Inflow & Infiltration: How King County G.I.S. is Helping Make Our Sewer System More Efficient

King County Wastewater Treatment Division

- Used to be Metro; 1992 King County and Metro merged
- WTD responsible for collection and treatment of wastewater from 34 local sewer agencies
- Local agencies operate local lines and handle customer billing

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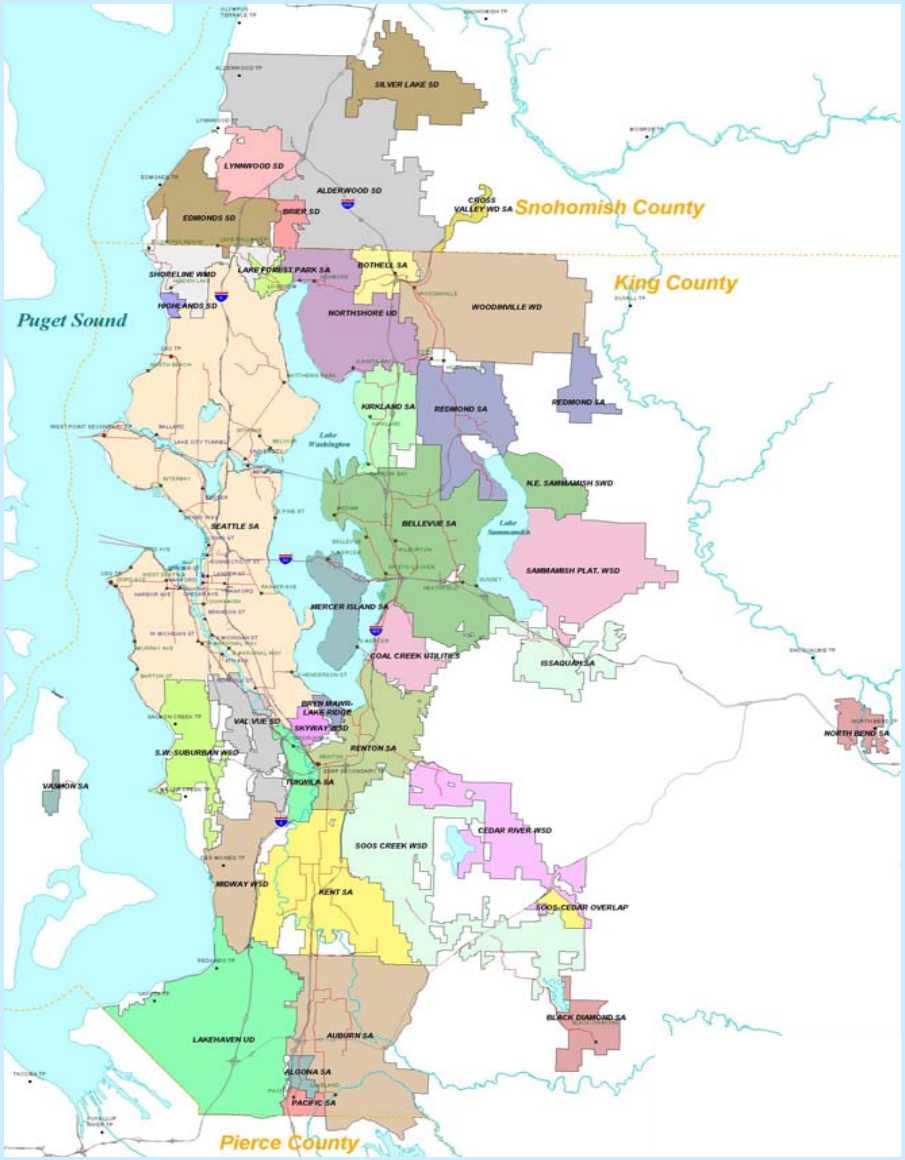

Service Area

- From Silver Lake to Pacific/Auburn
- Receive small amount from Lynnwood, Edmonds, Midway, Lakehaven
- Seattle has a combined system; all others should be separated

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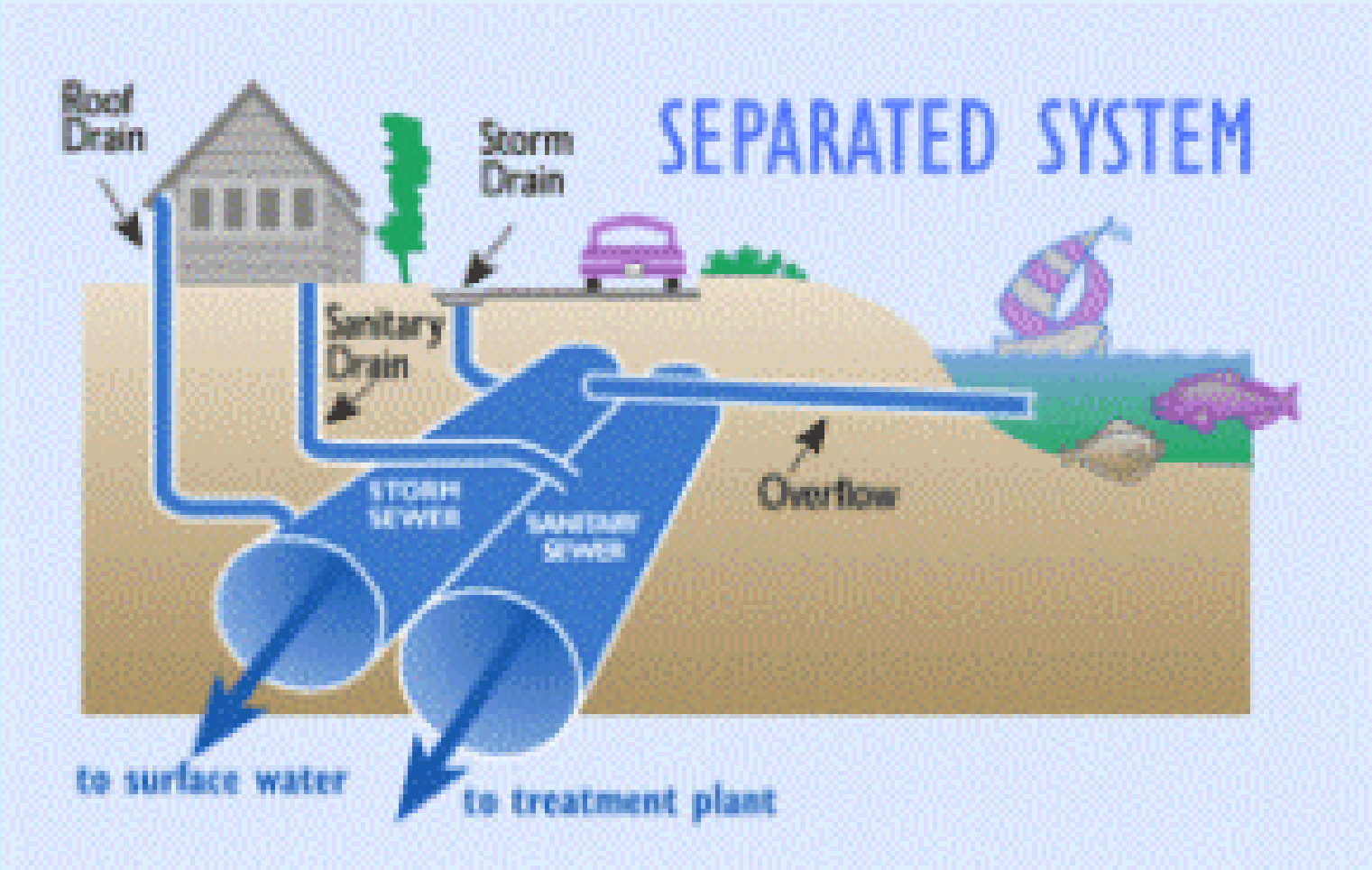
Combined vs. Separated



Regional I/I Control Program

- Sewers allow extra water in!
- Infiltration and Inflow (I/I) is storm and/or ground water that enters the sanitary sewer system
- 75% of the peak wastewater flow at the South Plant in Renton is I/I
- 95% of the I/I originates in the local sewer agency collection system
- $$$$!!! Facilities must have capacity to collect and treat
- 1998 Regional Wastewater Services Plan adopted; includes a Regional I/I Control Program

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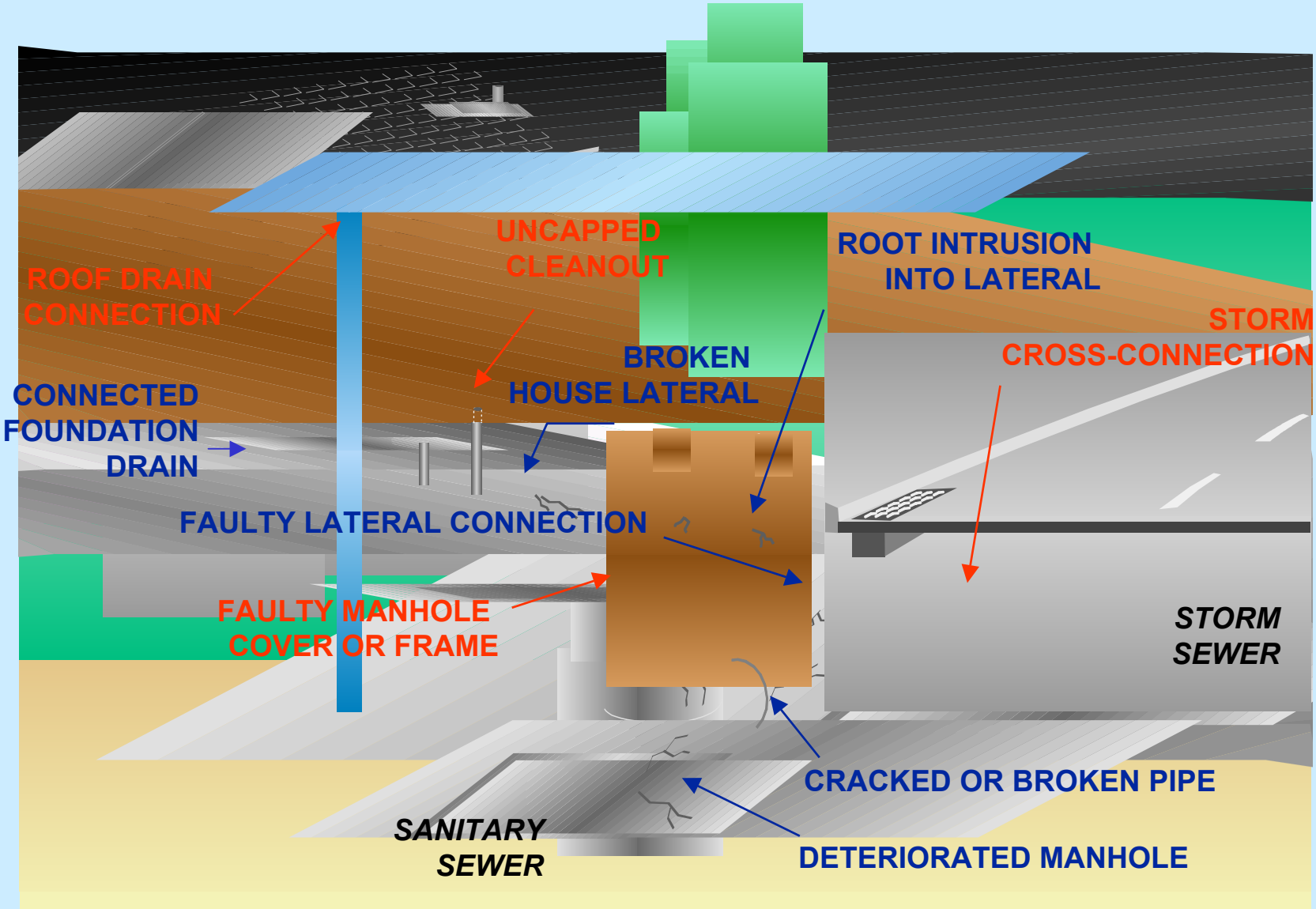
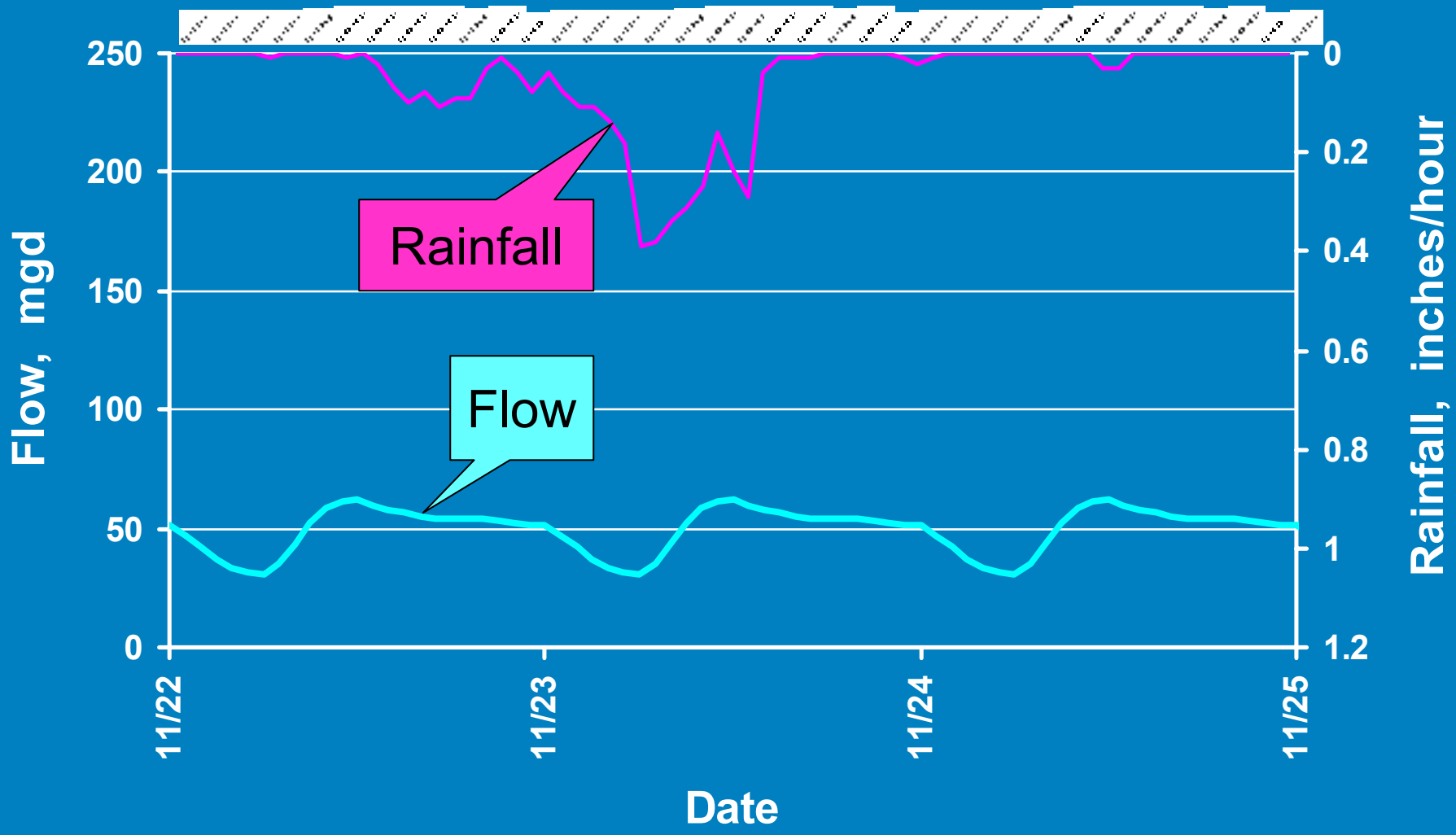
Sources of I/I

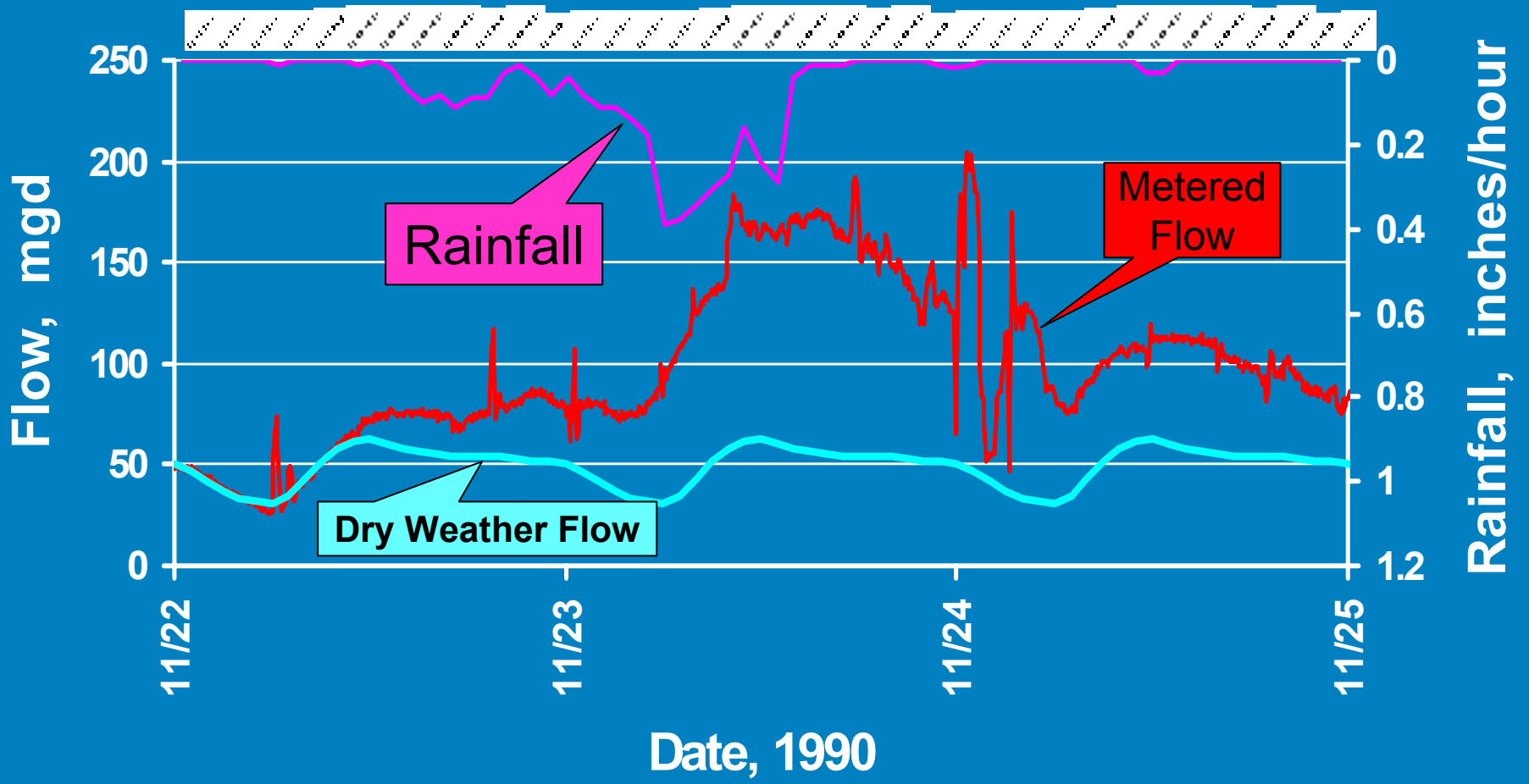


What It Should Look Like



What It Does Look Like

South Plant



So How is GIS Used?

- As a tool for map production, data compilation and analysis, and as a method to annoy engineers ☺
- Local sewer agency Line Coverage
- Flow Meters and Mini Basins
- Modeling Basins
- Identifying Parcels that might contribute to I/I
- Calculating Rainfall

Local Lines

- Multiple Sources:
  - Paper Maps
  - CAD files
  - GIS coverages and shape files
- Conflated to King County Parcel Base Layer
- Graphical representation
- Populate attributes: pipe diameters, slope

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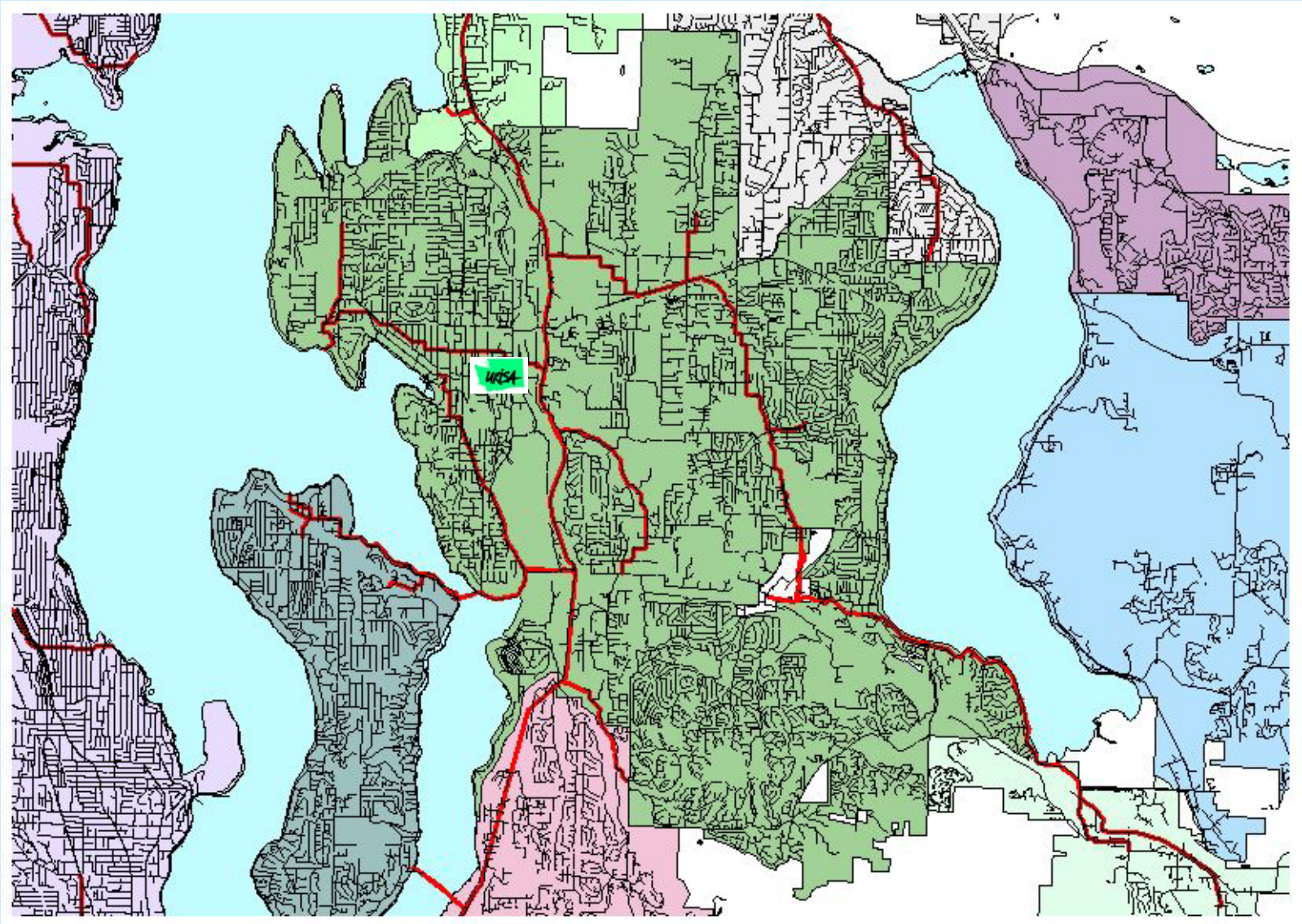

Flow Meters & Mini Basins

- Meters
- Backbone of I/I Control Program
- The way to find I/I is to measure it
- Placed to measure about 22,000 feet of pipe
- About 800 placed
- Place at outlet of Basins and can do Triple Duty
    - Mini Basin (short term only)
    - Modeling Basin
    - Sewer Agency Boundary

Flow Meters & Mini Basins

- Mini Basins
- Surround 22,000 feet of pipe
- About 800 defined
- 2 Analysts one Summer to identify and fine tune
- Purpose: to give a ‘snap shot’ of I/I for that location

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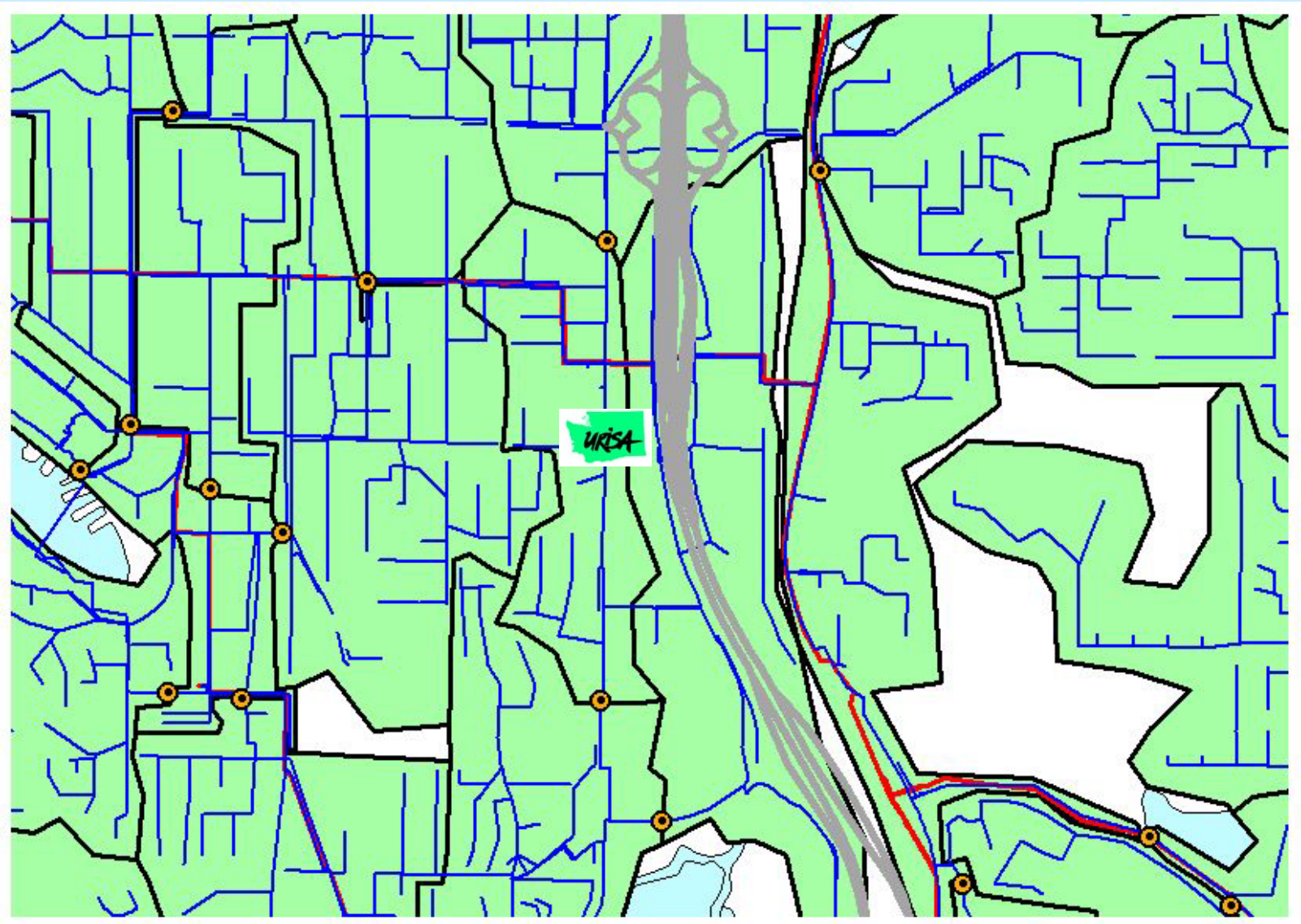

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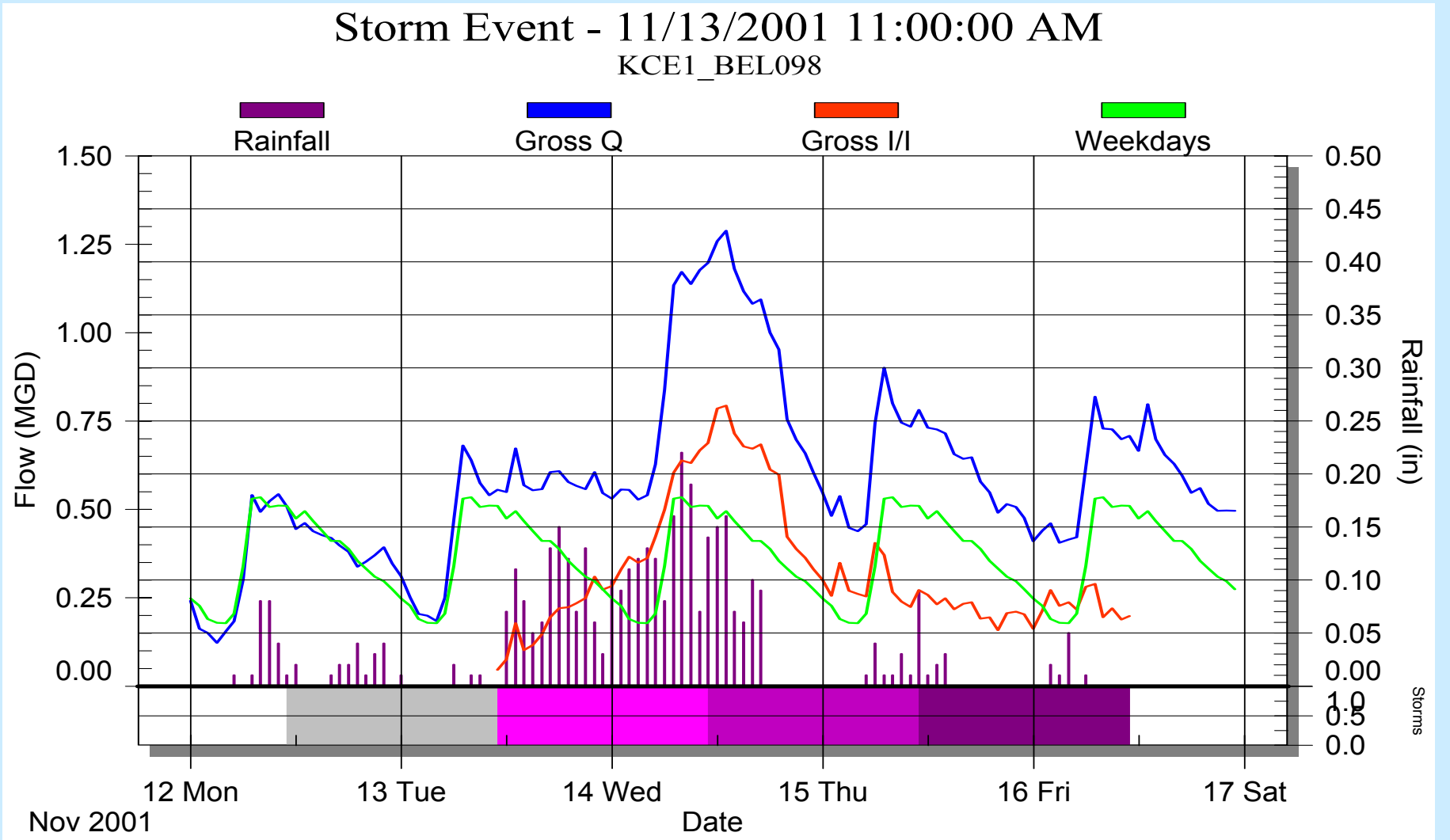

Modeling Basins & Sewered Land

- Modeling Basins
- Larger than Mini Basins
- Planning tool
- Follow natural drainage patterns - except where they don’t
- 150 Basins identified

Modeling Basins & Sewered Land

- Sewered land
- Which parcels might contribute I/I to sewer system?
- Along with slope and pipe diameters can run model determine current and needed capacity
- Modeling done at Modeling Basin level
- Used air photos, topography, current sewer plans, location of septic systems, KC parcel data, etc.
- Identified sewered, potentially sewerable, not sewered land
- Identified why potentially sewerable or not sewered

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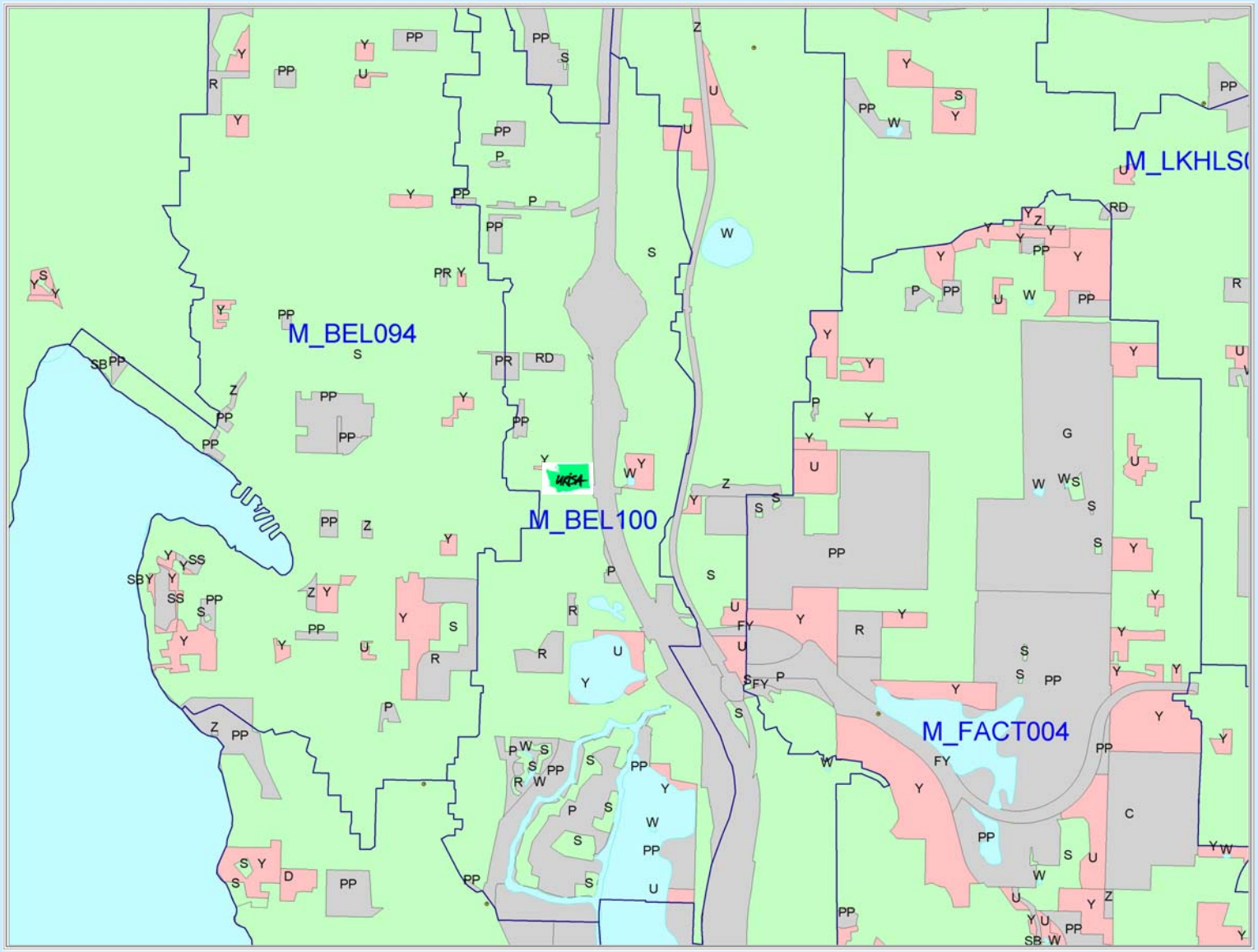

CALAMAR & GIS

- Knowing how much rain fell on a particular location is important to model
- CALAMAR software used to calibrate doppler radar
  - Breaks study area down into 1 km grid
  - Relate grid to Mini Basin Layer
  - GIS used to find percentage of Mini Basin in each CALAMAR grid Cell

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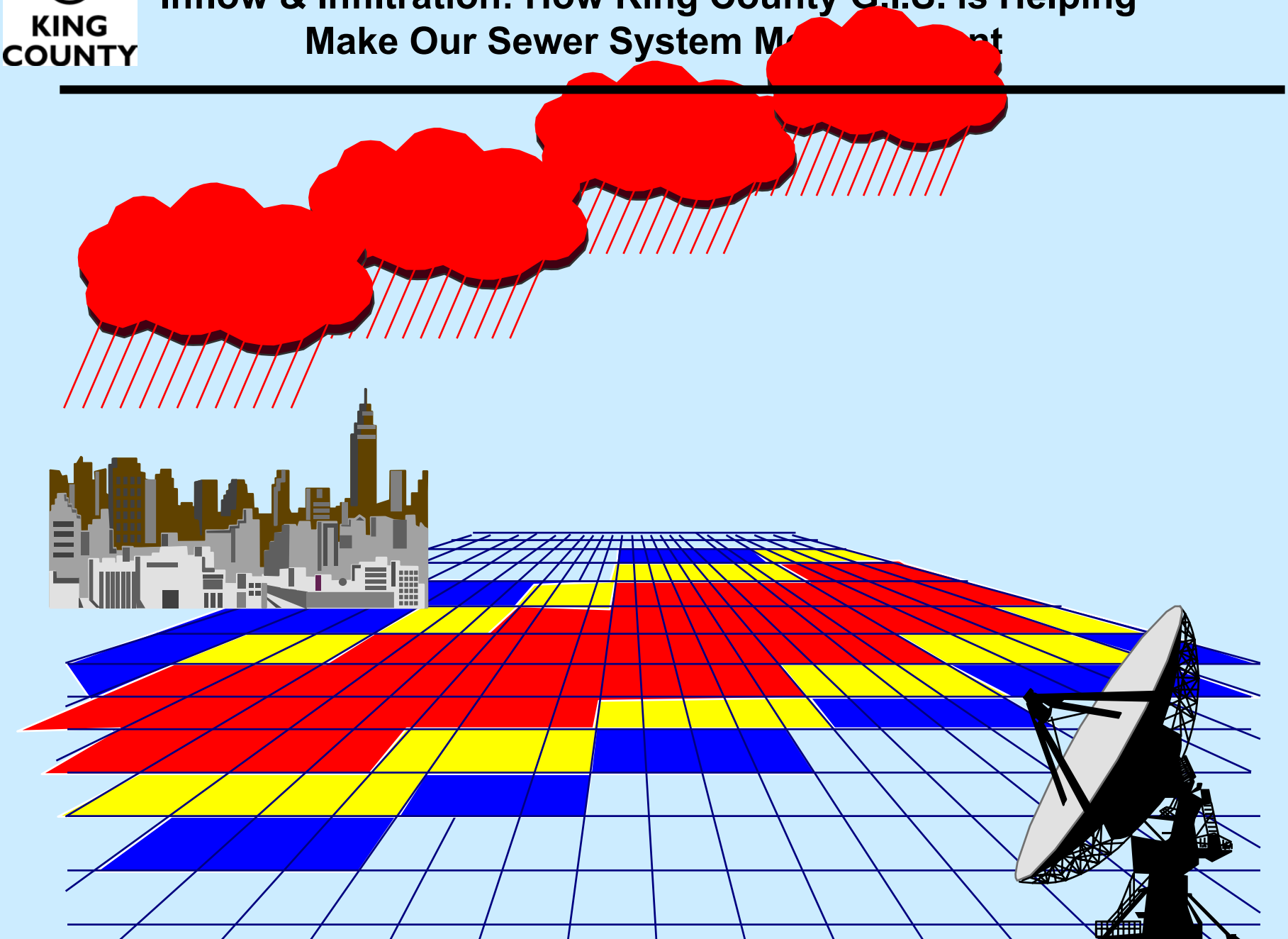

Pray to the Rain Gods!

- I/I Study won't work without rain
  - Need active sewers to study I/I so need wet weather
  - 2000-2001 We didn't get enough rain
  - Means the County paid for all that nice weather last year
- 2001- 2002 wet season Record Breaking
  - Something like 14" during first 6 weeks
  - Lots of Happy Campers in I/I Program
  - Salmon swim across roads

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Review

- GIS built local line coverage
- GIS created Mini Basins
- GIS identified location of Meters
- GIS built Modeling Basin and Sewerable Land layers
- GIS adjusted CALAMAR to Mini Basins to get accurate rain fall
- In the Future:
  - Identify Pilot Projects to study best I/I reduction methods
  - Build an application to see how reduction of I/I affects down stream facility and maintenance costs

Resources

- King County Web Page (www.metrokc.gov):
- Department of Natural Resources & Parks
- Wastewater Treatment Division
- I/I Control Program
- King County GIS
- Tour West Point Treatment Plant

Questions?