

MAP MAKER

# MAP MAKER



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# 1 Installation

## 1.1 Installation

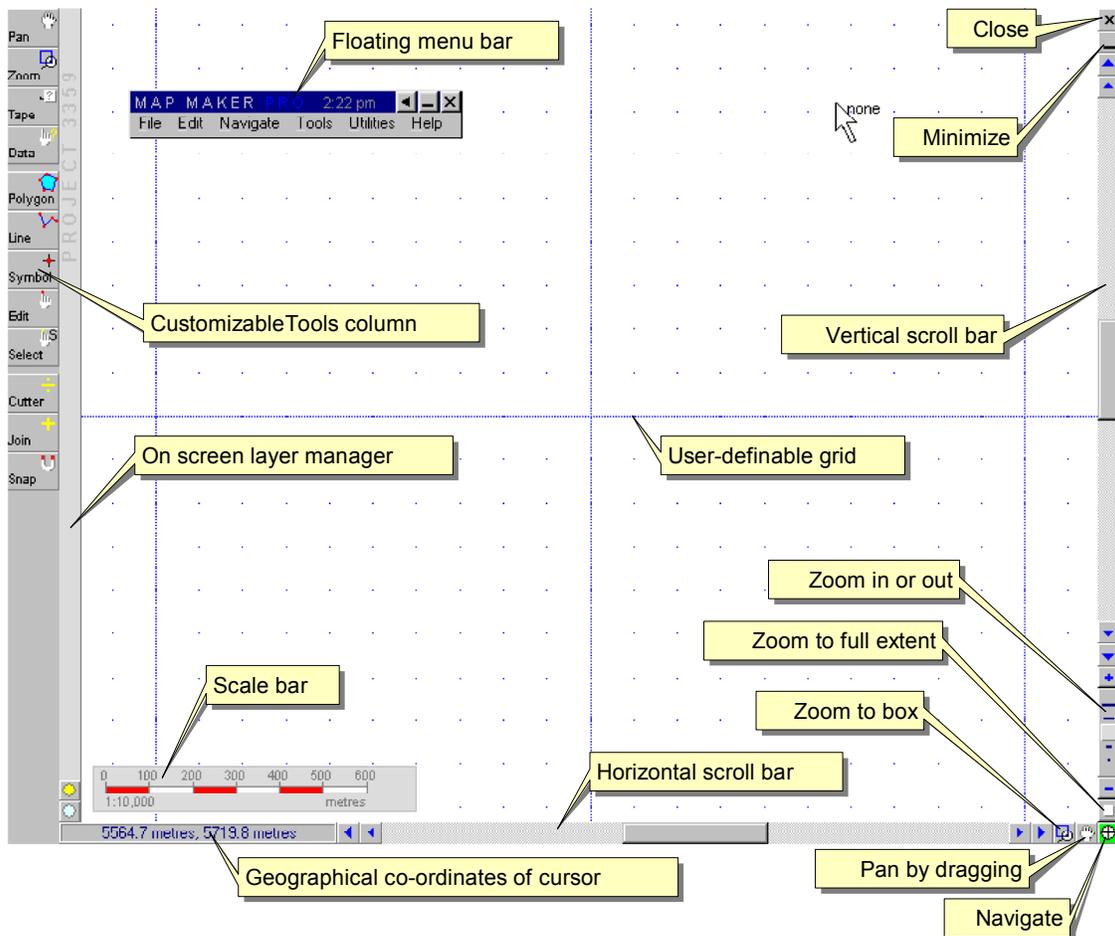
If your copy of **Map Maker** is on CD, the set up program will start automatically when you put the CD in the CD drive. Then simply follow the instructions on the screen.

If you have downloaded **Map Maker** from the web or have a copy on diskette, open Windows Explorer, locate the file that you downloaded and double click on it. The prompt will ask you to confirm or name an installation directory. Click OK and the program will be installed and launched.

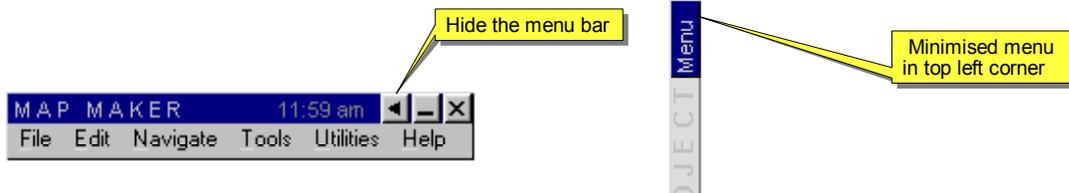
The supplier of your copy of **Map Maker** may have pre-configured the program with base data or a demo project. These will be loaded automatically when the program starts.

## 1.2 The Map Maker screen

The Map Maker screen is designed to maximise the area devoted to the actual map. When Map Maker starts for the first time it is in the “clean screen” mode.

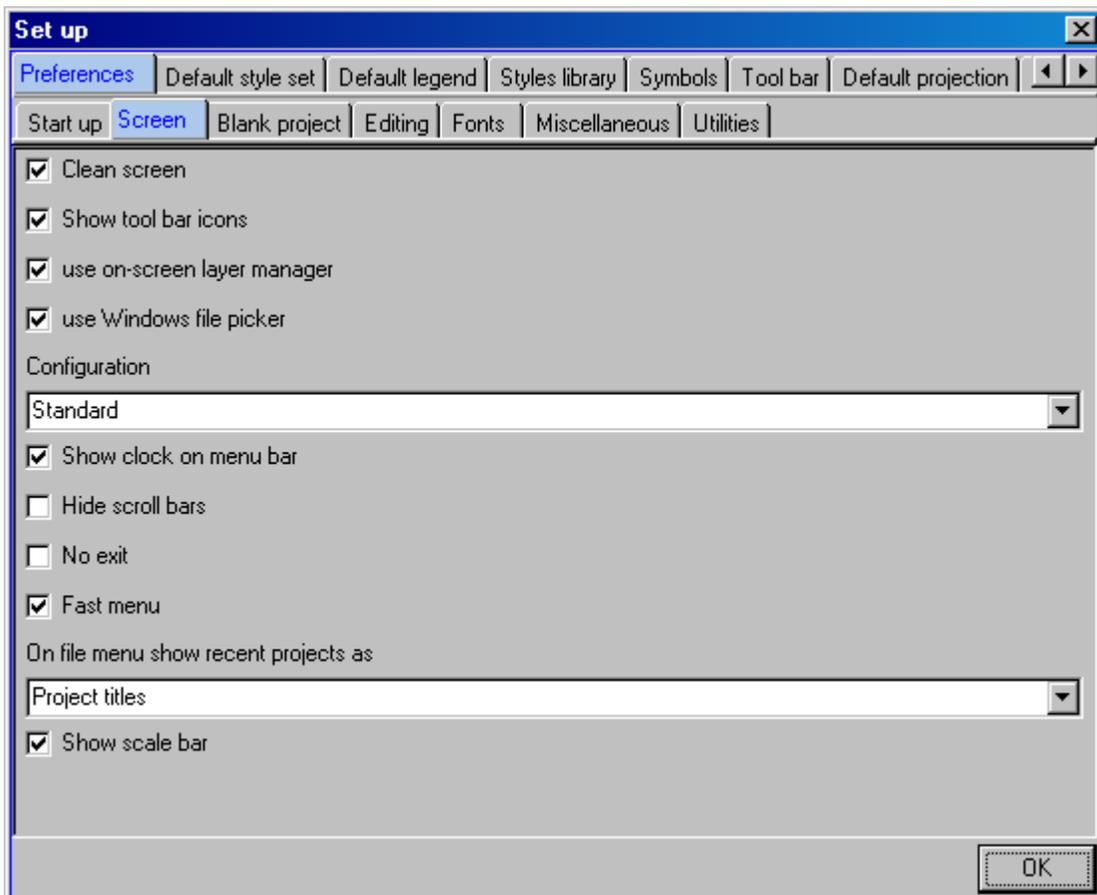


The “floating” menu bar in the clean screen mode functions like a conventional menu but, in addition to the usual minimise and close buttons, you can select the arrow button pointing left which will hide the menu bar.



When the menu bar is hidden a “menu” button appears in the top left corner. Click on the menu button to restore the menu bar. To re-locate the menu anywhere on the screen, drag the caption bar on the floating menu bar. Additional minimise and close buttons are found on the top right of the screen above the vertical scroll bar and can be used when the menu bar is minimised.

Some people, accustomed to the look of Windows’ screens, are uneasy with the “clean screen.” We suggest that you experiment with this mode because the large work area is so suitable for mapping however, if you prefer, you can select a more conventional Windows layout. To select this option, go to the **File** menu, open the **Set up** sub menu and click on **Preferences**. A dialogue box is displayed, click on the **Screen** tab:



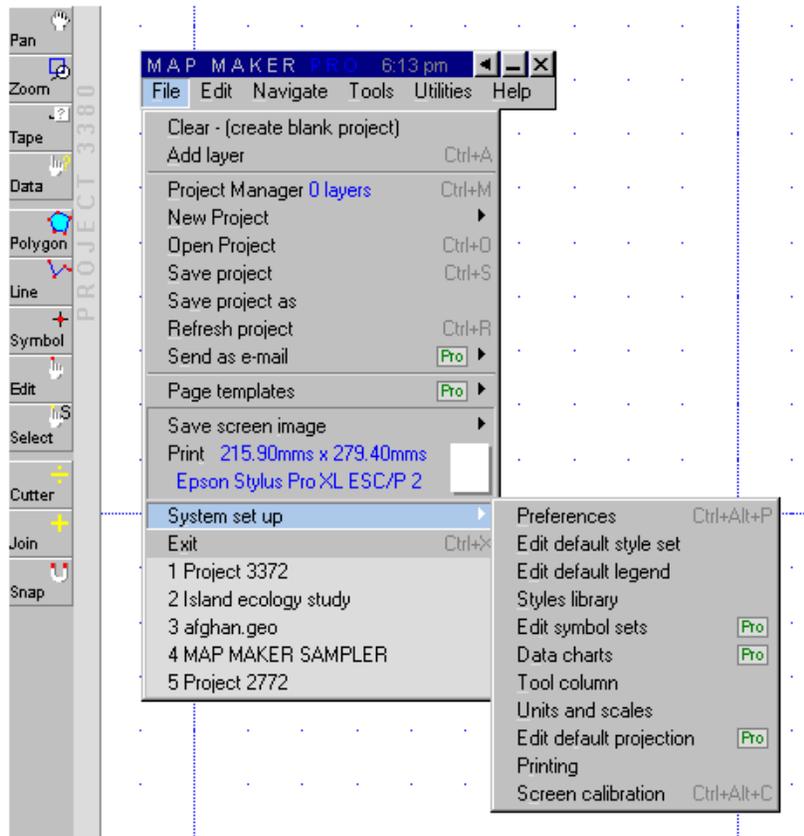
When you de-select the **Clean screen** tick box and click OK the floating menu will be replaced by a conventional Windows menu-bar and the Windows task bar will reappear.

### 1.2.1 The Fast menu

The fast menu allows you to access the most commonly used menu functions more quickly. Click the right mouse button anywhere in the main window to display the fast menu.

### 1.2.2 The Tools column

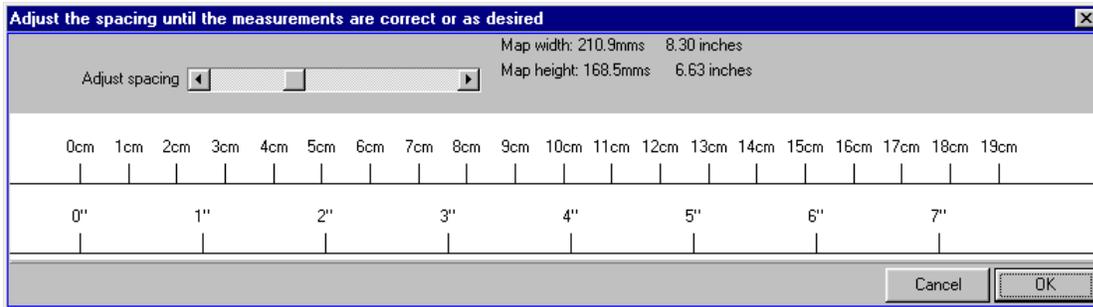
To display a column of tool icons on the left-hand edge of the screen, go to **File – System set up - Preferences - Screen** and select **show tool bar icons**.



The content of the Tools column can be customised from **File – System set up – Tool column**. The **Preferences** dialogue box offers a range of other possibilities for customisation.

### 1.2.3 Calibrating the screen

Before you can display maps to the correct scale on screen it is necessary to calibrate the monitor. Click on **File – System set up – Screen calibration**:



The dialogue box covers the width of the screen and displays a scale bar in centimetres and in inches. The spacing of the scale bar will change as you move the slider control to left or right. To calibrate the monitor of your screen, take an ordinary ruler in centimetres or inches , place it across your screen and adjust the slider control until the scale bar on the screen agrees with the dimensions of the ruler. Then click OK.

You will see that the width and height of the map are displayed at the top of the calibration dialogue box. These dimensions represent the width and height given the current calibration and they too will change as you move the slider control.

### 1.2.4 Using layers

In common with other GIS and CAD programs, Map Maker uses a system of layers. Think of the layers as sheets of tracing paper stacked on top of each other. In a well-made computer map each layer is dedicated to a single “theme”, such as roads, rivers, land-use or a particular crop or species. There is no limit to the number of layers one map can have. Generally, a layer contains either “bitmap” data or “vector” data. All the data in any one layer must consist of the same type of data and be in the same “format”.

### 1.2.5 What are file formats?

Map Maker primarily uses three types of data: vector, bitmap and attribute data. (The separate Map Maker 3D module also use three-dimensional data). In an ideal world three types of file would be used to store these three types of data. In fact the situation is more complicated. The same information can be recorded in a variety of file formats. File formats are analogous to languages. The same information can be recorded in Gaelic, Russian, Esperanto or any other tongue. In computer mapping the geographical information needed to draw the same polygon can be recorded in a number of ways.

Over the years software manufacturers and governments have created their own systems - each according to a slightly different pattern. While some software developers are primarily concerned to minimise the use of disk space, others want the computer to read and decode the data as quickly as possible. Some applications require only simple geometric information and others depend on high-quality cartographic annotation. The variation in today’s file formats evolved in response to the different demands imposed on computer mapping.

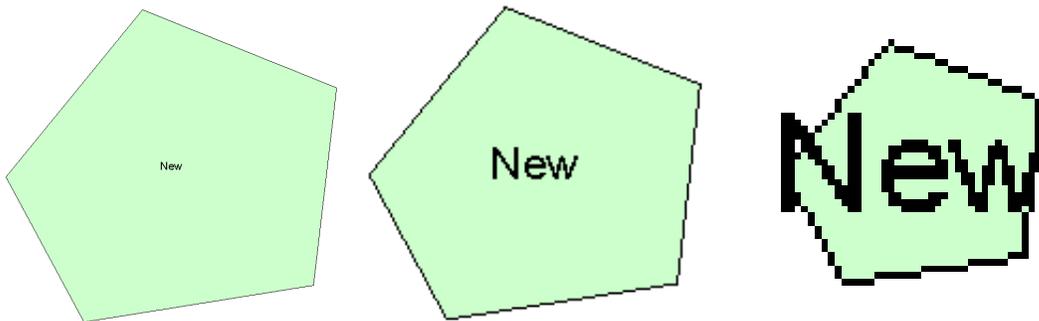
Before a computer can read and interpret the contents of a data file it must be given the rules - the format specification - whereby the information has been converted into bytes in a file. Some formats can be easily built into a program because the authors have placed their specifications in the public domain for other software developers to share. Some cannot.

The format of a file is reflected usually in the “extension” of the file name. For example, we can tell that a file named MYDATA.DXF is in the **Data eXchange Format** which was developed by a company called AutoDesk. This format is widely used in Computer Aided Design (C.A.D). MYDATA.DBF is a database file containing attribute data in a format first developed for the popular database program, **dBase**, and now used widely in programs like FoxPro. MYDATA.DRA is a **drawing** file in a format developed for Map Maker products.

### 1.2.6 What are bitmaps and vectors?

A vector is defined as a "quantity having both magnitude and direction". In the context of map data this means that a straight line is identified by the co-ordinates of a starting point and the direction moved in a specified distance. In practice, a straight line is defined by the co-ordinates of its two ends and this is enough information to determine the direction and length of a line. A polygon, or "polyline" (a line made up of a series of straight line segments) is described by the co-ordinates of its vertices. Vertices are the points where the line (or polygon boundary) starts, ends, or changes direction. As well as lines, vector objects include any entity on a map which is defined by co-ordinates and dimensions. A text object, such as a printed place name for example, is also defined by its location, its height, and its angle relative to the horizontal, that is whether it is sloping or curved.

Unlike vectors, bitmaps (or “raster” images) do not store any information about the lines. A bitmap or raster image consists of information about lightness, darkness and, sometimes colour. The three representations of a polygon shown below are all bitmaps. They are made up of square dots called pixels. The image on the left has more dots per inch - each pixel is smaller - so it appears to be a more accurate representation of a polygon than the others. The image on the right appears very crude because it contains fewer pixels per inch.



If this polygon were contained in a vector file it would be described in terms of the geometry of its angles and sides. In a vector file, the information needed to describe a polygon eight inches across occupies as much space in the file as the description of a polygon one inch across. In a bitmap file, on the other hand, the larger the image - the larger the graphics file needed to describe it. Instead of describing the boundaries of the polygon, the bitmap file must contain information about the shade and colour of each point – each pixel – which makes up the image of the polygon and the empty space around the polygon.

Take the case of a bitmap containing 300 dots per inch (d.p.i.). An image which is 4" x 3" would consist of (300 x 4) x (300 x 3) pixels; or 1,080,000 pixels. The amount of data required to describe each pixel is determined by the number of colours or tones which the image uses.

Computers store data in bytes. Each *byte* is made up of eight *bits*. A bit is like a simple switch. It can be either off (equals zero) or on (equals one). In a black and white bitmap image, such as an image representing a simple line drawing, the colour numbers for each pixel range from 0 for white to 1 for black. This means that the data for each of these pixels can be stored in just one *bit*. And the data for eight pixels can be stored in one *byte*.

At 300 d.p.i. a 4" x 3" image contains 1,080,000 pixels. If this image is in black and white (a 1-bit image) the file will contain 135,000 bytes – that is to say the file size will be equal to 1,080,000 bits divided by 8. If the image uses more colours than simple black and white, more than one bit will be needed to describe each pixel. Theoretically any number of bits could be used but, for various reasons, the following convention has become established:

1 bit -  $2^1$  = two colours, black and white

4 bits -  $2^4$  = 16 colours (no longer commonly used)

8 bits -  $2^8$  = 256 colours or 256 grey tones (e.g. aerial photos, etc.)

24 bits -  $2^{24}$  = 16,777,216 colours (sometime called True or RGB colour)

In our example of a 4" x 3" image scanned at 300 d.p.i, 3,240,000 bytes are required to describe a 24-bit image.

Vector data has two great advantages over bitmap data:

- *Compact*. Assuming that two polygons have the same number of vertices, no more information is needed to record a large polygon than to record a small polygon. In contrast, the larger the bitmap - the larger the amount of data required to record it - regardless of the information content of the image. The bitmap file describes the blank spaces on the map as well as the objects.
- *"Intelligent"*. While bitmap data simply record the colour of each pixel on the screen, vector data describe spatial entities, objects: polygons, lines and points. These objects have intrinsic attributes such as area and length, and can be associated with attribute data. The intrinsic data about a farm, for example, relate to its size and shape while the attribute data might contain information about land use, soil quality, crop yield, etc. On the whole, the geographic information that distinguishes G.I.S. from ordinary mapping – cartography - comes from associating attribute data with vector data. Dr. John Snow, who was said to have identified a contaminated well by mapping cholera deaths, is credited with creating the prototype Geographical Information System. An "intelligent" map contains the intrinsic and attribute data required to generate thematic maps and more sophisticated data analysis.

In addition to representing actual spatial objects (polygons, lines, and points), vector data can record notational objects such as text and arrows.

Bitmaps, on the other hand, offer a simple, intuitive way to represent a complex visual image. An aerial photograph for example, can be shown as a bitmap but not, realistically speaking, in vector format.

### 1.2.7 Bitmap layers

The simplest way to create a map using Map Maker is to start with a scanned image. If you have a scanner, or access to scanned images from the internet, you can load a scan – a bitmap image – into Map Maker and save it as a layer. Then you will be able to draw over it just as you would copy a picture using tracing paper.

Bitmaps are available in a variety of formats:

- **BMP.** BMP is the format developed by Microsoft to display images in Windows. As the “natural” format for Windows, BMPs are quick to load. Their disadvantage is that BMP files can be large and unwieldy.
- **TIF.** TIF (or TIFF) files are commonly used in desktop publishing. Unfortunately, the TIF format varies widely and includes several different forms of compression. Map Maker supports uncompressed TIFF files and TIFF files using “PackBits” compression.
- **JPG.** Unlike BMP or TIF files, the JPG (or JPEG) format can be used on web sites. Because it is always compressed it is far more compact than equivalent BMP files. JPG files are slower to load and there is sometimes a loss of image quality.
- **ECW.** ECW, a relatively new format developed by ER Mapper, is a remarkably effective compression. Although the compression results in some loss of image quality, it is a useful format for very large data sets.

Map Maker Pro allows you to read other bitmap formats such as Idrisi’s RST format and USGS’s Digital Orthoquads.

Map Maker can display bitmap layers as opaque or translucent. Lower map layers can be viewed through a translucent bitmap display. The colour of the original bitmap layer can be modified and you might wish to do so if, for instance, the strong colours of an aerial photo make it difficult to see the objects you are drawing. Chapter 6 on Bitmaps describes this procedure.

### 1.2.8 Vector layers

Vector layers can be created by drawing objects in Map Maker or a layer may consist of data imported from another source. Vector data, too, comes in a number of formats.

- **DRA.** The DRA format is unique to Map Maker. It was developed specifically for general purpose GIS and is the most frequently used format in Map Maker. The DRA format is fast to redraw and can contain a wide range of objects. One DRA file can contain a mixture of the following objects:
  - **Polygons.** Simple enclosed spaces and spaces which have holes taken out of them - such as lakes.
  - **Lines.** Lines including “polylines.” A polyline is a line containing intermediate vertices.
  - **Points.** A point is a single XY location usually indicated by a symbol.
  - **Text.** A text object is attached to a location, such as text along a mountain range or river. Text objects have a geographical size as if they were painted on the ground. As you zoom in and out the text objects get bigger and smaller. Labels work differently. Polygons, lines, and points can all have labels and the size and position of the labels can be changed at any time to make them easier to read. Object labels stay the same size regardless of the scale of the map.

- **Arrows.** Arrows are a special type of label.
- **Dimensions.** Dimension lines can be drawn to indicate the distance between two or more locations.
- **LOC.** The LOC format, also specially developed for Map Maker, is a simple text file used primarily to display the location of a set of points. A LOC file can be written in any text editor or generated from a simple program. The data are recorded as comma separated text. The first line is a header and each subsequent line represents the location of one point. A simple LOC file is written as follows:

```
ID, x, y
Point A, 123.452, 435.879
Bridge, 134.789, 421.115
```

- **SHP.** The SHP, ArcView “shape” files (format by ESRI), are commonly used in GIS and can be read directly by Map Maker. Like DRA files, SHP files are compact and load quickly however they are limited to points, lines and polygons and each file can contain only one type of object. A SHP file contains either polygons, or lines, or points. It is not possible to mix object types in a SHP file.
- **DXF.** The DXF file format created by AutoDesk is widely used in CAD programs and can be read directly by Map Maker. It is important to bear in mind that, unlike shape files, DXF files can contain a wide variety of object types and there are numerous sub-formats of DXF containing codes specific to particular programs. Map Maker does not support all of these variants. Map Maker reads regular DXF polygons, polylines, lines, circles, points, and text but Map Maker does not read, for instance DXF “mesh” objects or 3D faces, nor does it read stylistic data such as line styles. The DXF format was designed for moving data from one application to another. It is a “transfer” format. As a result, unlike DRA and SHP files, DXF files are large and slow to load.

DXF files can be loaded directly into Map Maker. However, if you plan to use a DXF file regularly we recommend that you convert it first to DRA format using the **Utilities – Vector utilities – Import file.**

Map Maker Pro supports other vector formats including ArcInfo coverages and e00 files, MapInfo MIF/MID files, various USGS formats, and Ordnance Survey NTF formats.

### 1.2.9 The live layer

The live layer is a unique kind of vector layer. Figuratively speaking, the live layer sits “on top” of all the layers that make up the map. The live layer is a temporary layer in which objects are created and edited using the drawing and editing tools. Returning to the image of the tracing paper, the top – or “live” - layer is the only one which can be drawn on. In Map Maker there is only one live layer. A layer must be loaded into the live layer before it can be added to or changed.

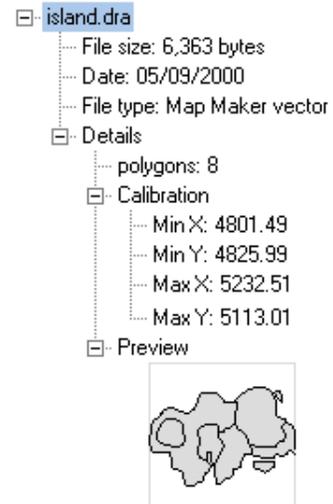
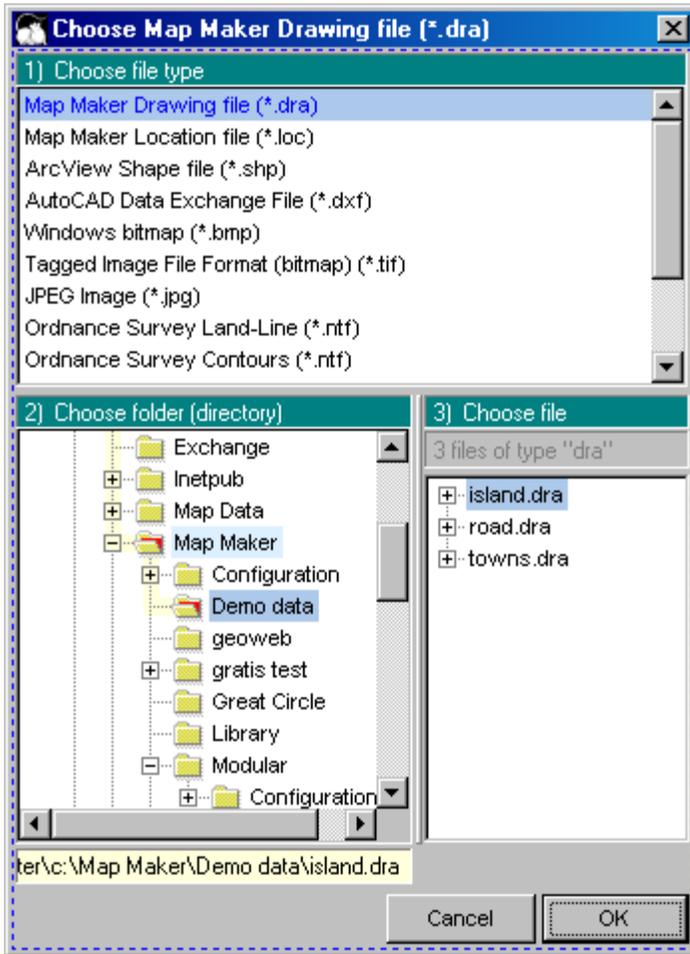
**Note:** Because the map layers are transparent, all the objects in all of the layers can be seen on the screen. **Objects in the live layer are marked by small light blue circles in order to distinguish them from objects in the background layers.**

If the map consists of three layers, fields, roads and rivers, all three appear on the screen. Load the rivers layer into the live layer and the rivers will be marked by small light blue circles to show that they can be added to, deleted, or altered.

See the section on Drawing and Editing

### 1.2.10 Loading the first layer

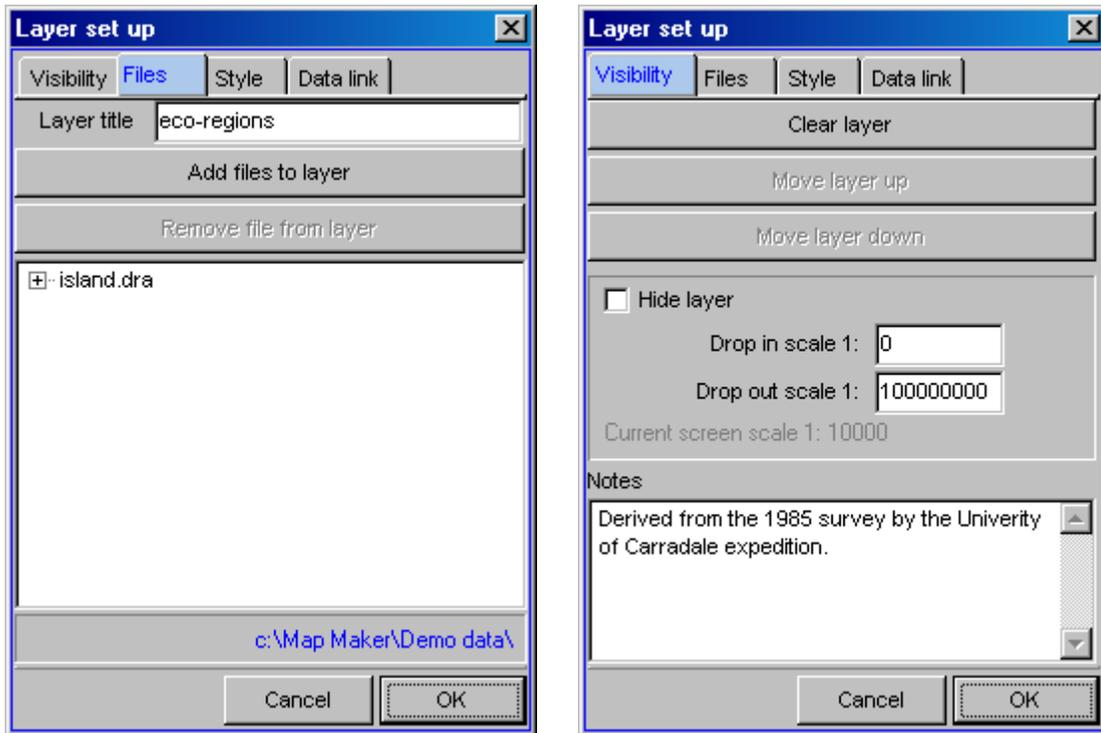
If the screen is not clear, create a blank screen by clicking on **File – Clear**. Then click on **File – Add layer**.



The file picker dialogue box appears. First choose the file type (the file format) you want to load - in this case a Map Maker Drawing file (\*.dra). Go to the bottom left panel to select the directory where your data is stored, in this case the **c:\Map Maker\Demo data** directory.

When you select the directory you will see a list of all the files of the selected file type in the right hand panel. Beside the file name is a box with a + sign in it. The + symbol indicates that you can expand this item. To make sure that you are selecting the file you want to load, click on the + sign to view a description of the file. Additional options give details of the calibration and finally a preview of the file. The “plus box” preview of a large file can save you wasting time by loading the wrong file.

To use a conventional Windows file picker dialogue box instead of the one shown here, go to **File – System set up – Preferences - Screen** and select **use Windows file picker**.



Select the file island.dra and click OK. A layer set up dialogue box appears:

The **Layer set up** dialogue box has several “pages” (see the tabs across the top). The box will first open onto the **Style** page. Styles are discussed below. For the moment, ignore the Style page and click on the **Files** tab to view the Files page. Because the selected file is island.dra, the name “island” has been assigned to the layer. You can re-name the layer as you wish, here the layer has been renamed “eco-regions”. You may choose to add more files to this layer. A layer must contain a minimum of one file. In this illustration, because the layer contains only one file, the “Remove file from layer” button is “greyed out” indicating that it is disabled.

In this case, since the first file is a DRA file, any other file added to the layer must also be a DRA file and be selected from the same directory as the first file.

All the files in one layer must be of the same type of format and contained in the same directory.

Click on the **Visibility** tab to find a **Notes** section. Descriptive notes, such as the those shown in the above example, can be attached to objects in a layer. The primary purpose of the Visibility page is to set the scale range at which the layer is visible.

### 1.2.11 Drop-in / drop-out

You may not wish all the layers of your map to be visible all of the time. If your map shows a whole country you may wish to zoom out to see an over-all picture of the country outline and provincial boundaries and zoom in to see details of the roads. When you zoom in, the provincial boundaries may be distracting and no longer be relevant. It is possible to hide a layer simply by ticking **Hide layer**. A more elegant solution is to set up “drop-in” and “drop-out” scales. The layer will be visible if the scale is greater than or equal to the “drop-in” scale but no greater than the “drop-out” scale. If your drop-out scale for a footpaths layer is 1:25,000 then in a 1:50,000 map the footpaths will be hidden. Careful adjustment of these scales allows you to create a map which will make sense and be easy to read at any scale.

For the purposes of this simple example, leave the drop-in/drop-out values at their default settings.

The **Files** and **Visibility** pages look the same for all types of layers. The content of the remaining pages of the Layer set up dialogue box depends on the file format.

### 1.2.12 Using styles

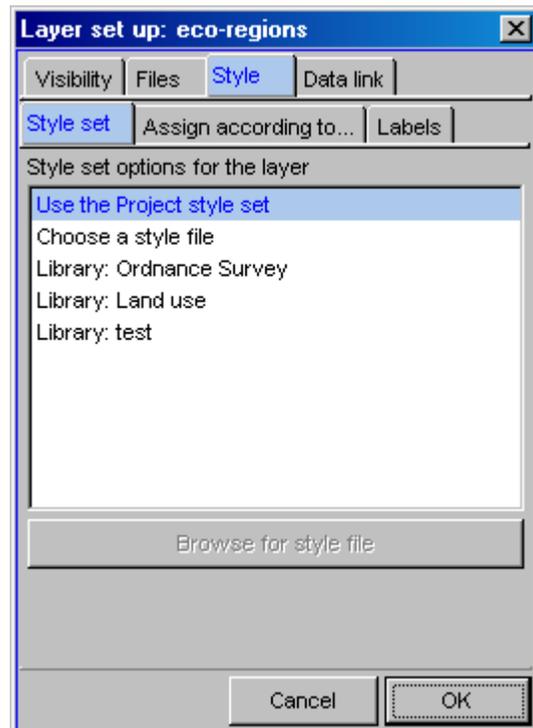
Click now on the **Style** tab. A vector file such as a DRA file (or a LOC, SHP, or DXF file) usually contains no more than the geometrical descriptions of objects – their shape and location. It does not describe how objects are displayed; their colour, texture, style of text, etc.

In Map Maker, this information is stored separately in a “style file” (\*.STL) which is a kind of library of visual styles.

One style file can be used for any number of vector files. The best practice is to develop one or a very few style files containing the styles you most commonly need.

The **Style** page is divided into three sub-pages. The first, **Style set**, offers options for choosing the style file:

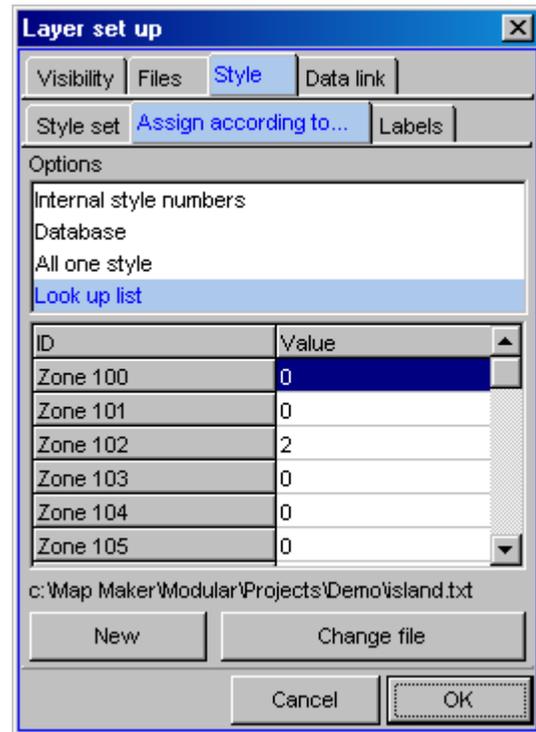
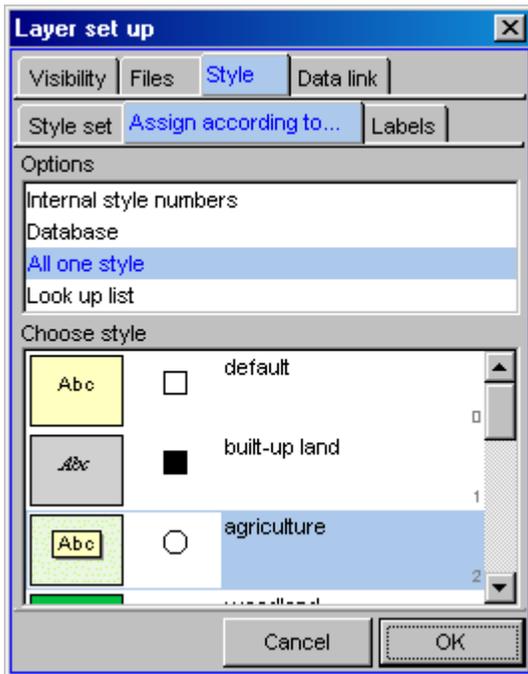
- **Project style set.** Map Maker comes with a default style set. When you start a new project a copy is made of this default style set and this copy becomes the **Project style set**. You can amend the default styles to suit your needs by going to **File – Set up – Edit default style set**.
- **Choose a style file.** If you have created several style sets, you can then assign a particular style file to this layer. In this example a style set customised for Ordnance Survey data has been created.
- **Library:** If you have added style files to your styles library (see **File – System set up – Styles library**) they will appear on this list.



The final appearance of an object is determined by three things:

- **The geometry.** The size, location and shape of an object is stored in the vector file.
- **The style file.** The library of numbered styles.
- **A style number.** A single whole number (usually between zero and 100) is associated with each object. The style number determines which style from the style file will be used.

The **Assign according to..** page allows you to select the rules which will determine how the **style number** is chosen. The appearance of the lower half of the dialogue box depends on the option you have selected from the top list.



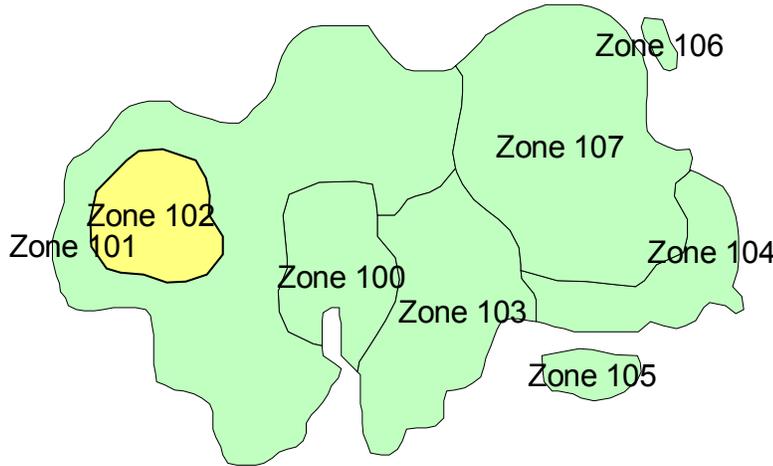
Each object in a DRA file has a default style number attached to it and the number is stored in the DRA file. The style number can be assigned when the object is drawn or edited. If you assign the style according to the **Internal style numbers**, Map Maker will display the object using the default style number to select a style from the style set.

The **Database** option will be discussed later.

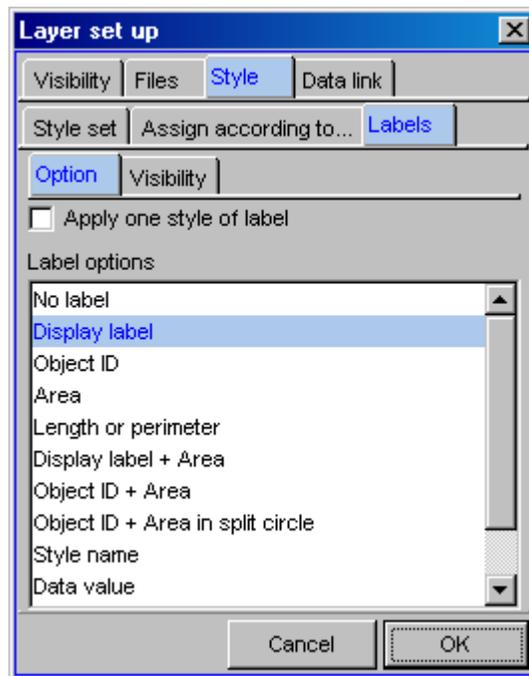
**All one style** allows you to impose one style on all the objects in the layer. In this example, the style called “agriculture” has been chosen.

The fourth option, **Look up list**, refers Map Maker to a simple list in which all the objects in the layer are listed with their corresponding style number. When you select **Look up list** you are asked if you want to create a new list of objects and styles or choose an existing list. In this case, since it is the first time you have viewed the file, you would have to create a new list. The first step is to name a new file with a TXT extension, so you might enter island.txt. The dialogue box changes.

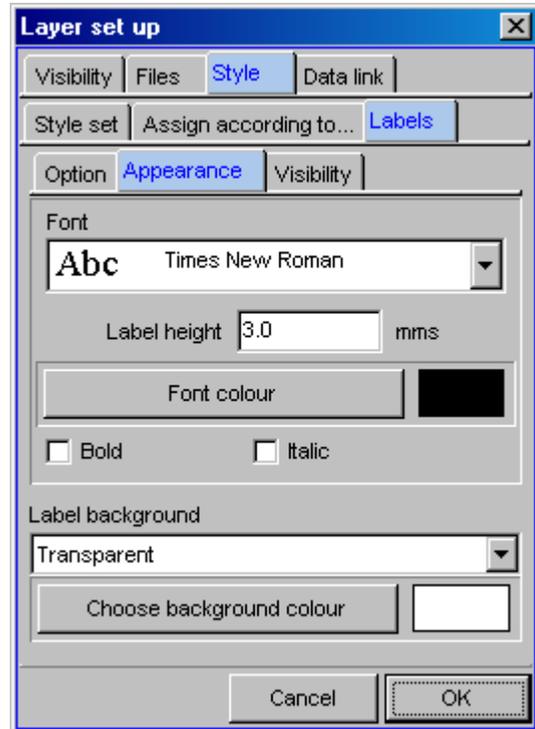
The list contains one line for each object in the file. In this example the objects in the layer are eco-regions named Zone 100, Zone 101 etc. The right hand column contains the style numbers. In this illustration “Zone 102” has been set to style number 2. (More details about assigning numbers to styles will be discussed below) If you click OK now, all the zones except zone 102 will be drawn with style zero:



The **Labels** tab in the Layer set up dialogue box allows you to control the labelling of all the objects in the layer. The **Style – Labels – Options** page offers a range of options. By default Map Maker will opt for “Display label”.

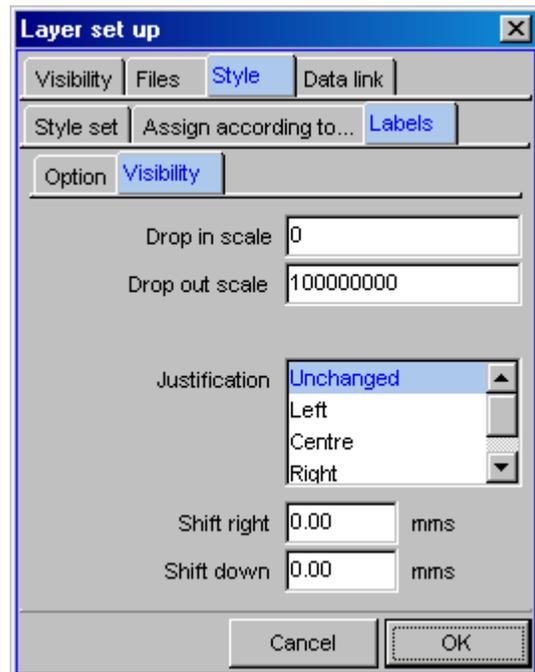


If you click the tick box, **Apply one style of label**, you will be taken to the **Style – Labels – Appearance** page where you can specify the appearance of the label. The appearance of the label attached to one style number may be different in colour or size of font from the label attached to another style number. If your map uses different styles for different objects, you may end up with an odd mixture of label styles. This dialogue box allows you to over-ride these style settings.



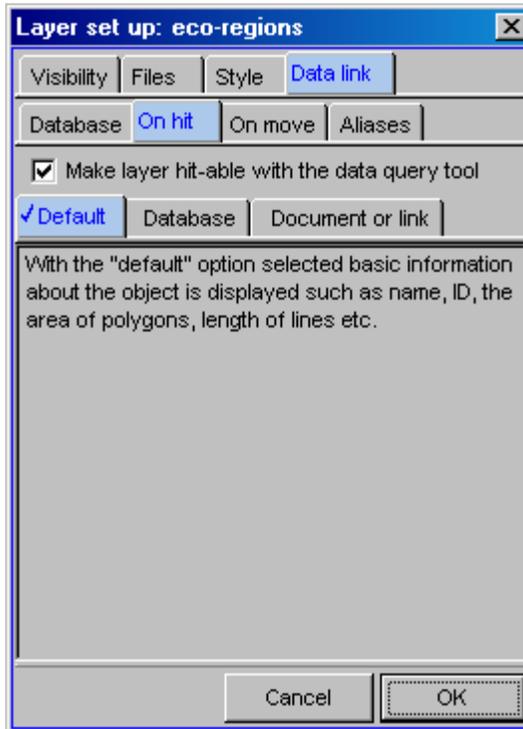
The **Style – Labels – Visibility** page allows you to specify drop-in/drop-out scales for the labels of the layer. For example, in a layer containing towns each town could be identified by its name and a town symbol. You might wish the names to disappear once you had zoomed out beyond a certain scale - though it might still be useful to see the location of the symbols (see section 1.4.6).

The **Shift right** and **Shift down** values are not often used. They allow you to shift all the labels on one layer left or right, and up or down if you should find that the labels on one layer are clashing with the labels on another layer.



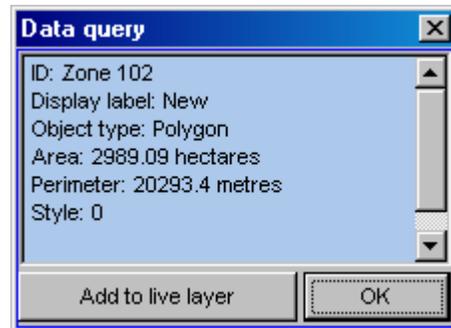
### 1.2.13 “Hitting” a layer

Select the **Data link** page. The **Data link** page is divided into four. The **Database** and **Aliases** pages are relevant only if you are selecting a database ( this is discussed later under Linking to data ). The **On hit** page lets you control what happens when you “hit” an object or objects with the **data query** tool. Generally you “hit” an object by clicking on it (other options are available using the Map Maker Scripts module). When you tick the box **Make layer hit-able with the data query tool**, you are given three options:



- The **Default** option means that basic information about the objects is displayed when - using the **Data query** tool - you hit one or more objects.

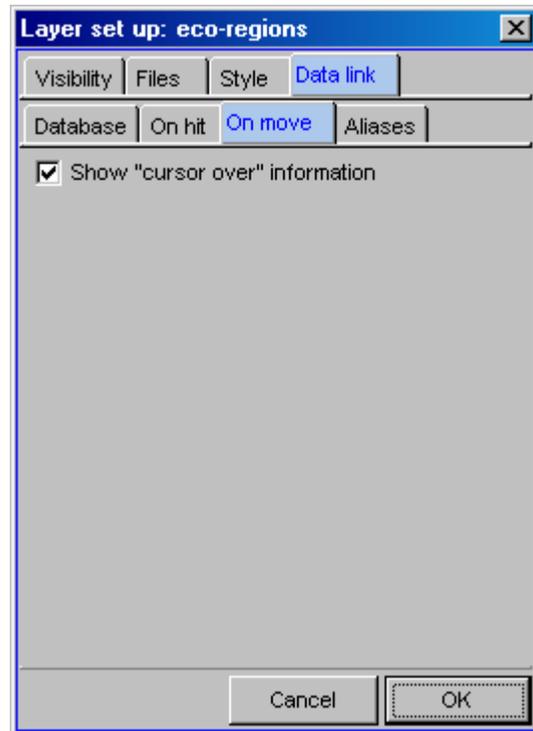
The **Add to live layer** button enables you to copy one or a group of objects into the live layer from a “passive” layer. First make the passive layer hit-able, hit the objects and then click on **Add to live layer**.



- **Database.** The use of this tab is discussed in Part 1 – Chapter 4.
- **Document or link.** As with the **Look up list** for styles described in section 1.4.7, the Document tab creates a table with one row for each object. When you click on the object name you will be able to select a document file to link with the object. The document could be in a Word doc file, an Adobe pdf, Web htm, ascii txt, or rich text rtf, image (emf, bmp, jpg), or an audio-visual file. The document will be displayed when the object is hit. This can also be used to link to another Map Maker project file (\*.geo).

### 1.2.14 “Cursor over” information

The **On move** tab allows you to determine what happens when the cursor moves over the layer. When **Show “cursor over” information** is selected, the program will display data about each object in the layer. As the cursor passes over the object the relevant data will appear; the object’s ID, its area, if it is a polygon, or its length, if it is a line, and the name of style assigned to it. Note that this feature can slow the performance of the program if it is used with a very complex layer or several layers at once.



## 1.3 Map projects

The “map project” is the heart of the Map Maker program. A map project can grow from a simple map consisting of one layer to become a multi-layered map with databases and gazetteers attached, internet links and multi-media content. Map Maker can be used to create a project and to view or edit another person’s project.

### 1.3.1 What makes a project?

The elements of a map project are recorded in a file with the extension GEO.

**Note:** a map project file does NOT contain the map data. A project file is simply a text file which records the whereabouts of the data to be used and describes how the data are linked and displayed.

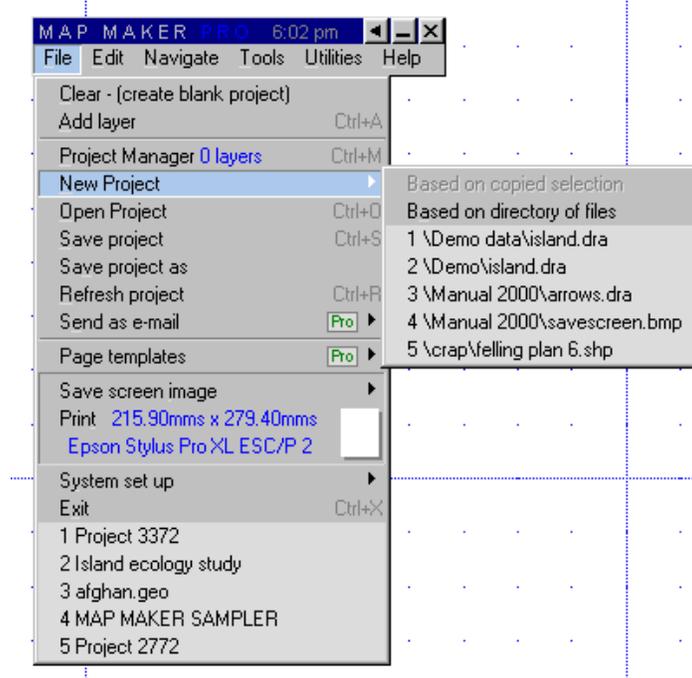
A map project contains:

- **Project description.** The name of the project, the author, and the date it was created.
- **Layers.** The thematic layers that make up the map. The layers can be scans or vector files, but the files in each layer must be in the same format. For instance, a single base map layer might consist of aerial photographs and contain hundreds of files covering a large area. The next layer might be a single vector file describing the outline of the forests in the photographs. You can opt to make some layers visible only within a specified scale range (see section 1.4.6).
- **Styles.** The appearance of objects on the map is governed by style definitions stored in a style file. Each project has a default style file associated with it.

- **Attribute data.** Some layers may have information attached to them in the form of a database table or photographs, documents, or videos.
- **Map projection.** Any map has, implicitly or explicitly, a map projection and geographical reference system (datum) associated with it. In Map Maker Pro the project files specify this reference system.
- **Units.** A map can be prepared in metres and hectares, or feet and acres and the printed output can be specified in millimetres, inches or points.
- **Scale and extent.** The extent of the map is often considerably greater than the area currently visible on screen. The project records the full extent of the map as well as its current scale and the co-ordinates of the centre point of the current view.
- **Map furniture.** Map furniture is the term used for all the elements which can be located anywhere on the map. The positions of the scale bar, north point, title panel and the like are not geographically determined.

### 1.3.2 Opening a new map project

There are several different ways to start a project. For instance, when you first start Map Maker an empty project is created. Similarly clicking on **File – Clear (create blank project)** also creates an empty project. If you have such an empty project and you click on **File – Add layer** to select a file then the extent, the scale, and the centre co-ordinates of the project will be set to correspond to the new layer. In addition, the file that you selected will be added to the bottom of the **File – New project** menu. Next time you can simply select the file from the menu to create a project based on that file.



Alternatively the **File – New project** sub-menu offers two additional options.

- **Based on copied selection.** The first option on the sub-menu is not available (greyed out) unless you have previously copied a section of an earlier map using the **Cut** or

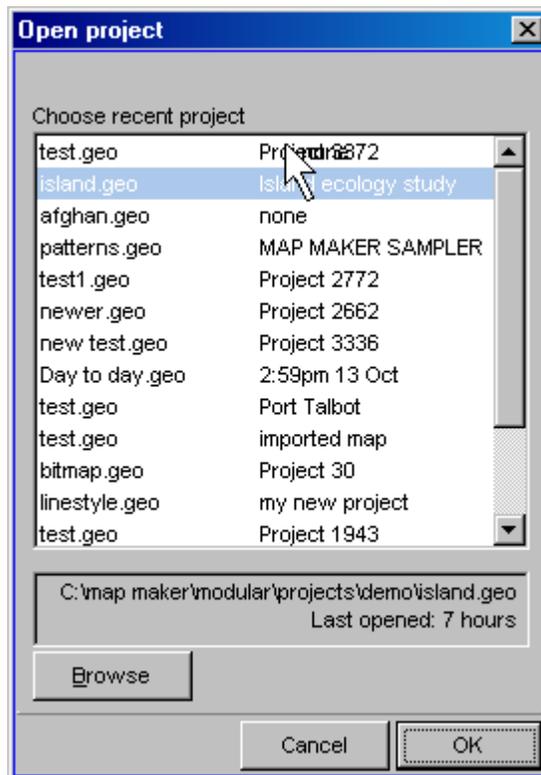
**Copy** commands in the **Edit** menu. If you have a copied selection it will become the “live layer” in the new project.

- A project **based on a directory of files** contains one layer that is made up of all the files of a specified file type in one directory. The project’s extent covers all the files and is automatically centred on the file set. If you select this option you are asked to pick a directory. A dialogue box will list the file formats present in the directory. Select the format you want to use.

Note that when a new project is created, it is assigned a default title. The default title can either be the current time and date or a serial number. You can specify which from **File – System set up – Preferences – Blank project**. At any time you can enter a more meaningful project title from the **Project Manager** (see section 1.5). A newly saved project is added to the bottom of the **File** menu. You can choose from **File – System set up – Preferences - Screen** whether the project file name or its title is displayed.

### 1.3.3 Opening a project

This dialogue box appears when you choose **File – Open project**. The list of recent projects shows the file name and the project title. Select a project from the list or click on **Browse** to select any other project file. The five most recently opened projects also appear at the bottom of the **File** menu.



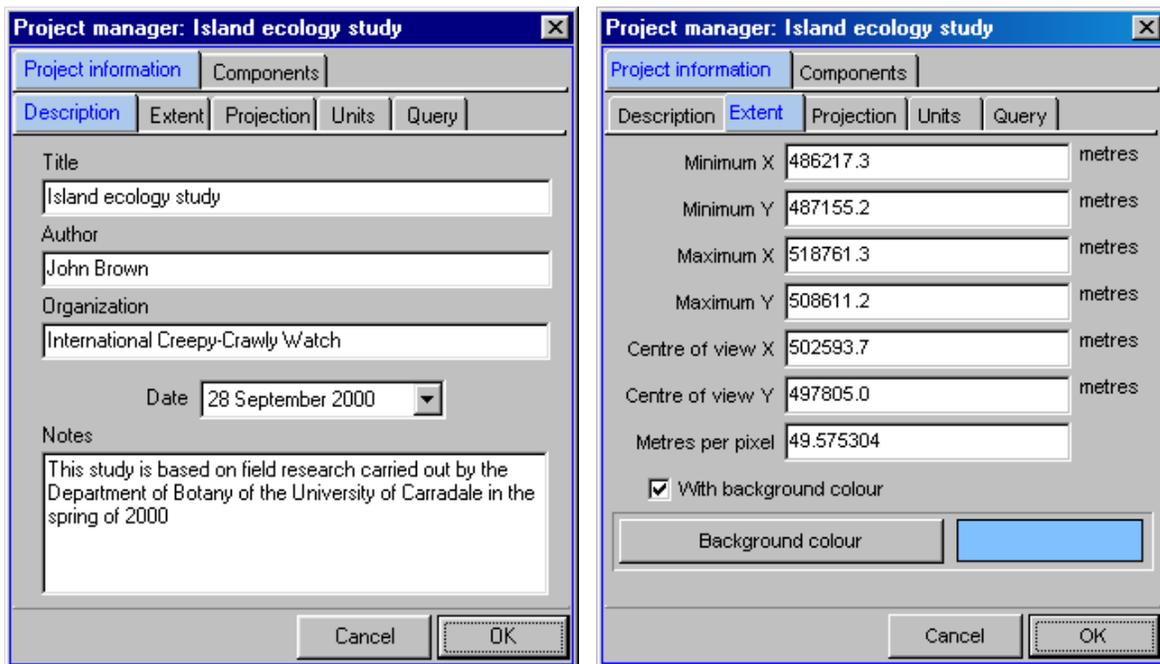
For the benefit of those who use the same base map for all their work, it is easy to configure Map Maker to automatically load the base map every time the program is started or the screen cleared. Go to **File – System set up – Preferences**. Choose the **Start up** group from the list on the right, click on the \*.geo button next to **Load project** and select the project file.

### 1.4 The project manager

The project manager enables you to review and edit information about the project as a whole. Click on **File – Project manager** (or select the Project manager from the Fast menu or simply press the space bar). The **Project Manager** dialogue box will appear. It is divided into two pages.

The first page, **Project information**, contains information pertaining to the whole project. This is sometimes called “metadata”.

The second page records and controls the **Components** (principally the files) that make up the project.



The **Project information** page contains five sub-pages. The first, illustrated above, contains the basic **Description** of the project. The second defines the **Extent** as well as the current centre of view and the background colour, if any. The scroll bars and the other navigation functions described below are controlled by the limits of the map (**Minimum X**, **Minimum Y** etc.) These values are set automatically. You may wish to change them in order to restrict the extent of the operation of the scroll bar or to enlarge the area in which you can draw new objects.

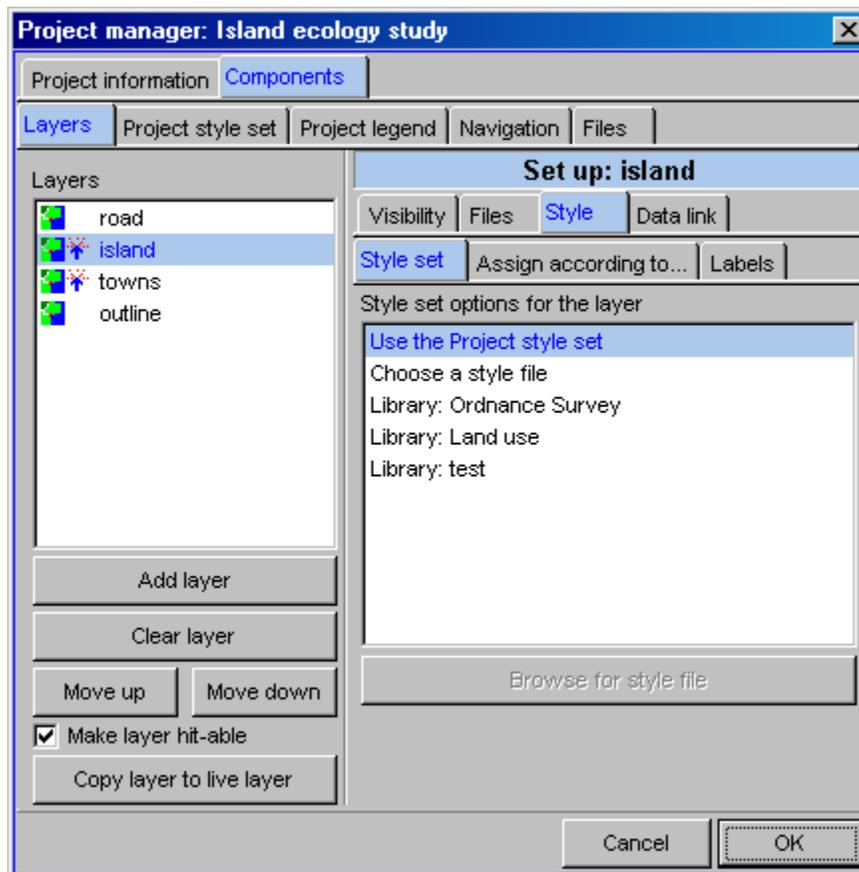
The **Projection** page is discussed in Chapter 12.

The **Units** of measurement section allows you to choose your preferred units.

Note: This page controls the units of measurement for this particular project only. To select the units of measurement for all future projects go to **File – System set up – Units and scales**.

The **Query** page describes how the **Data query** tool is used to interrogate data on the map (see The Data query tool, Chapter 4)

The **Components** page also contains five sub-pages. The first lists the current **Layers** and allows you to modify the layer set up and add more layers.



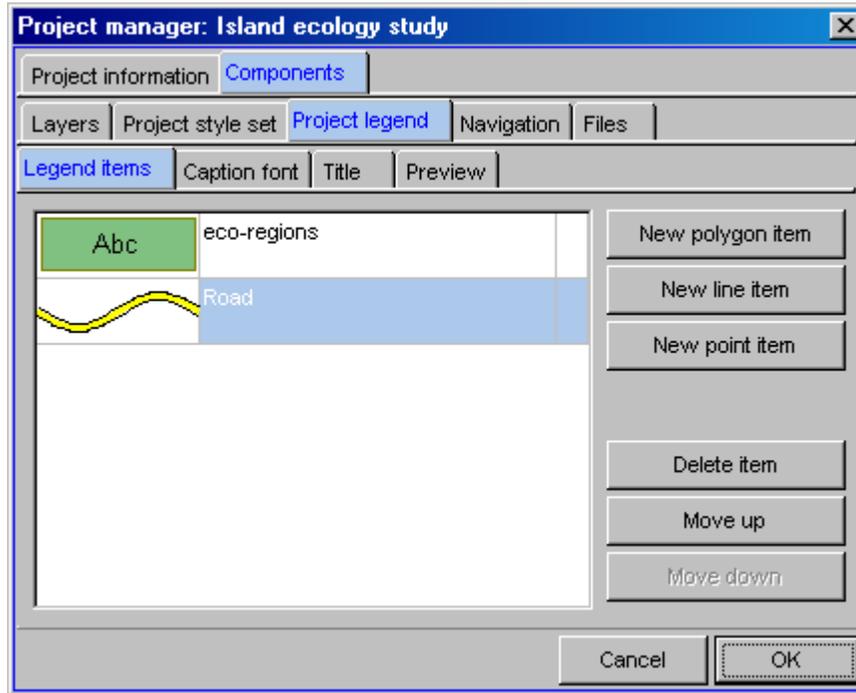
The right side of the page will be familiar to you from the **Layer set-up** dialogue box (see section 1.4.5).

Note: If **File – Preferences – Screen – Use on-screen layer manager** is ticked then the left hand edge of the screen will display a button for each layer. If you place the cursor over one of these buttons a menu pops up which, among other things, can take you to the **Layer set-up** dialogue box for that layer. Also, **Layer set up** for the first nine layers can be accessed by pressing “1” to “9” on the keyboard.

The **Style set** page allows you to edit the project style set. It is discussed in detail in Chapter 3.

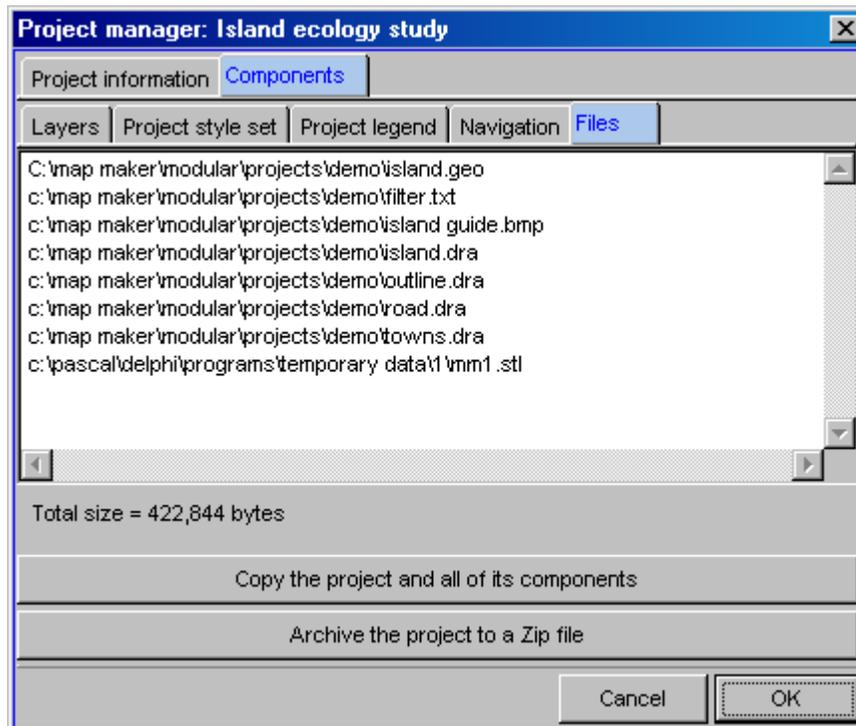
The **Project legend** page is a quick way to create a legend using the project style set. Use the buttons to add entries for polygons, lines, or points. Click on the left hand column to

choose a different style, and the right hand column to change the captions. The legend can be given a title on the **Title** tab



The **Navigation** page, used to select or generate a guide map and to add gazetteers is discussed in section 1.7.6.

The **Files** page lists all the files used by the project:



The **Copy the project and all of its components** button copies the files to a different or new directory.

The **Archive the project to a Zip file** creates a “zip” file containing the project. This file is compatible with WinZip and Pkzip/Pkunzip.

## 1.5 Map furniture

Map Furniture is the name given to those parts of a map; title blocks, north points, scale bars and the like, which are not part of - or directly tied to - actual geographic features. Clearly, object labels and text objects (such as the names of rivers) are not included in map furniture because they are tied to geographic features. Map furniture is created using the **Map furniture** tool.

While your map is on the screen, create the map furniture you require by selecting **Tools – Map furniture**. Click on the screen holding the mouse button down and drag the cursor to draw a box. Then release the mouse button and select the type of map furniture you need from the dialogue box that will appear. The size and position of the box can be altered by selecting the **Map furniture** tool again and dragging the edges of the box (see section 6 for more details).

## 1.6 Navigation

Navigation in Map Maker is concerned with viewing different areas of the map and finding locations. This kind of navigation should not be confused with route planning software, marine or in-car navigation devices or similar applications.

### 1.6.1 Scroll

The conventional way to move around a computer image is with the scroll bars. Map Maker scroll bars are similar to those in any word or image processing application except that they have two blue arrows at each end of the bars instead of the usual single black arrow. When you click on the smaller of the two blue arrows in the top right of the screen the image will scroll by a distance equal to 20% of the current height of the map. You will see that - as in a word processor - when you scroll up, the map image actually moves down as if you were in an aeroplane flying up the screen. The larger blue arrow scrolls by a distance of 80% of the current height of the map. You can also scroll by dragging the button on the scroll bar. When you release the mouse button, the map will redraw.

The extent to which you can scroll a document in a word processor is limited by the width of the page and the length of the document. The extent of a map, however, is theoretically unlimited and so the situation is less clear. The limits of the map you are building are set out in the **Project manager** and are updated automatically when new layers are added.

### 1.6.2 Pan by dragging

Select the **Pan** tool from the **Tools** menu or click on the button showing a picture of a hand in the bottom right corner of the screen. The cursor will change into a hand. Click on the screen and hold the mouse button down while you move the cursor to drag the map across the screen. When you release the mouse button the map will be fully redrawn.

### 1.6.3 Zoom to box

Select **Tools – Zoom to box** or click on the button showing the blue rectangle and the magnifying glass shown in the bottom right. Click and drag to draw a box. When you release the mouse button the map will be redrawn at a larger scale so that the area selected by the box now fills the screen. You will see that the proportions of the box are automatically adjusted to ensure that the area you select by dragging the cursor is drawn to the same proportions as the screen.

If you wish to zoom in to study a detail and then immediately return to the previous view, use the **Zoom to box** tool and simply click and release the left mouse button without dragging. The map will be redrawn to the view before the last zoom to box. You can repeat this operation as often as you like. If there is no previous view selected then, when you click the mouse button with the **Zoom to box** tool, the view will simply zoom out by a factor of two.

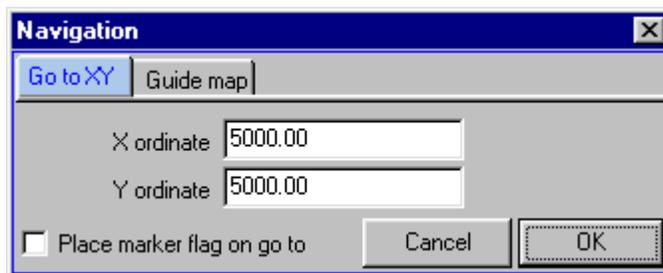
### 1.6.4 Zoom to scale

**Navigate – Zoom to scale** allows you to choose from a pre-defined list of scales or define your own custom scale.

[Edit the pre-defined list of scales in File – System set up – Units and scales.](#)

### 1.6.5 Go to co-ordinates

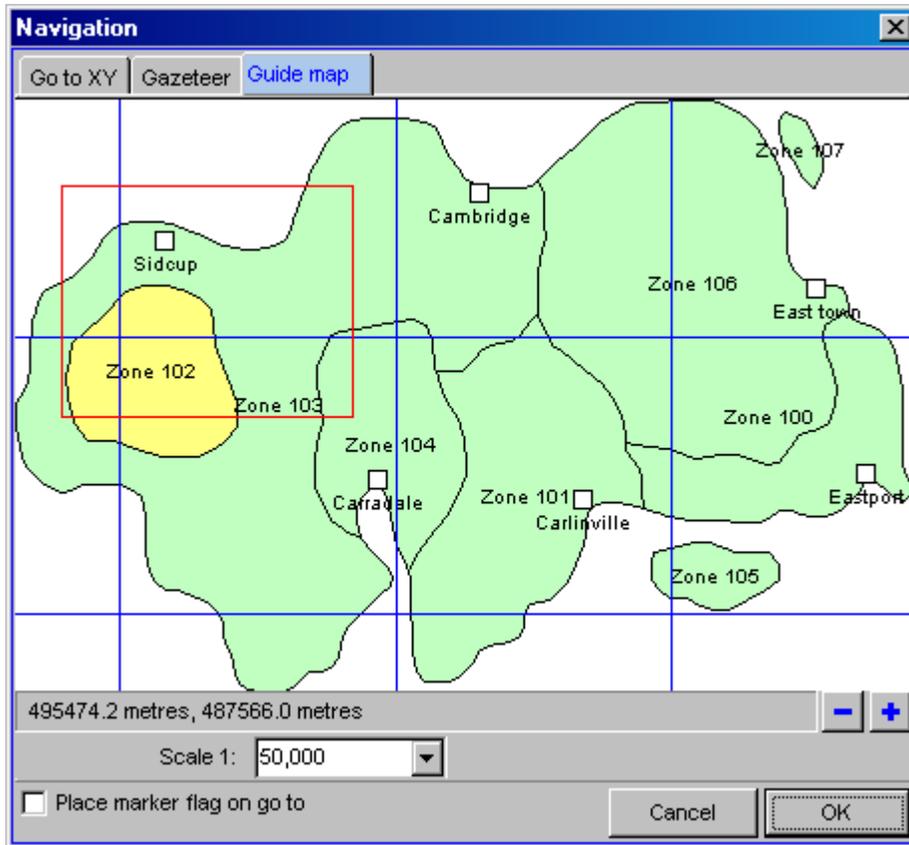
Select **Navigate – Go to co-ordinate**. A dialogue box appears:



To redraw the map centred on a new location, enter values for the X and Y ordinates of the location and click OK. To mark the location for future reference tick the **Place marker flag on go to** box.

### 1.6.6 Guide map

Select **Navigate – by Guide map**, or alternatively click on the green button in the bottom right-hand corner of the screen. If this is the first time that you have selected the guide map in this project, there will be a short delay while Map Maker refers to the layers of the project and generates the guide map. Then the guide map is displayed:



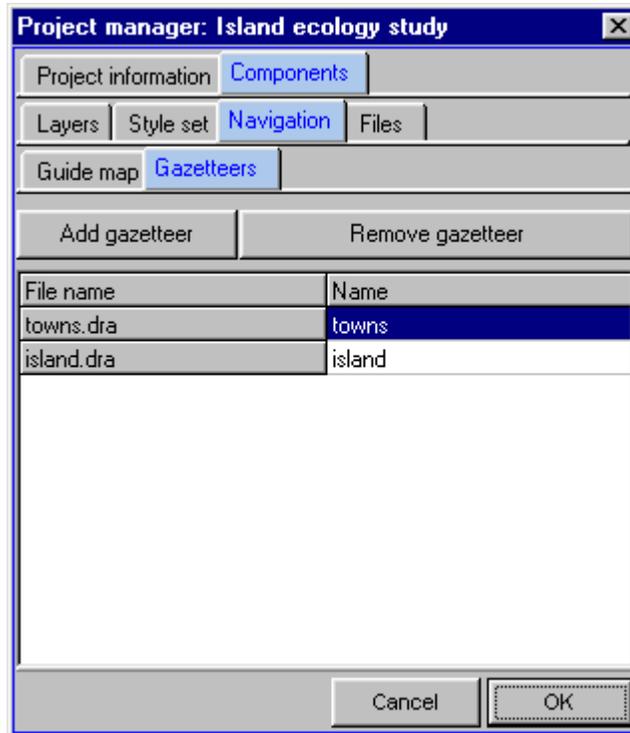
The guide map represents the full extent of the project area. The area of the project currently visible on the screen is indicated by the red rectangle. To relocate the red rectangle, select a point on the guide map, click the mouse button and the new screen view will be centred on the selected point. Use the + and – buttons to zoom in and out, that is to make the red rectangle larger or smaller. Alternatively you can choose a different scale. When you click OK the map will be redrawn to fit the area defined by the red rectangle or the newly defined scale.

Note that the drop-in/drop-out values (see 1.4.6) which you have defined for the layers in the project also apply to the guide map. If your map is full of complex data, you can make the guide map easier to read by setting the drop-in/drop-out values so that detailed information is hidden at given scales.

### 1.6.7 Gazetteers

A gazetteer is to a map as an index is to a book. The gazetteer allows you to select a location by name and command the program to redraw the map centred on the chosen location. There is no limit to the number of gazetteers that can be associated with a project. Go to **File – Project manager** and choose the **Navigation - Gazetteers** page.

Using the **Add gazetteer** button you can choose files to use as gazetteers. These can be DRA files such as island.dra and towns.dra. Click on **Close** to return to the map then click on **Navigate – by Gazetteer**:



Each of the gazetteers – in this case two gazetteers - is shown as a separate page in the **Gazetteer** section of the **Navigation** dialogue box. To redraw the map centred on Carradale, click on the Towns tab, select Carradale from the list, then click on OK.

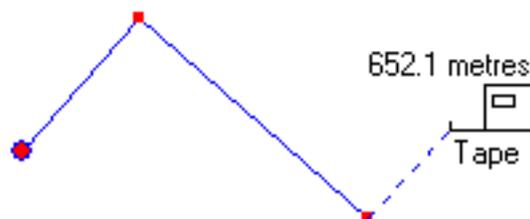
When, as in this example, the gazetteer contains only a few entries, it is easy to find the one you want. Map Maker has a Find facility for larger gazetteers. If you typed the word “East” followed by an asterisk ( East\* ) in the Find box and then clicked the **Find** button, the list would display all the entries starting with “East”. If you typed in “\*east” the program would list all the entries containing east.

## 1.7 Making measurements

Map Maker’s simplest measuring tool is the tape measure:

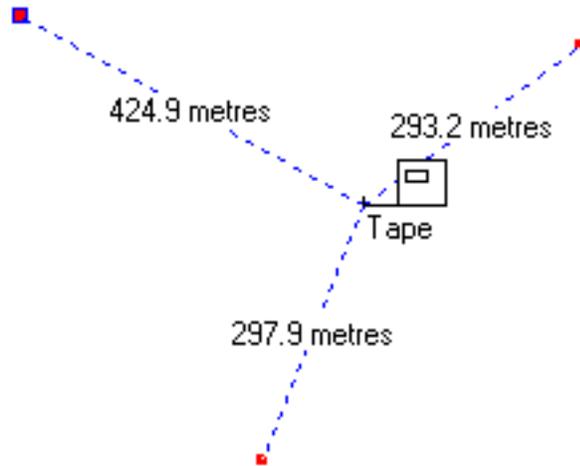
### 1.7.1 Tape measure

Select **Tools – Measurement – Tape measurer**. Click anywhere on the screen and move the cursor. Click again to form a vertex. You can create as many vertices as you like. The total distance along the line is displayed in the linear unit currently selected for the project; metres, yards, etc. Clear the tape measure line by clicking with the **right** mouse button or by pressing the **escape** key. Use the **Backspace** key to delete the last vertex on the line.



### 1.7.2 “Star” tape measurer

Select **Tools – Measurement - Star tape measure**. Click anywhere on the screen and move the cursor. Click on a second point and move the cursor again. You will see that the straight line distance from each of the two points to the cursor is shown. You can continue clicking to measure the distance from new points to the cursor. Clear the star tape measure with a right click.



### 1.7.3 Area measurer

Select **Tools – Measurement – Area measurer**. Click anywhere on the screen. Move the cursor and, as with tape measure, click as often as you like to create vertices. To close the polygon, click once more over the first point or click with the right mouse button. The area of the polygon is shown in the units selected for the current project; hectares, acres, square kilometres, etc.

### 1.7.4 Flood-fill area measurer

Particularly if you need to measure the areas of a large number of polygons, tracing with the area measuring tool is laborious. The **Flood-fill area measurer** is quick and easy to use provided the area concerned has a clearly defined boundary. Select **Tools – Measurement – Flood-fill area measurer**. As you move the cursor around the screen you will see that a dotted line “falls” from the cursor as if it were paint pouring from a paint pot. The paint drip stops when it hits a line on the screen and the area surrounding the cursor is tinted grey to indicate the extent of the flood fill. Click the mouse button to show the area of the selected polygon.

For more details on the flood-fill measuring technique and flood-fill options see [Flood-fill polygon tool](#), section 2.1.4

### 1.7.5 Angle measurer

Select **Tools – Measurement – Angle measurer**. Click anywhere on the screen and move the cursor. The angle is displayed in degrees, minutes and seconds and represents the compass bearing of the line based on the assumption that the top of the screen represents due north.

### 1.7.6 Colour measurement

Particularly when you are working with bitmaps, it can be useful to know the colour value at a given point on the screen. Select **Tools – Measurement – Colour value** and click on the colour you want to measure. The dialogue box divides the colour into its red, green, and blue components.

## 1.8 Actions

In Map Maker the term “Action” refers to an operation that is carried out to transform one or a set of spatial objects. Actions do not directly involve drawing objects. The original data are changed or new objects created which are based on the original set of objects. An example of a simple Map Maker “action” is the creation of a buffer zone around the polygon.

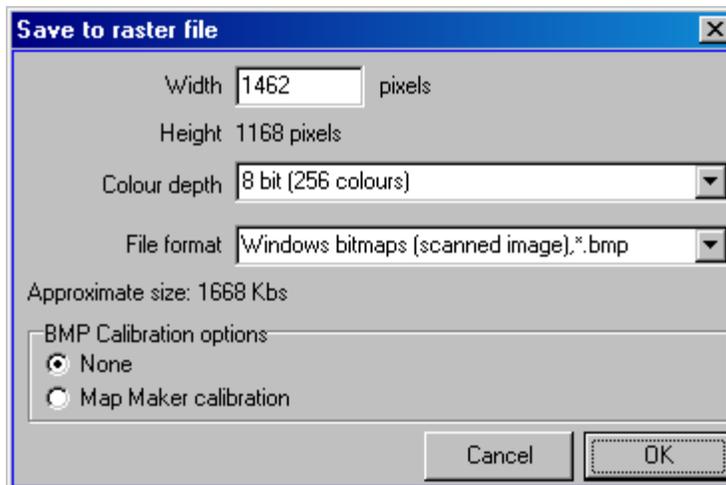
Using Map Maker Pro actions can be performed on the entire live layer or on a selected group of objects. Actions can also transform vector, bitmap, and attribute files. Using Map Maker Scripts actions can be grouped together and automated. For this reason in all the dialogue boxes that use Actions each action is given a unique reference number.

## 1.9 Sending maps to other people

A map is made up of a set of components; layers, furniture, databases, documents, etc. Though a map may work flawlessly on your own computer, difficulties sometimes arise when the map is loaded onto a different computer with a differently structured system of directories.

### 1.9.1 Exporting images

The easiest map to export is a static image. Go to **File – Save screen image**. The image can be saved as a simple bitmap or a Windows “Enhanced Metafile”. If the map is to be included in a document or PowerPoint presentation, the Enhanced Metafile (\*.emf) usually works best. Like any vector file, an EMF stays sharp no matter how much it is enlarged. As a rule an EMF file is also considerably smaller than a bitmap file and so is easier to send by e-mail. However EMF files run exclusively on Windows so some Mac-based publishers and printers cannot accept them. In this case, a TIF file is the best export format. Click on **File – Save screen image – As bitmap**.



If the map image is to be printed, the density of the pixels must be higher than it is on screen or the image will be very coarse. This dialogue box allows you to specify a resolution suitable for a printed image. For example, if the image is going to be reproduced on a page 8<sup>1</sup>/<sub>2</sub> inches wide with a margin of <sup>3</sup>/<sub>4</sub> inch the printed image will be 7 inches wide. The 7 inch image will need to contain 2,100 pixels from right to left in order to achieve a

fine resolution of 300 dots per inch. The height in pixels is automatically calculated in proportion to the width. The approximate size of the image in kilobytes is also calculated.

Different calibration options are available to suit the various file formats; (bmp, tif, or Jpg). If the image is to be published in printed form, it is not usually necessary for it to be calibrated. Calibration is useful if you are exporting the map to another GIS. If the image is being sent to another Map Maker user, use the Map Maker calibration. If you do not know what GIS the recipient is using, a "world" file is the safest option. It is essential to send the world file with the image (\*.tfw for a tif image, \*.jpw for a jpg file). The world file \*.bmw is used for a bmp file, though the \*.bmw file is not widely recognised.

If you are preparing an image for use on a web page then use the JPG option.

### 1.9.2 Sending a map with e-mail

If you click on **File – Send e-mail – Send current project** the current project is automatically compiled into a zip file which is attached to an e-mail. Your normal e-mail window then appears allowing you to enter a message and choose a recipient. This function requires that your computer has a MAPI based e-mail system (such as Outlook Express) and, of course, an internet connection.

Notice that in Map Maker, dialogue boxes are framed with a thin blue line. In Map Maker, this frame is used for "modal" dialogue boxes. In Windows' jargon "modal" is used for boxes which must be closed - usually by clicking on OK or Cancel - before you can proceed to do anything else. Map Maker dialogue boxes which are framed by a yellow line (such as the **Object/Data linker** window are "floating." They can be left open indefinitely and have a minimise button so that you can clear them out of the way.

Both the blue and the yellow boxes sometimes appear as dotted lines. These signify that the dialogue box is re-sizeable by dragging the edges of the box. When the line is solid the size of the box is fixed.

To move a dialogue box, click the mouse button while the cursor is on the title bar, drag the box and then release the mouse button.

## Speed versus presentation

Map Maker has a range of features for advanced presentation and editing. While these can be very useful they can reduce the speed of redrawing vector layers. On a simple map this may be negligible but in complex maps the effects can be significant. This is particularly true where a layer contains one or more complex polygons containing holes. These can be features such as lakes with many islands or road networks that are represented as a single polygon. When working with such layers there are measures you can take to maximise the speed of the program:

- Go to **Edit – Live layer options – Flood fill options** and make sure that there is no tick next to **Snap to background vector lines**.
- If you are working with the live layer, as opposed to simply viewing passive layers, then if all you are interested in is editing the geometry the go to **Edit – Live layer data** and either un-tick **Use live data**, or if you are interested in the data of new objects un-tick **Initialize live layer data**.
- Avoid choosing polygon styles that involve pattern fills and custom hatches. The fastest option is the “translucent” fill.
- In **Layer set up**, set the labels option to “No labels”.

## 2 Drawing and editing

### 2.1 The live object

In Map Maker jargon, the term “object” means a representation on a map of a thing in the real world such as a road, river, house, marsh, shopping mall, bridge, etc. The text printed along a mountain range or shoreline is a “text object.”

In other words, if it matters where you put it on the map – then it is an object.

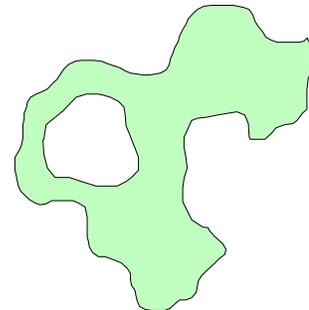
Scale bars, north points, title panels, legends and the like are part of a map but they do not have a geographical location. They are not objects in the Map Maker sense. They are called map furniture (See Map furniture, Chapter 8).

A “live object” is one that you are drawing or have selected to edit. At any one time there can only be one live object. (For operations on groups of objects see section 2.5)

#### 2.1.1 Spatial objects

Spatial objects are polygons, lines, and points which describe geographic features.

- **Polygons.** Polygons describe closed areas. A polygon can have one or more holes in it. The boundaries are made up of straight line segments.
- **Lines.** A line object consists of one or more straight line segments. There cannot be any breaks in a line object.
- **Points.** A point object is the location of a single point. A point has no size and is therefore invisible – it must be represented by a symbol.



#### 2.1.2 Information objects

Information objects have no physical equivalent in the real world but, nevertheless, they are attached to specific geographic locations:

- **Dimensions.** Dimension lines show the distance or distances between two or more points.
- **Text.** Text objects are not the same as object labels (the labels of polygons, lines, and points). The size of a label is specified in terms of its size on the printed page. The height of a text object is measured as if the text were written on the ground. The size of a label on the screen or the printed page will remain the same whether you zoom in or out. A text object will change its size according to the scale of the map.
- **Arrows.** Arrows attach a label to a single point. The size of the arrow will change with the degree of zoom. The size of the arrow’s label will remain the same.
- **Note objects.** Note objects only appear when the map is viewed on the screen, they are not visible on a printed map. A note object allows you to “hide” information about an object behind a little flag attached to the object. When the viewer clicks on the flag, the information will appear on screen. A note object can be in the form of a simple bit

of text, an entire document, a photograph or a video sequence. A note object can also connect the viewer directly to a web site.

### 2.1.3 Drawing a polygon

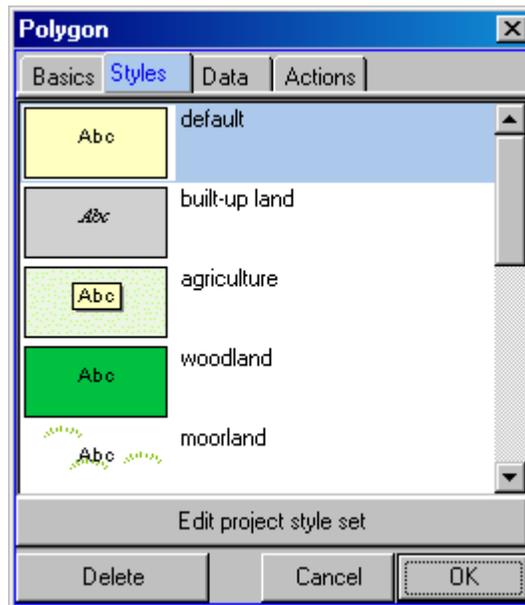
Select **Tools – Drawing – Polygon**. Click anywhere on the screen. Move the cursor and click as often as you like to introduce vertices in the boundary of the polygon. To abort the polygon, press the **Escape** key. To delete the last vertex, press the **Backspace** key. To finish the polygon, click again over the first vertex or click with the right mouse button. As soon as the polygon is closed a dialogue box appears.



The first page, **Basics**, gives the object's **Unique ID** and **Display label**. Typically the ID is used as a hidden identifier to link the object to a database.

To change the default ID and the label go to **Edit – Live layer options – New object options** and enter new values. You will see that one of the options is not to show the dialogue box when a new object is created. This is useful if you plan to draw a number of new objects and assign their IDs and attributes later.

The next page in the Polygon dialogue box is about **Styles**.



The polygon styles in the project style set are listed. Select a style by clicking on the list. If you need to amend a style or create a new one, click on **Edit project style set** (see Chapter 3). The **Data** and the **Action** pages are discussed later.

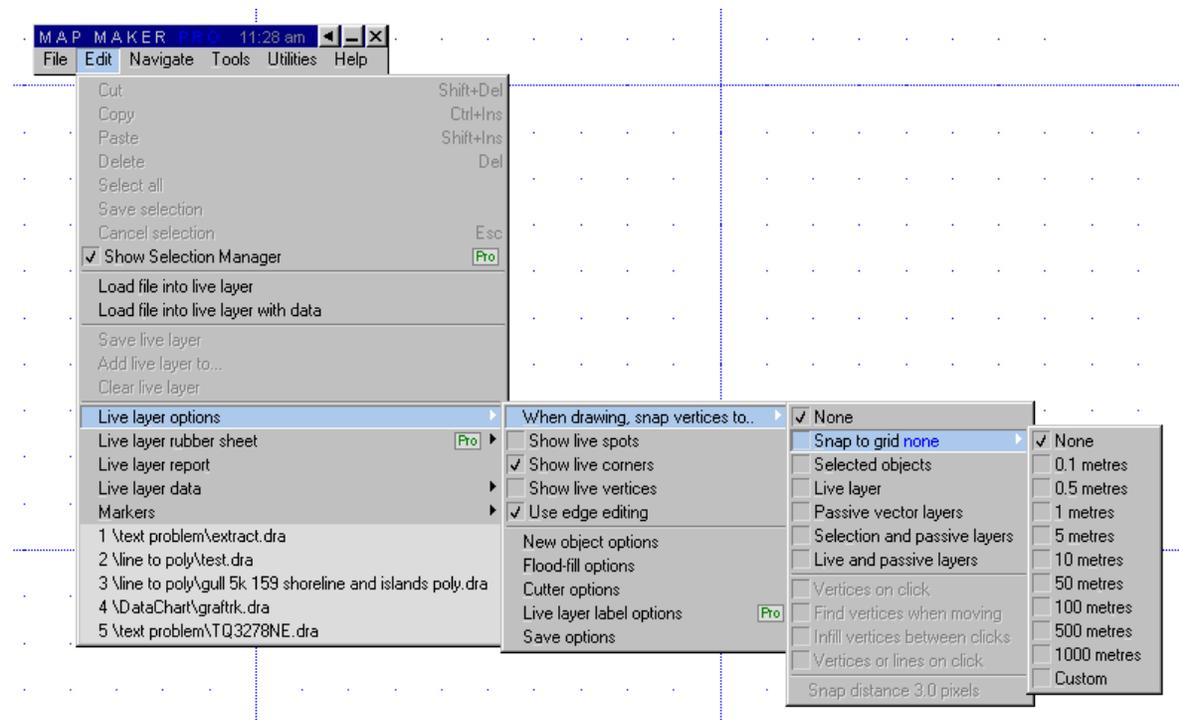
Usually you will create polygons using the polygon tool but other tools can be used to draw closed figures as well. The pencil tool (**Tools – Drawing – Pencil**) is a free-hand drawing tool that can be used to draw lines or polygons. Simply click and drag to draw a line. If the cursor passes over the first point a second time Map Maker assumes that you want to create a polygon; otherwise the pencil creates a line. Because even apparently curved lines are made up of straight line segments, you may wish to alter the spacing of the vertices to create a smoother pencil line. Go to **File – System set up – Preferences - Miscellaneous** and adjust the value of **Spacing of vertices in pixels for the pencil tool**.

The circle tool is a short cut to creating a circular polygon. Again, since it is made of straight line segments, the figure only approximates a circle. Select **Tools – Drawing – Circle** and click and hold down the mouse button where you want to place the centre of the circle. The circle will be drawn as you move to cursor and you will be able to note the length of the radius as you draw. Complete the circle by releasing the mouse button again.

The use of the **Cutter** tool for drawing polygons is described below.

### 2.1.4 Snapping vertices to other objects or to a grid

If you are drawing a new polygon (or line) next to existing objects it can be useful to automatically “snap” each new vertex to the nearest vertex in an existing object. Alternatively you may wish to make your newly drawn polygon or line coincide exactly with



a grid. Under **Edit – Live layer options – When drawing, snap vertices to**, there are a number of options.

You can snap vertices to one of the predefined grid spacings or select a custom spacing. When snapping to a grid, the grid intersections are displayed on the screen as red dots.

The vertices of newly drawn objects can be snapped to the vertices of existing objects either in the live layer or in passive layers. If you are snapping vertices to objects in the

live layer, you can opt to snap only to objects that have been selected using the **Select** tool. For example, if you wish to draw a new polygon snapped to the boundaries of adjacent existing polygons and the layer is large and complicated, you can speed up the process by selecting the adjacent polygons. This saves the program from checking the entire live layer for each new vertex.

When snapping to objects – rather than to a grid – the menu offers four options for when and how vertices are created and snapped:

- **Vertices on click.** This is the conventional option. When you click, a vertex is created and the program searches for any other vertices within the range of the snap distance. The snap distance is expressed as pixels on the screen. By default the distance is 3 pixels. If a vertex is found within the snap distance, the co-ordinates of the new vertex are adjusted to match the found vertex.
- **Find vertices when moving.** This option will snap the first vertex of a new line or polygon to an existing vertex within the snap distance as above. Thereafter you can simply move the cursor, *without clicking*, over an existing line or lines. As the cursor passes over existing vertices, their co-ordinates are copied to the new object. This option allows you to trace an existing boundary with perfect accuracy. Click with the right mouse button to finish a line or place the cursor over the start vertex to finish a polygon.
- **Infill vertices between clicks.** The above technique is effective with relatively simple boundaries. However, if you move too fast or drift away from the existing line you may miss points or – if your hand shakes - you may accidentally double back on the line. Use the infill option to trace a complex line such as a coastline or river. Click once over a vertex on an existing line to start the new line. Move the cursor some distance along the existing line and click again. The intervening points on the existing line will all be copied to the new line. If the line you are tracing is intersected by other lines make sure that you click on each of the junctions.
- **Vertices or lines on click.** The three options above snap new vertices to existing vertices. If there is a long stretch of straight line between existing vertices you can snap your new line to the straight line using this option which will snap to the closest line or vertex – in other words there does not have to be a vertex there to snap to.

**PRO**  
**only**

### 2.1.5 The Flood-fill polygon tool

The Flood-fill polygon tool in Map Maker Pro is an immensely powerful polygon creation facility which works in a similar way to the Flood-fill area measurer (see section 1.9.4). Some vector maps consist simply of a network of intersecting lines. The areas bounded by the lines in these maps are not identified as polygon objects in their own right. The Flood-fill polygon tool can create vector polygons out of the empty spaces in the network. Similarly, in the case of bitmaps, we have mere rows of darker pixels that our brains interpret as lines. Map Maker's flood-fill polygon tool can generate vector data from bitmaps by identifying the polygons enclosed by the darker pixels.

The flood-fill polygon tool can also identify new polygons created when lines in one layer intersect lines in other layers. For example, if your map contains a layer of roads, another of rivers and a third of railways, you could use the flood-fill polygon tool to create a new layer of polygons to show potential development land with direct road access. There is no limit to the number of layers which can be used in this process.

Select **Tools – Drawing – Flood-fill polygon**. As you move the cursor around the screen you will see that a dotted line “falls” from the cursor like paint pouring from a paint pot. The paint drip stops when it hits a line on the screen. It doesn’t matter whether the line is a vector line or part of a bitmap image. When a boundary line is touched the area around the cursor fills with grey colour up to the limits of the bounding lines. When you click the mouse button the new polygon is created.

**PRO**  
**only**

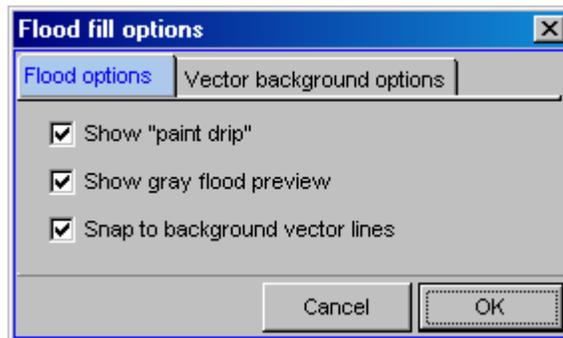
Be careful to ensure that the “paint drip” falls on the outer perimeter of the area you want to record. If it falls on an object or a bit of text within the area, it will digitise that rather than the area you want.

If an area extends up to the edge of the screen, the program cannot accept the area as a legitimate polygon. In other words, the border of the screen cannot constitute a polygon boundary.

If the boundary line is broken, the grey fill will appear to “leak” out beyond the area you intend to select. To close the gaps in the boundary line press the **Shift** key. The grey flood fill will disappear. Now click and drag the cursor. You will see that the cursor acts like a pencil drawing a line. Use the cursor to draw temporary lines to close the gaps in the boundary line. These temporary lines will disappear after the polygon has been created, or if the screen is panned, zoomed, or refreshed in any way.

Similarly, if the area you want to identify as a polygon is divided by a line, hold the **Control** key down and move the cursor. The cursor will now function as a temporary eraser and you can use it to create a gap in the dividing line. You do not need to erase the whole line – just a small segment of it. Again the effect is temporary.

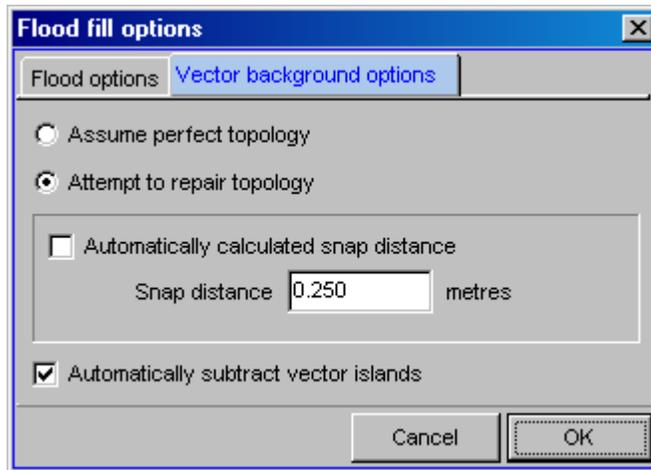
You may find it more convenient to turn off the flood-fill preview particularly if you are creating a large number of new polygons. **Go to Edit – Live layer options – Flood fill options:**



This dialogue box allows you to turn off both the **gray flood preview** and the **paint drip**. However, without the preview, if the map is complex, you may find that the flood-fill “leaks out” of the area you intended to select.

The flood-fill tool works by following the darker pixels on the screen. This means that the accuracy of the new polygon depends entirely on your screen resolution. If you are using vector data you can guarantee the accuracy of the new polygon by ticking the **Snap to background vector lines** box. The second page of the dialogue box offers some options if snapping to a vector background.

**PRO**  
**only**



If you know that the background vectors have perfect topology (i.e. all the lines meet with perfect junctions) you can select the **Assume perfect topology option**. If there is more than one background layer, this is often not a safe assumption to make. If you are not sure that all the lines meet perfectly at their junctions, select **Attempt to repair topology**. The program will use the specified snap distance (or an automatically calculated one) to try to close any line junctions and correct junctions where lines cross. The new lines will be used to assemble the boundary of the flood-filled polygon.

If you tick the box labelled **Automatically subtract vector islands**, any other polygons within the flood filled polygon will be cut out as islands from the principle polygon.

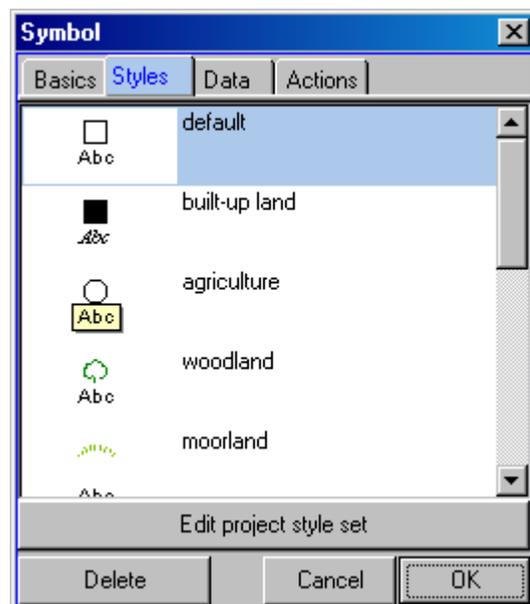
The **Snap to background vector lines** option will slow down the working of the flood-fill tool slightly but it ensures that the boundaries of the new polygon coincide precisely with the underlying vector data. Clearly this Snap option cannot function on a background bitmap.

### 2.1.6 Drawing a line

Drawing a line object is similar to drawing a polygon. Select **Tools – Drawing – Line**, click to draw the vertices and finish the line with a right click. The **Basics** page and the **Style** page of the dialogue box are similar to those in the polygon dialogue box.

### 2.1.7 Drawing a point (symbol)

Select **Tools – Drawing – Symbol**, click to locate the point. The dialogue box appears and, again, the **Basics** page is the same as for a polygon. The **Styles** page lists the symbols that can be assigned to the point.



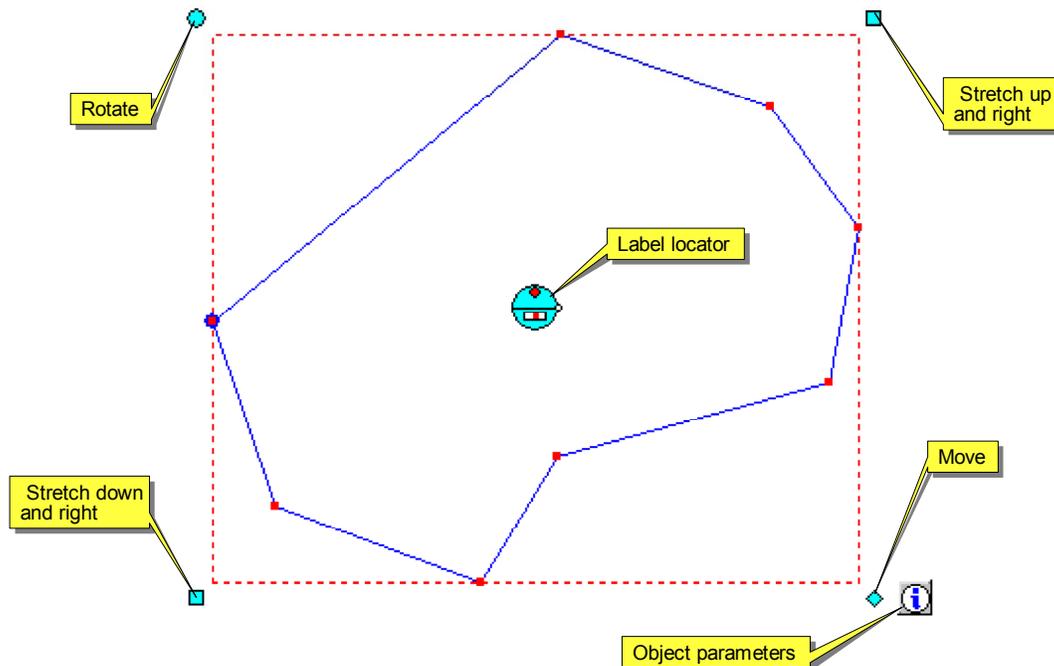
## 2.2 Editing spatial objects

Once you have created an object you need to be able to edit it and sometimes to divide it or merge it with another object.

### 2.2.1 The Edit object tool

To edit a polygon select **Tools – Edit – Edit object**. If you click once on the polygon you will return to the original polygon dialogue box. Here you can change the object's display label, ID, and style.

When you double click on the polygon, it becomes the "live object" (see Live Object section 2.1).



The polygon is framed by a red dotted rectangle with a blue symbols at each corner. Click and drag the top right blue square to stretch the polygon with respect to the opposite corner. Similarly, the bottom left blue square will stretch the polygon with respect to the top right corner. Drag the blue circle at the top left to rotate the polygon. Drag the blue diamond bottom right to move the polygon without altering its shape.

Near the bottom right corner you will see a button which will return you to the original object parameters dialogue box.

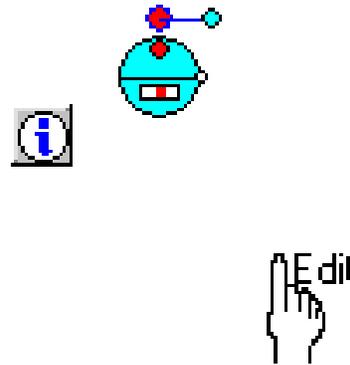
The vertices of the polygon are marked by small red squares. Place the cursor over one of the vertices and you will see that the cursor changes to a circle around the vertex. Click the mouse button, hold it down and move the cursor to alter the shape of the polygon by dragging the vertex to a new position.

Place the cursor over one of the blue straight line segments of the polygon boundary. When you click the mouse button, hold it down and move the cursor you will see that you have added a new vertex to the polygon.

To delete a vertex, place the cursor over the vertex and press the **Delete** key.

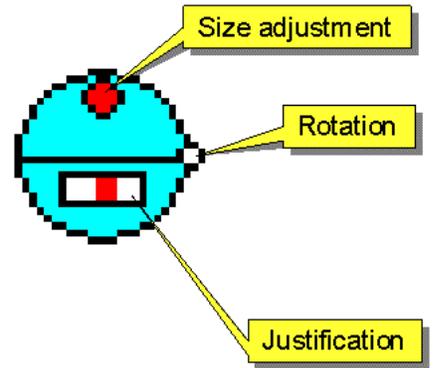
To transform the polygon into a line, place the cursor over a vertex and press the **C** key. This will cut the boundary and create an open figure.

When editing a symbol, double click on the symbol with the **Edit object** tool to put it into edit mode. The location of the symbol is indicated by a red dot with a smaller blue dot beside it and connected to it by a line. If you place the cursor over the red dot you can drag the symbol to a new location. If you place the cursor over the smaller blue dot you can rotate the line about the red spot. This will rotate the symbol. You might use this to align a bridge symbol with a road, for example

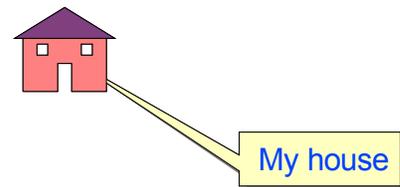


### 2.2.2 The label locator

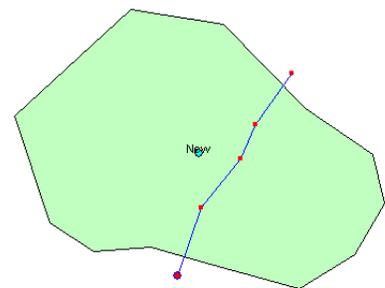
When the polygon is in edit mode – bounded by the red rectangle – you will see a blue circle in the centre. This is the **Label locator**. Any label you attach to the polygon will be drawn at the centre of this blue circle. The label locator allows you to adjust the placement of the label. The red square in the **justification** box controls whether the text is centred, left justified, or right justified. For instance, if you click the cursor in the left side of the justification box, the red square moves to the left and the text will be drawn to the left of the centre of the circle, that is to say it will be right justified).



The small white circle labelled **Rotation** in the illustration can be dragged around the circumference of the label indicator. This will rotate the angle of the baseline of the label. Click on the red circle at the top of the label locator to display a menu that lets you adjust the size of the label. As a rule, the size of the label is fixed when you select the polygon style (see section on Styles). However, if the labels on your map are very close to one another, you might wish to make some individual adjustments using the label indicator.



The size adjustment menu also contains an option called **Arrow label**. If you tick this option, then the label will be connected to the object with an arrow. This is particularly useful if a number of symbols are close together.



### 2.2.3 The Cutter tool

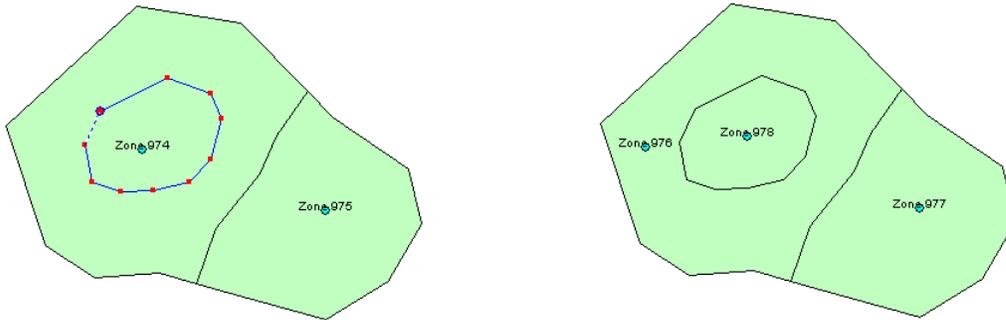
Simple effective maps can be created very quickly by subdividing a single large polygon using the cutter tool.

First select the polygon tool and create a polygon. Then select **Tools – Edit – Cutter**. Click on a spot just outside of the polygon and draw across the polygon, clicking to create vertices, just as if you were using the line tool. Make



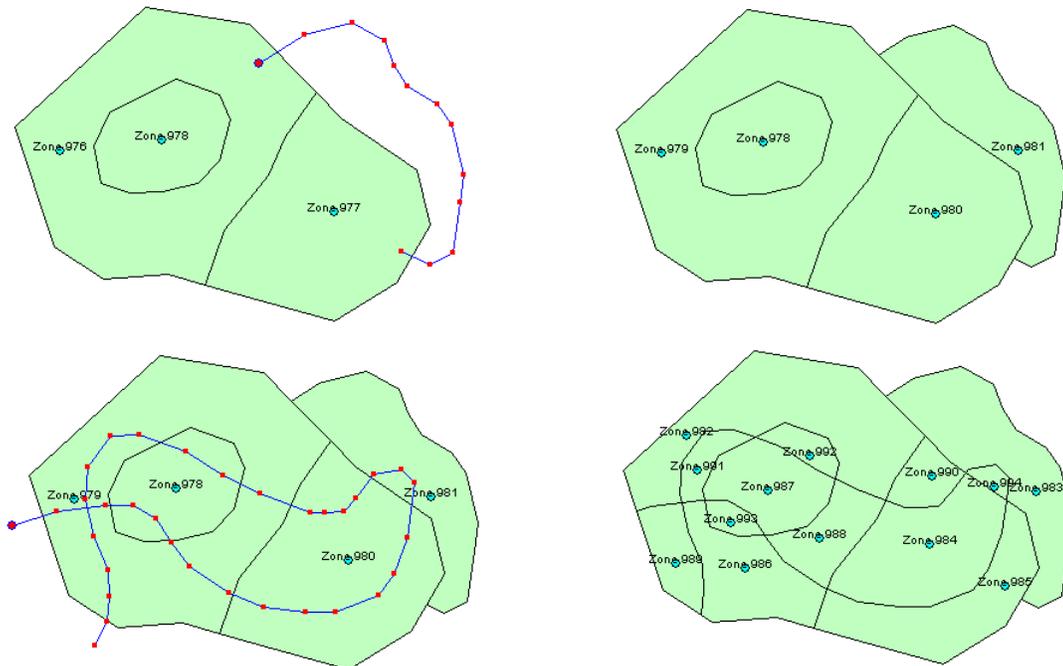
sure that your last click is again outside of the polygon. Finish the cutting line by clicking with the right mouse button. The polygon is now divided into two polygons. The procedure can be repeated indefinitely.

The cutter tool can also be used to create an island within a polygon. Use the cutter tool as if it were the polygon tool finishing the island by clicking a second time over the initial vertex.



In this operation, do not try to finish the cut with a right click. A right click here would create a cutting line rather than a cutting polygon.

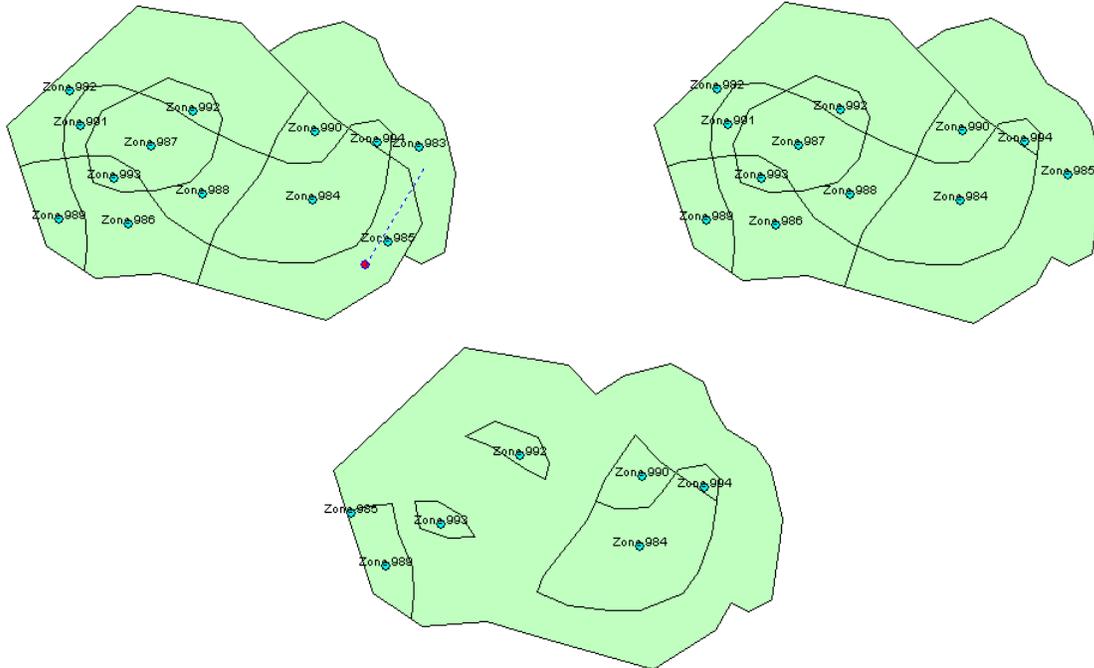
The cutter tool can be used to add polygons to the outside of the group of polygons. Start the cut line inside an existing polygon and make sure that the line also terminates inside an existing polygon.



The cutter tool can be used to cut several polygons at once or it can be turned back to cut through itself. The cutter tool can also be used like the polygon tool to draw a new polygon. When using the cutter tool, remember that you must close the polygon by making the final click over the first vertex.

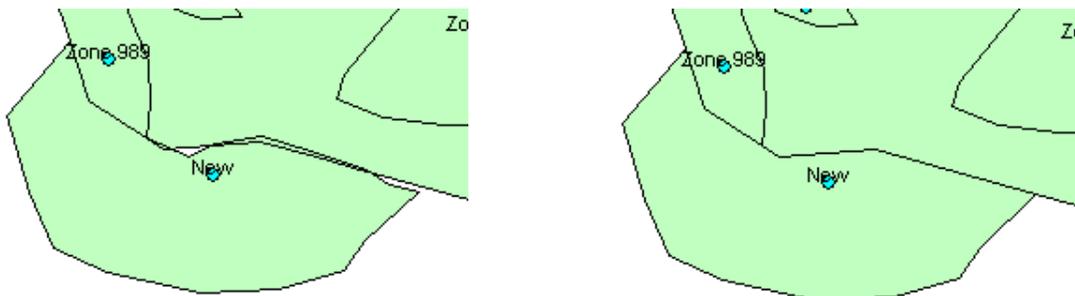
### 2.2.4 The Join tool

The join tool allows you to merge sub-divisions within a polygon. Select **Tools – Edit – Join**. Click on one polygon and move the cursor so that it is over an adjacent polygon. Click again to merge the two polygons. This process can be repeated as often as necessary.



### 2.2.5 The Snap tool

The **Snap** tool ensures that the boundary of one polygon is identical to the boundaries of adjacent polygons. If your map was created using Map Maker's cutter tool you will not need the snap tool. You may be working with a computer map that has evolved over time and includes data collected from a variety of sources. These maps often contain imprecise and overlapping boundary lines. For demonstration purposes, to replicate this problem: use the polygon tool to try to draw a new polygon that shares a boundary with the existing polygons. Unless you use the snap to vertex functions described earlier, you will find it very difficult to make an exact free-hand tracing of an existing line. When you zoom in you will see the gaps and overlaps.



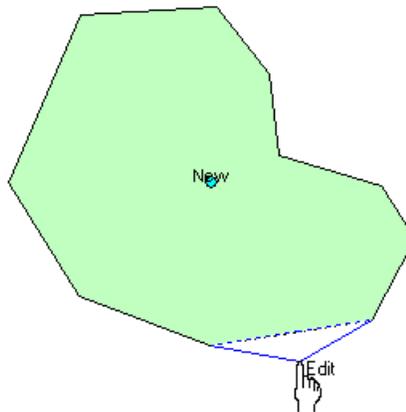
To snap the two lines together, select **Tools – Edit – Snap**. Click in the new polygon close to its boundary with the adjacent polygon. Move the cursor to click inside the second polygon - again near to its boundary. The first polygon will snap to the boundary of the second polygon.

Note that the snap distance and snap direction are determined by the two points where you clicked. In other words if your second click was five metres from the first click then the program will snap vertices in the first polygon a maximum of five metres towards the second polygon. In this illustration we have repeated the operation snapping the polygon to both adjacent polygons.

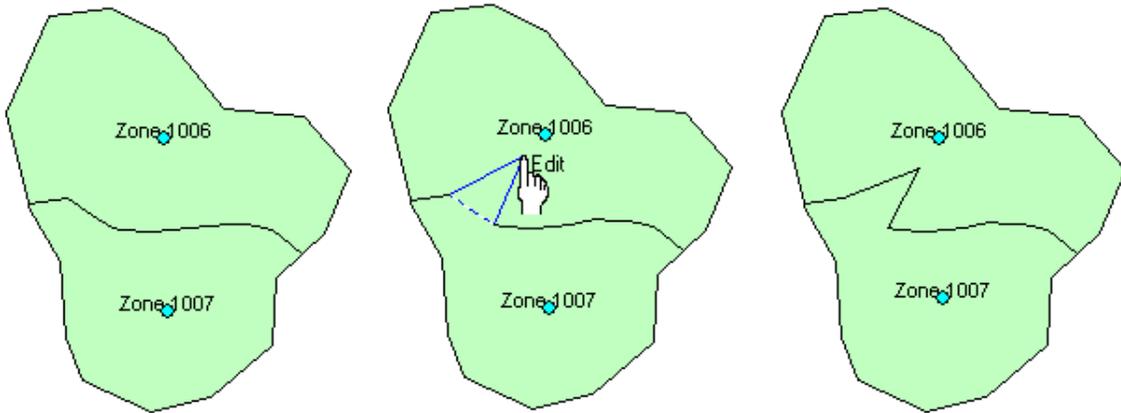
### 2.2.6 Editing common boundaries

The **Cutter** tool and the **Join** and **Snap** tools create adjacent polygons with identical boundary lines. It is essential that adjacent polygons share the same boundary line so that any change to the shape of one polygon is simultaneously reflected in the shape of the neighbouring polygons. This instant updating is achieved by Map Maker's "edge editing" facility.

The use of the **Edit object** tool is described in section 2.2.1. To access all of the editing functions of the edit object tool, double click inside the polygon. If you simply want to change the polygon boundaries select the **Edit object** tool, place the cursor on the polygon boundary, click and hold the mouse button down. The boundary will move as you drag the cursor. The original boundary appears as a blue dotted line while the new boundary is a solid blue line. When you release the mouse button, the polygon is redrawn.

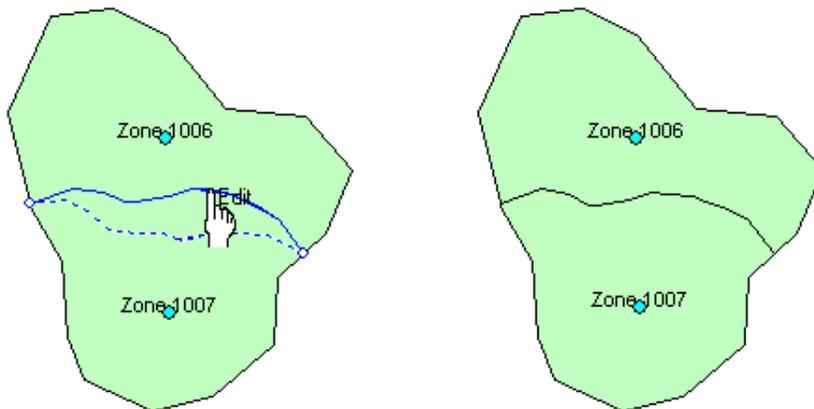


You can practice this operation by creating a polygon and dividing it in two with the **Cutter** tool. Select the **Edit object** tool and place the cursor over the common boundary. Click and hold down, move the cursor, then release the mouse button.

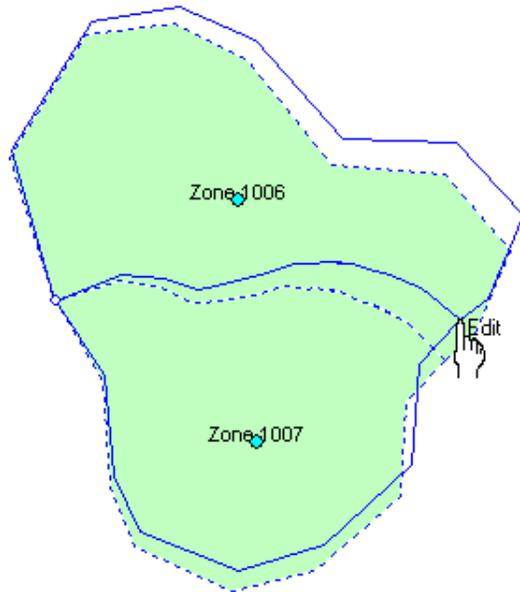


Both polygons have been updated. In this example, one vertex has been moved. If you click on the vertex, hold the mouse button down and press the **Delete** key, the vertex will be deleted from both polygons.

To edit the entire boundary, first place the cursor over the boundary. Then - before you click the mouse button - press and hold down the **Shift** key. Now click and hold down the mouse button. (You can release the Shift key.) Now move the cursor. You will see that the entire boundary is being moved. The two ends of the boundary remain in their initial positions while intermediate points are displaced in proportion to their distance from the ends. When you release the mouse button the common boundary line is updated.



Special conditions arise if you need to move the end of a boundary line. All the boundaries meeting at that point must be updated as well. Place the cursor over one end of the boundary line. Press the Shift key down, click the mouse button, move the cursor, release the Shift key and – when you have finished moving the cursor – release the mouse button.



This illustration shows the alteration in three boundaries that come together at the corner.

When working with very small polygons, you may find yourself accidentally editing an edge when you really are trying to click on a polygon. To suppress or turn off the edge editing function go to **Edit – Live layer options** and de-select **Use edge editing**.

### 2.2.7 Vertices and corners

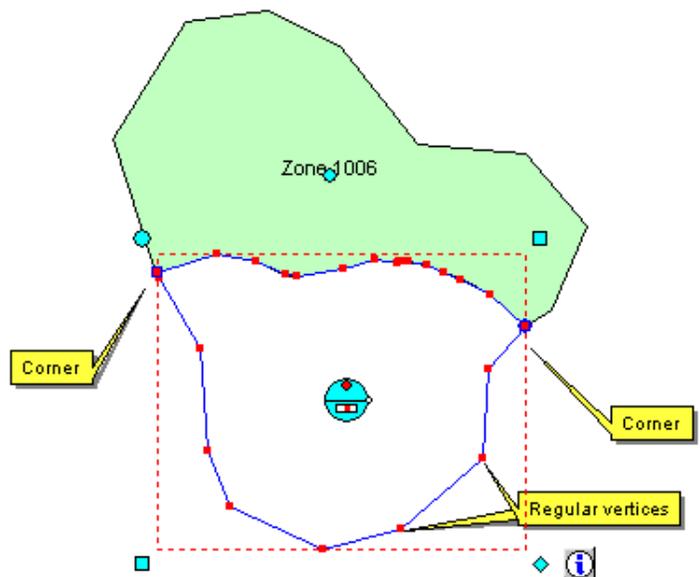
In Map Maker, a **corner** is a special kind of **vertex**. A vertex is any point at which a line changes direction. A **corner** is where lines meet and end.

When you double click on a polygon to put it into “edit mode,” you will see that a vertex is represented by a small red square. Corners are shown as slightly larger red squares with a blue edges.

True corners are where three or more polygons meet or where two polygons meet at the edge of a group of polygons (as in the illustrated example).

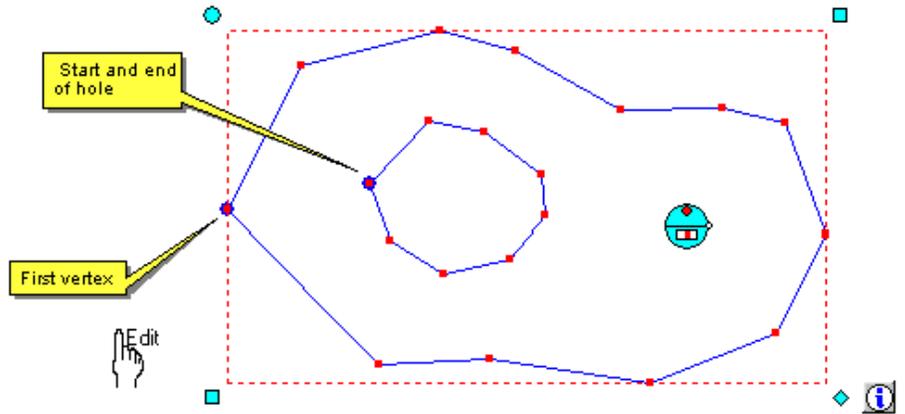
For editing purposes, you may want to introduce temporary “corners” so that you can confine your alteration to one small section of a longer boundary line.

To transform a vertex into a corner, place the cursor over the vertex so that the cursor changes to a circle over the vertex. Then press the **T** key. The vertex will “toggle” to become a corner. If you press **T** for Toggle again, the temporary corner will revert to a vertex. The corresponding vertex in the neighbouring polygon is automatically updated.



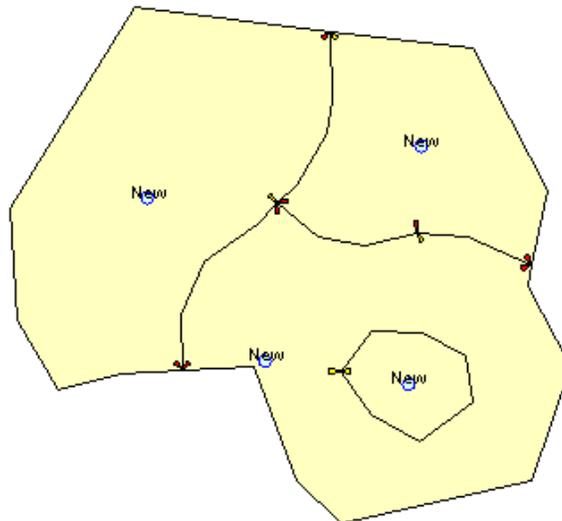
Note that there are circumstances when the **T** key will not change a corner into a vertex. The T key will have no effect:

1. if you try to use it over a permanent corner marking the junction of polygons.
2. upon the first and last vertices created when you draw a polygon. These vertices coincide at a permanent corner. The first vertex is indicated by a red circle slightly larger than the "corner" square.
3. in the case of a polygon with holes in it. The boundary of each hole has a start and end point which is as a permanent corner.



Note: As a rule, a vertex can be deleted by selecting it with the **Edit object** tool and pressing the **Delete** key. The three types of permanent corner listed above cannot be deleted.

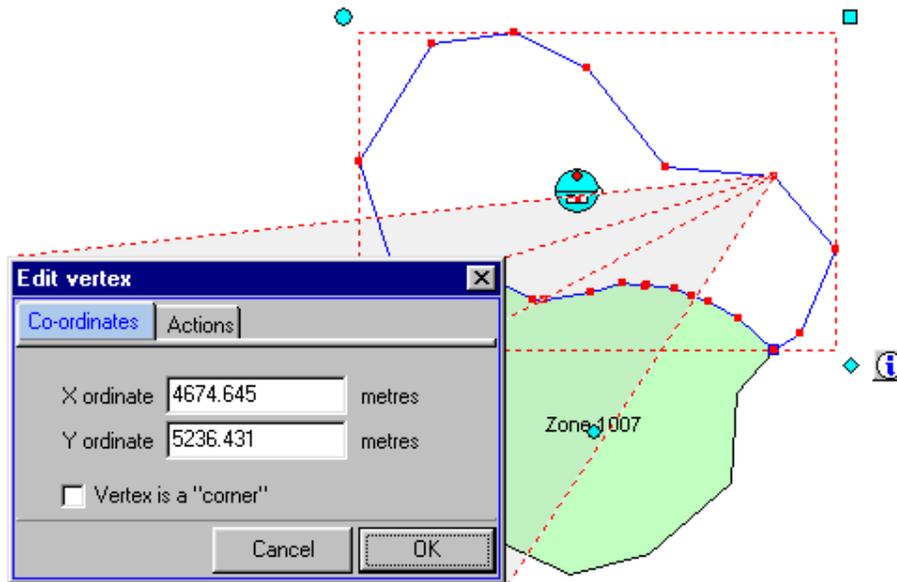
When dealing with a set of adjoining polygons it can be useful to identify all the corners in all the polygons. This allows you to ensure that a corner on one polygon is correctly matched with a corner on an adjoining polygon. Go to **Edit – Live layer options** and select **Show corners**. Little arrows will indicate all the corners in the live layer.



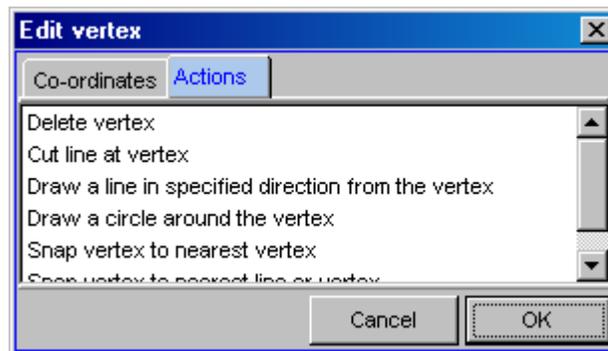
The start corner of each polygon and each hole within a polygon is shown with a yellow arrow while other corner arrows are red.

### 2.2.8 The live vertex

In Map Maker jargon, the word “live” refers to a layer or object which is available for editing. Select the **Edit object** tool, and double click on an object to edit it. If you now place the cursor over a vertex and click with the right mouse button. A dialogue box appears which allows you to edit the vertex.

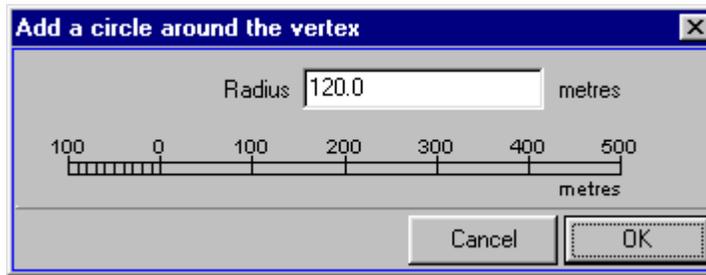


You can change the location of the vertex simply by changing the X and Y ordinate values and clicking **OK**. Toggle or transform the vertex into a corner by ticking the check box, **Vertex is a “corner”**. Now click on the **Actions** page:



The **Delete vertex** and **Cut line at vertex** functions are self explanatory. **Draw a line in a specified direction from the vertex** is useful if, for example, you are trying to locate a point which is a known direction from the vertex.

When you select **Draw a circle around the vertex** another dialogue box appears. Select the radius you require and click on OK.



Being able to draw a circle of a precise radius around a vertex is useful in population and distribution maps, planning services, monitoring health and safety hazards, etc.

The **Snap vertex to nearest vertex** function is used to tidy a shared boundary with an adjacent object in the live layer. The next function, **Snap vertex to nearest line or vertex** does the same but it will snap to the nearest part of an adjacent object in the live layer irrespective of whether the nearest point is also a vertex.

Note that the **Actions** page contains a slightly different set of functions when used with a line object or a point object.

### 2.2.9 Undo changes

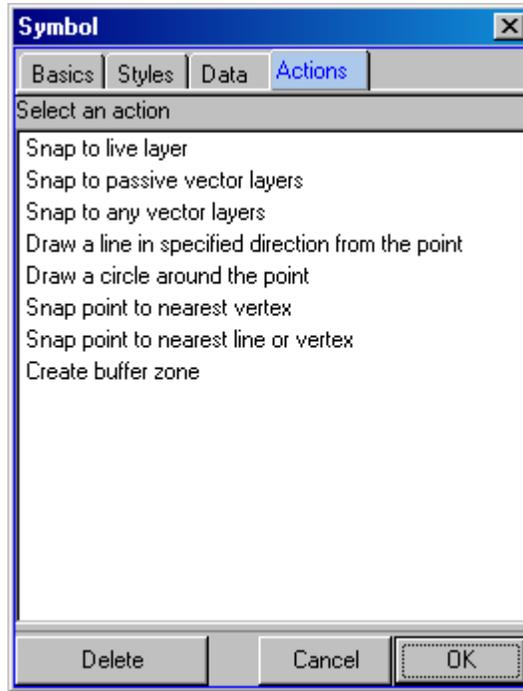
Map Maker's **Undo** facility allows you to correct editing mistakes. Open the **Tools** menu or the **Fast menu** (right click). Your last undo-able operation, if there is one, will be shown at the bottom of the menu. Alternatively press **Ctrl+U** on the keyboard. Under certain circumstances you will not be able to access the Undo facility.

The undo-able operations will be cleared if you:

- Open a new project
- Clear the screen
- Save the live layer
- Clear the live layer

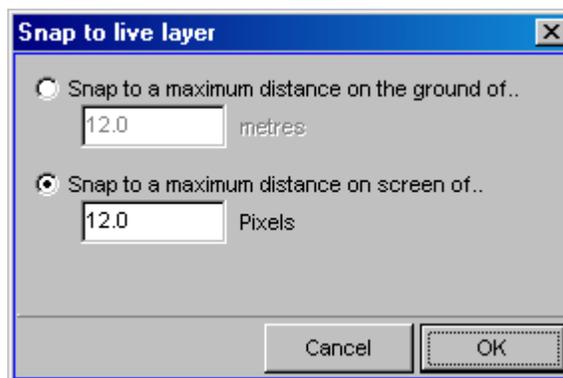
## 2.3 Actions on objects

The dialogue box for spatial objects contains a page for **Actions**. The contents of the page are different for polygons, lines, and points.



### 2.3.1 Actions for a point object

If you select **Snap to live layer** and click **OK** (or double click on **Snap to Live layer**) the following dialogue box appears.



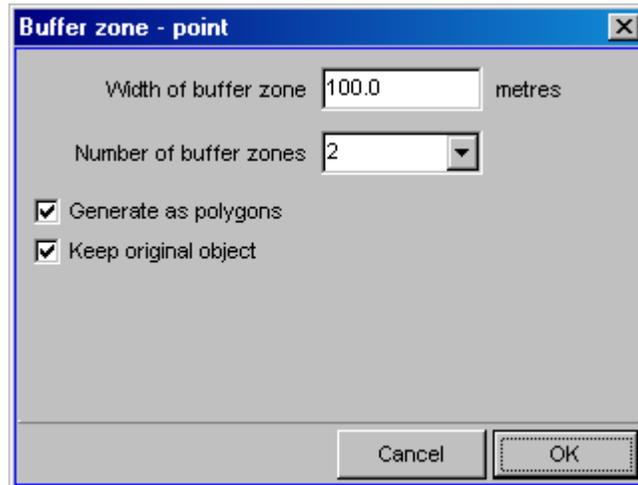
You can choose whether the point will snap a specified number of pixels or an actual distance on the ground. **Snap to passive vector layers** will snap the point only to passive or background layers while **Snap to any vector layers** will snap the point to the live as well as the background layers.

The next four functions (**Draw a line in a specified direction from the point**, **Draw a circle around the point**, **Snap point to nearest vertex**, **Snap point to nearest line or vertex**) are as discussed above with respect to the Live vertex (see section 2.2.8).

The **Snap** function can be used, for example, to snap a symbol for a pumping station to a line representing a pipe.

When you **Create Buffer zone** for a point, you simply draw a circle centred on the point.

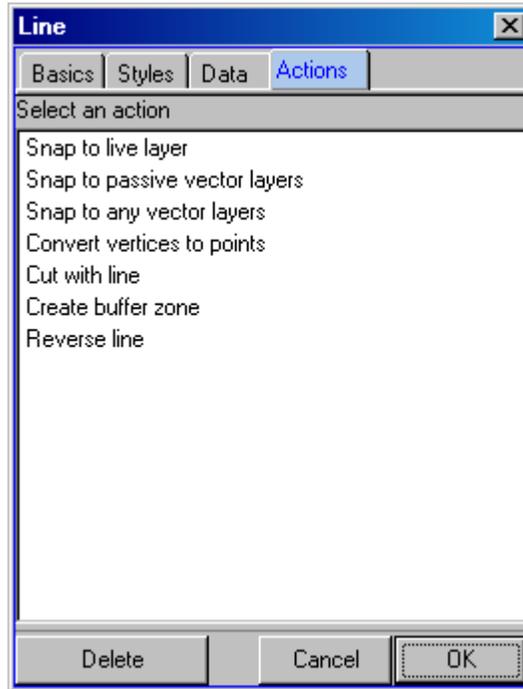
**PRO**  
**only**



In this case the **Width of the buffer zone** is specified as 100 metres and because we have set the **Number of buffer zones** to 2 there will be a second zone created with a radius of 200 metres. If the **Generate as polygons** box is not ticked, these two buffers will be simple line objects. If the box is ticked, as in this example, two polygons will be created, one a circle of radius 100 metres and the other a ring with an outside radius of 200 metres and a hole in it of radius 100 metres. If the **Keep original object** box is not ticked then the point object will be discarded leaving the buffer zones.

### 2.3.2 Actions for a line object

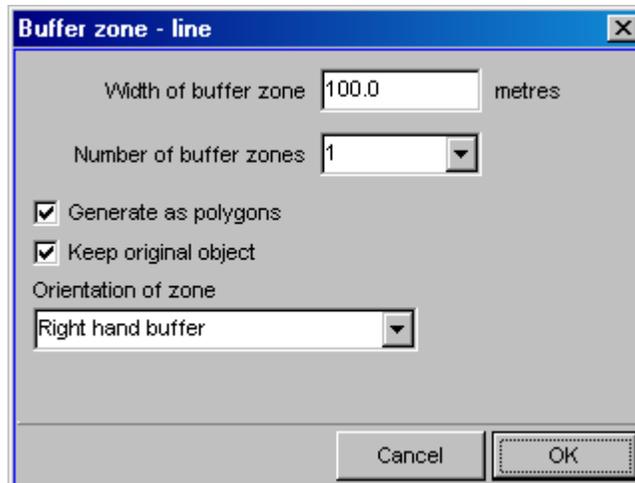
The first three **Snap** options are the same as the Actions for a point object. **Convert vertices to points** is a way to explode a line into its constituent vertices. If, for instance, you had taken soil samples at a number of points along a route, you might be more interested in the points than in the line of the route itself.



**Cut with line** allows you to use the line as if it were the cutter tool. In other words the line will cut all the objects in the live layer along its path. This method of cutting allows you to preserve the cutting line as an object in its own right. So if you cut polygons with a line representing a river, then you have both the polygons on either side of the cut and the original line of the river.

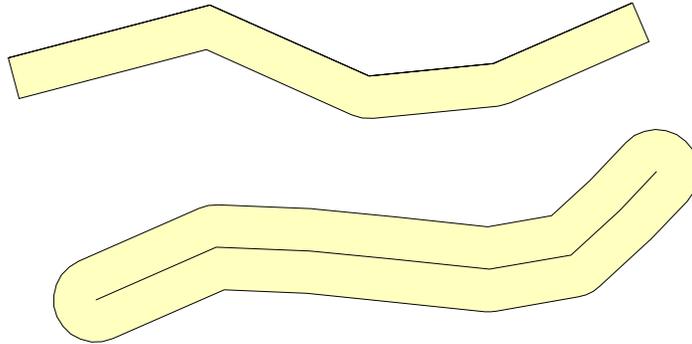
**PRO  
only**

**Create buffer zone** displays a dialogue box similar to that for the buffer zone around a point.

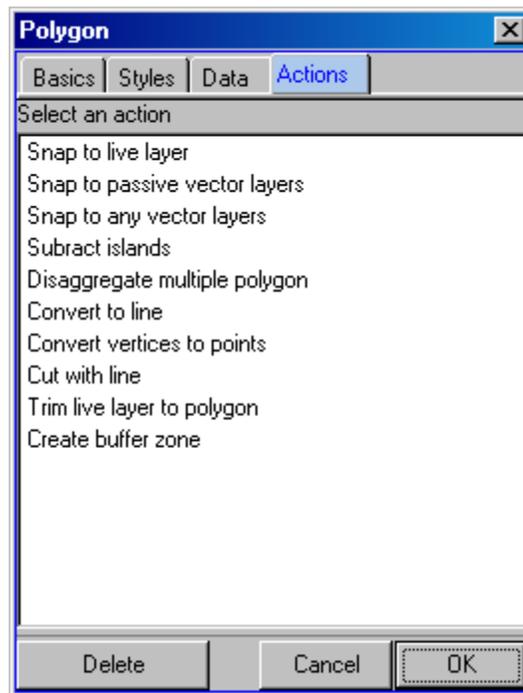


**PRO  
only**

The **Orientation of the zone** option allows you to select a **Right hand buffer**, a **Left hand buffer**, or a **Buffer on both sides** of the line. This last creates a buffer zone with rounded ends enclosing the ends of the line. Buffer zones on only one side of the line will have square ends and these shapes will appear too if you select **Generate as polygons**.



### 2.3.3 Actions for a polygon object



The **Snap** options are as described above. Choose **Subtract islands** if you want to subtract any polygons in the live layer from the principle polygon.

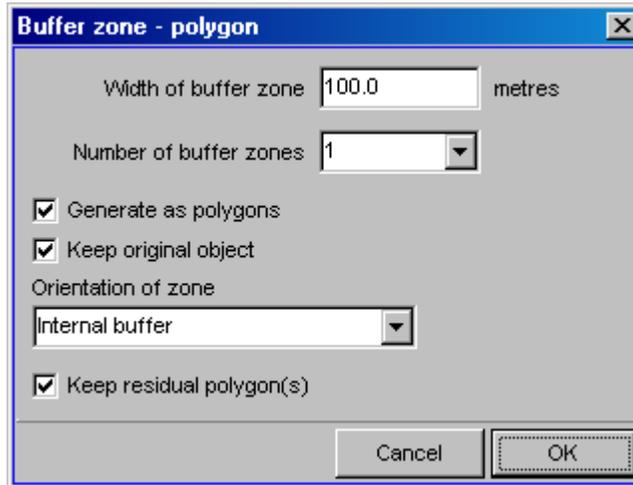
**Dis-aggregate multiple polygon** allows you to break a polygon with holes in it up into its constituent simple polygons. Select this option and a dialogue box will ask whether you want to save the islands as polygons. If, for instance, you have a complex polygon describing a lake which has holes in it and those holes are filled with polygons for islands

then you probably will not want to save the island polygons (i.e the holes in the lake) since these will be duplicates of the polygons that you already have for the islands.

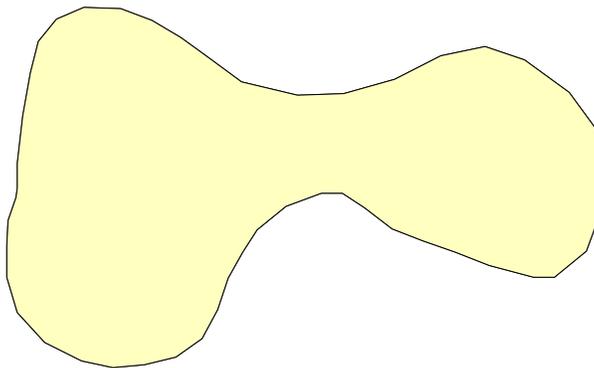
The **Convert to line** function is self explanatory. **Convert vertices to points** and **Cut with line** are as described above for the line object. **Trim live layer to polygon** will cut the live layer and discard any objects outside of the area of the polygon.

The buffer zone for polygons is similar to the buffers for points or lines.

**PRO  
only**



The **Orientation of zone** for a polygon allows you to create internal or external buffers. In addition, there is the option to **Keep residual polygon(s)**. Frequently applying internal buffers results in leftover bits of the polygon. This tick box allows you to keep these areas as polygons or discard them as in the example below.



## 2.4 The live layer

The "live layer" is where objects can be drawn and edited. There is only one live layer. All other layers are "passive layers".

It is important to understand that, unlike some CAD and GIS programs, Map Maker does not work by activating one layer and then activating another layer. The Map Maker system allows you to bring objects into the live layer from a variety of sources. They can be newly drawn objects, objects copied from other layers and objects created or copied through the use of queries.

Before a file can be edited, it must first be copied into the live layer. After the data are edited the file can be saved under the same file name or stored in a completely different file.

### 2.4.1 Editing existing files

To edit an existing file, first clear the screen if it is not already clear. Click on **File – Clear**. Select **Edit – Load file into live layer**. A dialogue box will appear listing the existing files. For this exercise, choose a DRA file (If your installation CD comes from Map Maker Ltd, you can select a file from the demo project c:\Map Maker\Demo data).

Objects in the live layer are each marked by a small blue circle to make them easy to distinguish from the objects in “passive” layers.

You can turn off the “live spots” by going to **Edit – Live layer options** and removing the tick from the **Show live spots** box.

As a practice exercise, clear the DRA file from the live layer by selecting **Edit – Clear live layer**.

(The **File – Clear** command will also clear the live layer as well as any “passive layers” from the screen.)

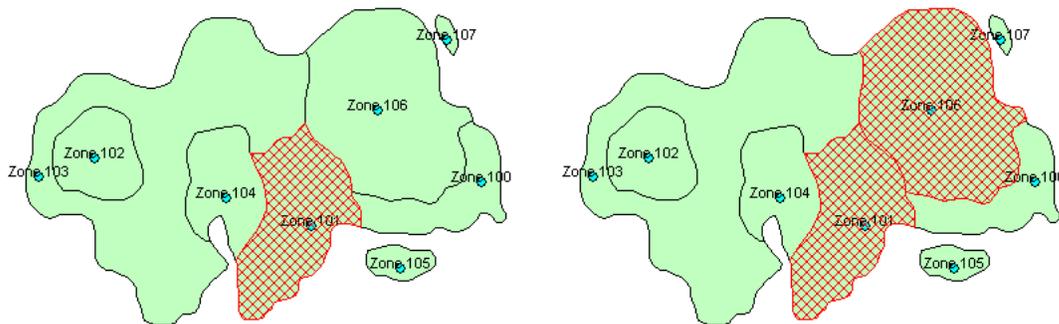
Now, when you re-open the **Edit** menu you will see that the last file you loaded into the live layer is listed at the bottom of the menu. As you progress with your project, the last five files used will always be recorded at the foot of the **Edit** menu to make them quick to re-load.

## 2.5 The selected group

The **Edit object** tool allows you to edit one individual object at a time.

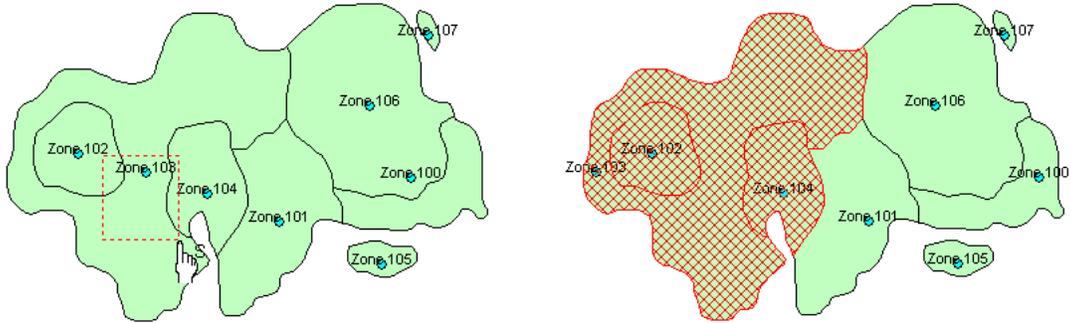
The **Select tool** allows you to perform an operation on a selected group of objects, rather than all the objects in the live layer.

Load a DRA file into the live layer. Select **Tools – Edit – Select**. Click on an object and it will be selected. Click a second time to de-select the object.



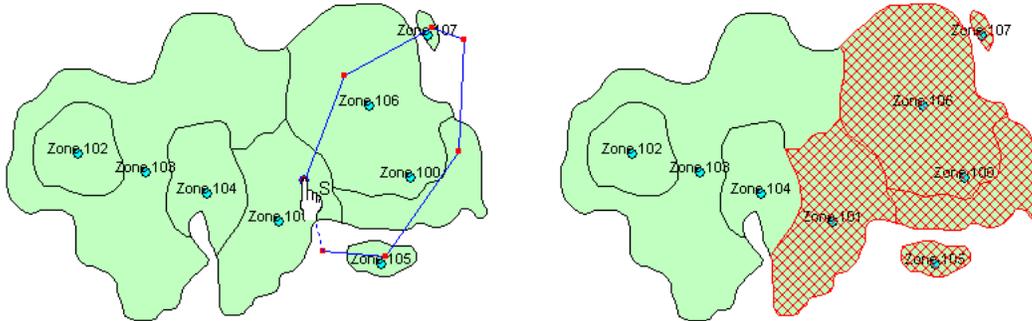
If you click on another object the first object will be de-selected. To select both objects simultaneously, hold the **Shift** key down while you click on the second object.

For an alternative method of selecting objects, go to **Tools – Edit – Select**. Then click, hold down and drag to draw a rectangle. All the objects within the rectangle will be selected. Any previously selected objects will be de-selected.



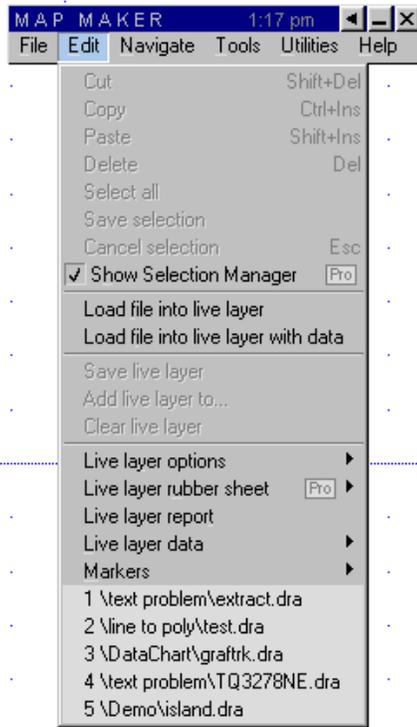
Using the **Select** tool, you can also press and hold down the **C** key on the keyboard. Then click, drag, and release to draw a circle containing the selected objects. (You can release the C key immediately after clicking)

Objects can also be selected using a line or a polygon. With the cursor set to the **Select** tool, hold down the **Control** key and click to draw a line just as if you were using the Line tool. If you finish the line with a right mouse button click, all the objects along the line will be selected. However, if you finish by clicking again over the first point, you will select all the objects contained or partially contained in the polygon as in the illustration below.



To add a second group of objects to the first, hold the **Shift** key down and make another selection. To remove a group of objects from all those selected, hold the Shift key down and click on the objects you wish to de-select.

When you have selected a group of objects, open the **Edit** menu:



**Cut** allows you to remove the selected group from this project and paste it into another project or to use the selected group to start a new project by selecting **File – New project – Based on copied selection**.

**Copy** allows you to copy the selected group and paste it into another project or use it to start a new project by selecting **File – New project – Based on copied selection**.

**Delete** will delete all the selected objects from the live layer.

**Select all** selects all of the objects in the live layer.

**Save selection** saves the selected objects to a DRA file.

**Cancel selection** will de-select the group.



Any item on the menu showing the word “Pro”, such as **Show Selection Manager**, requires Map Maker Pro.

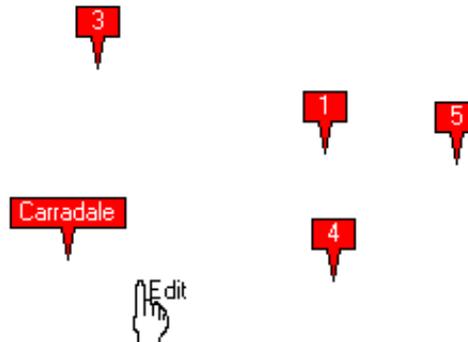
## 2.6 Live layer report

The **Live layer report**, launched from the **Edit** menu, displays a summary of the contents of the live layer in a floating window. The live layer report is automatically updated as the contents of the live layer are edited. The areas of polygons (and the length of lines) of the same style are summed so that you can see the total area represented by each style. A single style typically represents a particular land use, for example, a farmer might assign a different style to each crop.

Live layer report			
Polygons			
Style 0	default	32 Polygons	141.06 hectares
Style 1	built-up land	1 Polygon	2.33 hectares
Style 2	agriculture	3 Polygons	14.57 hectares
		36	157.96 hectares

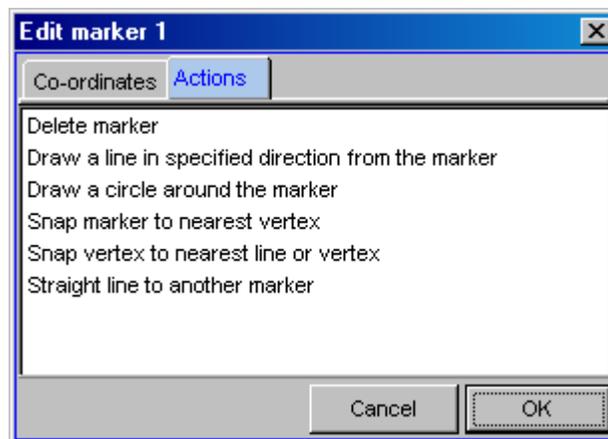
## 2.7 Using markers

Temporary markers are used when drawing objects or measuring distances and areas. Each time you press the **M** key, a marker will appear on the point indicated by the cursor. You can place a marker while you are drawing a line, measuring a distance or at any other time - provided that no “modal” dialogue box is present on the screen. Each marker is assigned a number automatically.



You can change the number or name the marker by selecting the **Edit object** tool and clicking at the base of the marker. A dialogue box appears which allows you to change the name of the marker and adjust its location.

The **Actions** page in the marker dialogue box is similar to the one that appears when you select a vertex of a line or polygon, or a point object. The action **Straight line to another marker** is different. When you click on this action you are presented with a list of all your current markers. If you select one from the list then a straight line will be drawn in the live layer linking the marker on the screen to the marker on the list.

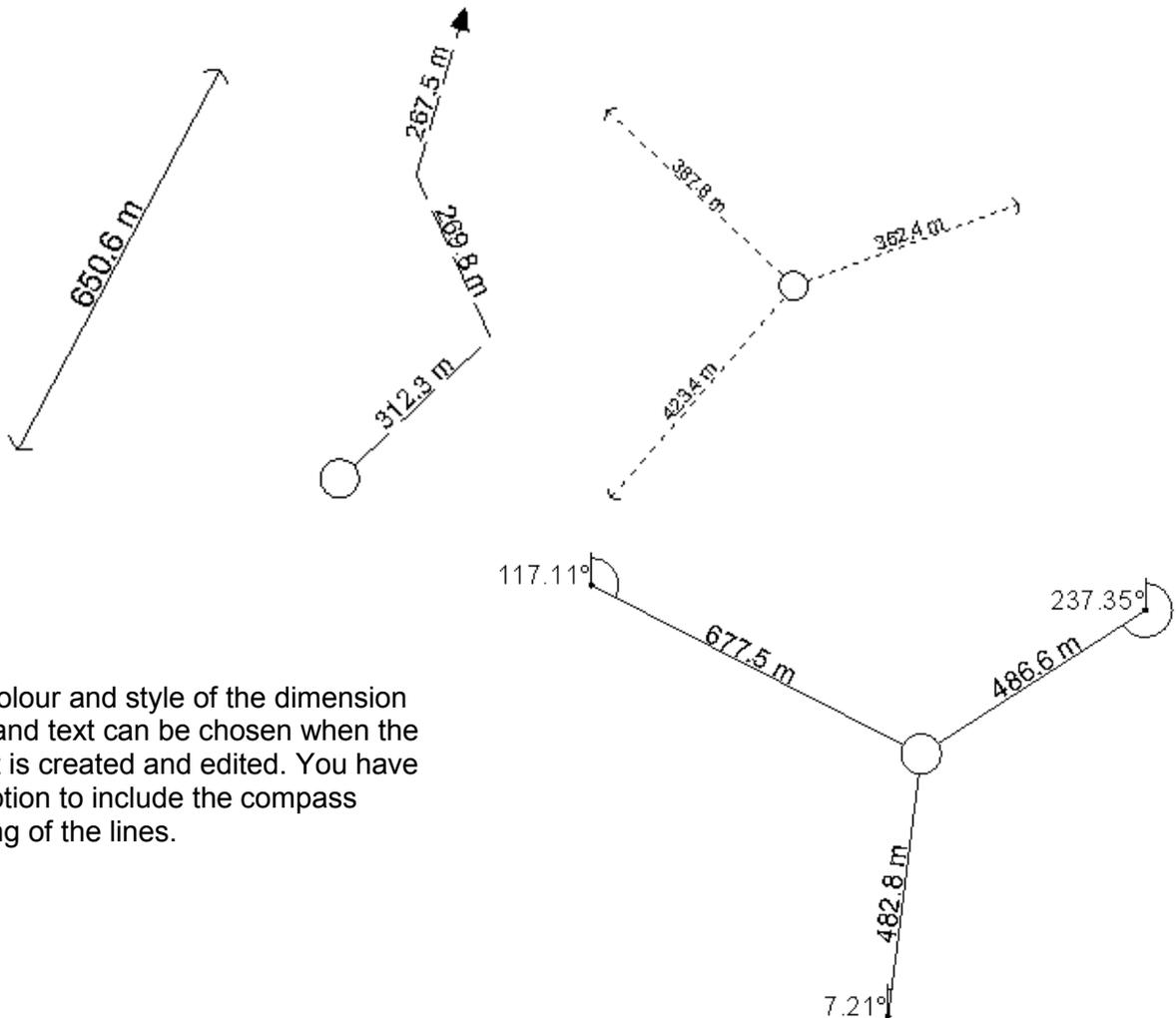


## 2.8 Annotation and dimensions

In Map Maker jargon, the word “object” refers to spatial objects (polygons, lines, and points) and information objects (see section 2.1.2). Annotation and dimension objects which convey information about spatial objects are - like spatial objects - tied to their location on a map. For this reason, annotation and dimension objects are not classed as map furniture (see section 1.5).

### 2.8.1 Drawing dimension lines

Open the sub-menu **Tools – Drawing – Dimensions**. The three types of dimension lines are: **Simple**, **Chain**, and **Star**. A **Simple** dimension shows the distance between two points, a **Chain** shows the lengths along of a series of line segments, and a **Star** shows the distances from one point to a number of other points.

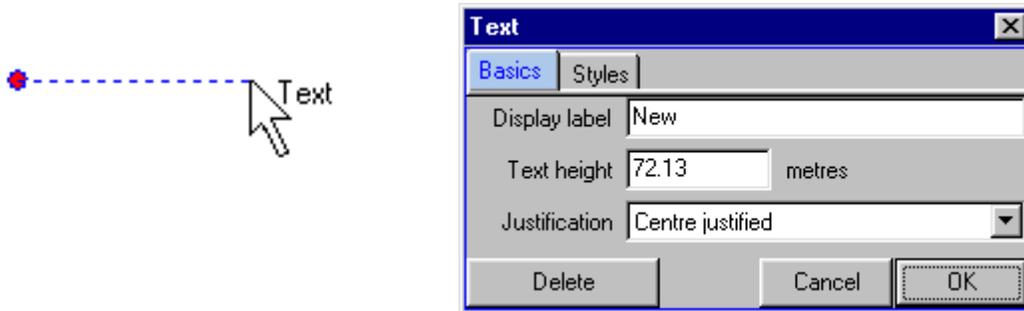


The colour and style of the dimension lines and text can be chosen when the object is created and edited. You have the option to include the compass bearing of the lines.

### 2.8.2 Placing text

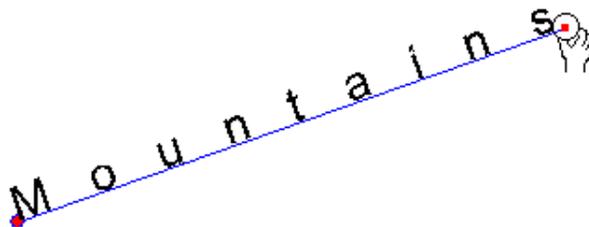
Remember that a text object differs from a label (such as the label of a polygon, line or point). The size of a text object is defined with respect to real world dimensions (i.e. metres or yards on the ground). This means that as you change the scale of the map by zooming in or out the size of the text grows and shrinks with the map geography.

To draw a Text object, select **Tools – Drawing – Text**. Click once – releasing the mouse button – then move the cursor. The line you are drawing will be the base line for the text. For normal horizontal text move the cursor to the right. Click again. A dialogue box appears:

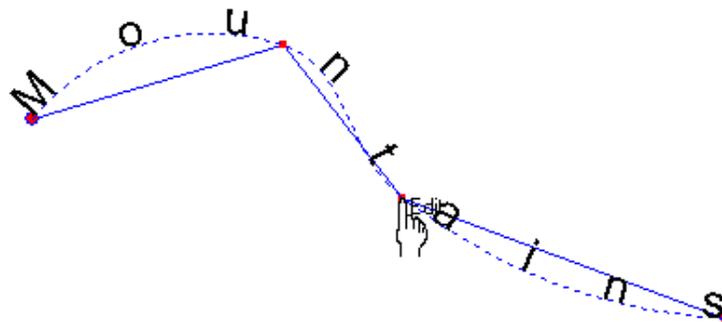


The program assigns a default size for text of medium size at the current scale. Text justification allows you to choose **Centre** to locate the text centred on the first point you selected or to the **Left** or **Right** of your first click. The angle of the line between the first and second point controls the angle of the text.

The justification option **Stretched between two points** will space the text so that it occupies the full length of the line from the first to the second point.



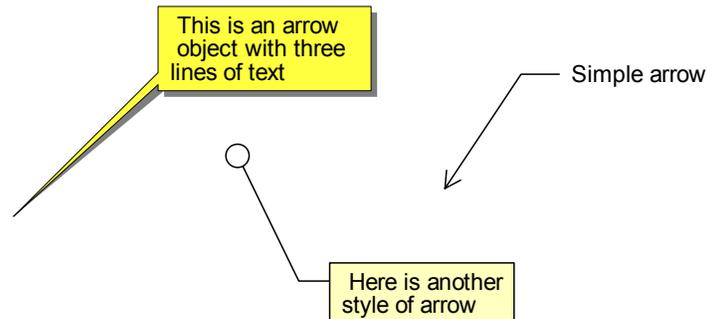
Finally you have the option to create a text object that is **Curved along an S curve**. This option allows you to create any number of vertices on the baseline which are used to generate a curve for the text:



Unlike other objects, a text object in the live layer is indicated by a small blue square. To edit the text object select the **Edit object** tool and click on the blue square.

### 2.8.3 Placing an arrow

Arrow objects connect a label to a geographical point.



As with other objects, you can specify the style and colour of the arrow and, if you select a text box, the colour used for the fill.

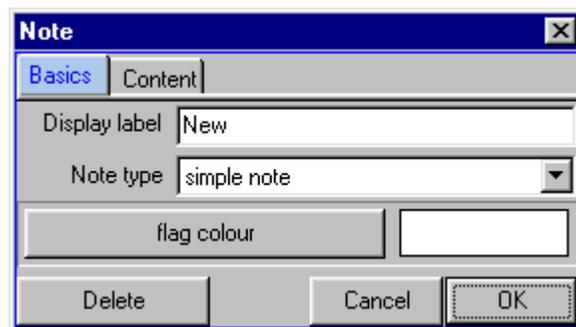
When an arrow object is in the live layer two blue circles indicate the tip and point at which the arrow meets the label. Click with the **Edit object** tool on either of these circles to open the dialogue box which allows you to change the style of the arrow.

Remember, the arrow is an object and will change size you when change the scale of the map by zooming in and out. The size of the label itself will **not** change.

### 2.8.4 Placing a note object

The **note object** is the only Map Maker object which is exclusively for use on the screen. A Note object has no function on a printed map.

The presence of a note is indicated by a flag attached to a spatial object. To display the note, select the **Data Query** tool and click on the base of the flag pole. A note object can be used to display a few words of text or to display one of a range of media. Select **Drawing – Tools – Note** and click on the map to display the note editor:



The options are shown in the drop-down list by **Note type**.

- **Simple note.** Click on the Content tab to enter your note in the text editor.
- **Rich text.** The rich text option allows you to use bold, italic and underlined text as well as different font sizes and colours and to change the justification of the note object.



The **Import from file** button allows you to introduce text from a Rich Text Format file (\*.rtf) however, the rich text editor will not accept some items - such as graphics and tables - found in more complex RTF files.

- **Document.** When text is imported in the form of an *MS Word* document (\*.doc), or an *Adobe Acrobat* document (\*.pdf), Map Maker will start either *Word* or *Adobe Acrobat* to display the document when you click on the note object. Clearly, this operation will only work if these programs are already on your computer.
- **Bitmap.** The bitmap option will display either a Windows bitmap (\*.bmp) or a JPEG image (\*.jpg). It is sensible to avoid choosing large files.
- **Enhanced metafile.** Windows Enhanced metafiles (\*.emf) can be created in Map Maker and other vector graphics programs. Pop-up detailed maps of an area can be built into your project by using an \*.emf as a note object.
- **External program.** This sophisticated option is included for experienced software developers. The **Content** page allows you to specify the program and a command line. A note object could, for instance, be used to launch a database program and call up the entry associated with the spatial object.
- **Audio/Video.** The audio/visual option depends on the media programs on your computer. Map Maker will launch the viewing (playing) program that Windows has currently associated with the file type. For example, though Map Maker can use QuickTime files, you can only play them if a QuickTime player is installed on your computer.

- **Web page.** Similarly, this option can display web pages using the program that your computer currently associates with html files; such as Microsoft Explorer or Netscape Navigator.

## 3 Styles

The concept of styles and style files is one of the most powerful aspects of Map Maker and the one that causes most confusion. Your work with Map Maker will benefit from planning how styles can best be tailored to your particular requirements.

### 3.1 Styles as a classification system

You can think of styles as a system of classifying the objects on your map to make them easy for the reader to recognise. Every object on your map belongs to a category of object and every category can be drawn using the same “style”.

Even though one category of object is not always represented by the same geometry, it can always be drawn in the same style.

Suppose “apple trees” is one category of objects on your map. On one map layer you might use red polygons to represent apple orchards. On other map layers – or in other related projects – individual trees might be represented by round red symbols marking their location points. In another situation, red lines might represent rows of apple trees. On each of these occasions you would simply draw the object and, when the Polygon - or Symbol - or Line - dialogue box appeared, you would assign the characteristic “apple tree” style to the Polygon, Symbol or Line.

Each style definition specifies:

- **Fill:** The colour of a polygon’s fill, whether the fill is solid or patterned, if patterned what kind of pattern.
- **Line:** The colour and width of a line, whether it is solid, dashed, or made up of a chain of symbols.
- **Symbol:** The size and appearance of the symbol associated with a point.
- **Label:** The font (typeface), its size and colour, whether it is bold and/or italic. The font used for labels is also used for text objects.
- **Arrow:** The type of arrow used by arrow objects.

The style definition of the “apple tree” style will contain all of these specifications. Another category could be assigned the “plum tree” style and its definition would specify the “plum tree” polygon style, the “plum tree” line style, etc. Map Maker can provide a distinctive style for as many categories as you need to accommodate your map objects.

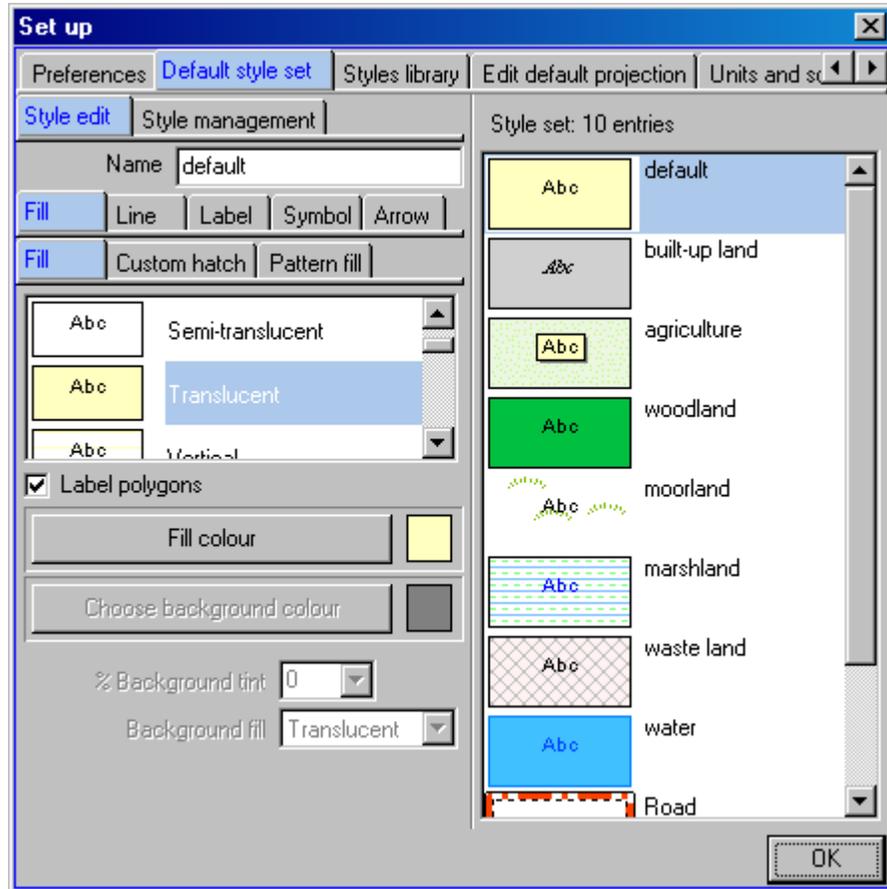
### 3.2 The default style set and the project style set

A style set contains one or more style definitions and it is stored in a style file (\*.stl). Following the theme, you might store the above set of style definitions in fruit.stl file. You can have up to 256 styles in one style file however we recommend that you organise your styles so that you do not have more than a few dozen styles in one style file.

Map Maker has one default style set and this you can edit to suit your needs. Every time a new project is created, a copy is made of the default style set and this copy becomes the project style set. This in turn can be edited and added to in order to suit the needs of the particular project. When you save a project (as, for example, “My project.geo”, the style file

is automatically saved as “My project.stl”). Clearly, if all or most of your projects are dealing with similar themes then it makes sense to configure your default style set so that it contains the styles which you will need regularly.

To edit the default style set go to **File – System set up – Edit default style set**:



The **Style set editor** is divided into **Style edit** which deals with the definition of an individual style and **Style management** which is concerned with editing the style set as a whole. We will look first at the definition of individual styles.

### 3.3 Style edit

On the **Style edit** page, notice the field for entering the style **Name**. The style name will appear in the list of all the styles in the set. The illustration arbitrarily shows names like “agriculture” and “moorland”. The choice of style names, like the choice of fill colour, font or symbol shape is up to you. Map Maker allows you to embody your own - or your team’s - classification system in your own customised style set.

Note: when you create new objects with the drawing tools or import vector objects from other sources, they are first displayed in the default style, zero. When you edit your own style set, it is sensible to give your default style - style number zero - a simple easily recognised definition and name it something like “default” or “undefined”.

To edit a style, first select it in the right-hand list, and then use the five page tabs: **Fill**, **Line**, **Label**, **Symbol**, and **Arrow** to change the style definition.

### 3.4 Fills

The style set editor opens on the **Fill** page. By “Fill” we mean the appearance of the inside of a polygon. A polygon can be coloured or patterned or both.

To change the fill colour, click on the **Fill colour** button and choose from the colour dialogue box. The way in which the colour is applied to the polygon depends on the fill style which can be selected from the list on the left. **Opaque**, the simplest option, gives a plain colour which hides any object under the polygon. The **Translucent** and **semi-translucent** options allow details below the polygon to “shine through”. A black line detail under a polygon with a **Translucent** fill will appear black. A **semi-translucent** fill makes the detail below rather more ghostly grey.

Note: some printers are not good with translucent fills. They may work well at one print resolution but produce opaque results at another. It can help to experiment with different printer settings. Occasionally, printing problems are solved by downloading and installing the latest printer driver from your printer manufacturer’s web site.

If you choose one of the six standard “hatch” fills (i.e. cross-hatch lines), the lines will be coloured according to the “fill colour.” Also the buttons and fields which are greyed out in the illustration will be activated allowing you to specify the **Background colour**, **Background tint**, and **Background fill**. If you click on **Background colour** and select a colour you will see no immediate change. This is because initially **Background tint** is set to zero. If you change the **Background tint** percentage to 20, for example, you should see your hatch lines against a pale coloured wash. If you also set the **Background fill** to **Translucent** or **Semi-translucent**, objects on the layers beneath the polygon will show through.

It is good practice, as a rule, to restrict yourself to the polygon fill options described in this section. The following customised special effects will significantly slow down the drawing of a complex map. They should be reserved for special needs.

**PRO**  
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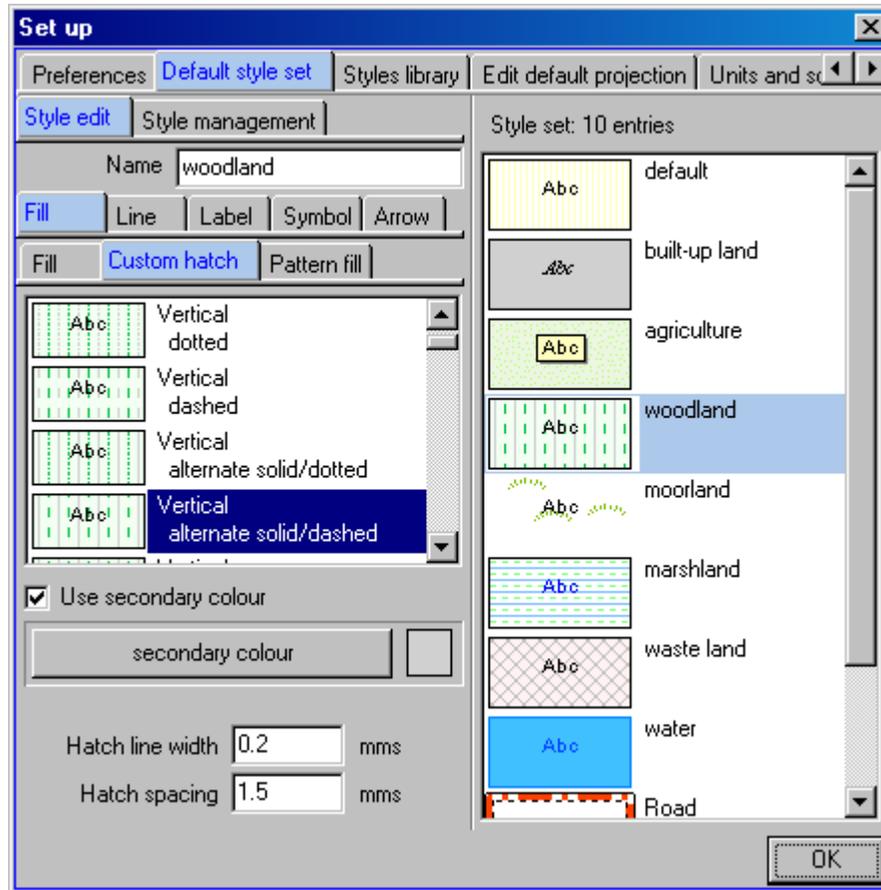
#### 3.4.1 Custom hatch fills

First select the style you want to edit, in this case “woodland” is selected. Select the **Custom hatch** option from the list of **Fill** styles and choose a **Fill** colour for the hatch lines and a different **Background colour** if you wish.

Now click on the **Custom hatch** tab. Scroll down the list of all of the custom hatch styles to select your preferred combination of solid, and broken, wavy and straight, horizontal, vertical, diagonal or crossed lines. To choose a colour to be used for alternate lines, tick the **Use secondary colour** option and select a colour. This, combined with the original fill and background colours, allows you to create a tri-coloured fill style.

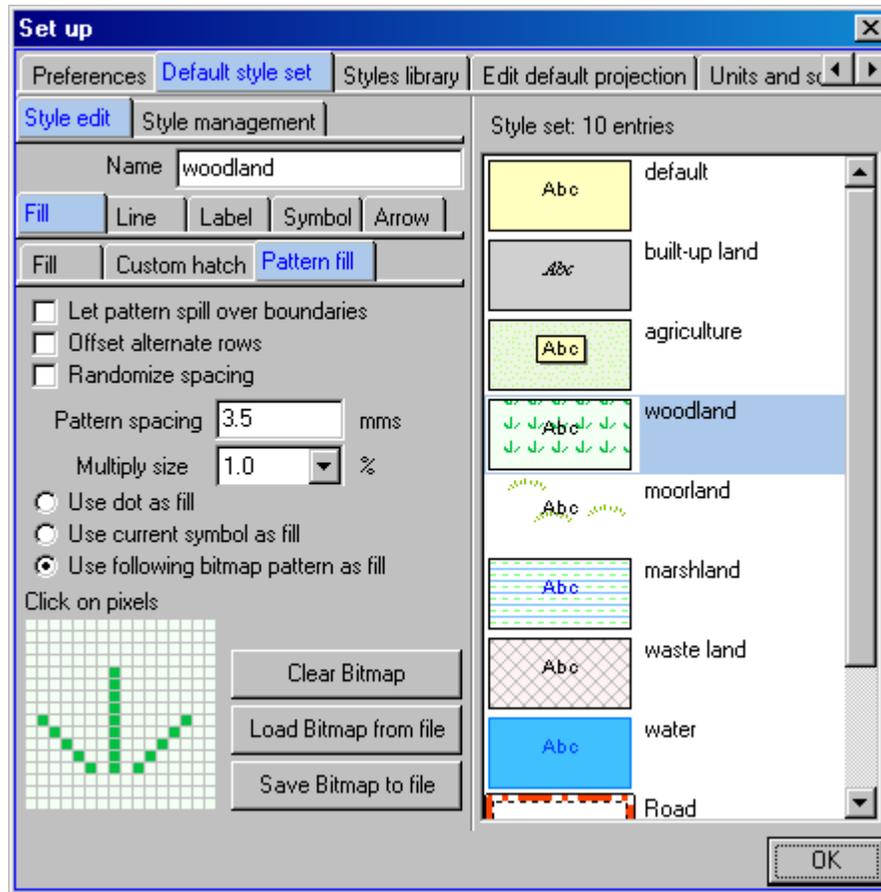
After each new selection, you can preview the style in the list on the right.

The **Hatch line width** and **Hatch spacing** are expressed in terms of millimetres on the printed page (or whichever unit you have chosen in **System set up**). In this illustration, the hatch line width is small compared to the hatch spacing. Another whole range of effects can be achieved by altering the line width and spacing.

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### 3.4.2 Pattern fills

Return to the list on the **Fills** page, select **Pattern fill**, click on the tab to go to the **Pattern fill** page and note the three bullet points (sometimes called “radio buttons”).

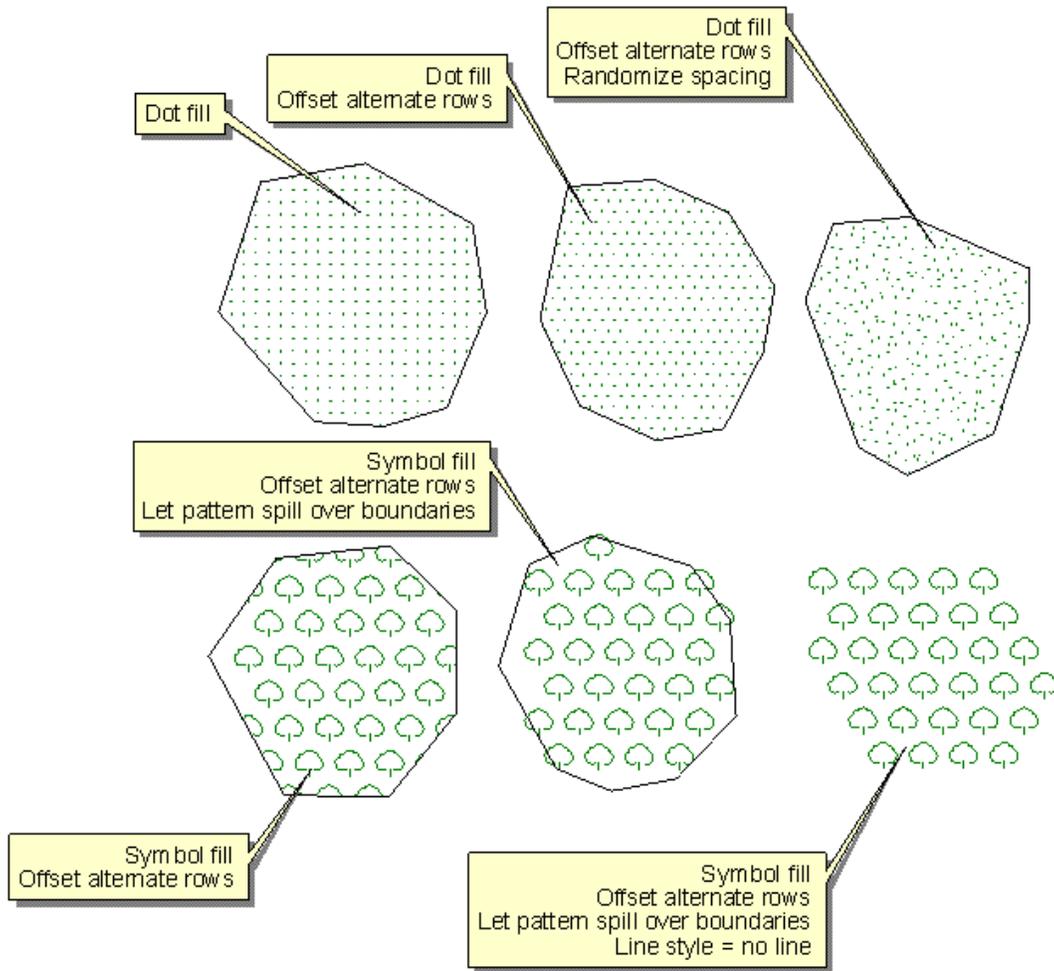
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- **Use dot as fill.** This option produces a dotted polygon. By default, the dots are drawn on a square grid and the spacing of the grid is controlled by the value in the Pattern spacing field. (To change the size of the dot, go back to the **Style edit – Line – Line type** page and edit the **Dot length**.)

The **Offset alternate rows** option displaces every other row of dots by half the width of a grid square. In effect it creates a triangular grid. If you select **Randomise spacing** the scattered dots will give an irregular fill.

- **Use current symbol as fill.** Each style is associated with a symbol which is defined under the **Style edit – Symbol** page. The style's symbol can be used to create a patterned fill. By default, the symbols overlapping the edges of the polygon will be clipped unless you decide to tick the box labelled **Let pattern spill over boundaries**. When this box is ticked, the symbols will be allowed to overhang the boundaries of the polygon. If you chose this option you could also set the line style (**Style edit – Line – Line type**) to be **No line**. This would give your polygon a soft edge and might be used to indicate the general character of a wooded or rocky area. The symbol size specified under the **Style edit – Symbols** page can be changed for use in the fill pattern by increasing the **Multiply size** value.

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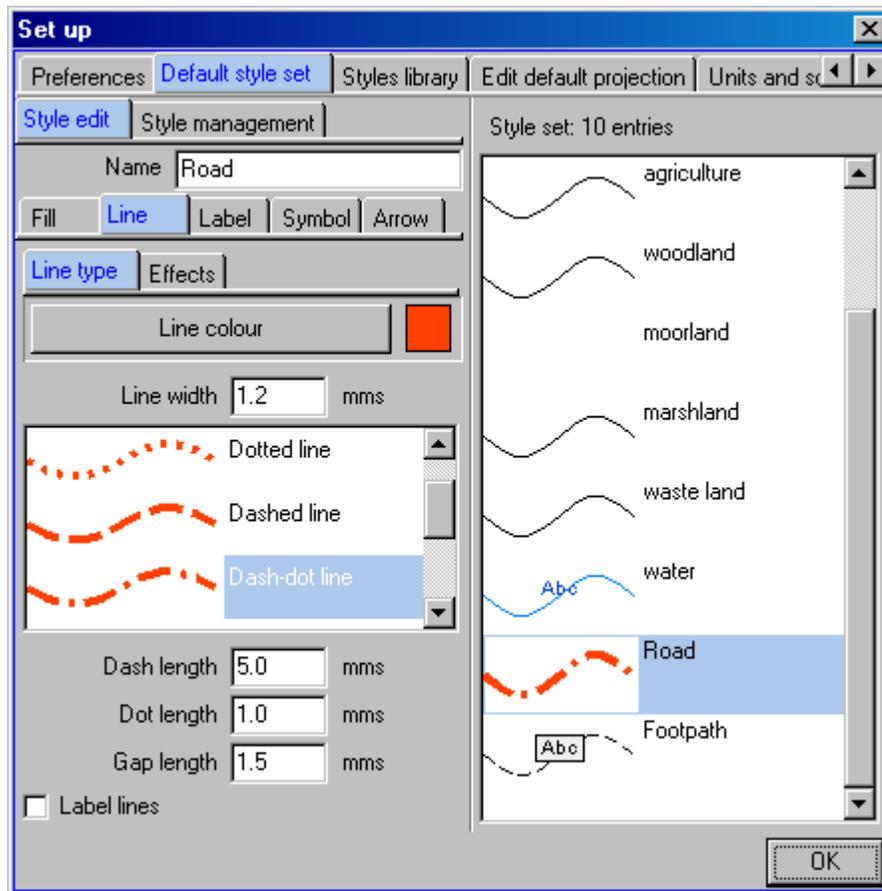


- **Use the following bitmap pattern as fill.** Though a bitmap pattern can be used as a fill, it is limited to a monochrome pattern 16 pixels by 16 pixels in size. You can import a pattern from a bitmap file (\*.bmp) or draw the pattern directly in the panel by clicking on the square panel at the bottom left. Click on the pixels to turn them on or off to create a pattern like the tuft of grass in the illustration.

Note: though custom hatching and pattern fills are attractive additions to a map, the computer must go through an lengthy procedure each time they are reproduced and so it is advisable to use them sparingly.

### 3.5 Lines

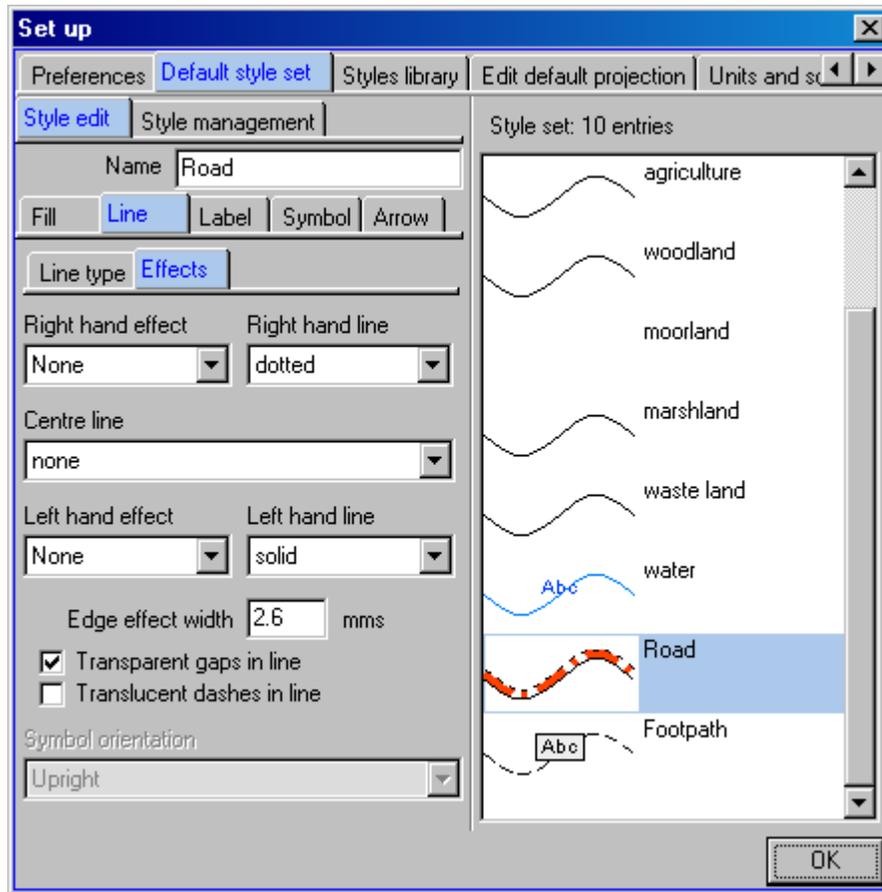
The **Style edit – Lines** page controls the appearance of line objects. The line object definition is also applied to the boundaries of the polygon objects. Go first to the **Style edit –Lines – Line type** page.



The list on the left shows line types: starting with a solid line and going through all the dash and dot options. The **Line colour** and **Line width** can be defined for all of the line options as well as the **Dash length**, **Dot length** and the **Gap length** for the broken lines. The lines will not be labelled unless the **Label lines** tick box is selected (such as the “Footpath” style at the bottom of the right hand list).

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As with the custom hatching and patterned fills above, once you have defined the line type and colour you can go to the **Effects** page to make the line style more elaborate. Again, it is worth mentioning that it takes time for the computer to reproduce these effects so use them sparingly.

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First look at the tick box labelled **Transparent gaps in line**. If this option is selected, the gaps along a broken line will be transparent so that map details under the lines will be visible. If the option is not selected the gaps will be opaque white. **Translucent dashes in line** will allow details on the map below to be seen through the coloured line in the same way that map detail is visible through a translucent polygon fill colour.

**Right hand line**, **Left hand line**, and **Centre line** boxes can be selected to create additional thin black lines to run parallel to a “main” line – that is, the line type which was defined on the **Line type** page. A major road, for example, could be drawn using a red line of 0.8mm (0.03 inches) with a solid **Right hand line** and a solid **Left hand line**. The various line types assigned different colours and widths combined with the line effects such as dotted, dashed and solid edge lines allow you to build up a complete set of route styles from footpaths to major highways.

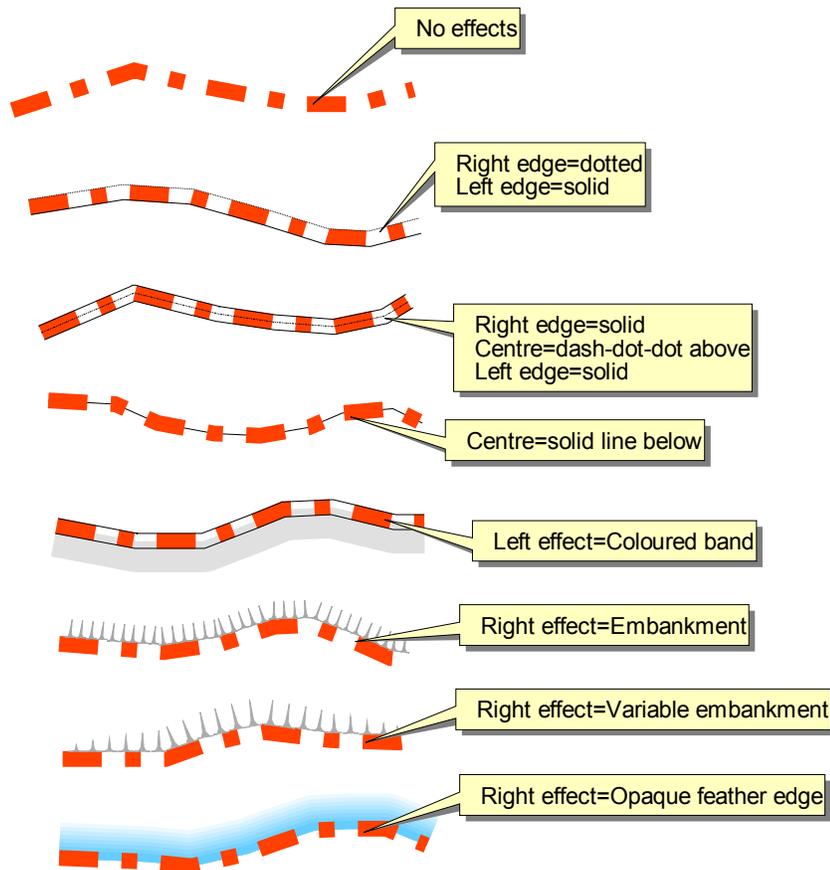
The **Centre line** drop-down list allows you to draw a centre line either above or below the main line. A major highway, for example, could be drawn showing a central reservation (median strip).

To see how the two pages work together, you might go to the **Line type** page and define a wide, opaque dashed line with transparent gaps. Then, on the **Effects** page, place a centre line below the dashed line. The coloured dashes will be displayed like beads on a string. If the centre line is drawn above the dashes, the line will appear un-broken.

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The **Right hand** and **Left hand effects** currently consist of coloured bands, embankments and feathered edges. Coloured bands add emphasis to major boundaries. If you select a variable embankment option, the width of the embankment will be negligible at each end of the line and increase to reach its maximum value at the centre point of the line. The feathered edge is the same as the coloured band and uses the current fill colour but the shading varies from white at the outer edge to the full colour where it meets the line. This effect is useful for coastlines and – with the line type set to “none” - it is used in pale shades to indicate secondary boundaries.

Note; due to an irritating limitation in Windows at present, a feathered edge cannot be at the same time translucent and smoothly graded in tone. The feathered edge is necessarily opaque.



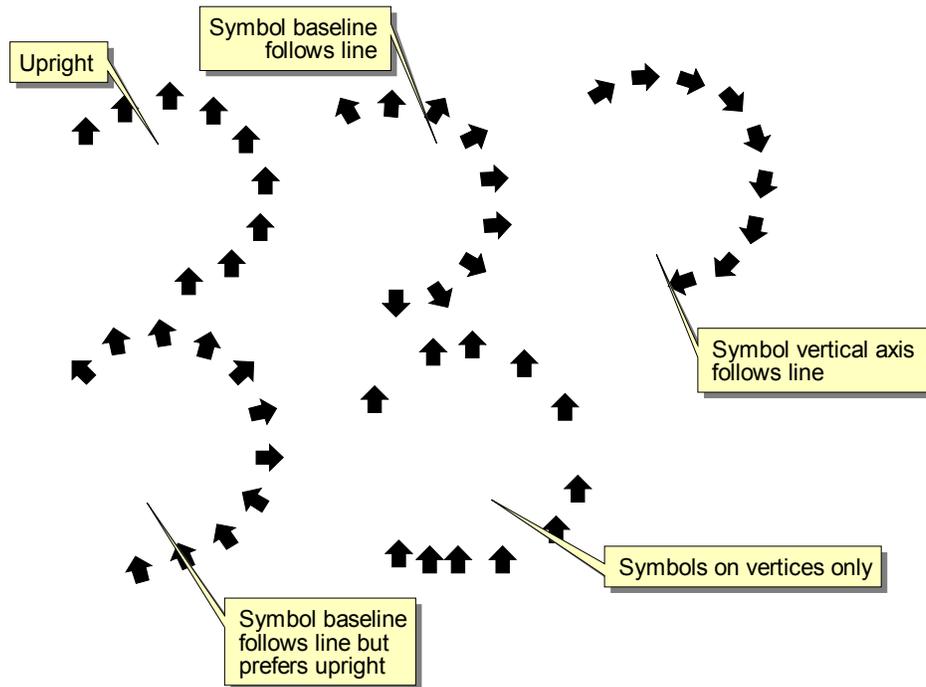
Returning to the list on the **Style edit – Lines – Line type** page, you will see a **Symbol line**. This option draws a line by placing the currently defined symbol (see **Style edit – Symbols**) at regular intervals along the line. The spacing used is that specified in the **Gap length** field. The symbol is drawn at the current symbol size. Now when you open the **Style edit – Lines – Effects** page, the **Symbol orientation** drop-down list is available and offers five options:

- **Upright**. The symbols are all drawn upright, like numbers on a clock face.
- **Symbol baseline follows line**. If the line is sloping then the symbol slopes by the same amount so that the horizontal axis of the symbol is always parallel with the line.

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- **Symbol vertical axis follows line.** This also follows the slope but the vertical axis of the symbol remains parallel to the line.
- **Symbol baseline follows line but prefers upright.** The symbols' horizontal axis is parallel to the line but if the line curves more than 90 degrees (in other words the "top" of the line – its left hand side – curves to face downwards) then the symbol flips over to the other side of the line.
- **Symbols on line vertices only.** This valuable option places the symbols on each point where the line changes direction - on each vertex – to show GPS points on a route, for example, or electric pylons along a line.

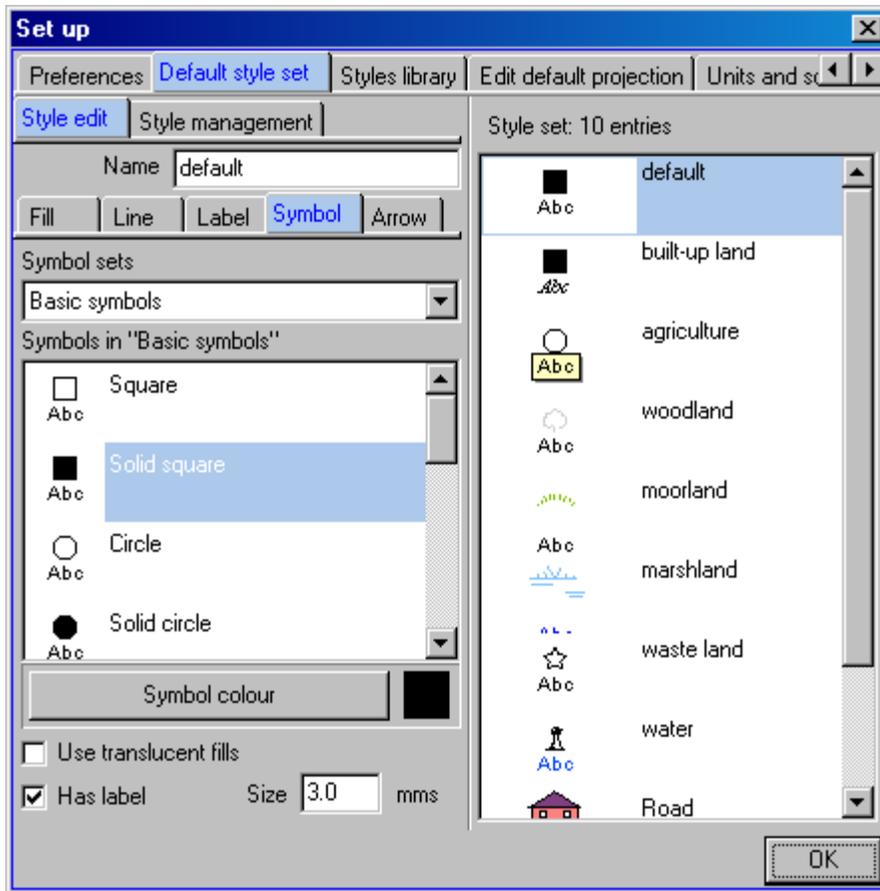
The following illustrations of symbol lines use a standard arrow symbol.



### 3.6 Symbols

Map Maker contains some ready-made symbol types and you can add symbol sets made by yourself or other Map Maker users. Instructions for making symbols are given below (see section 3.11).

For the moment, go to the **Style edit** page and click on the **Symbol** tab:



The drop-down **Symbol sets** list (left) names the symbol sets available on your system. If no custom symbol sets have been added, you will have two sets: **Basic symbols** and **Cartographic symbols**.

Select the style you want to edit from the list on the right, and click on a symbol from the list on the left to attach it to the style. The dimension in the **Size** field can be changed. It refers to the size on the printed page.

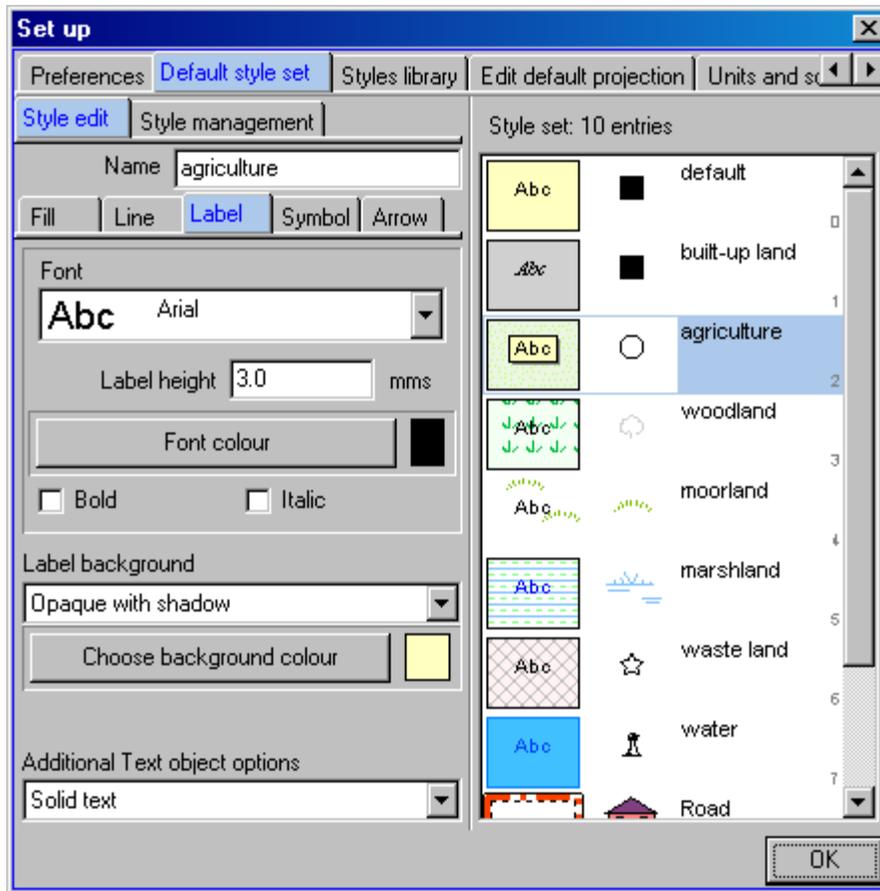
Polygonal symbols such as the **Solid square** (selected above) can **Use translucent fills** if you tick the box but otherwise, symbol polygons are opaque.

Finally the **Has label** tick box can be switched on or off for a particular symbol style. Click on the **Label** tab to edit the appearance of the label.

### 3.7 Labels

This page controls the appearance of labels for polygons, lines, points and arrows. It also controls the font (typeface) used for text objects.

Map Maker uses Windows "TrueType" fonts. The list of fonts on the Label Set up page shows a preview of each TrueType font available on your computer. Because computers now have dozens - even hundreds - of fonts you can go to **File – System set up – Preferences – Fonts** and select the fonts you regularly use. Your preferences will be first on the **Font** list and the others will still be available if you need them.



Once you have defined the characteristics of the font, you can choose a **Label background**. The selected label in the illustration has an opaque background with a “shadow”.

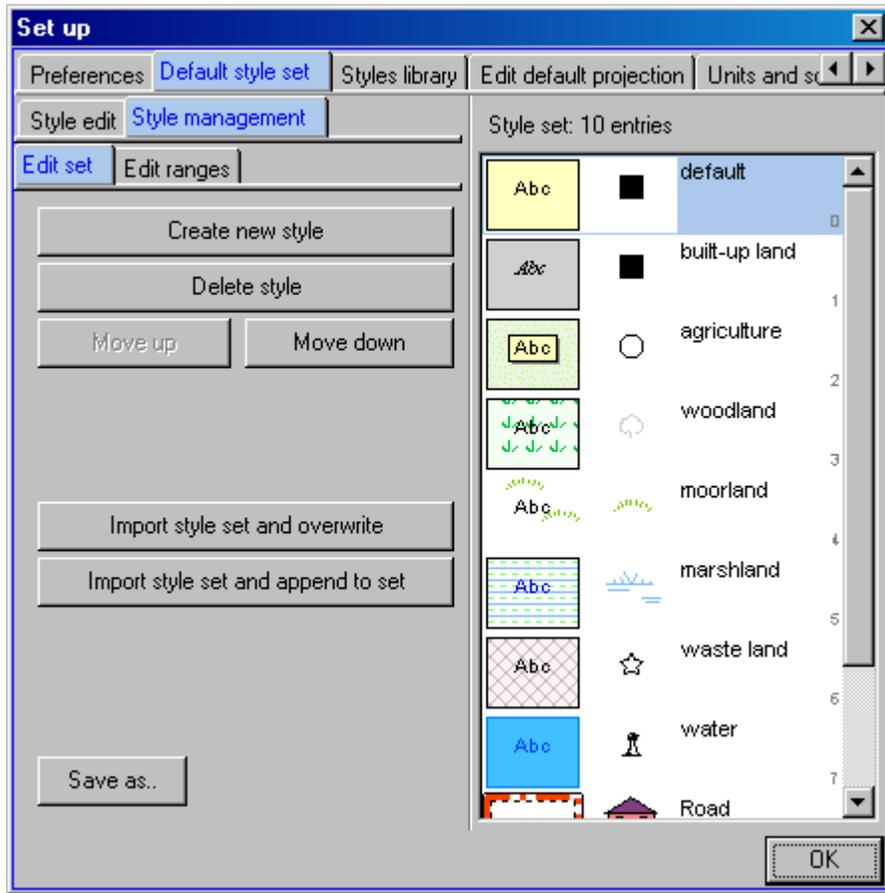
The **Additional Text object options** only apply to Text objects. They include outline text and translucent text.

### 3.8 Arrows

The **Arrows** page is self-explanatory. You can select an arrow type and define the label background as **Opaque**, **Translucent**, or **Semi-translucent**.

### 3.9 Style management

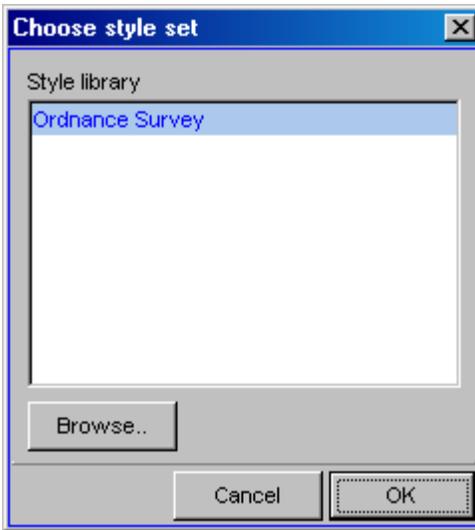
**Style management** is divided into **Edit set** and **Edit ranges**. Select **Edit set**.



In **Edit set**, click on **Create new style** to insert a new style into the list immediately after the currently selected style. The new style first appears displaying the same style definition as the first style in the set (style zero). Change the definition of the new style as described above using **Style edit**.

Use the **Move up** and **Move down** buttons to rearrange the order of the styles on the list.

To replace the current style set with a pre-prepared set, click on **Import style set and overwrite**:

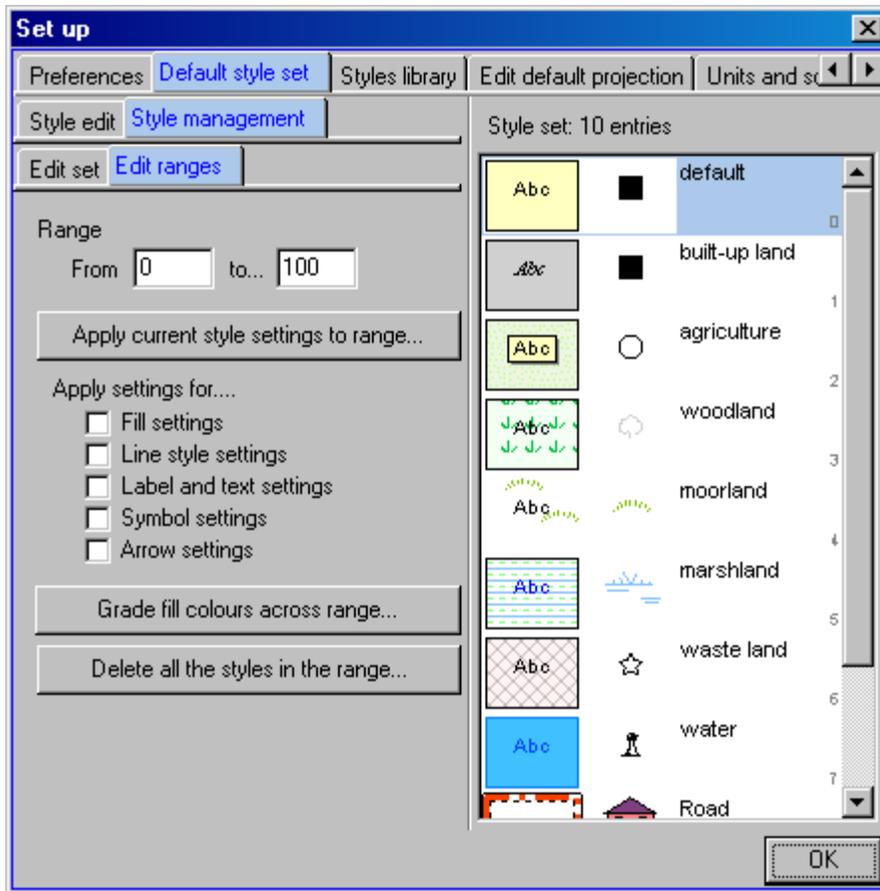


The dialogue box displays the style sets which are currently in your “style library” (see below for an explanation of the style library). In this instance there is just one set – a style set designed to give the appropriate appearance to features on UK Ordnance Survey maps. Alternatively you can click on **Browse** to select a style file (\*.stl) from any location.

Note, since Map Maker was first published, Microsoft have also started using files with the extension STL for “Certificate Trust Lists”. When picking a STL file you should be careful to choose the correct STL file.

To add a style set to the end of the current list of styles, click on **Import style set and append to set**. This feature allows you to build up a library of small style sets covering different themes and bring together the relevant mini-sets for the purposes of one specific project.

Go now to the **Edit ranges** page.



The **Edit ranges** tab under **Style management** makes it easy to apply selected style settings to a range of styles. In the illustration, the second style (style 1) defines the style's label definition as italic Times-Roman text. To attach this font to all the labels on the styles ranging from 0 to 5, first click to select the second style. Now set the **Range From** and **to..** and enter 0 and 5. Tick the **Label and text settings** box. Finally click the button **Apply current style setting to range**. Styles zero to 5 have now inherited the label settings from style 1.

**Grade fill colours across range** is a way to create a graded range of coloured polygons. If you set the **Range From** 0 to 4 and click **Grade fill colours across range**, the polygon fill colour of styles zero and four will remain unchanged but polygon styles one, two, and three, will range between pale yellow and khaki. Happily, the **Style edit** page allows you to choose other fill colours for the individual styles at the top and bottom of a range.

### 3.10 Using custom symbol sets

In addition to Map Maker's two standard symbol sets: **Basic** and **Cartographic**, you can import symbol sets created by someone else using Map Maker or, if you have Map Maker Pro, you can create your own symbol sets (see below).

A symbol set is contained in a file with a .syb extension (e.g. school.syb). To install a pre-prepared symbol set, use Windows explorer, or **Utilities – File manager**. Go to the directory where Map Maker is installed (the MMM.exe file) and copy the SYB file into the same directory.

Note: when the Windows system is set up, the **.exe** extension of **MMM.exe** and other program files is frequently hidden. Much confusion can be avoided if – in Windows Explorer - you go to **Tools – Folder options – View** and ensure that **Hide file extensions for known types** is not ticked.

The next time you start Map Maker, the newly installed symbol set will be available.

**PRO**  
**only**

### 3.11 Creating custom symbols

Above the procedure to import and use a custom symbol set is explained. In Map Maker Pro you can make your own symbol sets.

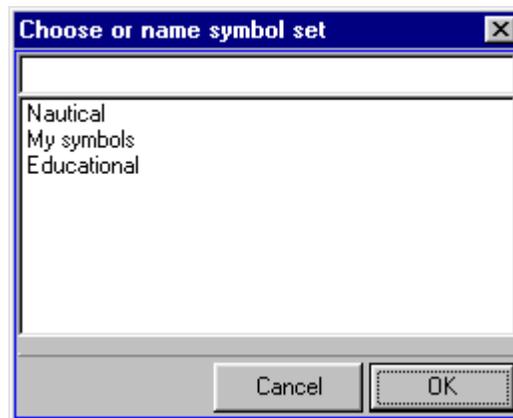
A symbol set is contained in a file with a **.syb** extension (e.g. school.syb). To use a symbol set it should be placed in the directory where Map Maker is installed (the MMM.exe file).

Note to convert a Map Maker Pro 2.4 symbol file (\*.mms) to a SYB file use the Map Maker Legacy program (MMLegacy.exe).

To create a symbol of your own, clear the screen with **File – Clear**. Then use the drawing tools to draw a symbol. The size does not matter at this point, the larger the better. The symbol should not include hatched or patterned polygon fills. Simpler symbols work best.

The labels of your points, lines, and polygons will not be included in the symbol. If you do want to write text on the symbol use the text object drawing tool.

When you have finished drawing the symbol in the live layer, save it by going to **File – Save screen – As symbol**.



The dialogue box will show the symbol sets you have already created or imported. If you are just beginning to use Map Maker the list in the dialogue box will be empty.

The symbol sets that came already installed in your copy of Map Maker (such as “Basic” or “Cartographic”) will not appear in this list as they are “read only”.

If this is the first symbol in a new set, enter a name for the new set. If you are adding a symbol to an existing set, select the name, for example, “Nautical” or “My symbols”, from the list and the new symbol will be added to the set automatically. The names in the dialogue box are not file names; they are descriptive names such as those in the illustration.

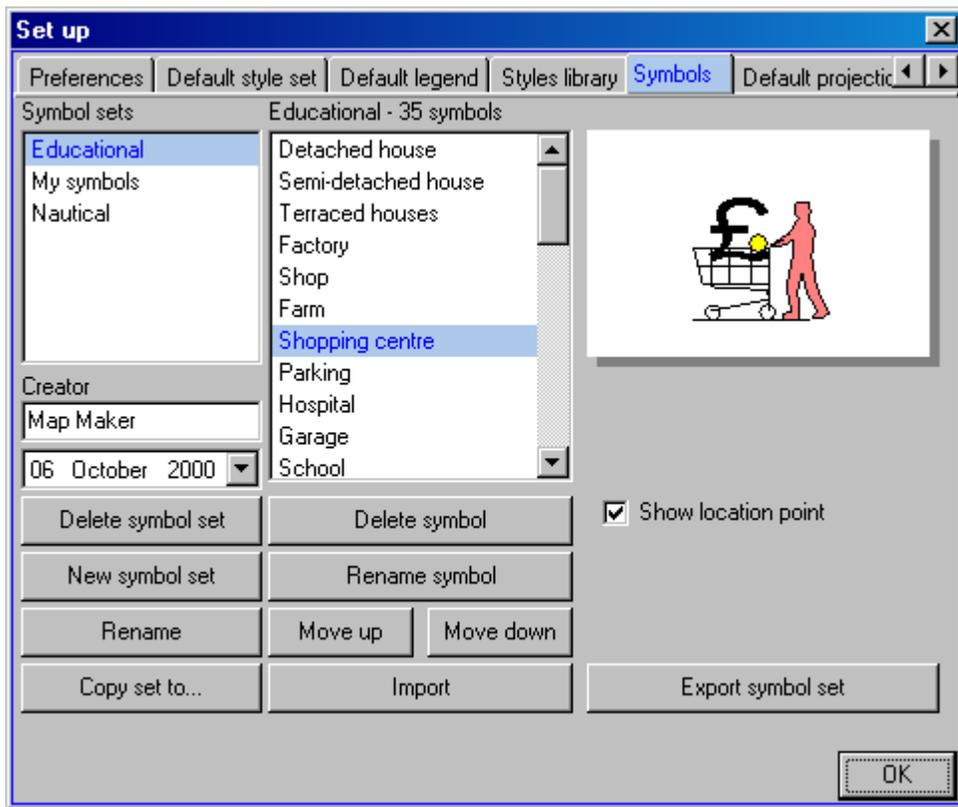
**PRO**  
**only**

When you click **OK** you will be prompted to name the symbol. Again, this is a descriptive name (maximum of 30 characters). Enter the name, click OK again and the symbol will be added to the set.

If you have started making a new set, it will be installed automatically so that when you next edit your style set you will be able to assign the new symbol to a style.

Remember, a symbol cannot be used until it has been added to the definition of one of the styles in your set. Got to **File – System set up – Edit default style set – Style edit - Symbol** and select the newly drawn symbol for one of the styles.

The above procedure can be used to simply create a few customised symbols for your own use. To prepare a complete symbol set for yourself or to distribute to other Map Maker users go to **File – System set up – Edit symbol sets**.



The list on the left hand shows your symbol sets and the list in the middle shows the symbols in the selected set - in this illustration the **Educational** set. The right hand window shows a preview of the selected symbol - in this case **Shopping centre**.

The “location point” is the point on a symbol which is placed over the precise co-ordinates of the point object on the map. As a rule the location point is at the centre of the symbol. The **Show location point** box is ticked in the illustration and the location point appears as a yellow circle on the symbol preview.

The location point is critical on some symbols. If you have a symbol for an electric pylon, for example, you might want to place the symbol so that its base was located over the point. Click on the preview to move the yellow dot.

**PRO  
only**

If your symbol set is for distribution to other Map Maker users you may want to enter your name and the date in the **Creator** and **Date** fields. The **Copy set to** button allows you to copy the symbol set to another file where it can become the basis for a new modified symbol set. Individual symbols can be copied from one set to another simply by dragging them across from the list on the right and dropping them on the name of a symbol set on the left.

To save your symbol set to a SYB file use the **Export symbol set** button. The file is now ready to distribute to other users. If you use the **Import symbol set** facility to introduce an SYB file into your system, you will be able to edit the file by removing symbols and/or adding symbols of your own. You will not be able to change the appearance of any of the existing symbols.

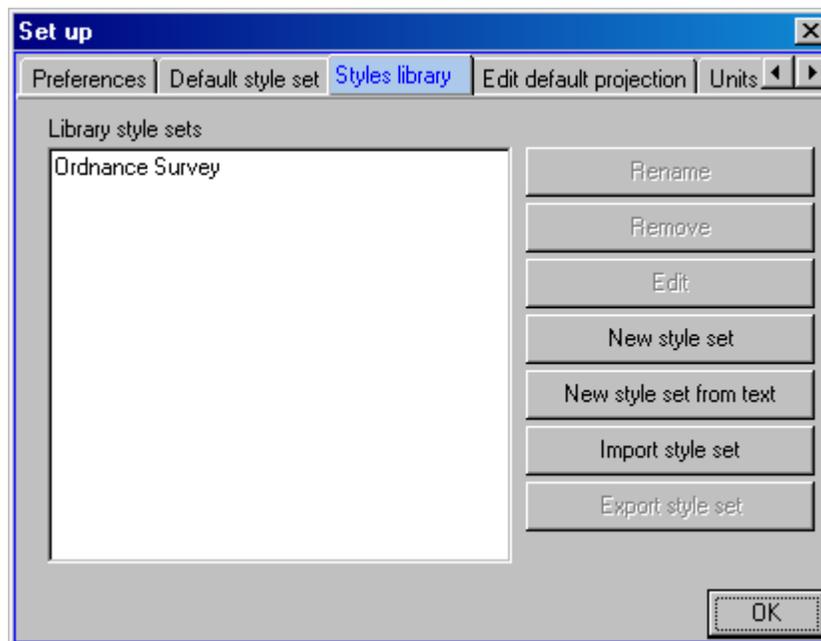
A symbol stored in a symbol file is simply an image. It cannot be edited.

The appearance of a symbol can only be changed if it has been saved as a DRA file and loaded into the live layer for editing. No one can alter the appearance of the symbols in your symbol set without the DRA files.

### 3.12 The Styles Library

As mentioned above, if all your maps are going to be describing the same small group of themes you may never need more than one set of styles. In this case, simply define your default style set to suit you and from then on the style set for each new project you start will be a simple copy of this default set. However, if your needs are more complex you will want a library of style sets designed for different purposes.

Go to **File – Set up – Styles library**:



In this example there is just one set currently in the library – “Ordnance Survey”. Suppose that you want to create a new set of styles for land use. Click on **New style set**. You will be asked to provide a name for the new style set. Enter “Land use” and click **OK**. Then, as

before, the style set editor appears and you can edit the styles to meet your requirements. The “Land use” style set will then be available in any project by going to **File – Project manager – Components – Project style set – Style management – Edit set** and clicking on the **Import style set and overwrite** button. For individual layers you can choose a Library style set from **Layer set up**.

If you want to create a style set describing a set of land use types, you probably have the land use types written down as a list or contained in a document. If you can produce this list as a simple ASCII text file (\*.txt) with the name of a different land use on each line then you can use the **New style set from text** button. You will still need to use the style set editor to go through the individual styles to give them the desired appearance, but you will be starting with a style set structured with a style for each land use (or whatever theme your map will represent).

The **Import style set** and **Export style set** buttons simply allow you to copy an existing style file (\*.stl) into the styles library and export a style set from the styles library as a style file.

### 3.13 Multi-feature layers

The section on vector layers (1.4.4) describes how files are organised in layers and how styles are assigned to the layers.

The situation is slightly different in the case of some vector files from other programs which already contain several layers (or “feature codes” or themes). The most common of these are DXF files created in C.A.D. programs. DXF files often contain more than one layer however the layer system is not organised in the same way that it is in Map Maker.

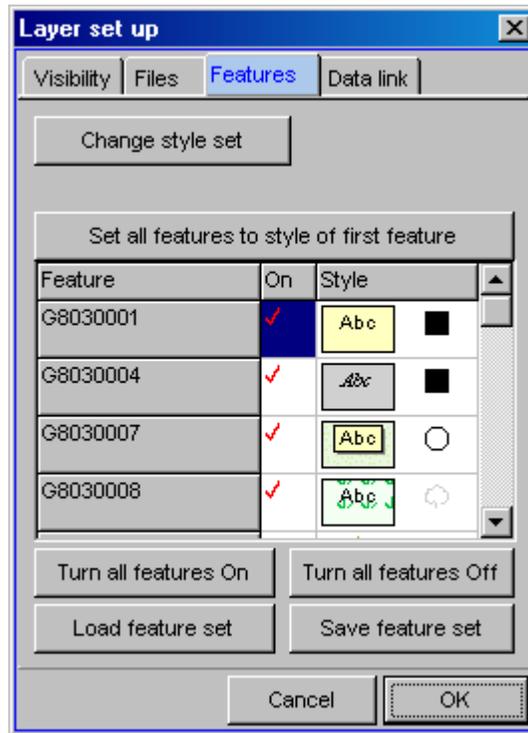
The U.K Ordnance Survey Land-Line files contain several dozen feature codes, another type of layered system. When you open a DXF or Land-Line file in Map Maker, the **Styles** page in the **Layer set up** dialogue box is replaced by a **Features** page (*note: Land-Line files can only be opened directly in Map Maker Pro*). The list contains the feature names (or DXF layers) in the file.

The Map Maker dialogue box uses the term “Features” for DXF files and U.K. Ordnance Survey Land-Line files to distinguish them from Map Maker layers.

A tick box beside each feature allows you to turn the feature “On” or “Off”. Click on any style in the **Style** column to display a drop-down list. Select your style for the feature from this list.

Like objects in a single Map Maker layer, all the features from one DXF or O.S. Land-Line file) must be drawn using styles from the same style file.

First choose the style set you wish to use, then select the features you want to display and choose the style to be assigned to each feature. If you wish to save these details, click on **Save feature set** and give the set a name. When you use a DXF or O.S. file in the future, you will be able to click on **Load feature set** rather than define all the settings again.



## 4 Linking to data

Map Maker provides a number of methods for linking objects to data and for displaying data about objects.

### 4.1 Live data

Map Maker enables you to set up the live layer so that, as you create and edit objects, entries corresponding to the objects are made in a database. In Map Maker jargon, these entries are called “live data”. As each new spatial object is created, a new record is added to the “live database”.

#### 4.1.1 Live data fields

Go to **File – Clear** or **Edit – Clear live layer** to ensure that the live layer is empty. Select **Edit – Live layer data – Define data fields**.

Column name	Type	Width	Dec. places
ID	text string	15	0
AREA	decimal number	10	2
SPARE	integer	10	0
DATE	Date	8	0

Buttons: New column, Edit column, Delete column, Move column up, Move column down

Link column: ID

Automatic area column: AREA

Automatic length column: none

OK

The database in this illustration has defined four data columns (or fields). One of the columns must contain the ID of the object.

**The object ID is the essential link between the graphic object and the database record.**

As a rule the **Link column** will be the first column and be called **ID** as it is in this example. It could be any column and be called by any name. From the **Link column** drop-down list, select which is to be the **Link column**. The Link column is the only essential column. If you wish, one of your numeric columns can be defined to be the **Automatic area column** and another to be the **Automatic length column**.

In the example, the **Area** column has been define as the **Automatic area column**. (An **Automatic length column** has not been selected in this database.) The area of each polygon - using the current area units (i.e. m<sup>2</sup>, Hectares, Acres, etc. ) – will be entered in

the **Automatic area column** as soon as the new polygon is drawn. The database will be updated automatically when you edit the polygon.

If, for example, you named a column “Fences” and assigned that name to the **Automatic length column**, it would automatically record the length of lines. (The **Automatic length column** also records polygon perimeters.)

**Note:** The **Define data fields** dialogue box can only be opened when the live layer is empty.

The **Edit column** dialogue box is opened by clicking on **New column**, or by editing an existing column by clicking on **Edit Column**.

The column name, often called the **Field name**, can contain a maximum of 11 characters and the characters must be upper case with no spaces between them. These restrictions are necessary to ensure that your database will be compatible with the standard database formats that Map Maker can use, such as DBF.

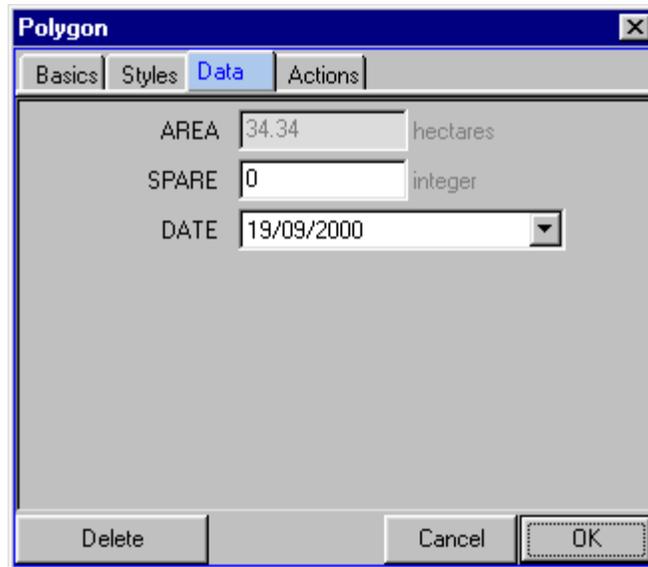
When you are using a database with a “passive” layer – that is to say any layer that is not the live layer - you can assign an “alias” to a data column. This means you can give the columns in the database of your finished map longer names in both upper and lower case.

The **Field type** drop-down list contains five options:

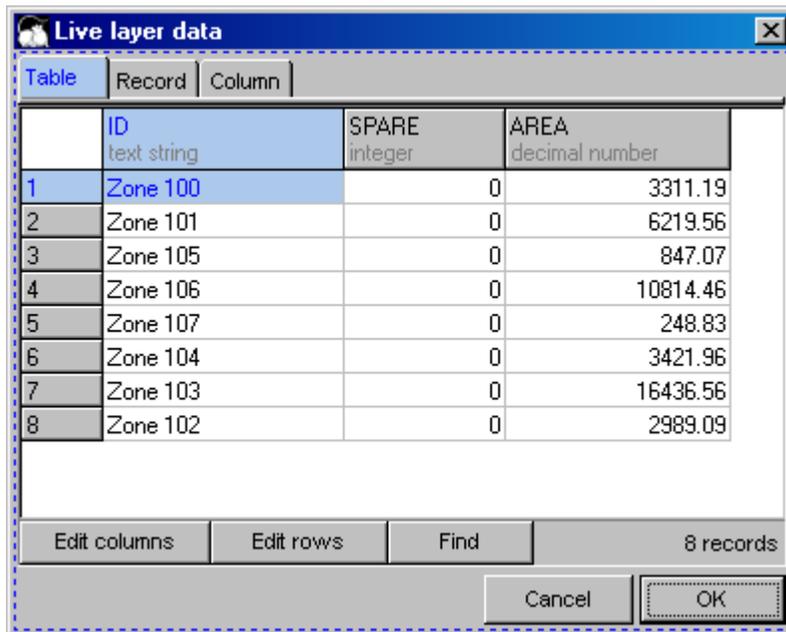
- **Text string** – simple text up to 255 characters with no carriage returns.
- **Integer** – a whole number in the range minus 2,147,483,648 to 2,147,483,647.
- **Decimal number** – Also called “real” or “float” variables.
- **Yes/No** – Also known as a “boolean” or “logical” variable.
- **Date**

The **Field width** is calculated automatically except in the case of the “Text string” field type. When editing a column containing “text string” this option will be available. Similarly, the **Decimal places** field is only available for the “decimal number” field type.

To practice using the live data facility, draw a new polygon. As soon as you complete the polygon the new object dialogue box appears. Go to the **Data** page:



You will see that the **Area** value has been calculated using the current area units and that the date field is automatically initialised with today's date. You can use this box to edit the data values associated with the object. Or, if there are several objects in the live layer, you can edit the entire live layer database from **Edit - Live layer data – Edit data**.



Click on **Edit columns** to move a column left or right, add another column, or change the definition of an existing column. In the following illustration, **Edit columns – Insert column** has been used to add a new column labelled "DENSITY" for decimal number values. For the purposes, of this exercise we have entered some random density values for each polygon.

ID	DENSITY	SPARE	AREA
text string	decimal number	integer	decimal
1 Zone 100	4.53	0	
2 Zone 101	6.54	0	
3 Zone 105	2.10	0	
4 Zone 106	10.78	0	
5 Zone 107	11.43	0	
6 Zone 104	8.77	0	
7 Zone 103	5.93	0	
8 Zone 102	12.01	0	

Buttons: Edit columns, Edit rows, Find, 8 records, Cancel, OK

This example consists of only a small data set. When you are dealing with larger sets you may want to work with a sub-set of the data. To select a sub-set, first select a column, such as AREA, and then click on **Find**. The dialogue box that pops up will vary according to the type of data in the column.

Find on "AREA"

Numeric field

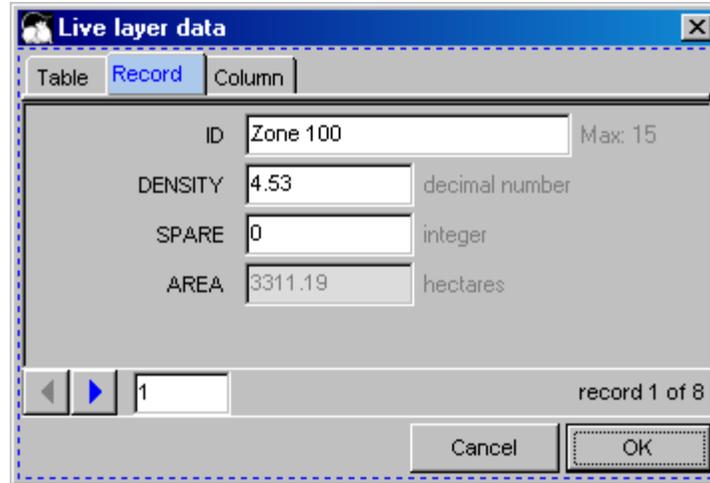
- Number equal to
- Number greater than
- Number greater than or equal to**
- Number less than
- Number less than or equal to

Number greater than or equal to 10

Buttons: Clear previous find, Find all and exit, Cancel, OK

A numeric field, such as the AREA field, will be searched according to numeric criteria. The example specifies a search for all the rows in the table where the AREA value is 10 or greater. When you click on OK, the table will show the selected data sub-set.

The **Record** tab on the **Live layer data** dialogue box contains the entry for the current row, in this case row (or record) 1.



This record is similar to the New object dialogue box however, it includes the ID field - which is hidden in the New object dialogue box - and forward and backward arrow buttons to allow you to move through the database.

The **Column** page can be used to set the values of an entire column. First go to the **Table** page to select the column. In this case the SPARE column, which is an integer column is selected. Then click on the **Column** tab. The options available under the **Column** tab will depend on the data type of the column (Text string, integer, decimal number, yes/no, date). Here the column is designated for integer data.

The first page under the **Column** tab allows to you to **Set all rows to** a serial number or a specified value.

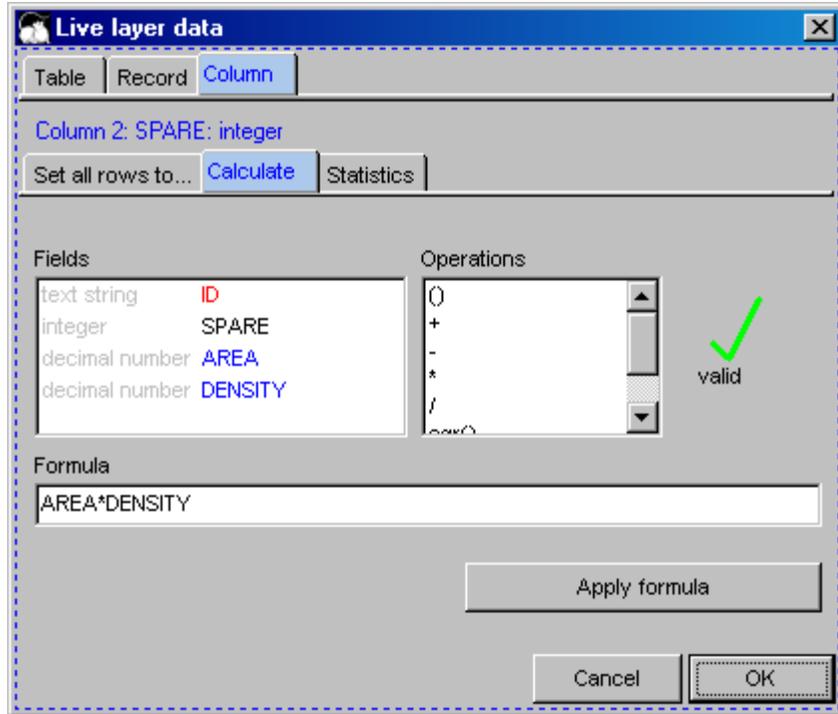
The **Set all rows to...** page allows you to specify a value for an entire group of objects at once. The group can be selected using the **Find** function described above to select a sub-set of the records. The value you specify will only apply to the records in the found set.

The same Data page can be found in the Selection manager (see Chapter 9) and can be used to edit the data values of the group of objects selected using the **Select** tool.

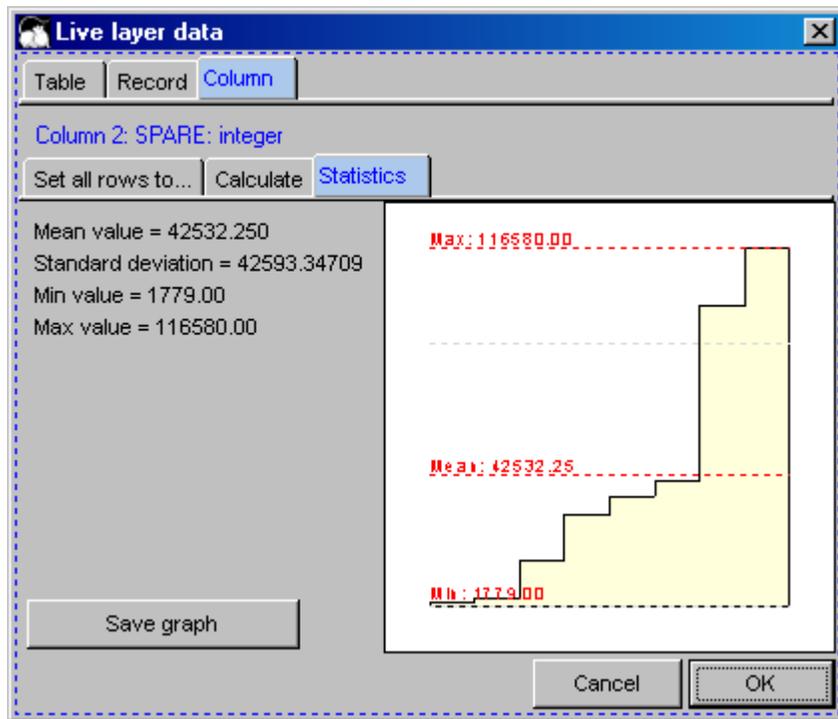
The second page under the **Column** tab, **Calculate**, allows you to specify the formula for calculating the values in the database.

The formula can include appropriate values from the **Fields** list, numbers you enter, and operators selected from the **Operations** list. If you enter an impossible formula the green tick will be replaced with a red cross.

In this example, Map Maker is instructed to make the values in the SPARE column equal to the AREA times the value in the DENSITY column. Since the SPARE column is an integer column the value will be rounded to the nearest whole number. Click on the **Apply formula** button to make it happen.



The **Statistics** tab opens a page which gives the basic statistics about the data in the selected column and represents the data in graphic form.



If you click on the **Save graph** button an Enhanced Metafile image (\*.emf) will be created. The Enhanced Metafile can be included in a word processed document or used in other programs.

### 4.1.2 When not to use live data

If **Edit – Live layer data – Initialise live layer data** is selected then every time you add a file to the live layer Map Maker will create a database entry for each object in the live layer. This can be useful if you are trying to create a thematic map. However, if you have a live layer containing hundreds or thousands of objects then creating a database with entries for each object can significantly slow the program down. If you are not creating a thematic map but simply want to edit the geometry then it can be advantageous to de-select **Initialise live layer data**. Even with **Initialise live layer data** de-selected every time you create a new object in the live layer an entry will be created in the live layer database. Similarly if you edit an object for which there is not a corresponding database entry then a new entry will be created. This can be useful if you only want certain objects in the live layer to have database entries. However, if you do not need the live layer database at all then you can de-select **Edit – Live layer data – Use live data**.

## 4.2 Using existing data

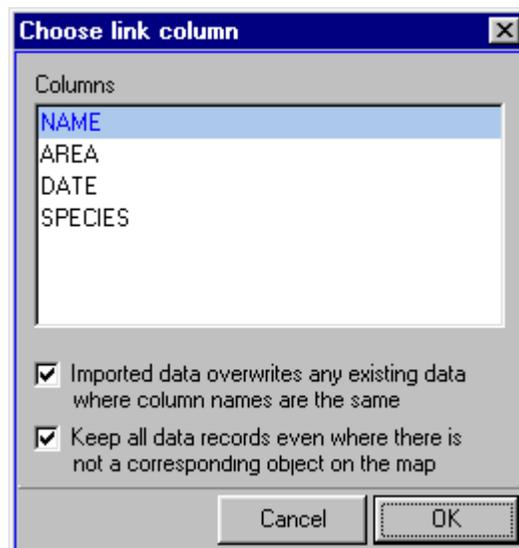
The previous section describes how to create and edit a database within Map Maker. This section is concerned with the use of existing databases and linking existing records to objects in the live layer.

Load a DRA file into the live layer. Take the islands.dra file in the demo project, for example.

Remember, when a file is loaded into the live layer, Map Maker automatically generates a default live data database so that every spatial object (polygon, line, or point) in the live layer has a corresponding data record.

The task now is to replace the default entries with data from an imported database file. Click on **Edit – Live layer data – Merge data table with live data**. You are asked to select a database file. If you have the Map Maker Pro you can choose Microsoft Access databases (\*.mdb) and Excel spreadsheets (\*.xls). Otherwise you can use dBase files (\*.dbf) or Comma Separated Variable (\*.csv) files. In this example import.dbf from the demo project has been selected.

After choosing the database file (and table – if using Access or Excel), a dialogue box appears which lists the column names in the database table that you have selected.



As described in section 4.1.1 above, one of the columns must be the link column.

The link column contains the ID which is the essential link between the data in the database and the spatial objects on the map.

In this example, the selected link column is called NAME.

The first tick box allows you to decide whether the live data in an existing column will or will not be replaced by the newly imported data in a column of the same name.

*Example: Suppose when you created the live layer, you set up a live database containing a column called SPECIES. And suppose the imported database also contains a column called SPECIES. This dialogue box allows you to decide whether the SPECIES data in the imported database will replace the existing SPECIES data.*

When Map Maker imports a new database it searches for columns with the same name as columns in the existing database. After that any remaining columns are added to the end of the live data database.

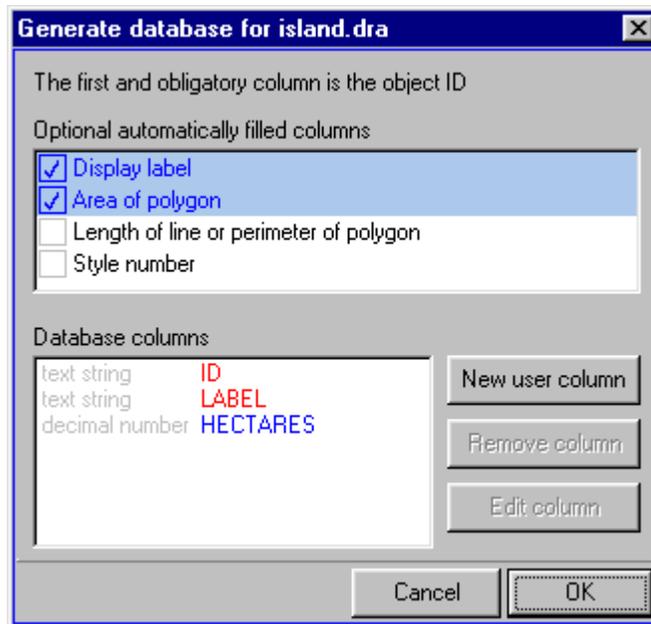
If the second tick box is not ticked then any records which do not have a corresponding object on the map will be discarded.

Note: alternatively go **Edit – Load file into live layer with data** This command allows you to load a DRA file and a data file into the live layer in a single sequence.

When you finish with the tick boxes, click **OK**. The live data file now contains both the existing live data and the imported database.

### 4.3 Generating a database

If your DRA file does not already contain a corresponding database with a record for each object, go to **Utilities – Database utilities – Generate database**. First select the DRA file. The next dialogue box allows you to define the fields of the new database.



Remember: The ID column is the crucial link between the DRA file and the database.

When you first generate the database, the ID column will be the first column. Use the Database editor later if you wish to change the location of this column. You have the option to include four more pre-defined columns – Display label, Area, Length, and Style number. If you choose any of these columns, the values will be entered automatically. In addition, you can click on **New user column** to add any other type of column. When you click **OK** to close this box, you will be asked to name the new database.

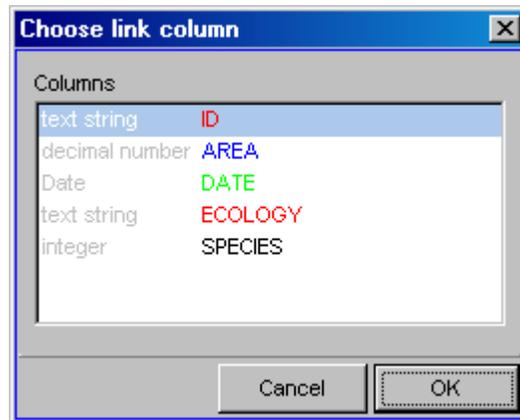
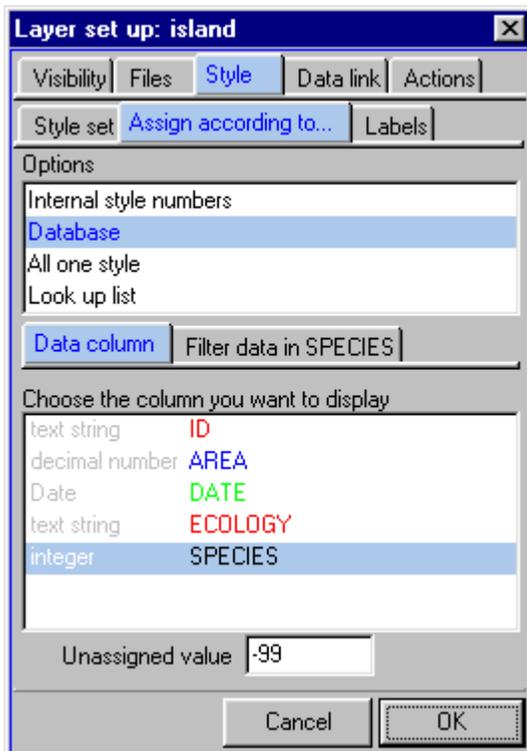
Alternatively, you can add the relevant information from an existing database to a DRA file by going to **Utilities – Data utilities – Make database extract**. In this case you choose an existing database and a DRA file. The database records which correspond to the IDs of the objects in the DRA file will be copied to a new database.

#### 4.4 Thematic maps

A thematic map is a map in which the appearance of objects (e.g. the colour and texture of polygon fills and the types of symbols for points) is determined by data values.

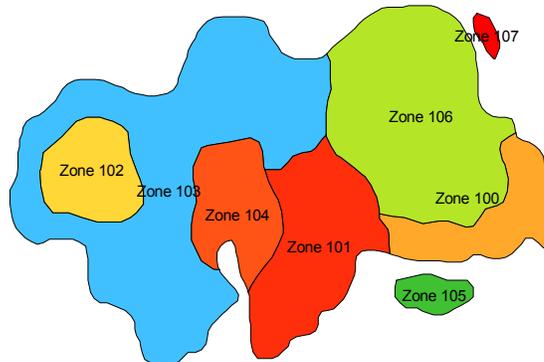
Once you have created a live database as described in section 4.1 or generated a new database for an existing DRA file as described above, you can use it to determine how the DRA file is to be displayed.

Open a new layer by choosing the DRA file for which you have a database by going to **File – Add layer**. In the **Layer set up** dialogue box go to the page under **Style – Assign according to**. In the **Options** list click on **Database**. You are asked to pick a database file. If you have installed Map Maker Pro you will also be able to select a Microsoft Access database (\*.mdb) or an Excel spreadsheet (\*.xls) and be prompted to select a table. After you have selected the database file you will be asked to choose the **Link column**.



Because the **Link column** contains the connections between the database entries and the spatial objects, the unique object ID column is the usual column to choose. Click OK and you return to the **Style – Assign according to** page.

The names of the database columns are displayed in the lower half of the page. Choose the column which is to be the theme of your map, in this case SPECIES. If the range of values within the SPECIES column is limited – perhaps ranging from 0 to 6 - you could simply click on OK and your map would be drawn using the styles numbered 0 to 6 in the project style set.



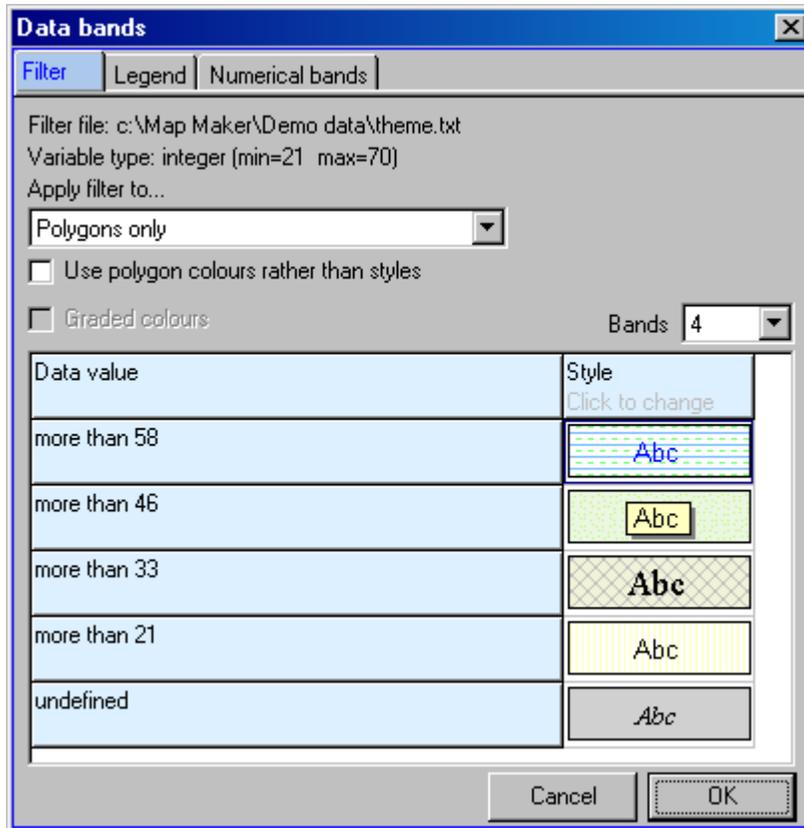
It is common practice to assign a “null” value to an object for which you have no data. In this Species map, for example, zero might be the true value of one of the areas, meaning that zero tortoises were found. If you want to show that you have no data for one of the polygons, you can assign “-99” to the polygon and enter “-99” as the **Unassigned value** (or null value) in this dialogue box.

If your data range is larger, or if the variable concerned is a decimal number, or you want to use a text column to govern the display, you will need to translate the data values into a manageable range of styles.

Remember the objective is to determine a whole “style number” for each object – style number 6 means that the object will be drawn with style number six from the style set. Data values which are not small whole numbers will need to be translated in some way into a simple numerical scale.

When you select SPECIES you will find a tab labelled **Filter data in SPECIES**. Click on this tab, then click on the **New filter** button and you will be asked to name a new filter file. Enter the name of the new filter file – this is simply a text file – you could call it “theme.txt” and the **Data bands** dialogue box will appear.

Map Maker examines the data column and determines the minimum and maximum values in the data. It then divides this range into equal bands. By default, Map Maker, creates four bands. In addition to the four bands, you will see a band for the unassigned (or undefined) data values. If you require more - or fewer - data bands, go to the **Bands** drop-down list and select another value.



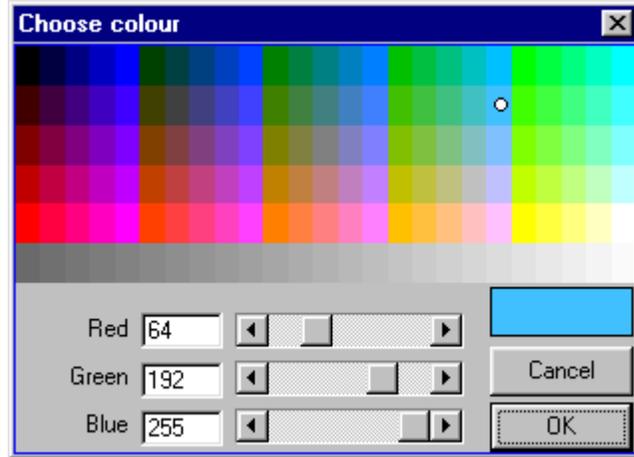
In this Species map, five bands (4+1) have been selected. By default, Map Maker chooses the first five styles from the current style file and displays the styles in the right-hand column. You may want the styles to be applied to all object types found in the layer whether they are polygons, lines or points. It is more usual to apply the styles to only one spatial type.

This example contains polygons. Go to the **Apply filter to** drop-down list if you want to select other object types. Because we are dealing with polygons, the style previewed in the right-hand column is a polygon. Click on any of these coloured polygons and a drop-down list appears offering you the choice of all the polygon styles in the style set.

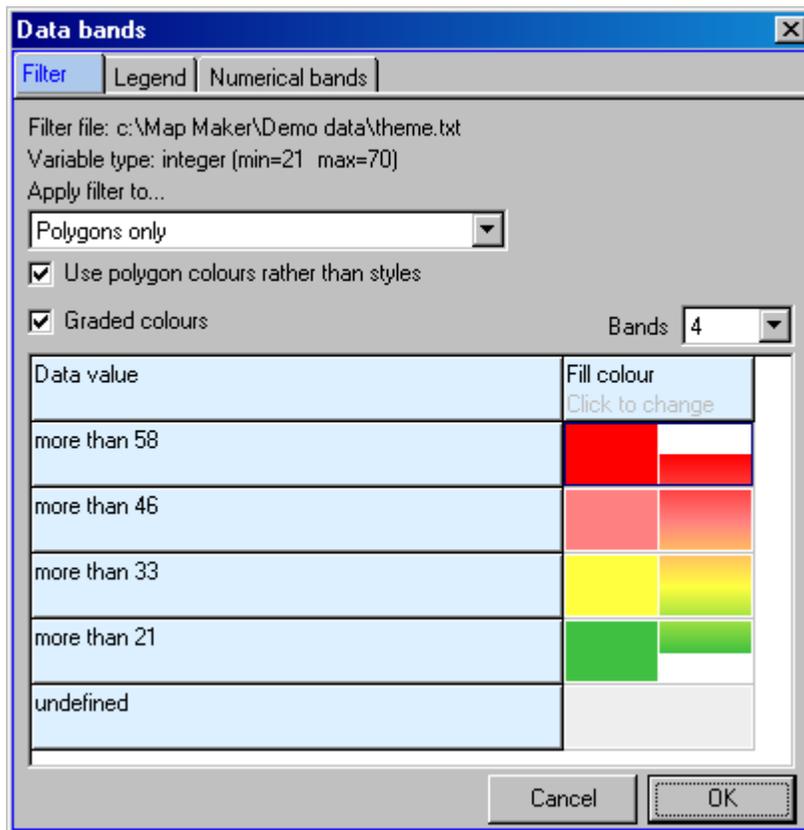
There are two additional options. When you tick **Use polygon colours rather than styles** you can control the fill colour directly instead of selecting one of the previously defined styles. When this option is selected, click on one of the entries in the right-hand column to call the colour selection dialogue box.

Choose any colour or grey tone by clicking on it or by specifying the red, green, and blue components of the colour. This will be used as the fill colour for the polygons whose data value falls within the selected band.

When you choose to **Use polygon colours rather than styles**, you can also choose to use **Graded colours**. This option allows you to use a continuum of colours to represent the range of data values.

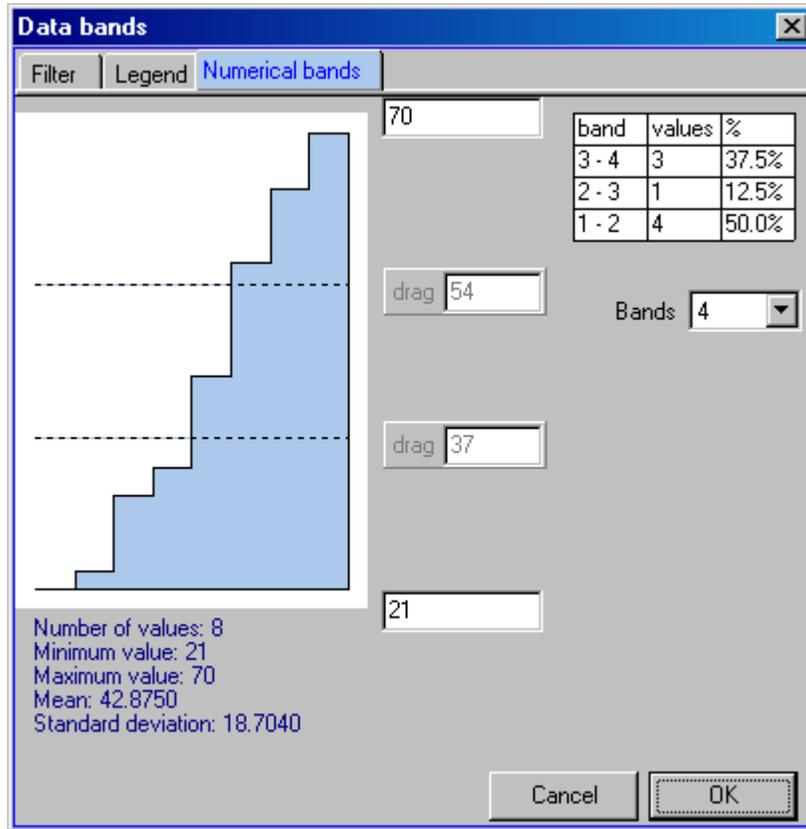


When **Graded colours** are selected, clicking on the column at the right will call a colour dialogue box which allows you to select a colour for an individual value rather than assign one colour to the entire band.



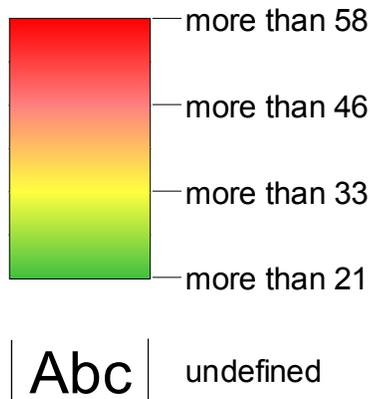
By default the data bands are of equal width. To adjust the bands so that they are of differing sizes, click on the **Numerical bands** tab.

This page displays a graphic profile of the distribution of the data values as well as some basic statistics. The top and bottom values (here 70 and 21) can be edited. They could be changed to 100 and zero, for example. The intermediate values can be edited by entering new values or simply dragging the demarcation lines up or down.

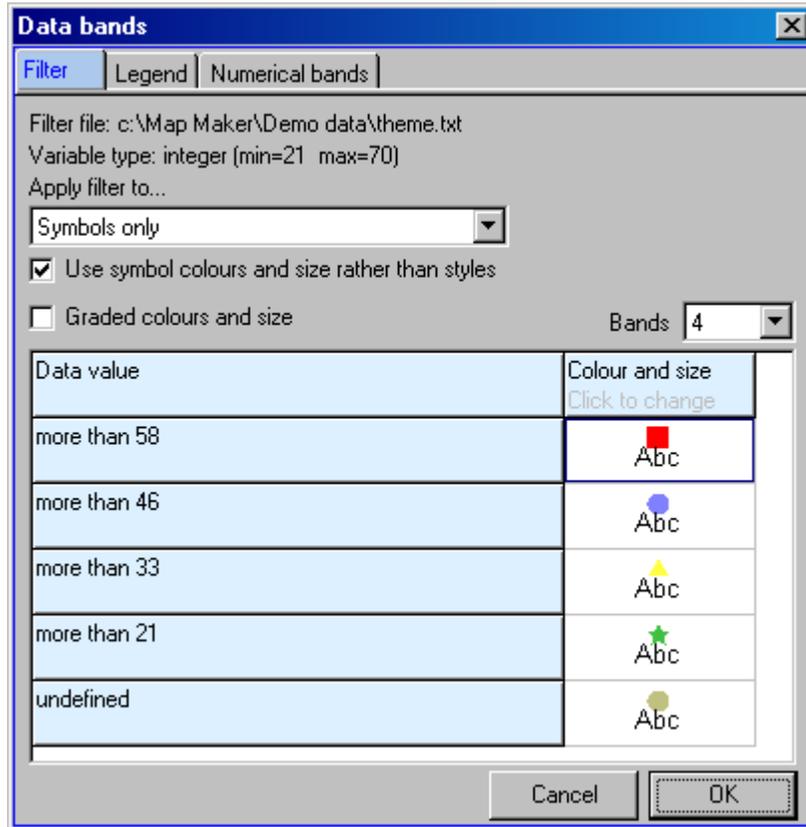


The **Legend** tab on the Data bands page enables you to create a legend for your map based on the data band. Save the legend as an Enhanced Metafile (\*.emf) See Map Furniture for details about placing the legend .emf file on the map.

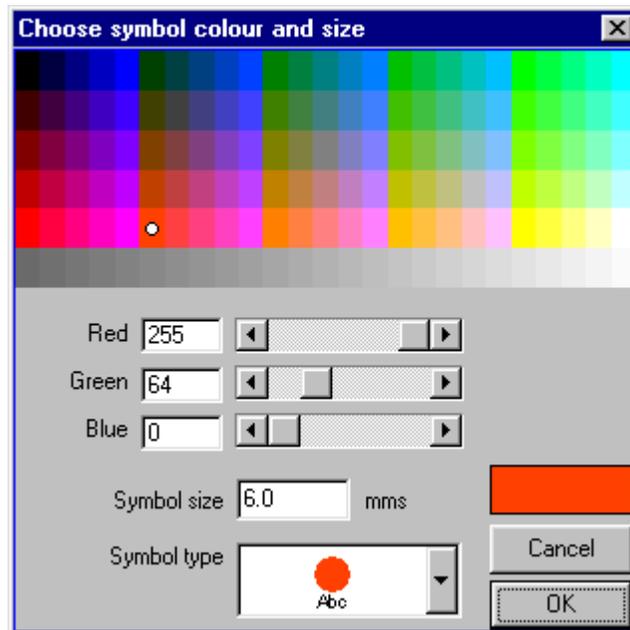
### Legend



To apply styles to point symbols rather than polygons, return to the **Filter** page of the **Data bands** dialogue box, go to the **Apply filter to** drop-down list and select **Symbols only**.



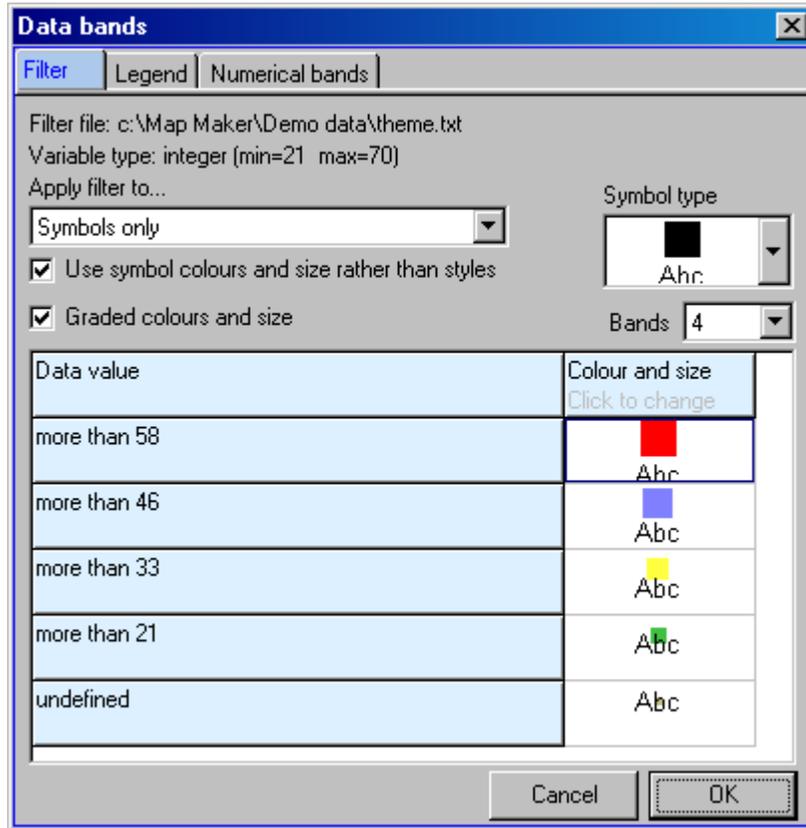
You can use the symbols defined in the style set or, if you select **Use symbol colours and size rather than styles**, when you click on the central column a symbol dialogue box will be shown.



Here you can choose a symbol type and specify its size as well as its colour.

Returning to the **Data bands – Filter** page, you can select the symbol version of the option to **Use graded colours and size**. Select one symbol type from the drop-down list.

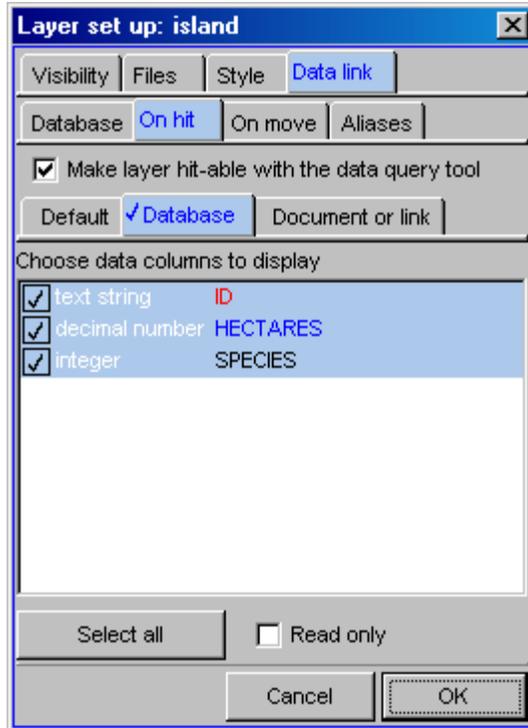
You will see that the symbol type is the same for all bands but – instead of using one symbol size and colour for all the values in one band - the size and colour of the symbol varies continuously with the data.



#### 4.5 Interrogating data

To set up your map so that you can interrogate a database by clicking on the screen, first open a DRA file for which you have a database. In the **Layer set up** dialogue box go to the page under **Data link – Database** page and click on **Choose database**. Choose your database. (If you are using an Access or Excel file, choose a table. Access and Excel require Map Maker Pro, see Part 2). Make sure that the correct ID column in your database has been selected as the **Link column**.

Select the **Data link – On hit** page.

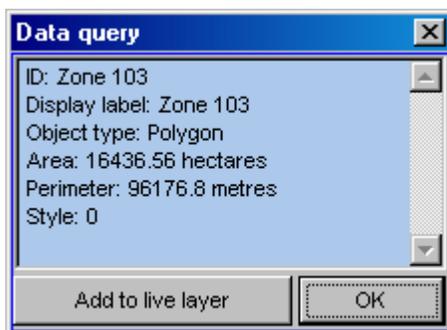


Tick the option to **Make layer hit-able with the data query tool** and then select the **Data link – On hit – Database** page. Here you can choose the data columns to be displayed when you interrogate the database. In this example, the data in all the columns will be shown.

Tick the **Read only** option, if your map project will be used by other people and you wish to prevent them from making changes to the database.

## 4.6 The data query tool

Returning to the map, select **Tools – Query – Data query** (or **Fast menu – Query – Data query**). To view data on screen, select the data query tool, move the cursor over the object on the map and click with the left mouse button to “hit” the object. (If you have not attached a database, basic information about the object will be displayed provided that the “Make layer hit-able” box has been selected).



If you have a database attached the relevant data entry is displayed.

If you edit the data displayed in the **Hit** window, the underlying database will be updated automatically.

Note that the ID column can not be edited since that would break the link with the object in the DRA file. To edit IDs in both the DRA file and the database load the DRA file and the database into the live layer. When the object ID is edited the corresponding entry in the database is automatically updated.

The **Data query** tool can be used like the Select tool to select a group of objects. If you click and hold down the mouse button and drag the cursor you will draw a rectangular box. All the objects within the box are queried and the selected sub-set of the database is displayed.

	ID	HECTARES	SPECIES
	text string	decimal number	integer
1	Zone 104	3421.96	23
2	Zone 103	16436.56	70
3	Zone 102	2989.09	44

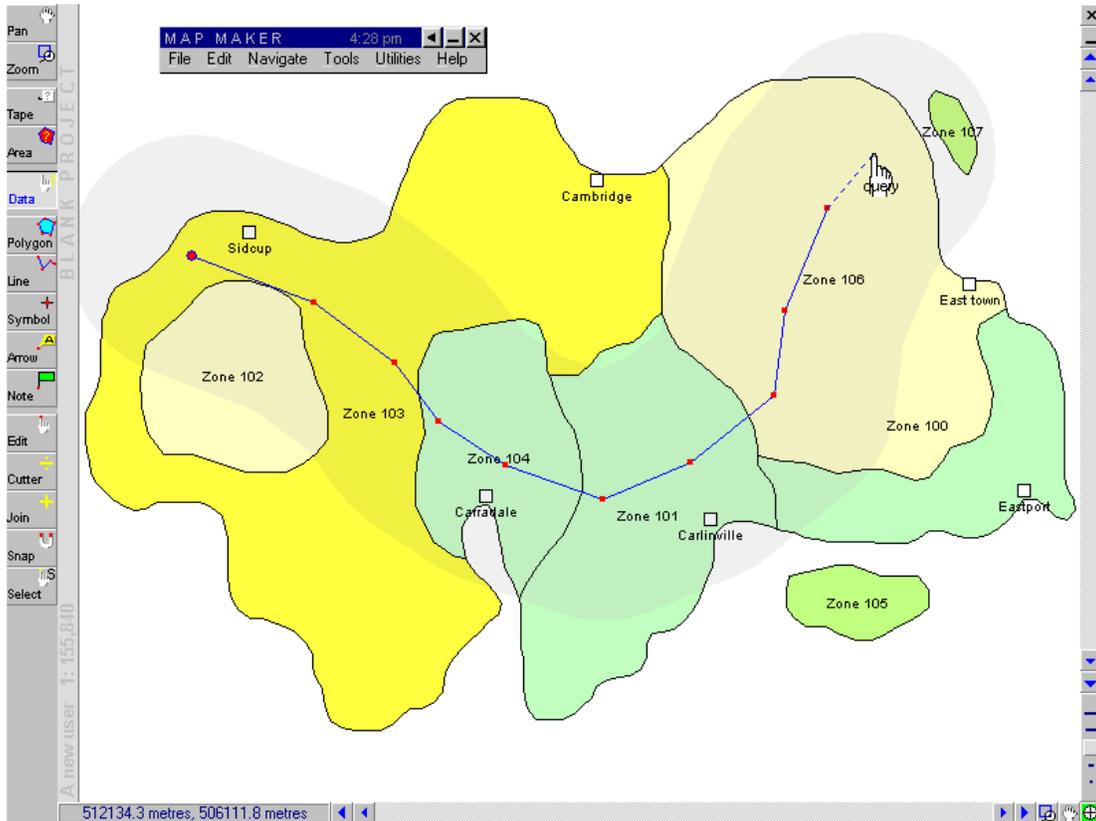
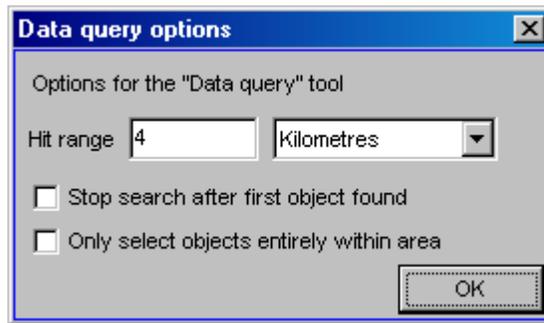
Details on the functioning of the data editor can be found in live data fields, section 3.1.1. As with the select tool, the **Data query** tool can be used to:

- **Select an object.** Click on it.
- **Select objects in a box.** Click, drag, release.
- **Select objects in a circle.** Hold down the **C** key, click and hold the mouse button down. The **C** key can be released. Drag the cursor. As the cursor is moved along the radius, the circle is displayed. Release the mouse button to finish.
- **Select objects along a line.** Hold down the **Control** key, click and release the mouse button. Release the Control key, move the cursor and add points as if you were using the line tool. Click with the right mouse button to finish.

- **Select objects in a polygon.** As for the line tool, hold down the **Control** key. Click and release the mouse button. The Control key can be released. Move the cursor and add points as if using the polygon tool. Click over the starting point to finish the polygon.

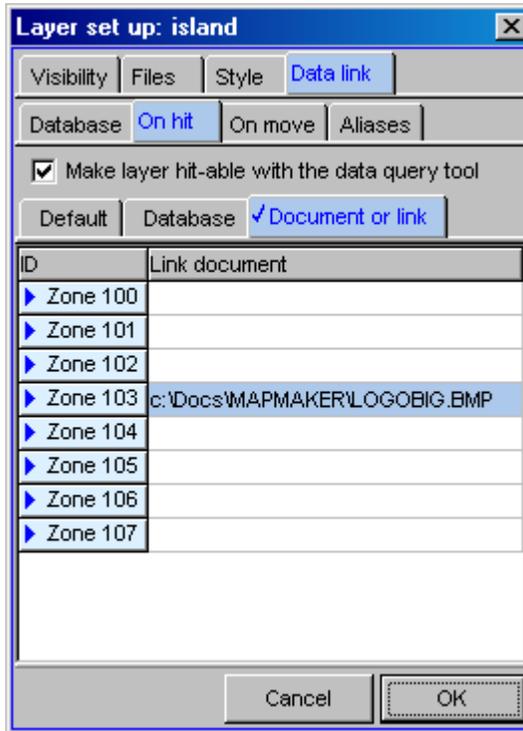
The functioning of the Data query tool itself can be regulated by going to **Tools – Query – Query options**.

As described above, the data query tool can be used to select objects that fall along a line. By adjusting the **Hit range**, you can set the data query tool to find objects within a defined distance of the line. The **Hit range** (or “snap” distance) can be expressed as a distance in pixels on the screen or in real world dimensions (e.g. metres, yards, miles etc.). Here the hit range has been set to 4 Kilometres. The data query tool can now be used to draw a line, for example, and select all the towns within a 4 km range of the line.



## 4.7 Linking to documents

To associate documents or other types of media to an object in the layer, go to **Layer set up – Data link – On hit – Document or link**.



Click on an object name in the column on the left to display a drop-down menu of options and select a document file. This illustration shows that when the object “Zone 103,” is hit, the file named “Logobig.bmp” will be displayed.

For our purposes, the following file types are all called “documents”: MS Word documents (\*.doc), Adobe Acrobat documents (\*.pdf), Web pages (\*.htm), Rich-text files (\*.rtf), Windows bitmaps (\*.bmp), JPEG images (\*.jpg), and audio-visual files. The BMP and JPG images are displayed directly by Map Maker. The other files cannot be displayed unless their relevant programs are present.

In addition you can link an object to either another map project (\*.geo) or a program (\*.exe). If you link to a GEO file then when the user clicks on that object the map is automatically loaded. This allows you, for instance, to display a detailed map of the area you have clicked on. The user can press on the backspace key to return to the previous map.

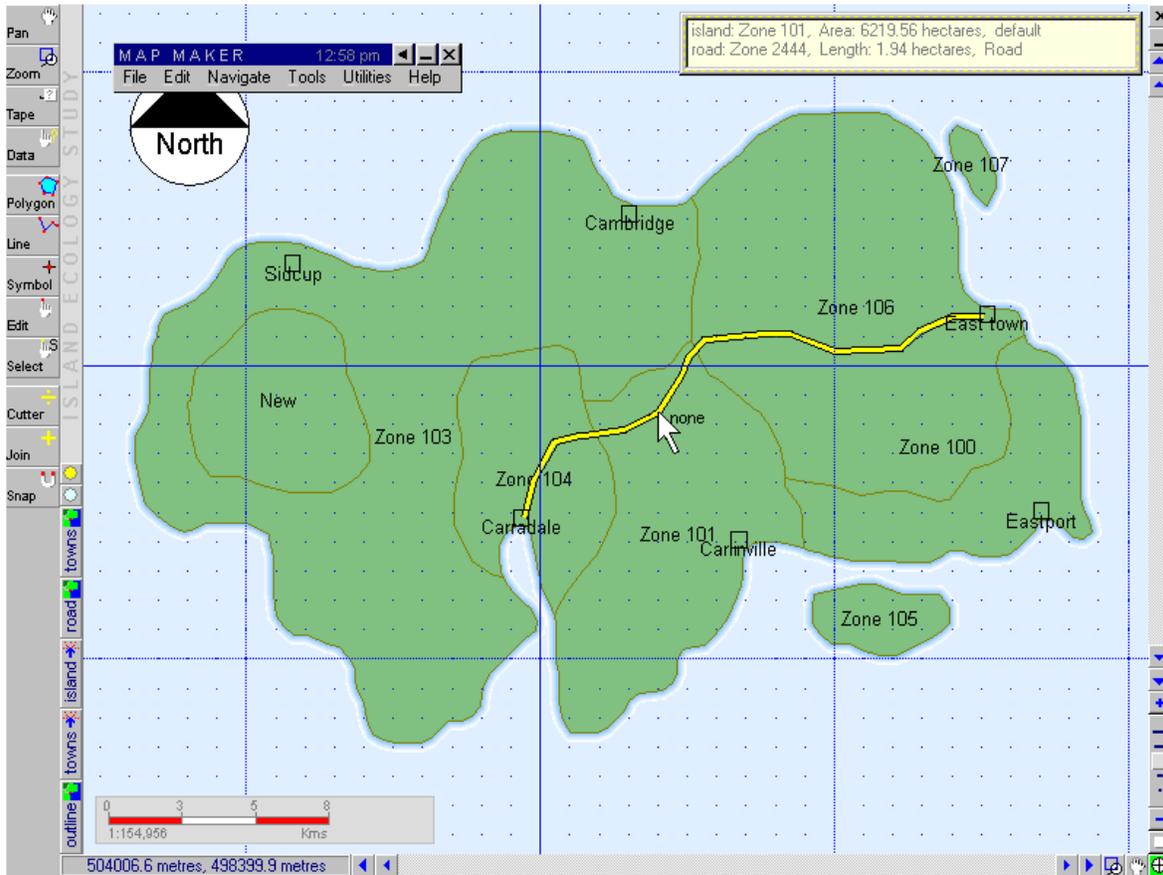
When you link an object to a program (\*.exe) then when the user clicks on the object the program is launched with the ID of the object sent as the command line parameter.

## 4.8 “Cursor over” information

In addition to clicking on the map to interrogate it you can also display a running commentary as the cursor roams about the map.

At **Layer set-up**, or else in the **Project Manager**, go to **Data link – On move** page and tick the **Show “cursor over” information**. You can do this to more than one layer.

# MAP MAKER



When you click **OK** and return to the map you will see that there is now a floating window displaying the name of all the layers for which you have selected **Show "cursor over" information**. As you move the cursor you will see that - if the cursor is over an object in one of those layers - the floating window will display basic information about the object, such as its ID, its area (for polygons) or length (for lines), and the name of the style used to draw the object.

If, for any selected layer, there is no object where the cursor rests, the name of the layer only is displayed.

Note that you can re-locate the floating window if you place the cursor over the window, click and hold the mouse button down, and drag the window.

**PRO**  
only

## 4.9 Using Access and Excel

In Map Maker Gratis you can edit and select data attribute files in the DBF format. Map Maker Pro allows you to use data from Microsoft Access and Excel, so long as your computer has the relevant Microsoft's data access tools installed.

To use Excel or Access data your computer must have:

- Microsoft ActiveX Data Objects (ADO) installed, version 2.1 or above.
- "ADO Extension for DLL and Security" (ADOX) installed, version 2.5 or above.
- Microsoft Jet Engine 4.0.

If you have Windows 2000 or Microsoft Office 2000 installed these should already be present. If you are in doubt, in Map Maker look under **Help – About Map Maker – System**. Where it will tell you if these elements are present. If not they are on the CD and available from the Microsoft web site: [www.microsoft.com/data/download.htm](http://www.microsoft.com/data/download.htm)

Wherever Map Maker asks for a database if you choose an Access database (\*.mdb) or an Excel spreadsheet (\*.xls), Map Maker will also ask you to pick from a list of table names. If you are creating a new table, such as when you use **Utilities – Data utilities – Generate database for DRA**, the program will ask you to name a new table.

When you are using **Utilities – Data utilities – Edit database** with an Access or Excel table the **Edit column** button that allows you to add new columns, delete columns, or change column definitions is grayed out. This is to prevent users from corrupting links, indexes and other items related to the structure of the database. These should be edited from within Access or Excel.

If you have a layer linked to an Access table then you can click on objects and view the data. You can also edit the data and the underlying Access database will be updated. You can do this with Access running and even with the pertinent database open within Access. However, if the table is open in Access then Access will stop Map Maker from changing the data.

## 4.10 Using Access Forms

When viewing data with Map Maker you can only see data from one table at a time. If you need the functions of a relational database in which data from various tables can be mixed on one data viewing or data entry form then you can configure Map Maker to launch a Microsoft Access form. To do this requires Microsoft Access to be installed on the computer.

To configure a layer to launch an Access form follow these steps:

1. Go to **File – Add layer** and choose a DRA file.
2. In **Layer set up** go to **Data link – Data base – Choose database**. Choose the Access database file (\*.mdb). A window appears listing the tables in the database. Choose a table.

PRO  
only

3. Still in Layer set up, go to the **Data link – On hit – Database** page and choose the **Use Access form** option.

The screenshot shows the 'Layer set up: afPROVINCE' dialog box with the 'Data link' tab selected. Within this tab, the 'Database' sub-tab is active. The 'Make layer hit-able with the data query tool' checkbox is checked. The 'Default' sub-tab is selected, and the 'Use Access form' checkbox is checked. The 'Forms' dropdown menu is set to 'PROVINCE' and the 'ID field' dropdown menu is set to 'ID'. The 'Read only' checkbox is unchecked, and the 'Create new entries where missing' checkbox is checked. The 'Cancel' and 'OK' buttons are visible at the bottom.

4. The **Forms** that are in the Access file are listed as are the data fields on the currently selected form. Choose the form that you want and the field in the form that is the link field for the object ID. If you are designing a project where you do not want the user to be able to alter the data tick the **Read only** box. If you tick the **Create new entries where missing** box then if an object in the layer does not have a corresponding entry in the database then a new database entry will be created if you click on that object.

When you select the **Use Access form** page the **Make layer hit-able with the data query tool** check box is automatically ticked. As with other data queries in Map Maker, the data query tool can be used to select a group of objects in a rectangle, circle, polygon or along a line. This group becomes the selected group of records in Access. All of the analysis, data processing and reporting functions of Access can then be employed on that selected group.

## 5 Advanced data linking

### 5.1 Matching existing data to objects on the map

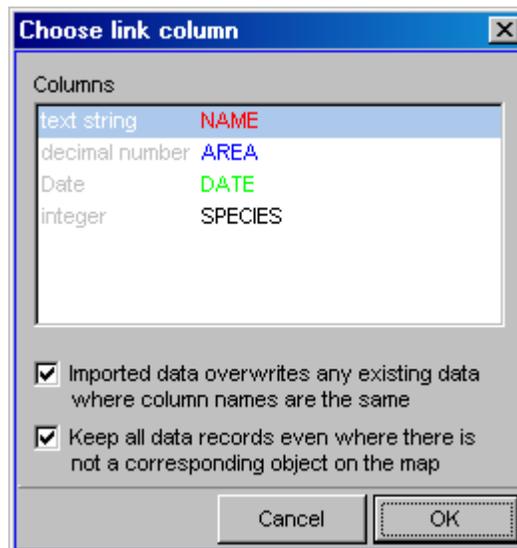
If your database was created within Map Maker then the data records should be correctly matched with the objects on the map. However, if you are trying to use an existing database with a new map then you will need to determine which data record should be associated with which object (polygon, line or point).

Make sure that **Edit – Live layer data – Initialize live layer data** is ticked. Load a DRA file into the live layer, the islands.dra file in the demo project, for example.

Remember, if **Edit – Live layer data – Initialize live layer data** is ticked, when a file is loaded into the live layer, Map Maker automatically generates a default live data database so that every spatial object in the live layer has a corresponding data record.

The task now is to replace the default entries with data from an imported database file. Go to **Edit – Live layer data – Merge data table with live data**. You are asked to select a database file. In this example import.dbf from the demo project has been selected.

After choosing the database file, a dialogue box appears which lists the column names in the database table that you have selected.



One of the columns must be selected as the link column.

The link column contains the ID which is the essential link between the data and the spatial objects on the map.

In this example, the link column is called NAME.

The first tick box allows you to decide whether the live data in an existing column will or will not be replaced by the newly imported data in a column of the same name.

*Example: Suppose when you created the live layer, you set up a live database containing a column called SPECIES. And suppose the imported database also contains a column*

called *SPECIES*. This dialogue box allows you to decide whether the *SPECIES* data in the imported database will replace the existing *SPECIES* data.

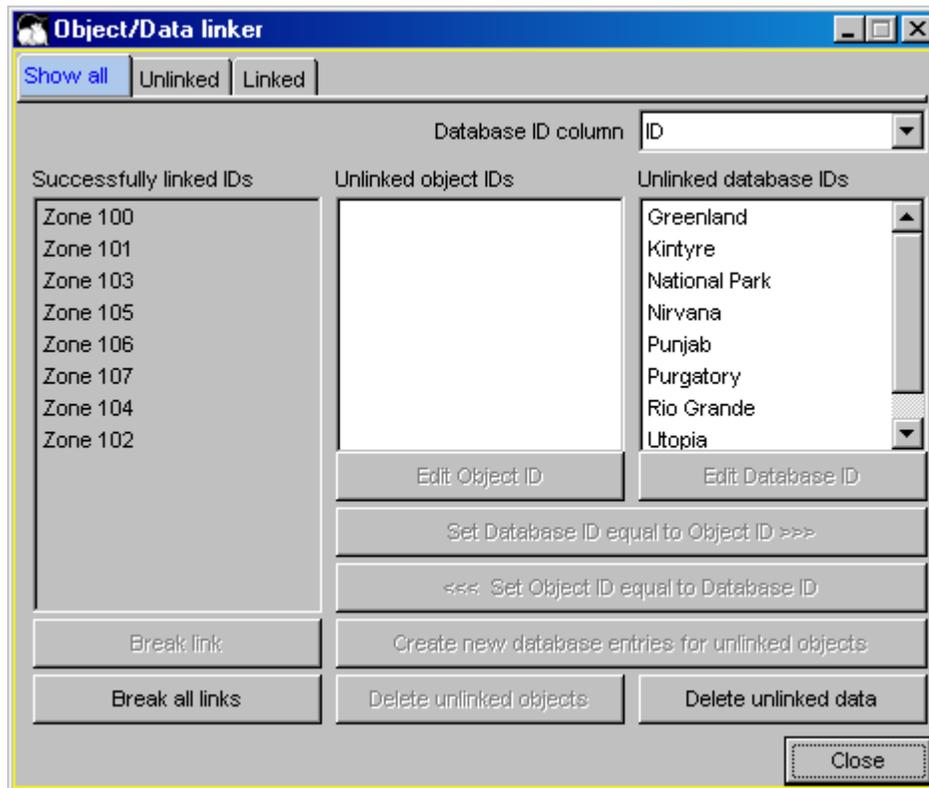
When Map Maker imports a new database it searches for columns with the same name as columns in the existing database. After matching those columns (if any) any remaining columns are added to the end of the live data database

The second tick box should be selected unless you know that the IDs in the link column of the imported database (in this case the NAME column) correspond with the IDs of the objects in the live layer.

Note: alternatively go **Edit – Load file into live layer with data** This command calls the same dialogue boxes as those just described and allows you to load a DRA file and a data file into the live layer in a single sequence.

When you finish with the tick boxes, click **OK**. The live data file now contains both the existing live data and the imported database.

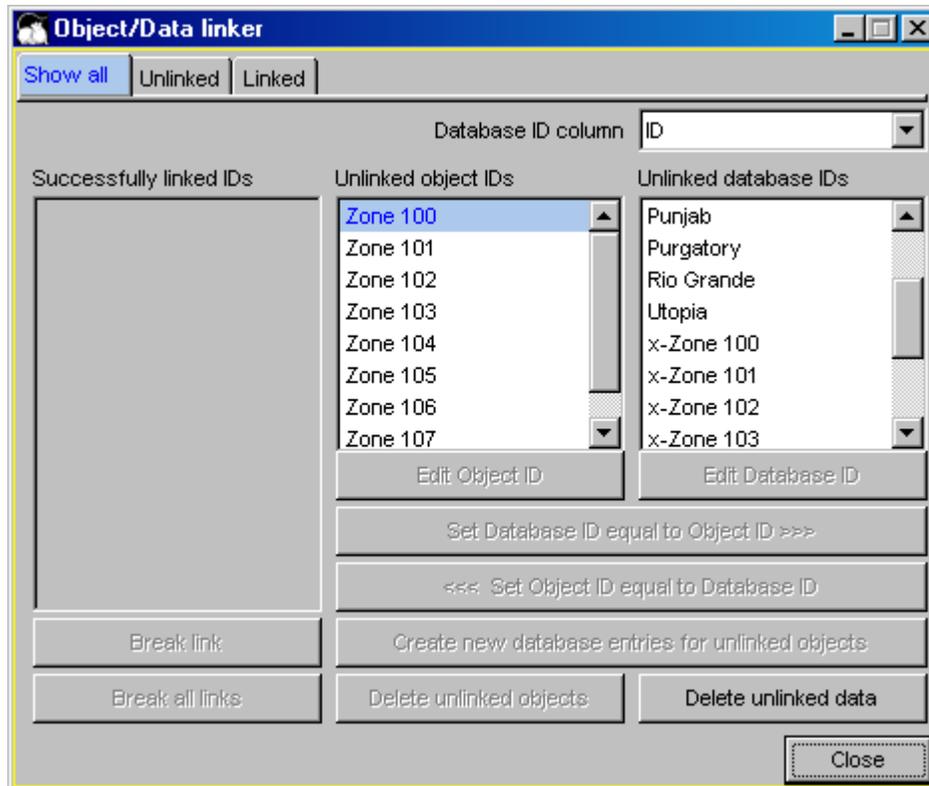
Click on **Edit – Live layer data – Show object/data linker**.



The left hand list of the **Object/Data linker** shows all the objects in the live layer which have corresponding entries in the live data database – they are “successfully linked”. The middle column shows all the objects without corresponding data entries – “unlinked

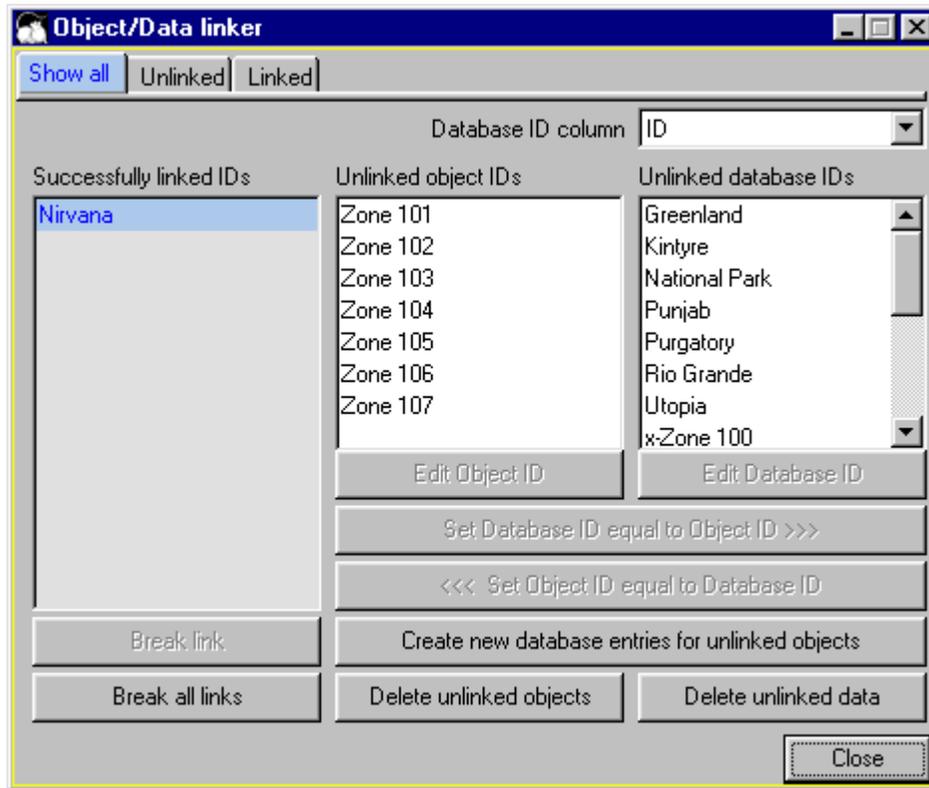
objects". In this case, there are none. On the right is the list of all the entries in the new database for which there are no corresponding objects.

We want to reorganise things so that the imported data is associated with objects on the map. First click on **Break all links**. This command moves the objects in to the central "unlinked" list. Notice the bottom of the right hand list. The IDs of the data entries for the unlinked objects have changed. In this case, the data entry **Zone 100** has become **x-Zone 100**. The link between the polygon on the map with the ID "Zone 100" and the original live database has thus been broken. The object's data entry has been renamed "x-Zone 100." This name simply reminds you that the object we knew as "Zone 100" still exists but is temporarily unlinked to any data.



Now suppose that we know that **Zone 100** really corresponds with the database entry for **Nirvana**. Select **Zone 100** in the central list, and **Nirvana** in the right hand list. You now have two choices. Either the database entry can be renamed "Zone 100," or the object in the live layer called "Zone 100" can be renamed "Nirvana." In this example we clicked on **<< Set Object ID equal to Database ID**.

**Zone 100** disappears from the central list, **Nirvana** disappears from the right-hand list, and **Nirvana** appears in the left-hand successfully linked list. Continue the procedure until the central list is cleared. Then click on **Delete unlinked data** to remove the now redundant entries, such as **x-Zone 100**.

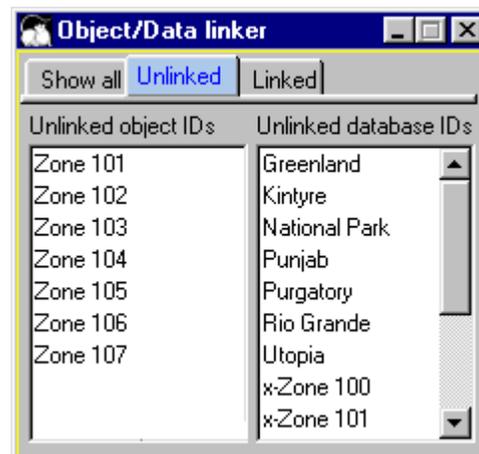


When you click on an object name in the central list, the corresponding object on the map is automatically highlighted so that you can be sure that you have selected the correct object. Likewise, if you go to (**Tools – Edit – Select**) and use the **Select** tool to click on an object on the map, the corresponding entry either in the “successfully linked” list or the “unlinked” list will be highlighted.

Because of this feature, when the floating window **Object/Data linker** is active, the **Select** tool is restricted to selecting one object at a time.

The **Object/Data linker** dialogue boxes support “drag and drop” operations. You can drag Nirvana and drop it over Zone 100 thereby renaming Zone 100 and creating the link. Similarly you could drag Zone 100 and drop it over Nirvana so changing the entry in the database to Zone 100. You can also drag objects from the successfully linked list and drop them in either of the unlinked lists if you decide to break the link.

You can reduce the size of the dialogue box by clicking on the **Unlinked** tab. The drag and drop facility means no buttons are required and it is easier to view the underlying map.



## 5.2 Inheritance

Objects in the live layer can “inherit” attributes from other objects in vector layers and vice versa.

### 5.2.1 What is inheritance?

Inheritance means that if one object is over a second object then attributes associated with the second object can be copied to the first object.

The attributes that can be copied are:

- The style number
- The display label
- One or more fields from a database

For instance, if you choose to inherit the style number and display label, then if a polygon in the live layer is over a town in another layer – the “source” layer - and the town has a style of 4 and a display label of “London” that style and label becomes the new style and label of the live layer polygon.

If the source layer has a database attached then the live layer’s database can inherit data from it. If, for instance, you choose two fields from the source layer’s database then those two fields will be added to the live layer’s database. If a field of the same name already exists in the live layer database then data from the source layer’s database will be copied into the existing field. Note that data will not be inherited into the database field which is the link column between the database and its layer, since this would corrupt the link.

It may be that there are several candidates in the source layer for inheritance. The polygon described above might be over several towns. In such cases the polygon will only inherit from the first valid candidate.

### 5.2.2 What constitutes being “over”?

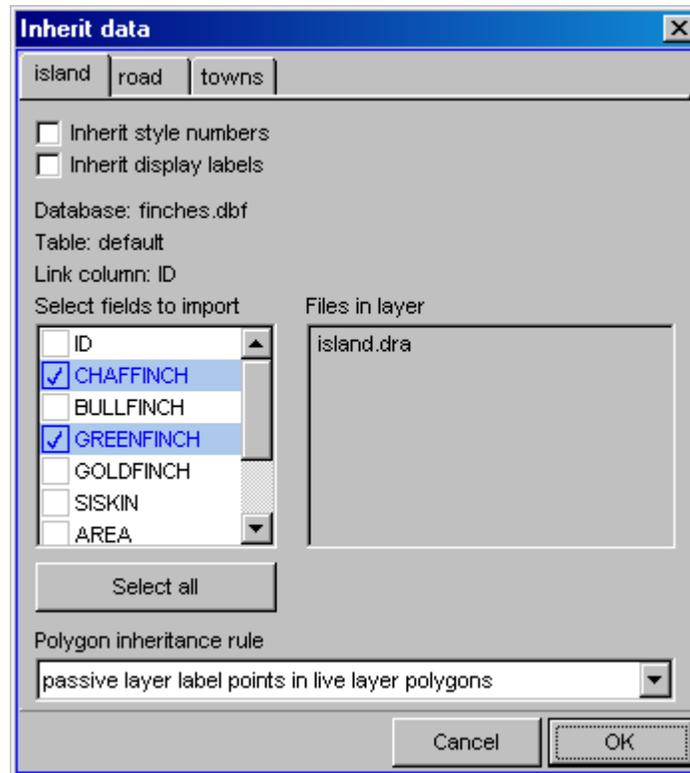
In some situations it is clear what is meant by one object being over another. If a point object is over a polygon it is unambiguously over the polygon. If a line object is completely contained in a polygon it is clearly over the polygon, but if it is part in and part out of the polygon the situation is less clear. In these circumstance Map Maker takes the “label point” of the line and if the label point is in the polygon then the line is considered to be over the polygon.

The default label point of a line object is the centre point of the middle line segment. When a line consists of an even number of line segments the label point is in the middle of the line segment that precedes the centre vertex – i.e. if a line has four line segments the label point is in the middle of the second segment.

Where a polygon is over another polygon then there are two choices, either the label point of the first polygon is inside the second polygon, or else the label point of the second polygon is in the first polygon. When carrying out an inheritance operation involving polygons over polygons you must choose which option you want to use.

### 5.2.3 Live layer inherits data from layers

When you have something in the live layer and at least one vector layer on screen the live layer can inherit attributes. Go to **Edit – Live layer data – Live layer inherit data from layers**. A dialogue box appears:



The tabs across the top allow you to choose one of the vector layers in your current project. If the layer does not have a database attached you can still inherit the style numbers and/or the display labels. If, as in this example, there is a database attached to the layer you can choose which fields you want the live layer database to inherit. If both the live layer and the layer that you are inheriting from contain polygons then choose the appropriate **Polygon inheritance rule**, either:

**Passive layer label points in live layer polygons**, the live layer polygon will only inherit if the label point of the source polygon is inside the live layer polygon.

Or...

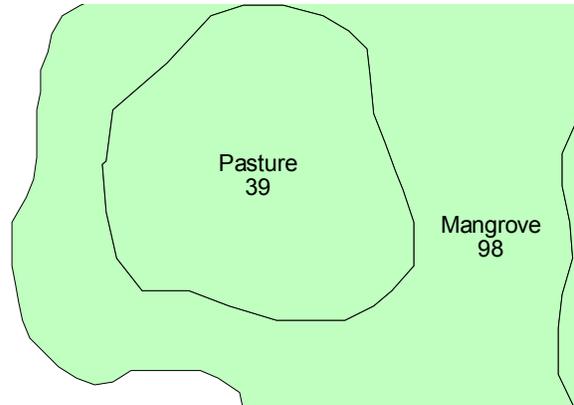
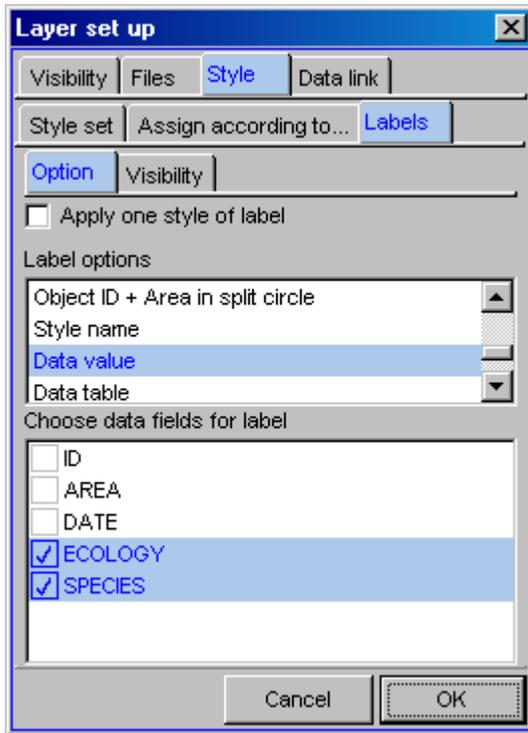
**Live layer label points in passive layer polygons**, the live layer polygon will only inherit if its label point is inside the source polygon.

### 5.2.4 Layers inherit data from live layer

Conversely, a vector layer can inherit attributes from the live layer. Go to **Edit – Live layer data – Layers inherit data from live layer**. If the layer does not have a database attached then it can still inherit style numbers and display labels – this only applies to layers of DRA files. If it has a database then it can inherit all or some of the fields in the live layer database. Note that if you choose to inherit styles numbers and captions then the DRA files of the layer are permanently amended, so you should be sure of what you are doing.

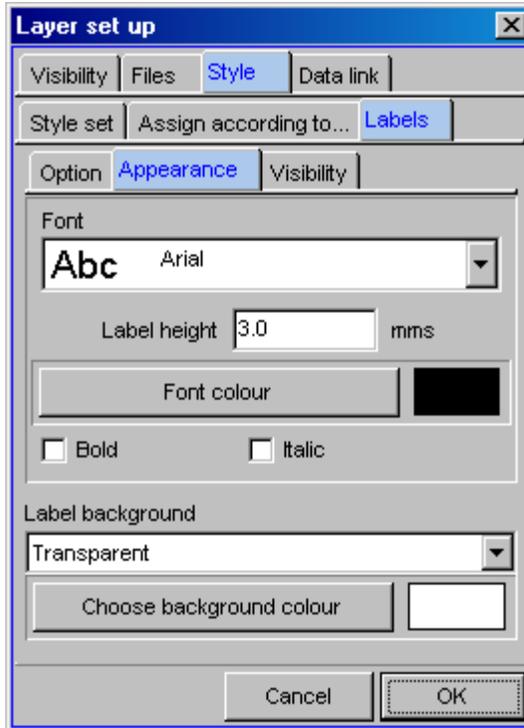
### 5.3 Data labels

Open a DRA file for which you have a database. In **Layer set up** go to the **Styles – Labels – Option** page:

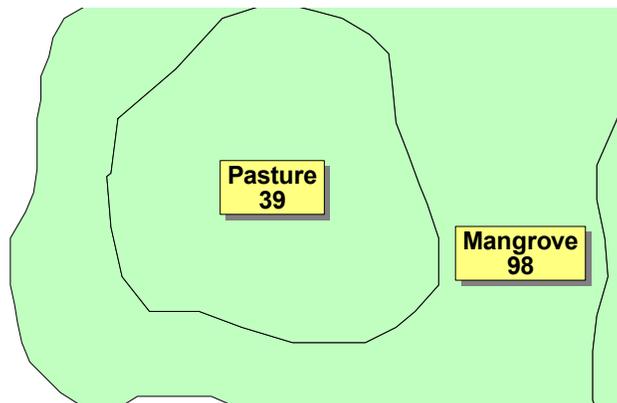


Under **Label options** choose **Data value**. If a database is not already attached you will be asked to select a database and a link column and then the columns in the database will be listed. Choose one or more of these column names. Here **ECOLOGY** and **SPECIES** are selected. Each object on the map is now labelled with these two values.

Map objects are usually displayed in a variety of styles each of which may have its own different label style. If you want to label objects with information drawn from your database, you will probably want all the object labels to be displayed in the same style. Ticking on **Apply one style of label** will override the existing label style definitions and ensure that the labels look the same as each other. When you tick this option an additional page is displayed under **Style – Labels – Appearance**.



Here you can design the new labels by selecting the font type, its size, colour and attributes (e.g. bold or italic) and also the background for the label. Usually labels have a transparent background but, if your map is complicated, labels with coloured backgrounds might be easier to read.

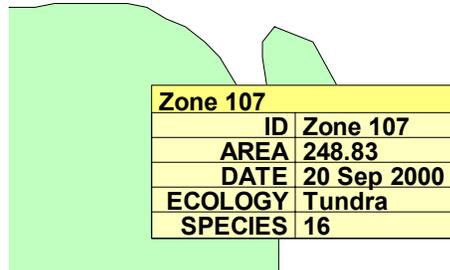


In this example the **Label background** option on the **Labels – Appearance** page has been set to **Opaque with shadow**.

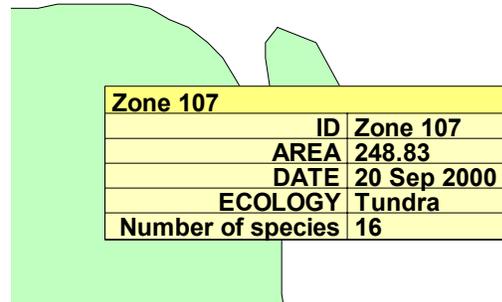
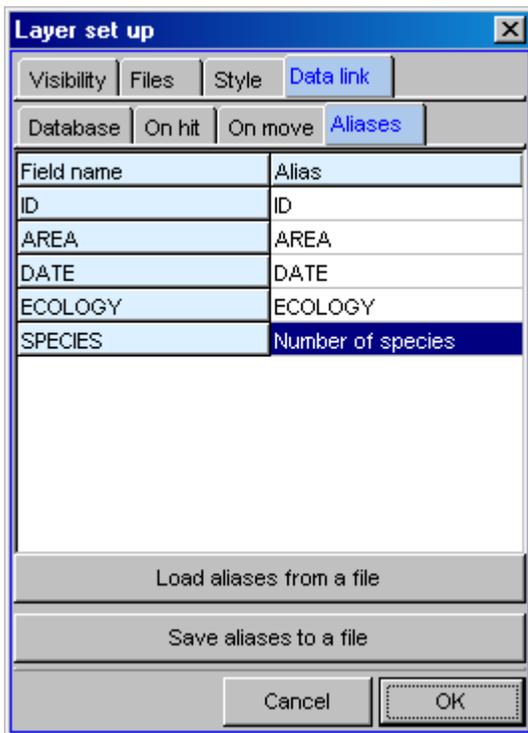
### 5.3.1 Data labels as tables

When using multiple data values as labels, as in the example above with ECOLOGY and SPECIES, the map can soon start to become confusing unless the meaning of the different data values is made explicit. This can be done by displaying the data values as a small table. In layer set up go to **Style – labels – option** and select **Data table**. As with **Data value** you choose the database, the link column and the fields in the database that you want to use as labels.

As with data labels if you tick the **Apply one style of label** box then you can choose from various options for the background of the label. For instance, if you choose translucent then the table will not totally obscure the map below.



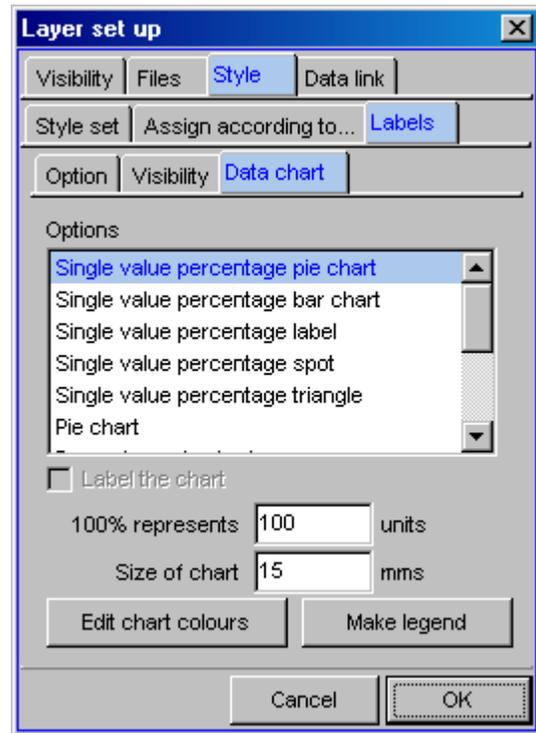
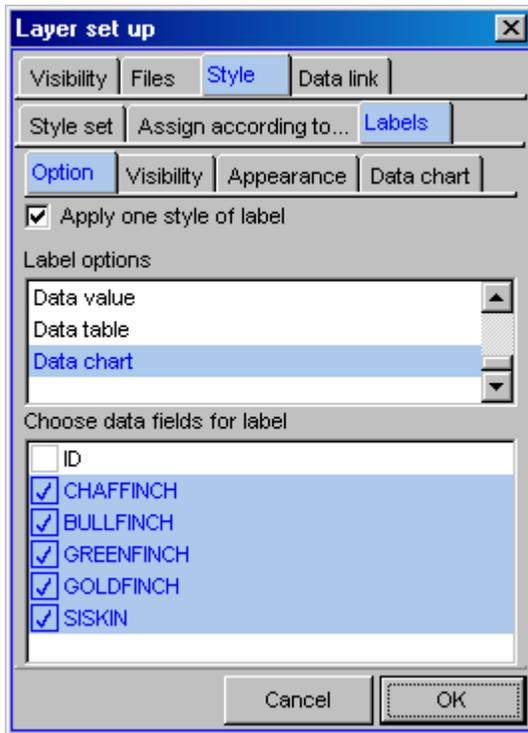
To be compatible with DBF databases the names of database fields needs to be in upper case letters and short – no longer than 11 characters. Your labels can be made more informative if you go to the **Data link – Aliases** page and choose new names to be used on the map labels.



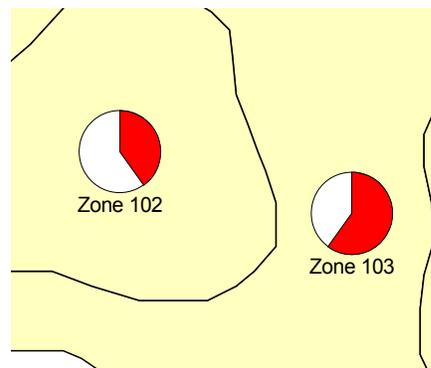
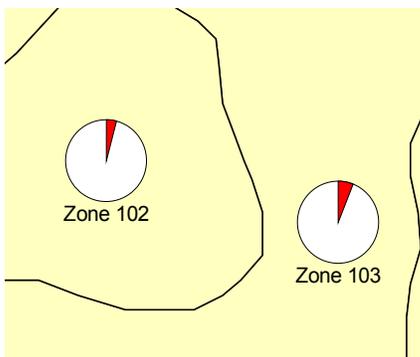
The aliases that you create can be saved to a file for subsequent use in another project. If you will only need them for this project there is no need to save them to file since they will be automatically saved with the project.

### 5.3.2 Data labels as charts

In the example above where several different types of data are being shown at once (e.g. text, numbers, dates) the table format is an appropriate one. However, when you want to display a set of numerical values a chart may be more useful.

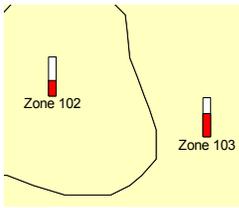


In this example a database describing the incidence of five bird species is being charted. On the **Styles – Labels – Option** page **Data chart** has been selected. Going to the **Data chart** page displays the charting options. The first five options are all for displaying a single data value. If you chose one of these in this example then just the first data value (CHAFFINCH) would be displayed.

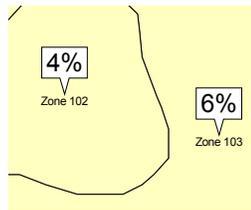


Here the two polygons “Zone 102” and “Zone 103” have 4 and 6 Chaffinches respectively. In the left hand illustration these values are shown as 4% and 6% in a **single-value percentage pie chart**. By changing the **100% represents** value from 100 units to 10 units you can display the data in a way more appropriate to the range of values, as in the right hand illustration.

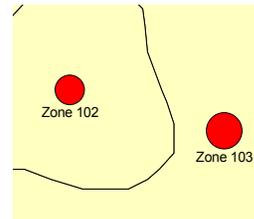
The other single-value charts are shown below:



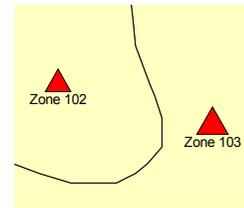
Bar chart



Label

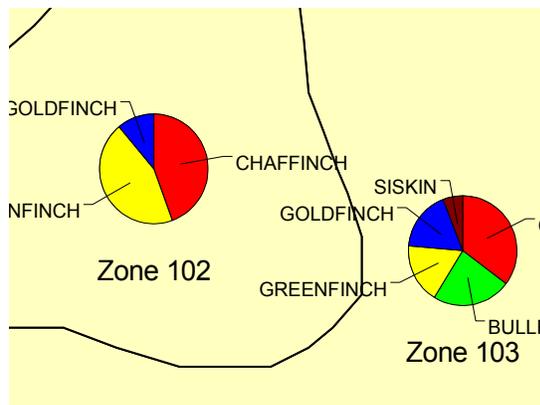
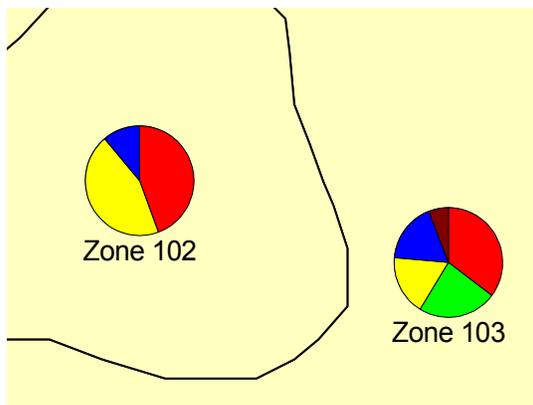


Spot



Triangle

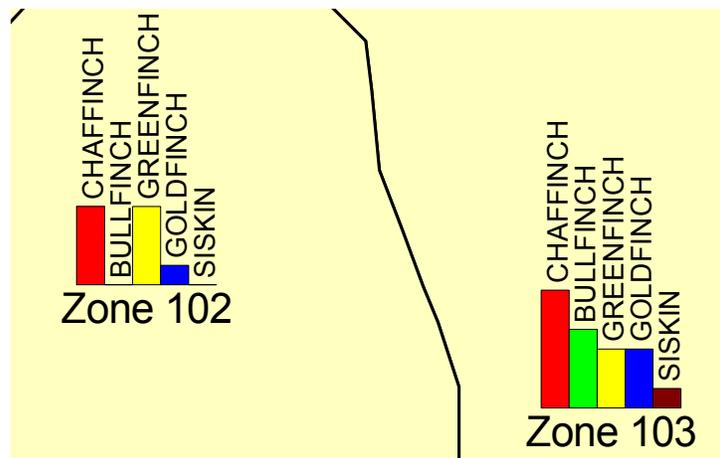
The remaining charts are for displaying several data values at once. With the **Pie chart** option the program first adds together all the data values to calculate a total and then displays each value as a proportion of the total.



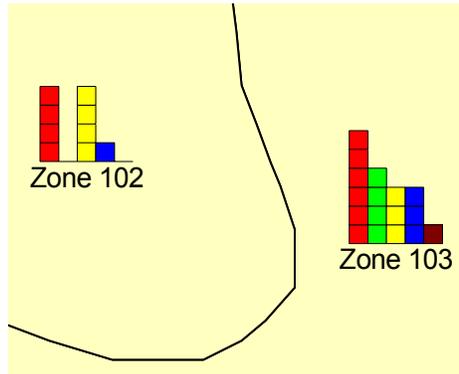
In this case “Zone 102” has no Bullfinches or Siskins while “Zone 103” has all five species. By ticking the **Label the chart** box you can label each chart, as in the right hand illustration. Clearly, this should only be done where there is sufficient space for the labels not to clash.

You can also select Percentage pie chart which shows each value as a proportion of a fixed total (by default 100) leaving any remaining space white.

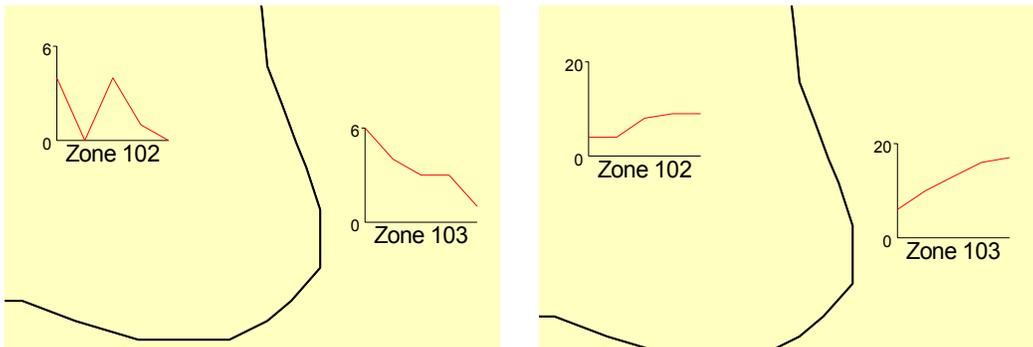
The histogram option can also be used with or without labels:



When dealing with low integer values (such as small populations or family members) you can use the **Unit histogram** option, again with or without labels:



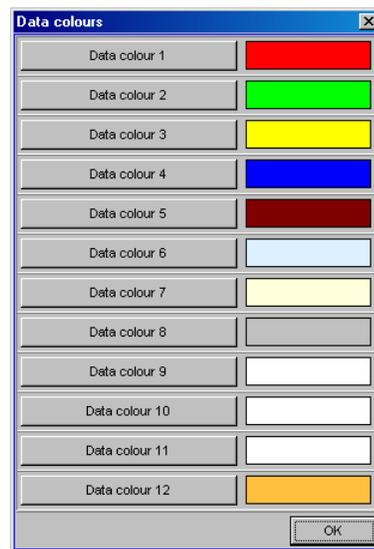
The two graph options are used when you want to display a sequence of values of the same variable. You would not use it to display different bird species but you might use it to show total numbers of birds over a series of years:



The right hand illustration show the **Cumulative graph** option in which each value is added to the sum of the previous values.

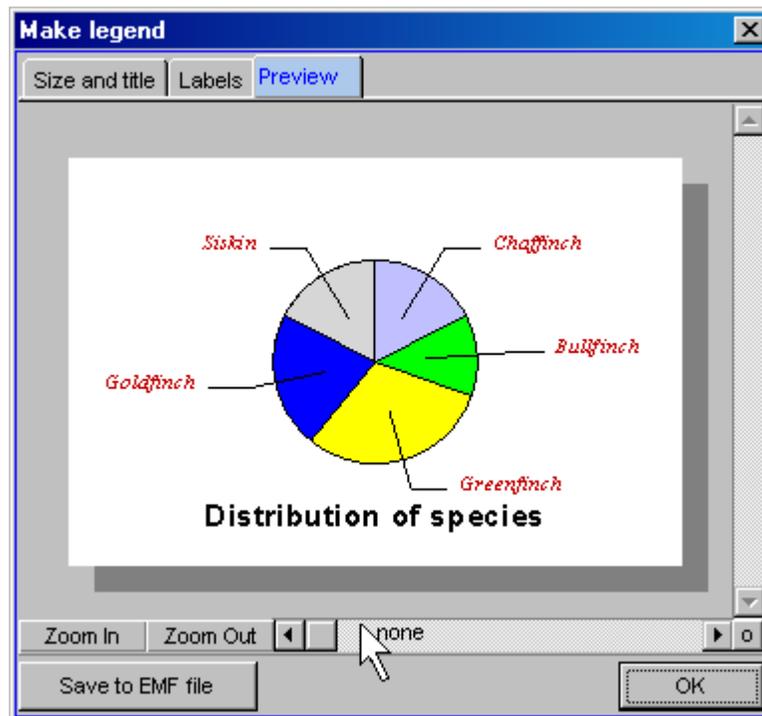
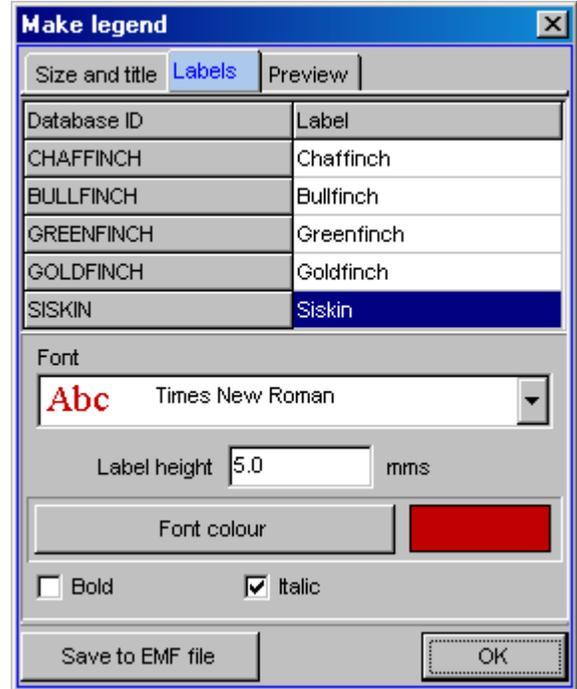
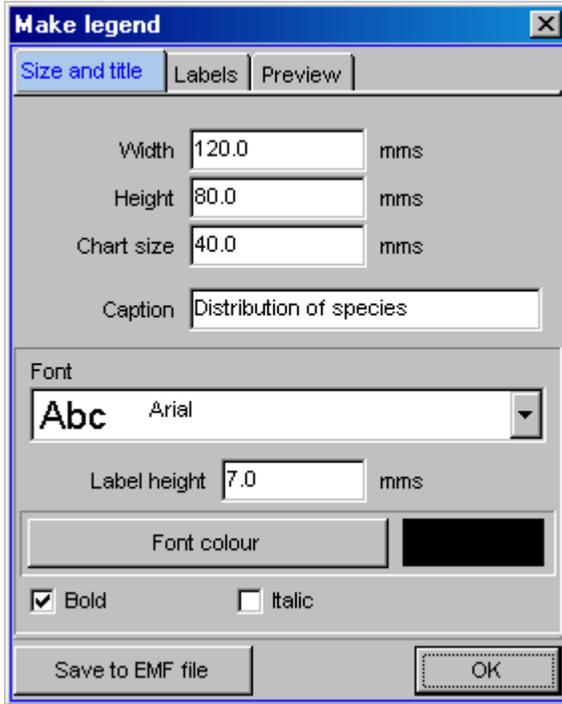
The colours used in the charts are user define-able. Under **File – System set up – Data charts** you can edit the default colour set used for data charts. In **Layer set up** (and **Project Manager**) on the **Styles – Labels – Data chart** page you can change the chart colour for that layer by clicking on **Edit chart colours**:

The number of colours shown will be the same as the number of data fields you have selected.

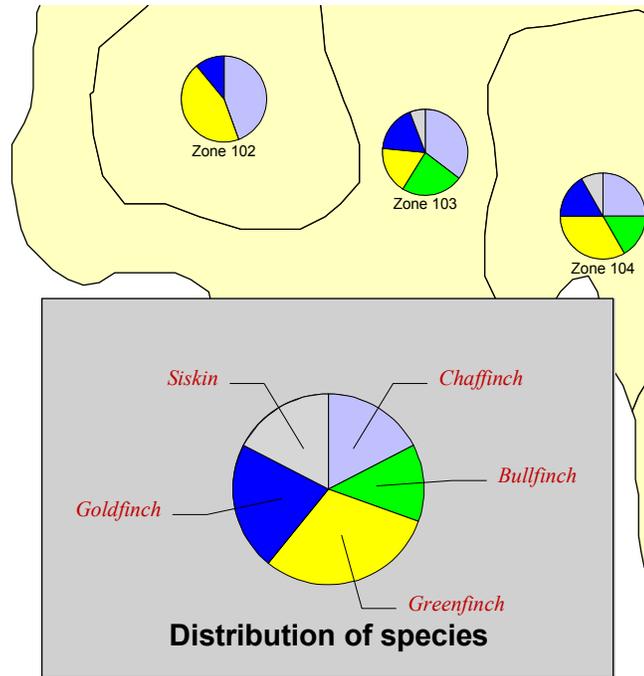


### 5.3.3 Data chart legends

Having set up a data chart for a layer you can go to **Style – Labels – Data chart** and click on the **Make legend** button in order to generate an Enhanced Metafile (\*.emf) image of a legend.



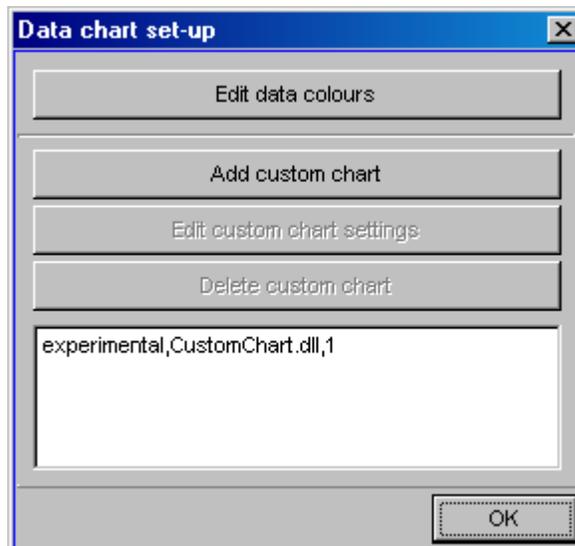
Having saved the EMF file you can use the Map furniture tool to place the legend on the map. If, as in this example, you set the panel style for the map furniture to be translucent or semi-translucent the legend can be used without excessively obscuring the map.



### 5.3.4 Custom charts

The above examples of data charts all use numeric data. It may be that you need to display non-numeric data, or a mixture of data types, or need to display numeric data in a more specialised way. Map Maker allows anyone with basic Windows programming skills to create an add-on to draw a custom chart.

The add-on must be in the form of a dynamic link library (DLL). The details of how to write this DLL are contained in Technical Paper 5. Once you have the DLL it can be registered by going to **File – System set up – Data charts**:



By clicking on **Add custom chart** you can select the DLL. The DLL must be in the same directory as the Map Maker program. Having selected it you enter a description, in this case “experimental”, and an optional ID, in this case “1”. The ID is there so that you can use one DLL to draw several different types of chart, should you want to.

Now when you next go to create a layer using the **Data chart** labels, the “experimental” option will appear on the list of chart options.

## 6 Bitmaps

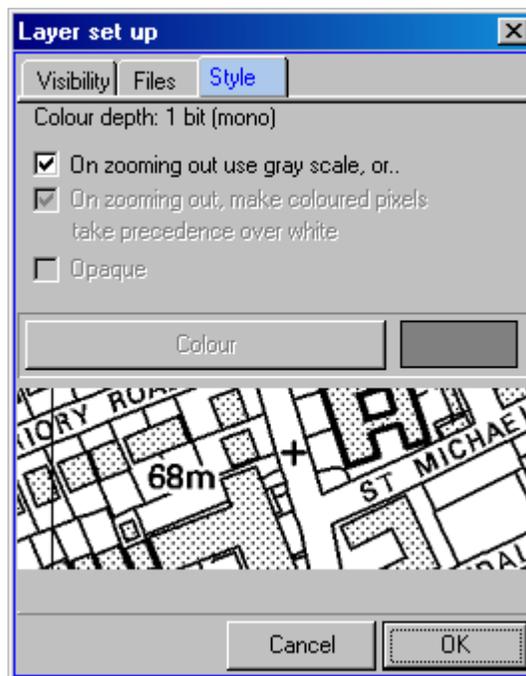
Chapters 2 to 5 discussed the use of vector files. Bitmaps (or “raster” or “scanned” files) are treated differently. Bitmap images consist of a grid of square dots called “pixels,” each one of which is a single colour. Bitmap images and the various bitmap formats are discussed in sections 1.4.1 to 1.4.3.

Bitmap images are either monochrome or in colour. (“Grey scale “ is a special kind of bitmap colour format.) When you load a bitmap file, Map Maker detects whether the format is monochrome or colour.

Bitmap files can be very large. Redrawing time is drastically increased when you zoom out to try to view the whole of a large image. Speed up your work by using the **Visibility** settings in **Layer set up** to ensure that bitmaps are only drawn at useful scales. (See Drop-in / drop-out, Section 1.4.7)

### 6.1 Mono bitmaps

When you load a mono bitmap (**File – add layer**), the **Layer set up** dialogue box is slightly different from the Layer set up box for vector files.



The first two pages of the dialogue box (**Visibility** and **Files**) are familiar. The **Style** page however, is different. If no other layers are loaded, the first time you load a bitmap layer it will – by default – load at its “natural” scale.

A bitmap is displayed at its “natural” scale when one pixel (one dot) in the bitmap image is represented by one pixel on your screen.

If other layers are present when the bitmap is loaded, the scale of the bitmap will be adjusted to correspond to the current scale of the project map.

Whenever a bitmap is enlarged or reduced, its appearance changes. When you zoom in, the dots in the image get larger and eventually appear as squares on the screen. When you zoom out – and the scale becomes smaller than the natural scale – each pixel on the screen is made up of more than one dot from the source bitmap image. This means that the computer will try to mix white and black in the same pixel but clearly, one pixel can be only one colour. The program will select which colour to use according to your choice from the following three options:

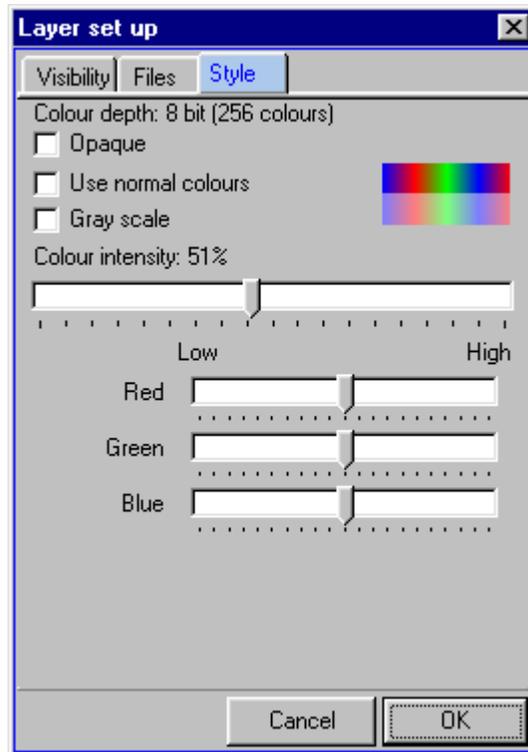
- **Use grey scale.** If one pixel in the screen is attempting to display black source pixels and white source pixels, it will display a grey pixel. The grey pixel on the screen will be lighter or darker depending on the proportion of black to white source pixels.
- **Black takes precedence.** If the set of source pixels contains one or more black pixels, the pixel on screen will appear black.
- **White takes precedence.** If the set of source pixels contains one or more white pixels, pixel will be displayed as white.

If you choose the first option the image should be legible irrespective of scale. However, due to limitations in Windows, a grey scale image is always opaque. The other two options allow you to display the layer as opaque or translucent. You can also choose to display the image in darker and lighter shades of another colour.

## 6.2 Colour bitmaps

The **Layer set up** dialogue box for a coloured bitmap contains the same **Visibility** and **Files** pages as above. The **Style** page allows you to define the colours. If you choose **Opaque**, the bitmap will hide any project layers below it. The default translucent option allows you to view the layers below but it must be set up carefully.

Due to the different types of monitors and video cards, translucent colours can be rather unpredictable. Allow yourself time to get used to the way your own computer handles different translucent colours. The same applies to printers; you may need to print out a couple of drafts before you achieve the colour effects you want.



Coloured bitmaps, particularly aerial photographs, often contain strong colours and textures. If you are using a coloured bitmap as a background image, you can reduce the intensity of the colours so that it will be easier to see the objects you are drawing and editing. Go to the **Use normal colours** tick box and click on it to de-select the option. Reduce the intensity of the colour by dragging the top slider control to a lower setting. When the map is re-drawn, if the colours are still too dark or pale, you can go back to the Layer set up and adjust the control.

Note: this feature works very quickly with 8 bit (256 colour) bitmaps but it can be slower to redraw 24 or 32 bit ("true" colour) images.

The **Grey scale** option on the **Style** page converts a coloured bitmap into a grey scale image. This is another way to make drawing and editing easier against a strongly coloured bitmap background.

The three lower slider controls allow you to intensify or reduce the red, green, and blue components of the colours. These controls are used to emphasise a particular colour range and seldom need to be altered.

### 6.3 Calibrating bitmaps

A bitmap, when it comes from the scanner, is simply a collection of dots (see What are Bitmaps and Vectors? section 1.4.2). No GIS can use a bitmap until it is calibrated.

At a minimum, a calibrated bitmap needs the following:

- the co-ordinates of one point on the map
- a scale
- the direction of north

You can only calibrate a map if you have some real-world knowledge about the place your map represents. You must know which way is north and you must know either the co-ordinates of one point and the scale of the map or the co-ordinates of two points. If you know the location of two points you can calculate the scale by measuring the map itself.

### 6.3.1 Types of calibrated files

There are three standard ways for a bitmap file to pass on calibration data to a GIS such as Map Maker:

- **File name.** The file name itself can be a code in a form which your GIS can interpret containing the information about the scale and position of the file.

The British Ordnance Survey digital maps are calibrated in this way. These file names give the location of the bottom left corner of the image. The disadvantage of this system is that it requires a knowledge of the code. There are no standard international codes - just local ones.

- **“World” files.** A world file is a small companion file to a bitmap image. It describes the location and resolution (and implicitly the scale) of the image. World files are widely used for JPEG and TIFF files. Map Maker also supports World files for BMP files. The fact that World files are widely supported is a great advantage. The danger is that, since they are separate files, they can easily become separated from the image file.
- **GeoTIFF.** GeoTiff is an extension to the commonly used TIFF format. The information is stored in the image file and so it is not in danger of being lost. The disadvantage is that the entire GeoTIFF specification is so large and complex that most geographical information systems support only parts of it. Map Maker supports “base-line GeoTIFF”. This means that Map Maker can interpret the location and scale of a GeoTiff image, but not its rotation or map projection system. Another disadvantage is that most general purpose image editors (PhotoShop etc) do not recognise GeoTiff data so, if you edit a GeoTiff image, you are liable to loose the calibration information.

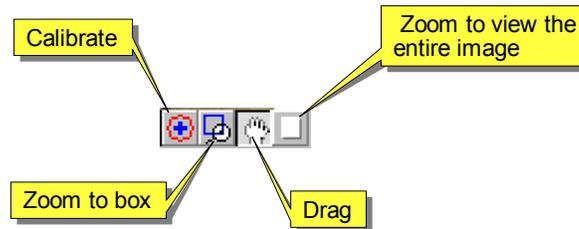
In addition to these three standard calibration systems Map Maker supports a system which attaches the location and resolution of the image to the end of the bitmap file so, unlike a World file, it cannot be lost. The strength of the Map Maker calibration is that the same system works for BMP, TIF, and JPG files. The disadvantages are that it is not recognised by other GIS packages and that, like GeoTiff, the calibration information will be lost if the image is edited in an image processor.

Clearly there is no ideal calibration system. If you work with Map Maker exclusively, then the Map Maker calibration system is the easiest. If you plan to export your data to other systems, World files are usually the best option.

### 6.3.2 Single point + known scale

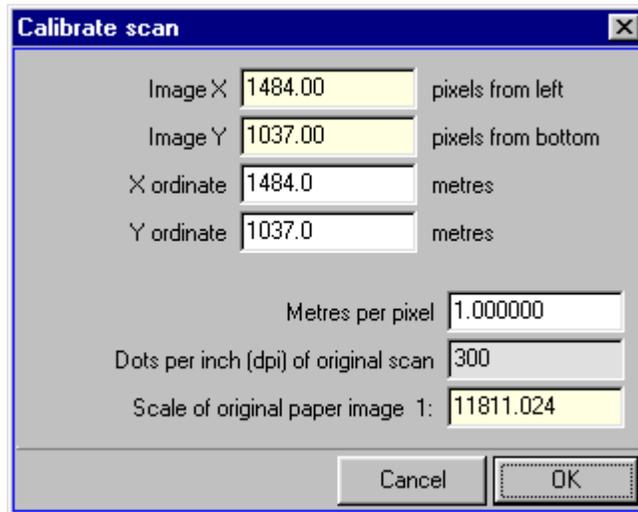
To calibrate an un-calibrated image, go to the sub-menu under **Utilities – Bitmap utilities – Calibrate scan**.

The first option, **Single point + known scale** can be used on a scanned paper map of a known scale with a grid - or at least a border – showing known points. When you choose this option a new window opens which fills the screen and shows four tool buttons in the bottom right corner.



Alternatively, choose your tools from the fast menu which you can display by clicking with the right mouse button.

Select the **Drag** tool to move the image on the screen until you find a point for which you know the co-ordinates. Select the **Calibrate** tool and click on the known point.



When the dialogue box appears, enter the **X ordinate** and the **Y ordinate** of the known point.

Digital aerial photographs are often supplied with the resolution of the image expressed in metres per pixel. Enter this value in the **Metres per pixel** field.

If you are calibrating a scanned paper map enter the **Scale of the original paper image**.

When you change either the **Metres per pixel** or the **Scale of the original paper image**, you will note that the other figure is automatically updated. These two figures describe the same thing, namely the difference in size between the real-world objects and their representation on the screen.

**Note:** Occasionally a scanner may not correctly record the dots per inch (dpi) of the original scan. This means you must calculate the **Metres per pixel value** yourself (see [What are Bitmaps and Vectors? Section 1.4.2](#)).

When you have entered these values, click **Ok** and the image will be calibrated and ready for use in Map Maker.

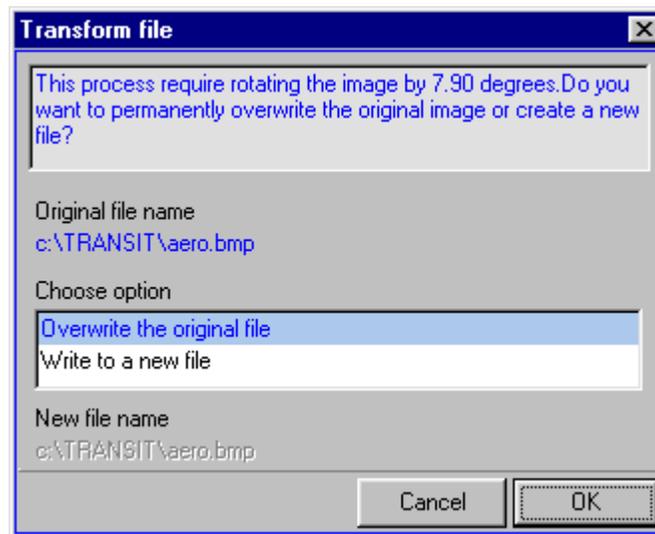
### 6.3.3 Single point + known distance

If you do not know either the **Metres per pixel** or the **Scale of the original paper image**, it is possible to calibrate a scan using the location of one point and its distance from a second point. Go to **Utilities – Bitmap utilities – Calibrate scan – Single point + known distance**. The same window appears. Choose the Calibrate tool, click on the known point and enter the co-ordinates of the point. Click **OK**. A **Reference point** flag will appear on the screen to mark the “known point”. Move the cursor to a point a known distance from the original point and click again. When you enter the distance, the image is calibrated.

This method is useful for calibrating the scanned image of a paper map which has grid lines. Your first known point could be the intersection of two grid lines. Follow along the same horizontal grid line and click on a point at the other side of the screen where it intersects with another vertical. For the greatest accuracy, choose the second point to be as far as possible from the first.

### 6.3.4 Two known points

You can also calibrate a scan if you have the co-ordinates of two points on the map. Go to **Utilities – Bitmap utilities – Calibrate scan – Two known points**. Again use the Calibrate tool to click on the first known point. Enter its co-ordinates. Then do the same with the second known point. A dialogue box follows:



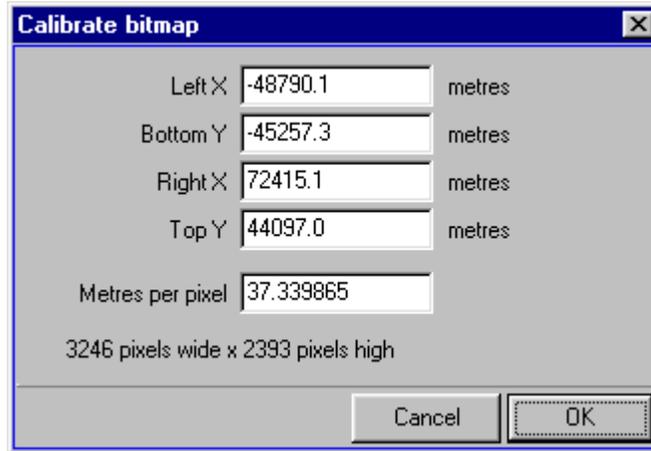
By entering two co-ordinates, you implicitly define a direction for north with respect to the image. Map Maker requires that north be vertically up the screen.

If your image is not aligned so that north is towards the top of the screen, the **Transform file** dialogue box allows you to create a new bitmap image which is revolved so that the co-ordinates of your two known points are still correct but north is upwards. You can choose to overwrite the original file or write to a new file. It is advisable to preserve the original and write to a new file. If you click on **Write to a new file** you will be asked to name the new file. When you click on **OK** the bitmap image will be rotated. This is a slow process taking several seconds - the larger the image the slower the process will be.

Any process that involves rotating a bitmap inevitably results in a loss of quality. Further damage is done rotating an image that has already been rotated. If possible always go back to the original un-rotated image.

### 6.3.5 Known extent of image

You can also calibrate a scan if the top of the image is towards north and you know precisely the geographic extent of the image. Go to **Utilities – Bitmap utilities – Calibrate scan – Known extent of image** and enter the numeric data.

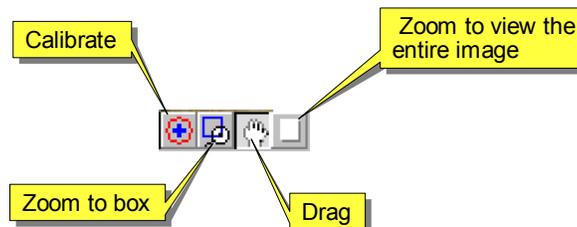


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### 6.3.6 Multiple points

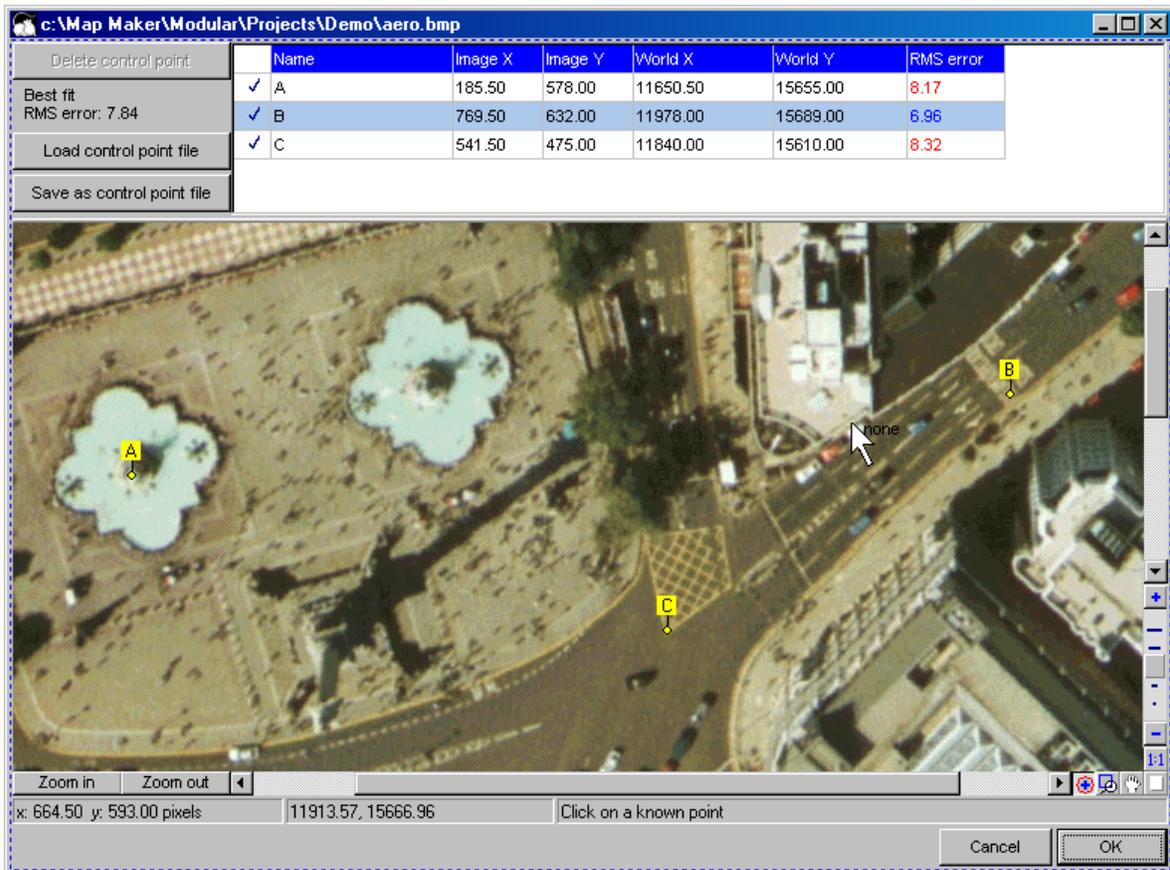
GPS data can be used to calibrate aerial photographs and satellite imagery. To do this you need to establish “control points” for each of which you have both GPS co-ordinates and an identifiable location on the image. In theory two control points is all that is required however when using GPS data in this way there are inevitably errors. There may be distortions in the image, inaccuracies in the GPS signal, or errors in recording where the GPS control point is with respect to the image. Using several control points helps to minimise and expose these errors.

In Map Maker Pro go to **Utilities - Bitmap utilities – Calibrate scan – Multiple points**. Select the file that you want to calibrate and a window appears divided into a top and bottom half. The lower half contains the image while the top is a table listing control points. When you first load the image the control point list will be empty. At the bottom right are buttons for tool which can also be selected with a right click for a fast menu.



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Select the calibrate tool and click on a spot on the image for which you have control point data. You can zoom in first to achieve greater precision. When you click a flag appears displaying a default name for the control point – “A”, “B” etc. If you want to adjust the position of the flag, still with the Calibrate tool selected, click and drag the base of the flag pole.



For each control point that you add to the image a corresponding line appears in the table at the top. The **Image X** and **Image Y** columns indicate the position of the control point on the image in pixels measured from the bottom left. In the **World X** and **World Y** columns you should enter the geographical location of the control point. As you enter the co-ordinates of the control points Map Maker attempts to make sense of the figures by experimenting with rotating and shifting the co-ordinate system and altering the scale of the image to achieve the best fit with the data that you have entered. Once it has achieved the best fit it calculates how far each control point is away from it calculated correct position, it also determines the RMS (root mean square) error of the set of points and displays this figure at the top left. For each control point it displays the distance from the calculate position in red if it is more than the RMS value, and blue if it is less.

It may be that one or more of your control points is wildly out due to incorrect data or the incorrect identification of its position on the image. You can experiment with turning such points off by clicking on the left hand column containing the ticks.

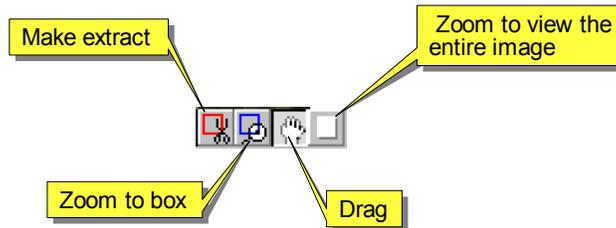
When you believe that the data is as correct as it can be click OK. You will then be asked to name a new file to save the calibrated image to.

## 6.4 Rotating and shrinking bitmaps

To rotate a bitmap or reduce its size by a known amount, go to **Utilities – Bitmap utilities – Revolve** or **Utilities – Bitmap utilities – Reduce size** and enter the appropriate numeric value for rotation or reduction.

## 6.5 Making extracts from bitmaps

To extract a section from a large bitmap, select **Utilities – Bitmap utilities – Make extract**. Choose the bitmap format of your file, then choose the file. As with calibration (see section 6.3), a window fills the screen. Select the tools from the buttons at the lower right corner or click with the right mouse button to open the fast menu.

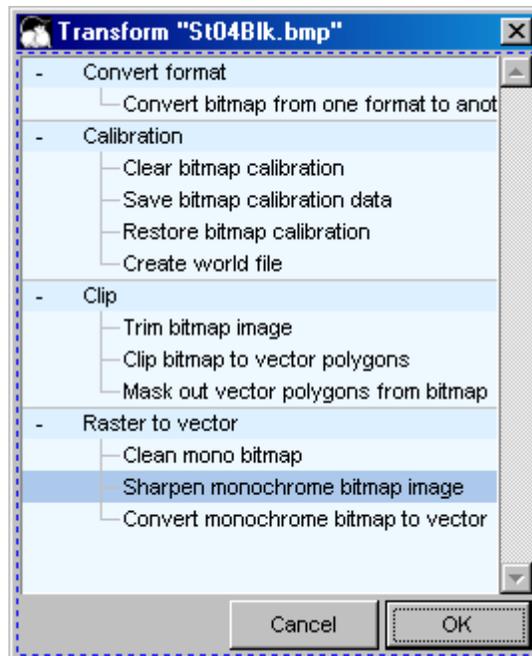


Select the **Make extract** tool. Then click, hold down, drag to draw a box covering the section you wish to extract and release the mouse button. You will be asked to enter a name for a new file.

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## 6.6 Bitmap actions

Map Maker Pro includes some additional actions which are accessed through **Utilities – Bitmap utilities – Actions**. Some of the actions only apply to mono bitmaps, and some only to colour but most apply to all types of bitmap (raster) image.



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### 6.6.1 Convert bitmap from one format to another

Converts the chosen bitmap into a file of a different raster format.

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### 6.6.2 Convert colour bitmap to mono (Colour only)

A colour bitmap can be converted to a mono bitmap on the basis of specified criteria. This is particularly useful if you want to extract one type of feature such as contours or water features. The criteria are specified in terms of the red, green, and blue components of the colour. Each of these components can have a value from zero to 255. Multiple criteria can be linked by “or” or “and”. For instance, if your colour bitmap contains contours shown in a reddish brown you could use criteria such as that shown below:

```
(red>(green+10)) and (red>(blue+10))
```

Pixels that meet the criteria will be drawn in black and those that do not in white. Note that the longer and more complex the criteria, the slower the processing.

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### 6.6.3 Clear bitmap calibration

If you have calibrated a bitmap using any of the calibration techniques available under **Bitmap utilities** you may at some later date want to remove the calibration using this function.

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### 6.6.4 Save bitmap calibration data

If you process a calibrated bitmap in an image processor (like PhotoShop etc.) it is probable that when you save the image the calibration will be lost. Use this function first to save the calibration data to a separate file. The calibration can then be restored later using the action below. You can also use this technique to copy calibration data from one image to another that covers the same area at the same scale.

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### 6.6.5 Restore bitmap calibration

Restores calibration data saved earlier using the above action.

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### 6.6.6 Create world file

If you have an image calibrated using Map maker’s own calibration, or GeoTiff calibration you can save that calibration to the more commonly used “world file”. This will make the image compatible with several other G.I.S. programs.

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### 6.6.7 Trim bitmap image

You can make an extract from a bitmap image by using **Utilities – Bitmap utilities – Make extract**. Alternatively you can trim an image using numerical parameters using this

function. The image must be a calibrated image. The north, east, south, and west edges of the area that you want must be specified in metres.

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### 6.6.8 Clip bitmap to vector polygons

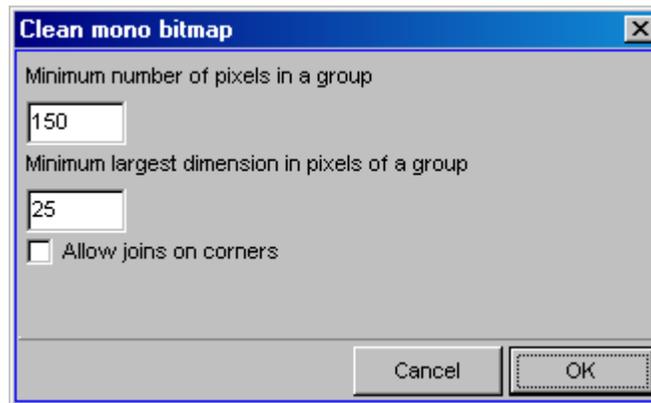
A calibrated bitmap can be trimmed to one or more polygons in a DRA file. Like all bitmap files the image remains rectangular but all areas outside of the polygons become white. This action asks you to choose a DRA file containing polygons.

### 6.6.9 Mask out vector polygons from bitmaps

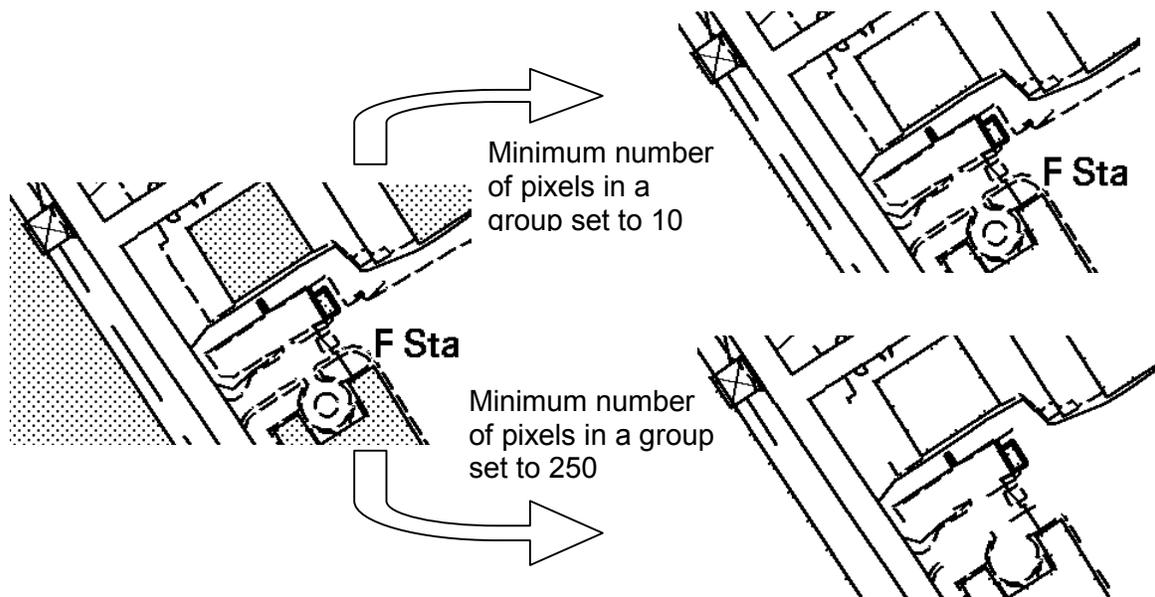
This is effectively the reverse of the previous action. You are asked for a polygon file and then all parts of the bitmap which fall within the polygons become white.

### 6.6.10 Clean mono bitmap

Scanned black and white paper maps are often used as base maps. Frequently, dust and other marks can create a lot of “noise” on the image. This action can be used to clean such an image. In addition it can be used to remove small text and symbols. Some bitmap images (such as Ordnance Survey 1:10,000 mono bitmaps) are supplied with some areas covered with dots to create a tone. This action can be used to clear the dots.



The dialogue box allows you to specify the **Minimum number of pixels in a group**. A group in this context means a continuous set of adjacent black pixels. If the **Allow joins on corners** box is ticked then two pixels are considered to be adjacent if they meet at a



corner, otherwise they have to meet along an edge.

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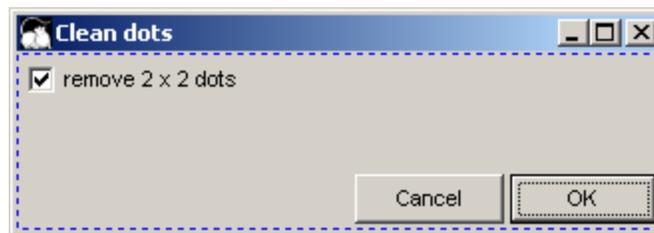
By choosing different values for the **Minimum number of pixels in a group** you can determine the extent to which the image is “cleaned”. In this example setting the group to 10 pixels clears away the dots, setting the value to 250 pixels removes text and dotted lines.

As an option you can also set **Minimum largest dimension in pixels of a group**. This means that if, as in this example, the number of pixels is set to 150 and you have a group of, say, 170 pixels it will be deleted if its maximum dimension (width or height) is less than 25 pixels. This is a mechanism to help keep linear features but to throw away more tightly clumped groups of pixels such as text or symbols. If you set **Minimum largest dimension in pixels of a group** to zero then this criteria will be ignored.

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### 6.6.11 Clean dots

The previous action covers a wide range of circumstances, but if all you want to do is to remove a regular pattern of dots then the **Clean dots** action is quicker. If you tick the Remove 2 x 2 dots then both single pixel dots and 2 x 2 pixel dots are removed. To classify as a “dot” the dot must be surrounded by white pixels.




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### 6.6.12 Sharpen monochrome bitmap image

Scanned images of paper maps often result in rather coarse lines when magnified on the screen. This action can be used to make lines on a monochrome bitmap image narrower without losing the continuity of lines. Typically this is used after using the above action to clean up the image.

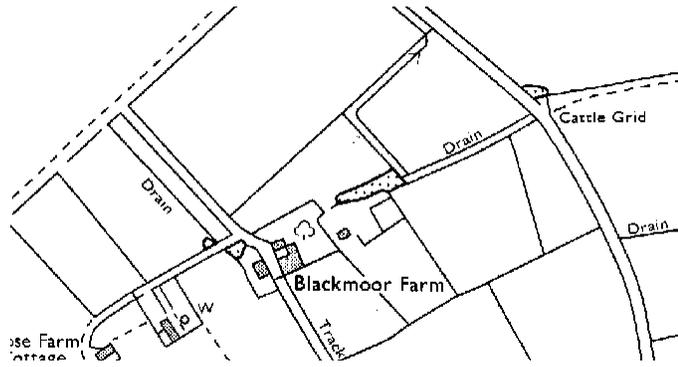
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### 6.6.13 Convert monochrome bitmap to vector

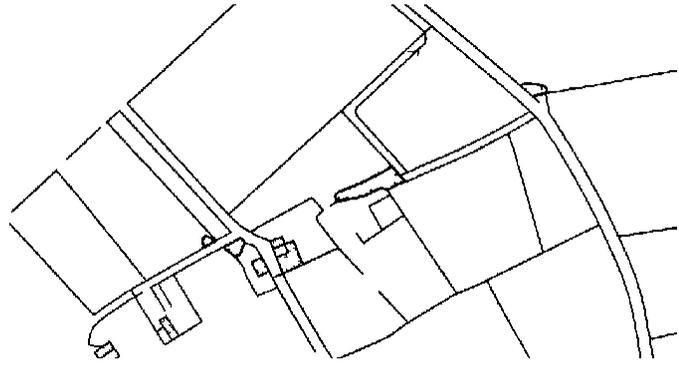
This action converts lines on monochrome images to vector lines. Typically it is used after using the above actions to clean the image.

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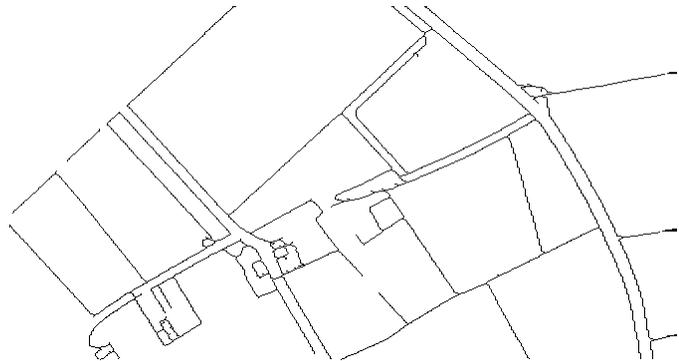
Here the original image contains text, dotted areas for tones, dashed lines.



Using **Clean mono bitmap** the image is cleaned.



Using **Sharpen monochrome bitmap image** the image is sharpened by reducing the thickness of the lines.



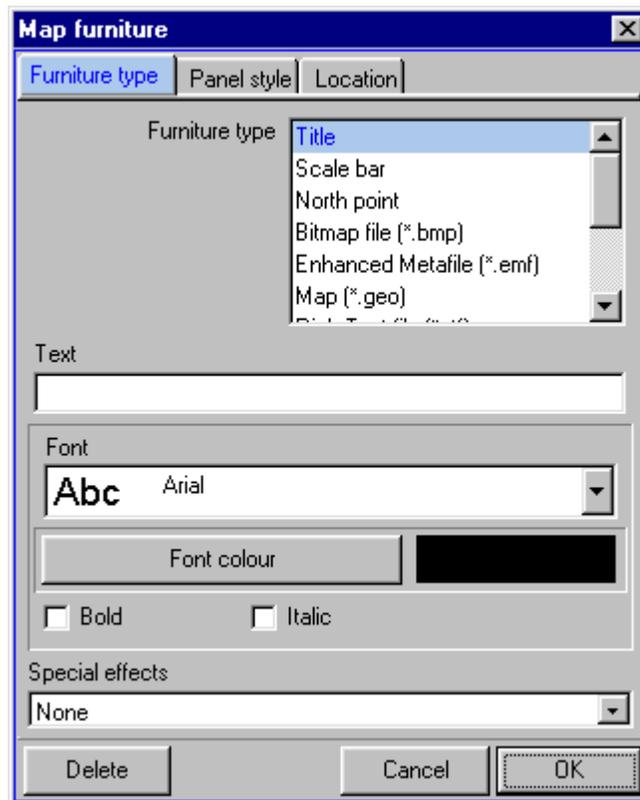
## 7 Map Furniture

“Map furniture” is Map Maker jargon meaning items which can be placed anywhere on a map because they are neither geographic features nor directly attached to geographic features.

Map furniture belongs to one of two types:

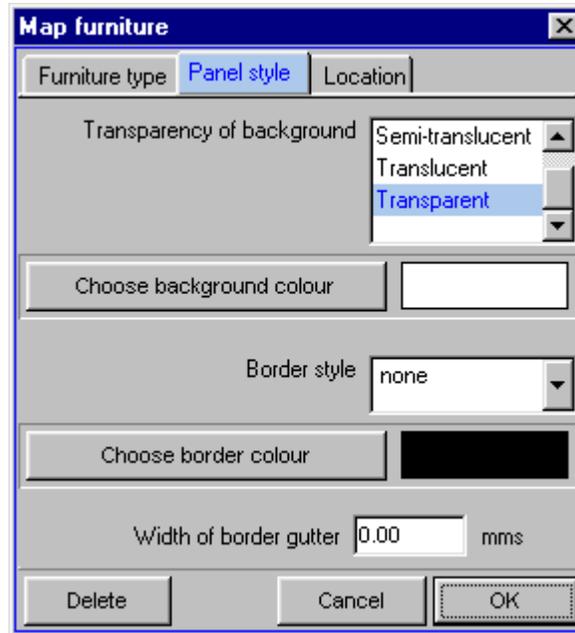
- Static written information; titles, legends and keys, distance indicators, etc. such as you would find on any printed map.
- Navigation panels such as location (or guide) maps and zoomed detail maps which enable the viewer to move around the map on screen simply using the cursor and the left and right mouse buttons.

To create a piece of Map Furniture select **Tools – Map furniture**. Click, hold down, drag, and release to draw a box. A dialogue box appears.



This first page in the Map Furniture dialogue box lists **Furniture type**. The bottom half of the page will change according to the type of furniture highlighted. Before we discuss the different furniture types, we will look at the other two pages which are the same for all map furniture.

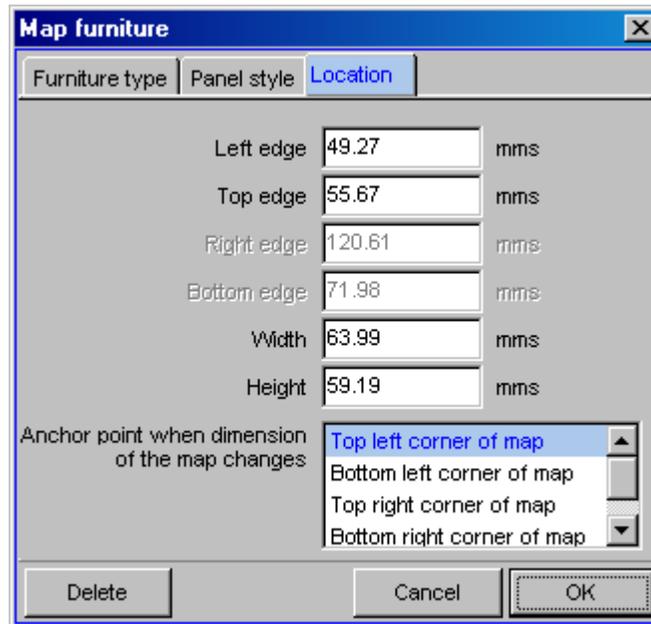
First the **Panel style** page:



The box that appears on screen when you first use the **Map furniture** tool is the “panel” and it will become the background to the piece of map furniture (title, scale bar, north point, etc.) placed inside it. The **Panel style** page allows you to control the appearance of the panel.

The **Transparency of the background** can range from opaque through translucent to transparent. A traditional north point, for example, is usually displayed using a transparent background with the **Border style** set to “none”. This will make the panel invisible and the north point seem to be simply drawn on the map. You can experiment with the Text panel to select a style that will enable the viewer to read the text and also, if necessary, view the map behind the text. While a transparent text panel may suit an empty place on the map, if the map background is complex it may make the text illegible. To prevent the geography from obscuring your text, try highlighting the text with a translucent or semi-translucent panel. You will also need to experiment with the **Background colour** settings since translucency works differently with different colour mixes and – importantly - with different printers. The **Width of border gutter** refers to the internal distance between the contents of the panel and the edge of the panel.

The third page of the **Map Furniture** dialogue box is **Location**:

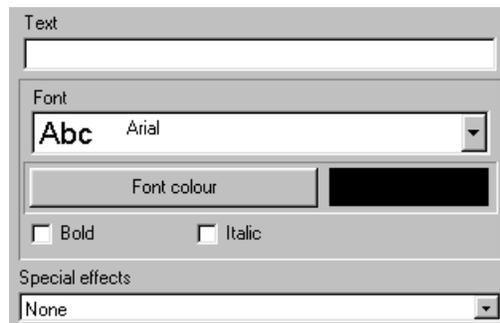


When you first use the Map furniture tool to draw a box - the panel - on the screen, Map Maker calculates the size of the panel on the printed page and also notes which of the four corners of the map is closest to the panel. This corner becomes by default the “anchor point” for the panel. This means that if, at a later stage, you decide to print out on a larger size of paper, the position of the panel will be adjusted relative to the anchor point. The anchor point is defined in relation to two of the edges of the map (e.g. top and left). The two irrelevant **Edge** fields on the **Location** page will be greyed out.

Having studied the **Panel style** and the **Location** pages of the **Map furniture** dialogue box, we now return to the first page to look at the **Furniture types**.

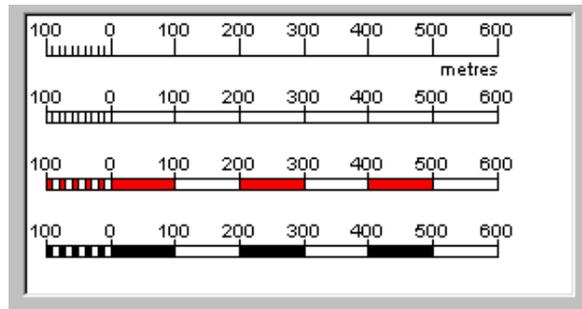
## 7.1 Title

The **Title** bar is used for a single short line of text, such as a major title. Simply enter the title in the **Text** field and select font, colour and, if you like, one of the **Special effects** which include outline text and “raised” and “engraved” text. The size of the text is determined by the size of the panel – if you want a bigger title simply drag the edges of the panel to make it larger.



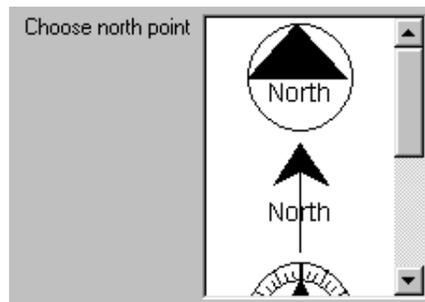
## 7.2 Scale bar

The scale bar feature automatically sets itself to the correct scale as you zoom in and out and will show the geographic units that you have selected for the project. This illustration shows metres but, as you zoom out, the scale will change to show kilometres. (If your project is using imperial units it will show feet and miles)



## 7.3 North point

You can select one from the range of pre-prepared North points or, if you wish to design your own, save it as an Enhanced Metafile and use the Enhanced Metafile option described below.



## 7.4 Bitmap file (\*.bmp)

The bitmap (\*.bmp) furniture option can be used to display a photograph or logo on the map. If you select this option you will be prompted to choose a file. It is sensible to avoid using excessively large bitmaps.

## 7.5 Enhanced metafile (\*.emf)

EMF files are used to include images of other Map Maker maps and legends generated from **Layer set up**. Logos or diagrams generated using other software can also be imported as \*.emf files and displayed as furniture on the map. When you select the Enhanced metafile option, you will be prompted to choose a file.

## 7.6 Rich text file (\*.rtf)

A small rich text file can be included. Unlike the **T**itle bar, "rich text" can include several lines of text and a mixture of fonts, text attributes (bold, italic etc.) and text size. Many word processors create Rich text files (\*.rtf). It is important to remember that the map furniture

panel will not support all of the RTF features; tables, bullet points and graphics are not supported.

## 7.7 Rich text panel

If you select the **Rich Text** panel, you can write an elaborate title block or a panel of informative text directly into a furniture panel. If you wish, you can then save the text panel to an RTF file for use in other projects.



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## 7.8 Inset maps

If you have Map Maker Pro installed, three additional map furniture options are available all using project files (\*.geo); the inset map, the location map (which shows the location of your current view within a larger context) and the zoomed detail which enlarges a section of the map.

### 7.8.1 Map (\*.geo)

In the same way that large maps often include panels containing smaller maps, a Map Maker project can be displayed as map furniture. It is not necessary to include the whole of a project in the furniture panel. You might wish to show only the major boundaries and roads, for instance. The same rules that govern the drop-in/drop-out scales (see chapter 1.4.7) apply to map furniture. The full extent of the project area will be shown in the furniture panel.

Also see Chapter 11 for details of how to use the “map” option in Map furniture to create a calibrated frame for a printed map as part of a page template.

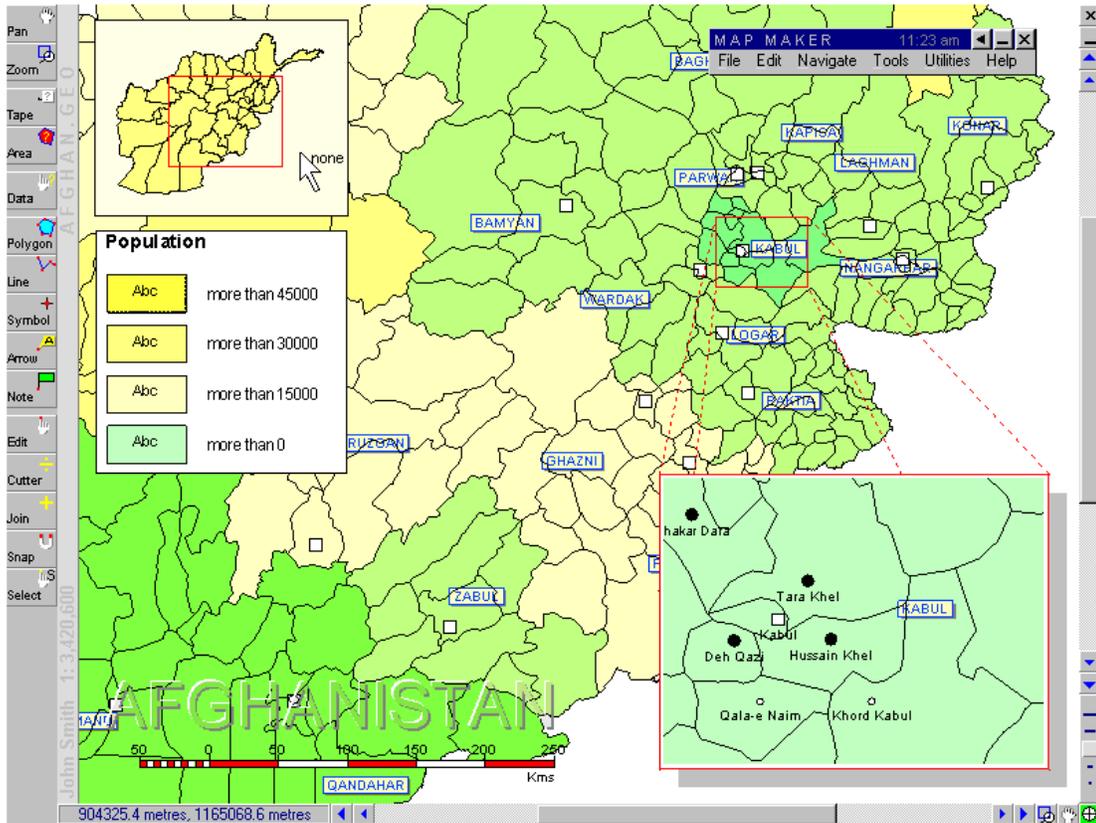
### 7.8.2 Location map (\*.geo)

A **Location map** indicates where the main project map is within a larger context. The easiest way to do this is simply to choose as your location map file the same file as your main map. Alternatively you can choose another map file which covers the same area as your main map. Map Maker will detect that the extent of the two files is identical or overlaps. In this example the small map of Afghanistan in the top left is a location map.

The location map displays the entire extent of the map and - using a red rectangle - illustrates the position of the screen view with respect to the entire map. As you pan and zoom across the map the red rectangle will be updated accordingly. Furthermore, if you click on a point on the location map, the screen view will be redrawn centred on the point

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you selected. The location map serves as a guide map for navigating quickly around the project area.



### 7.8.3 Zoomed detail (\*.geo)

A **Zoomed detail** panel enlarges one section of the map and links the panel to the main map with red dotted lines to show which section is enlarged.

As with the location map, the zoomed detail panel uses the main project file (or any other file covering the same region). In the illustration, the same project file is used for the main map, the location map, and the zoomed detail. The drop-in/drop-out values governing the towns and villages layers can be set so that no towns appear in the location map, only major towns are shown in the main map, and smaller towns will only be visible in the zoomed detail map. Similarly a layer coloured according to a database is visible in the main map but has been set to drop-out of the location map panel and the zoomed detail panel. If you have made a layer hit-able then using the **Data query** tool it will also be hit-able in the zoomed map and, if a database is attached, that too can be interrogated in the zoomed detail map.

The area shown in the zoomed detail is indicated by a red rectangle on the main map. If you place the cursor inside the red rectangle and click with the left mouse button, the detail shown in the panel will be further enlarged. If you click with the right mouse button, the panel will zoom out. Using the click, hold down, drag and release technique you can drag the red rectangle to another location and the zoomed detail will be updated to show the new area.

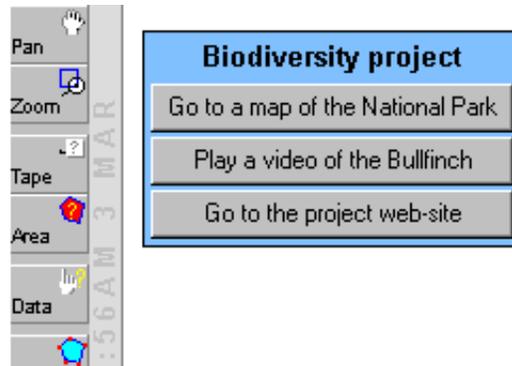
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## 7.9 Word documents as furniture

Title panels and other blocks of text are made easy in Map Maker Pro if you use it in conjunction with Microsoft Word. When creating an item of furniture set the Furniture type to “Word document” and then select the document. The first page of the document will be displayed as if it were a graphics file. As with other items of map furniture you can set the border and background colours and determine whether or not the panel is opaque, translucent or transparent. The image does not include the margins of the document page but you can set margins to the furniture in the normal way.

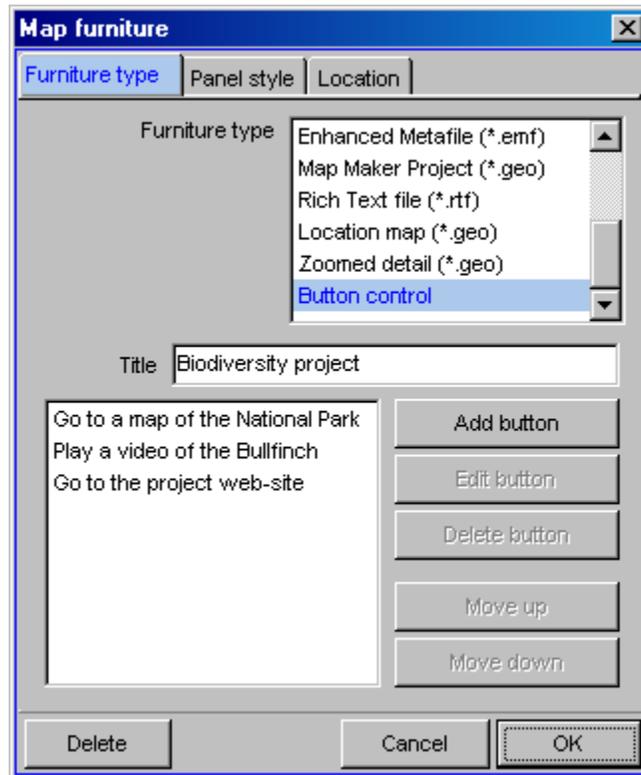
## 7.10 Button controls

An additional piece of map furniture is the “button control”. This allows you to place a panel of one or more buttons on the map. The user can click on a button to move to another map, launch a third party program, go to a web site, or to display a “document”. A document, in this instance, can be a image, a sound or video clip, or a database extract as well as a text document. BMP and JPG images and simple text files are displayed in Map Maker’s own viewers. Other file types (e.g. DOC, PDF, HTM, MDB, XLS) require that you have the relevant programs installed. Map Maker simply launches the program with the “document” pre-loaded.



Use the **Map furniture** tool to draw the extent of the panel. In the dialogue box that then appears choose **Button control** from the **Furniture type** list.

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Use the **Add button** button to create new entries.

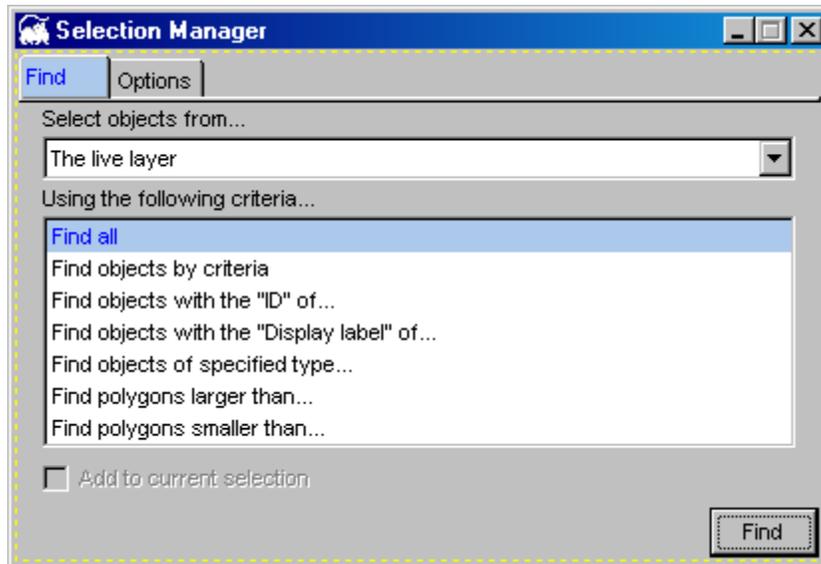
Enter the caption for the button then either choose a file using the **File to launch when button is clicked** button or else type a value in. If you want the button to launch a web site enter the site address complete with its **http://** prefix. If you are launching a program (an EXE file) then you can also type in a command line parameter.

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## 8 The Selection Manager

The **Select tool** can be used in Map Maker Gratis to select one or more objects. Map Maker Pro allows more methods of selecting objects and contains more operations which can be carried out on the selected group.

An object cannot be selected unless it is in the live layer. Go to the **Edit** menu and click on **Show Selection Manager**. The floating **Selection Manager** dialogue box appears. If no objects are currently selected, the **Selection Manager** will show only two pages: **Find** and **Options**.

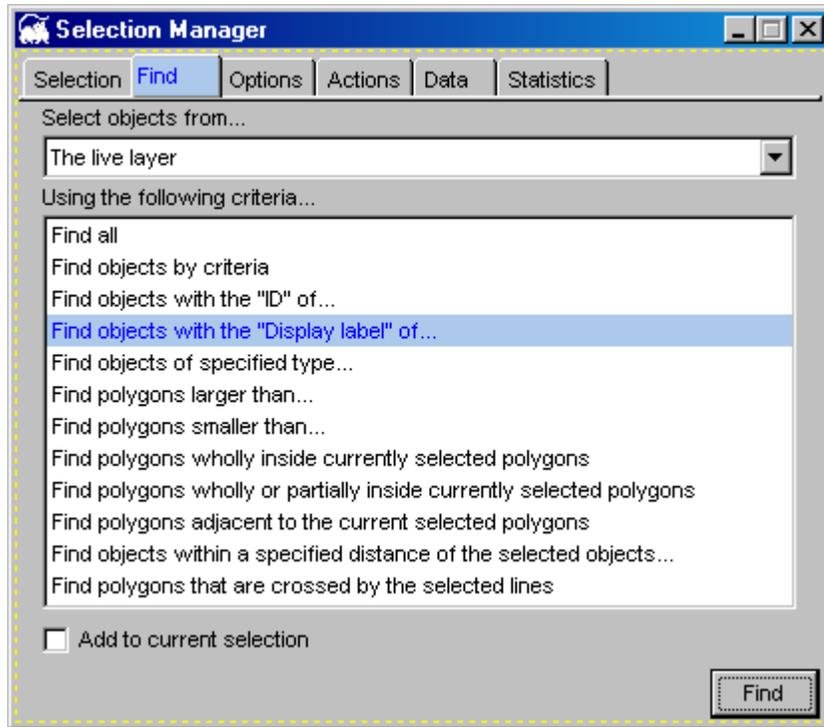


### 8.1 The Find page

The **Select objects from** box allows you to specify whether the program will search the entire live layer or only the currently selected objects. If you choose **The live layer** and double click on **Find all** (or select **Find all** and click on the **Find** button), then the entire live layer will be selected. Objects can be searched systematically according to a series of criteria. For example, **Find polygons larger than** will search the entire live layer using the specified criterion. You could then search the currently selected objects to **Find polygons smaller than**. The result will be the set of polygons within the specified size range.

Once one or a set of objects has been selected, you can tick the box beside **Add to current selection** to build up a composite group of objects. You could use **Find objects with the "Display label" of** to make a set of all the polygons with the label "barley". Then you could tick **Add to current selection** and go on to **Find objects with the "Display label" of** "wheat". When you add the second group to the current selection, the selected group will contain all the wheat and the barley polygons.

If objects have already been selected, the criteria list of the **Find** page will show more options.



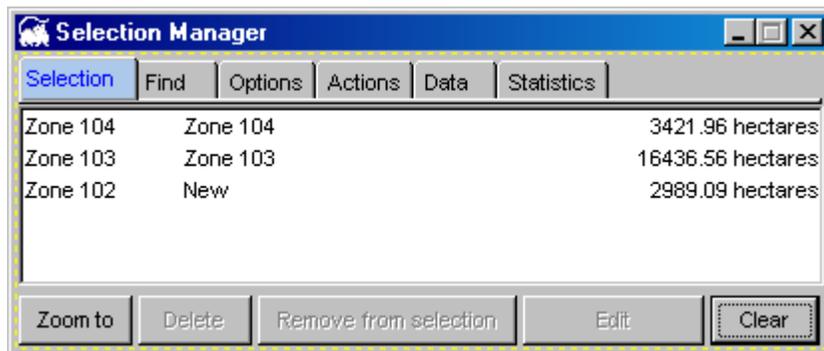
The selected object or objects can now become part of the criteria for selecting another group of objects. For example, you might select one large polygon that represents the extent of a country and then use **Find polygons wholly inside currently selected polygons** to find all the provinces within that country, for example. If you do not wish the original country polygon to be included in the selected set make sure that **Add to current selection** is not ticked.

**Find objects within a specified distance of the selected objects** could be used, for instance, to find all the properties within a certain distance of a set of roads.

**Find polygons that are crossed by the selected lines** will find the properties through which a road or a river runs.

## 8.2 The selection page

After objects have been selected, the Selection Manager shows more pages. The first is the **Selection** page.



This page lists the IDs, Display labels, and areas of the selected polygons (or the length of selected lines). To delete one of the selected objects from the live layer, click on it and press the **Delete object** button. Alternatively, if you use the **Remove object from selection** button the object is removed from the list but remains in the live layer. Click on **Clear** to cancel your selection. To edit one of the objects in the selected set, select it from the list and click on **Edit object**. The **Selection Manager** will be minimised and the chosen object will appear in edit mode. This procedure is like using the **Edit object** tool to double click on the object.

### 8.3 The Actions page

This page allows you perform an operation on all the objects in the selected group simultaneously. The actions are divided up into thematic groups. Click on the group title to expand the group. Implement an action by clicking on the action. The actions are described in the next chapter.

If you have objects loaded into the live layer and you click with the right mouse button, the fast menu will appear and you can click on **Live layer actions**. This will select all the objects in the live layer and the **Selection Manager** will open on the **Actions** page.

### 8.4 The Data page

The live layer data base is explained in Chapter 3. The **Data** page in the **Selection Manager** enables you to manipulate the data entries for the selected group.

	ID	AREA	SPARE	DATE
	text string	decimal number	integer	Date
1	705 D	2.79	0	15 Feb 200
2	704 C	19.43	0	15 Feb 200
3	703 B	4.05	0	15 Feb 200
4	705 C	8.18	0	15 Feb 200
5	707 B	2.67	0	15 Feb 200
6	705 E	2.33	0	15 Feb 200
7	701 B	4.51	0	15 Feb 200
8	707 D	0.07	0	15 Feb 200
9	707 A	0.64	0	15 Feb 200
10	703 A	0.43	0	15 Feb 200
11	703 B	4.05	0	15 Feb 200
12	703 B	4.05	0	15 Feb 200
13	703 B	4.05	0	15 Feb 200

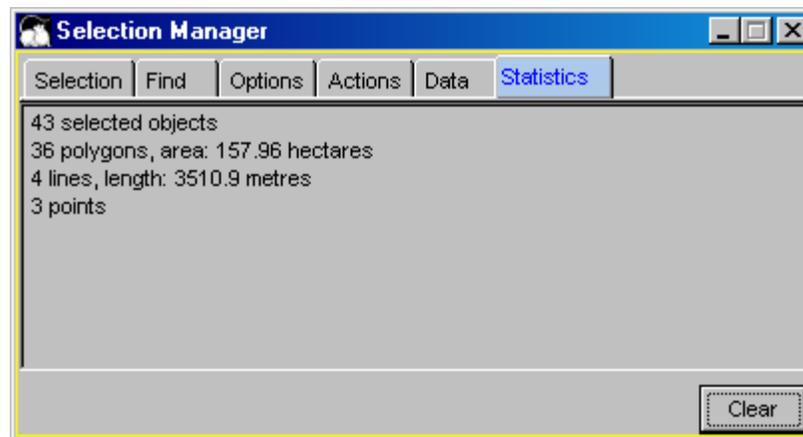
Clear

The data editor takes the same form as the data editor for the live layer. You can view the data as a table, or record by record, or you can manipulate data in the current column. You could, for instance, use the **Select** tool to select all the fields on the farm growing barley, then use the **Selection Manager's Data** page to set the data values for the selected fields in a single operation.

Note: when dealing with the data for a selected group - as opposed to the whole live layer - you cannot delete or add columns or rows or change their definition. If you want to edit the whole live layer in this way go to **Edit – Live layer data – Edit data**.

## 8.5 The Statistics page

The **Statistics** page simply supplies basic information about the selected objects as a group. This can, for instance, be useful for quickly determining the total area of all the selected polygons.



## 8.6 The Options page

The **Options** page controls how the Select tool is used to make a selection. In a small project it is easy to select them individually. Larger projects might contain thousands of objects in one layer. The **Options** page allows you to choose a method for selecting groups of objects.

The illustration here shows the objects selected according to their distance from the cursor on the screen. Here any object within a range of 4 pixels will be selected. You can change this option and select according to distances on the ground (i.e. metres, yards, kilometres). You might choose to select all the objects within 100 metres of the spot indicated by the cursor. Or, using the **Control** key to select by drawing a line, as described earlier, you could select all objects within 100 metres of the line.

The first tick box guarantees that you will select only one object and will not accidentally select another object nearby. The second tick box - **Only select objects entirely within area** - is used if your selection tool is a box, circle, or polygon. If it is ticked you will not accidentally select an object that is only partially included within the selection area.

If **Apply “snap to” rules** is ticked then the same snapping rules that apply to the drawing tools are applied to the selection tool. The snap to options are under **Edit – Live layer options – When drawing, snap vertices to**.

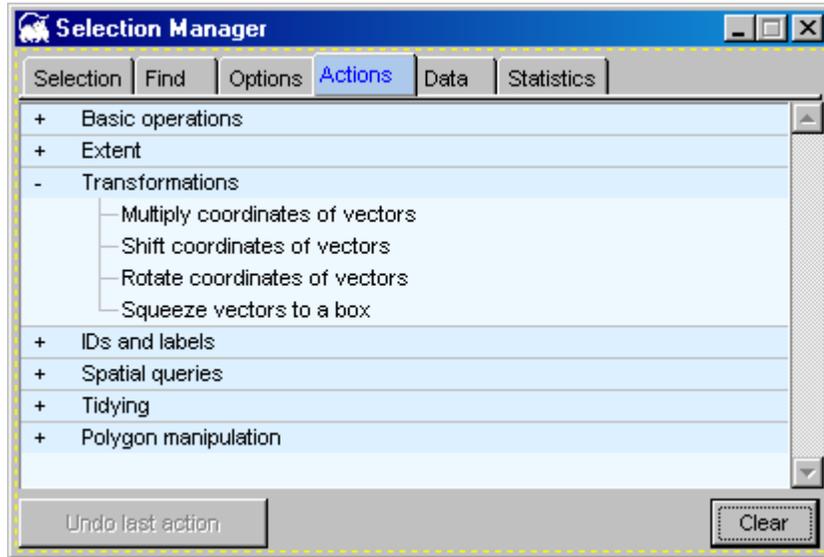


Go to **File – System set up – Preferences – Editing** to change the **Selection highlight style**. You can choose that the selected polygons are displayed in a bold red hatch or you can choose a more subtle alternative.

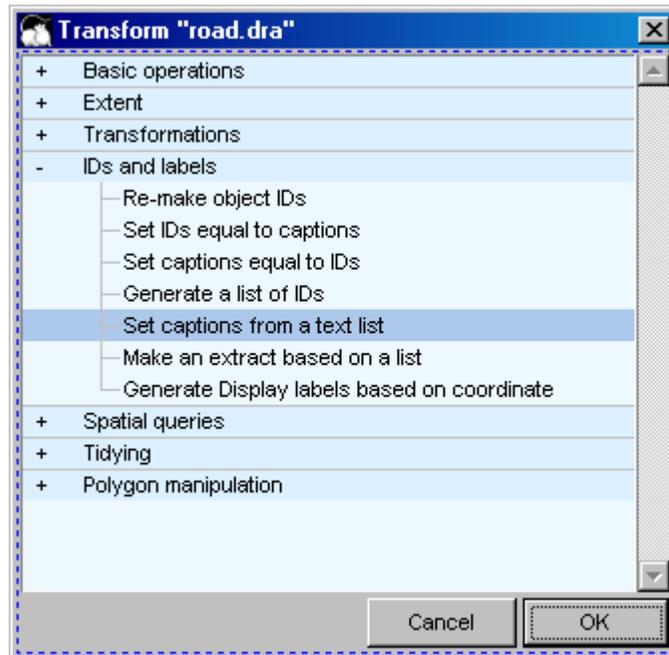
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## 9 Vector actions

As described in the previous chapter, the **Actions** page of the **Selection Manager** can be used to carry out actions on all of the objects in the live layer or a selected group from the live layer. The available actions are divided up into thematic groups:



Sometimes it is more convenient, and quicker, to carry out actions directly on files. By going to **Utilities – Vector utilities – Actions** you can select a file, apply an action, and save the result to a new file, or the same file.



Some actions that can be applied to a file are not applicable to the live layer and so do not appear on the Selection Manager's actions page. Those that are only applicable to files are indicated with an in the list below.

## 9.1 Basic operations

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### 9.1.1 Delete group

Permanently deletes the selected objects from the live layer.

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### 9.1.2 Save group as

Allows you to copy the selected group to a new DRA file.

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### 9.1.3 Set all objects to one style

Displays a dialogue box from which you can select one style from the current project style set and apply it to all the objects in the selected group. In practice, this action sets the "internal style number" of the object to the number of the chosen style.

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### 9.1.4 Remove polygons smaller than..

Displays a box in which you can enter an area. (Use the area units of the current project - square metres, hectares, acres, etc). Click OK to delete from the live layer all the polygons in the selected group which are smaller than the area specified.

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### 9.1.5 Remove lines shorter than..

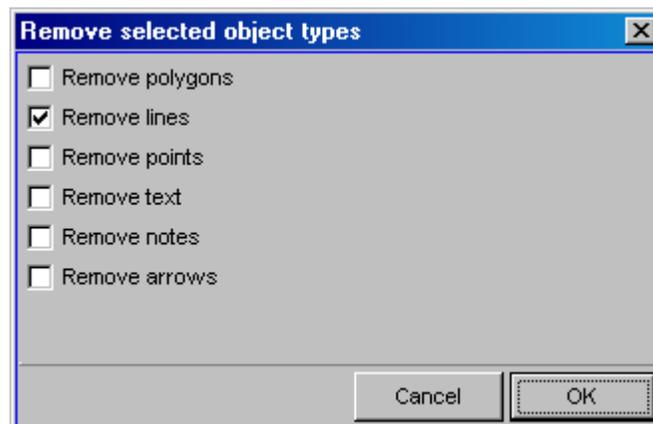
Displays an input box to enter a length. (Use the units of measure chosen for the current project metres, kilometres, yards, etc). Click OK to delete from the live layer all the lines in the selected group which are shorter than specified length.

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### 9.1.6 Remove selected object types

Displays a dialogue box where you can pick one or more object types to be deleted from the selected group.

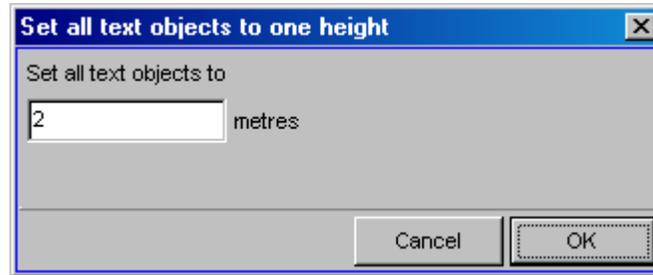


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### 9.1.7 Set all text objects to one height

Displays a dialogue box in which you can specify a text height in metres which will be applied to all the text objects in the selected group.



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### 9.1.8 Create seed points from polygons

Each polygon in the selected group is turned into a single point object. This point is called a seed point. The point has the same ID, display label, and style number as the original polygon. The point is positioned where the label of the original polygon was located. If the label is currently located outside of the polygon the seed point will be adjusted to be inside.

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### 9.1.9 Explode lines and polygons into points

Each vertex of every line and polygon in the selected group is converted into a point object having the same ID, display label, and style number as the original line or polygon.

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### 9.1.10 Ensure all polygons are clockwise

Some operations – such as internal buffers – when deciding which is the left or right side of the polygon boundary, assume that all polygons are drawn in a clockwise direction. This function will reverse any polygons in your selected group which may have been drawn counter-clockwise.

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### 9.1.11 Ensure polygon labels are inside

The default position for a polygon label is in the centre of the bounding box of the polygon. In the case of a “U” or “L” shaped polygon, for instance, this point may be outside of the polygon. This function will check each polygon and - if the label is outside – re-position it inside the polygon boundary.

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### 9.1.12 Delete all objects of a specified style

Displays a dialogue box in which you chose a style number. All objects drawn with the specified style number in the selected group are deleted.

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### 9.1.13 Convert polygons to lines

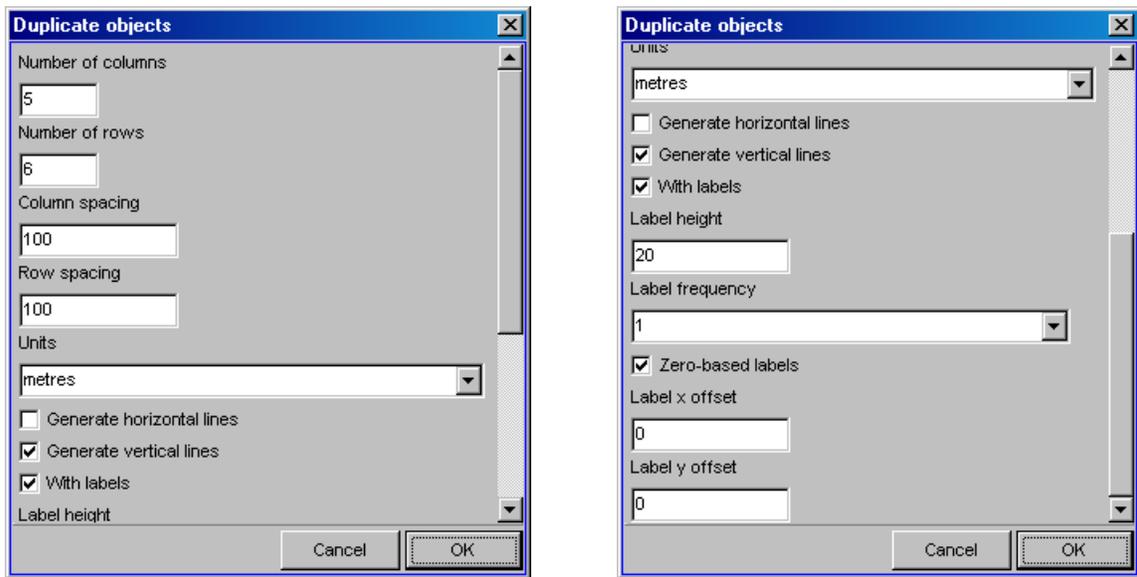
Converts all polygons in the selected group to lines. If the polygon is a “complex” polygon (i.e. it has islands) then the polygon is dis-aggregated into one line for each “loop.” In other

words, the outer edge will be converted into one line and each polygon will become a line. If you tick the box to **Break lines at corners**, each continuous boundary line will be broken into lines that start and end with a “corner” rather than a simple vertex.

See Chapter 2 for an explanation of the distinction between corners and vertices.

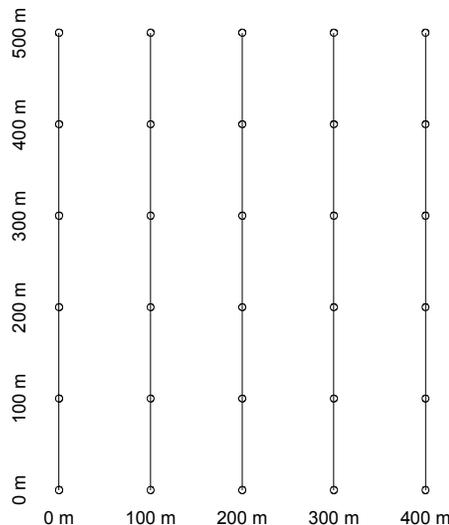
### 9.1.14 Generate duplicate objects

Copies the selected object or objects and duplicates them for a specified number of columns and rows in a rectangular grid. This action is useful when creating maps of regular features such as trial planting beds or housing plots, or for creating specialised grids for soil samples and the like.



When you select this action a scrolling dialogue box is displayed:

Select the units for the **column spacing** and **row spacing** from the **Units** list. The dialogue box allows you to generate horizontal and or vertical lines to show the grid before you copy the objects. The following example was created using the **Circle tool** to draw one small circle. Then the **Generate duplicate objects** function was used with 5 columns, 6 rows, and both the column and row spacing set to 100 metres. The **Generate vertical lines** option and the **With labels** option were selected. The **Label X offset** and **Label Y offset** function can be used to adjust the distance from the grid of the vertical and



horizontal labels respectively.

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#### 9.1.15 Rotate text

A dialogue box is displayed allowing you to apply a clockwise rotation to all the text objects in the selected group. The rotation is only applied to text objects which are justified to the left, right, or centre. Text objects that are stretched between two points or along a curve are not affected.

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#### 9.1.16 Convert text to points

The location point of each text object is used as the co-ordinates for a point object. The label of each point is the same as the text of the text object.

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#### 9.1.17 Points to line

Converts all the points in the selected group into a single line object. This can be useful in converting GPS way points into a single line. The points are used in the order in which they found in the live layer file so you should not edit any of the points prior to carrying out this operation since this will alter the order of the points.

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#### 9.1.18 Cut with file

Cuts lines and polygons in the selected group with lines and polygons in a chosen DRA file.

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#### 9.1.19 Extract specified objects (files only)

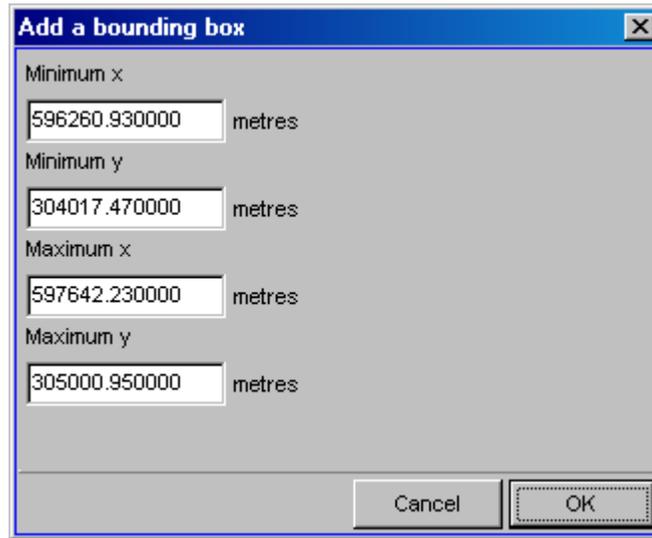
Copies the specified objects in a DRA file to another DRA file. Each object is identified by its ID. The IDs should be listed in a text file (\*.txt) with one ID on each line. If there are several objects with the same ID they will all be extracted. If the **Invalidate extracted objects in original** box is ticked then the objects are also deleted from the original file.



## 9.2 Extent

### 9.2.1 Add bounding box

Displays a dialogue box which shows the current bounding box of the selected group. The size of the bounding box can be altered manually by changing the values.



### 9.2.2 Trim vectors to a box

Displays a similar dialogue box to the previous action. When the action is executed lines and polygons which intersect the edge of the box are cut and any objects outside the box are discarded.

### 9.2.3 Trim vectors to tile boundaries

A dialogue box asks for the **Width** and **Height**, in metres, of a "tile". The program checks the current boundaries of the selected group of objects and trims the objects to the tile that most closely matches the current boundaries. The program assumes that the tile system starts at co-ordinate zero, zero.

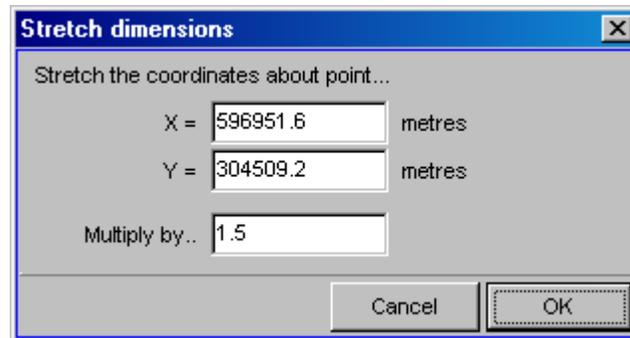
### 9.2.4 Trim vectors to polygons

A dialogue box asks you to select a DRA file containing polygons. These polygons are then used to trim the selected objects. Objects outside of the polygon - or polygons - are discarded.

## 9.3 Transformations

### 9.3.1 Multiply co-ordinates of vectors

A dialogue box appears showing the centre of the currently selected group. This **X** and **Y** co-ordinate can be edited manually. The selected group is multiplied by the factor entered in the **Multiply by** field using the XY values as the static point around which the co-ordinates are stretched.



### 9.3.2 Shift co-ordinates of vectors

Displays a dialogue box in which you can enter values for an X and a Y “shift”. For example, an X shift of 100 metres moves the selected group right (eastward) by 100 metres. An X shift of minus 100 metres moves the selected group left (westwards) by 100 metres.

### 9.3.3 Rotate co-ordinates of vectors

Displays a dialogue box which identifies the centre of the selected group. This XY co-ordinate can be edited and is used as the centre around which the group is revolved by a specified number of degrees in a clockwise direction.

### 9.3.4 Squeeze vectors to a box

Displays a dialogue box that shows the ordinates of the bounding box of the selected group. Edit these values and click OK to stretch and/or squeeze the selected group so that it fits the new box.

### 9.3.5 Convert metres to yards (files only)

If you wish to convert the co-ordinates of objects within a file from metres to yards then use this function. Note that any file used in Map Maker should be in metres even if you are choosing to display distance and areas in imperial measures. You would only normally need to use this function prior to exporting data to a program that wants co-ordinates in yards.

### 9.3.6 Convert metres to feet (files only)

If you wish to convert the co-ordinates of objects within a file from metres to feet then use this function. Note that any file used in Map Maker should be in metres even if you are

choosing to display distance and areas in imperial measures. You would only normally need to use this function prior to exporting data to a program that wants co-ordinates in feet.

### 9.3.7 Convert yards to metres (files only)

If you have imported data in which the co-ordinates are in yards then this function will convert the file to metres.

### 9.3.8 Convert feet to metres (files only)

If you have imported data in which the co-ordinates are in feet then this function will convert the file to metres.

## 9.4 IDs and labels

### 9.4.1 Amend labels and IDs (live layer only)

Displays the following dialogue box:

This dialogue box can be used to regenerate the unique IDs for the objects. If you have edited the live layer or added new objects to it, the objects' IDs may no longer be unique or meaningful. For example, if a set of polygons represent building plots, you might click on **Renumber IDs starting from**, assign a number to the first plot, tick the **Add prefix** box,

enter the word "Plot", and then click **OK**. Or, before clicking on **OK**, you might want to click on **Set display labels equal to IDs** so that the Display labels on screen will be the same as the object IDs.

The **Keep one label in** function allows you to reduce the number of labels in cases where you have a lot of closely spaced point data, such as soil sample points, or depth soundings.

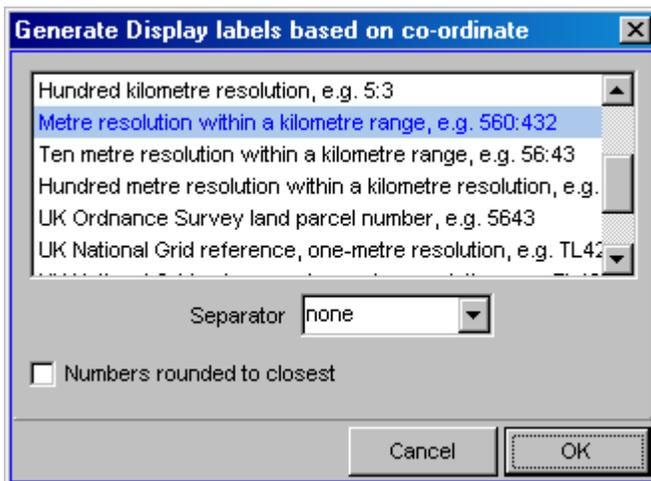
The **set label to database value** will set the labels to the values found in the chosen column of the live database, while if you click on **set label to external database value** you are asked to select a database, table, and column. The external database table must include a column containing the object IDs which can be used as the link column.

### 9.4.2 Generate a list of IDs

Unlike the previously described actions, this one does not alter the selected group. It generates a text file containing a list of the IDs of the objects in the selected group.

### 9.4.3 Generate Display labels based on co-ordinate

Generates a display label for an object based on its location. The reference point for a polygon is its centroid unless the centroid is outside of the polygon. In that case a seed point, that is to say any point that falls within the polygon, is used.



If the box next to **Numbers rounded to closest** is ticked, the co-ordinate value is rounded to the closest whole number (or 10, 100, or 1000 depending on the chosen format). If the box is not ticked, the number is always rounded down.

Some of the label options are specifically for UK applications and utilise the prefix letters that denote the 00km grid squares on the UK National grid (The UK Grid excludes Northern Ireland).

HL	HM	HN	HO	HP	JL	JM
HQ	HR	HS	HT	HU	JQ	JR
HV	HW	HX	HY	HZ	JV	JW
NA	NB	NC	ND	NE	OA	OB
NF	NG	NH	NJ	NK	OF	OG
NL	NM	NN	NO	NP	OL	OM
NQ	NR	NS	NT	NU	OQ	OR
NV	NW	NX	NY	NZ	OV	OW
SA	SB	SC	SD	SE	TA	TB
SF	SG	SH	SJ	SK	TF	TG
SL	SM	SN	SO	SP	TL	TM
SQ	SR	SS	ST	SU	TQ	TR
SV	SW	SX	SY	SZ	TV	TW

#### 9.4.4 Set captions from a text list (files only)

Sets the captions of the objects in a DRA file according to names recorded in an ASCII text file. Each caption must be on one line and the order of the captions in the text file must be in the same order as the objects in the DRA file. Typically, the list would have been derived from a list of IDs generated using the **Generate a list of IDs** action.

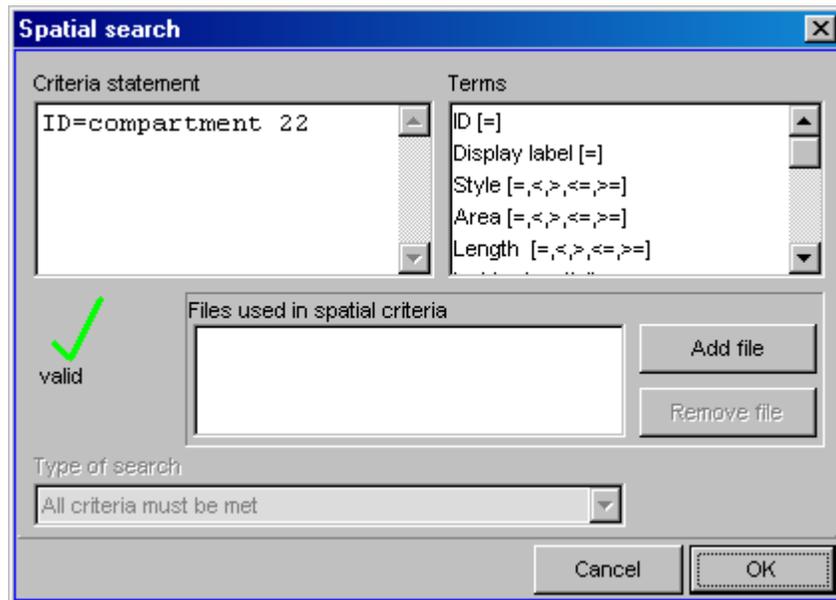
#### 9.4.5 Make an extract based on a list (files only)

This function uses an ASCII text file containing a list of ID's (one per line) to determine which objects to copy from one DRA file into a new one.

### 9.5 Spatial queries

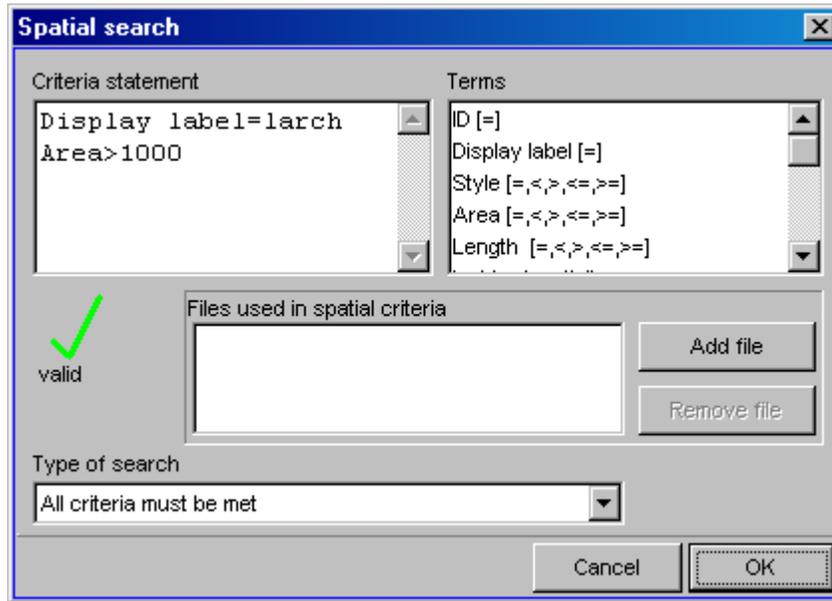
#### 9.5.1 Find objects

This function allows you to use a range of criteria to search the objects in the selected group. The criteria of the search are specified by typing them in following the prompts in the Terms box. Each criterion occupies one line in the **Criteria statement** box.



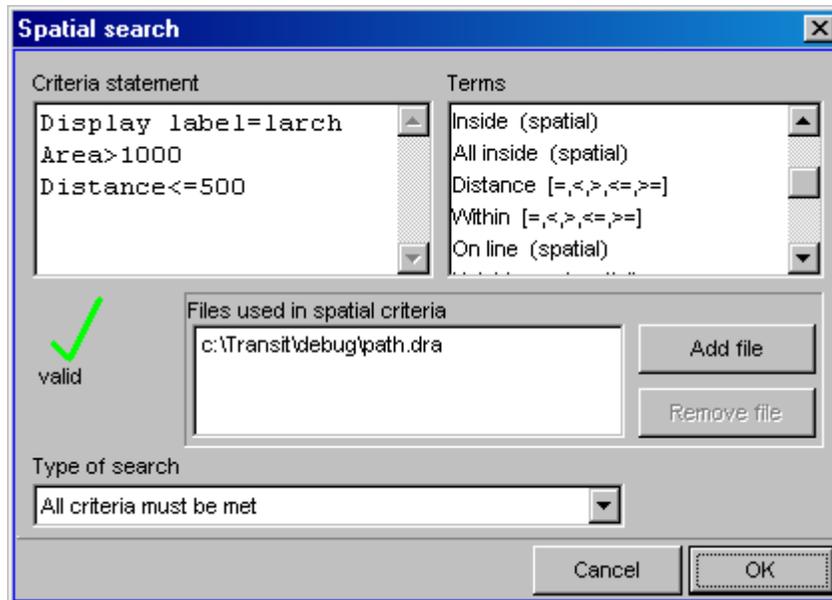
In this simple example there is just one criterion – “ID=compartment 22” – all objects in the selected group with an ID of “compartment 22” will be selected.

The criteria statement can contain more than one clause. The following example returns all polygons with a display label of “larch” and an area greater than 1000 square metres:



If the Type of search is set to “One or more criteria must be met” then all the objects which either have a label of “larch” or which have an area greater than 1,000 square metres will be returned.

Some spatial criteria require reference to one or more other files, for instance:



Here the distance criterion is used with reference to the **Files used in spatial criteria**, in this case one file, "path.dra". If there were two files, say paths and roads, then the distance criteria would return objects within 500 metres of either a road or a path.

For a simple search the attributes which you can use in the criteria are:

ID

Display label

Style

Area (*polygons only*)

Length (*lines and polygons*)

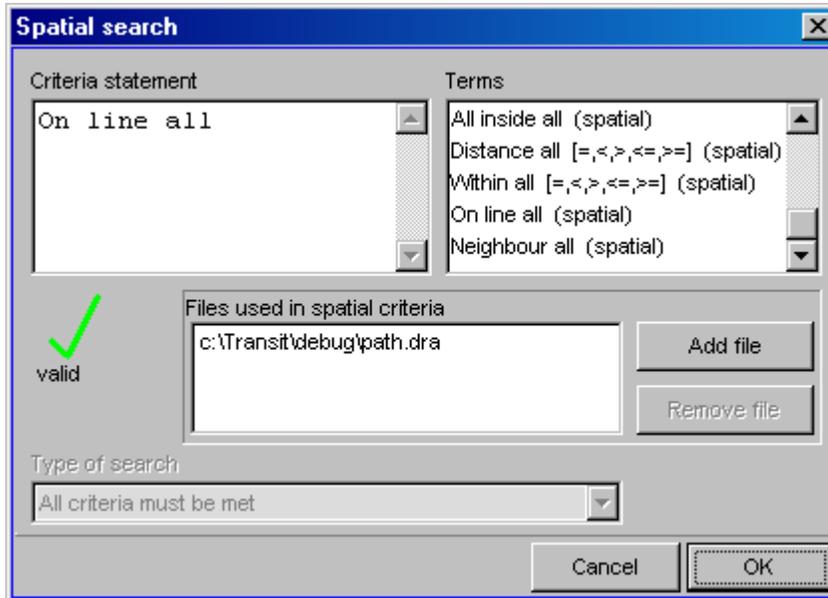
The operators that you can use are:

- = Equals
- < Less than
- > More than
- <= Less than or equal to
- >= Greater than or equal to

Spatial queries using other vector files can use additional criteria:

Inside	Inside or partially inside a reference polygon.
All inside	Entirely inside a reference polygon.
Distance	Distance from a reference point, a reference line or from the boundary of a reference polygon.
Within	Either within a reference polygon or within the specified distance of a reference point, line or polygon (can only be used with the "=" operator).
On line	The object is a polygon and it intersects a reference line.
Neighbour	The polygon shares a boundary with a reference polygon.

The word "all" can be used in defining spatial criteria. In the following example, the polygons returned are those which are crossed by ALL the lines in the paths file:

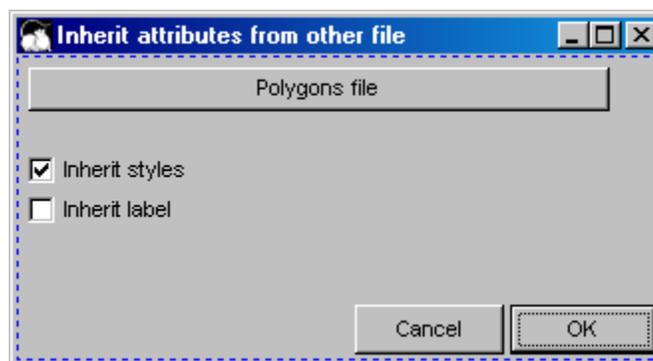


### 9.5.2 Polygons inherit attributes from seed points

You are asked to choose a DRA file containing point objects, i.e. seed points. If a point in the file falls within a polygon in the selected group, then that polygon inherits the attributes of that point – that is the ID, Display label, and style of the point are attached to the polygon. You can further choose to discard the polygons which do not contain a point which corresponds to a point in your DRA file.

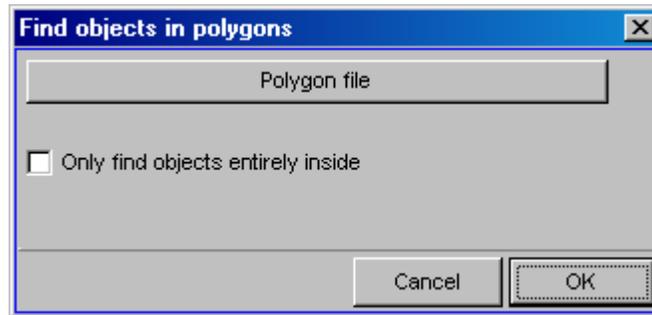
### 9.5.3 Inherit attribute from other file

The selected group inherits one or more attributes from a DRA file containing polygons. A point inherits from the polygon it is over, a line or a polygon inherits from the polygon that its label point is over. The objects in the selected group can inherit styles and display labels.



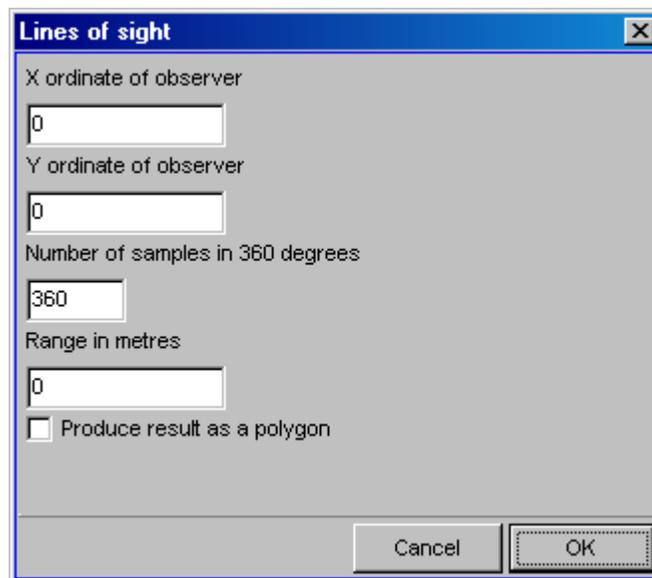
### 9.5.4 Find objects in polygons (files only)

Finds objects that fall within one or more polygons that are stored in the “polygon file”.



### 9.5.5 Lines of sight (files only)

Some people need to know the line of sight from a given location. This can be to do with radio-communications, wind exposure or visual impact studies. This action allows the user to define a spot and then generate a file which shows how the lines and polygons in an other DRA file obstruct the view. The new file can either take the form of a series of radiating lines or a single polygon.



If the **Range in metres** is set to zero then Map Maker choose a range that will include all the objects in the source file.

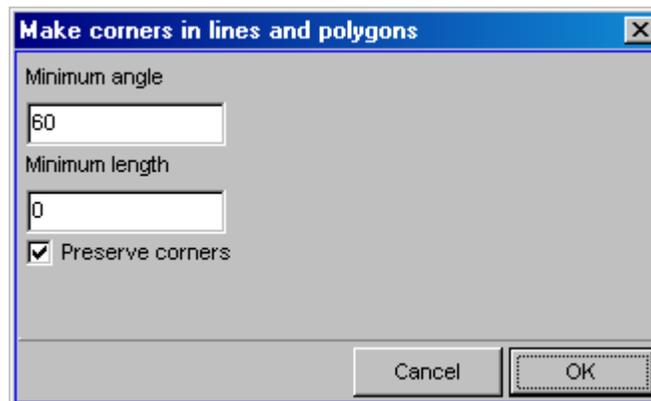
## 9.6 Tidying

### 9.6.1 Remove any duplicate objects

Sometimes files contain duplicate objects. By duplicate objects we mean identical objects which are on top of each other. This function searches the selected group and removes the duplicates.

### 9.6.2 Make corners in lines and polygons

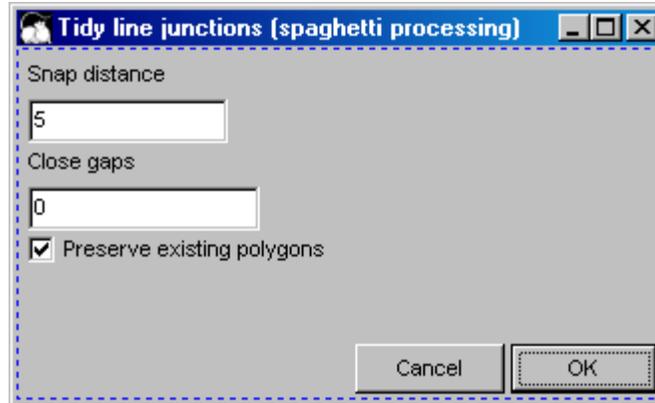
In Map Maker, the terms “corners” and “vertices” have specialised meanings and they are not synonymous. For example, in data imported from other programs the lines and polygons will probably not have corners, in the Map Maker sense, except at their ends. Using this function, a vertices in a polygon boundary or line can be converted into corners if the change of direction at a vertex exceeds a specified angle. You can further specify the minimum length of line segment (in metres). This ensures that if the lines meeting at the vertex are shorter than the specified length, a corner will not be formed. This function reduces “noise” caused by an excessive number of spurious corners. If you do not tick **Preserve corners**, existing corners will be converted to simple vertices if they do not meet the criteria you have specified.



### 9.6.3 Tidy line junctions (spaghetti processing)

This action is one of the most important. It is used to tidy data containing line endings that do not meet precisely and where lines may cross each other without a vertex recording the crossing point.

Use the dialogue box to specify a **Snap distance** in metres. The action searches for situations where the end vertex of a selected line is within the snap distance of a vertex on another selected line. If it finds a vertex it will adjust the co-ordinates of the end of the line to match those of the found vertex. If a vertex is not found within the snap distance the action will search for a line segment within snapping distance of the end of the line. If such a segment is found, a new vertex will be inserted in the line at the closest point to the segment and the line will be snapped to the new vertex.

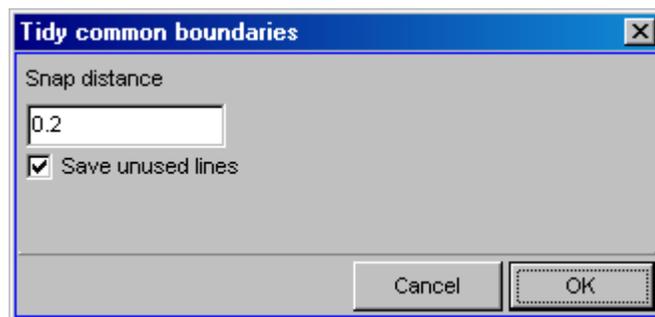


Where a line or polygon crosses another line of polygon vertices are created. If the **Preserve existing polygons** box is ticked then any polygons in the selected group will still be polygons after the operation, otherwise their boundaries are converted into line objects.

If the **Close gaps** value is not zero then after the snap operation has been carried out a second pass is made to close any gaps smaller than the specified amount. A typical example of this might be a map containing field boundaries on a farm. There might be gaps caused by inaccuracies up to say 0.25 metres. The **Snap distance** is set to 0.25 metres to close up these gaps. However there may also be 4 metres wide gaps which are gates in the boundary fence. By setting close gaps to 4 these gaps in the perimeter will be closed.

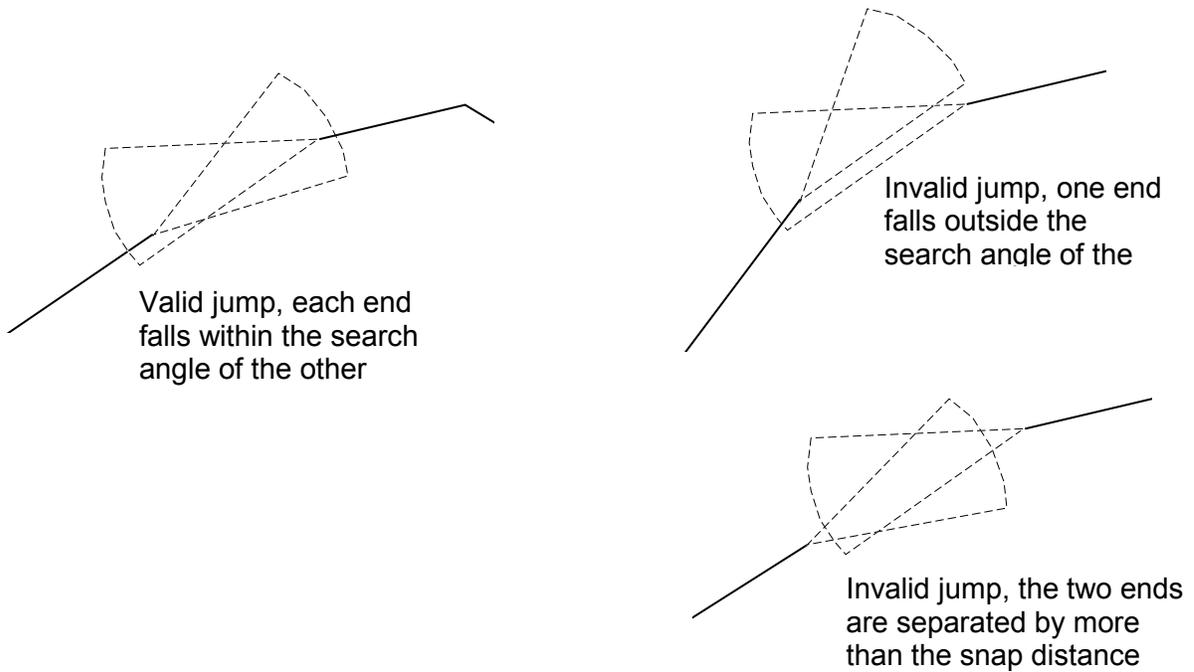
#### 9.6.4 Tidy common boundaries

As with the Snap function this action checks the snap distance to attempt to tidy the gaps and overlaps in the boundaries of a set of polygons which are not precisely adjacent. It will also attempt to create polygons from any line objects in the selected group.

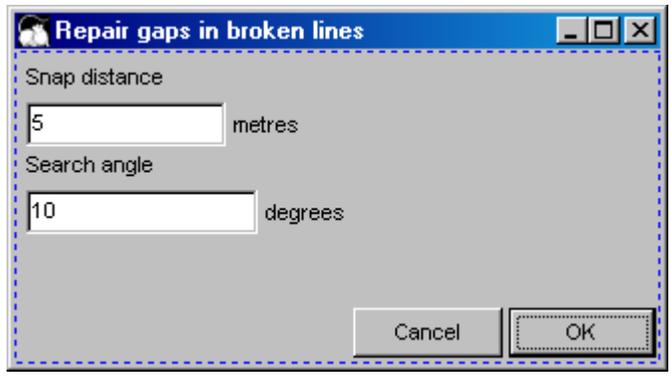


#### 9.6.5 Repair gaps in broken lines

Particularly when dealing with vector data originally generated from raster data, you are likely to find breaks in lines, such as contours or rivers, that ought to be continuous. This action can be used to attempt to “jump” those gaps. This is different from simply trying to snap together nearby vertices since, when looking for a nearby vertex, this action will only accept as valid a vertex that falls within a specified “search angle”. The search angle is like a cone of light from a torch pointing in the same direction as the last segment of the line.



In the dialogue box, the **Search angle** is defined as the number of degrees to either side of the direction of the last segment of the line. In other words, the number of degrees of the apex of “cone” is double the specified search angle.



### 9.6.6 Smooth lines

This action is used to smooth out jagged lines. Frequently lines derived from bitmaps contain irregularities which are due entirely to the size of the pixels of the original image. What should be straight lines or smooth curves are unnecessarily jagged. This function traces polygons and lines to eliminate the vertices that fall within a specified tolerance of the general direction of the line.

### 9.6.7 Snap to another file

Snaps the objects in the selected group to objects in another vector file. If the vertex of an object is not within the specified snap distance of any object in the file then it is unchanged.

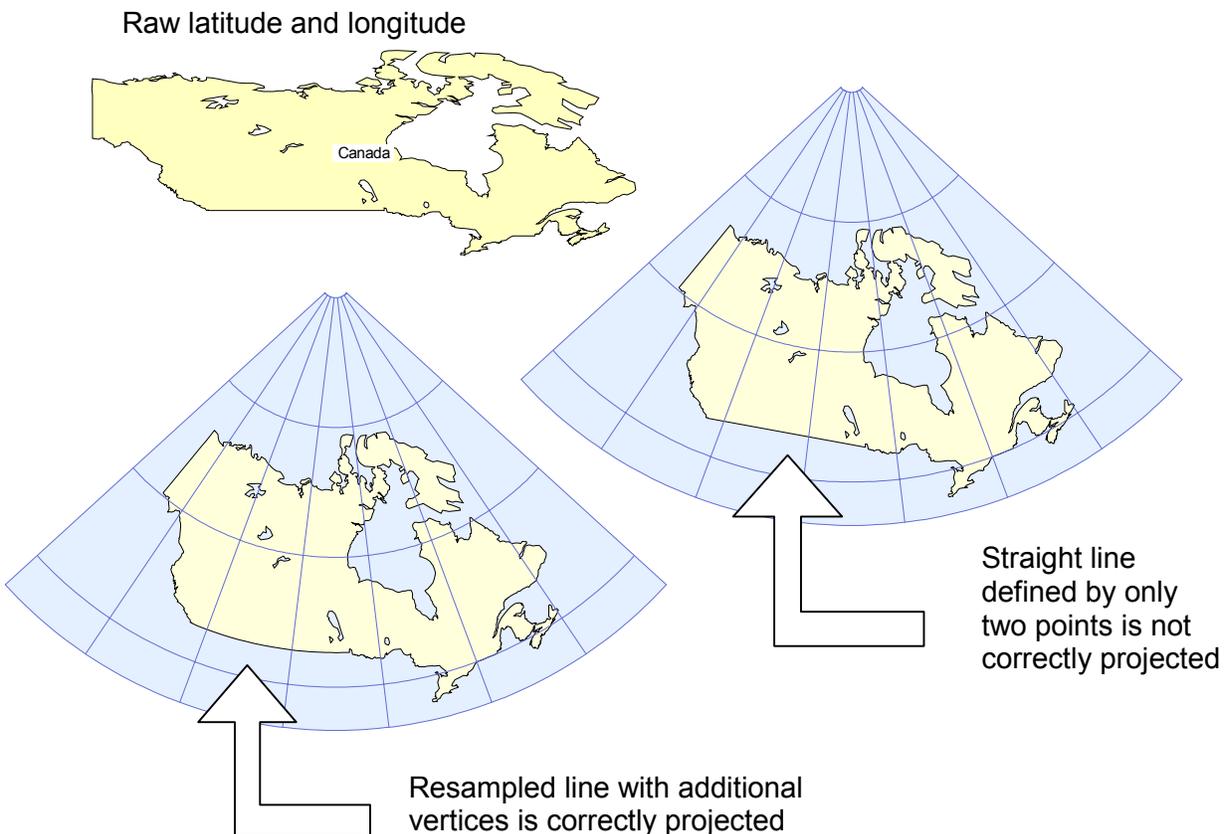
### 9.6.8 Remove redundant line junctions

Particularly when importing vector data, you find that large line features, such as coastlines or contours are made up of many short lines. This function finds all line junctions where no more than two lines meet and merges the two lines thereby eliminating redundant junctions. This function does not work by snapping. Because the two lines must meet precisely, this action is a useful way of highlighting imperfect junctions.

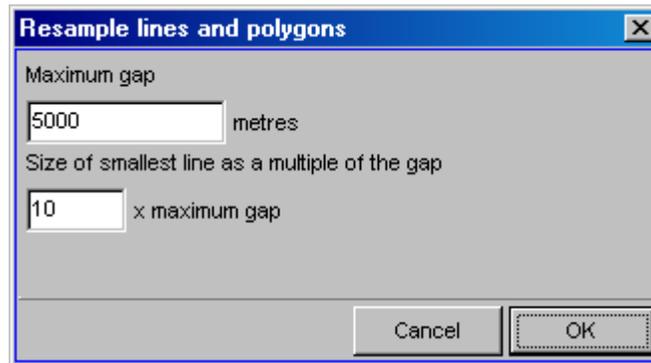
### 9.6.9 Resample lines and polygons

This action reduces the file size of a map by reducing the number of vertices in the lines. Making a complex map simpler and less detailed is useful when you wish to include the map in a printed document or display it on a web page.

Alternatively, you can use this action to increase the number of vertices in the map before carrying out an operation that twists or otherwise distorts the map - such as converting raw latitude and longitude data into a map projection. In the following illustration, you can see that on a latitude and longitude map the greater part of the southern Canadian border appears as a straight line. If the line is simply described by two vertices, when the lat/long data are converted into a projection, the Canadian border looks wrong.



The **Maximum gap** in metres entered in the dialogue box will be used to determine the maximum gap between vertices.



If you were to resample the vertices of short lines and small polygons the objects would effectively disappear or be distorted beyond recognition. If the smaller lakes in the illustration were resampled they would become invisible. This is why the dialogue box allows you to specify the size of the smallest object to be re-sampled. The smallest line is described in terms of a multiple of the **Maximum gap** so that the specification does not depend on the scale of the map.

#### 9.6.10 Resample without loss

In the previous action it is important to note that, even though you are increasing the total number of vertices, you may still be deleting existing vertices in cases where one vertex is very close to the next. In contrast, this action keeps all for the existing vertices and will simply insert one or more extra vertices wherever the distance between two consecutive vertices exceeds the maximum specified gap.

#### 9.6.11 Remove segments smaller than

Simplifies lines and polygons by removing any line segment which are shorter than the specified minimum length.

#### 9.6.12 Check common corners

Wherever polygons share boundaries there should be "corners" at the junctions of the polygons. (There may also be corners at intermediate points along a common boundary.) Map Maker requires that adjacent polygons agree about the corners and vertices along their common boundary. If point X on the boundary of polygon A is a corner, the corresponding point on the boundary of the adjacent polygon B must not be defined as a vertex. If you have brought together data from different files the definitions of corners and vertices may not coincide. Where they do not agree, this action will replace any disputed vertex with a corner.

#### 9.6.13 Basic repair

Map Maker polygon topology depends on special vertices being flagged as such. Special vertices are: the first vertex, the last vertex, the first vertex of an island loop, the last vertex preceding an island loop. Sometimes imported data or data from earlier versions of Map Maker does not have these vertices correctly identified. Sometimes the minimum and

maximum X and Y extent of a polygon become corrupted. This action checks and repairs all polygons, it also repairs the bounding box.

## 9.7 Polygon manipulation

### 9.7.1 Join adjacent polygons of the same style

This action will not work unless the topology of the selected group is sound. If in doubt, first use **Tidy common boundaries** to make sure that the boundaries between adjacent polygons are accurate – that is to clear up any gaps or overlaps between polygons. When the topology is tidy, you can go on to use this action to merge adjacent polygons which share the same style number.

### 9.7.2 Join adjacent polygons of the same ID

As with the preceding action, once you have ensured that the topology of the selected group is sound, this action will merge any adjacent polygons which share the same ID.

### 9.7.3 Join adjacent polygons of the same display label

This action also requires that the selected group has a sound topology. It merges adjacent polygons that share the same Display label.

### 9.7.4 Remove all internal boundaries

Again, this action cannot be used unless the selected group has a sound topology. It will remove all of the internal boundaries so that what remains is the bounding polygon - or polygons - of the selected group of polygons.

### 9.7.5 Dis-aggregate nested polygons

Complex polygons (i.e. polygons containing islands) are broken up into a set of simple polygons.

### 9.7.6 Ensure adjacent polygons have different styles

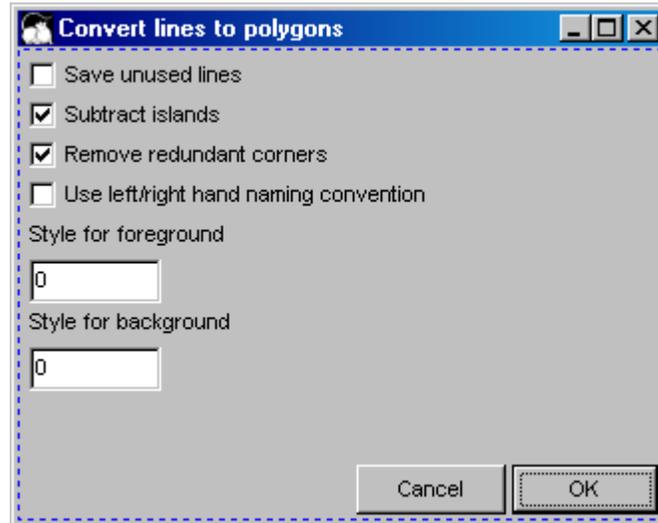
If you are editing a complex layer of polygons it can be useful to colour up the polygons simply to see more clearly the layout of the polygons. It is a rule of topology that using just four colours it is possible to colour up any group of polygons, however complex, in such a way that no polygon is ever adjacent to another of the same colour. This function can be used to assign style numbers from 0 to 3 to the polygons in a layer in the same fashion. If you ensure that the fill colours of the first four styles in your style set are distinct from each other then the map will be coloured up in this way.

### 9.7.7 Convert lines to polygons

This is one of the key actions. Before applying it, ensure that the lines in the selected group have a sound topology using **Tidy line junctions**. The action will turn all enclosed spaces into polygons.

If **Save unused lines** is not ticked, all lines which do not enclose spaces will be discarded.

If you have chosen to **Subtract islands**, any polygon or polygons enclosed by another



polygon will be subtracted automatically from the enclosing polygon.

Ticking **Remove redundant corners** ensures that corners (as opposed to vertices) will only remain at the start and end of polygons, the start of islands, and points where two or more polygons meet.

You should only tick **Use left/right hand naming convention** in the special circumstance of having a set of lines which have IDs of the form:

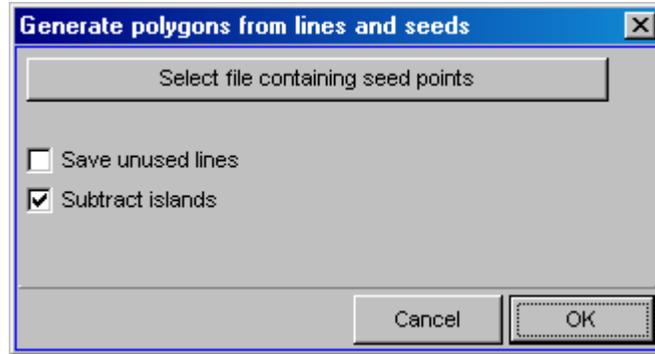
```
"left name|right name"
```

The "right name" is the name of the polygon to the right side of the line as you travel forward along the line. The "left name" is separated from the "right name" by the bar character "|". This convention of assigning a left and right hand polygon attribute to lines is common to several G.I.S data formats. This function can be a route to polygonizing the line data and maintaining the correct IDs provided that, when these attributes are imported, they are stored in the line ID using this convention.

Complex maps of water systems or vegetation patterns, for example, frequently contain "nested" polygons; that is to say, polygons with islands and, sometimes, islands within islands. The **Style for foreground** and **Style for background** fields allow you to assign alternating odd and even style numbers to the polygons in the nesting hierarchy.

### 9.7.8 Generate polygons from lines and seeds

The dialogue box asks you to **Select a file containing seed points**.

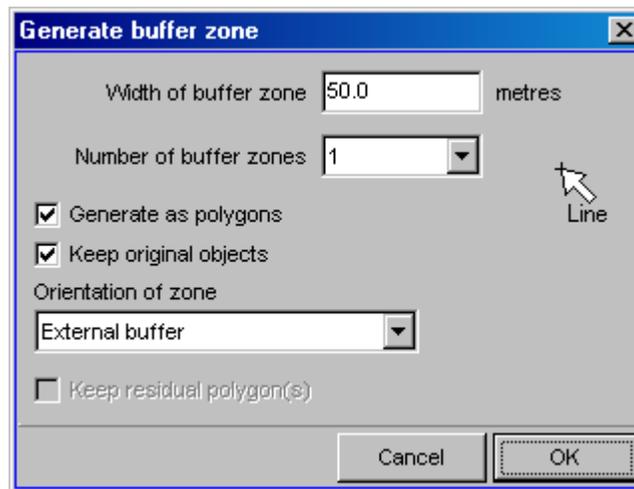


The action will convert the lines in the selected group into polygons and then refer to the point data in the seed file to assign attributes (ID, label, style number) to the new polygons.

Any lines not used in creating polygons are discarded unless the **Save unused lines** box is ticked. Ticking the **Subtract islands** box ensures that any polygon entirely enclosed in another polygon is subtracted from the larger polygon.

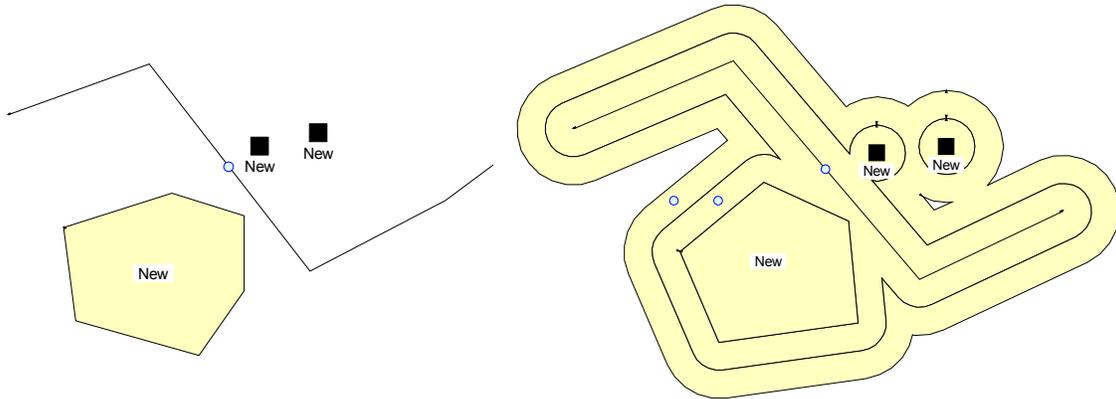
### 9.7.9 Generate buffer zones

Generates a buffer zone or zones around the selected group of polygons, lines, and points.



In the drop down list under **Orientation of zone**, “external buffer” will place buffers around polygons, on both sides of lines, and around points. “Internal buffer” will ignore lines and points and create buffers around the inside edge of the polygons. If, when you select “internal buffer,” you have also ticked the **Keep residual polygons box**, the part of the polygon which has not been included in the buffer zones is also saved.

The example below shows two external buffer zones.



### 9.7.10 Make cut

This action uses the selected objects to cut the rest of the live layer.

### 9.7.11 Make square

When interpreting an aerial photograph, it is usual to trace the outlines of buildings and other generally rectilinear features either manually or semi-automatically. Due to the nature of the process the resulting polygons are often rather irregular. This action assumes that each polygon ought to have right angled corners and attempts a “best guess” to determine the shape of each polygon in the selected group.

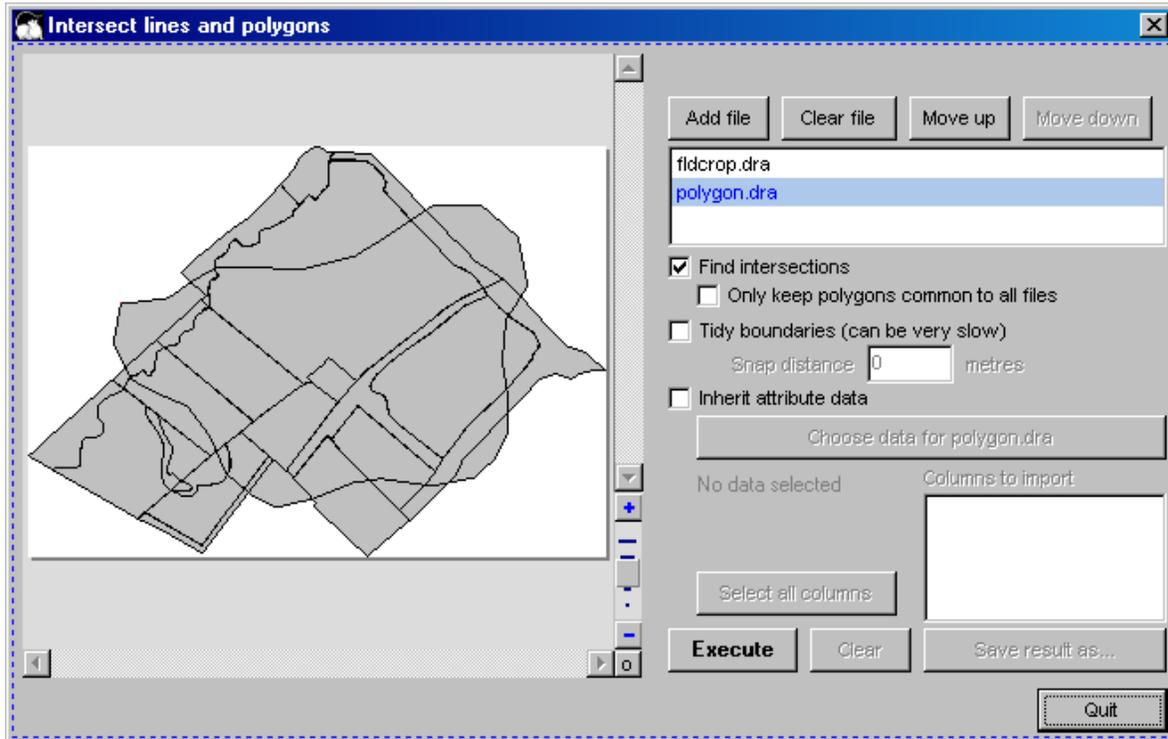
### 9.7.12 Alternate styles between "foreground" and "background"

Where you have a set of nested polygons, such as water and dry-land, or forest-cover and clear land, you can use this action to apply two styles alternately to the foreground and the background.

## 9.8 Intersect files

The actions described above provide methods for intersecting files, in which overlapping lines and polygons cut each other to create a set of non-overlapping contiguous polygons. However, the need to intersect two or more layers of polygons to create a new file of polygons is such a common requirement that it has its own menu item and interface:

**Utilities – Vector utilities – Intersect files.**



Using the **Add file** button you can choose two or more DRA files to intersect. The left hand side of the dialog box displays a preview of the files chosen. Unless the files already share the same topology (i.e. line junction are at the same points) then the **Find intersections** box should be ticked. If all you need is the polygons that result from intersecting the files simple click on **Execute**. If you only want the polygons that fall within the polygons of all the selected files then first tick **Only keep polygons common to all files**. When the process has finished the result will be displayed in the preview window. Click on **Save result as** to save the polygons.

If need be the **Tidy boundaries** box can be ticked which will close up any gaps between adjacent polygons. You need to set a **Snap distance** in metres. Gaps larger than the snap distance will not be closed. On large files this process can be very slow so it should only be used where necessary.

If you tick the **Inherit attribute data** box then when you click on **Execute** a new database table will be generated with a row for each polygon. The first column of the database is always called SERIAL and is simply a serial number. The new polygons are automatically given a serial number as an ID. For each of the selected files you can choose a corresponding data table (DBF, Access table, or Excel spreadsheet) . The data table must include a link column that contains the object IDs of the polygons in the source file. When

you select a data table the **Columns to import** list displays the names of the columns in the data table. You can choose all or some of these columns to import into the new data table. You should ensure that if you are using more than one source data table that you do not select two columns with the same name.

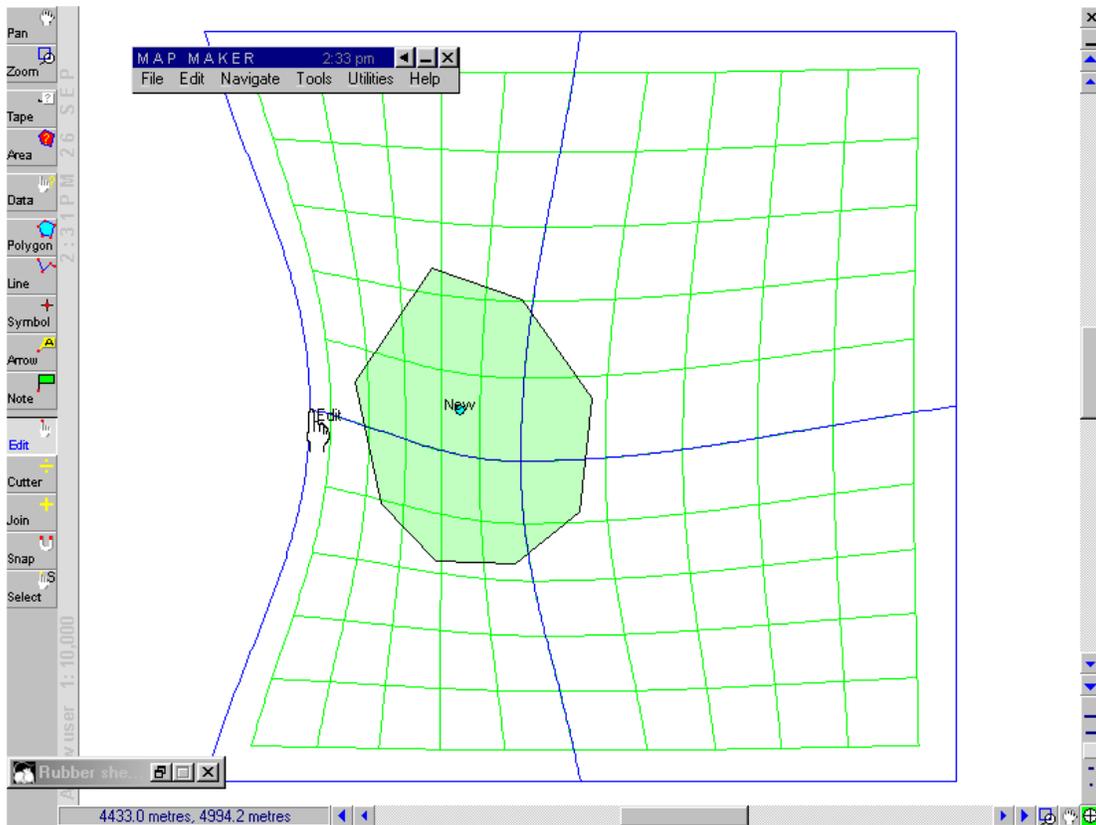
If you have chosen to inherit data then when you click on **Save result as** you will be asked to name a new data table as well as a new DRA file.

## 10 Rubber sheeting

When you are dealing with sketch map's, historical maps, maps of unknown projection, or simply poorly made maps it can be necessary to adjust the maps in non-linear ways. In other words problems in the data can not be resolved by simple changes of scale, orientation or projection. To cope with these situations Map Maker uses a "rubber sheet" feature.

### 10.1 Vector data

The rubber sheet function allows you to distort the contents of the live layer, or part of the live layer. To access it there first has to be something in the live layer, if there is then select **Edit – Live layer rubber sheet – Show vector rubber sheet**. A grid is displayed over the map and a floating dialogue box called the **Rubber sheet manager** appears. The rubber sheet function permits you to distort the live layer either by pulling and pushing the grid or by moving, revolving, and magnifying the grid using the fields in the dialogue box. For now, click on the **Rubber sheet manager's** minimise button so that you can properly see the grid.



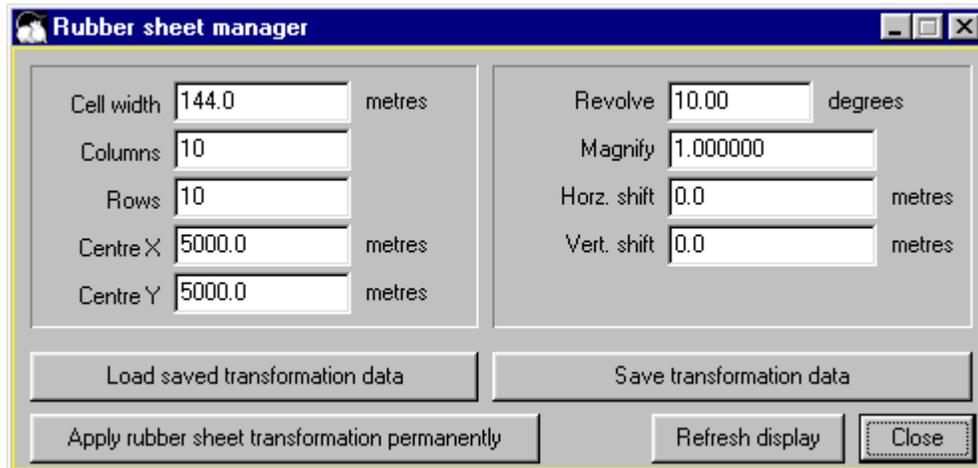
The map is overlaid by two grids; a fine green grid and a blue grid that simply quarters the map.

Select the **Edit object** tool. When you place the cursor exactly over one of the intersections in the blue grid, the cursor will change to indicate that this point can be "hit". Click and hold down the mouse button, move the cursor and release the mouse button.

After a short pause the map and the grids are redrawn following the movement of the cursor - as if you had tugged a rubber sheet. You will see that dragging the green grid lines distorts the image on a more local scale.

It is important to realise that the deformations of the grid only effect vertices that fall within the grid. If you have a polygon that is partly within the grid and partly outside then the vertices that are in the grid will be moved while those outside are not.

Click on the **Rubber sheet manager**'s restore button to display it fully.



The left hand group of fields in the **Rubber sheet manager** allows you to define the size and location of the grid. The right hand group transforms the grid and the all the objects in the live layer that fall within the grid.

Note that there is a hierarchy in what you can change when. For instance, if you make a local change by pulling the green grid and then make a change to the coarser blue grid then any changes to the green grid will be undone. Similarly, if you make any changes to the values of **Cell width**, **Columns**, or **Rows** then all manual changes to the grid (pushing and pulling) will be cleared.

Typically the steps when using the rubber sheet are:

1. Since the grid is initially sized and located according to the current extent of the screen the first step when thinking of using the rubber sheet is to navigate the map so that the objects that you want to manipulate are comfortably within the screen.
2. Launch the Rubber sheet by clicking on **Edit – Live layer rubber sheet – Show vector rubber sheet**.
3. Adjust the values in the left hand group so that the grid correctly covers the area you are concerned with.
4. Use the right hand group to carry out any general operations such as revolving the whole group.
5. Push and pull the blue grid to make any coarse-grain adjustments.
6. Finally push and pull the green grid to make fine adjustments.

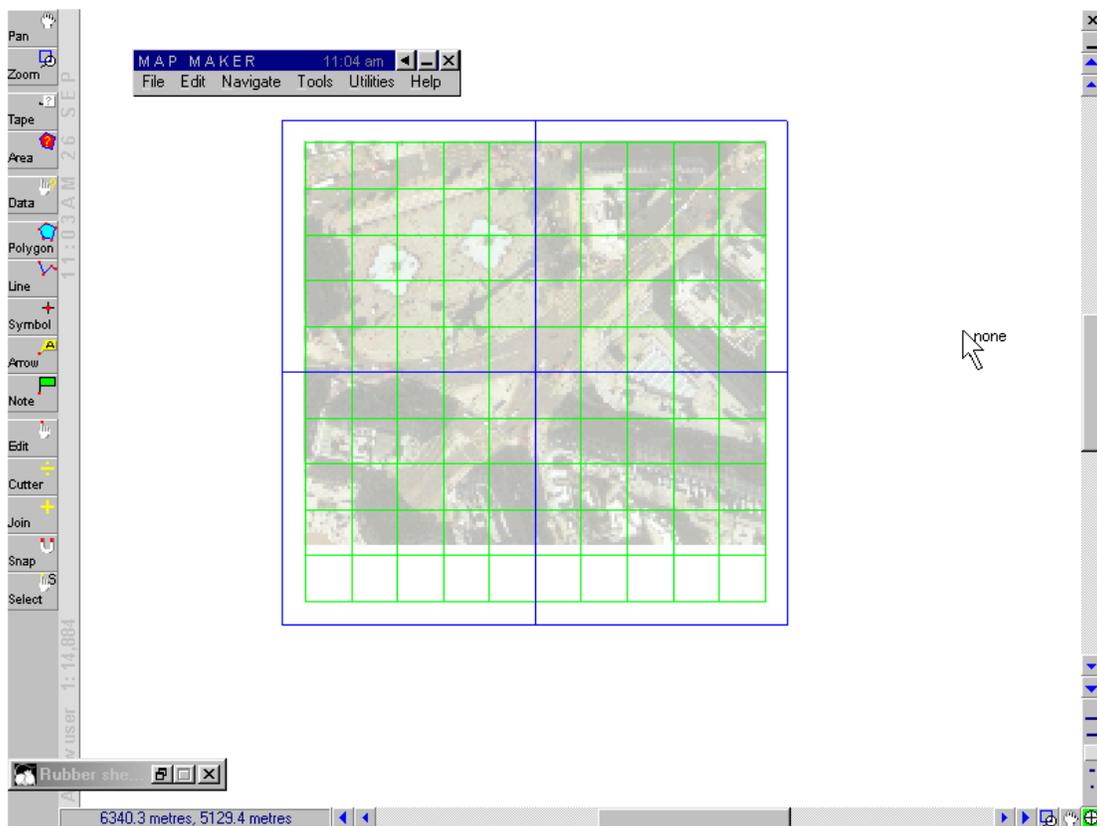
7. If you are ever likely to need to apply the same transformation to another file (such as another thematic layer covering the same area), use the **Save transformation data** to save the settings. This can be recovered in another session using **Load saved transformation data**.
8. Click on **Apply rubber sheet transformation permanently**.

## 10.2 Bitmap data

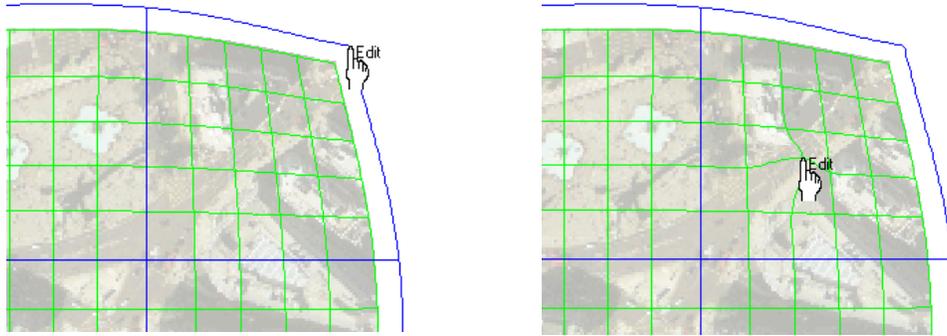
When using aerial photographs or scanned historic maps, calibration may involve more than defining one or two known points and a scale. You may need to distort the whole image so that it will fit a set of known points or so that you can superimpose it on another map. As with vector data you can use the rubber sheet to distort it.

Note that this is the one instance in Map Maker where bitmap data can be edited in the live layer. Normally the live layer is just for vector data.

Select **Edit – Live layer rubber sheet – Show bitmap rubber sheet**. You are asked to select a bitmap file. Then the **Rubber sheet manager** appears. Click on the minimise button in the top right of the dialogue box and look at the map.



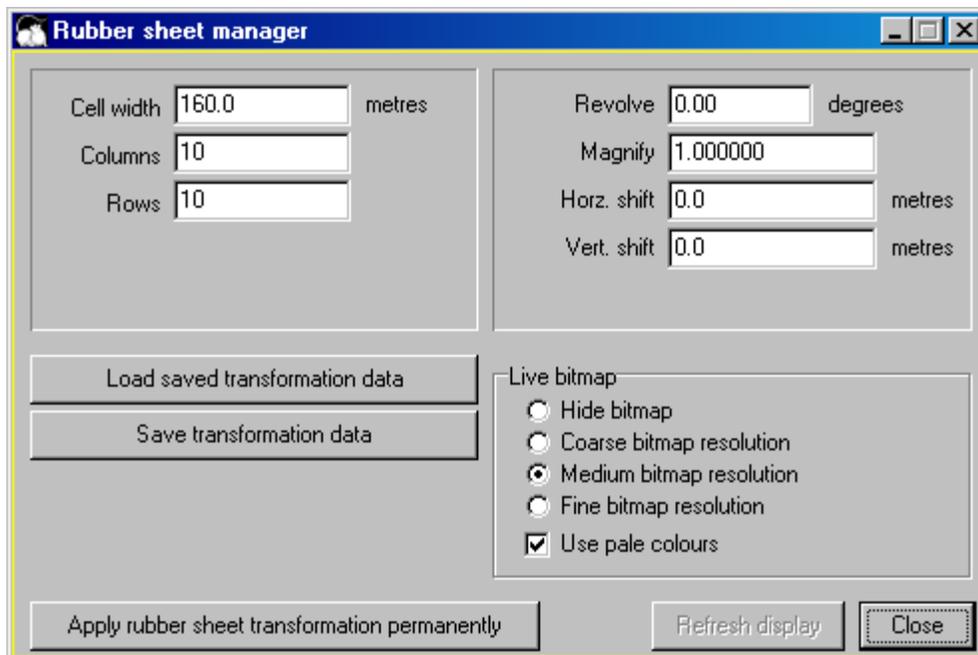
As before, the bitmap is overlaid by two grids; a fine green grid and a coarser blue grid. Again you can use the **Edit object** tool to drag the grid.



The bitmap in the rubber sheet is translucent. When the bitmap is spread over a vector layer, you can adjust the image to make it coincide with the vector features such as buildings, rivers and roads on the layer beneath.

Though the initial image appears coarse, if you zoom in, the resolution increases proportionately allowing you to see finer details.

Now click on the dialogue box to restore the **Rubber sheet manager**. It looks slightly different from when it was used with vector data.



At the top left are the settings for the number of columns and rows and their spacing in the green grid. The default values are set to the cell width which allows the entire bitmap image to fit the grid. If you want to change these default settings, do it first – before altering the other settings in the dialogue box.

As before, the fields in the top right allow you to rotate, magnify or shrink the image or move it from side to side or up and down. The **Refresh display** button is greyed out until you change any of these values. After changing the settings, click on **Refresh display** to apply the new values to the image.

The buttons under **Live bitmap** in the bottom right corner of the dialogue box control the resolution of the bitmap as it is displayed on screen. You will find it quicker to work with a coarse resolution than a fine one and that if you choose to **Use pale colours** it easier to see the grid and the vector lines on any other layers.

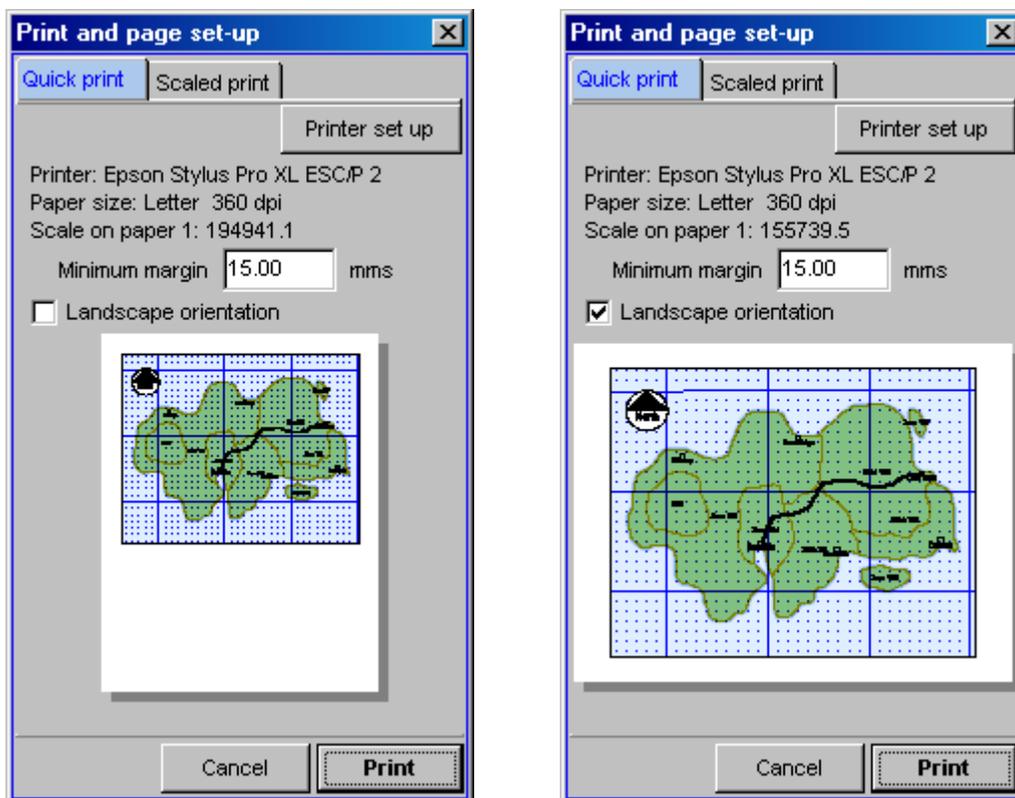
When the image is adjusted to your satisfaction, click on **Apply rubber sheet transformation permanently**. You will be asked to provide a file name. If you choose the original file name the adjusted image will overwrite the original file. We recommend that you write the bitmap to a different file.

## 11 Printing and Page templates

Go to **File – Print**. You will see in the **Print and page set up** dialogue that Map Maker has two printing options - **Quick print** and **Scaled print**.

### 11.1 Quick print

The **Quick print** facility prints an image which corresponds with your present view on the screen. The height and width of the printed map are in the same proportion as the height and width of the map window on screen. The extent of the visible map is also the same – what you see is what you get. The scale of the printed map is not necessarily the same as that shown on screen. The scale is determined by the paper size, the minimum margin setting, and the orientation of the paper (portrait or landscape).



The paper size and the margins are the same in the two examples shown above. The printout on the right is in **Landscape** format and one on the left (where the Landscape option is not ticked) is in Portrait format. The extent of the map in both printouts is the same but the maps are drawn at two different scales.

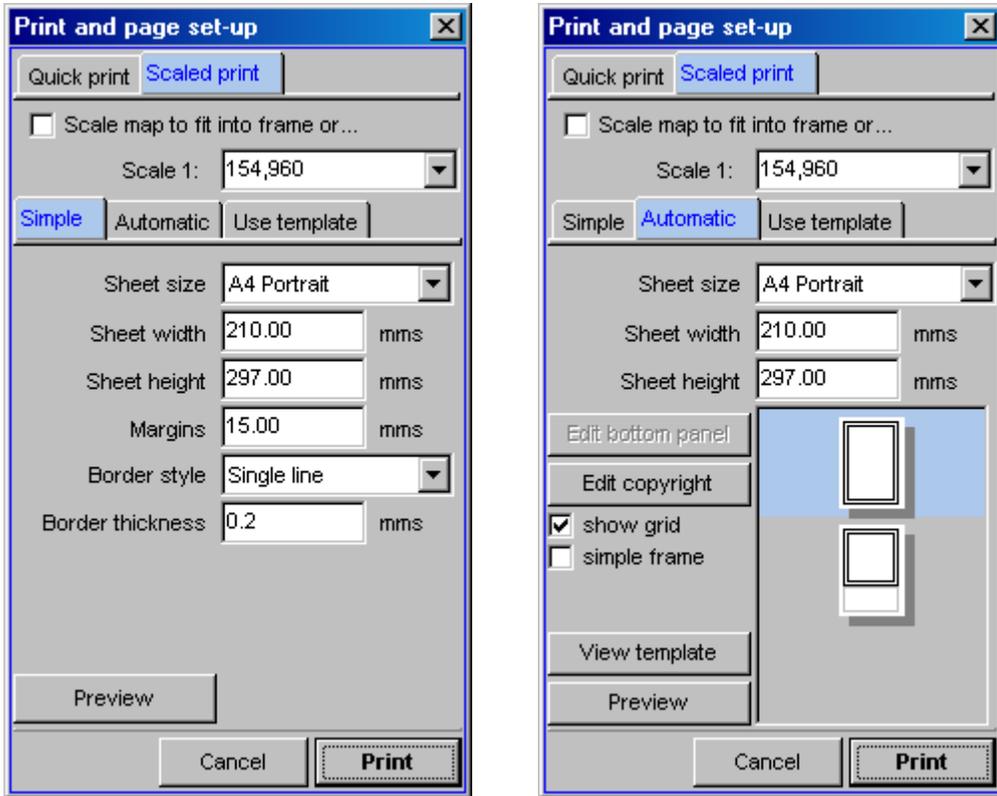
### 11.2 Scaled prints

When you go to the **Scaled print** page of the **Print and page set up** dialogue box and choose the scale you wish to use on your printed map, remember that the geographic extent of the map may be more or less than you see on your screen. The extent of the printed map is determined by the paper size, orientation, and the margin widths.

The Scale value on the **Scaled print** page is initially set to the same value as the screen display (see Calibrating the screen, Chapter 1). On the **Scaled print** page, choose any scale from the drop-down list or type in a custom scale.

Note: if you would like the scales you most often use to appear in the print scale and navigation scale options, go to **File – System set up – Units and scales**. Edit the scales in the list on the right of the dialogue box to show your list of preferred scales.

Alternatively, tick the **Scale map to fit into frame** box and the map will be both centred and scaled so that the full extent of the map is visible.



The **Scaled print** page contains three tabs: **Simple**, **Automatic**, and **Use template**:

Both the **Simple** and **Automatic** options allow you to choose a **Sheet size** from the drop-down list or else specify a **Sheet width** and **Sheet height**.

Map Maker makes an important distinction between “sheet size” and “paper size”. “Paper” is the material in your printer. “Sheet”, on the other hand, refers to the size of your finished map. A map sheet may be made up of several pieces of paper put together. Map Maker allows you to use a normal letter size or A4 size printer to print out a much larger map: A1 sized (841mm x 594mm, 33” x 23.4”), for example.

To define the sheet sizes you regularly use, go to **File – System set up – Printing – Sheet sizes**.

The **Simple** print page allows you to specify the size of margin and the style and thickness of border. Any map furniture included in your map will be printed at its specified size and at its position relative to one of the corner “anchor points”(see Chapter 7 on Map furniture). Click on the **Preview** button to see a replica of the image that will be sent to your printer.

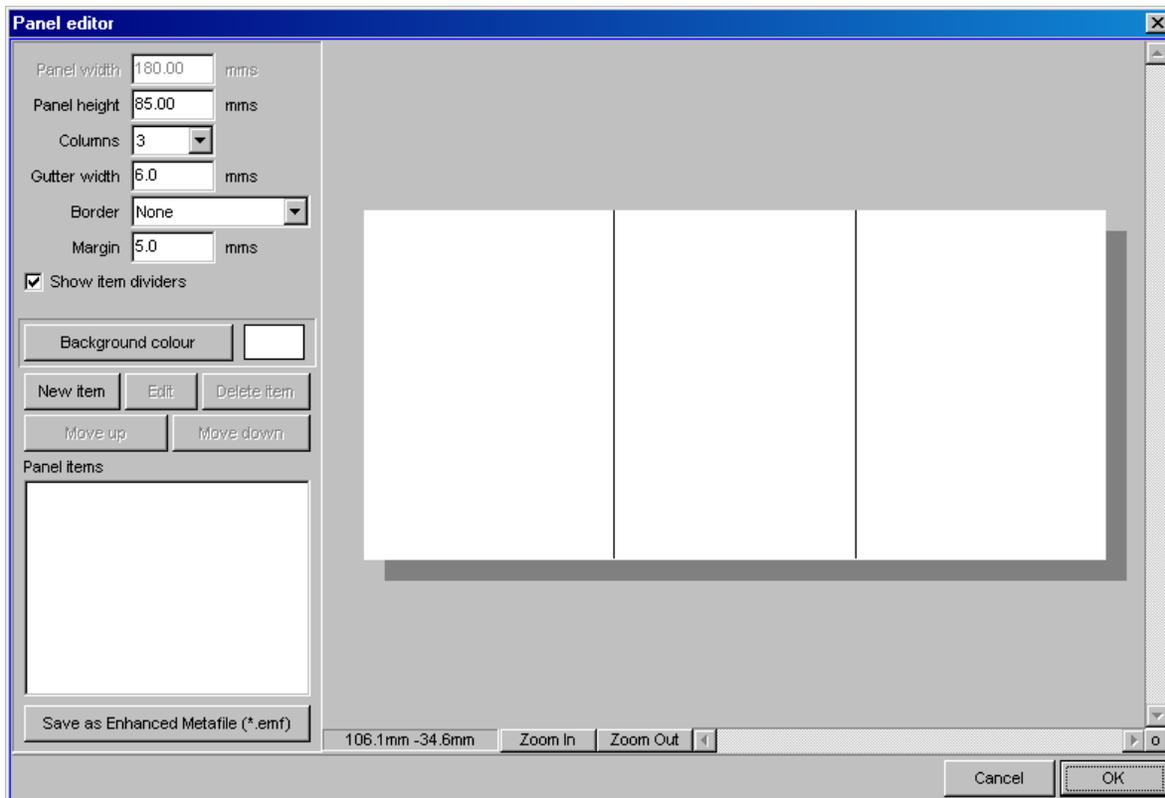
You can zoom in and pan around the preview to check the details before you click on **Print**. If your map is complex or memory intensive (i.e. if it uses large bitmaps) it can be more convenient to use **View template** which shows the page without the actual content of the map.

The **Automatic** page allows you to print your map in an automatically defined template which includes a border showing grid numbers with a title and scale information. Use the **Show grid** box to de-select the grid option if you wish. Click on **Simple frame** if you want the map to have a simple border, otherwise it will have a captioned border with grid numbers and the like. To include a copyright notice on the bottom left of every sheet, click on **Edit copyright**.

The scroll bar at the bottom right of the **Automatic** page shows the possible printing formats. In the first, the map and its frame fill the page. Other formats contain panels at the side or below the map which can be used for legends, text or graphics. The **Edit side panel** button (or **Edit bottom panel** button) will be accessible if you choose an option which includes a side or bottom panel.

### 11.3 Side or bottom panel editor

The side or bottom panel provides space on the printed page for text and graphics adjacent to the map. If you have chosen a portrait format page, then the only panel option given is for a “bottom panel” below the map. Click on **Edit bottom panel**:



The right hand side of the **Panel editor** dialogue box shows a preview of the panel. Controls on the left hand side allow you to adjust the size and appearance of the panel. When, as in this example, the panel is wider than it is tall (i.e. it is a bottom panel not a side panel) then it can be divided up into a number of columns. Otherwise the panel

contains just one column. Using the **New item** button you can add items to the panel starting from the top of the left hand column. You can continue adding items until the panel is full.

If the **Show item dividers** box is ticked then there will be a thin black line between columns and between items in a column. The spacing between items and between columns is defined by the **Gutter width**. The space between items and the edge of the panel is determined by the value of **Margin**.

When you click on **New item** you will see four options.

- **Image**. You can choose either a Windows bitmap image (\*.bmp) or a Windows Enhanced Metafile (\*.emf). The image is automatically sized so that its width fills the width of the column.
- **“Rich text”**. If you choose this option the “Rich text editor” is displayed:

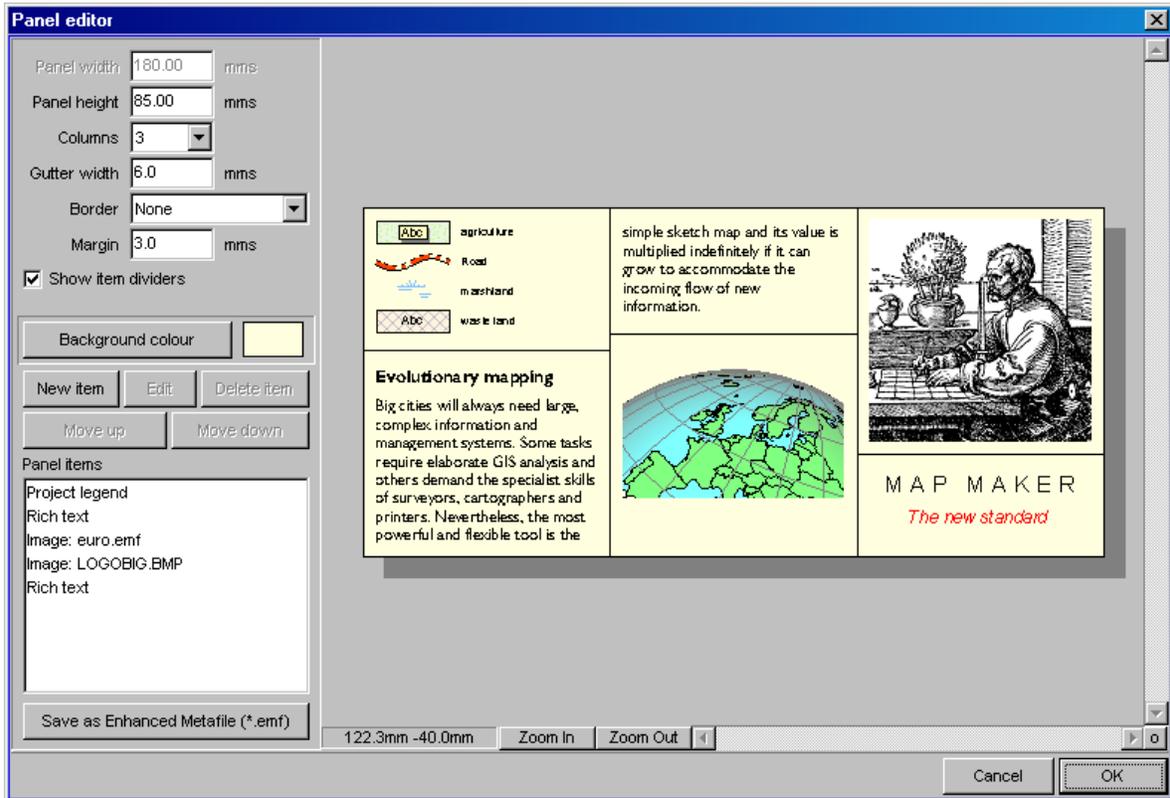


The Rich text editor enables you to create a block of formatted text using a variety of typefaces, colours, bold and italic etc. Using the **Import from file** button, you can select a Rich Text Format file (\*.rtf). RTF files can be produced by most word processors (such as MS Word) though be aware that Map Maker will not support all the items that might be found in an RTF file (such as tables, graphs etc). This Rich text editor is simply for basic formatted text.

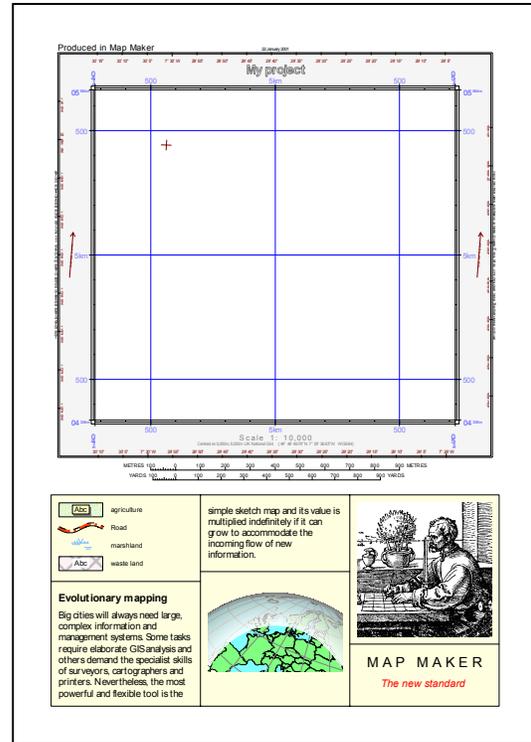
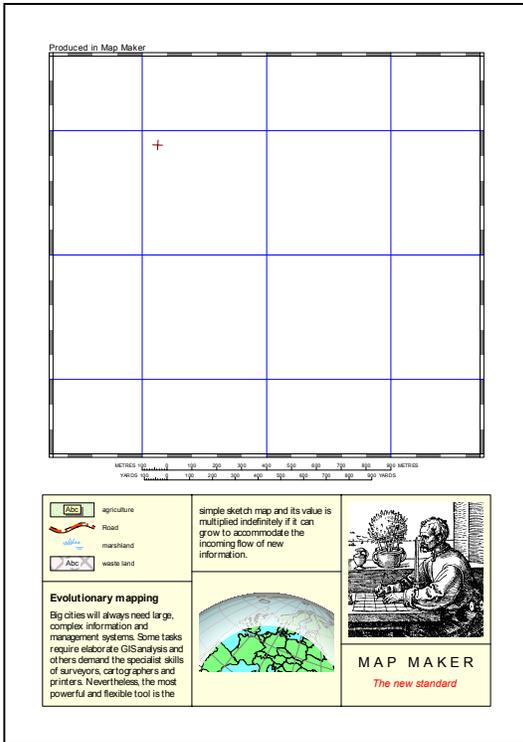
- **Project legend**. The project legend can be displayed. If the legend is too long to fit in one column it will automatically extend into the next column (to edit the Project legend go to the Project Manager).
- **White space**. Introduce a white space to spread out the items on the pane. If, for instance, you want a title block at the bottom of a vertical side panel add white spaces to position it.

Having added items to the list of **Panel items** you can select an item either by clicking on the list or else clicking on the item in the preview image. To edit the item, click on **Edit**, double click on the list or double click on the preview.

If you create a panel that you will want to use again in different projects, click on **Save as Enhanced Metafile (\*.emf)** to save an image of the whole panel. The next time you want to use this panel import the EMF file.



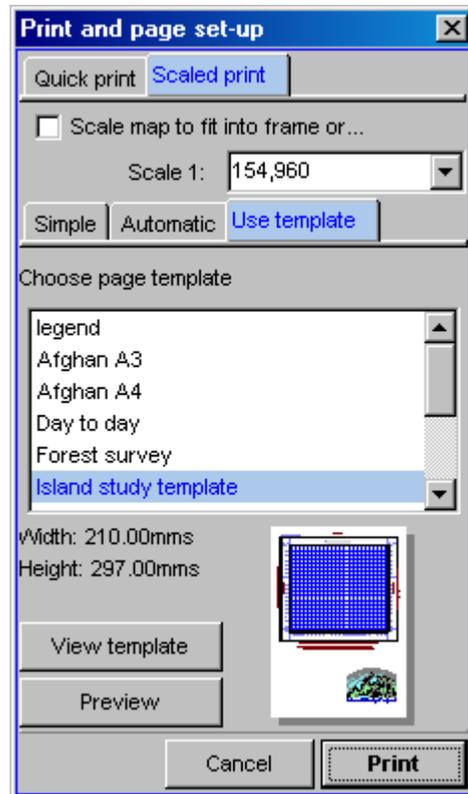
Once you have created a bottom or side panel, click on **OK** to return to the previous dialogue box and click on the **Preview** button to see the panel in context - either with or without the **simple frame** option selected.



**PRO only**

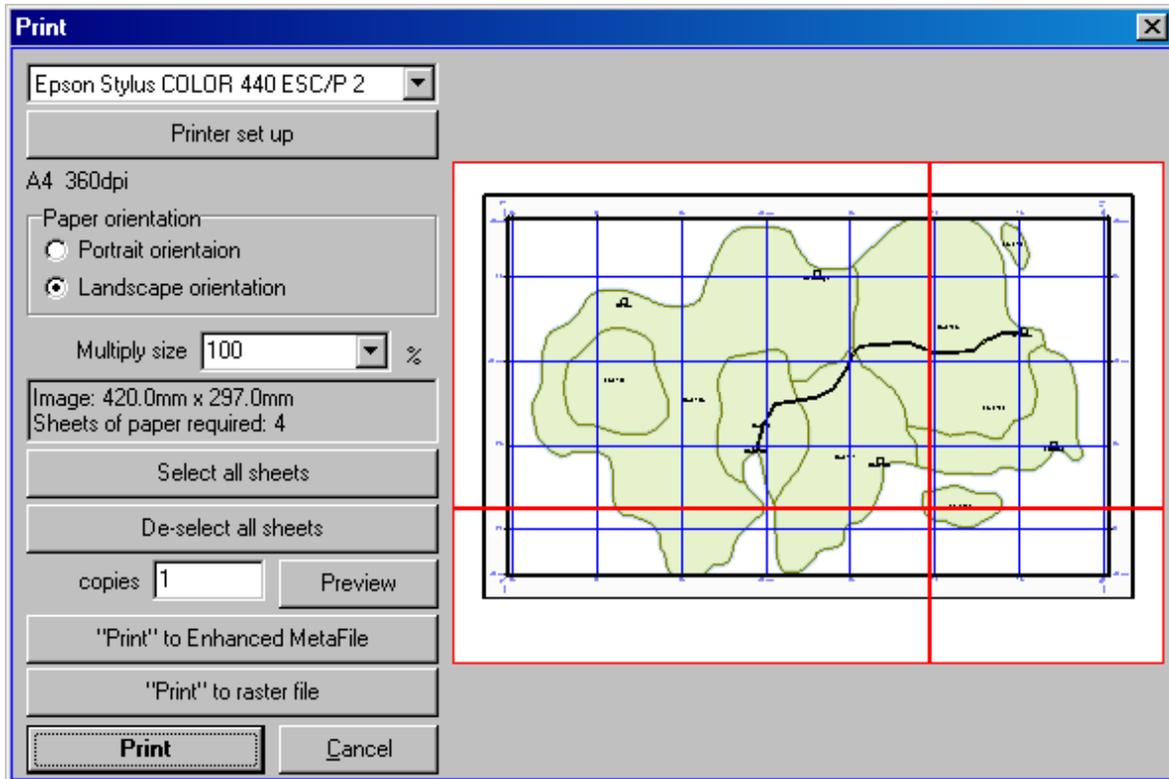
**Use template** is the third option under **Scaled print** on the **Page set up**.

Templates can only be created and used in Map Maker Pro (see below). When you select a template a thumbnail image of the template is displayed or click on **View template** to see more detail. When you click on **Preview**, your project map will be displayed in the selected template.



## 11.4 The print dialogue

To use the **Quick print** option, click on the **Print** button and the image will be printed immediately. If you choose another print option and click on **Print**, the print dialogue box appears.

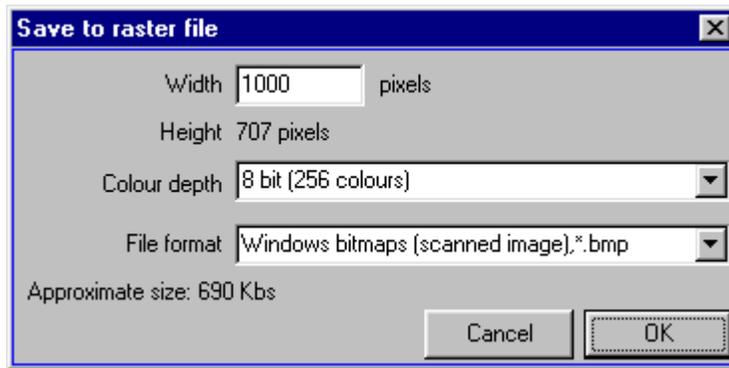


In this example, the “sheet size” is set for A3 paper in landscape format (i.e. 420mm wide by 297mm high). The paper size on the selected printer, however, is smaller, size A4 (i.e. 297mm x 210mm). Although the map itself is in landscape format - wider than it is high - the paper used for printing can be oriented to either portrait or landscape.

If more than one page is required to print the map, you will see the preview image divided by red lines to indicate the number of sheets of paper that will be used to print the map – in this case 4.

You can print out all of the map segments or a selected few of them. To update a section of a large wall map, for example, it is not necessary to print out the whole map afresh. Click on the preview image to de-select the sheet segments you do not wish to print.

To prepare an image for publication or for use on the Internet, select **“Print” to raster file**.

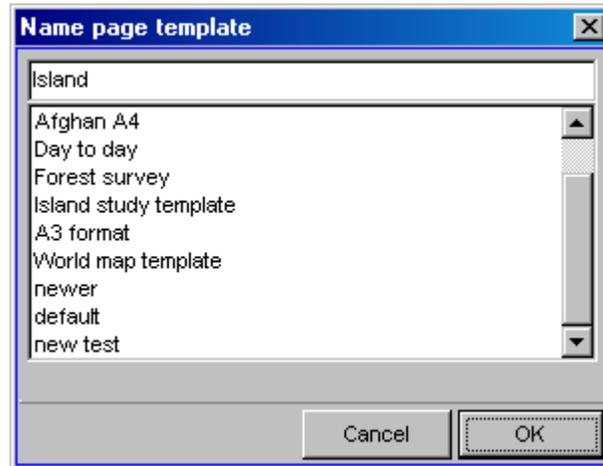


Remember that when you click on “Print to raster file”, the image will show the entire page including margins. To save a raster image of the screen, use **File – Save screen image – As raster file**. Choose a figure for the image width that will give you the resolution the printer needs. For instance, if the finished map on the printed page will be 4 inches wide and the printer requires 300 dpi then the image needs to be 1200 pixels across.

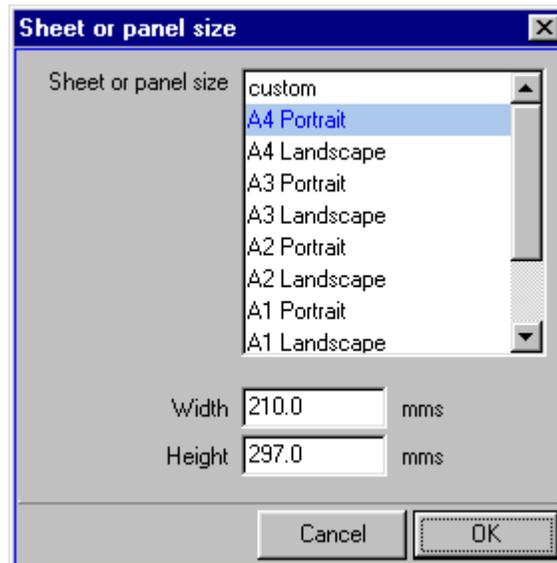
### Making page templates

The procedures and tools for making a page template are similar to those for making a map in Map Maker. A page template can be thought of as a map of a page. The template locates the map on the page and can contain elements such as graphics, title panels and scale bars.

Clear the screen and go to **File – Page templates – New template:**

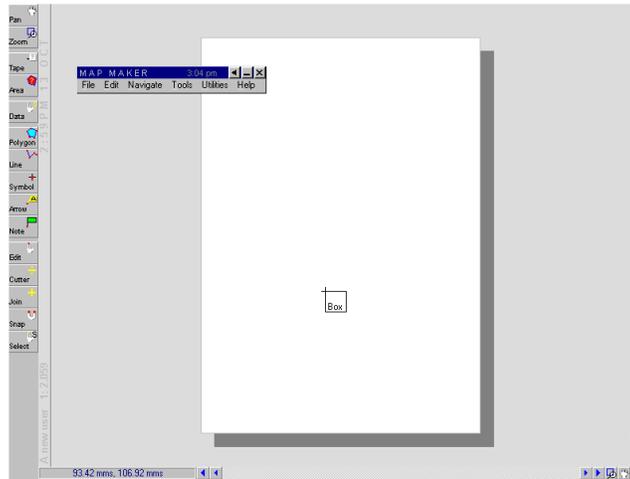


Enter a new name, or choose an existing one. Click OK and you will be asked to choose a **Sheet or panel size** (Panel size because a page template project can be used to design a panel within a sheet as well as an entire map sheet).



To change the names and sizes of the sheets on this list, go to **File – System set up – Printing – Sheet sizes** and edit the list.

Choose a sheet size and click OK. The screen will show a representation of a blank page against a grey background.



The co-ordinates in the bottom left corner are not the usual geographic units (e.g. metres or yards) but paper units (millimetres or inches). In effect, you are about to use Map Maker to edit a map of a sheet of paper. Use the drawing tools and map furniture to design the page.

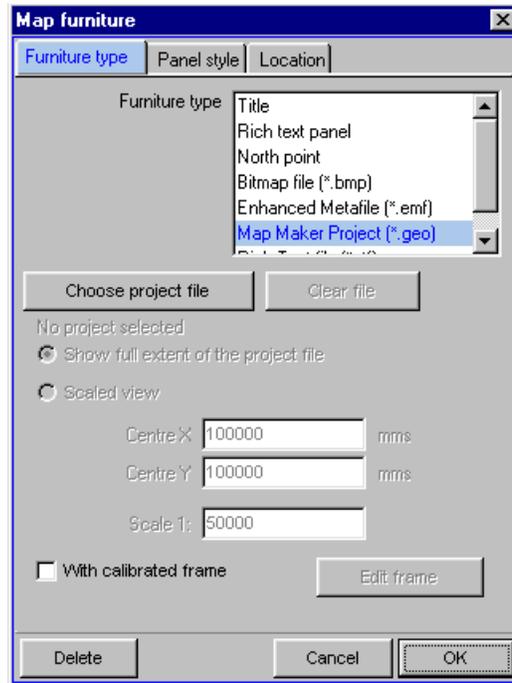
The following illustration shows a typical page. The main “map frame” is displayed along with a text panel and a graphic.

The screenshot displays the Map Maker software interface. At the top, a grey bar contains the text "MAP MAKER". Below this, a map frame is shown with the title "ISLAND STUDY" and the date "13 October 2000". The map frame includes a "Metric XY grid" and a "Latitude and Longitude grid of 'graticule'". A "Rich text panel" is located at the bottom left, containing the following text:

**Evolutionary mapping**  
 Big cities will always need large, complex information and management systems. Some tasks require elaborate GIS analysis and others demand the specialist skills of surveyors, cartographers and printers. Nevertheless, the most powerful and flexible tool is the simple sketch map and its value is multiplied indefinitely if it can grow to accommodate the incoming flow of new information. By degrees, workers with access to easy-to-use computer mapping can transform their intuitive, rudimentary drawings into complete, detailed graphic representations of an evolving geographical area. *This day-to-day, hour-by-hour, interactive process only occurs when we give the map users themselves the tools to make their own maps.*

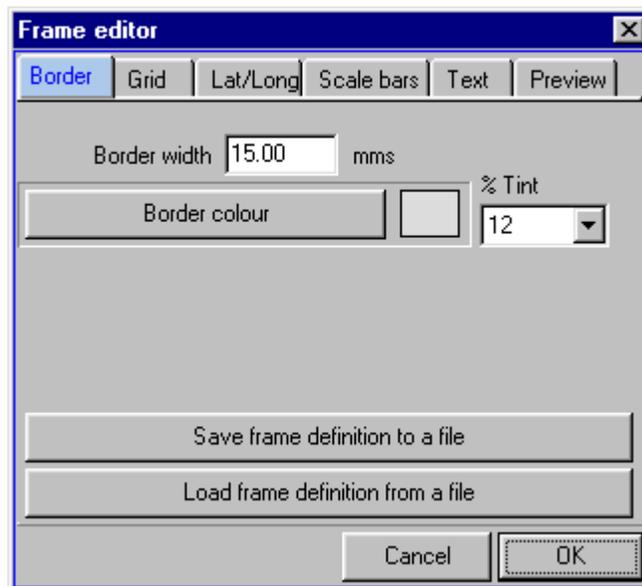
At the bottom right, there is an "Enhanced Metafile image" showing a globe with the text "Island Study Project" below it. The map frame also features a "Metric, imperial and nautical scale bars" at the bottom and a "Title panel" at the bottom right. A "Deviation of grid North from True North message" is shown on the left side of the map frame.

To create the map frame, select **Tools – Map furniture** and draw a box on the page where the map is to appear. In the **Map furniture** dialogue box, select **Map Maker project (\*.geo)** as the **Furniture type**.

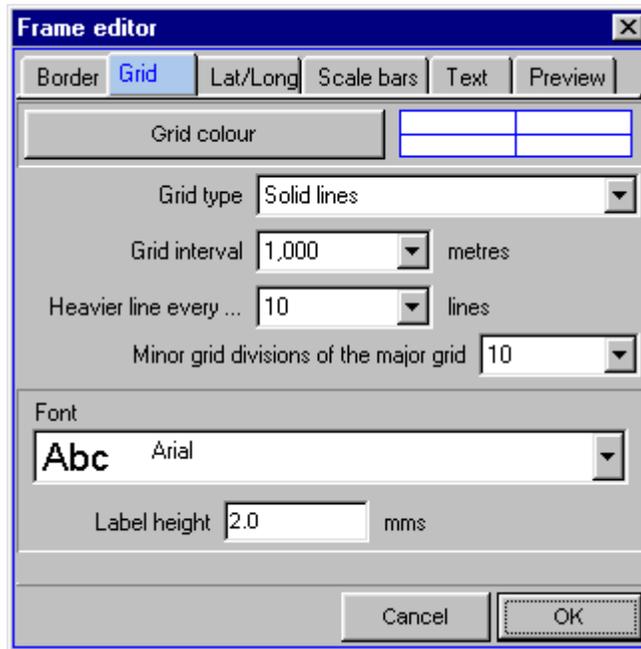


Do not use the **Choose project file** button in this procedure because all you are doing here is defining the box within which your map project will finally appear.

If a simple line border is all you require, click on the **Panel style** tab. For a more elaborate “map frame”, as shown in the illustration on the previous page, select **With calibrated frame** at the bottom left to go to the **Frame editor**.



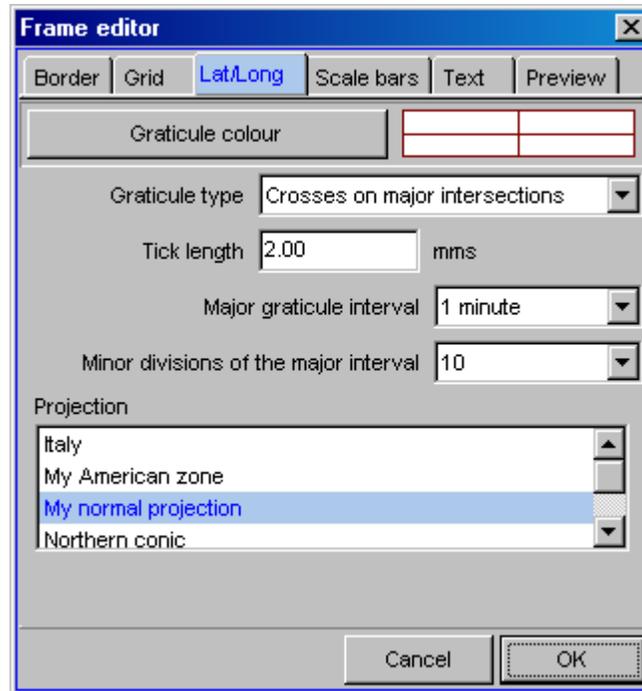
The **Border** page of the frame editor is used to define the **Border width** and choose a **Border colour**. The **Border width** refers to the coloured band surrounding the frame which displays the grid numbers. After you have selected the **Border colour** button, changing the **Tint** value will give a pale “wash” rather than a bright strong colour.



The **Grid** page controls the appearance of the orthogonal (square) grid and the grid numbers. To show the grid numbers around the edge of the map but not the grid itself, select **None** from the **Grid type** list.

Choose **Automatic** under **Grid interval** and Map Maker will select an appropriate grid spacing for the scale of the map. Otherwise you may specify the spacing. The option to set a **Heavier line every..** so many grid lines is used to make the grid lines easier to read across the map.

The value assigned to **Minor grid divisions of the major grid** places marks around the frame of the map indicating distances between grid lines. For example, if your **Grid interval** is 1,000 metres and the value of the **Minor grid divisions of the major grid** is 10, tick marks at every 100m will be shown on the frame.



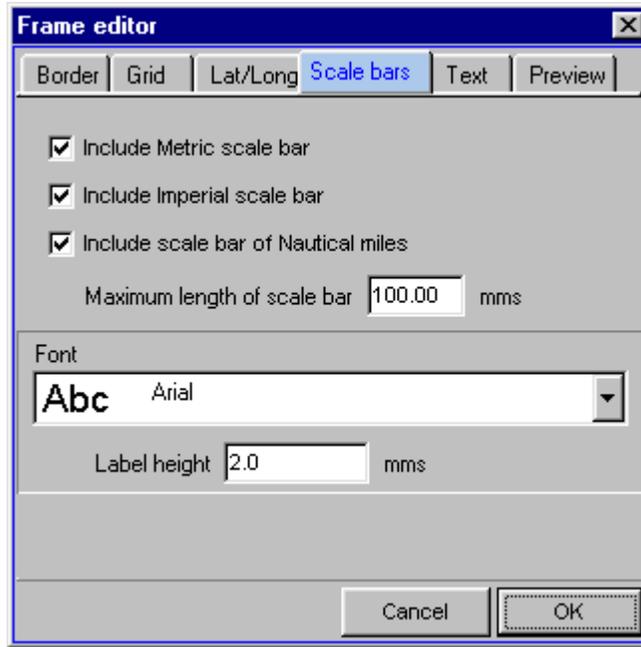
The **Lat/Long** page determines the appearance of the Latitude and Longitude grid or “graticule”.

A **graticule** is a grid composed of latitude and longitude lines. The term is used to distinguish a Lat/Long grid from a square XY grid.

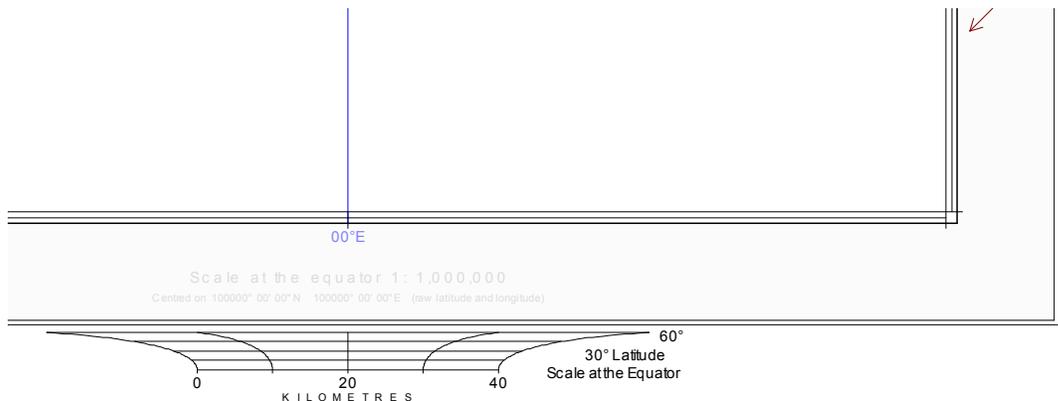
When you select the **Graticule type** you can choose to show latitude and longitude as grid lines or to indicate only the line intersections by marking them with small crosses. The little crosses are visually less intrusive than continuous lines. The **Tick length** determines the size of the little crosses. If, on the **Grid** page, the **Grid interval** is set to **Automatic**, then the **Major graticule interval** will also be automatically set.

You cannot display a correct graticule unless you know the map projection for your region. If you do not know the correct projection choose **None** as the graticule type. The graticule and latitude and longitude numbers will not appear on your template.

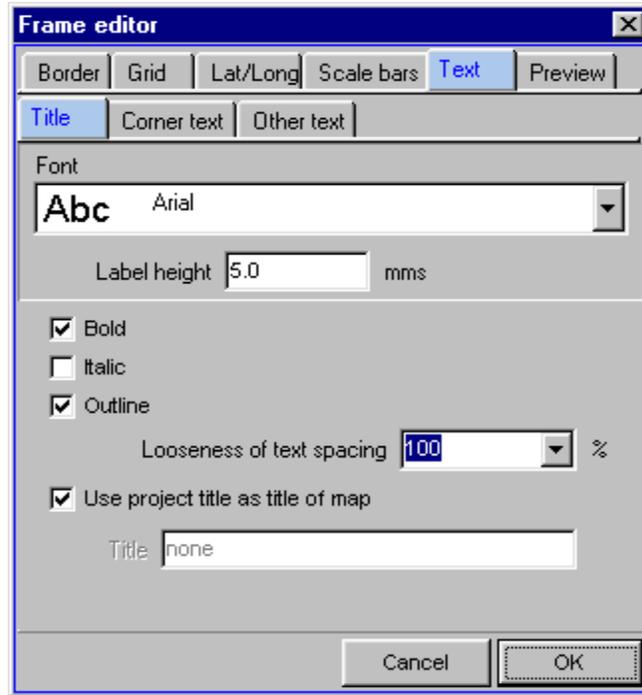
The **Scale bars** page in the **Frame editor** allows you to include scale bars as part of the frame. This means you do not need to create a separate scale bar furniture box. You may select one or any combination of the three scale bars: Metric, Imperial, and Nautical miles.



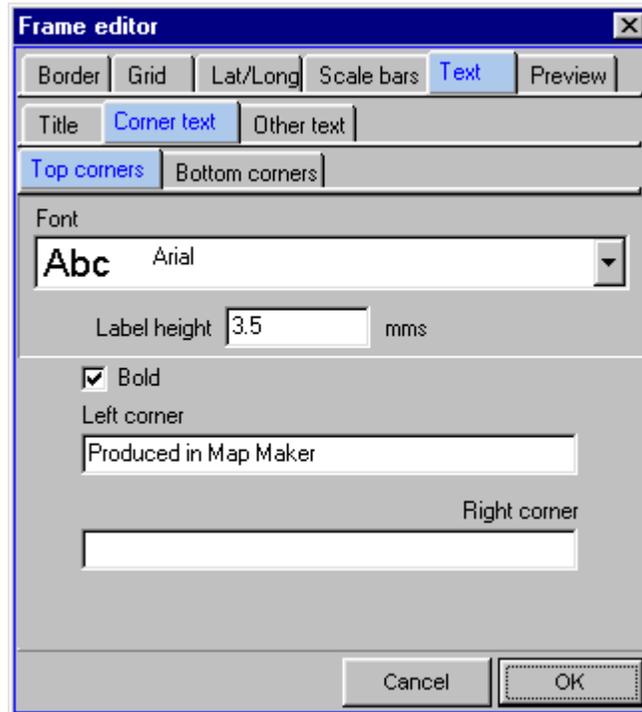
If, on the **Lat/Long** page, you choose **Raw latitude and Longitude** as the projection type, any scale bar you choose will appear as a special variable scale bar showing the scale at different latitudes.



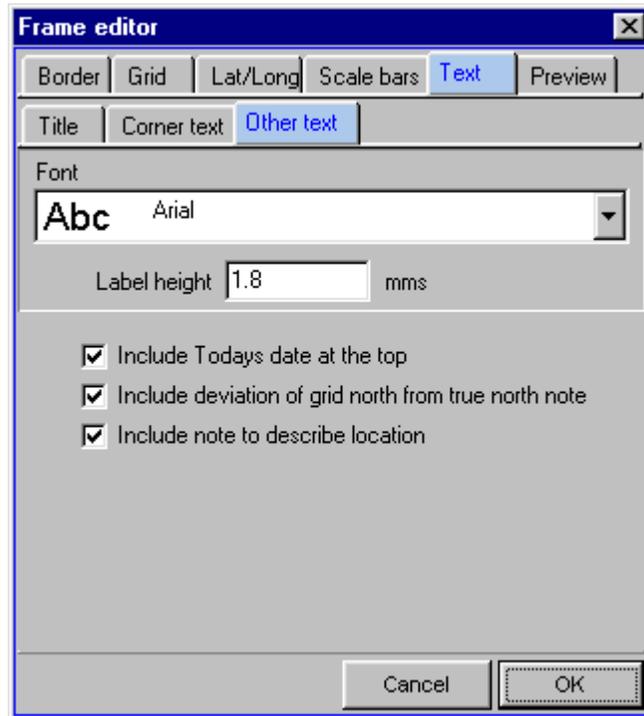
The **Text – Title** page controls the appearance of the title at the top of the map frame. You can choose **Use project title** or specify some other title. The colour of the title text is the same as you chose for the **Border colour** but stronger because the **Tint** will not be applied. As with other text elements you can specify whether the text is **Bold** and/or **Italic** but you can also specify **Outline** and **Looseness of text spacing**. If the spacing is set to a value greater than 100%, the letters of the title will be spread out to give a more formal effect.



The **Text – Corner text** page is used to place text messages, such as a sheet number or a copyright notice, outside the four corners of the frame. Different font attributes can be chosen for the **Top corners** and the **Bottom corners**. The text in the corners on the right will be right justified.



The **Text – other text** page allows you to select or de-select three text items that are automatically generated. If you **Include today's date at the top**, the date on which the page is printed will appear above the centre of the top edge of the frame.

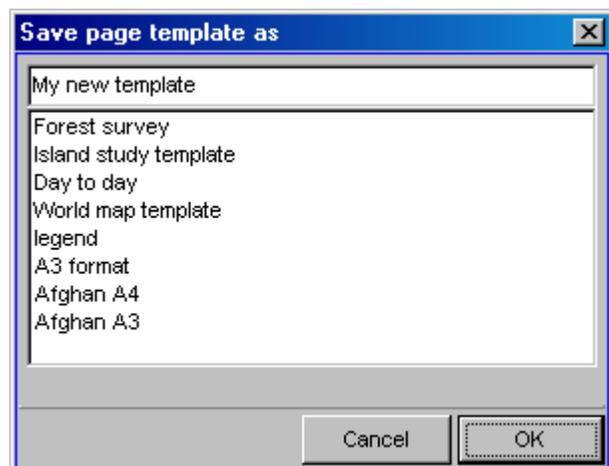


If you tick on **Include deviation of grid north from true north note**, a note will be added as vertical text on each side of the frame to indicate the deviation for the east and west edges of the map. A small north arrow will appear in each margin indicating true north. These will be drawn in the same colour as the Latitude and Longitude graticule.

If you select **Include note to describe location**, a note in the bottom margin of the frame will describe the centre point of the map in terms of the latitude and longitude and the co-ordinates in the projection system.

The **Preview** tab simply allows you to preview the frame before you leave the **Frame editor**.

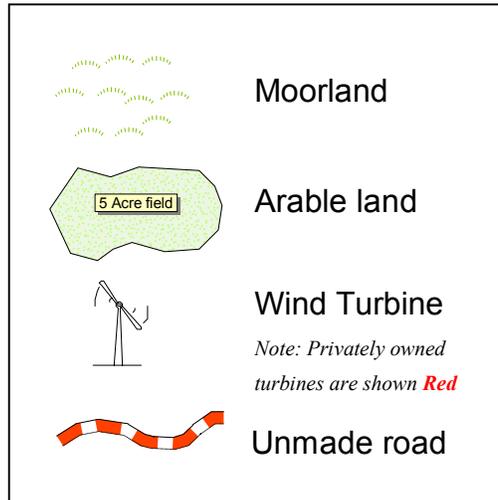
Once you have designed the map frame, add any other items on the page such as text boxes, titles and logos using the map furniture facility. When you come to save the page, using **File – Save project**, it will be saved to the template library.



## 11.5 Creating custom legends and title panels

The page template mode can also be used to create customised legends and title panels as well as map sheets.

To create a custom legend, go to **File – Page templates – New template**. In this case, the sheet size will refer to the size of the panel you plan to draw, for example, 100mms x 100ms (4" x 4"). Use the Map Maker drawing tools to create the items to appear in the legend. The **Text** tool or **Map furniture** tool are used to create the captions.



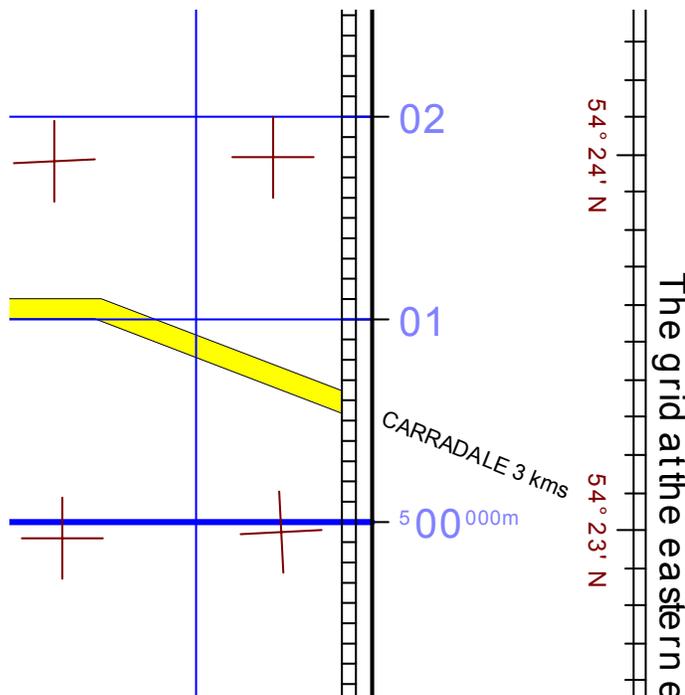
In **Page** mode map furniture – as well as text objects - change size as you zoom in and out. This means that both map furniture and text objects can easily be included in your sheet and panel templates.

Map furniture has the advantage of being able to use **Rich text panel** to create more elaborate captions. In this illustration, the wind turbine caption was created using the map furniture facility, while the other three captions are text objects.

When you have made the legend, or title panel, select **File – Save screen image – As Enhanced metafile**. Because you are in page mode, the image saved will be of the page (or panel) rather than the actual screen image. The new enhanced metafile (\*.emf) can be used as a piece of map furniture or included in a template.

## 11.6 Adding marginalia

Sometimes there is a need to annotate the margins to indicate elements that go off the edge of map, such as roads or district boundaries. Create your map then go to **File – Print**, choose which form of printing you want (Quick print, template etc.), click on Print and then in the final Print window click on the button labelled **“Print” to enhanced metafile** to create an EMF image of the finished page. Then use **File – Clear**, followed by **File – Add layer**. Choose Enhanced Metafile as the file type, open the EMF file. You can now use the **Text** tool – or any other drawing tools - to annotate the page.



Save the notes with the map image by going to **File – Save screen image – As Enhanced metafile**. You can give the file the same name as the original metafile or define a new name. To print the file go to **Utilities – Print Enhanced Metafile (\*.emf)**.

## 11.7 Printing elsewhere

By distinguishing between the map sheet size and the physical size of the paper, you can create a larger map than your printer can handle and send the map as a file to a large format printer. When your map is finished, go to the Print dialogue box and click on the **“Print” to Enhanced Metafile** button. The image of the printed sheet will be saved as an EMF file. Not all printers have the software to print Enhanced Metafiles. In this case, send a copy of the free utility file **MapPrint.exe** together with your EMF map file. This utility can be found on your Map Maker CD or downloaded from the Map Maker web site.

**Note:** this procedure is for PCs. It does not work with Macintosh computers. If your printing bureau uses Macs, send the page image as a TIF file – use **“Print” to raster file**.

## 12 Import and Export

The **Selection Manager** provides a wide range of actions which can be carried out on the live layer or a selected group of objects within the live layer. However, often rather than working with objects on the screen it is more convenient to carry out actions on files. The **Utilities - Vector utilities** menu provides a range of functions.

### 12.1 Importing files

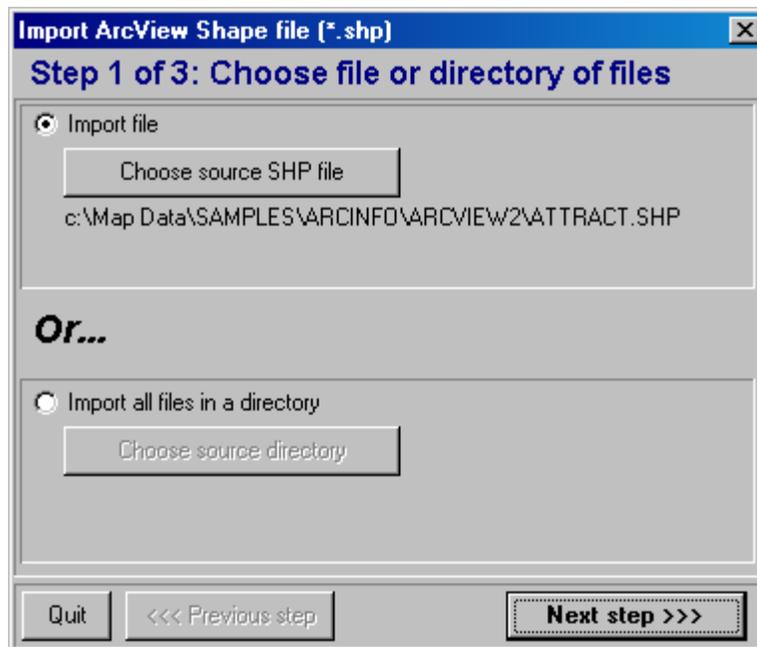
A range of vector file formats can be converted to the Map Maker DRA format. Not all formats can support the same information that is found in other formats.

#### 12.1.1 ArcView Shape format (SHP)

The Shape format (\*.shp) for storing vector data was developed by ESRI. Like DRA files, SHP files are compact and load quickly however they are limited to points, lines and polygons and each file can contain only one type of object. A SHP file contains polygons, or lines, or points. It is not possible to mix object types in a SHP file.

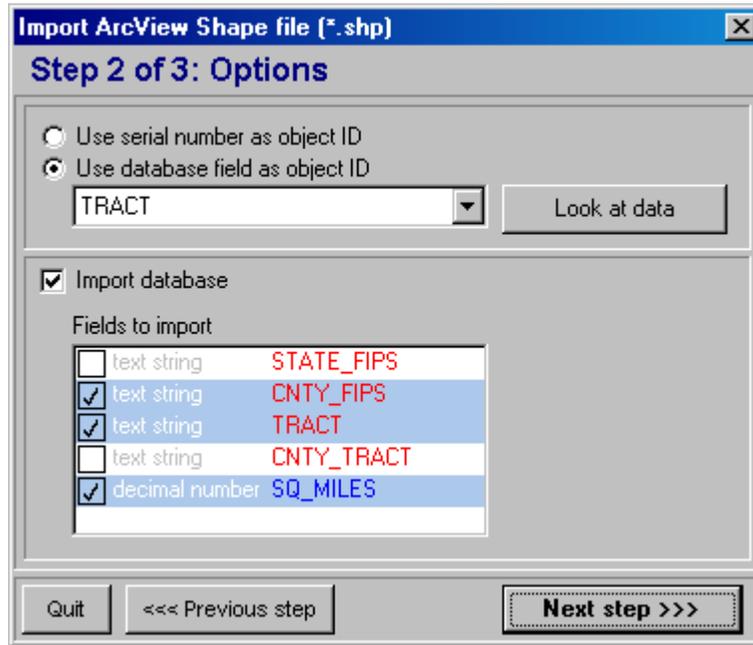
Each shape file should be accompanied by two other files that have the same prefix as the shape file. For instance FIELD.SHP is accompanied by FIELD.SHX (an index file) and FIELD.DBF (a database file containing attribute data). When you import a shape file the dbf file is also imported. For instance if you select FIELD.SHP as your source file and TEST.DRA as the target file then FIELD.DBF will be copied to TEST.DBF.

To import a shape file go to **Utilities – Import files – ArcView shape file**.

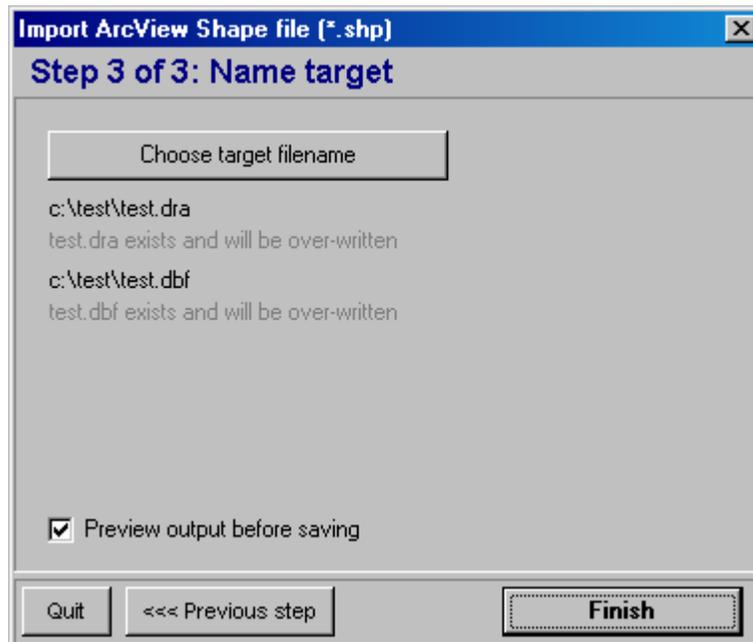


Either choose a single shape file to import or choose a directory from which you want to import all the shape files.

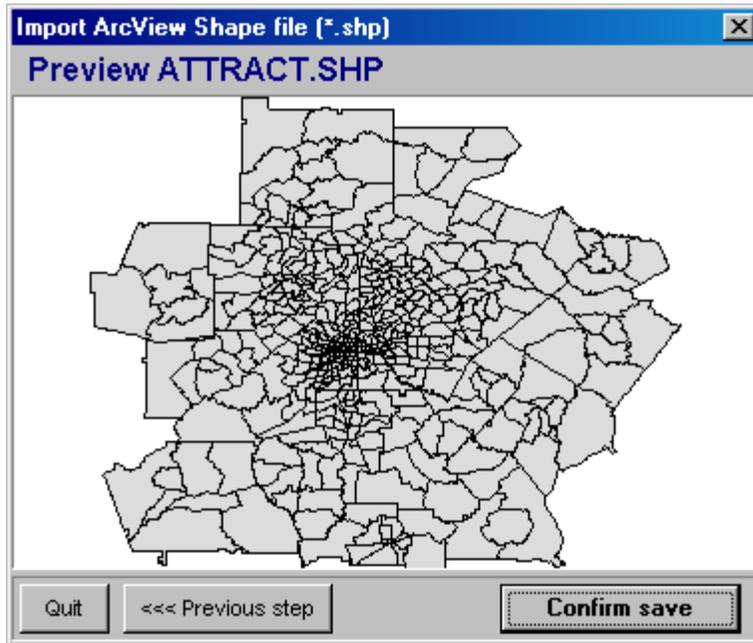
On the Options page you can either choose to generate a simple serial number as the object ID or else choose a field from the shape files database (DBF file). You can also choose whether or not you want to import the DBF file.



When you choose the target filename if you are importing the database the database will be named automatically with the same prefix. Note that if you are importing the database you should avoid using the same file prefix and the same directory as the source shape file, since the target database name will end up being the same as the source database file.



If you tick the **Preview output before saving** box then when you click on Finish the imported file will be previewed before finally being saved to the target file.

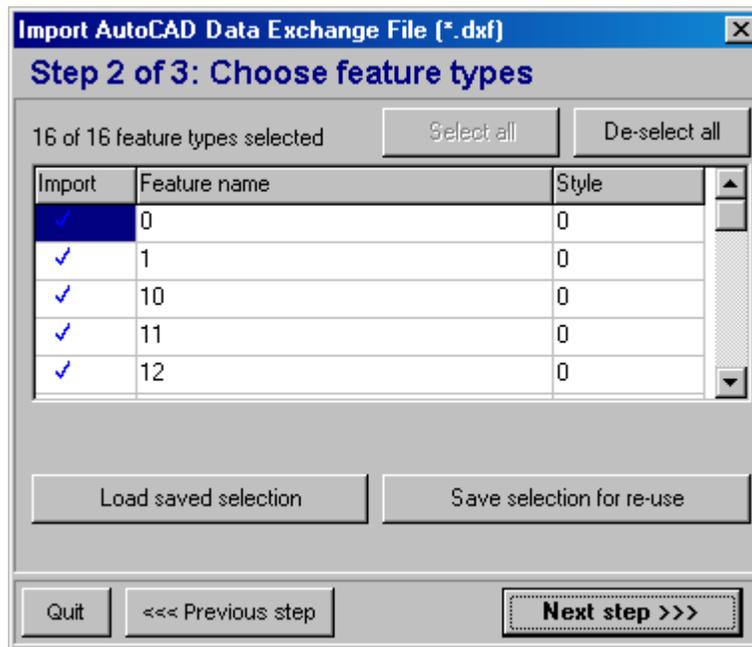


### 12.1.2 Data Exchange Format (DXF)

DXF files were developed by AutoDesk for their popular and widely used AutoCAD program. DXF files are now common to most C.A.D. programs. The DXF format was designed for moving data from one application to another. It is a “transfer” format. As a result, unlike DRA and SHP files, DXF files are large and slow to load. Because they come from an engineering rather than a cartographic background they are not an ideal G.I.S. format.

There are numerous sub-formats of DXF containing codes specific to particular programs. Also because DXF is used for a wide range of engineering applications they support many specialist object types. Map Maker can not read all of these types. Map Maker reads DXF points, polygons, lines, and text objects. In particular, note that DXF “Polyface meshes” are interpreted by Map Maker as simple polylines.

DXF files are organised in “layers”. One DXF file contains one or more layers. When you import a DXF file you have to choose which layers you want to import from those displayed in a dialogue box:



The list of layers will be different depending on the content of your DXF file. The DXF layer name is used as the ID of each object when it is imported into a DRA file.

### 12.1.3 MapInfo Interchange File (MIF)

MIF files store vector data and were developed by MapInfo to exchange data with other programs. Each MIF file is accompanied by a MID file which contains attribute data for the points, lines and polygons in the MIF file. Not all object types found in MIF files are supported by Map Maker. Map Maker reads points, lines, and polygons.

### 12.1.4 Idrisi Vector Export file (VXP)

Like ArcView Shape files, an Idrisi vxp file can only contain one object type: polygon, line or point.

### 12.1.5 Map Maker DRA format

The DRA format is unique to Map Maker. It was developed specifically for general purpose GIS and is the most frequently used format in Map Maker. The DRA format is fast to redraw and can contain a wide range of objects. One DRA file can contain a mixture of polygons, lines, points, text, notes, dimensions, and arrows.

Note that the technical specification for DRA files is contained in [Technical Paper 2 on File formats](#).

### 12.1.6 LOC format

The LOC format, also specially developed for Map Maker, is a simple text file used primarily to display the location of a set of points. A LOC file can be written in any text

editor or generated from a simple program. The data are recorded as comma separated text. The first line is a header and each subsequent line represents the location of one point. A simple LOC file is written as follows:

```
ID, x, y
Point A, 123.452, 435.879
Bridge, 134.789, 421.115
```

Note that LOC files can contain more than this. Full details are in Technical Paper 2 on File formats.

### 12.1.7 Map Maker Export format (MME)

The Map Maker Export format is also an ASCII text file but it can contain a greater range of information than the LOC file. It can also contain attribute data.

Full details of the Map Maker Export format are in Technical Paper 2 on File format

### 12.1.8 Map Maker survey (XY)

The Map Maker format for survey data (\*.xy) is discussed in the chapter on “Real World Data”

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### 12.1.9 ArcInfo Export file (E00)

ESRI's ArcInfo can produce several versions of "Export" files including binary and compressed formats. All of these share the file extension E00. Map Maker only supports uncompressed ASCII export files. E00 files may either contain point objects or else line objects (known by ESRI as "arcs") along with a table that explains how the lines can be assembled into polygons. They may or may not contain a database of attribute data. If there is attribute data and you choose the **Convert attribute data** option then a database with the same prefix as the target DRA file will be created.

### 12.1.10 USGS Digital Line Graph (DLG)

DLG files are public domain data developed by the US Geographical Service downloadable from <ftp://edcftp.cr.usgs.gov/pub/data/dlg/>. These files are provided in a compressed format with a .gz extension. Use a decompression program such as WinZip to unpack the file which will produce a file with .tar extension. Use WinZip again to unpack this.

### 12.1.11 USGS Land Use and Land Cover (GRS)

USGS Land Use and Land Cover files are in a format called GIRAS. They are downloadable from <http://edc.usgs.gov/doc/edchome/ndcdb/ndcdb.html>. The files should have an extension of GRS. For census and political boundary maps all polygons are given the default style. For land-use maps the polygons are given the style and name of their LULC land-use code:

```
1 Urban or Built-Up Land
  11 Residential
```

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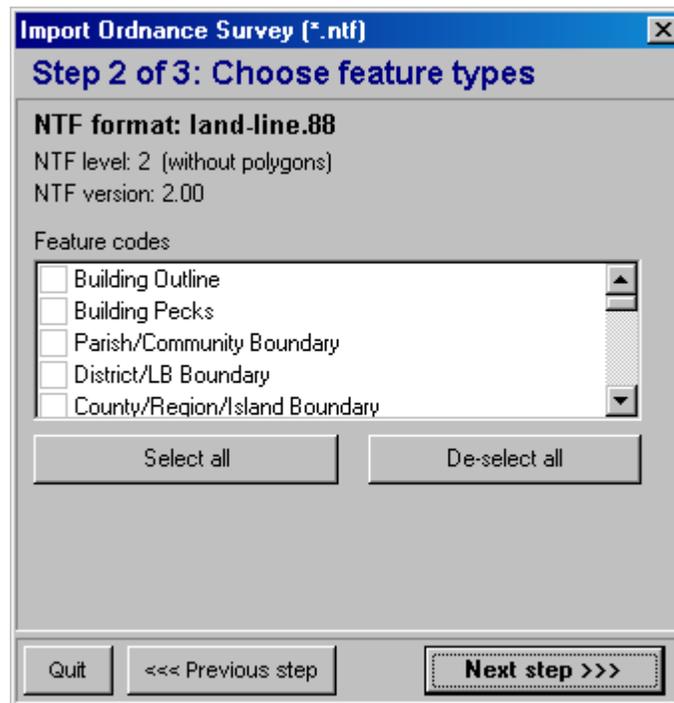
- 12 Commercial Services
- 13 Industrial
- 14 Transportation, Communications
- 15 Industrial and Commercial
- 16 Mixed Urban or Built-Up Land
- 17 Other Urban or Built-Up Land
- 2 Agricultural Land
  - 21 Cropland and Pasture
  - 22 Orchards, Groves, Vineyards, Nurseries
  - 23 Confined Feeding Operations
  - 24 Other Agricultural Land
- 3 Rangeland
  - 31 Herbaceous Rangeland
  - 32 Shrub and Brush Rangeland
  - 33 Mixed Rangeland
- 4 Forest Land
  - 41 Deciduous Forest Land
  - 42 Evergreen Forest Land
  - 43 Mixed Forest Land
- 5 Water
  - 51 Streams and Canals
  - 52 Lakes
  - 53 Reservoirs
  - 54 Bays and Estuaries
- 6 Wetland
  - 61 Forested Wetlands
  - 62 Nonforested Wetlands
- 7 Barren Land
  - 71 Dry Salt Flats
  - 72 Beaches
  - 73 Sandy Areas Other than Beaches
  - 74 Bare Exposed Rock
  - 75 Strip Mines, Quarries, and Gravel Pits
  - 76 Transitional Areas
  - 77 Mixed Barren Land

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- 8 Tundra
  - 81 Shrub and Brush Tundra
  - 82 Herbaceous Tundra
  - 83 Bare Ground
  - 84 Wet Tundra
  - 85 Mixed Tundra
- 9 Perennial Snow and Ice
  - 91 Perennial Snowfields
  - 92 Glaciers

### 12.1.12 Ordnance Survey (NTF)

In the UK the National Transfer Format (NTF) is the format used by the national mapping agency, the Ordnance Survey ( <http://www.ordsvy.gov.uk/> ). NTF is actually a family of related formats each one used for different data products but all sharing the NTF file extension. Some NTF files do not contain vector data but instead contain digital elevation models. When importing NTF data, care needs to be taken to ensure that you are using the correct NTF files. When you import an NTF file a dialogue box is displayed:



The content of the dialogue box depends on the NTF data type contained in the file. Supported NTF vector formats are:

- Land-Line and Land-Line.Plus
- Land-Form Profile contours

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Land-Form Panorama contours

Boundary-Line 2000

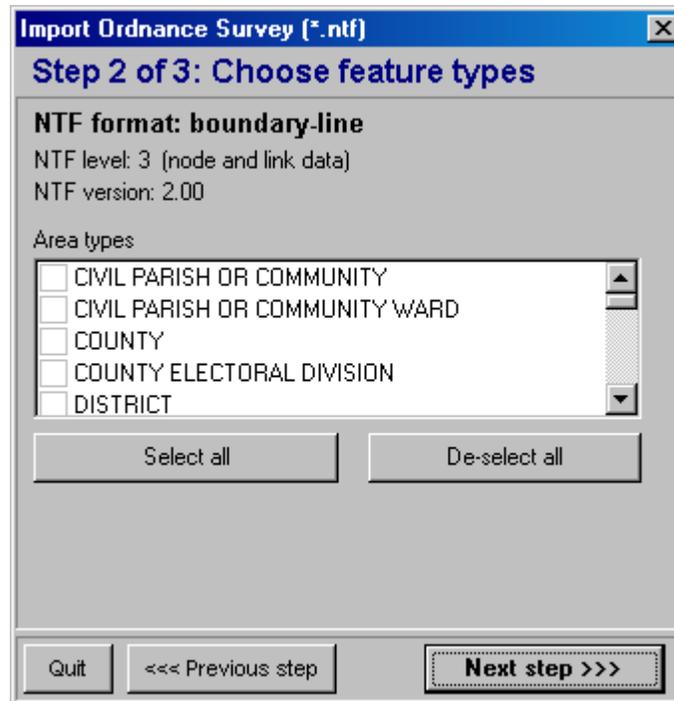
Meridian 2

Address-Point

Code-Point

Oscar Asset Manager

Oscar Traffic Manager



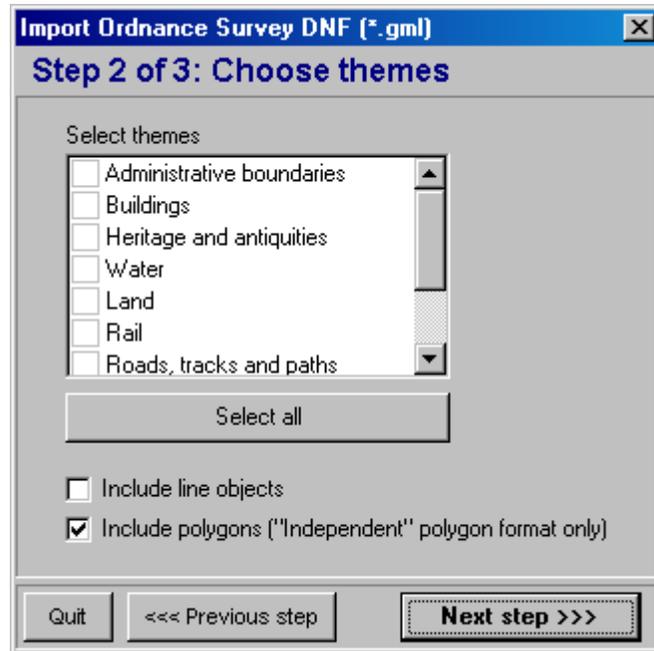
### 12.1.13 Ordnance Survey MasterMap (GML)

The Ordnance Survey MasterMap format uses a variant of the GML format. It is supplied in two versions one with “independent” polygons, the other with “topological” polygons. Map Maker Pro reads the “independent” polygon format. It will read the files containing the “topological” format polygons but the polygons will be ignored so only the lines, points, and text objects will be imported.

The “independent” polygon format files contain both the polygons and the line objects that make up the boundaries of each polygon. You can choose whether you want to import the line objects as well, or instead of, the polygons.

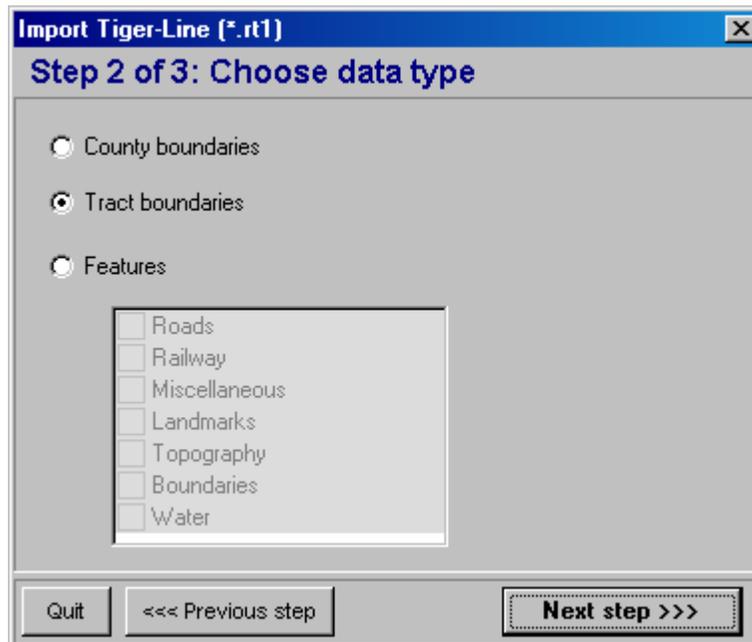
MasterMap files contain data classified by themes. You can choose one or more themes to import. If you choose no themes then Map Maker assumes that you want all of the themes. Every object has a unique identifier (known by Ordnance Survey as a TOIC) which is imported as the object ID in Map Maker. The Ordnance Survey feature code for each object is imported as its style number.

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### 12.1.14 Tiger Line (RT1)

Tiger Line files are produced by the US Bureau of the Census. They contain County boundaries, Census tract boundaries and varies features, such as roads and railways. County and tract boundaries can be imported by Map Maker as polygons with their census code IDs as the polygon ID. They are available from <http://www.census.gov/geo/www/tiger/index.html>.



**PRO  
only****12.1.15 NIMA VMAP0 (Digital Chart of the World)**

For importing VMAP0 data see the chapter on World Map Projections.

**12.1.16 CSV**

A file of comma separated text can be converted into a DRA file, assuming that it has columns containing the X and Y ordinates. The filename must have a CSV extension and every line must contain the same number of entries. After choosing the source file this dialogue screen is displayed:

The screenshot shows a dialog box titled "Import Comma separated variables (\*.csv)" with a close button (X) in the top right corner. The main heading is "Step 2 of 3: Choose columns". Below this, there are several configuration options:

- Column containing the object ID: A
- Column containing the X ordinate: A
- Column indicating direction of X (if any): [assume positive is East]
- Column containing the Y ordinate: A
- Column indicating direction of Y (if any): [assume positive is North]
- Format of X and Y ordinates: Integer or decimal number
- Column containing the display label: [none]
- Column containing the style number: [none]

At the bottom of the dialog, there is a "Preview data" button, a "Quit" button, a "<<< Previous step" button, and a "Next step >>>" button.

If your CSV file contains GPS data the X and Y values may be latitude and longitude values recorded in one of a variety of ways. For instance it is common for values to be a whole number of degrees followed by a decimal number of minutes. 40 and a half degrees may be recorded as 4030.00000 (40 degrees and 30 minutes). You must choose the **Format of X and Y ordinates** that is correct for your data. You can use the **Preview data** button to look at the data to help you determine the correct format.

**12.1.17 DBase file with X and Y (DBF)**

Conventional DBF database files can be used to store point objects. To be recognised as a legitimate vector file by Map Maker the DBF file must contain two columns containing the X and Y ordinates. A window similar to that for CSV files (above) is displayed where you should choose the correct columns.

**12.1.18 Microsoft Access MDB database**

As with DBF files you can import an MDB table if it has columns for the co-ordinates.

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### 12.1.19 Excel spreadsheet

As with DBF files you can import an Excel spreadsheet if it has columns for the coordinates.

Note to import Access or Excel data you need Microsoft ADO, ADOX, and Jet Engine 4.0 installed.

## 12.2 Export files

Remember that in Map Maker information on the appearance of styles is not stored in the vector file but is stored separately in style files. Some vector formats such as MIF and DXF files, contain stylistic information (e.g. line styles). This information is ignored both in import and export.

### 12.2.1 DXF

When a DRA file is exported to a DXF file all the objects are placed in the default DXF layer called "0".

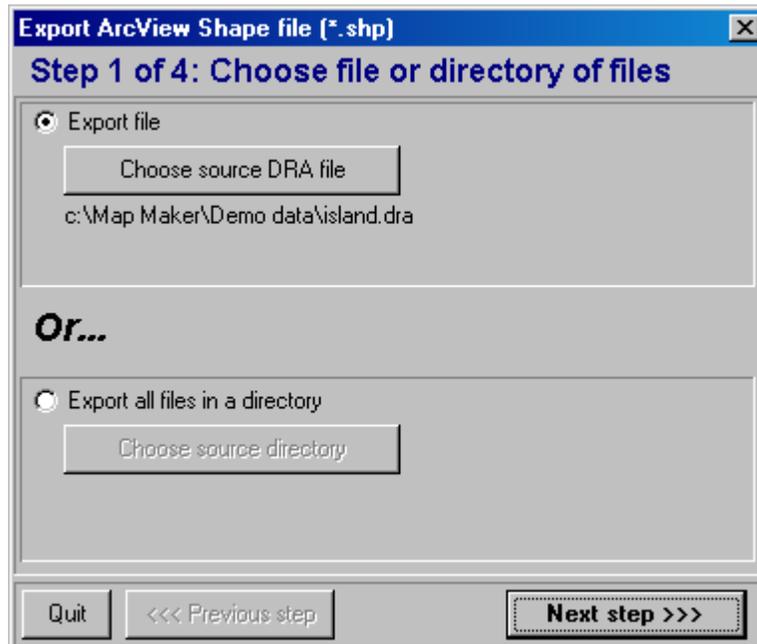
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### 12.2.2 ArcView shape files

To export a DRA file as a SHP file go to **Utilities – Vector utilities – Export files – ArcView Shape file**.

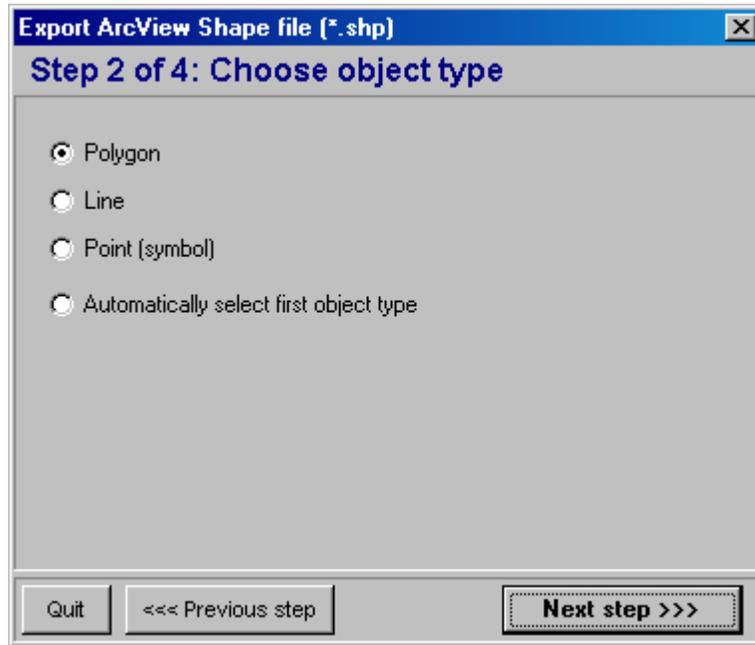
The process involves four steps:

**Step 1:** Either choose a DRA file to export or else choose a directory from which you want to export all of the DRA files. When you have done this click on **Next step**.

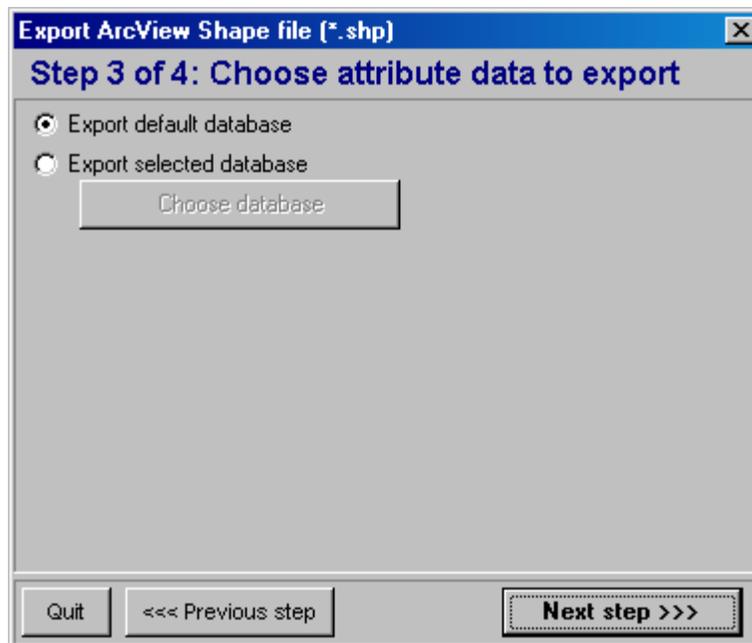


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**Step 2:** Shape files can only contain one object type while a DRA file can contain a mixture of object types so you must choose which type that you want to export. Alternatively you can choose the automatic option which determines the type of the first object in the DRA file and then takes that as the chosen object type.

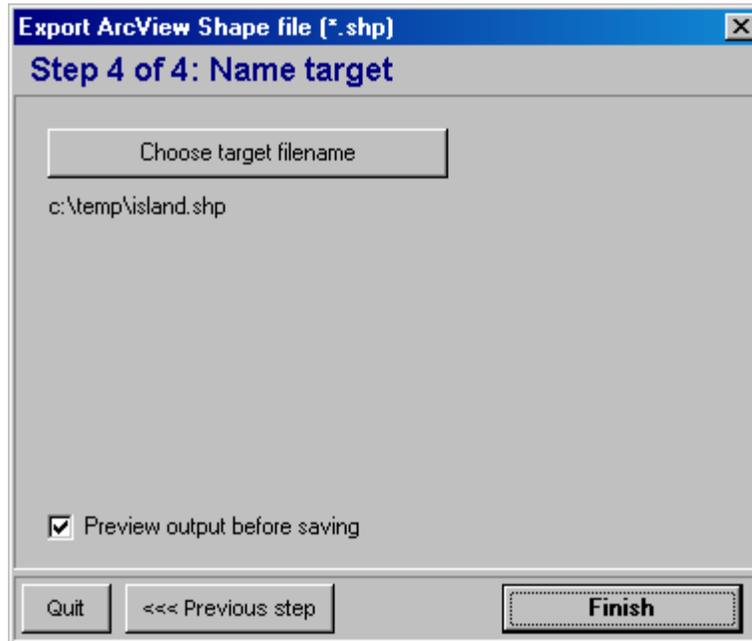


**Step 3:** A Shape file must have a corresponding database. You can either export a “default” database which is a simple database generated for the DRA file with basic information such as the ID and area of each object. Alternatively you can select a database which must include a link column to the object IDs.

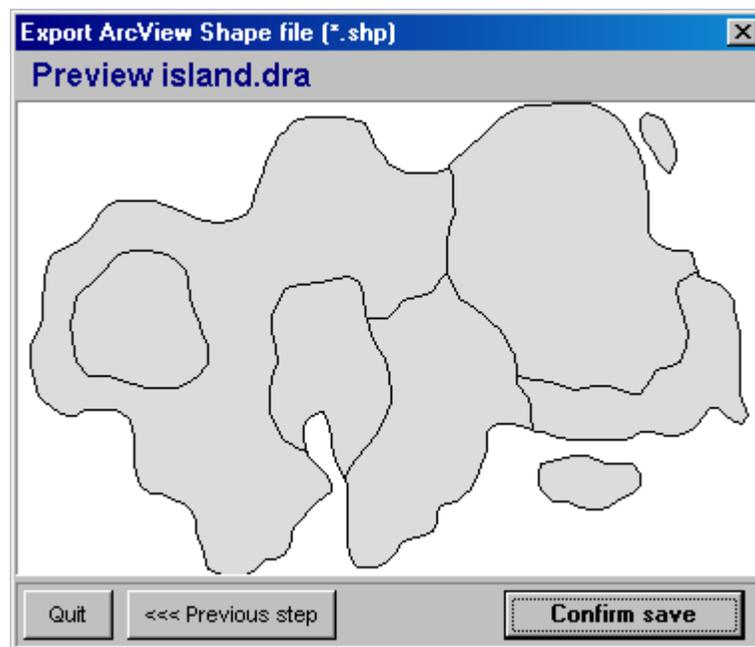


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**Step 4:** Finally choose the name of the new Shape file, or in the case of exporting a directory choose the target directory.



Finally, if you tick the **Preview output before saving** box then when you click on the Finish button you are shown a preview prior to confirming that you want to save the file (this only applies to single file conversion not to converting directories).



### 12.2.3 Idrisi VXP

Like ArcView Shape files, an Idrisi vxp file can only contain one object type: polygon, line or point so when you export to a vxp file you are asked to select which object type.

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### 12.2.4 ArcInfo UNGEN (\*.lin)

Again this format can only contain one object type.

### 12.2.5 Dbase/FoxPro DBF

Only point objects can be exported to a DBF file.

### 12.2.6 MapInfo MIF/MID

The header of a MapInfo MIF file includes details of the map projection and datum. When exporting to MIF, by default this is set to "Nonearth", meaning that it is a simple XY co-ordinate system with no specified co-ordinate system. If you know the co-ordinate system you can specify it with a definition string, for instance:

```
Earth Projection 8,79,"m",-2,49,0.9996012717,400000,-100000
```

is for the UK National Grid. The following is a UTM projection using the WGS84 datum for UTM zone 1:

```
Earth Projection 8,104,"m",-177,0,0.9996,500000,0
```

While for the NAD27 datum for the continental US, using UTM zone 15 which is centred on longitude 87 degrees west it would be:

```
Earth Projection 8,62,"m",-87,0,0.9996,500000,0
```

See the MapInfo MIF/MID documentation for details of more options.

## 12.3 Save screen as vectors

Map Maker Pro offers two additional options when using **File – Save screen image**:

- **Save vector layers as a DRA file.** Clips all the vector objects to the extent of the screen, adds a bounding box then saves the objects to a new file. If the image on screen consists of several vector files this is a way of merging data from all the vector layers into one file.
- **Save vector polygons as a DRA file.** Does the same thing but it carries out an additional step of making polygons of all the spaces enclosed by the vector lines. For instance you might have an Ordnance Survey Land-Line map which contains no polygons just lines and point. This procedure can be used to make an extract of the map and create non-overlapping polygons of all the building, gardens, roads, etc.

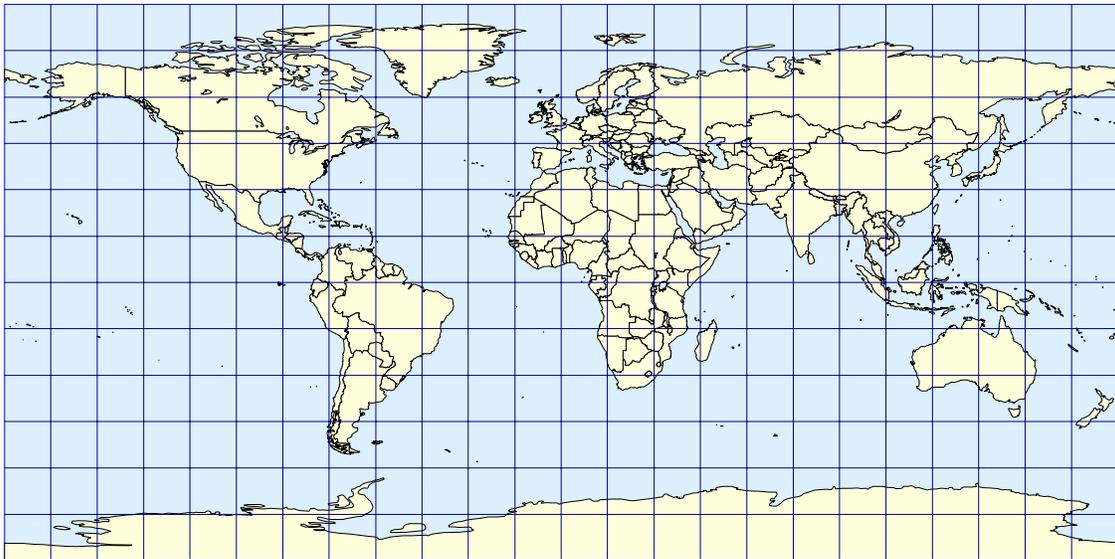
The same two functions are also available under **Tools – Make extract** which allows you to select part of the screen.

## 13 Projections, datums, and GPS

### 13.1 Getting from Latitude and Longitude to X and Y

Any point that appears on a map has, like a point on a graph, an X and a Y ordinate. On maps these are also commonly known as Eastings and Northings. The values describe how far the point is east and north of a point of origin. A point to the west of the origin has a negative X ordinate (Easting), a point to the south has a negative Y ordinate (Northing). These X and Y ordinates are on a square grid, like graph paper – one unit in the X direction is the same size as one unit in the Y direction. This simple system is all that most map users in the past required. However, with the advent of low-cost GPS (Global Positioning System) there is a greater need for map users to understand the relationship between XY co-ordinates and latitude and longitude.

X and Y values describe a location on a flat plane – necessarily a flat plane only approximates the curved surface of the earth. Putting aside for the moment the question of altitude, the location of any point on the globe can be described by a latitude and a longitude. The latitude and longitude grid is not a square grid. Only on the equator is one unit of latitude measured on the ground the same length as one unit of longitude. Elsewhere one degree of latitude is larger than a degree of longitude. In Oslo, for example, at the latitude of 60 degrees north, one unit of latitude is double the length of one unit of longitude. If you plot the world on a square grid (one degree of latitude is drawn equal to one degree of longitude) the resulting map flattens and distorts the countries at a distance from the equator.



Map projections are about establishing the relationship between XY co-ordinates on a map and values of latitude and longitude on the globe.

There is no single magic formula for doing this for two reasons.

- **The map projection system.** The flat plane with its origin for its XY values is purely arbitrary. There are many different ways to represent a curved surface on a flat plane and these methods are called map projection systems.

- **The “datum”**. Latitude and longitude is an internationally agreed system with a constant 360 degrees of longitude, and 180 degrees of latitude. But this consistency is deceptive. The process of measuring the exact size and shape of the earth and agreeing on the precise position of the centre of the earth, its axis, and the location of the zero meridian (zero line of longitude) has gone on for centuries and is still evolving. We have not yet arrived at a universally accepted definition of latitude and longitude *values*. The latitude and longitude values used in the creation of historic maps and long established National Grids usually differ from the values we use today. Geographers and cartographers have imposed their definitions of the earth’s shape and the latitude and longitude system. Such a definition is known as a “datum”.

To determine the XY co-ordinates on a map for a given latitude and longitude requires a knowledge of both the datum used and the map projection system.

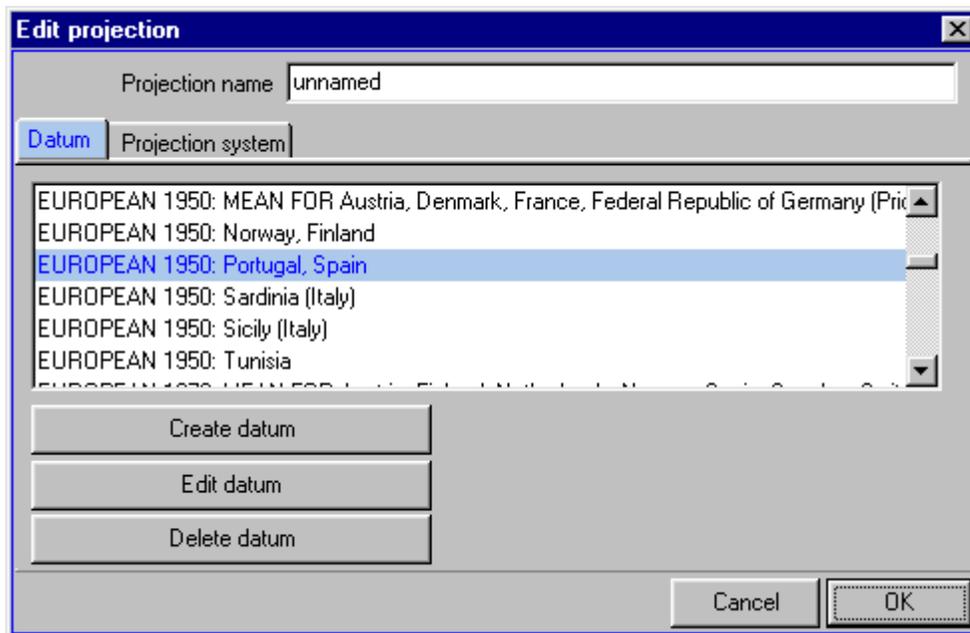
Map projections can be divided into those used for maps of the world - or large parts of the world - and those used for "local" mapping. We include in local mapping the types of maps generally produced by national mapping agencies.

### 13.2 Creating a local map projection

The datum known as WGS84 is the system of latitude and longitude used by the global positioning system (GPS). In Map Maker, to convert WGS84 co-ordinates into a local map projection, first create a “projection”. Here the term “projection” is used to encapsulate both the datum and the map projection system.

To create a projection, go to **Utilities – Latitude and longitude utilities – Create projection**. First you must give a name to the projection. Later, when you come to convert your GPS data into a map, you will use this name to select the projection you will use for the conversion.

Go first to the **Datum** page of the dialogue box.



### 13.2.1 Datums

The earth can be described as a slightly flattened sphere – or an ellipsoid. The height of the earth from pole to pole is about 0.3% less than its diameter at the equator. Over the years there have been many different attempts to define the size of the earth in terms of its radius at the equator and the extent to which the sphere has been flattened. Today about twenty different definitions of the earth’s ellipsoid are in use. While it is convenient to think of the world as an ellipsoid, in practice - even if we ignore mountains and valleys - the underlying shape of the world undulates. Many ellipsoids, were defined to make the best sense of a given locality - typically a particular country. To achieve the best fit, the centre of the ellipsoid is often offset from the “real” centre of the earth. Using different offsets and slight rotations to achieve the best fit, the same ellipsoid can be used in different parts of the world. So while there 20 or more ellipsoid shapes, more than 200 different combinations of ellipsoid shape and ellipsoid position are in common use.

In more recent times people have promoted datums that can be used all over the world. The WGS84 is one used by the GPS satellites and is the most important of these “geo-centric” datums. Data from a GPS receiver must be converted from WGS84 into the locally used datum. Then it must be converted from the modified latitude and longitude values of the locally used datum into the locally used map projection system.

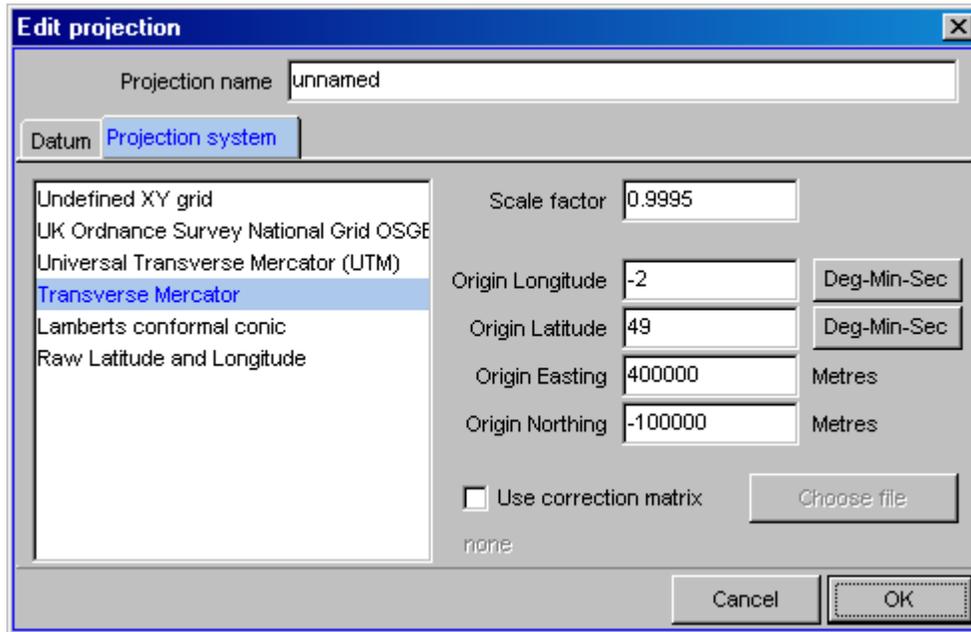
Map Maker comes with a database of over 200 datums. This should be sufficient for most purposes. More advanced users can create their own datum by clicking on the **Create datum** button.

There are two options available for the transformation from WGS84 to a local datum; either the standard Molodenski transformation or, if you have the data, the seven-parameter Helbert transformation which gives more precise results. To learn how to use the system consult one of the standard reference works such as “Datums and Map Projection”, by J. C. Iliffe, Whittles Publishing, 2000.

*Note that choosing the correct datum from the database will not guarantee a precise conversion from WGS84 to the local system* – it is not an exact mathematical formula, it is simply a better approximation. Your national cartographic institution may be able to give you more precise conversion parameters for your particular area of interest but – even so - they will not be exact. Many GPS devices have built in converters to display your location in local grid co-ordinates. These conversions may not be accurate to more than 10 metres. For the most precise results see the section on correction matrices below.

### 13.2.2 Local map projection systems

Return to the **Projections** page of the **Edit projection** dialogue box. In Map Maker there are two broad categories of projection system used for local mapping: Transverse Mercator projections and Conic projections. The projections systems on this page are variations on these two basic types.



### 13.2.3 Transverse Mercator projections

The Transverse Mercator projection is by far the most common projection used for local mapping. At its simplest, the regular Mercator projection can be thought of as a cylinder that has been wrapped around a glass globe. The axis of the cylinder is parallel to the axis of the globe and touches the globe at its equator. A light bulb in the centre of the globe casts the shadows of the lines of latitude and longitude onto the cylinder where they are recorded and then the cylinder unwrapped as a flat sheet. Areas near the equator are well represented but as you move up or down the cylinder, further away from the equator, the dimensions of the map become more and more distorted.

The Transverse Mercator projection is similar to the regular Mercator but the cylinder is turned through 90 degrees so that – instead of touching the equator – one half of it touches a line of longitude starting at one pole and ending at the other. Features near the central line of longitude (or central meridian) are accurately represented but as you move east or west away from the “central meridian” the map becomes more distorted. If you get too far away from the central meridian you will need to stop and start again with a new version of the Transverse Mercator projection centred on a different line of longitude. As a rule, it is considered acceptable to use a Transverse Mercator projection for a band of longitudes six degrees wide – in other words - plus or minus 3 degrees on each side of the central meridian.

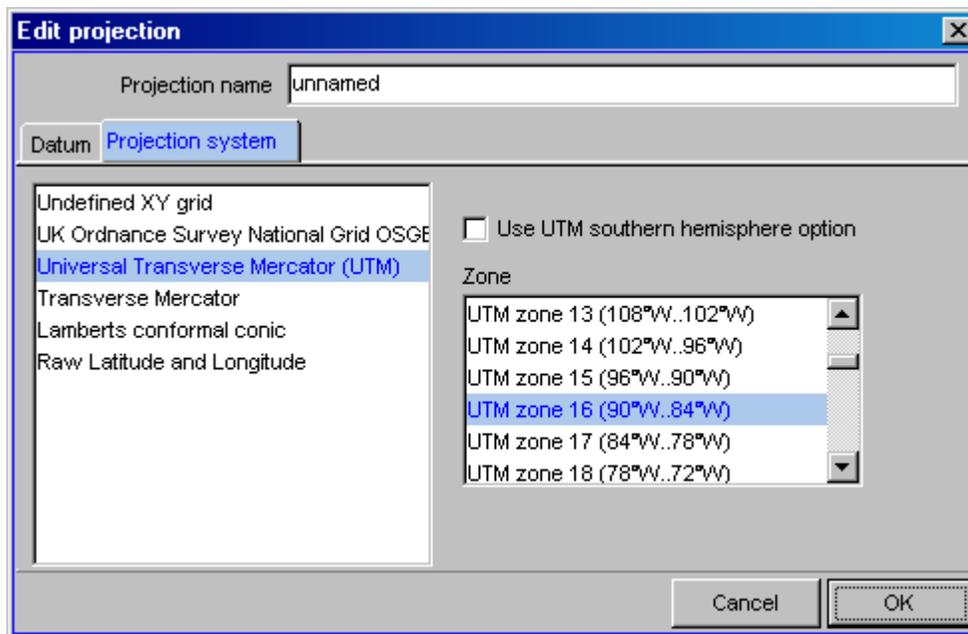
In order that the projected latitude and longitude positions can be converted to XY coordinates you need to define an origin - a latitude and longitude point where X and Y both are defined as equal to zero. In practice it is more common to define a so-called “false

origin” - a latitude and longitude point where X and Y are both defined to have a value other than zero. This practice ensures that for all practical uses the X and Y values will be positive thereby avoiding confusions that can arise with negative values.

The final item to complete the definition of a Transverse Mercator projection is a “scale factor”. This is a device to spread the distortions. Instead of having the map precise along the central meridian with increasing distortions to east and west, the scaling factor is applied to slightly decrease the size of features along the central meridian. As you move east or west away from the meridian you pass through an area where the dimensions are correct and further still the dimensions are increasingly distorted but less than they would be if the scaling factor were not applied.

### 13.2.4 Universal Transverse Mercator projection

The Universal Transverse Mercator projection (U.T.M.) is not really one projection but a family of sixty projections. Each one has been designed for a six degree longitudinal strip of the globe. Zone 1 is centred on longitude 177 degrees west and so it spans from 180 degrees west to 174 degrees west. Each strip – or zone – of the U.T.M has a similarly defined false origin and the same scale factor. When you use the UTM you do not need to worry about these issues. Simply choose the correct zone for your location.



The one complicating factor of UTM concerns the origin used for the Y ordinates. When mapping areas in the northern hemisphere, the equator – by convention – is given a Y ordinate of zero. When producing maps for the southern hemisphere the equator is defined to have a Y ordinate of 10,000 km in order to avoid negative Y ordinates. If you are mapping an area spanning the equator you must choose whether to use the northern hemisphere convention or choosing the southern hemisphere option.

### 13.2.5 Ordnance Survey National Grid

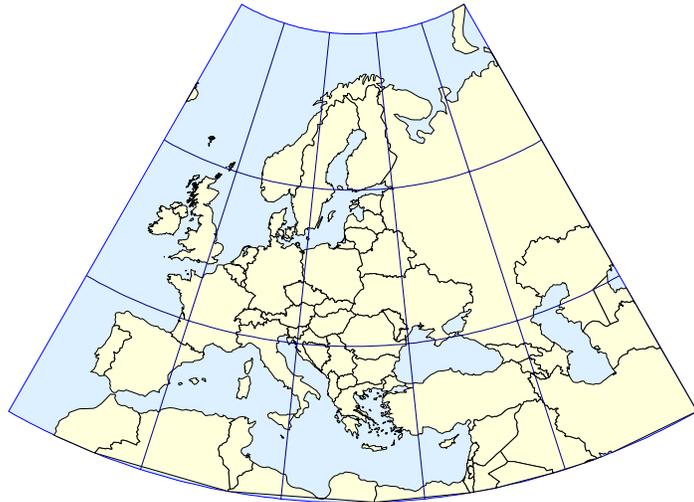
The Ordnance Survey National Grid used in England, Scotland, and Wales is another example of a Transverse Mercator projection. If you choose the UK Ordnance Survey National Grid option then the correct datum, false origin, and scale factor are given. In

addition, the conversion process applies correction factors to give a 2 metre accuracy across Britain. If you have the file `osmatrix.mtx` installed, the accuracy of the conversion improves to a typical value of 3cm.

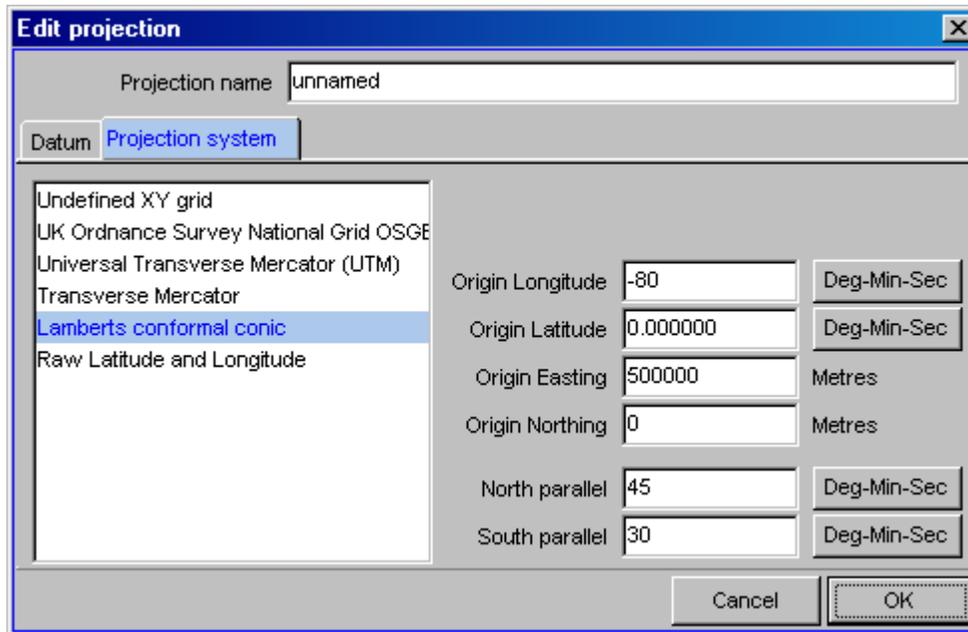
The `osmatrix.mtx` file comes as part of Map Maker Pro.

### 13.2.6 Conic projection

The accuracy of the Transverse Mercator projection is restricted to a limited range of longitude. It is not always possible to map large countries or provinces accurately with a single Transverse Mercator projection. In the case of areas of the globe at some distance from the equator a conic projection is a better alternative. Conic projections are useful for areas of Canada, the USA, and former Soviet states that span a large longitude.



Instead of imagining a cylinder around a glass globe, think of a cone with its point above the north or south pole. The cone touches the globe along one line of latitude. The lines of latitude and longitude are projected out from the earth's centre onto the cone. The cone can then be unwrapped as a flat sheet. As with the Transverse Mercator projection the scale is correct along the line of contact with the globe and the distortion grows as one travels away from that line of contact. In this case the line of contact is a line of latitude rather than longitude. As an alternative to the scale factor to spread the distortion, a mechanism is used to effectively shrink the cone slightly. This means that the cone no longer touches the globe along one line of latitude – it cuts through the globe at two lines of latitude. These two lines are the “**North parallel**” and the “**South parallel**” and the scale is correct along these two latitudes.



Again the latitude and longitude of a false origin must be defined and its **Easting** and **Northing** entered in the dialogue box.

### 13.2.7 Correction matrices

A datum and projection system can be used to convert WGS84 data to a local projection but only to a limited degree of accuracy. The degree of accuracy depends on many factors including the inescapable fact that the historic projection systems on which all world mapping is based, have in built errors. These systems were calibrated using the best data available at the time which later technology has refined. Physical factors also play their part. In some parts of the world continental drift can move the geography by 10 metres in one century. The accuracy of the conversion of WGS84 data to a local projection improved if data concerning errors and geographic shifts in the projection are taken into account.

Map Maker provides a mechanism for advanced users to utilise this data where it is available. This is described in a separate technical paper on “Correction matrices”.

### 13.3 Using G.P.S.

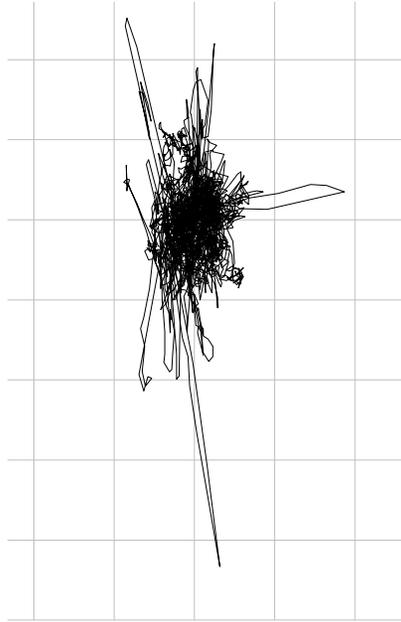
A basic knowledge of projections and datums has become more important with the widespread use of the Global Positioning System (GPS). If you are uncertain about these themes read first half of this chapter. In 2000 the US government turned off the “selective availability” which had made GPS readings vary by 100m or more. This does not mean that GPS readings are now steady and accurate. If you place a GPS receiver in a fixed position and monitor the readings you will find that the readings are constantly wandering. A recent book on datum systems<sup>1</sup> points out that:

<sup>1</sup> Datums and Map Projections: (2000:p37) J.C.Iliffe, Whittles Publishing

*“It can be seen that the accuracy is almost entirely dependent on factors external to the receiver: any difference in price between different models is therefore explained by the functionality of the equipment, such as the storing of data, the use of digital map displays, and so on”*

This means that low-cost handheld GPS receivers are pretty much as accurate as the expensive models. The differences come in what data the manufacturers allow you to extract and in the use of “Differential” GPS (DGPS).

*This illustration shows the variation of the recorded position of a fixed point over a 24 hour period. The grid is a 10 metre grid (The root mean square error was 5.7 metres).*



The more expensive and elaborate GPS devices use Differential GPS (DGPS) in which radio signals from base stations of precisely known locations give details of the GPS error at that exact moment. The errors are automatically subtracted from the GPS values being recorded. An alternative for people on a tighter budget is “post processing” in which data is recorded in the field and the GPS device records the precise time of each reading. Subsequently, data recorded at the same moment at a known base station can be used to subtract the errors from the data.

## 13.4 Importing GPS data

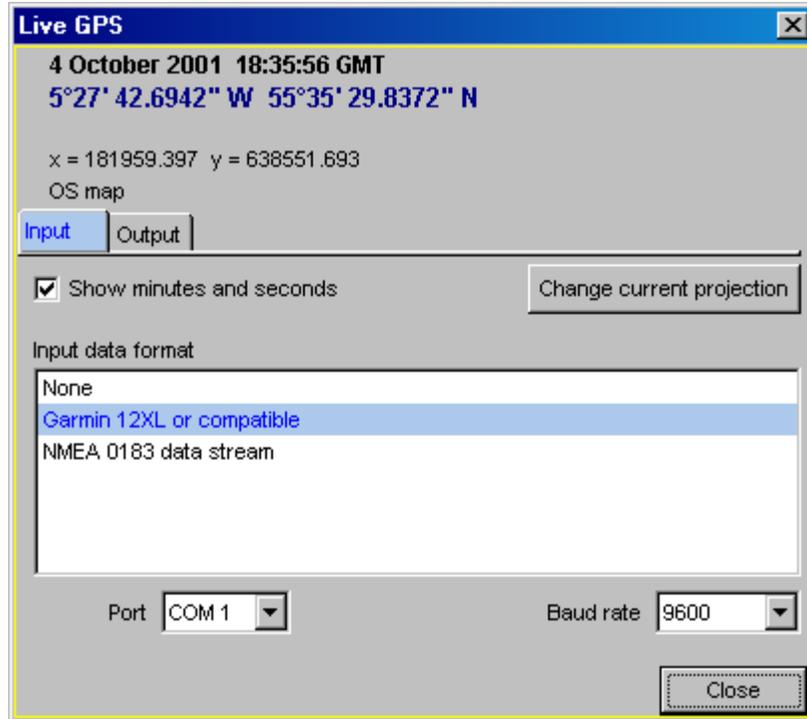
GPS data can be entered into Map Maker in any one of five ways:

### 13.4.1 Live data

If you have Map Maker running on a laptop computer you can enter GPS data directly. You will require a GPS receiver that has a data cable that can be plugged into the serial port (COM port) of your computer. Most GPS devices can produce data in the NMEA format but Map Maker also supports the Garmin format produced by the Garmin 12XL and compatible models.

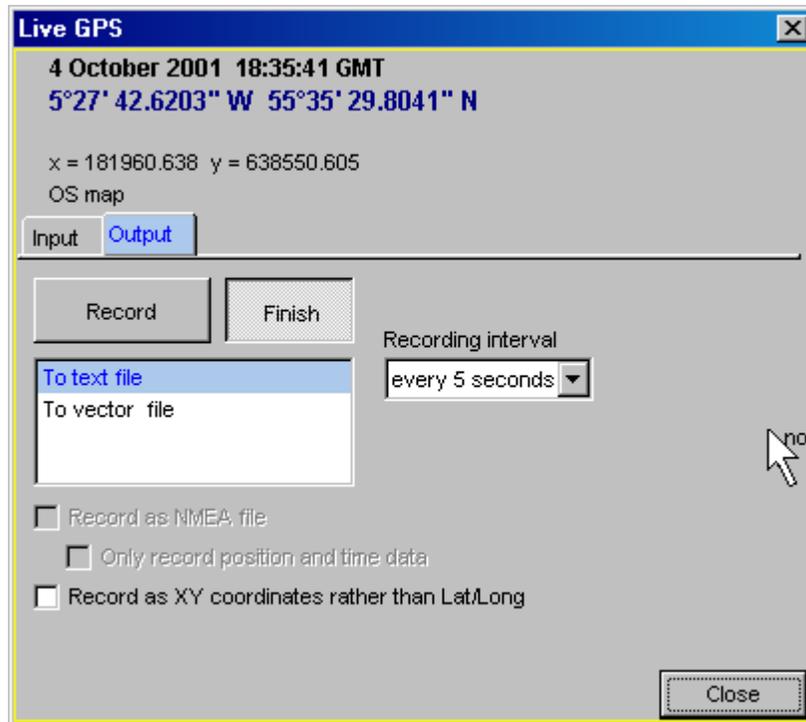
Note that irrespective of how you have your GPS device configured to display data most devices will transmit their data to PCs in the original WGS84 latitude and longitude format.

Go to **Utilities – GPS utilities – Live GPS data**. A floating dialogue box appears:



Ensure that the **Port** and **Baud rate** settings are correct for your device. Choose an **Input data format**.

If you are using a Garmin then we recommend choosing the Garmin format since this will record data to a high precision. NMEA data rounds off the values. The Garmin NMEA data produces latitude and longitude values rounded to the nearest thousandth of a minute which for Latitude translates to about 1.8 metres on the ground. In the Garmin go to the Interface set up page and set the interface mode to “GRMN/GRMN” unless you want the data in NMEA format in which case choose “NMEA/NMEA” and set the version to 2.0.



Assuming that you are picking up a signal, the live date, time, and latitude and longitude values will be displayed at the top of the dialogue box. If you choose a projection (using **Change current projection**) then the XY coordinates will also be shown. The values are updated every second. Once the data is flowing proceed to the **Output** page:

If you chose the NMEA option tick the **Record as NMEA file** box. NMEA data includes a lot of extra information regarding the position of satellites and the like. If you tick the **Only record position and time data** then this extra information is discarded. If you are not using NMEA, select an appropriate **Recording interval**, and choose **To vector file**.

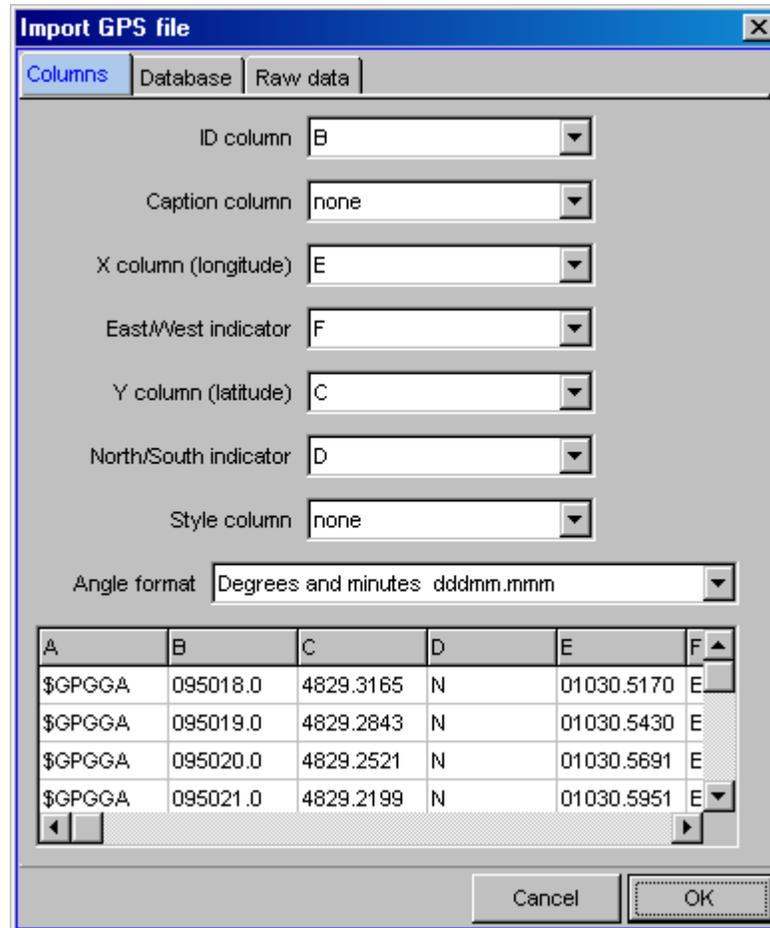
Click on **Record**. When you have finished collecting data click on **Finish** and you will be prompted to name a file for the data.

### 13.4.2 Files

Some GPS devices come with their own data loggers which record the data as a file. This file can be imported into Map Maker by going to **Utilities – GPS utilities – Import data**. The options currently available are NMEA files, Garmin and Magellan waypoint and track files, and Comma or tab separated text. When you import a file, Map Maker asks you if you want to set the captions of the objects to be the date and time of the point. This is necessary if you need to do any post-correction of the data (see below). If you reply **Yes** and your file is an NMEA file then Map Maker will check to see whether the NMEA file contains the date as well as the time, some do, some do not. If not, the program will ask you to specify the date on which the survey was made.

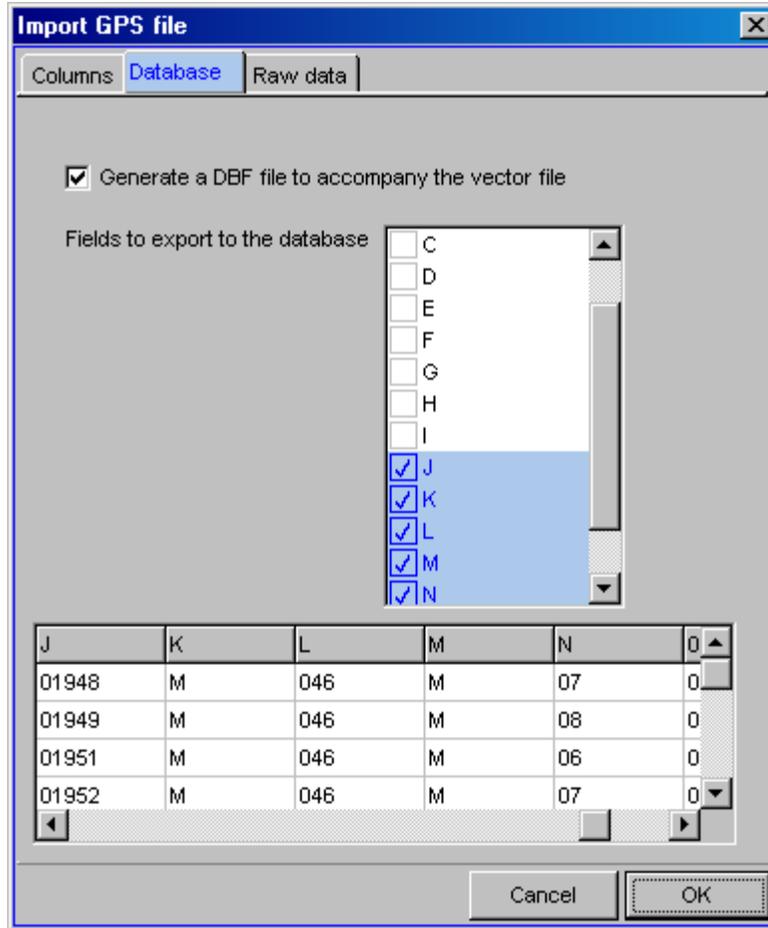
Note that Garmin waypoint data, as produced by the Garmin PCX5 software, use the file extension “wpt”. There are other forms of GPS data that also use the wpt extension. Ensure that the data that you are importing really is a Garmin ASCII wpt file.

Specialist GPS systems, such as agricultural data loggers, generally record their data in text files either in a comma or text separated format. Map Maker allows you to specify how such a text file is interpreted. Go to **Utilities – GPS utilities – Import data – Comma separated text** and choose your data file.



In the lower portion of the dialogue box a sample of the file is displayed. If Map Maker detects a header to the file it labels the columns accordingly otherwise it uses A,B,C etc. These columns can then be selected for the different data items. In this case column C contains the latitude (or Y ordinate) expressed as a whole number of degrees followed by the minutes as a decimal number. For instance the first number in column C is 4829.3165, which means 48 degrees and 39.3165 minutes. This is quite a common format for GPS files. It is also quite common for the latitude column to be followed or preceded by a column containing “N” or “S” signifying north or south. In this case column D has been selected as that containing the **North/South indicator**.

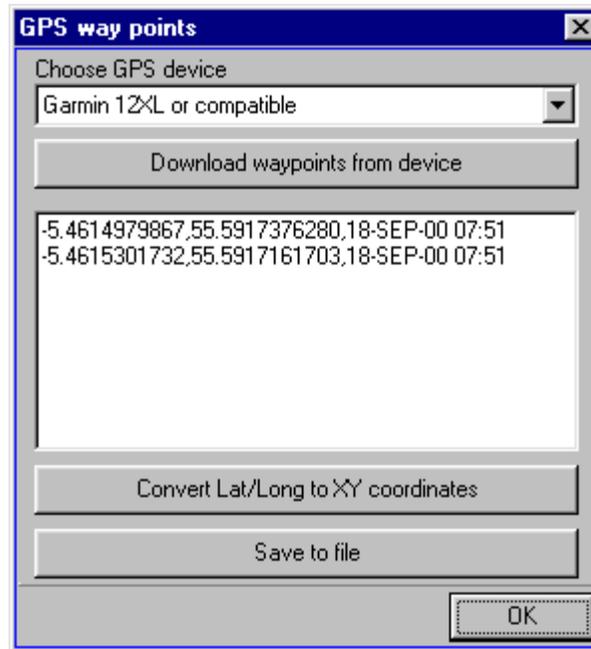
Some GPS files contain no more than the co-ordinates of the points but many others contain additional data. Click on the **Database** page:



If you tick the **Generate a DBF file to accompany the vector file** box then you can select any number of columns from the file to be exported to a DBF file. The column you selected as the ID column on the **Columns** page will be included in the database irrespective of whether you select it again here.

### 13.4.3 Waypoints or Landmarks

A “waypoint” or a “landmark” are what different GPS manufacturers call recorded points. You can go into the field and record a waypoint by clicking a button, Typically a handheld GPS device may record up to 500 waypoints. When you return to your desk plug the device into the serial port. If you are using a Garmin ensure that the interface is set to “GRMN/GRMN”. In Map Maker go to **Utilities – GPS utilities – Import data – Download Waypoints/Landmarks**.



Choose the GPS device then click on **Download waypoints from the device**. This process can take several seconds depending on the number of waypoints stored in the device and the speed of the connection between computer and device. The waypoints are listed in the central box. In this example there are just two points. Each one recorded with its longitude and latitude as decimal degrees (as opposed to degrees, minutes, and seconds). To convert these points to a projection click on **Convert Lat/Long to XY coordinates** where you are asked to pick a projection (see Part 1, chapter 8.2 for details on creating a projection). Finally click on **Save to file**.

#### 13.4.4 Tracks

Most GPS devices also automatically record the “track” taken by the device. This is quite independent of the waypoints. Usually there are many more track points than waypoints. The process of importing the points is the same, just go to **Utilities – GPS utilities – Import data – Tracks**.

Note that an irritating feature of low-cost GPS devices is that they tend not to record the time with the waypoint, even though it is recorded within the device. The lack of an accurate time limits the ability to subsequently correct for the wander in the GPS fix. The Garmin 12XL, by default, uses the date and time as the waypoint label but the time is only accurate to the minute. However, track points do often have the time, accurate to the second, but track points are not so useful for surveying point locations.

#### 13.4.5 Text

For people who are just occasional users of GPS another alternative is entering the GPS value by hand. When in the field set your GPS device to display decimal degrees (i.e. not degrees, minutes, and seconds, nor degrees and decimal minutes). For each point, note down the longitude and the latitude. If the longitude is in the western hemisphere record it as a negative number. If the latitude is in the southern hemisphere record that as negative. Be sure that the datum for the GPS device is set to WGS84. When back at your desk, in

Map Maker go to **Utilities – Text editor**. You will be prompted to name a file, choose **Map Maker Location file (\*.loc)** as the format and enter the name of a new file. In the text editor window that appears enter as the first line: ID,x,y,caption. On subsequent lines enter an ID number (or name) for each point followed by the longitude and the latitude and a description or label. Each item should be separated from the next by a comma. E.g.:

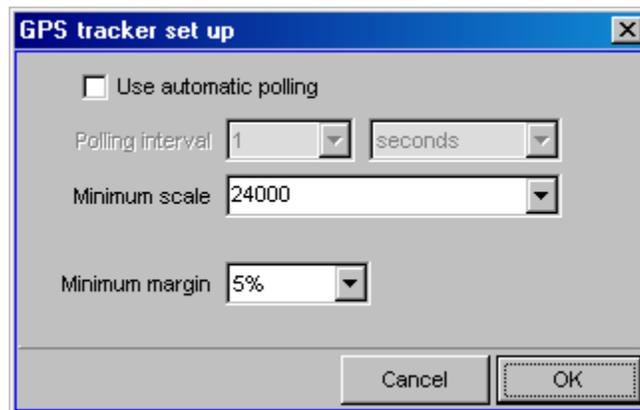
```
id,x,y,caption
A,-5.456323,55.556734,The big tree
B,-5.456411,55.556712,The small bush
```

This LOC file can be converted to a DRA file in a projection using **Utilities – Latitude and Longitude utilities – WGS84 Lat/Long to XY**.

### 13.5 Live tracking

Map Maker can be configured to display the location of one or more moving points. These would typically be vehicles or animals with transmitters linked to GPS devices. For this function to work requires third party software to update the points. Map Maker will show the points as they move and if one or more of the points moves into the margin of the screen then the map is redrawn centred on a new location and, if need be, at a new scale to ensure that all the points remain on screen.

To configure the live tracking go to **Utilities – GPS utilities – Set up tracker**.



In the dialogue box you can specify a minimum scale. This means that as the points move around and the map is being automatically re-centred and re-scaled it will not choose a scale larger than that specified. If you tick the **Use automatic polling** box then at the specified interval Map Maker will look at the data that indicates where the point or points are and refresh the map accordingly. If **Use automatic polling** is not ticked then the third party program needs to tell Map Maker when the map needs updating.

The **Minimum margin** value determines how close any of the points can get to the edge of the screen before Map Maker will automatically redraw the map. If, as in this illustration, the value is 5% then if the x ordinate of a point is within 5% of the width of the screen of the sides of the screen, or the y ordinate is within 5% of the height of the screen of the top or bottom of the screen then the map is redrawn.

Once the GPS tracker has been set up it will not come into action until the **Use tracker** item has been ticked on the **Navigate** menu.

To set the number, location, and attributes of the points to be displayed the third party program makes use of a small Map Maker utility program called **TrackMan.exe**.

The TrackMan program is used by launching it with one or more command line parameters, for instance:

```
TrackMan "command=update,id=vehicle 22,x=123765,y=456987"
```

This command updates the position of the point with the ID of “vehicle 22”. If no such point currently exists then it is added. Similarly, to remove the point with the ID of vehicle 22:

```
TrackMan "command=delete,id=vehicle 22"
```

To tell Map Maker to refresh the screen, if automatic updating is not being used:

```
TrackMan "command=refresh"
```

You can also activate and stop the tracker using TrackMan rather than by the user clicking on **Navigate – User tracker**:

```
TrackMan "command=start"
```

```
TrackMan "command=stop"
```

Each command is enclosed in double quotes. To send several commands at once you can simply send several parameters, each in double quotes and separated by a space. Alternatively you can call TrackMan several times in sequence which will be marginally slower though not a lot since TrackMan is a tiny program.

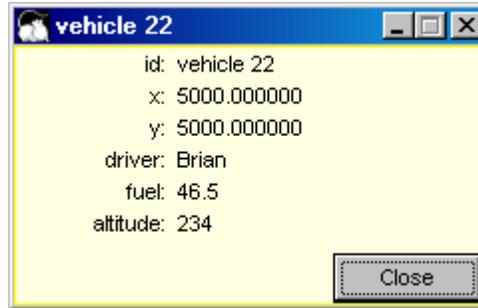
When using the “update” command you can send any additional information:

```
TrackMan "command=update,id=vehicle 22,x=123765,y=456987,caption=Brian, ...
... style=4"
```

By default the GPS point is drawn with its display label equal to its ID, but if you set the “caption” value then that will be used instead. Similarly, the default style is zero but you can set a style here. You can also send application specific data:

```
TrackMan "command=update,id=vehicle 22,x=123765,y=456987,driver=Brian, ...
... fuel=46.5,altitude=234"
```

This additional data is stored with the point and can be viewed by the user selecting the **Data query** tool and clicking on the point. A pop-up window appears displaying the data.



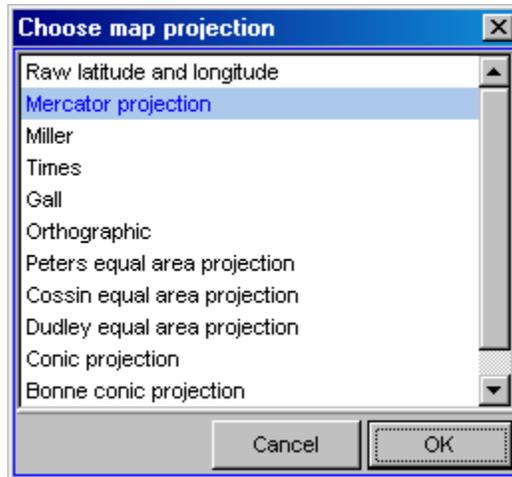
This window is a floating window so it can be left open. As the data is updated the information in the window reflects the update. If you are tracking several points you can have more than one of these windows open at once.

PRO  
only

## 14 World maps

Map projections are about the process of representing the three dimensional surface of our earth onto a two dimensional plane. All map projections involve distortions and compromises. There is no one best projection, they each have advantages and disadvantages.

To create a world map go to **Utilities – Latitude and Longitude utilities – World Map**. A selection of map projections are offered:

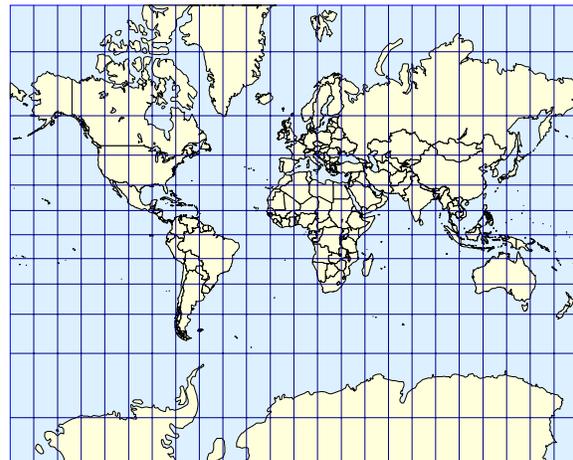


### 14.1 Cylindrical projections

The first four, Mercator, Miller, Times, and Gall are world maps that use “cylindrical projections”. These projections are perhaps the most familiar from atlases:

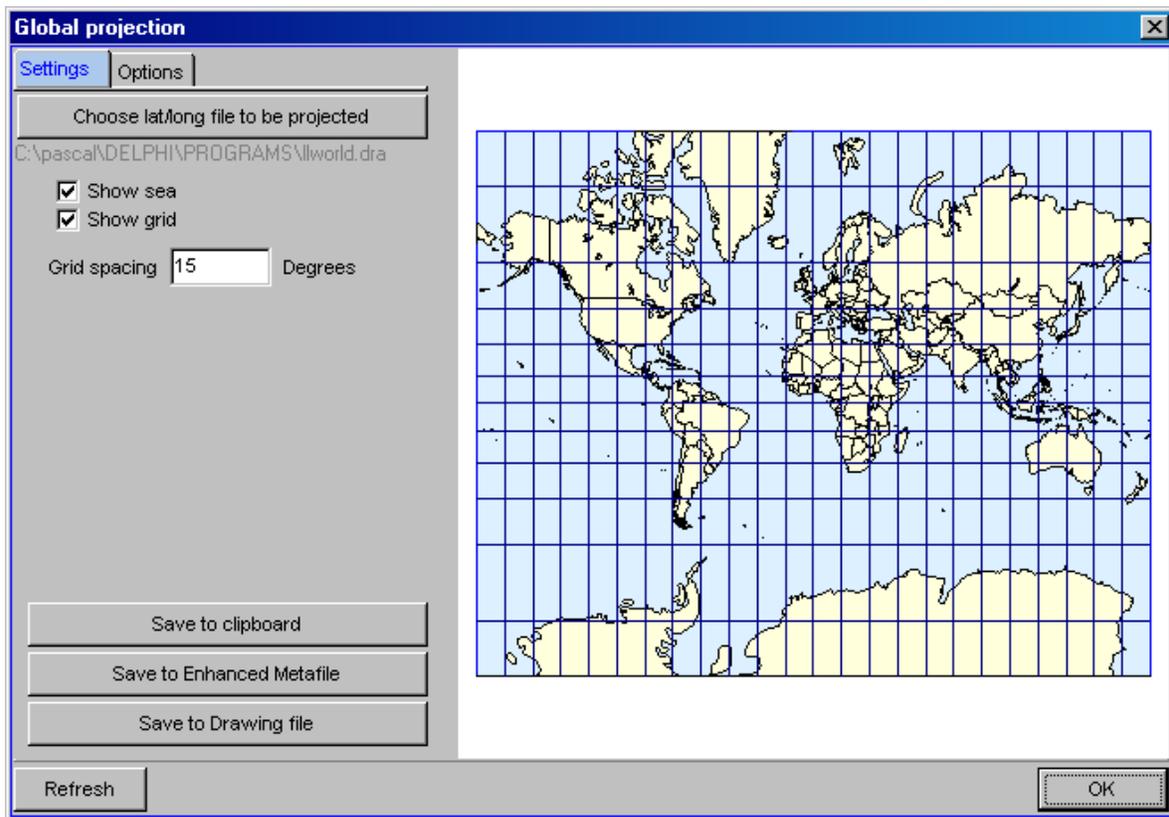
#### 14.1.1 Mercator’s projection

Imagine the earth as a glass globe with a piece of paper wrapped around it to form a cylinder touching the earth along the equator. If there were a light source at the centre of the globe the lines of latitude and longitude, as well as features like the outlines of countries would be “projected” out from the surface of the globe to cast shadows on the paper. If those lines were recorded on the paper then the paper could be unwrapped and the result would be Mercator’s projection of the world. A disadvantage of this system is that the north and south poles cannot be shown on the map and points near the poles, such as Greenland, are heavily distorted.



Select Mercator's projection and click OK.

This window appears:

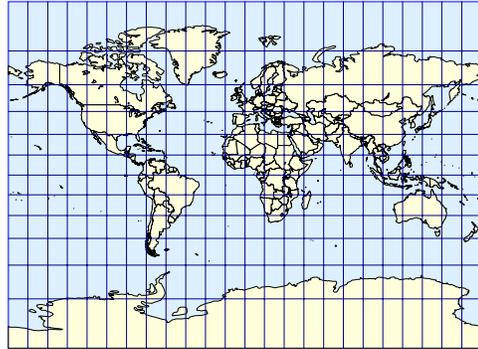


Map Maker Pro comes with a Map Maker DRA file containing outlines of the countries of the world with the co-ordinates in raw latitude and longitude. The file is called Llworld.dra. If you want you can use a different file either of the whole world or of the particular area or theme that you are concerned with. The only requirement is that the data is recorded in terms of latitude and longitude.

The two check boxes, **Show sea** and **Show grid** enable you to create a polygon showing the extent of the projection including the sea areas and to generate a grid of the specified spacing. Having generated the projected map you can use the three **Save to** buttons to save it to the Windows clipboard for immediate use in a document or else to an Enhanced Metafile (\*.emf) or a Map Maker Drawing file (\*.dra). If the latter you can use the DRA files within Map Maker in the normal way to create a multi-layered map. So you might, for instance, create a projected world map then overlay it with a separate projected map of weather systems, or shipping routes.

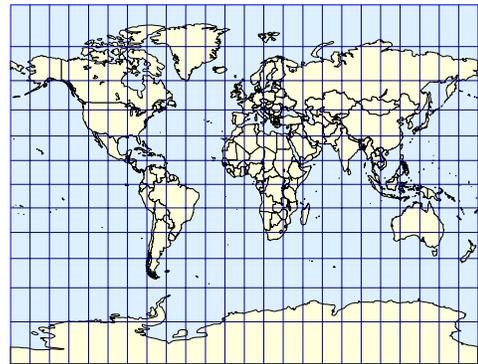
### 14.1.2 Miller's projection

The other cylindrical projections are all based on the same principle as Mercator's projection but they mathematically distort the results to try and compensate for the distortion. Millers projection effectively reduces the spacing of the lines of latitude so that the poles can be shown and the distortion near the poles is reduced.



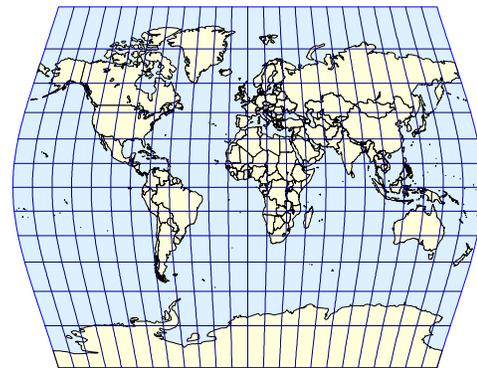
### 14.1.3 Gall's projection

Gall's projection, like the Miller's projection, reduces the distortion near the poles but also creates a distortion in the other direction near the equator. In other words a one degree by one degree cell of latitude and longitude is virtually square at the equator in Miller's projection while in Gall's it is wider than it is tall. The effective of this is to distribute the distortion across the map making the polar distortion less.



### 14.1.4 The Time's projection

The Time's projection takes a rather different approach by shortening the lines of latitude near the poles so creating lines of longitude which are curved.

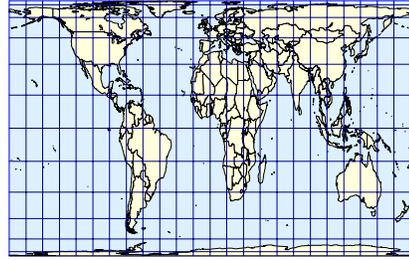


## 14.2 Equal-area projections

While all map projections distort they distort in different ways. The Mercator projection, for instance, distorts areas but at any location on the map the relative size of distances in the latitude and longitude directions is correct, that is to say *shapes* (locally) are correct (such projections are known as *Conformal*). Another group of projections are equal-area projections which distort shapes but show areas at their correct size relative to each other.

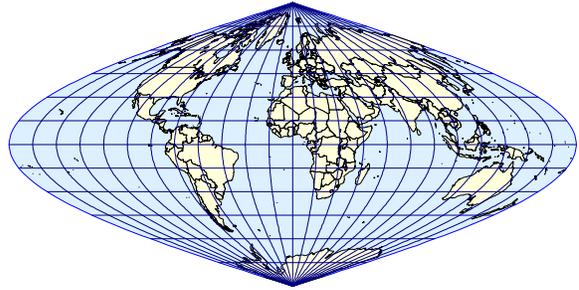
### 14.2.1 The “Peter’s” projection

The most well known of these is the Peter’s projection. It was actually first used by Gall in 1885 but popularised by Peter’s in the 1970’s. It achieves its equal-area characteristic by reducing the distance between latitude lines near the poles.



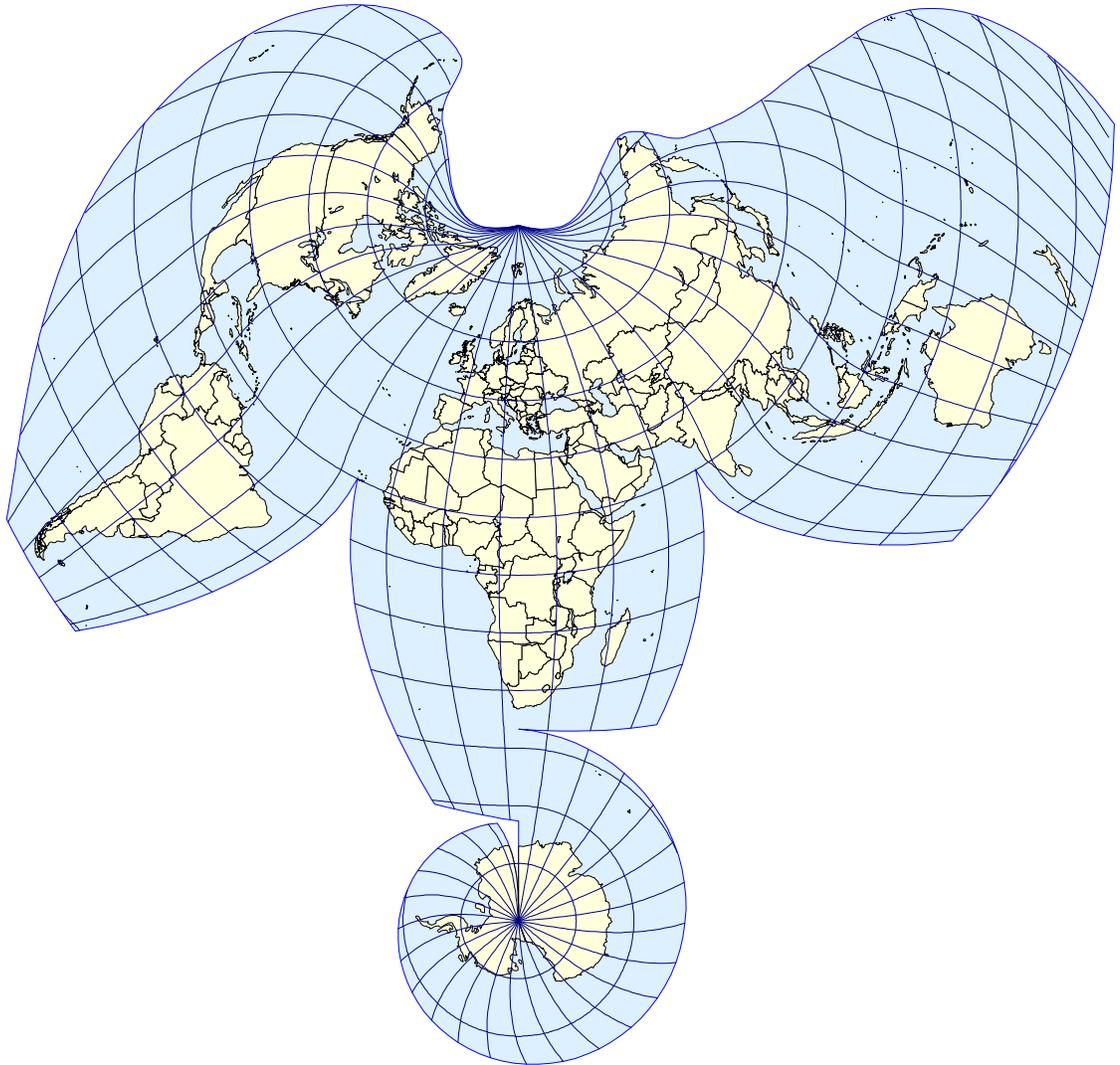
### 14.2.2 Cossin’s projection

Cossin’s is the first equal area projection, dating back to 1570. Like the Time’s projection it shortens lines of latitude as they near the poles reaching nothing at the poles.



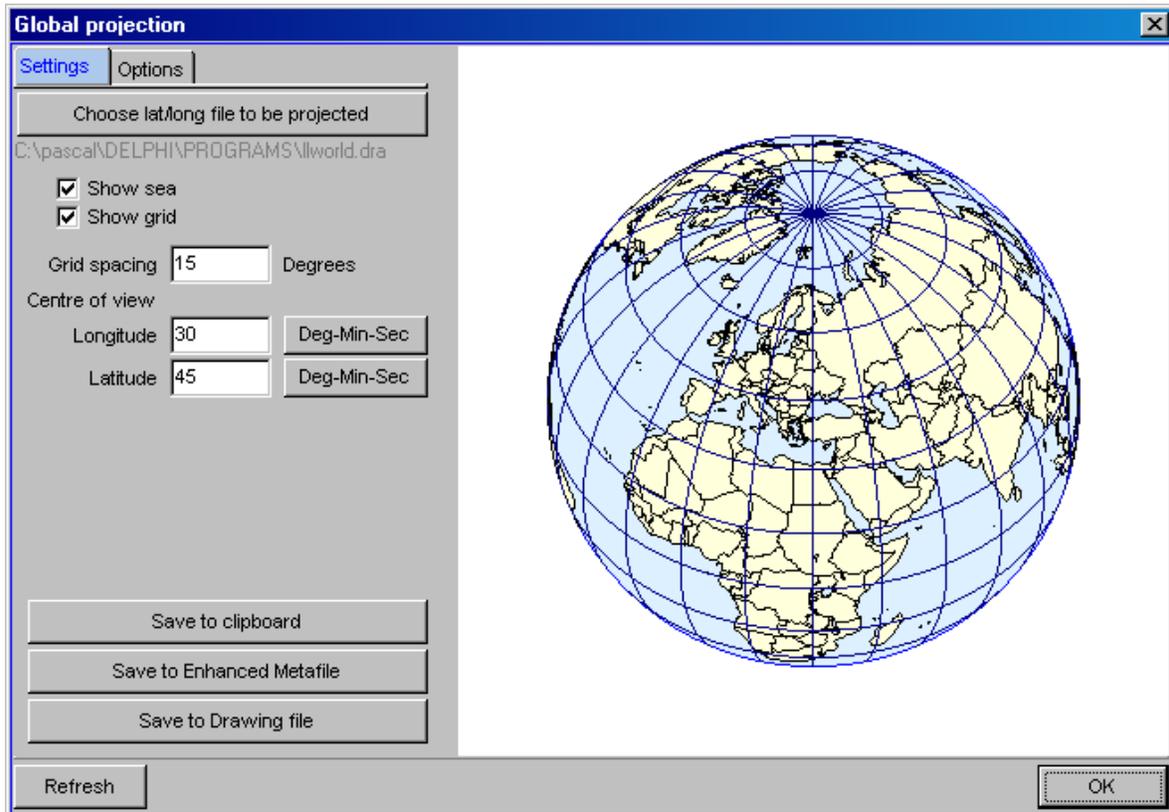
### 14.2.3 Dudley projection

The Dudley projection was developed for Map Maker and takes advantage of the computing power available in today's PCs. The distortion employed varies continuously about the map to create this "orange peel" effect which reduces the shape distortion of the land masses while maintaining true areas.



### 14.2.4 Orthographic projection

An orthographic projection is like a distant view from space. An orthographic view can only see one half of the globe. When you create an orthographic view you must specify the latitude and longitude of the point which you want to be in the centre of the view. After entering these values click on the **Refresh** button.



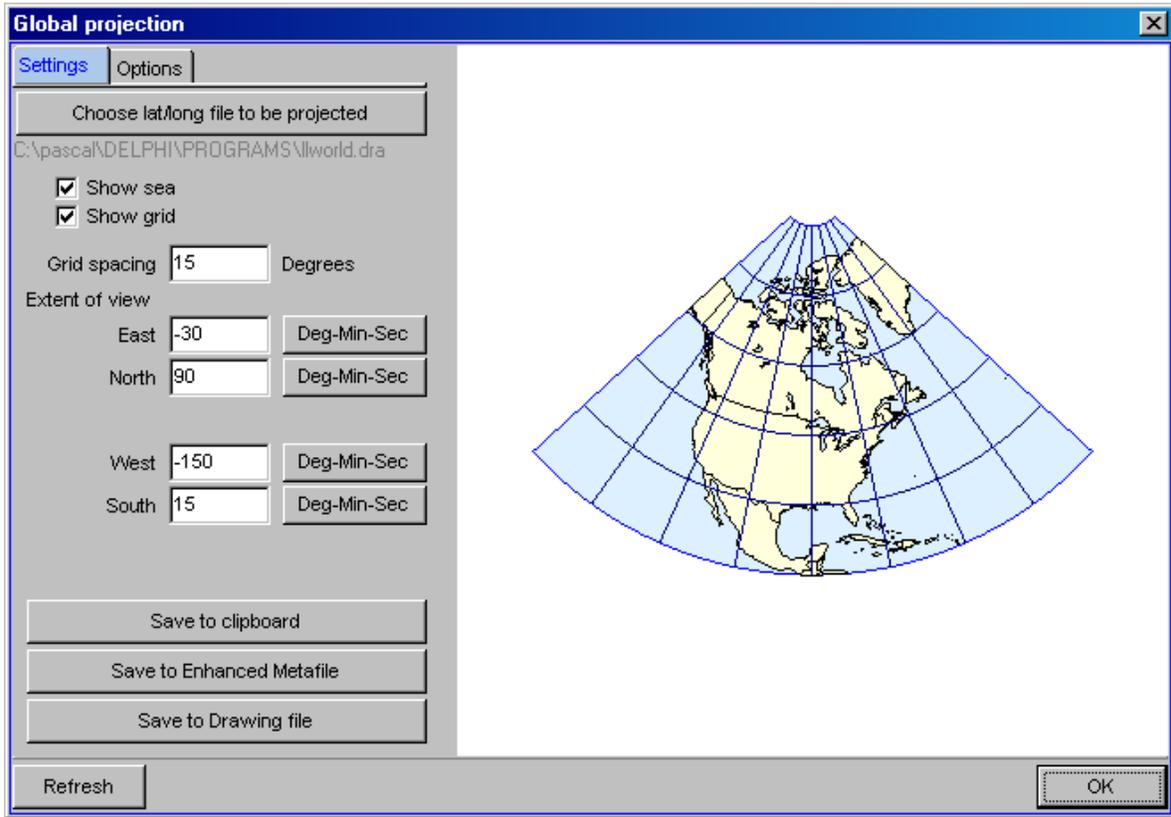
Remember that westerly longitudes and southerly latitudes are expressed as minus numbers.

## 14.3 Conic projections

The disadvantage with all the cylindrical projections is that they distort the regions far from the equator. If you are mapping such regions which cover a wide range of longitude, such as Canada or Russia, a conic projection can be useful. Like an orthographic projection, a conic projection cannot be used to map the entire globe. It is used for part of the north or the southern hemisphere. It should not be used for mapping predominantly equatorial areas. The principles of conic projections were described in the previous chapter. Map Maker Pro supports two type of conic projection:

### 14.3.1 Simple conic projection

The simple conic projection is as described earlier except rather than specifying the two “standard parallels” you define the north, east, south and west extents of the area you want to map.



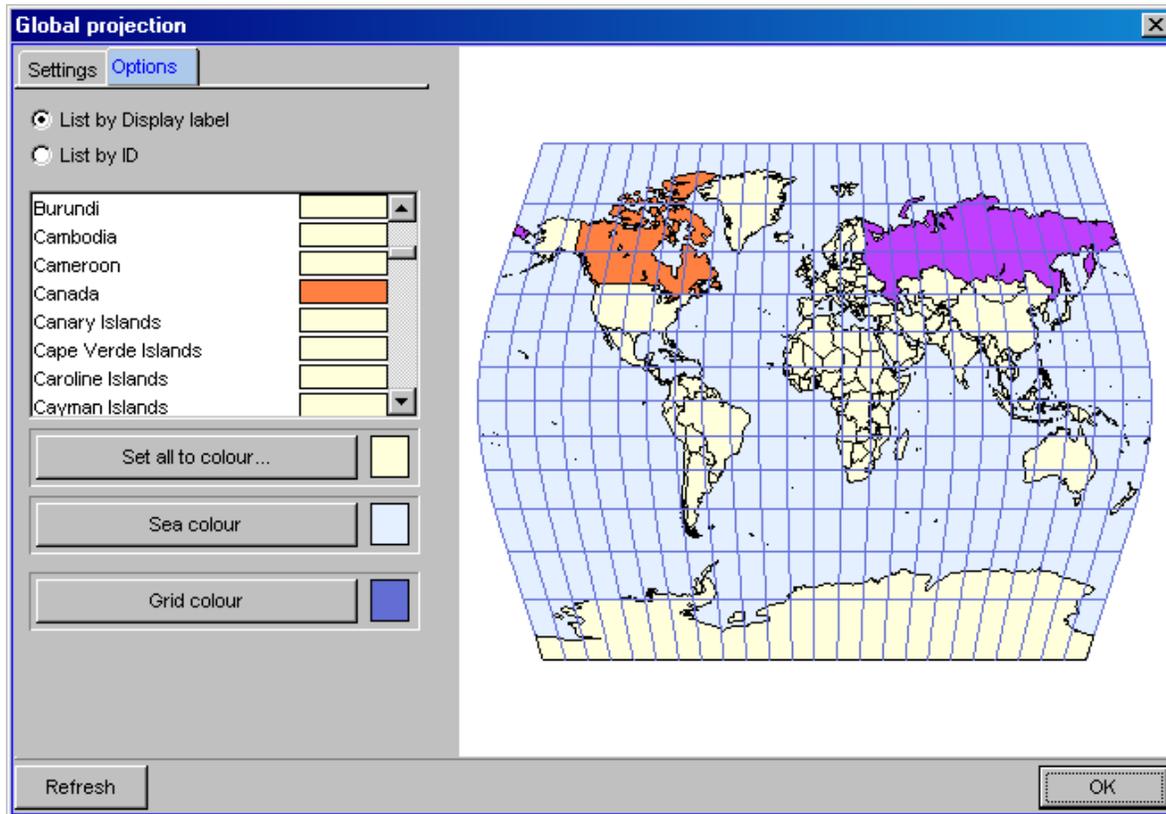
### 14.3.2 Bonne projection

The Bonne projection is a variant on the conic projection in which the lines of latitude are shown at their correct relative lengths and in which areas are shown correctly. The pay-off is that the lines of longitude have to be curved.



## 14.4 Highlighting countries

If you want to create a world map that simply illustrates where one or more countries is located then go to the **Options** page:

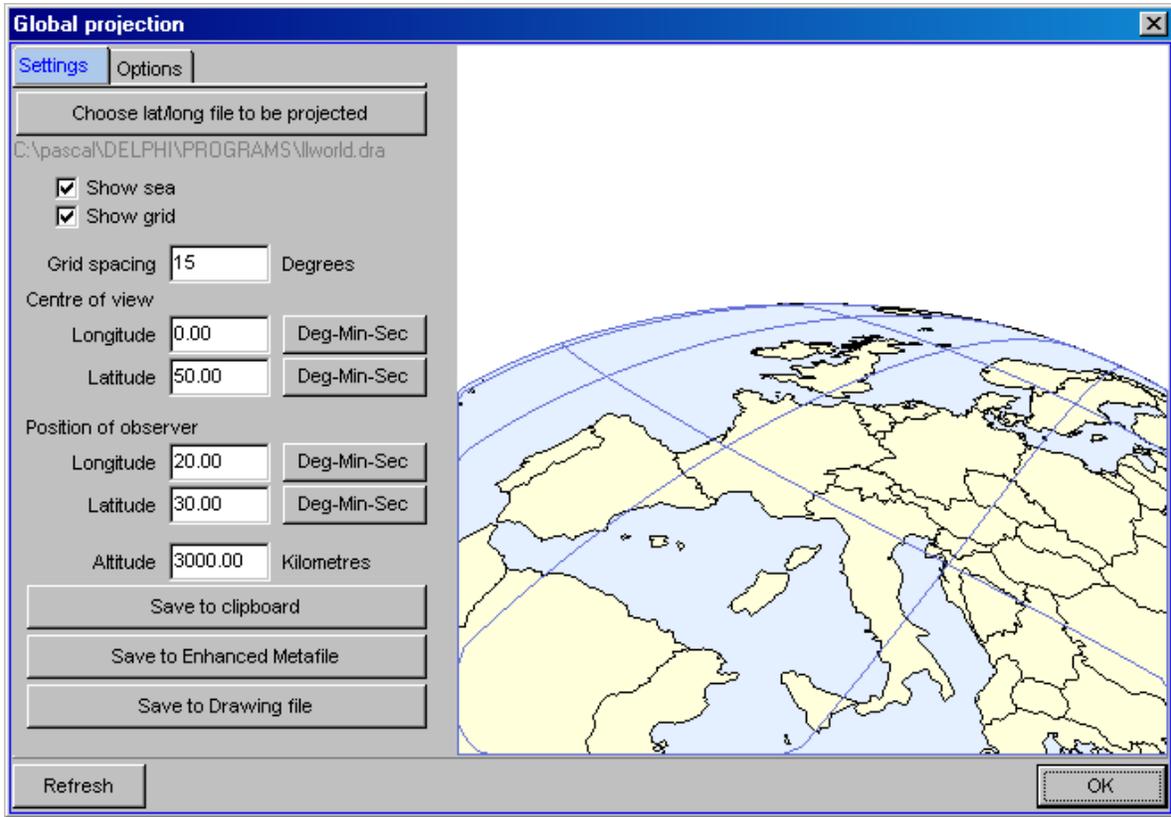


Click on any country in the list and a colour selector dialogue box is displayed. Choosing a colour assigns that colour to the country. Next time you click the **Refresh** button the countries are displayed using their assigned colour.

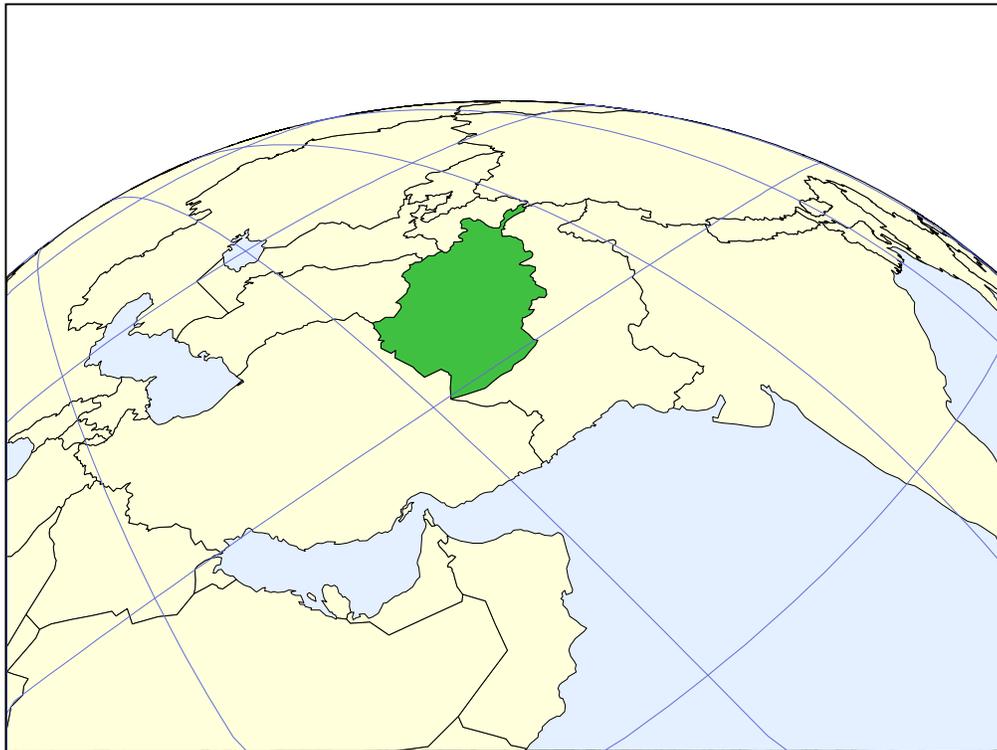
Generally it will be more convenient to use the **List by Display label** option but if you are using your own source file of latitude and longitude data you may want to see the IDs of the objects.

## 14.5 Perspective view

The perspective view option can be used to generate a view as if from a satellite. As with the other projections you can choose your own latitude and longitude source file and opt to **Show sea** and **Show grid**. As with the orthographic projection you must specify a latitude and longitude location to be the centre of your view. In addition you must specify the **Position of the observer** – your view point. This is specified as a latitude and longitude location plus an altitude above the earth's surface in kilometres. In the example below the observer is 3,000 Kms above Libya looking at London.



As with the other projections you can use the **Options** page to highlight countries.



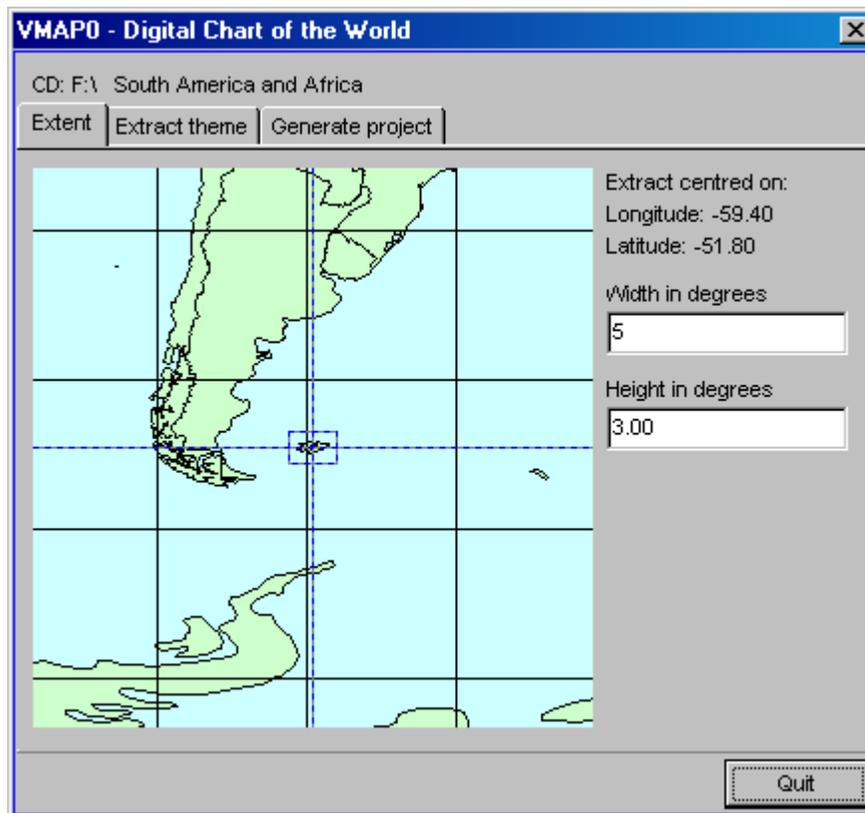
## 14.6 Using VMAP0 (Digital Chart of the World)

VMAP Level 0 (VMAP0) is produced by the US National Imagery and Mapping Agency (NIMA). It replaces the earlier Digital Chart of the World, produced by the US Defense Mapping Agency (incorporated into NIMA). It is a digital atlas covering the whole world based on 1:1,000,000 data. It has the advantage of being comprehensive, low-cost (less than \$100), and copyright-free. Its disadvantages are that place-names are unreliable and man-made features, such as road networks, tend to be out-of-date. However for basic topographic base-maps it is a valuable resource, though note that in some mountainous regions (i.e parts of the Himalayas and Andes) the contour information is incomplete.

Details of where it can be obtained can be found at:

<http://www.nima.mil/publications/vmap0.html>

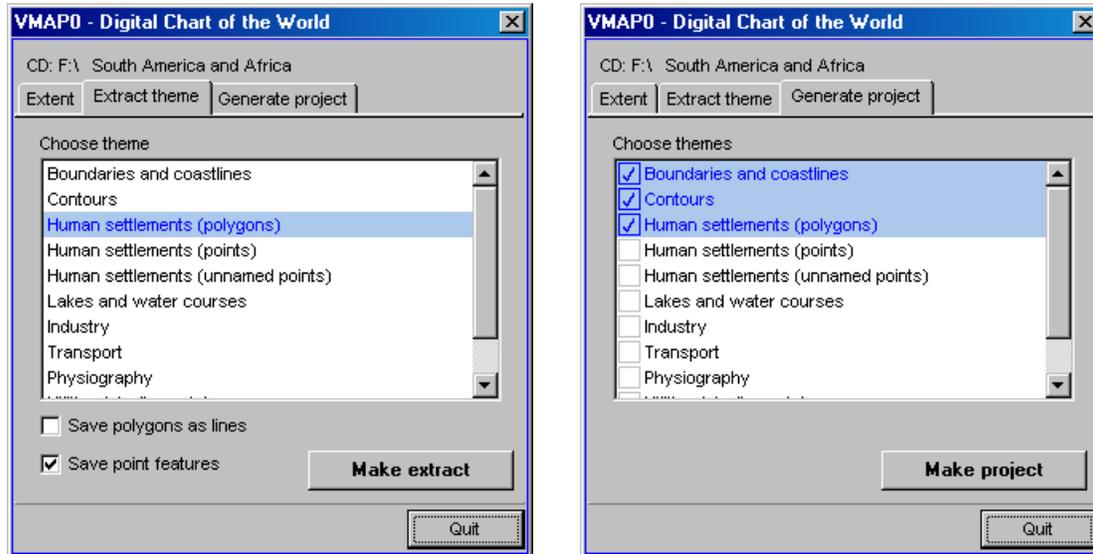
VMAP0 comes on four CDs each covering a different region. Some of the regions overlap so you must ensure that you insert the correct CD for the region that you want. Once the CD is in go to **Utilities – Latitude and Longitude utilities – Digital Chart of the World VMAP0**.



The dialogue box includes a map of the world. Click and drag on this map to navigate around the world. The rectangle in the middle of the map indicates the size of the currently defined extract. The size of the extract is determined by the **width in degrees** and **height in degrees** fields.

When you have established the location and the extent of the extract go to either the **Extract theme** page or the **Generate project** page. The **Extract theme** page is used when you want to create one DRA file depicting one theme. The **Generate project** page

allows you to select several themes and creates a project file (\*.geo) containing those themes. The DRA file for each theme is named automatically.



Be careful not to select too large an area since this will generate an enormous amount of data and be time consuming.

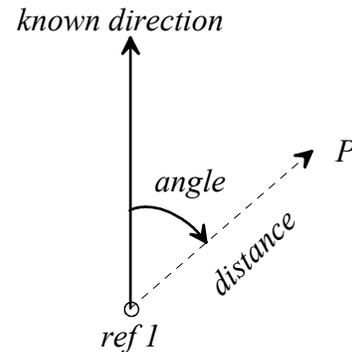
# 15 Survey data

GPS, though useful, can not yet entirely replace more traditional surveying techniques.

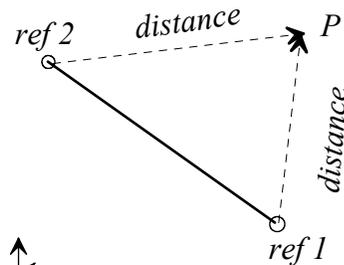
## 15.1 The essence of surveying

In essence, a surveyor measures the relationship of a new point to the location of known points using four basic operations.

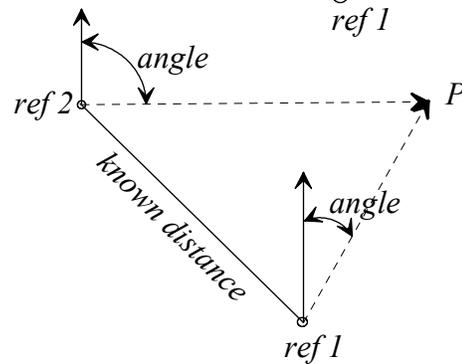
**Distance and direction.** Measure the distance and the direction of the unknown point, P, from a known point Ref 1.



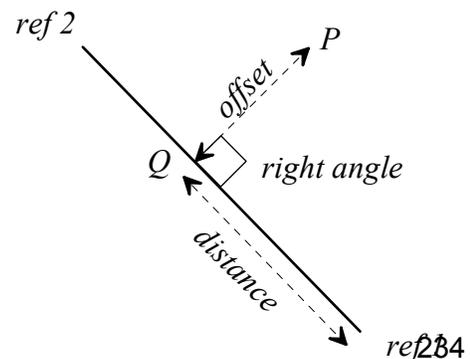
**Two distances.** Measure the distance of point P from known points, Ref 1 and Ref 2.



**Two directions.** Measure the direction of point P from two known points, Ref 1 and Ref 2.



**Offset from a line.** Draw a straight line between known points, Ref 1 and Ref 2. Find the point Q on the line which forms a 90 degree angle to point P. Measure the distance to this point from Ref 1 and the distance (offset) to point P.



The procedures described below are simply developments of these four basic operations.

## 15.2 The XY format

Map Maker can create drawings from an ASCII text file arranged in a simple format called the .XY format. The .XY format was designed specifically for entering simple survey data. XY files can be created in a text editor (such as **Utilities – Text editor**) and imported through **Utilities – Vector utilities – Import files – Map Maker survey data (\*.xy)**.

The location of the corners of a surveyed object in an .XY file can be described using:

- Simple X,Y co-ordinates (default)
- Distances from two reference points
- Compass bearings from two reference points
- Angles measured from two ends of a reference line
- Polar co-ordinates
- Relative polar co-ordinates
- Compass traverse in which each point is defined by a compass bearing from the previous point.
- Angle traverse where the angle of each line segment is measured from the previous line segment.
- Offsets from a line between two points

Distances and co-ordinates within an .XY file can be described in various units:

Metres (default)

Yards

Feet

Chains (1 chain = 22 yards)

The simplest way to enter numerical survey data is to write an .XY file in the same form as the following example.

```
House plot 1, 123.45, 223.67
125.87, 245.90
145.00, 242.34
143.12, 221.32
123.45, 223.67
```

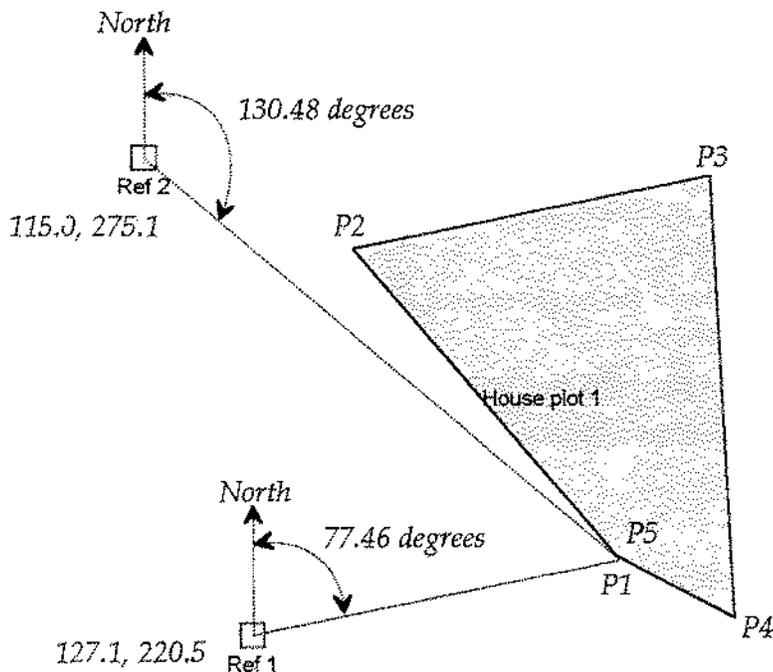
The short file above describes a single polygon, `House plot 1`. Each pair of numbers is a simple X,Y co-ordinate. Map Maker assumes that the plot is a polygon because the last

co-ordinate is the same as the first. Your XY file can contain any number of polygons, lines, and points.

### 15.3 Compass bearing

The following file also describes a polygon. However, it uses compass bearings from the two known reference points described by the two X,Y co-ordinate pairs following the word BEARING.

```
BEARING, 127.10, 220.50, 115.00, 275.10
House plot 1, 77.46, 130.48
14.61, 114.07
44.65, 91.91
87.96, 128.35
77.48, 130.48
```



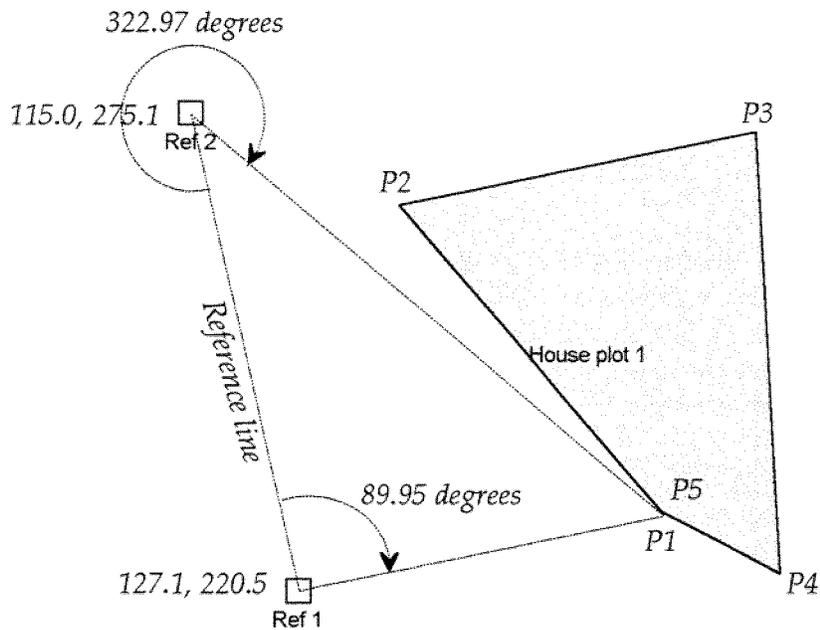
### 15.4 Relative angles

In the following example, the two known reference points are defined after the word ANGLE. These two reference points, REF 1 and REF 2, define the two ends of the reference line. The corners of the polygon, points P1,P2, etc. lie at angles to the reference line. First, from REF 1, measure the angle from the reference line to point P1. Then, from REF 2, measure the angle from the reference line to point P1. The angles must always be

taken in a **clockwise** direction from the reference line. Note: The clockwise rule means that one of the angles may describe an almost complete circle.

```

ANGLE, 127.10, 220.50, 115.00, 275.10
House plot 1, 89.95, 322.97
27.11, 306.57
57.14, 284.40
100.43, 320.85
89.95, 322.97
    
```



### 15.5 Polar coordinates

When using POLAR co-ordinates, only one known reference point is required. That point is defined by the pair of numbers following the word POLAR. The subsequent pairs of numbers are the polar co-ordinates of an angle followed by a distance from the reference point.

```

POLAR, 1134.33, 2322.88
House plot 1, 34.5, 23.45
12.22, 67.77
25.55, 75.44
34.65, 58.56
34.5, 23.45
    
```

## 15.6 Relative polar coordinates

In the case of RELATIVE POLAR co-ordinates, the angles are not measured from North but rather from a reference line defined by two X,Y points. The angles are measured from the first reference point with respect to the line to the second reference point.

```
RELATIVE POLAR,127.1,220.5,115.0 275.1
House plot 1, 80.95, 122.97
17.22, 107.77
45.55, 95.44
130.65,88.56
80.95, 122.97
```

## 15.7 Distances from fixed points

In the next example, the house plot is defined in terms of the DISTANCE of each corner of the polygon as measured from REF 1 and REF 2. If the numbers are negative, point P is to the left of the line between REF 1 and REF 2 as viewed from REF 1. Otherwise, point P is to the right of the reference line.

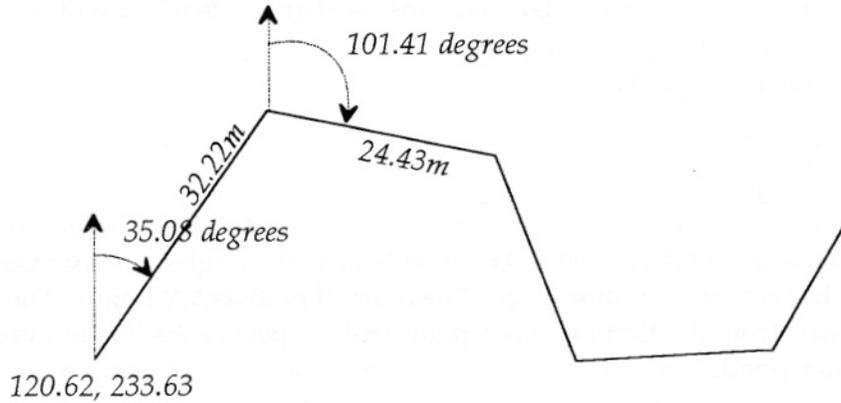
```
DISTANCE,50.34,180.67,55.87,276.32
House plot 1, 123.45, 223.67
125.87, 245.90
145.00, 242.34
143.12, 221.32
123.45, 223.67
```

## 15.8 Compass traverse (“metes and bounds”)

Using the COMPASS TRAVERSE, the first number pair of each object is an X,Y co-ordinate. The subsequent pairs of numbers consist of a compass bearing from the previous point P1 to the next point P2 followed by the distance of P2 from P1. In effect, the surveyor is walking from point to point measuring the direction and distances on the route – this sometimes called a “metes and bounds” survey.

```
COMPASS TRAVERSE
Forest path, 120.62, 233.63
35.08, 32.22
101.41, 24.43
158.93, 23.51
```

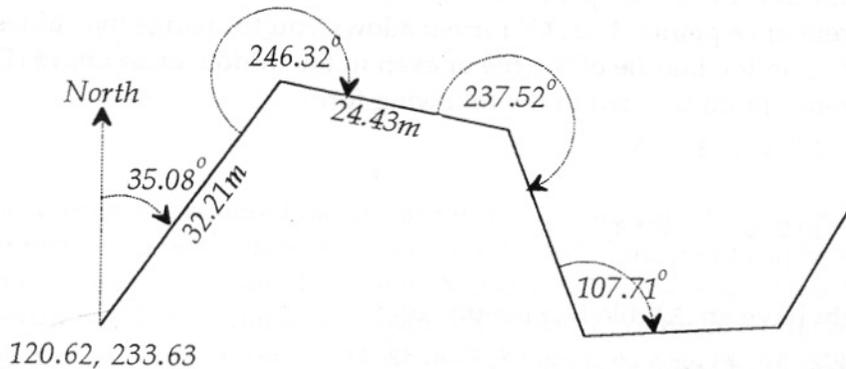
86.63, 20.56  
 29.74, 16.22



### 15.9 Angle traverse

In an ANGLE TRAVERSE, the first pair of numbers is the X,Y co-ordinate of the known starting point P1. The second number pair contains the **compass** bearing of the first line segment followed by its length. If the compass bearing is not known, this number may be arbitrarily set to zero. The whole line can be reconciled to other known points later. In the subsequent number pairs, the first number is the number of degrees of the angle of the direction of the next line segment measured from the previous line segment in a **clockwise** direction. The second number in the pair is the distance along the line.

ANGLE TRAVERSE  
 Forest path, 120.62, 233.63  
 35.08, 32.21  
 246.32, 24.43  
 237.52, 23.51  
 107.71, 20.56  
 123.11, 16.22



### 15.10 Closing errors

If the ANGLE TRAVERSE or the COMPASS TRAVERSE describes a polygon, the first point and the last point should coincide. Inevitably, in practice, there will be a discrepancy. Write the word CLOSE after the pair of numbers describing the last point in the polygon. CLOSE instructs Map Maker to detect the inevitable error between the first point and the last point and spread the error proportionally among the other points in the polygon. For example:

```
ANGLE TRAVERSE
Boundary, 0, 0
0, 25.54
230.33, 12.65
154.66, 5.54
278.32, 24.23
CLOSE
```

### 15.11 Offset from a fixed line

Finally, an object can be described in terms of its OFFSET - its perpendicular distance - from a point on a straight line between two known reference points:

```
OFFSET, 20.5, 0.89, 102.7, 50.67
Rice field, 23.2, 2.12
25.3, 1.87
27.1, 2.8
39.8, 3.6
```

### 15.12 Changing reference points

In this form of .XY file, the first number of each pair represents the distance along the reference line between REF 1 and REF 2. The second number is the offset, or the distance of point P from the reference line. This distance must be measured at 90 degrees to the reference line.

While surveying a large area, you will need to move around the field and take new reference points. The .XY format allows you to change the values of REF 1 or REF 2 in the middle of the file or even in the middle of an object. The change of reference point is noted in the following form:

```
REF 1, 23.45, 34.23
or
REF 2, 112.67, 76.88
```

Thus, you might have an .XY file like the one below:

```
DISTANCE, 50.34, 180.67, 55.87, 276.32
House plot 1, 123.45, 223.67
125.87, 245.90
145.00, 242.34
REF 1, 48.55, 234.56
```

```

143.12, 221.32
REF 1, 89.01, 195.55
123.45, 223.67
CLOSE

```

In this example, the first reference point is moved twice during the course of the survey. Reference points must be changed when it is not possible to see all the corners of the object being surveyed from the first two reference points. Here also the word `CLOSE` is used to ensure that the polygon is closed and any errors absorbed.

Alternatively, you may define a series of reference points by name. There are two ways of doing this, firstly by explicit definition, for example:

```
DEFINE,Point A1,50.34,180.67
```

In this case, `Point A1` is the unique name of a reference point and its co-ordinates are specified. Subsequently, the reference name can be used in any command that requires an X,Y co-ordinate. For example this line:

```
DISTANCE,50.34,180.67,55.87,276.32
```

could be replaced by this line:

```
DISTANCE,XY,Point A1,55.87,276.32
```

The “XY” in the line indicates to the program that `Point A1` refers to an X,Y co-ordinate.

The second way to change the reference point during the course of a survey is to use brackets to inform Map Maker that this point will be the new reference point for future measurements.

```

ANGLE TRAVERSE
Boundary,0,0
0,25.54
230.33,12.65 [G8]
154.66,5.54
278.32,24.23
CLOSE

```

In this example, the square brackets around `[G8]` indicate that the third point in the angle traverse is a new reference point called “G8”. This point can be selected even though the surveyor does not know its X and Y ordinates. *Map Maker Pro* calculates the co-ordinates in the course of mapping the object. In this case, the program uses the angles of the angle traverse. Map Maker then assigns those co-ordinates to the new reference point.

## 15.13 Changing units

By default, Map Maker calculates all co-ordinates and distances in metres. If you wish to specify a different unit of measurement, write one of the following words:

YARDS  
FEET  
CHAINS

All subsequent co-ordinates will be in the specified unit. If you wish to change back to metres, write the line "METRES".

Similarly angles can be recorded in different ways. By default, angles are in decimal degrees, in other words thirty and one half degrees is recorded as 30.5. However if you include the key word:

MINUTES

Then the numbers after the decimal point are assumed to be minutes, so 30.5 degrees becomes 30.30.

In some places angles are recorded not in degrees but in "grades". If you include the key word:

GRADES

Then angle measurements will be read in grades. You can change back by including the key word:

DEGREES

## 16 Introduction to customisation

Map Maker Gratis is designed to serve as a general purpose map making and G.I.S. program. Because many users do not require all the facilities of Map Maker Gratis the Map Maker system makes it easy to customise the software to suit users at every level. The add-on module, Map Maker Scripts, provides many customisation features, but even without the module a certain amount of customisation is possible:

### 16.1 Start up project

The simplest form of customisation is to set up Map Maker so that every time the program is started it loads a specified project. Users who always (or usually) work with one project will find that this customisation makes their lives simpler.

To set the start up project, go to **File – System set up – Preferences - Start up** then choose the appropriate project file (\*.geo) and enter it in the **Load project** field.

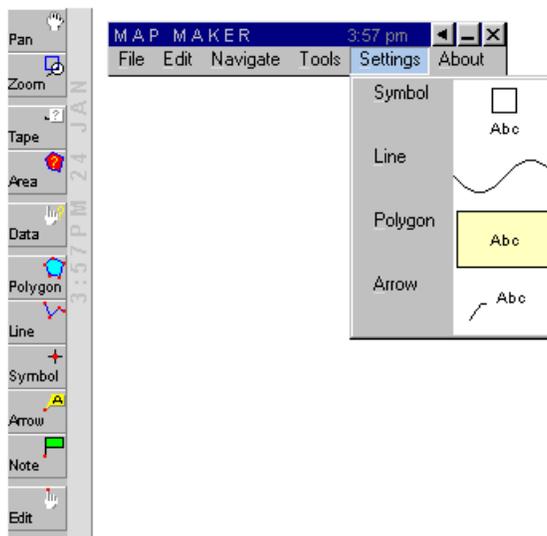
In addition, this screen allows you to define a **Start up banner**. The start up banner could show a logo, project name, or explanatory text when the program is opened. If you choose a bitmap (\*.bmp, or \*.jpg) for the start up banner, it should not be excessively large.

### 16.2 Simpler configurations

If the program user is not likely to be comfortable dealing with files and directories (or when you wish to restrict access to files and directories), there are several ways to ensure that the user is not exposed to file names. Go to **File – System set up – Preferences - Screen** section from the right hand list. The **Configurations** drop-down list contains several options. The first is **Standard**. This configuration uses the normal Map Maker menus which include files and directories. The next is **Elementary**.

#### 16.2.1 Elementary

The Elementary menu and tool bar are simplified versions of the standard configuration.

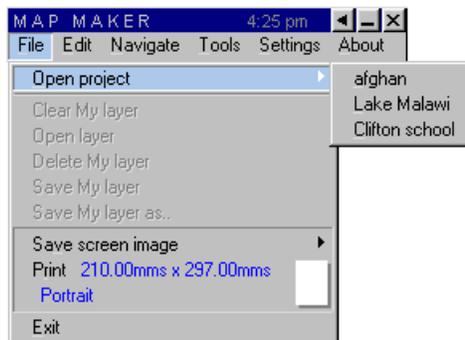


The **Utilities** menu is removed and a **Settings** menu inserted. A limited range of **Settings** replaces the styles facility in the standard Map Maker. The user simply chooses a setting for the current line, fill, symbol, and arrow. The **Tools** menu and the icon bar contain fewer tools than in the standard configuration.

To set up Map Maker in the Elementary configuration to load the same project every time the program is started, go to the Map Maker configuration directory and find a sub-directory called “Projects.” Place the appropriate start up project file (\*.geo) in the directory.

Note that if you are not sure of the Map Maker configuration directory you can find it under **Help – About Map Maker – System – Configuration directory**.

If you place several projects in the Projects directory, the File menu will list the projects allowing the user to select from a limited set of projects.



The user creates a layer using the drawing tools. The concept of the “live layer” is replaced by “**My layer**”. When saving “my layer” the user simply assigns a name like “Forests” instead of defining a file name. To open a layer, the user simply selects from a list of previously saved layers. Only one layer - other than the layers in the background map - can be open at any one time.

The **Print** function in the elementary configuration is equivalent to the **Quick print** function in the standard version.

Note that the elementary configuration - and the other non-standard configurations – do not have a **System set up** item on the file menu. To access set up press **Ctrl+Alt+P** on the keyboard.

### 16.2.2 Viewer

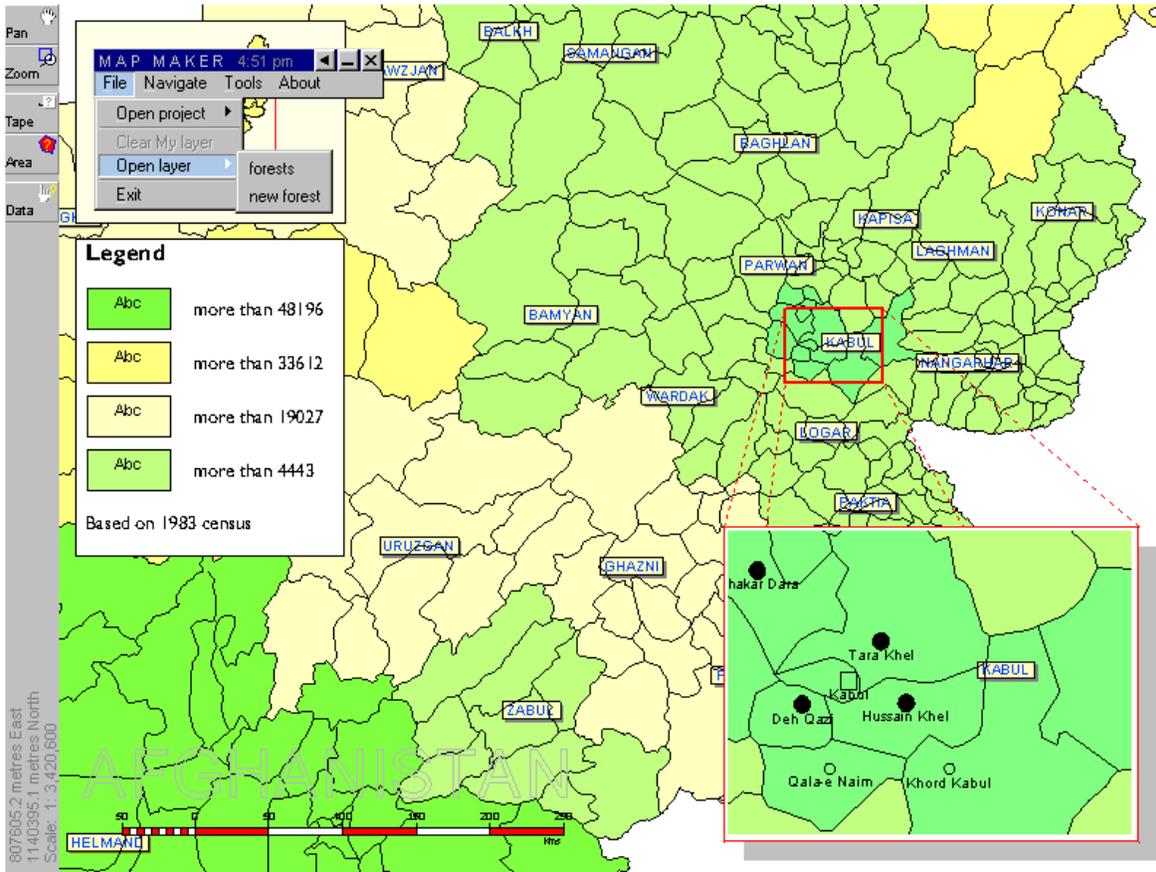
The **Viewer** option is similar to the **Elementary** configuration but it does not include any drawing tools. Use the **Elementary** configuration to create a set of “my layers” then change the configuration to **Viewer**. The user will be able to open any of “my layers” as an overlay to the base map. If you attach a database to the base map, the viewer will be able to use the **Data query** tool to interrogate the data.

As with the **Elementary** configuration, the user has access only to the projects stored in the “Projects” sub-directory of the Map Maker configuration directory.

The **Viewer** configuration does not include scroll bars. The **Pan** and **Zoom to box** tools allow the viewer to navigate about the map. The **Guide map** is available from the

**Navigate** menu and the **Navigate** menu can include any **gazetteers** which may be present in the project.

The **Viewer** configuration contains the option to include the **Print** function on the **File** menu – or not, as you prefer.



In this example you can see a project with a zoomed detail and a location map. These can only be set up using Map Maker Pro (see Part 2) but - once set up - they can be viewed and interrogated using the **Viewer** or **Elementary** configurations of Map Maker Gratis.

### 16.2.3 No menu

The **No menu** option is like the **Viewer** but, as the name suggests, it does not include the floating menu bar. This option is designed primarily for public information systems. Clearly it can only be used with one project and there is no option for the user to add layers, but the **Data query** tool is available so that viewers can interrogate any attached data. You can choose whether or not to include scroll bars.

The lack of menu also means that there is no **Exit** button. To quit the **Viewer**, click on the extreme bottom left corner of the icon bar.

Map Maker Scripts allows you to configure the Viewer so that it requires a password to exit the program or to access the set up dialogue using **Ctrl+Alt+P**. Map Maker Scripts gives the system manager access to the program while preventing accidental or mischievous damage to the set up.

### 16.3 Setting up icons

You can set up Map Maker icons on the Windows **Start - Programs** menu, or on the desktop, to launch Map Maker in different configurations. Go to Windows Explorer to create a new shortcut to the main Map Maker program file – mmm.exe.

To create a shortcut in **Windows Explorer** right click on an item and select **Create shortcut**. Drag the new shortcut to where ever you want it, e.g. the desktop.

Now right click on the new shortcut and choose **Properties**. The name of the program appears in **Target**. If you want Map Maker to start up in Standard mode, type the word “standard” after the program name and a space, e.g.:

```
"C:\Map Maker\Modular1\MMM.exe" standard
```

If you want to set up a configuration that includes a space in the name, such as “No menu” then put this name in quotes:

```
"C:\Map Maker\Modular1\MMM.exe" "No menu"
```

Alternatively, Map Maker comes with three small programs called `Gratis.exe`, `Viewer.exe` and `Elementary.exe`. Launching any of these programs without any command line launches Map Maker in the specified configuration.

### 16.4 Illustrating your documentation

If you are writing documentation for a customized version of Map Maker, you can save most of the dialogue boxes that appear in Map Maker as bitmap images. To do this, within a dialogue box, use the tab key to step through the controls to select the **OK** button. Press **Ctrl-Alt-S** on the keyboard. In most cases, this procedure will save an image of the dialogue box. A **Save as** box will appear asking you to name the bmp file. To save an image of the whole screen, click on the floating menu to ensure that it is selected and then press **Ctrl-Alt-S**.