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, the data may contain a different number of fields than the databases defined in **HAZUS**. This will require putting the data in the correct format to ensure compatibility with **HAZUS** databases. An import database utility has been developed to help you convert databases to the **HAZUS** format (Section 6.2.1).

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 opened without converting to another format, while others will require conversion.

6.1.1 Opening ArcInfo Files in ArcView

ArcInfo coverage files (*.e00) can be opened directly in ArcView. To open an ArcInfo file in ArcView, you start by making the View window active. Choose the **Add Theme** option from the **View** menu. Make sure that the **Data Source Types:** is pointed to **Feature Data Source**. Select the desired coverage file and click the **OK** button (Figure 6.1).

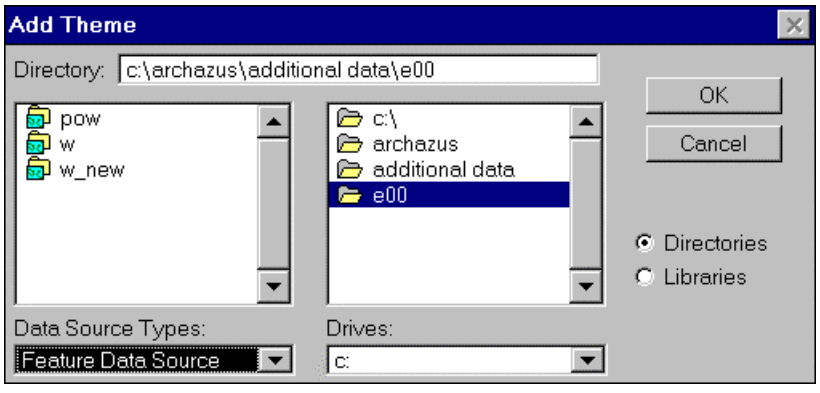

Figure 6.1 Opening ArcInfo files in ArcView.

6.1.2 Importing MapInfo Files in ArcView

MapInfo files cannot be opened directly in ArcView. A special import utility that converts MapInfo (*.mif) files to ArcView(*.shp) files is generally packaged with the ArcView software and is installed automatically on your system when ArcView is installed.

6.1.3 Opening Atlas GIS Files in ArcView

Atlas GIS exports ArcInfo (*.e00) files that can be directly opened in ArcView as described in Section 6.1.1.

6.1.4 Opening AutoCAD (*.dxf) Files in ArcView

A special ArcView extension can be purchased separately from ESRI that will allow the conversion of AutoCAD (*.dxf) files to ArcView (*.shp) files.

6.1.5 Digitized Maps

ArcInfo has the ability to read and display a variety of image formats. These formats include: *.bsq, *.jpg (when the JPEG Image extension that comes with ArcView is loaded), *.tif, *.gis, and *.bil.

To add an image to a view, click the **Add Theme** button. In the dialog box that appears (shown in Figure 6.2), choose **Image Data Source** from the **Data Source Types** and navigate to the directory that contains the image you want to add. Select the image file and click the **OK** button. Check the box next to the theme's name in the table of contents of the **Map View** window to be able to see the image. It is important to understand that scanned images can be displayed in **HAZUS** but cannot be used for analysis.

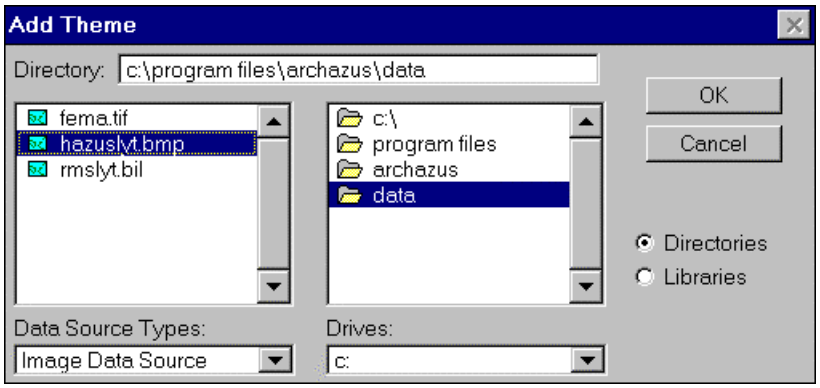

Figure 6.2 Opening an Image file in ArcView.

6.2 Opening Database Files into HAZUS

In some cases, the user can acquire inventory information databases from local agencies in electronic files. To open such file in **HAZUS**, they must be in a (*.dbf) format. Other formats will require to you to use a database manager external to **HAZUS** for converting 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 appropriate format for **HAZUS**. Clicking on the right mouse button accesses this import utility. The Database Management Tools menu, shown in Figure 6.3, will appear. Select the **Import database** and the dialog box shown in Figure 6.4 will appear. Click on the name of the file you want to import and click the **OK** button.

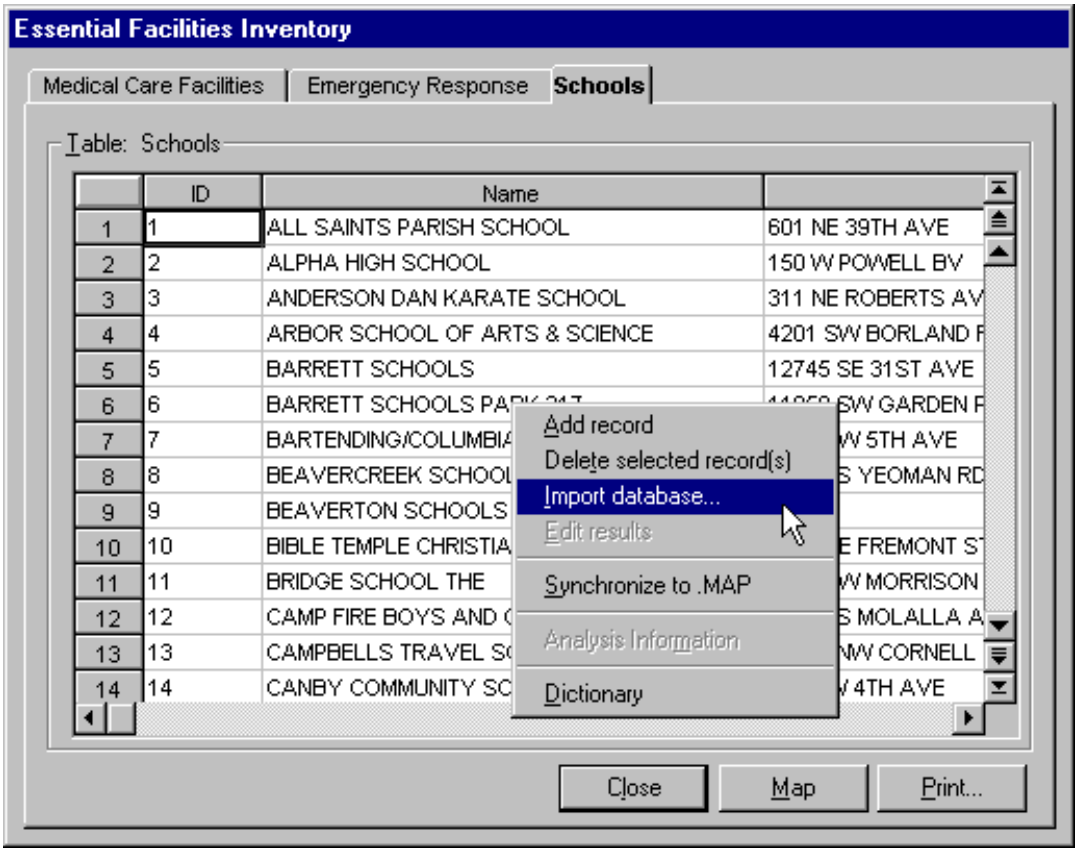

Figure 6.3 Accessing the database menu.

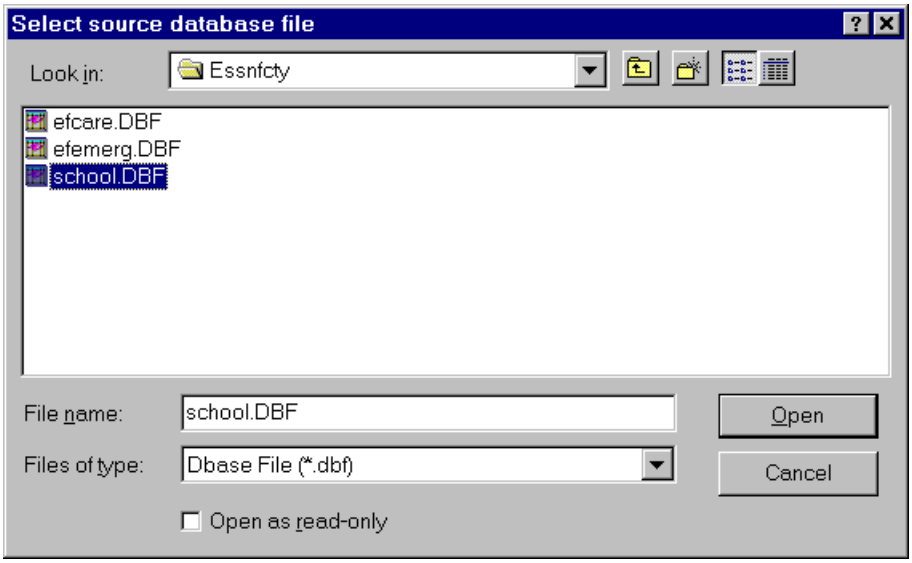

Figure 6.4 Window used to identify the location of a database to be imported.

The mapping window shown in Figure 6.5 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 6.3, click on **Dictionary**. An example of the Database Dictionary is shown in Figure 6.6.

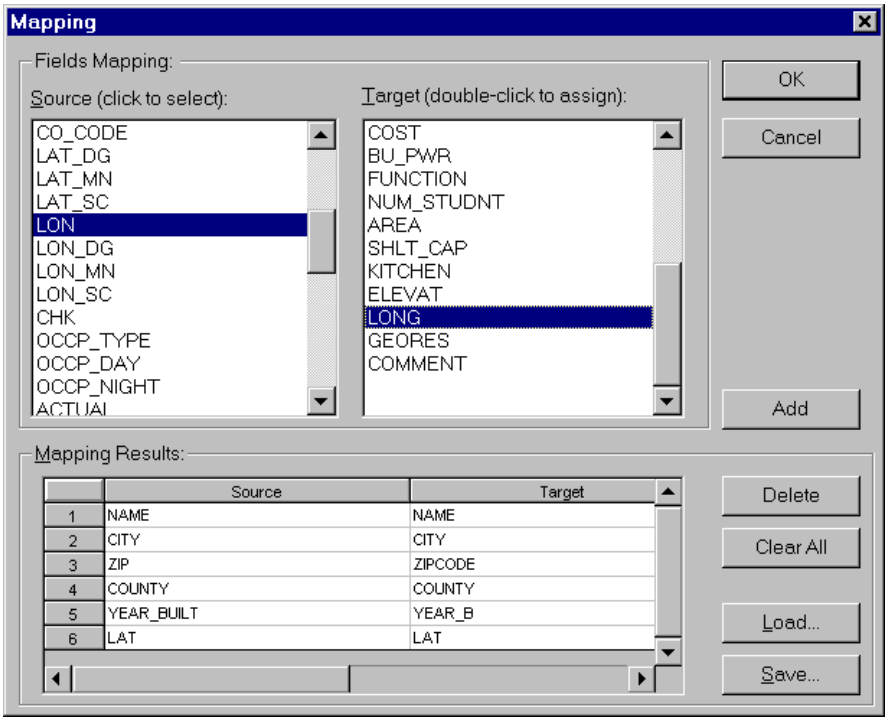

Figure 6.5 Mapping the fields of your data file to the HAZUS data structure, when importing a site-specific database.

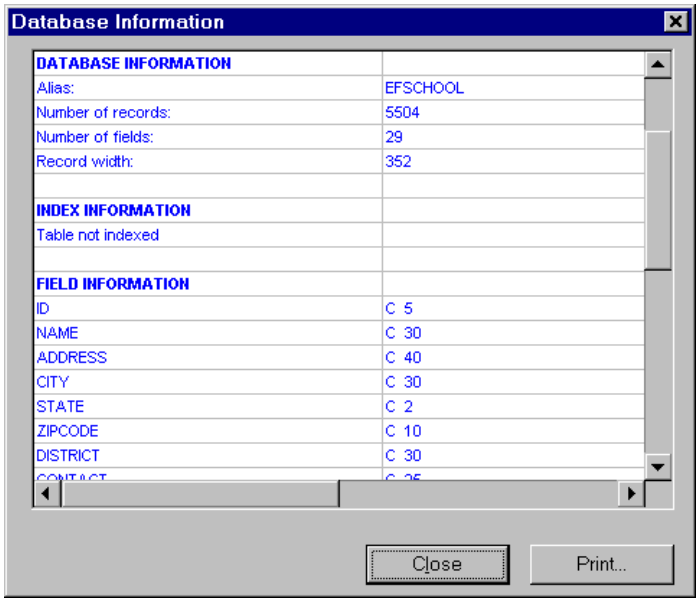

Figure 6.6 Interactive database dictionary.

The fields from the **Source** menu do not have to be in the same order nor do they have to have the same names as the fields in the **Target** menu. For example, in Figure 6.5, the year the school was built is in a field called "YEAR_BUILT" in the **Source** file, whereas the field that contains this information is in the "YEAR_B" field in the **Target** file. To define the desired mapping, simply click on a field name from the **Source** menu (e.g.

LON) and the corresponding field name from the **Target** menu (e.g. LONG) and then click on the **Add** button. After performing these steps, the mapping you have defined will disappear from the **Source** and **Target** menus 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** menu. However, any fields you do not map will not be imported into the **Target** database.

It is possible to have several databases with the same format. To save the mapping that you have defined so that it can be reapplied to other files, click the **Save** button in Figure 6.5 and the dialog box shown in Figure 6.7 will appear. Enter a name for the mapping scheme and click the **OK** button. To retrieve the saved mapping, click on the **Load** button in Figure 6.5.

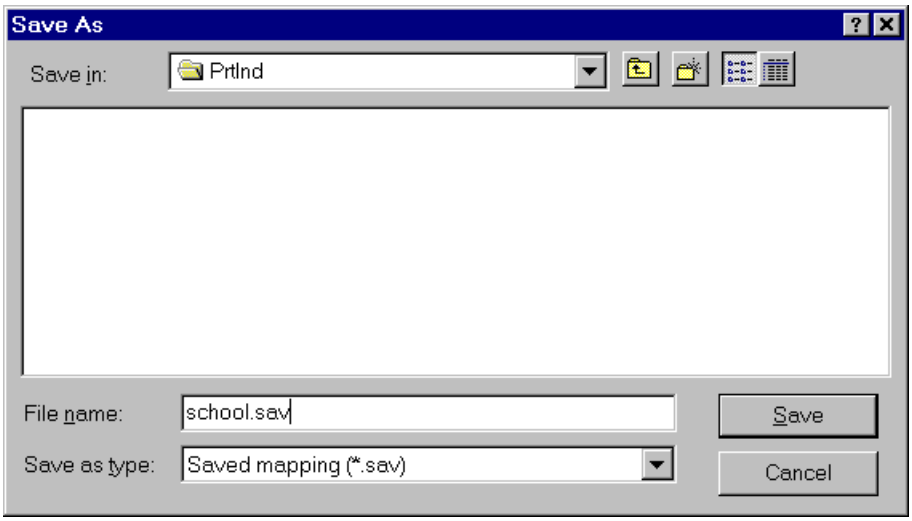

Figure 6.7 Saving a database mapping scheme.

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

Files in a (*.dbf) format can be directly opened into ArcView. To open a (*.dbf) file in ArcView, select **Add Table** from the **Project** menu, shown in Figure 6.8, and an **Add Table** dialog box will appear as shown in Figure 6.9.

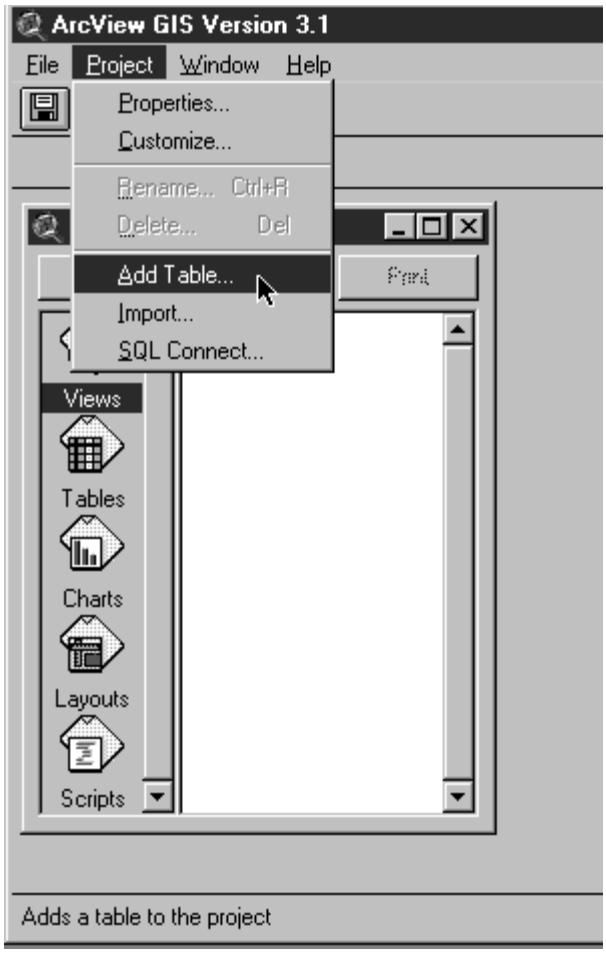

Figure 6.8 Project menu in ArcView.

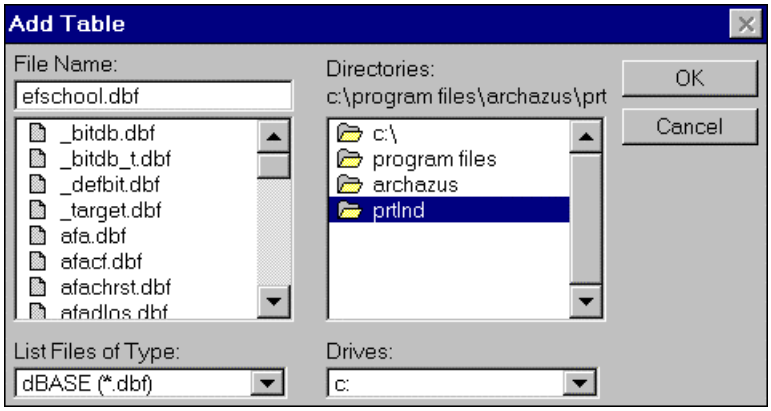

Figure 6.9 Opening a table in ArcView.

Choose **dBASE (*.dbf)** from the **List Files of Type:** box in the lower left corner of the **Add Table** dialog box. Select the drive and directory that contains your file the select the file to be opened. Click the **OK** button.

6.2.3 Opening Excel (*.xls) Files in ArcView

ArcView can read dBASE, INFO (INFO is the database built into ArcInfo software), and tab- or comma-delimited text files. 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 is showing. Anything that is hidden behind another column will be truncated when you save the file in a (*.dbf) format.
2) Highlight all the columns and rows that you would like to include in the (*.dbf) format file.
3) From the **File** menu, select **Save As**.
4) Select the drive and directory that the file should be saved to. From the **Save as type:** menu, select the file type. As illustrated in Figure 6.9, you should select dBASE DBF.

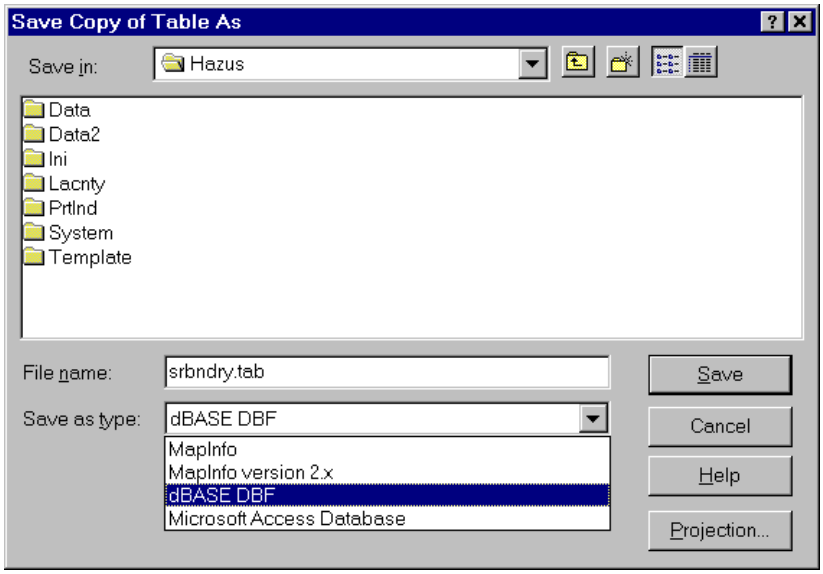

Figure 6.10 Saving an Excel file in a dBASE format.

5) Click on the Save button.

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

Paradox files (*.db) cannot be opened directly in ArcView. To open a (*.db) file, you must open the file in Paradox and convert it from (*.db) to (*.dbf) file type. Now you can open the (*.dbf) file directly in ArcView as explained in Section 6.2.2.

6.2.5 Instructions for Opening ASCII Delimited Files in ArcView

Files in an ASCII Tab or Comma Delimited format can be opened directly in ArcView. To open a Tab- or Comma Delimited file, select Add Table from the Project menu (Figure 6.8). Choose Delimited Text (*.txt) from the List Files of Type: box in the lower

left corner of the Add Table dialog box. Select the drive and directory that contains your files. Select the file to be opened. Click the OK button.

6.2.6 Instructions for Importing ASCII Fixed Length Files into ArcView

ASCII Fixed Length Field Files cannot be directly opened in or imported into ArcView. An external program should be used to convert such a file into an ASCII Tab or Comma delimited or dBASE file format. Use the procedures discussed in the previous sections to open the files.

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 6.11 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).

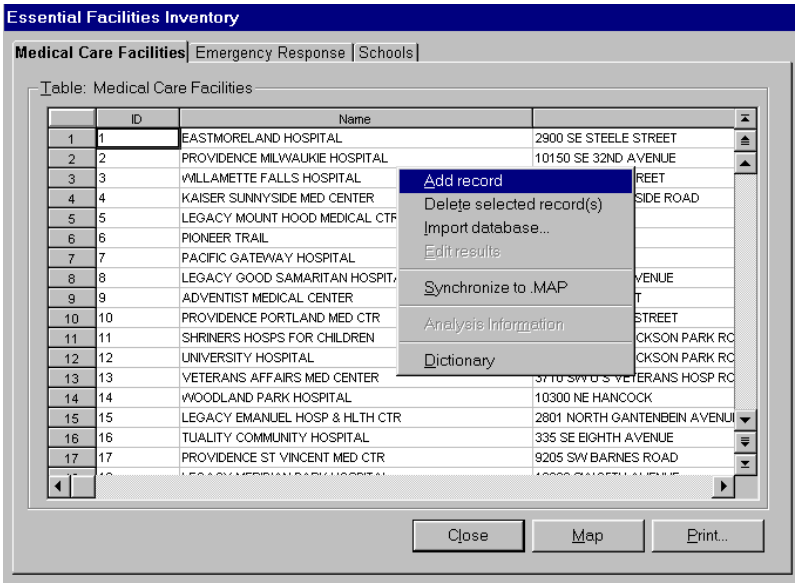

Figure 6.11 The Add Record option

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[5] to get the longitude and latitude of the location and then add it to the database in **HAZUS**.

Once you have defined a location, click on the **Close** button and the database will be saved. 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 dialog box shown in Figure 6.13 allow you to confirm the database changes.

[5] The geocoding process is performed outside HAZUS. Any commercial geocoder application can be used.

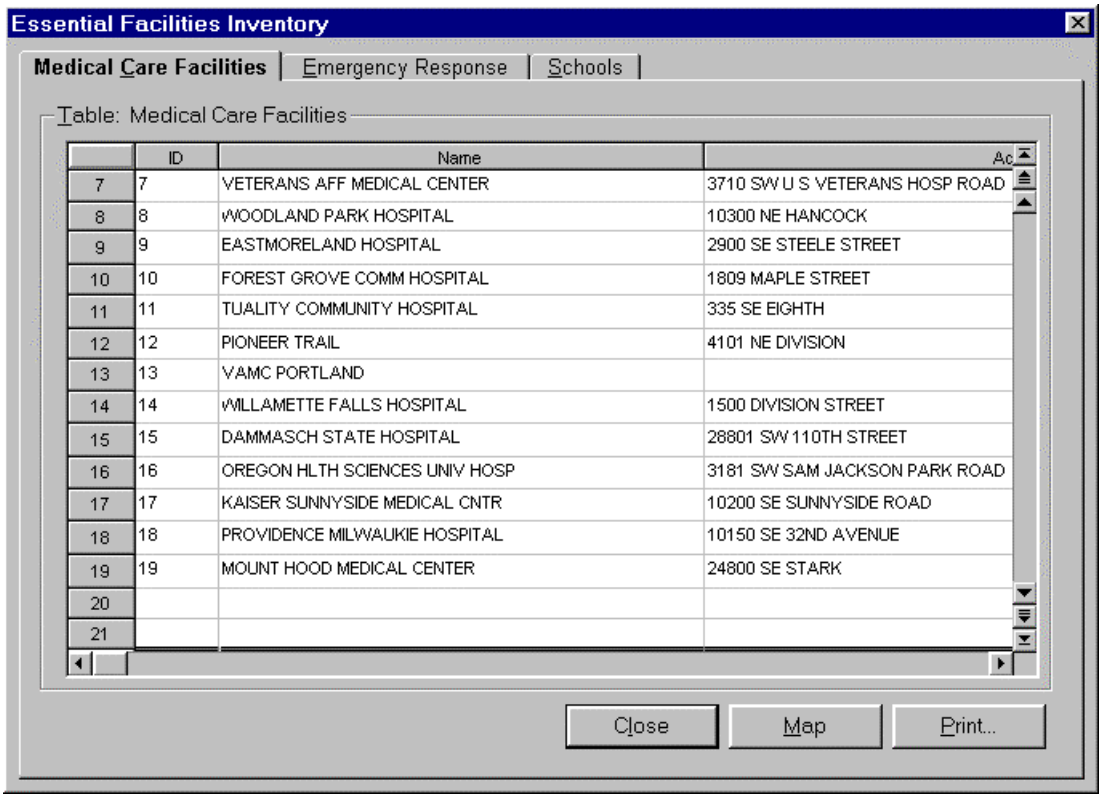

Figure 6.12 Modified medical care facilities database after adding two records.

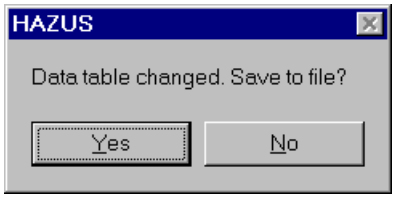

Figure 6.13 Confirmation window when data have been changed.

6.3.1 Errors When Adding Records

HAZUS is very strict about enforcing the rule that *all inventory data points must fall within the study region boundary*. If you define facility locations that are outside the study region, **HAZUS** deletes them and displays the dialog show in Figure 6.14.

Figure 6.14 Error message when adding records with sites located outside the study region.

6.4 Deleting Records from Site Specific Databases

Select the record to be deleted from a database by clicking on the record number on the left side of the record. To highlight the records shown in Figure 6.15, click on the number 5 and 6. When the records have been selected, use the right mouse button to display the database management options and select **Delete selected record(s)…**. The dialog box shown in Figure 6.16 will appear. When you click **Yes**, the records are deleted.

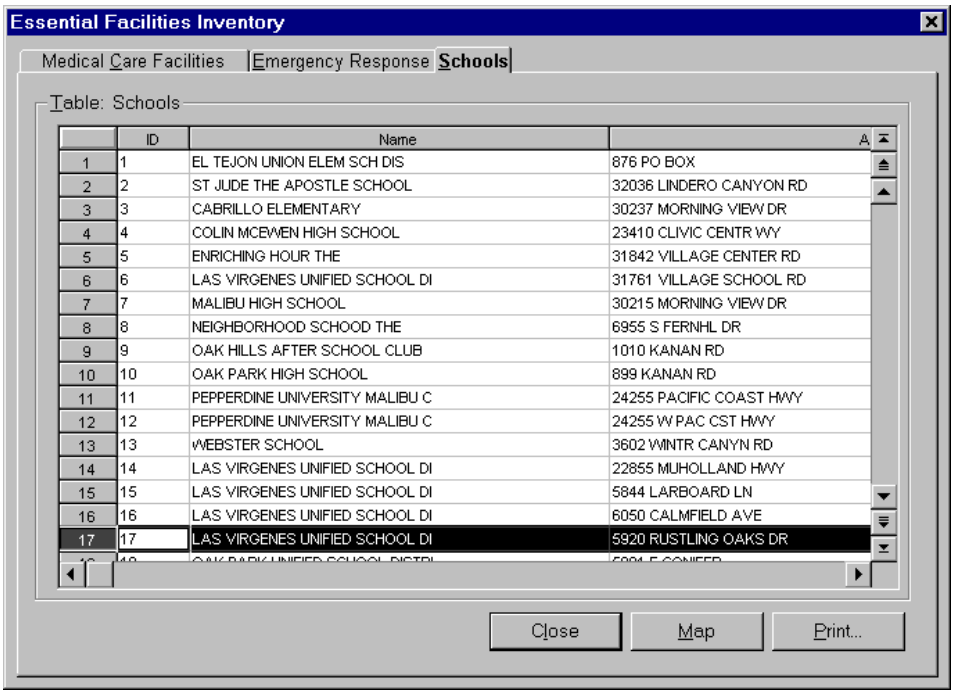

Figure 6.15 Selecting a record to delete from a database.

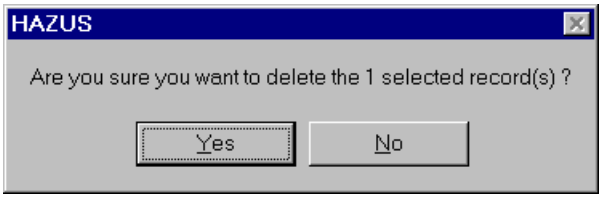

Figure 6.16 Confirmation window for deleting a record.

6.5 Editing Records

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

Alternatively, a facility can be moved by selecting **Edit|Start Editing** from the map window (i.e. the window that appears after you map a database). Once you are in an edit mode, double click on the location to be moved and a box will appear around the symbol as shown in Figure 6.17. With your mouse button held down, drag and drop the facility

symbol from its old location to the desired new location. To delete a location, click on **Edit|Start Editing**, double click on the location to be deleted and click on **Edit|Delete Features** (as shown in Figure 6.17).

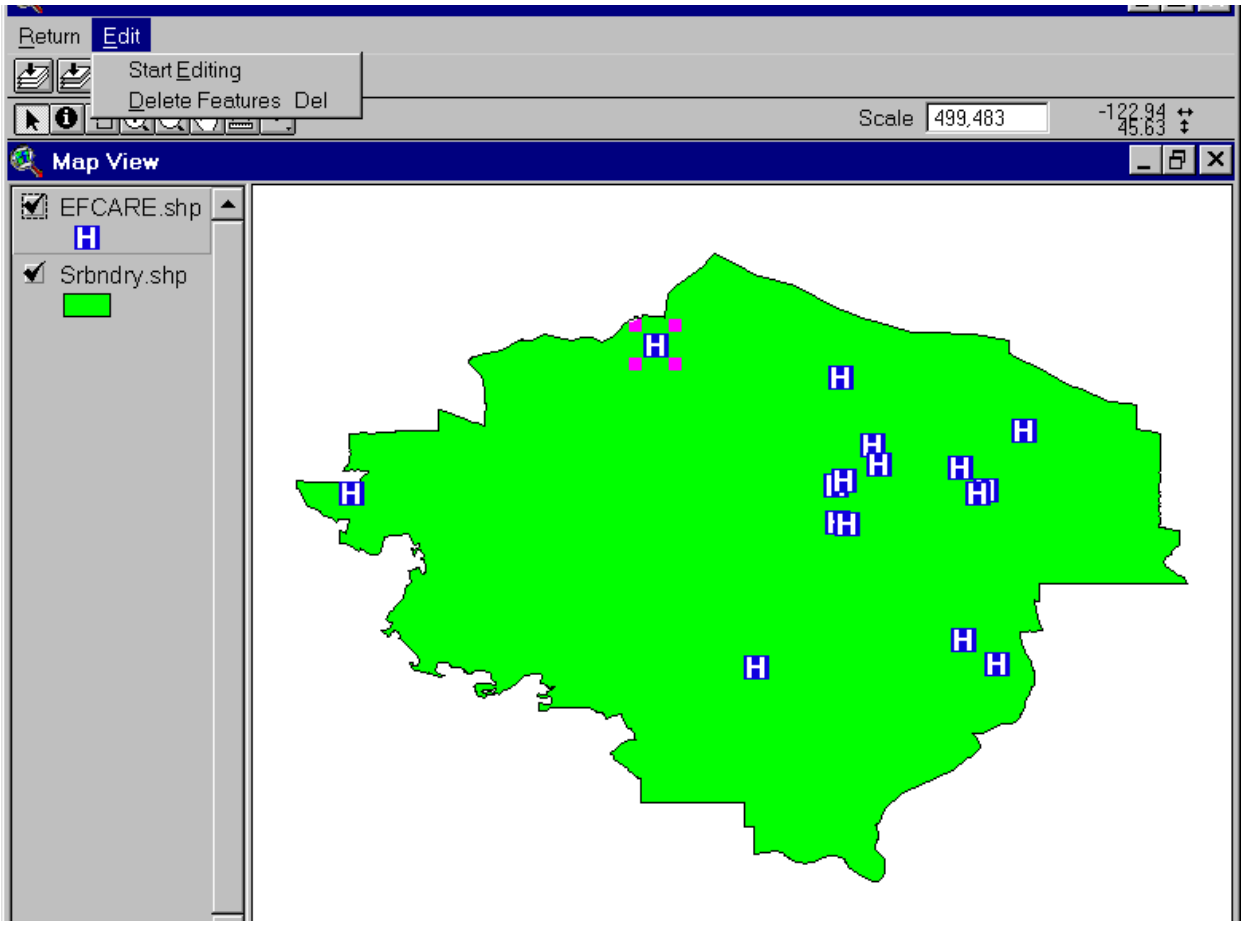

Figure 6.17 Editing Window

You also have the option of moving or deleting more than one record at a time. To do so, click on each location, one at a time, while holding the shift key down. Once all the locations have been selected, release the shift key and follow the above steps for deleting or moving a record. It is also possible to access the **Start Editing** and **Delete Features** menus by positioning your cursor over the map and clicking the right mouse button. When you have finished, click on the **Return|Return to Table** menu. You will be asked to confirm your changes as shown in Figure 6.18.

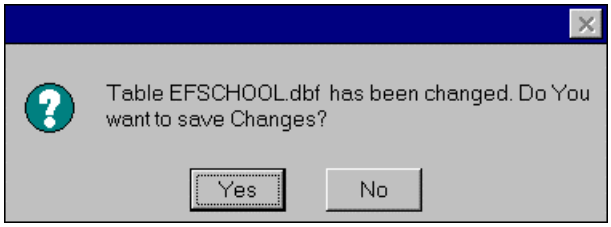

Figure 6.18 Confirmation window for modifying a site-specific database in the map window.

6.5.1 Synchronizing Databases with Mapping Coordinates

There are two databases that contain your data: a (*.dbf) file and a (*.shp) file. The (*.dbf) file contains the database as you see it in the spreadsheet. The (*.shp) 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 mapped database are displaying the same information. Synchronizing, which is done with the **Synchronize to .MAP** option as shown in Figure 6.3, will update the (*.shp) file so that the mapping coordinates agree with the spreadsheet.

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

6.6 Lifelines

6.6.1 Adding Lifeline Segments

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

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 are 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.

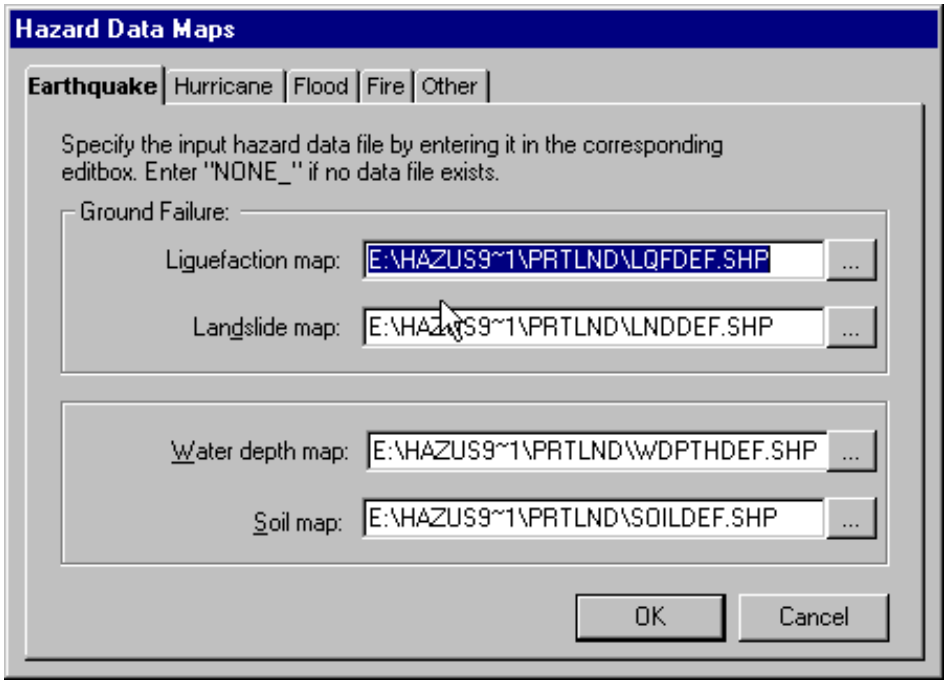

Figure 6.28 Specifying hazard maps in HAZUS.

Soil, liquefaction susceptibility and landslide susceptibility maps are specified in the window shown in Figure 6.28. 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 6.29. It is now possible to move around the directories to find the needed file. Note: Map files in ArcView are identified by the .shp extension.

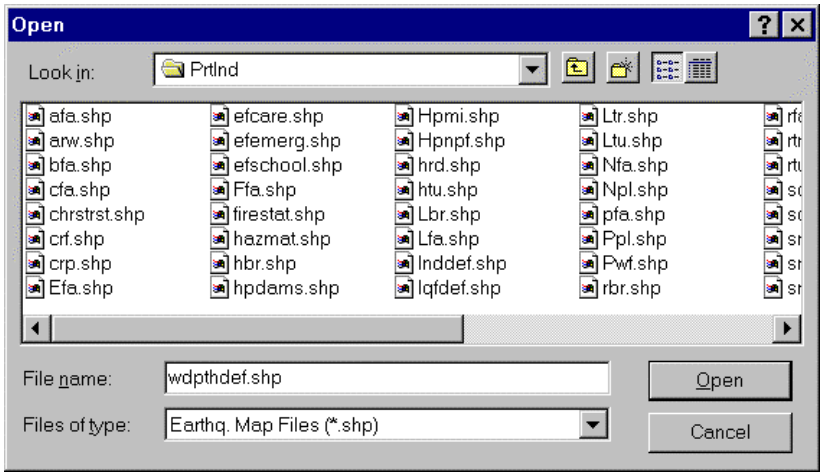

Figure 6.29 File open window listing (*.shp) files.

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.

1. Display the soil map using **Map|Earthquake|Soil Type** and the window shown in Figure 6.30 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 6.31. In this case, the user is displaying the default soil map, so all of the census tracts are soil class D.

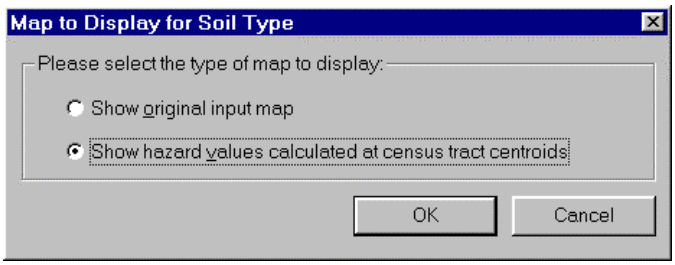

Figure 6.30 Map to Display for Soil Type Dialog.

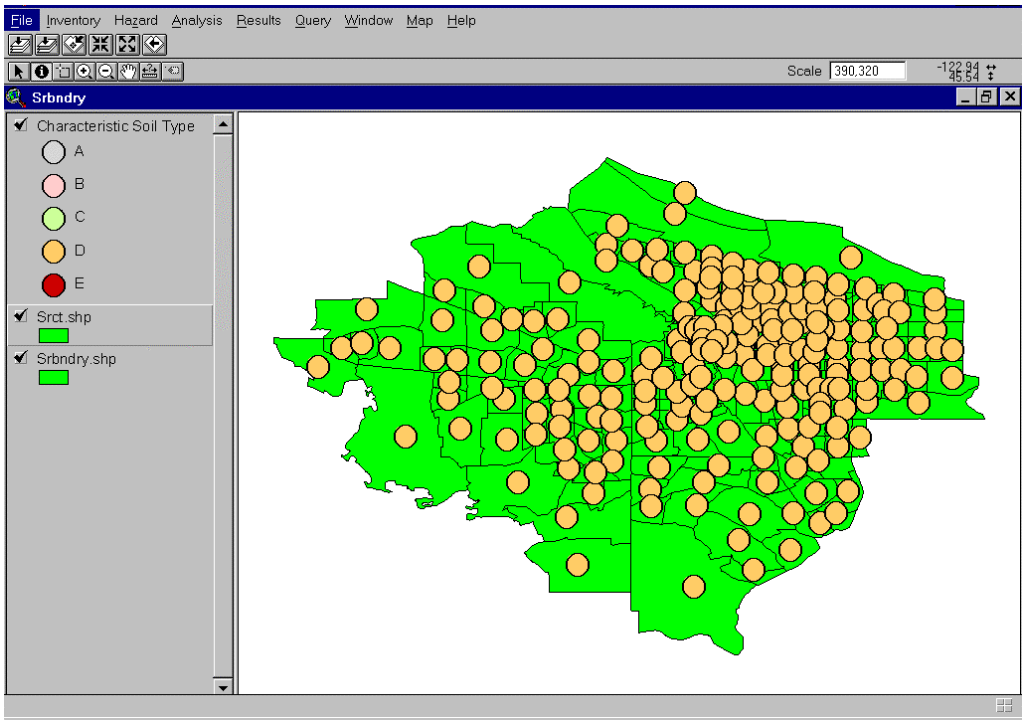

Figure 6.31 Soil map with census tract centroid values.

With the button (i.e., "Info Tool" button), click on the census tract to be changed. A dialog window displaying information related to the currently active layer will appear. In this case they are three layers in the map:

- chrstrst: characteristic soil map
- SRCT: census tract boundaries
- srbndry: study region boundary (which is not accessible)

By making any of the chrstrst layers active and clicking on the button, Figure 6.32 will appear displaying more information related to the particular location you had selected in the active layer:

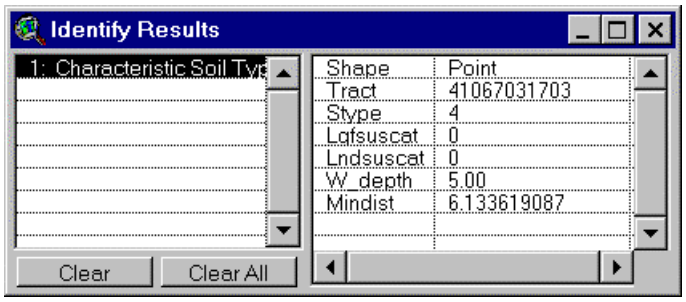

Figure 6.32 Identify Results window showing details information of a selected location.

Note that you can switch between the layers and select different locations in the active layer with the Info Tool button and have a list of location information displayed at one time as shown in Figure 6.33. You can switch between any of the locations on the list and view more information related to the particular location you have selected.

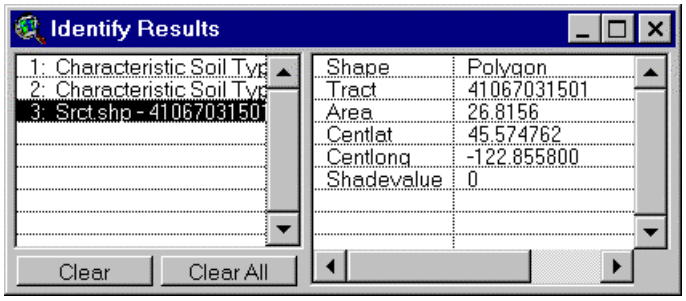

Figure 6.33 The Identify Results window showing a list of locations.