
Weston & Sampson
SM
transform your environment

EAGLE DAM PUBLIC MEETING (WRENTHAM)

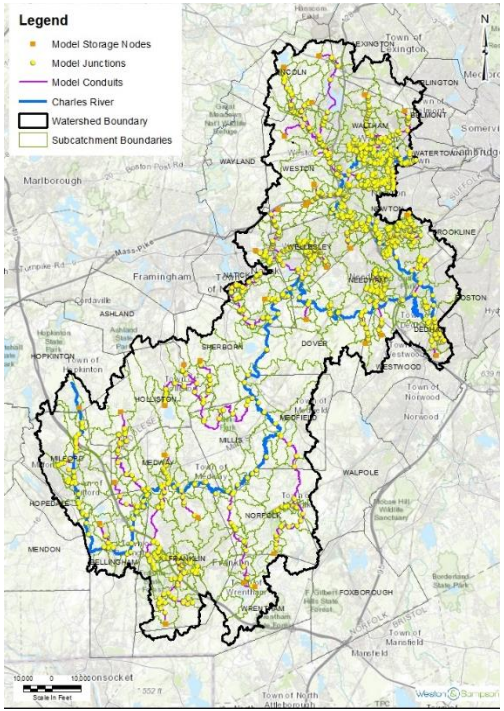
5/1/2023

Outline

- Brief overview of Charles River Flood Model (CRFM)
- Updates made for this project
- Model scenarios
- Results

Overview of Charles River Flood Model

- 272 sq.-mi. watershed
- 35 communities (15 partners)
- 705 sub-basins
- 23 tributaries
- 190 miles of river
- 15 miles of storm drain
- 450 bridges/culverts
- 108 dams



https://storymaps.arcgis.com/stories/5e214750da174c46bf6a8b8da12630e9

Weston & Sampson SM

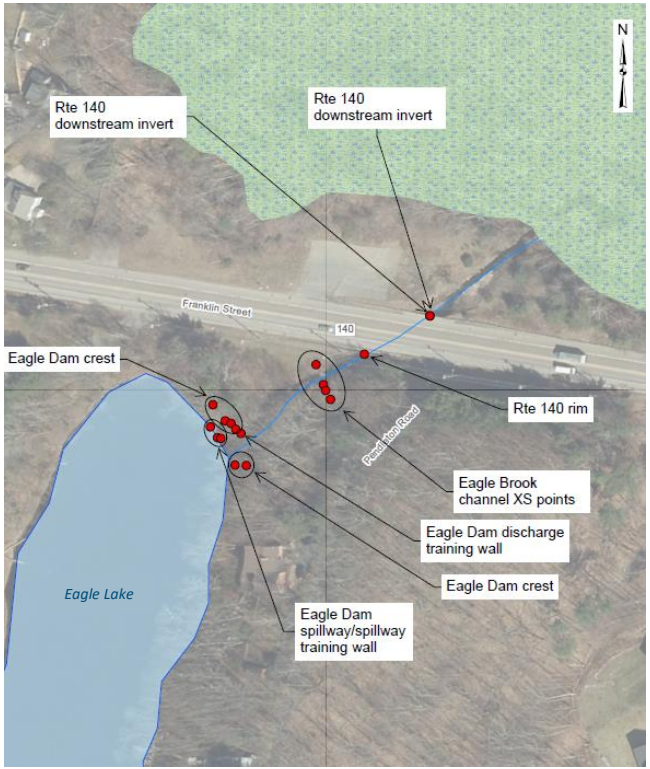
CRFM Updates for Eagle Dam

- Updates made for this project
  - Field work to gather data in the study area
  - Updated channels, dams, bridges
  - Refined 2D mesh for more detailed output
  - Added storm events
  - Created “Dam Out” geometry

CRFM Updates for Eagle Dam

Field Work

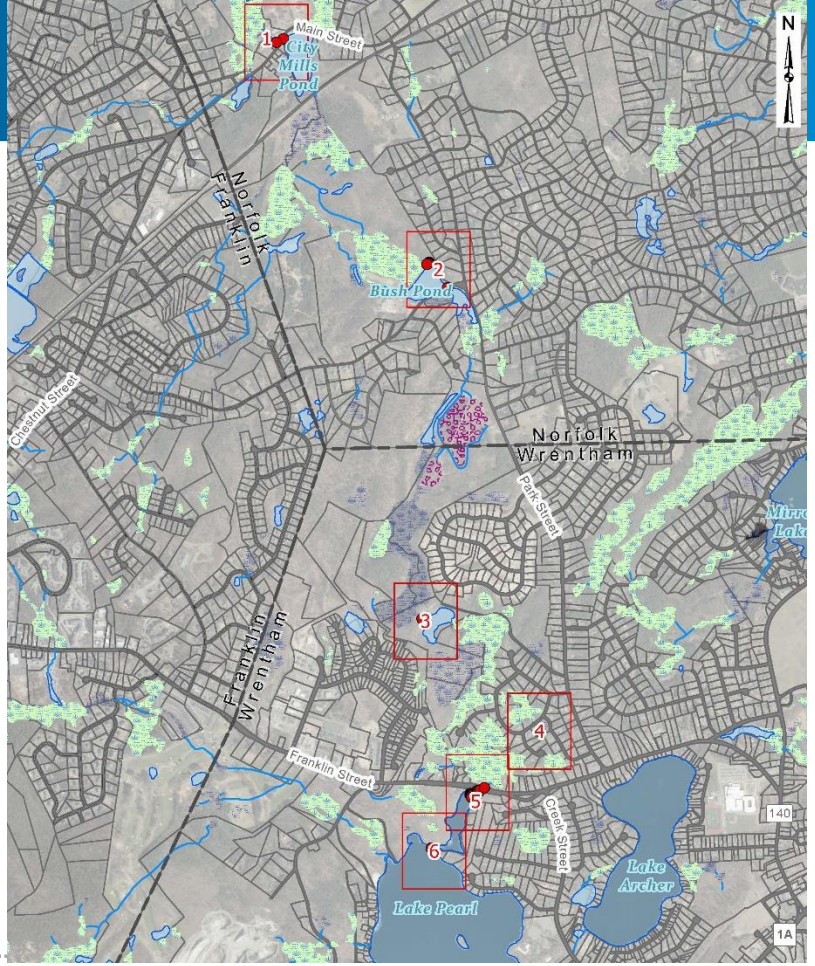
- Trimble TDC600 (most data points accurate to within 1.2”)
- 11 different instream structures
- Typical channel cross-sections
- Ground surface and FFE height at houses near floodplain



CRFM Updates for Eagle Dam

Field Work Locations

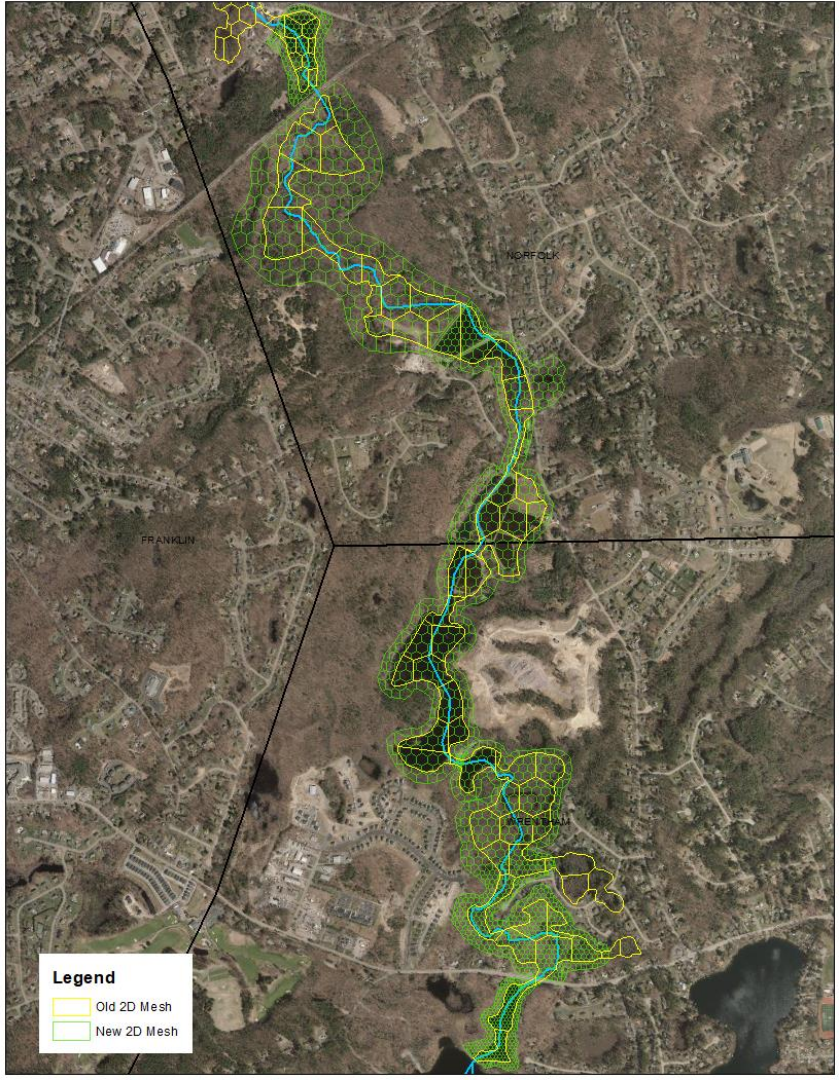
- The outlet to Lake Archer
- The outlet to a small pond downstream of Lake Archer
- Creek Street culvert
- Red Dam (MA00170)
- Eagle Lake Dam (MA02263)
- Route 140 bridge
- Wrentham Angler's Club Dam
- The culvert immediately downstream of the Wrentham Angler's Club Dam (Wrentham Angler's Club Keystone Arch)
- Lawrence Street bridge
- Bush Pond Dam #2 (MA01158)
- City Mills Pond Dam (MA00818)/Main Street



Weston & Sampson

CRFM Updates for Eagle Dam

- Riverbank, dam, and roadway heights were updated from field data
- Channel width, dam outlet dimensions, and culvert/bridge dimensions were updated from field data
- Adjusted connectivity from Lake Archer to Lake Pearl per field observations
- Added the Wrentham Angler's Club dam and the crossing immediately downstream per field measurements
- Extended 2D mesh and increased resolution (see image)


NORFOLK
FRANKLIN
FOXBORO
Legend
Old 2D Mesh
New 2D Mesh

CRFM Updates for Eagle Dam

24-hour design storm, precipitation total (in)

Recurrence Interval	Baseline Climate (NOAA14)	2070 Climate (RMAT)
2 years	3.4	4.6
10 years	5.2	7.1
***50 years**	**7.2**	**9.8**
100 years	8.2	11.1
***500 years**	**11.0**	**14.9**

*Added to the CRFM

Modeling Scenarios

- Dam In (existing) vs Dam Out
  - Dam Out assumes a bankfull width cut through embankment (~25 ft.)
- Ten design storms:
  - Baseline and 2070 climate scenarios
  - 2-, 10-, 50-, 100-, and 500-year, 24-hour storm events
- 20 total simulations

Analysis Points

- Evaluated flooding impacts for ~4.0 mi.
- Lake Pearl to Main Street in Norfolk
- Evaluated crossings, dams, and buildings
- All ten design storms

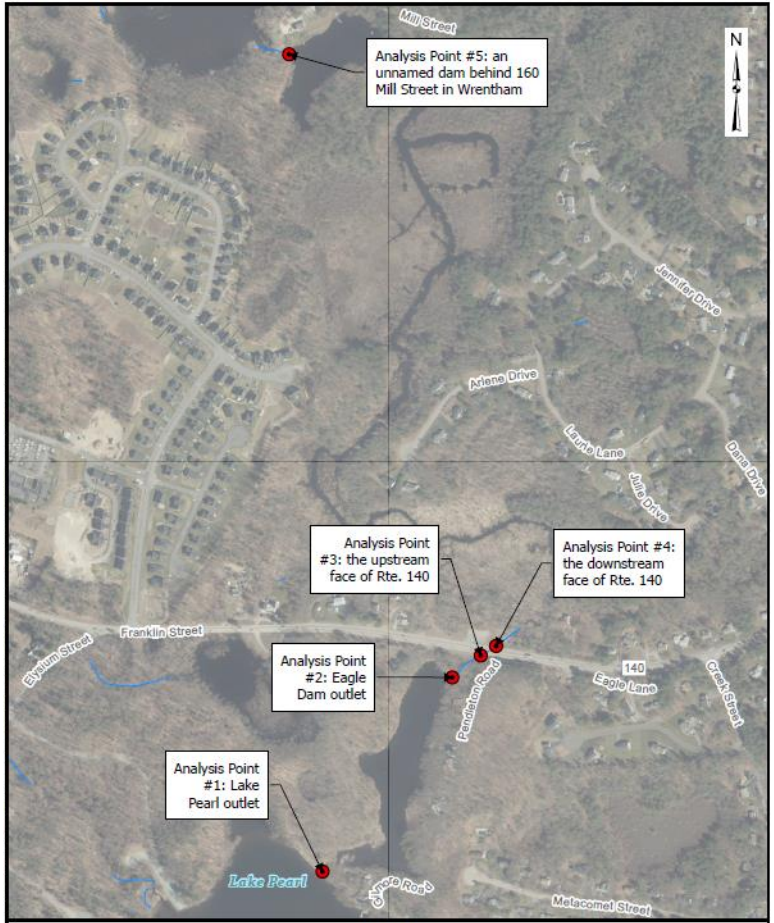


FIGURE 2
TOWN OF WRENTHAM MASSACHUSETTS

H&H ANALYSIS POINTS

Weston & Sampson

Results: **Eagle Dam**

Climate Scenario	Recurrence Interval (yrs)	Max. Water Level (ft. NAVD88)		Change (ft.)
		Dam In	Dam Out	
Present	2	196.77	196.65	-0.12
	10	197.17	196.86	-0.31
	50	197.73	197.43	-0.29
	100	198.05	197.70	-0.34
	500	198.90	198.45	-0.46
2070	2	196.95	196.74	-0.21
	10	197.69	197.41	-0.29
	50	198.55	198.14	-0.41
	100	198.93	198.47	-0.46
	500	199.95	199.36	-0.58

Results: **Upstream Face of Rte. 140**

Climate Scenario	Recurrence Interval (yrs)	Max. Water Level (ft. NAVD88)		Change (ft.)
		Dam In	Dam Out	
Present	2	188.70	188.69	0.00
	10	188.94	188.94	0.00
	50	190.26	190.26	0.00
	100	190.61	190.61	0.00
	500	191.56	191.56	0.00
2070	2	188.77	188.77	0.00
	10	190.22	190.22	0.00
	50	191.15	191.15	0.00
	100	191.60	191.60	0.00
	500	192.87	192.88	0.02

Results: **Downstream Face of Rte. 140**

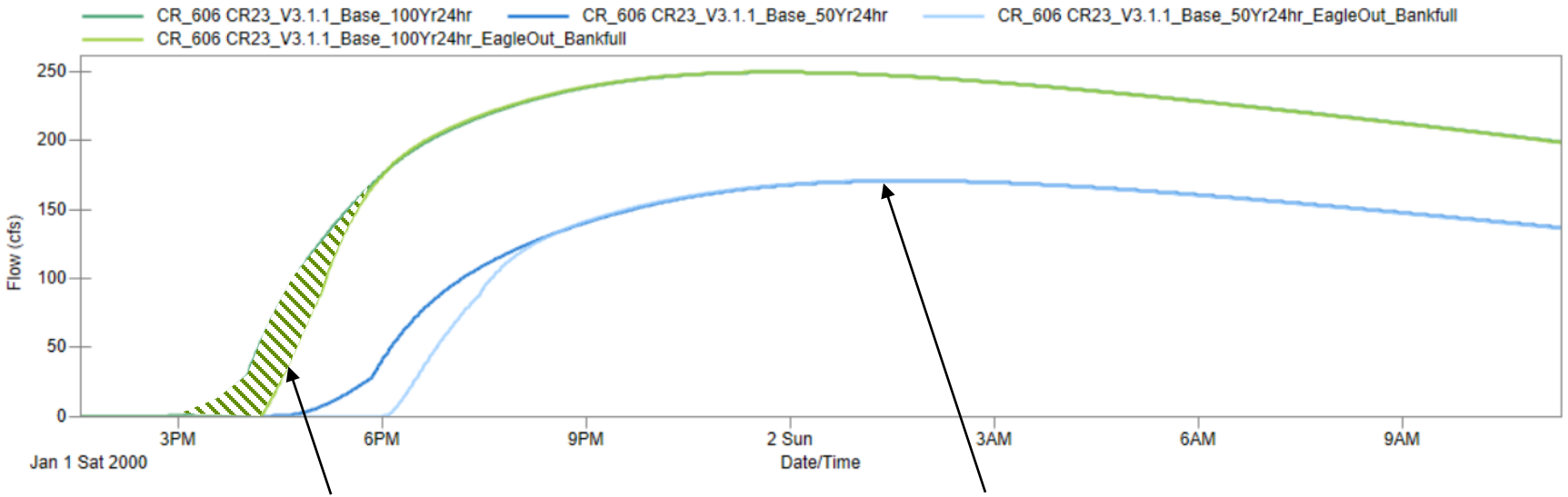
Climate Scenario	Recurrence Interval (yrs)	Max. Water Level (ft. NAVD88)		Change (ft.)
		Dam In	Dam Out	
Present	2	188.46	188.46	0.00
	10	188.91	188.91	0.00
	50	190.23	190.23	0.00
	100	190.54	190.54	0.00
	500	191.38	191.38	0.00
2070	2	188.55	188.55	0.00
	10	190.18	190.18	0.00
	50	191.01	191.01	0.00
	100	191.41	191.41	0.00
	500	192.58	192.58	0.00

Results: **Wrentham Angler's Club Dam**

Climate Scenario	Recurrence Interval (yrs)	Max. Water Level (ft. NAVD88)		Change (ft.)
		Dam In	Dam Out	
Present	2	186.63	186.63	0.00
	10	186.66	186.66	0.00
	50	186.79	186.79	0.00
	100	186.83	186.83	0.00
	500	187.09	187.09	0.00
2070	2	186.64	186.64	0.00
	10	186.78	186.78	0.00
	50	186.99	186.99	0.00
	100	187.09	187.09	0.00
	500	188.22	188.22	0.00

Results: Example Hydrograph

Discharge (cfs) Arriving at Rte. 140 Crossing

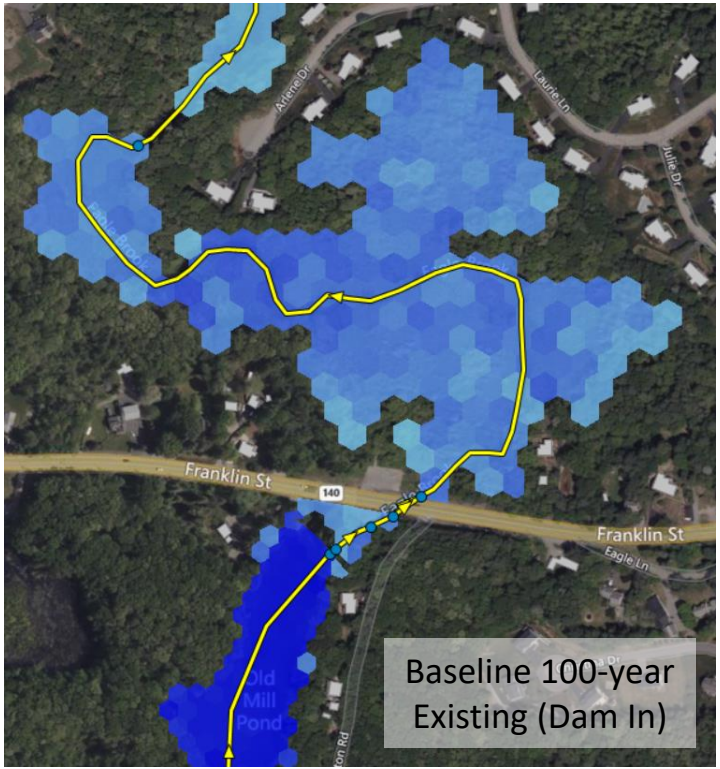


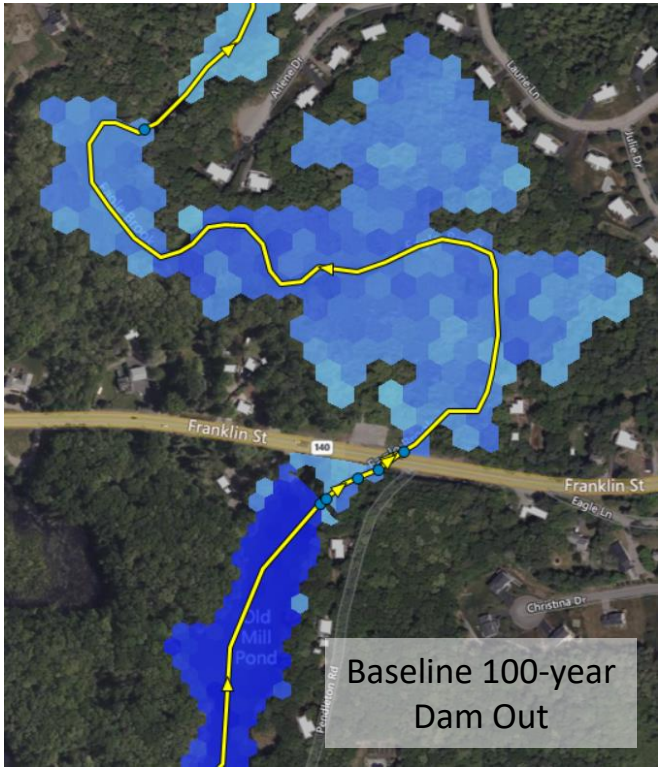
Higher discharge under Dam Out due to lost flood storage

Deviation from Dam In occurs well before peak of storm

Weston & Sampson

Results: Example 2D Output





Conclusions

- Floodwater levels in Lake Pearl will not be impacted by dam removal.
- Little change in floodwater levels in Eagle Dam Impoundment – less than 1 ft.
- Floodwater levels upstream of Rte. 140 will not change, with the exception of a 2070 500-yr flood, which will increase levels by 0.01-0.02 ft.
- Floodwater levels downstream of Rte. 140 will not be impacted.
- Floodwater levels will not change at 160 Mill Street (Wrentham Angler Club).
- No increases in flooding for any residences near the Eagle Brook in dam removal scenario.
- No significant impact on flood levels at Rte. 140 bridge in dam removal scenario. However, MassDOT consultation is underway to review the Rte. 140 bridge.

Conclusion: Dam removal is feasible from both hydrologic and hydraulic perspectives to protect Wrentham from flooding in extreme weather.

thank you

westonandsampson.com