Taking Control – Peak Flow Management At Village Creek Water Reclamation Facility

January 27, 2017

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Overview

- **Presentation #1**
  - Project Team
  - Village Creek Water Reclamation Facility Overview
  - Peak Flow Management Project Overview
  - Basin Sizing and Optimization
- **Presentation #2**
  - CMAR Process
  - Construction Activities

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Project Team

Owner/Operator
Village Creek Water Reclamation Facility

HRC Improvements
Pipeline
Hydraulics
On-Site Resident Project Representative

Peak Flow Storage Basin

Construction Manager at Risk (CMAR)

Environmental Review
Process Integration

Geotechnical

Village Creek Water Reclamation Facility Overview

- City of Fort Worth's only wastewater treatment facility
- Serves over 1,000,000 people in Fort Worth and 22 wholesale customers/cities
- Activated sludge process with Tertiary Treatment
- High Rate Clarification for wet weather flows over 255 MGD
- Reclaimed Water System
- Energy Recovery System
- Beneficial Reuse of Biosolids by Land Application

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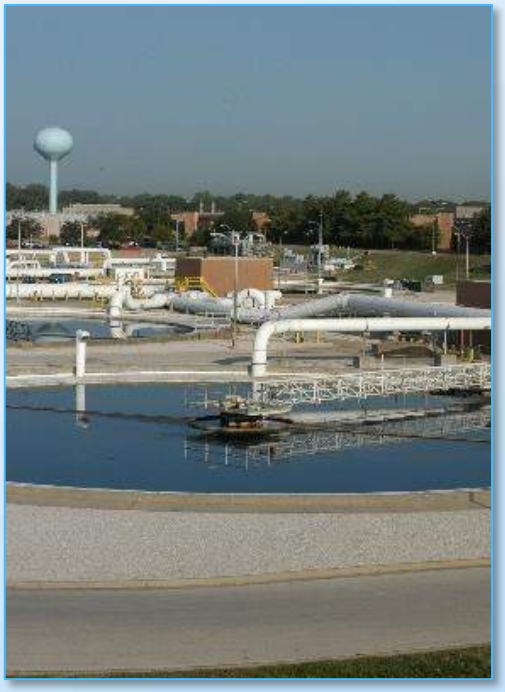
Village Creek Water Reclamation Facility Overview

- **Permitted Treatment Capacity**
  - 166 MGD Daily Average Flow
  - 369 MGD 2-Hr Peak Flow
- **Sustainable Peak Treatment Capacity (SPTC)**
  - Observed historical 3-day peak flow capable of being treated by VCWRF (also known as Extended Peak)
  - Current – 250 MGD
  - 2030 – 320 MGD
- **2HR Functional Treatment Capacity (2HR FTC)**
  - Peak operating capacity of the functional unit
  - processes at VCWRF
  - Current – 303 MGD
  - 2030 – 388 MGD



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Peak Flow Management Project Overview

Peak Flow Management

- 2012 Master Plan identified the projected 2HR peak flow will exceed VCWRF permitted treatment capacity in 2015
- Construct peak flow storage basin instead of amending VCWRF permit to increase functional peak flow treatment capacity to include HRC treatment (383 MGD)

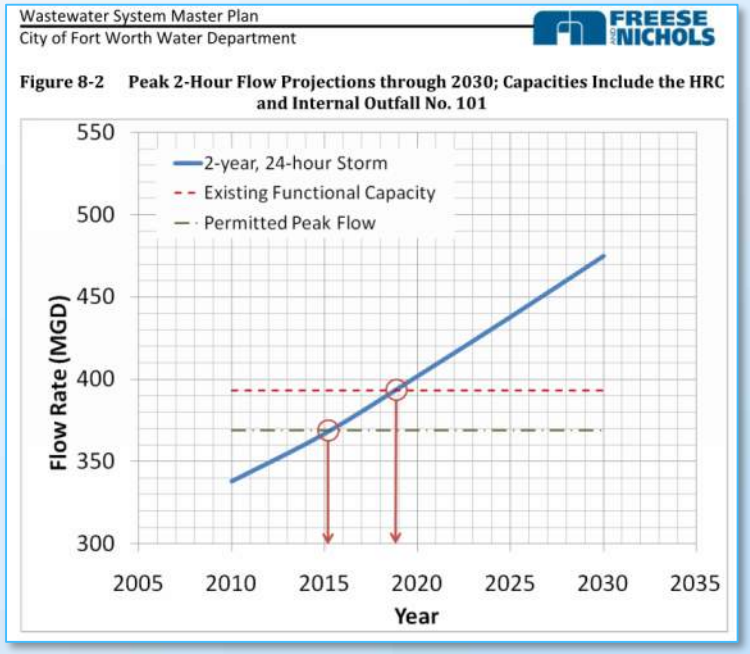

Table 8-2 2-Hour Peak Flow Functional Capacity with Ongoing Improvements

	Functional Capacity (MGD)		
	Existing Processes	Existing Process with Current Improvements	With Filtrate Management and Decreased Primary Clarifier Efficiency
HRC System	**66**	**80**	**80**
Fine Screens	345	525	525
Primary Clarifiers	303	**303**	**303**
Activated Sludge System	**279**	304	320
Filtration(1)	150	280	280
Disinfection	480	480	480
Solids Processing	n/a	n/a	n/a
Overall Functional Capacity	**279+66=345**	**303+80=383**	**303+80=383**

(1) Not required for functional capacity. Filters can be bypassed in current operations without permit violation.

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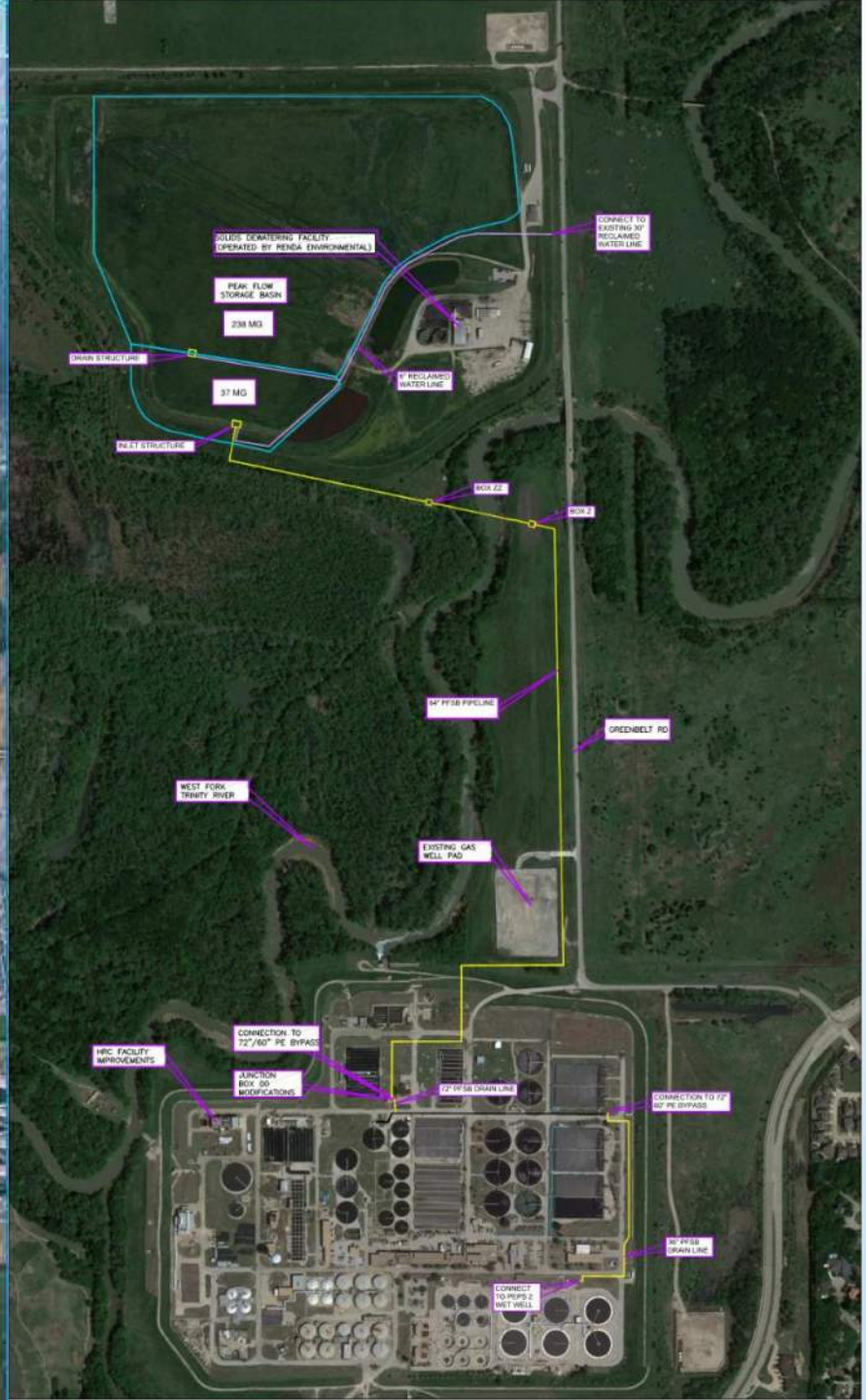

Peak Flow Management Project

- Conveyance vs treatment
- Use existing infrastructure and City owned property to save capital dollars
- Greatest flexibility with lowest responsible cost
- Minimize interruptions with plant operations
- CMAR as alternative delivery method to accelerate schedule
- $14M savings over Master Plan recommended alternative

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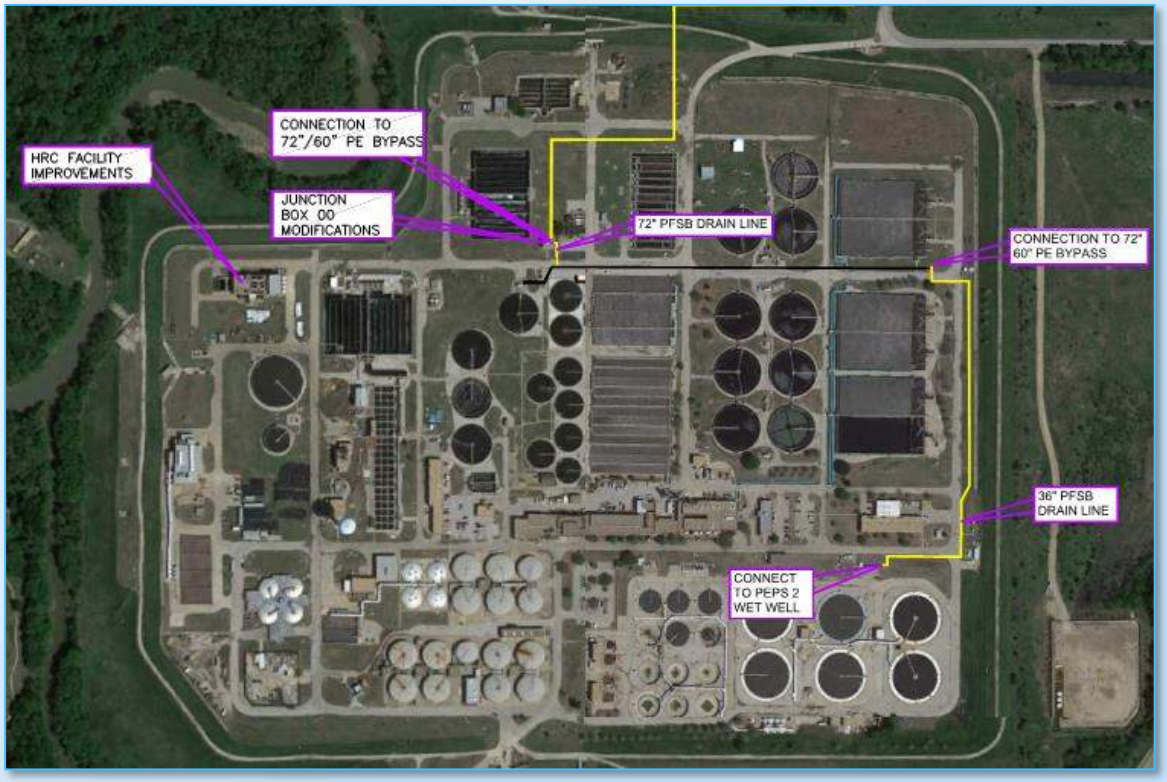
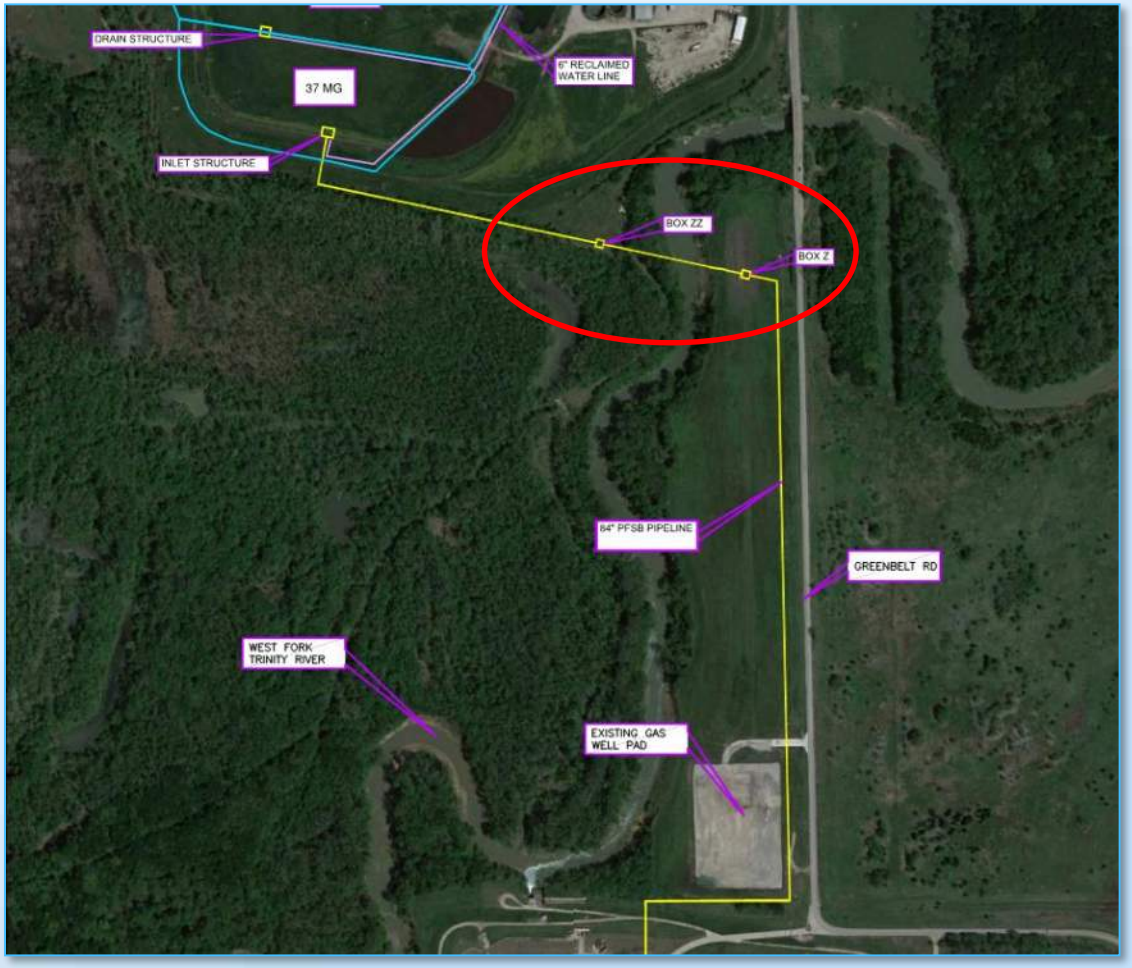
Project Components

- Increase HRC firm pumping capacity to 110 MGD
- Add redundant HRC chemical feed equipment
- Add sluice gate at HRC influent to connect to HRC drain system
- Add sluice gates at Box OO for flow management
- 6,400 LF 84-inch PFSB pipeline
- PFSB flow metering
- 1,400 LF 36-inch PFSB drain pipeline
- Use existing chlorine system for odor control



River Crossing

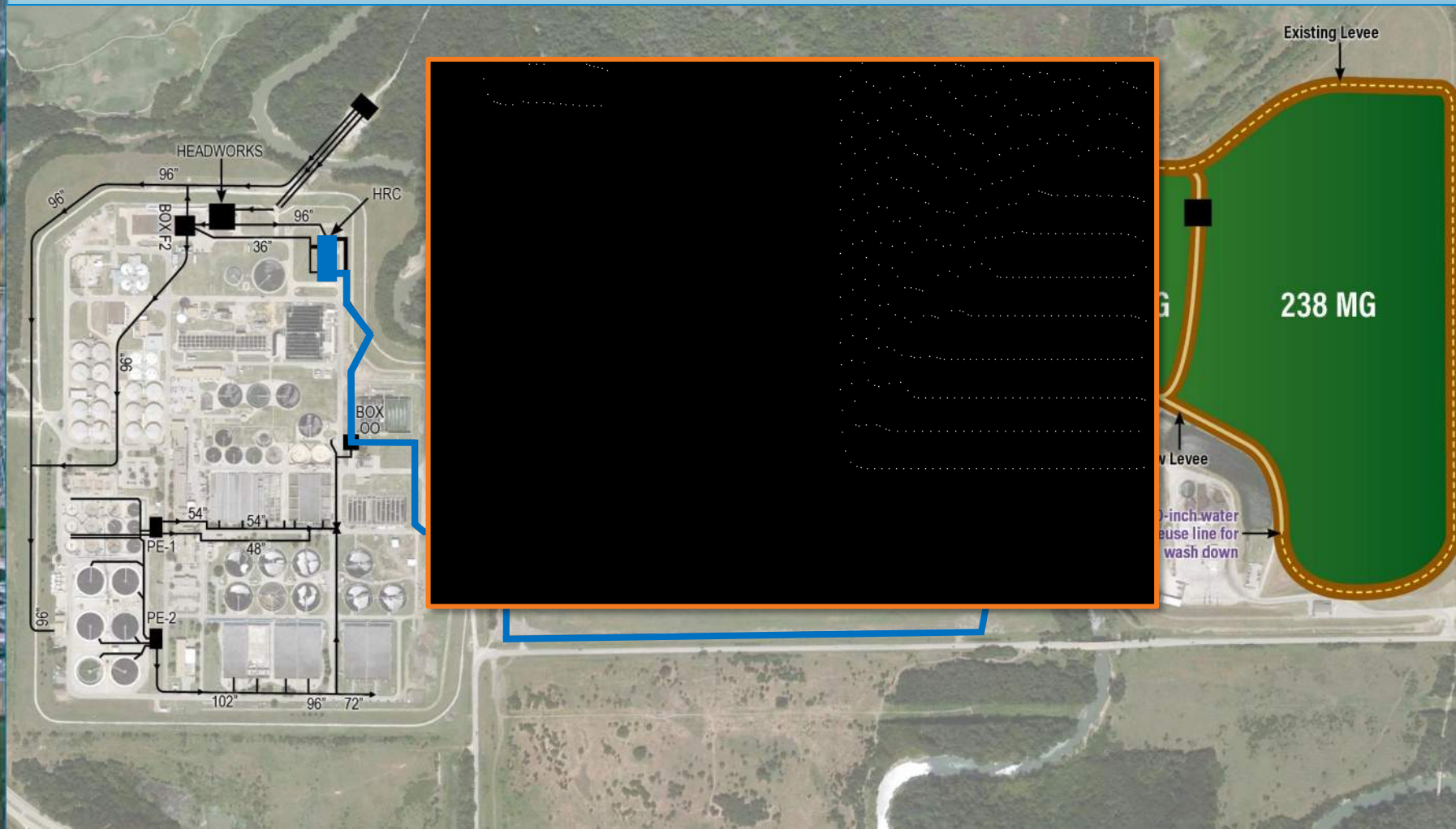
- USACE Nationwide Permit
- Open Cut Method
- Environmental Impact Document
  - Mussel survey and relocation plan



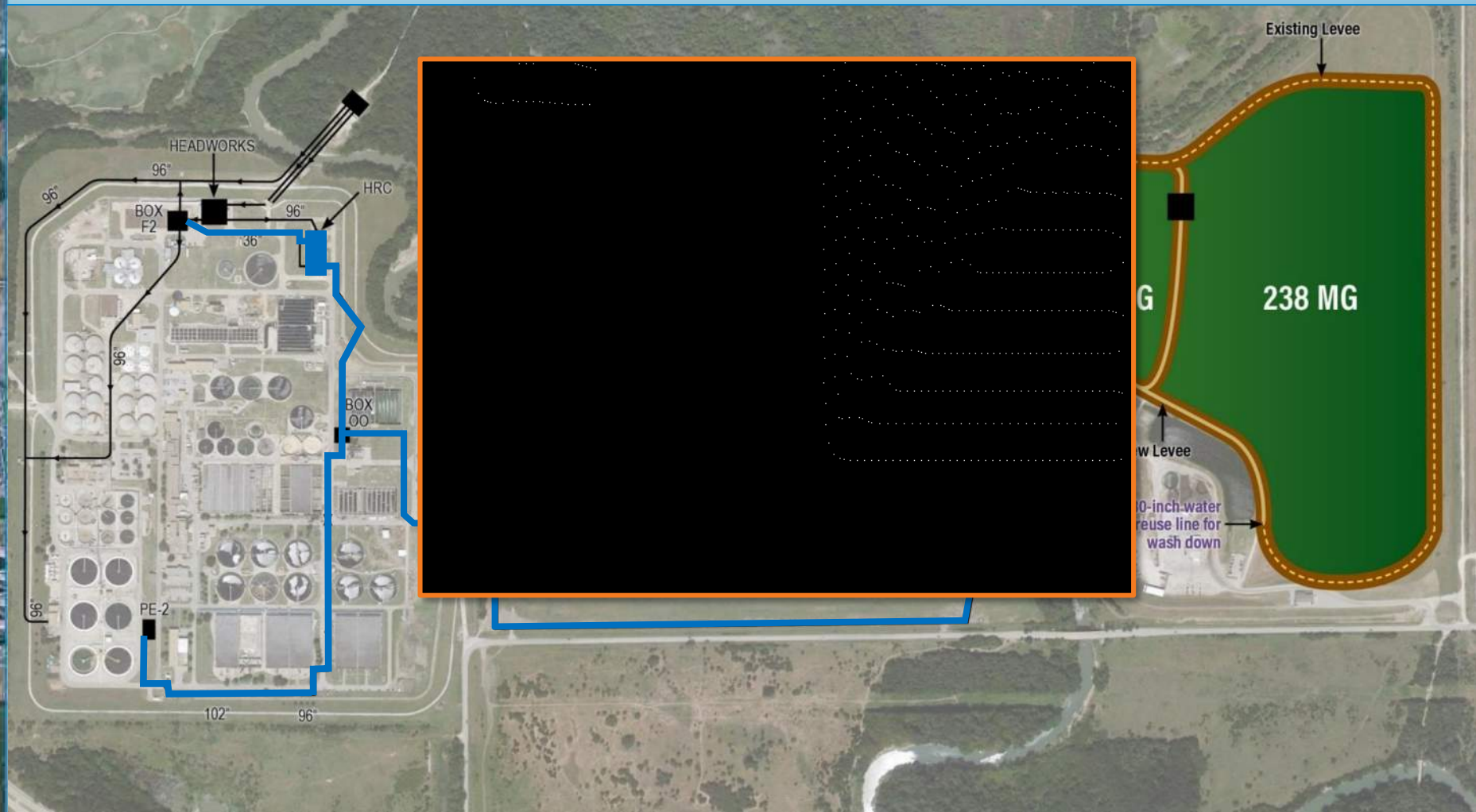
Peak Flow Storage Basin

- Two earthen basins with 275 MG total storage
- Use existing Sludge Only Landfill levee on south, west, and north sides
- Add approx. 4,000 LF of new interior and exterior levee
- Extend reclaimed water line for basin cleaning

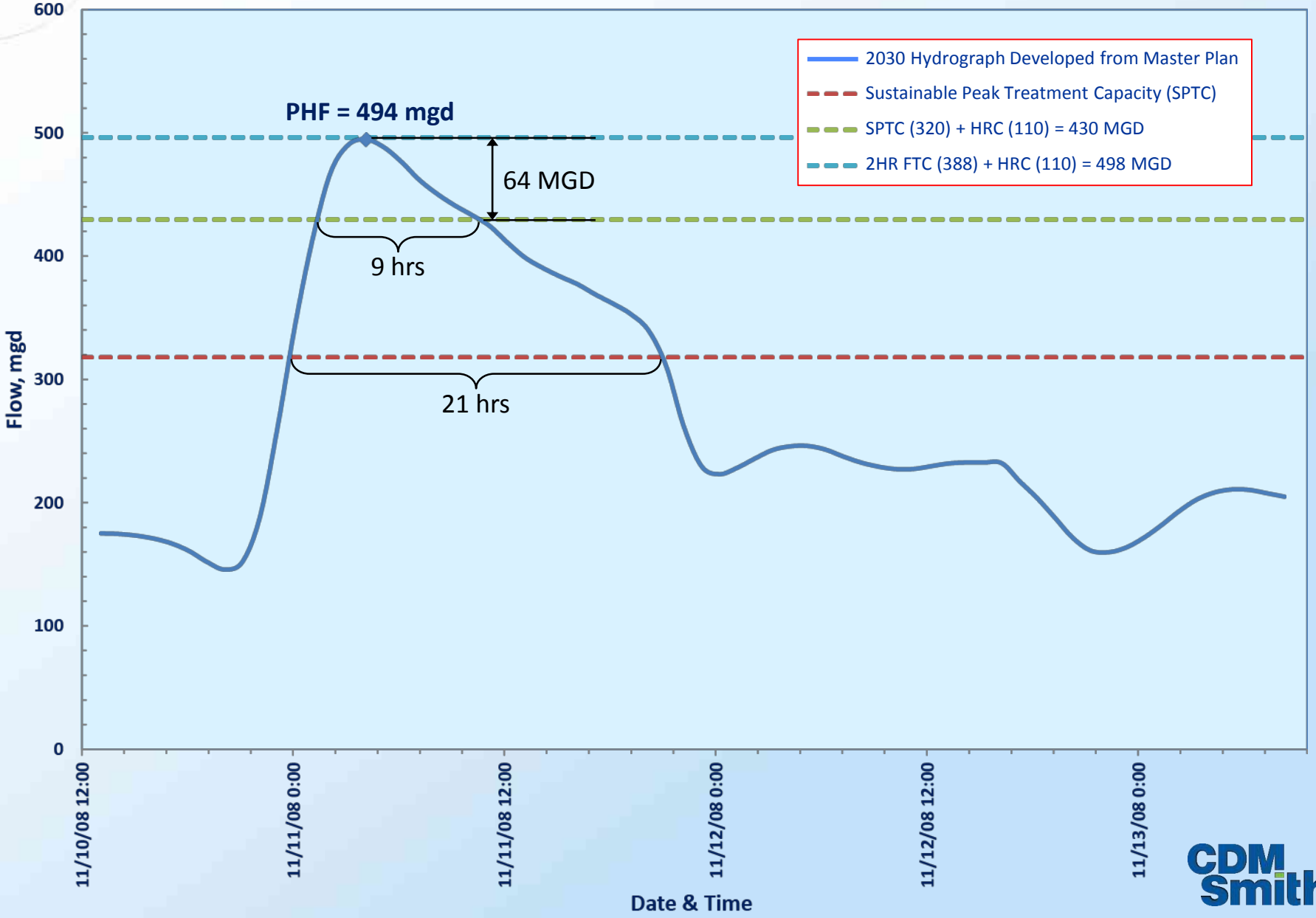
Peak Flow Management Facilities



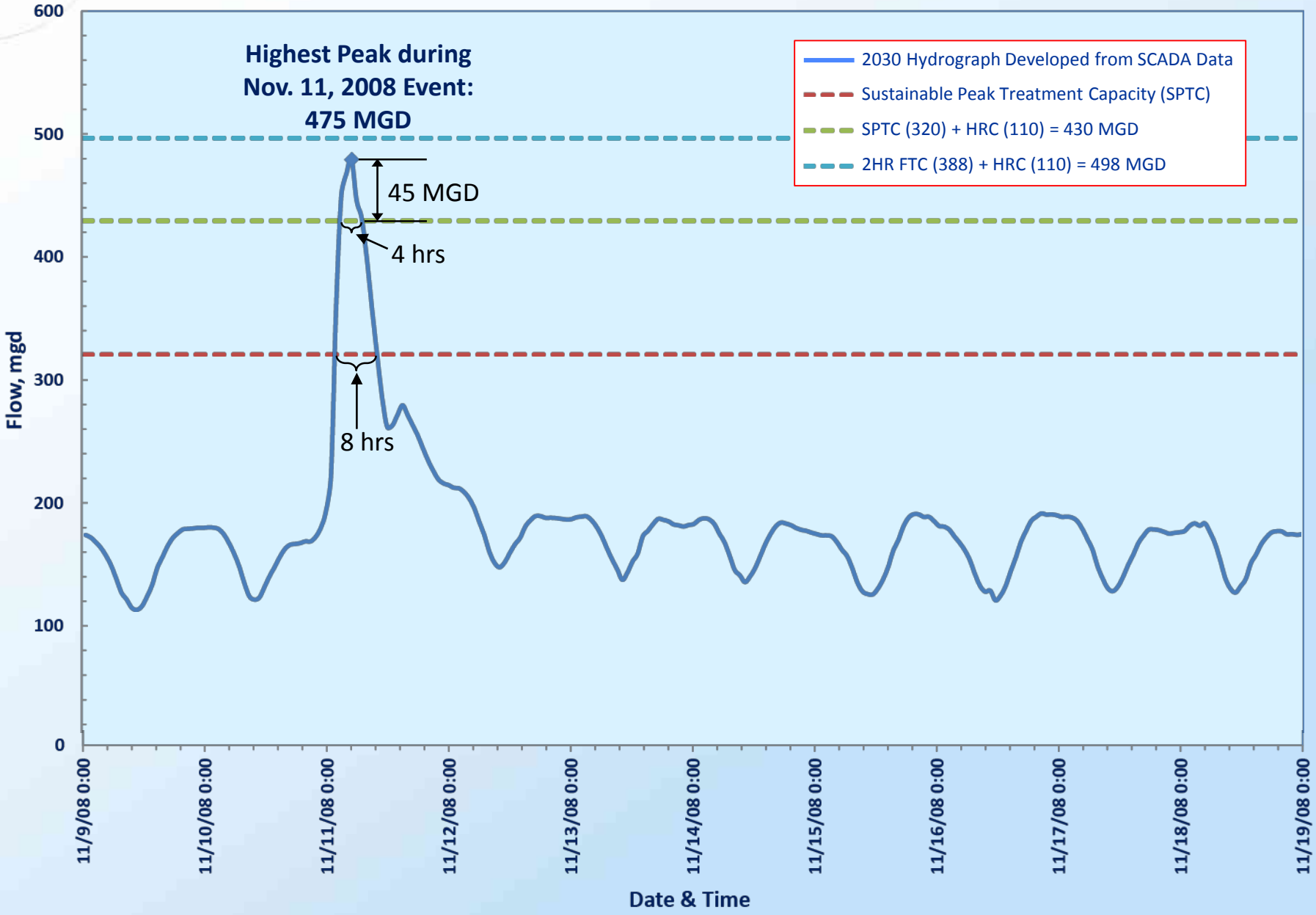
Peak Flow Management Facilities



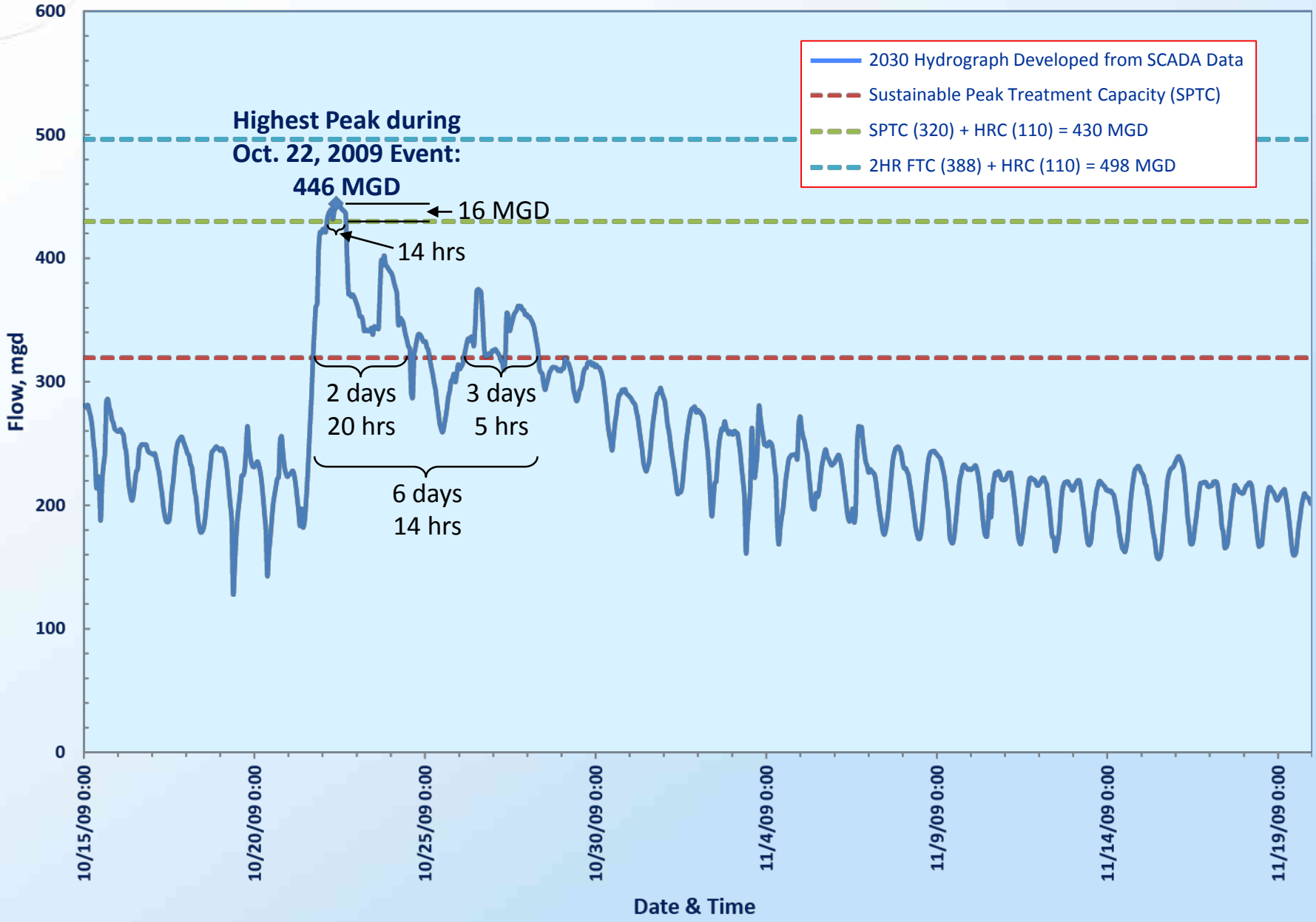
2030 Master Plan Single Event



2030 SCADA Single Event



2030 SCADA Multiple Event



Peak Flow Management Summary

	MASTER PLAN SINGLE EVENT			SCADA SINGLE EVENT			SCADA MULTIPLE EVENT		
	2015	2020	2030	2015	2020	2030	2015	2020	2030
PHF MGD	380	418	494	364	403	475	341	377	466
SPTC MGD	250	250	320	250	250	320	250	250	320
HRC PEAK FLOW PUMPING MGD	110	110	110	110	110	110	110	110	110
2HR FTC MGD	303	303	388	303	303	388	303	303	388
AVAILABLE 2HR PEAK CAPACITY MGD	413	413	498	413	413	498	413	413	498
DURATION ABOVE STC HRS	4	9	9	1	5	4	0	14	14

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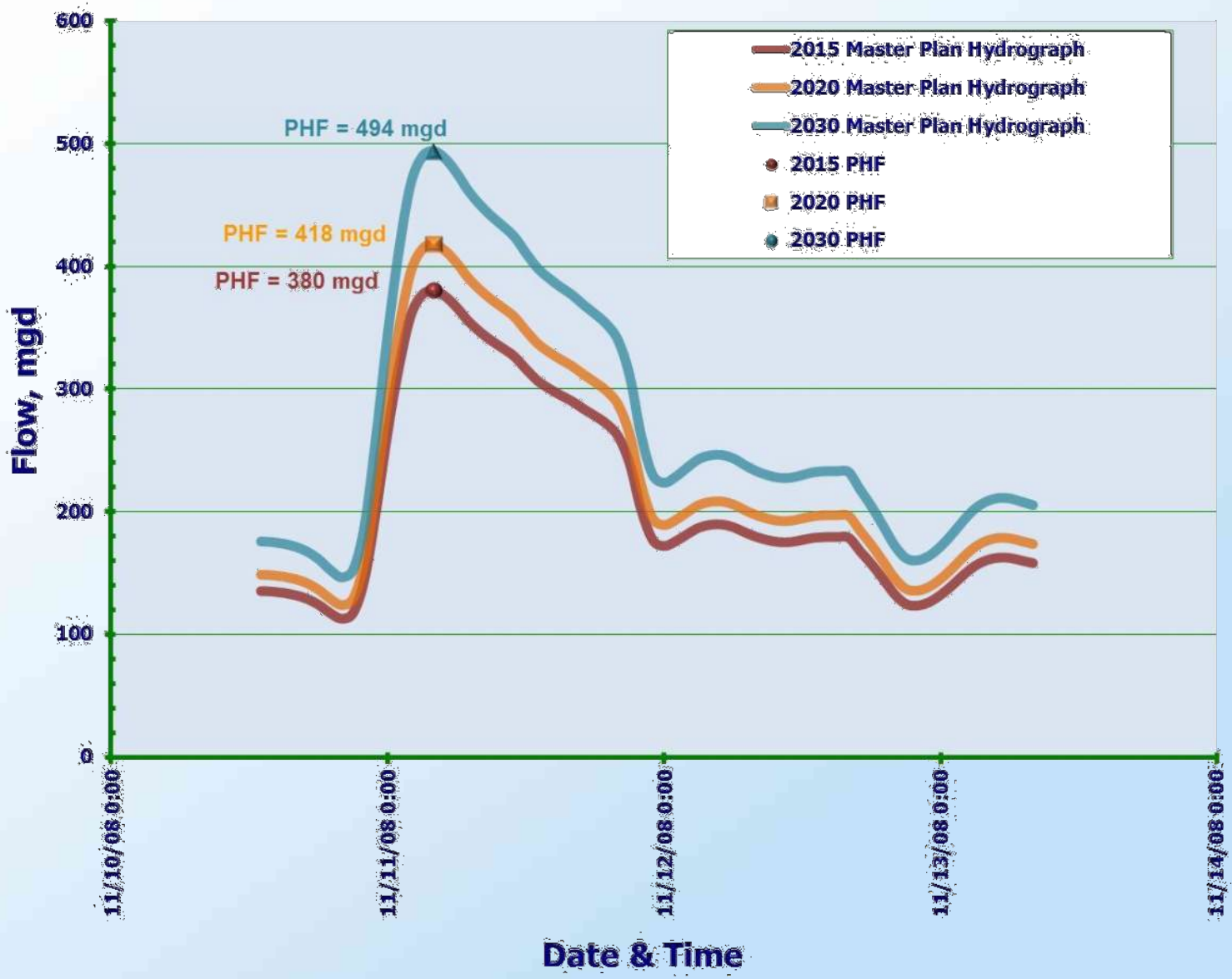
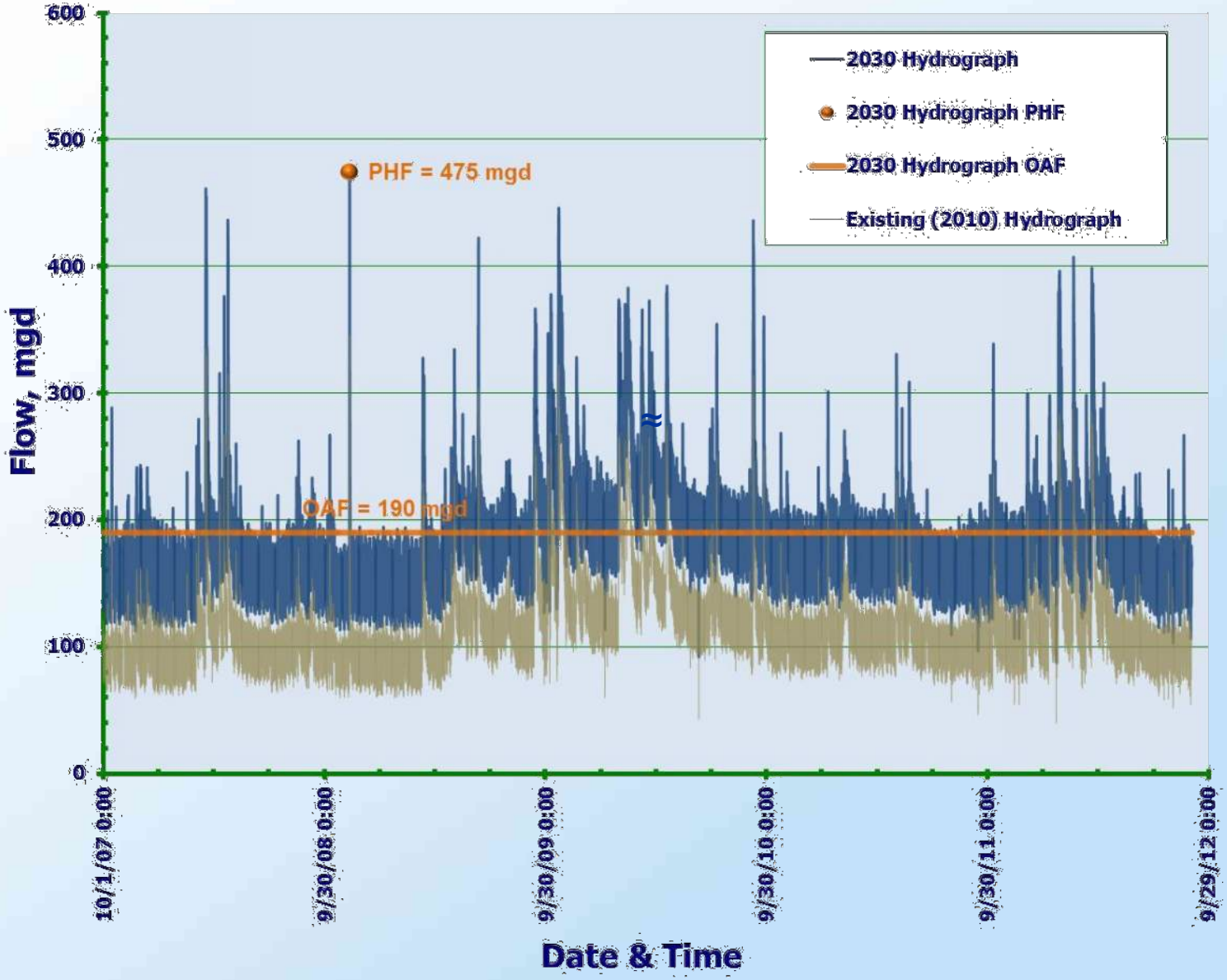
Basin Sizing and Optimization

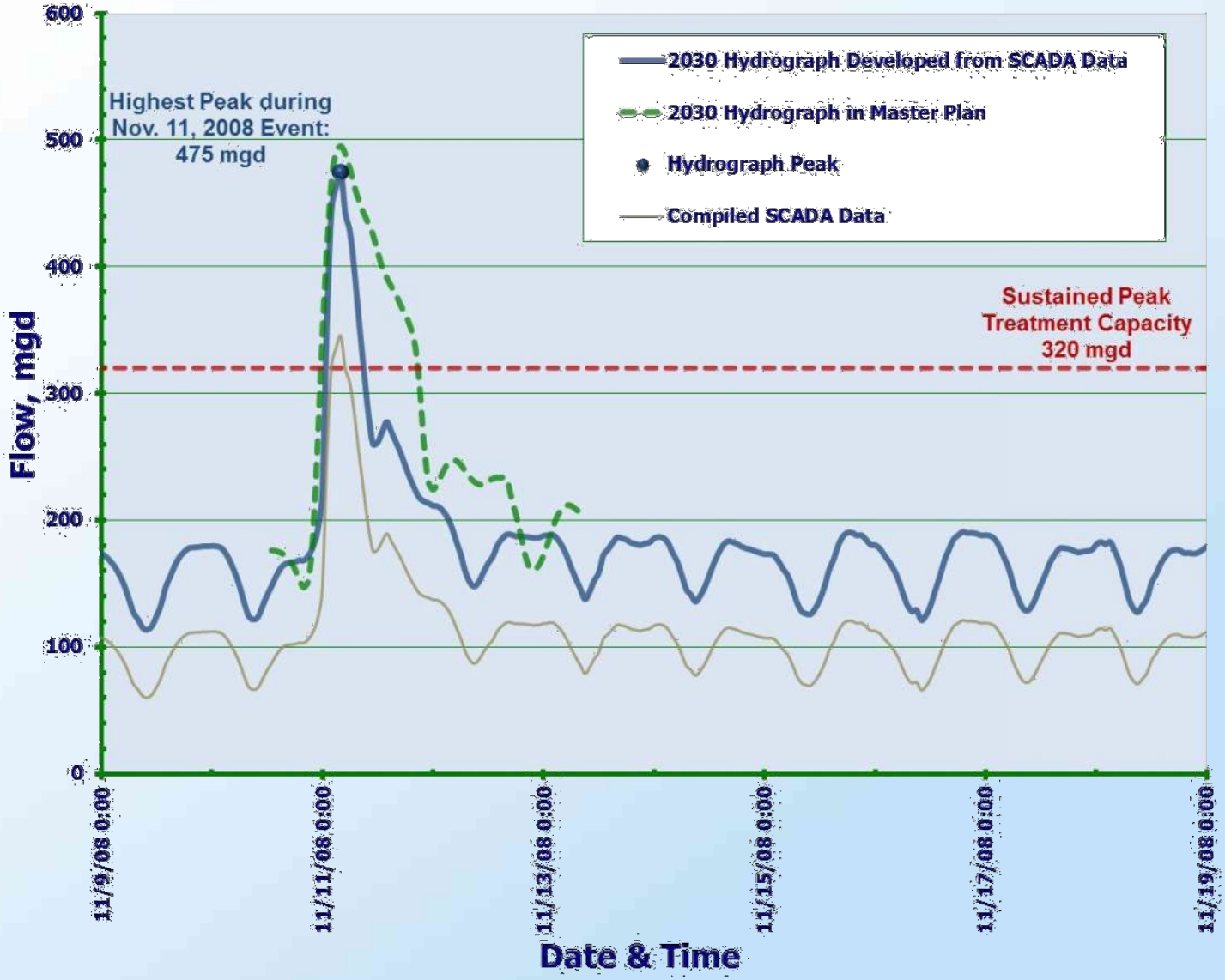
Master Plan Single Event Hydrographs



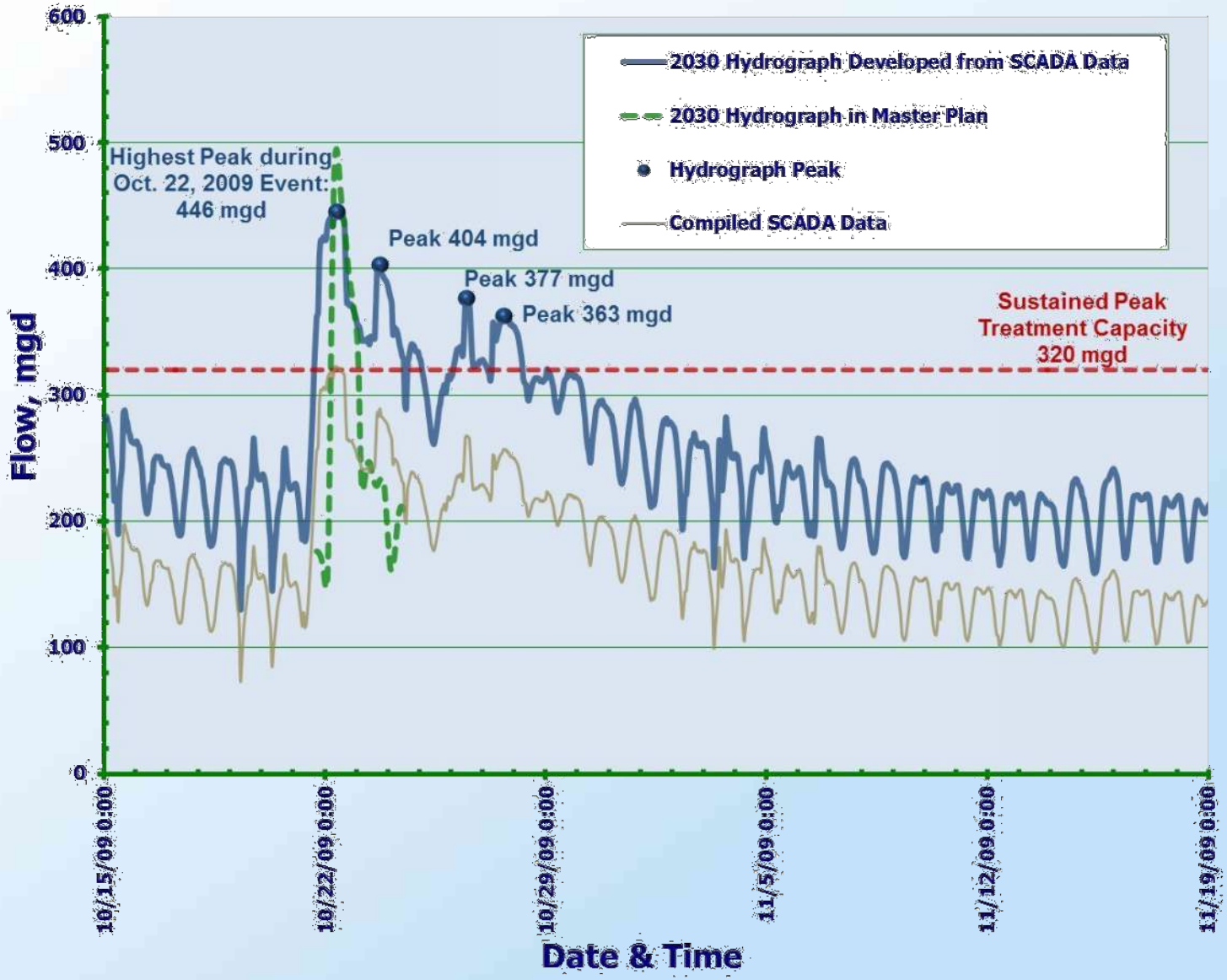
Adjusted Historical Data for 2030 Flows



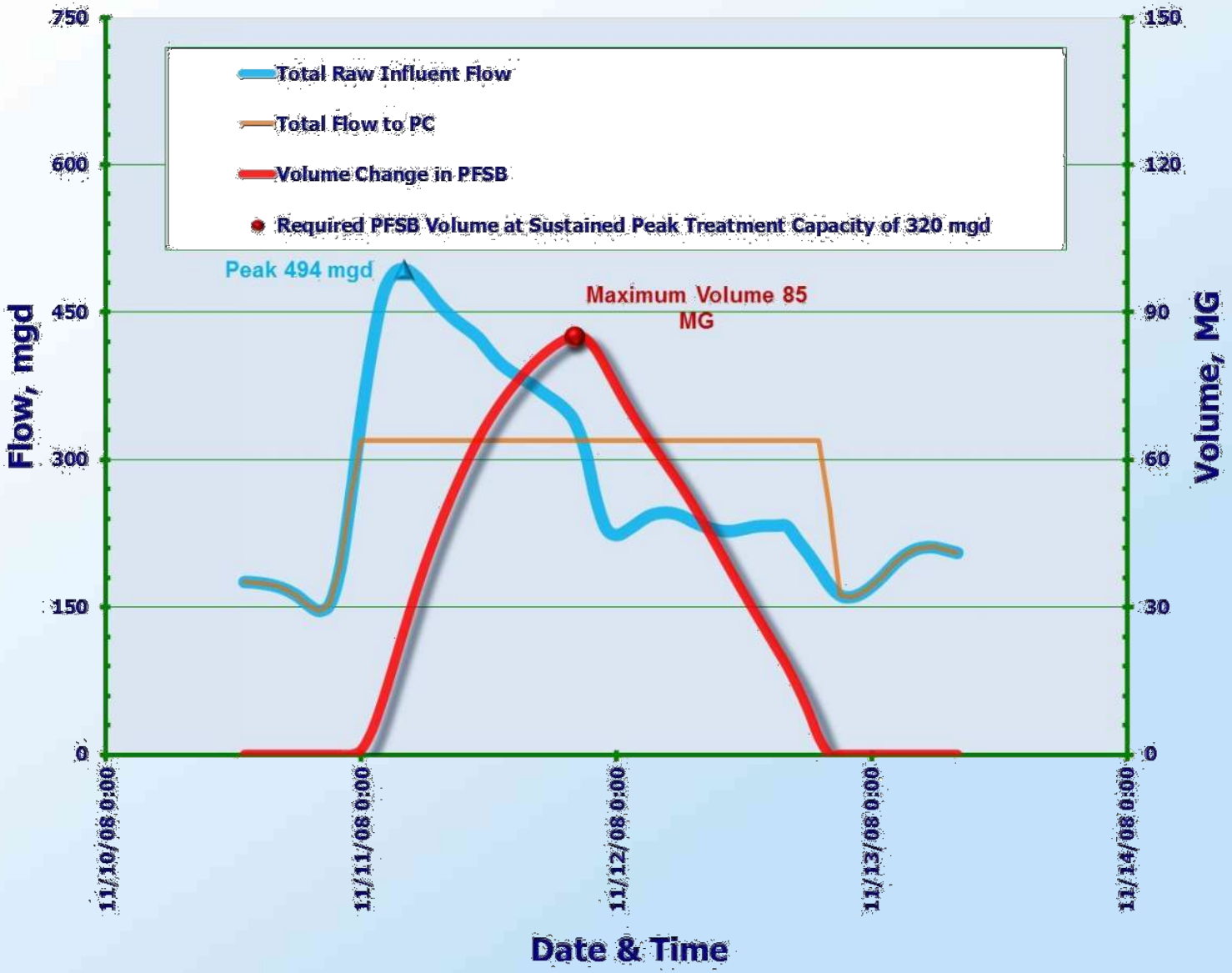
Comparison of Master Plan Hydrograph to Historical Data Peak Flow Hydrograph



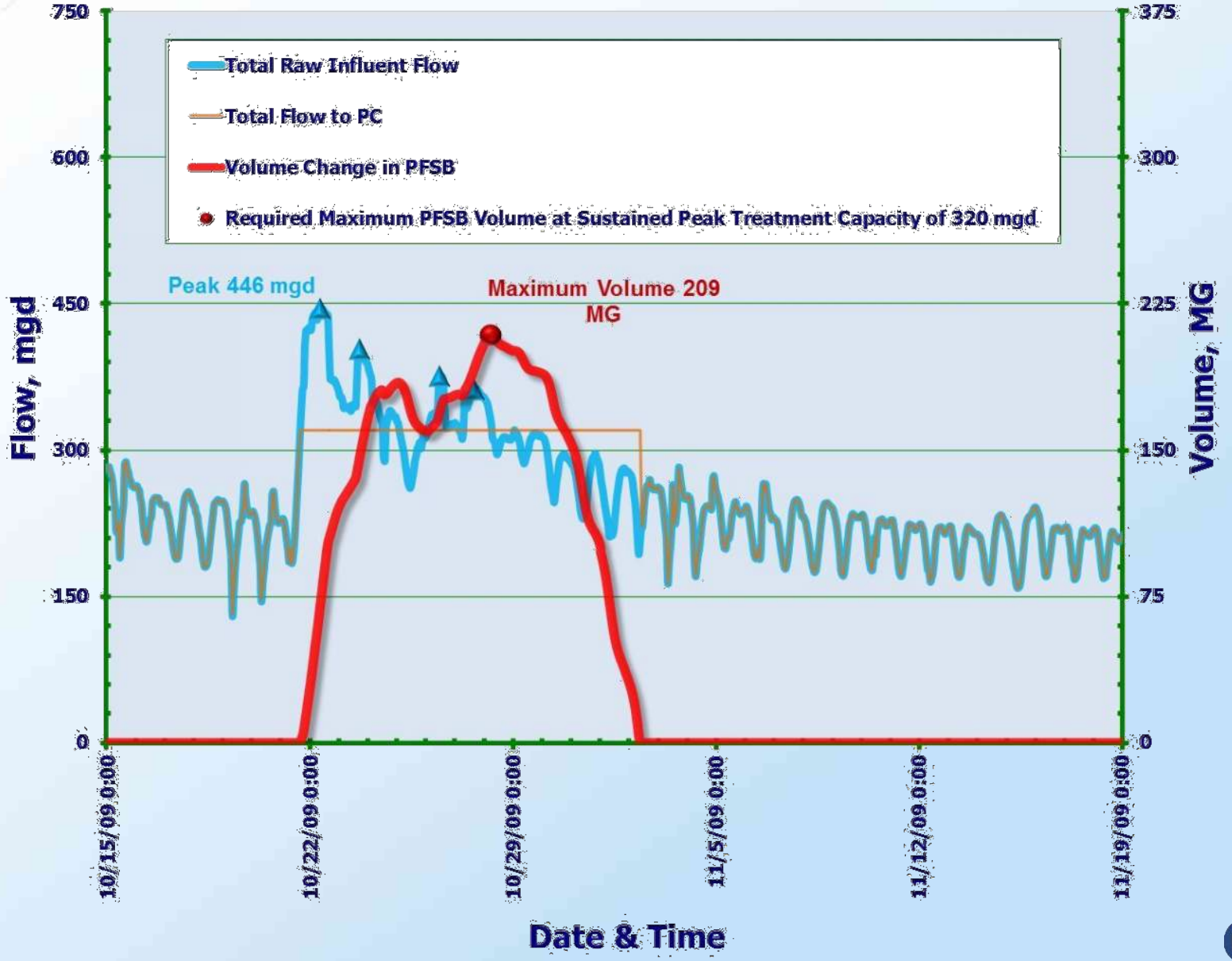
Comparison of Master Plan Hydrograph to Historical Data Multi-Day Peak Hydrograph



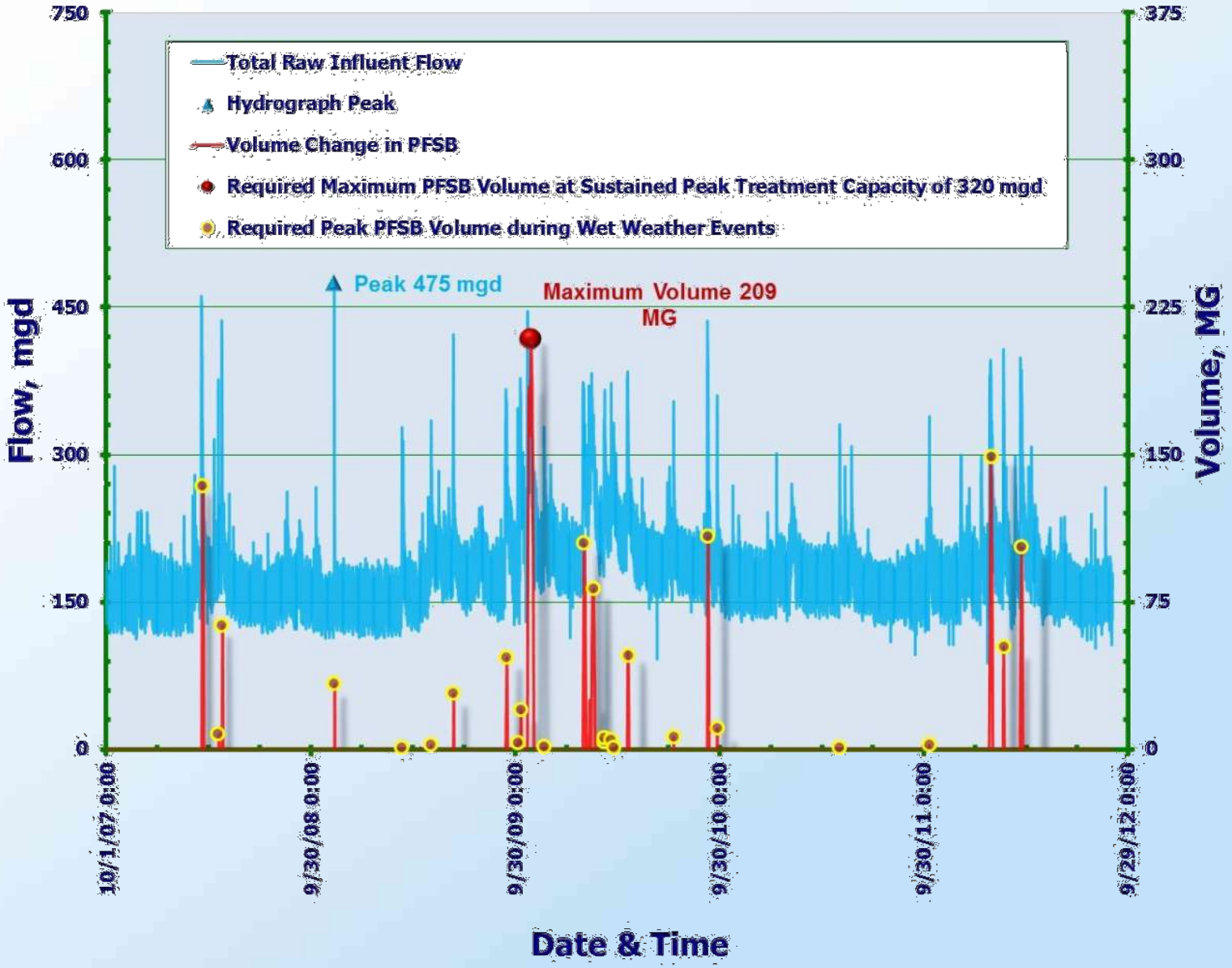
Basin Volume – Master Plan Hydrograph



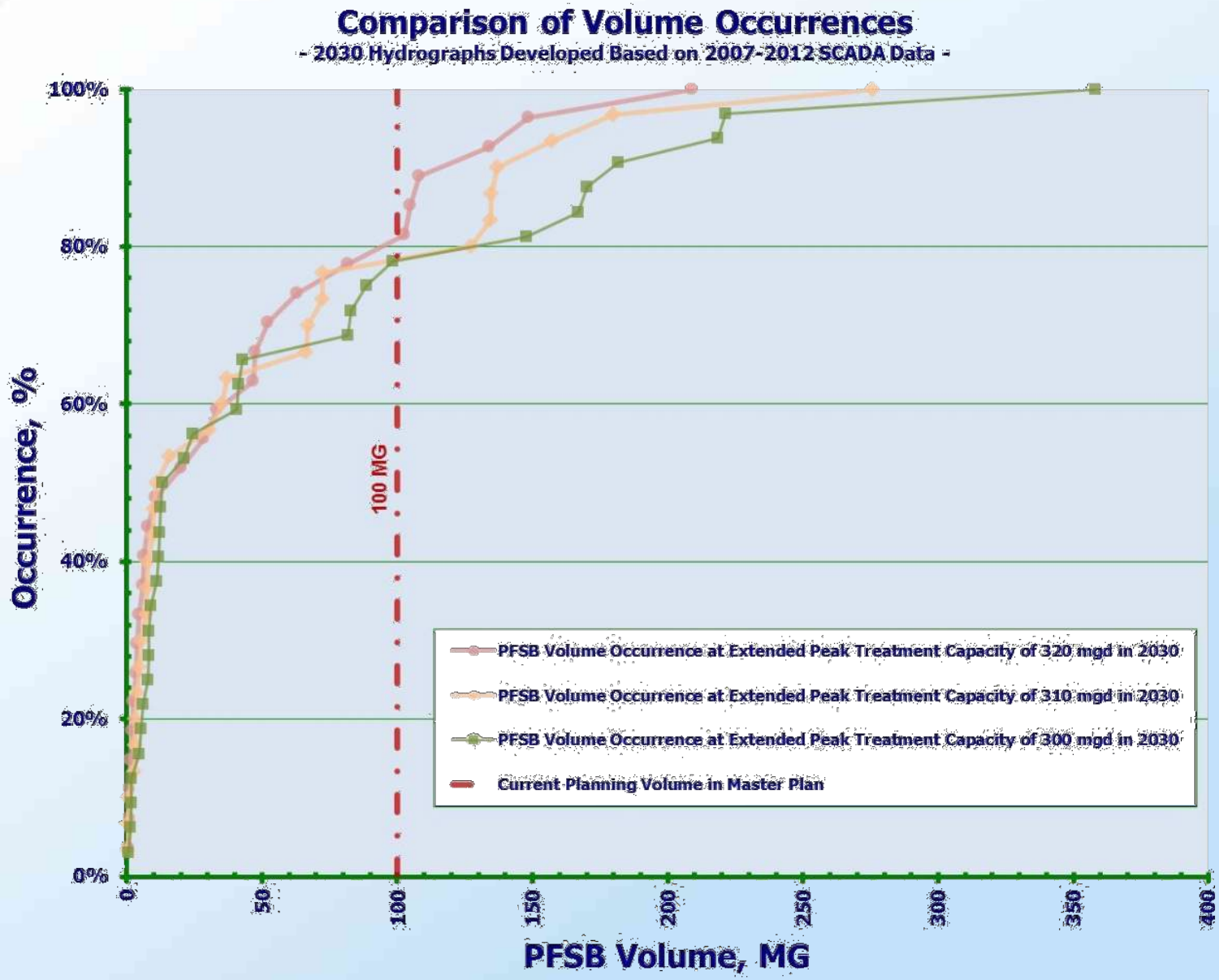
Basin Volume – Multi-Day Peak Hydrograph



Basin Volume – Multi-Day Peak Hydrograph



Volume Occurrence Curves



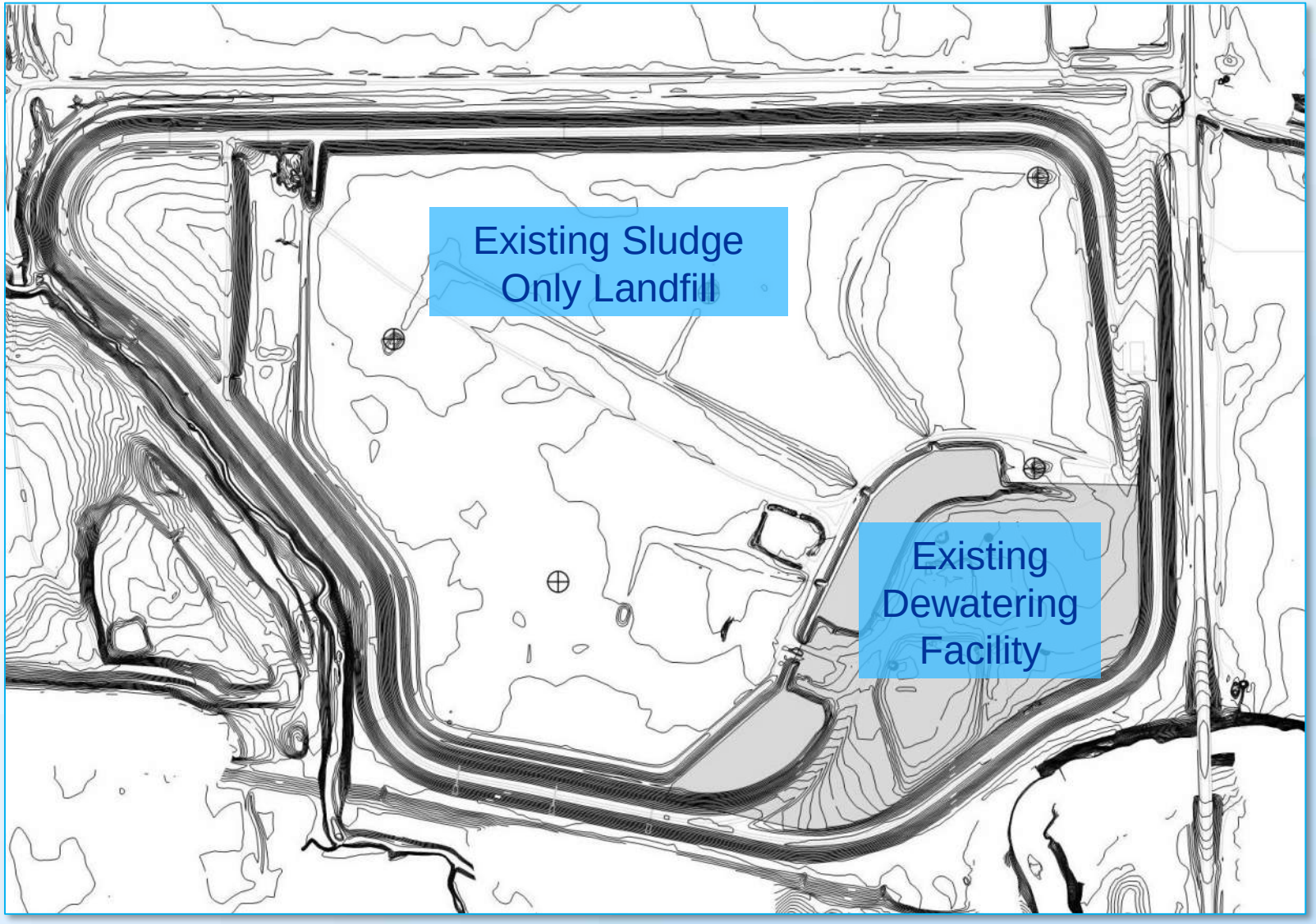
Comparison of Operating Values

Parameter	Existing (2010)	2015	2020	2030		
SPTC, mgd	250	250	250	320	310	300
Hydrographs Developed from SCADA Data						
Highest Hydrograph Peak Hourly Flow (PHF), mgd	345	364	403	475	475	475
Overall Average Flow (OAF), mgd	120	135	150	190	190	190
Maximum PFSB Volume Required, MG	**70**	**117**	**298**	**209**	**276**	**358**
Events in 5-year Period	24	25	31	27	30	32
Maximum Duration of Use in an Event, days	5.1	9.8	15	12	14	16
Hydrographs in Master Plan						
Highest Hydrograph Peak Hourly Flow (PHF), mgd	361[a]	380	418	494	494	494
Maximum PFSB Volume Required, MG	**N/A**	**62**	**91**	**85**	**94**	**103**
Maximum Duration of Use in an Event, days	N/A	1.8	2.3	1.8	2.0	2.1
Maximum Total Flow to PFSB, mgd	N/A	130	168	174	184	194

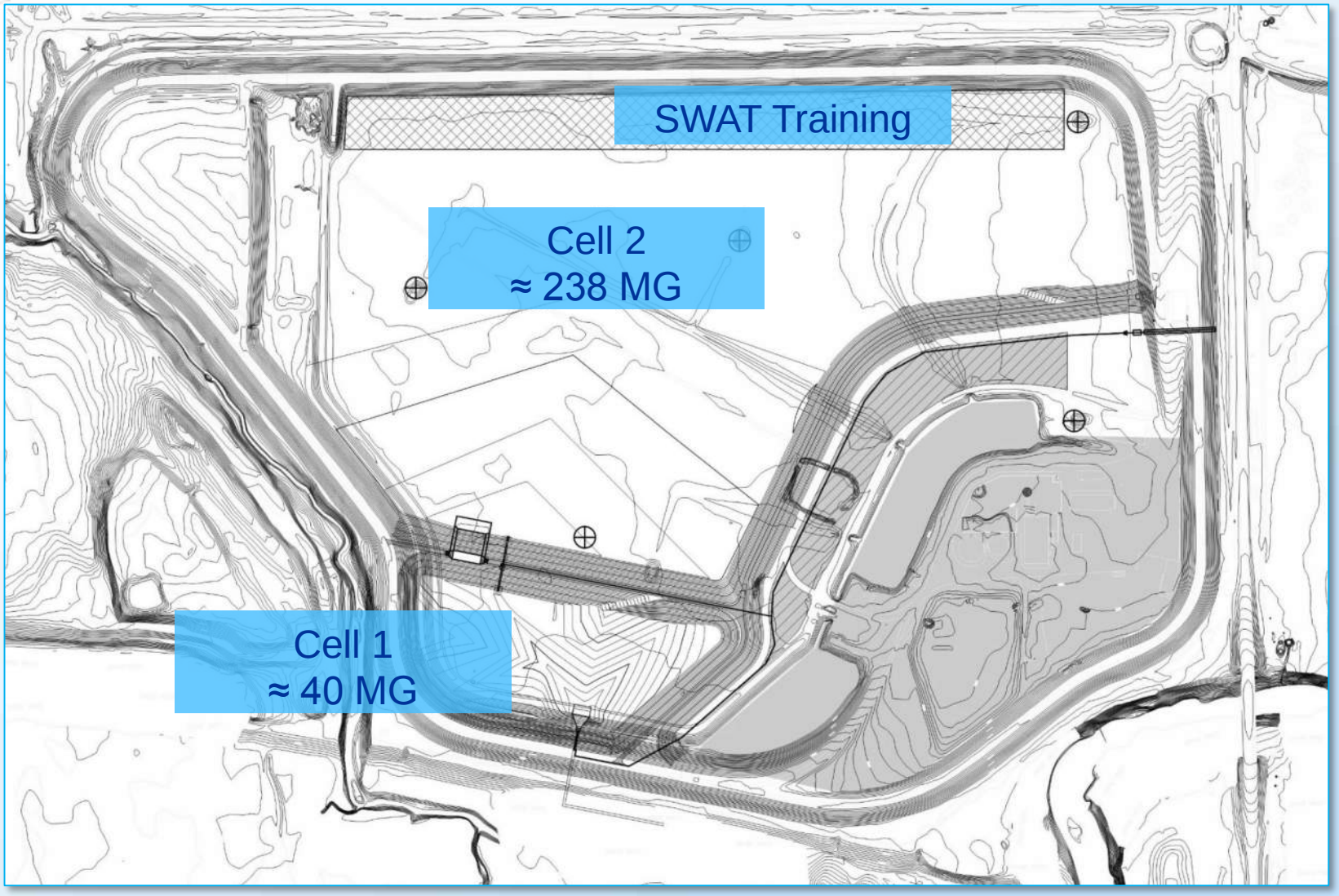
Physical Modeling

Physical Modeling

Peak Flow Storage Basin Layout



Peak Flow Storage Basin Layout



Questions?