Regional I&I Reduction Program Implementation

NEW Water TAC Meeting, Green Bay, WI // July 18, 2023

Meeting Agenda

- Meeting Objectives
- I&I Activity Sharing
- Definitions
- Flow Limits
- Compliance (if time)
- Next Steps

Meeting Objectives

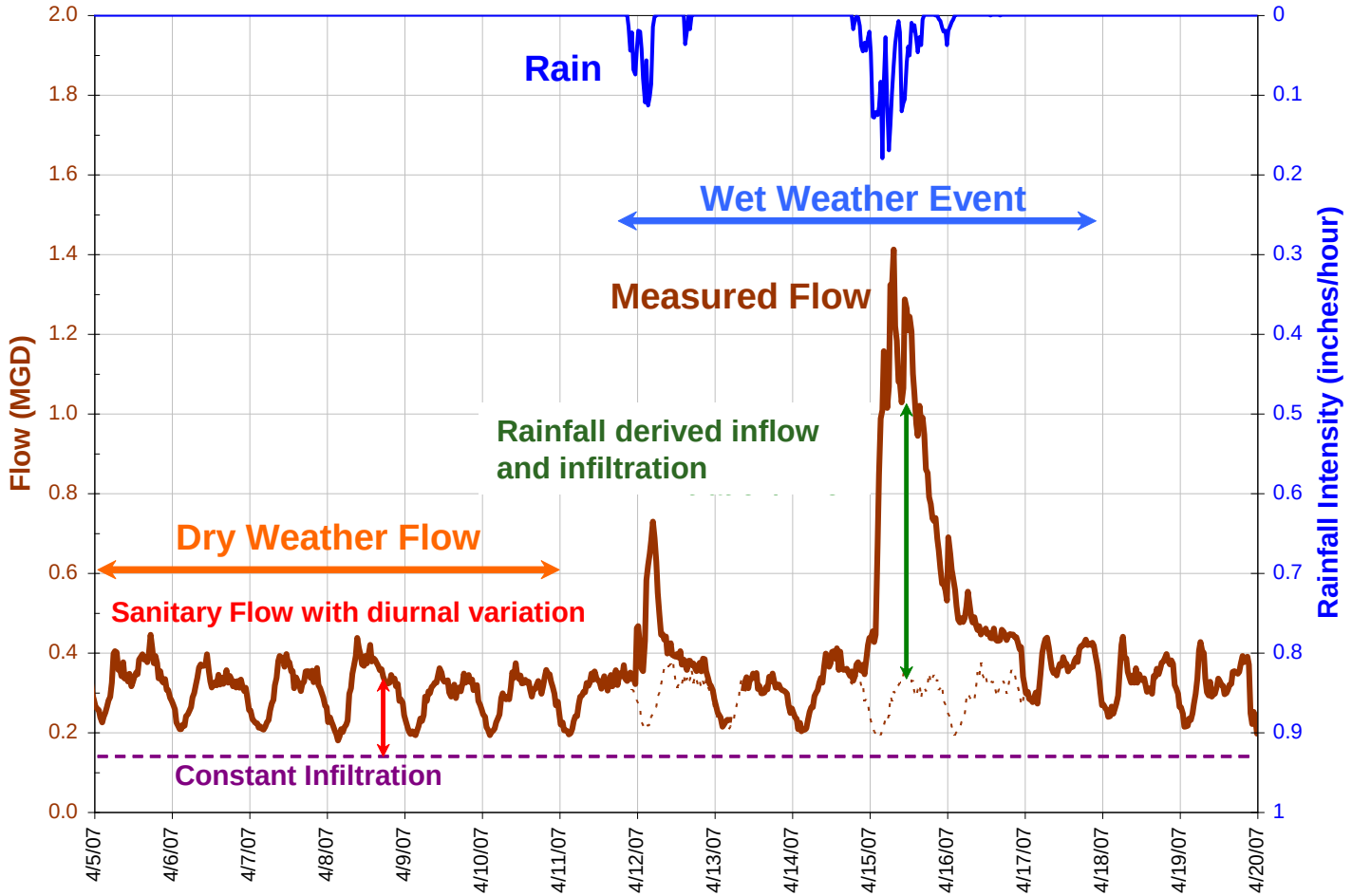
- Share what your organization has been working on for I&I
- Discuss possible options/refinements for the Regional I&I Program for:
  - Flow Limits
  - Compliance
- Solicit feedback from the Technical Advisory Committee (TAC)

I&I Activity Sharing

- What has your organization been working on for I&I?

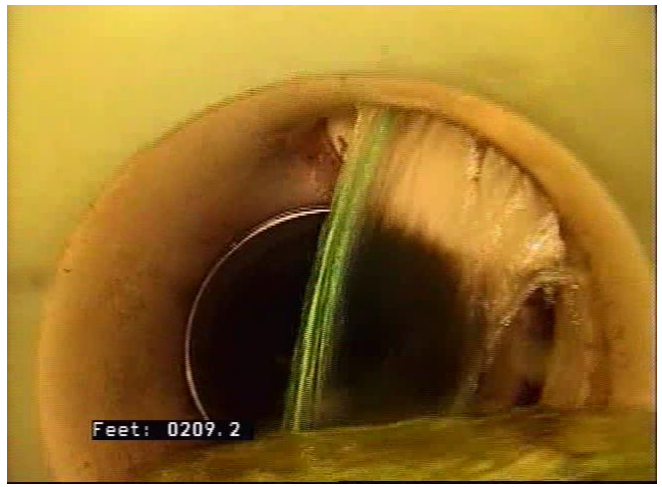
Flow Components

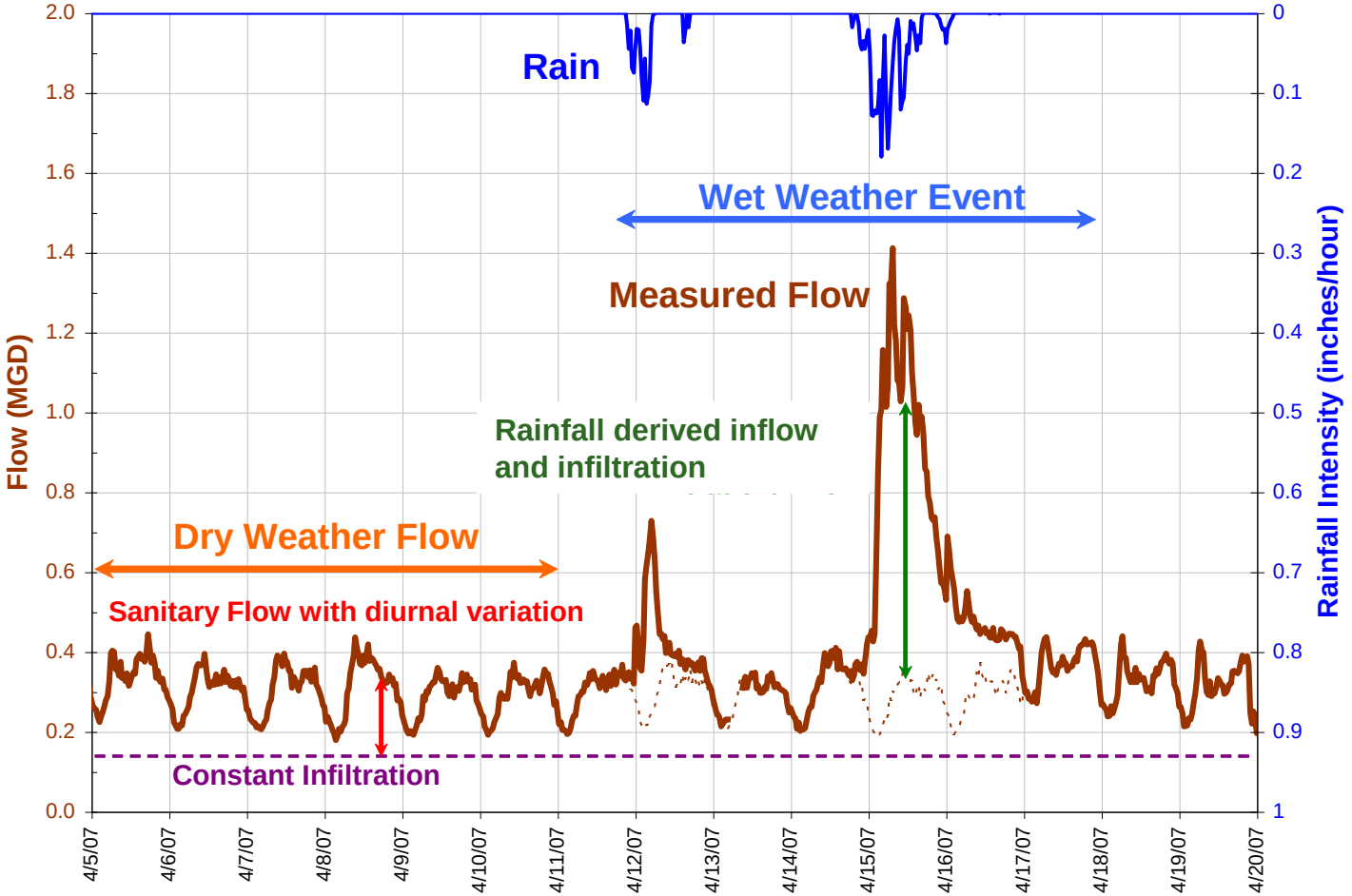
- Dry Weather Flow (DWF)
  - Base sanitary flow
  - Diurnal variation
  - Constant infiltration
- Antecedent Moisture
- Wet Weather Flow
  - Rainfall Derived Inflow and Infiltration



Inflow and Infiltration (I&I)

- Constant Infiltration
- Antecedent Moisture
- Rainfall Derived Inflow





Recurrence Interval

- Statistical evaluation of past events used to predict the likelihood of an event in the future
- Example: In the past, an event of a certain size occurred an average of every 10 years; this means there is a 10% probability of a similar event in the next year

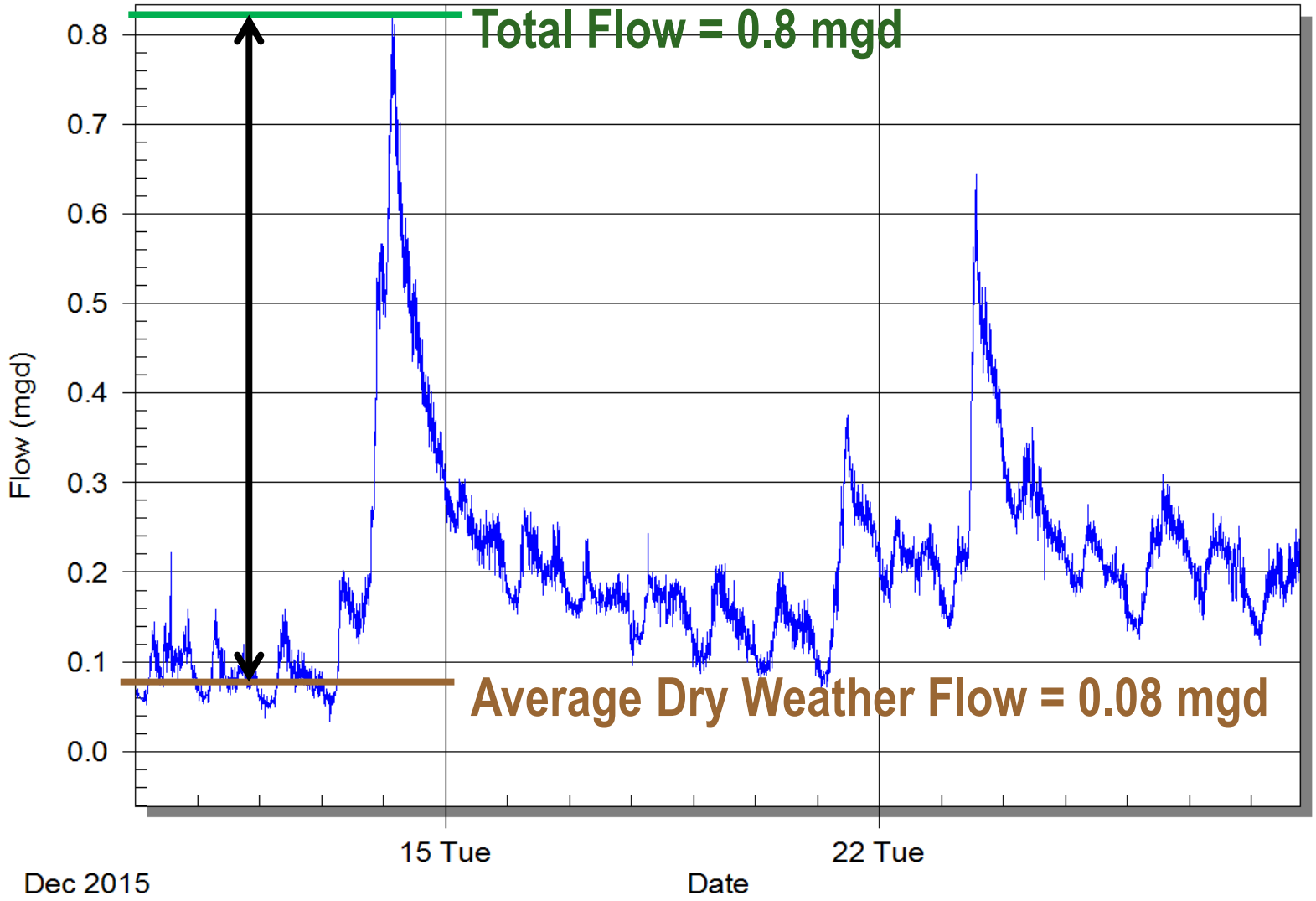
Recurrence Interval (carleton.edu)

Level of Service

- How much the sanitary system and treatment facilities can handle before overflows to waterways and basements occur
- Similar concept to how much traffic roads can handle

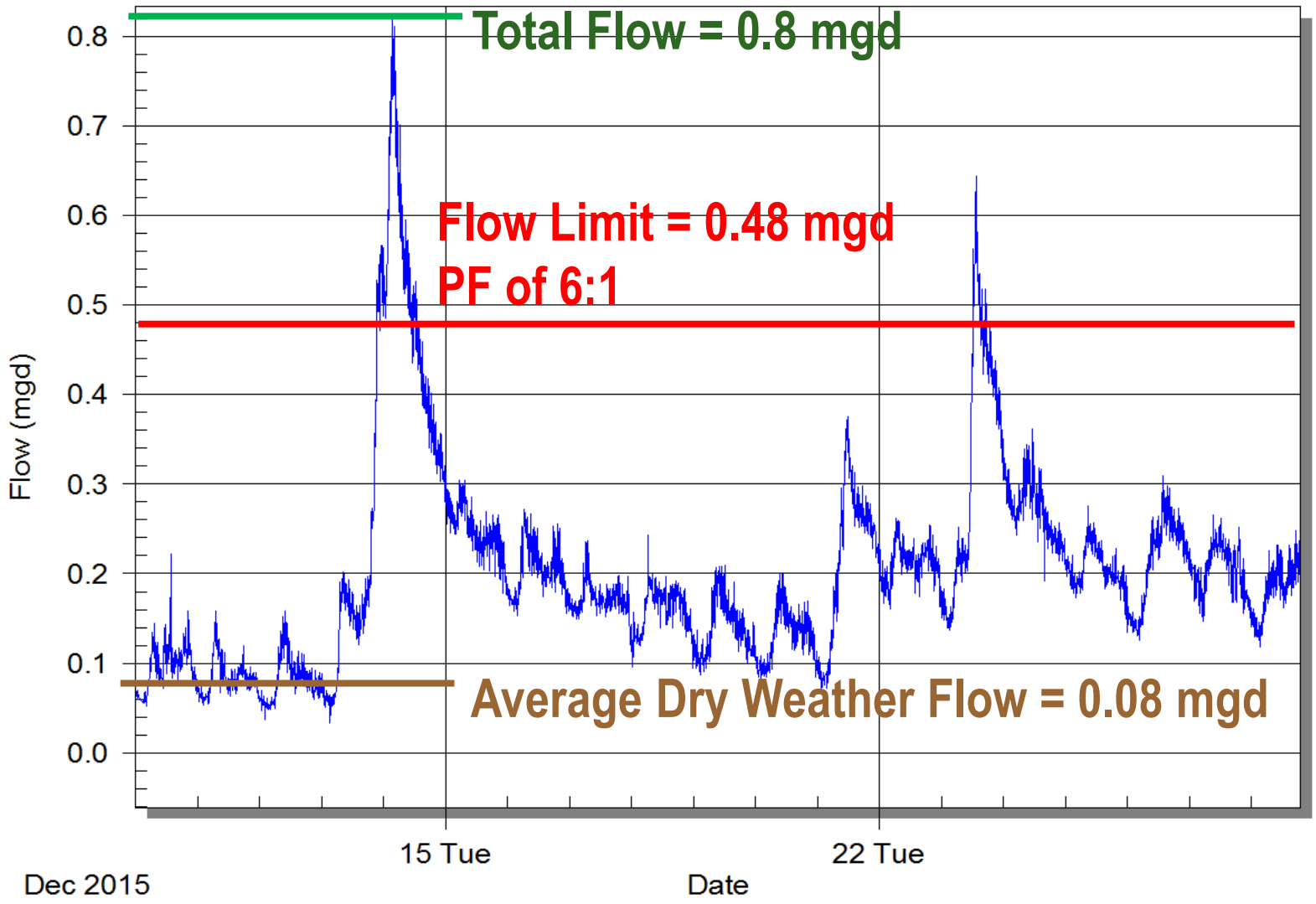
Peaking Factor (PF)

- How much the total flow enters the sanitary sewer system during an event compared to the typical flow on a dry day (average dry weather flow).
- Example:
  - 0.8 mgd/0.08 mgd=10
  - Peak flow is 10 times higher than average DWF
  - PF = 10:1



Flow Limit

- How much flow is allowed in the sanitary system
- Like a speed limit for a road



Contracted Interceptor Capacity Allocations

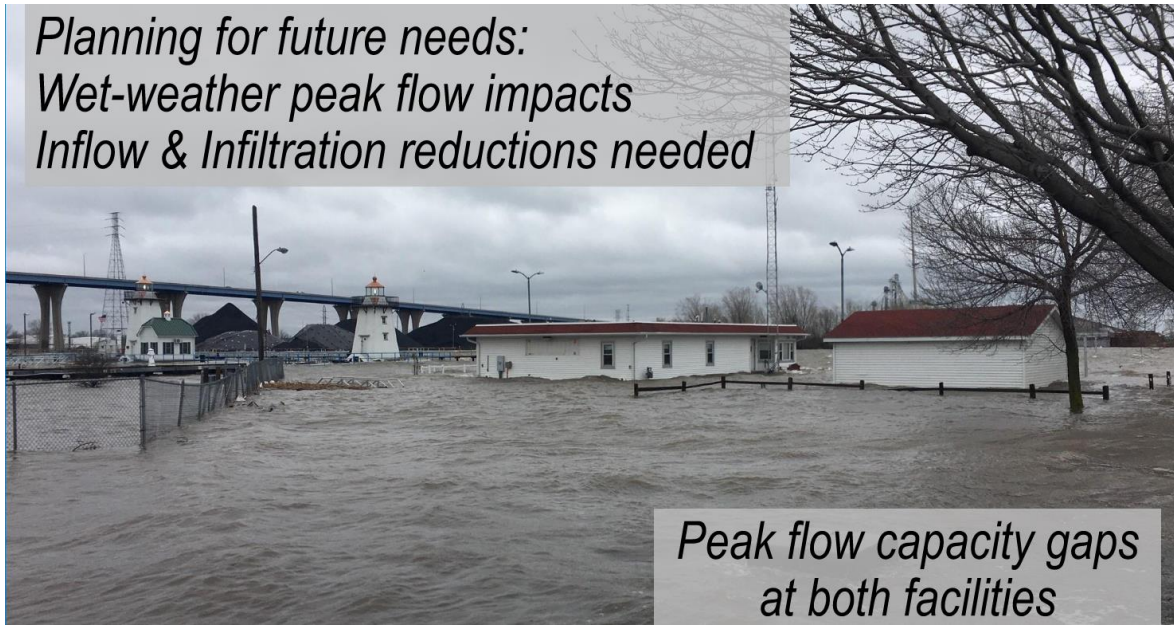
- NEW Water interceptor capacity allocated to municipal customers that flow to that interceptor

Flow Limits

- Why are Flow Limits Needed?
- What is Currently in the I&I Plan?
- Comparison of Current Conditions and Proposed Peaking Factor Limit
- Why would an I&I Volume Standard be useful?

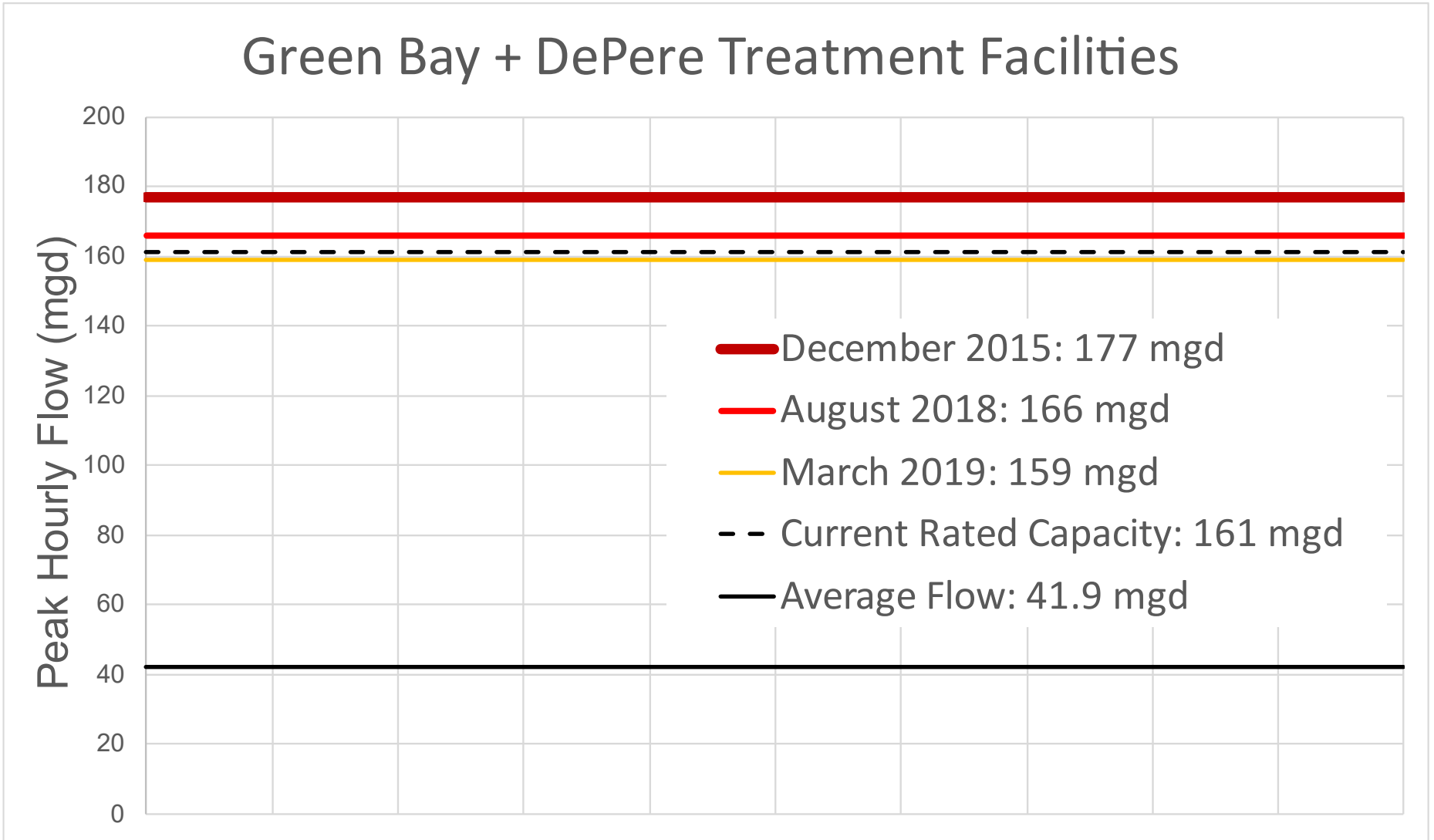
Why is a Flow Limit Needed?

- Excessive I&I takes up capacity in the NEW Water system, which can inhibit economic development, and community growth
- Excessive I&I increases risk for overflows to waterways and basements
- It's expensive and wasteful to treat excessive I&I (clear water)
- NEW Water compliance with WDNR permit



There have been recent instances when the design capacity of the WWTPs have been exceeded

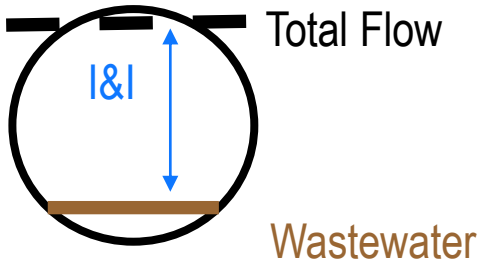
Rated Peak Hourly Flow at the Treatment Facilities Currently Being Exceeded



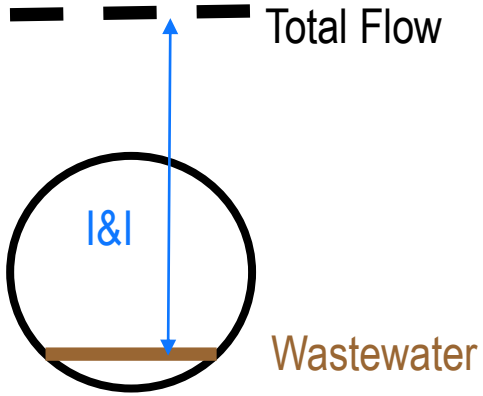
Contracted Capacity Allocations versus I&I Compliance Triggers

With Contracted Capacity Allocation

Level of Service Event

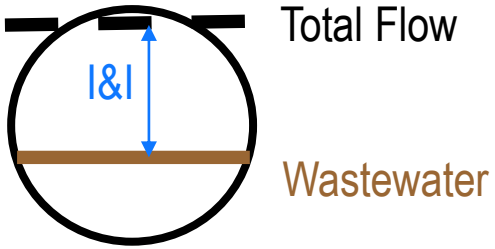


Extreme Event

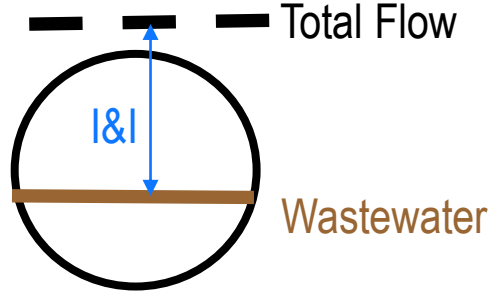


With I&I Compliance

Level of Service Event



Extreme Event



What is Currently in the Draft Regional I&I Plan?

- Temporary flow meters needed at strategic locations for future analysis and modeling
- Flow monitoring to calibrate a sewer flow model
- Calibrated model used to generate 10-year peak hour flows
- Calculated Peaking Factor:

$$\frac{\text{10-year Peak Hour Flow}}{\text{Average Dry Weather Flow}}$$

- Areas with excessive I&I identified as:

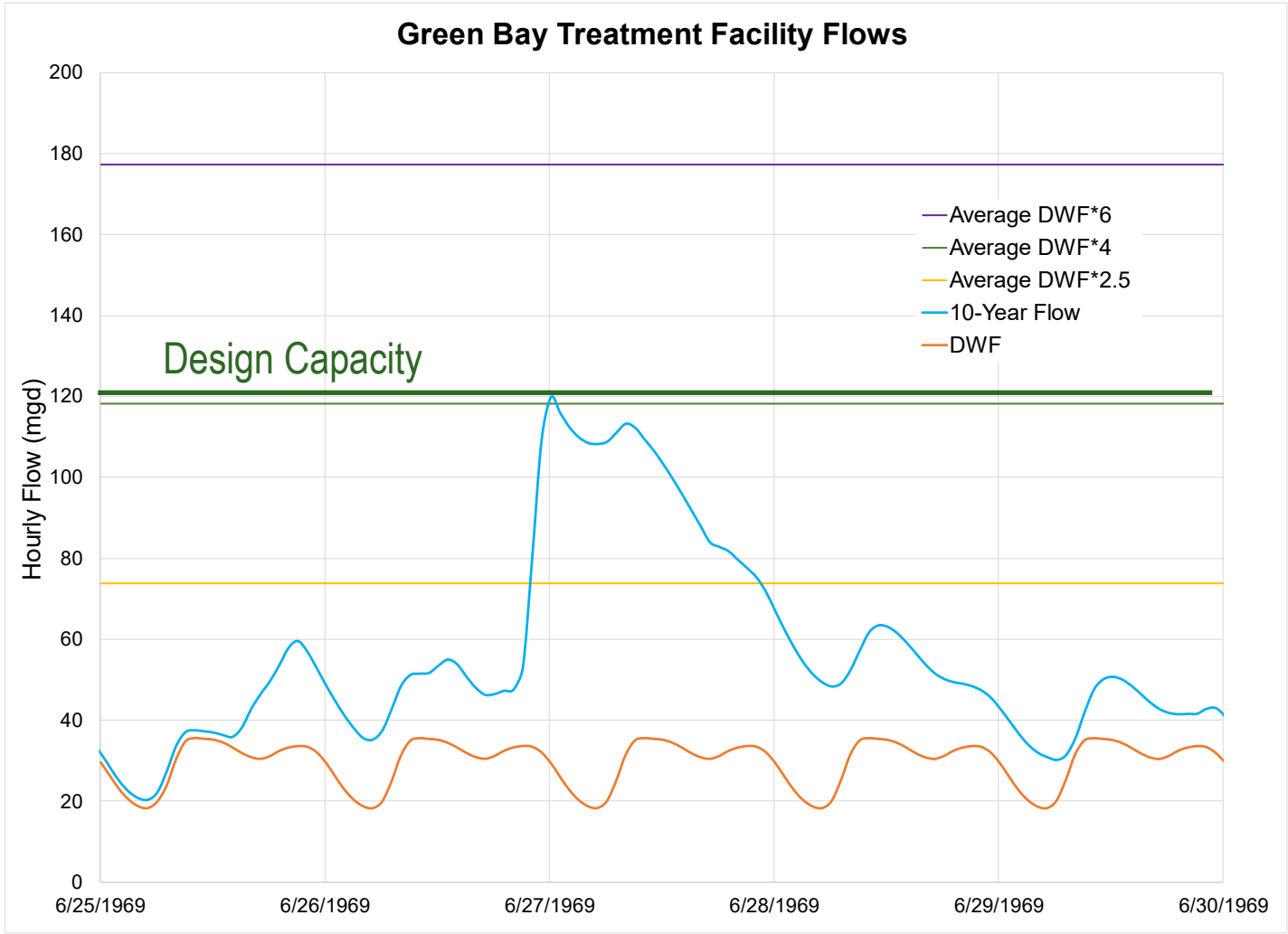
PF > 6:1 in areas with population equivalent of 500 or less

- Capacity allocations described in customer agreements will not be considered for I&I compliance

Note: NEW Water Interceptors are currently designed for PFs ranging from 2.5:1 to 4:1

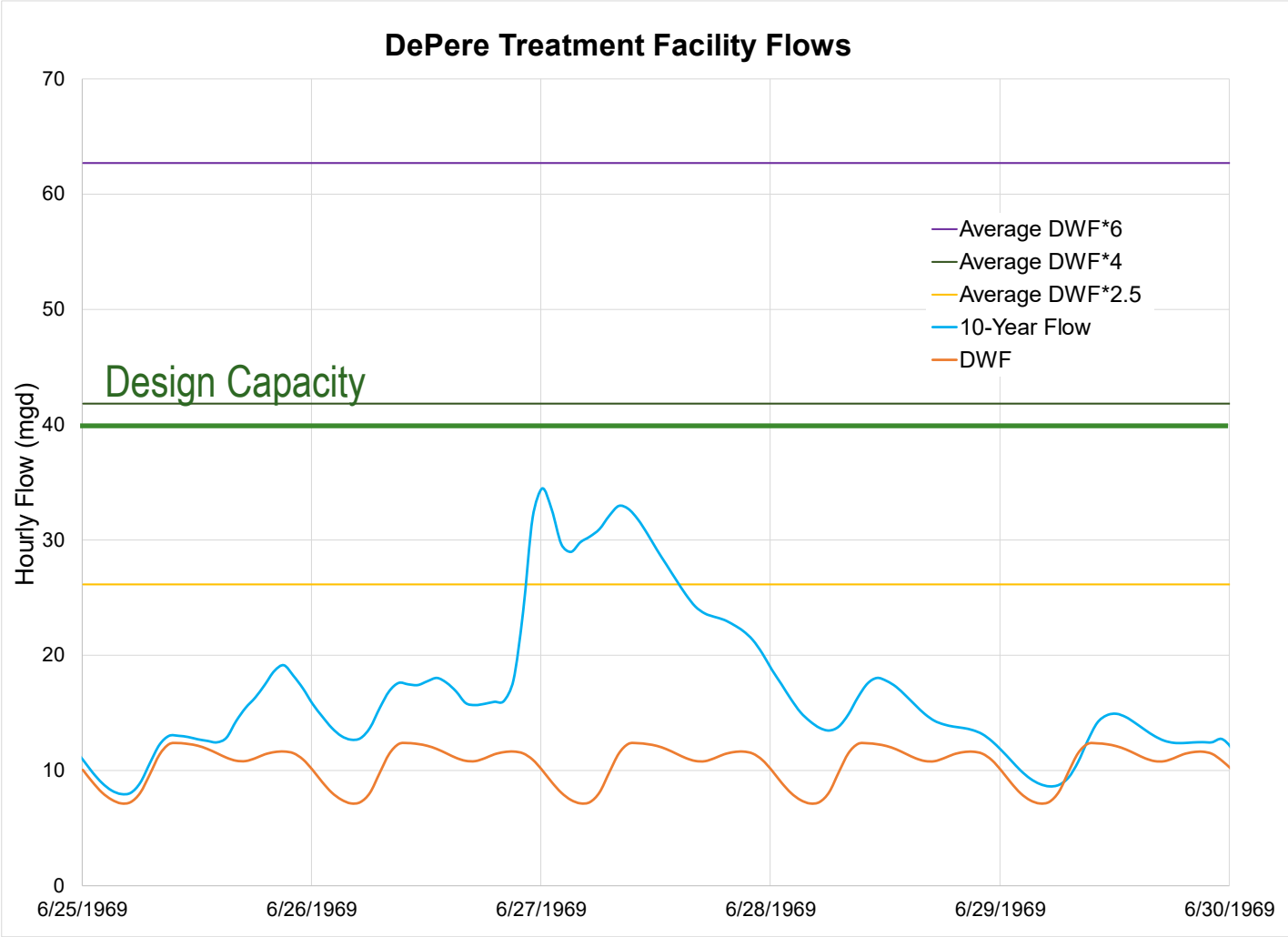
Current Conditions versus Proposed PF

- GBF Hydrographs from **Model** Results
  - Dry Weather Flow (DWF)
  - 10-year peak hour flow
  - Average DWF*6
- Design capacity is 120 mgd

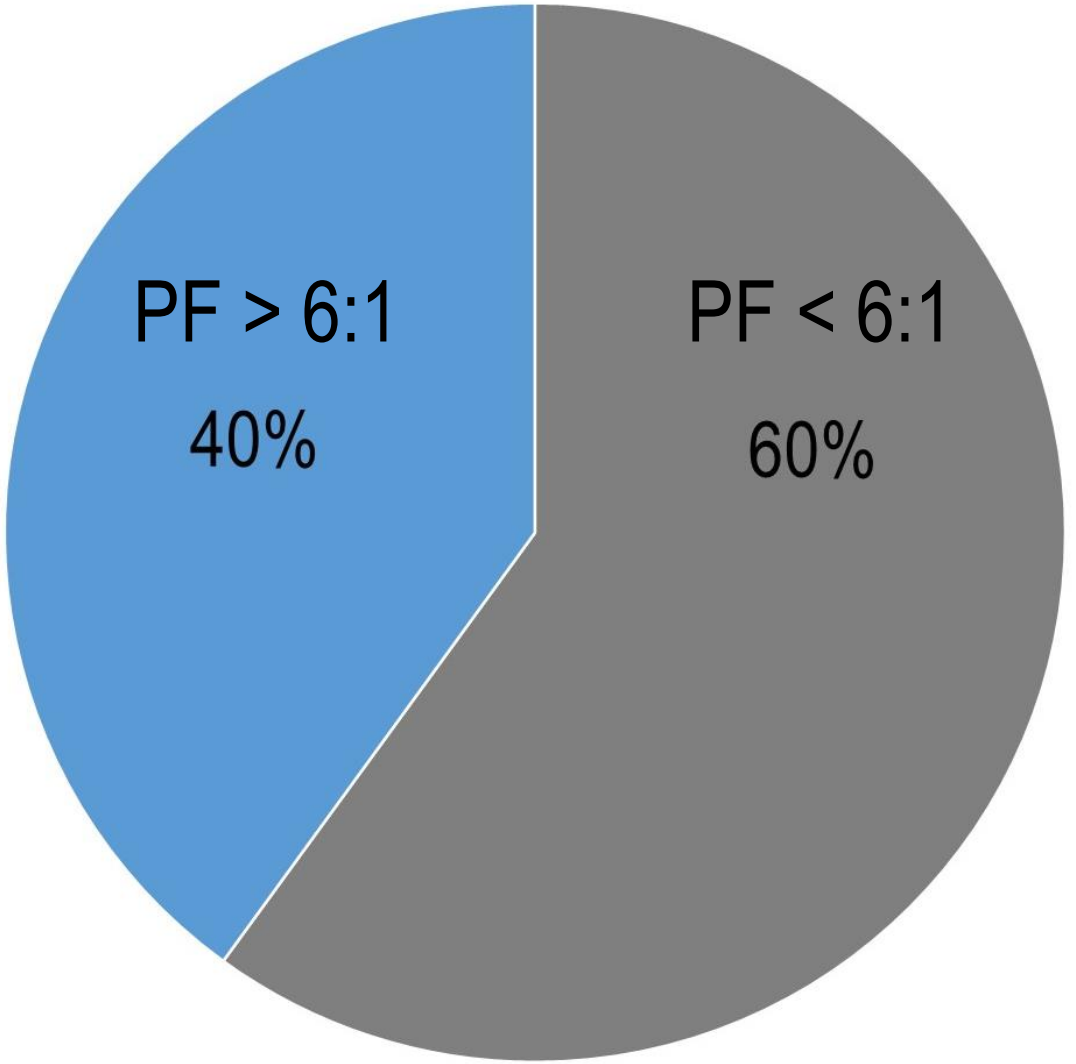


Current Conditions versus Proposed PF

- DPF Hydrographs from **Model** Results
  - DWF
  - 10-year peak hour flow
  - Average DWF*6
- Design capacity is 40 mgd



Estimated Percentage of Municipal Customers with PF > 6:1*



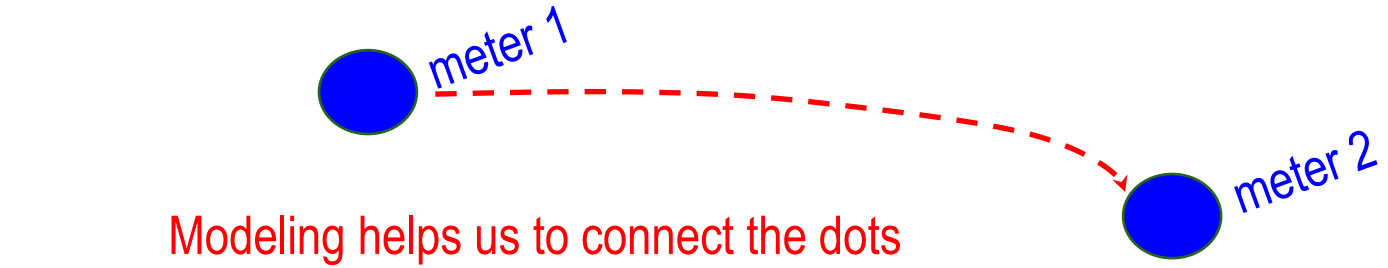
*Based on preliminary modeling and flow monitoring information

Measured versus Modeled

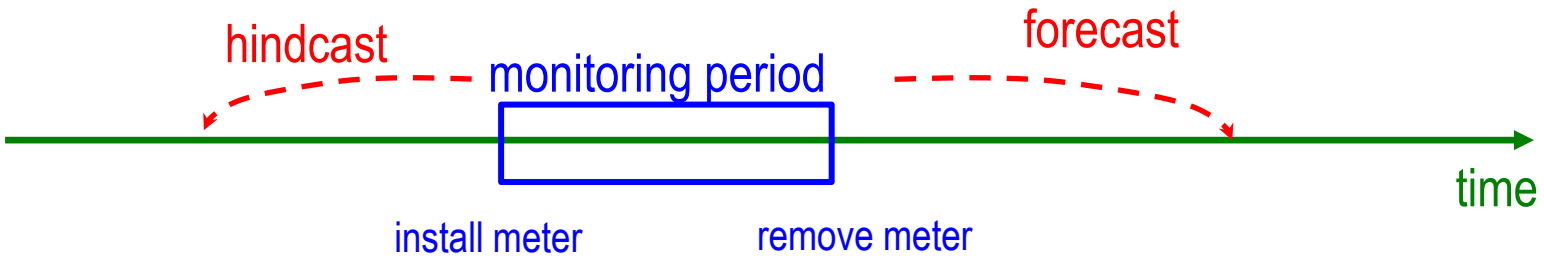
Flow meters:

We only know what we know <u>where we know it</u>

… when we know it



Modeling helps us to connect the dots and get an idea about what is going on in between the dots



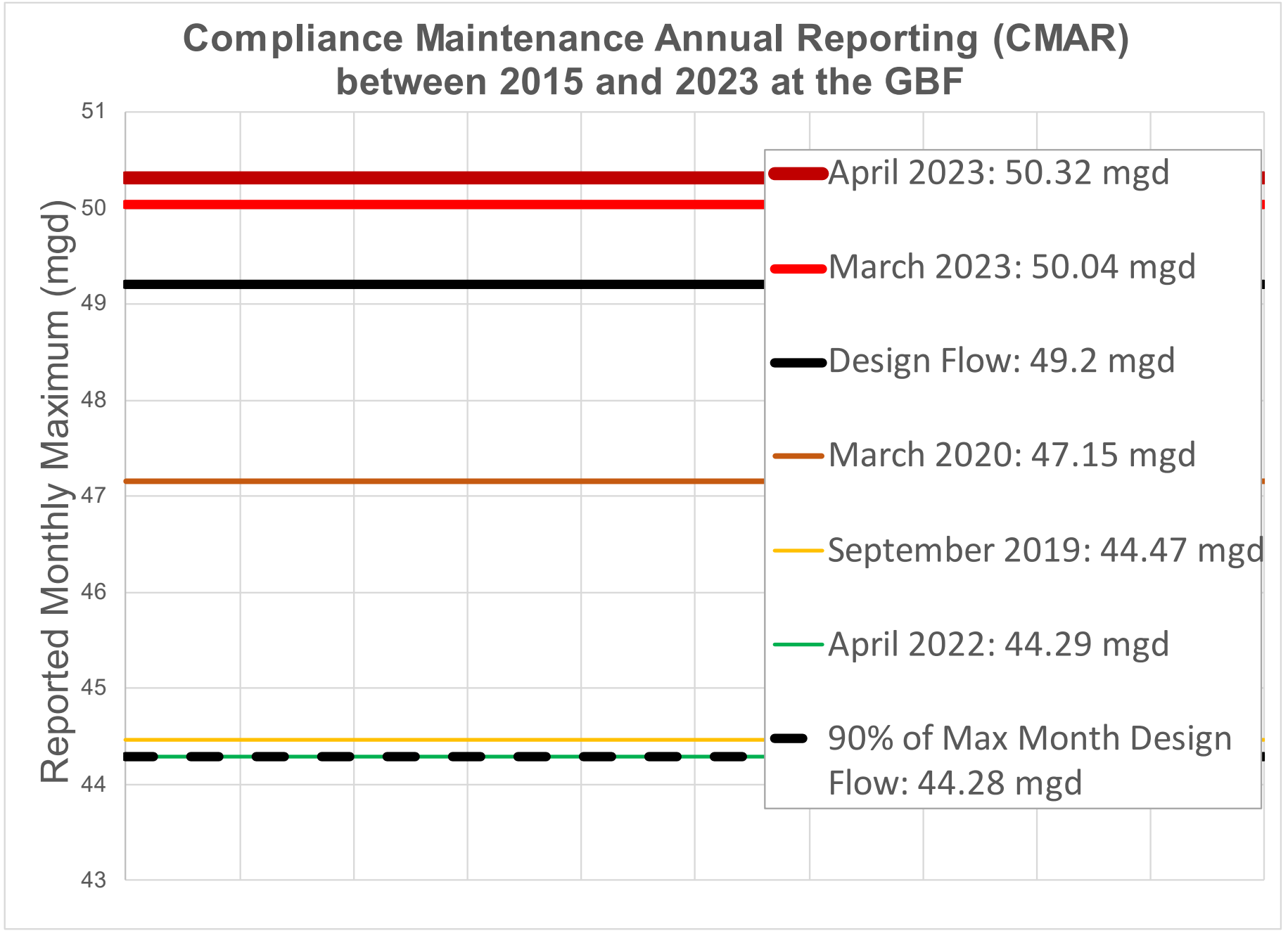
Peaking Factor Flow Limits: Thoughts and Discussion

- Why are flow limits important for development requests?
- PF 6:1 is a starting point
- Would there be support with starting lower? Higher?
- Is there an understanding of modeled versus measured data and results?
- Suggestions for improvements?
- Clarifications?

Why an I&I Volume Standard?

From Draft I&I Plan: "In the future, NEW Water may determine that it is necessary to also establish a 24-hour I&I volume standard for tributary areas."

- Some facilities are more sensitive to volume
- Volume is an issue with longer duration events and back-to-back events


Compliance Maintenance Annual Reporting (CMAR) between 2015 and 2023 at the GBF
Reported Monthly Maximum (mgd)
51
50
49
48
47
46
45
44
43
April 2023: 50.32 mgd
March 2023: 50.04 mgd
Design Flow: 49.2 mgd
March 2020: 47.15 mgd
September 2019: 44.47 mgd
April 2022: 44.29 mgd
90% of Max Month Design Flow: 44.28 mgd

I&I Volume Standard: Thoughts and Discussion

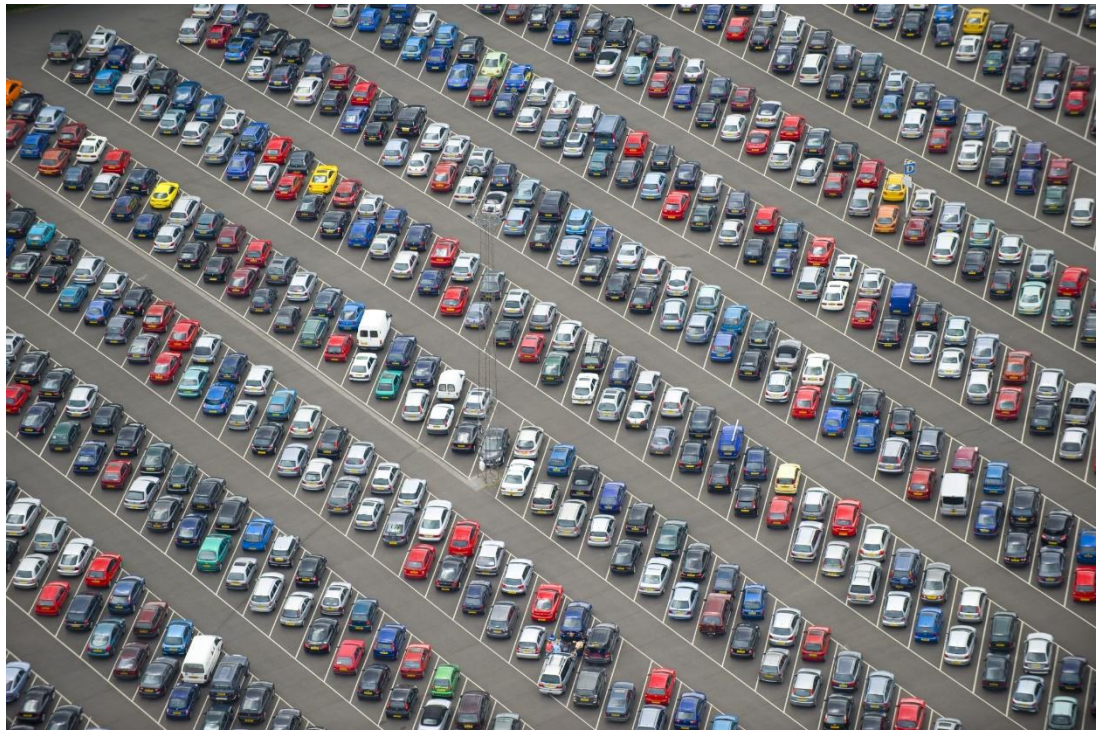
- Why would an I&I volume standard be important?
- How might a customer municipality's I&I reduction strategy be different with a volume standard?

Compliance

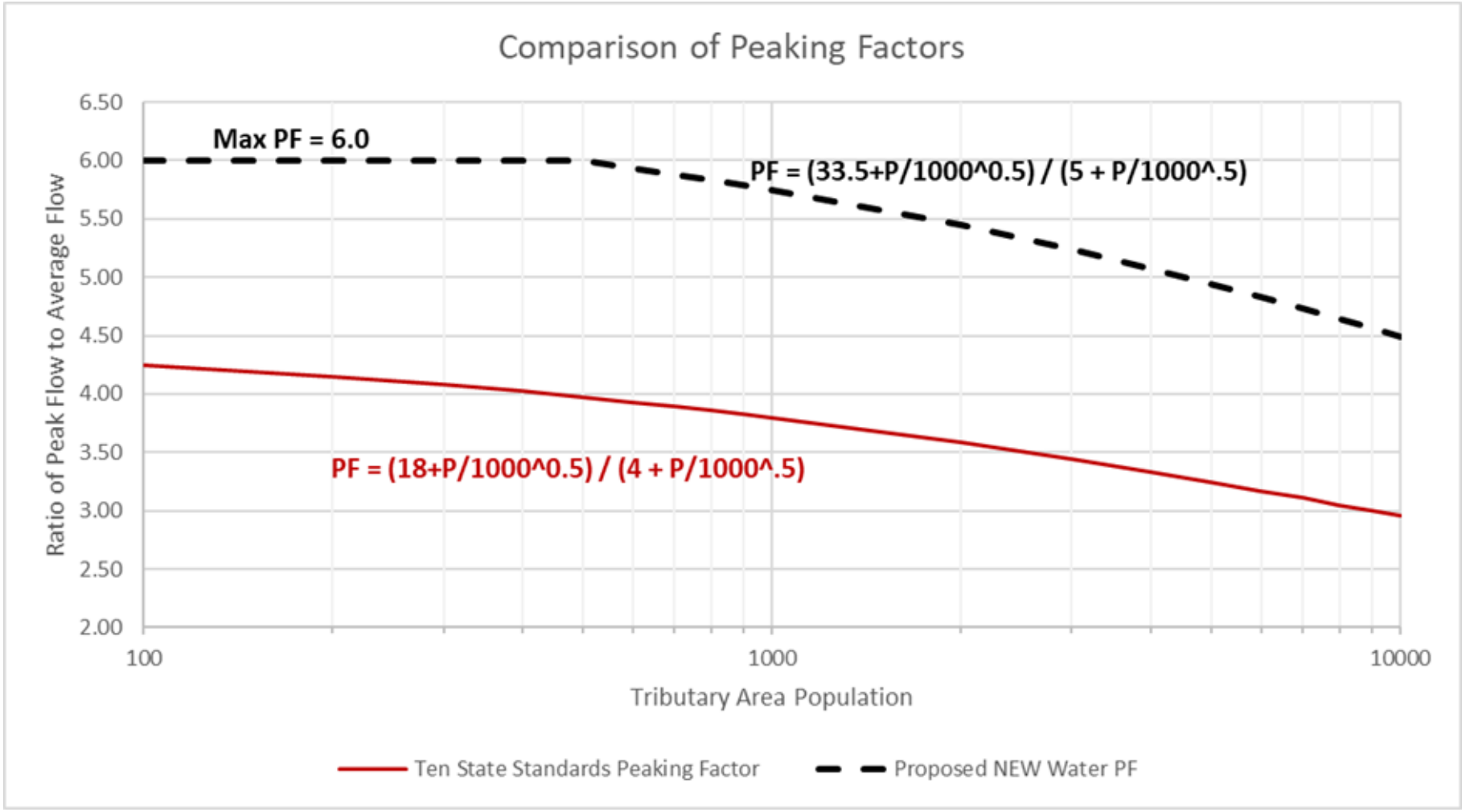
- Why is compliance needed?
- How is non-compliance identified?
- In the plan, what actions result from non-compliance?

Why is Compliance Needed?

- If municipal customers do not comply with the flow limit, then too much flow will enter the system
- Without compliance, I&I will use up capacity that could be otherwise used for development
- Help manage I&I reduction efforts so they are:
  - Completed in the locations needed
  - Completed to the extent needed
  - Most cost-effective



How is non-compliance identified?



Non-compliant if LOS PF > 6:1 in areas with population equivalent of 500 or less

In the Plan, what actions arise from non-compliance?

Phase 1

- Develop a Work Plan for investigating and repairing the system
- Negotiated completion timeline
- Applicable for grant funding

Phase 2

- Applies if Phase 1 is unsuccessful
- Develop a Work Plan for investigating and repairing the system
- 5-year implementation term with some negotiation on schedule
- Grant funding could be applicable

Phase 3

- Applies if Phase 2 is unsuccessful
- Fines and/or penalties could be triggered, with amounts scaled to extend of flow limit exceedance
- Grant fund may not be applicable

Compliance: Thoughts and Discussion

- What if the I&I reduction is effective but not at or below the flow limit?
- How does a customer with upstream and downstream flows from others handle compliance?

Next Steps

- Financial Impact Evaluation (in progress)
- Flow Monitoring Plan
- Upcoming TAC Meetings and Tentative Timing:
  - TAC Meeting #3 (Oct)
  - TAC Meeting #4 (Dec/Jan)
- Tentative Topics:
  - Financial Assistance
  - Compliance Actions
  - Financial Impact Evaluation Results
  - Flow Monitoring Plan
  - Proposed Tributary Areas to Flow Meters

Thank you!

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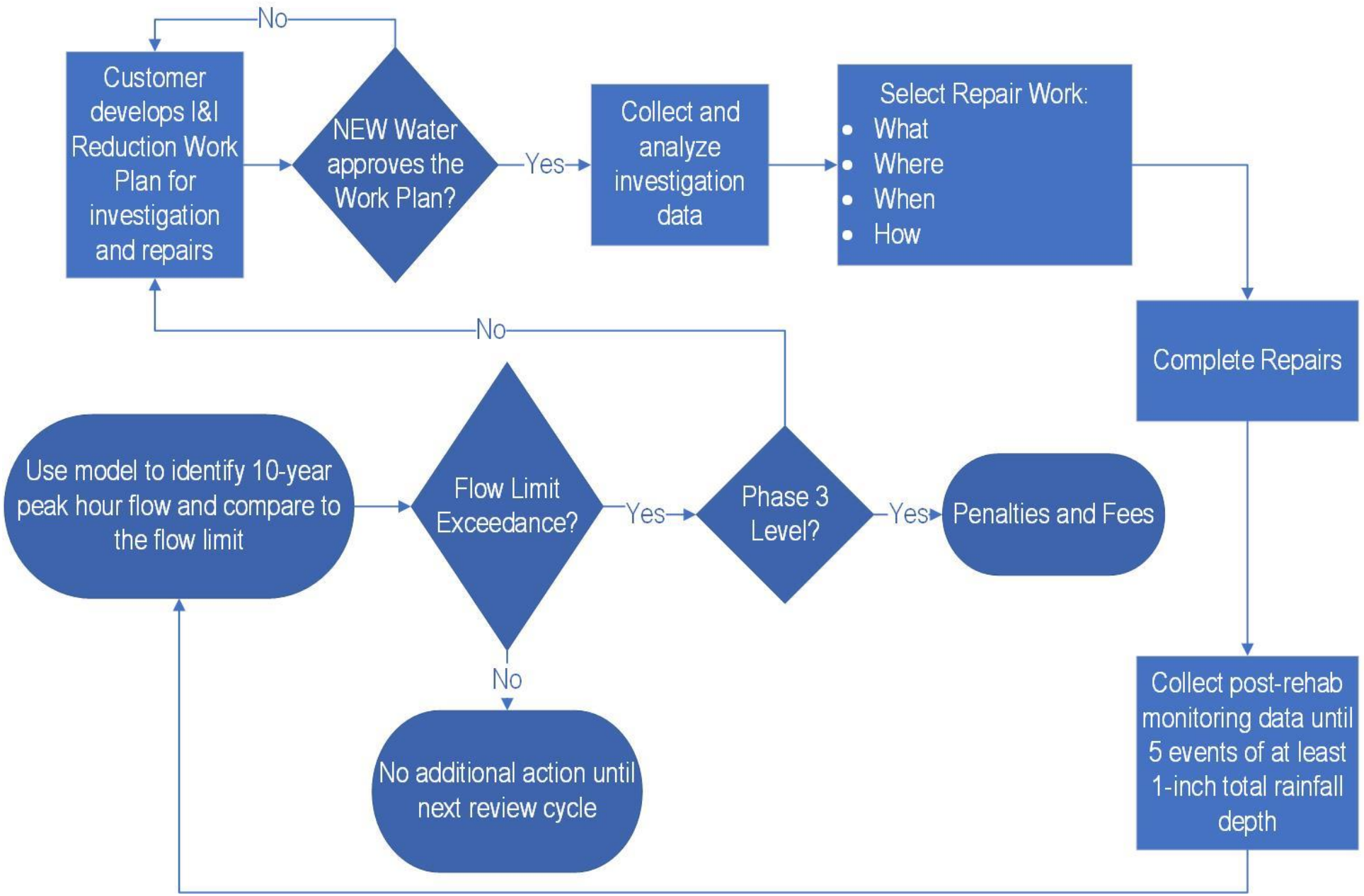
Population Equivalent

- Estimate of usage made of sanitary sewer facilities
- Flow translated into usage per person
- Example:

Flow of 75 gallons = one person generating 75 gallons per capita per day

Population equivalent calculator – The Equivalent (the-equivalent.com)

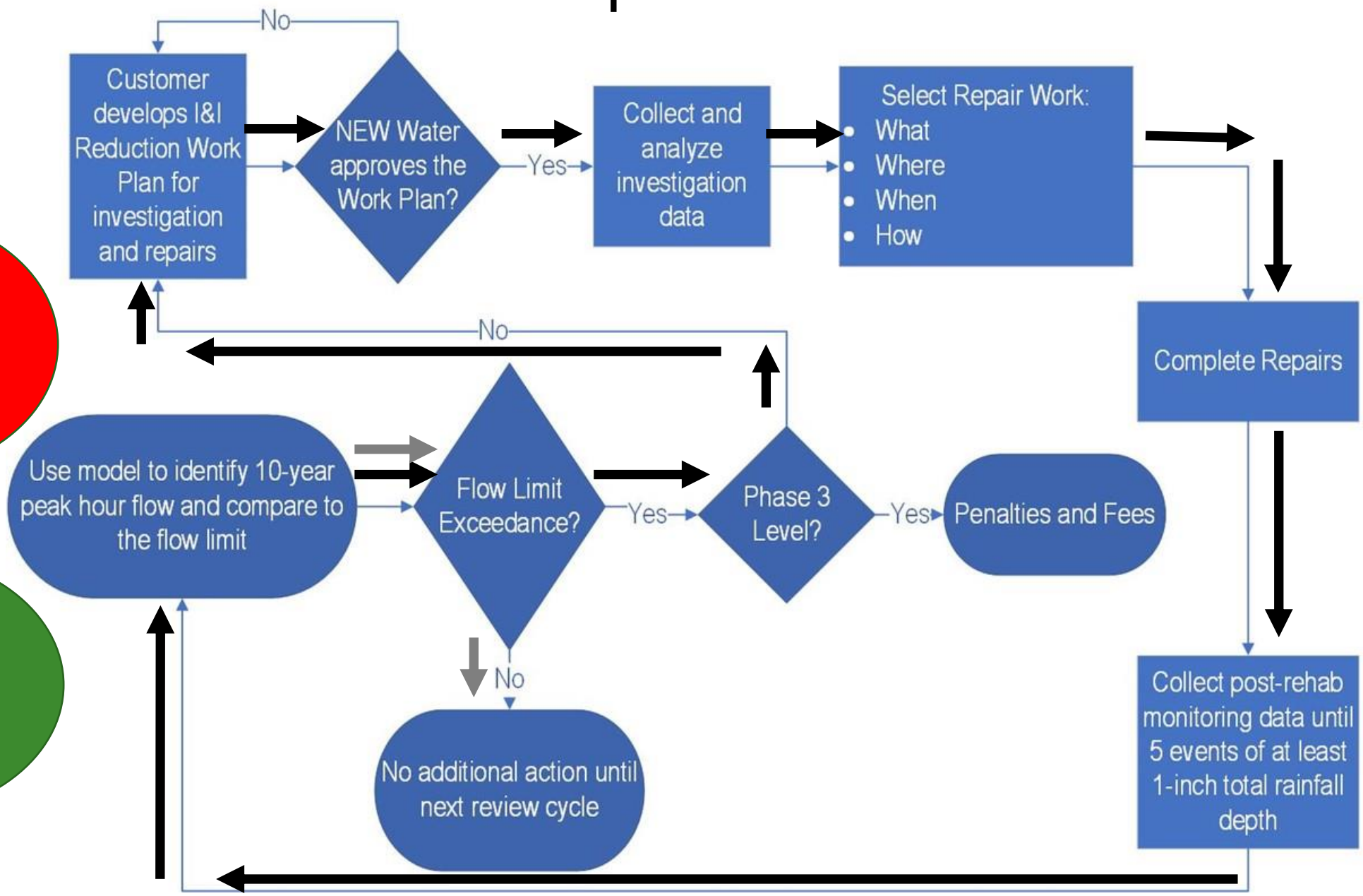
How Does a Non-Compliant Area Become Compliant?



Example

Pre-Rehab
10-year Peak Hour Flow
PF = 12:1

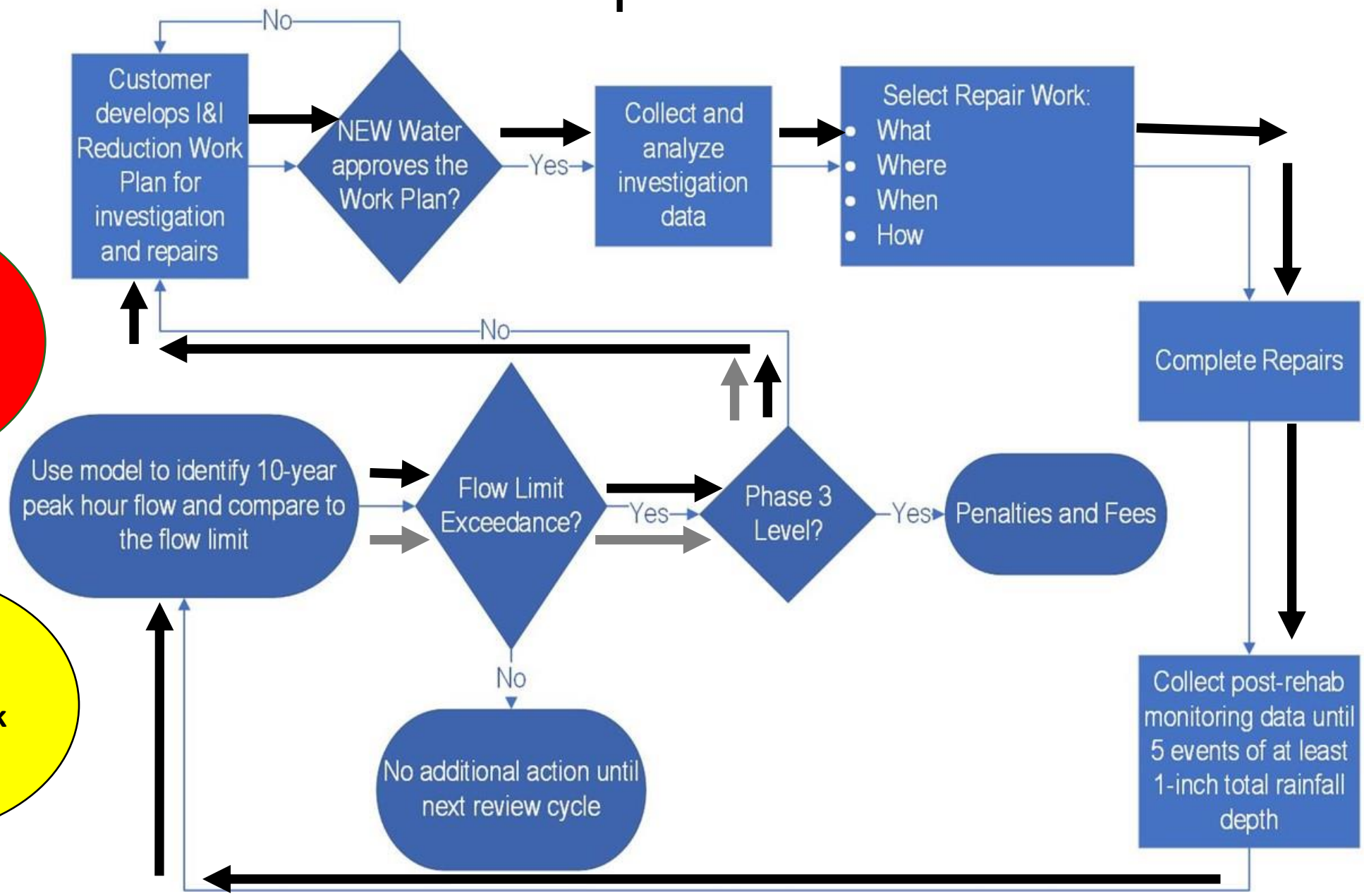
Phase 1
Post-Rehab
10-year Peak Hour Flow
PF = 4:1



Example

Pre-Rehab
10-year Peak Hour Flow
PF = 12:1

Phase 1
Post-Rehab
10-year Peak Hour Flow
PF = 8:1



Example

Pre-Rehab 10-year Peak Hour Flow PF = 24:1

Phase 2 Post-Rehab 10-year Peak Hour Flow PF = 8:1