



Comparing Different Methods to Calculate Riverine Flooding from Significant Rainfall

Connecticut Association of Floodplain Managers Conference November 13, 2024

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Presentation Outline



- 1. Project Background
- 2. How We Performed the Rainfall-Runoff Analysis
- 3. Another Method
- 4. Comparison
- 5. Other Methods
- 6. Observations



GEOTECHNICAL ENVIRONMENTAL ECOLOGICAL WATER CONSTRUCTION ANAGEMENT



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GEOTECHNICAL ENVIRONMENTAL ECOLOGICAL WATER CONSTRUCTION

Westport, CT





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Project Background

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Goal: Model flooding in each stream for the:

- 10-year
- 25-year
- 50-year
- 100-year and
- 500-year floods.



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Delineate Watersheds and Subwatersheds



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Snyder Unit Hydrograph Method

Calculate runoff using equations relating flow with these parameters:

- Rainfall (in.)
- Drainage Area (sq. mi.)
- Lag time (hr.)
- Peaking Coefficient
- Initial Loss (in.) (soil infiltration)
- Constant Loss (in/hr) (soil infiltration)







Snyder Unit Hydrograph Method

Calculate runoff using equations relating flow with these parameters:

- Rainfall (in.)
- Drainage Area (sq. mi.)
- Lag time (hr.)
- Peaking Coefficient
- Initial Loss (in.) (soil infiltration)
- Constant Loss (in/hr) (soil infiltration)

These variables are calibrated in a model by simulating historic storms.





Westport's streams are ungauged so GZA used a watershed nearby to calculate the parameters and then translated these parameters to our watersheds.







Calibration



April 1996 Total Precipitation: 3.19"





Calibration



1 3 Alles

Sept 2004 Total Precipitation: 1.88"





Calibration



KAR ANCK

April 2006 Total Precipitation: 5.84"





Calibration and Verification

4 storms used to calibrate and 3 storms used to verify the parameters.

- April 1996
- September 2004
- April 2006
- April 2007
- March 2010 (1)
- March 2010 (2)
- May 2014

- Rainfall (in.)
- Drainage Area (sq. mi.)
- Lag time (hr.)
- Peaking Coefficient
- Initial Loss (in.)
- Constant Loss (in/hr)

Ready to model our subwatersheds!





Simulate storms in Westport's watersheds



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Terrain

Land Use



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Field Reconnaissance

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Time (hours)

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How we did the project



HEC-RAS Computations		
Write Geometry Information		
Layer: Complete		
Geometry Processor		
River:	RS:	
Reach:	Node Type:	
IB Curve:		
Unstandy Flow Cimulation		
Simulation:		
Time: 0.1226 011002000 00:07:20	Iteration (2D): 10	
Unsteady Flow Computations		
Computation Messages		
Plan: 'IRInflow100yrPlan Proposed' (India	nRiver.p18)	
Simulation started at: 19Oct2017 01:43:54 PM		
Using 64 Bit Computation Engines		
Writing Geometry		
IndianRiver: Mesh property tables are current.		
Completed Writing Geometry		
Geometric Preprocessor HEC-RAS 5.0.3 September 2016		
Finished Processing Geometry		
Writing Event Conditions		
Event Conditions Complete		
Performing Unsteady Flow Simulation HEC-RAS 5.0.3 September 2016		
Pause Take Snapshot of Results		Stop

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How we did the project

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ECOLOGICAL
WATER
CONSTRUCTION

Image: Construction of the second sec



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How we did the project

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