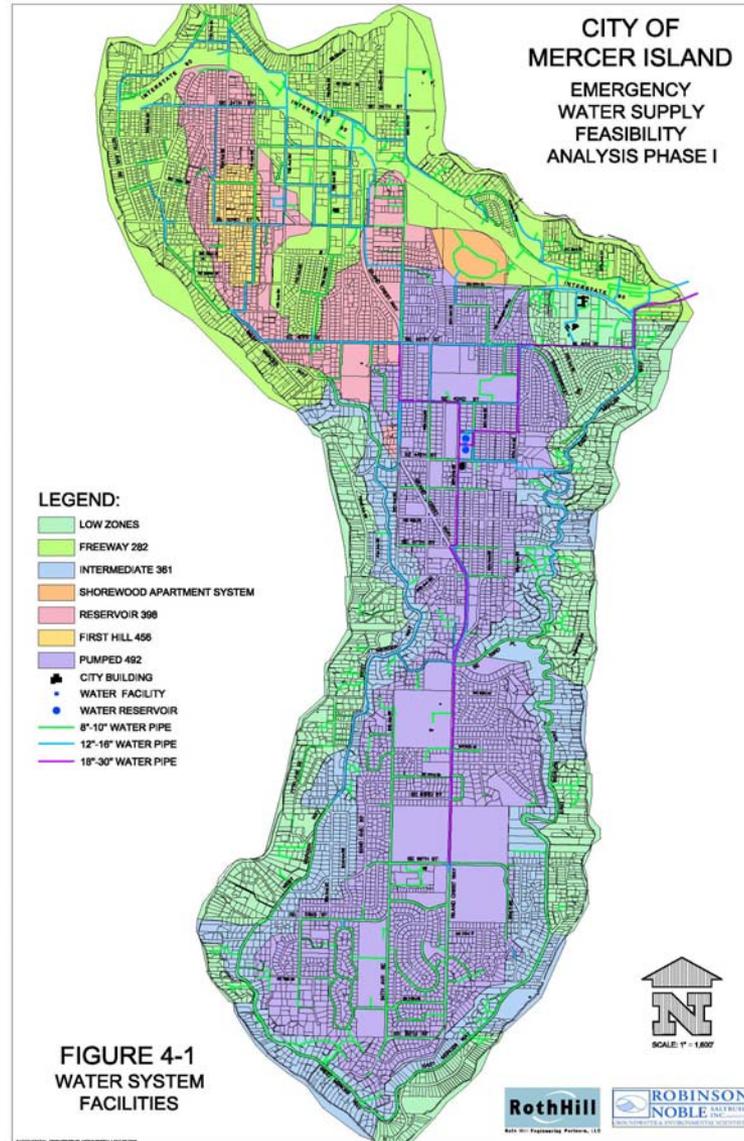
# Ownership Analysis

- GIS analysis of public and private sites
- Ownership
- Size
- Location



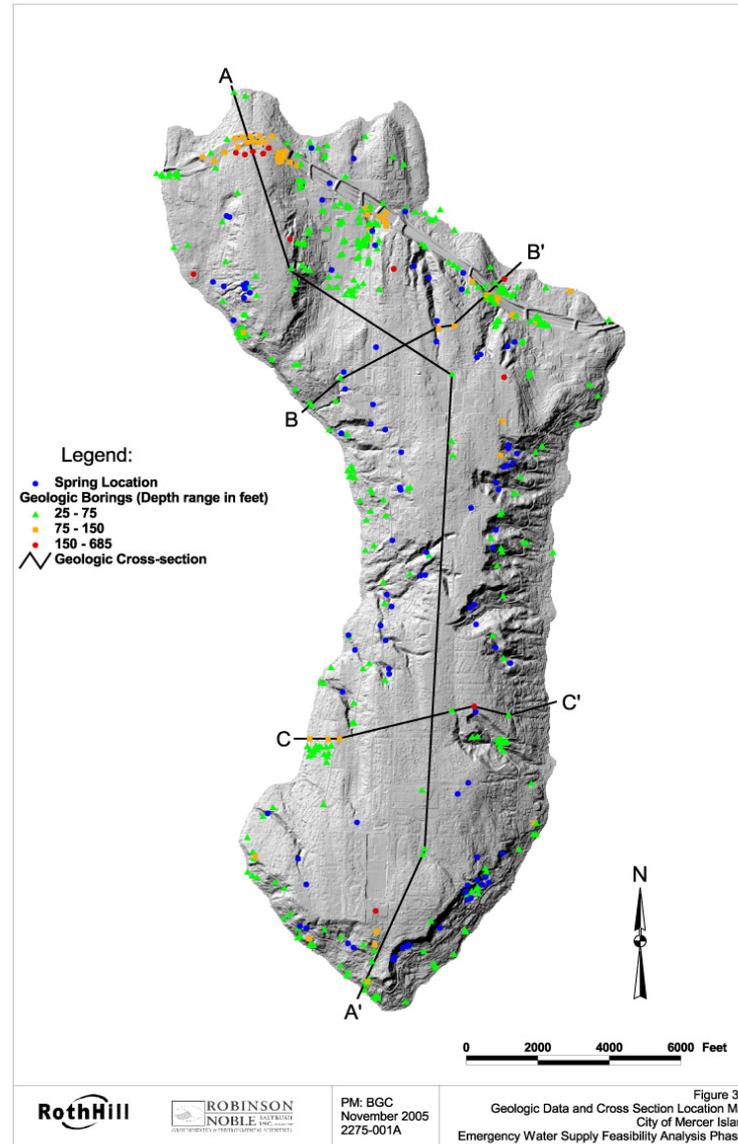
# Operational Issues

- Pressure Zones
- Proximity to other water system components
- Reservoirs
- Generators



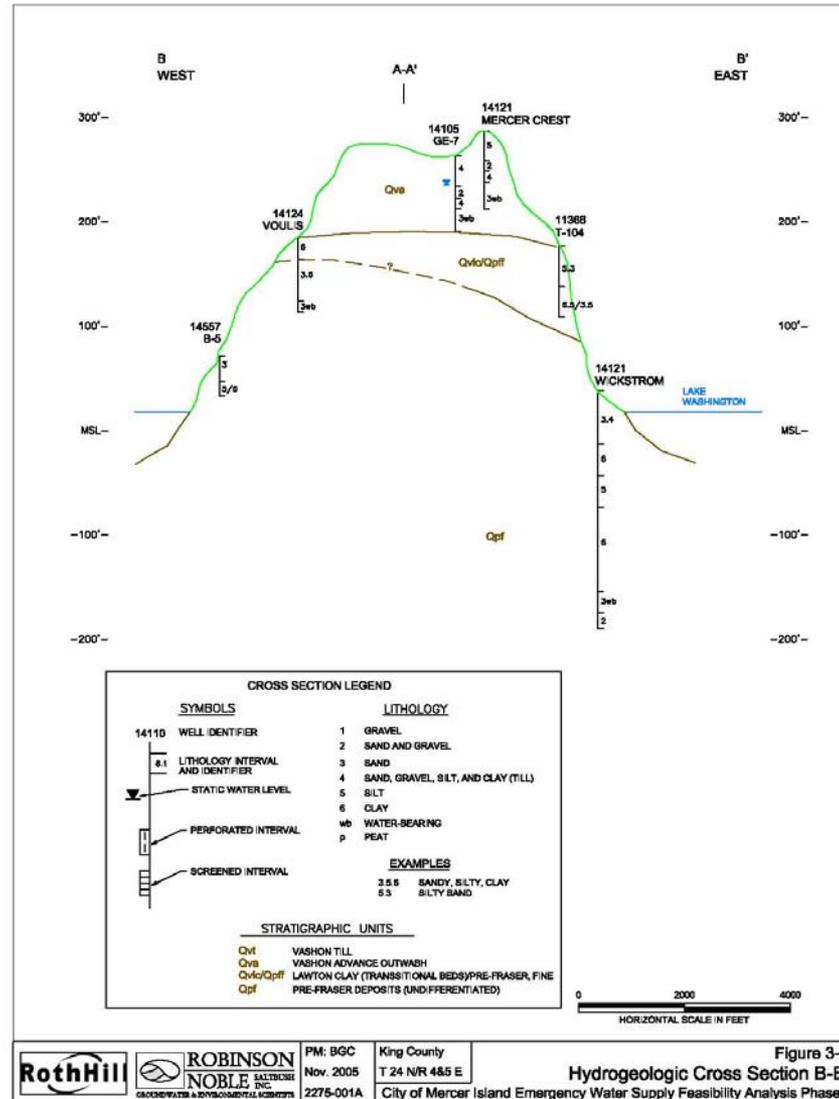
# Hydrogeology

- Critical component
- Robinson Noble & Saltbush expertise
- Historical Research
- Geology
- UW GeoMapNW



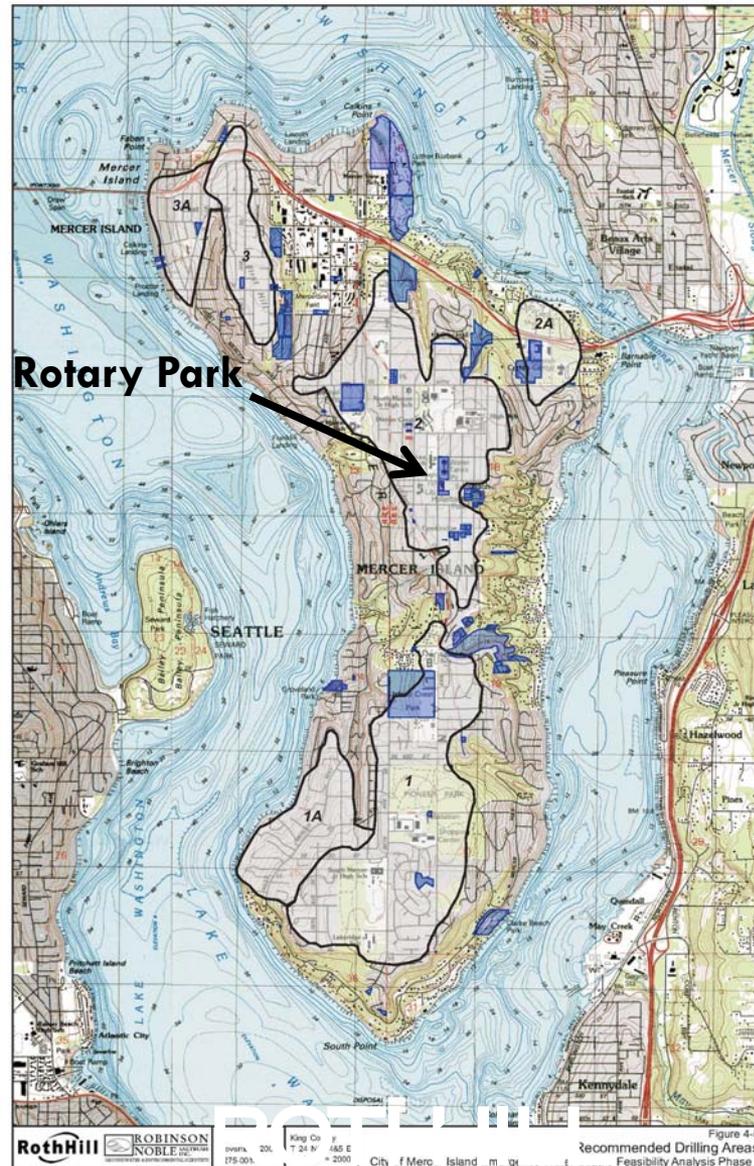
# Searching for Sites

- Historical records
- Mostly shallow wells
- Low value for shallow sources due to recharge area
- Avoiding Lake Washington



# Drill Sites

- Alignment with criteria
- Adjacent to reservoirs
- Existing generator
- City-owned site
- Rotary Park selected
- Started to plan test well



# Regulatory Environment

- Lake Washington Sub-Basin of Cedar-Sammamish Watershed (WRIA 8)
- Lake Washington Drainage and all tributary streams closed to new allocations in 1978 by rule (WAC 173-508)
- Muckleshoot Tribe Usual and Accustomed area (U & A)
- Administrative Closure of Lake Washington Drainage
  - Ecology finding of Overriding Considerations of Public Interest (OCPI) required for MI to secure permit, to justify issuance of emergency source right that could affect closed state waters

# Regulatory Environment

- In 2005, no state law, regulation, policy, guideline or process to permit emergency sources
- State law and policies limited to temporary and emergency drought permits (POL-1035/WAC 173-166) or permits for Short Term Water Use (POL-1037) relating to dust control/hydrostatic testing
- Also, despite new state and federal emergency source planning regulations directing cities/utilities to engage in more aggressive emergency response planning/source development after the Nisqually earthquake and Hurricane Katrina, no state effort was in place to advance this process.

# Regulatory Environment

- The absence of any legal authority, regulation, or policy guidance under the State Water Code compelled MI to take the initiative to develop a statewide policy and process that would enable the permitting of emergency sources to address catastrophic events.
- MI authorized Legal Counsel Mortimer to draft an emergency source policy for review, comment, and adoption by Dept. of Ecology and WA. State Dept. of Health that would enable the permitting of their planned emergency sources, and benefit the interests of other utilities in the state.

# Draft Policy

- Draft policy to enable water utilities (particularly cities) to:
  - Employ their police powers under the Public Necessity Doctrine to develop and use emergency sources
  - Proceed outside of standard permit process, to quickly respond to catastrophic natural or manmade emergencies that compromise drinking water supplies and threaten public health and safety
- Proposed that emergency water source use would need to be:
  - Authorized by Incident Response Commanders
  - Consistent with Emergency Response Plans (ERP)
  - With notifications to Ecology and DOH
- Emergency sources could not be used if interties were available to meet critical potable needs.

# Draft Policy

- Initial draft policy deliberately sought to avoid conventional permit process due to fact that emergency sources may never be used, and if used, would only be used on a temporary vs. ongoing basis as opposed to normal water rights.
- Related interest/concern was that Ecology would decline to trigger OCPI findings, employ impairment test to deny applications, and consequently deter needed investment and action in emergency source development.

# Draft Policy Rejected

- The MI initial draft policy was rejected by Ecology Program Management Team and Attorney General's office as creating undue legal risk to the State per possible impairment of state resources, tribal reserved right claims, fish flows, and private interests.
- Ecology consequently insisted that such applications be subject to standard permit application process and impairment test.

# Rejection Specifics

- With specific reference to MI's proposed emergency source, the Muckleshoot Tribe expressed concern that emergency source wells could be misused by MI to meet peaking or other non-emergency needs. Tribe indicated a clear desire that the wells be operated on stand-alone basis – unconnected to MI's broader distribution system.
- WA DOH expressed same (stand-alone) operational interest, but over concern that broad system failure could preclude use and/or result in contamination of emergency sources during a catastrophic event.
- MI agreed to operate wells on a stand-alone basis – water provided on a walk-up basis and/or for transport by water tanker. Also conceded that emergency well production would not be available to support fire flows/hydrants.

# Permit Applications

- During negotiations with Ecology over Emergency Source Policy text, MI concurrently and effectively worked with Ecology NWRO to secure preliminary permit for well test, and potential permit conditions.
- MI filed application on April 18, 2006 for its emergency source wells (400 gpm (Qi)/66 afy (Qa)).
- In September 2006, Ecology issued POL-1045 (Emergency Source Water Authorization).
- On December 1, 2009, MI received its permit.

# Water Plan Update

City updated its Water System Plan to comport to predicted permit conditions, and updated its Emergency Response Plan for the same purpose.

**City of Mercer Island**



**2008 Water System Plan**



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# Impairment Concern Realized

- After receiving general, repeated assurances that Ecology would make an OCPI finding, the MI permit was unexpectedly delayed by Ecology management at 11<sup>th</sup> hour over the OCPI issue.
- After a two week delay, the issue was resolved by MI expressing its concern with the agency's conduct to Ecology management and its intent to bring the issue to the Governor's Office.

# General Permit Process and Condition Issues

Pursuant to POL-1045 and related negotiations with Ecology, the following process and permit conditions were established:

- Emergency source well permits can secure preliminary drill and test permits like other sources. Such permits produce information regarding source reliability, potential impairment analyses, and contamination susceptibility.
- DOH may require emergency sources to operate as strictly stand-alone systems to preclude being affected by broader system failure or contamination.
- Finding of OCPI likely required for virtually all applications. OCPI finding only relates to potential impacts on closed/regulated waters, cannot be employed to overcome potential claimed impairment of private water rights.
- An Emergency Source Permit will remain in perpetual permit status until used for an emergency when it may be beneficially used and certificated.

# Specific Permit Operating Conditions

Consistent with POL 1045, Ecology imposed the following operating conditions upon the MI permit:

- Emergency Well sources are issued for standby reserve- to be used only in the event of a catastrophic emergency that compromises existing public water supply transmission, distribution, treatment, etc in a manner that risks the public health and safety of local and transient populations.
- Emergency source water may not be used to relieve drought related water shortages or emergency conditions that can be relieved by use of interties.

# Specific Permit Operating Conditions

- Utility/Entity must provide clear documentation of emergency sources and use conditions in water system plans.
- Periodic non-consumptive testing of emergency source water shall occur but directed to stormwater drains.
- Emergency source use may only occur pursuant to:
  - Governor Emergency Declaration; and/or
  - Determination of Local Incident Response Commander that public health is at risk. If possible, utility shall notify Ecology /DOH prior to use of emergency source and/or notify after ASAP.
- Duration of emergency source use may vary per circumstances. MI requested 90 days, with more time allowed if required per documentation provided to Ecology.
- Once emergency is over, use must terminate immediately, and post-emergency use report provide to Ecology/DOH.

# Benefits Of MI Experience

## Looking Forward



Seattle Children's  
HOSPITAL · RESEARCH · FOUNDATION



- MI preliminary permit, Report of Examination, and issued permit now serve as template applicants may employ and Ecology should follow to evaluate future emergency source permits in consistent and predictable manner.
- MI process educated/sensitized Ecology of legal/operational need of utilities to plan for and install emergency water sources after encountering initial ambivalence.
- Seattle Children's Hospital was issued emergency source well permit using MI Template, and City of Normandy Park is in process of seeking permit.

# What You Can Expect

- Obstacles remain.
- Applicants should expect Ecology anxiety over OCPI findings, irrespective of need and merit, and Tribal concern over misuse of sources.
- Water systems with multiple interties may face more difficulty in securing permits due to regulatory perception that need is not as great.
- Despite process issues and obstacles, the projection that the Puget Sound area is a candidate for a massive seismic event should be more than sufficient motivation for utilities, Ecology and Tribes to support prudent catastrophic event emergency source development.

# Operational Considerations

- Site access after disaster
- Ease of use for Staff and Volunteers
- Regular Training
- Onsite water distribution
  - Traffic flow
  - Filling containers
  - Water bottles (10,000 at 6 quarts)
  - Bulk fill station
  - Water quality and treatment
- Emergency declaration
  - Incident command system

# Facility Design

## Withstanding the earthquake

- Wood frame for flexibility
- Robust structure
- Substantial foundation
- Strong tank anchors



# Lighting and power

- Primary power
- Emergency power
- Exterior lighting



# Operational Issues

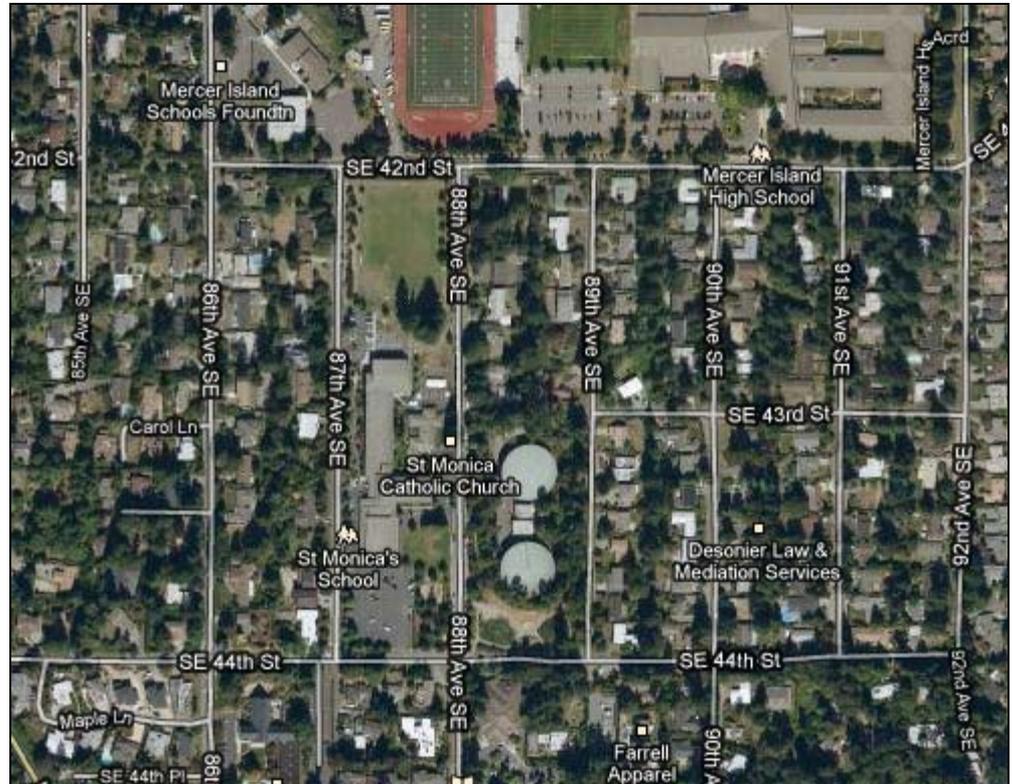
- Overhead door
- Plenty of space in the building
- Will be warm, dry, and bright
- Proximity to secured reservoir site
- Easy to start – run - stop
- Simple Operations Manual
- Record-keeping for volume, flow, customers served

# Emergency Declaration

- Required to activate system
- Can be declared by Incident Commander
- Prior notification of State not required
  - But as soon as possible
- Operate until emergency is over
- Record-keeping requirements

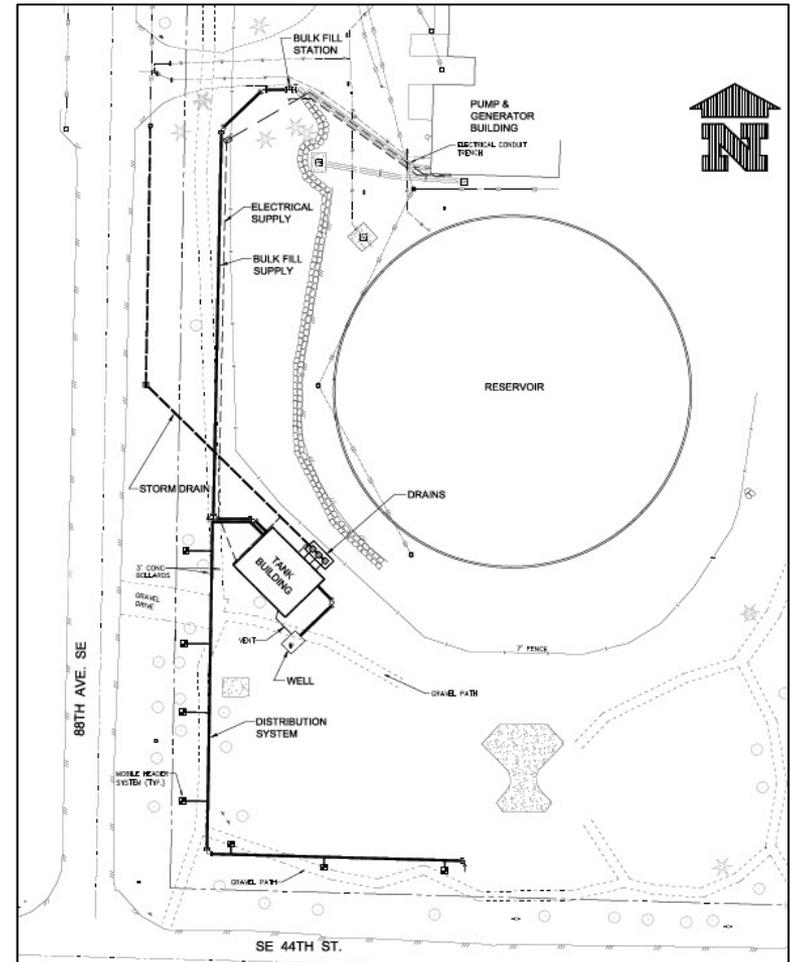
# Moving People and Traffic

- Central location
- Near arterials
- Near schools
- Good road grid
- Single flow direction



# Distribution System

- Simple linear system along edge of road and park
- Drive-through service
- Scalable output depending on demand and volunteers or staff
- Small volume for most people
- Bulk fill station
- Keeps people out of the pumping facility



# Training Volunteers

- ❑ Operations Manual
- ❑ Well system new to city staff
- ❑ Cadre of local volunteers
- ❑ Complex system must be simple to run
- ❑ Graphic Tools
- ❑ Video training planned for future
- ❑ Refresher events planned



# Project Costs

Alternatives analysis	\$ 68,000
Drilling, legal, permits	\$ 200,000
Temporary use plan	\$ 35,000
Facility design	\$ 140,000
Construction services	\$ 58,000
<u>Construction</u>	<u>\$ 812,000</u>
Total	\$ 1,313,000



# Questions?

# Contact Information

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