Chapter 6. Entering and Managing Data in HAZUS

HAZUS contains a variety of default parameters and databases. You can run a loss estimation analysis using only default data (Chapter 3), but your results will be subject to a great deal of uncertainty. If you wish to reduce the uncertainty associated with your results, you can augment or replace the default information with improved data collected for your region of study. You will find that **HAZUS** contains spreadsheets for entering data and several additional utilities that were developed to assist in organizing your inventory data. The following sections provide information on importing data, entering data through **HAZUS** windows and managing the data.

As has been discussed in earlier sections, it is very likely that data obtained from different sources will not be in the same format. Furthermore data may contain a different number of fields than the databases defined in **HAZUS**. You will need to put the data in the correct format to ensure compatibility with **HAZUS** databases. The Import Database utility has been developed to help you convert databases to the **HAZUS** format (Section 6.2).

6.1 Importing GIS and Graphic Files

Many municipalities and lifeline operators are currently using a GIS to maintain databases of their facilities. There are a number of formats that **HAZUS** can accept for graphic or geographic data. Some can be imported without converting to another format, while others will require conversion.

6.1.1 Importing Arc/Info Files into MapInfo

Arc/Info files need to be translated into a MapInfo format for use in **HAZUS**. As discussed below, several software utilities exist for doing this. However, independent of which utility you decide to use, you need to obtain map projection details from the provider of the Arc/Info database. This information should include the coordinate system (e.g. latitude/longitude, Eckert IV, meters) and any offsets or multipliers that need to be applied.

ArcLink is a utility included in MapInfo 5.0/5.5 and runs from within MapInfo. It is invoked through the command **Tools|ArcLink**. ArcLink has the ability to translate uncompressed Arc/Info Export format files (*.E00) into MapInfo files (*.TAB or *.MIF/MID). Different versions of this program are available for conversion within a Windows environment or from a Sun workstation. Additional information on this program can be obtained directly from MapInfo Corporation at 800-327-8627.

AIMI by ERSIS is a stand-alone utility that converts UNIX, VMS and PC Arc/Info files to MapInfo format. It runs in a Windows or DOS environment. ERSIS headquarters is located in Brisbane, Australia. To obtain information about this utility call 011-617-844-7744 or fax to 011-617-844-2400. You can also email for information to the following address: info@ersis.com.au

6.1.2 Importing Atlas GIS Files into MapInfo

Issues discussed above with regard to translating ArcInfo files, also apply to Atlas GIS files. AGLink from MapInfo Corporation is a utility for importing Atlas GIS files into MapInfo. To obtain information about this software, contact MapInfo Corporation at 800-327-8627.

6.1.3 Instructions for Importing AutoCAD (*.dxf) Files into MapInfo:

It is possible that lifeline data such as pipelines or electrical networks may be obtained from utilities operators in an AutoCAD (*.dxf) format. In order to store and map the data, AutoCAD files must be converted to a MapInfo format. AutoCAD files can be imported directly into MapInfo without the use of additional software utilities. To import the file, use the following steps:

1. Start MapInfo. In the **Table** menu select **Import**.
2. A window with the title **Import File** will appear. Select the import format at the lower left portion of the window (in this case, AutoCAD DXF).
3. Select the name of the file you wish to import from the right side of the window. After you have selected the file name, click on the **Import** button**.** A window with the title **Import in Table** will appear. In this window, type the name of the MapInfo table in which you would like to save the imported data. Click the **Save** button.
4. A window with the title **DXF Import Information** will appear. From this window, select the DXF layer or layers you wish to import by highlighting them.
5. Choose **Projection.** The projection indicates the type of coordinate system to which the DXF file will be converted. Examples are Latitude/Longitude, the U.S. State Plane Coordinate System, and the Universal Transverse Mercator NAD 27 System. Select the category to be Longitude/Latitude. Then select category members to be Longitude/ Latitude by highlighting. This defines which type of latitude/longitude you will use. Click the **OK** button.
6. Select **Set Transformations**. Enter the transformation information. The transformations relate the AutoCAD Cartesian type coordinates to the global longitude/ latitude coordinates used by MapInfo. The transformation depends on knowing the coordinates of two points in the DXF file. The two points are typically the lower left and the upper right corners of the control area used in AutoCAD. This information must be obtained from the DXF file creator. Points outside of this control area are extrapolated as to their correct longitude and latitude. (There is only small error if the AutoCAD points are not too far out of the control area.)

Once the points are defined, click on the **OK** button. Then click the **OK** button in the DXF Import Information window and wait. It will take a long time for the file to be converted into the MapInfo format- for a complex file with many layers it can take 30 minutes to an hour.

A new utility included in MapInfo 5.0/5.5 is the Universal Translator accessed through the command **Tools|Universal Translator.** Using this tool is an alternative to the process described above and might yield better results.

6.1.4 Digitized Maps

MapInfo has the ability to read and display a variety of raster files (scanned images). These formats are *.GIF, *.JPG, *.TIF, *.PCX, *.BMP, *.TGA, and *.BIL. The *MapInfo User's Manual* contains detailed instructions on how to read and display these images. It is important to understand that scanned images such as these can be displayed in **HAZUS**, but they cannot be used for analysis.

Maps can be digitized directly using MapInfo if you have an appropriate digitizing table, puck and device driver. This is discussed in the *MapInfo User's Manual*. When digitizing the map, it is important that you use the file formats that are summarized in the Database dictionary in Appendix E. For example, if you are digitizing a soil map, you use numbers 1 through 5 to represent the five soil classes defined in **HAZUS**. The data would need to be in a file with one column called "Type".

6.2 Importing Database Files

Sometimes you will be able to acquire electronic databases from local agencies that contain inventory information that you need. To import a file it must be in a *.dbf format. If it is in some other format, such as a *.xls or *.txt you will have to use a database manager external to **HAZUS** to convert the file to a *.dbf format. These types of files are discussed in Sections 6.2.3 through 6.2.6.

6.2.1 The Import Database Utility

A database import utility has been developed to assist you in converting an electronic database to the correct format for entering the data into **HAZUS**. The import utility is contained in the database management tools, shown in Figure 6.1, and is accessed through the right mouse button. Click on **Import database** and the window shown in Figure 6.2 will appear. Click on the name of the file you want to import and click the **OK** button.

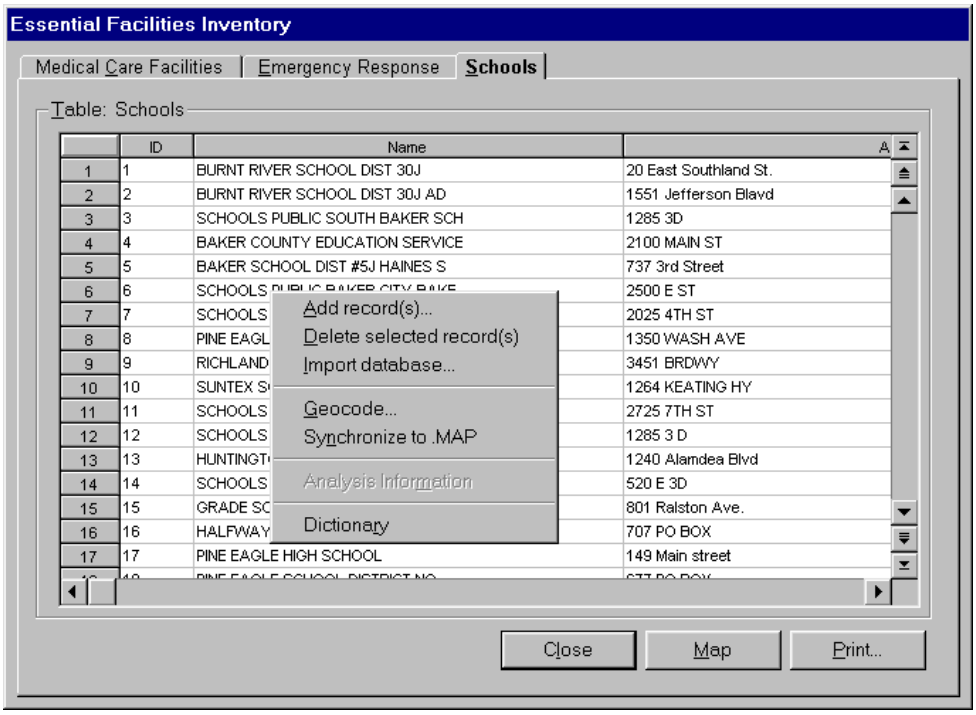

Figure 6.1 Accessing the database menu

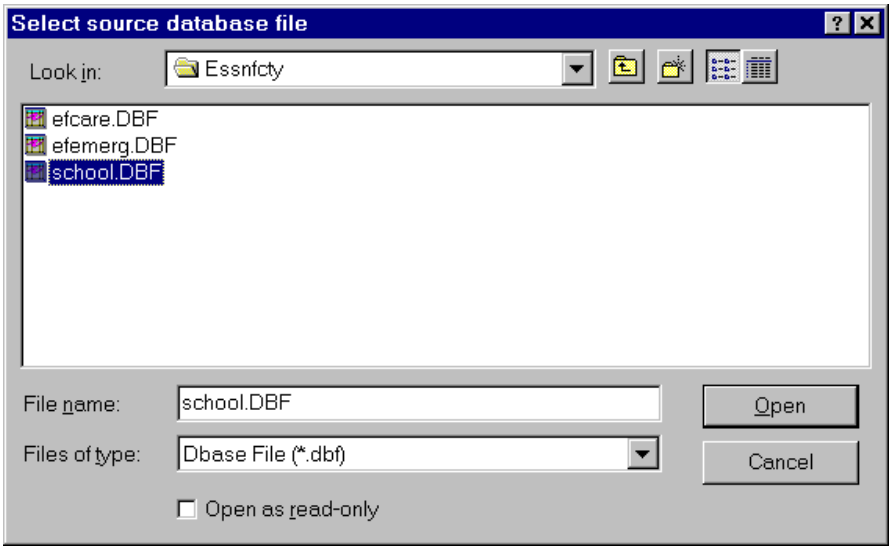

Figure 6.2 Window used to identify the location of a database to be imported

The mapping window shown in Figure 6.3 is used to map the fields in your database (the source) to the fields used in the **HAZUS** database (the target database). The Database Dictionary in Appendix E contains the names and structures of all of the databases that are used by **HAZUS**. From the database dictionary you can determine the names of the target fields. The database dictionary in an abbreviated form is available interactively in **HAZUS**. To access the dictionary, click on the right mouse button and using the menu

shown in Figure 6.1, click on **Dictionary**. An example of the database dictionary is shown in Figure 6.4.

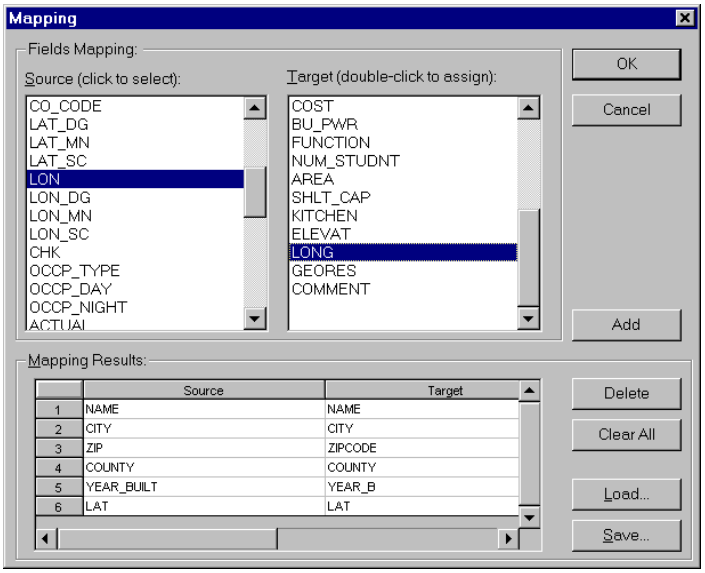

Figure 6.3 Mapping the fields of your data file to the HAZUS data structure, when importing a site-specific database

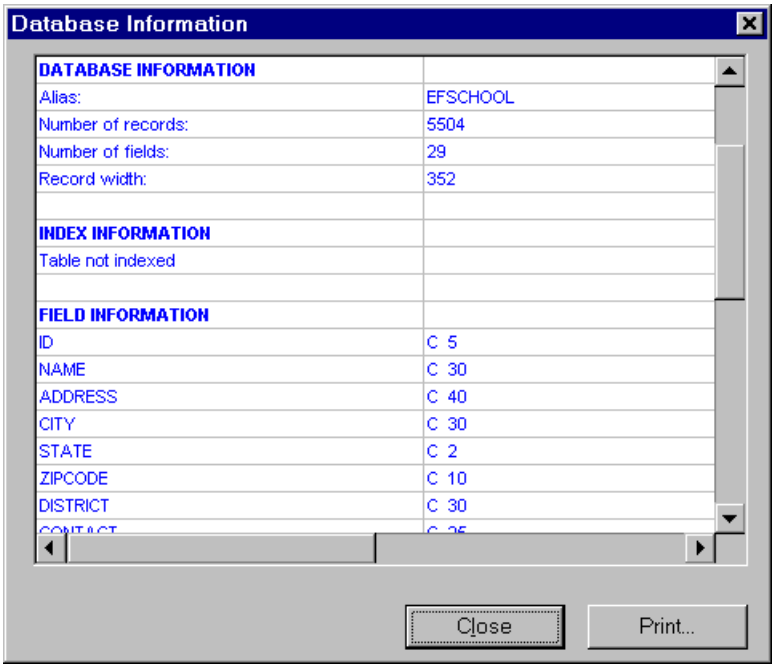

Figure 6.4 Interactive database dictionary

The source-database fields do not have to be in the same order nor do they have to have the same names as the target-database fields. For example, in Figure 6.3 the year the school was built is a field called "YEAR_BUILT" in the source database, whereas the field that contains this information in the target database is called "YEAR_B". To define the desired mapping, simply click on a field name in the source database (e.g. LON) and

the corresponding field name in the target database (e.g. LONG) and then click on the **Add** button. After each time you perform this operation the mapping you have defined will disappear from the **Fields Mapping: Source** and **Target** boxes and will appear in the **Mapping Results** box at the bottom of the window. If you make a mistake, click the **Delete** button and the last mapping pair you have defined will be undone. In this example the user has already defined six relationships and is in the process of defining a seventh. When you have completed defining all of the information, click on the **OK** button, wait a few seconds and your imported database will be displayed in **HAZUS**. NOTE: You do not have to map all of the fields from the source database. However, any fields you do not map will not be imported into the target database.

It is possible you may have several databases with the same format and you would like to save the mapping that you have just defined. Before you click the **OK** button, click the **Save** button in Figure 6.3. The window in Figure 6.5 will appear and you will need to enter a name for the saved mapping. To retrieve the saved mapping, click on the **Load** button in Figure 6.3.

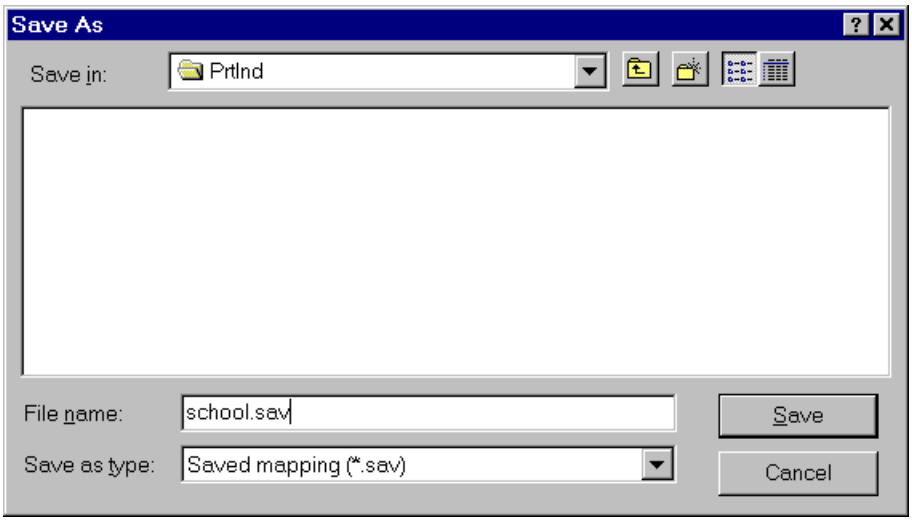

Figure 6.5 Saving a database mapping scheme

6.2.2 Instructions for Opening dBASE (*.dbf) Files in MapInfo

Files in a *.dbf format can be directly imported into MapInfo without the use of external programs or internal utilities. To open a *.dbf file, start **HAZUS** or MapInfo and select **Open Table** from the **File** menu.

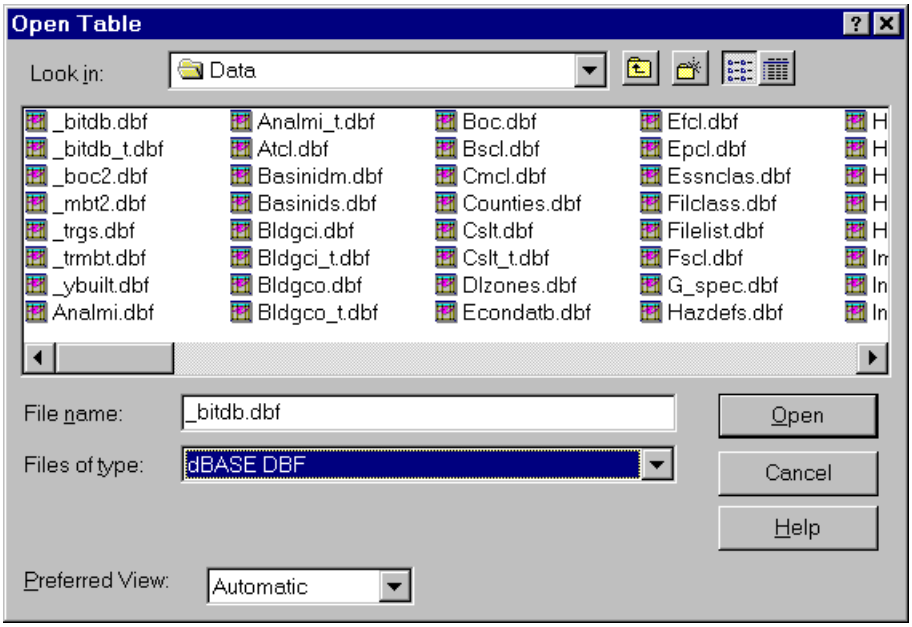

Figure 6.6 Opening a table in MapInfo

Choose **dBASE DBF** from the **Files of type** box in the lower left corner of **the Open Table** dialog box. Select the drive and directory that contains your file and then select the file to be opened. Click the **Open** button. A window will appear titled **dBASE DBF Information** (see Figure 6.7).

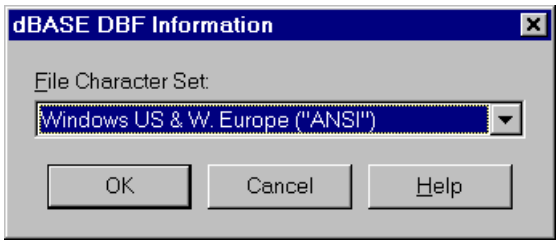

Figure 6.7 the dBASE DBF information window in MapInfo

Select the File Character Set of your dbf file. This is typically Windows US & W. Europe ("ANSI"). Click **OK**. The table should appear on the screen.

The first time a *.dbf file is opened in MapInfo using this procedure, it will be automatically saved in a MapInfo format (*.tab). This allows you to open the file directly from the MapInfo **File|Open Table** command in the future. MapInfo will **not** automatically save the file in the future, thus if you decide to make changes to the file you must save it. It is important to note that when the tab file is opened, all the fields must have the same type as they had before the table was converted; if not, then the table needs to be restructured and saved.

6.2.3 Importing Excel (*.xls) Files into MapInfo

MapInfo can read files either with its own format (*.tab) or in a dBASE format (*.dbf). If you have inventory information saved in an Excel spreadsheet (*.xls) you will need to convert it to a *.dbf format. To convert the file, use the following steps:

1. Open the file in Excel. Be sure that all of the columns in the spreadsheet are wide enough so that all of the data in each column are showing. Anything that is hidden behind another column will be truncated when you save the file in a *.dbf format.
2. Highlight the columns and rows to be included in the *.dbf format file.
3. From the **File** menu, select **Save As**.
4. Select the drive and directory that you would like the file to be saved to. From the **Save as type:** menu, select the file type. As illustrated in Figure 6.8, you should to select dBASE DBF.
5. Click on the **Save** button.

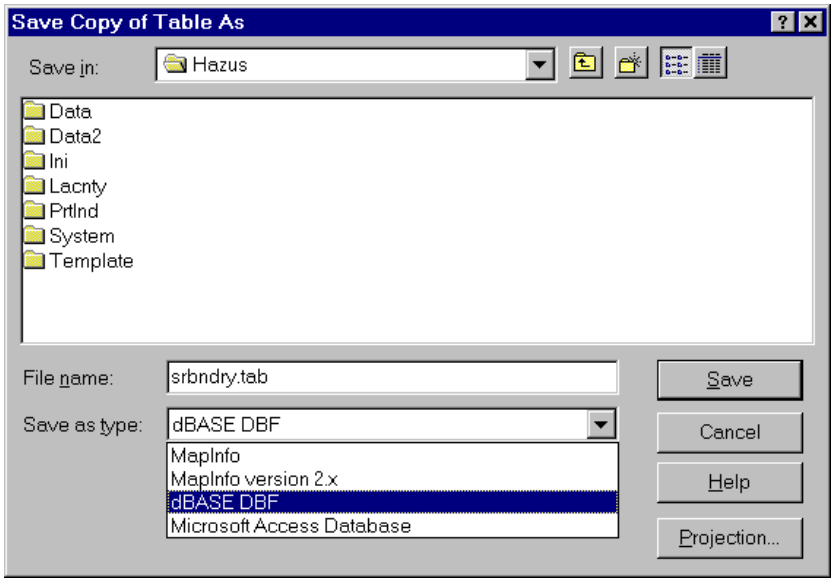

Figure 6.8 Saving an Excel file in a dBASE format

6.2.4 Instructions for Importing Paradox (*.db) Files into MapInfo

Paradox files (*.db) cannot be opened directly in MapInfo. Open the file in Paradox and save it with the extension .dbf. Now you will be able to follow the instructions in Section 6.2.2.

6.2.5 Instructions for Opening ASCII Delimited Files in MapInfo

An ASCII Delimited file is opened using a procedure similar to that described in Section 6.2.2 for a *.dbf file. To open a file, start **HAZUS** or MapInfo and select **Open Table** from the **File** menu. Then choose **Delimited ASCII** from the **Files of type** box in the lower left corner of the Open Table dialog box. Select the drive and directory that contains your file and then select the file to be opened. Click **Open**. Once the file is

selected, a window will appear titled **Delimited ASCII Information**. The File Character Set is likely to be Windows US & W. Europe ("ANSI"). Select the type of delimiter the file uses. If the delimiter is something other than a tab, such as "or" , select **Other** and insert the delimiter type in the box to the right. If the first line of the ASCII file contains the column or field headers, check the option **Use first line for column titles**. Click **OK**. The table should appear on the screen.

The first time an ASCII delimited file is opened in MapInfo using this procedure, it will automatically be saved in a MapInfo format (*.tab). This allows you to open the file directly from the MapInfo **File|Open Table** command in the future. Note that MapInfo will **not** automatically save the file in the future, so, you need to save any changes you make to the file if you want to keep them.

6.2.6 Instructions for Importing ASCII Fixed Length Files into MapInfo

ASCII Fixed Length Field Files cannot be directly opened in or imported into MapInfo. An external program should be used to convert such a file into an ASCII delimited or dBASE file format and then use the procedures discussed in the previous sections to open them.

6.3 Adding Records to Site Specific Databases

When you are collecting information about essential facilities, high potential loss facilities, lifeline components and facilities storing hazardous materials, you will be collecting and storing the data on a site by site basis. Therefore, your databases will contain sets of records in which each record refers to a particular site. When you identify a new site you will need to add a new record.

When you need to add a record to a database, you go to **Inventory|(**database category)|**Inventory data**. Clicking on the right mouse button while the mouse is positioned in the inventory table accesses the database management tools. This provides you with several utilities for managing your inventory databases. From this menu you can add, or delete records. You can also import a database that contains a complete set of sites of interest to you (Section 6.2.1 To add records, place the cursor on the top of data-sheet and use the right mouse click to access the **Add record** option. The pop-up menu shown in Figure 6.9 will appear. This particular example refers to medical care facilities, but the same steps would be followed for all of the site-specific databases mentioned above. The only exception is that you cannot use this procedure to add lifeline components that are represented as lines instead of points (e.g. highway segments, railway segments, pipeline segments).

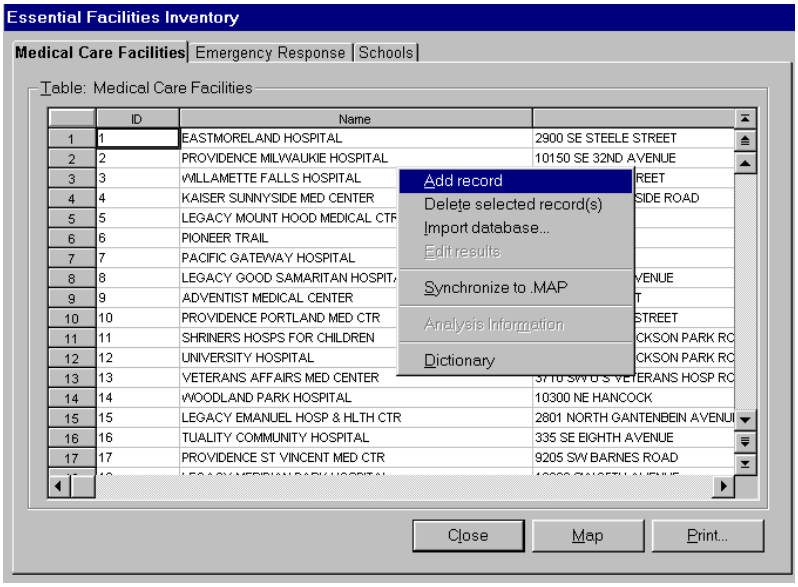

Figure 6.9 The Add record window

For this example, assume you wish to add two records, you would need to do (right-mouse click)|**Add Record** twice. Every time you add a record, you will be prompt with a "Save" window dialogue. The medical care facility database has 27 fields for storing data; however, only a few of these fields are required for defining a record. The required fields for each database are specified in Appendix E. It is recommended that you give each record an ID number, although the database will accept your entries without ID numbers. ID numbers are used for reporting results. Therefore, if you have a several records without ID numbers you will not be able to associate results with a particular facility.

The one essential datum element required to define a facility is its location. The only way to define a location of a facility in **HAZUS** is to type the longitude and latitude of the facility. If you don't know the longitude and latitude of the facility, you would need to use a geocoder[6] to get the longitude and latitude of the location and then add it to the database in **HAZUS**.

Once you have defined a location you can click on the **Close** button and select **Yes** from "Save" window dialogue. Alternatively you can map the database using the **Map** button or switch to another database by clicking on the tabs at the top of the window (for example click on Schools). In any of these cases the window shown in Figure 6.11 will give you the opportunity to confirm that you wish to save the changes to your database.

[6] The geocoding process is carried out outside HAZUS, therefore any commercial geocoder application can be used.

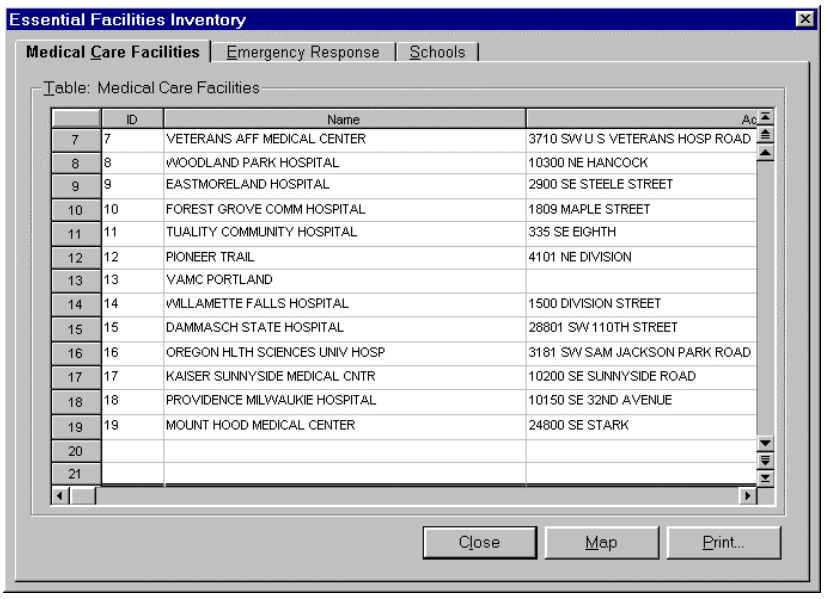

Figure 6.10 Modified medical care facilities database after adding two records

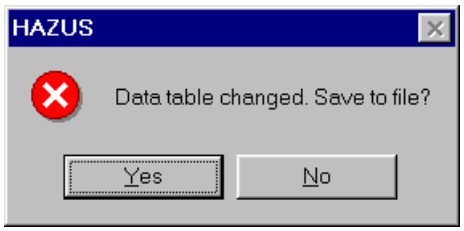

Figure 6.11 Confirmation window when data have been changed

6.3.1 Errors When Adding Records

HAZUS will provide a warning when data are located outside the study region. If you define facility locations by either entering longitudes and latitudes or addresses that are outside the study region you will get a warning message such as the one displayed in Figure 6.12. The same type of warning will occur if you do not define a location for a record you have entered.

While **HAZUS** allows you to retain facilities outside the study region boundary, it is strongly recommended that you delete such records (click on **Yes**). When you delete records, the remaining records will not be renumbered. The ID numbers associated with deleted records will be eliminated from the database.

If you think you have made an error while inputting the data, click on the **No** button in the warning message, then review and modify the longitudes and latitudes of the facilities that were added. Unfortunately, HAZUS does not indicate which of the facilities it found outside the study region, so it can be difficult to identify your errors. Facilities outside the study region that are retained in the database will be included in the analysis with default PESH parameters.

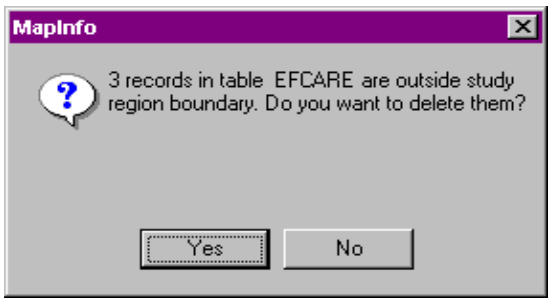

Figure 6.12 Error message when adding records with sites located outside the study region

6.4 Deleting Records from Site Specific Databases

Select the record you wish to delete from a database by clicking on the record number at the left side of the record. To highlight the record shown in Figure 6.13, click on the number 17. To select a block of records, click on the record number at the top of the block, then, while pressing the keyboard's **Shift** key, click on the record number at the bottom of the desired block. The entire block will be highlighted.

When the records have been selected, use the right mouse button to display the database management options and select **Delete selected record(s)...** (See Figure 6.9). The window shown in Figure 6.14 will appear. When you click **Yes**, the record is gone for good. There is no undo option.

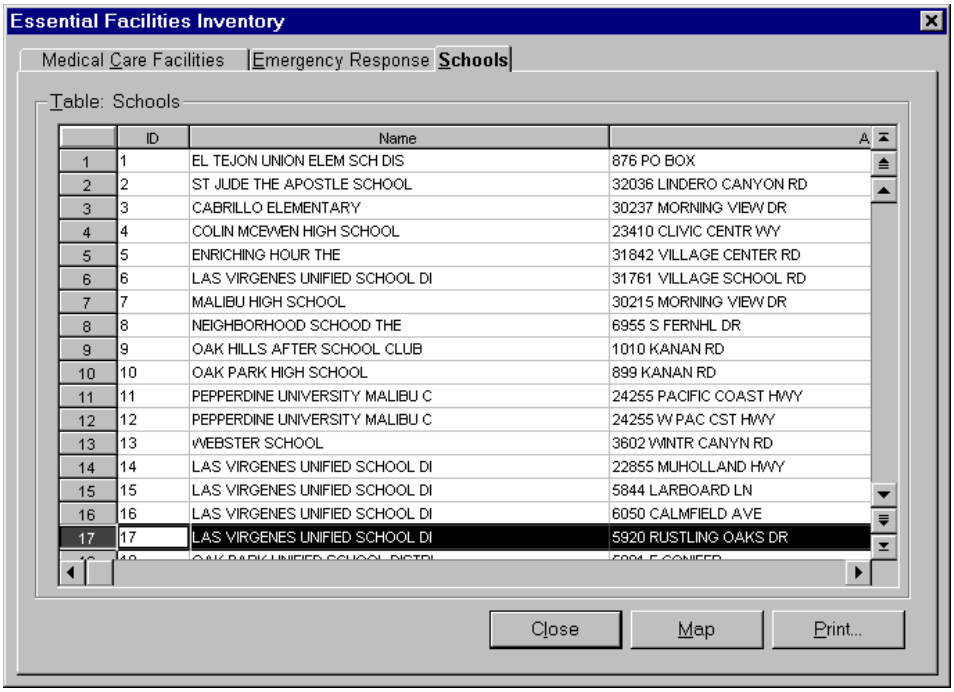

Figure 6.13 Selecting a record to delete from a database

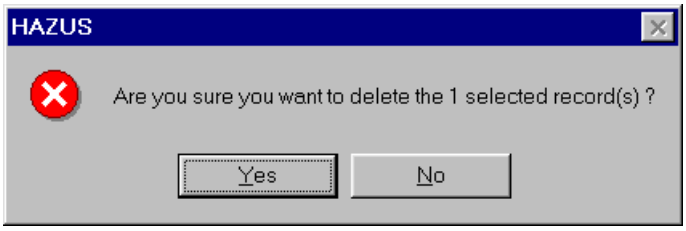

Figure 6.14 Confirmation window for deleting a record

6.5 Editing Records

Data within a record can be edited by clicking on the spreadsheet cell containing the data and then highlighting the text you wish to modify. To highlight the text, hold the left button of the mouse down while dragging it over the text. Release the mouse and your new entry typing will replace the highlighted text.

Alternatively, a facility can be moved using the map tools in the map window. To do this, map the database using the **Map** button.

1. Select the "Layer Control" option. It can be accessed three ways: a) Through the menu **Map|Layer Control**, b) The toolbar (The three sheets of paper stacked on each other), or c) By clicking the right mouse button.
2. The next step is to make the inventory data layer editable. Select (highlight) the inventory data layer (in this case, we have selected the EFCARE Cosmetic Layer as shown in Figure 6.15) and click in the corresponding box under the "pencil". A check mark will appear, indicating that the layer is now editable. Click the **OK** button and you will return to the data map.

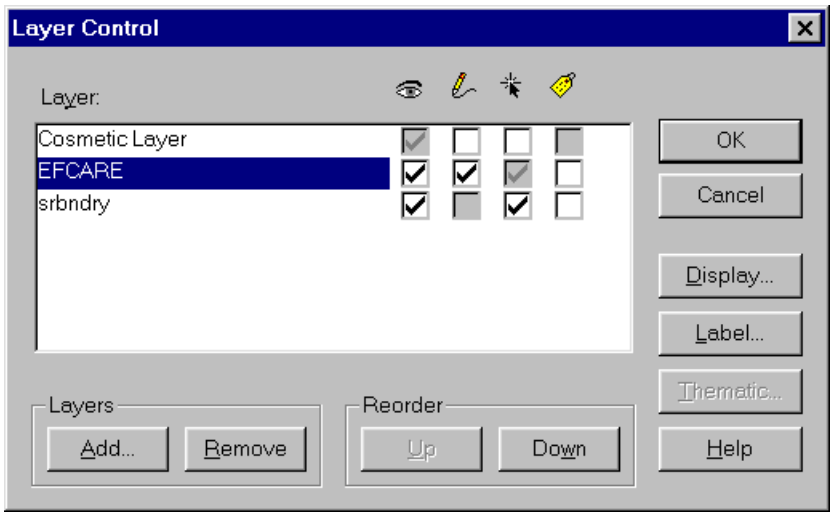

Figure 6.15 Layer Control window

3. Click on the facility you want to move, and with the left mouse button held down drag the facility to the new location. Move as many facilities as you want.

When you have finished, click on the **Return|Return to Table** menu. You will be asked to confirm your changes as shown in Figure 6.16.

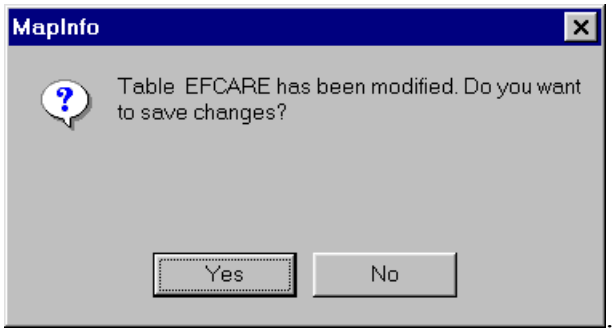

Figure 6.16 Confirmation window for modifying a site-specific database in the map window

6.5.1 Synchronizing Databases with Mapping Coordinates

There are two databases that contain your data: a .DBF file and a .MAP file. The .DBF file contains the database as you see it in the spreadsheet. The .MAP file contains the coordinates of the points used to display the points on a map. If you modify data in the latitude and longitude cells of a record in the spreadsheet, you need to "Synchronize" the databases so that the spreadsheet and the mapped database are displaying the same information. Synchronizing, which is done with the **Synchronize to .MAP** option as shown in Figure 6.1, will update the .MAP file so that the mapping coordinates agree with the spreadsheet.

When data is modified using the map window (Section 6.4), it is synchronized automatically.

6.6 Lifelines

6.6.1 Adding Lifeline Segments

Lifeline segments must be created using MapInfo tools. To add lifeline segments you must be familiar with the basic functions of MapInfo.

6.6.2 Adding Highway Bridges

Adding highway bridges is done using the procedure discussed in Section 6.2. To access the database, use the **Inventory|Transportation Systems|Inventory Data** menu. **HAZUS** assumes a default bridge class of HBW5 (Concrete Construction, Simply Supported, Multiple Column Bent, Built before 1990 and Constructed outside of California - see Table A.6 in Appendix A) if no bridge class is supplied.

6.7 Specifying Hazard Maps

Simplified hazard maps are generated during the creation of the study region. These files will be named SOILDEF, LQFDEF, and LNDDEF and are located in the study region directory. These crude hazard maps are based on default soil maps and the census tract boundaries and can be modified by a user that has a general understanding of spatial distribution of the hazards. If digital information is available from experts or other state agencies, the expert-generated maps should replace the simplified maps.

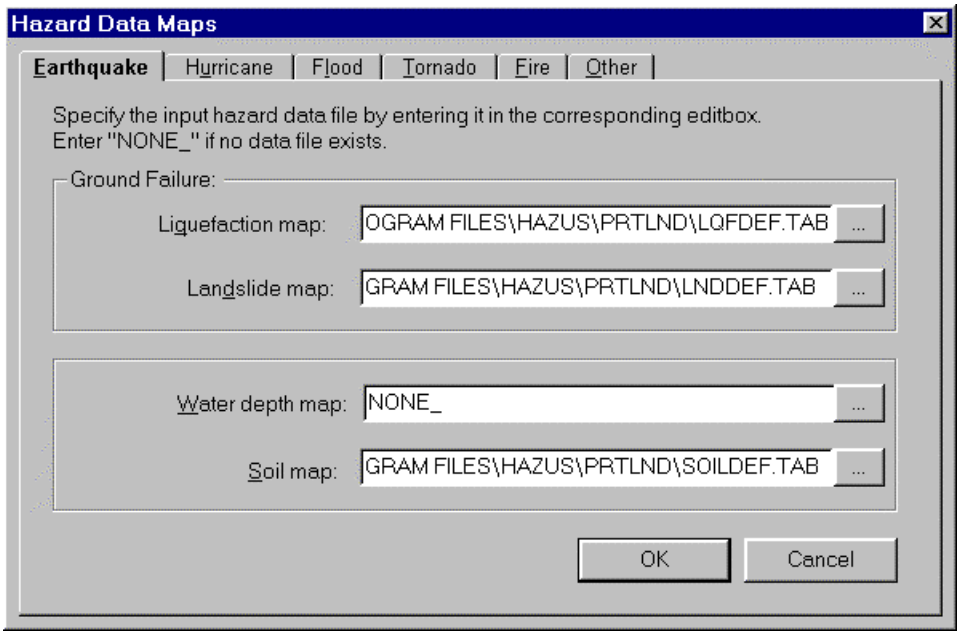

Figure 6.17 Specifying hazard maps in HAZUS

Soil, liquefaction susceptibility and landslide susceptibility maps are specified in the window shown in Figure 6.17. This window is accessed from the **Hazard|DataMaps** menu. In this example the default maps generated by **HAZUS** during the creation of the study region are specified. To change the name of a file, either type the path name in the provided box, or click on the button to the right of the box. This button will access the standard "Open" window as shown in Figure 6.18. Once in this window you can move around your directories to find the file you need. Note: Map files in MapInfo are identified by the .tab extension.

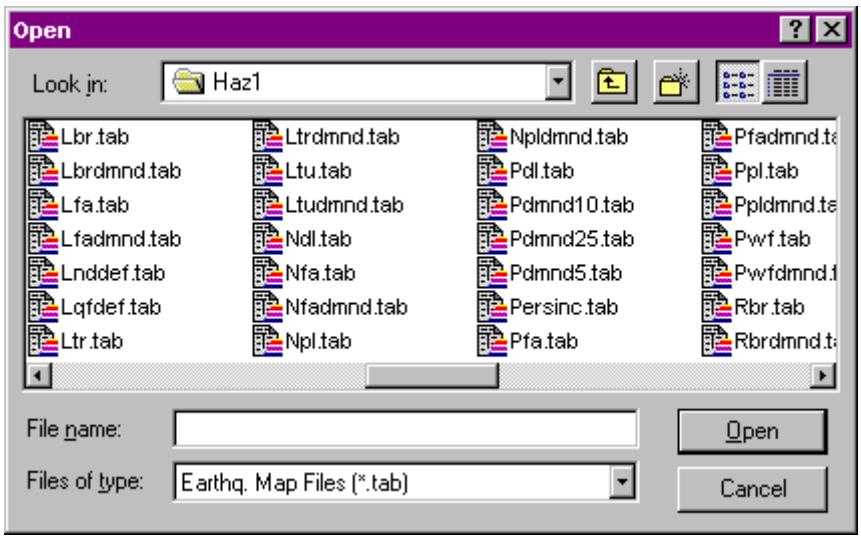

Figure 6.18 File open window listing *.tab files

6.7.1 Modifying Census Tract Centroid Hazard Values

For the general building stock, **HAZUS** uses a simplified analysis procedure that aggregates the data and locates the aggregated data at the centroid of the census tract. In some cases, the soil or susceptibility class determined for the centroid does not represent the average value for the census tract. HAZUS was designed with a capability to modify the values based on your observation and understanding. In the following example, the census tract centroid soil information for a study region is modified. The liquefaction and landslide maps can also be changed using the same approach. This procedure can only be completed after a PESH analysis has been run at least once.

Display the soil map using **Map|Earthquake|Soil Type** and the window shown in Figure 6.19 will appear. Select the "Show hazard values…". Click **OK** and a census tract map with the shaded hazard values will appear as shown in Figure 6.20. In this case, the user is displaying the default soil map, so all of the census tracts are soil class D.

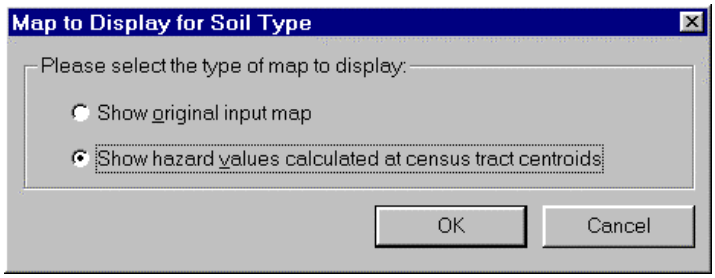

Figure 6.19 Map to Display for Soil Type Dialog

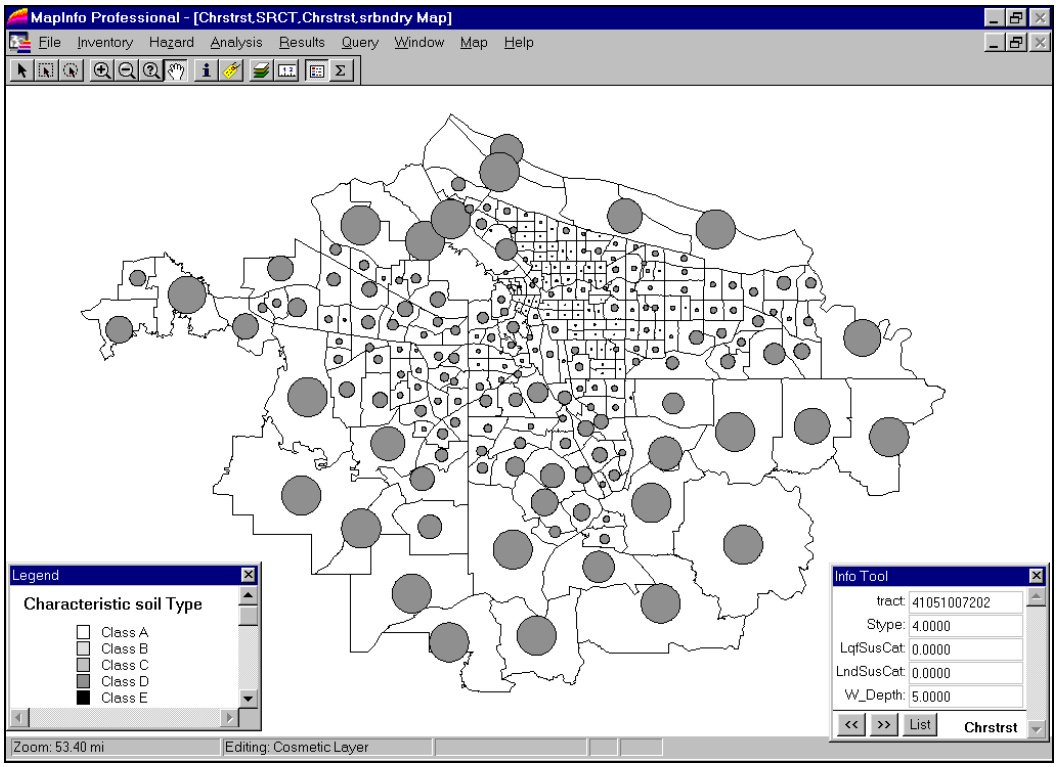

Figure 6.20 Soil map with census tract centroid values

Using the "Info Tool" (**i**), click on the census tract to be modified. The Info Tool will then show the layers currently being mapped (See Figure 6.21). In this case they are:

Chrstrst: characteristic soil map
SRCT: census tract boundaries
Srbndry: study region boundary

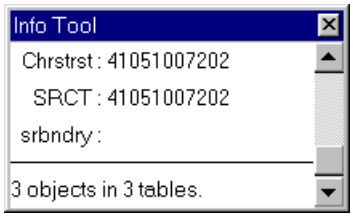

Figure 6.21 Info Tool window showing mapped layers

Click on chrstrst and the Info Tool window will display all of the characteristic values for the selected census tract (Figure 6.22). The characteristics are as follows:

Stype: soil type
LqfSusCat: liquefaction susceptibility category
LndSusCat: landslide susceptibility category
W_Depth: groundwater depth

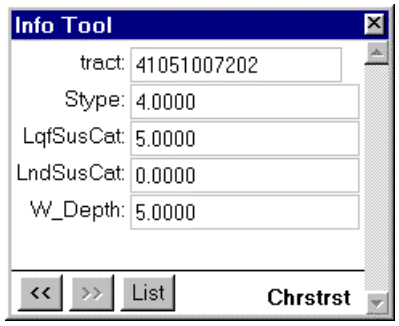

Figure 6.22 The Info tool dialog used for changing census tract centroid soil type

To change the soil classification, edit the value labeled "Stype" in the dialog box (1 is soil class A …, 5 is soil class E; see Table A.1 in Appendix A). To change another census tract, simply click on it and repeat the above procedure. Each time you do this, the census tract in which you have changed the soil type will change color. When you are finished, close the "Info Tool" dialog box using the button in the upper right corner. An example of the resulting map is shown in Figure 6.23.

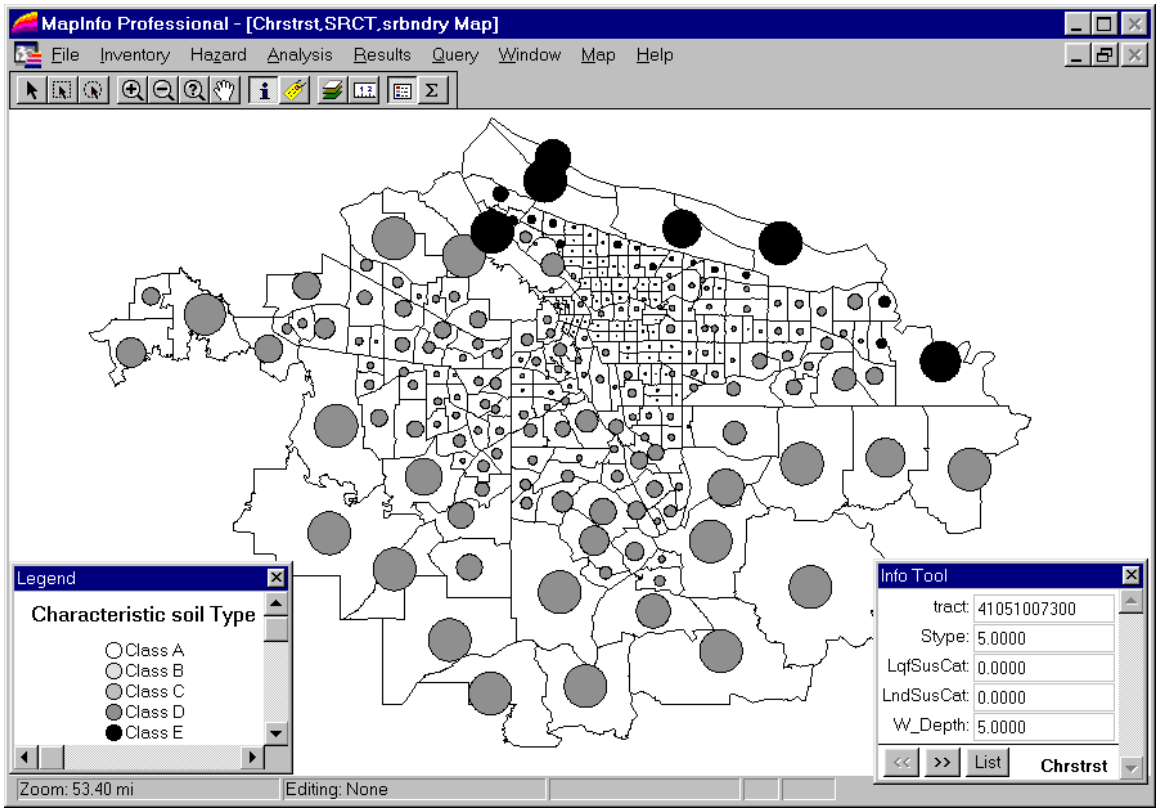

Figure 6.23 Modified census tract centroid soil map

After all the changes are made, the map must be saved using the **File|Save** command. By selecting this menu command the window in Figure 6.24 will appear. Highlight the table to save and click on the **Save** button**.**

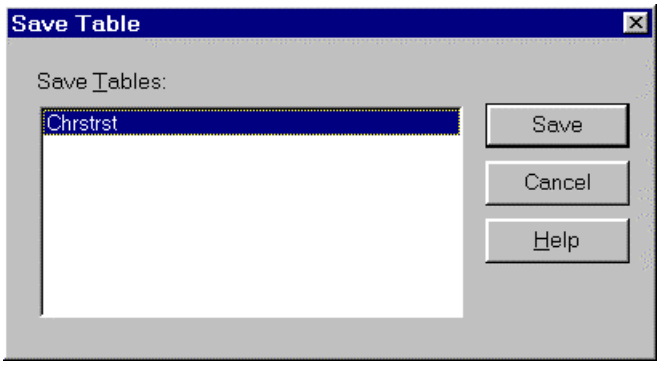

Figure 6.24 Saving the centroid soil values after changes are completed