

CHAPTER ONE

IRA-WDS: Overview

Manual of Risk Assessment for Contaminant Intrusion into Water Distribution Systems

Chapter-1 IRA-WDS: Overview

Chapter-2 Data Preparation

Chapter-3 Contaminant Ingress Model

Chapter-4 Pipe Condition Assessment Model

Chapter-5 Risk Assessment Model

Chapter 1: IRA-WDS Overview

1.1 System setup

The recommended screen settings for IRA-WDS are 1024 x 768. Lower settings may result in some parts of the input dialogue boxes being partially displayed.

1.1.1 Hardware and software requirements

Hardware and software requirements for IRA-WDS are similar to those of standard PC-based ArcView 3.1 or 3.2. Memory and compatibility requirements for the installation of IRA-WDS are presented in Table 1.1, below.

For three-dimensional visualization of the results from IRA-WDS, ArcView 3D Analyst and Spatial Analyst software need to be installed with ArcView, these having to be obtained separately.

Table 1.1. Hardware and software requirements		
Hardware/Software	Minimum requirements	Preferred requirements
Processor	Pentium III 1GHz	Pentium IV 2.2GHz or above
Hard disk space	100MB	1GB
Random Access Memory (RAM)	128Mb of RAM plus 256Mb of permanent virtual memory swap space	512Mb of RAM plus 512Mb of permanent virtual memory swap space
Colour monitor	Configured for 16-bit high colours, resolution 1024 x 768	Configured for 32-bit true colours, resolution 1024 x 768
Operating system	Windows 98, 2000, NT	Windows 2000 or Windows XP professional
ArcView	ArcView Version 3.2, 3D Analyst	ArcView 3.2, 3D and Spatial Analyst

Microsoft Excel 2000/XP is recommended for use. Internet Explorer 6.0 or a more recent version is required to view help files.

1.1.2 Arc View 3.1/3.2

ArcView is not software in the public domain. It is a desktop Geographic Information System developed by ESRI. With ArcView, one can create intelligent, dynamic maps using data from virtually any source and across most popular computing platforms. ArcView provides the tools to allow the user to work with maps, database tables, charts and graphics all at once. One can also use multimedia links to add pictures, sound and video to the maps generated. ArcView makes it easy to integrate data from overall organization and work with the data geographically. Using ArcView software's powerful visualization tools, one can access records from existing databases and display them on maps. Using Avenue, which is ArcView software's built-in object-oriented scripting language, one can develop custom tools, interfaces and complete applications.

ArcView can be purchased from the ESRI store direct and costs approximately \$1,195.00 for the Windows platform and \$2,195.00 for the UNIX platform. More information can be obtained from <http://www.esri.com/software/arcview/how-to-buy.html> or by contacting a local ESRI distributor.

ArcView comes with several extensions for carrying out different tasks. Extensions are plug-ins that one can load and unload according to need. 3D Analyst and Spatial Analyst are the most useful extensions in environmental modelling studies. However, these are supplied as optional extensions and one has to procure or purchase them separately. IRA-WDS has been developed using ArcView's built-in macro language, Avenue.

The extensions, 3D Analyst and Spatial Analyst are not necessary for running IRA-WDS software. However, in order to view results in a three-dimensional or perspective view, one must have ArcView's 3D Analyst extension installed. At the same time, if one is to perform spatial analysis of results by buffering, overlaying and so on, one must have ArcView's Spatial Analyst extension installed on the computer.

1.2 Installing the interface

The set-up installs the ArcView interface for IRA-WDS, which has been formatted to create a two separate directory structure on the local hard disk.

First it creates an 'AVIRAWDS' folder on the 'C:\' drive. In this folder, subdirectories named 'Legends' and 'Help' are created. The ArcView Legend files for various themes are copied to the 'C:\AVIRAWDS\Legends' subdirectory. The IRA-WDS html Help files are copied to the 'C:\AVIRAWDS\Help' subdirectory.

The second folder is created in a user-specified path. In this folder, four subdirectories named 'Help', 'Logo', 'Project' and 'Sample Data' are created. The Excel files stating the data requirements for Ingress and Pipe Condition Assessment themes are copied to the 'Help' subdirectory. The Logo files are copied to 'Logo' subdirectory. The IRA-WDS default start-up ArcView Project File 'irawds.apr' is copied to the 'Project'

subdirectory. The sample data for analysis of the model is copied to the 'Sample Data' subdirectory.

The IRA-WDS ArcView extension file 'ira-wds.avx' is copied to ArcView's EXT32 folder, which is normally placed in the 'C:\ESRI\AV_GIS30\ARCVIEW\EXT32' path. The dynamic link libraries of the Contamination Ingress Model 'ingress.dll', Pipe Condition Assessment Model 'pca.dll', Risk Assessment Model 'risk.dll' and Analytical Hierarchy Process sub model 'ahp.dll' are copied to ArcView's 'BIN32' folder, which is normally placed in the 'C:\ESRI\AV_GIS30\ARCVIEW\BIN32' path.

To install the interface:

- 1 Double click on the IRA-WDS Setup.exe



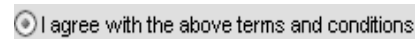
- 2 'Welcome' screen will appear. Click



- 3 'Information' screen will appear. Click



- 4 'License Agreement' screen will appear. Click



and then click



- 5 Choose the installation directory. And then click



- 6 'Confirmation' screen will appear. Click



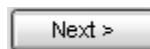
The setup will copy 'ira-wds.avx' file to the ArcView extension directory.

The setup will copy 'ahp.dll', 'ingress.dll', 'pca.dll' and 'risk.dll' to '\$AVBIN'.

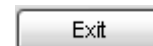
The setup will copy the Sample Data files, Project file and Uninstallation file to the directory chosen by the user.

If the Installation directory is other than 'C:\AVIRAWDS', then set-up will create a folder 'AVIRAWDS' on the C: drive and will copy Legend and Help files into the Legend and Help directories.

- 7 'End' screen will appear. Click



'Clickteam Installation Creator Pro' screen will appear. Click



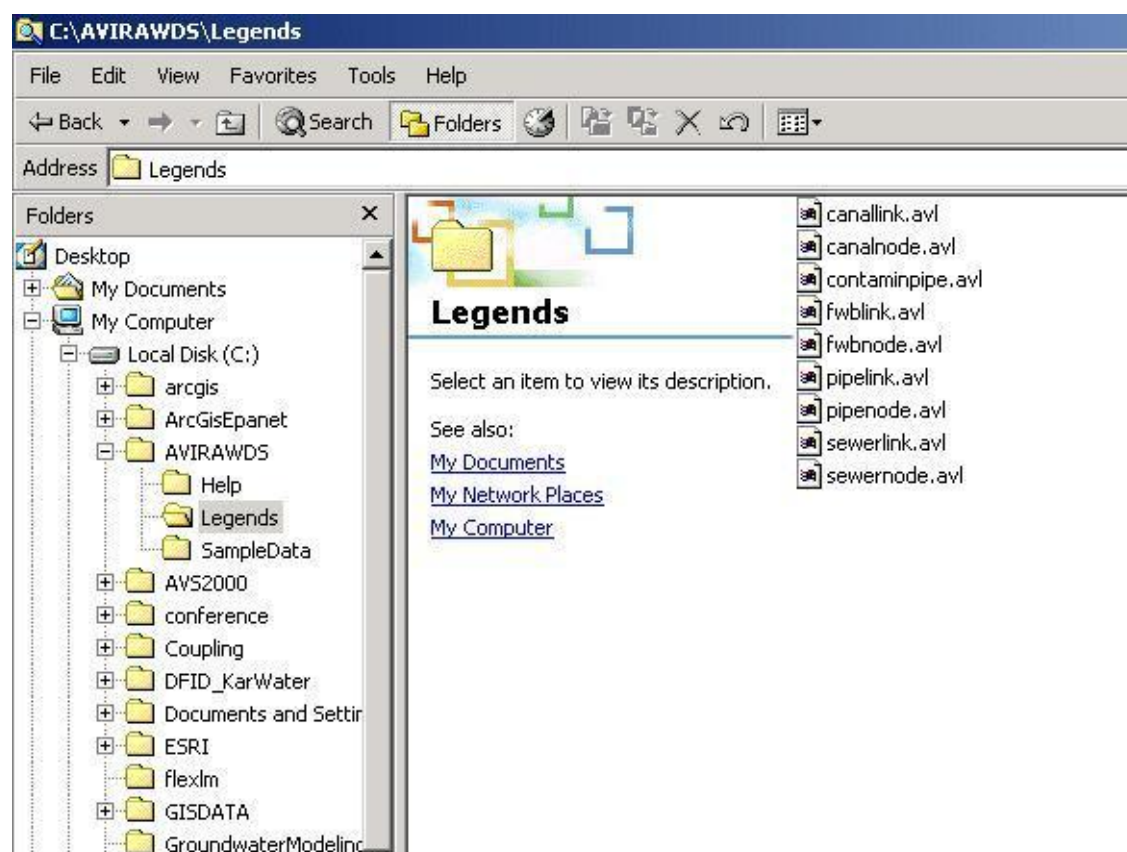
Installation is complete. Shortcut



will appear on desktop and





IRA-WDS is ready for use.

The directory structure created by installation of the IRA-WDS interface is displayed below:



1.3 Uninstalling the interface

The IRA-WDS interface can be uninstalled in number of ways. It is recommended to uninstall the software by running the 'uninstal.exe' from the installation directory. The uninstalling steps are given below.

- 1 Click  on desktop.
- 2 Go to  Programs
- 3 Go to  IRA - WDS
- 4 Click on the  Uninstall IRA - WDS

Uninstallation removes IRA-WDS from the programs menu, deletes 'ahp.dll', 'ingress.dll', 'pca.dll', 'risk.dll' and 'IRA-WDS.avx' from ArcView installation paths and removes all legend files, help files, sample data files and 'IRA-WDS.apr' from the respective installation directories.

1.4 Using IRA-WDS

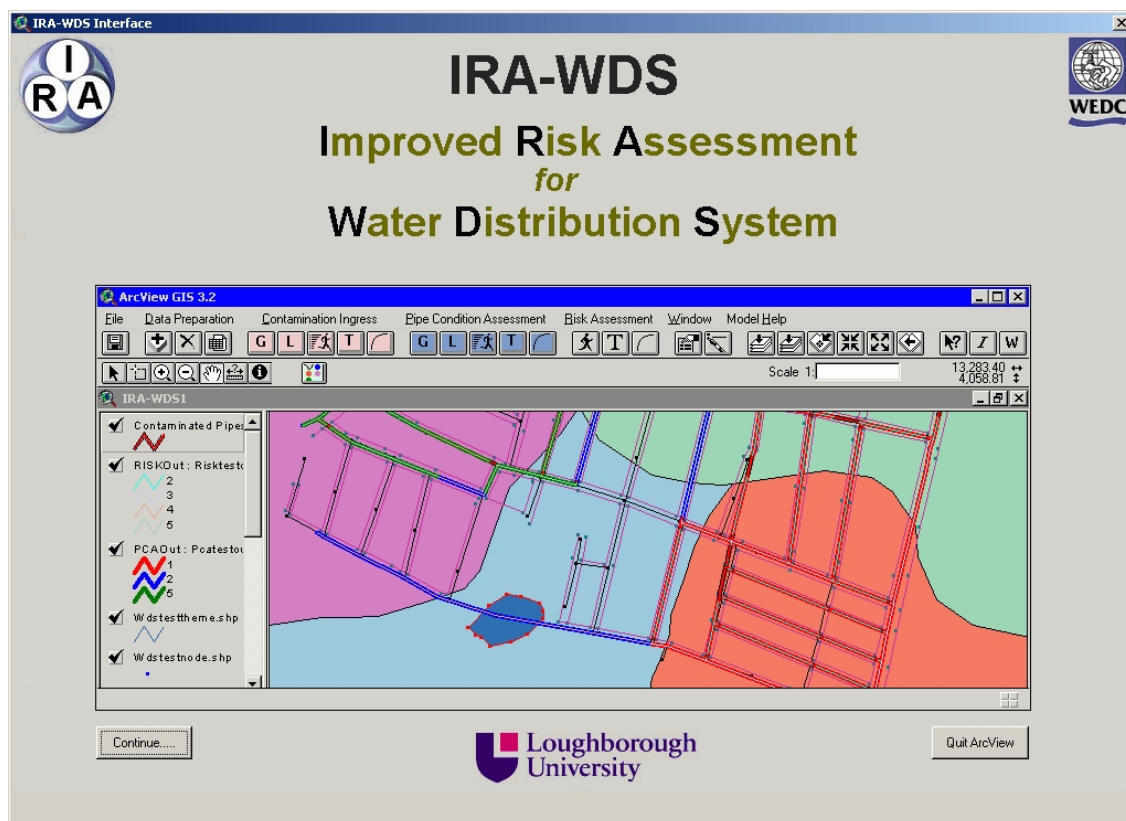
IRA-WDS can be run either by double clicking



or from taskbar as



Then following IRA-WDS 'Welcome' screen will appear:



Clicking

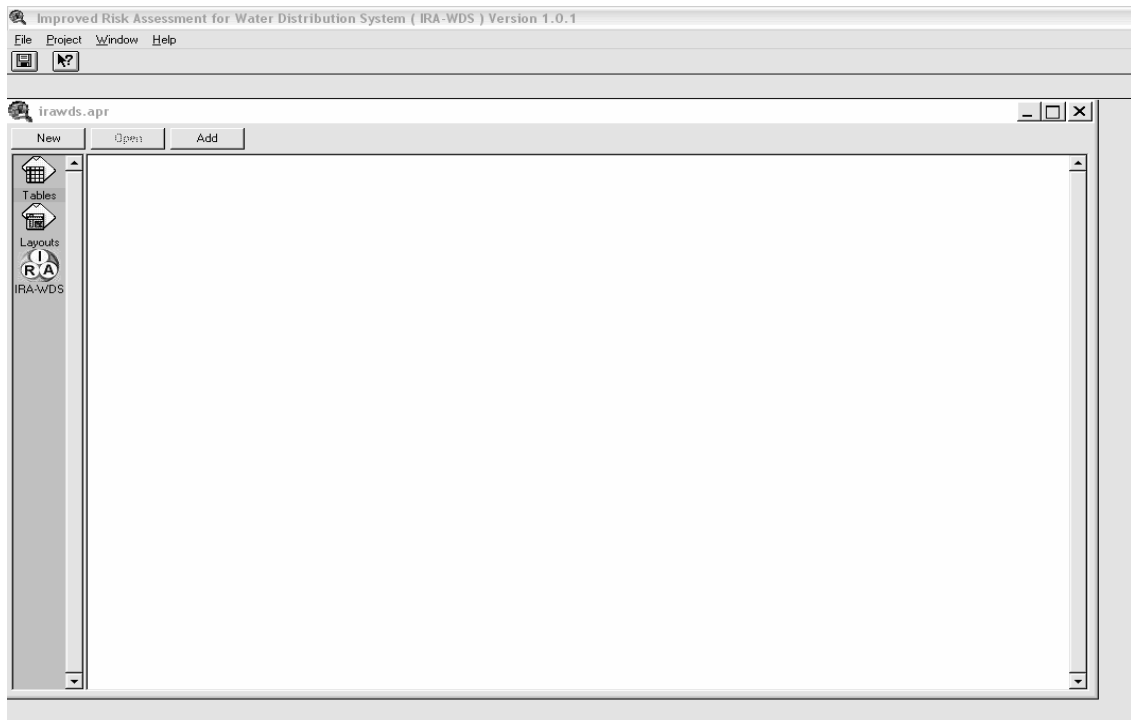
Quit ArcView

will exit IRA-WDS

and clicking

Continue.....

will take you to following screen:

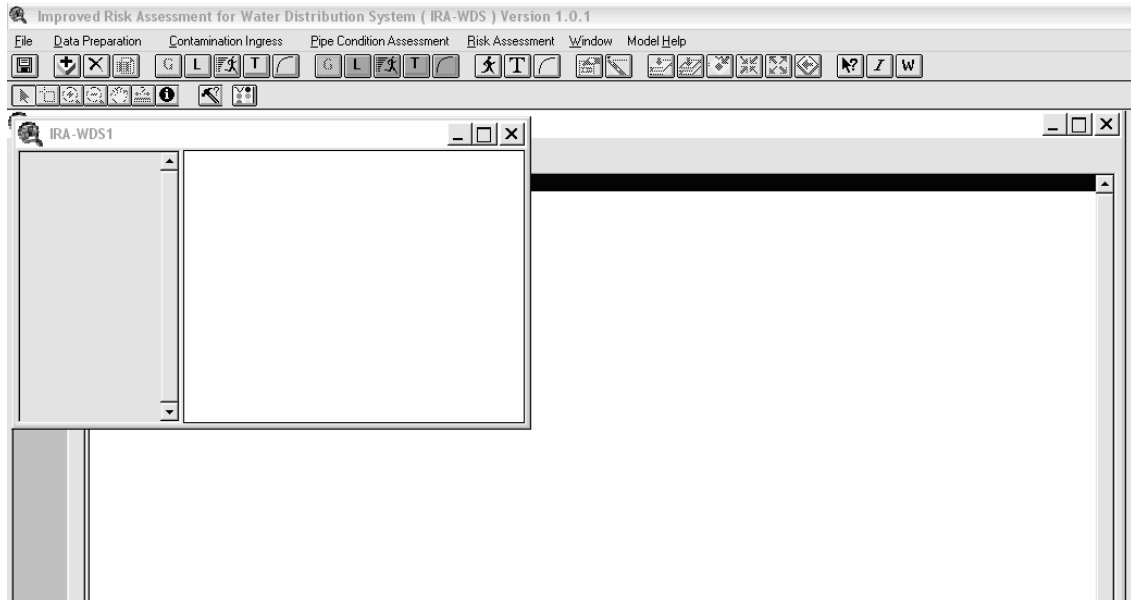


After double clicking on



from the menu on the left, the following

main IRA-WDS screen will appear:

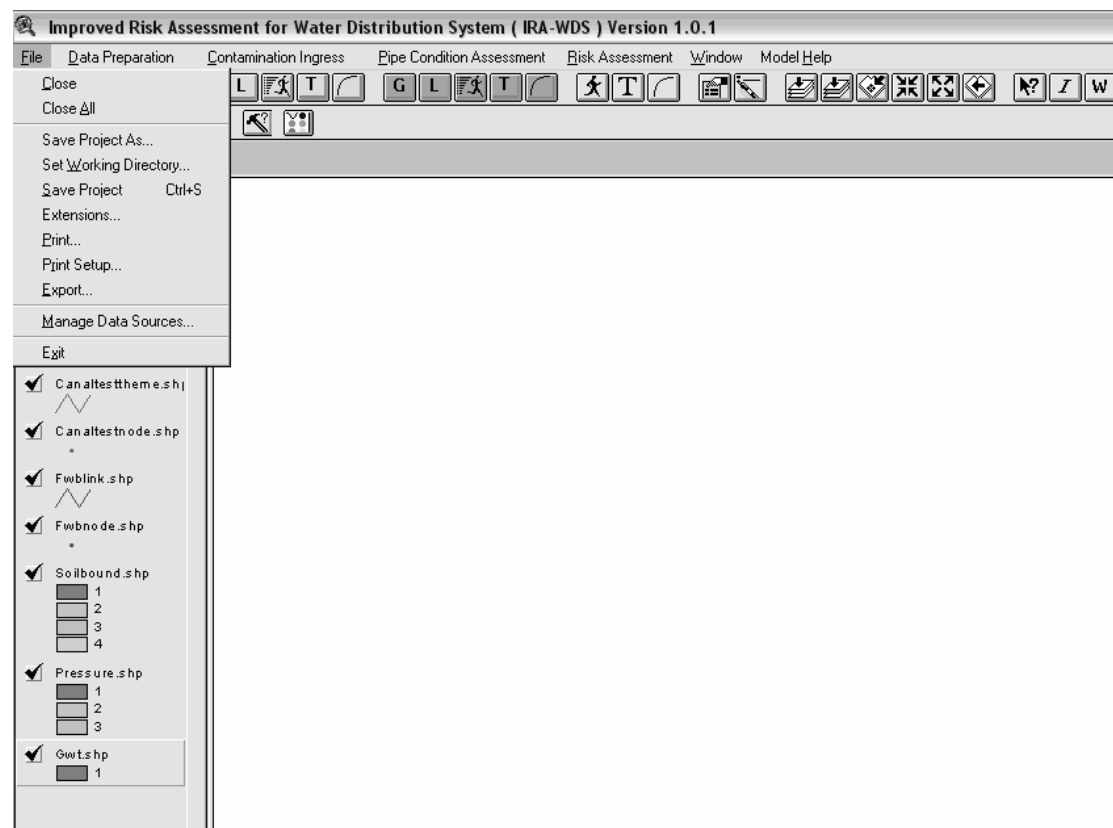


IRA-WDS has following seven main menus. One or more of these menus needs to be used in order to obtain results from IRA-WDS.

- 1 **F**ile
- 2 **D**ata Preparation
- 3 **C**ontamination Ingress
- 4 **P**ipe Condition Assessment
- 5 **R**isk Assessment
- 6 **W**indow
- 7 **M**odel **H**elp

1.4.1 File menu

After clicking on 'File', the user gains access to following options:



1. Close and Close All:

Helps in closing a single opened document or Graphical User Interface (GUI) or all opened documents or GUIs.

2. Save Project and Save Project As:

Helps in saving the current project or saving it with a different name.

3. Set Working Directory:

Helps in setting the current project work directory so that the user will be prompted to 'Choose/Save/Load' his or her work to or from the directory set at every instance of the file 'Open/Save' dialogue box.

4. Extensions:

Helps the user to load other extensions to the IRA-WDS interface, if required.

5. Print:

Helps the user to set the printer and printing properties, and to print the maps he or she has generated.

6. Export:

Helps the user to export the maps he or she has generated in various other image formats so that he or she can use them for publication or presentation purposes.

7. Manage data source:

Helps the user to manage the shape files data he or she has generated. It also helps the user to perform operations such as copying, renaming and deleting shape files easily.

8. Exit:

Helps the user to exit from the IRA-WDS interface and ArcView.

Note: Details of the menus Data Preparation, Contaminant Ingress, Pipe Condition and Risk Assessment are provided in Chapters 2, 3, 4 and 5, respectively.