Northern Redmond-Kirkland Area Electric System

PUGET SOUND ENERGY

September 29, 2011

Chapter 1: The Electric System

- How power gets to you

Chapter 2: Electrical System Issues and Solutions

- Issues: Demand, and capacity and reliability
- Solutions: Traditional and non-traditional

Chapter 3: Northern Redmond-Kirkland Area

- Issues, solutions and projects

Chapter 4: Our Project: Sammamish-Juanita

Chapter 1: The System

- How power gets to you

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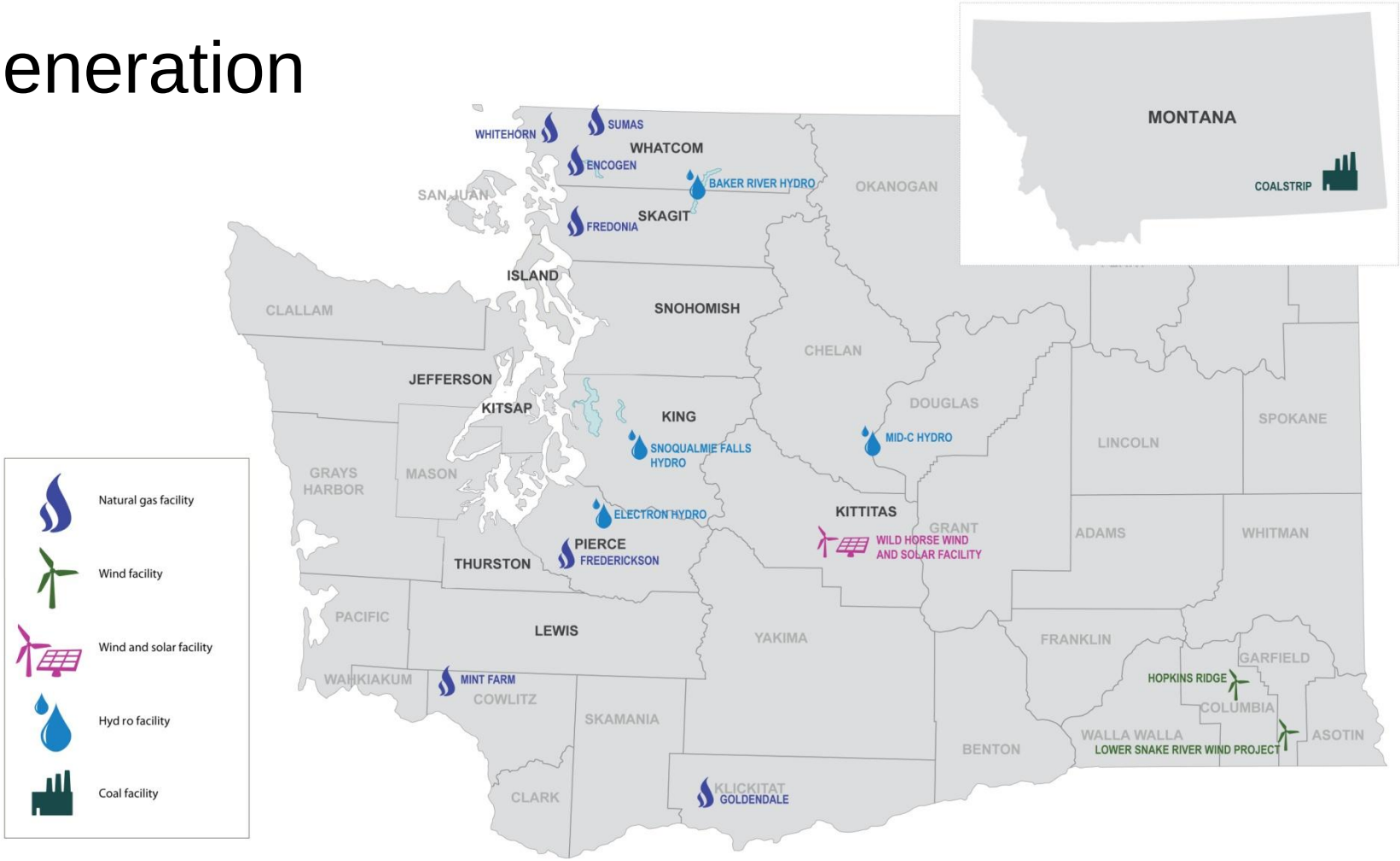
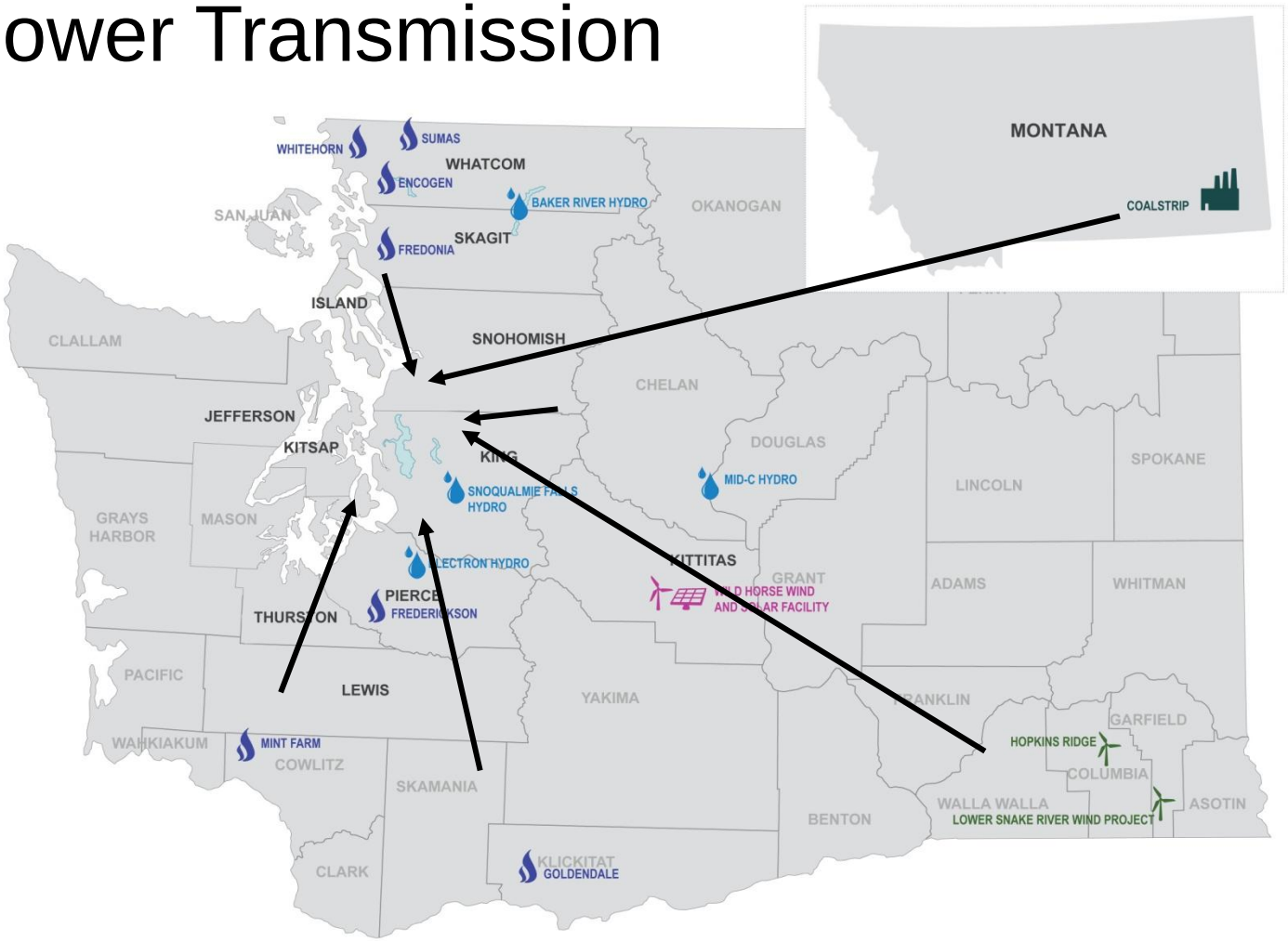
How Power Gets to You

Generation



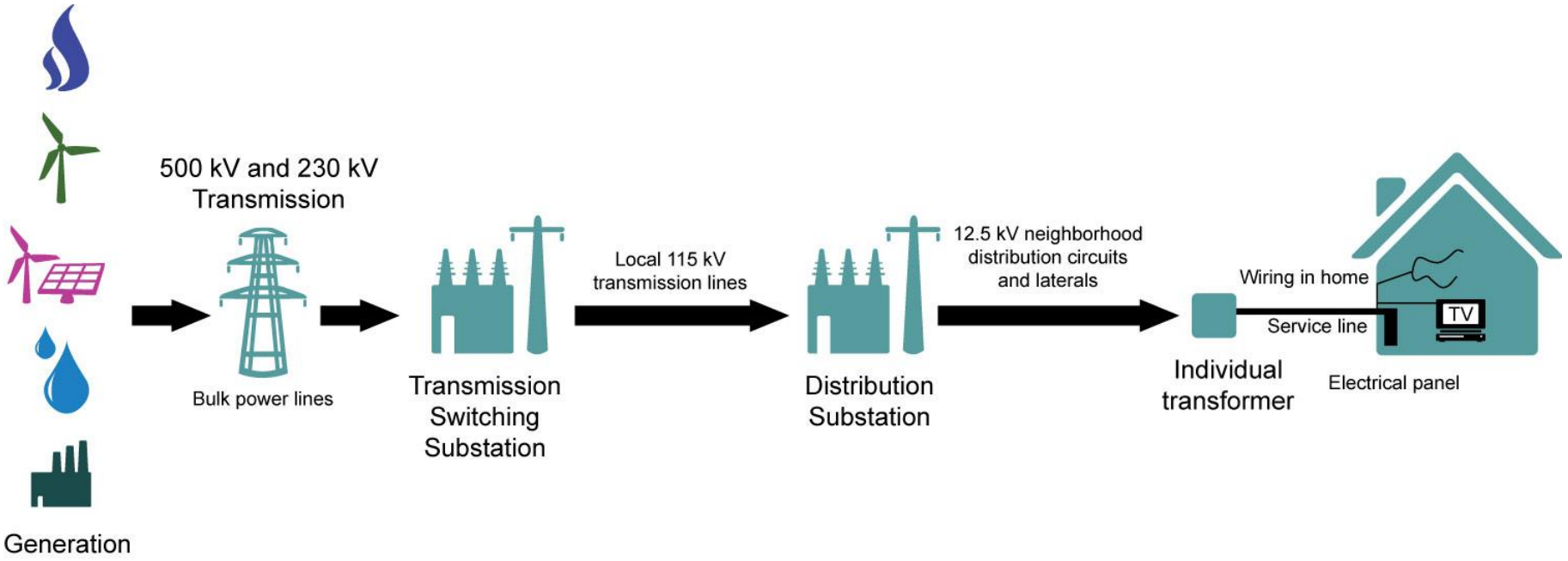
How Power Gets to You

Bulk Power Transmission



How Power Gets to You

Distribution



Power to the Northern Redmond-Kirkland Area

Chapter 1: The System

Chapter 2: Electrical System Issues and Solutions

- Issues: Demand and capacity
- Solutions: Traditional (infrastructure) and non-traditional (reduce demand)

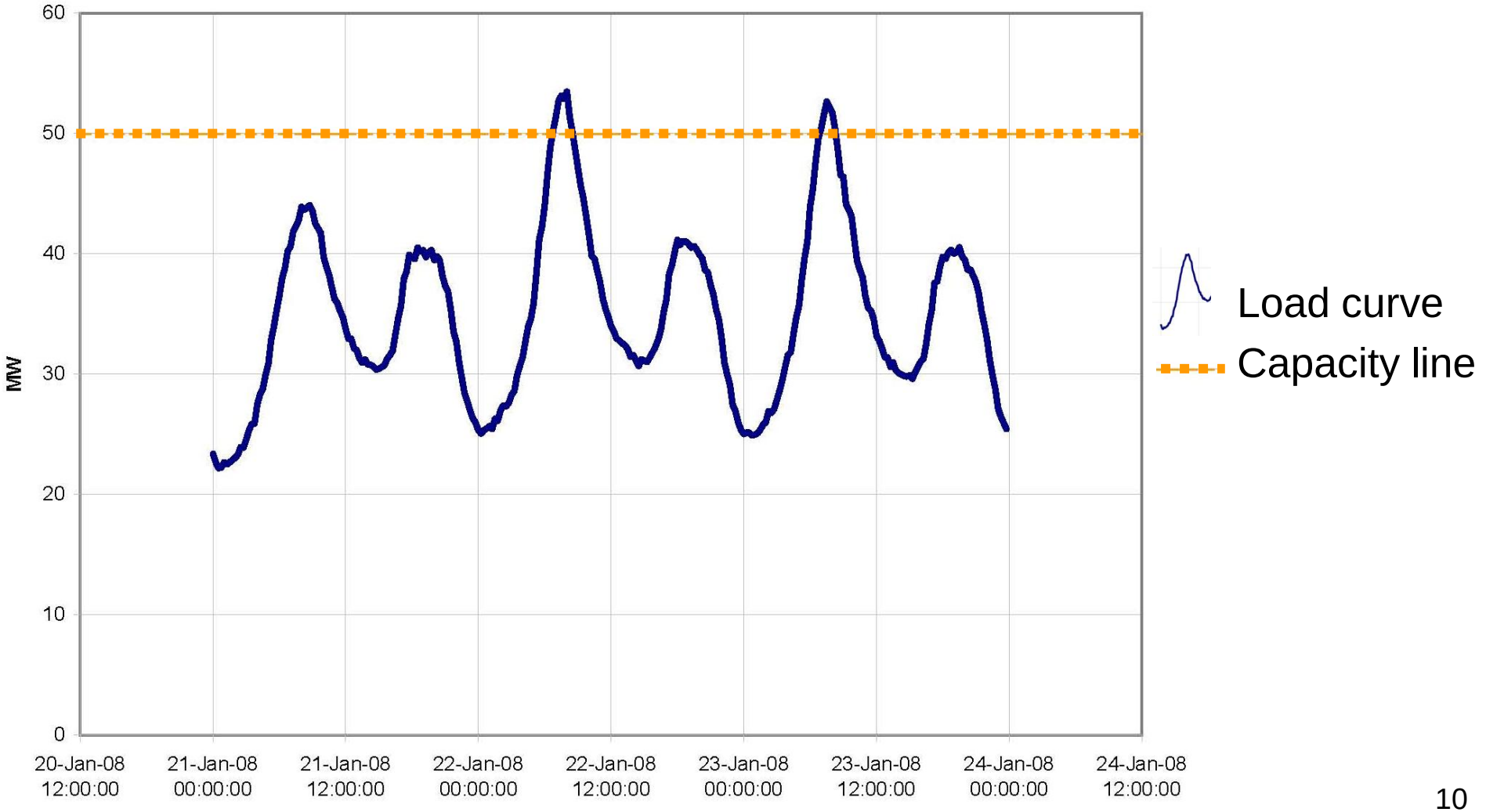
Chapter 3: Northern Redmond-Kirkland Area

Chapter 4: Our Project: Sammamish-Juanita

Customer Demand and Electric Capacity

- Demand for power is growing
- Demand for power pushing limits of system capacity
- Our job is to keep your lights on

Example of peak load graph



Traditional Solutions

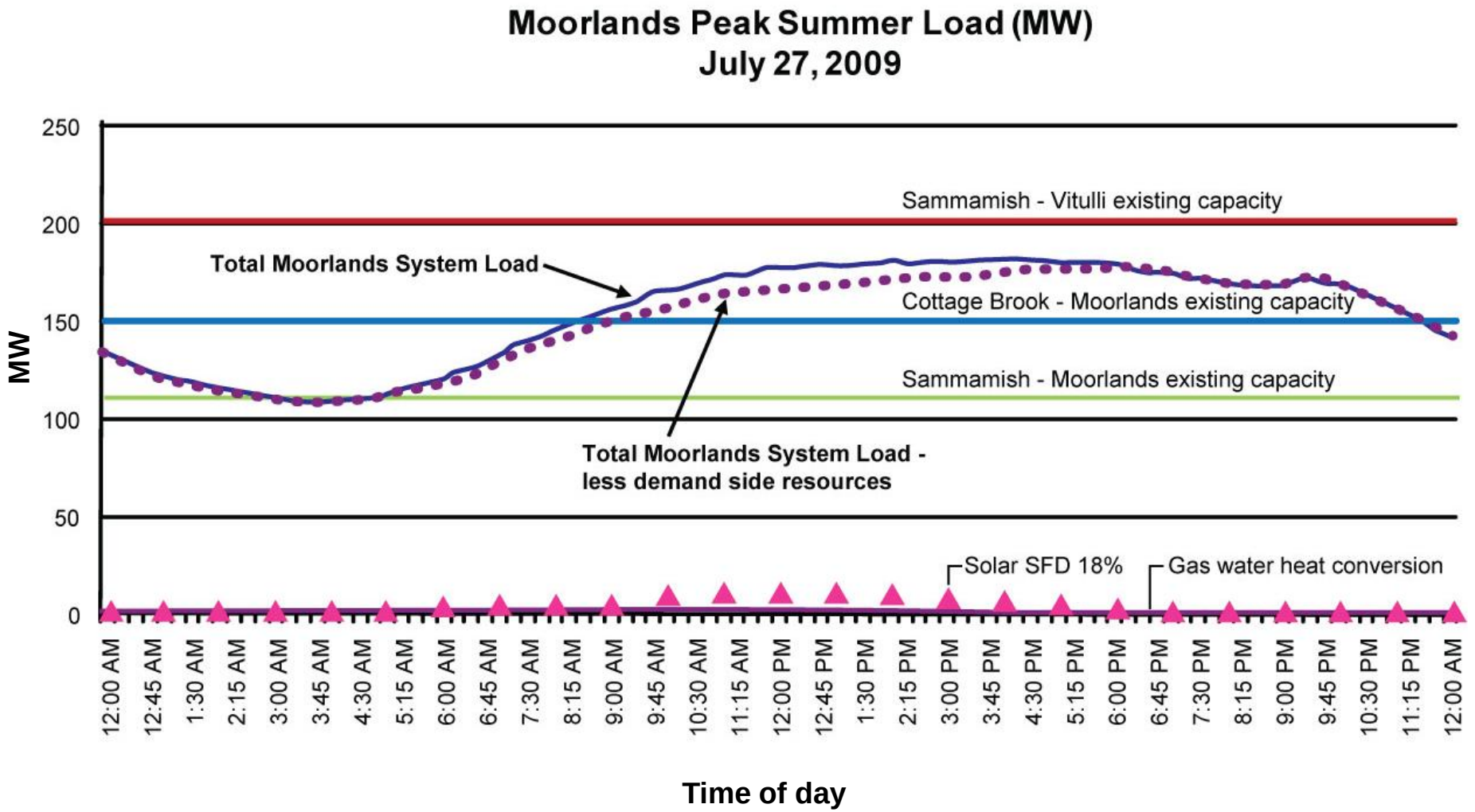
- Expand or rebuild existing infrastructure
- Build new infrastructure

Non-Traditional Solutions

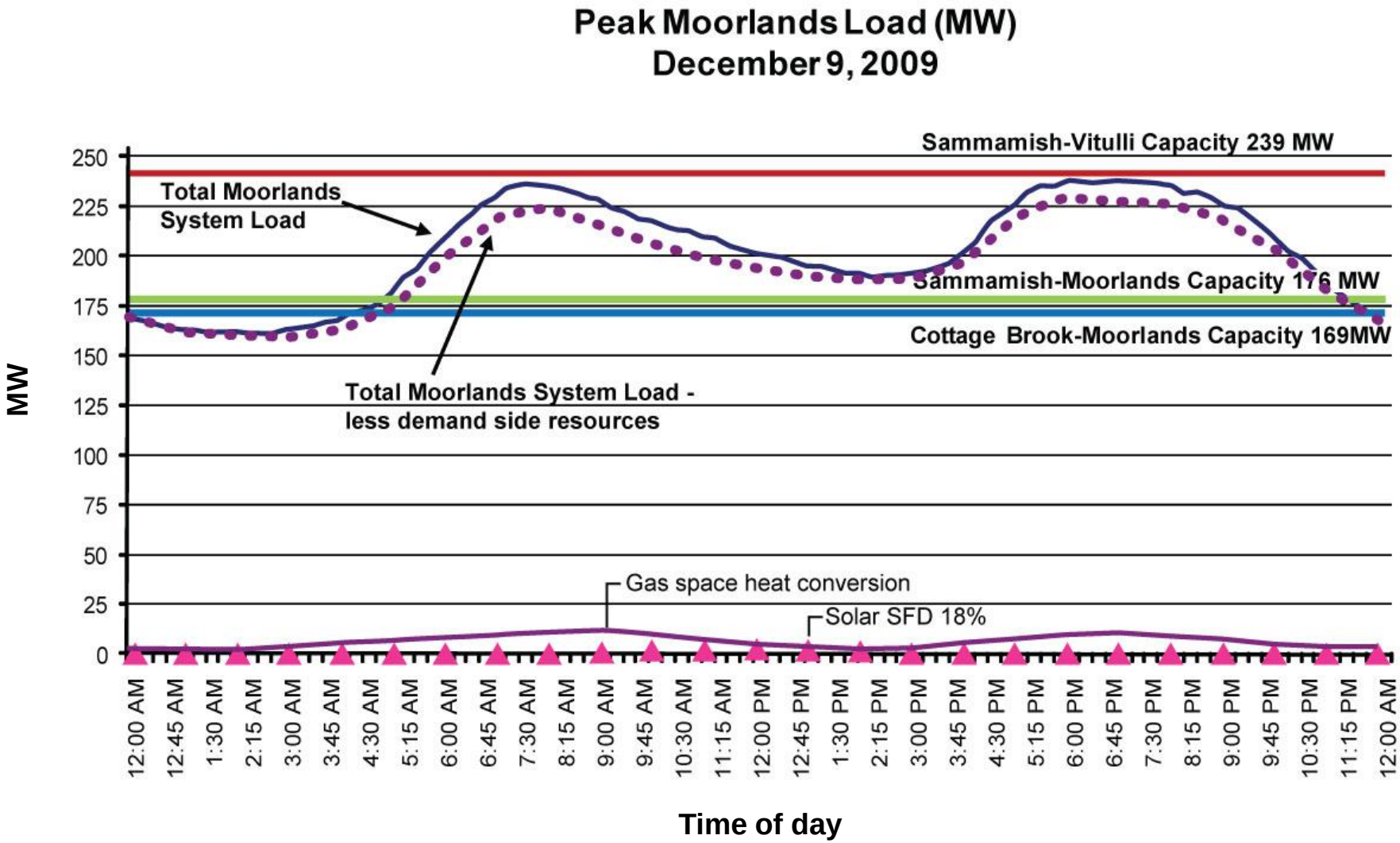
- **Increase energy efficiency**
  - Gas fuel conversion of electric water and space heaters
  - Commercial industrial demand response
  - Smart grid
- **Alternative generation**
  - Solar
  - Dispatchable distributed generation
- **Energy storage**

Energy storage system in Charleston, WV

Possible Solutions



Possible Solutions



Chapter 1: The System

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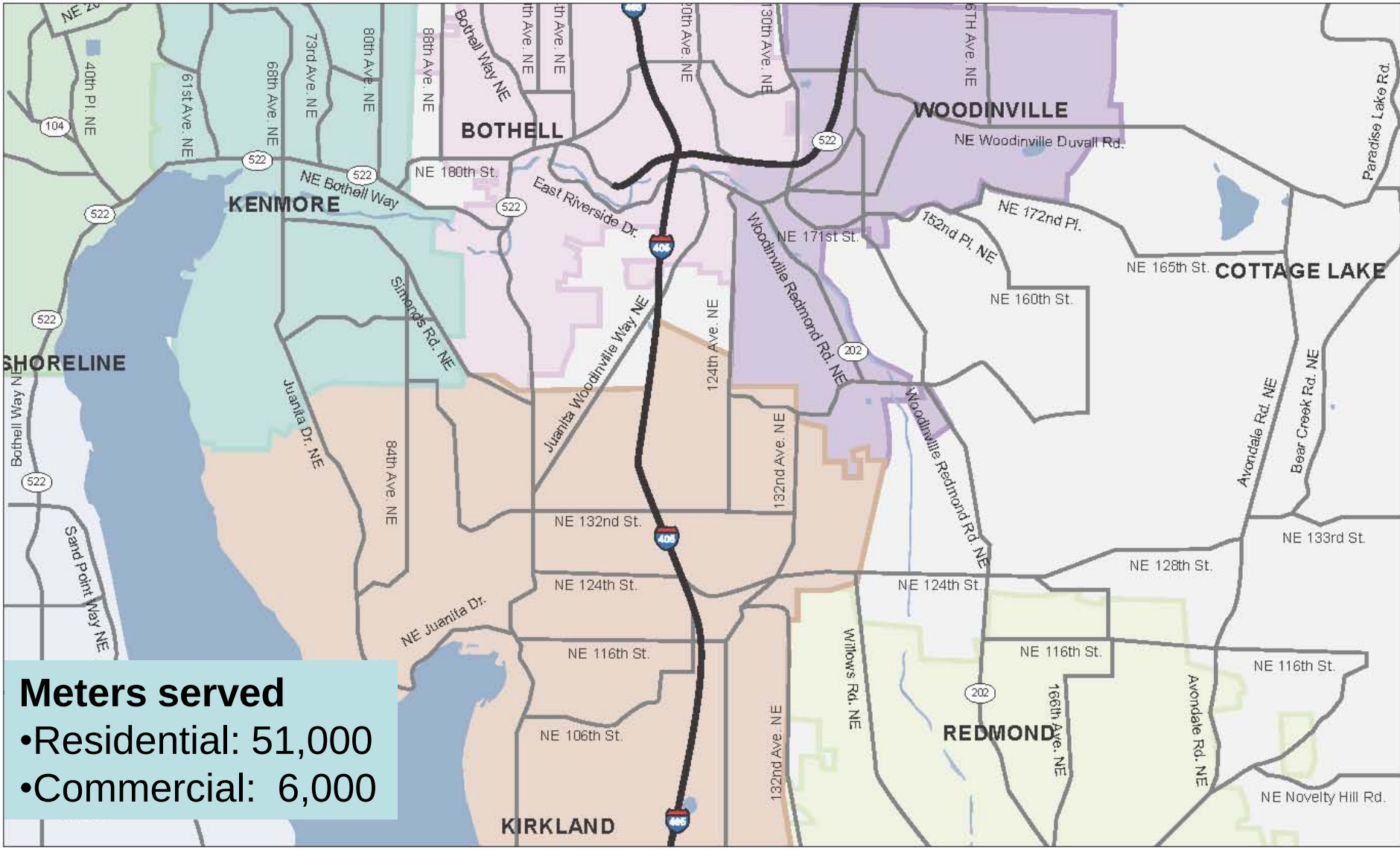
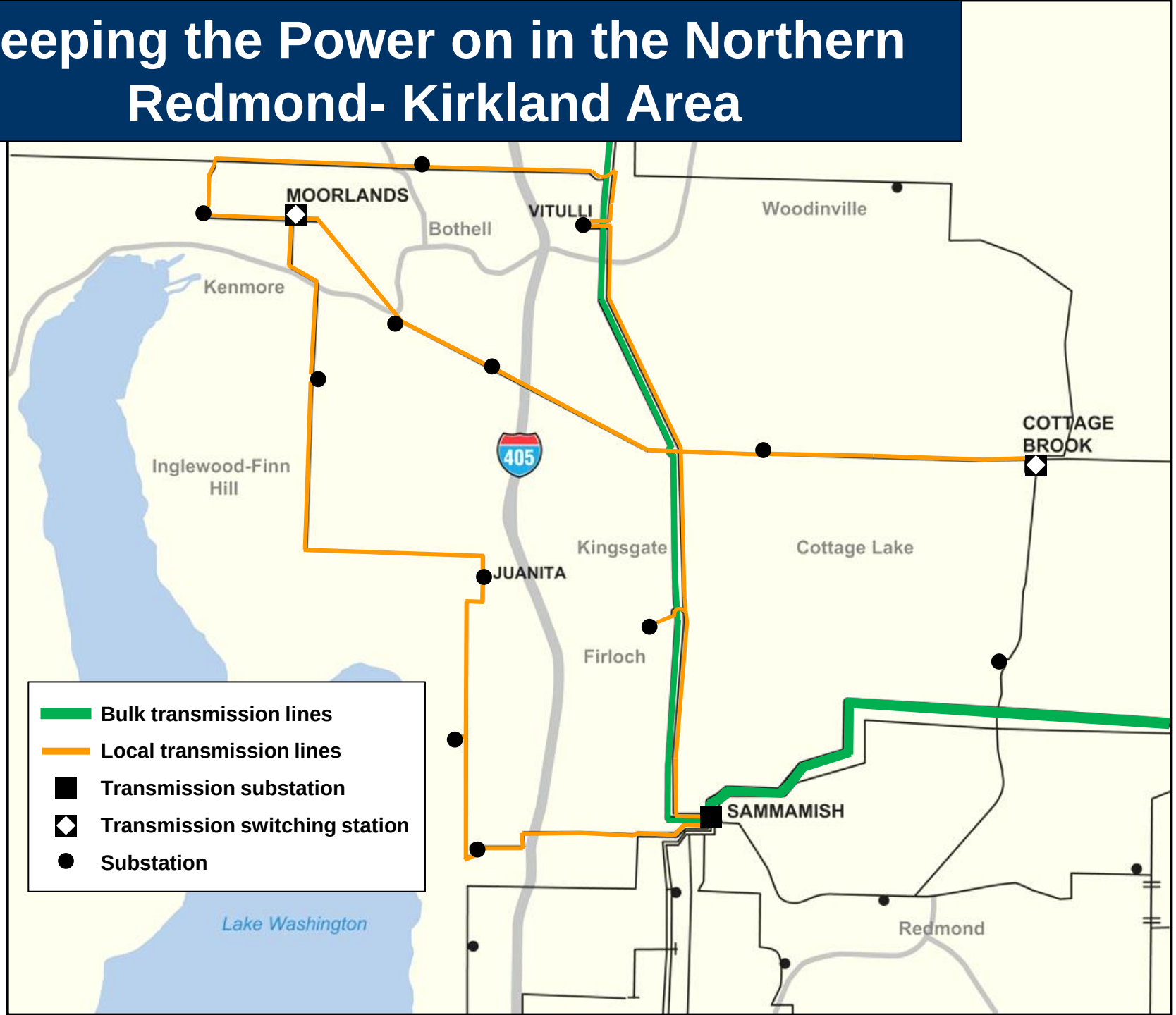
Northern Redmond-Kirkland Area



Meters served

- Residential: 51,000
- Commercial: 6,000

Keeping the Power on in the Northern Redmond- Kirkland Area

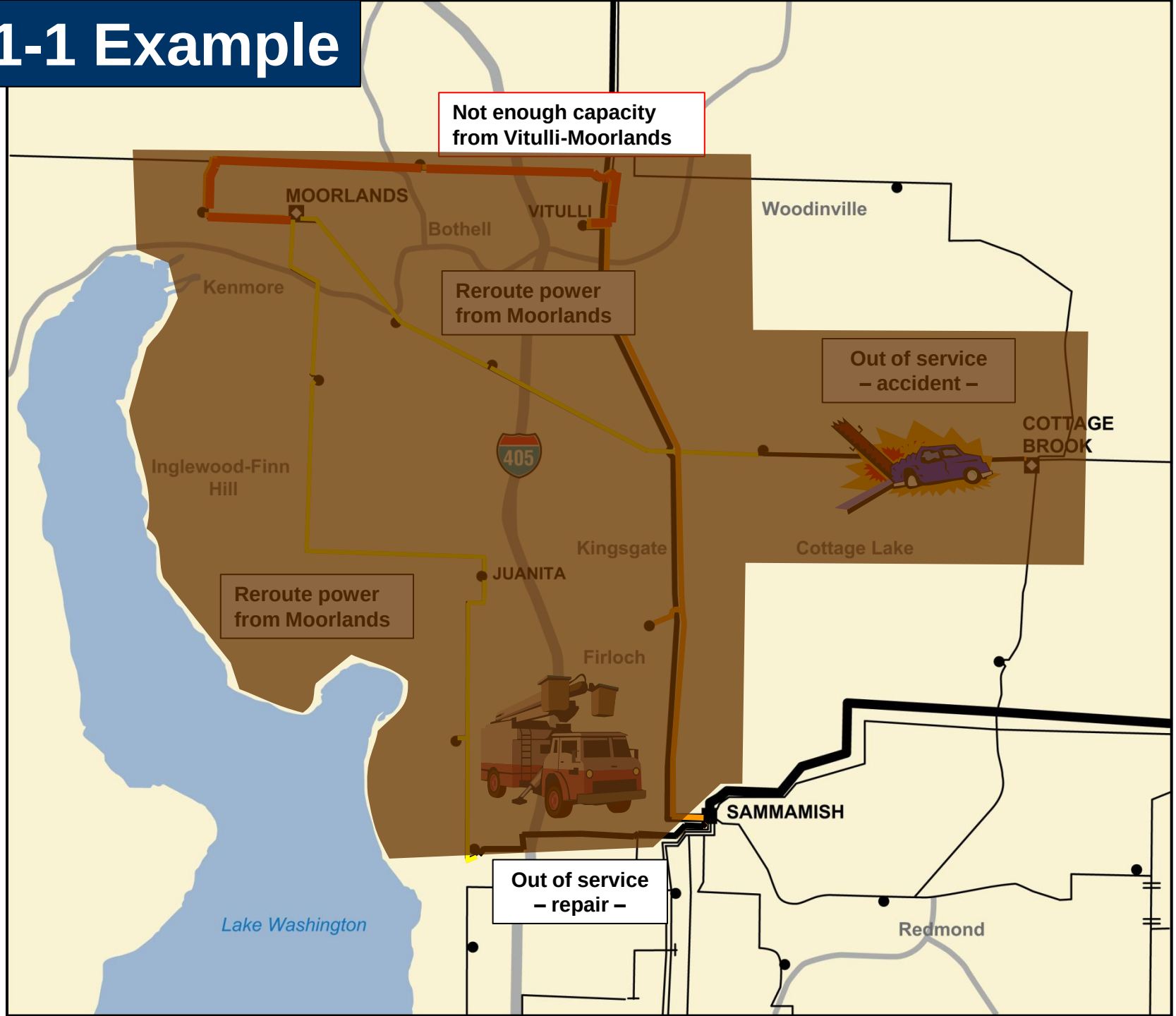


Area Challenges

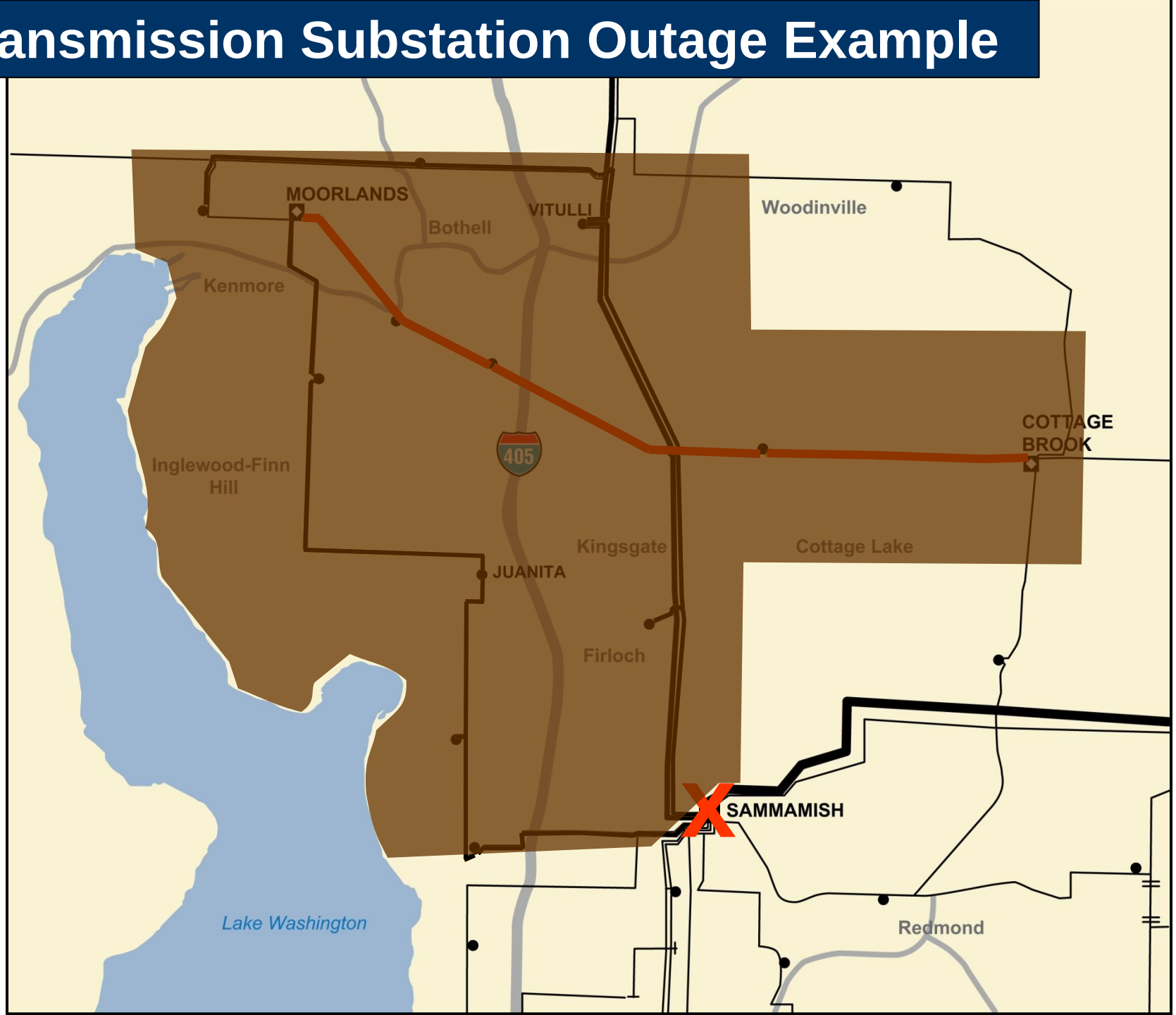
Challenges to system reliability and redundancy

- **N-1-1**
  - One transmission line out of service for repairs and another is taken out by an accident
- **Transmission substation outages**
  - Loss of a substation component, which could trigger the loss of transmission lines and possibly load

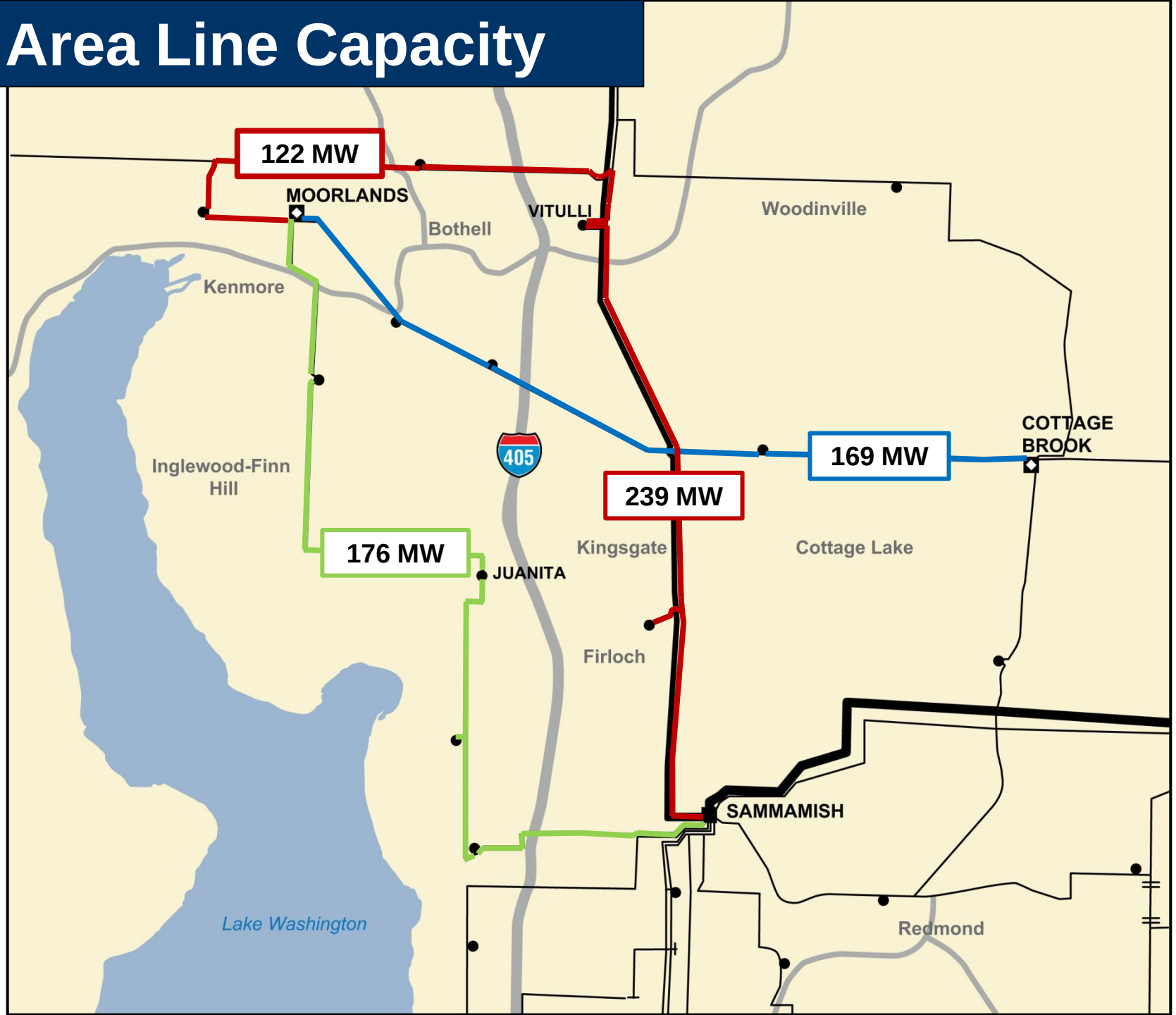
N-1-1 Example


Not enough capacity from Vitulli-Moorlands
MOORLANDS
VITULLI
Bothell
Woodinville
Kenmore
Reroute power from Moorlands
Out of service – accident –
COTTAGE BROOK
405
Inglewood-Finn Hill
Kingsgate
Cottage Lake
JUANITA
Reroute power from Moorlands
Firloch
SAMMAMISH
Out of service – repair –
Lake Washington
Redmond

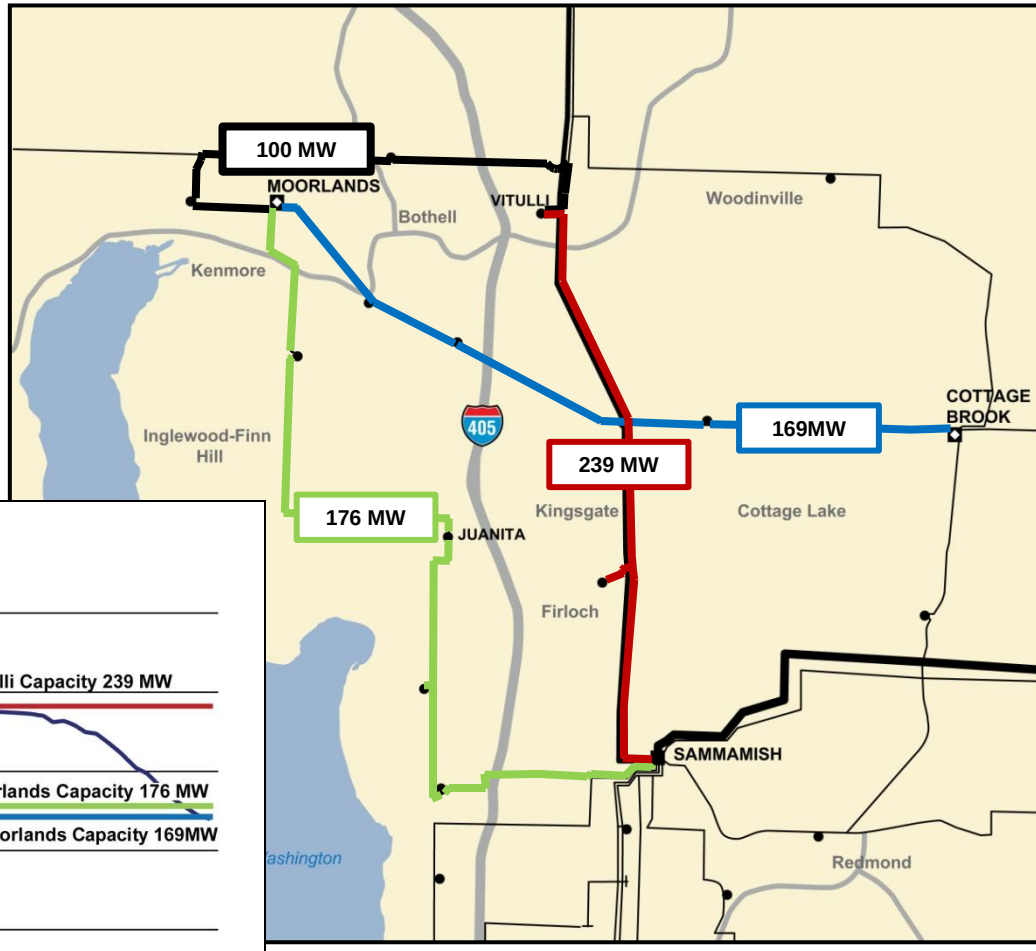
Transmission Substation Outage Example

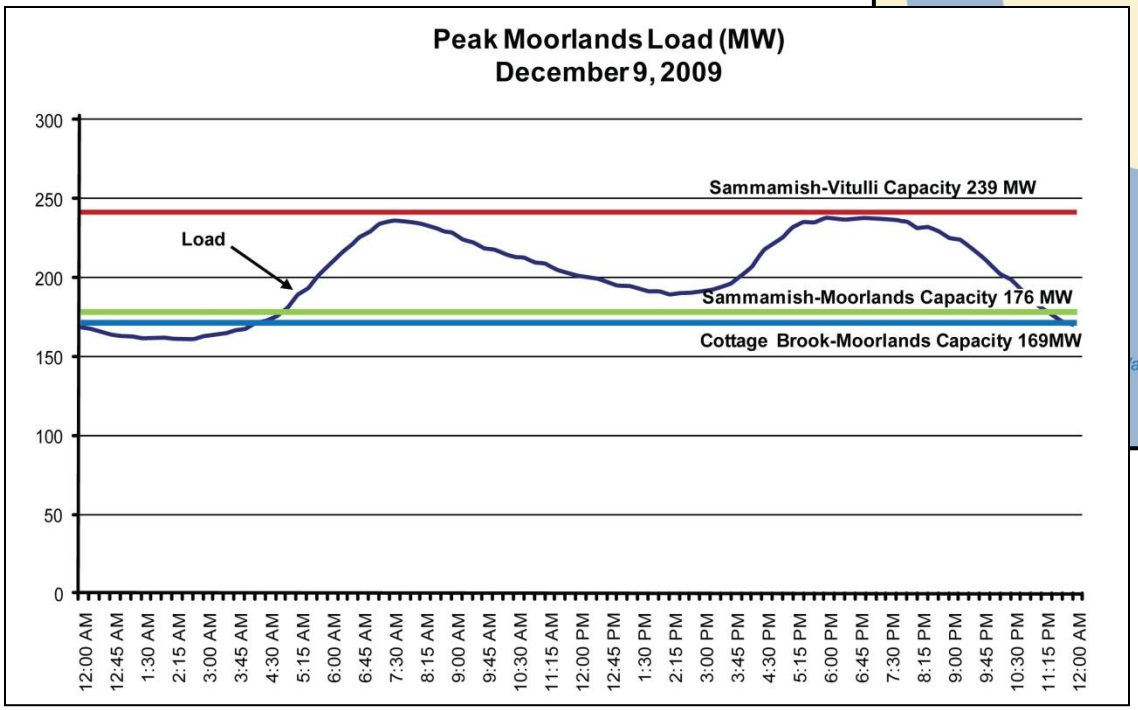


Area Line Capacity



System Peak Load Capacity Issues

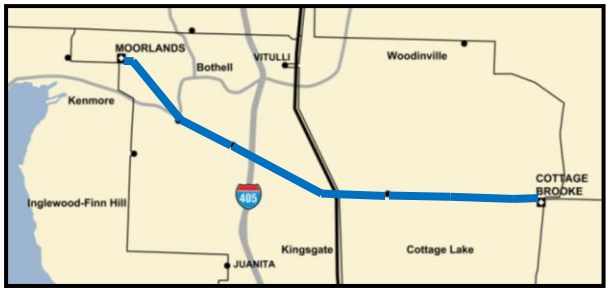




Moorlands System Projects

- Cottage Brook-Moorlands
- Moorlands-Vitulli
- Sammamish-Juanita-Moorlands

Cottage Brook-Moorlands Line



- **Challenges:**
  - **Small gauge wire**
  - **Aging equipment**

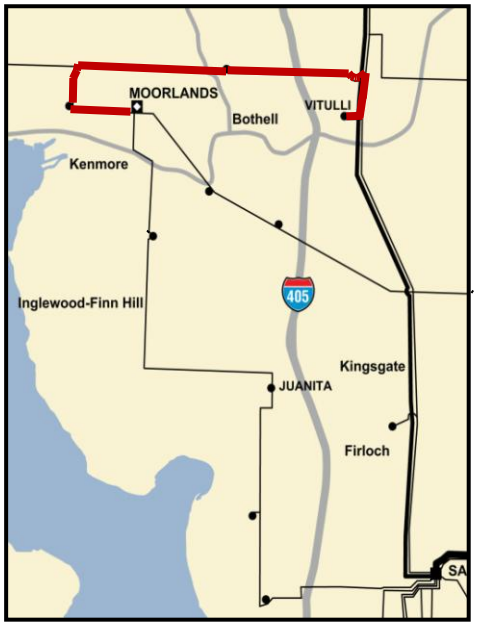
- **Risk: Tens of thousands of customers could lose power**

Cottage Brook-Moorlands Project

- **Solution: Rebuild**
  - Install higher-capacity wire
  - Replace aging insulators and poles with new structures
  - Add new fiber-optic line
- **Project timeline:**
  - Spring 2011: Planning and engineering
  - Fall 2011: Jurisdictional permitting process
  - 2012: Construction
  - 2013: In service

Moorlands-Vitulli Line

- **Challenges:**
  - **Moorlands-Vitulli segment has small gauge wire and aging equipment**
  - **Risk: Tens of thousands of customers could lose power**



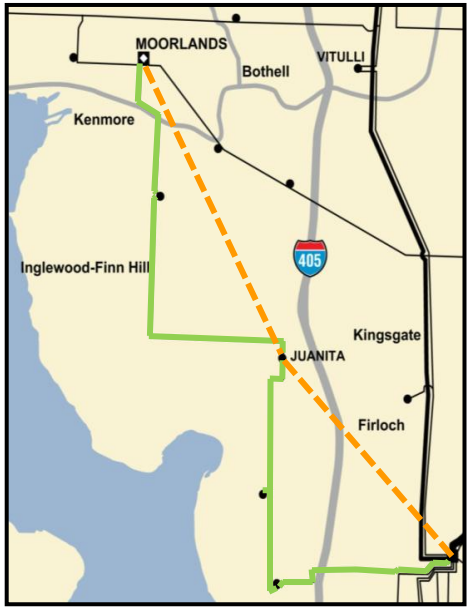
Moorlands-Vitulli Project

- **Solution: Rebuild**
  - Install higher-capacity wire
  - Replace aging poles and arms with new structures

- **Project timeline**
  - 2012-13: Planning, engineering and permitting
  - 2013-14: Begin construction
  - 2014: In service

Sammamish-Juanita-Moorlands New Line

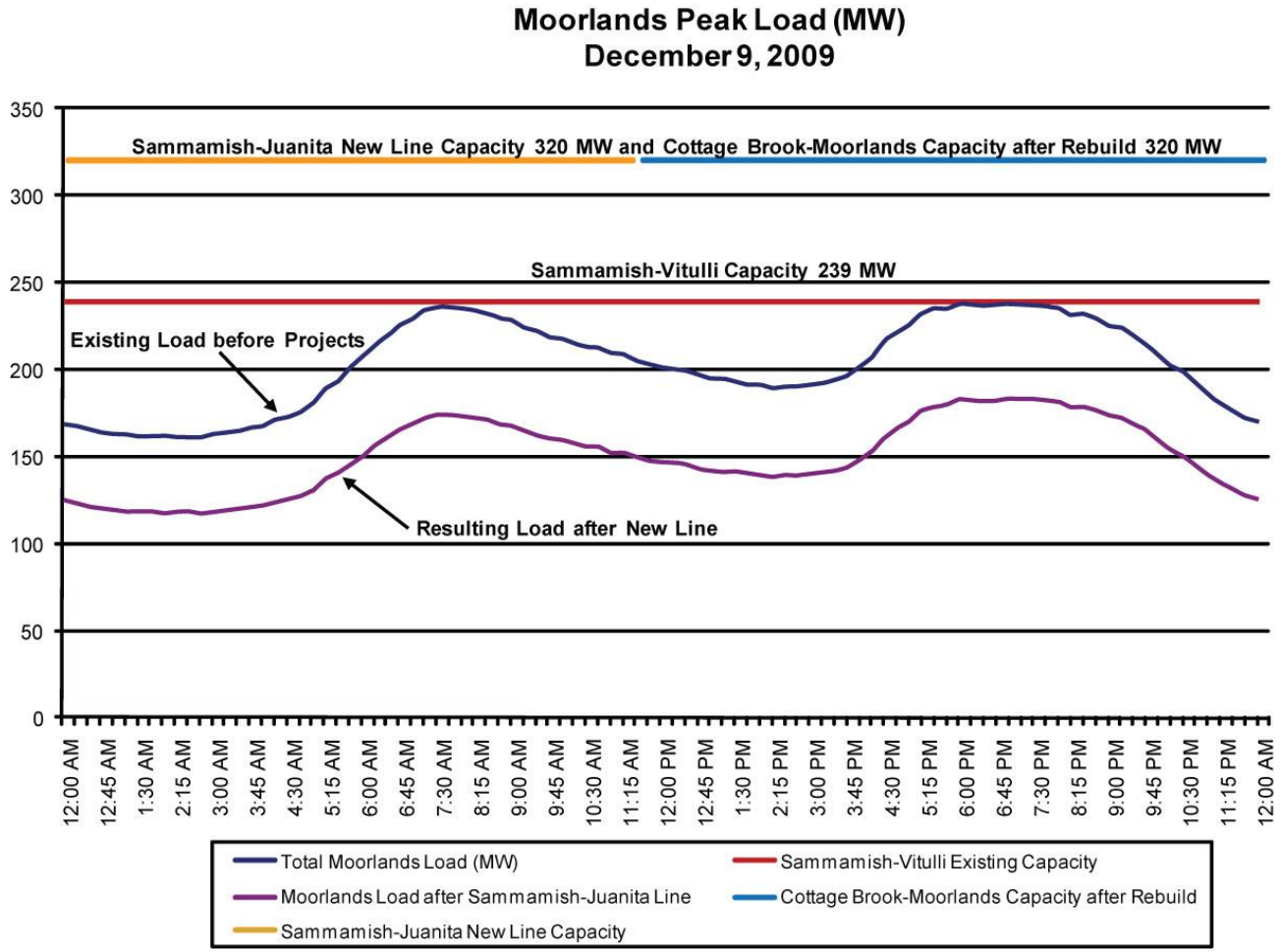
- **Challenges:**
  - **Load for the Moorlands system is higher than existing capacity**
- **Risk: Tens of thousands of customers could lose power**



Sammamish-Juanita: Needs

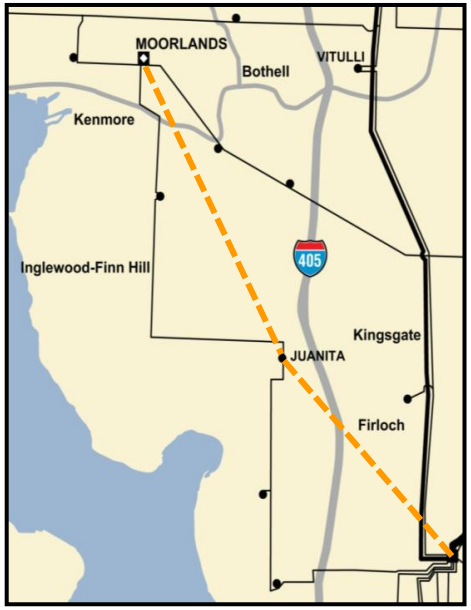
- **Need to move two substations off the Moorlands system**
- **Area load is higher than existing capacity in the summer and winter**

Sammamish-Juanita: Solution



Sammamish-Juanita-Moorlands

- **Solution: Build a new line**
  - Phase 1 - Sammamish-Juanita 115 kV transmission line
  - Phase 2 – Juanita-Moorlands 115 kV transmission line



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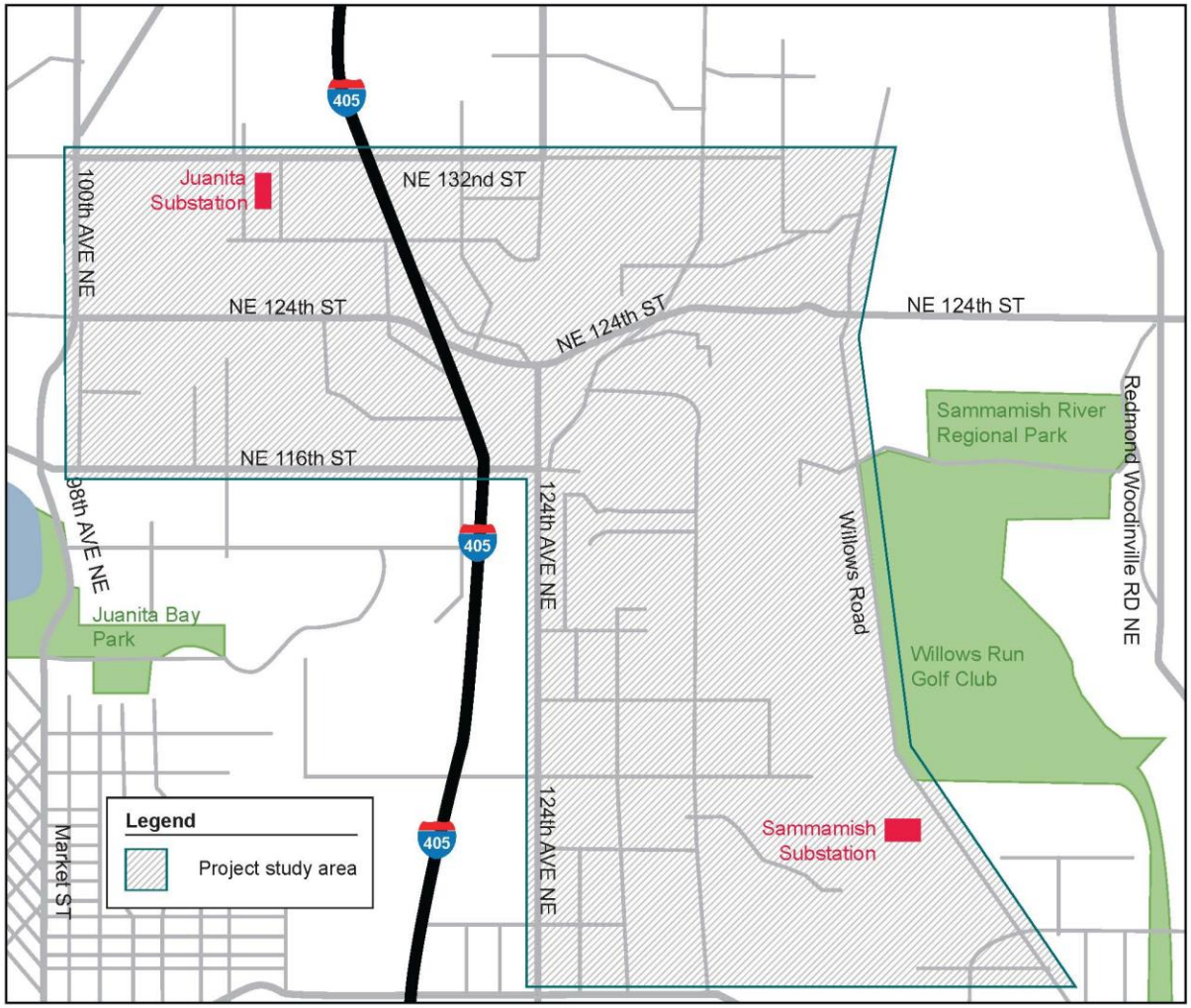
Sammamish-Juanita: Project Study Area



Sammamish - Juanita
115 kV transmission line project

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Typical 115 kV Transmission Lines and Poles

Sammamish-Juanita: Not a New Project

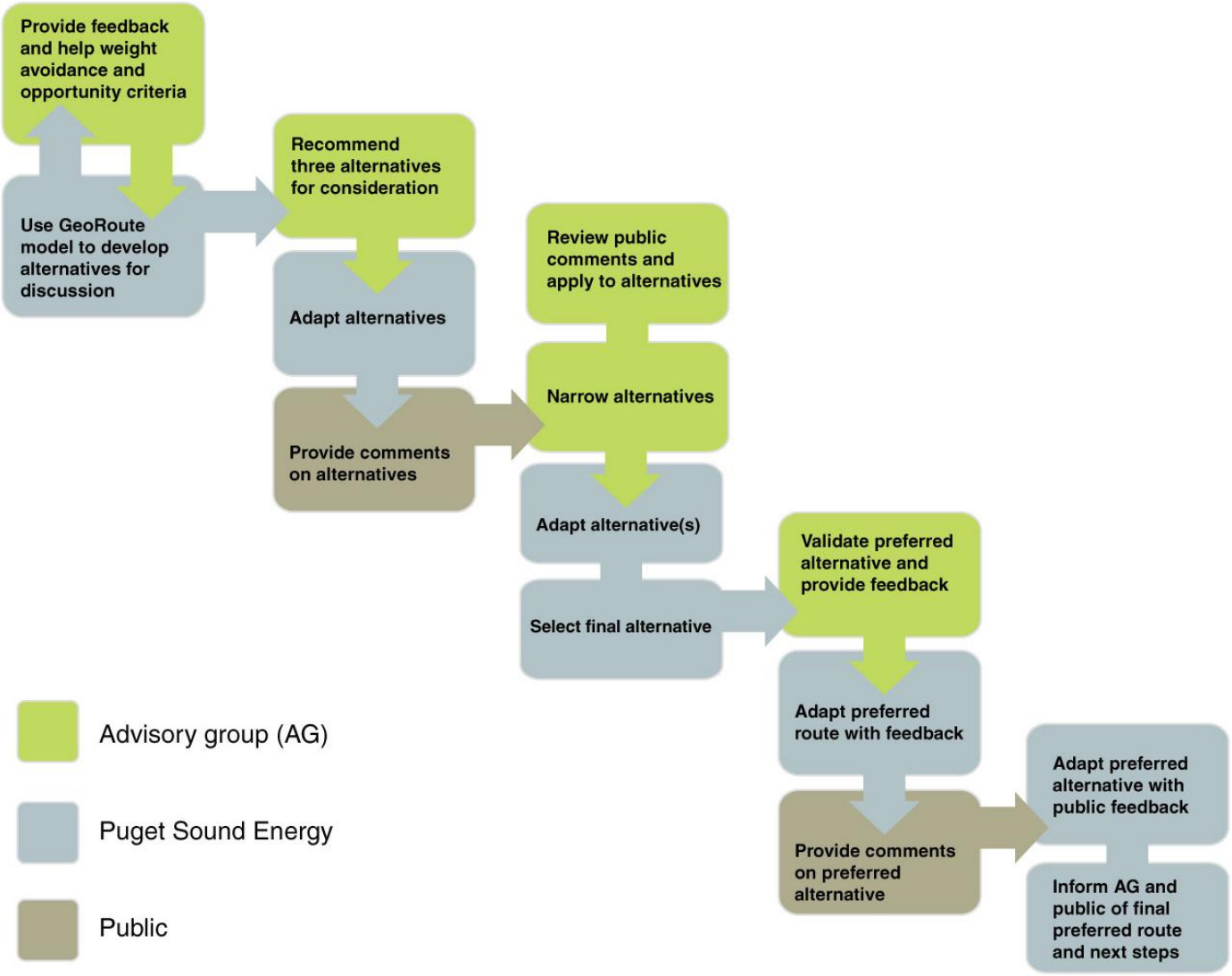
- Identified project in local and county comprehensive plans
- Began siting process and developed possible route alternatives
- Hosted public meetings to gather feedback (2008-2009)
- Decided to use transmission line siting model incorporating community input to develop alternatives
- Beginning a more robust community involvement process

Sammamish-Juanita: Advisory Group Process

- **Goal: Develop a preferred route that reflects community input**

- **How we get there:**
  - Give input into a model that produces route options
  - Provide feedback on route options
  - Review community input on route options
  - Continue to work with PSE to select a preferred route

Sammamish-Juanita: Advisory Group Process

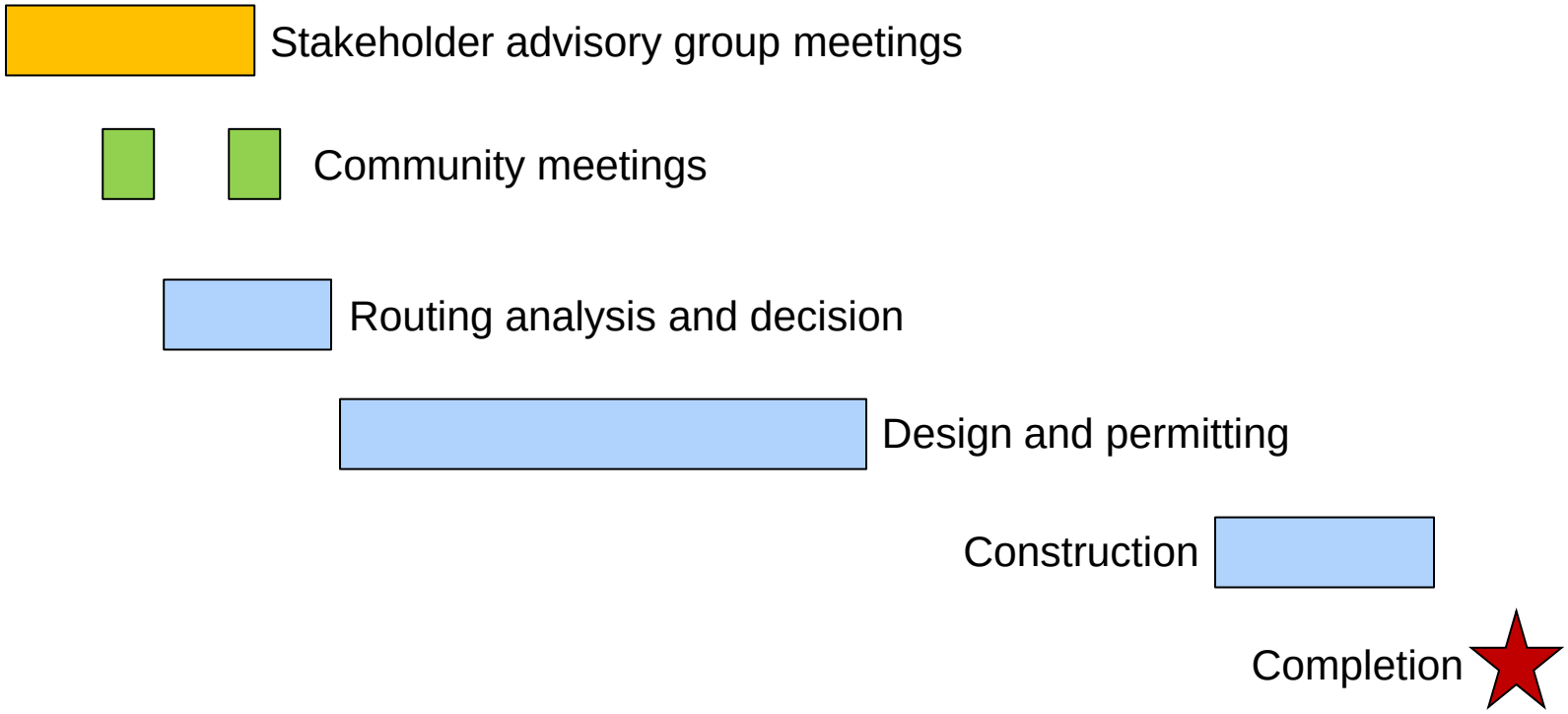


Sammamish-Juanita: Community Involvement

- Local jurisdiction outreach
- Stakeholder advisory group
- Landowner outreach
- Community meetings

Sammamish-Juanita: Schedule

2011		2012				2013			
Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall



Questions?

- **Sammamish-Juanita Project Contacts:**

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