



Hazus 7.0 Release Notes

November 2024



FEMA

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Introduction

Welcome to the Release Notes for Hazus 7.0, FEMA's natural hazard risk assessment software, now integrated with ArcGIS Pro. This document provides a comprehensive overview of the latest enhancements, performance improvements, and user experience updates included in this release. In addition to outlining new features, it covers system requirements, known issues, and a preview of future developments in the Hazus program.

Release Date: November 20, 2024

1. What's New

Hazus 7.0 represents a significant update in natural hazard risk assessment modeling, building on the foundation of previous versions while leveraging the latest GIS technology. For more details on the improvements made in this release and our future plans, please continue reading the full document. Below are some of the key highlights introduced in Hazus 7.0:

- **Transition to ArcGIS Pro:** Hazus is now available in ArcGIS Pro, providing users with advanced GIS capabilities, an improved user interface, and seamless integration with modern tools for hazard analysis.
- **Terminology Updates:** Previous users of Hazus will find we have updated some of the Hazus terminology in the GUI and documentation to better represent what the software is doing and to align with industry standards. For example, the previously known General Building Stock, or GBS, will now be known as Aggregated Baseline Inventory or ABI.
- **Full Integration of HURREVAC:** HURREVAC, the real-time hurricane tracking and prediction tool, is now fully integrated within Hazus, allowing users to assess hurricane risks more easily without relying on external tools like the Hurricane Hazard Import Tool (HHIT).
- **Enhanced Flood Model:** The new multi-return period depth grids and dynamic Average Annualized Loss (AAL) calculations offer more flexible flood risk assessments, allowing users to input any combination of three or more return periods for more tailored analyses.
- **Simplified Installation Process:** The installation process has been streamlined and is now quicker and more straightforward, with Hazus automatically installing SQL Server Express 2022 to minimize technical barriers. The Getting Started Guide also provides detailed step-by-step instructions to assist users throughout the process.

2. System Requirements

For optimal performance of Hazus 7.0, it is recommended to adhere to the following system specifications in the table below. While the software may function on lower-spec systems, doing so could result in slower performance and potential instability.

Table 1. System and Software Requirements for Hazus 7.0:

Component	Minimum Requirements	Recommended Requirements
Operating System (OS)	Microsoft Windows v10 & 11 (Pro & Enterprise) <i>Please Note: other OS have not been fully tested and may not function as expected.</i>	Latest version of Microsoft Windows v11 (Pro & Enterprise)
Windows .NET Framework Version	4.8	-
Processor	2.4 GHz with at least 2 cores and simultaneous multithreading	4 cores (or higher)
Memory/RAM	8 GB	16 GB or more
Hard Drive	50 GB of free space	100 GB or more of free space for large study regions
Screen Resolution	1078 x 768 pixels	1920 x 1080 pixels (or higher)
Video/Graphics Adapter	24-bit video card with a minimum of 128 MB video memory (or higher)	-
ArcGIS Pro Version, License Type, and Extensions	ArcGIS Pro v3.2 or v3.3 (Basic, Standard, or Advanced); Spatial Analyst extension is required to run a flood analysis	ArcGIS Pro v3.2 or v3.3 (Standard or Advanced); Spatial Analyst extension is required to run a flood analysis. Basic licenses may experience some limitations. See General Software Limitation 1.2.
Other Software Dependencies	SQL Server Express 2022	-

Please Note: Users must install ArcGIS Pro first. If you require help getting ArcGIS Pro installed, please check out Esri’s help page or reach out to their help desk for assistance. The SQL Server Express 2022 installation will be handled automatically by the Hazus 7.0 installer.

3. Documentation

To assist users in getting the most out of Hazus 7.0, we provide the following resources:

- **Hazus 7.0 Getting Started Guide:** Available with the Hazus application download file, this guide offers essential information for new users, including installation steps, basic usage, and initial setup guidance.
- **Hazus 7.0 User Guide:** Available on the [Hazus User & Technical Manuals | FEMA.gov](#) page, the User Guide provides step-by-step instructions for the features, functionalities, and workflows in Hazus 7.0, making it a valuable resource for both new and experienced users.

4. Installation and Uninstallation

Step-by-step instructions for installing Hazus 7.0 are included in the Hazus 7.0 Getting Started Guide, available with the Hazus application download file.

New Features and Enhancements

1. General Software Enhancements

1.1. Simplified Installation

In Hazus 7.0, the installation process has been streamlined to accommodate users of all technical levels. Step-by-step instructions are available in the Getting Started Guide, ensuring that each phase of the installation is easy to follow. Whether upgrading or installing Hazus for the first time, the process is straightforward and efficient.

A key improvement is the ability to install and run Hazus 7.0 on the same machine that has Hazus 6.1, the last available version before this release. This functionality ensures a smooth transition while maintaining access to the previous ArcMap-based version for features not yet available in Hazus 7.0. While it's possible that earlier versions may work alongside Hazus 7.0, it's important to note that this compatibility has only been tested between Hazus v6.1 and v7.0.

Additionally, we resolved a known issue with SQL Server login during installation. The improved SQL Server authentication process allows users in restricted environments to complete the setup with IT assistance, without barriers, reducing downtime and simplifying database configuration.

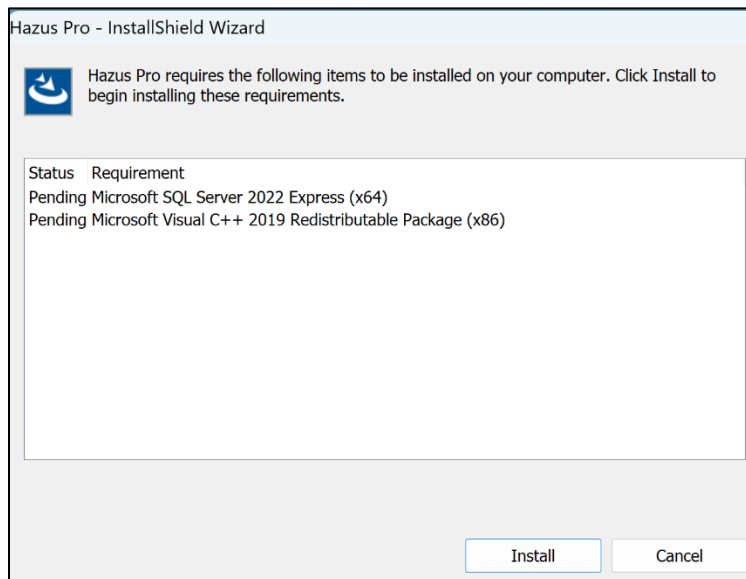


Figure 1. Hazus will install necessary prerequisites for the user.

1.2. Improved User Interface

Hazus 7.0 features a significantly enhanced user interface, fully aimed to align with ArcGIS Pro best practices. This update includes a more intuitive layout, adoption of a ribbon for cleaner menus and

faster tool navigation, and implementation of in-software guidance such as tooltips, making tasks such as defining study areas, creating scenarios, running analyses, and exporting data simpler and more accessible than before. This overhaul aims to reduce the learning curve while improving workflow efficiency.


Key improvements include:

- **Ribbon Interface:** The new ribbon interface provides a structured, step-by-step workflow. Users should start by defining their study area, then create a hazard scenario, run the analysis, and finally share the project package with others using Hazus 7.0, making it easy to collaborate and view results.
- **Improved User Messaging:** Progress and error messages have been refined to give clearer, more helpful information throughout your workflow, ensuring you stay informed at every stage.
- **Attribute Table Integration:** Hazus now leverages ArcGIS Pro's powerful attribute table functionality, allowing users to view inventory and results directly in attribute tables that auto-populate into new maps as they move through the Hazus workflow.
- **Map Symbology:** We've also enhanced the auto-loaded map symbology, making it easier to visualize and interpret data within your analysis.
- **Tooltips:** To further improve the user experience, contextual tooltips have been added. When hovering over tools or icons, users will see brief descriptions and guidance, eliminating the need to consult the manual for basic tasks and saving time for the user.
- **Ongoing Improvements:** We're actively working to refine the user interface even further, with additional improvements planned for Hazus 7.1.

For more detailed information on navigating through the new interface, users can refer to the [Hazus 7.0 User Guide](#) and [Hazus 7.0 Getting Started Guide](#).

1.3. Auto-download and Versioning of State Databases

Hazus 7.0 introduces an automatic download feature for the latest state databases, making it easier than ever to define study areas and access the required data. Users no longer need to manually search for, download, extract, and place state datasets in the correct file locations—Hazus handles this entire process, streamlining data preparation and enabling faster project setup, especially for new users. This automation removes a major manual step, allowing users to focus on running analyses without needing to worry about data management.

 **Important Note:** An internet connection is required for the initial download of each state database through the software. Once downloaded, the data can be accessed offline in future Hazus projects.

Additionally, Hazus 7.0 includes a new versioning system for state databases, ensuring compatibility between datasets and the software. This prevents users from inadvertently using outdated or

incompatible state databases, which could lead to inaccurate results or errors that may not be immediately apparent. With this versioning system, users can easily track which version of the database they are working with, reducing errors and ensuring consistency across multiple projects.

⚠ Important Note: All previous state databases are incompatible with Hazus 7.0, but we are working toward a seamless upgrade solution so that future versions don't have this issue.

Learn More

For more information, refer to the **Limitations** section for best practices on creating a study area that does not exceed the 10GB database size limitation.

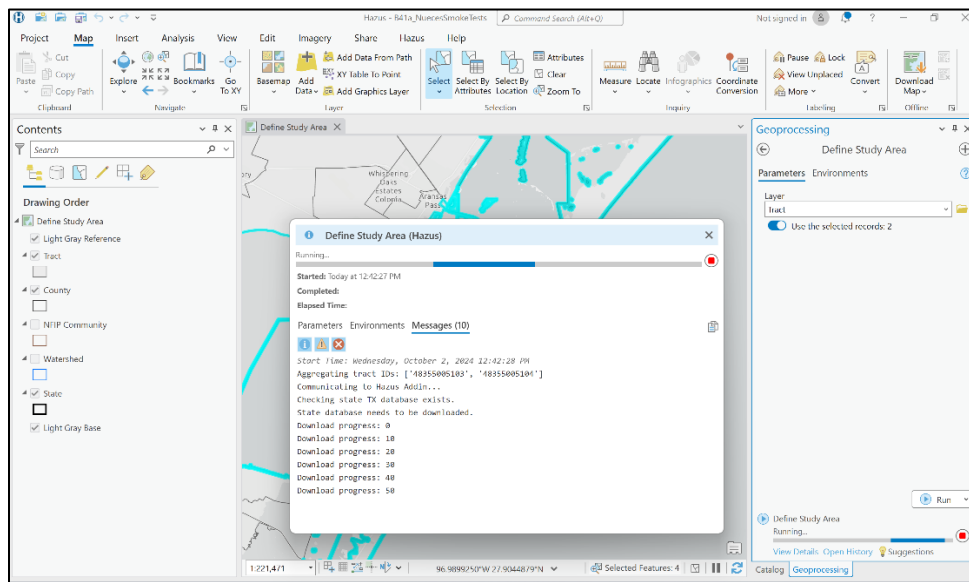


Figure 2. Image of the automatic state database download working in Hazus 7.0.

2. Flood Model Enhancements

2.1. Dynamic Average Annualized Loss (AAL) Calculation

Hazus 7.0 introduces a more flexible and precise approach to calculating Average Annualized Loss (AAL), providing users with greater control over the inputs. The AAL represents the expected loss per year, averaged over many years, and is a crucial parameter for comparing risk across different hazards or communities and for prioritizing mitigation investments.

Previously, Hazus required users to input five specific return periods (10-year, 25-year, 50-year, 100-year, and 500-year) to calculate flood AAL. Now, with Hazus 7.0, users can input any combination of return periods, with a minimum of three required, allowing for more flexibility in flood risk assessments. This update is particularly beneficial for regions with unique hydrological characteristics, as it allows for more tailored risk analysis.

The AAL calculation methodology uses Riemann Sums to estimate the contribution of each return period to annualized losses, summing the results to provide a more accurate assessment. While a minimum of three return periods is required, including additional return periods can significantly improve the accuracy of the results by better estimating the area under the loss curve using the Riemann method.

This update empowers users to perform more nuanced flood risk assessments, resulting in better risk prioritization and planning.

2.2. Depth-Limited Coastal Zone Assignment

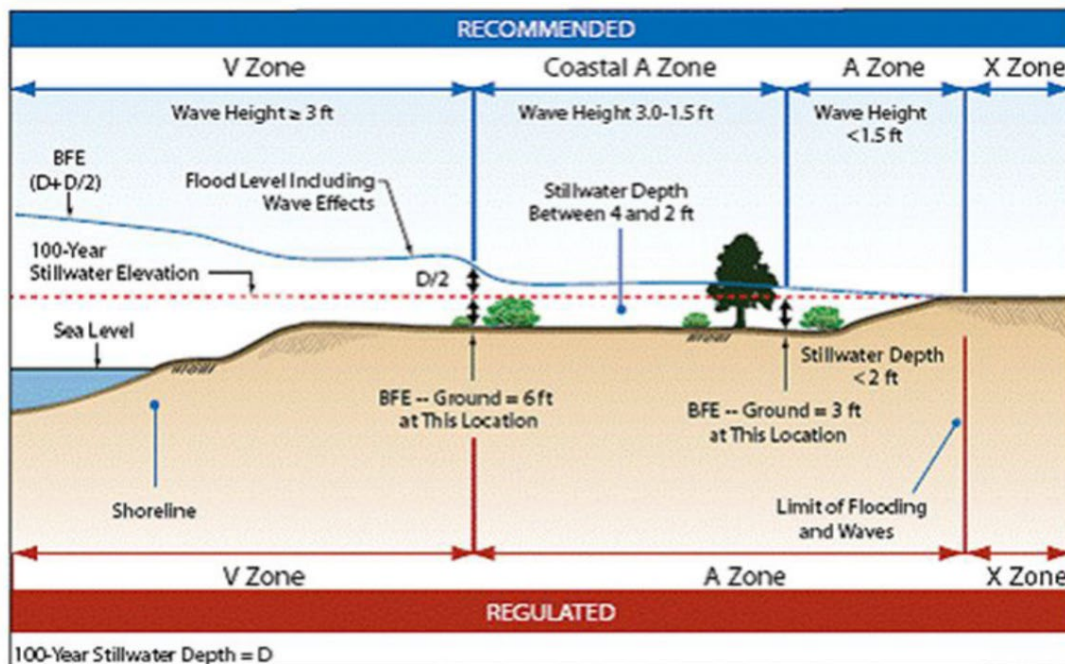


Figure 3. National Flood Insurance Program (NFIP) Coastal Flood Hazard Regulations and Recommendations.

Hazus 7.0 introduces a more precise method for assigning Coastal A and Coastal V Zone Depth Damage Functions (DDFs) in coastal areas using a depth-limited approach. Previously, the software defaulted to Coastal A zone DDFs unless users provided custom damage function identifiers. Now, Hazus automatically assigns Coastal V Zone DDFs when water depths are 6 feet or greater, and Coastal A Zone DDFs for water depths between 3 and 6 feet. When water depths are 3 feet or less, the software will assign A Zone DDFs, also referred to as the Riverine DDFs in Hazus. This approach was recommended by the FEMA Benefit Cost Analysis (BCA) Expert Panel and follows FEMA's 2011 guidelines.

The new system better reflects the real-world risks associated with high water levels in Coastal A and Coastal V Zones, improving the accuracy of coastal flood assessments. Specifically:

- **Coastal V Zones** are areas subject to base floods with wave heights of 3 feet or greater, which typically occur where water depths are greater than or equal to 6 feet. In these cases, Hazus now applies Coastal V Zone DDFs by default.
- **Coastal A Zones** are areas with wave heights between 1.5 and 3 feet, corresponding to water depths between 3 and 6 feet. In these scenarios, Hazus applies Coastal A Zone DDFs by default.

For more information, refer to Figure 2, which illustrates the depth-limited method recommended by the FEMA BCA Expert Panel.

Learn More

The depth-limited assignment replaces the previous method used in Hazus 6.1 and older versions, where Coastal A zone DDFs were used by default. Users comparing results should expect an increase in predicted losses for areas with 6 feet or greater water depth exposure and a decrease in predicted losses for areas with less than 3 feet of water depth.

3. Hurricane Model Enhancements

3.1. Integrated HURREVAC

One of the major enhancements in Hazus 7.0 is the integration of HURREVAC (Hurricane Evacuation) data within the software. HURREVAC is a real-time hurricane tracking and prediction tool owned and operated by the National Hurricane Program, a partnership between FEMA, the U.S. Army Corps of Engineers, and the National Oceanic and Atmospheric Administration (NOAA). Previously, users had to rely on the open-source Hurricane Hazard Import Tool (HHIT) to manually import HURREVAC data. Now, the integration is seamless, allowing users to run hurricane wind analyses within Hazus without needing external tools, significantly reducing the complexity of hurricane risk assessments.

Users can perform detailed hurricane wind risk assessments based on active storms, historic storms, and exercise storms from HURREVAC. However, Hazus 7.0 only supports .hvx files from HURREVAC, meaning the historic storm data available goes back to 2005. The integration of HURREVAC data allows communities and planners to assess current risks or potential hurricane impacts in their region.

Learn More

The Hazus 7.0 Technical Manuals are not currently available and will be released at a later date. However, the existing [Hazus Hurricane Technical Manual\(s\)](#) can still provide insight into the hurricane modeling methodology.

Improved Search Functionality: The search functionality for HURREVAC data has been improved as well. Users can now easily navigate the HURREVAC storm list, and with the search bar, they can search directly by storm name or storm ID for faster access to specific data.

HURREVAC Scenario

Search Storm Track Progress

Storm Type

Active Historical Exercise

Basin: Atlantic Year: All Years

Storm Id	Year	Name	Type	Basin	Status	Start Date
al012016	2016	ALEX	Hurricane	Atlantic	Historical	1/13/2016 9:00:00 PI
al022016	2016	BONNIE	Tropical Storm	Atlantic	Historical	5/27/2016 9:00:00 PI
al032016	2016	COLIN	Tropical Storm	Atlantic	Historical	6/5/2016 3:00:00 PM
al042016	2016	DANIELLE	Tropical Storm	Atlantic	Historical	6/19/2016 9:00:00 PI
al052016	2016	EARL	Hurricane	Atlantic	Historical	8/2/2016 4:00:00 PM
al062016	2016	FIONA	Tropical Storm	Atlantic	Historical	8/17/2016 3:00:00 Al
al072016	2016	GASTON	Hurricane	Atlantic	Historical	8/22/2016 9:00:00 PI
al082016	2016	EIGHT	Tropical Depression	Atlantic	Historical	8/28/2016 3:00:00 PI
al092016	2016	HERMINE	Hurricane	Atlantic	Historical	8/28/2016 9:00:00 PI
al102016	2016	IAN	Tropical Storm	Atlantic	Historical	9/12/2016 3:00:00 PI
al112016	2016	JULIA	Tropical Storm	Atlantic	Historical	9/14/2016 3:00:00 Al
al122016	2016	KARL	Tropical Storm	Atlantic	Historical	9/14/2016 3:00:00 PI
al132016	2016	LISA	Tropical Storm	Atlantic	Historical	9/19/2016 9:00:00 PI
al142016	2016	MATTHEW	Hurricane	Atlantic	Historical	9/28/2016 3:00:00 PI
al152016	2016	NICOLE	Hurricane	Atlantic	Historical	10/4/2016 3:00:00 PI
al162016	2016	OTTO	Hurricane	Atlantic	Historical	11/21/2016 9:00:00 /
al012017	2017	ARLENE	Tropical Storm	Atlantic	Historical	4/19/2017 3:00:00 PI

Continue

Catalog Geoprocessing Symbology History **HURREVAC Scenario**

Figure 4. The new interface for creating a HURREVAC scenario in Hazus 7.0.

Resolved Issues

The Hazus 7.0 release addresses several defects and issues from previous versions, improving stability and performance. Below is a list of key issues that have been resolved to enhance the overall user experience.

1. Defects Fixed in Flood Model

1.1. RSA-30867: Masking of User-Supplied Depth Grid Excludes Loss

How it was Addressed: This defect caused certain user-supplied depth grids to incorrectly exclude loss calculations during flood analyses. The masking process was adjusted in 7.0 to ensure that all data points are included in the analysis, leading to more accurate loss results when using custom depth grids.

1.2. RSA-30866: No GBS Flood Losses Where Depth Grid Resolution Is Low

How it was Addressed: In situations where flood depth grids had a low resolution and the pixels were larger than the census block area from the Aggregated Baseline Inventory (ABI), formerly known as the General Building Stock (GBS), flood losses were not being calculated. This has been corrected, and now flood losses will be calculated for all ABI, regardless of grid resolution, ensuring more comprehensive results.

1.3. RSA-4924: 24-foot Threshold for Losses Improperly Enforced

How it was Addressed: The defect involved improper enforcement of the 24-foot threshold in flood damage assessments. The correction ensures that the software correctly handles the threshold, allowing for accurate application of depth grids and damage functions in regions where water depths exceed 24 feet.

Known Limitations

While Hazus 7.0 brings significant improvements, there are a few known limitations in this release that may affect certain workflows. Please review these limitations to better understand any potential constraints and use best practices to minimize their impact.

1. General Software Limitations

1.1. Earthquake and Tsunami Models

At present, Hazus 7.0 does not support earthquake and tsunami models, which were available in previous versions. These models are slated for reintroduction in future releases, ensuring that users will eventually have the same comprehensive capabilities for earthquake and tsunami risk assessments as with other hazards such as floods and hurricanes. Users needing to run earthquake or tsunami analyses should continue to use Hazus 6.1 in the meantime. We also encourage users to check out the [Hazus Loss Library](#) for previously run earthquake and tsunami Hazus analyses.

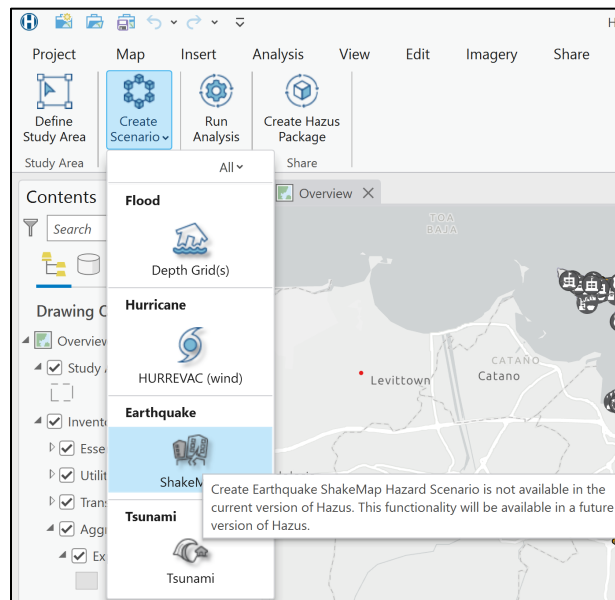


Figure 5. The Earthquake and Tsunami tools are currently grayed out indicating they are non-functional and will be available in a later release. The tooltip for these tools also explains this.

1.2. Esri ArcGIS Pro Basic License

Users with an Esri ArcGIS Pro Basic license may encounter limitations when using Hazus 7.0. Specifically, these include difficulties working with file geodatabase (FGDB) rasters in the flood model and challenges importing shared project files (.ppkx) from other users who have exported

their projects using Hazus 7.0. Users with these limitations are encouraged to explore upgrading their license level or consult the [Hazus Help Desk](#) if they have questions.

1.3. Low-End Systems

While Hazus 7.0 is designed to run efficiently on modern hardware, users operating on systems that only meet the minimum specifications (8 GB RAM, dual-core processor, etc.) may experience slower performance, particularly when running large-scale analyses. For the best user experience, we recommend upgrading to at least 32 GB of RAM and a quad-core processor to optimize the speed and efficiency of the software.

1.4. Windows Only (No Mac or Linux OS Support)

Hazus 7.0 is only supported on Windows machines, and currently cannot run on Mac or Linux operating systems. Users with non-Windows machines can still run Hazus using virtualization tools, however success is not always guaranteed.

1.5. Maximum 10GB Data for MDFs

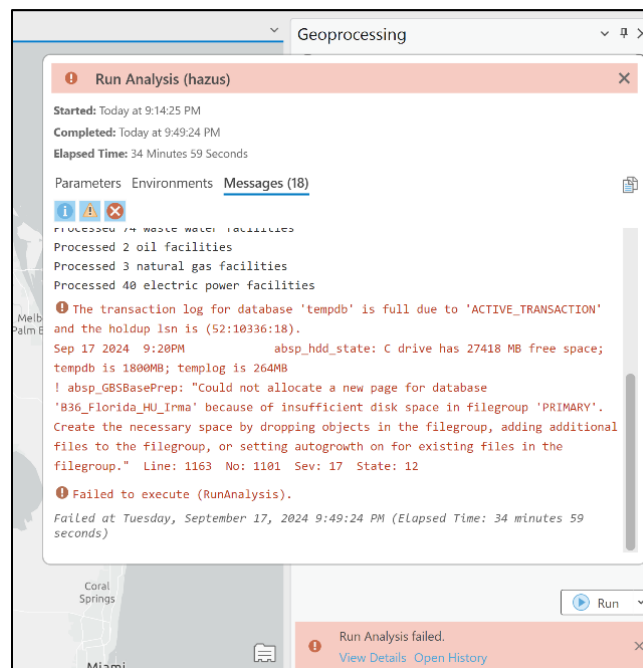


Figure 6. Error message for when your database is exceeding the 10GB limit.

Hazus 7.0 imposes a 10GB limit on the size of MDF (Master Database Files) used within the software for each project. This should be taken into consideration when defining a study area in Hazus. For large study areas, especially those that are mostly urbanized, users may need to split their study area into multiple, smaller study areas so as not to exceed this 10GB limit (i.e., users cannot create a study area for the entire state of California). Exceeding this limit will cause performance issues and/or errors during analysis.

To resolve this issue, users will need to break their study area into smaller study areas and re-run the workflow so that it does not exceed the 10GB database size limitation.

1.6. HTML Help Pages Won't Open If Windows Username Contains Spaces

If the user's Windows username contains spaces, they will not be able to open the HTML help pages in Hazus 7.0.

1.7. Pipeline Inventory Data May Appear Outside Study Area

When defining study areas that include pipeline inventory data or other line feature datasets, users may notice that these features sometimes appear outside the study area boundary. This occurs because, by design, the software does not clip or mask line features to the study area; even a small overlapping section causes the entire line to be included.

2. Flood Model Limitations

2.1. Hazus Does Not Create Depth Grids

Users can no longer run a Hazus flood scenario where Hazus will generate the depth grid for the user. To run a flood analysis, users will need to supply their own flood hazard data (i.e., depth grids).

2.2. Inability to Define Study Areas at Block Level

Users can no longer define study areas at the block level. While users can still define larger areas such as tracts, counties, watersheds, NFIP communities, and state - the block-level detail has been removed to streamline processing and improve performance.

2.3. Debris is Not Analyzed for Flood Scenarios

Debris losses are not analyzed for any flood scenarios. Thorough testing of the current methodology uncovered latent issues are present in the methodology today that we are working toward resolving for a future release. To ensure Hazus 7.0 has no known methodology issues, this module has been disabled in flood for this release.

3. Hurricane Model Limitations

3.1. Manually Editing Storm Track Data is Not Enabled

While this functionality is available in previous versions of Hazus, it is not yet available in this release. We are working to bring this functionality back in future releases.

3.2. Hurricane-Wind Damage Function Misalignment

Issues were discovered in the wind damage functions for multi-story residential buildings, thanks to testing by the NHERI SimCenter. These defects affect the accuracy of damage state predictions (Minor, Moderate, Severe, Destruction) but do not impact economic loss, loss of use, or building debris estimates. The issues identified are as follows:

1. **Transposition of Damage State Data:** For wood multi-story residential buildings, such as multi-family apartments, hotels, and motels with flat asphalt built-up roofing and poor roof cover quality but good roof deck attachment (e.g., 6"x6" nailing), the damage state data for destruction (Damage State 4) was incorrectly labeled as minor damage (Damage State 1). This led to overestimation of damage for minor wind speeds in buildings with these specific characteristics.
2. **Incorrect Application of Damage State Functions:** For 2- and 3-story multi-family wood and masonry buildings (e.g., WMUH2, WMUH3, MMUH2, and MMUH3), the damage state functions were incorrectly replaced with those for single-story buildings (WMUH1, MMUH1). This error results in smaller but more widespread inaccuracies in the damage estimates for these building types.

While the relative impact varies by factors such as wall type, roof quality, and deck nails, these defects affect a range of multi-story residential buildings, including hotels, dormitories, and nursing homes.

Additional Resources

1. Training and Support

Hazus offers a range of resources to help users get the most out of the software:

- **Webinars:** Attend live and recorded [webinars hosted by Hazus experts](#). These sessions cover the latest features, use cases, and best practices for using Hazus for natural hazard risk assessments.
- **Documentation and Guides:** Explore the [Hazus 7.0 User Guide](#) and other helpful documentation for comprehensive instructions on installation, setup, and advanced workflows.

2. Community and Feedback

Stay connected and share your insights with the Hazus team:

- **GovDelivery Email List:** Stay updated on new releases, feature updates, and upcoming training opportunities by [joining our GovDelivery email list](#).
- **Provide Feedback:** Your feedback is crucial for improving Hazus. Share your suggestions, experiences, and any issues you encounter with the [Hazus Help Desk](#) to help make Hazus better.

3. Support Contacts

If you need assistance, the Hazus support team is here to help:

- **Hazus Help Desk:** For any questions related to this release, technical support, troubleshooting, expected differences in results, or general guidance, contact the [Hazus Help Desk](#).

Future Updates

1. Roadmap

The Hazus team is committed to continuously improving the software, and we are working toward a release schedule of two updates per year to introduce new features and enhancements more frequently. While this is our goal, it is important to note that the schedule may vary depending on development progress and user needs.

For upcoming Hazus releases, a primary goal will be reintroducing the earthquake and tsunami modeling capabilities, ensuring Hazus once again supports all four major hazards: flood, hurricane, earthquake, and tsunami. Users can also expect improvements to performance, user workflows, and overall software functionality, based on community feedback.

Looking further ahead, research into a web-based environment continues to be explored through OpenHazus, which will function as a web-based environment application with a vision of streamlining workflows and improving accessibility to quality, easy-to-use risk assessment data and information.

Stay tuned for more detailed announcements on these exciting future developments!