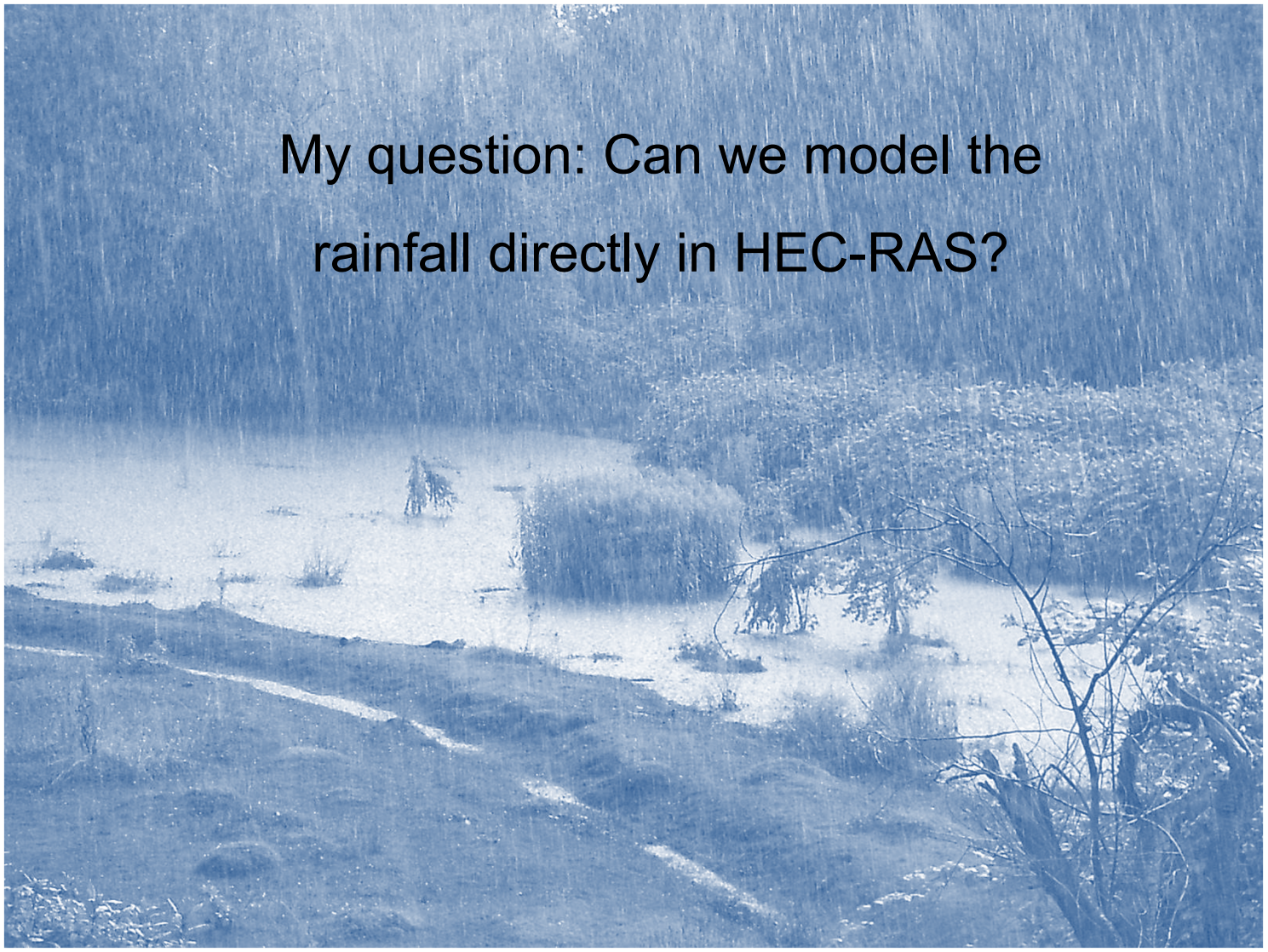
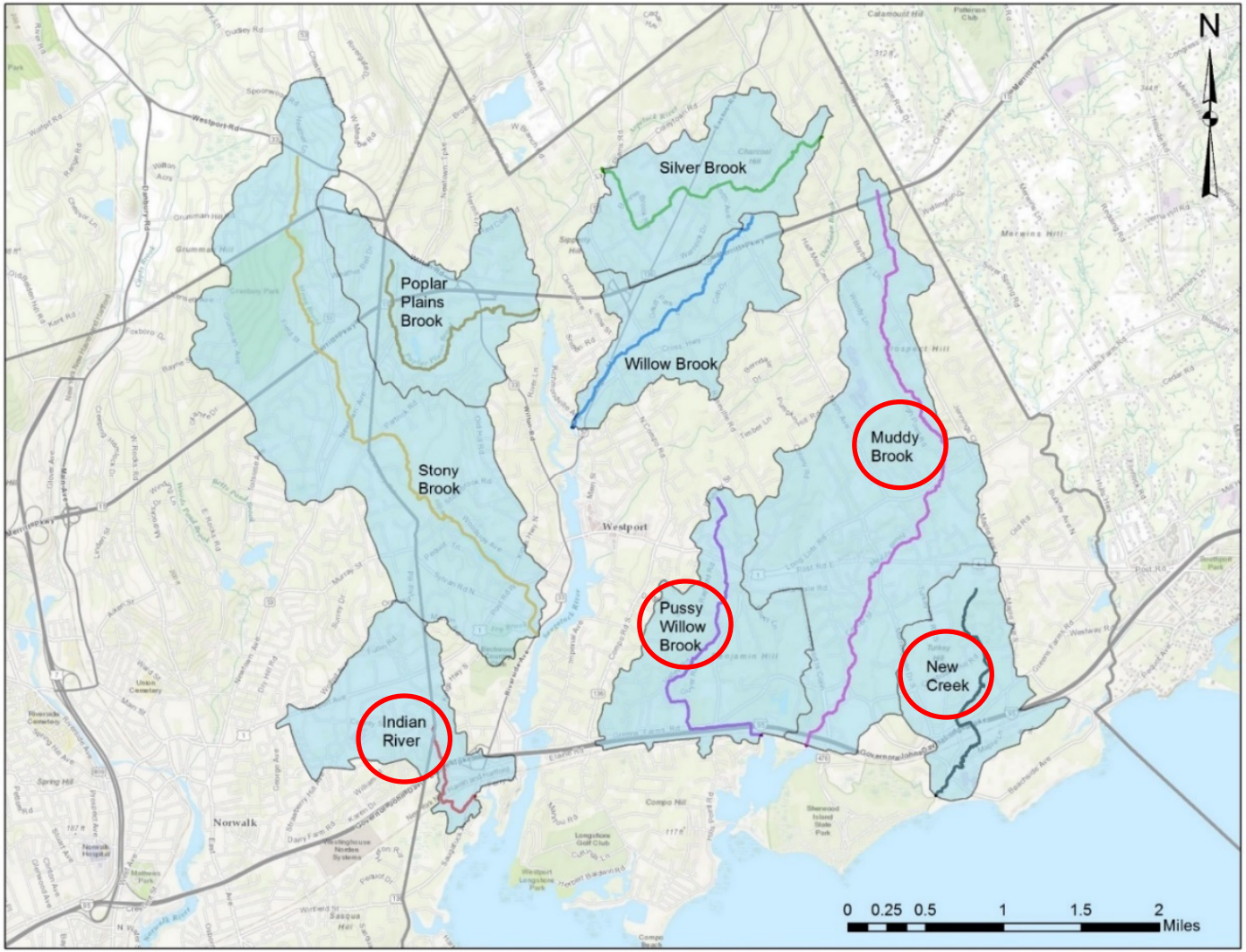
Another Method



Another Method

Assigned 100-year excess rainfall as the input to HEC-RAS.



Another Method

Snyder Unit Hydrograph Method

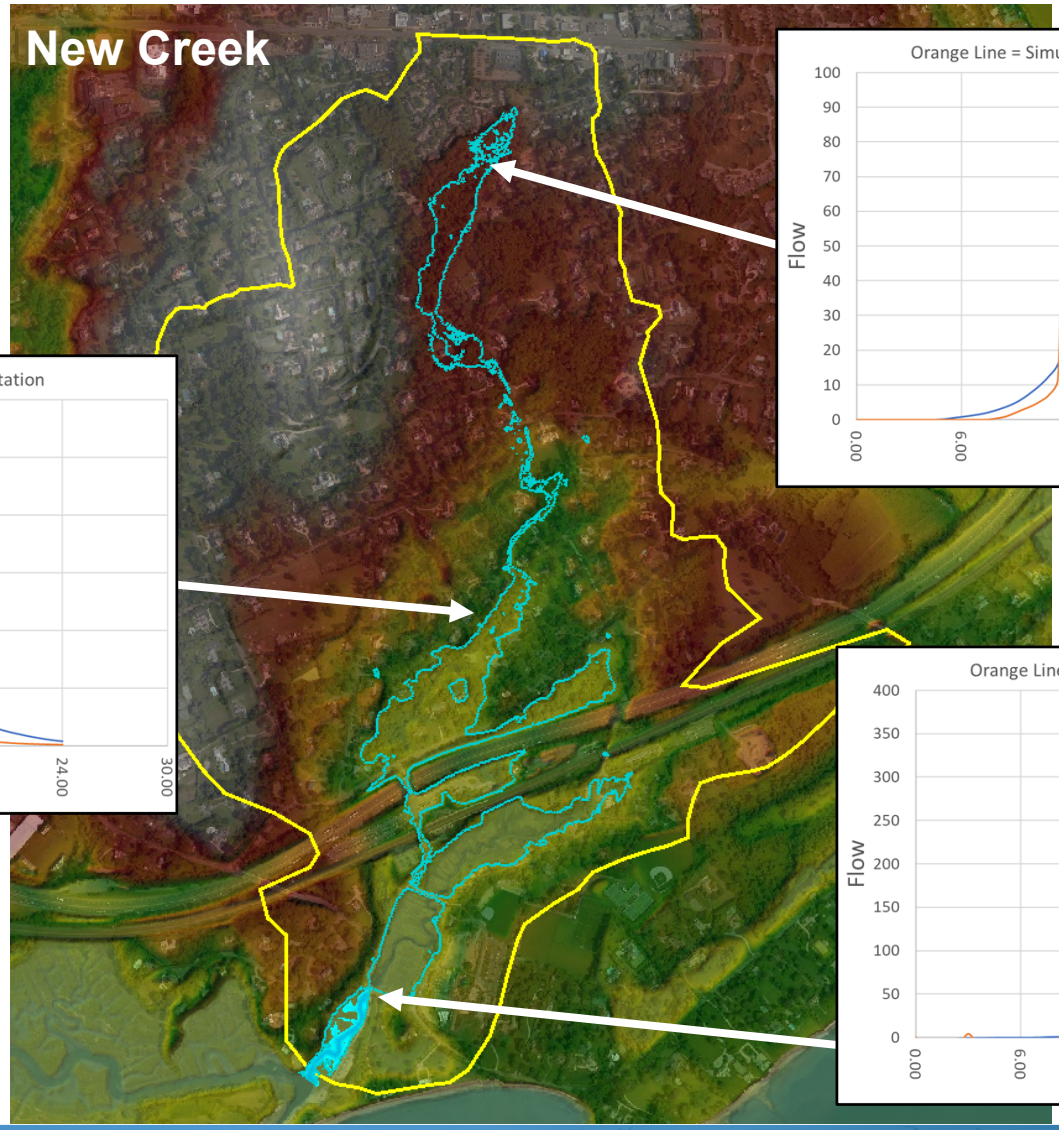
Calculate runoff using equations relating flow with these parameters:

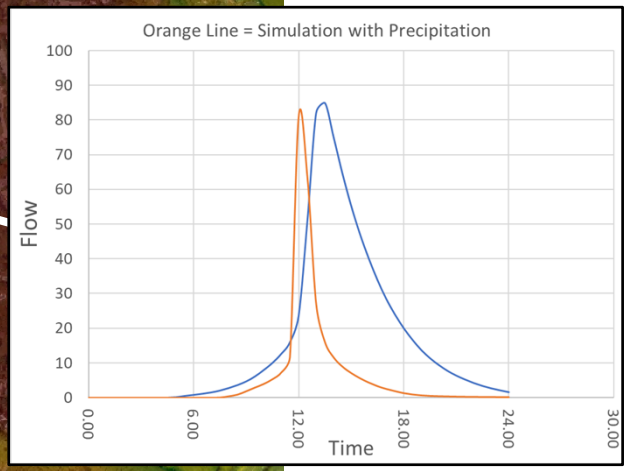
- Rainfall (in.)
- Drainage Area (sq. mi.)
- Lag time (hr.)
- Peaking Coefficient
- Initial Loss (in.) (soil infiltration)
- Constant Loss (in/hr) (soil infiltration)

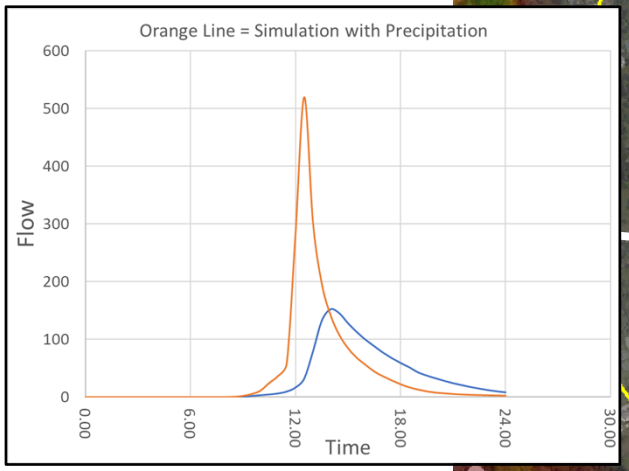
These parameters are now eliminated from the analysis.

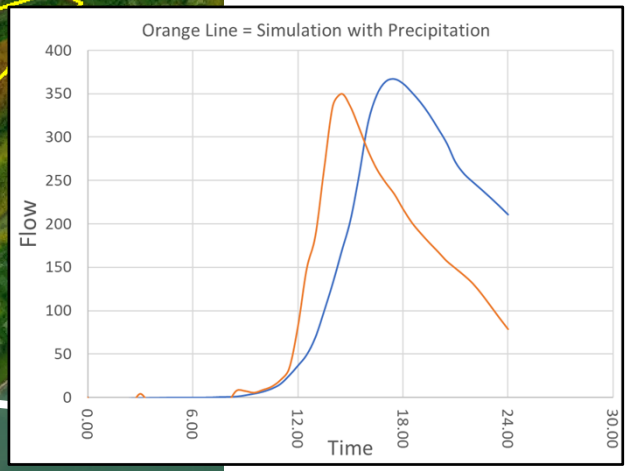
Comparison


GEOTECHNICAL
ENVIRONMENTAL
ECOLOGICAL
WATER
CONSTRUCTION MANAGEMENT


New Creek

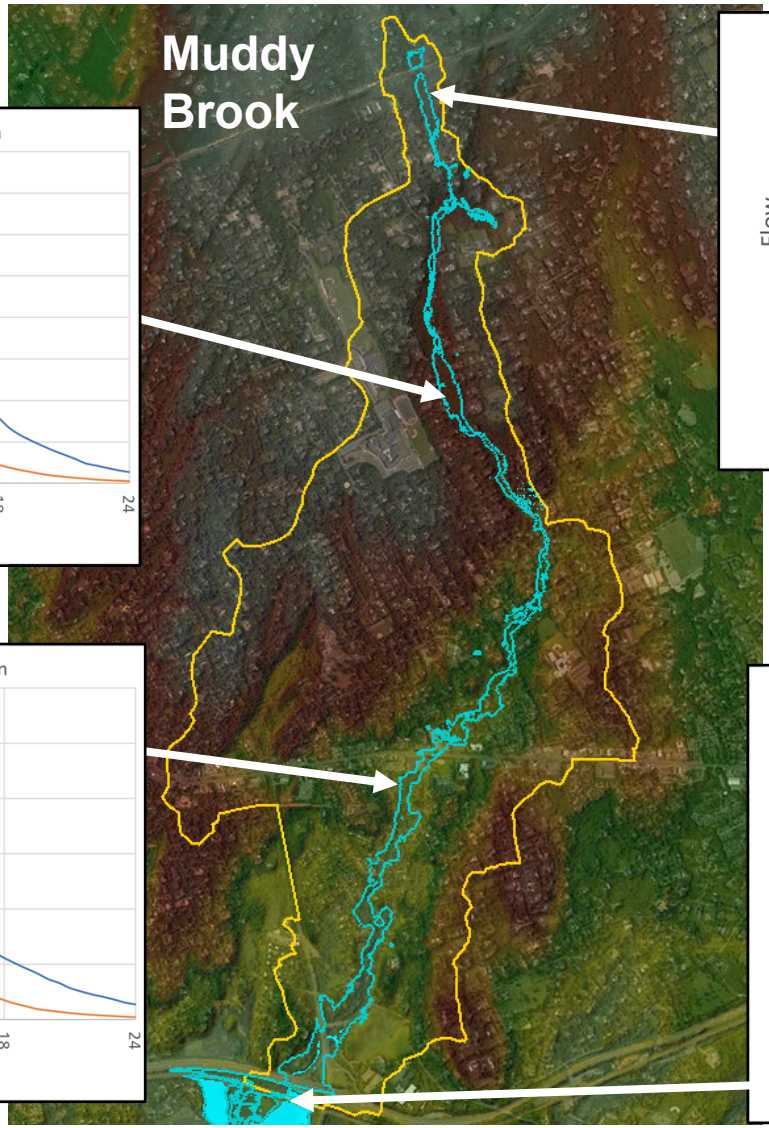

Orange Line = Simulation with Precipitation
Flow
Time
0
10
20
30
40
50
60
70
80
90
100
0.00
6.00
12.00
18.00
24.00
30.00

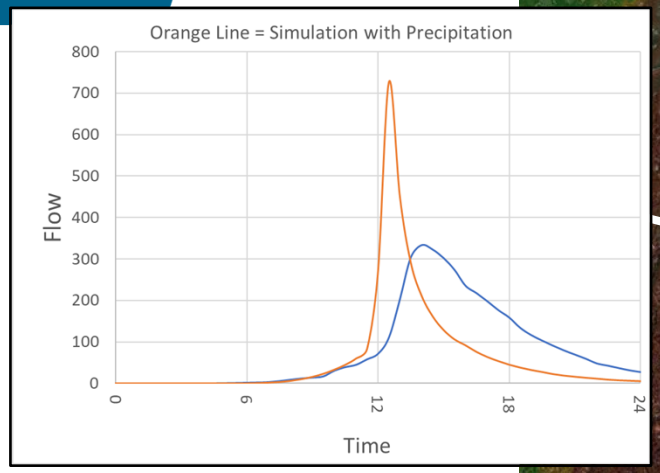

Orange Line = Simulation with Precipitation
Flow
Time
0
100
200
300
400
500
600
0.00
6.00
12.00
18.00
24.00
30.00

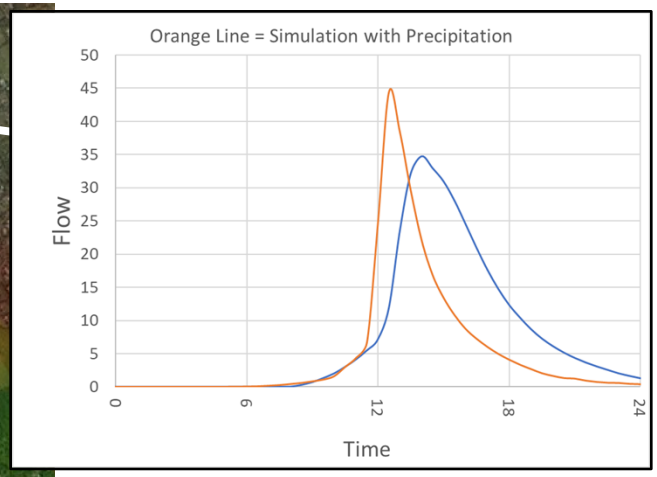

Orange Line = Simulation with Precipitation
Flow
Time
0
50
100
150
200
250
300
350
400
0.00
6.00
12.00
18.00
24.00
30.00

Comparison


GEOTECHNICAL
ENVIRONMENTAL
ECOLOGICAL
WATER
CONSTRUCTION MANAGEMENT


Muddy Brook


Orange Line = Simulation with Precipitation
Flow
Time
800
700
600
500
400
300
200
100
0
0
6
12
18
24


Orange Line = Simulation with Precipitation
Flow
Time
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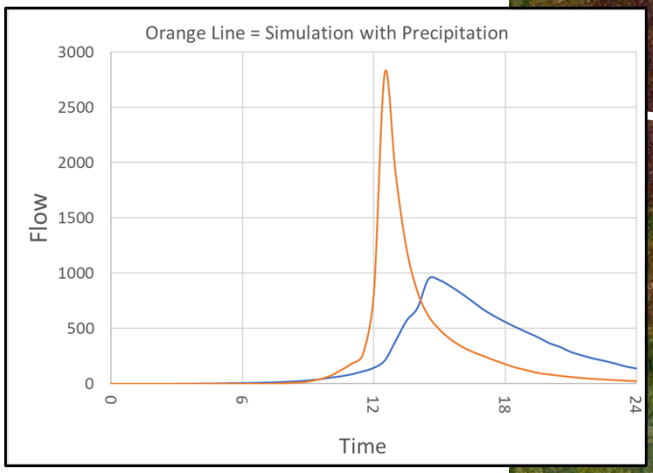
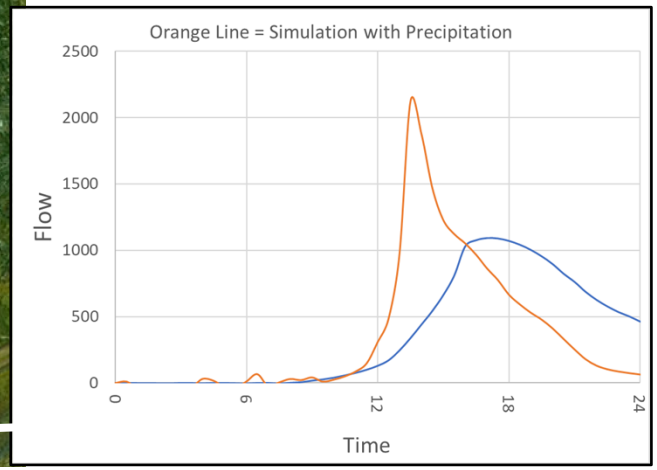
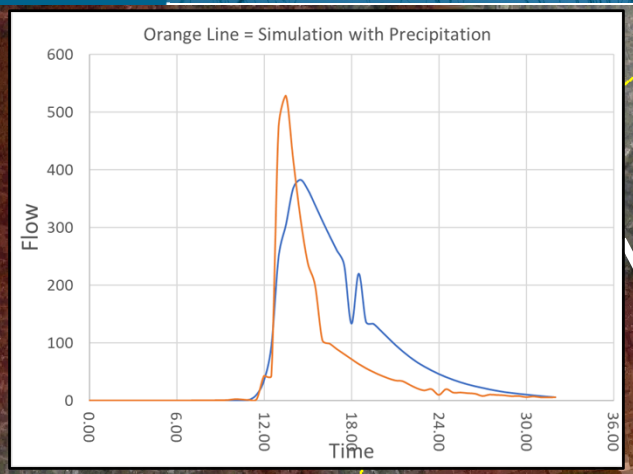
45
40
35
30
25
20
15
10
5
0
0
6
12
18
24


Orange Line = Simulation with Precipitation
Flow
Time
3000
2500
2000
1500
1000
500
0
0
6
12
18
24

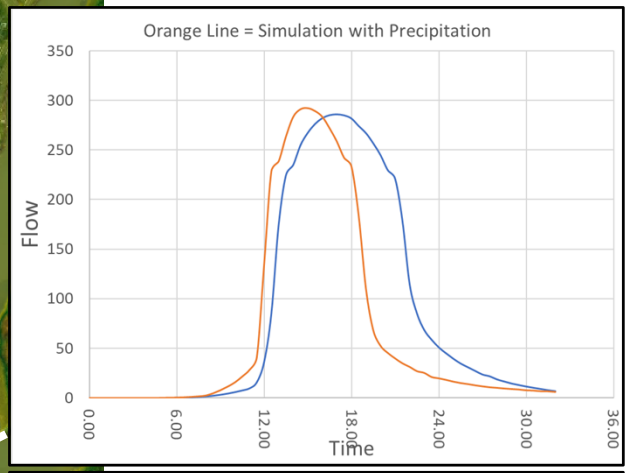

Orange Line = Simulation with Precipitation
Flow
Time
2500
2000
1500
1000
500
0
0
6
12
18
24

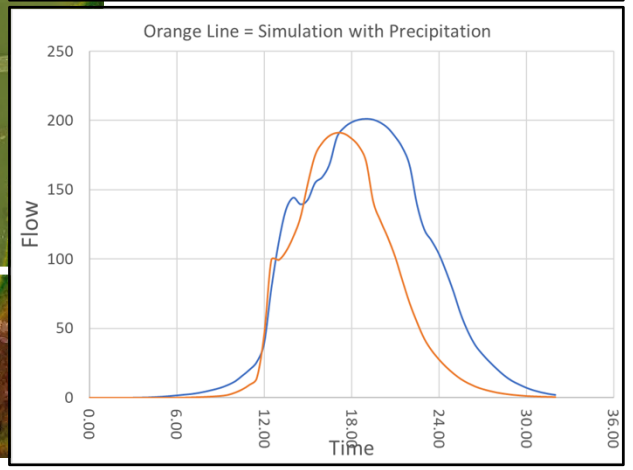
Comparison


GEOTECHNICAL
ENVIRONMENTAL
ECOLOGICAL
WATER
CONSTRUCTION MANAGEMENT


Orange Line = Simulation with Precipitation
Flow
Time
600
500
400
300
200
100
0
0.00
6.00
12.00
18.00
24.00
30.00
36.00

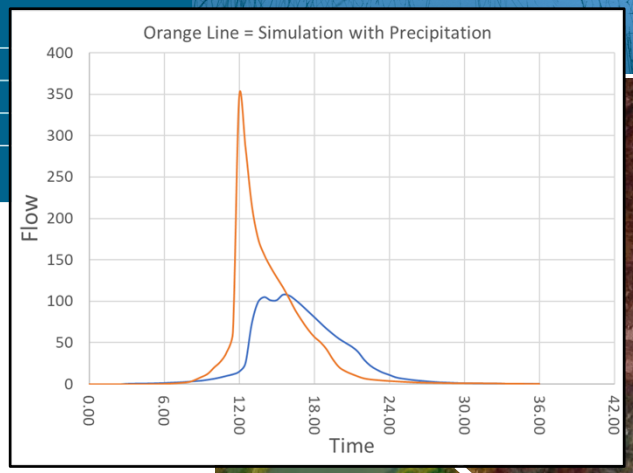
Indian River

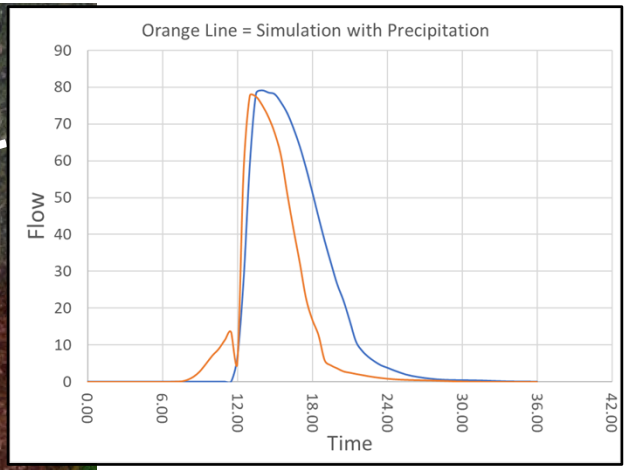

Orange Line = Simulation with Precipitation
Flow
Time
350
300
250
200
150
100
50
0
0.00
6.00
12.00
18.00
24.00
30.00
36.00


Orange Line = Simulation with Precipitation
Flow
Time
250
200
150
100
50
0
0.00
6.00
12.00
18.00
24.00
30.00
36.00

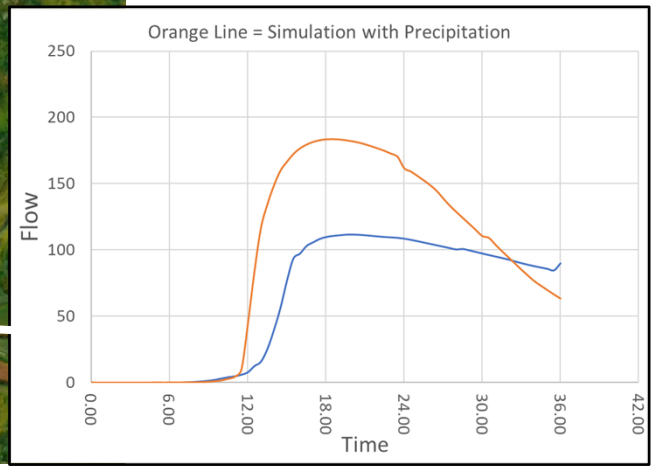
Comparison


GEOTECHNICAL
ENVIRONMENTAL
ECOLOGICAL
WATER
CONSTRUCTION MANAGEMENT


Orange Line = Simulation with Precipitation
Flow
Time
0
50
100
150
200
250
300
350
400
0.00
6.00
12.00
18.00
24.00
30.00
36.00
42.00


Orange Line = Simulation with Precipitation
Flow
Time
0
10
20
30
40
50
60
70
80
90
0.00
6.00
12.00
18.00
24.00
30.00
36.00
42.00

Pussy
Willow
Brook


Orange Line = Simulation with Precipitation
Flow
Time
0
50
100
150
200
250
0.00
6.00
12.00
18.00
24.00
30.00
36.00
42.00

Other Methods

What about PCSWMM?

What about StreamStats?

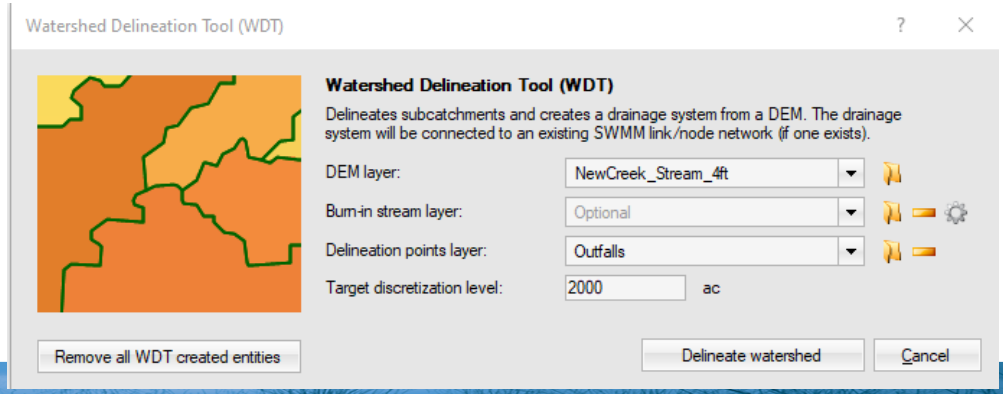
Other Methods

PCSWMM

PCSWMM 2023
Computational Hydraulics inc.

Calculate runoff using an equation relating flow with these parameters:

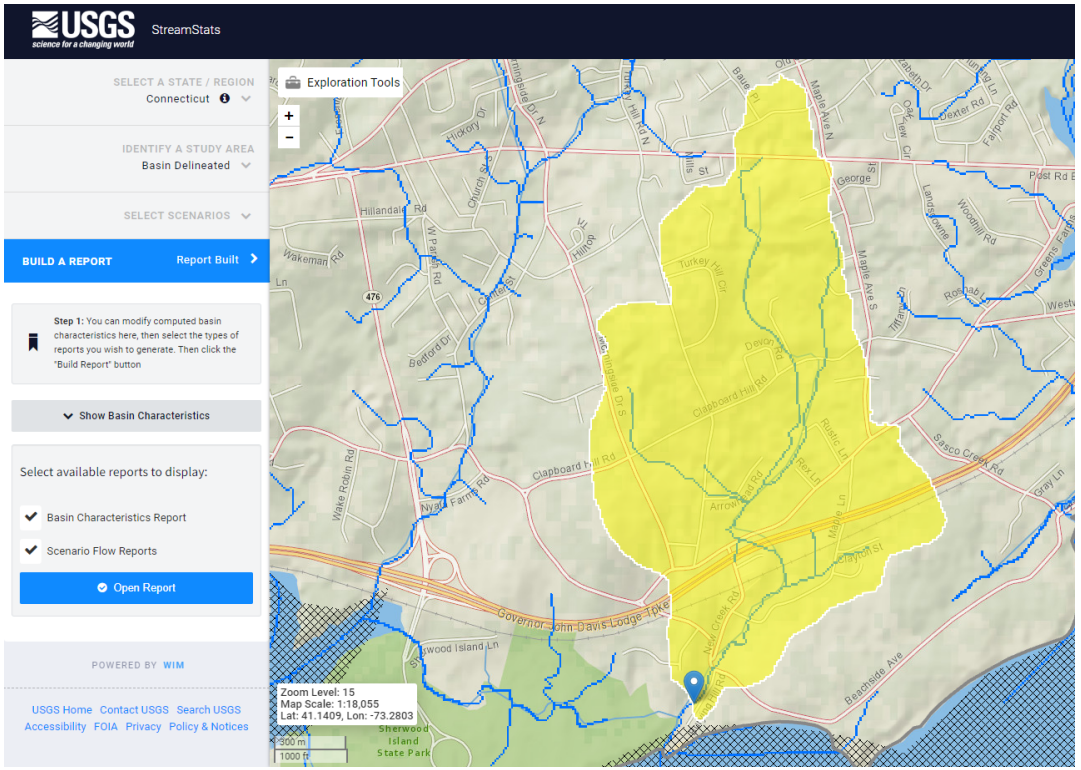
- Rainfall (in.)
- Drainage Area (sq. mi.)
- Initial Loss (in.) (soil infiltration)
- Constant Loss (in/hr) (soil infiltration)
- Watershed "Width" (PCSWMM computes from terrain)
- Watershed Slope (PCSWMM computes from terrain)
- Overland Manning's n
- Depression Storage



StreamStats for Connecticut

Calculate peak runoff using equation with variables :

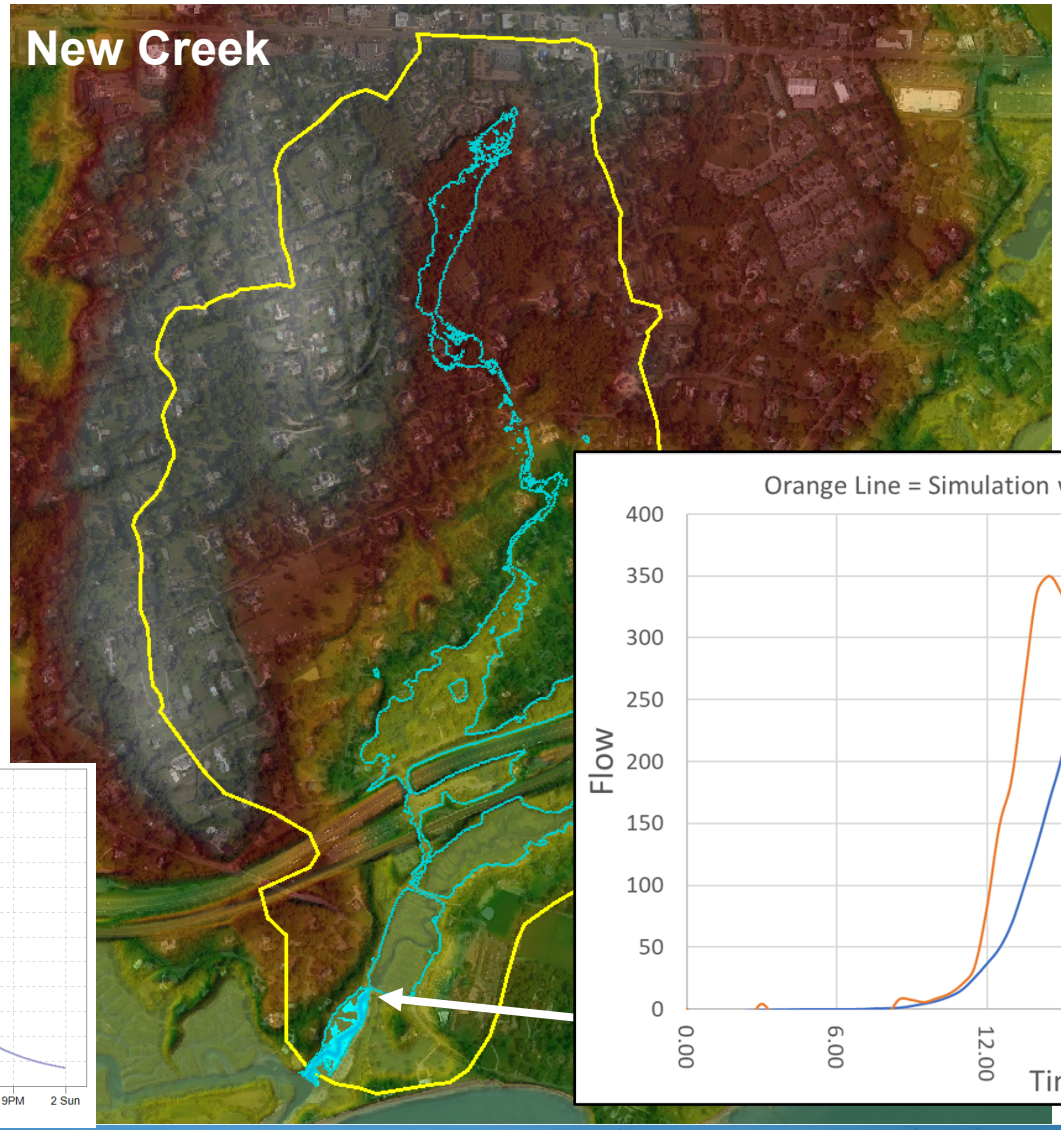
- Drainage Area (sq. mi.)
- Percentage of Soil C/D
- Rainfall (in.)

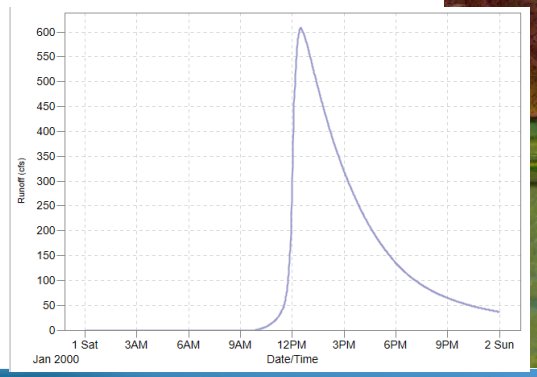


Another Method

StreamStats: 200 cfs

PCSWMM: 610 cfs (Manning's n of 0.4 for overland flow)



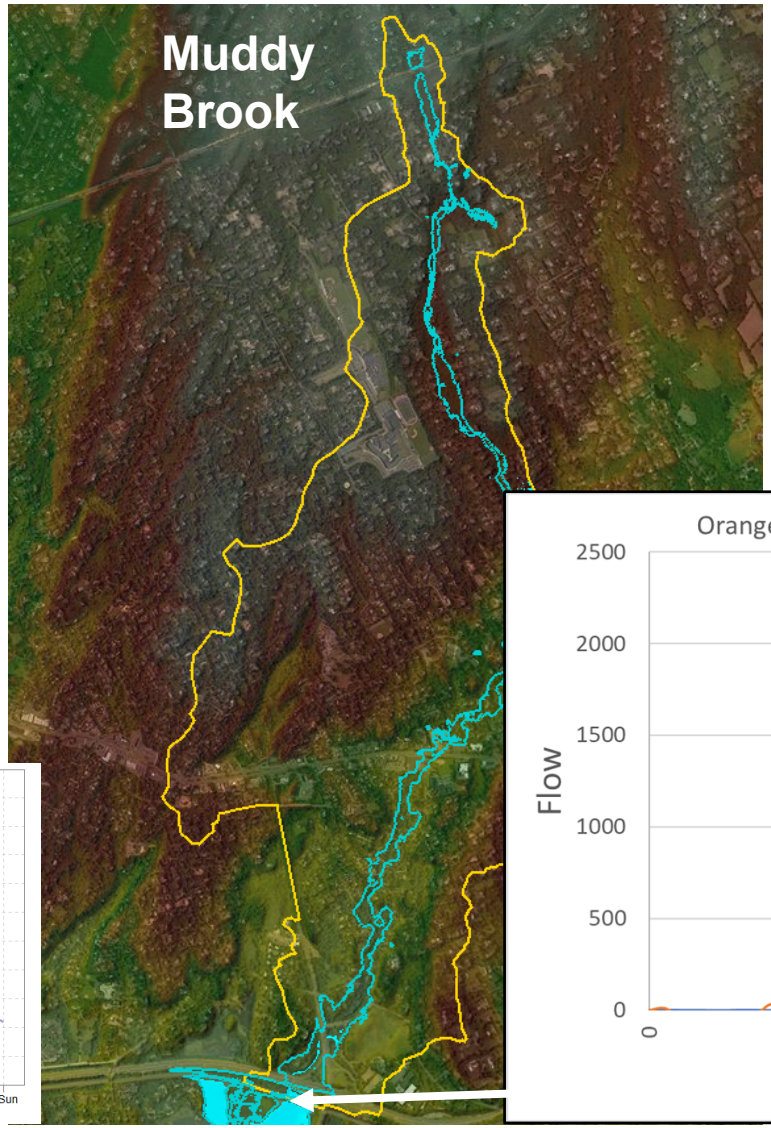


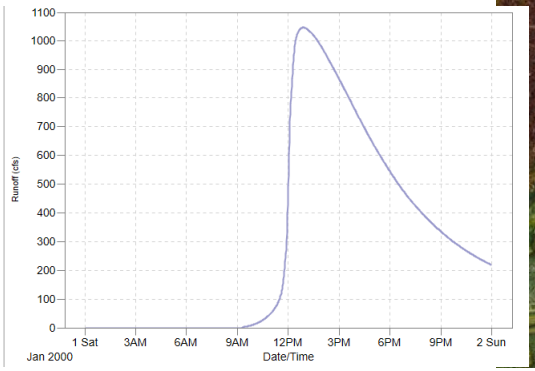
PCSWMM

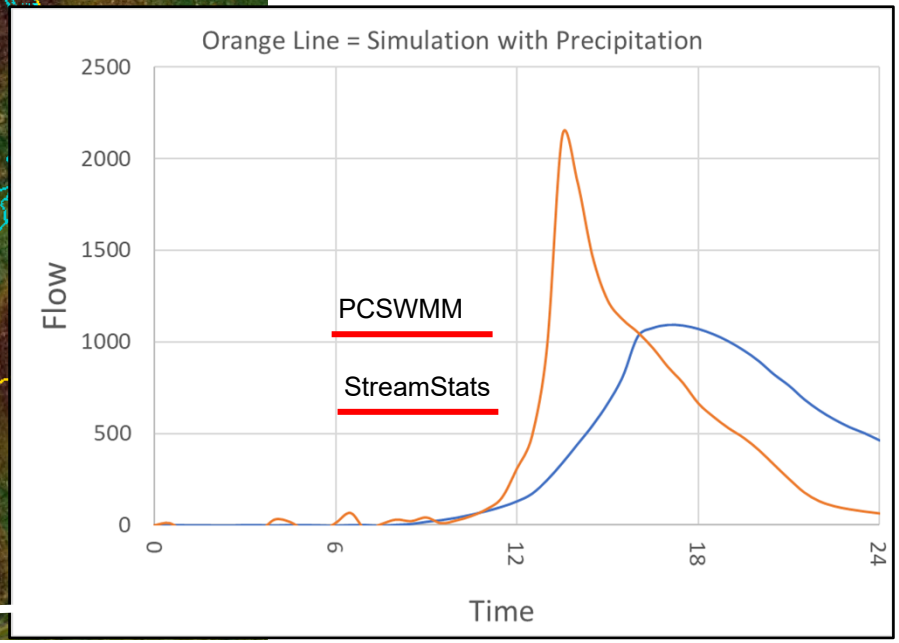
Another Method

StreamStats: 620 cfs

PCSWMM: 1,050 cfs (Manning's n of 0.4 for overland flow)







Observations

- Peak flow from precipitation simulation tends to be higher.
- Time of peak flow from precipitation simulation tends to be earlier.
- Difference in simulations are lessened downstream of structures that cause significant obstructions (Interstate, Railroad).
- Precipitation simulation results in some of the runoff being stored in topographic low points.
- PCSWMM generates hydrograph with very few inputs, but Manning's n is difficult to assign and hydrograph does not show lag time.

Questions?

Contact Information:
Christine.Suhonen@gza.com
914-450-7925

Info on Hydraulic Model

Table 6: Manning's n Values for Different Land Uses

Land Use	Manning's n	Land Use	Manning's n
Stream	0.035	Developed	0.2
Building	0.5	Turf and Grass	0.04
Pavement	0.025	Other Grass	0.04
Ag. Field	0.03	Deciduous Forest	0.1
Water	0.035	Coniferous Forest	0.1
Non-Forested Wetland	0.05	Barren	0.03
Forested Wetland	0.08	Utility	0.1
Tidal Wetland	0.08		

Grid Cell size = 30 feet
Terrain Resolution = 4 feet

Info on Watershed Sizes

- Indian River (0.9 square miles);
- Muddy Brook (2.7 square miles);
- New Creek (0.9 square miles);
- Poplar Plains Brook (1.1. square miles);
- Pussy Willow Brook (1.3 square miles);
- Silver Brook (1.1 square miles);
- Stony Brook (3.3 square miles); and
- Willow Brook (0.9 square miles).

March 2010 Storm

WestportNOW.com
(http://www.westportnow.com/index.php)

TUESDAY, MARCH 30, 2010

Muddy Brook is Muddy—and Flooded

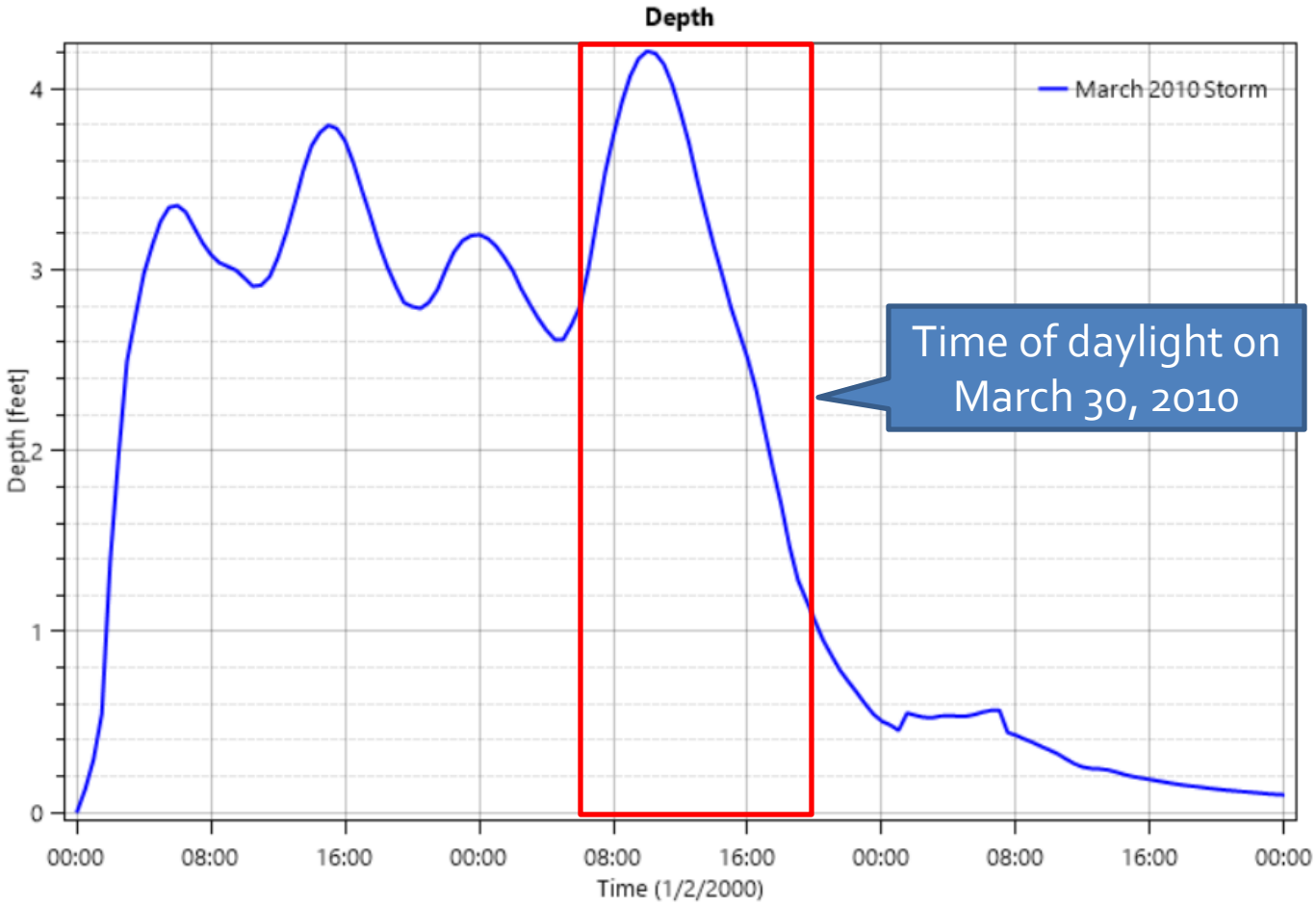
(http://cdn.westportnow.com/ee/images/uploads/muddybrook03301001pop.jpg)
Westport's Muddy Brook was among waterways running over their banks today. This view is off of Hillandale Road in Westport's Greens Farms area. Westport has had almost 5 inches of rain since Sunday night. (CLICK TO ENLARGE) *Ned Hardy for WestportNow.com*

Posted 03/30/10 at 08:43 PM Permalink
(http://www.westportnow.com/index.php?/v3/comments/muddy_brook_is_muddy_and_flooded/)

Photo from March 30, 2010 during daylight. No exact time of photo.

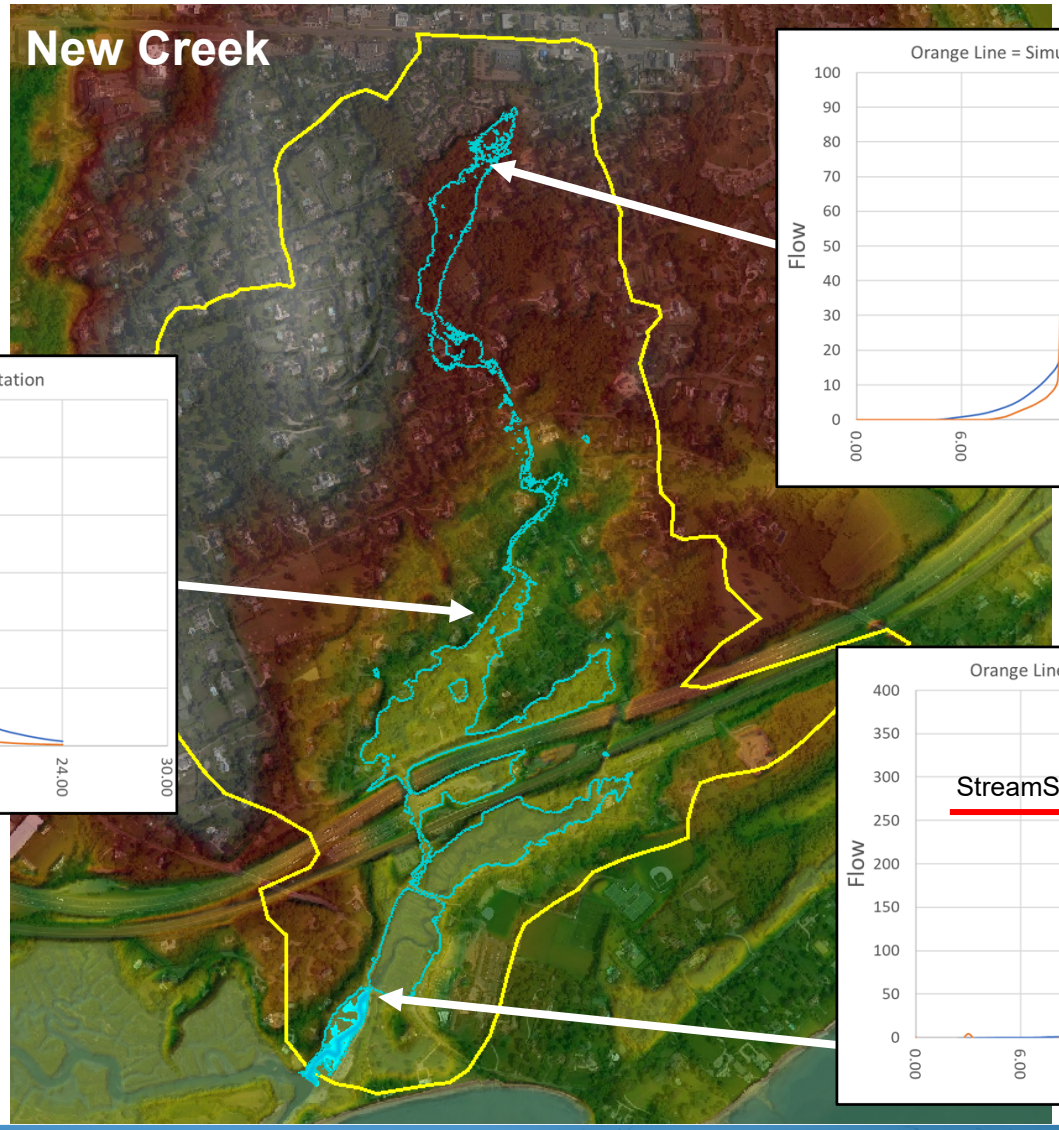
March 2010 Storm

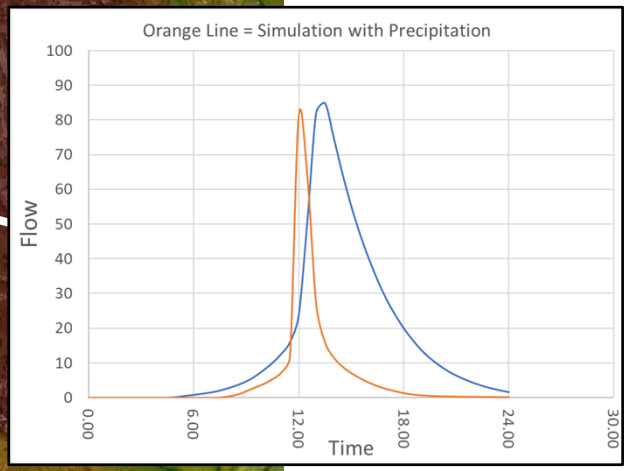
March 2010 Storm

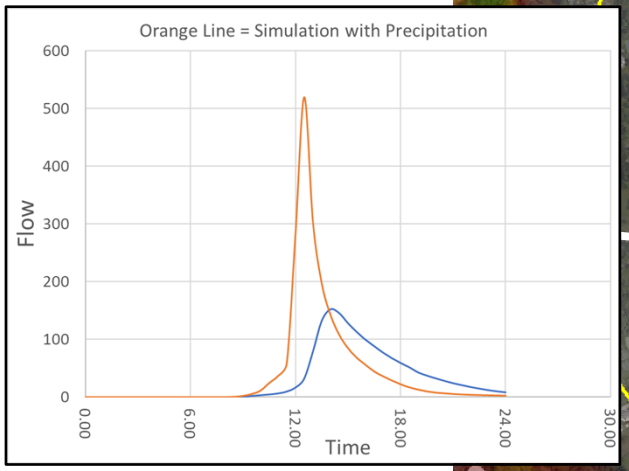


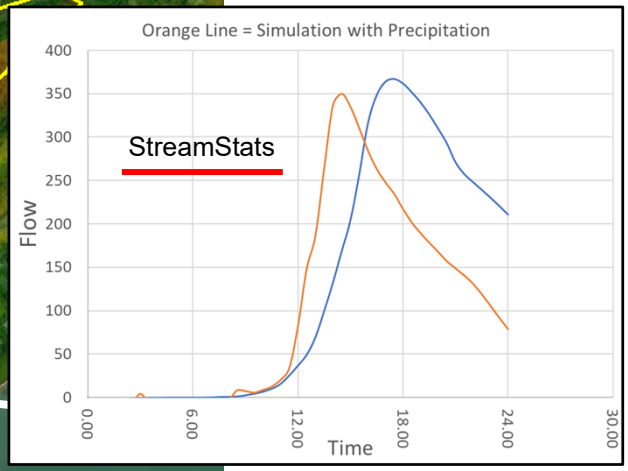
For small watershed – can't calibrate without time of photo.

Other Methods?

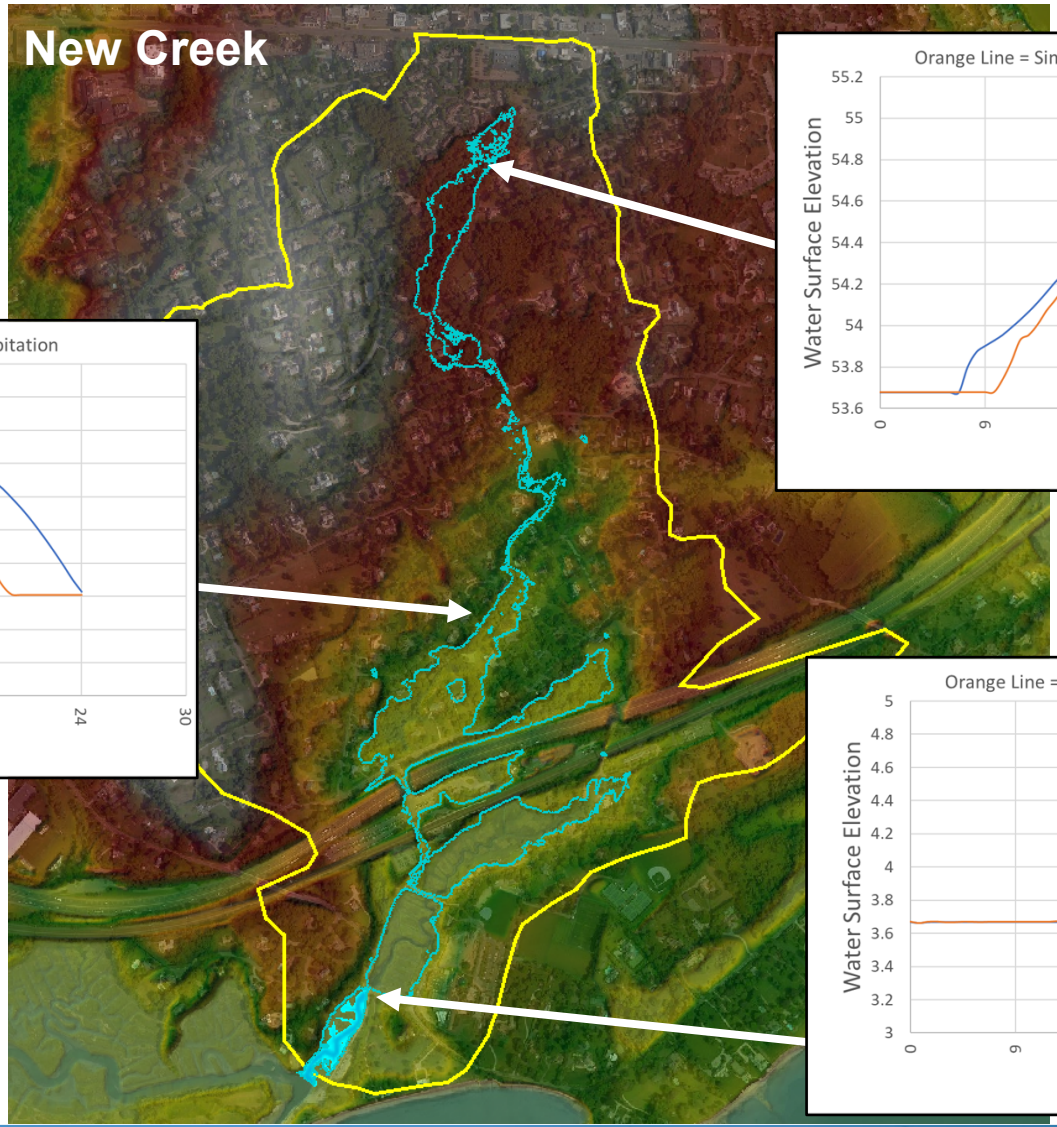


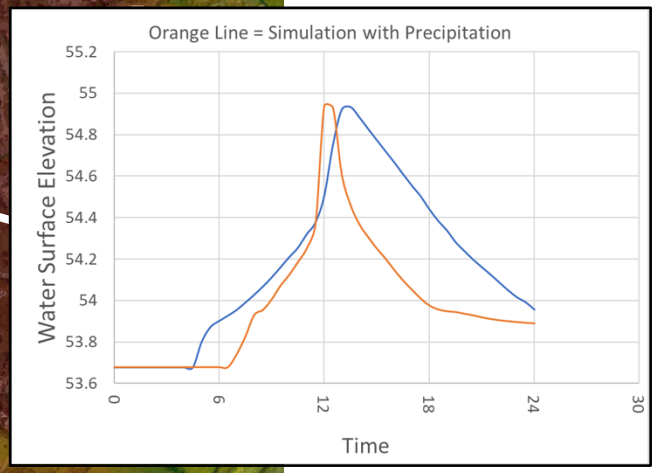


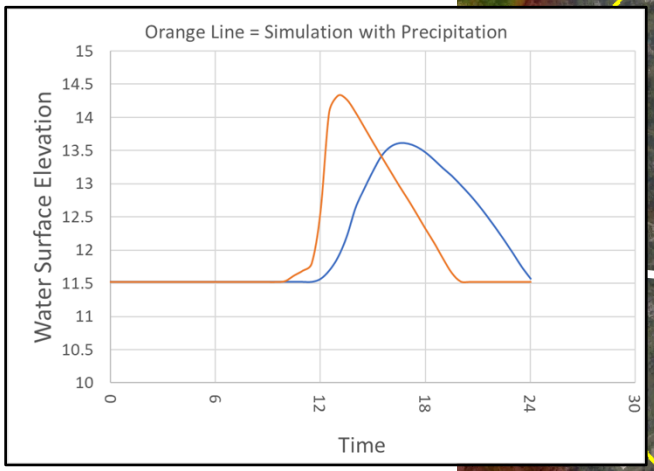




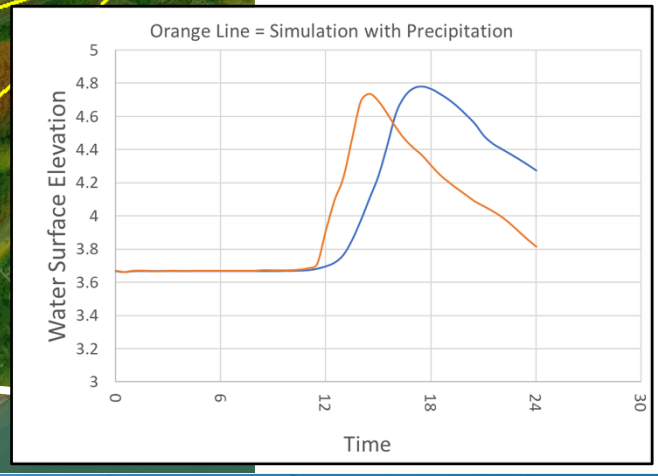
Other Methods?



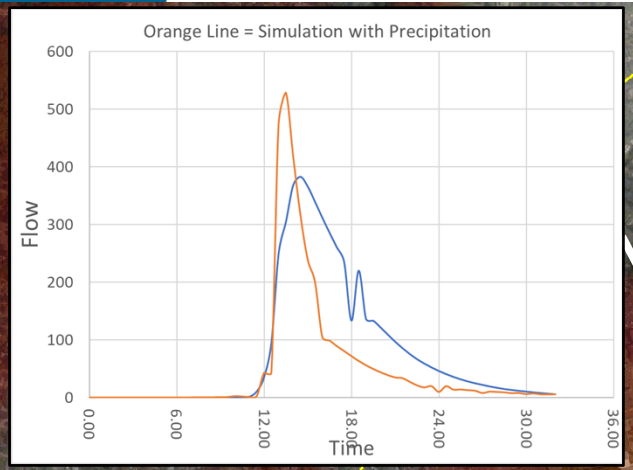


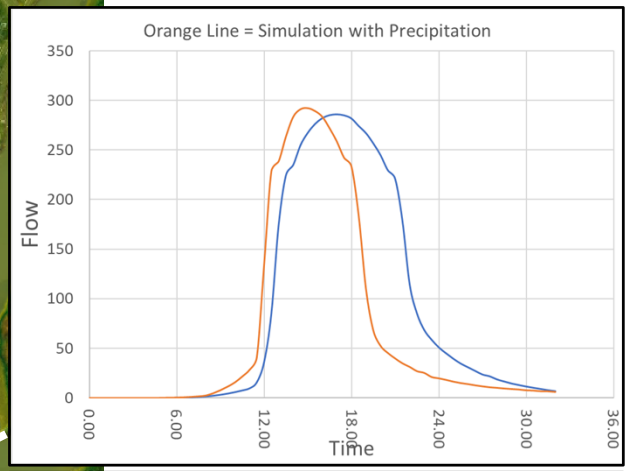


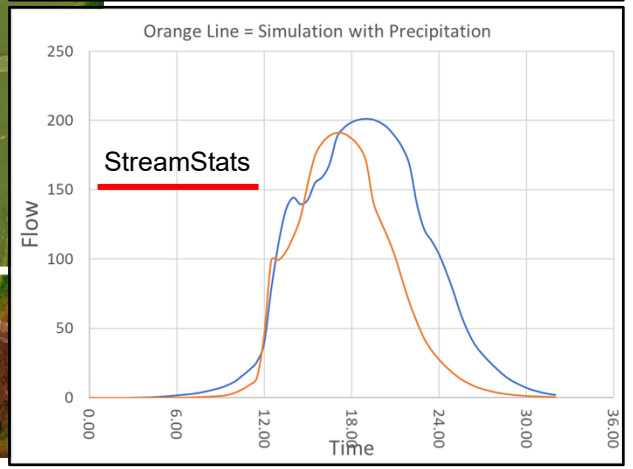
Difference in WSEL = 0.8 ft



Other Methods?

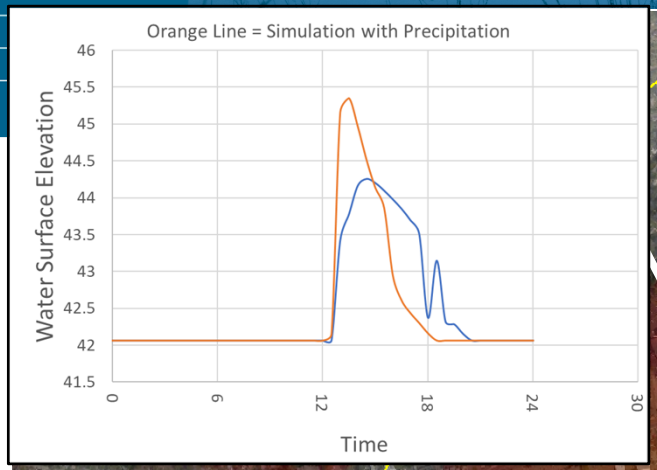


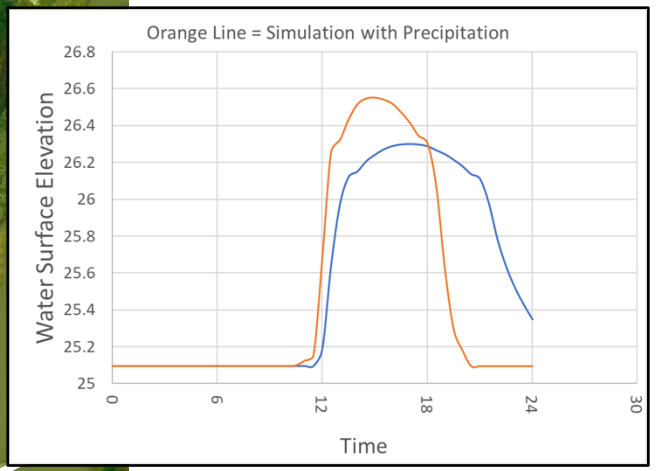


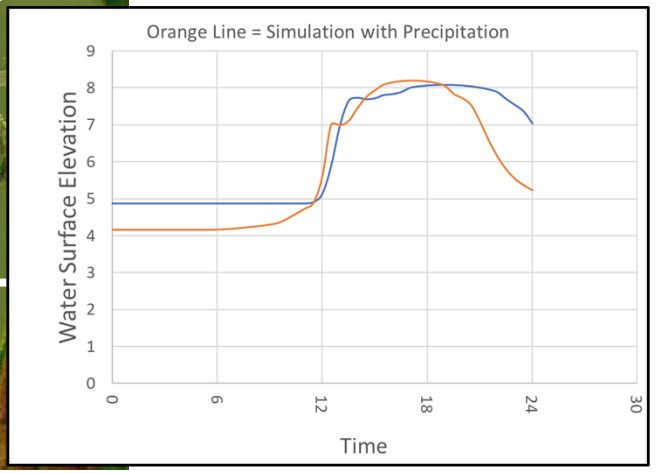


Other Methods?

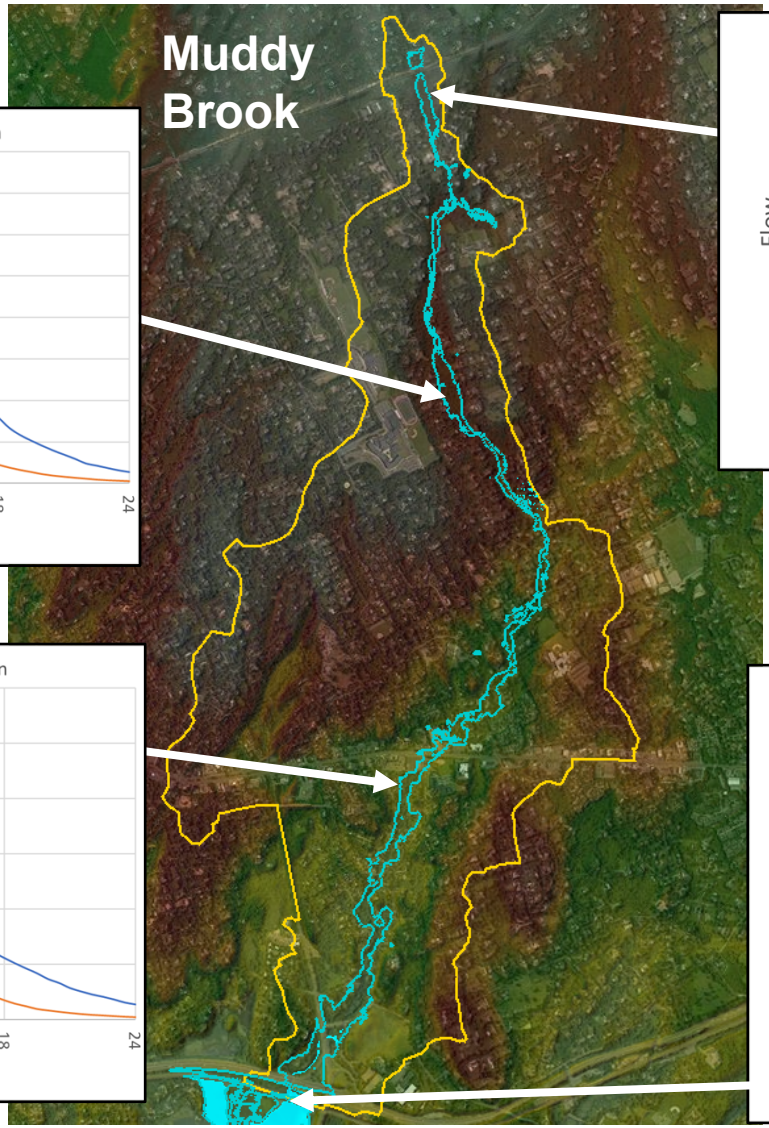
Difference in WSEL = 1 ft

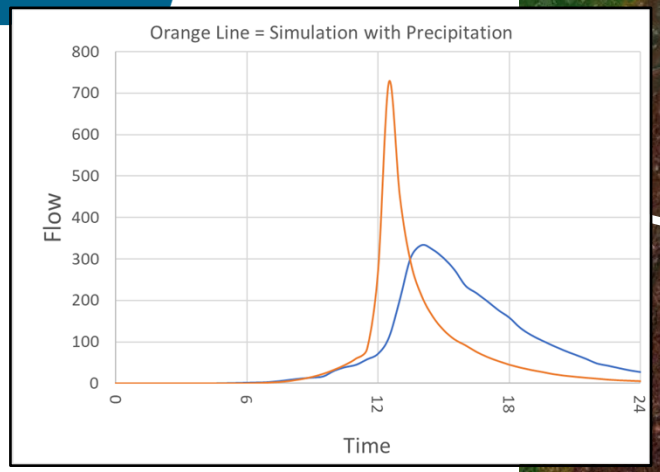


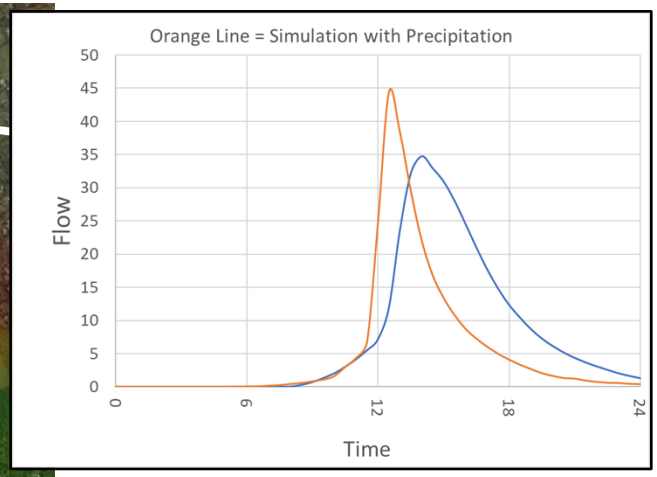


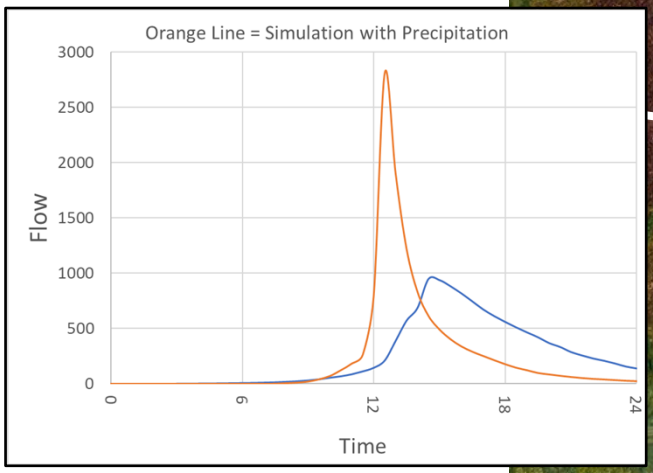


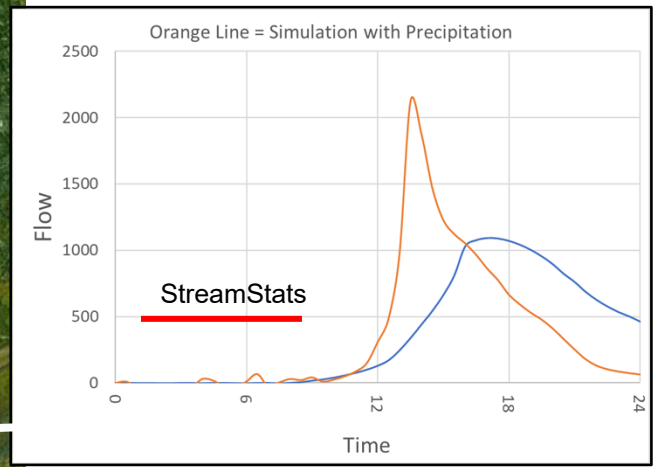
Other Methods?



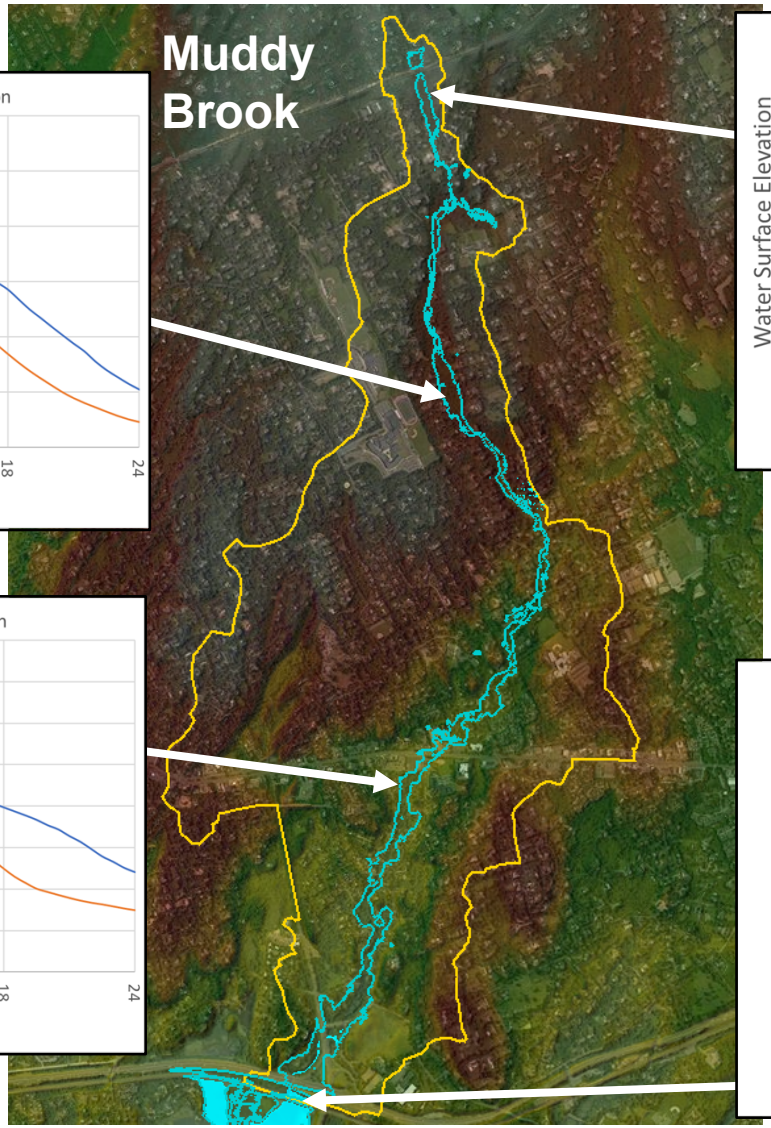


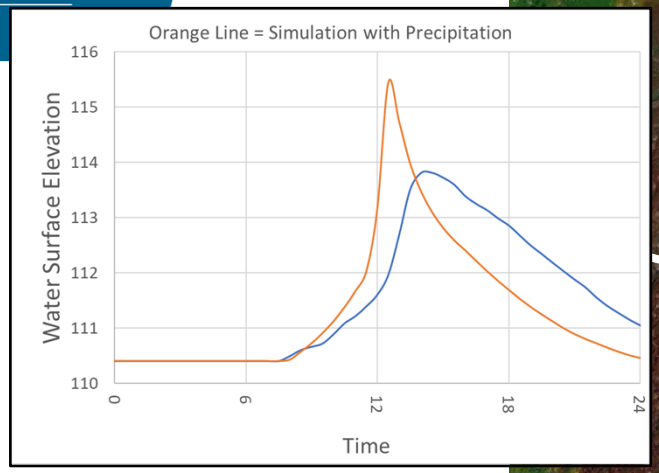


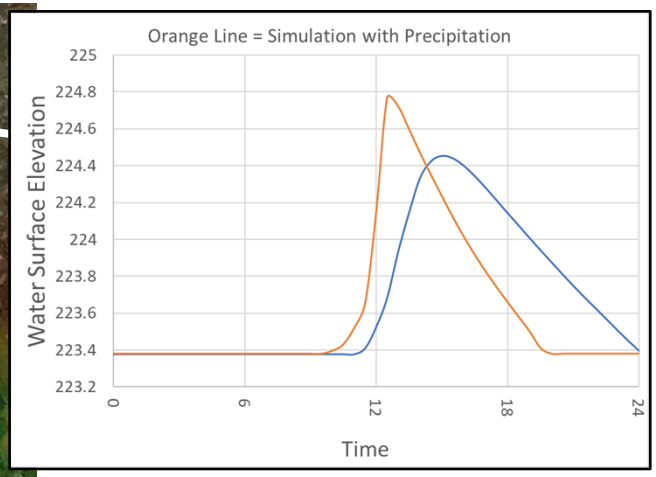


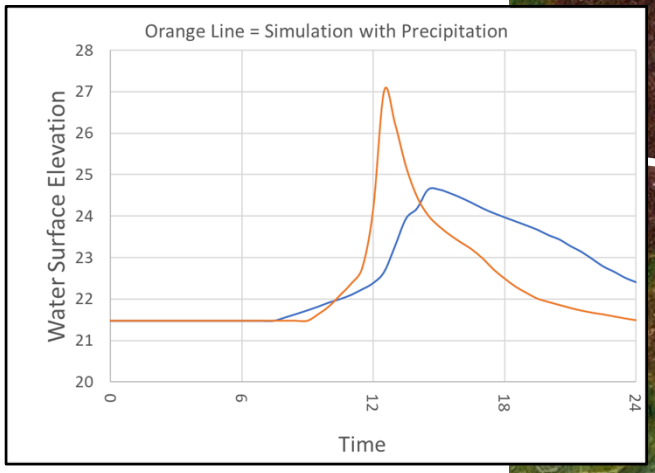


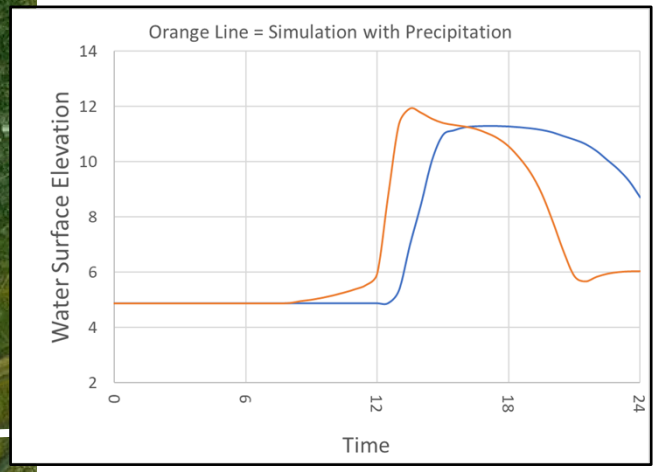
Other Methods?





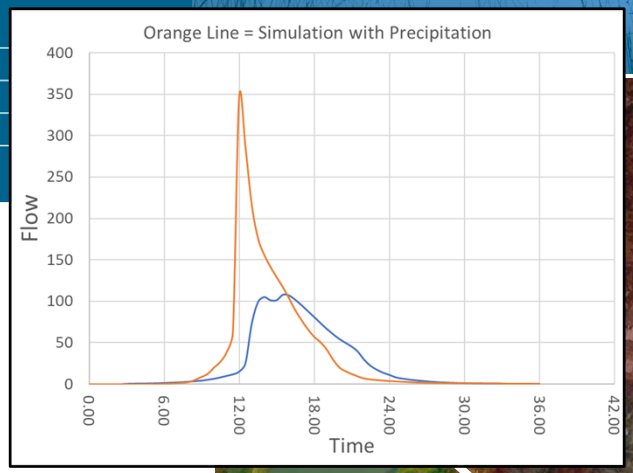


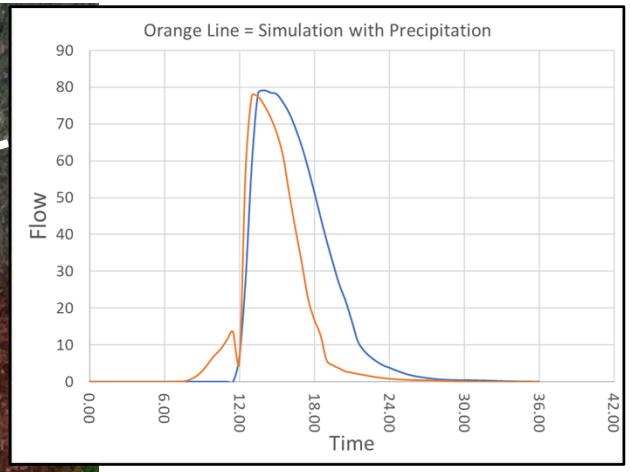


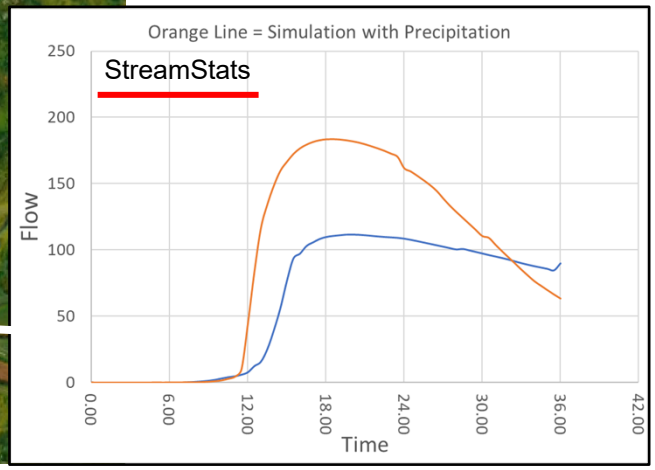


Difference in WSEL = 2.2 ft

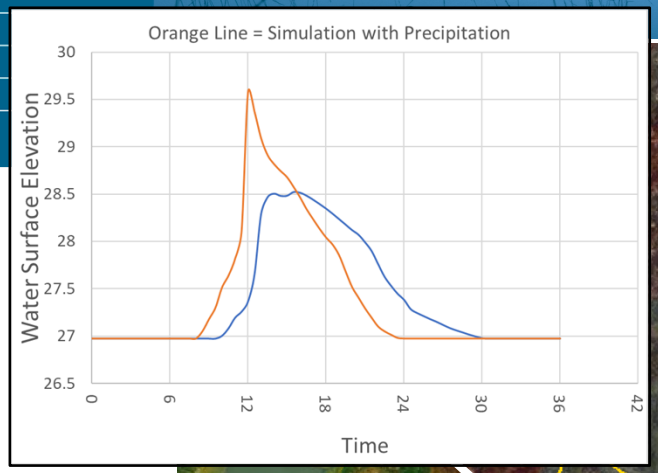
Other Methods?

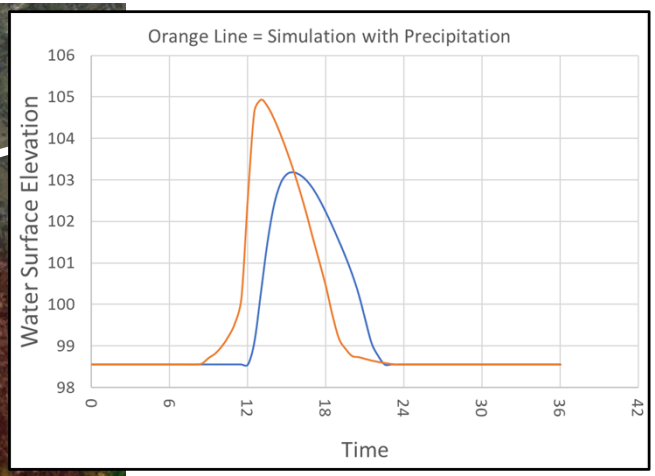






Other Methods?





Difference in WSEL= 2 ft