Planning a Flushing Program

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Overview

- Why flush?
- Different flushing goals
- Conventional vs. Unidirectional flushing
- When to use each?
- How to model flushing?

Why are we flushing?

- Remove solids
- Improve disinfectant residual
- Respond to complaints
- Remove biofilms
- Test hydrants
- Cleanup after contamination

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Removing Solids

- Prevent turbidity/color
- Must increase velocity/shear stress
- Increase above normal peak velocity
- Flush with clean water

Improve Disinfectant Residual

- Bring fresh water into area
- Velocity/shear stress don't matter
- Understand initial water quality
- Review die-off after flushing
- May need (automatic) blowoffs

Respond to Complaints

- Understand nature of complaint
- Response different for
  - Color/turbidity
  - Taste and odor
- Study chronic areas

Remove Attached Growth

- Understand nature of growth (biofilms, corrosion)
- Establish flushing criteria
- May need high velocities

Test Hydrants

- Ensure hydrants operate
- Operate every hydrant
- Flush with clean water, not random
- Document operation
- Record pressure, flow

Cleanup after Contamination

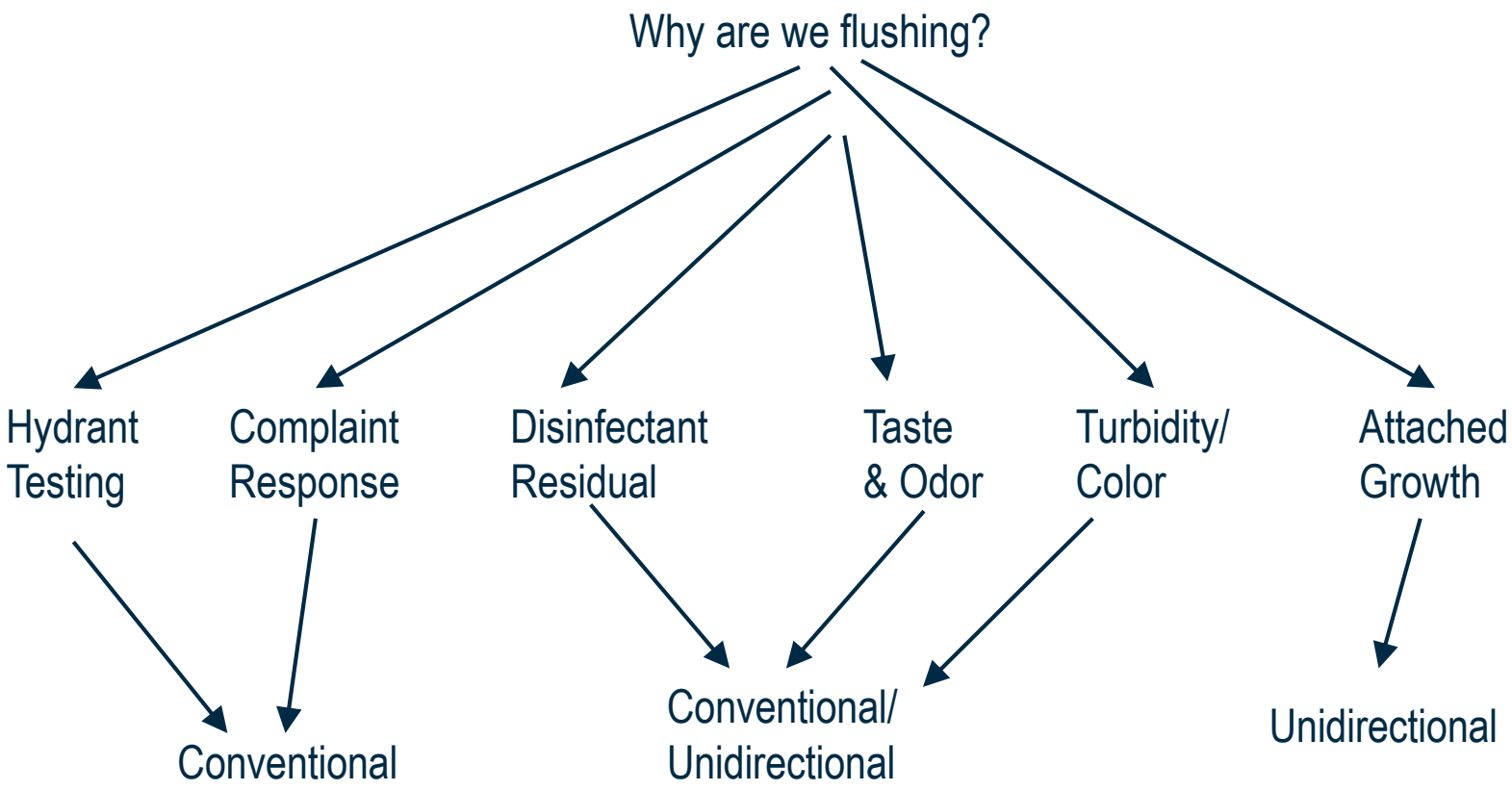
- Identify extent of contamination
- Flush clean to dirty
- Careful plan – don’t spread plume
- Frequent monitoring for confirmation

Common Threads

- "Flush with clean water behind you"
- Plan before you flush – modeling helpful
- Document pressures, flows, quality (if applicable)
- Safety…
- Safety…
- SAFETY

Types of Flushing

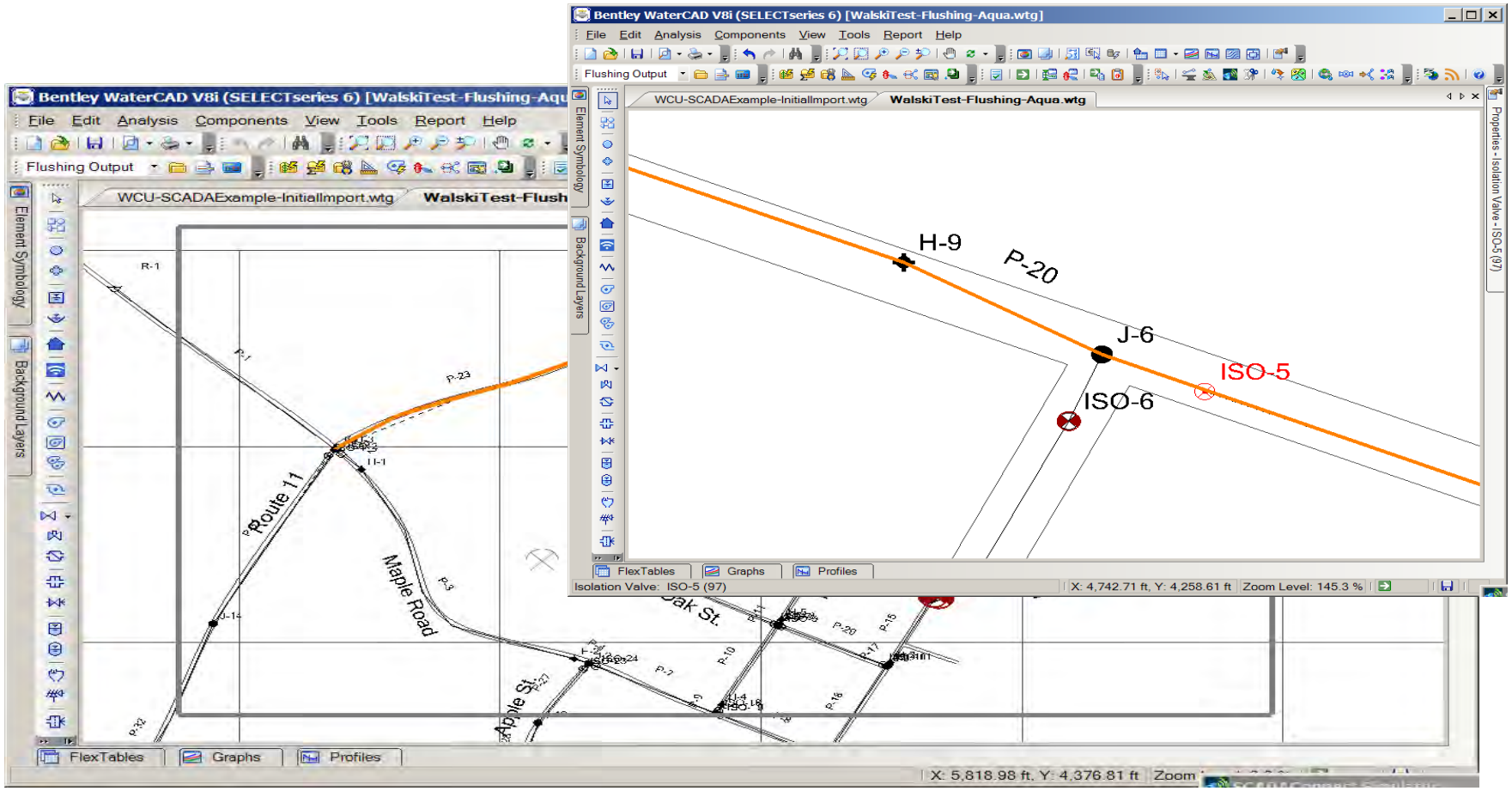
- Conventional
  - Easy
  - Achieves sufficiently high velocity
  - Must understand flow direction
- Unidirectional
  - Achieves higher velocity
  - Uses less water



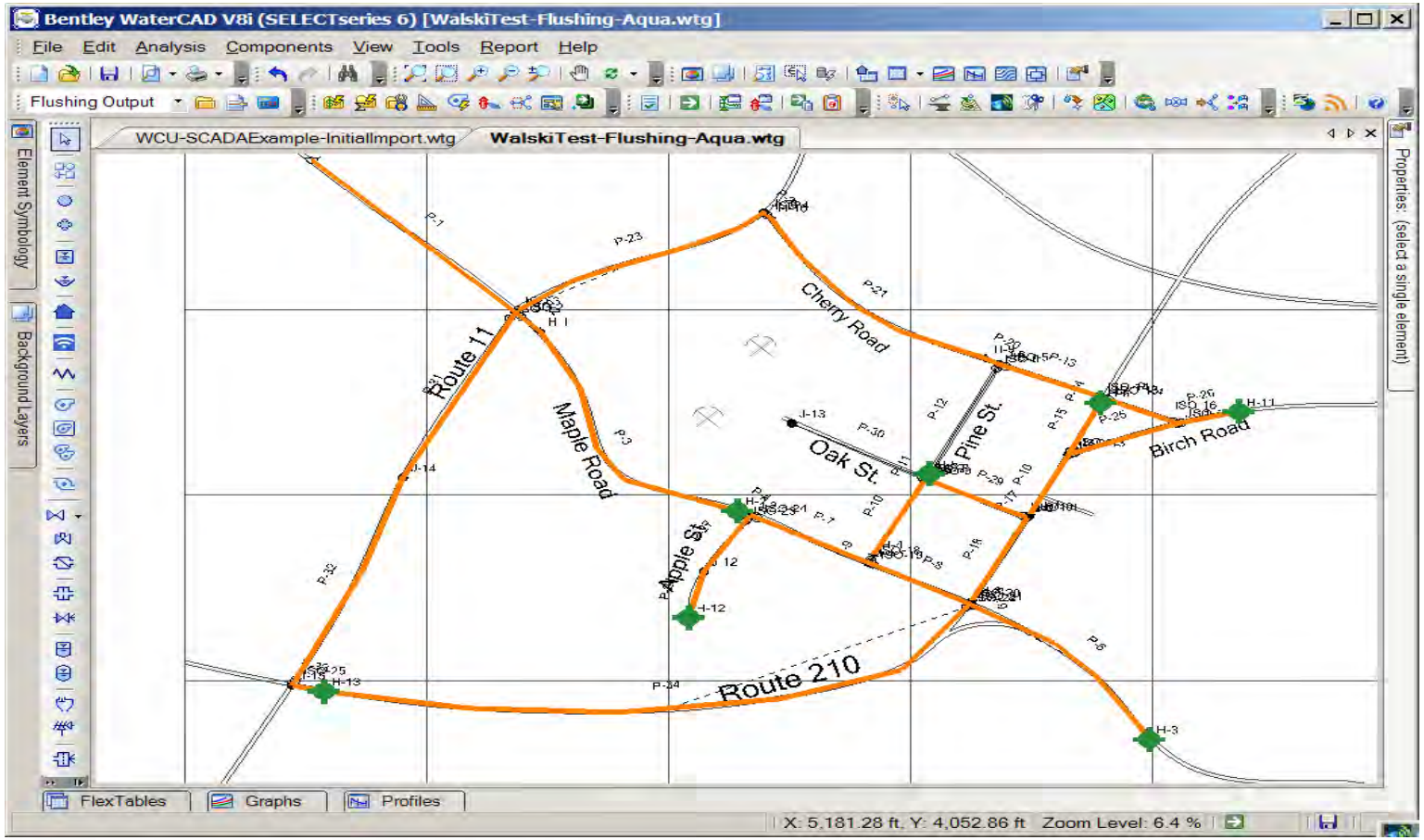
Modeling to Support Flushing

- Flushing runs
  - Shear stress/velocity important
  - Not tracking water quality
- Extended period simulation runs
  - Quality/age more important than shear
  - Tracking water quality from source
- Why are we flushing?

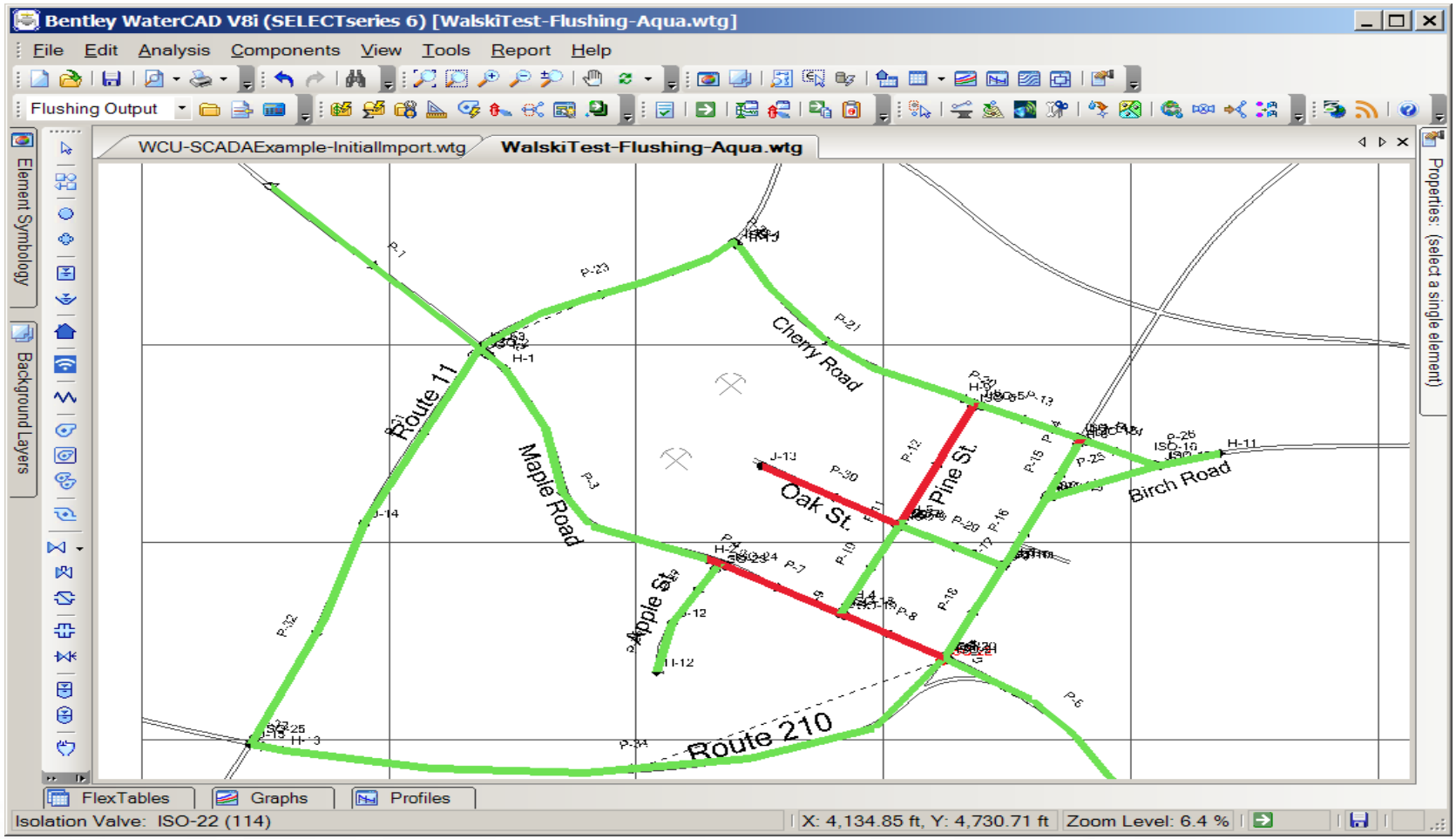
Pipe Run Creation



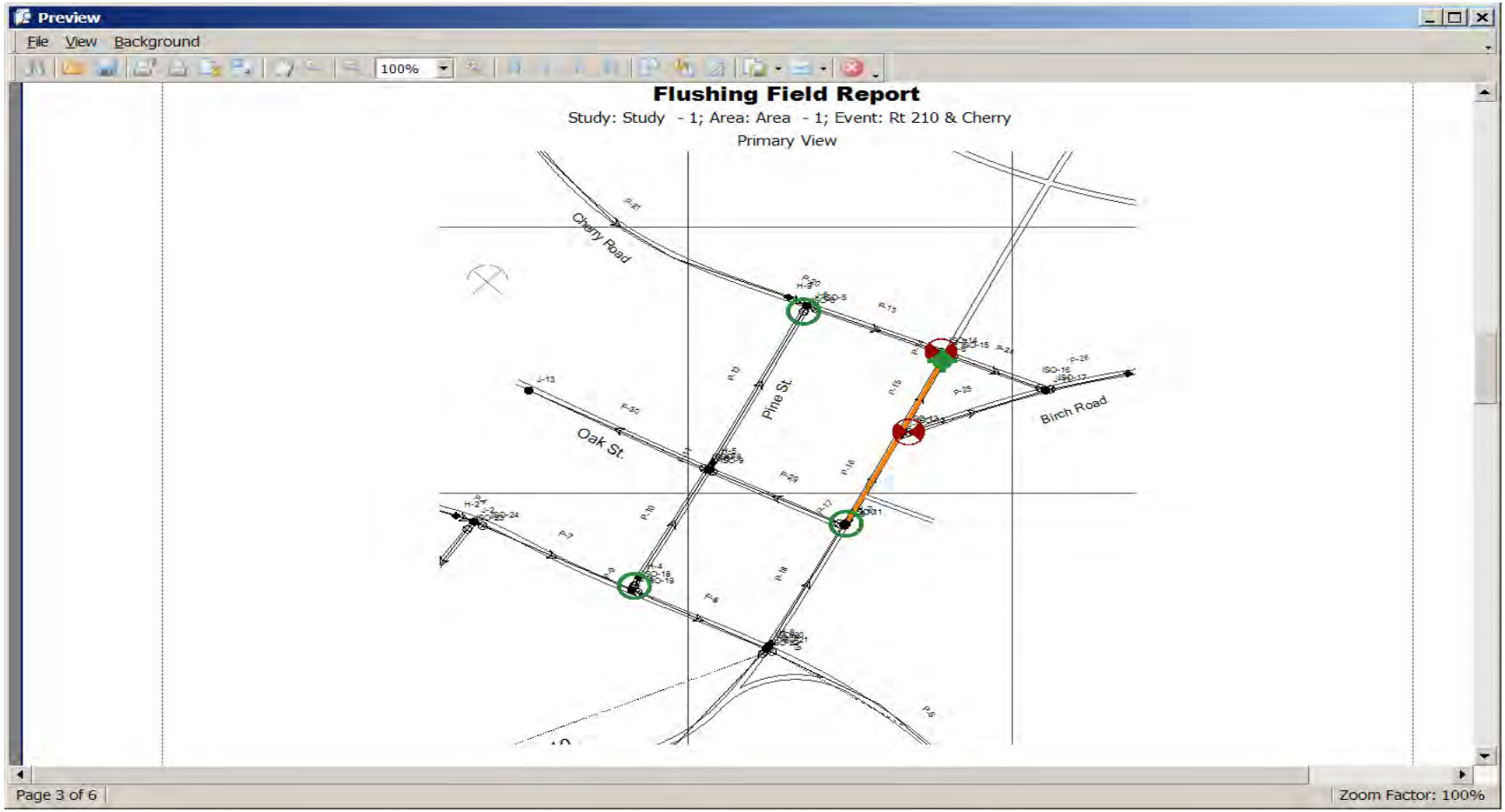
Highlight Plan for Area



Highlight Results



Operator Report Drawing



Operator Reports

Preview

File View Background

100%

Flushing Field Report

Study: Study - 1; Area: Area - 1; Event: Maple to east end

Fire Hydrant	Notes	Pressure (psi) Static, Dynamic	Measured Flow (gpm)	Predicted Pressure (psi)	Predicted Flow (gpm)
H-3	End of Maple			24	730

Valve	Operation	Notes
ISO-24	Open ☐	Maple at Apple
ISO-18	Closed ☐	Pine at Maple
ISO-22	Closed ☐	Rt 210 south of Maple
ISO-20	Closed ☐	Rt 210 north of Maple
	☐	
	☐	
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Flushing	Minimum	Recommended
Time (min)	5.1	10.2
Volume (gal)	3,724.5	7,448.9

Start Time

End Time

Operator

Date

Water Quality	Initial	Final
Clear	☐	☐
Colored	☐	☐
Chlorine Residual		
Turbidity		

Pipe Run to be Cleaned
P-8, P-7, P-6

Notes

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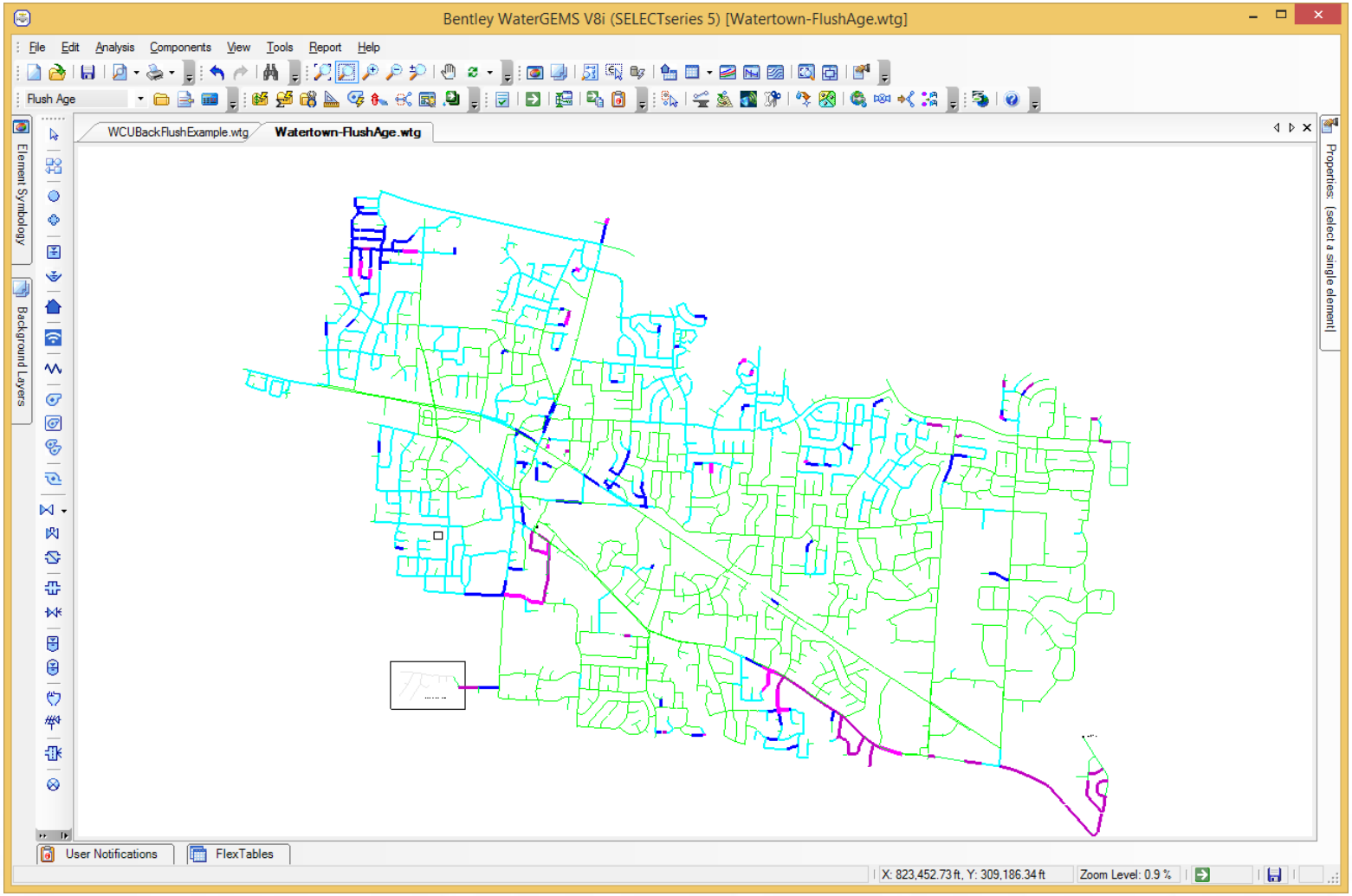
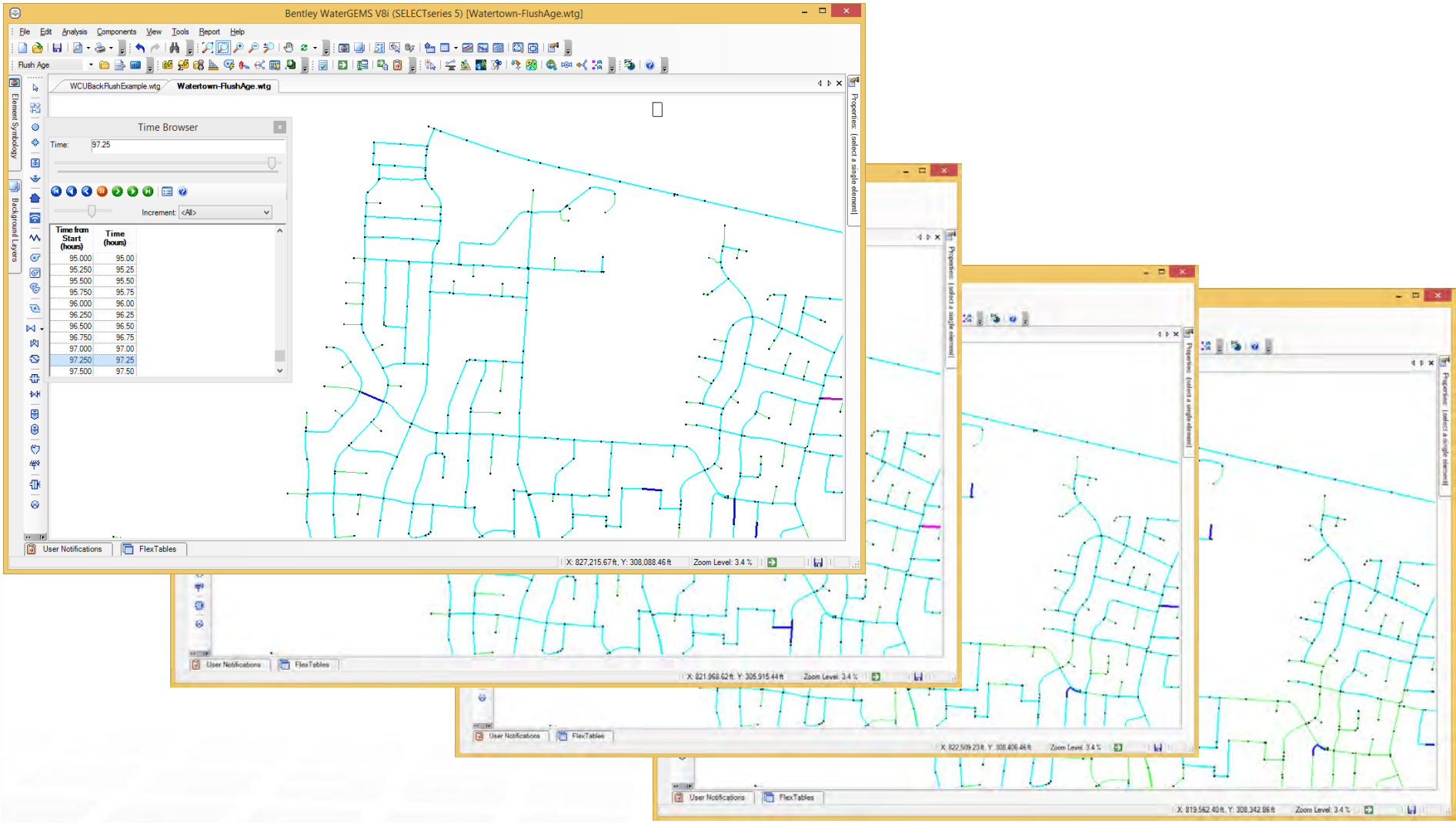
Identifying Older Water



Flushing Progress



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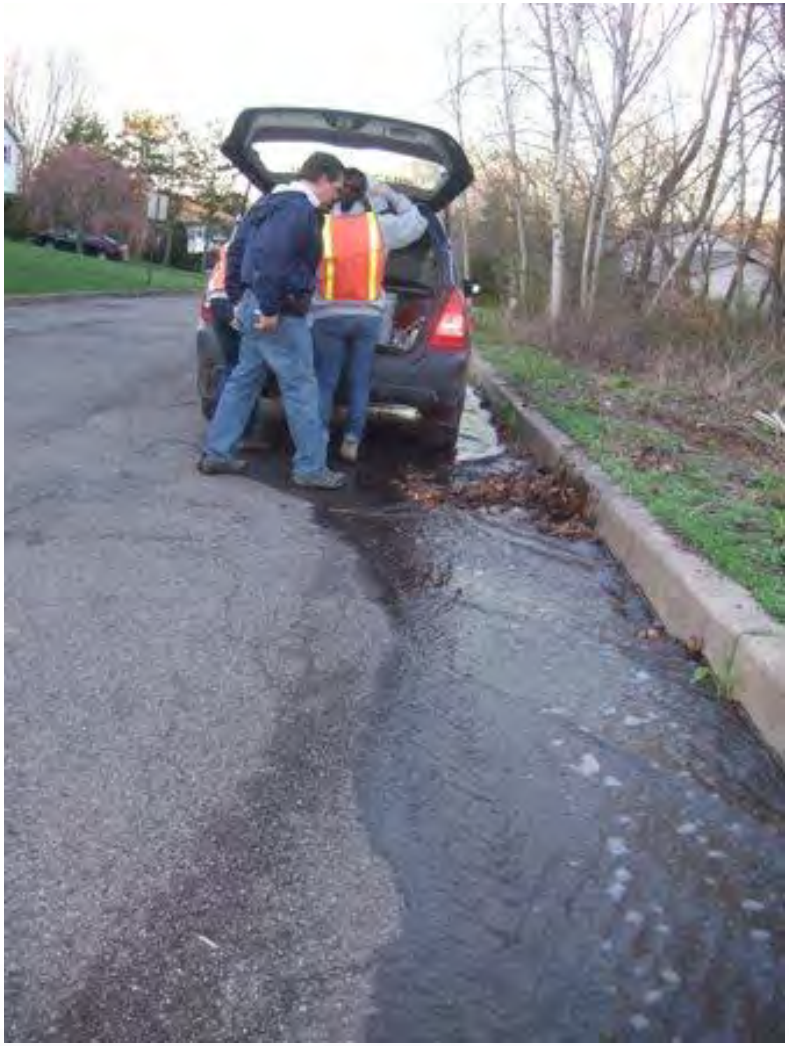
Need for Dechlorination

- Always
- Never
- Site specific

Field Work



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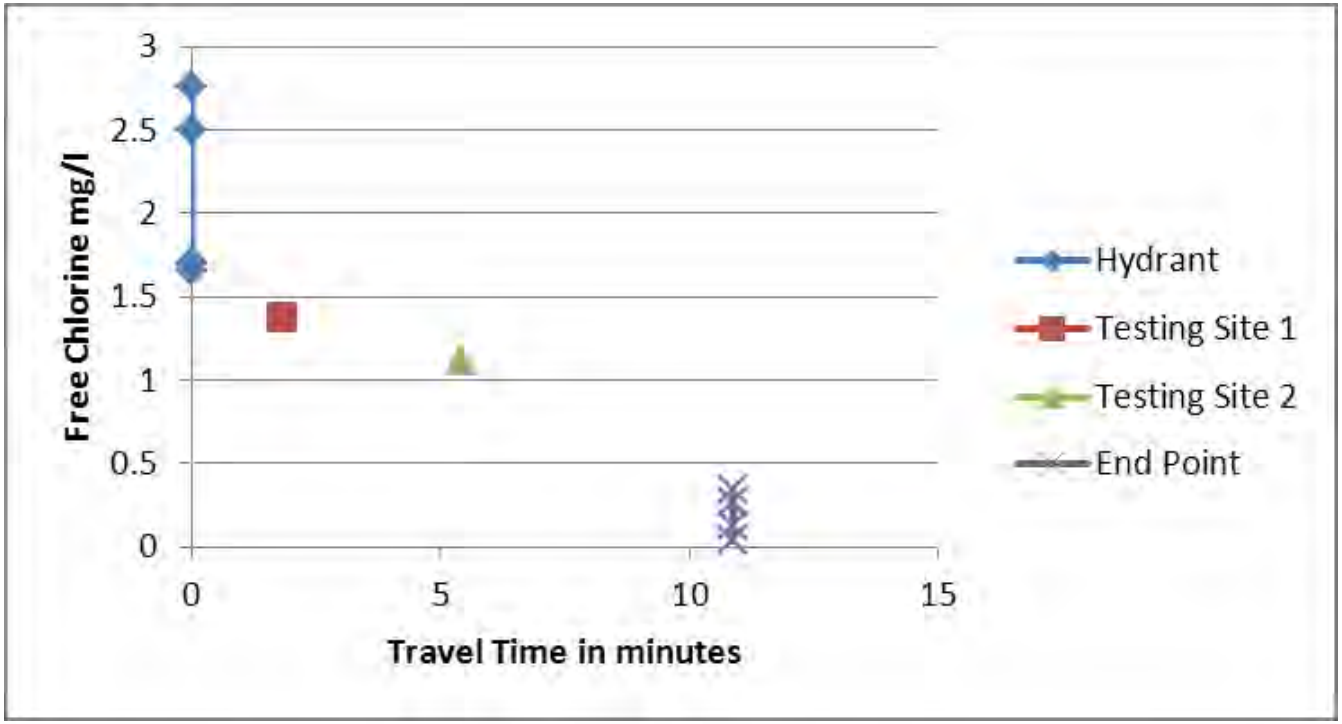
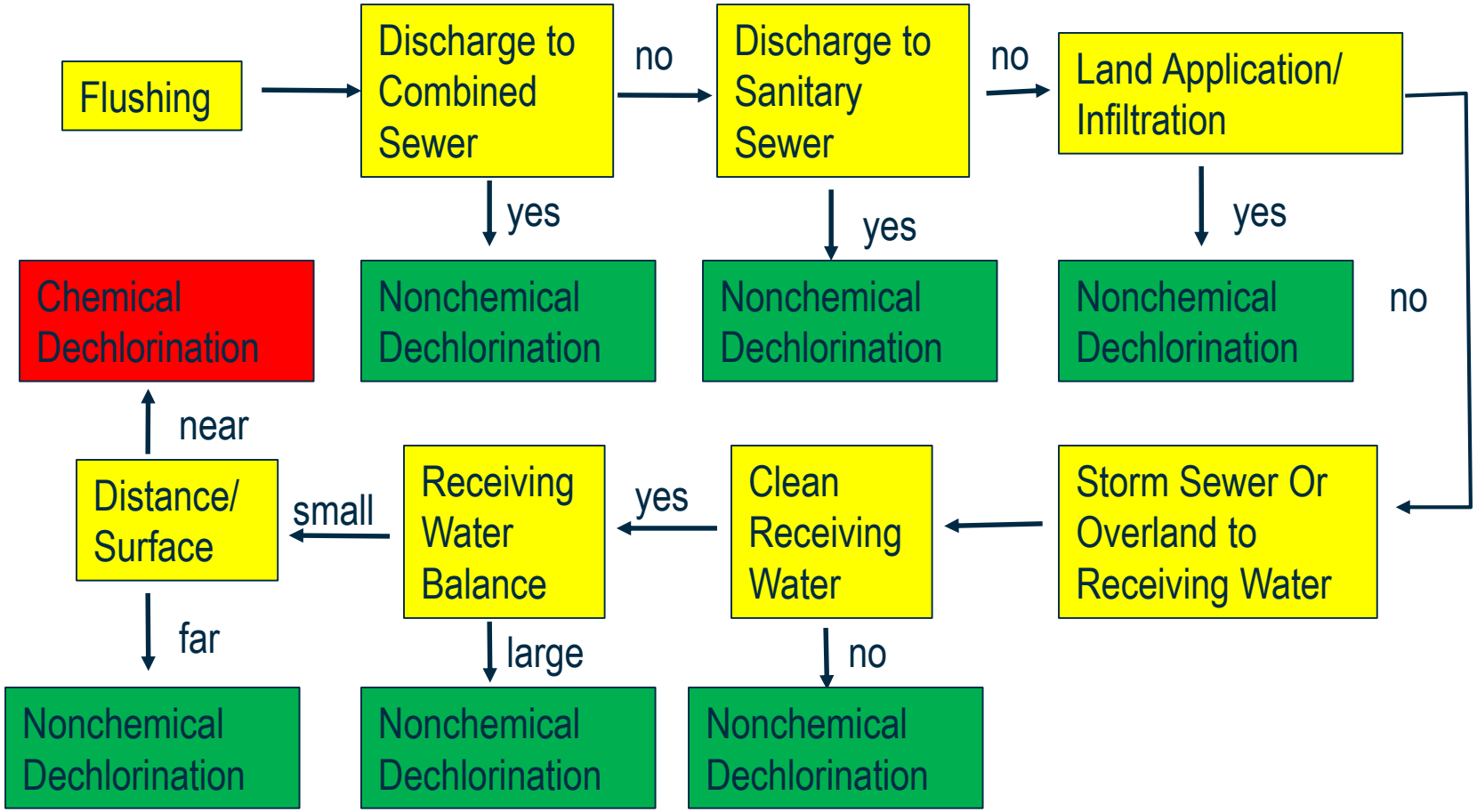
Field Testing Data

- Analysis provided range of decay



Site 1 – Free Residual Decay Range



Suggested protocol

Summary

- Need to identify flushing goal
- Modeling can help planning
- Water disposal must be considered

There is no single "right" way

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