APPENDIX 6
BASIC MAPPING SKILLS*

CONTENTS

INTRODUCTION	2
MAP READING	2
Scale	2
Symbols	3
Contours	3
Orientation	4
TYPES OF MAPS	5
Topographical maps	5
Aerial photographs	5
MAPPING AIDS	6
Compass	6
Compass bearings	7
Global Positioning Systems	8

* Deacon, G. and Harding, G. 2007. *Worksite Management Manual.*

BASIC MAPPING SKILLS

INTRODUCTION

Map skills are essential for all persons undertaking clearing of invasive alien plants. Maps serve to orientate one in relation to location of the area and its boundaries. This assists in pre-planning and execution of the work. For calculation and scheduling purposes areas can be divided on the map into Natural Biological Alien units (Nbals) to clear. An Nbal is a homogenous area defined by a species, age class or density perspective. The use of a variety of maps will improve the quality of your work plan.

MAP READING

Scale

A map drawing of a piece of land is smaller than the actual piece of land. To be useable it must be an accurate representation of the land that it is showing. This is termed **drawing to scale**.

There is a large variety of scales that are available, each with a particular use.

- A large-scale map shows a large area of land in broad detail. Mountains, rivers, and roads will be shown but the smaller details will not be available. This sort of map is generally used for orienting within a large area and would be used, for example, when travelling from Cape Town to Johannesburg.
- A small-scale map shows more detail. The detail depends on how small the scale is but will include contours, fence and power lines and minor roads. This type of map would be used when walking or working in an area where detail is required.

Scale is given as a ratio, e.g. 1:10 000. This means that one centimetre (cm) on the map represents a distance of 10 000 cm on land or 1 cm on the map equates to 100 m on land. This scale is ideal for use in IAP management.

A scale of 1:50 000 means that each cm on the map equals 500m on land. This scale of map is useful for management of a region consisting of numerous projects. To determine land distance from a map using the scale, measure the required distance on the map using string or similar. Measure this against a ruler in either mm or cm. If cm is used, divide the scale of the map by 100. If mm is used divide the scale of the map by 1 000. The value obtained from the scale is then multiplied by the distance (cm or mm) measured on the map.

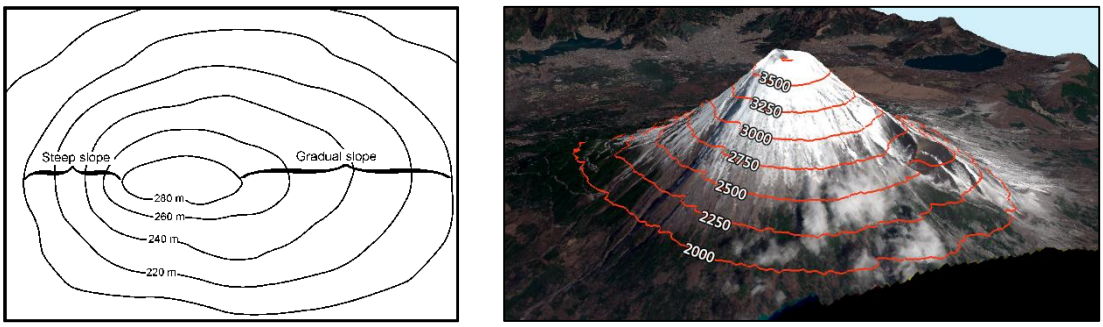

Figure 1: Examples of contour lines

Example using a 1:10 000 map

The contract length as measured on the map is 3.5 cm. The ground distance is obtained by:

- (10 000/100) x 3.5 = 350 m

Example using a 1:50 000 map

The distance between two towns is measured as 50 mm. The ground distance is obtained by:

- (50 000/1000) x 50 = 2 500 m or 2.5 km

Symbols

To make maps internationally acceptable and understandable, a set of symbols has been developed. A symbol is a drawing on the map to represent an object on the ground. When using a map, use the guide on the map that explains the meaning of each symbol.

Contours

A map may be covered with a number of fine (usually pale brown) lines. This is known as a topographical map and these lines are termed contours. Contours represent the height above mean sea level. Each line on the map connects all points that are, for example, 200 m above sea level. If these lines are far apart, then the incline (slope) is slight or gentle; when they are close together, this indicates a steep incline. Contour lines are at given heights, as will be indicated on the map. Some maps have contour lines at every 10 m while on others it may be 50 m.

The benefit of contour lines is that they give users a clear indication of the type of terrain they are facing. For contractors, it will show whether the work is on a flat area or a steeply sided valley. From this, estimates of accessibility, ease of clearing and clearing methods can be developed.

Orientation

All maps have an arrow showing true and magnetic north. This is given so that the map can be oriented against the land it represents. Once this is done, it is a simple process to locate a position on the map relevant to the land.

Since all maps must be accurately oriented it is important that map users have an accurate compass (or a compass app function on their cell phone) and know how to use it.

TYPES OF MAPS

Topographical maps

A topographical map shows the layout (or the topography) of the land. It indicates the height above sea level using contour lines, which also give details of the gradient of the land. This type of map is useful for assessing accessibility to an area and walking time to an area. Rivers, roads and compass bearings are shown on these maps.

It is advisable that a contractor has a topographical map of the area where the work is to be conducted.

Aerial photographs

Aerial maps are made from photographs (images) taken from aeroplanes at set heights above given areas (Figure 2). These types of maps are particularly useful as they provide a picture and not just a line drawing of the area. While many people find these easier to understand, they give less detail than topographical maps.

A 1:10 000 map is the ideal scale for Nbals and other land features to be easily recognisable. It is important to remember that one needs to get the most up-to-date aerial map as landscapes change over time due to fires, development, etc. These maps are also orientated with compass bearings and can be overlaid by contour lines if preferred.

Figure 2: An example of an aerial photograph clearly showing features such as trees and open ground

MAPPING AIDS

Compass

A hand-held magnetic compass is a useful tool in clearing operations. A compass can be used to orientate oneself in a contract area by placing the compass on the map and aligning the compass bearing of the map to that of the magnetic compass. Remember that there is a small variation between true North and magnetic North (Figure 3). Directional information is now also available through various cell phone-based applications. The earth has a natural magnetic field. This field is used through a magnetic compass to find magnetic North and then true North.

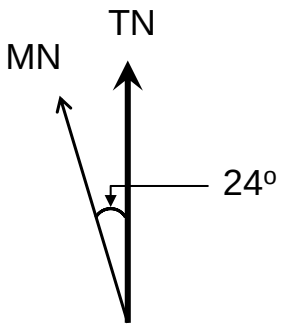

Figure 3: The variation of magnetic north (MN) from true north (TN). This variation is normally around 24^0 west of true north.

Compasses are also useful for management purposes, cutting transects through areas where vegetation is dense or closed, settling boundary disputes between neighbouring contracts, or orientating escape routes across prevailing winds in fire hazard areas.

Compass bearings

The compass needle rotates through a complete circle. To facilitate measurements, this circle is divided into 360 degrees. By default, true North is given as zero degrees, East as 90, South as 180 and West as 270 degrees. North can therefore also be 360 degrees but this is seldom used. Figure 4 shows a schematic of a compass with the key bearing marks.

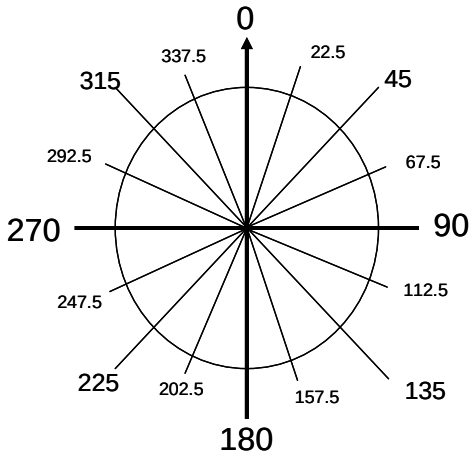

Figure 4: A diagram showing the compass given in degrees

The main pointers are North, South, East and West but the compass can be broken down into further sectors, as shown in Figure 5. Terms such as “northeast” are less accurate than the bearing but are often used as a general bearing when accuracy is less important.

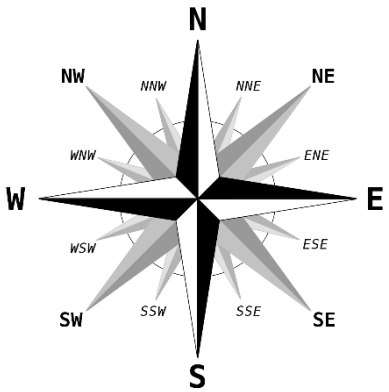

Figure 5: A diagram showing the key compass directions

GLOBAL POSITIONING SYSTEMS

The Global Positioning System (GPS) was developed by the United States Military to accurately find your location on the ground. The system makes use of special satellites launched for this purpose. The GPS is a radio receiver that collects information from these satellites, which it uses to determine the position on the ground. To do this the GPS connects to a minimum of three satellites.

A hand-held GPS is a useful but not essential tool for field work. It has a role to play as it can store data on locations which can be located at a later stage. For example, the co-ordinates of landmarks, such as stumps or large trees felled in the initial phase, can be stored and be found at a later date. Handheld GPSs are generally accurate down to 5 square meters. This depends on how many satellites are found.