Drainage Area Delineation for Storm Water Drains from LiDAR Data

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Introduction

GIS Professionals Supporting Engineers

- Pre and Post processing of modeling data.
  - Flood modeling
  - Water body temperature modeling
  - Utility modeling
  - Traffic noise modeling
01 Overall Storm Water Modeling Process

02 Problem

03 Solution

04 Conclusion
01 Overall Storm Water Modeling Process
Overall Storm Water Modeling Process

1D vs 2D

1D
- Requires surface area drained by inlet to be pre-calculated.
- Sufficient for answering many questions, Example: Does this pipe segment have enough capacity for all likely storm events?

2D
- Uses DEM to calculate area drained by each inlet.
- Uses DEM to determine above and below ground (in pipes) drainage behavior.
- More setup intensive.
- Requires more processing time.
Overall Storm Water Modeling Process

1D Model Geometry and Attribute Inputs

- Nodes (manholes [MH], drains [DI] and junctions [JN])
- Pipe/Ditch Centerlines
- Fields
  - Manhole and drain rim elevations
  - Node IDs
  - Pipe segment from and to node IDs
  - Pipe segment from and to node pipe elevations
  - Surface area drained by each drain
Problem
Problem

- Defense Logistics Agency (DLA) Site
- Efficient delineation of drainage basins
03 Solution
Solution

Method
1. Derive natural basins
2. Derive man-made basins
3. Snap drains within 10ft
4. Derive man-made basins for modified locations
Solution

- Extracting bare-ground and top of building surface
- Derive Natural Basins
Solution

Drains under the structure
Solution

Problems
  o Some areas were not covered by basins.
  o Micro-basins were created within the large basins.
  o Resolution:
    • Use ELIMINATE tool to dissolve small basins into large basins.
    • Modify raster surface using ZONAL FILL or Focal Statistics.
Conclusion
Conclusion

 Issues
  o Some of the drains were at the bottom of depressions and had to be delineated manually.
  o Saved time from manually drawing in the delineation.

 Benefits
  o Potentially more accurate.
Conclusion

Issues
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Benefits
- Potentially more accurate.
- This effort shows the value of GIS professionals being integrated with a team of engineers to effectively and efficiently work through a modeling workflow.