Appendix B - Using GFLOW with Other Programs

The GFLOW package is designed to be a comprehensive set of tools for modeling groundwater flow and for preparing high-quality printed output for reporting. Many users also have the need to use other software packages in conjunction with GFLOW, both as sources for data input into GFLOW and as final report generating tools for GFLOW output. This appendix is an introduction to the ways in which GFLOW can interact with other software packages. In particular, the following topics are discussed:

- Use of GFLOW in the Microsoft Windows environment
- Application of DXF files (both for input and output)
- Application of PCX files
- Application of PostScript files

The present release of GFLOW has worked quite well in conjunction with a number of word processors, drawing systems and graphical software packages. We encourage users to contact Haitjema Software, LLC with any problems associated with this aspect of GFLOW. We will try to assist in any way we can.

GFLOW and Microsoft Windows

None of the GFLOW programs is a Windows Executable file; that is, we do not make use of the Windows environment in any way, but all GFLOW programs work well in the DOS box under Windows (and presumably under OS/2 as well, but this has not been tested at the present time).

Limitations

- Graphics Most Windows screen drivers will not allow the display of interactive graphics from GFLOW1 or GAEP in a window. It is best to run all GFLOW programs in "full screen" mode (press <ALT-ENTER>).
- GFLOW1 and Memory Windows and GFLOW1 both use large amounts of memory. It is not recommended that large GFLOW1 models be run under the Windows environment unless the computer system has a LOT of memory (16 MB or more). Small GFLOW models (250 equations or less) will run fine in Windows on an 8 MB system. To ensure optimal performance, the user will want to carefully manage GFLOW1's memory usage. Modify the \GFLOW\GFLOW.BAT file to set the smallest number of equations necessary by setting the "number of equations" parameter on the GFLOW1 command line:

  ```
  %GFLOW%\GFLOW1 200 %1
  ```

  will set up GFLOW1 to run with a maximum of 200 equations.
- Background execution In Windows, you can configure GFLOW1 to run in background while other applications (word processors and such) are active. This is useful when solving models. Check the Windows documentation for examples describing how this is done.
- GFPRINT and Memory When preparing output for high-resolution raster output (laser printers at 300x300 dpi, for example), GFPRINT will attempt to allocate a large memory buffer for image preparation. This can lead to severe performance degradation. If high-quality output is required, we recommend that GFPRINT be run in a standalone fashion from DOS.

DXF Files

GFLOW supports the use of DXF files for basemaps in GAEP and as an output medium from GFPRINT. Each technique is discussed separately here.

DXF Basemaps in GAEP

GAEP is capable of importing DXF basemap data and converting it to the internal GAEP digital map format. DXF files may be imported either as basemaps (background map curves) or as hydrography (streams without heads). If you import a file as hydrography, you will need to digitize the heads yourself, as they are not contained in the DXF file. The following considerations exist:

- Scaling GAEP performs no scaling when it reads DXF files. It is up to the user to ensure that the data units are the same in the digital map and DXF file. For example, if you are importing a DXF file into a digital map which was digitized in UTM coordinates, the points in the DXF file *must* be stored in georeferenced UTM coordinates.
- Memory DXF files tend to be very large. Since the present version of GAEP is a normal DOS application with a 640K memory limit, some DXF files may be too large for it to handle. Our experience is that on a typically loaded system, GAEP can load a DXF file of about 800K or so. If your DXF files are too large, you should use your drafting program or GIS to create several smaller files.

  Note

  Be aware, though, that once in GAEP, a DXF file can be written to a GFLOW1-compatible data file which creates a background map. Once a GFLOW1 background map file exists, it is read from disk by GFLOW1 when needed and no memory limitation exists.
- Colors When importing a DXF file, GAEP assigns the same color to all features in the file. To override, use the GAEP "Digitize/Edit/Rename" command to change the color, or just use several DXF files, each in a different color.

GFPRINT and DXF Files

GFPRINT can create three different kinds of DXF files:

- 8½" x 11" formatted page. Note that GFPRINT formats all pages to the 8 x 11 inch printable area available on PCL printers.
- GFLOW local coordinates
- World coordinates

All the information needed to create each of these output formats is contained in the special `.EPS` file written by GFLOW1. The following considerations exist:

- Formatted page The margins are applied, just as if the file were being prepared for a printer. This format will typically be used to move a GFLOW1 graphic to a drawing program for annotation and placement in a report. One good use of this mode is to create the DXF file, then load the DXF file into a drafting program for addition of a boilerplate border and annotation box.
- Local Coordinates This format is available for users who create small models without using GAEP and have not used a world-coordinate input file (that is, no `MODELORIGIN` command was issued in GFLOW1). The DXF file's coordinates will match those in the input file.
- World Coordinates This format uses the model origin set by GAEP or GFLOW1 to create a DXF file in georeferenced coordinates. In practice, this is usually done by making a georeferenced data set in GAEP and setting a model origin when element files are created. A DXF file in world coordinates (usually UTM or state plane coordinates) is very useful in exporting data from GFLOW to GIS systems.
- Layers GFPRINT writes each color to a separate layer in the DXF file. This is very useful, because colors are used by GFLOW to denote certain features of a model. For example, if you want to extract only a well's capture zone and send it to a GIS system, write a world coordinate DXF file and extract only the red lines with a drafting program to be sent to the GIS.

PCX Files

GFPRINT, as part of the "slide output" feature, can create PCX-format bitmapped graphics files. These files are compatible with a variety of programs, including paint programs, presentation graphics and word processors. The PCX files created by GFPRINT are screen images (640 x 480 pixels) and use a 24-bit PCX palette.

PostScript Files

GFPRINT is also capable of writing files in PostScript format, either in color or monochrome mode. Many word processors are capable of importing PostScript files and scaling them for inclusion in documents.

If you are planning to create PostScript files for inclusion in other documents, it is best to set the margin settings in GFPRINT to 0.0 on all four sides. This will allow the final destination program to scale the final figure properly, without any extraneous "white space" in the figure caused by the GFPRINT margins.