FEMA

Using WSEL Grids to estimate BFEs in a Zone A

The Water Surface Elevation (WSEL) grid delivered in the Flood Risk Database (FRD) allows users to better understand, investigate, and communicate the variability of flood elevations in areas identified as flood prone. WSEL grids illustrate the flood elevation (in feet), using the North American Vertical Datum of 1988 (NAVD88). NAVD88 is a base measurement point from which all elevations are determined. WSEL grids are produced for riverine flooding sources at the 10-percent, 4-percent, 2-percent, 1-percent, 0.2-percent and 1-percent plus annual-chance flood events. In coastal areas, the 1-percent-annual-chance WSEL grid may be produced. The WSEL values in the grid for the 1-percent-annual chance flood event are directly related to the Base Flood Elevations (BFE) found on Flood Insurance Rate Map (FIRM) panels.

The estimated BFE can be cross checked against the water surface elevation data found in flood model cross sections, if available.

Potential Uses for WSEL Grid Data

Individual Property Owners

- Provides water surface elevation information at site-specific locations so property owners and professionals can determine building codes and insurance rates.
- Provide residents with the BFE information required to complete Elevation Certificate submittals or pursue a Letter of Map Change (LOMC).
- Allows insurance ratings to be based on the site-specific data required to rate structures.

Insurance Agents, Lenders, and Real Estate Agents

- Assists in reviewing flood risk and expected flood elevations at site-specific locations throughout the communities served.
- Allows more accurate insurance rate quotes to be provided in areas where BFEs have been calculated.

Elected Officials and Community Staff Level

- Assists with capital improvement planning by guiding infrastructure investment away from high-risk areas.
- Helps determine where more stringent building codes/ standards may apply or elevation requirements for specific sites.
- To prepare outreach materials for residents and developers to visually depict water elevations and better communicate risk.

Engineering and Technical Staff

- Assists local staff in identifying site-specific BFEs, when combined with address or building footprint data
- Assists with land use and comprehensive planning decisions to guide development to areas with lower flood risk.

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Community and Technical Staff can use the 1-Percent WSEL Grid to Determine a BFE using ArcGIS:

No BFE is included on the FIRM for areas designated Zone A. However, the WSEL grid can help determine an approximate BFE in Zone A. A user can click on the grid to have it report the BFE at a point location or use the steps below to sample an area around a structure to determine the BFE.

Step 1: Use the ADD DATA feature to add WSEL_01pct from the Flood Risk Database.

Step 2: CREATE a new point shapefile in ArcCatalog and add the shapefile to the map. Begin an editing session and place a point on the center of the structure's roof, using aerial imagery or address points as a reference. This process can be repeated for additional structures.

Step 3: Within the Proximity tools, use the BUFFER of 32 feet on the new point shapefile to create an area to sample the WSEL. Buffer size can be adjusted based on the size of individual structures.

Step 4: Enable the Spatial Analyst Extension (Customize>Extensions), then open the "Zonal Statistics as Table" tool. Use the buffered shapefile as the input feature zone and the input value raster to the WSEL grid. Select an output location and click OK to run the tool.

Step 5: Open the output table and export to a dbf, which can be opened in Microsoft Excel. The output table from the tool will have attributes for MIN and MAX. The largest value is the estimated BFE for the location. This BFE can be cross checked against the WSEL data found in flood model cross sections, if those data are available.

The example illustrates how to determine a BFE in Zone A using the WSEL grid. This procedure can be used to determine if it might be appropriate to apply for a Letter of Map Amendment (LOMA).

Other possible analyses...

Determining Flood Prone Roadways

To help identify flood prone roadways and structures built below the BFE. The water surface elevations can be used to calculate the extent and depth of flooding of the structures for a 1-percent-annual flood event.

Roadways identified as being vulnerable to flooding can be evaluated for potential retrofitting projects able to produce the necessary cost-benefit results required for grant funding eligibility.

Analyzing New Proposed Development

Building and code officials, floodplain managers, planners, and other community officials can use the WSEL grid dataset to compare the height of Finished Floor Elevations (FFE) of proposed buildings to flood elevations. This will help promote development in low-risk areas to better plan communities that are more resilient.
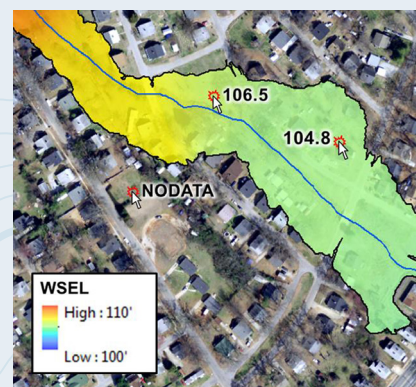
The Water Surface Elevation Grid vs The Flood Depth Grid

Please note that the WSEL grid dataset is very similar to the Flood Depth Grid available through the FRD; however, the Flood Depth Grid is measured from the ground, whereas the WSEL Grid is measured from NAVD88

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