



HLU GIS Tool v1.0

Installation Guide

Version 2.4

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Date	Description
24 March 2010	Draft installation and configuration guide
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1 Introduction

In August 2009 Hampshire Biodiversity Information Centre (HBIC) awarded exeGesIS SDM the contract to develop a new toolkit which would manage their Habitat and Land Use spatial data. The new toolkit would be used by HBIC and Local Record Centres in the South-East of England, and therefore needed to be compatible with both ArcGIS and MapInfo.

The Habitat and Land Use (HLU) data consisted of a set of habitat polygons. Each habitat polygon had approximately 80 attributes. The decision was taken by Local Records Centres to split these habitat polygons into Ordnance Survey (OS) Mastermap derived polygons.

Whilst there are benefits to splitting the habitat polygons by OS Mastermap, such as ensuring polygon boundaries are accurate, the splitting process significantly increases the volume of data. On average, there are 33.5 Mastermap-derived polygons for each habitat polygon in the HLU data.

For example, Table 1 indicates the effect on a 500 polygon dataset if the data was held in a single GIS layer.

	Original	Split by Mastermap
Polygons	500	16,750
Attributes	40,000	1,340,000
Total	40,500	1,356,750

Table 1 - Effect of OS Mastermap Split (Single Dataset)

Due to the complexity of the attribute data required by the Local Records Centres and to minimise data duplication, the habitat attribute and spatial data were split into a relational database with an associated GIS layer. Splitting the attribute and spatial data, reduces the number of attributes required for the spatial layer to 6.

This offers a significant reduction in total attributes as shown in Table 2. Nevertheless, there is still a significant increase in data volume versus the original HLU dataset.

	Original	Attribute database and associated GIS Layer
HLU Records	500	500
HLU Attributes	40,000	40,000
Spatial Polygons		16,750
Spatial Attributes		100,500
Total	40,500	157,750

Table 2 - Effect of OS Mastermap Split (Attribute and Spatial Datasets)

The HLU GIS Tool provides a user interface for maintaining the habitat and spatial data, including changes to attributes and changes to the spatial data. It also provides an audit trail to indicate when it was last edited, why and by whom.

The toolkit provides an interface that links the spatial and attribute data in multiple software environments. It can link ArcGIS and MapInfo with databases held in Access or SQL Server. In principle, the toolkit could link to other database systems such as PostgreSQL and Oracle but these have not been tested and are not supported.

The performance of the tool is limited by the capabilities of third party software, particularly GIS software, which were not designed to handle large datasets split across multiple platforms.

In addition, one of the key requirements for this tool was the ability to use multiple GIS and database environments. Significant improvements in performance could have been achieved if the tool had been designed to work with a single environment e.g. ArcGIS and SQL Server but multiple environment functionality was a key requirement.

The HLU GIS Tool has been optimised as far as possible and there are no further technological enhancements that can be made to significantly improve performance. It is important therefore to ensure performance is optimised wherever possible through user operation. The following section suggests some simple approaches to improving performance.

The code for the HLU GIS Tool is 'open source'.

1.1 Optimising Performance

1.1.1 Creation of ArcGIS Map Document (.mxd) or MapInfo Workspace (.wor)

An ArcGIS Map Document (.mxd) or MapInfo Workspace (.wor) must be created for use with the HLU GIS Tool. This should be optimised to ensure maximum performance, which should include the following:

- Ensure that the .mxd or .wor file only contains one copy of the HLU layer
- Add zoom layering to datasets so that detailed datasets such as the HLU layer and aerial photography are not displayed at smaller scales. Our recommended maximum extents are:
 - ArcGIS – Do not display out beyond:
 - HLU Layer: 1:24,000
 - Aerial Photography: 1:10,000
 - MapInfo – Max Zoom:
 - HLU Layer: 7.5 km
 - Aerial Photography: 3 km
- Ensure that the .mxd or .wor is saved at a sensible view level such as 1:10,000 scale rather the full extent of the HLU dataset

1.1.2 Use of HLU GIS Tool with ArcGIS or MapInfo

It takes a significant length of time for ArcGIS or MapInfo to draw an entire HLU GIS layer, therefore care should be taken when using certain tools to avoid this issue.

- 'Zoom to Selection' is useful for identifying the habitat polygons on the map, however if zoom layering is not used it may take a significant length of time to display the result depending upon the number of polygons selected and their geographical distribution.
- 'Select by Attributes' performs complex queries and selects the results in the GIS window. If a large number of results are returned, it could take a long time to select the spatial polygons in the GIS.
- If the layer is taking a long time to draw, pause or cancel the drawing using:
 - ArcGIS - Click the Pause (||) button in the bottom left corner of the map window
 - MapInfo – Press the Esc key on your keyboard
- For ArcGIS users, if an ArcMap error occurs when the tool is used, check that the HLU ArcMap Extension is enabled in Tools > Extensions – see section 2.
- For ArcGIS users, we strongly recommend that the HLU layer is stored as a file geodatabase or personal geodatabase. **The tool will be significantly slower if the HLU layer is stored as a shapefile due to the limitations of the file format. e.g. exporting 152 features takes 18 minutes from a shapefile but takes under 3 minutes from a file geodatabase.**
- For MapInfo users, ensure the Cosmetic layer is editable when digitising a polygon for a split operation. The polygon will be added to the layer much faster than if the HLU layer was used and also removes the possibility that the polygon is not deleted after the split.

1.1.3 Selection of Database Type

The HLU GIS Tool is supplied with both Microsoft Access 2000 and SQL Server 2008 databases.

Microsoft Access is a versatile desktop database application, but does not have the same performance as other database systems. Database management systems such as SQL Server are optimised to handle large data volumes and complex queries, and can be significantly faster.

We therefore recommend using the HLU GIS Tool with SQL Server or a similar database management system, as this will improve performance when filtering the database records and updating attribute data.

1.1.4 Local vs. Network Storage

It is important to remember that application performance will depend upon the data transfer speed. Data stored locally on a single computer will provide good performance, but will limit access to the data to a single user. Data stored on a network drive is accessible to all users, but performance will be limited by the speed that the data can be transferred across the network.

1.1.5 Data Management

Only one copy of the database and the GIS layer should be used to avoid data becoming corrupted. If multiple copies are used e.g. an ArcGIS layer and a MapInfo layer or an Access database and a SQL Server database, changes to one GIS layer or database will not be present on the other, causing a mismatch between the attribute and spatial data.

Habitat data must not be edited directly in either the database or the GIS layer. Any modifications made outside the HLU GIS Tool could cause data corruption particularly if unique identifiers are altered.

However, if additional entries are required in the lookup tables, these may be added to the database directly. It is essential that the structure of these tables is not altered and we recommend that any updates to the data in these tables are carried out solely by the database administrator.

1.2 Disclaimer - Updates to User Guide

Version 2.3 of the user guide is the official exeGesIS SDM guide to the HLU GIS Tool v1.0.

exeGesIS SDM takes no responsibility for errors or omissions in future versions of the HLU GIS Tool User Guide that have not been produced by exeGesIS SDM.

2 Installation

2.1 System Requirements

2.1.1 Hardware

Minimum specification:

3 GHz Pentium PC with 2 Gb RAM and 3 Gb available hard disk space.

Recommended specification:

Intel 3 GHz Dual Core PC with 3 Gb RAM and 10 Gb available hard disk space. For increased performance a multiple core PC with as much RAM as possible is recommended.

Note: Hard disk space requirements are given as a guideline. The actual amount of disk space required will depend upon the size of the GIS and database files. In addition to these files, space is required for temporary files during processing.

2.1.2 Software

Minimum software specification:

- .NET framework 3.5 Service Pack 1
- Microsoft Access 2000
- ArcGIS 9.3 or MapInfo 8.0

Recommended software specification:

- .NET framework 3.5 Service Pack 1
- Microsoft Access 2000 or later
- Microsoft SQL Server 2008 Express Edition
- ArcGIS 9.3.1 or MapInfo 10.0.1

2.2 Installing the HLU GIS Tool

Double click on the Setup.exe and follow the instructions. By default this will install the HLU GIS Tool into C:\Program Files\ESDM\HLU GIS Tool\ directory. The installer will also create shortcuts in the start menu and on the desktop.

Important: For ArcGIS users, the tool must be enabled in ArcGIS prior to use. Open ArcMap and go to the 'Tools' menu and select 'Extensions...'.

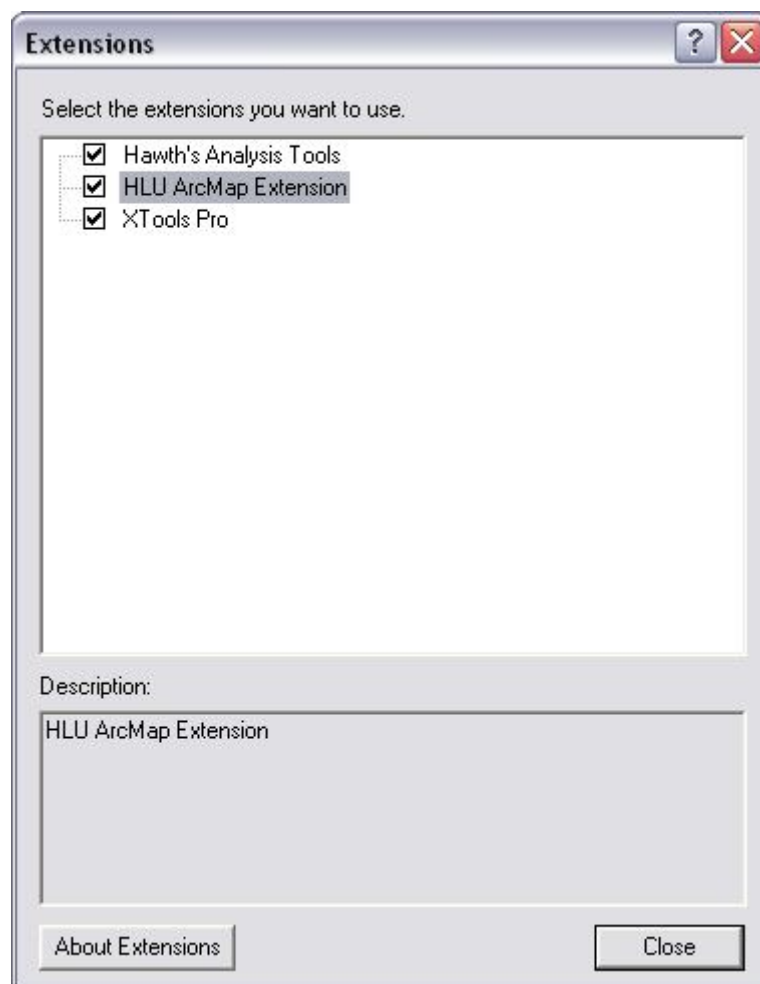


Figure 1 - ArcMap Extensions dialog

Tick the box next to HLU ArcGIS Extension as shown in Figure 1 then click 'Close' and exit ArcMap.

3 Configuration

Double click on the link in the start menu or the desktop icon (HLU GIS tool) to launch the application.

3.1 Database Configuration

The first time the GIS tool is used, you will need to configure the database connection. Once the tool is running a Connection Type dialog will be displayed as shown in Figure 2.

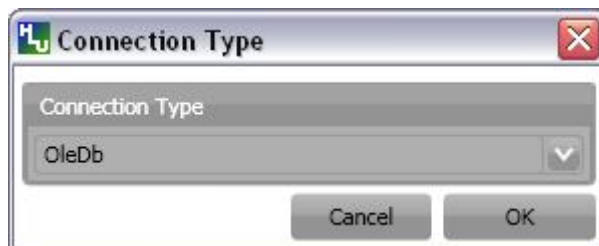


Figure 2 - Connection Type dialog

Select the appropriate connection type from the drop-down list and click OK. For each dialog, fields highlighted in red must be completed.

3.1.1 Connecting to Microsoft Access

For Microsoft Access, select OleDb from the drop-down list, then click OK. A dialog will be displayed as shown in Figure 3.

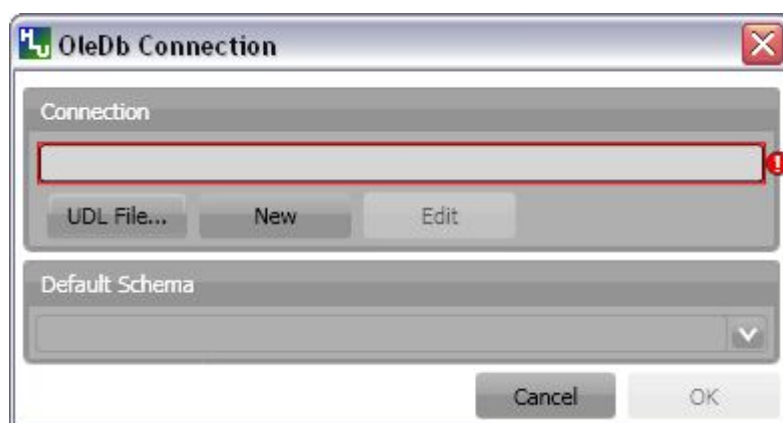


Figure 3 - OleDb Connection dialog

If you have an existing Microsoft Data Link (UDL) file, click 'UDL File...' and browse to the appropriate directory.

Otherwise, click 'New' to define a new connection. The Provider tab of the Data link properties dialog will be displayed as shown in Figure 4.

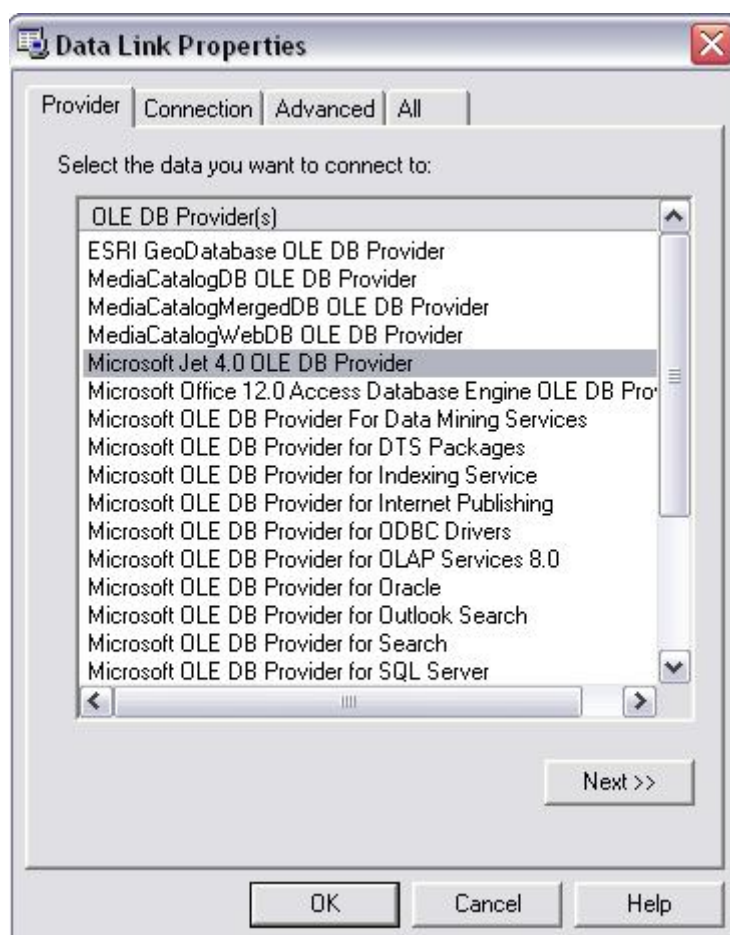


Figure 4 - Provider - Data Link Properties dialog

Access 2000-2003: select 'Microsoft Jet 4.0 OLE DB Provider'
Access 2007: select 'Microsoft Office 12.0 Access Database Engine OLE DB Provider'

Click 'Next >>' to display the Connection tab of the Data Link Properties dialog as shown in Figure 5.

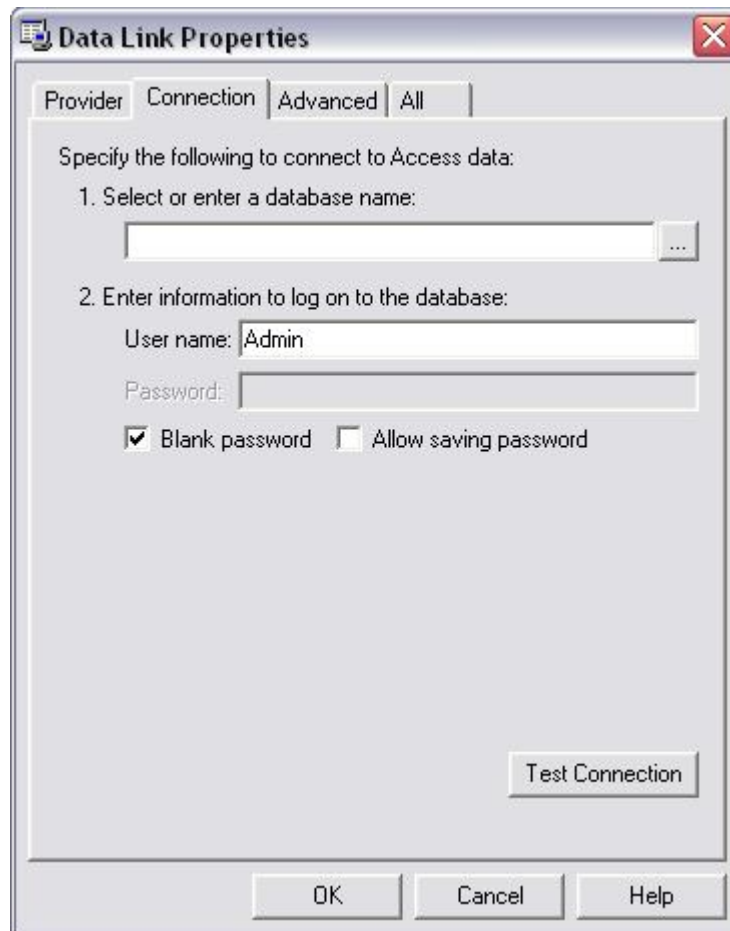



Figure 5 - Connection - Data Link Properties dialog

Click  to browse to an existing database. If user names and passwords are defined for the database, untick 'Blank password' and enter your user name and password.

Click OK, then click OK on the OleDb Connection dialog.

3.1.2 Connecting to SQL Server

For Microsoft SQL Server, first attach the database using SQL Server Management Studio and configure user permissions. Launch the HLU GIS Tool and select SQLServer from the drop-down list, then click OK.

Select the instance of SQL Server from the drop-down list as shown in Figure 6.

If the computer or server is listed but no services are listed e.g. P3000CA\, you can either:

- Select the computer or server, then press 'End' or use the arrow keys to move the cursor to the end, then type the name of the database service.
- Exit the HLU GIS Tool, then open the SQL Server Configuration Manager. Right-click on SQL Server Browser and set the start mode as Automatic or Manual. Start the service, then re-launch the HLU GIS Tool and select the database service from the list.



Figure 6 – SQL Server Connection dialog

Select whether you wish to use Windows or SQL Server authentication. This will depend upon how your SQL Server database has been configured.

If you are using SQL Server authentication, enter the user name and password you use to connect to SQL Server.

Select the HLU database from the 'Database' drop-down list.

'Default schema' defaults to 'dbo'. If you wish to use a different schema, select it from the drop-down list, then click OK.

3.1.3 Reconfiguring the Database Connection

To re-configure the database connection, the HLU GIS Tool configuration must be cleared.

To reset the configuration, go to Start Menu > Run... If you have installed the HLU GIS Tool in the default location, at the prompt type:

```
"C:\Program Files\ESDM\HLU GIS Tool\" /c
```

If you have installed the tool in another location, enter the appropriate folder path in double quotes followed by /c.

3.2 GIS Connection

3.2.1 Connecting to ArcGIS/MapInfo

The tool checks your system to determine which GIS software is installed. If both ArcGIS and MapInfo are installed on your computer, you will be asked to select which one to use.

A dialog will then be displayed which allows you to open an existing ArcGIS map document or MapInfo workspace which contains the HLU layer as shown in Figure 7.

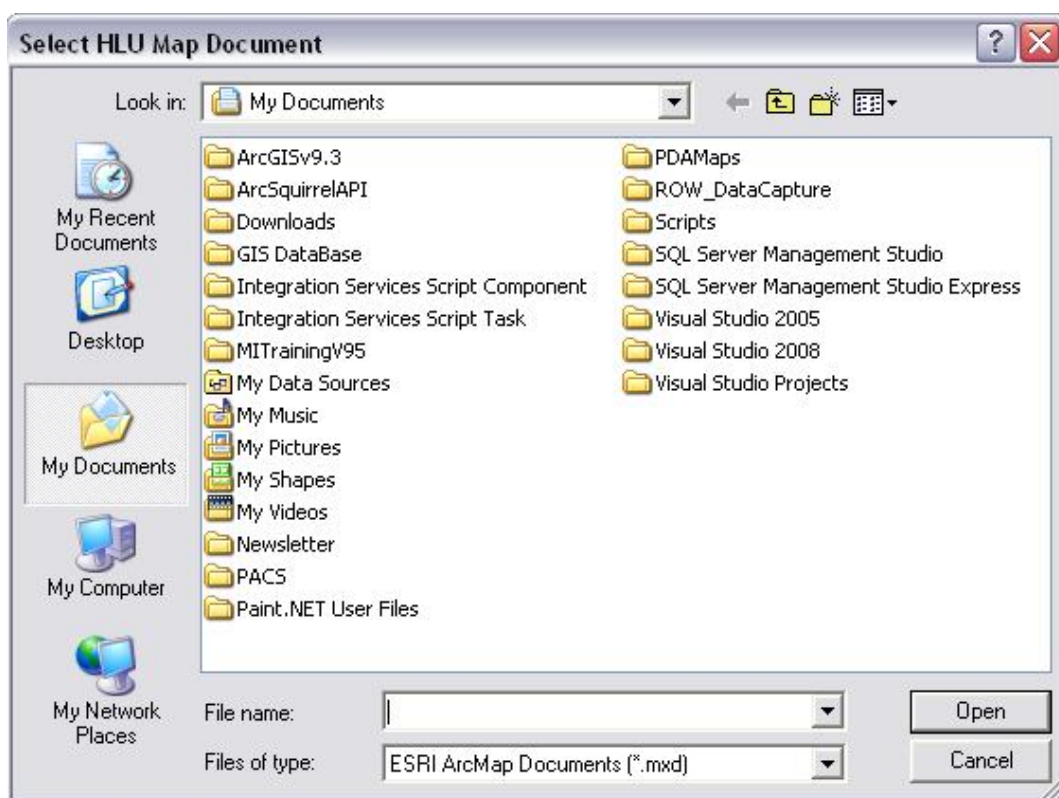


Figure 7 - Map Document selection dialog (ArcGIS)

Note: For ArcGIS users this dialog may not be visible, hold Alt and press Tab on your keyboard to switch windows.

If you have an existing map document or workspace which contains the HLU layer, browse to the file and click 'Open'. The HLU GIS Tool will then be ready for use.

If you do not have an existing map document or workspace, click Cancel. A dialog will then be displayed as shown in Figure 8 which allows you to select the HLU layer.

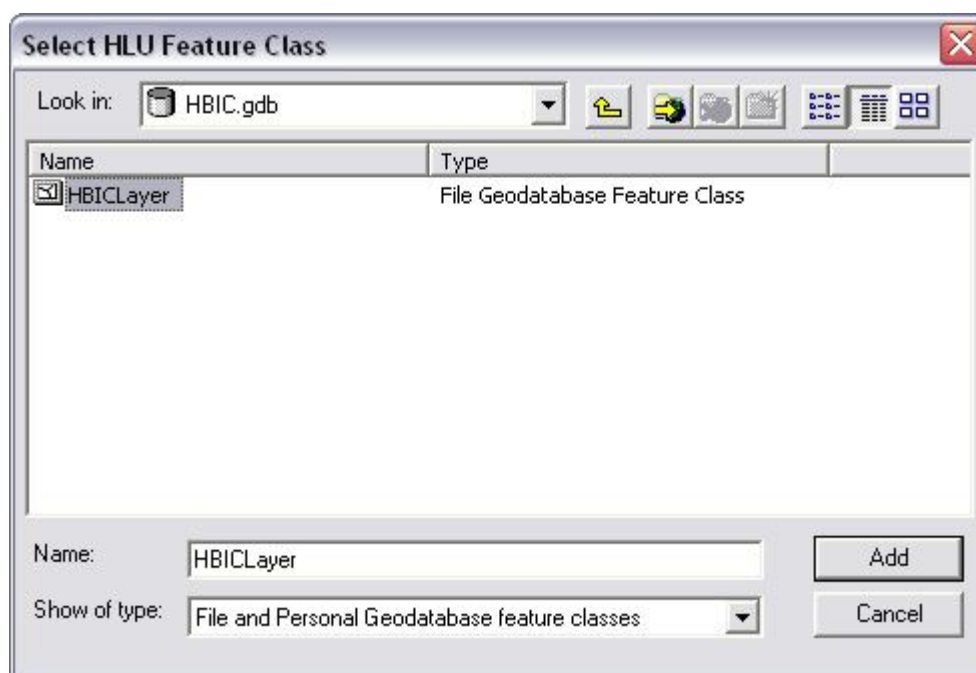


Figure 8 - HLU layer selection dialog

Browse to the HLU layer file and click 'Open'. You will then be prompted to select a location to save as a new map document or workspace as shown in Figure 9.

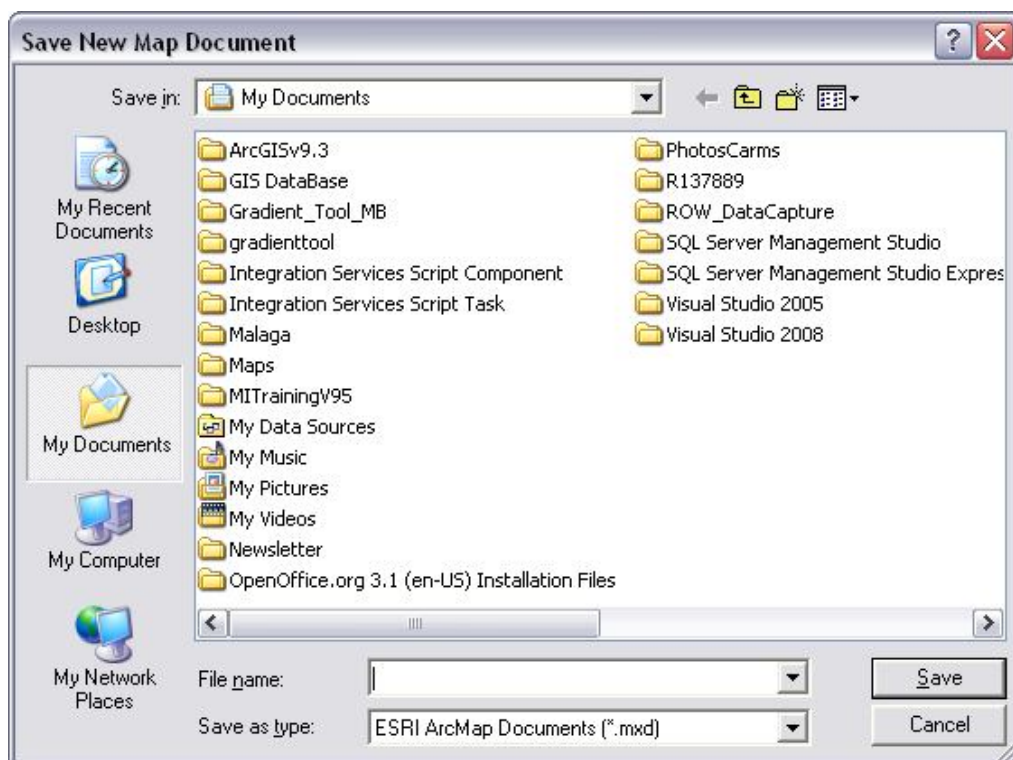


Figure 9 - Save New Map Document dialog

Browse to the location, enter a name for the map document or workspace and click 'OK'. The HLU GIS Tool will then be ready for use.

The GIS connection details can be reconfigured through the Tools menu – see section 3.1.3.