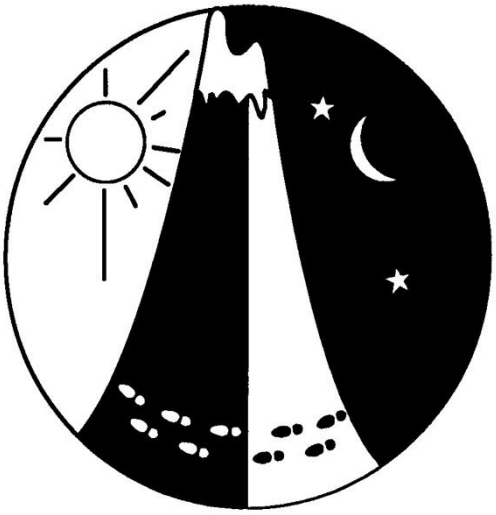

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WA Rogaining Association

Map Standards and OOMAPPER

Revision 3

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ABOUT THIS MANUAL

All setters and vetters who plan on using a OOMAPPER as part of the setting or vetting process should read this manual.

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1. INTRODUCTION

1.1 Introduction

This manual has been developed as an appendix of the WARA Setters and Vetting Manual and is intended to be a guide to the implementation of WARA standards with respect to generating a competition-standard rogaining map. It is not intended to be a guide as to how to use OOMAPPER. However, there are a few basic functions that need to be described in order to be able to document the processes and procedures required to implement these standards:

- It provides some basic instructions on how to use OOMAPPER (Section 2 - Basic OOMAPPER Functions)
- It describes the basics of generating a base rogaine map (Section 3 - Generating the Base Map)
- It provides some instruction on some of the tricky issues that are commonly confronted when making a map (*Section 4 - OOMAPPER FAQ and Tips).*

1.2 OOMAPPER

OOMAPPER is WARA's chosen software package that we use for making orienteering maps. OOMAPPER is capable of producing very complex and high quality orienteering maps. Rogaining maps are relatively straightforward. Important Points

Chances are that you won't read or remember everything written in this appendix… So here are the important points:

- Do not adjust the size of the symbols provided with your base map. Over many years these have been adjusted to look good when commercially printed. If you change a symbol, for example the thickness of a track, so it looks good when printed from your personal bubble-jet printer, it won't look good when printed commercially.
- If you get stuck – Call one of the OOMAPPER experts listed in the main manual. WARA has an A3 colour printer which we will lend you for making draft maps.

1.3 Why Use OOMAPPER?

The computer production of rogaining maps by WARA began around 1995. This replaced a process using drafting film, with the different colours used on the map drawn on their own sheet. The process was fraught with difficulties, particularly for the inexperienced, and alignment problems were common – controls would be slightly out, creeks appear on the wrong side of a track and so on. These problems were often not discovered until the final map was commercially printed. For the record – the last WARA map made with drafting film was the first 6 Hour bush event – The Keaney Kollege Kapers in 1998. The repeatability and accuracy of computer-produced mapping is such that setters should not contemplate otherwise!

WARA began producing computer-based maps in 1996 using the commercial package OCAD, a computer aided design package. CAD packages are essentially ways of drawing very accurately and repeatably using software tools to scale using a computer. Other examples of CAD packages include MicroStation, Adobe Illustrator, AutoCAD and ArchiCAD. CAD packages are WYSIWYG, or what you see – is what you get. Whilst OCAD was an excellent package designed for orienteering and rogaine map production, licensing was an issue.

Today, most professional-grade map production occurs using geographical information systems (GIS). Google Earth is an example of a simple and user-friendly GIS. GIS are able to overlay

multiple layers of information including drawings, GPS points and aerial images of the landscape, with each layer appropriately referenced such that the same points on the earth's surface match up precisely. This enables GPS points to be viewed overlying aerial images, for example. Consumer-grade GIS, such as Google Earth, do not generally have sufficiently sophisticated drawing tools to produce rogaining maps, however.

In 2014 WARA converted to using the public domain package OpenOrienteering Mapper or OOMAPPER, which can be freely downloaded from www.openorienteering.org, and is available in multiple formats including Windows, Mac and Linux. OOMAPPER is widely used by many orienteering and rogaining associations.

Why use OOMAPPER rather than other potential packages? OOMAPPER is currently the dominant mapping software for orienteering and rogaining. Some setters may have professional experience with professional-grade CAD or GIS packages and feel that they would be able to do a faster or improved map on an alternative platform. Irrespective, setters are still strongly encouraged to use OOMAPPER because:

- a standard set of map symbols and standards in OOMAPPER has been produced. These are known to print well and be readable by entrants under all lighting conditions and should be used in all rogaine mapping
- WARA is building up an archive of OOMAPPER maps. Setters that follow you will be able to use your OOMAPPER map and benefit from any corrections (new dams, road re-alignments) you have made during your field work
- WARA volunteers understand how to convert OOMAPPER maps to produce winners' routes for the WARA web page. Using another system complicates matters for other volunteers
- WARA officers can assist with OOMAPPER, but cannot assist with other packages
- some vital information, for example magnetic north lines and arrows, are difficult to plot in other packages.

1.4 Using OOMAPPER

The cartographer from a setting team can be provided with some basic OOMAPPER training (contact the Training Officer). OOMAPPER isn't difficult to use, but be prepared to spend some time learning and making mistakes. When you commence work on your event, regularly save version (e.g. mymap_version23.omap) as you work. If there is a disaster you will be able to revert to a previous version. It is also wise to backup copies of your map. If you don't have a decent computer backup system, then e-mail versions of your map to your co-setters and vetters.

Do not get bogged down in the details of using OOMAPPER. As stated earlier, making a rogaine map uses only a portion of OOMAPPER's capability. OOMAPPER features an on-line help system and further help can be found at https://www.openorienteering.org/mapper-manual/pages/. If you get stuck… ask!

2. BASIC OOMAPPER FUNCTIONS

2.1 Introduction

This manual is intended to be a guide to the implementation of WARA standards with respect to generating a competition-standard rogaining map. It is not intended to be a guide as to how to use OOMAPPER. However, there are a few basic functions that need to be described in order to be able to document the processes and procedures required to implement these standards.

2.2 Starting OOM and Opening an Existing Map

- Locate OOMapper in your program menu and open it.
- Upon entry the welcome screen will be displayed. On the left, under *Activities*, you will be given the option of creating a new map or opening an existing one. The *Recent Maps* panel lists the maps you have recently worked on (and is probably blank the first time!)
- Click *Open map* …
- Navigate to the map you want to open. OOMapper will accept map files that were made in OCAD, which are saved in *.ocd* format, as well as files made in OOMapper, which are saved in *.omap* format.
- Click *Open*
- Opening a file made in OCAD almost always generates a warning. The things it warns you about usually aren't worth worrying about. If you see a warning, have a quick read, then click *OK*.

2.2.1 OOM Screen Layout

The workspace of OOM is split into four main parts (Figure 1). These are:

- Toolbars — usually positioned along the top of the screen
- Windows — usually positioned down the right hand side of the screen
- Status Bar — always positioned along the bottom of the screen
- Map Editor — this is the area in the middle where your map appears

Figure 1 – OOMapper Workspace

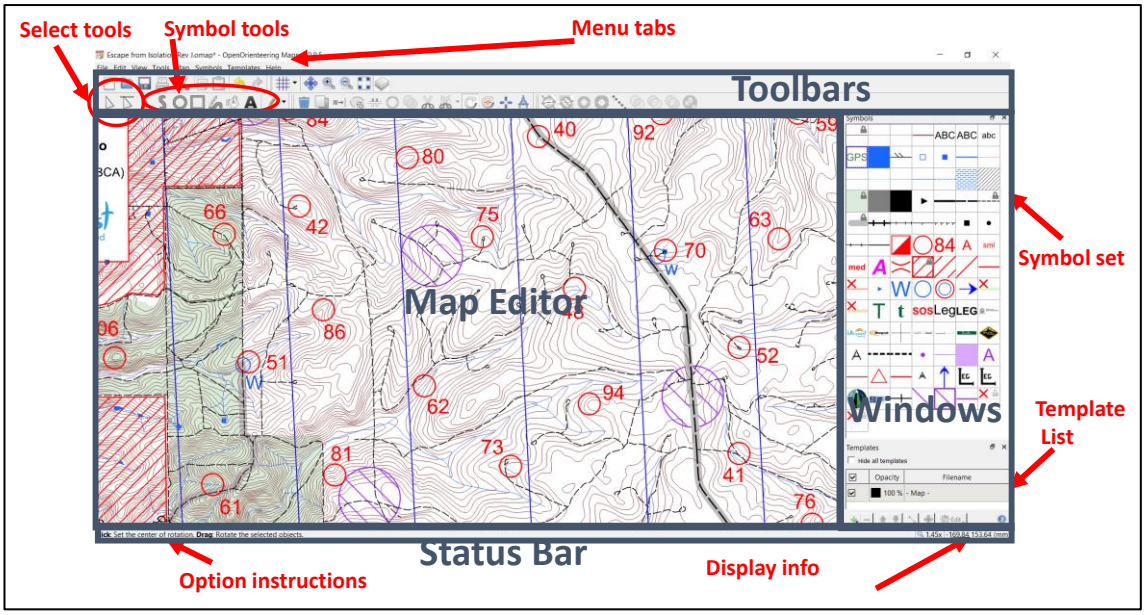


Figure 1 illustrates the key components of the display window after a map has been loaded up. As with most applications, there is a set of menu tabs across the top, each of which leads to a drop-down list of additional functions. Below this are two Toolbar lines of shortcut icons, the first row being predominantly file and display control functions, standard across most applications, while the second row are functions specific to OOMAPPER. All of these functions can be also accessed by the menu tabs. These icons may be greyed-out if they are not applicable to what you are currently doing (e.g., you cannot use the *measure* or *cut* icons if you have not selected at least one object). If you hover the mouse over an icon, a pop-up label will tell you what the function of the icon is.

The standard symbol set is displayed on the righthand side. Below it, the *Template* list is usually hidden and is only relevant when using background maps (Section 4.8). It enables you to turn the display of the background maps off and on, as required. The *Display Info* in the bottom right corner of the Status Bar tells you the extent to which the current screen is zoomed in and the grid co-ordinates of the current cursor position. The format of these co-ordinates will change according to the co-ordinate system set for display via the *View* menu *Display Coordinates as …*option.

The *Option Instructions* area provides further information as to what you can do at this point in time. This is particularly important if you are doing a multi-step process, such as cropping a map using the cut-away function – you have undertaken a task but nothing appears to have happened – the software may be waiting for an additional step (like pressing <enter> to continue).

2.2.2 Rearranging toolbars

The toolbars and windows can be rearranged on screen to suit your preference. At the left end of each toolbar are two parallel vertical lines. When you move the mouse cursor over these lines a 4-way arrow will appear. To move a toolbar, click and drag these lines. As you drag the toolbar around,the other toolbars and windows might move out of the way to create a spot for your toolbar to move to. When you release the mouse button, the toolbar will fall into its new home and will re-orientate vertically if placed on the left side of the screen.

2.2.3 Rearranging windows

Similar to the way toolbars are moved, windows can also be moved. To do this:

- *Left-click and drag* the title bar near the top of the window.

Windows can also be resized. This includes changing the width of the symbol window. To do this:

- *Hover* the mouse between the Map Editor and the window you want to resize until this cursor appears.
- *Left-click and drag* until the window is the width that you want, then release the mouse button.

2.2.4 Showing and hiding windows

OOM has several toolbars and windows. When you start the program for the first time, all of the toolbars are visible, but only one of the windows (the symbols window) is visible. To see the full listof windows that are available, select ***View*** from the main menu and at the bottom you will see the names of the four windows, which are:

- Tag Editor
- Color Window
- Symbol Window
- Template Setup Window

Alongside, each entry is an icon depicting a window. If this icon has a faint blue box around it, like this one  , then the window is visible. You may need to use the template setup window and tageditor during rogaine map preparation.

2.3 Zooming and moving the map

2.3.1 Zooming in and out

There are three ways to zoom in and out. These are:

- left-clicking one of the magnifying glasses  on the View toolbar
- pressing "+" or "-" on your keyboard
- rolling the mouse wheel — when rolling your mouse wheel forward, the screen will zoom toward the point under your cursor ad when *rolling* the mouse wheel backward, the screen will zoom out by holding stationary the point under your cursor.

2.3.2 Zoom to map

To set the zoom so that the whole map fills the screen, click on the  symbol in the view toolbar.

2.3.3 Panning

To move the map around on the screen without zooming (known as panning), click the.pan icon  in the view toolbar, then *left-click and drag* the map.

2.4 The Right-Click Tool Widget

If you *right-click* on the map window an octagonal toolbar showing eight icons that represent some commonly used tools will be displayed. Some of the options will be greyed out, indicating they are not available for your current task. To change tool, simply *left-click* the tool you want to use. All of these tools (which we will discuss later) can also be found in the various toolbars along the top of the screen. This menu is merely a quicker way to access these tools.

2.5 Select Tools

The Select tools are the default operating mode for OOMAPPER. The most common one is the basic pointer, otherwise known as *Edit Object*( ). You can use it to select any object on the map, by hovering over that object. Once selected, the nodes of the object will appear, as illustrated in the left image in Figure 2, and there will be a dashed box around the entire object. The square node shown are normal nodes. Other types include triangles (for dash points) and circles (for Bézier curve handles – these are only used when curves are being fitted between the nodes, rather than straight lines).

Common node editing functions include:

- Moving – *click* on a node and drag it to where you want it
- Adding – to add a node, *ctrl-click* on the line between two existing nodes – an new one will be created and you can then move it to where you want it
- Deleting – *ctrl-click* on an existing node and it will be deleted. The nodes either side will be joined.

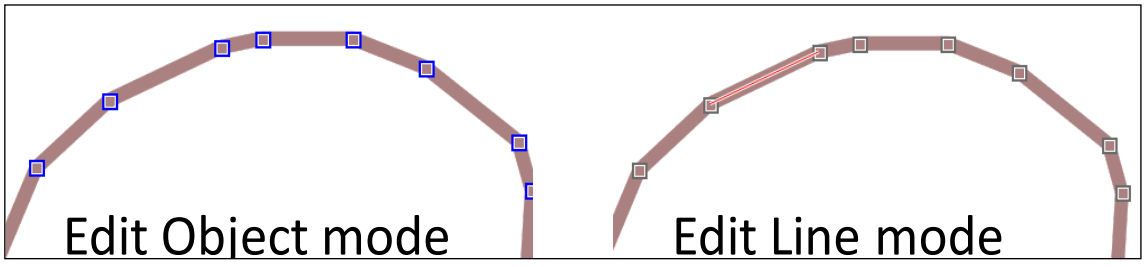
It is noted that nodes appear on the vertices of the lines and on the corners of polygons but on the centre of point objects, such as circles and icons. Hence, to select point objects you need to click on where you think the centre of the object is. Sometimes this is difficult to determine if there are other objects in the same area, such as contours. Two ways to select a point object where there is a lot of other obejcts are:

- Zoom in as far as you can
- Use the *Lock* function to turn off the ability to select the object type that is overwriting the object you are trying to select (Section 4.2).

To move an entire object, click on the dashed bow outlining the entire boject and drag it to where you want it to be.

If you need to select more than one object, hold the shift key down whilst clicking on each object.

Figure 2 – Display of Nodes When Editing



When you select the *Edit Line* pointer ( ) the same functions as for *Edit Object* mode apply, though in a modified format. When you hover the mouse over the object a line will appear between

the nodes, as in illustrated in the right image in Figure 2. You can drag this line to a different location, but *ctlr-clicking* on a node or a line will add or delete a Bézier curve to the line.

As adding curves to contours is manipulating the data, WARA recomemnded that you DO NOT use the *Edit Line* pointer on any of the data provided in the base map.

2.6 Working with Symbols

The symbols window shows all of the symbols that are currently defined in your map. If you cannot see the symbols window, make sure it is turned on (see Section 2.2.4). There are four symbol types to be aware of. These are:

- **Point symbols** – used to draw simple (and sometimes complex) objects positioned near asingle point, like control circles, the hash triangle and rogaining and sponsor logos
- **Line symbols** – used to draw lines, like roads, watercourses and contours
- **Area symbols** – used to draw filled shapes, like out-of-bounds areas and plantation areas,
- **Text symbols** – used to write text on your map.

2.6.1 Adding New Point Objects to the Map

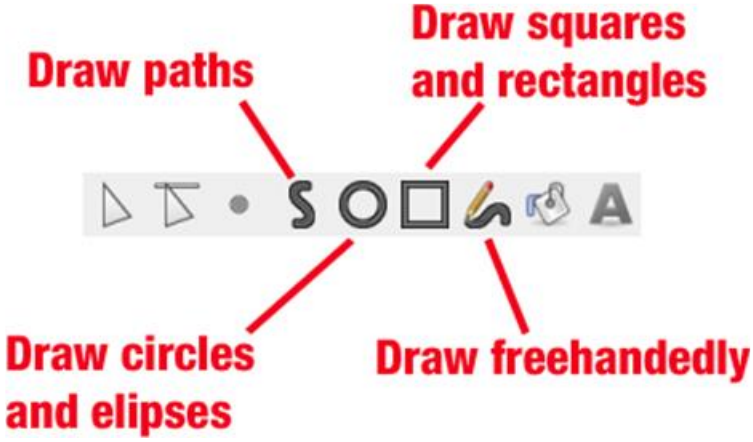
To draw a point symbol on the map, first

- Select the symbol you want by left-clicking the icon in the symbols window.
- Make sure the 'Set point objects' tool depicted by a dot (see right) is selected inthe drawing toolbar.

- Move your mouse cursor over the map. You will see a greyed-out version of the symbol appear behind your mouse cursor.
- To place one point symbol, left-click at the desired location on the map.
- To rotate the point symbol while placing it (not all point symbols can do this!!), *left-clickand drag*. As the cursor moves the symbol will rotate. Release the mouse button when the rotation is correct. This is particularly useful when drawing continuation arrows.
- To exit point mode, click on the *Edit Symbol* icon 

2.6.2 Adding New Line and Area Objects to the Map

To draw a line or area object on the map, first select the symbol you want *by left-clicking* the corresponding icon in the symbols window, and then choose which of four drawing tools you want to use (see image on the right).



OOM drawing tools are quite powerful. By holding down the **Shift** key or **Ctrl** key, the normal function of the mouse left-click can be changed. Also, a short left-click will often generate a different result compared to a left-click and drag. To get a list of the various key combinations and a short description of what they do without having to refer to this guide every five minutes,

look at the status bar displayed along the bottom of the program window - the status bar is an excellent source of information and will usually give enough clues to help you get through.

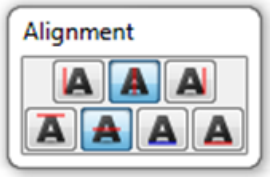
But if you prefer all your instructions on paper please see Appendix 1 for a complete list of ways that the these tools can be used.

2.6.3 Adding New Text to the Map

In the symbols window select the symbol for the text type that you want to use. This will cause the *Write Text* tool  in the toolbar to become active (if not, *left-click* on it to activate). Two different types of text objects can be placed with this tool:

- ***Left-clicking once*** will create a text object anchored to a single point (this point is marked by a small blue square, but is only visible when text is selected with the Edit Objects tool).
- **Left-clicking and dragging** the mouse will create a text box (with automatic text wrap, meaning the text will be forced onto the next line after it reaches the width of your box).

Usage note: Single point style text objects should be used for control numbers, road names, map titles and other short names.Text boxes should be only used for long sentences over two or more lines and therefore rarely used - one situation when you might use a text box would be when thanking landowners and listing many names.



After placing an anchor point or text box a vertical blue line will appear. This is the text cursor and shows where the text will begin when you start typing. The alignment window will have also appeared (see right), which controls how the text should be aligned. The top row shows horizontal alignment (theoptions being left, centred and right-aligned), while the bottom line shows the vertical alignment (the options being top, centred, baseline and bottom-aligned). By changing these settings, you will change the position of the text relative to the anchor point or text box. Onceyou have finished typing, commit your changes by pressing the **Esc** key.

2.7 Working with Object Selections

Up until now this guide has been discussing methods for adding new objects to a rogaine map. Now we address methods to change or delete existing objects. The first step is always the same: you mustcreate a selection containing one object (or multiple objects) that you want to work with.

The tool that is used to make selections is the *Edit Objects* tool  , available from the toolbar. Once activated, the mouse cursor will take on the same triangle shape.

To select one object:

- Left-click it OR left-click and drag a rectangle around it

Once selected, the object becomes slightly darker in colour and a pink dotted line surrounds it. If wenow *left-click* on a second object, the first object will be deselected and the second object will

instead become selected. To remove all objects from a selection, left-click in white space or press the **Esc** key.

We can also include additional objects in (and remove objects from) any existing selection by holdingthe **Shift** key. So, to select both the first and second objects we could:

- Select the first object (detailed above),
- Hold down the **Shift** key then *left-click* or *left-click and drag* a rectangle around the second object. You will notice that both objects are now darker in colour and the purple dotted linehas expanded to encompass both objects.
- If you want to add many items to an existing selection, one of the fastest ways is to hold **Shift** and *left-click and drag* a rectangle around multiple objects.

Lastly, objects can be removed from a selection in the same way:

- Hold down the **Shift** key then *left-click* or *left-click and drag* a rectangle around the object(s)you want to remove.

2.7.1 Moving Objects Around (All Object Types, One or More Objects at a Time)

- Select the object(s) you want to move.
- You will notice a purple dotted rectangle surrounding your selected object(s). Move your mouse cursor over this dotted line.
- When it turns orange, *left-click and drag* the rectangle.
- Release the mouse button to place the object(s) in the new location

2.7.2 Moving Objects Around (Point or Point Text Objects Only, ONE Object at a Time)

The method in the last section works for all objects. However, point objects (like the hash triangle) or a single point text object (like a control number) can also be moved around by left-click and dragging their blue anchor:

- Select one point or point text objectyou want to move. A blue anchor point will appear.
- *Left-click and drag* the anchor boxto the desired location.
- Release the mouse button.

Tip: Holding the **Shift** key when moving a single point or point text object will cause it to snap to a line or another point object. This is very useful for positioning a control circle directly on top of a building or over a watercourse/fenceline/road etc. This also works for text point objects, line objects and area objects, but is less useful.

2.7.3 Rotating objects

- Select the object(s) you want to rotate.
- Activate the rotate tool  or press the '**R**' key on your keyboard.
- A small black circle will appear at the centre of your selection. This is called the centre of rotation and it is the point that will be held fixed about which your selected objects will berotated. If you want to reposition the centre of rotation, *left-click* the point you would like to move it to.
- *Left-click and drag* to rotate the objects

Tip: Holding the **Shift** key while dragging will force the objects to rotate in 15° increments.

2.7.4 Duplicating objects

- Select the object(s) you want to make a copy of.
- Activate the duplicate tool  or press the '**D**' key on your keyboard. You won't see anything change as the new object will put placed exactly on top of the original. To separatethe duplicate from the original, select one of them by left clicking the object once, then left-click and drag the duplicate to the desired location.

2.7.5 Deleting objects

- Select the object(s) you want to delete
- *Left-click*  in the toolbar or press the **Del** key on your keyboard.

2.7.6 Editing existing text

- Select ONE item of text you want change.
- When the purple dotted bounding box becomes visible, move the mouse over the text untilyou see this cursor: I

Important tip: If this cursor does not appear, zoom in and try again.

- *Left-click* to place the text editing cursor on the text, which appears as a vertical blue line (this cursor doesn't flash). Alternatively *left-click and drag* to select multiple characters.
- Change your text.
- To finish editing, press the **Esc** key or *left-click* away from the text in white space.

2.7.7 Editing Line and Area Objects

Both line objects and area objects consist of multiple points connected by line segments. Points are shown as small blue squares (or diamonds) and are used to mark each vertex in a line or area object.You can alter the shape of a line or area object by manipulating these points and segments.

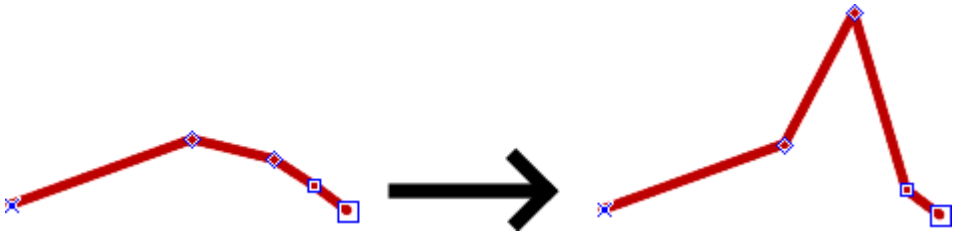
> OOM is capable of drawing both straight-line and curved line segments. However, all of the data WARA purchases from Landgate uses only straight-line segments. All objects that are curved in reality, like contours, are drawn as a series of short straight lines, which when zoomed out look like a curve. Since curves are not generally used on WARA rogaine maps, this guide will only explain how to work with straight-line segments.

To begin editing:

- Select the line or area object that you want change. All of the points (blue squares or diamonds) used to define the object will become visible.

There are four basic ways to alter objects. These are:

1. Move a point in the object to a new location:
    - *Left-click and drag* the point to its new position then *release* the mouse button. Repeatfor other points as desired.



2. Insert a new point:
    - *Hold* the **Ctrl** key then *left-click* on the line or area edge away from the other points. Anew point will appear. Repeat this step as desired.
    - *Release* the **Ctrl** key.

3. Delete a point:
    - *Hold* the **Ctrl** key then *left-click* on the point you want to delete. The point will disappearand the shape of the object will change. Repeat this step as desired.

- *Release* the **Ctrl** key.

4. Move one line segment to a new location,
    - Activate the *Edit lines* tool  in the toolbar.
    - *Left-click and drag* the line segment you want to move to its new position then *release* the mouse button. Repeat this step with other segments as desired.
    - In the example below the third segment from the left (the bit of the line between thethird and fourth points from the left) has been moved.

2.7.8 Dash Points

In the images in the preceeding section you can count four different blue anchor points that define the position of each vertex in the line. They are:

- the “cross”, which marks the start of a line
- the large square, which marks the end of a line
- the diamond, known as a “dash point”
- the small square, known as a “normal point”.

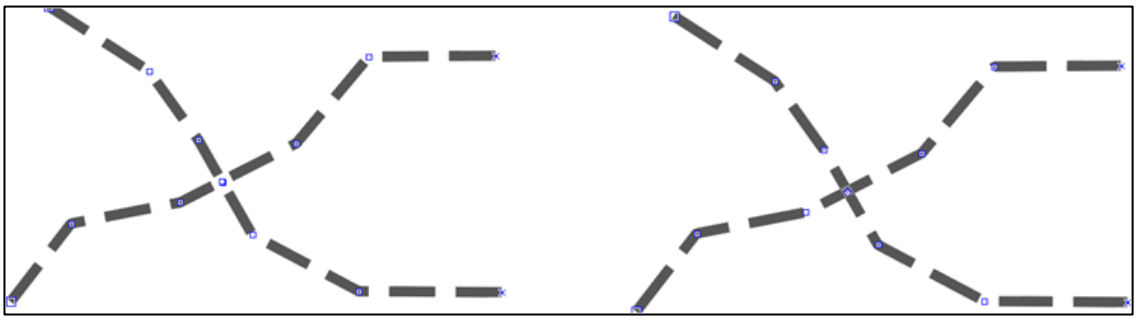
The first, second and fourth in the list behave in the same way. However, the dash point is able to alter the appearance of dashed lines. In the following example there are two minor roads that form a crossroads. Even though there is a normal point drawn on each line at the centre of the

intersection, because of the dashed nature of the roads, the actual crossing is blank. To force OOM to centre one of the dashes exactly over the centre of the intersection, the normal points need to be converted to dash points via:

- select one of the lines
- hold **Ctrl** and the **Spacebar** then *left-click* the normal at the centre of the intersection
- select the other line and repeat the second step.

Figure 3 illustrates crossroads with normal points (left) and with dash points (right).

Figure 3 – Normal and Dash Points



The two most common sets of menu shortcuts used are the Select tools and the Symbol tools.

3. GENERATING THE BASE MAP

When you start setting an event you may only have a general idea as to the potential extent of the map. The WARA Locations and Technical Officers will be able to assist you in providing you with a base map for your chosen area. Once you have armchaired the map, you will have a reasonable idea on the area but things may change when you get into the field – contours that look great turn out to be indistinct in the field, vegetation may be too thick, or something else could result in up to 30% of the armchaired controls being changed. A road you thought might be a good control road is impassable and the whole focus of the event could change. But the map that the vetters get must be close to the competition map, so it must contain a number of features:

- printed at the final paper size/orientation
- have north lines (the vetters will be navigating to controls as competitors would)
- legend
- scale bar
- Out-of-Bound areas
- preliminary patrolled roads

Features that need to be on the final map but are not required for vetting purposes include:

- acknowledgement of landowners
- acknowledgement of setter/vetters
- acknowledgement of software and source of data
- sponsor logos
- event title
- WARA logo.

However, the draft map should have sufficient space for all of these, so it is preferable that they are added as soon as the map extents are known – progressive addition is fine.

3.1 Getting Started

When you request data from the Technical Officer you will most likely have requested a general area; either a map from a previous event, data covering several previous area, or possibly a whole new area. If you have chosen a new area, it is likely that appropriate permissions will need to be granted prior to map information being sought from Landgate, due to the costs involved (currently data to produce a rogaine map for an area in the south west of Western Australia from Landgate costs in the region of $1000-$2000). Discussion with the Locations and Technical Officers well in advance of the event is therefore strongly advised if you believe that your chosen area has not previously been used for rogaining (check the Setters and Vetters Manual for information on the tools available showing the distribution of previous rogaines). For some new rogaining areas outside the south west of Western Australia (e.g., some remote regions) mapping data at the required level of contour definition may not be available. In this case, a custom LIDAR survey would need to be commissioned to obtain the required contour data. Due to the high cost, this is normally carried out only for National and World Championship events. The setting and vetting team should not necessarily be dissuaded from selecting an attractive new rogaine location but are instead encouraged to discuss with relevant WARA Officers well in advance of their preferred event.

In most circumstances, however, your event is likely to reuse existing maps, and you will therefore most likely be provided with an OOMAPPER file containing the base map for an area larger than needed alongside the standard WARA template data. The latter may come as a second file relevant to the proposed map scale (1:50,000 or 1:25,000) (e.g. wara-standard_1_50000_Scale_updated_v6_1.omap) or it may already have been incorporated into the base map file. If it comes as a second file, it is possible to cut and paste data from the template into the data file.

3.2 Setters Responsibilities

Setters will be provided with the base map for their event in OOMAPPER. This data will have the latest symbol set and the magnetic north lines will be in place. The cartographer still has some work to do. Tasks include:

- *Determine the age of the mapping*. Landgate does regularly update mapping. Landgate aerial imagery for example may be updated multiple times per year, while man-modified landscape components such as cadastral boundaries, buildings and roads may be updated each few years. While most commercial users of Landgate can receive regular updates of their datasets, our data has been purchased at one point in time. It is therefore sensible for the cartographer to determine the year at which data was obtained prior to the start of mapping, and also determine what (if any) corrections and alterations were made by the previous setting team who used the mapping data. This approach will greatly enhance the setting and vetting team's expectations of their mapping accuracy. For example, should the mapping for a mixed bushland and farmland area have been purchased in 2005 based on survey data from 1998, setters and vetters should expect that features such as dams, farm tracks, fence lines and even forest boundaries may not be accurate. Conversely an area of bush where mapping was derived from 2015 may be more accurate. Of course, it is not expected that landscape features such as contours would change substantially over either period.
- *Work out the map layout*. As soon as possible consider how you will place the title, legends and other map features.
- *Remove clutter.* Remove road names and farm names and other information not relevant to the competitors.
- *Fix the tracks.* The base data may use the same symbol (kind) of road for the entire map – These will need to be graded so they are sealed, major bitumen, minor tracks or in many cases deleted.
- *Fix road and track names.* Road and track names will have to be positioned and oriented in an appropriate direction to suit your map layout. A good policy for minor roads/tracks is that if there is a signpost on the map with a name on it, the track should be named on the map – otherwise, leave the name off.
- *Fixing the map.* There may well be mistakes as the data set could be out of date. This particularly applies to man-made features such as tracks, dams and buildings. Dams and new buildings can be added by taking bearings from known positions. GPS receivers are handy for adding in new dams or road re-alignments. When using a GPS, if the coordinates are clearly wrong then you may need to adjust the OOMAPPER map's reference coordinates. See *Section 4.5*.
- *Forest boundaries should be obvious.* Use the forest boundary symbol which is like the fence symbol but has double tag marks. If the areas of forest and farm are complex, then use a faint green shading for the forest.
- *Consider whether you wish to keep bare rock surfaces and internal farm-fences on the map*. These are a problem because they are not completely accurate. Farmers move their fences

around. Many rock surfaces on the map may be clearings instead. Expert teams will use these features like a street directory… inexperienced teams will assume the features are correct when they are not, and potentially become lost or confused as a result.

3.3 Symbol Set

The base map provided will come with a standard symbol set (shown by default on the right side of the screen but it can be moved as required). If you hover the cursor over a symbol the name and number of the symbol will be displayed.

If a symbol has a small lock in the top right corner, it is protected – this means that you will not be able to select any objects on the map of that type. It is possible to unprotect a symbol by right clicking on the symbol and unselecting the *Protect objects with this symbol*. But it does not prevent you from deleting the object if it is within a cut-away selection.

The symbol set also includes symbols for a number of the standard icons used around the map, such as the WARA Rogaining logo, common sponsors (Department of Sport and Recreation, Lottery West, etc.) and text types for the various textural information provided.

3.4 Paper Size/Orientation

Smaller 12 Hour and most 6 Hour events (at 1:50,000 scale) will fit onto an A4 page while larger event at 1:50,000 and 6 Hour events at 1:25,000 will fit on a A3 paper. WARA operates at 1:25,000 and 1:50,000 scales; changing to an alternate scale would need to be ratified by the committee and should be driven by data rather than desire. Data provided by DOLA is usually at a 1:50,000 scale.

Once the scale and page size has been selected, the orientation (portrait or landscape) will be driven by where you plan on setting the controls. Extract the required page size/orientation from the template file and copy it into the draft map OOM, if a template has not been provided in the data file. You can move it around over the contours to get a feel for the potential area available. Make sure that you do this before you do the armchairing, to ensure that the shape of the area you select fits onto a single page.

The standard page template is designed to generate a map with a 5 mm margin around all sides.

It is possible to generate a map larger than A3, but this should be avoided if possible: it increases the cost of printing and is harder to manage in the field.

3.5 North Lines

The blue north lines are aligned with magnetic north. This is different to grid north, with the declination in Western Australia around 2^0-3^0. The base map provided should include the north lines, but if they are not, they need to be generated. There is no automatic function to generate them, each has to be added separately. The following process can be used to generate them:

- Generate grid lines at 1500 m
    - Select the down arrow adjacent to the grid icon  and select *Configure grid*
    - Tag *Show Grid* and set a horizontal and vertical spacing of 1500 m (the North lines should be 1.5 km apart)
    - Set the *Additional Rotation* to the required declination

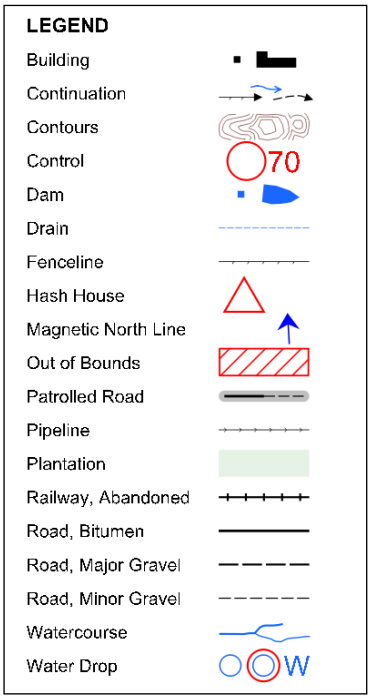
- Select the North line from the Symbol set  and then the *Draw Paths* option  from the menu bar
- Create a line, selecting a grid intersection point just south of the contours and then one just north (you will need to zoom and and out to do this). Double-click to finsh the line. This will create a North line with the arrow head just outside of the contours
- You can either repeat this process for each vertical grid line or copy the one already generated and paste in new moves, moving them to the adjacent grid lines. The first approach is preferred as lines can be of variable length.
- Make sure that the arrow head is just outside of the contours – if they are inside the contours they can mask contour features.

To find out the required declination for the site, select the *Map* menu option, then *Georeferencing.* At the bottom of the pop-up window, select *Lookup* declination. This will take you to an external website (www.ngdc.noaa.gov/geomag-web - you need internet access for this) where a calculation sheet will show you the declination. Note that declination changes between years.

3.6 Legend

The base map provided will include a basic legend, with all of the normal symbols explained. This should be sufficient for the start but you will need to add items to the legend every time you add a symbol. Symbols such as roads, contours, controls, etc. will already be there but you may need to add dams, rock surfaces, etc.

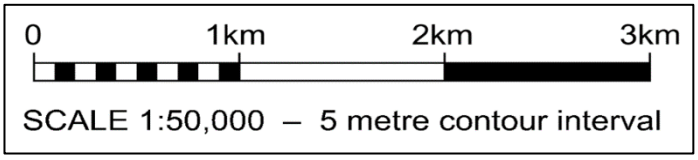
The legend is just a collection of symbols. Items can be added in the middle by selecting all items below the required spot and dragged down. Alternatively, you can replace entries on the legend that are not appropriate to your map, such as pipeline, plantation or Railway, Abandoned. If you are not sure if a legend entry is used on the map, click on the symbol entry in the Legend. This will highlight the equivalent symbol in the Symbol table. Right click on the entry in the symbol table and the *Select all objects with this symbol* from the drop down menu. This action will put a blue dashed box around all selected items. If this box is around only the item in the legend, then there are no occurrences in the map and the legend item can be removed.



3.7 Scale Bar

The base map provided will include a scale bar at the scale of the provided map; either 1:50,000 or 1:25,000. Select the scale bar and the associated annotation and move onto the map. Make sure that you do not drag it as this will change the length of the scale bar. Make sure that the scale annotation stays with the scale bar itself.

Figure 4 – Scale Bar

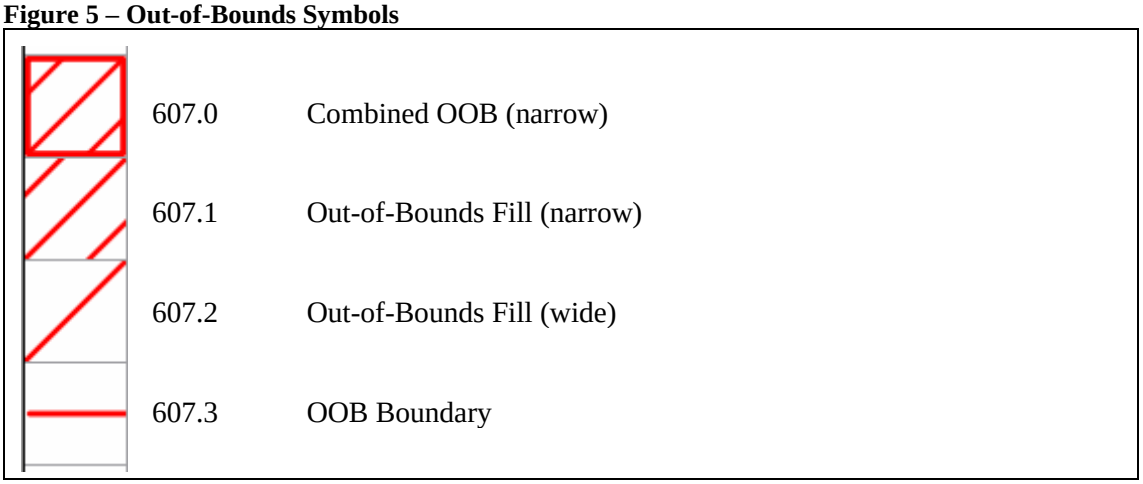


It is usual to place the scale bar near the legend, but space may preclude this.

3.8 Out-of-Bound Areas

There are two types of out-of-bound areas; those fully enclosed within the map and those on the outskirts. The former may be a single landowner who has not given permission or an area with rare/endangered fauna/flora, while the latter may be a number of properties on the edge of a map. All Out-of-Bounds areas within the map are to be filled with a red cross-hatch and outlined with a red border. There is a symbol set up for this (607.0) but there may be occasions when the density of the cross-hatching partially masks complex contours underneath. In this case it is possible to create one object with a wide fill pattern (607.2) and duplicate it using the OOB boundary symbol (607.3).

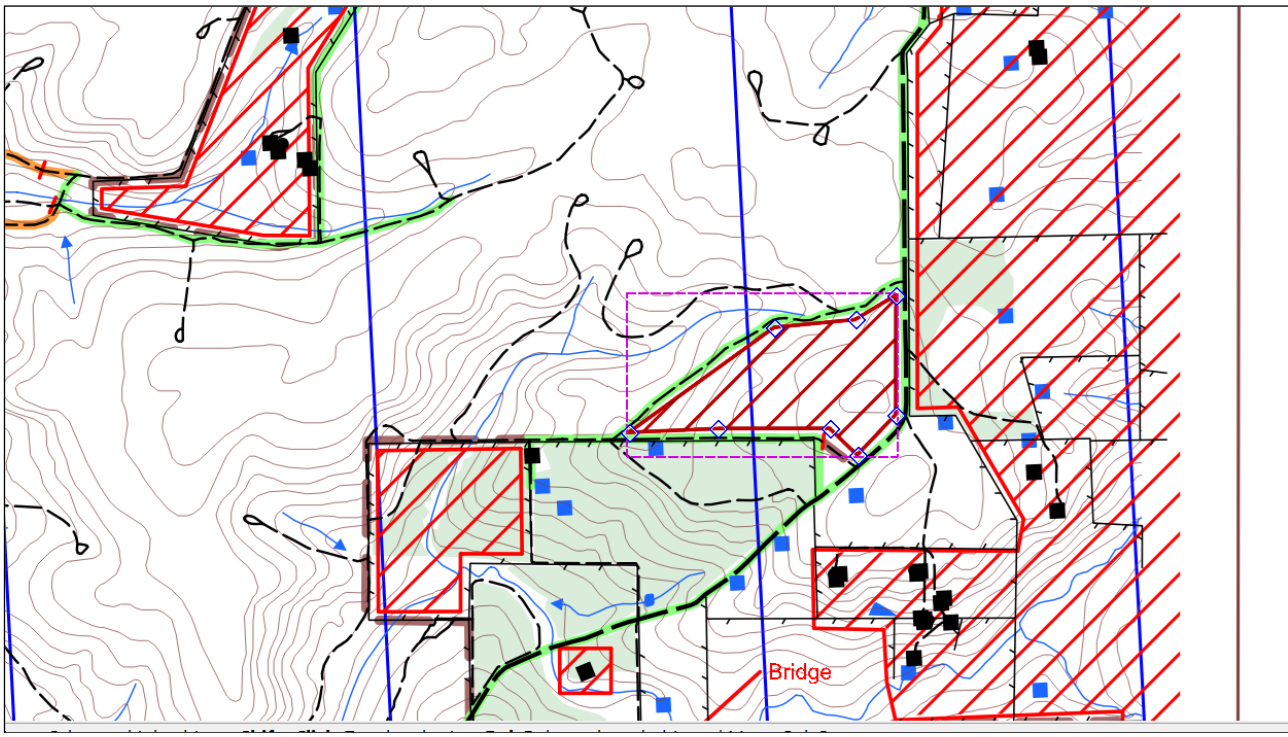
Figure 5 – Out-of-Bounds Symbols



For large OOBs areas on the edge of the map it is permissible to use the narrow fill symbol (607.1) and just mark the inside edge of the OOBs with the boundary symbol (607.3). This means that there will be no edge to the OOBs areas on the outside of the map, as shown in Figure 6.

Figure 6 also illustrates the preferred methodology for showing OOB areas. In this case there are tracks around the boundary of the private property in the centre that can be used by competitors as they lie immediately outside of the fence. There is also a major road traversing the area. In cases where landowners on either side of the road do not give access permission, the road itself is still accessible, being a public road. Offsetting the OOB boundaries just inside the property boundaries ensures that the map shows that the road can be used. However, it is also advisable to note this in any notes accompanying the map and mention it at the pre-event briefing.

Figure 6 – Out-of-Bounds Examples



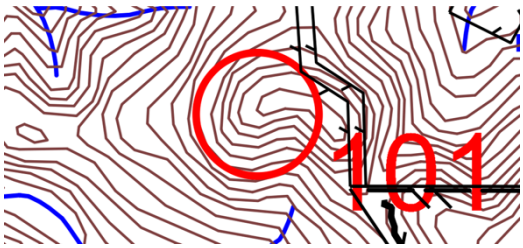
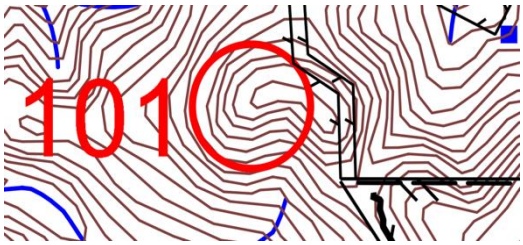
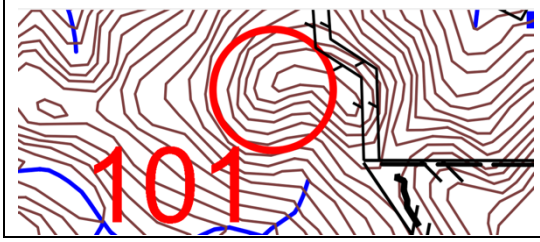
4. OOMAPPER FAQ AND TIPS

This section is under development and will be expanded upon in future manuals.

4.1 Correct Control Labelling

There is nothing worse than being disorientated at 2 am in pouring rain and looking at the map to see how you can relocate. But the control label has been placed on top of what looks like a good attack point. And, if you happen to be colour blind, it may be almost impossible to work out what the contours are actually doing. Hence it is extremely important that you think carefully about exactly where the control label goes in relation to the actual control. Figure 7 provides two examples where placement of the label can obscure the contours below, and one example where it does not. This third example would be the preferred location.

Figure 7 – Placement of Control Labels

	Label is placed obscuring fence lines and a saddle
	Label is obscuring the saddle to the west of the control that could be used as an attack point
	The label is placed over an area of parallel contours and does not obscure any features

Other aspects to consider include:

- Other nearby controls – make sure that it is not possible to confuse which label belongs to which circle when the controls are close together
- Impact of changing the number. When setting the control will be allocated a two digit label (e.g. AV) while the final control number may be 109 – this latter label takes up more space and while the initial label was a good fit, the latter may not be. Always check the layout whenever a label is changed.

4.2 Locking/Hiding Objects

As noted in Section 2.5, there are times when you cannot select a point object, such as a control, when there are a lot of contours and other objects in the same area. Or the control has been located at a creek or track intersection and all you can select is that creek or track. It is possible to turn off the ability to select an object type – select one of the objects that is stopping you from selecting

the point object. You will note that the equivalent symbol in the symbol set is highlighted. Tight click on the symbol in the symbol set and a drop down menu will appear. You have two options:

- *Hide objects with this symbol* – select this and all objects on the map with this symbol will disappear, and a red cross will appear in the left hand corner of the symbol
- *Protect objects with this symbol* – select this and a small lock icon will appear in the right hand corner of the symbol. You will also not be able to select any object with that symbol.

You may need to do this several times to eliminate all of the overlying objects.

WARA recommends that you only use the *Protect object* option – if you hide a symbol, the potential exists to forget to unhide it afterwards and then that object is gone from the map.

4.3 How to Crop the Map

Often the map data you are provided with will cover a larger area than what is eventually printed on your competition map. In these cases, it will probably be necessary to 'crop' the map, which refers to deleting the unwanted data to make it small enough to fit on an A3 (or A4 sized) page and to leave enough room for the map legend, logos, scale bar, rogaine title etc. WARA prefers that any map improvements, like the redrawing of poorly mapped roads, deletion of buildings that no longer exist,adding in of newly built dams etc., be made on the uncropped version to be of maximum usefulness to setters who may return to the area and use your maps to set future events. **Therefore, it is recommended that you DO NOT crop your map until all fieldwork is complete. At the minimum, anelectronic copy of both the uncropped map and the final competition map should be given to the map co-ordinator after the event.**

When cropping:

- leave at least 500 m of map outside of the outermost control, and leave catching features where possible – if someone walks past the control, we need to provide sufficient information for them to recognise the mistake and to relocate
- leave as much area on the map as possible – only crop if you need the space for something else – there have been instances where competitors have walked several kilometres past the last control (they were walking along a road and too busy talking).

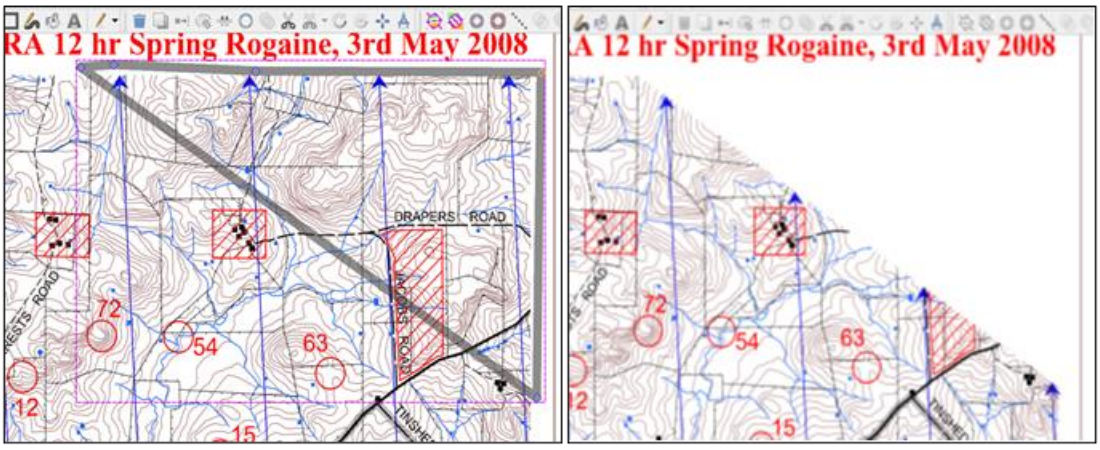
When cropping a map, you usually just want to trim small bits around the outside. To do this, we create a polygon containing all of the data that we wish to delete and nothing else. It may be necessary to do this in several stages to make sure we get everything that has to go.

- Create a polygon by selecting a line symbol type (any one will do, say a patrolled road), then the rectangle symbol type  , then outline the area to be cropped. Once you have finished creating the polygon, it is likely that you may need to edit it slightly to make sure that only data to be deleted lies inside the polygon
- Select the polygon you have just created
- From the Tools menu select *Cutaway*  and then press enter
- Delete the polygon that you have used to do the cropping.

Figure 8 provides an example of cropping the corner off a map. Note:

- The North lines are shortened and still have the arrow head at the top
- Labels that have their attachpoint inside the cropped area are totally deleted – you may need to add some of these back in

Figure 8 – Cropping a Map



An alternative approach, if it is the final map, is to create a polygon, as above, that includes just the competition map and use the *cut-out* tool to remove everything outside of the required map. But this means you will have to redo all of the legends, titles, etc., so is not the preferred approach.

4.4 How to Handle Sponsor Symbols.

There are certain logos that must appear on every WARAmap. These are the rogaining logo, the LotteryWest logo and the Department of Local Government, Sport and Cultural Industries (ex- Dept of Sport and Recreation) Logo (see right). WARA receives financial support from the latter two bodies and displaying their logo is an important recognition of this fact. The Department of Parks and Wildlife Service should be added if it is a bush event.

Logos for other businesses must also be shown on the map if they are sponsoring your particular event. To place a logo:

- Select the Edit Objects tool
- Left-click the symbol you want place from the symbols palette
- Left-click the map to place the logo/scale bar.
- If you want to shrink or enlarge the logo, right-click on the symbol icon in the symbols palette,then choose **Scale…**
- Enter a percentage scale value, then click **Okay**.Obviously, the scale bar should never be scaled under any circumstances!

The most common sponsor labels have been set up as icons and are at the bottom of the Symbol Set.

4.5 Copying Data from Another Map

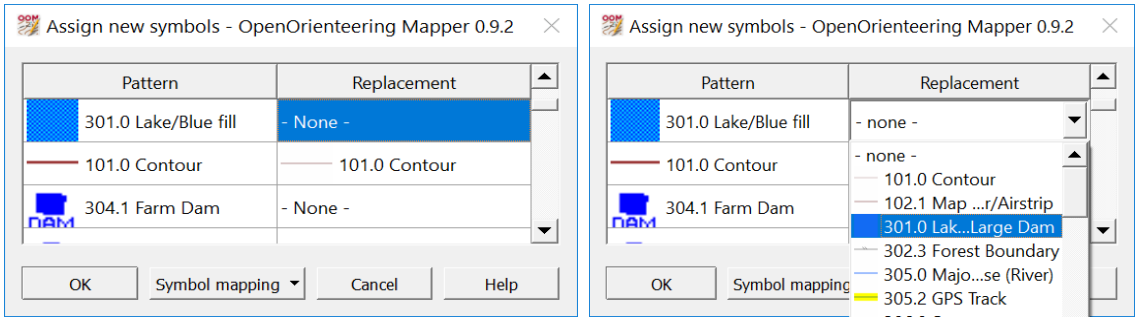
You may need to copy data from another OOMAPPER map, such as extracting data from the template files. This is a simple task: select the required data in the source map and use the standard Windows Copy and Paste functions to add them to the current map (both should be open in different windows). However, all data copied in will be placed at the centre of the destination map. If the maps are at different scales you will get a warning message about rescaling, but the grid co-ordinates of the selected objects are not transferred with them. So make sure that you have

moved you map to the side of the screen before you paste the new objects in, otherwise you will overlay them on your existing map.

If you need to copy data with the right co-ordinates, then you need to use the *import* function under the *File* menu. Note, the import function imports ALL data in the source map, including the legend, map boundaries and everything else. So, to avoid cluttering up your current map, take a copy of the source map and delete everything except for the data that you need to import.

During the import process you may be prompted to "Assign new Symbols". This occurs when there are differences between the symbol sets in the two maps. This will definitely be the case when the source file is an old OCAD map – while most of the symbol numbers will be the same, any difference in the actual text of the label will be highlighted. If you do nothing, the new symbols will be added to the symbol set and the data associated with them will be different to the existing data set. To prevent this, select the down arrow in the replacement field and choose the appropriate replacement. In the example in Figure 9 the description of the symbol is all that has changed.

Figure 9 – Replacing Symbols When Importing from Another Map



4.6 Relating your Rogaine Map to the Real World

Your map is a representation of a rogaine area in space and time. The cartographer may (read should!) attempt to accurately relate information in the real world to map space, and vice versa, to verify map accuracy and truth. It should be noted that mapping errors have crept in where this step has not carried out, even when the setters are highly experienced. Real-world verification could potentially be achieved by:

- importing and plotting GPS coordinates gathered in the field on top of the rogaine map, to determine accuracy (this is VERY STRONGLY RECOMMENDED FOR ALL EVENTS)
- exporting locations from the rogaine map and verifying these are at the correct location in the field
- overlaying the rogaine map onto aerial images such as those found in Google Earth to visually assess accuracy
- using an electronic version of the rogaine map and an aerial image in the field with a "live" setter location.

Each of the above approaches has advantages and technical issues. The simplest and recommended route is by importing GPS coordinates to OOMAPPER, but all may be possible depending on the cartographer's interest and technical expertise. Here we outline how to achieve the above.

4.6.1 Plotting Locations from a GPS Unit onto an OOMAPPER Map

When setters are conducting fieldwork, it is highly recommended that they carry a GPS. The GPS devices owned by WARA, as well as many other devices including GPS-enabled mobile phones, arecapable of recording "tracks" (also known as "routes" or "traces") and "waypoints". It is recommended that setters record a continuous track from the moment they start to the moment they end fieldwork each day, even when driving. Also, when placing a setting plate, a waypoint should be taken to record both the position and ID of the plate.

Once these tracks and waypoints have been recorded, they can be imported into OOM. The waypoints are the most important, since they will show whether or not the setting plate was placed at the position indicated by the control circle. The tracks are sometimes useful to identify features, especially roads, that have been incorrectly mapped or not mapped at all. In these cases, the cartographer would use the GPS track to redraw the road in the correct place on the map.

To import GPS information into OOM you need to obtain the data from your device in GPX format.This guide will not attempt to describe how to retrieve tracks and waypoints and save them as GPXfiles since every GPS device and the software used to access them is different. Please refre to Appendix F of the WARA Setters and Vetters Manual (WARA GPS Users Manual) for information on using the WARA GPS units. Please contact a WARA committee member (or tech guru if you have one) if you need help retrieving GPS data.

The steps below will only work with a properly georeferenced map. If GPS data does not appear inthe right place seek help from WARA Map Co-ordinator who you received the base map from.

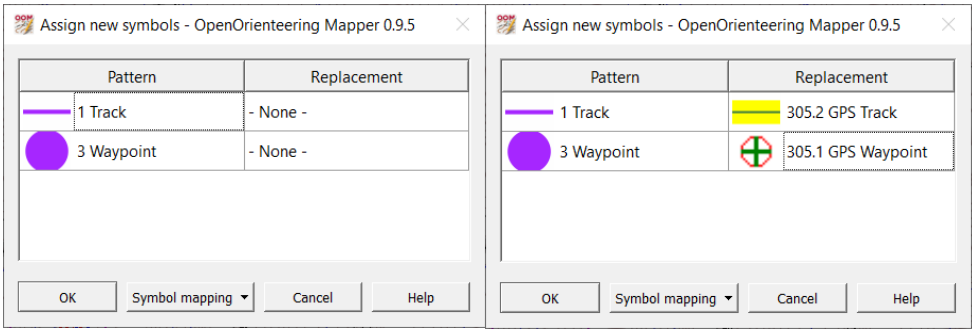
To plot GPS coordinates, obtain a file of GPX data from your GPS device and Import to OOMAPPER. For many newer Garmin devices, this is as simple as plugging in your device and computer via your USB cable. In OOMAPPER click Import from the File menu, select GPX, and navigate to your device, then Import the relevant gpx data. For other GPS devices or older Garmin units, it may be necessary to download a data file in gpx format for the required waypoints prior to importing. While the WARA GPS Users Manual provides the full details on how to download data from a GPS device, Section 4.6.2 provides details on how to upload a gpx file into OOMAPPER.

Please note that setters should (read MUST!) collect **reference** data for each GPS import in addition to the locations that they wish to verify. For example, locations for verification might include control locations, track intersections, etc. Suitable reference points might include: conspicuous lone trees on a defined landscape feature, a known corner of an obvious mapped building, a pile of rocks on clear ground at a defined landscape feature. Each reference location should be clearly obvious and mapped on both on the rogaine map and determinable on the aerial image. Ideally there should be a minimum of four reference locations scattered over the rogaine map that the setting team can regularly record on entering and leaving the rogaine area. Once each batch of GPS locations are overlain on the rogaine map, the cartographer must first determine whether the reference points obtained match with the expected locations on the OOMAPPER rogaine map. Bear in mind the accuracy of your GPS unit, as most have an accuracy of +/-10 m, so variation around a point of this order is to be expected (note that GPS units **must** be switched on and allowed to "warm up" prior to recording waypoints so that satellites can be successfully located and maximum accuracy achieved). Sometimes reference points clearly do not align on their expected locations on the OOMAPPER map, and there is a clear and regular offset for each point. Should this be the case, refer to Section 4.7 on correcting map coordinates (an incorrect coordinate reference system is the normal reason why this occurs). Once reference points are verified, the setter may then continue to determine the extent to which field recorded locations match mapped locations in OOMAPPER, for example control locations. At this point do not simply move the mapped control location if there is a discrepancy, it is vital that the setting and vetting team determines the cause of discrepancy and rectifies if there is an underlying issue. In

the simplest case, a setter may have placed a control on a parallel feature, and the incorrect control location may then be simply remapped in OOMAPPER (or the control moved in the field). In more complex cases a proposed control located on a track may be found not to match the GPS-determined location because the track is incorrectly mapped, in which case the team would be advised to remap the track via GPS and correct the track location in OOMAPPER.

4.6.2 Loading GPX data into OOMAPPER

- Launch OOMAPPER
- Open required map and *File \ Save as* (always work with a new copy of the map, in case the current copy becomes corrupted)
- From the menu bar *File \ Import* and navigate to where your gpx file is located
- Select *Georeferenced* so that your data comes in in the right location
- Select *No* to *Should the waypoints be imported as a line going through all points*
- A window will pop up asking you to assign new symbols. It will come up with defaults, as shown on the left below. If you just clock on OK, these will appear on your map, but the symbol is rather large and not very useful. WARA=specific GPS symbols have been set up that are easier to use. Click on – *none* – and a scroll list will appear – scroll down till you find the symbols as shown on the left below and select these. If they do not appear, you can select any other symbol or go with the defaults. Just make sure that the you are not already using the symbols you select as you will not be able to turn them off later (e.g., do not use a track symbol for the GPS track or a dam for the waypoint).

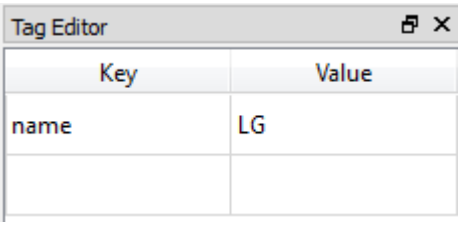


Once imported, OOMAPPER will zoom the screen to the extent of the imported data. It should appear within the extents of your map. **If the GPS data does not appear inthe right place seek help from WARA Map Co-ordinator who you received the base map from.**

If you now zoom in each waypoint should now appear as a small circle with a green crosshair, hopefully inside the control circle.

You may notice that the two letter setting plate code that you typed in when recording thewaypoint is not visible on the map. If you want to see the two letter code of any particular waypoint that you keyed in to the GPS do the following:

- from the menu bar *View* | *Tag Editor*. The tag editor window will open
- Select one waypoint



If you used the WARA GPS devices then you will see something like the image to the right, where *LG* is the two letter code on the setting plate that was keyed in when the waypoint was recorded.

4.6.3 Overlying Aerial Images onto OOMAPPER

Aerial images are the base for Google Earth and are also available from other sources (e.g. Landgate, Nearmaps). WARA is not able to provide aerial images due to cost, but the cartographer may be able to obtain access legally via another route (for example, you may work for an organisation with a Nearmaps or Landgate login). To import a tile of an aerial image into OOMAPPER, save the required tile as a GeoTIFF or JPEG2000 (a georeferenced image, which saves both image and its location) and use the Import function in OOMAPPER. Georeferencing ensures that the image is in the correct position relative to the OOMAPPER map (see Section 4.7). If the image is misplaced relative to the OOMAPPER map, there may be a problem with the coordinate referencing system, so refer to Section 4.7.

There are some circumstances in which you may wish to import an image such as a topographical map without it having prior georeferencing. Note at this point that most aerial images and hard copy maps are protected by copyright. In many circumstances the cartographer may find that viewing for example GPS locations directly on Google Earth may give a quicker result than attempting to overlay aerial images within OOMAPPER. OOMAPPER does, however, have a georeferencing functionality which is outlined in Section 4.8.

4.6.4 Exporting Control Locations

OOMAPPER in its current version unfortunately cannot easily export individual control locations as gpx points, nor indeed identify an individual location on an open map. It can export the entire map in OCAD (.ocd) format via the Export as Image function under the *File* menu. OCAD files can be converted to display on a range of devices (e.g. Garmin, iPad) with some technical wizardry for field use, but note that a device with a reasonably large colour screen is preferred. For example, ArcCollector Classic can import and display OCAD maps on iPads for those with ArcGIS access. Contact the Technical Officer for further advice if required, which will be device- and platform-dependent.

4.6.5 Viewing an OOMAPPER Map Live in the Field

OOMAPPER has an Android interface to permit direct viewing of OOMAPPER maps on an Android Phone with live location. The directions for download and installation are given in the "Mapper App for Android" section of the OOMAPPER online manual. An iPhone / iPad version of the Mapper App is not available. Setters who are technically experienced and wish to view their map on iPhone or iPad may wish to test out alternative platforms for this functionality as outlined in Section 4.6.4. Contact the Technical Officer for further advice.

4.7 Correcting Map Coordinates

The earth is roughly a sphere. Map projections attempt to portray the surface of the earth on a plane, such as paper or computer screen. A coordinate reference system determines how the locations in the real world are related to the planar map that you view. There are three families of projections (cylindrical, conical, and planar), each of which results in distortion of angles,

distances and areas at some points in the map and relative to the real world. For example, a conical projection is accurate at the equator but severely distorts at the poles. There are many individual projections within each projection family which attempt a compromise, but in general, map projections either optimise angular or distance conformity (ie the compass bearing will be correct, or the distance between points correct). Every location on a map can be specified using a coordinate. Geographic coordinates are very commonly used, for example latitude and longitude, each of which comprises degrees, minutes and seconds. The distance represented by one second of latitude and longitude is a square of the same dimension only at the equator, and it should be evident that the further south the further away from a square a segment of a second of latitude and longitude becomes. The most popular geographic coordinate reference system used is the World Geodetic System or WGS84 and is commonly implemented by GPS systems. In contrast, projected coordinates are on an XY plane (think, scatterplot of east-west and north-south coordinates). A popular projected coordinate system is the Universal Transverse Mercator (UTM), and many country-based systems are derived from UTM, such as the Geocentric Datum of Australia (GDA). The Mapping Grid of Australia (MGA) is a derivative of the GDA projection. Locations within GDA are defined by coordinate locations within a named zone (for example Pinjarra is MGA2020 Zone 50 easting 399098 m, northing 6364293 m). Most mapping within the Perth region and specifically all Landgate data on which WARA mapping is produced is in GDA. Note that GDA has or is about to change, such that the numerical suffix represents the year (GDA94 is 94, and GDA2020 represents the latest form which is 2020). Much historical data up to 2020 will be projected in GDA94, and from 2020 we are about to receive data in GDA2020. Prior to GDA94, even older data may be projected in Australian Mapping Grid (specifically AMG66 or AMG84).

Now imagine that we hold in our hands a paper bushwalking map of the Perth Hills. Superimposed on the map is regular grid squares of northing and easting lines corresponding to the MGA grid, allowing us to determine MGA coordinates. Now imagine that we have also a GPS unit, and determine a waypoint location which will be returned in degrees, minutes, seconds latitude and longitude. It would not be easily possible in the field to determine a location on the MGA grid corresponding to the waypoint in latitude and longitude. This is because the coordinate reference system of the map and the GPS are different. We can have exactly the same situation on an OOMAPPER map. Indeed, our situation can be more complex as our base map data may be projected in GDA94, GD2020, AMG84 or AMG66. The same point plotted in each of these projections will differ by about 200-250 m in absolute location, so that it is important that any map is plotted in its correct coordinate reference system or transformed appropriately. Similarly, GPS data to be overlain must be plotted in WGS84 or transformed appropriately. Further, your GPS unit should be set to save locations in UTM projection, which is the closest match to MGA.

To verify that the data for your current OOMAPPER map is correctly projected in OOMAPPER, check the Georeferencing button under Map to bring up the Georeferencing window. You should enter your coordinate referencing system as follows using EPSG codes, entering the relevant number as below:

AGD84/MGA zone 50 – EPSG 20350

GDA94/MGA zone 50 – EPSG 28350

GDA2020/MGA zone 50 – EPSG 7850

You will also notice on this OOMAPPER box below the coordinate referencing system input boxes the facility for ensuring that georeferencing is correct by verifying a coordinate on a map, by checking scale, and also by ensuring magnetic declination. Normally a correctly georeferenced map should not require georeferenced point correction, but this may be carried out in the event that there appears to be a discrepancy in the georeferenced utility. Magnetic declination varies between years, and should be corrected to that for the current year in the mapped region via the relevant box. To identify any errors in map scaling:

1. While in the field – create some waypoints of unmistakable locations in the corner-areas of your event map area (see section 4.6.1).
2. When using OOMAPPER – zoom in as much as you can on one of the features you have marked a waypoint for. Note the coordinate that is displayed in the bottom right hand corner of the workspace (Figure 1) when the cursor is exactly over that feature. Be careful - different cursors have a different "hot-points"– for an arrow cursor it is the tip of the arrow. The coordinate of the cursor is 416292 (horizontal – east/west) and 6279515 (vertical – north/south) in the example below.

   Note: if you right click on the bottom right hand corner, you can change the display of the map co-ordinates to Lat/Log co-ordinates in decimal form or in degrees/minutes/seconds (DMS). If the number is in mm, it is still in map co-ordinates. The display can also be changed through the *View* menu option, *Display coordinates as ...*
3. Calculate the difference between the GPS-provided waypoint and the OOMAPPER-provided coordinate for the features. Subtract the OOMAPPER values from the real-world values. The values calculated may be negative – that is okay.

Pass this information on to the Technical Officer, along with a copy of your current map, so that they can assess the source of the error and correct the map for you.

4.8 Including Artwork

Some cartographers like to jazz up their maps by including artwork or photographs. To include artwork on your map:

- Make sure your image is saved in one of the following file formats: bmp, gif, jpeg, jpg, tif, tiffor png
- Under the *Templates* menu, select *Template setup Window…*
- The template window should have appeared. In the lower left hand corner, *click* the green +symbol, then click *Open…*
- Navigate to and choose your artwork file, then click *Open*
- A dialogue will appear. Select "*Meters per pixel*" , type 10 into the box, then click Open. The artwork should appear at the centre of the map window
- To scale the artwork, got to the Templates window and select ***Edit >> Positioning…*** The positioning dialogue box will appear
- Alter the X-scale and Y-scale values to change the size of your artwork. Normally you would set these to the same value otherwise you will squash your image.
- When happy with the size, to reposition the artwork, go to the Template window and choose the *Move by Hand* tool. 
- *Left-click and drag* the artwork to the desired position.

4.9 Background Maps

Often when setting a map, the setters come across roads, tracks, and other features in the field that are not on the OOMAPPER data provided to them. There are occasions when it is necessary to

add these features to the map as controls map have been placed on them, or they are required to ensure that competitors are not mislead by not having them there (in a logging area, old data may not have very substantial roads, as the roads may have been put in after the map data was collected).

Any graphics image can be placed behind an OOMAPPER map as a background image. Consequently, it is possible to use an image to update the map. Placing an aerial photograph behind the map enable the operator to trace in a track, a creek, a dam or whatever feature is missing. The cartographer should, however, be aware that most hard copy maps and aerial images are protected by copyright. It is also more accurate to follow new tracks with a GPS on and import the trace of that track via a GPX file. Similarly with dams, etc. – take a waypoint at new dams.

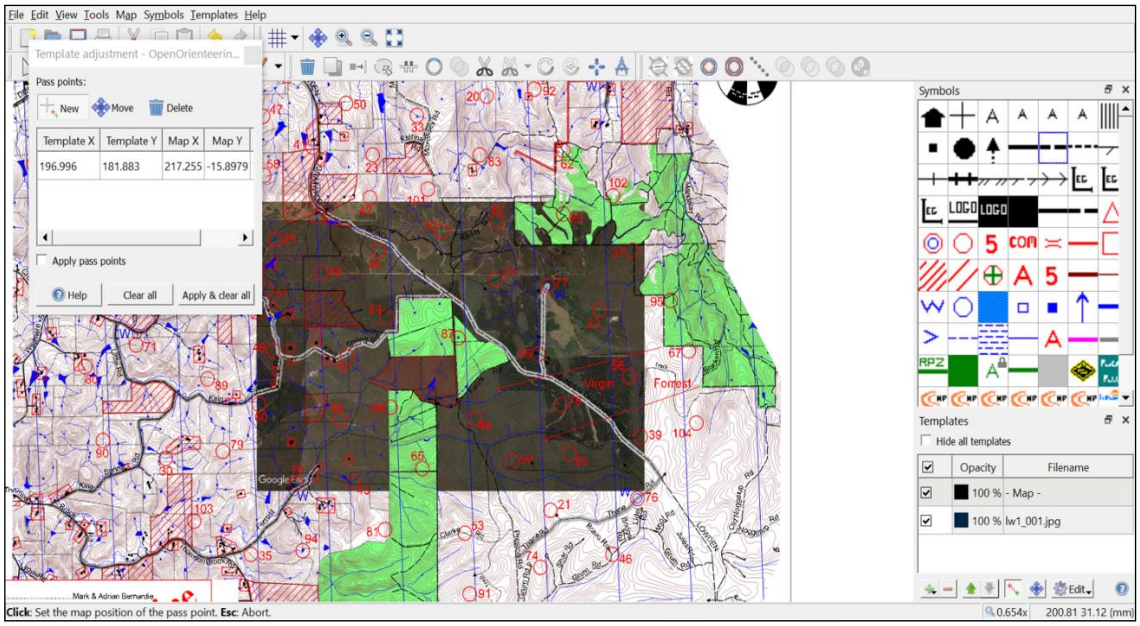
A background map is simply a graphics image – a jpg, tiff, bmp, or a gif file. If you have access to a more up-to-date topographical map and are legally able to, use a scanner to obtain one of these files. Similarly, any graphics image legally obtained, even via screenshot, may be used as a background map. The easiest method is to obtain a georeferenced image (see Section 4.6.3 above). If your image has been legally obtained but is not georeferenced, continue as below.

To load the image into OOMAPPER, select *Templates* from the top menu, and choose *Open Template*. Navigate to where your image is stored and select it. OOMAPPER will ask you how to position and scale the image. As you probably do not have sufficient information to make an accurate load, put 10 in the box *meters per pixel*. That will bring it in a at a scale that you can manipulate. You will now have your image behind the OOMAPPER map, but it will not be where you want it to be or the right scale. The *template* window will now be active, below the symbol set.

The next step is to geo-reference, or adjust, it. This is where the common points come into play. You have to tell the image which points on the image correspond to which points on the OOMAPPER map. For this, you need at least three points. To do this, select the Adjust icon ( ) from the base of the Template window. The *pass points* window will pop up. Select *new* from this and then click on one of the features on the image with the mouse, and then click the corresponding point on the map. This will add a pass point to the list. Repeat this process for as many common points as you have, and then tick the *apply pass points* box. OOMAPPER will adjust (/stretch) the image so that these points coincide. Now check other points on the image and see if they match – for example, if a road runs through the aerial photography, make sure that it matches the road on the map for its full length. You may well have to do this process several times before you get it right.

Figure 10 provides an example where one set of pass points connecting a forest boundary corner has already been set and the second is in progress. The sets of pass points are connected with a red line. Typically, you should try to use connecting points on opposite sides of the photo. Points close together may generate a close match nearby but any minor error in connecting can generate major distortions on the other side of the photo.

Figure 10 – Adding a Template



So, things to remember are:

- Make sure you don't use all your common points to adjust the image – otherwise you won't be able to check how accurate the adjustment was
- If you only use one common point, you will just move the image behind the map, no adjustment will occur
- If you use the wrong points, the image will be skewed
- You can zoom and pan around whilst doing it, but make sure you don't click within the image to pan – the program will assume that that is the point you want to adjust. The best idea is to zoom in before you start, and then use the scroll bars on the side to pan around.

Note that

- All you are doing is assigning translation points – you are not modifying the image itself. So if you make a mistake, just do it again.
- If you weren't quite accurate the first time, and you do Adjust it again, OOMAPPER does not remember the first set of points, so you will have to associate them again.

Remember, if the whole area is bush, it may well be difficult to find enough points to guarantee a good translation of an aerial image – so be very careful, and only use it if you are sure.

Once you have the background image in the right place, you can then use the standard OOMAPPER tools to add on the features that you want. Generally, if you can see a track on an aerial photo, you can see it on the ground – but make sure you check it out afterwards.

You can have multiple background maps, but they do increase the size of your OOMAPPER file, and if they do super- impose, you can only see the top one. You can adjust their transparency on the *Templates* menu and also the order, so that you and determine which is on top. This could be useful if you want to put a newer topographical map behind it with tracks marked for control collectors, but the additional data makes the map hard to read.

When you are finished with an image, it is a good idea to remove it – otherwise the OOMAPPER file will increase significantly in size.

A final word of warning. The accuracy of a background map is only as good as the pass points used and the amount of distortion generated. DO NOT adjust features already on the map to match the photo. If you do digitise any features from the photo onto the map, you must field validate using a GPS.

4.10 Printing Maps for Fieldwork

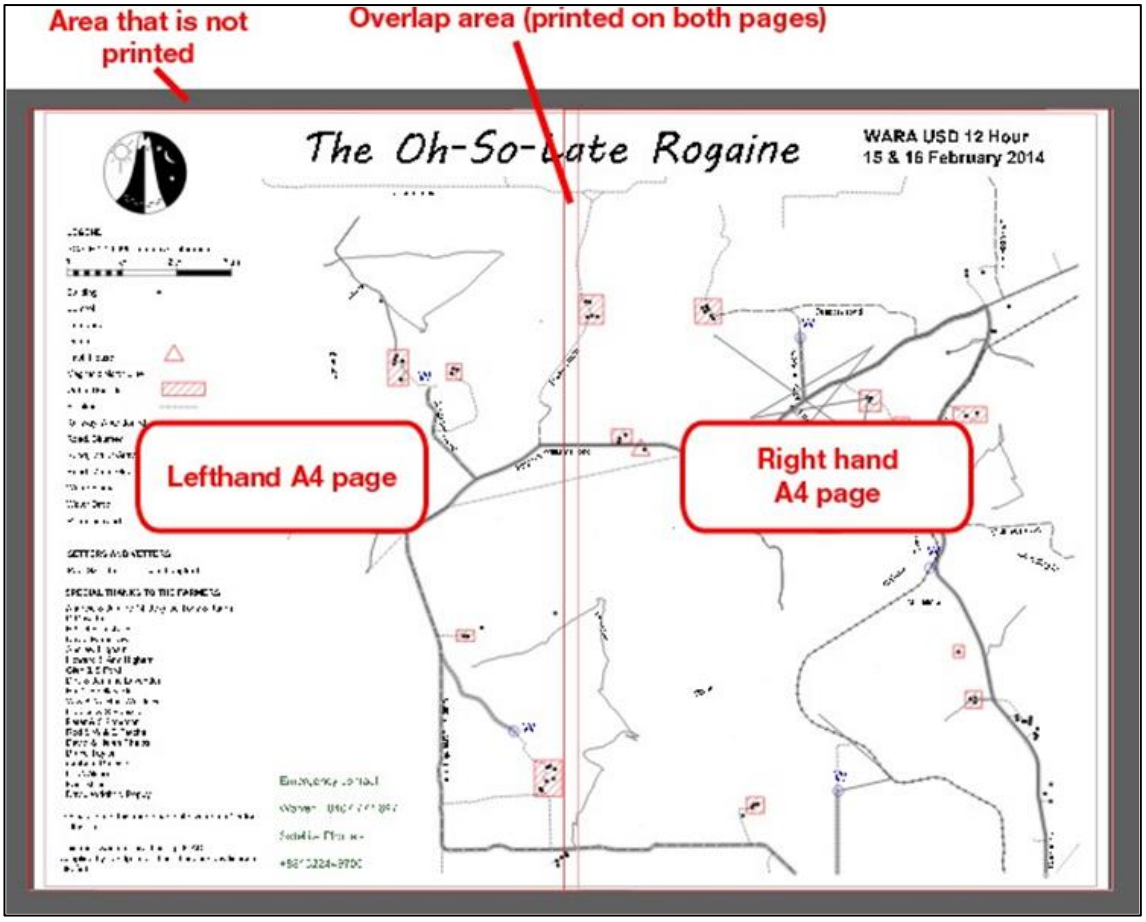
Printing your map on a home or workprinter is fairly straightforward:

- From the *File* menu select *Print* to access the print dialogue.
- Select the printer you want to usefrom the *Printer* drop down box.
- Choose the appropriate page size(A3 or A4) and orientation (landscape or portrait). You will notice that the map area has become dark except for a white area in the centre which represents the printed page. This white area will change in response to the options you set.
- If the entire page is greyed out, then a print area has yet to be set up for this map. If this has occurred, then
    - Set Map Area to **Single Page.** The white print area should appear
    - Change the page format to **A3**
    - Change the Page Orientation to Landscape or Portrait as appropriate

If you want to print an A3-sized map but only have an A4 printer do the following:

- Set Map Area to **Custom Area**
- Set the Page Format to **A4**
- If you are printing a portrait A3 map select **Landscape**. Likewise if you are printing a landscape A3 map, select **Portrait**.
- Check **Center print area**
- Click and drag the red border of the printed area so that it is large enough to cover your map.
- You should now see something like that in the image on the next page. To finish, click **Print**
- then trim one page and tape or glue the two A4 pages together along the overlap region.

Figure 11 – Print Areas



4.11 Printing Competition Maps

Competition maps must be printed by a professional printer. The professional printer will require themap to be supplied in PDF format. To create a PDF, do the following:

- From the File menu select *Export as…* and then *PDF* to open the PDF export dialogue. This dialogue is exactlythe same as the print dialogue, except the *Printer* option is missing.
- Set the *page format* to the appropriate size (*A3* or *A4*) and the appropriate *page orientation (landscape* or *portrait*)
- Set *Map area* to *Single Page*
- Check *center print area*
- Make sure *Vector graphics* mode is selected, if available. Vector-based PDFs can be significantly smaller than raster-based PDFs and much easier to email
- If you have added any templates (background images), make sure *Show templates* is checked and that the *resolution* is set to a value between 300 dpi and 600 dpi.
- If you need to make your page just a little bit taller (or wider) than a standard A3 or A4 pageto fit your map then you may set a custom page. From the Page Format drop down box select *Custom* then type in your desired page height and width. However, under no circumstances should the printed map exceed 450 mm on the longest side and 320 mm

on the shortest side. Anything larger than this will need special consideration by the committee and the printer.

- Click ***Export*** to finish. The result can be viewed in any PDF viewer (Adobe Acrobat reader isone such viewer that is available for free online).

Appendix 1 Drawing Tool, Keyboard and Mouse Combinations

	——————————— Drawing tool ———————————			
				
Left-click	Places a point that will be followed by a straight line.	Places a point in a straight-sided shape.	Places first point in a circle. A second *left-click* closes the circle.	Does nothing
Left-click and drag then *release*	Places a point that will be followed by a curved line **Note:** To get a curved line segment, you must do this at least twice in a row.	*Left-click* places a corner point in a straight-sided shape, *drag* allows you to set the direction and length of the line and *release* finishes the line/places the next shape corner point.	*Left-click* places the first point in a circle, *drag* enlarges the circle to desired size and *release* finishes the circle.	*Left-click* starts the freehand line, *drag* places short lines segments following your mouse cursor and *release* ends your line.
Right-click	After you have started drawing a path, *right-click* finishes a path and does include the last point (the place where you right-clicked) in the shape.		After you have started drawing a circle, *right-click* finishes the circle ***Note***: To draw an ellipse, *left-click*, then *right-click and drag*, then *release*.	Does nothing
Double left-click	After you have started drawing a path, *double left-click* finishes a path and ***does not*** include the last point (the place where you double left-clicked) in the shape.		Does nothing	
Return Key (i.e. the key above **Shift** — the key in the number pad won't work!)	After you have started drawing a path, pressing **Return** finishes the path and converts it to a closed shape by joining the first point to the last point.	Same behaviour as *double left-click*.	Does nothing	
Hold **Shift** key then *left-click*	This will cause the program to force the next point to go directly over top of an existing point or line. This is known as snapping. It is very useful, for example, when you want to draw two intersecting lines or place a control circle directly over a watercourse.		Does nothing	

	Drawing tool			
				
Hold **Shift** key then *left-click and drag*	After you have started drawing a path, this combination will allow you to trace existing lines and areas. Nifty!	Does nothing		
Backspace Key	After you have started drawing a path, the **Backspace** key deletes the last point drawn.		Does nothing	
Esc Key	After you have started drawing a path, pressing **Esc** at any time will abort drawing.			
Hold **Ctrl** key	After you have started drawing a path, holding the 'Ctrl' key displays a light blue asterisk. The next line segment is forced to align to with one of the blue lines.		Does nothing	
Hold **Ctrl** key then *left-click*	Before starting to draw a shape, by holding the **Ctrl** key then left-clicking on a pre-existing line or shape, a blue crosshair will appear. Release the **Ctrl** key. This crosshair will force the new line to be drawn either parallel or perpendicular to the pre-existing line. To remove the crosshair, press the **Ctrl** key.		Does nothing	
Press **space bar**	Turns dash points on and off. This is only important for lines that are dashed (like minor roads). For more information see the dash points section.		Does nothing	

Appendix 2 Drawing Magnetic North Lines

The instructions below assume that the map has been properly georeferenced. Please see theGeoreferencing section and ensure this is the case before proceeding.

Magnetic north lines need to be drawn at a particular angle and with a particular spacing. One strategy to achieve this is to draw these lines on blank map, then copy and paste them onto your course map. To do this:

- Select File >> New… and the Create new map dialogue will appear.
- Click on the Scale dropdown box and type in your map scale (25,000 or 50,000)
- Select Empty symbol set from the list of options
- Click Create

Now we will set up a grid that we will use to space and align the north lines

- Select Map >> Configure Grid and a dialogue will appear.
- Place a check next to show grid
- Set the Unit dropdown box to millimetres on map.
- Change Horizontal spacing to 30.0mm (or 40.0mm if you want your north lines spaced further apart).
- Change Vertical spacing to 420.0mm.
- Click OK
- The grey map editor window will be replaced with tall grey rectangles. If you only see vertical lines, zoom out a bit and they will appear.

Before we can draw the north lines, we need to import the magnetic north line symbol from your map. To import the symbol:

- Select Symbols >> Replace Symbol Set…
- Navigate to your map, select it, then click Open
- The Replace symbol set dialogue will appear. Click OK

We are now ready to draw the magnetic north lines:

- Select the magnetic north line symbol in the symbols window
- Ensure the Draw Paths tool is activated
- Hold the **Shift** key and position the mouse cursor near the intersection of two grid lines
- When a blue cross appears, left click once.
- While still holding shift, move the mouse curse up the screen to the next intersection until ablue cross appears.
- Right-click.
- Repeat this process until you have drawn about 20 parallel lines.

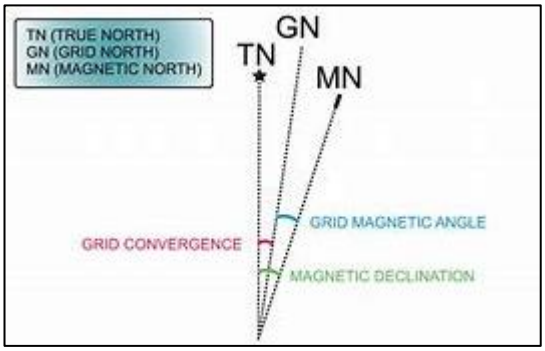
Next, the magnetic north lines need to be rotated to the correct angle relative to the map. To calculate this angle:

- Go back to your competition map

- Select *Map >> Map Georeferencing*

  Record the Declination value (call this angle G1). The declination value is the difference between true north and grid north, shown on Figure 12 as Grid Convergence

  Figure 12 – True and Magnetic North



- Click on the *Lookup* button next to the Declination field and then *Yes.* You will be taken to the website www.ngdc.noaa.gov which will calculate the magnetic declination for your map. The form will return a '**D**' value of around -2°. Record this value. It is the difference between true North and Magnetic North, or Magnetic Decliantion, as shown on Figure 12.
- Now, evaluate the following formula:

  D + G1 = R

  Note, as D is negative and G1 is positive, the resultant R has an absolute value less than that of D. This is the Grid Magnetic Angle, shown in Figure 12

To apply the rotation to the lines:

- Go back to the OMAP file where you drew your magnetic north lines.
- Select Map >> Rotate Map…
- Enter the value of **negative** R e.g., if your calculated R value is -2.53°, enter +2.53°
- Click Okay

Finally, copy and paste your properly spaced and angled magnetic north lines onto your map:

- Use the edit tool to select all of the magnetic north lines, then select Edit >> Copy
- Go back to your competition map
- Centre the map on your screen by pressing Show whole map
- Select Edit >> Paste
- Click and drag the pink dotted border to position the magnetic north lines as required.
- The north lines will hang over the edge of your map area. Do not go to the trouble of adjusting the length of each line manually. Rather, when it comes time to crop your map (see cropping your map section), the magnetic north lines will also be cropped.

How do you check if you got the right result?

- Your magnetic north lines should slant slightly to the left of north i.e., slightly towards northwest.