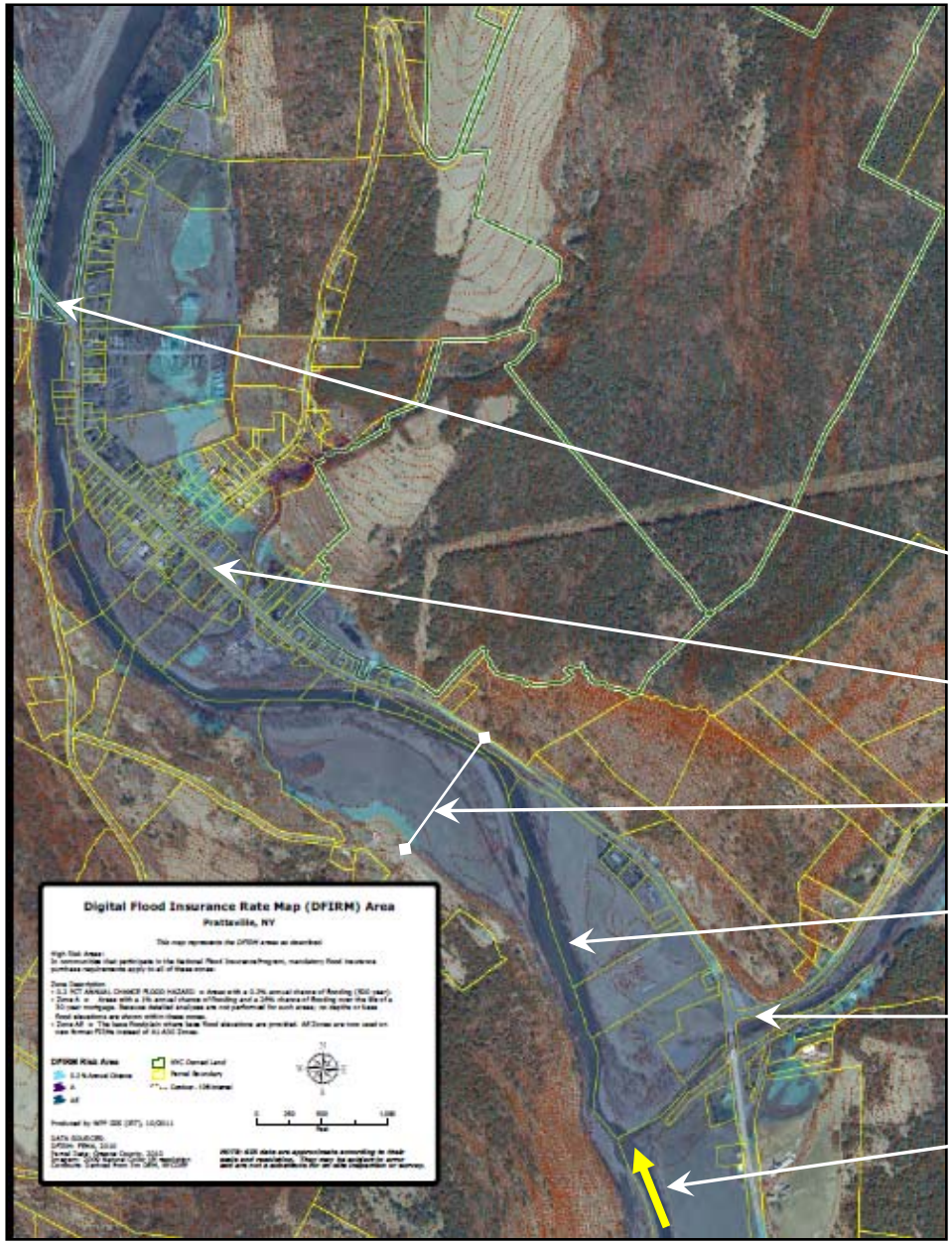
Local Flood Hazard Mitigation

Preliminary Hydraulic Analysis

Case Study

Schoharie Creek – Prattsville, NY

FEMA FIRM



The FEMA Flood Insurance Study published in 2008, included developing a new hydraulic computer model of Schoharie Creek and its major tributaries to predict floodwater elevations.

The preliminary hydraulic analysis prepared used this computer model as the foundation for the assessment.

Rte 23 Bridge

Hamlet of Prattsville

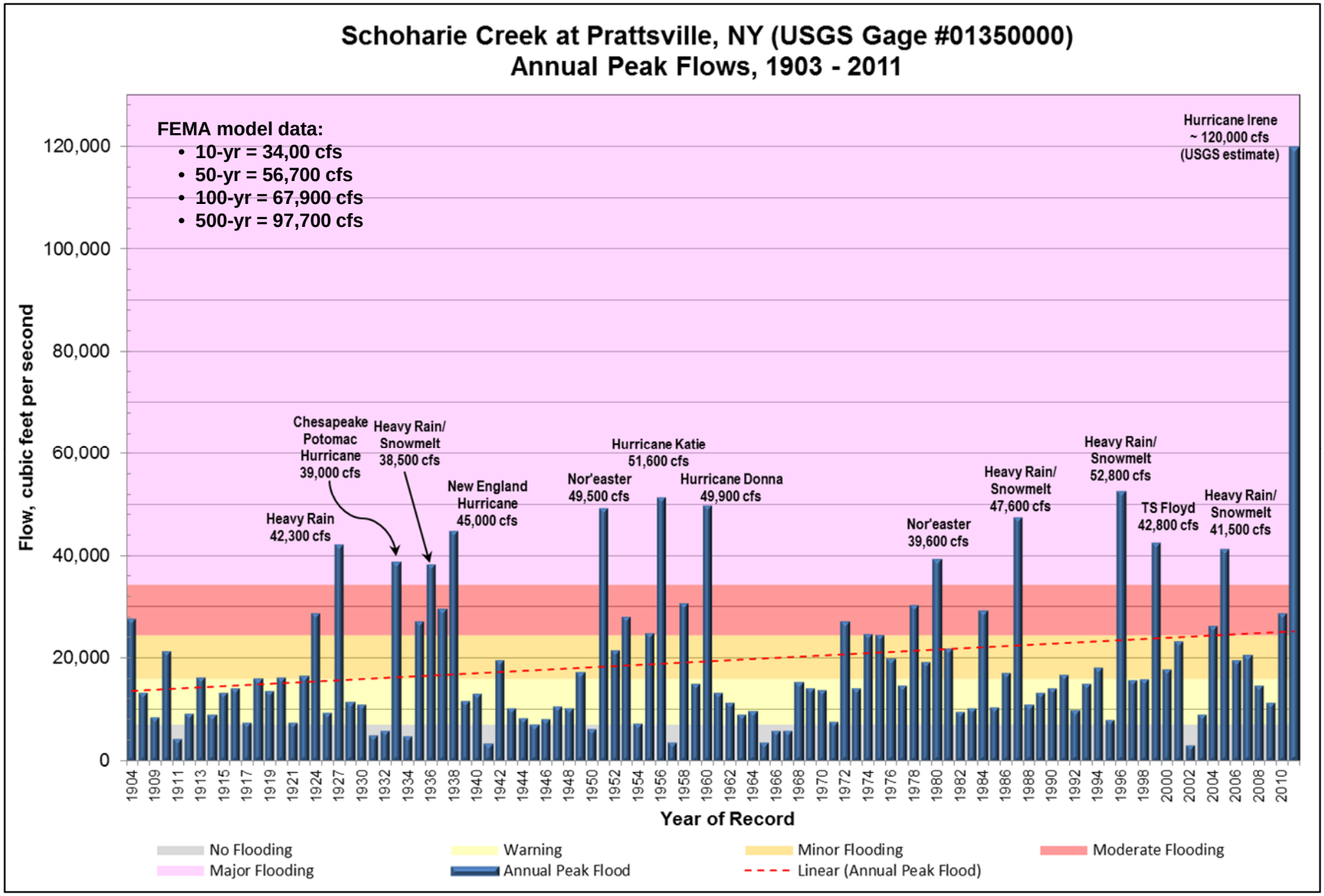
100-yr Floodplain (blue)

Schoharie Creek

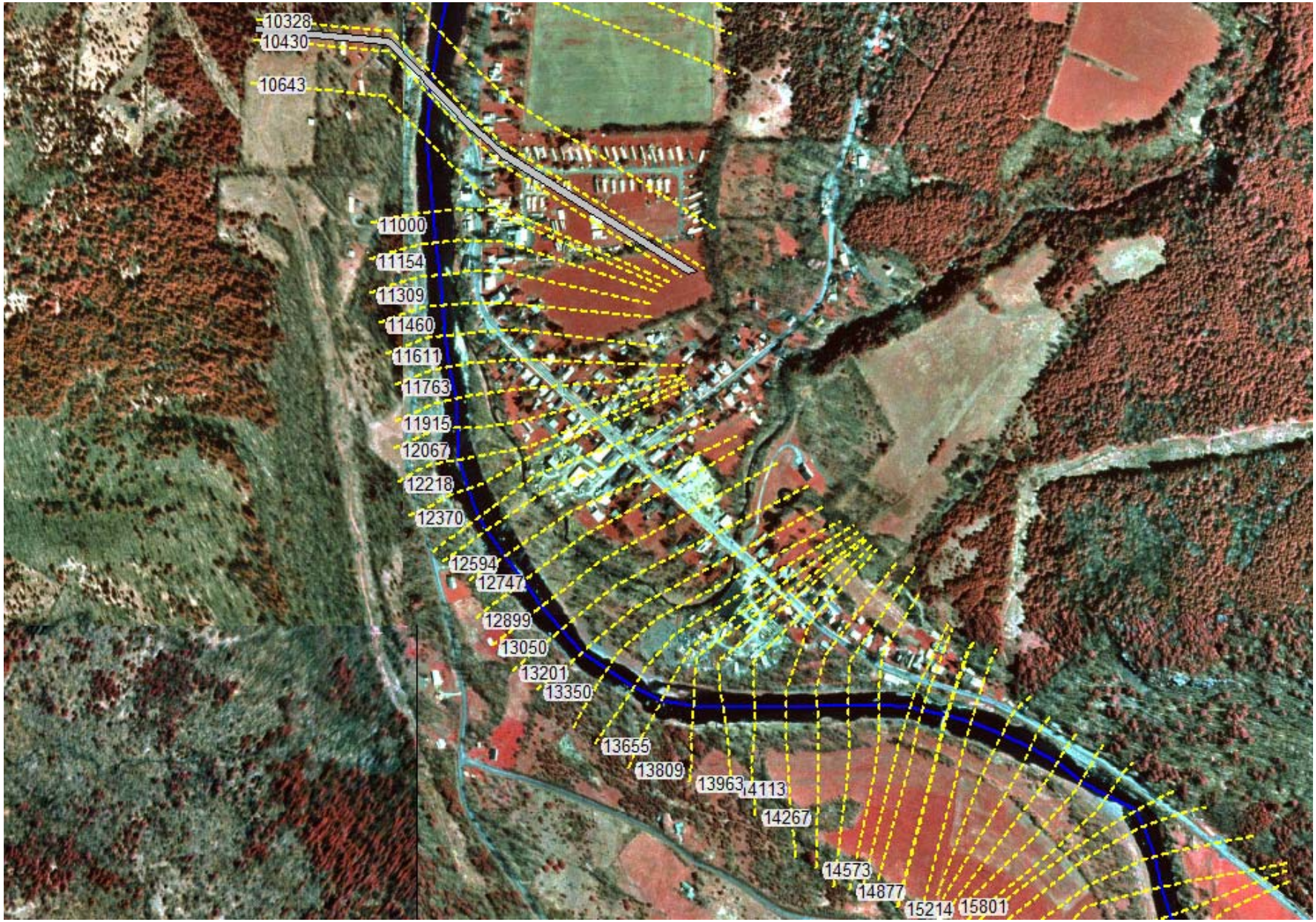
Batavia Kill

Direction of Flow

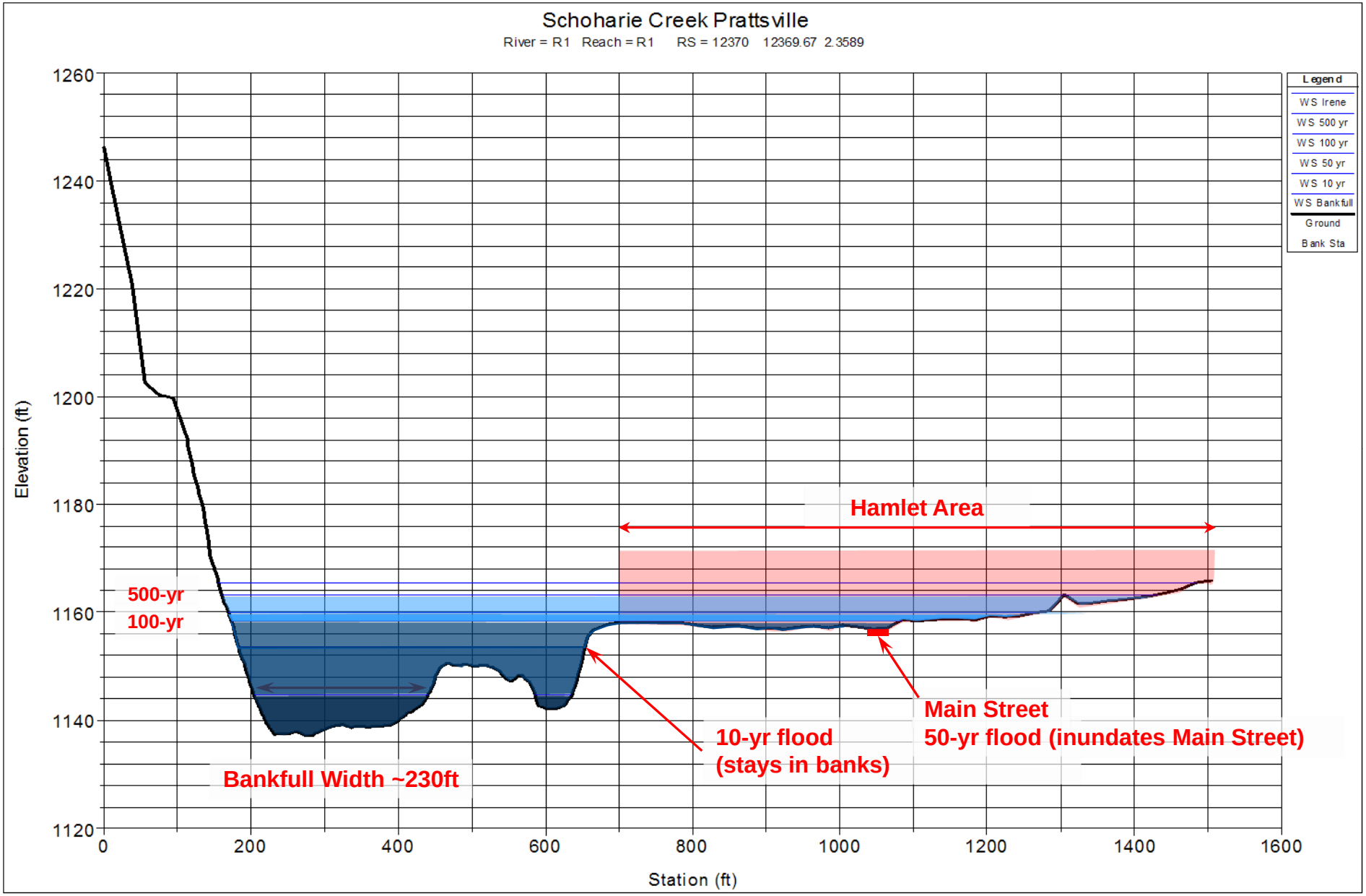
HYDROLOGY


Schoharie Creek at Prattsville, NY (USGS Gage #01350000)
Annual Peak Flows, 1903 - 2011
FEMA model data:
• 10-yr = 34,00 cfs
• 50-yr = 56,700 cfs
• 100-yr = 67,900 cfs
• 500-yr = 97,700 cfs
Hurricane Irene ~ 120,000 cfs (USGS estimate)
Chesapeake Potomac Hurricane 39,000 cfs
Heavy Rain/ Snowmelt 38,500 cfs
Heavy Rain 42,300 cfs
New England Hurricane 45,000 cfs
Nor'easter 49,500 cfs
Hurricane Katie 51,600 cfs
Hurricane Donna 49,900 cfs
Nor'easter 39,600 cfs
Heavy Rain/ Snowmelt 47,600 cfs
Heavy Rain/ Snowmelt 52,800 cfs
TS Floyd 42,800 cfs
Heavy Rain/ Snowmelt 41,500 cfs
Flow, cubic feet per second
Year of Record
No Flooding
Warning
Minor Flooding
Moderate Flooding
Major Flooding
Annual Peak Flood
Linear (Annual Peak Flood)

EXISTING HYDRAULIC MODEL



EXISTING HYDRAULIC MODEL



EXISTING CONDITIONS

Interpretation of Existing Conditions:

- Main Street, at elevation ±1,160, is roughly equal to the elevation of the 50-year flood and subject to two to three feet of inundation by the 100-year flood.

- The 500-year flood would be six to eight feet above the Main Street area. This elevation corresponds fairly well to inundation experienced by Hurricane Irene.

- The channel narrows as it extends downstream toward the Route 23 bridge and the low floodplain diminishes. This confinement results in higher water levels and velocity.

- The FEMA model of existing hydraulic conditions indicate there is a significant rise in flood water elevations at the Route 23 Bridge.

HYDRAULIC MODELING SCENARIOS

- Determine channel size required to convey the 100-yr event.
- Assess the Route 23 Bridge
- Evaluate potential impacts of the fish migration barrier
- Evaluate potential effect of the Schoharie Reservoir
- Evaluate potential for floodplain improvements
  (remove encroachments & berms, enhance floodplain areas, Huntersfield Creek)

CHANNEL SIZE

- Determine the required channel size for a basic cross section adequate to convey the 100-yr peak flow, plus sediment, without the use of the (developed) floodplain.

  Required Depth = 27 ft.

  This channel would be roughly twice as deep as the existing channel.

  However, the depth makes it impossible to construct due to the need for continuity with the downstream channel.

- Alternate approach is to maintain the existing channel depth of 16 ft. and determine the required channel width adequate to convey the 100-yr peak flow, plus sediment.

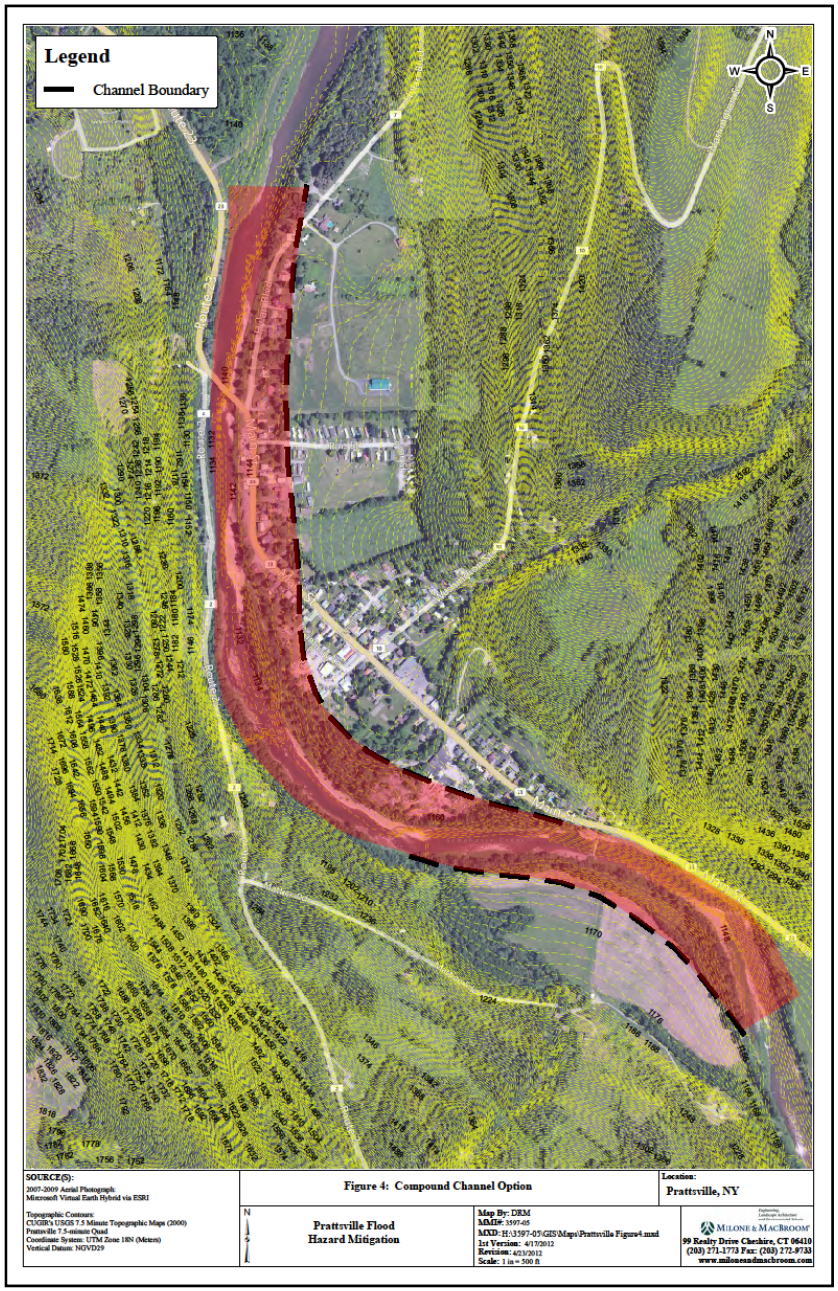
  Required Channel Bottom Width = 496 ft.

  Required Channel Top Width = 560 ft.

  Increases channel width by +200 ft.

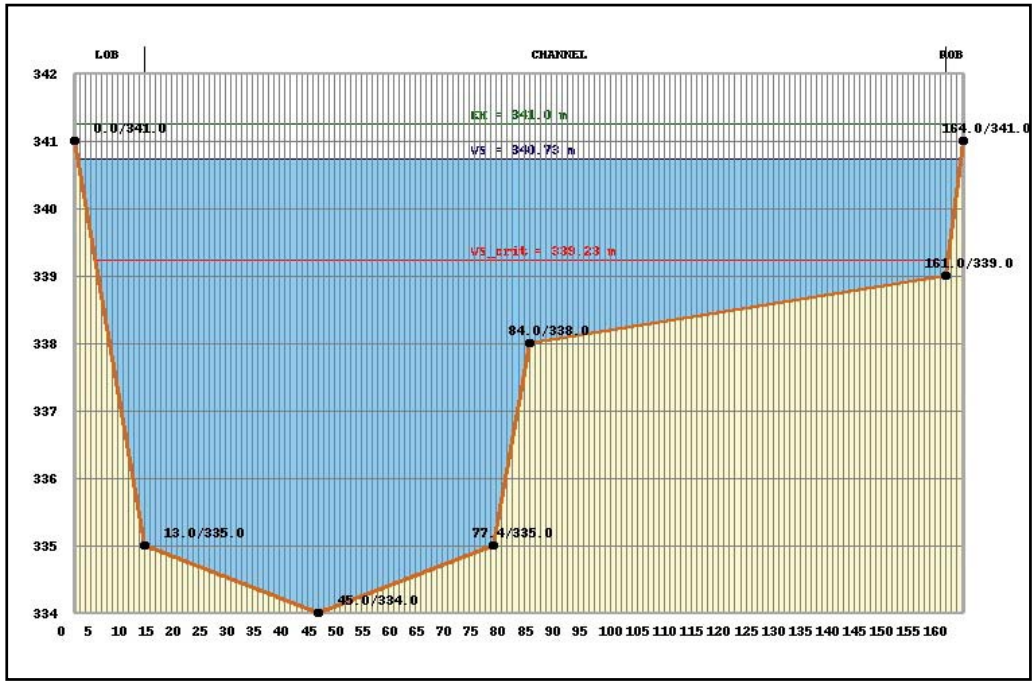
  This channel has the correct depth and slope, but is three times wider than the existing channel approaching the bridge.

CHANNEL SIZE

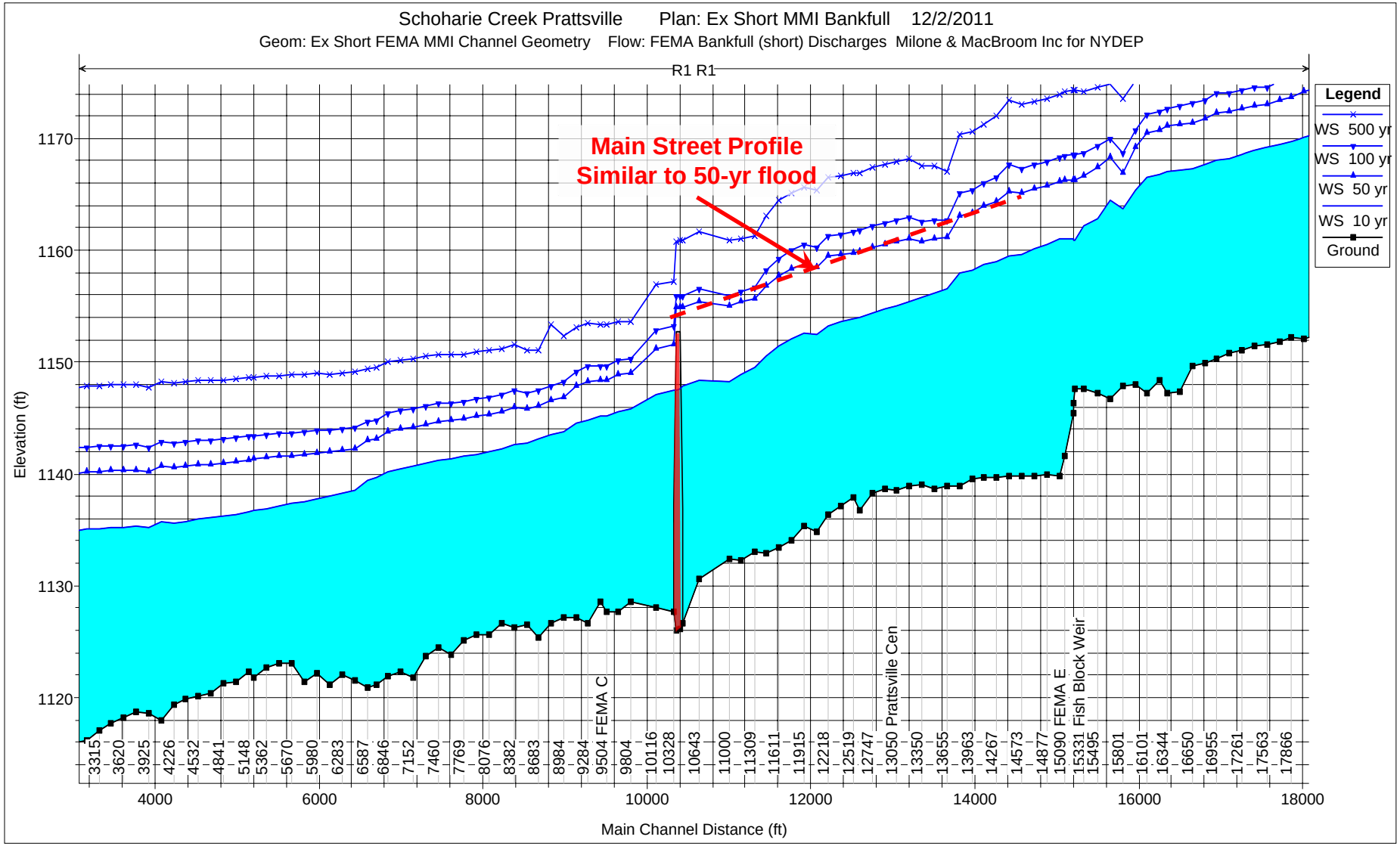


Requires much of the space between Main Street and the Schoharie Creek, as well as several existing including existing infrastructure and private properties.

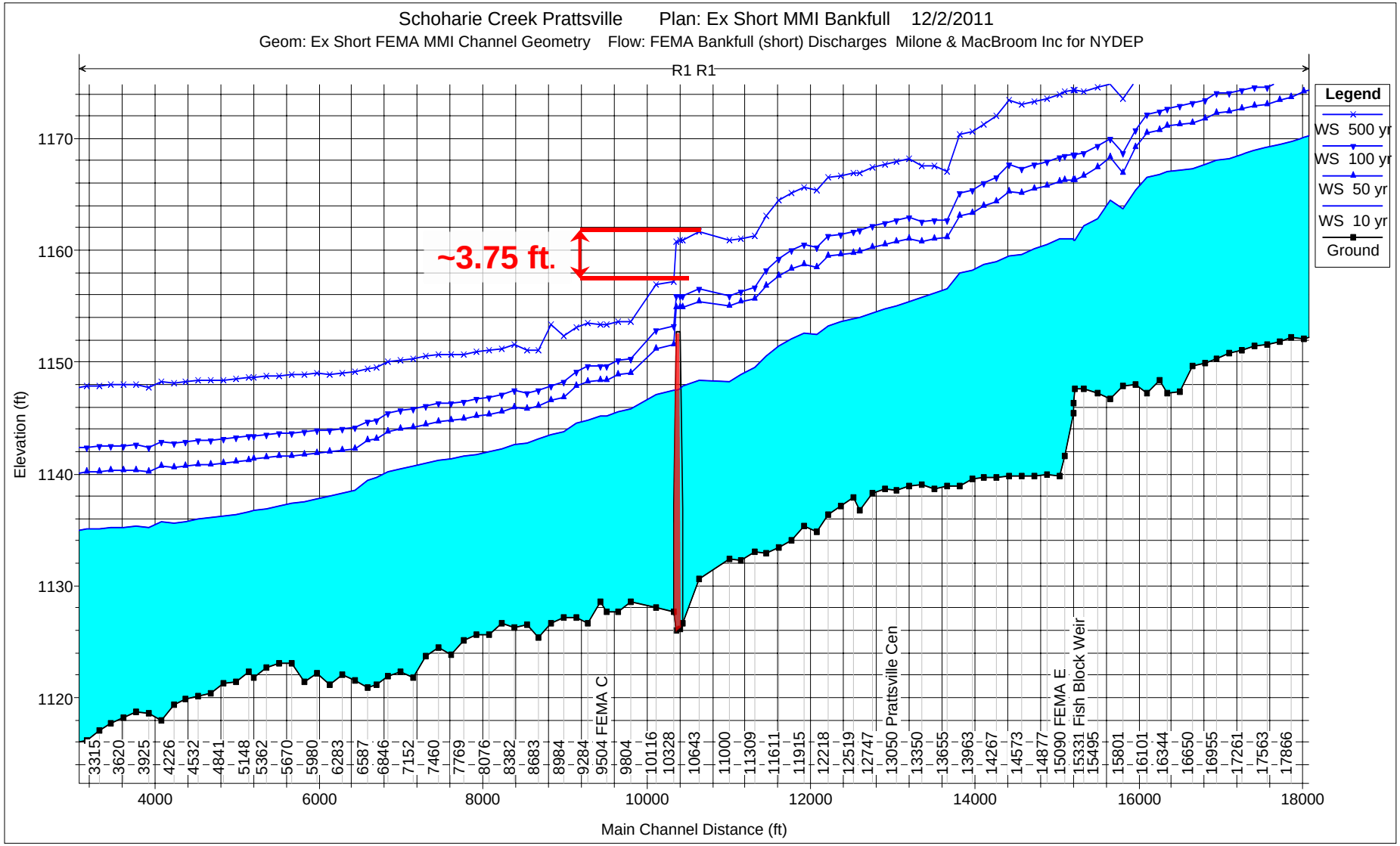
500' WIDE FLOODWAY



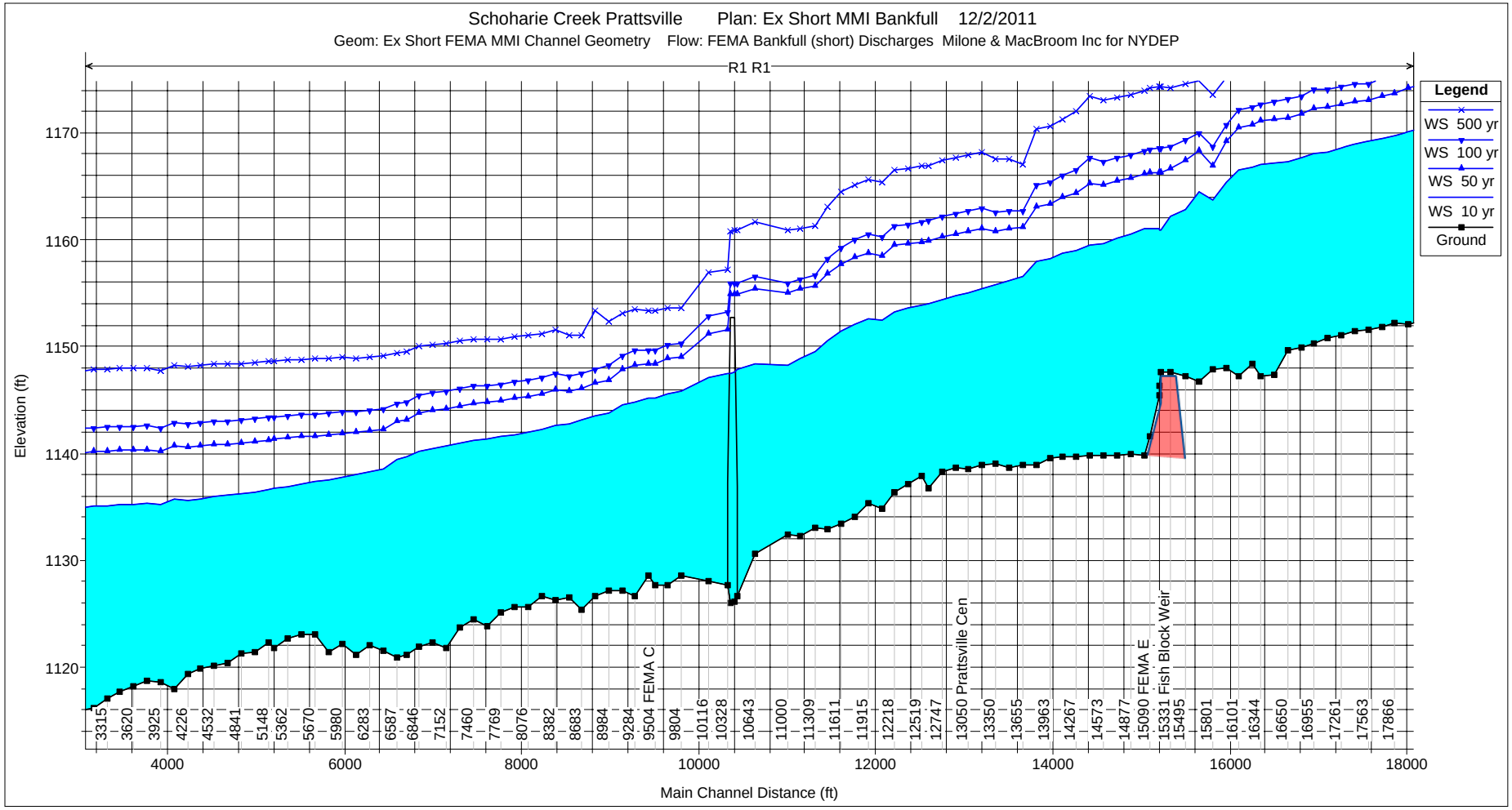
ROUTE 23 BRIDGE



ROUTE 23 BRIDGE

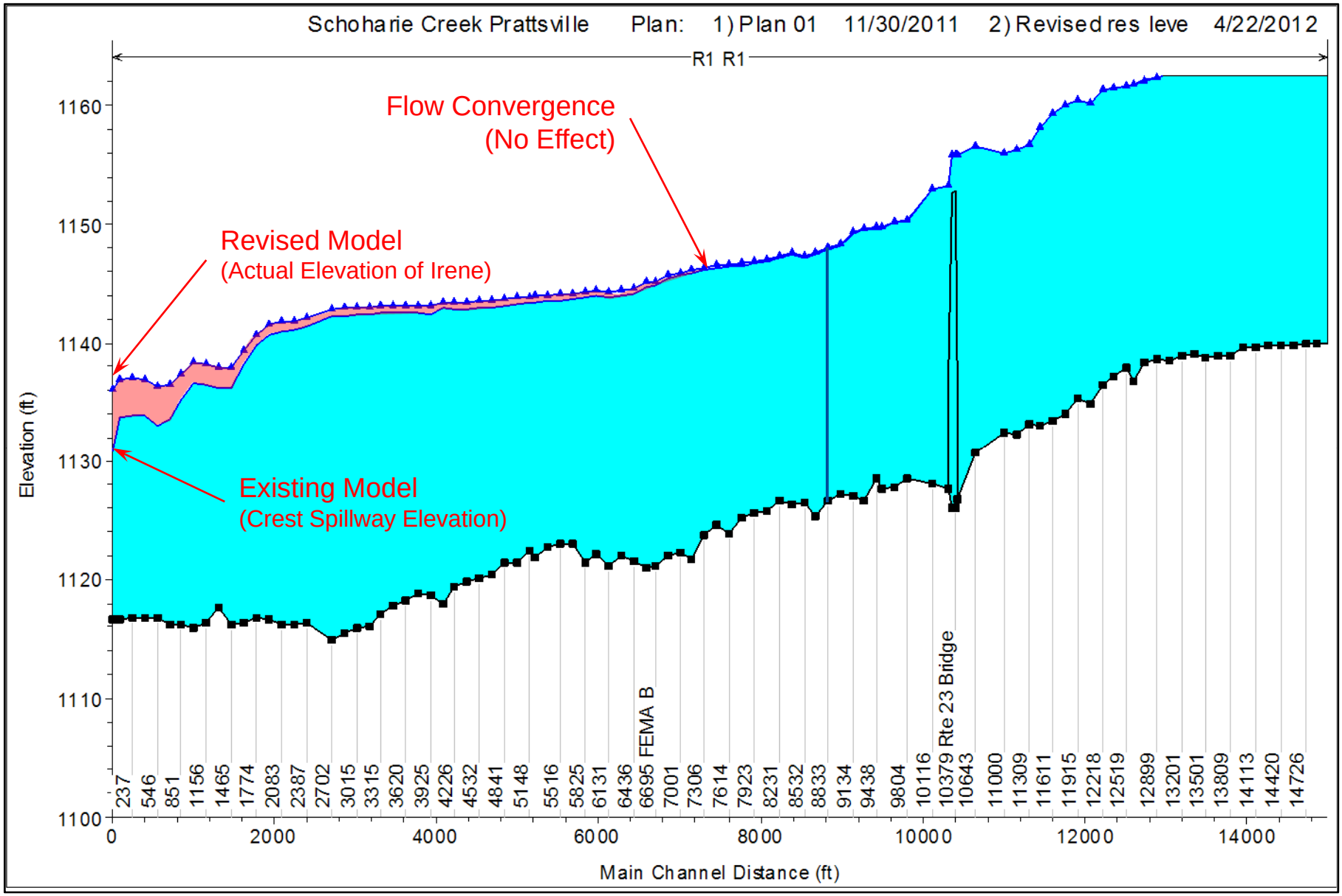


FISH MIGRATION BARRIER

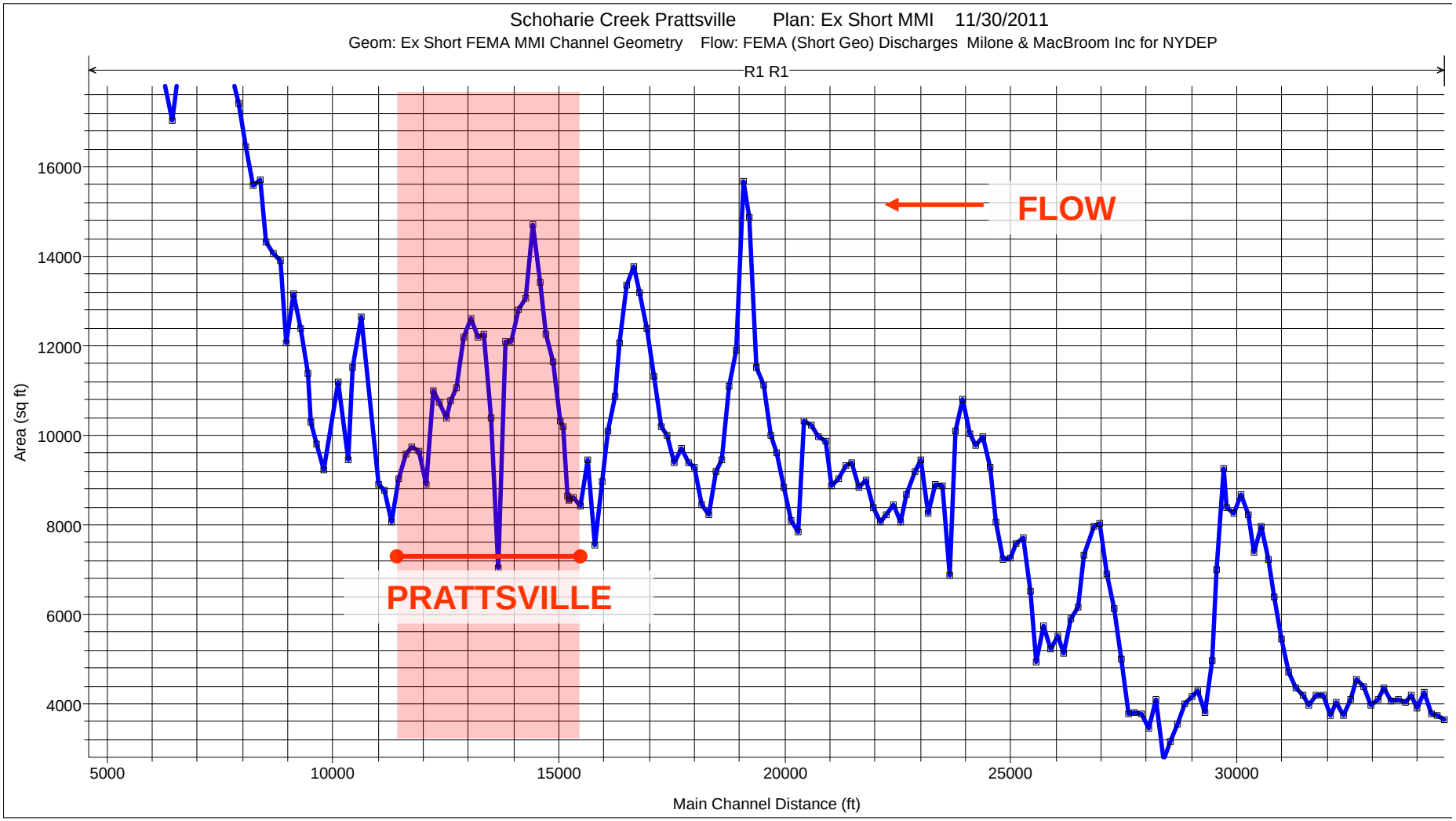


Insignificant change in water surface elevation in the Hamlet during large storm events.

SCHOHARIE RESERVOIR

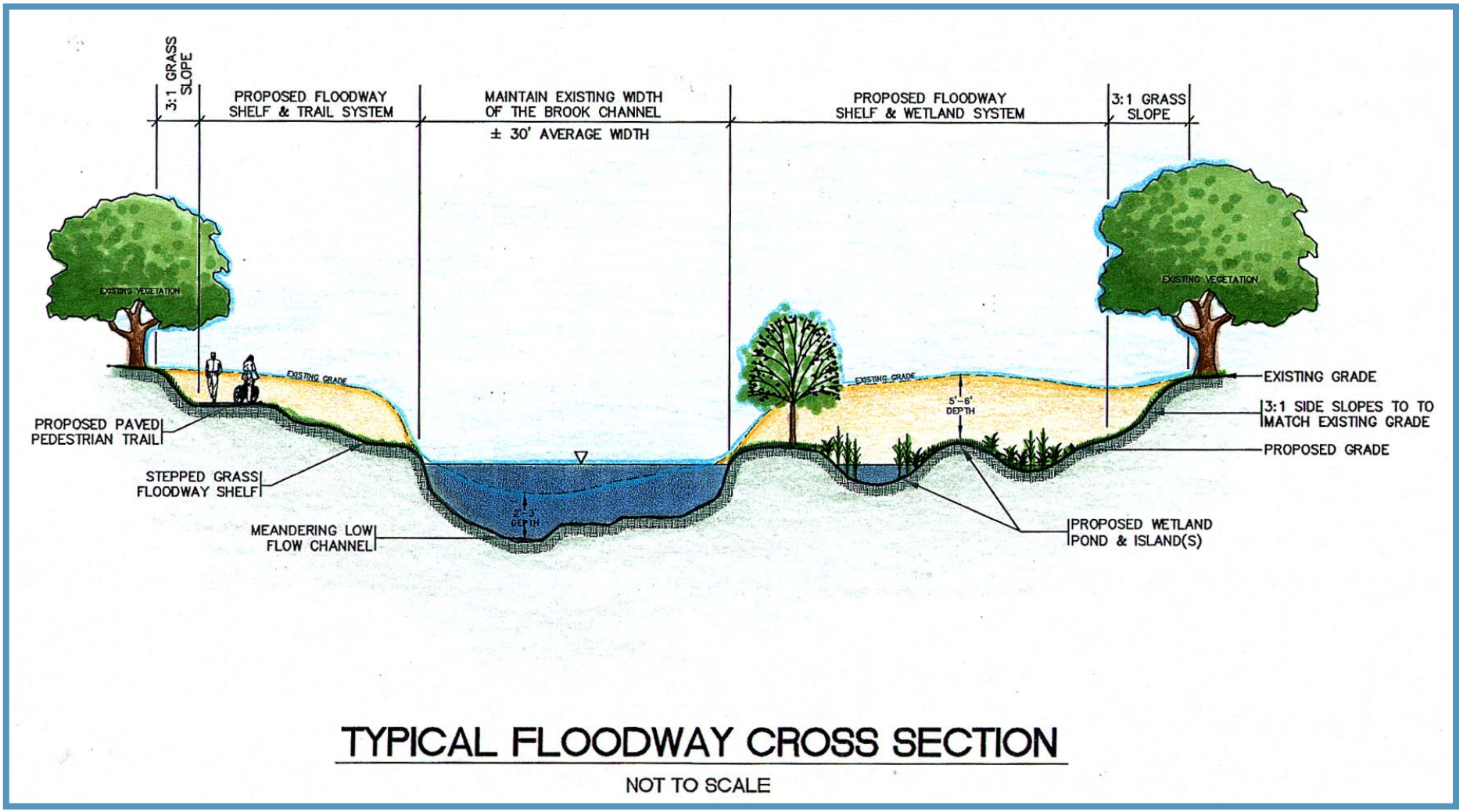


FLOODPLAIN ENCROACHMENTS



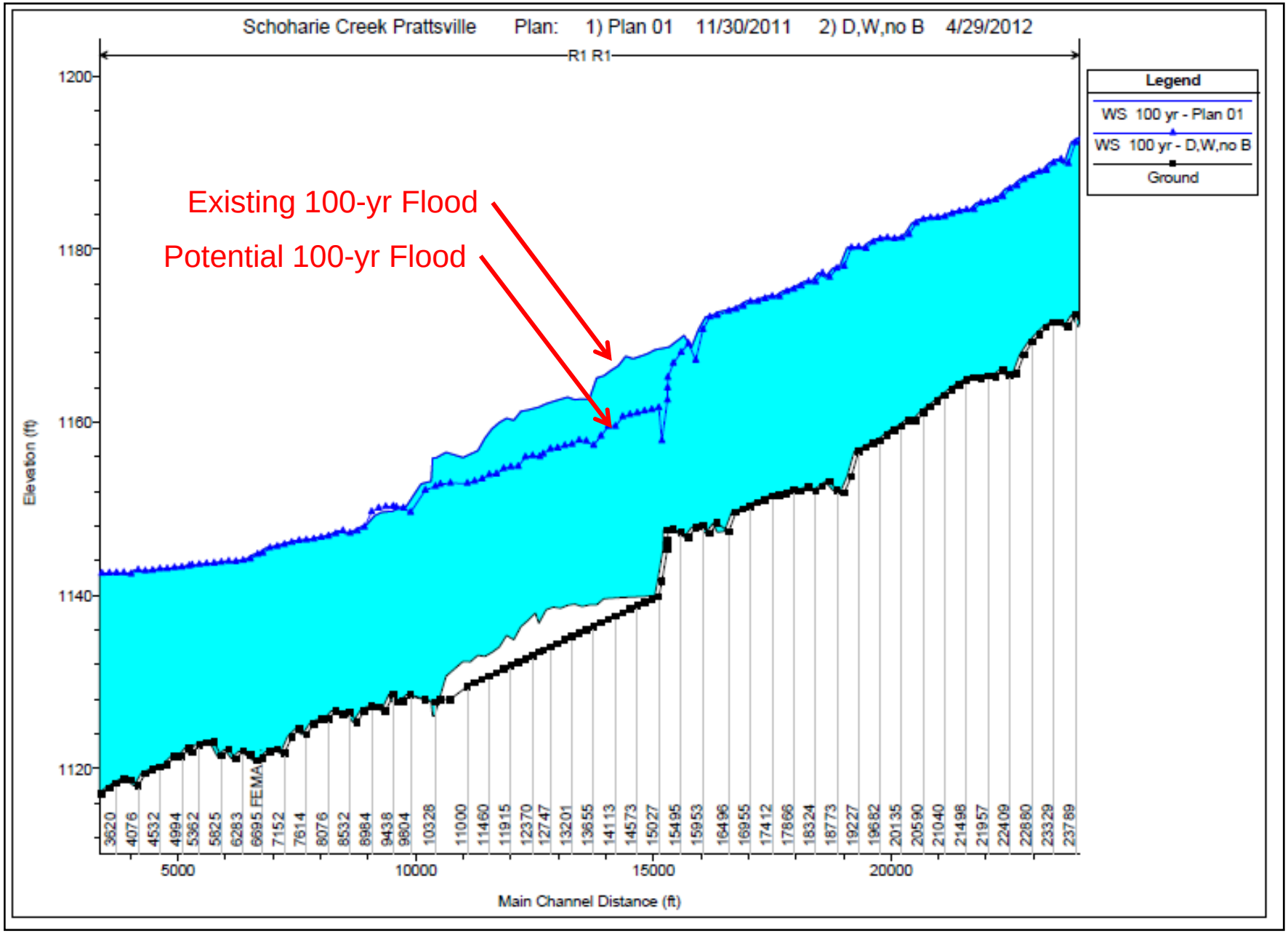
Cross-sectional Area of the total flood flow.

FLOODPLAIN ENCROACHMENTS

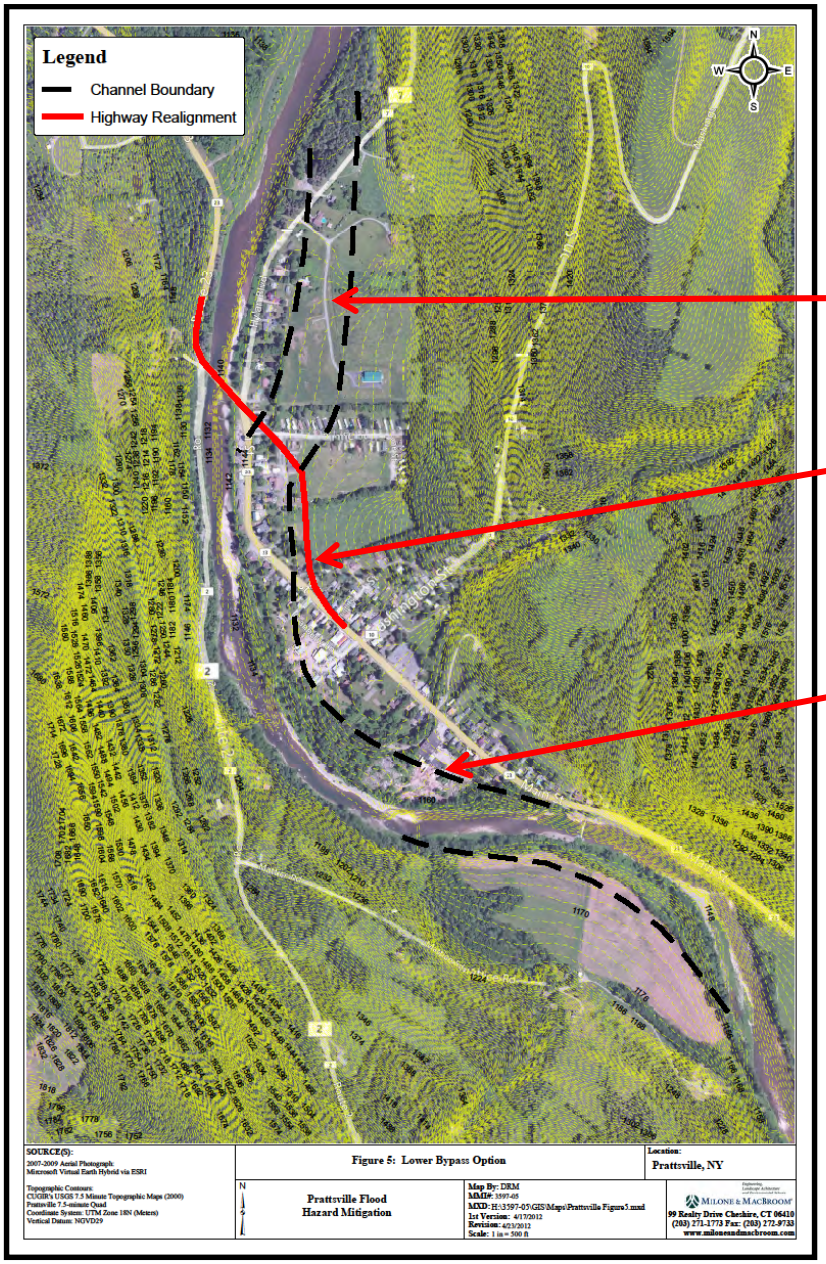


Modification to the floodplain to improve capacity result in measurable improvements.

REMOVE BRIDGE, DREDGE, & WIDEN



CONCEPTUAL BYPASS PLAN



Compound Channel with Floodplain Overflow

BYPASS CHANNEL

RELOCATE HIGHWAY

COMPOUND CHANNEL

PRELIMINARY CONCLUSIONS

- Trends in peak flood flows are increasing.
- The active river corridor (channel and floodplain) need to average 500 feet wide to convey major floods.
- Schoharie Creek is too narrow from Washington Street to the Rt. 23 bridge.
- Schoharie Reservoir does not impact flooding in the Hamlet.
- The fish migration barrier does not impact flooding.
- Channel widening and dredging alone are not a feasible alternatives, but in combination with floodplain widening and improvements may help reduce flood elevation in the upper portion of the Hamlet.
- Modification of the Route 23 bridge crossing (and approach) could result in measurable flood reductions through the lower portion of the Hamlet.
- The best probable scenario is a combination of the above.