APPENDIX A – COURSE PLANNING PRINCIPLES

AA1. Introduction

AA1.1 The purpose of course planning principles is to establish a common standard for the planning of foot orienteering courses in order to ensure fairness in competition and to safeguard the unique character of the sport of orienteering.

AA1.2 Courses in all foot orienteering events shall be planned in accordance with these principles.

AA1.3 The term 'orienteering' used throughout this Appendix refers specifically to 'orienteering on foot'. The terms competitor, planner, organizer, and controller means an individual of either gender.

AA1.4 Course standards are defined by the levels of technical and physical difficulty.

AA1.5 In addition to understanding the principles contained in this Appendix, all planners are encouraged to attend training courses, and to read relevant books and articles on the subject.

AA2. Basic Principles

AA2.1 DEFINITION OF ORIENTEERING

Orienteering is a sport in which competitors visit a number of control points marked on the ground, in the shortest possible time aided only by map and compass. Orienteering on foot may be characterised as running navigation.

AA2.2 AIM OF GOOD COURSE PLANNING

The aim of course planning is to offer competitors courses correctly designed for their expected abilities. Results must reflect the competitors' technical and physical ability.

AA2.3 THE COURSE PLANNER'S GOLDEN RULES

The course planner must keep the following principles in mind:-

AA2.3.1 UNIQUE CHARACTER

Every sport has its own character. The unique character of orienteering is to find and follow the best route through unknown terrain against the clock. This demands orienteering skills: accurate map reading, route choice evaluation, compass handling, concentration under stress, quick decision making, running in natural terrain, etc.

AA2.3.2 FAIRNESS

Fairness is a basic requirement in competitive sport. Unless the greatest care is taken at each step of course planning and course setting, luck can easily become significant in orienteering competitions. The course planner must consider all such factors to ensure that the contest is fair and that all competitors face the same conditions on every part of the course.

AA2.3.3 COMPETITOR ENJOYMENT

The popularity of orienteering can only be enhanced if competitors are satisfied with the courses they are given. Careful course planning is therefore necessary to ensure that courses are appropriate in terms of length, physical and technical difficulty, control siting, etc. In this respect it is particularly important that each course is suitable for the competitors doing that course.

AA2.3.4 WILDLIFE AND THE ENVIRONMENT

The environment is sensitive, wildlife may be disturbed, and the ground and vegetation may suffer from overuse. The environment also includes people living in the competition area, walls, fences, cultivated land, buildings and other constructions. It is usually possible to find ways to avoid interference with the most sensitive areas without damage. Experience and research have shown that even large events can be organised in sensitive areas without permanent damage if the correct precautions are taken and the courses are well planned. It is very important that the course planner ensures that there is access to the chosen terrain and that any sensitive areas in the terrain are discovered well in advance and discussed with the environmental authorities.

AA2.3.5 MEDIA AND SPECTATORS

The need to give a good public image of the sport of orienteering should be a concern for a course planner at events where a media presence is likely.

AA3. The Orienteering Course

AA3.1 TERRAIN

The terrain must be chosen so that it can offer fair competition to all competitors. To safeguard the character of the sport, the terrain should be runnable and suitable for testing the orienteering skills of the competitors.

AA3.2 DEFINITION OF AN ORIENTEERING COURSE

An orienteering course is defined by the start, the controls, and the finish. Between these points, which are given precise locations in the terrain and correspondingly on the map, are the course legs over which the competitor must orienteer.

AA3.3 THE START

The start area should be so situated and organised that waiting competitors cannot see route choices made by those who have started. The point from which orienteering on the first leg begins is marked in the terrain by a control flag with no marking device, and on the map by a triangle. The competitors should be faced with orienteering problems right from the start.

AA3.4. THE COURSE LEGS

AA3.4.1 GOOD LEGS

The course legs are the most important element of an orienteering course and will largely determine its quality. Good legs offer competitors interesting map-reading problems and lead them through good terrain with possibilities for alternative individual routes. Within the same course different types of legs should be offered, some of them based on intense map-reading and others containing more easily run route choices. There should also be variations regarding leg length and difficulty, to force the competitor to use a range of orienteering techniques and running speeds. The course planner should also endeavour to give changes in general direction for consecutive legs as this forces the competitors to reorientate themselves frequently. It is preferable for a course to have a few good long legs joined by short links designed to enhance the legs rather than a larger number of even but lesser quality legs.

AA3.4.2 FAIRNESS OF LEGS

No leg should contain route choices giving any advantage or disadvantage which cannot be foreseen from the map by a competitor under competitive conditions. Legs which encourage competitors to cross forbidden or dangerous areas must be avoided.

AA3.5 THE CONTROLS

AA3.5.1 CONTROL SITES

Controls are placed at features in the terrain that are marked on the map. These must be visited by the competitors in the given order, if the order is specified, but following their own route choices. This demands careful planning and checking to ensure fairness. It is particularly important that the map portrays the ground accurately in the vicinity of the controls, and that the direction and distances from all possible angles of approach are correct. Controls must not be sited on small features visible only from a short distance if there are no other supporting features on the map. Controls must not be sited where the visibility of the control flag for runners coming from different directions cannot be evaluated from the map or control description.

AA3.5.2 THE FUNCTION OF THE CONTROLS

The main function of a control is to mark the beginning and end of an orienteering leg. Sometimes controls with other specific purposes need to be used as, for example, to funnel runners around dangerous or out of bounds areas. Controls can be adjacent to refreshment, press or spectator points.

AA3.5.3 THE CONTROL FLAG

The control equipment must be in accordance with the rules for OI events. As far as possible, a control flag should be placed in such a manner that competitors first see it only when they have reached the described control feature. It should be accessible from all sides and in the case of restricting features like a crag it should be placed 1m in front of it. For fairness, the visibility of the control should be the same whether or not there is a competitor at the control site. On no account should the control flag be hidden when competitors reach the control they should not have to search for the flag.

AA3.5.4 FAIRNESS OF CONTROL SITES

It is necessary to choose control sites with great care and notably to avoid the acute angle or 'dog leg' effect where incoming competitors can be led into the control by outgoing runners.

AA3.5.5 PROXIMITY OF CONTROLS

Controls on different courses placed too close to one another can mislead runners who have navigated correctly to the control site. According to Rule 10.8 controls shall not be sited within 30 metres of each other (15 metres for map scales 1:5000 or 1:4000). Only when the control features are distinctly different in the terrain as well as on the map, should controls be placed closer than 60 metres (30 metres for map scales 1:5000 or 1:4000).

AA3.5.6 THE CONTROL DESCRIPTION

The position of the control with respect to the feature shown on the map is defined by the control description. The exact control feature on the ground, and the point marked on the map, must be indisputable. Controls which cannot be clearly and easily defined by the IOF control symbols are usually not suitable and should be avoided.

AA3.6 THE FINISH

At least the last part of the route to the finish line should be a compulsory marked route.

AA3.7 THE ELEMENTS OF MAP-READING

On a good orienteering course, competitors are forced to concentrate on navigation throughout the race. Sections requiring no map-reading or attention to navigation should be avoided unless they result from particularly good route choices.

AA3.8 ROUTE CHOICE

Alternative routes force competitors to use the map to assess the terrain and to draw conclusions from it. Route choices make competitors think independently and will split up the field, thus minimising 'following'.

AA3.9 THE DEGREE OF DIFFICULTY

For any terrain and map, a course planner can plan courses with a wide range of difficulty. The degree of difficulty of the legs can be varied by making them follow line features more or less closely. Competitors should be able to assess the degree of difficulty of the approach to a control from the information available on the map, and so choose the appropriate technique. Attention should be paid to the competitors' expected skill, experience, and ability to read or understand the fine detail of the map. It is particularly important to get the level of difficulty right when planning courses for novices and children.

AA3.10 COMPETITION TYPES

Course planning must account for the specific requirements of the type of competition considered. For instance, course planning for Sprint and Middle-Distance orienteering must call on detailed map reading and on a high degree of concentration throughout the entire course. Course planning for relay competitions should consider the need for spectators to be able to follow closely the progress of the competition. Course planning for relays should incorporate a good and sufficient forking/splitting system.

AA3.11 WHAT THE COURSE PLANNER SHOULD AIM FOR:-

AA3.11.1 KNOW THE TERRAIN

The course planner should be fully acquainted with the terrain before they plan the courses. The Planner should also be aware that on the day of the competition the conditions regarding map and terrain could be different from those which existed at the time the courses are planned.

AA3.11.2 GET THE DEGREE OF DIFFICULTY RIGHT

It is very easy to make courses for novices and children too difficult. The course planner should be careful not to estimate the difficulty just on their own skill at navigating or on their walking speed when surveying the area.

AA3.11.3 USE FAIR CONTROL SITES

The desire to make the best possible legs often leads a Planner to use unsuitable control sites. Competitors seldom notice any difference between a good and a superb leg, but they will immediately notice if a control leads to unpredictable loss of time due to a hidden control site or flag, ambiguity, a misleading control description etc.

AA3.11.4 PLACING CONTROLS SUFFICIENTLY FAR APART

Even though the controls have code numbers they should not be so close to each other as to mislead competitors who navigate correctly to the control site on their course.

AA3.11.5 AVOID OVER-COMPLICATING THE ROUTE CHOICES

The Planner may see route choices which will never be taken and thereby may waste time by constructing intricate problems, whereas the competitors may take a 'next best' route, thus saving time on route planning.

AA3.11.6 COURSES THAT ARE NOT TOO PHYSICALLY DEMANDING

Courses should be set so that normally fit competitors can run over most of the course set for their level of ability. The total climb of a course should normally not exceed 4% of the length of the shortest sensible route. The physical difficulty of courses should progressively decrease as the age of the competitors' increases. Special care must be taken that the courses for classes M70 and over and W65 and over, are not too physically demanding.

AA4. The Course Planner

AA4.1 The person responsible for course planning must have an understanding and appreciation of the qualities of a good course gained from personal experience. They must also be familiar with the theory of course planning and appreciate the special requirements of different classes and different types of competition.

AA4.2 The Planner must be able to assess, on site, the various factors which can affect the competition, such as the conditions of the terrain, the quality of the map, the presence of participants and spectators, etc.

AA4.3 The Planner is responsible for the courses and the running of the competition between the start and the finish line.

AA4.4 The Planner's work must be checked by the Controller. This is essential because of the numerous opportunities for error, which could have serious consequences for the integrity of the event.

AA5. Types of Orienteering Competitions

AA5.1 While the fundamentals of course planning are common for all types of event, different planning styles are required for the different formats.

AA5.1.1 **Long Distance (normal cross-country or 'classic' type events).** The emphasis should be on route choice to test a variety of techniques, and to include long legs, a variety of legs, and direction.

AA5.1.2 **Middle Distance**
The emphasis should be continuous map reading, technical difficulty, a high density of controls, many changes in direction, and micro rather than macro route choices. Most suitable for technical terrain.

AA5.1.3 **Sprint**
Normally held in urban or semi-urban areas and parkland of moderate technical difficulty as the technical standard is enhanced by the high rate of decision making. The emphasis should be on continuous thinking, fair controls, map reading on the run, map interpretation, and route choice rather than finding controls. A clear and very accurate map, and clear control descriptions are essential. Safety should be a key consideration where traffic may be encountered.

AA5.1.4 **Relays**
The aim is to provide head to head racing between teams while maintaining sufficient uncertainty that competitors need to continually map read. All of the teams in a particular class need to cover exactly the same legs in total, but not in the same order.

AA5.1.5 **Night**
The emphasis should be on route choice over runnable terrain with the technical difficulty enhanced by darkness. Care should be taken over the fairness of control sites, and route choices.

AA5.1.6 **Score**
The emphasis should be on the choice of routes with competitors selecting the controls to visit based on the distance and technical difficulty. The challenge is enhanced if it is not possible for competitors to visit all the controls.

AA5.1.7 **Urban or City Races**
Similar to Sprint but with longer course lengths, longer leg lengths, and an emphasis on route choice.

AA5.1.8 **Ultra-Long Distance**
Held over long distances with mostly long legs and complex route choices. There will be a low density of controls and they should be easy to find.

AA6. Technical Difficulty

AA6.1 The technical difficulty of a course is based on the skills needed to successfully complete it. The aim of the Planner should be that the courses at an event show clearly the progression of technical difficulty.

AA6.2 The technical difficulty of a course is that of its hardest component. For example, a course is of technical difficulty 3 even if only one leg of that course is technical difficulty 3. However, a well-designed course will have most, if not, all of its legs of the required technical standard.

AA6.3 At some locations, the terrain may not be of the highest technical standard and in order for events to take place a compromise has to be accepted. In such areas the Planner must plan at the correct technical level as far as the terrain allows. For example, in an area of technical difficulty 4, then those courses requiring technical difficulty 1, 2, 3, and 4 should be planned exactly to the Guidelines. The courses requiring technical difficulty 5 should then be planned at technical difficulty 4, accepting that they will be less than ideal, but the best that the terrain will allow.

AA6.4 The key criteria in selecting an area are that it can provide:-

- the required technical difficulty,
- courses of the correct length,
- the competitors with an enjoyable experience
- the necessary infrastructure for car parking, assembly, etc.

AA7. Definition of Technical Difficulty

AA7.1 DEFINITION OF TERMS

AA7.1.1 **Route Choice**
The option of taking more than one (sensible) route between two controls. For example, this may be taking a long path route versus a direct cross-country one.

AA7.1.2 **Decision Point**
A point at which you can no longer continue in the same direction. A Decision Point on a leg does not imply a route choice. There may only be one obvious route between controls, but this could require the ability to change direction at a number of Decision Points.

AA7.1.3 **Attack Point**
A distinct feature, for example a road junction, that is close to the control site and from which an accurate compass bearing can be taken.

AA7.1.4 **Collecting Feature**
A large feature beyond a control which, when reached, confirms to the competitor that they have completely passed through an area of ground. A collecting feature is usually a line feature such as a road.

AA7.1.5 **Relocating Feature**
A distinct feature that may be used by a competitor to relocate their position on the map.

AA7.2 TABLE

The table below defines the planning requirements for each level of technical difficulty (TD), together with the orienteering skills that are to be tested.

RULES & GUIDELINES – FOOT-O

Technical difficulty grade (TD)	Controls	Control sites	Leg lengths	O techniques required	Routes & route choice	Re-location
TD 1	Reasonably close together (200m maximum) A control at every decision point Sited in the direction of the next control	Paths and tracks Placed at junctions, crossings, and bends	Similar lengths	Understand map colours and commonly used symbols Able to orientate map Able to make decisions at Decision Points	Along paths and tracks No route choice	Should not be required
TD 2	Fairly close together (350m maximum) Leg lengths should not vary greatly A control is not needed at every Decision Point but there should be no more than two Decision Points per leg	On the line feature along which the competitor is travelling Can be placed on prominent point features on or close to line features	Not to vary greatly	Able to make a decision at a Decision Point without the assistance of a control	All along obvious line features No route choice	Should not be required, but can be done by re-tracing the route along line features
TD 3	More variation in leg length Frequent controls on short courses less so on longer ones	Any line feature, prominent point, or contour feature that can be easily found from an Attack Point on a line feature	Of different length	Basic use of compass to allow short cuts between line features Able to navigate short legs on rough compass bearings to a control, at or in front of a line feature Able to make simple route choice decisions	Simple route choice Along line features to an obvious Attack Point	Should be a collecting feature close behind all controls that are not on a line feature
TD 4	As few as necessary for good planning	Any feature but should not require complex map reading	Of different length	Able to navigate long legs on a rough compass bearing to a collecting feature Able to use an accurate compass bearing on short legs Able to navigate over short distances using simple contour features	Significant route choices encouraging contouring	Collecting features behind all controls Errors should not involve significant time loss
TD 5	As few as necessary for good planning	Any feature particularly those demanding careful map reading No hidden or isolated controls	Of different length Long route choice followed by short intricate legs	Able to navigate over long distances using only major contour features Able to read and interpret complex contours Able to recognize indistinct features Able to concentrate fully over all of the course	Significant route choices	Control sites far from obvious relocating features Errors should be costly in time

AA8. Physical Difficulty

AA8.1 The nature of the terrain over which the competitors will be running should be considered for all age groups. Areas of dense undergrowth (e.g. rhododendrons), or which are difficult underfoot (e.g. boulder fields), do not test the orienteering skills of 'running navigation' and should be avoided. Steep descents, whilst acceptable for M/W 21 should be kept to a minimum for younger juniors and older seniors. Features such as fences or walls that may be significant obstacles to younger competitors or the less agile should be avoided where possible or be made more crossable with the use of stiles or ladders.

AA8.2 Courses should be set so that normally fit competitors can run over most of the course set for their level of ability.

AA8.3 The total climb of a course should normally not exceed 4% of the length of the shortest sensible route.

AA8.4 The physical difficulty of courses should progressively decrease as the age of competitors increases. Special care must be taken that the courses for classes M70 and over and W65 and over are not too physically demanding.

AA8.5 The table below defines the different levels of physical difficulty (PD).

Physical difficulty grade (PD)	Climb involved	Type of terrain
PD 1	Minimum of climbing	Paths
PD 2	Some climbing	Paths and forest with no undergrowth
PD 3	Moderate climb	Avoiding green areas, steep descents, and treacherous areas
PD 4	Climbing as necessary but avoiding steep ascents and descents	Avoiding long legs in green areas
PD 5	Climbing as necessary	Chosen so that a fit orienteer can run most of the time

AA9. Colour Coded Courses

AA9.1 Most of the non-championship regional and club competitions are colour coded classic long-distance ones where the competitor chooses the colour course appropriate to their skills.

AA9.2 The colours attached to the courses range from white (simple and short) to black (complex and very long) with the level of difficulty increasing as the colours darken. The designated colours are white, yellow, orange, red, light green, green, blue, brown, and black, and the level of technical and physical difficulty for each is defined in Guideline 5. Following the guidelines should ensure a consistency of standards at all Colour Coded Competitions.

AA9.3 A young newcomer would be expected to start on either a White or Yellow course, while an adult novice might be expected to start on an Orange or Red course. As the abilities and confidence of competitors improve they can progress to longer and/or technically more difficult colour courses.

AA9.4 Competitors of any age can enter any of the Colour Coded Courses but only experienced juniors should be allowed to enter the more technical and physical courses.

AA9.5 The colour courses offered shall be decided by the organizing club or regional association if the event is part of a regional league.

AA10. Planning for Juniors

AA10.1 Competitors in the very youngest junior age categories need every encouragement to enjoy the sport, and the feeling of failure engendered by a lengthy spell lost in the forest is a major disincentive to younger competitors. Children are attempting a sport that provides a considerable mental challenge, and the need for courses to match their abilities cannot be over-stressed. Even at large events, designed to find a true champion as the winner, it must be remembered that junior competitors are far more erratic in their performance than seniors. Simple and short courses planned to the correct technical standards and recommended lengths are the only way to produce an evenly grouped results list whilst still finding the true champion.

AA10.2 Planning the Junior courses is the most difficult task in terms of providing courses of just the right technical and physical level. If conflict between length and technical standard occurs the course shall be to the correct technical standard. The Junior courses should always be taken into account when locating the start and finish of the event to ensure that these courses are not too long and can be taken through suitable terrain.

AA10.3 Technical difficulty 1 and white standard colour courses. In some areas, particularly open areas because of the absence of paths, it may still be possible to plan a TD1 or white colour courses of suitable standard by substituting prominent

line features such as walls or rivers. If these courses cross open ground without prominent line features the route between the controls should be taped.

AA11. Planning for Older Competitors

AA11.1 Older orienteers are technically just as capable as M/W21 competitors. It is therefore totally inappropriate to combine their courses with the technically easier Junior courses just because the recommended course lengths are similar, unless the terrain prevents courses of high technical difficulty being set.

AA11.2 Any restriction on their physical ability relates largely to their speed over the ground. One result of this is in the interpretation of the phrase 'control sites far from obvious re-locating features. A control that may not be considered far from an attack point or obvious relocating feature by an M21 competitor may impose a significant time penalty for a W55 who has to return to the attack point and make a second approach.

AA12. Deciding on course lengths

AA12.1 For C1 (International), C2 (Championship), and C3 (Colour) competitions, the required lengths of courses are defined by the Competition Rules and Guidelines. In the case of C1 and C2 events the recommended winning times for each class are given, together with the Course Length Ratios that operate off the base of usually the M21E course. For this purpose, course lengths are adjusted for height climb by adding 0.1km for every 10m of climb. The recommended winning time for M21E at C2 events is 90 to 100 minutes, and with the average running speed of winning Irish M21Es' of 5.00 minutes per km the Adjusted Course Length should be 19.0 k for the winner to hit the mid-point winning time of 95 minutes. (This course could have an actual length of 15.0km and climb of 400m) Taking this example a stage further, the Course Length Ratio for W16A, W50L, W55L, and W60L classes is 0.26, and applying this to the base of 19.0km, it would suggest an Adjusted Course Length of 4.9km with an actual course length of 3.9km and a climb of 100m.

AA12.2 The Guideline for C3 Colour Coded Competitions provides a time range for each Colour course and the expectation is that most competitors should complete the course within that time range assuming they have the expected orienteering skills to complete that standard of course. The expected winning times should be based on the lower end of the time range.

AA12.3 Various methods are available for deciding on the length of the base course. The main methods are:-

AA12.3.1 Comparison with previous events. This is fairly straightforward if the area has been used before or the terrain is similar to previously used areas.

AA12.2.2 Test running – planning a course and then running it. This is often difficult to interpret, as navigating to a feature is generally much easier

in an event when there is a flag on it, and running solo tends to be slower than running competitively.

AA12.4 Applying the course length ratios – points to watch for:-

AA12.4.1 M21 probably uses the whole area. The shorter courses use only part of it, and this might be more or less runnable, or steeper/flatter, than the average.

AA12.4.2 Rough terrain has a greater effect on the running speed of younger and older competitors than of M21s.

AA12.4.3 Older competitors are significantly affected by steep terrain, particularly downhill.

AA12.4.4 Older competitors find dense tree growth more of an obstacle– suppleness decreases with age.

AA12.5 Course lengths should not be adjusted to cater for the expected quality of the competitors, e.g. by making a particular course longer because you know that some top orienteers will be entering. Similarly, if the running times on a particular course turn out to be longer than intended simply because the quality of the entry was low, this does not mean that the course was planned too long!

AA13. Control Descriptions

AA13.1 Control descriptions need to be prepared for all courses in accordance with the current "International Specification for Control Descriptions" (2004 edition) available from the Document Library section of the IOF website (www.orienteering.org) and also from the Technical section of the OI website, www.orienteering.ie

AA13.2 Particular care needs to be taken with Sprint control descriptions where inaccuracy e.g. on the side of a wall, may have a very significant effect on the race.

AA14. Electronic Punching

AA14.1 A computer file, which exactly matches the course file, needs to be prepared for input into the electronic results system. The planner will need to liaise with the results team about the way in which electronic course data is to be transferred to the event software.

AA15. Safety, Risk Assessment and Mitigation

AA15.1 The dangers of a particular type of terrain will generally be known to local inhabitants and to local orienteers so check with them, e.g. for old mine shafts etc. Don't assume that all orienteers will follow the best route between controls; even hazards well away from the expected routes should be thought about.

AA15.2 The Planner must take into consideration all hazards that competitors may encounter. Dangerous features should be marked with yellow, or yellow and black tape, if they are likely to be visited by any competitors.

AA15.3 The Planner's input into the Risk Assessment should be completed at an early stage e.g. at the draft planning stage.

AA16. Planning and the Map

AA16.1 COURSE DRAWING

AA16.1.1 Courses may be prepared by computer using a variety of course drawing software. Whilst the detail of operation of them may be different the principles remain the same.

AA16.1.2 The courses file is likely to go through several versions in the lead up to the event and the Planner and Controller should agree on a version control procedure to prevent old versions being mistaken for the current one.

AA16.1.3 All data, courses for printing, loose control descriptions, maps for control hanging and checking etc. shall be generated from the same version of the same file.

AA16.1.4 Representative courses should be checked independently to ensure that the length calculated by the software system is correct.

AA16.1.5 Late changes should be avoided. If these are necessary additional checks should be included

AA16.1.6 Care needs to be taken that the map detail which is clear on the computer (e.g. at x8 magnification) is as clear on the printed map.

AA16.1.7 Physical checks of maps are still necessary (e.g. overlapping block colours) and the Controller may ask to see proof copies of the map before printing is approved.

AA16.1.8 Course markings on the map are to be in accordance with the IOF 'International Specification for Orienteering Maps (ISOM) and for Sprint events in accordance with the IOF 'International Specification for Sprint Orienteering Maps (ISSOM) Both are available from the IOF website at www.orienteering.org (go to Document Library > Rules and Guidelines >Mapping Standards)

AA16.1.9 The courses and map corrections shall be printed in purple (red/violet) colour. All line thicknesses should be 0.35mm. The course drawing software should do this automatically, but this should be confirmed nevertheless.

AA16.1.10 The starting point of the course shall be marked by an equilateral triangle of side 7mm which points towards the first control. The centre of the triangle shows the precise position of the start point.

AA16.1.11 The site of each control shall be shown as the centre of a circle of 6mm diameter. The circle should be broken to avoid obscuring important detail. If the control feature is shown on the map symbolically rather than to scale, the circle should be drawn so that the symbol lies exactly at the centre. For example, this means that if you use the east side of a dot knoll as a control site then the circle should be drawn around the middle of the symbol, not the east side of it. However, a feature such as a knoll shown by a ring contour (i.e. hill) is drawn to scale and the centre of the circle shall be drawn where the control site is (e.g. N side) rather than at the centre of the ring contour.

AA16.1.12 The position of the finish shall be shown as the centre of two concentric circles of diameter 5mm and 7mm. Where a course uses two or more maps with map exchanges then the finish should be shown on all maps.

AA16.1.13 If the controls are to be visited in a prescribed order they shall be numbered in that sequence. The numbers shall be printed on a north-south axis, with the top north, and should be positioned so that they do not obscure any important detail.

AA16.1.14 Control numbers should be positioned so as to obscure as little map detail as possible but close enough to the circle to avoid ambiguity. Particular care should be taken when controls are close together e.g. crossovers, and where there is possibility for confusion e.g. control numbers 6 and 9 being close together.

AA16.1.15 If the controls are to be visited in a prescribed order they shall be joined by straight lines. These lines should be broken to avoid obscuring important detail, diverted to meet up with compulsory routes, broken or diverted to indicate compulsory crossing points, and broken or diverted to avoid lakes, 'out of bounds', or other areas that cannot be crossed by competitors. If necessary, lines joining controls along tracks should be offset.

AA16.1.16 Where lines joining controls cross one another, it is the convention to break the line which joins the controls to be visited later in the course where it crosses the "earlier" line.

AA16.1.17 The convention for Sprint events is that the lines drawn between control circles are not broken or diverted around impassable objects but go straight across them instead.

AA16.1.18 Any part of the course where the competitor is obliged to follow a compulsory route shall be clearly and precisely indicated on the map by a dashed line.

AA16.1.19 Forbidden routes (e.g. busy roads, railways) shall be shown by a chain of crosses.

AA16.1.20 Uncrossable boundaries (ones which are forbidden to cross and described as "impassable" on Sprint maps) which affect the course, should be indicated by overprinting the mapped feature with a solid purple line, except on Sprint maps where solid overprinted lines are only used where a boundary has changed from being passable to impassable and the map does not show this. Crossing points shall be indicated by curved brackets.

AA16.1.20.1 Whether crossing points are mandatory or not needs to be unambiguous both in the event details and on the map.

AA16.1.20.2 where there is only one valid option for crossing an uncrossable boundary, the line between controls should be bent to this point. In this instance there should be no advantage to be gained by not using the crossing point and it is unlikely that the previous control will be more than 100m before the boundary. If in doubt, consider placing a control at the crossing point.

AA16.1.20.3 Where there is more than one option for crossing the uncrossable boundary, the line between controls should be broken either side of the boundary. Sufficient crossing points should be provided such that there is an option on all likely route choices and no competitor will gain an advantage by not using a crossing point.

AA16.1.21 The dimensions of the course overprint symbols on 1:10,000 (or larger scale) maps should be as defined in AA16.1.9 to 16.1.12 above. However, for competitions in which both 1:10,000 and 1:15,000 maps are used, the size of the symbols on the 1:10,000 maps may be 150% greater than on the 1:15,000 maps. Factors to consider are:-

AA16.1.21.1 Symbol enlargement allows the control descriptions to be the same on both the 1:15,000 and 1:10,000 maps.

AA16.1.21.2 Some courses, such as White, and some types of event, such as Sprint races, may have controls relatively close together. Enlarged circles might overlap to an unacceptable degree.

AA16.1.22 Editing, which will also include the breaking of control circles and connection lines, should be an important part of the process of preparing the master course overprint file. Time should be allowed for this in the planning timetable.

AA16.1.23 Maps should be clearly identified by course number and/or title so that competitors can identify their courses.

AA16.1.24 If maps are not printed on waterproof material, they should be protected by a sealed plastic covering of at least 250 gauge (or a heavier gauge if the map unit size exceeds A4).

AA16.2 MEASUREMENT OF DISTANCE AND HEIGHT CLIMB

AA16.2.1 Course length is measured as defined in Rule 8.1.3, and quoted to ± 0.1km (e.g.5.5km, not 5.50km). This is the shortest route which a competitor could reasonably possibly take, irrespective of whether or not the competitor would be sensible to do so.

AA16.2.2 Height climb is measured as defined in Rule 8.1.4, and quoted to ± 5m. That is, it is measured "along the shortest sensible route", which may well be longer than the route used for measuring the course length. This is not necessarily the "optimum route", nor is it necessarily the route which the planner would take; it is simply the route extended to avoid those hills/valleys etc. which all competitors will also avoid. The intention is to give a figure which is representative of the climb a competitor would actually undertake. As a rule of thumb, if a competitor will go over it, count it in; if you're not sure whether they'll go over it, count it in; only discount it if you are certain that all the competitors will go around it.

AA16.3 MAP CORRECTIONS

If corrections have to be made to the map subsequent to map printing, copies of the map showing no information other than any map corrections essential to the competition should be displayed and available for study before the start line or they should be displayed in the start lanes and if possible overprinted on the competitors map. An adequate number of maps detailing the 'map corrections' shall be made available.

AA16.4 THE START

AA16.4.1 The position of the centre of the start triangle shown on the map shall be on a mapped feature and identified on the ground by a control flag. For TD1 and TD2 courses this feature will need to be a path or similar feature; also, it shall not be at a junction or intersection, as this would require the beginners to decide which way to go without knowing where they have just come from.

AA16.4.2 Where a map exchange is used the position of the start of the next section of the course shall be marked on the ground by a control flag if it is a significant distance away from the previous control site.

AA16.4.3 The position of the start flag or master maps should be such that competitors waiting to start cannot see or have minimum visibility of the route taken by competitors who have started. The map issue point should be such that all competitors will visit the start flag.

AA16.4.4 The courses should be designed so that competitors are unlikely to return past the start on their way to the first control site.

AA16.4.5 For larger competitions with chasing starts, the Pre- start and start needs to be of sufficient size to accommodate the increased number of competitors.

AA16.5 THE FINISH

AA16.5.1 It is important to ensure that the Finish is easily located. "Navigate to Finish" should not be used except for score events where the Finish will normally be next to the start. In other cases, there should be an ordinary last control and then a taped route, which can be just a few metres, to the Finish.

AA16.5.2 As a minimum the Finish should consist of a punch unit and control flag, preferably with a prominent Finish banner. There should be no possibility of a competitor being unable to find the Finish after they have visited the last control.

AA16.5.3 The Finish should be manned as it may often be the first place where a competitor can report that an injured competitor needs urgent assistance or a problem with the course.

AA16.6 CONTROL SITE LAYOUT

AA16.6.1 The control flag should be visible from all directions of approach unless the control description indicates otherwise. Control flags should be sited so that the absence or presence of another competitor does not affect the difficulty of locating the control.

AA16.6.2 Punching stations should be clearly visible and easily accessible from the control flag.

AA16.6.3 Marking devices should be positioned in such a way that competitors may endorse a control card attached to any reasonable part of their clothing. A backup system shall be provided should the electronic system fail. For SI this is usually a pin punch and for EMIT a paper card in the brick. However, this is optional for C3 & C4 events.

AA16.6.4 At C1 and C2 competitions the layout of the control flag, control code, and marking devices should be the same for all controls. A model control shall be displayed at the pre-start.

AA16.7 PROXIMITY OF CONTROLS

AA16.7.1 There is usually little point in putting controls closer than 30m apart (15m for Sprint Competitions) – competitors are, in effect, navigating to the same point. An exception might be e.g. when one control is on a point feature, used by a technical course, the other on a path junction on a TD1 or White colour coded course.

AA16.7.2 The 60m limit may be breached for the younger junior courses e.g. when two successive decision points come close together but this will require the circles to overlap even at 1:10,000, so consider taking the course elsewhere particularly if the course is not being overprinted.

AA16.7.3 Care should be taken when interpreting 'features which appear similar in the terrain', e.g. paths and rides are obvious ones not to mix, but some vegetation

boundaries have faint paths along them (or develop them as the competition takes place). 'Similar features' does not just mean those mapped with the same symbol: it is not fair, for instance, to use both a fence and a ruined fence. Neither is it acceptable to claim that e.g. 'boulder (2 m) NE side' and ' boulder (1 m) SW side' are different: they are both boulders.

AA16.8 CONTROL SITE SELECTION

AA16.8.1 Consideration should be given to the fairness of control sites

AA16.8.1.1 The control site should be uniquely described.

AA16.8.1.2 The control feature should be visible from within 10m or 10% of the distance from the nearest attack point.

AA16.8.1.3 For fairness, the visibility of a control should be the same whether or not there is a competitor at the control site. On no account should the control flag be hidden. Thus control flags should normally be placed on the rim of pits or small depressions, and not “hidden” at the bottom.

AA16.8.1.4 Particular care should be taken over the fairness of controls in low visibility/ “green” forest.

AA16.8.1.5 Spectator controls need to be chosen to give ready visibility to the maximum audience. A return to the Assembly area works well but care needs to be taken that competitors can enter and leave without confusion.

AA 16.8.1.6 Drinks points and road crossings need to be established early in the planning process in conjunction with the Organiser.