



**BEFORE**

**BEFORE**

**AFTER**

# Battling Mother Nature During the Reconstruction of Garretts Mill Road Bridge





## Presenters



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## Project Description



- ▶ May 15-16, 2018 over 16 inches of rain fell on Southern Washington County (9.45 inches of which in 45 minutes).
- ▶ Garretts Mill Road Bridge over Israel Creek was overtopped and the flood plain inundated.
- ▶ The bridge and roadway was rendered unusable.



Source: Julie E. Greene May 29, 2018; South County resident Sophia Turner talks to Maryland Lt. Gov. Boyd Rutherford across a damaged bridge on Garretts Mill Road in Knoxville on May 16, 2018 during his visit to inspect damage left after strong thunderstorms caused severe flash flooding overnight.



## Project Description



- ▶ Washington County issued an RFP for Design-Build Replacement Project on July 5, 2018.
- ▶ Building Systems Inc. (Contractors) / Brudis & Associates, Inc. (Designers) was Awarded the Contract on August 24, 2018.
- ▶ The Project involved Hydraulically In-Kind Replacement of the Bridge and Roadway.



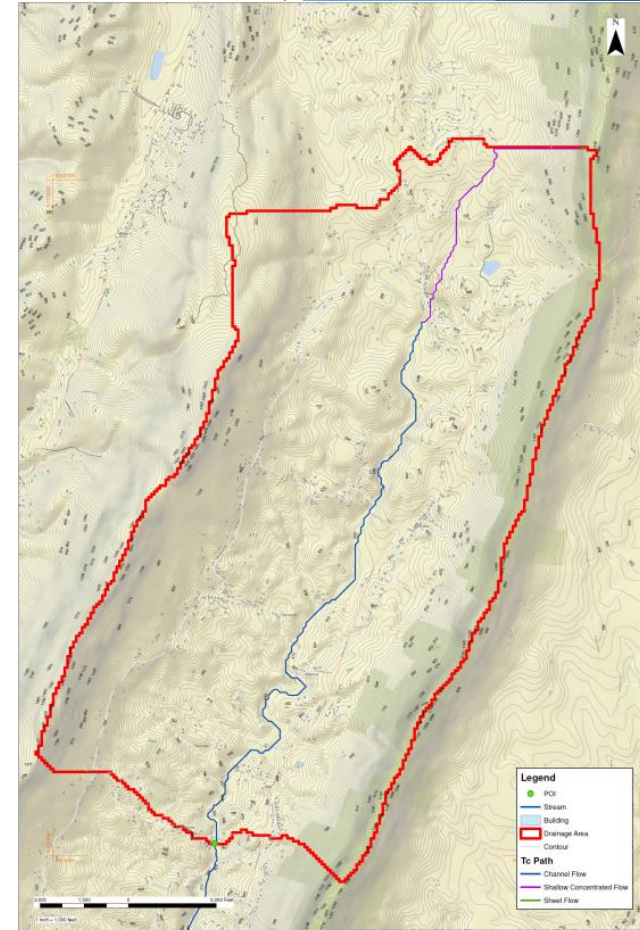
# Hydrologic Modelling

- Win TR-20 & GIS Hydro was used
- Drainage Area = 9.8 Sq. Miles
- No gage data available
- Calibration conducted using FRR equation and Tasker upper 67% confidence limits
- Existing condition land use was used

Summary of Discharges for Israel Creek at Garretts Mill Road

RETURN PERIOD (yr)	Existing Development* Conditions WinTR-20 Estimate (ft <sup>3</sup> /s)	Ultimate Development Conditions WinTR-20 Estimate (ft <sup>3</sup> /s)
2	640	620
10	1,780	1,740
25	3230	3180
50	4,150	4,080
100	5,190	5,140
500	8,150	8,070

- Hydrology report submitted and approved by MDE using Expedited Reviewers





### GOALS:

HEC-RAS Model used to accomplish the following goals:

- Assess the impacts of proposed design on Shear Stress, Flooding Conditions and Overtopping Conditions
- Find optimum size of proposed structure
- Provide hydraulic parameter for scour analysis

### RESULTS & RECOMMENDATIONS:

- No adverse impacts to the WSEL
- Hydraulic in-kind replacement with 26 ft long 28 ft wide CON/SPAN O-SERIES bridge
- Scour protection - Not an issue due to rock outcrops at shallow depths

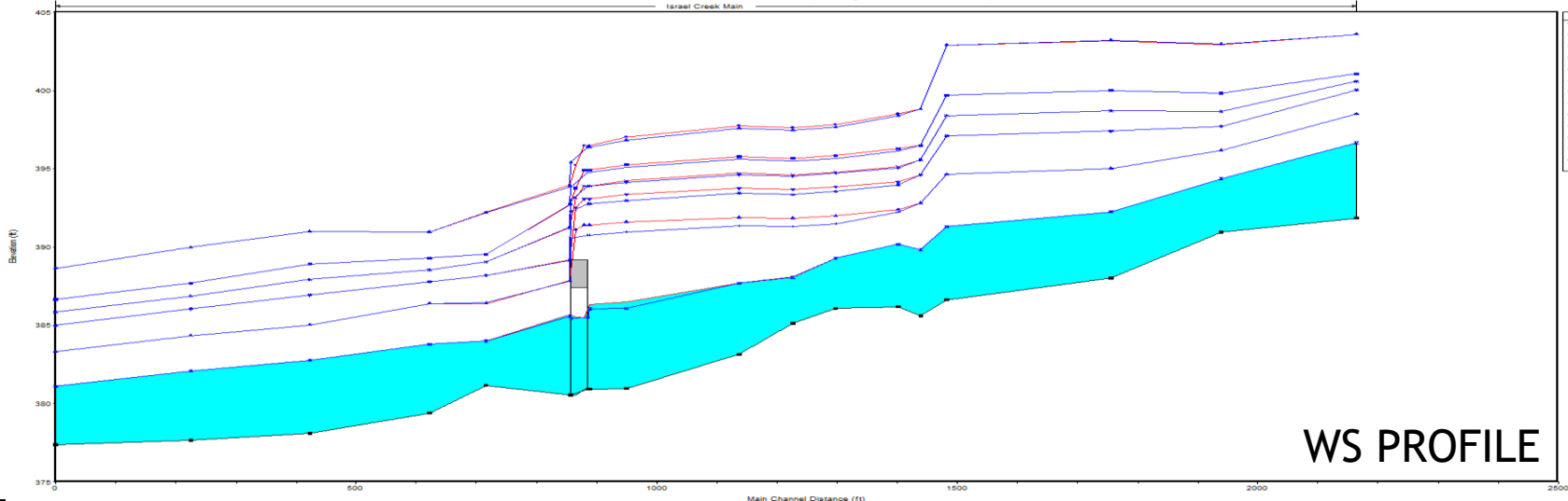
Hydraulic Report submitted and approved by MDE



# Hydraulic Modelling



IsraelCreek-Garretts Mill Road  
Israel Creek Main Plan: 1) ExistingCond 9/7/2018 2) ProposedCond 9/21/2018



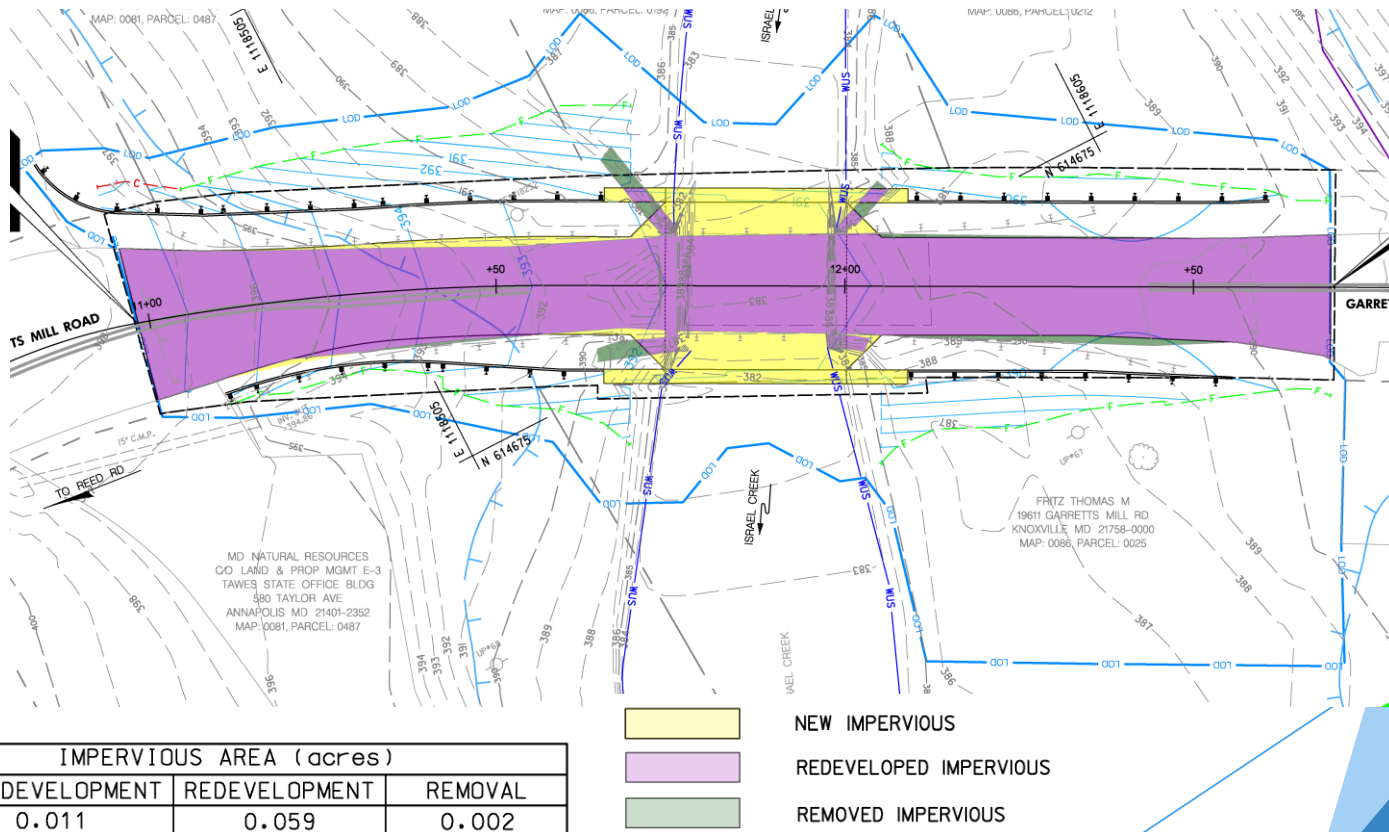




# STORMWATER MANAGEMENT

## REQUIREMENTS

- Project LOD = 0.35 Ac( > 5000 SF)
- SWM is required





### WATER QUALITY:

- ESDv Required = 148 CF
- Additional nutrients (Phosphorus) reduction required
- Emergency project
- All SWM options were evaluated but not feasible
- Granted SWM qualitative control waiver under section 3.2.3 of Washington County's SWM ordinance

### WATER QUANTITY:

- No increase in peak discharges at downstream of bridge
- SWM quantity control requirement satisfied



## EROSION AND SEDIMENT CONTROL

### REQUIREMENTS

- Project LOD > 5000 SF
- Excavation > 100 cy
- E & S design and permit required

Three phases were implemented:

- Phases 1 & 2- Demolition & Abutment foundation (emergency)
- Phase 3- Superstructure, Roadway



## EROSION AND SEDIMENT CONTROL

### Demolition & Abutment Sub-foundation (Phases 1 & 2)

- Construction entrance
- Silt fence
- Temporary stream diversion using concrete blocks
- Filter bag and pump

### Superstructure & Roadway (Phase 3)

- Stream diversion using concrete barrier





## TIMELINE

DAYS SINCE NTP	ACTIVITY
0	NTP/BEGIN DESIGN
14	HYDROLOGY REPORT SUBMITTED
31	HYDROLOGY APPROVAL GRANTED
30	HYDRAULICS REPORT SUBMITTED
45	HYDRAULICS APPROVAL GRANTED
30	EMERGENCY PACKAGE SUBMITTED
40	EMERGENCY CONCURRENCE GRANTED
60	PHASE 1 & 2 CONSTRUCTION STARTED
140	SWM & EROSION CONTROL PERMIT GRANTED:
300	PHASE 3 CONSTRUCTION COMPLETED

## Demolition



- Bridge was lifted by crane.



## In-Stream Work



- In-stream diversion used, but high levels of rainfall and underground flow made this option unusable.

## In-Stream Work



- Pump and pipe diversion was ultimately used with three additional pumps evacuating the work area for subfooting concrete pours.





## New Bridge Installation





## Questions



## Questions ??

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