



FEMA



Hazus Modernization Factsheet

Hazus is a nationally applicable standardized methodology that contains models for estimating potential losses from earthquakes, floods and hurricanes. Hazus-MH software uses Geographic Information Systems (GIS) technology to estimate physical, economic and social impacts of disasters to support risk-informed decision making.

Release Contents

The Hazus Modernization releases thus far have included the following:

- **Task 1 (January 12, 2015):**
 - Compatibility with ArcGIS 10.2.2
 - Compatibility with Windows 7 (32-bit and 64-bit) and Windows 8 (64-bit)
 - Updated General Building Stock and 2010 Census data
- **Task 2 (May 18, 2015):**
 - Application of dasymetric GBS exposure distribution approach
 - Implementation of study region aggregation at custom jurisdiction or neighborhood levels
- **Task 3 (November 16, 2015):**
 - Migration of current database structure from Access (.mdb) and Personal Geodatabase (pGDB) format to SQL Spatial
 - Migration of VB6 code in flood model to C# and .NET
 - Dasymetric data now serving as the default for analysis
 - Alignment with Benefit Cost Analysis (BCA) tool
 - Updated SQL-compatible version of CDMS
 - Repair of several major defects in block-level aggregation and the flood and hurricane models

Upcoming Modernization

Hazus Modernization will move forward in 2016 to Phase II, which will address a number of key areas. Some of these changes will help improve customization capabilities, further enhance the technical framework to prepare for future needs, and align with helpful module tools. For any questions, please contact our Hazus Outreach Team at [hazus@arcaspicio.com](mailto: hazus@arcaspicio.com).

Learn more about Hazus
www.fema.gov/hazus

To download Hazus, visit
msc.fema.gov

Questions?

Contact the Hazus
HelpDesk [hazus-
support@riskmapcds.com](mailto: hazus-support@riskmapcds.com)

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Installing Hazus-MH 3.0

If applicable, uninstall Hazus-MH 2.2 before installing Hazus-MH 3.0. Installation instructions are provided in the Getting Started file that comes with the software. Go to the [MSC Hazus page](#) to download the software and .zip files containing updated state datasets.

Windows and ArcGIS Compatibility

Hazus-MH 3.0 is compatible with ArcGIS 10.2.2. Compatibility with other versions of ArcGIS is not supported.

Hazus-MH-3.0 is certified for Windows 7, 8, and 8.1. Support for Windows XP has been discontinued.

Hazus-MH 2.2

With the release of Hazus-MH 3.0, users are no longer able to download Hazus-MH 2.2 from the MSC. If you would like to request an older version of Hazus, please contact the [FEMA Map Information eXchange](#) (FMIX).

When to Upgrade

It is recommended that users do not download Hazus-MH 3.0 if they are in the middle of a project. Studies with regions that cannot be easily re-built should be completed on the current version of Hazus-MH prior to downloading the new software.

Project File Compatibility

Users wishing to preserve their study regions and transfer them to Hazus 3.0 may do so, but only if they are operating on the most recent version of Hazus (2.2 SP01). They will be able to follow the steps outlined in the [Getting Started Guide](#) to extract their study regions in Hazus 2.2 SP01 and then upload them into Hazus 3.0 once it is downloaded. Users that are operating on a version of Hazus older than 2.2 SP01 **will not** be able to extract their study regions and upload to Hazus 3.0 due to major underlying changes occurring in this release. For questions or issues, feel free to contact the Hazus Help Desk at hazus-support@riskmapcds.com.

Census Data Compatibility

The Hazus-MH 3.0 release will continue to operate with 2010 Census data, which was introduced with the release of Hazus-MH 2.2. If users happen to be using a version of Hazus older than 2.2, which operate with 2000 census data, they will not be able to download any of the older data sets from the MSC. 2000 Census data is not certified for use in Hazus-MH 2.2 or later.

Changes in the Spatial Analyst Tool

As a result of changes made to the Spatial Analyst Tool in ArcGIS, some minor modifications to the Hazus Core of Hydraulics model were necessary. This resulted in very slight changes in loss estimations in some flood analyses as compared to previous versions of Hazus-MH.

2000 and 2010 Data Differences

Census blocks and tracts change with each Census. There are several counties in the 2000 data that were de-listed in 2010:

- 02201, Prince of Wales-Outer Ketchikan, AK
- 02232, Skagway-Hoonah-Angoon, AK
- 02280, Wrangell-Petersburg, AK
- 51560, Clifton Forge, VA (transitioned status from city to town within Alleghany county)

New counties available in the 2010 data set are:

- 02105, Hoonah-Angoon, AK
- 02195, Petersburg, AK
- 02198, Prince of Wales-Hyder, AK
- 02230, Skagway, AK
- 02275, Wrangell, AK
- 08014, Broomfield, CO

2010 Data Set Details

Detailed information for each dataset is contained within its corresponding Metadata Profile. Items of interest are highlighted below.

➤ National Inventory of Dams Data Excluded

The National Inventory of Dams data are considered sensitive information; however, placeholders are still included.

➤ Building Exposure Data

Building and content exposure data valuations were updated to 2014 dollars. Residential square footage data were updated using 2010 Census information. However, square footages for non-residential occupancies were not updated in this release.

➤ Water Bodies Data

With the 2.2 release, Census blocks were not clipped based on existing water bodies. These areas were later removed as part of the 3.0 release.

➤ USGS Data

Within the flood model of Hazus-MH 2.2 or later, updates have been made to the USGS DEM automated import process, to ensure successful importing of DEM data. Additionally, the new 2014 USGS earthquake hazard mapping for the lower 48 states has been included, which is the basis for the latest earthquake building codes in the U.S.

Dasymetric vs. Homogenous Datasets

The Hazus Task 2 release included the dasymetric distribution approach, allowing users to download either the homogenous or dasymetric state datasets on the MSC. This capability was removed with the release of Hazus-MH 3.0, which combined all datasets into one download for each state. While all datasets are included in the download, the dasymetric dataset now acts as the default for analysis. Below you can find a description of each dataset and some reasoning behind when to use each one.

➤ Homogenous Datasets

The building exposure in the homogenous

datasets is assumed to be uniformly distributed throughout a Census block. Hazus-MH has historically used homogenous Census data. Using these data may lead to estimating flood losses in sub-Census Block areas with no building exposure.

➤ Dasymetric Datasets

Undeveloped areas (such as area covered by bodies of water, parks, or forests) are removed from the Census Blocks. The cumulative building exposure is distributed only in the developed sub-Census Block areas. Use these datasets to more accurately produce flood loss determinations.

➤ When to Use Each Dataset

It is important to note that the flood model in Hazus 3.0 will be set up with new default settings for state data analysis:

- **Aggregation** of flood study regions will be done using the **homogeneous** data
- **Analysis** within flood study regions will be done using the **dasymetric** data
- Aggregation **and** analysis for the Earthquake and Hurricane model will use homogeneous data **only**. These models aggregate at the census tract level and therefore are not able to make use of the dasymetric census blocks

Dasymetric data is the recommended default dataset for analysis, however users may prefer to manually switch to the homogenous in the following situations:

- User-defined facilities (UDFs) are being included in the analysis, and one or more of the facilities falls outside of the dasymetric census block boundaries
- New development has occurred in the analysis area, and exposure now exists where the 2014 NLCD is showing undeveloped land

For documentation on how the dasymetric data was produced, please contact hazus-support@riskmapcds.com. Since Earthquake and

Hurricane analysis use the tract level data, users of those models can choose either dataset.

Community Based Analysis

Hazus users can now build and analyze study regions based on the Community Information Data (CID). Study regions can be aggregated beyond the current state, county or census block levels and can now be completed at the community and neighborhood levels.

What is the CID?

- Based on 2010 Census jurisdiction boundaries
- Linked to NFIP's Community Information System (CIS) that tracks community map adoption and participation
- Now incorporates tribes
- Aligns with other FEMA programs (NFIP, Mitigation Plan tracking)

Hazus Data Update Components Included the 2010 Census Data Transition

Item	EQ	FL	HU
Update list of Census blocks, tracts, counties for all 50 states + Puerto Rico	X	X	X
Update block, tract, county and state geographic boundaries (TIGER files)	X	X	X
Update demographics data for all blocks, tracts, counties and states (Census 2010)	X	X	X
Recalculate casualties data (custom algorithm for population at day, at night, and commuting)	X	X	X
Generate income, year built, school data by disaggregating ACS data to block level	X	X	X
New square footage data by occupancy for all blocks and tracts	X	X	X
New dollar exposure data by occupancy and building type for all blocks and tracks	X	X	X
Update earthquake occupancy mapping schemes for added or removed counties	X		
Update default flood mapping schemes for added or removed counties		X	
Generate square footage data by building type (general and specific) for all blocks and tracts	X	X	X
Update location attribute (Census tract) for all site specific data	X	X	X
Generate building count data by occupancy specific and general type	X	X	X
Correct bridge locations (snapping) with new 2010 boundaries	X	X	X
Update height distribution for all blocks		X	
Update garages distribution for all blocks		X	
Update MEANS values for RES for all counties			X
Historical event wind speeds (77 events, Categories 3-5)			X
Stochastic event wind speeds (350,000 mainland events)			X
Stochastic event time histories and speed ups (~15,000 Hawaii events)			X
Return period wind speed layers (10, 20, 50, 100, 200, 500, 1,000 years)			X
Stochastic event tracks			X
Historic event tracks			X
Surface roughness using 2011 NLCD LULC (published in 2014); NLCD 2001 used for Hawaii			X
Tree inventory (type, max. stems/acre, and height distribution) using 2013 USFS Forest Inventory Analysis (FIA) Database			X
Tree canopy percentages using 2011 NLCD LULC			X
Tree collection factors for eligible debris computations using 2013 US Census TIGER data			X
Update default wind mapping schemes for added or removed counties			X
Storm surge (update Census tract to Basin Mappings)		X	X
Update economic analysis parameter defaults			X
Update Natural Gas and Potable Water distribution lines	X		

Notes:

EQ = Earthquake; FL = Flood; HU = Hurricane; ACS = American Community Survey; NLCD LULC = National Land Cover Database Land Use Land Cover