Hec-1 Design & Analysis

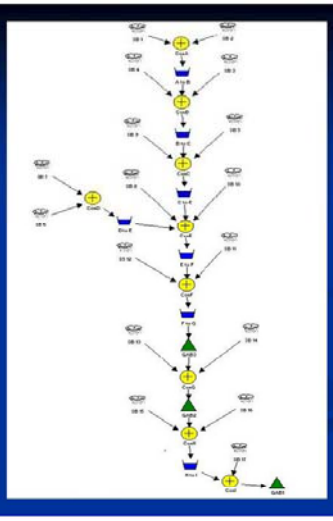
Used to determine the hydrologic properties and the amount of flow through the watershed

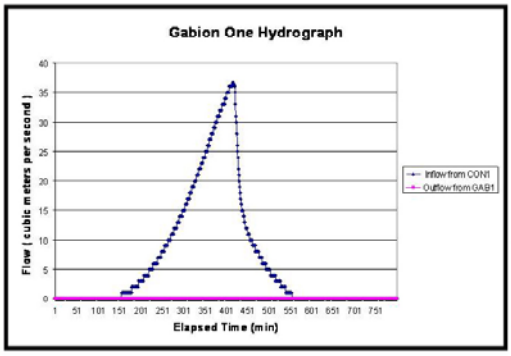
- The watershed was represented by a series of sub-basins, routing channels, connections, and detentions ponds, which is shown to the right.
- Properties such as curve number, amount of rainfall, area, and slope can be individually attributed to each portion of the model.
- The output of the model included properties such as time of peak flow, average flow, and the peak runoff from each portion of the watershed.

HEC-1 Simulation Schematic

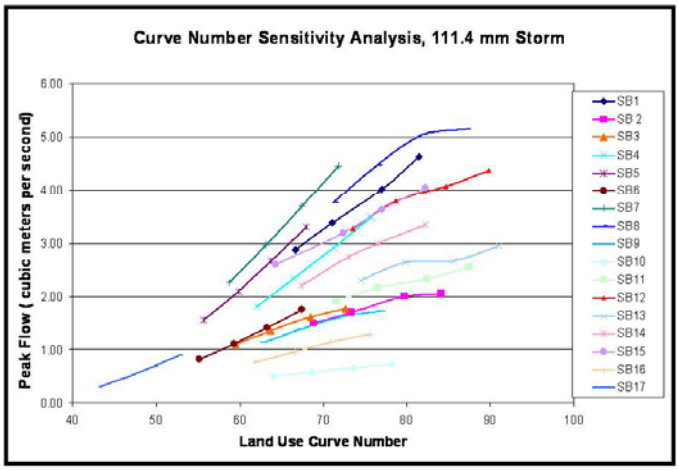
Legend:

- Sub-basins
- Routing Channels
- Gabions
- Connections





This graph is the hydrograph generated from Gabion One. The blue curve shows the inflow to the gabion. The lack of a second curve indicates that, with a 111.4 mm storm, there is no outflow from gabion farthest downstream when represented alone.



Output from the HEC-1 Simulations

22 simulations were completed using variations in:

- curve number
- number of represented gabions
- size of storm
- channel roughness coefficient

The following conclusions were made:

- The minimal size of storm needed to produce runoff with no initial ground saturation is 30 mm.
- Based on our model there is no runoff that flows downstream of the gabion with the maximum size storm recorded in the local data we received.
- With all three gabions represented in the gabion, the amount of storage at each gabion is decreased, since there is no outflow with the size of storm we simulated.

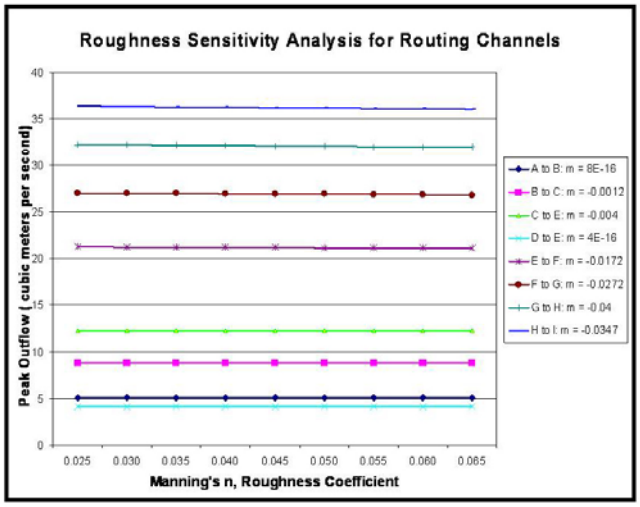
Recommendations

If time had allowed, local data should have been collected to validate the conclusion of no outflow from the gabion.

Sensitivity Analysis for HEC-1 Hydrologic Outputs

Two sensitivity analyses were performed with HEC-1 to determine the sensitivity of various inputs on the output, the peak runoff, of the sub-basins and the watershed as a whole.

- The range of roughness coefficients is the normal range for stream beds: 0.025 to 0.065.
- The range of curve numbers included two calculated numbers, and a 10 % variation.
- The roughness sensitivity graph shows there is minimal change in the peak outflow when the roughness coefficient is increased. This concludes there is minimal error associated with this input value.
- The curve number graph, shown above, displays the large variation in the peak outflow from each sub-basin as the curve number is increased. This indicates the sensitivity of curve number to outflow. It is very important that the initial curve number is calculated correctly or erroneous outputs may result.



PURDUE UNIVERSITY

Design and Evaluation of Watershed-Scale Water Harvesting Structures for Hallouf Watershed in Southern Tunisia

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