



Reality in Level of Service

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Milwaukee, WI

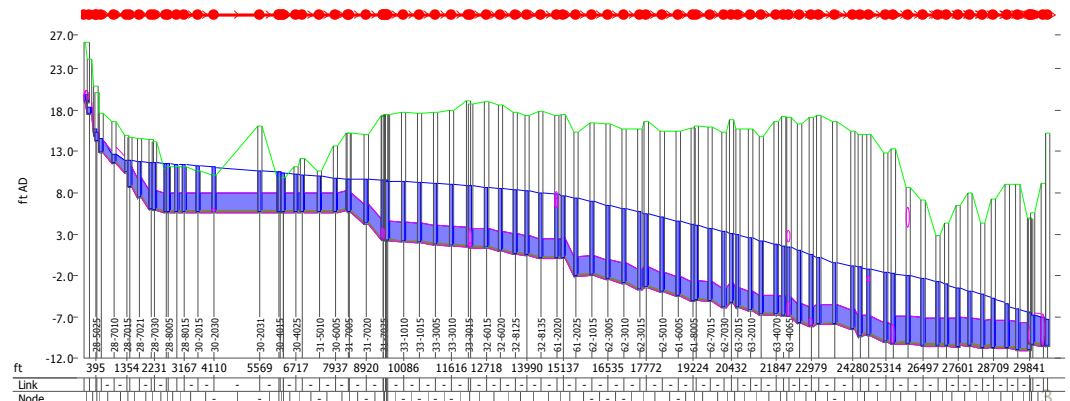
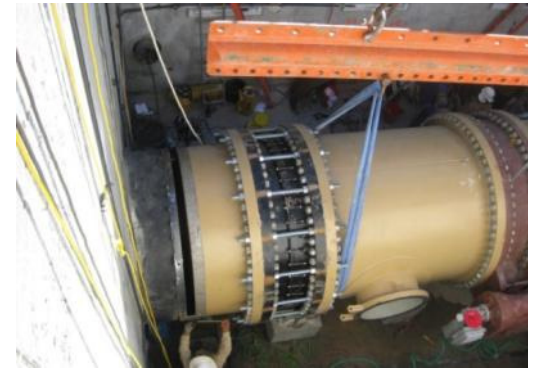
How Much Is Enough?

- Topics
- Trends
- Tips



Trend – Or Outlier?

- Level of Service Bars
 - Commonly Found, Very Inconsistent
 - High or Impossible
- Standard Requirements
 - Design storms are common, but are they appropriate?
 - I/I reduction evaluation is expected
 - Level of Service/Control Increments
- Examples
 - Milwaukee
 - Portland

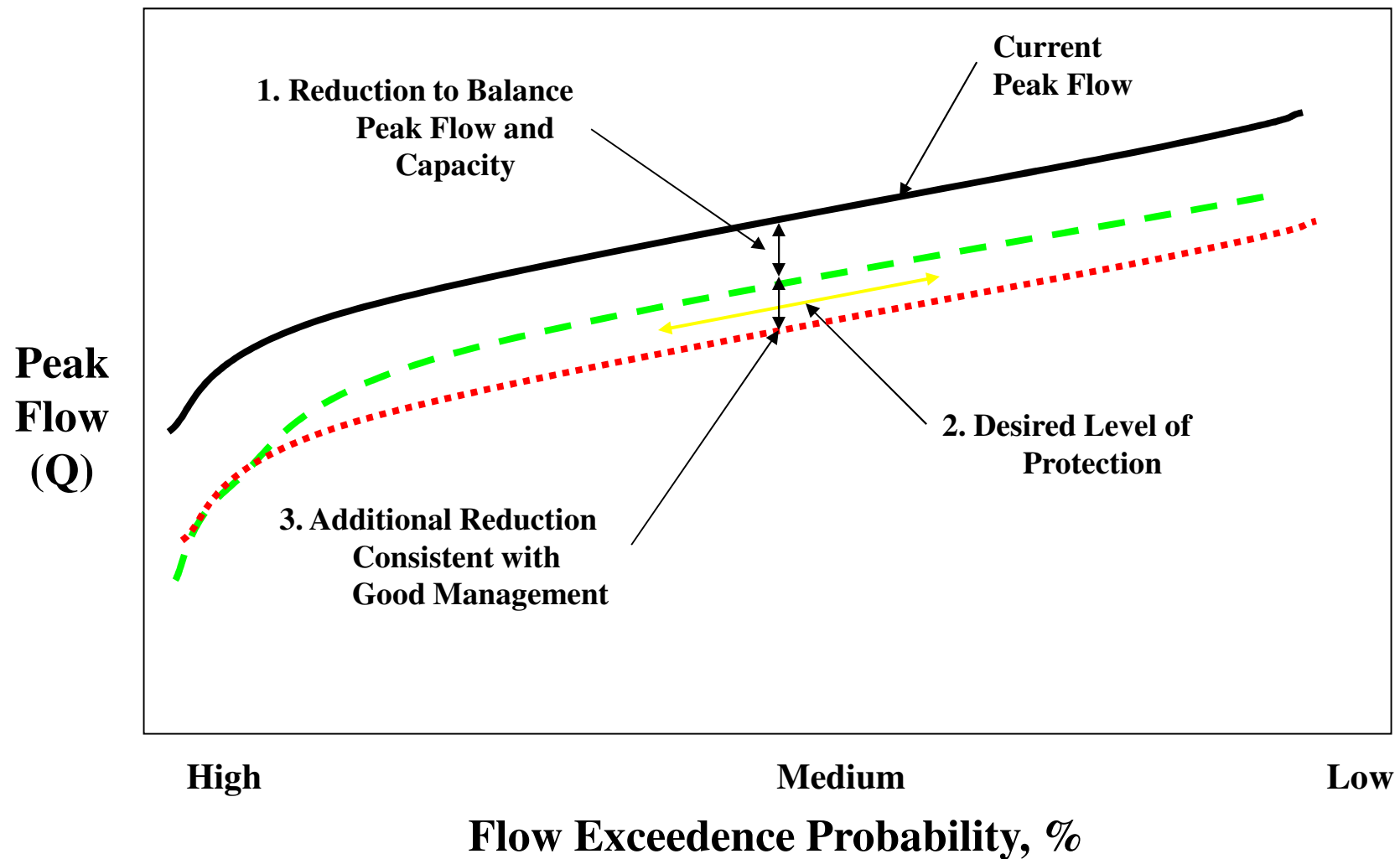


Level of Service Concepts

- Collection system capacity to be provided
- Level of Service considerations
 - Level of protection against overflows
 - Redundancy and reliability criteria
 - Flow criteria for satellite collection systems

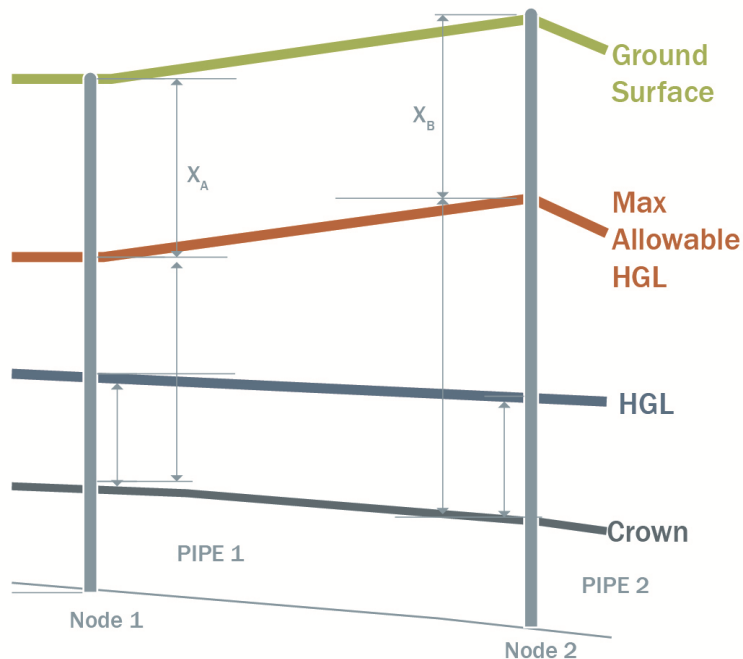
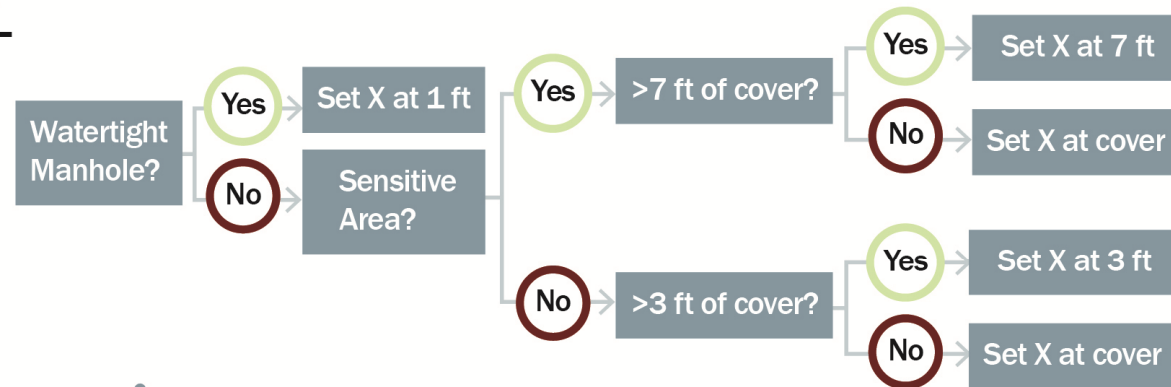


Level of Service Example Milwaukee MSD



Nashville Surcharge LOS protects system performance and is sensitive to water quality

Max Allowable HGL



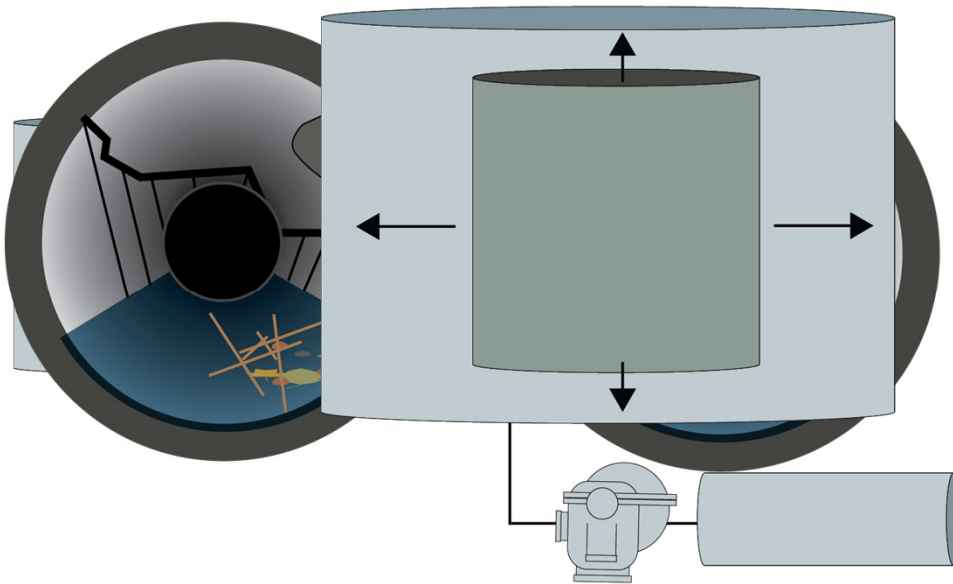
Cover is determined at node as ground/rim elevation minus highest crown elevation of the outgoing pipes.

Sensitive Areas Include:

- History of basement backups
- Wetlands
- Observations of Rare Species by TDEC
- Proximity of 303d streams listed for *E. coli*
- Proximity to Exceptional Tennessee Waters

CAP/ER - Peak Wet Weather HGL/Surcharging Criteria

Blending elements to the right proportion to get the desired LOS



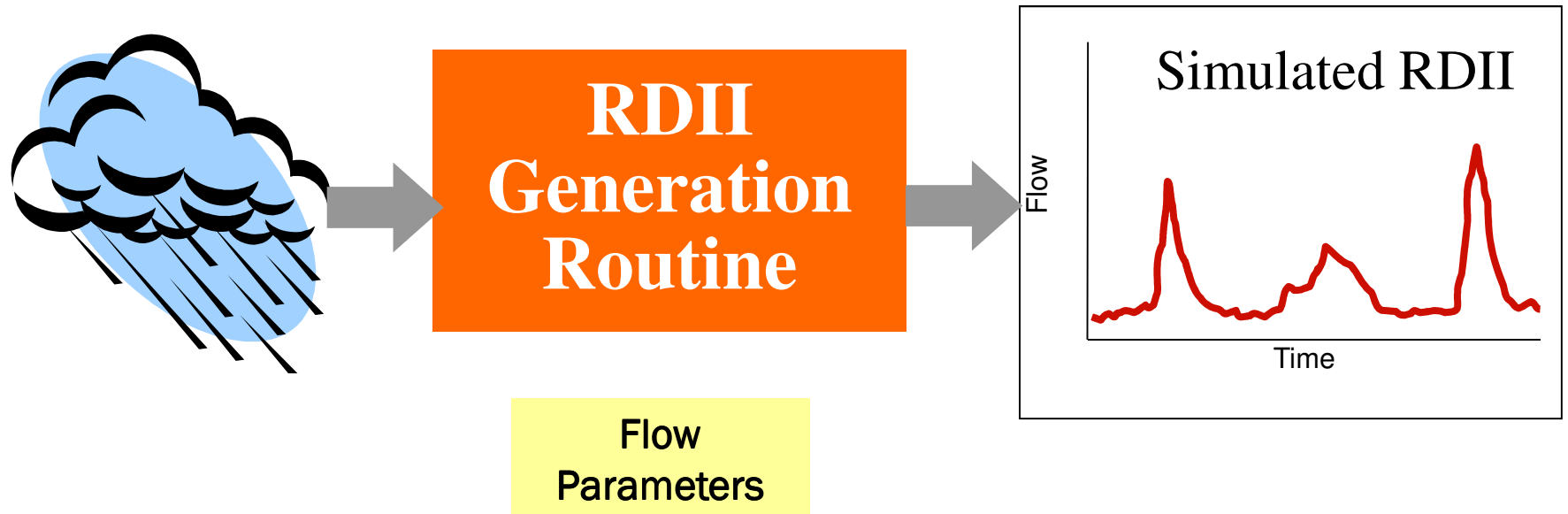
1. Increased Conveyance Capacity
2. Rehab for I/I Reduction
3. Storage
4. Increased Treatment Capacity

What are EPA and/or States Looking For?

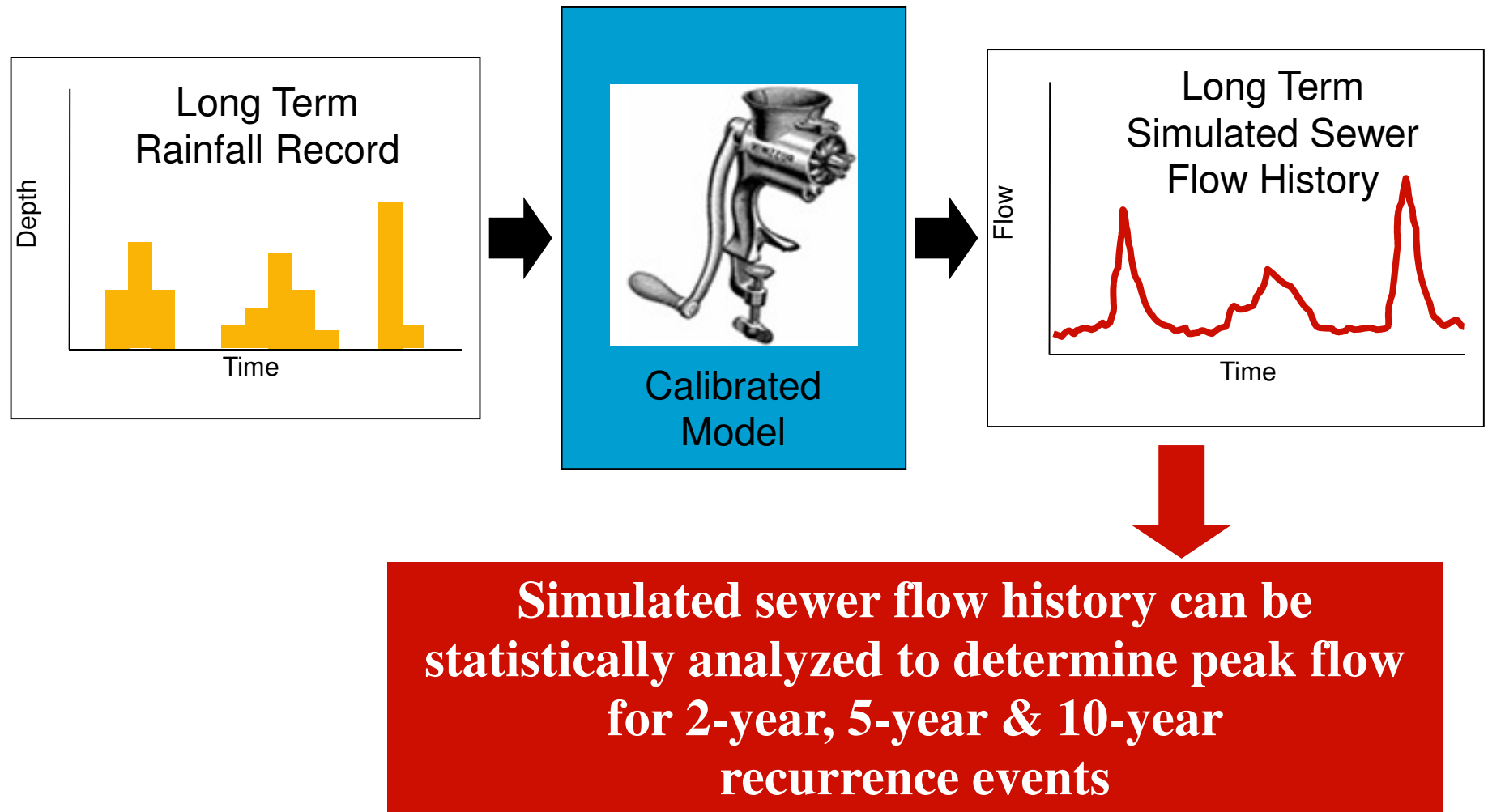
- Confidence in Analytical Approach
 - Underlying data
 - Appropriate modeling
- Certainty in Proposed Solutions
 - Built on appropriate modeling
 - Available funding
 - Schedule
 - Proof you meet LOS with post-construction monitoring



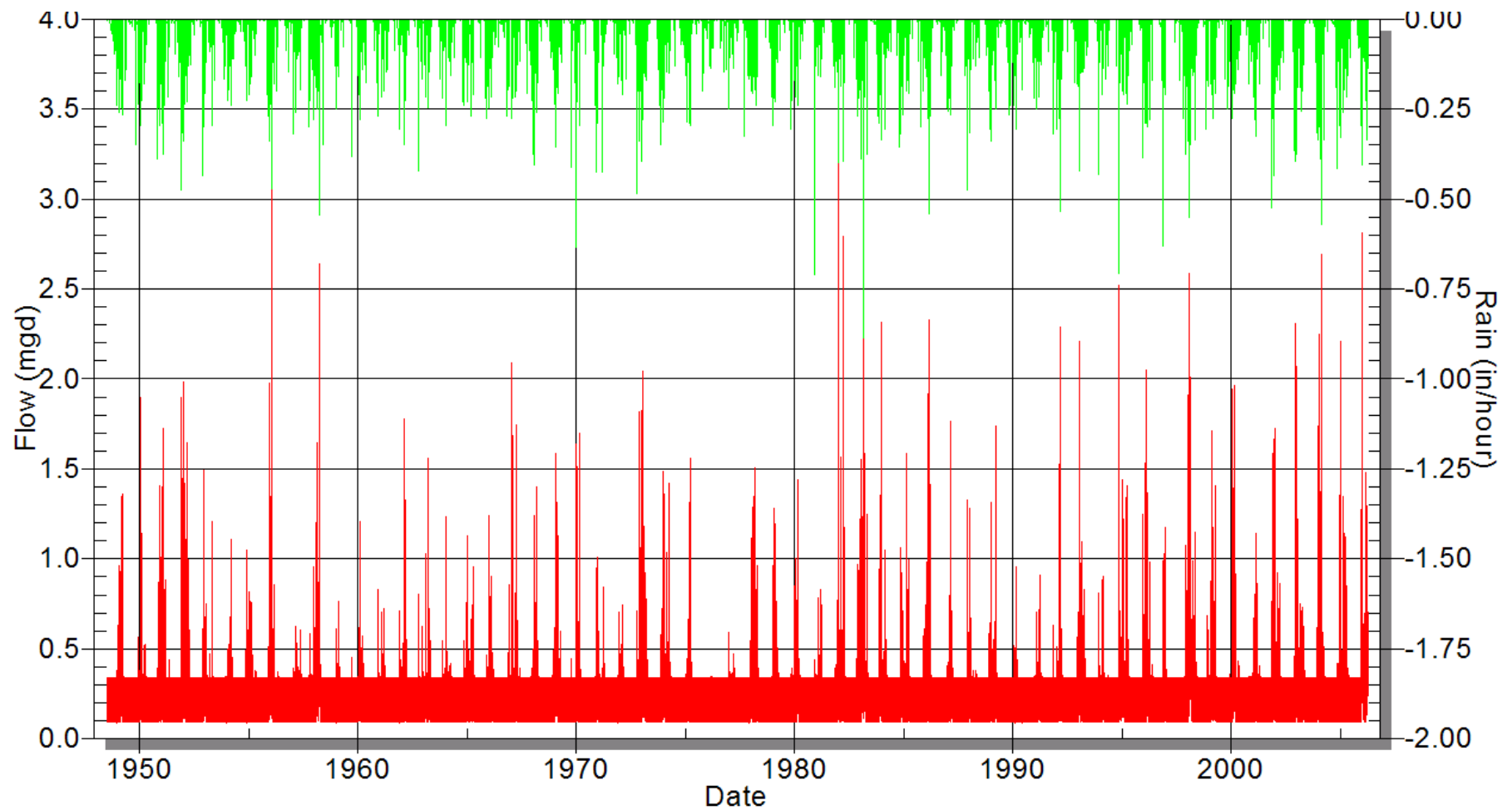
Appropriate Modeling Example



Continuous Modeling For Peak Flow Frequency Analysis – A More Realistic Picture

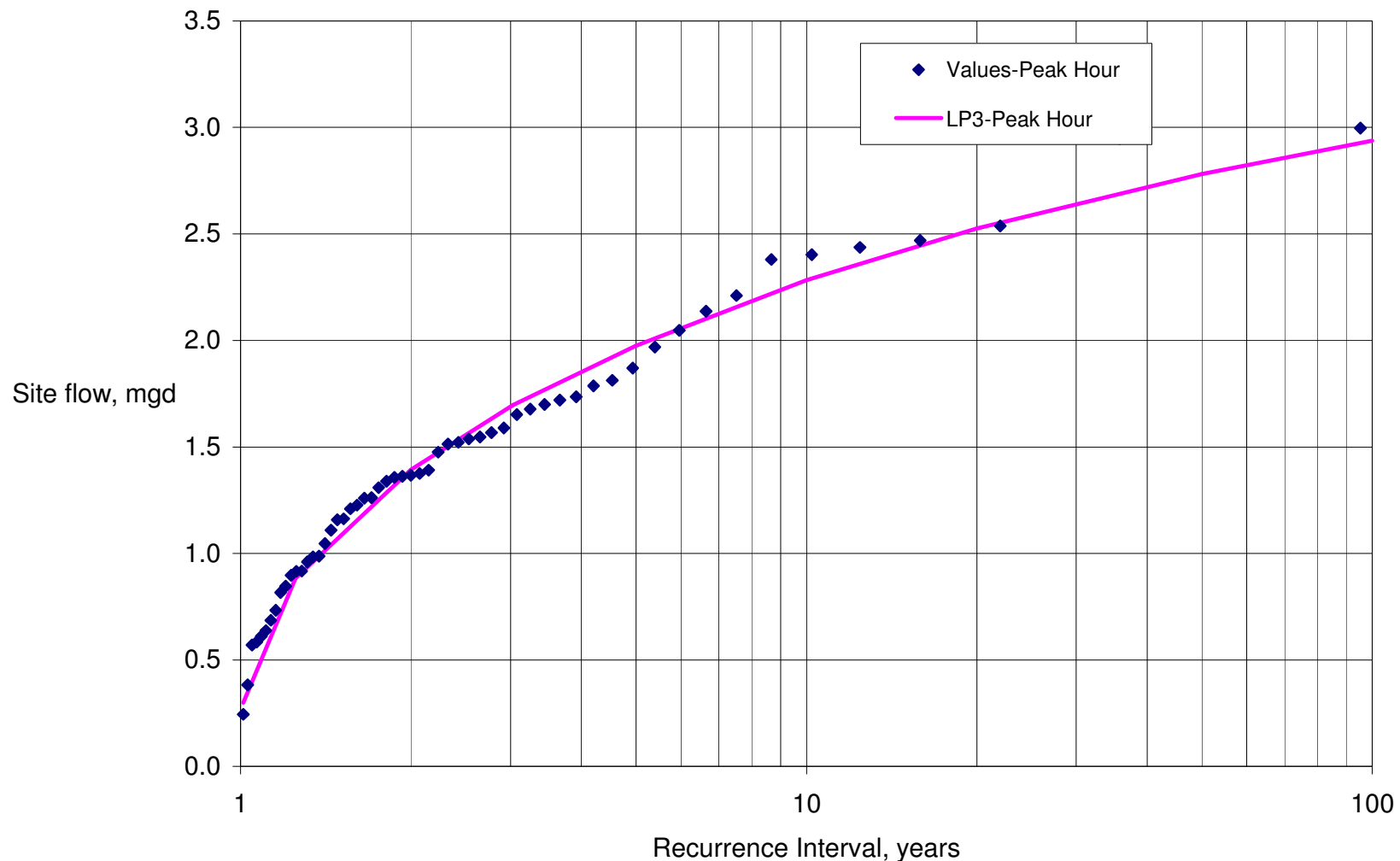


Long Term Simulation Results

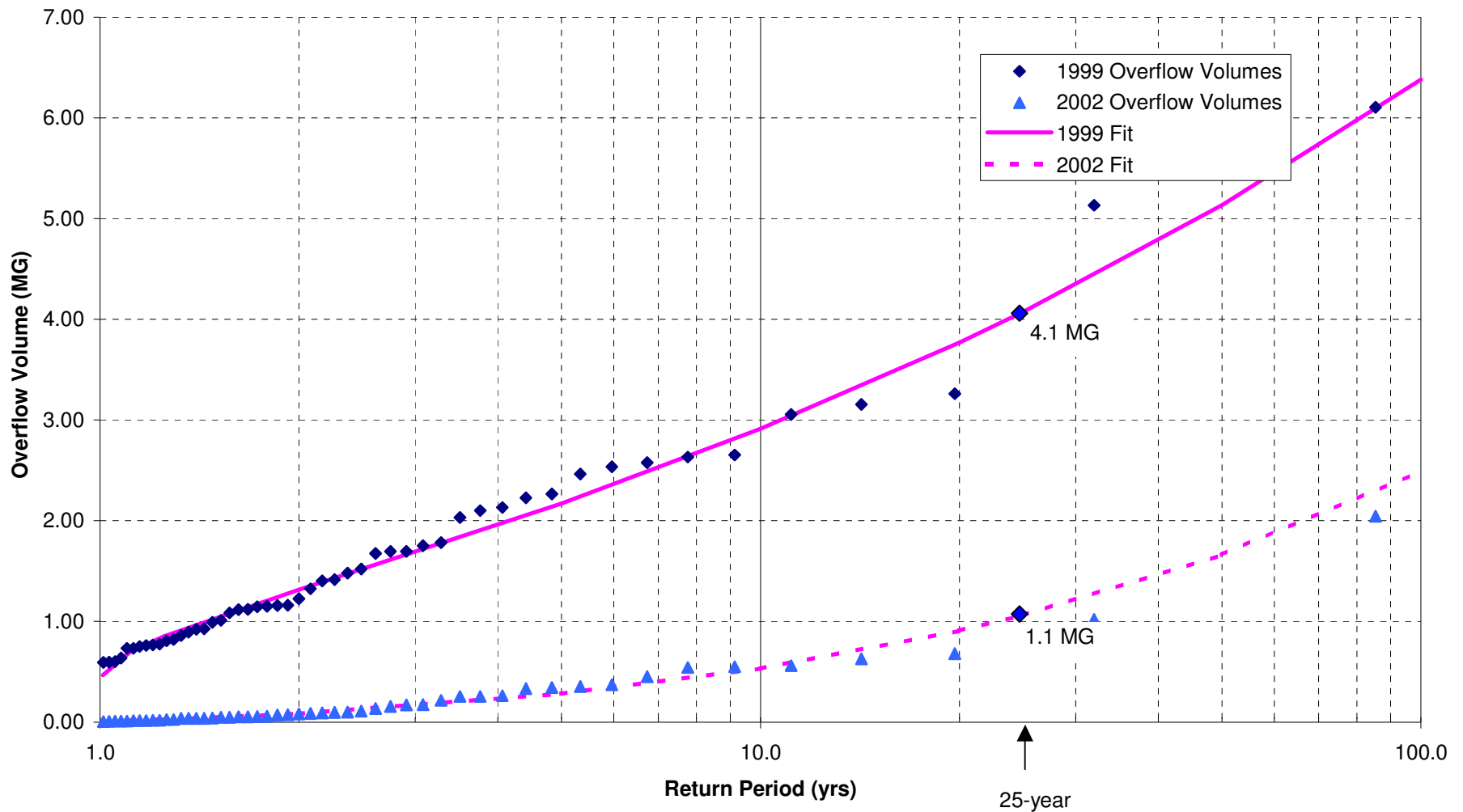


Continuous Simulation Enables Frequency Analysis of Flows

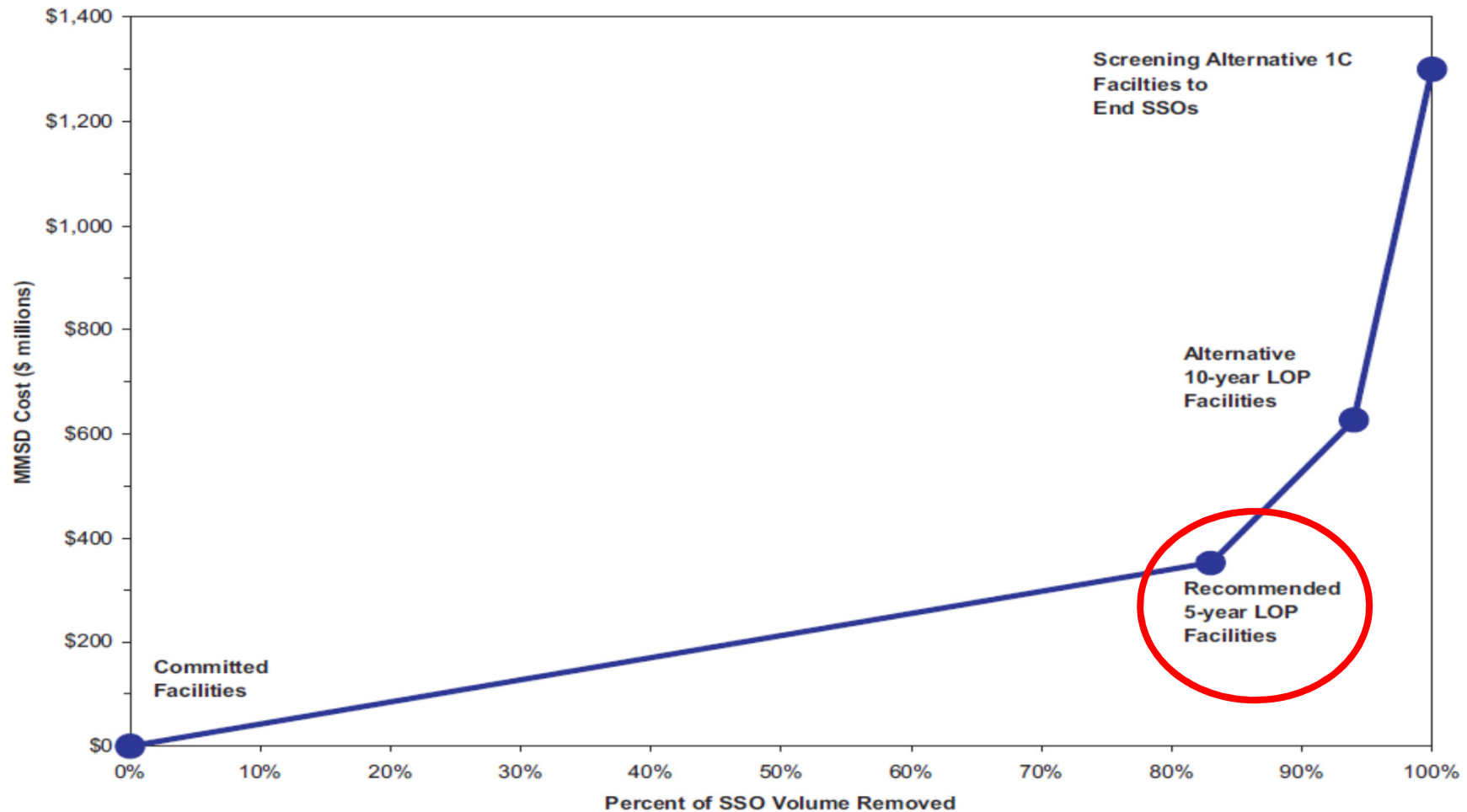
Site E Peak Hour Flow Statistics for I/I Modeling



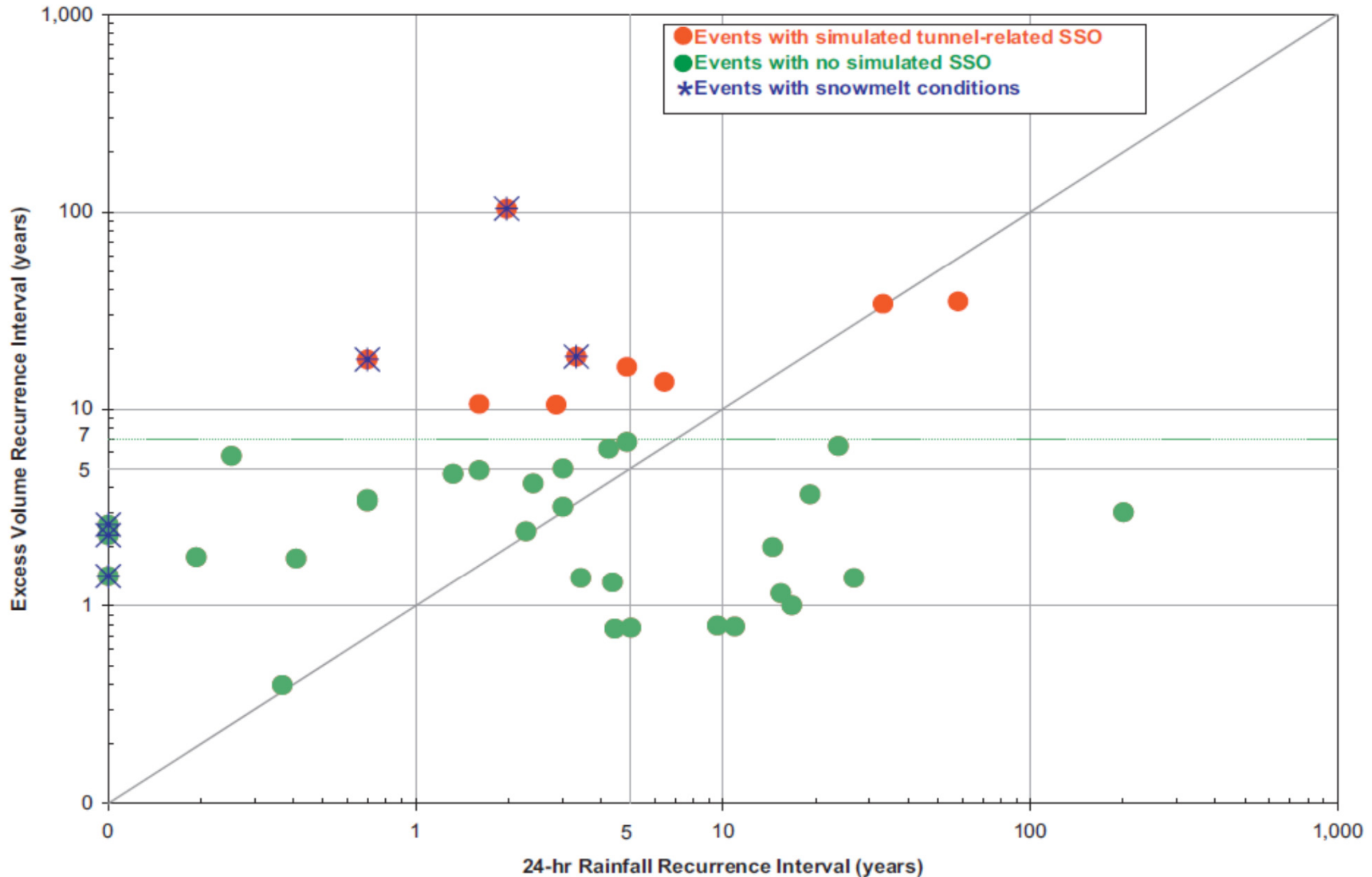
Example – Application to SSO Storage Needed Before and After I/I Reduction



Milwaukee MSD – Recommended 5-Year Level of Control for SSOs

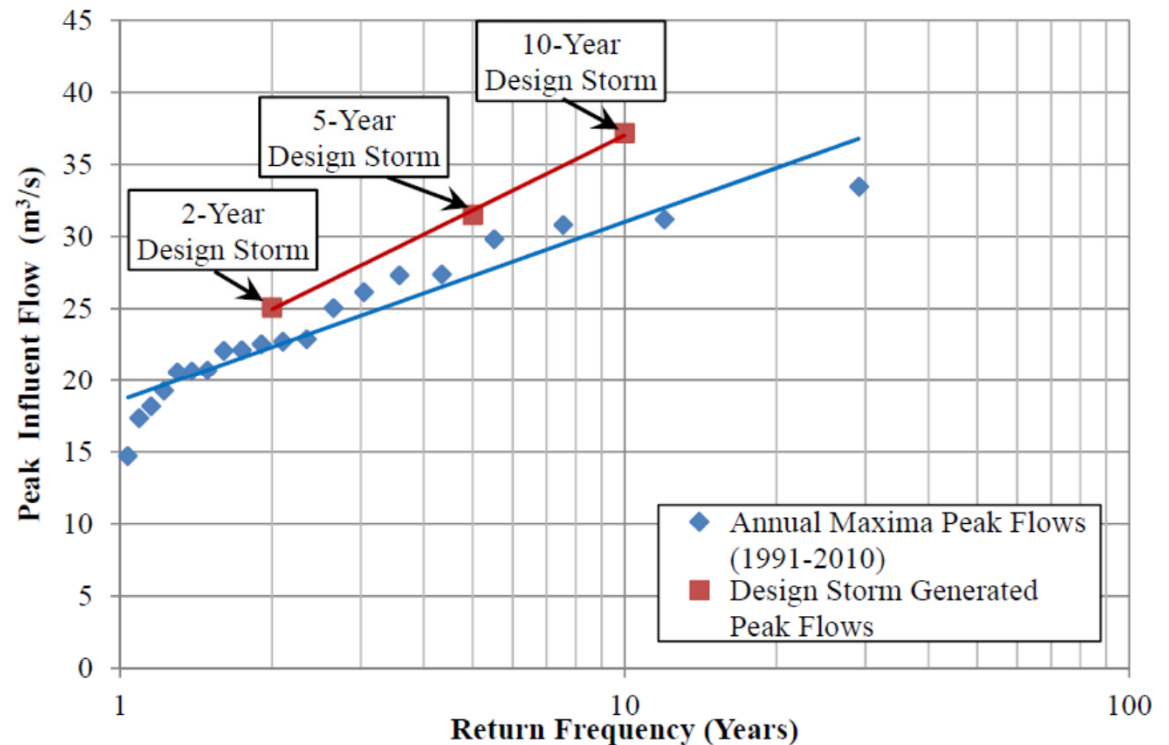


Milwaukee MSD – Analysis Showed Range of Events that 5-Year Facilities Can Control



Baltimore Consent Decree Modification

- Original CD required design storm analysis
- Wet weather plan recommended 2-year event solution
- EPA rejected 2-year
- City changed model to continuous simulation
- New plan recommends 5/10 year SSO control



Statistical peak flow is smaller than corresponding design storm flow

Tips

- Isolate
- Understand
- Tailor
- Make Your Case
- Position

