

## FLOOD RISK PRODUCTS PROMOTE UNDERSTANDING

In an effort to assist community officials in building a support base for hazard mitigation, sustainability, and resiliency discussions within their communities, FEMA developed a variety of Flood Risk Products. These tools are being prepared with the latest technology and provide a clearer picture of flood risk within a community.

These Flood Risk Products will allow communities to better understand and plan for the natural hazard risks that they face. The information can be used to enhance mitigation plan content, increase risk communications capability, and support mitigation activities to increase community resilience.

The mission of FEMA is to support communities in becoming more disaster resilient by *knowing* their risk, *planning* for that risk, and *mitigating and communicating* these risks. Everyone can take steps to reduce their risk. Families, business owners, and local economies benefit from hazard mitigation activities and may transfer their risk by obtaining flood insurance.

For more information on the natural hazard risk in your community, visit <https://MSC.FEMA.gov>.

# WATER SURFACE ELEVATION GRIDS

The Federal Emergency Management Agency (FEMA) has broadened its delivery of flood hazard data to include several flood risk products. These flood risk products complement the 1% annual chance floodplains designated on the Flood Insurance Rate Maps (FIRMs). Water Surface Elevation Grids are delivered to local officials during the Flood Risk Review Meetings as a part of the Flood Risk Database, prior to the preparation of the preliminary FIRMs. Water Surface Elevation Grids allow local community officials to examine the variability of flood risk in the vicinity of the designated Special Flood Hazard Areas and leverage technological and software advances to more easily interact with flood hazard study analysis results.

## Digital Elevation Models

At the start of a study, elevation data is collected through a number of different approaches such as on-the-ground field surveys, aerial surveys, and satellite data collection. Elevation datasets are generally made up of millions of data points that describe the x, y and z coordinates within the project study area. Digital Elevation Models (DEMs) are prepared to describe large datasets in a more concise format.

**Figure 1** shows how these millions of data points may be generalized into a gridded or raster depiction. This figure depicts an array of equally sized grid cells that each have unique elevations. DEMs allow large datasets to be converted to a more concise data format by calculating an average elevation of all data points which fall within a grid cell area. **Figure 1** depicts the features of a grid as the cell describes the x and y location and the elevation is depicted by the height of each cell.

DEMs may also be produced in a vector format. DEMs using a vector format are also referred to as a Triangular Irregular Network (or TIN) that transforms the elevational points into a series of triangles to describe the ground or water surface. **Figure 2** shows a graphical representation of how elevation points are processed with GIS software to create a TIN. DEMs are used to prepare terrain surfaces and water surface elevation datasets during a Flood Risk study.

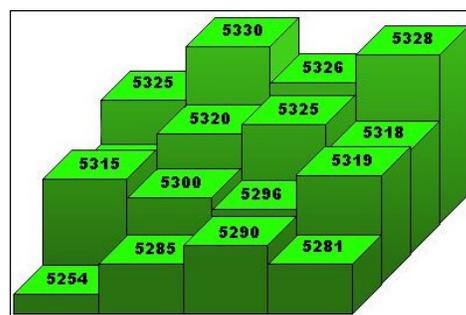


Figure 1: Raster (Gridded) DEM

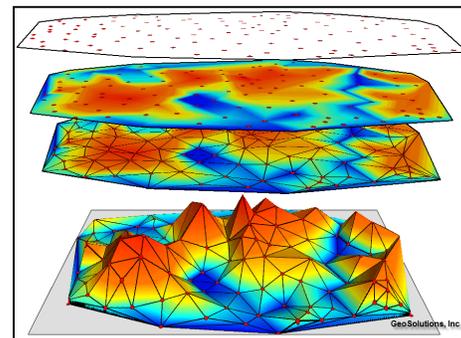


Figure 2: Vector (TIN) DEM

For more information about Flood Risk Products visit: <https://go.usa.gov/xsGGB>.

## Water Surface Elevation Grids

A Water Surface Elevation Grid will assist local community officials responsible for floodplain management and permitting by making the calculated Water Surface Elevation Results more readily available. The Water Surface Elevation Grid will be prepared for the 1% annual chance storm event allowing community officials to generate an estimated Base Flood Elevation (BFE) for interested residents and land developers. It may be produced for a range of flood events (most commonly the 0.2%, 2%, 4%, and 10% annual chance events) and will depict variable flood depths throughout the determined flood extent for each event. At a minimum, the 1% annual chance flood depth grid will be produced. See [Figure 3](#) for an example overlaid on an aerial photograph.



Figure 3: Water Surface Elevation Grid

The Water Surface Elevation Grid allows community officials to better understand and communicate the flood risks within their community. This dataset equips community officials with data that is easier to interact with, allowing officials to provide residents with the BFE information required to complete Elevation Certificate submittals. This dataset will assist communities in reviewing local permits and development requests against the calculated Base Flood Elevation in a more efficient manner.

## How Else Can You Use This Data?

<p>Elected Officials and Community Staff</p>	<ul style="list-style-type: none"> <li>• Prepare flood risk communication materials for discussions with citizens and developers</li> <li>• Relay variability of flood risk within the identified Special Flood Hazard Areas on FIRMs</li> <li>• Allows communities to review more stringent building codes/standards and develop elevation requirements for specific sites which may change over time due to increased floodplain development</li> <li>• Assists local permitting staff in identifying site-specific Base Flood Elevations</li> <li>• Supporting information for community requirements for the adoption of enhanced ordinances with mitigation building practices</li> </ul>
<p>Community/Regional Planning Staff</p>	<ul style="list-style-type: none"> <li>• Resource to enlist the support of elected officials and key local leaders from mitigation projects that reduce flood risk by identifying the areas of highest flood risk (flood frequency and water surface elevations)</li> <li>• Assist with land use and comprehensive planning decisions to guide development to areas with lower flood risks</li> <li>• Assist capital improvement planning efforts by guiding strategic infrastructure investment and resulting in future land use in rapidly growing areas</li> </ul>
<p>Engineering &amp; Technical Staff</p>	<ul style="list-style-type: none"> <li>• Assists local staff in identifying site-specific Base Flood Elevations</li> <li>• Informs development decision making of risk-prone infrastructure and areas</li> <li>• Provides required data for completion of an Elevation Certificate</li> </ul>
<p>Insurance Agents, Lenders, Real Estate Agents</p>	<ul style="list-style-type: none"> <li>• Assists in review of flood risk and expected flood elevation at site-specific locations throughout the communities served</li> <li>• Allows better insurance rate quotes to be provided in areas where Base Flood Elevations have been calculated</li> </ul>
<p>Citizens</p>	<ul style="list-style-type: none"> <li>• Provides water surface elevation information at site-specific locations</li> <li>• Provides required data for completion of an Elevation Certificate</li> <li>• Allows for rating of insurance based on site-specific data required to rate structures for coverage</li> </ul>