STEP 3: INVENTORY ASSETS 3

OVERVIEW

The third step in the risk assessment is to consider the assets that can be impacted by the prioritized hazards from Step 2. Risk is a combination of hazard, exposure, and vulnerability. During Step 3, you will assemble information about, and document the populations, structures, and lifelines that can be impacted by different hazard events. The tasks and outputs for Step 3 are shown in Figure 3-1.

| Step 1: Identify Hazards |
| Step 2: Profile Hazards |
| Step 3: Inventory Assets |
| Step 4: Estimate Losses |
| Step 5: Consider Mitigation Options |

TASKS:

3.1 Review HAZUS-MH Provided Inventory Data

3.2 Perform a Data Gap Analysis

3.3 Collect Additional Local Data (if needed)

3.4 Integrate Local Data into HAZUS-MH

OUTPUTS:

- Tables and Maps of Inventory Data
- Updated Local Data in HAZUS-MH
- List of Data Sources (Worksheet 3-1)

Figure 3-1   Step 3 tasks and outputs

As profiles in Chapter 2 indicate, the primary parameters of a natural hazard are the likelihood of occurrence, severity, and geographic location of the inventory. HAZUS-MH includes general inventories for your geographically assigned study region to support your loss estimates and risk studies. Task 3.1 involves accessing and understanding the inventory provided

HAZUS-MH Inventory Terms

Asset – Any human-developed or natural feature that has value, including but not limited to people, buildings, lifelines, or other features (such as parks or cultural centers)

Inventory – Populations, buildings, and lifelines in your study region

Buildings – Commercial, residential, industrial, essential, and critical facilities and potentially other user-defined buildings

Lifelines – Transportation and utility systems

Exposure – Presence of an inventory asset in an area susceptible to a hazard

Vulnerability – How exposed or susceptible to damage an asset is

by HAZUS-MH. Task 3.2 takes you through the steps of performing a data gap analysis in case you decide to refine your inventory by using local data to perform HAZUS-MH Level 2 and Level 3 analyses. Task 3.3 provides information on where to collect additional data for your risk assessment. Task 3.4 shows you how to integrate local data into HAZUS-MH to perform Level 2 and Level 3 analyses.

Review HAZUS-MH Provided Inventory Data (Task 3.1)

HAZUS-MH includes seven inventory data categories, as follows:

1. **General Building Stock**. General building types and occupancy classes

2. **Essential Facilities**. Facilities essential to the health and welfare of the community

3. **Hazardous Material Facilities**. Storage facilities for industrial hazardous materials

4. **High Potential Loss Facilities**. Facilities that, if affected by disaster, would have a high loss or impact on the community

5. **Transportation Lifeline Systems**. Transportation systems for air, road, rail, and water

6. **Utility Lifeline Systems**. Utilities include potable water, wastewater, oil, natural gas, electric power, and communication systems

7. **Demographics**. Demographics include population statistics.

These inventory data are linked geographically to your study region within HAZUS-MH. On your study region maps, the inventory data categories are symbolized as point, line, and polygon features.

These three types of GIS features include:

1. **Point Features**. Site-specific facility locations such as essential facilities, high potential loss facilities, and hazardous material facilities. The facilities data will be geographically displayed as an individual point for each facility.

2. **Line Features**. Site-specific facility locations connected by pipelines for utility lifeline systems or roads for transportation lifeline systems. The facilities will be geographically displayed as an individual point for each facility and lines for pipelines and roads.

3. **Polygon Features**. A group of facilities or inventory data within a defined area such as general building stock and demographic data. The features will be geographically displayed as polygons.

The HAZUS-MH provided inventory data is gathered from nationally available data sources for each of the data sets. The specific data sources for each category are presented in Job Aid 3-1 in Appendix E. When accessing and understanding the HAZUS-MH provided data, it is important to check the locations of the inventory assets. The locations may be checked using high-resolution aerial photos, local GIS data overlain in HAZUS-MH, address information, or by personnel familiar with the study region. If the location of a major facility such as a hospital, school, or fire station is not accurate, HAZUS-MH provides tools to easily change the location, and if necessary, the characteristics of the inventory. This section describes the types of inventory data provided in HAZUS-MH for each of the seven categories and guides you on how to modify and supplement this data.

General Building Stock broadly includes residential, commercial, industrial, and public service building types. HAZUS-MH groups the general building stock into 36 model building types and 28 occupancy classes. Examples of model building types include light wood frame, steel-braced frame, concrete frame with unreinforced masonry infill walls, and unreinforced masonry. Each model building type is further subdivided according to the number of stories or other classifications. Examples of occupancy types include single-family dwellings, retail trade, heavy industry, and churches. General building stock is aggregated at the Census block or Census tract level. This means that the total number of buildings and the number of buildings within each model building type and occupancy class are provided for each Census tract or Census block.

To access the HAZUS-MH provided general building stock, select "General Building Stock" from the inventory menu. You will see options to view the general building stock by square footage, building count, occupancy mapping, dollar exposure, and foundation type. Review the information provided in the tables, select a column in the table that is of interest to you, and select the map function at the bottom of the menu to view the general building stock distribution across the study region.

Essential Facilities include hospitals and other medical facilities, police and fire stations, emergency operation centers, and schools (often used as shelters). These facilities are especially important following hazard events. The potential consequences of losing these facilities are so great that you may want to carefully inventory these facilities.

To access the HAZUS-MH provided essential facility inventory, select "Essential Facilities" from the inventory menu. Review the information provided in the tables and select the map function at the bottom of the menu to view the locations of these facilities.

Hazardous Material Facilities include storage facilities for industrial or hazardous materials such as corrosives, explosives, flammable materials, radioactive materials, and toxins.

To access the HAZUS-MH provided hazardous material facility inventory, select "Hazardous Material Facilities" from the inventory menu. Review the information provided in the table and select the map function at the bottom of the menu to view the facility locations.

High Potential Loss Facilities include nuclear power plants, dams, levees, and military installations. These types of facilities would have a high loss or impact on the community if they were impacted by a hazard. HAZUS-MH only provides data on dams. The database provides a placeholder for levees, nuclear power facilities, and military installations.

To access the HAZUS-MH provided high potential loss facility inventory, select "High Potential Loss Facilities" from the inventory menu. Review the information provided in the tables and select the map function at the bottom of the menu to view the asset locations.

Transportation Lifeline Systems include the following types of infrastructure inventory data:

❍ Airways – airport facilities, airport runways, heliport facilities, and heliport landing pads

❍ Highways – bridges, tunnels, and road segments

❍ Railways – light rail systems, tracks, tunnels, bridges, and facilities (rail-yards and depots)

❍ Waterways – ports (locks, seaports, harbors, dry docks, and piers) and ferries

❍ Bus Stations

To access the HAZUS-MH provided transportation lifeline system inventory, select "Transportation Lifeline Systems" from the inventory menu. Review the information provided in the tables and select the map function at the bottom of the menu to view the asset locations.

Utility Lifeline Systems include potable water, wastewater, oil, natural gas, electric power, and communication systems. Certain facilities are unique to the flood module and others are found only in the earthquake and hurricane modules. The types of facilities found in each HAZUS-MH module are based on each facility's susceptibility to loss by each hazard. Job Aid 3-1 in Appendix E details these differences.

To access the HAZUS-MH provided utility lifeline system inventory, select "Utility Lifeline Systems" from the inventory menu. Review the information provided in the tables and select the map function at the bottom of the menu to view the asset locations. Because the national data available for utilities may require updating, the HAZUS-MH database provides a placeholder for your local utility data.

> NOTE
>
> The intent of DMA 2000 includes the evaluation of risk to socially vulnerable populations such as the elderly and low-income families.

Demographics inventory data include total population; age, gender, and race distribution; income distribution; number of owners and renters; building age; workforce location data; and other data obtained from the U.S. Census Bureau and Dun & Bradstreet. The demographic data are aggregated at the Census block or Census tract level.

To access the HAZUS-MH provided demographics, select "Demographics" from the inventory menu. Select a column from the table and then the map function at the bottom of the menu to view the data across the study region.

Congratulations! You have now reviewed the inventory data provided in HAZUS-MH and can proceed to perform a data gap analysis, if required, for your study area.

Perform a Data Gap Analysis (Task 3.2)

If you select to use only HAZUS-MH provided data, you will have the necessary inventory data to complete your risk assessment. However, if you decide to add local data and perform a HAZUS-MH Level 2 or Level 3 analysis, you will need to perform a data gap analysis. For this task, you will evaluate schedules, resources, priorities, and needs for local inventory data collection.

The decision to gather additional inventory data should be based on your local needs and available resources. Consider the following questions to help determine whether additional inventory data may be required:

❍ Does the general building stock data appear acceptable in terms of number and types of buildings?

❍ Are there areas of recent development that are not reflected by the HAZUS-MH provided inventory data?

❍ Are there essential facilities that are missing or inaccurately described?

❍ Are there additional transportation and utility lifelines that are important?

❍ Are there areas within the study region that are of greatest concern, based on hazard profiles, and that should be the focus for local data improvement efforts?

❍ Do state or local requirements specify certain categories of assets to be addressed (e.g., special facilities such as museums, historical landmarks, or government buildings)?

Figure 3-2 illustrates the categories of local inventory data and recommended focus areas based on the FEMA field pilot projects performed to date. Certain inventory data, such as the locations of hospitals or bridges, are static and easier to collect than other inventory data, such as gender composition or income levels of the population in a specified area.

Before you begin your gap analysis, determine what resources are available to reduce or eliminate data gaps. Then, prioritize areas of your region or specific inventory categories

GREATER PRIORITY/LEAST EFFORT

Essential Facilities
(police and fire stations, schools, hospitals, emergency operations centers)

User-Specified Facilities
(government buildings, historical landmarks, stadiums)

Transportation Lifeline Systems
(road segments, bridges)

Hazardous Materials Facilities
(storage, industrial labs)

High Potential Loss Facilities
(dams, power plants, military bases)

Utility Lifeline Systems
(power lines, sewers and water mains)

General Building Stock
(numbers of buildings, occupancy and construction classifications)

Demographics
(age, population, gender)

LEAST PRIORITY/GREATEST EFFORT

Figure 3-2
Local inventory data collection potential levels of effort

STEP 3: INVENTORY ASSETS

(e.g., hospitals) for additional inventory data collection. At this point, you may use the hazard maps that you created to determine where you may concentrate further inventory data collection

The City of Austin, Texas, combined general building stock information provided in HAZUS-MH with updated critical facility data for hospitals, schools, and emergency operations centers. Buildings of special interest based on Texas mitigation requirements, such as stadiums and museums, were added as user-specified facilities. Finally, pipeline data for fuel and oil pipelines were incorporated into the inventory data sets.

efforts. The review of the inventory data in HAZUS-MH that you conducted in Task 3.1 will help you identify those categories of inventory data that you may want to refine by collecting local data. At the end of this step, Worksheet 3-1 provides a tool that you can use to consider each inventory asset category provided in HAZUS-MH and potential local data sources and available data that you have to support the use of HAZUS-MH. Job Aid 3-2 in Appendix E provides additional detail regarding the attributes included for each inventory category in HAZUS-MH.

Congratulations! You have now performed a data gap analysis and can proceed to collect additional inventory data.

Collect Additional Local Data (If Needed) (Task 3.3)

Job Aid 3-2 (Appendix E) lists the inventory categories for HAZUS-MH and the specific attributes required for each category.

If you decide to perform a HAZUS-MH Level 2 or Level 3 analysis, you will need to collect local hazard-related data and use local inventory data. Integrating local data in HAZUS-MH will produce more refined risk assessments. However, collecting extensive new data can become difficult and costly. Job Aid 3-2 in Appendix E shows the attribute data you will need for various data categories. Before deciding to perform a Level 2 or Level 3 HAZUS-MH analysis, you may want to evaluate your resources and determine if you have the staff, time, and funding to proceed further. If your resources are limited, you may decide to: (a) use only HAZUS-MH provided data as your "best available data" and plan future local data collection efforts; or (b) combine readily-available local data with the data provided in HAZUS-MH (see Task 3.4).

If you have the resources to start your data collection, it would be wise to assess which data you need to collect and which efforts would be most cost-effective. You may want to gather detailed information for a particular category of inventory data that you believe has changed significantly since the latest version of the HAZUS-MH software was released. Alternately, you

may want to refine all of the inventory categories for a particular area of your study region that is vulnerable to one or more significant hazards. You may decide to gather detailed inventory information for all of the essential facilities, or you may focus your attention just on the schools or hospitals. Remember that HAZUS-MH will provide refined risk studies as you provide quality local data.

To start or expand your current efforts in data collection, contact local personnel such as the tax assessor, the department of public works manager, county officials, and GIS specialists, and ask them for the necessary inventory data. Job Aid 3-1 in Appendix E will help you with this process. You may want to share this Job Aid with appropriate personnel so that they can guide you in your effort of data collection. When collecting local data, ask for data in an electronic format when feasible. Keep a log of all data collected so that you can document your risk assessment study in your mitigation plan.

Integrate Local Data into HAZUS-MH (Task 3.4)

Local data can be integrated into HAZUS-MH using the following tools or techniques:

- ❍ **Edit or Import Inventory Data Tables**. You can directly update the inventory data tables if you have databases containing all of the required fields shown in Job Aid 3-2 (Appendix E) or if you want to add or remove selected data from a particular inventory category. If you do not have all of the required fields, you may want to develop the data based on assumptions from similar existing inventory contained in your study region or by field data collection.

- ❍ **Collect Data Using InCAST**. You can use the Inventory Collection and Survey Tool (InCAST) to collect building and infrastructure data. Use InCAST if you are integrating limited building data or if you do not have existing electronic data.

- ❍ **Organize and Import Data Using BIT-MH**. The Building Import Tool for Multi-Hazards (BIT-MH) allows you to incorporate building data

for the general building stock only, and is most useful for integrating large sets of data. Use BIT-MH if you have one or more large sets of databases or spreadsheets and you are importing building information, not infrastructure data.

Instructions for each data integration option are presented in the following subsections.

Edit HAZUS-MH Inventory Data Tables

You can add or edit one or more site-specific (point) feature records directly in the HAZUS-MH data tables. You can use this approach to improve inventories of essential facilities, high potential loss facilities, lifeline components, and facilities storing hazardous materials. When you identify a new site, you will need to add a new feature record with attributes. Follow the directions provided below to update one or more site-specific records:

1. **To access the appropriate inventory category**. Select a category from the HAZUS-MH inventory menu.

2. **To edit an existing table**. Left-click on a record; then right-click and choose "Start Editing" (see Figure 3-3).

3. **To delete current records**. Highlight the record to be deleted, right-click the table, and select "Delete Selected Records."

4. **To insert a new record.** Right-click the table and select "Add New Record."

Figure 3-3   Example of an inventory table

5. **To modify a record**. Double click in the appropriate box and make the edit or add new data.

6. **To stop an editing session**. Right-click and choose "Stop Editing."

Import Local Inventory Data Tables into HAZUS-MH

This approach is appropriate if you want to modify, add, or delete a large number of facilities concurrently and develop database files as part of Task 3.3. The following steps will help you import local inventory data tables directly:

1. **To access the appropriate inventory category**. Select a category from the HAZUS-MH inventory menu (see Figure 3-3).

2. **To import electronic data into an existing table**. Left-click on a record; then right-click and choose "Start Editing." Now that you are in
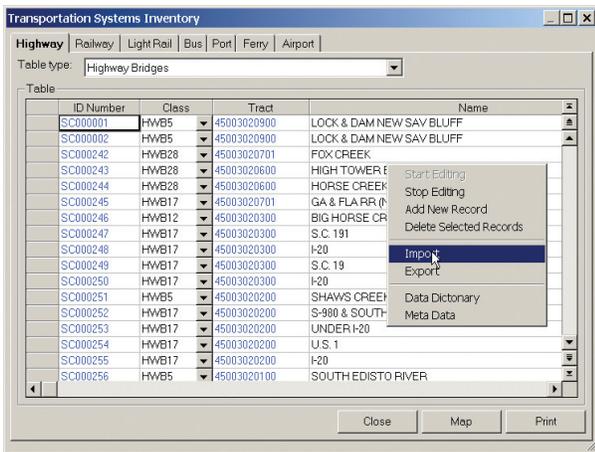
Figure 3-4
Import features with attributes
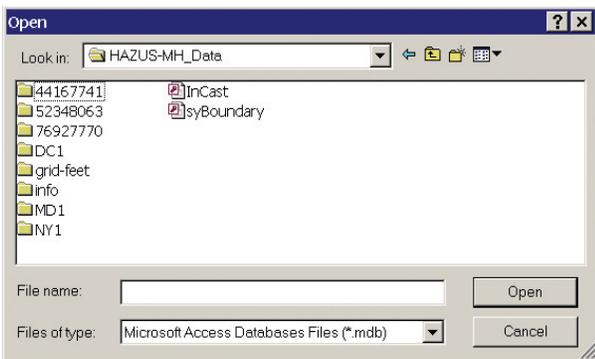
Figure 3-5
Identifying the database to be imported
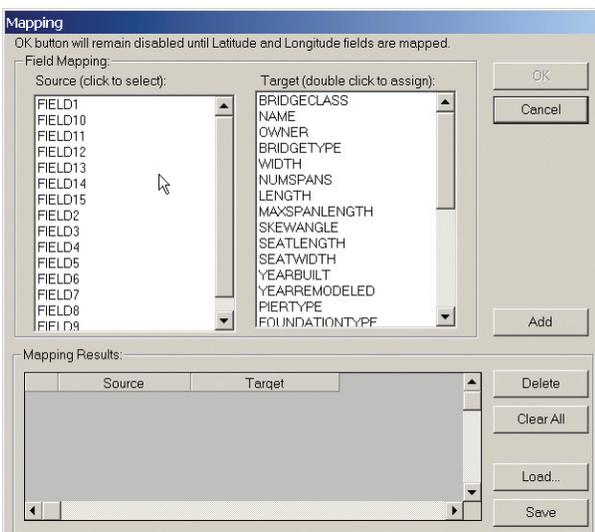
Figure 3-6
Source and target field mapping tool

the edit mode, "Import" will appear in bold when you right-click the mouse (see Figure 3-4).

3. **To access your local data file**. Enter the directory and filename for the database that you wish to import as shown in Figure 3-5.

4. **To assist you in converting your electronic database to the appropriate format for HAZUS-MH**. Click the right mouse button while you are in the inventory portion of HAZUS-MH and access the import utility. Select the appropriate database created in Task 3.3 and then click on the "OK" button.

5. **To map your data file (source file) with HAZUS-MH**. Use the mapping menu shown in Figure 3-6. Map each field in your database to the corresponding field in the HAZUS-MH database. The mapping that you have defined will now disappear from the Source and Target menus and will appear in the Mapping Results box at the bottom of the window.

6. **To support the field mapping efforts**. You should first make sure you understand the number of characters and format required for each data item. The Database Dictionary provided as Appendix E of the *HAZUS-MH Earthquake User Manual* contains the names and structures of all the databases used by HAZUS-MH. Using the dictionary, you can determine appropriate titles for target fields. An abbreviated form of the Database Dictionary is available in HAZUS-MH. To access the dictionary, click the right mouse button; using the menu shown in Figure 3-4, click on "Data Dictionary." An example from the Database Dictionary is shown in Figure 3-7.

7. **To assure your data file is appropriately mapped**. Review the mapping menu. If you see a mistake, click on the "Delete" button, and the last mapping pair that you defined will be undone.

8. **To complete your local data imports**. Click on the "OK" button, wait a few seconds, and your imported database will be displayed in HAZUS-MH. You do not have to map all of the fields on the Source (local data) menu. However, any fields that you do not map will not be imported into the target (HAZUS-MH inventory) database.

9. **To use your local database mapping scheme for future data integration efforts**. You can save the mapping scheme you defined so it can be reapplied to other files. Click on the "Save" button shown in Figure 3-6, and the dialog box shown in Figure 3-8 will appear. Enter a name for the mapping scheme, and click on the "OK" button. To retrieve the saved mapping scheme, click on the "Load" button shown in Figure 3-6.
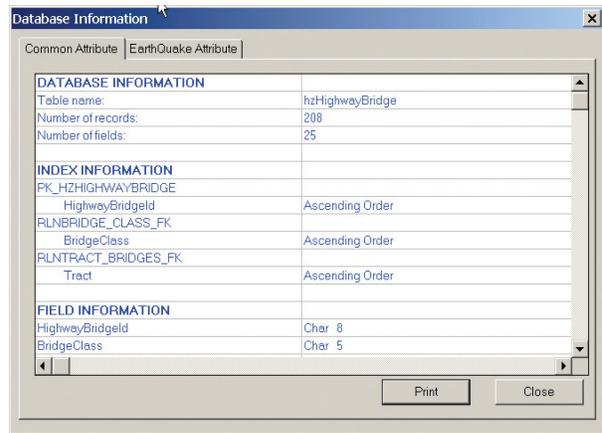
Figure 3-7
Interactive database dictionary

In HAZUS-MH, the fields of the Source (local data) menu do not have to be in the same order or have the same names as the fields in the target (HAZUS-MH inventory database). To define the desired mapping scheme, simply click on a field name on the Source menu (such as "LON") and the corresponding field name on the Target menu ("Longitude"); then click on the "Add" button.

Collect Data Using InCAST

InCAST allows the user to integrate point data for buildings in a user-friendly, standardized manner. Data integration using InCAST addresses four distinct datasets:

❍ General data common to all hazards

❍ Earthquake-related data

❍ Flood-related data

❍ Wind-related data
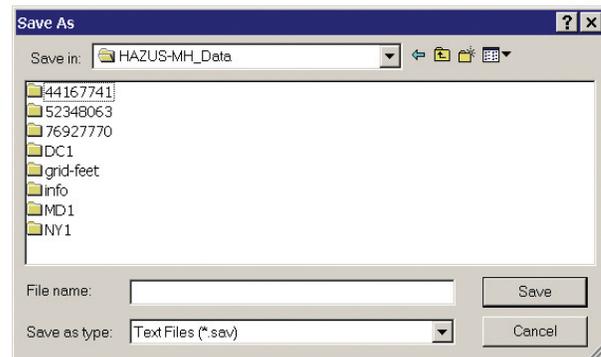
Figure 3-8
Saving a database mapping scheme
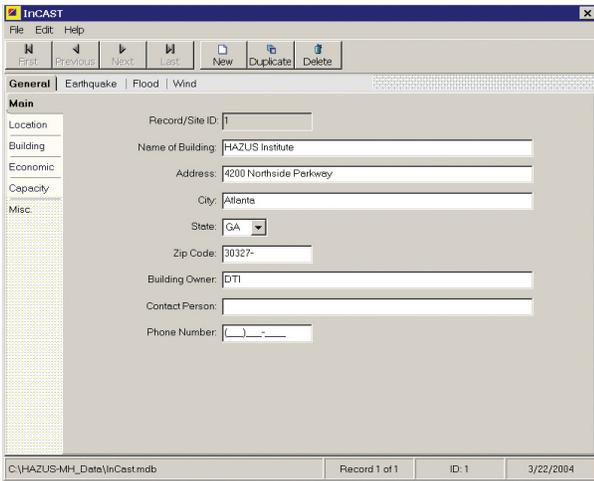
Figure 3-9   InCAST general menu
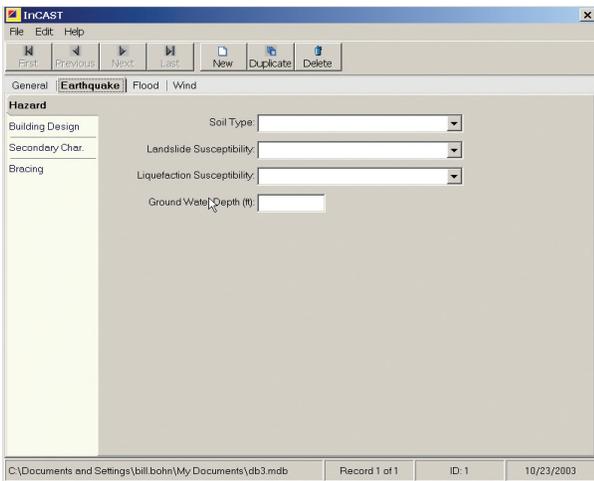
Figure 3-10   InCAST earthquake menu
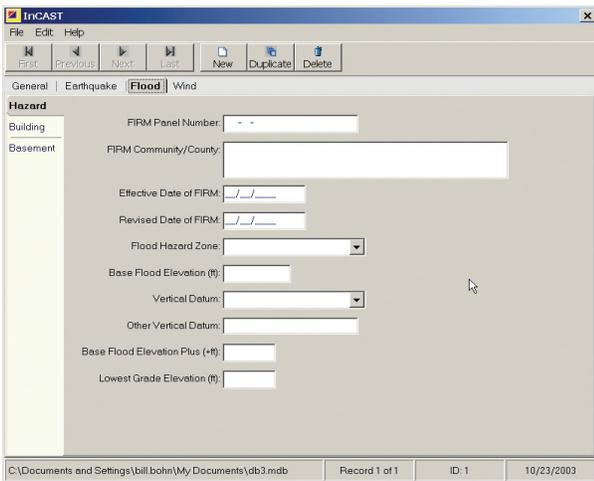
Figure 3-11   InCAST flood menu

InCAST can be run without first opening HAZUS-MH. To use InCAST:

1. **Start the program**. Click on the "Windows Start" button and then on "Programs;" you will find the InCAST program in the "FEMA Risk Assessment System" folder.

2. **Create your InCAST database**. You will be prompted to create a new database or open an existing database. For your first session, you will create a new database and then select its location.

3. **Enter the data**. You are now ready to begin entering building data for your study region. (During future sessions, you can edit your database at this point.) Figure 3-9 presents an example of a data input screen in InCAST. The topic tabs near the top are used to distinguish between hazard datasets. Hazard datasets that are not applicable to your study region do not need to be completed. For example, if the earthquake hazard is not a concern, skip the associated topic tab. Figures 3-10, 3-11, and 3-12 present data input screens for the earthquake, flood, and wind (hurricane) hazards.

4. **Save the database**. When you are finished entering data, click on "File" at the top left, and then click on "Save." This procedure will save the database. You will use this database when you begin running HAZUS-MH, so note its file location.

Organize and Import Data Using BIT-MH

BIT-MH allows a user to integrate existing building datasets (not infrastructure datasets) into HAZUS-MH. BIT-MH also is found in the "FEMA Risk Assessment System" folder. To use BIT-MH, perform the five activities described below:

1. **Specify an input file**. After BIT-MH begins running, you will be prompted to specify an input file (see Figure 3-13). This input file must be an Access table, a dbase table, or a text file. County-specific datasets will be processed individually. Therefore, if your study region encompasses multiple counties, repeat each of these five activities for each county.

2. **Map the attributes**. After specifying the input file, you will be prompted to map the attributes (see Figure 3-14). This process redefines the field names in your local data with names compatible with those used in HAZUS-MH. A minimum of 10 attributes must be mapped: area, building value, content value, building type, occupancy class, age or year of construction, height or number of stories, design code (low, medium, or high), latitude, and longitude. As you proceed, you may also need to convert units of measurement (e.g., HAZUS-MH requires square footage for area attributes).
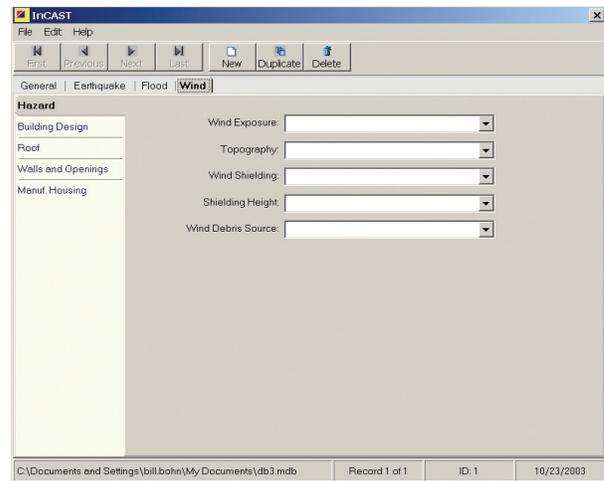
Figure 3-12   InCAST wind menu

For additional information on the BIT-MH tool, see Chapter 8 of the *HAZUS-MH Earthquake User Manual.*
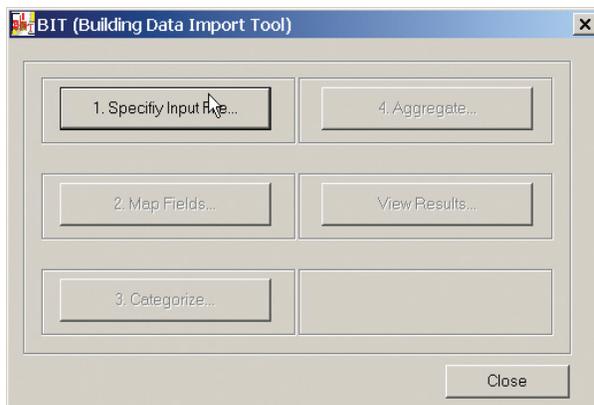
Figure 3-13   BIT-MH startup menu
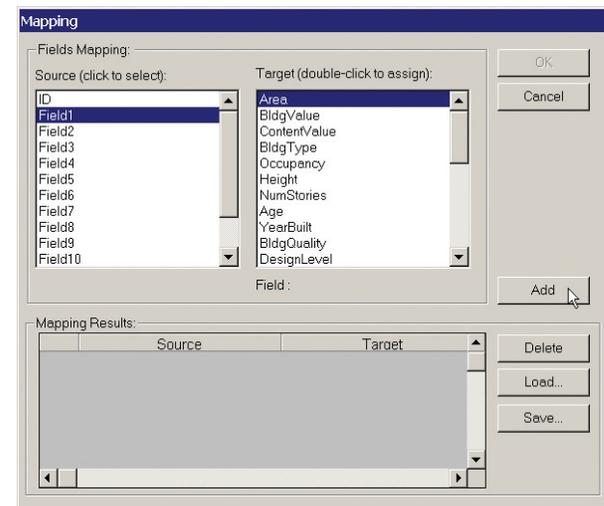
Figure 3-14   Mapping menu

3. **Categorize the attributes.** After mapping the attributes, you will be prompted to categorize them (see Figure 3-15). This process allows the categorization of the 10 or more attributes that you just mapped. The attribute values will be transformed into HAZUS-MH acceptable values (see Figure 3-16). For more information on field categorization, see Chapter 8.5 in the *HAZUS-MH Earthquake User Manual.*

4. **Aggregate the data.** After categorizing the attributes, you will be prompted to aggregate the data at the Census block and Census tract levels (e.g., square footage by "Specific Occupancy" and "Bldg Count" by "Specific Occupancy"). For more information on data aggregation, see Chapter 8.6 in the *HAZUS-MH Earthquake User Manual.*

5. **View results.** After aggregating the data, you will be given the option of viewing the results. This activity is primarily for quality control and assurance purposes and should be completed before the data are used in HAZUS-MH. For more information on BIT-MH results, see Chapter 8.7 in the *HAZUS-MH Earthquake User Manual.*

Congratulations! You have now successfully integrated your local data into HAZUS-MH.

SUMMARY

When you are finished with Step 3, you will have collected and integrated inventory data into HAZUS-MH. These inventory data may include essential facilities, hazardous material storage (HazMat) facilities, high potential loss facilities, transportation and lifeline facilities, demographic data, and general building stock. Table 3-1 will help you verify that you have completed the activities for Step 3.
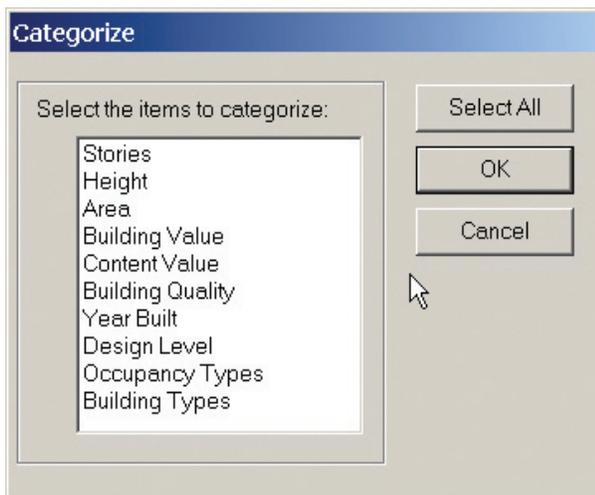
Figure 3-15   Category menu
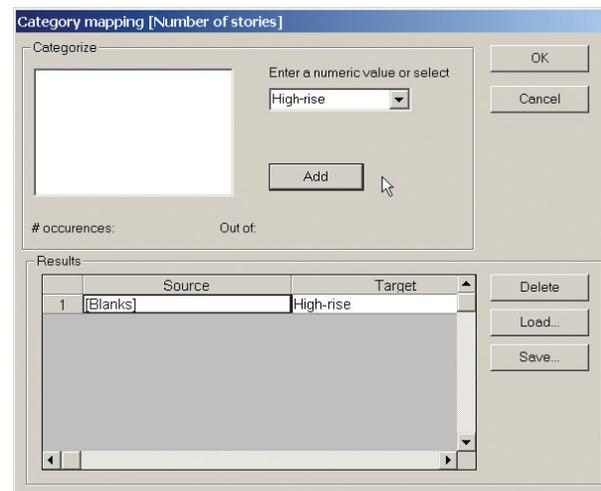
Figure 3-16   Category mapping menu

Table 3-1: Inventory Assets Activities and Outputs Checklist

Activity	Output	Check Completed Items
Review HAZUS-MH provided inventory data (Task 3.1)	Understanding of inventory provided in HAZUS-MH, including: • General building stock • Essential facilities • HazMat facilities • High potential loss facilities • Transportation and utility lifeline systems • Demographic data	
Perform a data gap analysis (Task 3.2)	Determination to use Level 1 inventory data and documentation of basis for decision (go to Step 4) or documentation of determination to collect additional data (go to Task 3.3)	
Collect additional local data (if needed) (Task 3.3)	Worksheet 3-1 and updated inventory data collected for some or all of the following categories: • General building stock • Essential facilities • HazMat facilities • High potential loss facilities • Transportation and utility lifeline systems • Demographic data	
Integrate local data into HAZUS-MH (Task 3.4)	Updated HAZUS-MH data integrated into HAZUS-MH for some or all of the following categories: • General building stock • Essential facilities • HazMat facilities • High potential loss facilities • Transportation and utility lifeline systems • Demographic data	

Complete any missing items in your checklist, and then continue to Step 4.

GO TO STEP 4: ESTIMATE LOSSES

WORKSHEET 3-1: HAZUS-MH INVENTORY DATA AND DATA SOURCES

Worksheet 3-1 shows the sources and dates of data provided by HAZUS-MH. This worksheet can help you to keep track of your local data, sources, and reliability. It helps you compare data provided in HAZUS-MH with data that you have collected or wish to collect. Complete the column on the right to record your local data.

Inventory Asset Category	Supported in Database Model			HAZUS-MH Provided Data Source (Year)	Local Data Source and Comments (Indicate N/A for not applicable if using HAZUS-MH Provided Data)
	EQ	FL	HU		
General Building Stock					
	X	X	X	U.S. Census Bureau (2000) and Dun & Bradstreet (2002)	
Essential Facilities					
Medical Care	X	X	X	American Hospital Association (2000)	
Emergency Response	X	X	X	InfoUSA, Inc. (2001) and previously geocoded data from FEMA	
Schools	X	X	X	National Center for Education Statistics, U.S. Department of Education (2000)	
Fire Stations	X	X	X	InfoUSA, Inc. (2001)	
Police Stations	X	X	X	InfoUSA, Inc. (2001)	
HazMat Facilities					
	X	X	X	Toxic Release Inventory Database, EPA (1999)	
High Potential Loss Facilities					
Dams	X	X	X	National Inventory of Dams, USACE (2003)	
Levees	X	X	X	Source not provided	
Nuclear Power Facilities	X	X	X	Source not provided	
Military Installations	X	X	X	Source not provided	
Transportation Lifeline Systems					
Highway Segments	X	X	X	Tiger/Line Files, U.S. Census Bureau (2000)	
Highway Bridges	X	X	X	National Bridge Inventory Database, FHWA (2001)	

Inventory Asset Category	Supported in Database Model			HAZUS-MH Provided Data Source (Year)	Local Data Source and Comments (Indicate N/A for not applicable if using HAZUS-MH Provided Data)
	EQ	FL	HU		
Highway Tunnels	X	X	X	National Bridge Inventory Database, FHWA (2001)	
Rail Segments	X	X	X	National Rail Network Database, Bureau of Transportation Statistics (2000)	
Rail Bridges	X	X	X	National Bridge Inventory Database, FHWA (2001)	
Rail Tunnels	X	X	X	National Bridge Inventory Database, FHWA (2000)	
Rail Facilities	X	X	X	Amtrak Station Database (2000) and the Intermodal Terminal Facilities Database (1998), BTS, U.S. DOT (2000)	
Light Rail Segments	X	X	X	Fixed-Guideway Transit and Ferry Network Database, BTS, U.S. DOT (2000)	
Light Rail Bridges	X	X	X	National Bridge Inventory Database, FHWA (2001)	
Light Rail Tunnels	X	X	X	Source not provided	
Light Rail Facilities	X	X	X	Source not provided	
Bus	X	X	X	InfoUSA, Inc. (2001)	
Port	X	X	X	Port and Waterway Facilities Database, USACE (2000)	
Ferry	X	X	X	Port and Waterway Facilities Database, USACE (2000)	
Airport Facilities	X	X	X	BTS, U.S. DOT (1999)	
Airport Runways	X	X	X	BTS, U.S. DOT (1999)	
Utility Lifeline Systems					
Potable Water Pipelines	X	X	X	Source not provided	
Potable Water Distribution Pipes (by Census tract)	X			Tiger/Line Files, U.S. Census Bureau (2000)	
Potable Water Facilities	X	X	X	EPA Envirofacts Data Warehouse LRT Tool (2001)	
Wastewater Pipelines	X	X	X	Source not provided	

Inventory Asset Category	Supported in Database Model			HAZUS-MH Provided Data Source (Year)	Local Data Source and Comments (Indicate N/A for not applicable if using HAZUS-MH Provided Data)
	EQ	FL	HU		
Wastewater Distribution Sewers (by Census tract)	X			Tiger/Line Files, U.S. Census Bureau (2000)	
Crude and Refined Oil Pipelines	X	X	X	Source not provided	
Oil System Facilities		X		EPA Envirofacts Data Warehouse LRT Tool (2001)	
Natural Gas Pipelines	X	X	X	No source provided	
Natural Gas Distribution Pipes (by Census tract)	X			Tiger/Line Files, U.S. Census Bureau (2000)	
Electric Power	X		X	EPA Envirofacts Data Warehouse LRT Tool (2001)	
Communication	X		X	Broadcast Auxiliary Microwave File, FCC (2001)	
Demographics	X		X	U.S. Census Bureau and Dun & Bradstreet (2000)	

Notes:

BTS = Bureau of Transportation Statistics

EPA = U.S. Environmental Protection Agency

FCC = U.S. Federal Communications Commission

FHWA = Federal Highway Administration

LRT = Locational Reference Tables

USACE = U.S. Army Corps of Engineers

U.S. DOT = Department of Transportation

EXAMPLE 3-1: HAZUS-MH INVENTORY DATA AND DATA SOURCES

Example 3-1 shows the HAZUS-MH provided and local data reviewed and used for the Ausitn, TX pilot project.

Inventory Asset Category	Supported in Database Model			HAZUS-MH Provided Data Source (Year)	Local Data Source and Comments (Indicate N/A for not applicable if using HAZUS-MH Provided Data)
	EQ	FL	HU		
General Building Stock					
	X	X	X	U.S. Census Bureau (2000) and Dun & Bradstreet (2002)	N/A. Revised Travis County Tax Appraisal District data; determined to use HAZUS-MH proivded data because tax data did not include all attributes required for integration into HAZUS-MH.
Essential Facilities					
Medical Care	X	X	X	American Hospital Association (2000)	Used local data supplied by City of Austin Geographic Information System (COA GIS) staff.
Emergency Response	X	X	X	InfoUSA, Inc. (2001) and previously geocoded data from FEMA	COA GIS
Schools	X	X	X	National Center for Education Statistics, U.S. Department of Education (2000)	COA GIS
Fire Stations	X	X	X	InfoUSA, Inc. (2001)	COA GIS
Police Stations	X	X	X	InfoUSA, Inc. (2001)	COA GIS
HazMat Facilities					
	X	X	X	Toxic Release Inventory Database, EPA (1999)	N/A. Reviewed local fire department data. Team determined to use HAZUS-MH data which showed less facilities but generally the larger facilities.
High Potential Loss Facilities					
Dams	X	X	X	National Inventory of Dams, USACE (2003)	N/A.
Levees	X	X	X	Source not provided	N/A.
Nuclear Power Facilities	X	X	X	Source not provided	N/A.

Inventory Asset Category	Supported in Database Model			HAZUS-MH Provided Data Source (Year)	Local Data Source and Comments (Indicate N/A for not applicable if using HAZUS-MH Provided Data)
	EQ	FL	HU		
Military Installations	X	X	X	Source not provided	N/A.
Transportation Lifeline Systems					
Highway Segments	X	X	X	Tiger/Line Files, U.S. Census Bureau (2000)	N/A. Reviewed COA GIS data. For purposes of analysis, considered comparable to HAZUS-MH data.
Highway Bridges	X	X	X	National Bridge Inventory Database, FHWA (2001)	N/A. Reviewed COA GIS data. For purposes of analysis, considered comparable to HAZUS-MH data.
Highway Tunnels	X	X	X	National Bridge Inventory Database, FHWA (2001)	N/A. COA GIS data reviewed but missing attributes required for HAZUS-MH.
Rail Segments	X	X	X	National Rail Network Database, Bureau of Transportation Statistics (2000)	N/A. COA GIS data reviewed but missing attributes required for HAZUS-MH.
Rail Bridges	X	X	X	National Bridge Inventory Database, FHWA (2001)	N/A. COA GIS data reviewed but missing attributes required for HAZUS-MH.
Rail Tunnels	X	X	X	National Bridge Inventory Database, FHWA (2000)	N/A. COA GIS data reviewed but missing attributes required for HAZUS-MH.
Rail Facilities	X	X	X	Amtrak Station Database (2000) and the Intermodal Terminal Facilities Database (1998), BTS, U.S. DOT (2000)	N/A. COA GIS data reviewed but missing attributes required for HAZUS-MH.
Light Rail Segments	X	X	X	Fixed-Guideway Transit and Ferry Network Database, BTS, U.S. DOT (2000)	N/A. COA GIS data reviewed but missing attributes required for HAZUS-MH.
Light Rail Bridges	X	X	X	National Bridge Inventory Database, FHWA (2001)	N/A. COA GIS data reviewed but missing attributes required for HAZUS-MH.
Light Rail Tunnels	X	X	X	Source not provided	N/A. COA GIS data reviewed but missing attributes required for HAZUS-MH.
Light Rail Facilities	X	X	X	Source not provided	N/A. COA GIS data reviewed but missing attributes required for HAZUS-MH.
Bus	X	X	X	InfoUSA, Inc. (2001)	N/A. COA GIS data reviewed but missing attributes required for HAZUS-MH.

Inventory Asset Category	Supported in Database Model			HAZUS-MH Provided Data Source (Year)	Local Data Source and Comments (Indicate N/A for not applicable if using HAZUS-MH Provided Data)
	EQ	FL	HU		
Port	X	X	X	Port and Waterway Facilities Database, USACE (2000)	N/A. COA GIS data reviewed but missing attributes required for HAZUS-MH.
Ferry	X	X	X	Port and Waterway Facilities Database, USACE (2000)	N/A. COA GIS data reviewed but missing attributes required for HAZUS-MH.
Airport Facilities	X	X	X	BTS, U.S. DOT (1999)	N/A. COA GIS data reviewed but missing attributes required for HAZUS-MH.N/A. COA GIS data reviewed but missing attributes required for HAZUS-MH.
Airport Runways	X	X	X	BTS, U.S. DOT (1999)	N/A. COA GIS data reviewed but missing attributes required for HAZUS-MH.
Utility Lifeline Systems					
Potable Water Pipelines	X	X	X	Source not provided	N/A. COA GIS data reviewed but missing attributes required for HAZUS-MH.
Potable Water Distribution Pipes (by Census tract)	X			Tiger/Line Files, U.S. Census Bureau (2000)	N/A. COA GIS data reviewed but missing attributes required for HAZUS-MH.
Potable Water Facilities	X	X	X	EPA Envirofacts Data Warehouse LRT Tool (2001)	N/A. COA GIS data reviewed but missing attributes required for HAZUS-MH.
Wastewater Pipelines	X	X	X	Source not provided	N/A. COA GIS data reviewed but missing attributes required for HAZUS-MH.
Wastewater Distribution Sewers (by Census tract)	X			Tiger/Line Files, U.S. Census Bureau (2000)	N/A. COA GIS data reviewed but missing attributes required for HAZUS-MH.
Crude and Refined Oil Pipelines	X	X	X	Source not provided	COA GIS. Based on importance of these pipielines, local data used (locaitonal data).

Inventory Asset Category	Supported in Database Model			HAZUS-MH Provided Data Source (Year)	Local Data Source and Comments (Indicate N/A for not applicable if using HAZUS-MH Provided Data)
	EQ	FL	HU		
Oil System Facilities		X		EPA EnvironFacts Data Warehouse LRT Tool (2001)	COA GIS. Based on importance of these pipelines, local data used.
Natural Gas Pipelines	X	X	X	No source provided	COA GIS. Based on importance of these pipelines, local data used.
Natural Gas Distribution Pipes (by Census tract)	X			Tiger/Line Files, U.S. Census Bureau (2000)	COA GIS. Based on importance of these pipelines, local data used.
Electric Power	X		X	EPA Envirofacts Data Warehouse LRT Tool (2001)	N/A.
Communication	X		X	Broadcast Auxiliary Microwave File, FCC (2001)	N/A.
Demographics	X		X	U.S. Census Bureau and Dun & Bradstreet (2000)	N/A. Reviewed COA GIS data; Census data considered comparable to local data.
Special/User-Defined Facilities					
Stadiums; post offices; historical sites; musems; and convention centers	X	X	X	Not provided with HAZUS-MH; a holder is located in the database for such items.	COA GIS data was used to add these facilities so that the city plan could meet the State of TX mitigation requirements.

Notes:

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STEP 3: INVENTORY ASSETS