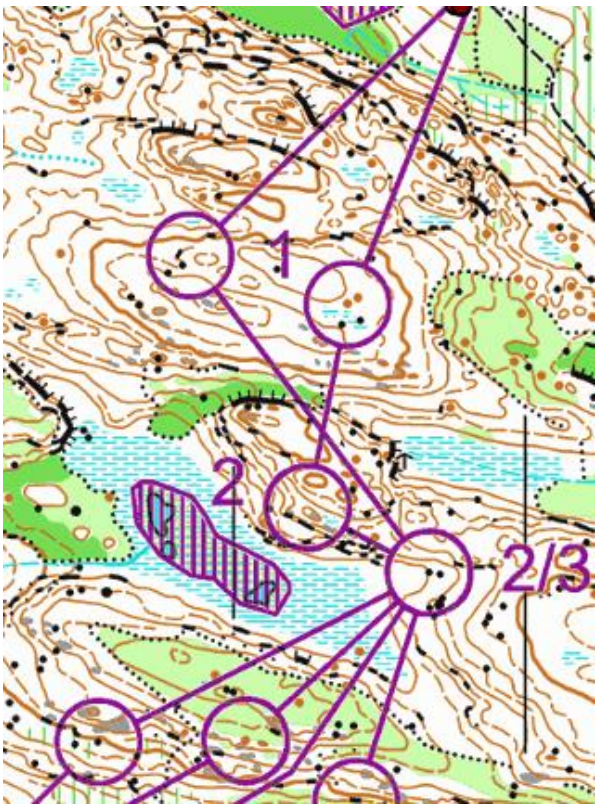
INTERNATIONAL ORIENTEERING FEDERATION

Guidelines for Course Planning

Foot-O Forest Competitions



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IOF Foot Orienteering Commission

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Contents

Foreword

”Foot orienteering is an endurance sport which involves a huge mental element. There is no marked route – the orienteer must navigate with map and compass while running.”

The core of the sport of Orienteering is to have great maps and courses set in a challenging terrain. This manual is intended to give guidelines to plan an orienteering course that is testing the ability of the competitor both physically and mentally. An orienteering course shall contain elements described for the competition formats in the IOF Competition Rules of Orienteering (“Rules”) for different formats of foot orienteering.

This Course Planning Guideline for orienteering courses in forest competition formats is based on the requirements for course planning in the Rules. The purpose of this guideline is to clarify how these requirements are used as a starting point for creating good courses. Throughout this document, reference to specific Rules paragraphs and appendices will be made in boxes such as this:

Rules section 16.1
The IOF *Principles for Course Planning* (see Appendix 2), the competition format descriptions (see Appendix 6) and the Leibnitz Convention (see Appendix 5) shall be followed.

The contents of the box above clarify that it is mandatory for course planners in IOF Events to meet the requirements of the Appendices as well chapter 16 as the appendices mentioned.

Basic course planning requirements

A fair course requires a reliable map, unambiguous control points, accurate placement of control points on the map, and good and challenging course legs between the control points. It is a main goal for a course planner to provide an experience that can be looked back on as a “best orienteering course ever”.

More and more demands are put into TV and arena production to get the sport of orienteering attractive to both spectators on-site and people watching broadcasts all around the world. This requires full co-operation between course planners and TV production crew in very early stages of the course planning.

To keep the quality of the orienteering courses at high level, there is a need to fulfil expectations of the customers of the course planners. This will require an understanding of different format demands for terrain and course planning. This manual is giving insight to those.

Examples of good and not so good solutions in course planning are presented in the Appendices.

Acknowledgement

The authors wish to pay tribute to the great work done by Göran Andersson in putting together the 2014 IOF document “Guidelines for Course Planning – World Class Events”. These guidelines update and build on the precedent set by Göran’s work.

1. Introduction to course planning

The Rules Appendix 2 contains the IOF principles for course planning:

Rules - Appendix 2: Principles for course planning 1. Introduction
1.1 Purpose: These principles aim 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. **1.2 Application of these principles**: Courses in all international foot orienteering events must be planned in accordance with these principles. They should also serve as general guidelines for the planning of other competitive orienteering events. The term 'orienteering' is used throughout to refer specifically to 'orienteering on foot'.
Rules - Appendix 2: Principles for course planning 2. Basic principles
2.1 Definition of orienteering: Orienteering is a sport in which competitors visit a number of points marked on the ground, controls, in the shortest possible time aided only by map and compass. Orienteering on foot may be characterised as running navigation. **2.2 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. **2.3 Course planner's golden rules**: The course planner must keep the following principles in mind: • the unique character of foot orienteering as running navigation • the fairness of the competition • competitor enjoyment • the protection of wildlife and the environment • the needs of the media and spectators **2.3.1 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. **2.3.2 Fairness**: Fairness is a basic requirement in competitive sport. Unless the greatest care is taken at each step of course planning, 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. **2.3.3 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. **2.3.4 Wildlife and the environment**: The environment is sensitive: wildlife may be disturbed and the ground as well as the vegetation may suffer from overuse. The environment also includes people living in the competition area, walls, fences, cultivated land, buildings and other constructions, etc. 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 in advance.

2.3.5 Media and spectators: The need to give a good public image of the sport of orienteering should be a permanent concern for a course planner. The course planner should endeavour to offer spectators and the press the possibility to follow as closely as possible the progress of a competition without compromising sporting fairness.

Unique character of the competition formats

Each competition format has its own demands for choosing terrain and designing a brilliant orienteering course for competitors. Requirements for the formats are found in Appendix 6, Competition Formats in the Rules of Foot Orienteering (https://orienteering.sport/orienteering/competition-rules). It has definitions for controls, route choices, types of running, map, terrain etc. that need to be obeyed when planning courses.

2. The orienteering course

Rules - Appendix 2: Principles for course planning 3. The orienteering course (extract)

3.1 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.

3.2 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.

3.3 The start: The start area should be so situated and organised that:

- there is a warmup area
- 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.

3.4. The course legs

3.4.1 Good legs: The course legs are the most important elements 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 with regard to 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 reorient themselves frequently. It is preferable for a course to have a few very good legs joined by short links designed to enhance the legs rather than a larger number of even but lesser quality legs.

3.4.2 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.

3.5 The controls

3.5.1 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.

3.5.2 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 also serve as refreshment, press and spectator points.

3.5.3 The control flag: The control equipment must be in accordance with the rules for IOF 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. 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.

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

3.5.5 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 19.4, controls shall not be sited within 30 metres of each other. For Sprint, this may be reduced. For map scales 1:4000 or 1:3000, the minimum running distance between controls is 25 metres and the minimum straight line distance is 15 metres. 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 1:4000 or 1:3000). The distance between the controls is measured in a straight line.

[Further notes for Forest: the minimum distance between control features is 60 metres. If the features are distinctly different in the terrain as well as on the map, this minimum is reduced to 30 metres.]

3.5.6 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.

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

3.7 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.

3.8 Route choices: 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'.

3.9 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.

3.10 Competition types

Course planning must account for 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.

3. The course planner

Rules - Appendix 2: Principles for course planning 4. The course planner
The person responsible for course planning must have an understanding and appreciation of the qualities of a good course gained from personal experience. He or she must also be familiar with the theory of course planning and appreciate the special requirements of different classes and different types of competition. The course 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. The course planner is responsible for the courses and the running of the competition between the start and the finish line. The course planner's work must be checked by the controller. This is essential because of the numerous opportunities for error, which could have serious consequences.

Rules - Appendix 2: Principles for course planning 3. The orienteering course (extract)
3.11 What the course planner should aim for **3.11.1 Know the terrain**: The course planner should be fully acquainted with the terrain before he or she plans to use any control or leg. 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 exist at the time the courses are planned. **3.11.2 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 his or her own skill at navigating or on his or her walking speed when surveying the area. **3.11.3 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. **3.11.4 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. **3.11.5 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. **3.11.6 Courses that are not too physically demanding**. Courses should be planned 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 in Masters' classes. Special care must be taken that the courses for classes M70 and over and W65 and over are not too physically demanding.

4. The Three Forest Formats

SUMMARY TABLE	Middle Distance	Long Distance	Relay
Controls	Consistently technically difficult.	A mixture of technical difficulties.	A mixture of technical difficulties.
Route Choice	Small and medium scale route choice.	Significant route choice including some large-scale route choices.	Small and medium scale route choice.
Type of Running	High speed, but requiring runners to adjust their speed for the complexity of the terrain.	Physically demanding, requiring endurance and pace judgement.	High speed, often in close proximity to other runners who may, or may not, have the same controls to visit.
Terrain	Technically complex terrain.	Physically tough terrain allowing good route choice possibilities.	Some route choice possibilities and reasonably complex terrain.
Map	1:10000	1:15000	1:10000
Start Interval	2 minutes	3 minutes	Mass start
Timing	1 second	1 second	Mass start so the finish order is the order across the line.

4.1 Middle Distance

Rules Appendix 6: 2 MIDDLE DISTANCE

2.1 The profile

The Middle distance profile is technical. It takes place in a non-urban (mostly forested) environment with an emphasis on detailed navigation and where finding the controls constitute a challenge. It requires constant concentration on map reading with occasional shifts in running direction out from controls. The element of route choice is essential but should not be at the expense of technically demanding orienteering. The route in itself shall involve demanding navigation. The course shall require speed-shifts e.g. with legs through different types of vegetation.

2.2 Course planning considerations

The course should be planned to allow competitors to be seen by spectators during the course of the race as well as when finishing. The start should be at the Arena and the course should preferably make runners pass the Arena during the competition. The demand on selection of Arena is subsequently high, providing both suitable terrain and good possibilities to make runners visible to spectators. Spectators are not allowed along the course except for parts passing the Arena (including controls at the Arena).

[English language note: “during the course of the race” = “during the race”; “course” has a different meaning here!]

2.3 The map

The standard ISOM specification shall be followed. The map scale is 1:10000. The terrain shall be mapped for 1:15000 and then be strictly enlarged as specified by ISOM.

2.4 Winning time, start interval and timing

The winning time, for both women and men, shall be 30 – 35 minutes. In WOC and World Cup the winning time in qualification races shall be 25 minutes. The start interval is 2 minutes and a time-trial, individual format is used. The competitor shall have passed the start gate before having access to the map.

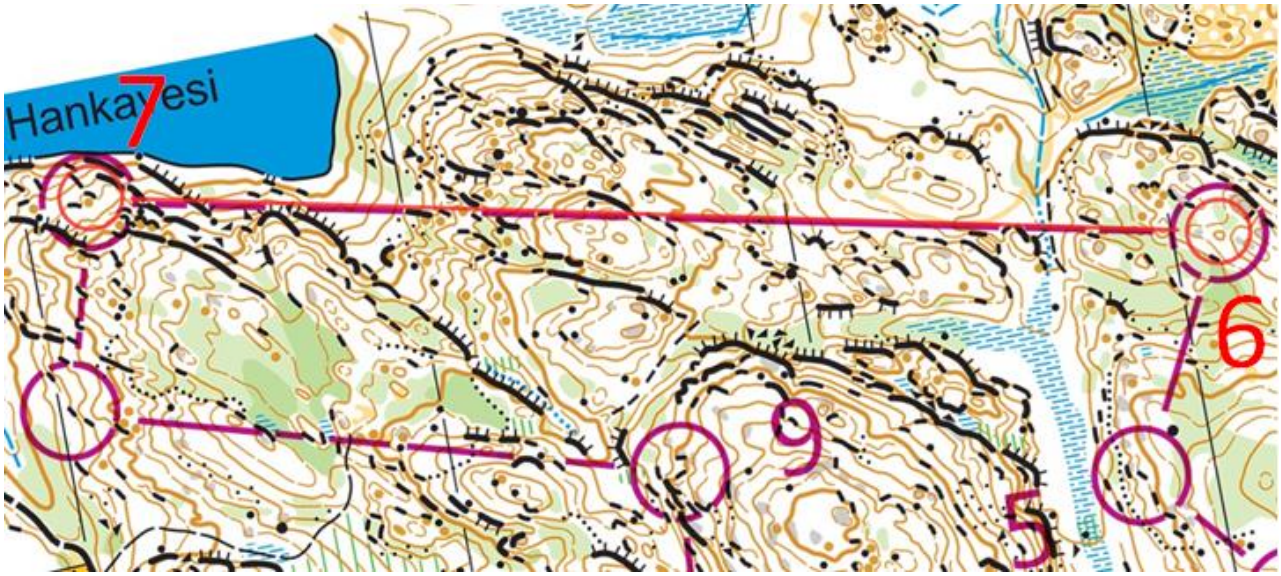
The key features of a Middle Distance are:

- competitors are forced to demanding map reading right from the beginning
- different leg combinations with rhythmic changes will be provided
- decisive points are in the later parts of course, when physical stress starts to kick in
- decisive points near the competition centre when spectators and announcement increase pressure
- competitor needs to be fully alert and concentrate to navigation during the whole course

Planning courses that meet these features means that the Course Planner should identify the detailed areas allowing for difficult orienteering and areas well suited for challenging route choices. A route choice leg in Middle Distance should still be challenging to execute even after the route choice has been made. As a general rule, each control in a Middle Distance course should have an angle forcing the athlete to change direction at every control. When selecting legs in very detailed areas, care should be taken not to make the legs so short that one control becomes the attack point for the next.

"In the middle distance, there should be need for high concentration for map reading, complex terrain and lot of changes in direction, rhythm and technical demands."

***Miika Kirmula, FIN**: In my opinion, the most interesting leg in year 2019 is from the Finnish WCup selection race middle distance 6-7 leg. This leg was directly after five short legs so there wasn't so much time for perfect planning ahead. After making the bigger route choice you could win or lose A LOT with small micro route choices due to really steep parts and big cliffs. I missed the right choice and lost 22 seconds to the fastest split. I think it seemed like a risk to run a really steep slope descending to a lake and big cliffs in the end. However, the fastest split was made running the leg from the right.*



***Magne Daehli, NOR**: For the middle distance, I think the most important with a course is to serve challenging and intense orienteering. But also, here it's important with some changes in terrain and/or type of legs, to break up the rhythm and forcing the runners to change their technique a bit.*

Example: WOC2016, Sweden

4.2 Long Distance

Rules Appendix 6: 3 LONG DISTANCE

3.1 The profile

The Long distance profile is physical endurance. It takes place in a non-urban (mostly forested) environment and aims at testing the athletes' ability to make efficient route choices, to read and interpret the map and plan the race for endurance during a long and physically demanding exercise. The format emphasises route choices and navigation in rough, demanding terrain, preferably hilly. The control is the endpoint of a long leg with demanding route choice, and is not necessarily in itself difficult to find. The Long distance may in parts include elements characteristic of the Middle distance with the course suddenly breaking the pattern of route choice orienteering to introduce a section with more technically demanding legs.

3.2 Course planning considerations

The course should be planned to allow competitors to be seen by spectators during the course of the race as well as when finishing. Preferably, the start should be at the Arena and the course should make runners pass the Arena during the competition. A special element of the Long distance is the long legs, considerably longer than the average leg length. These longer legs may be from 1.5 to 3.5 km

depending on the terrain type. Two or more such long legs should form part of the course (still requiring full concentration on map reading along the route chosen). Another important element of the Long distance is to use course planning techniques to break up groups of runners. Butterfly loops are one such technique. The terrain itself should be used as a break-up method by putting the course through areas with limited visibility. Spectators are not allowed along the course except for parts passing the Arena (including controls at the Arena).

3.3 The map

The standard ISOM specification shall be followed. The map scale is 1:15000.

3.4 Winning time, start interval and timing

The winning time shall be 70 – 80 minutes for women and 90 – 100 minutes for men. In WOC and World Cup the winning times in qualification races shall be 45 minutes for women and 60 minutes for men. The start interval is 3 minutes. A time-trial, individual format is used. The competitor shall have passed the start gate before having access to the map.

Remarks related on section 3.2 above:

E.g. phi-loops give an alternative technique for breaking up runners. Butterflies with sharp angles may let runners see other runners more easily so they speed up, making this less worth as a spreading method. Some butterflies may even let runners approaching the centre control of the butterfly see runners leaving the butterfly. Also, phi-loops have less problems with sharp angles than butterflies.

In some case the butterflies/phi-loops have been followed by short legs instead of long legs – and in forest with good visibility. Continuing with a short leg after the butterfly increases the chance of regrouping of the same runners. One should ideally use a long leg straight after the spreading (butterfly or phi-loops), and if possible there should be low visibility at the start of the long leg straight after the butterfly helping them leave the phi-loop less obviously and therefore preventing followers from catching up.

The butterflies/phi-loops have not always been implemented in the most difficult terrain. Weak navigators tend to increase their speed in the butterfly in order to be able to catch up with the better runners up front. The risk for them making mistakes in tricky terrain in the spreading method is then increased. Also, low visibility in the area of the spreading method is an advantage.

In some case the course has started with short technical controls – increasing the chances for grouping – followed by long legs. Long route choice legs often allow good runners to get away from followers but the reverse can be true if visibility in the terrain is good. A course could start with short leg(s) (for familiarising competitor to the map and terrain before long decisive leg) followed by long legs to avoid groups being formed early in the course.

The terrain chosen for the long distance has not always been optimal with regard to avoidance of groups formation. For optimal spreading, there should be distinctly different options on the long legs. However, this also often depends on the terrain and this should be taken into account when choosing terrain for high level IOF events Long distance races.

Butterflies have (sometimes) been too small. Short butterflies do not split packs while they only put constraints on the planning which again may lead to more packs due to fewer long legs and nothing gained by the butterflies.

Good terrain for the Long distance has characteristics that make runners lose eye contact with each other (such as denser vegetation, many hills/depressions etc.). Terrain with continuously good visibility is not ideal for high-level Long distance races. The terrain itself should be used as a break-up method by

putting the course through areas with limited visibility especially in the more difficult terrain where more skilled orienteers can disappear from potential followers. Spectators are not allowed along the course except for parts passing the Arena (including controls at the Arena).

Remarks related on section 3.3 above:

For WMOC the map scale is 1:10.000 and 1:7.500.

Key features of a Long Distance are:

- physically demanding requiring endurance and pace judgement
- multiple and decisive route choice legs demanding full concentration and commitment to decisions
- breaking up (or avoiding forming) groups somehow is important
- preferably no decisive route choice legs right from the starting point
- avoid short, technical controls / legs in the beginning to avoid grouping
- control point placement important, clearly readable
- decisive points in skill levels in later parts when physical elements are more important
- important where and when will refreshments offered, effect to route choices (rule 19.8)

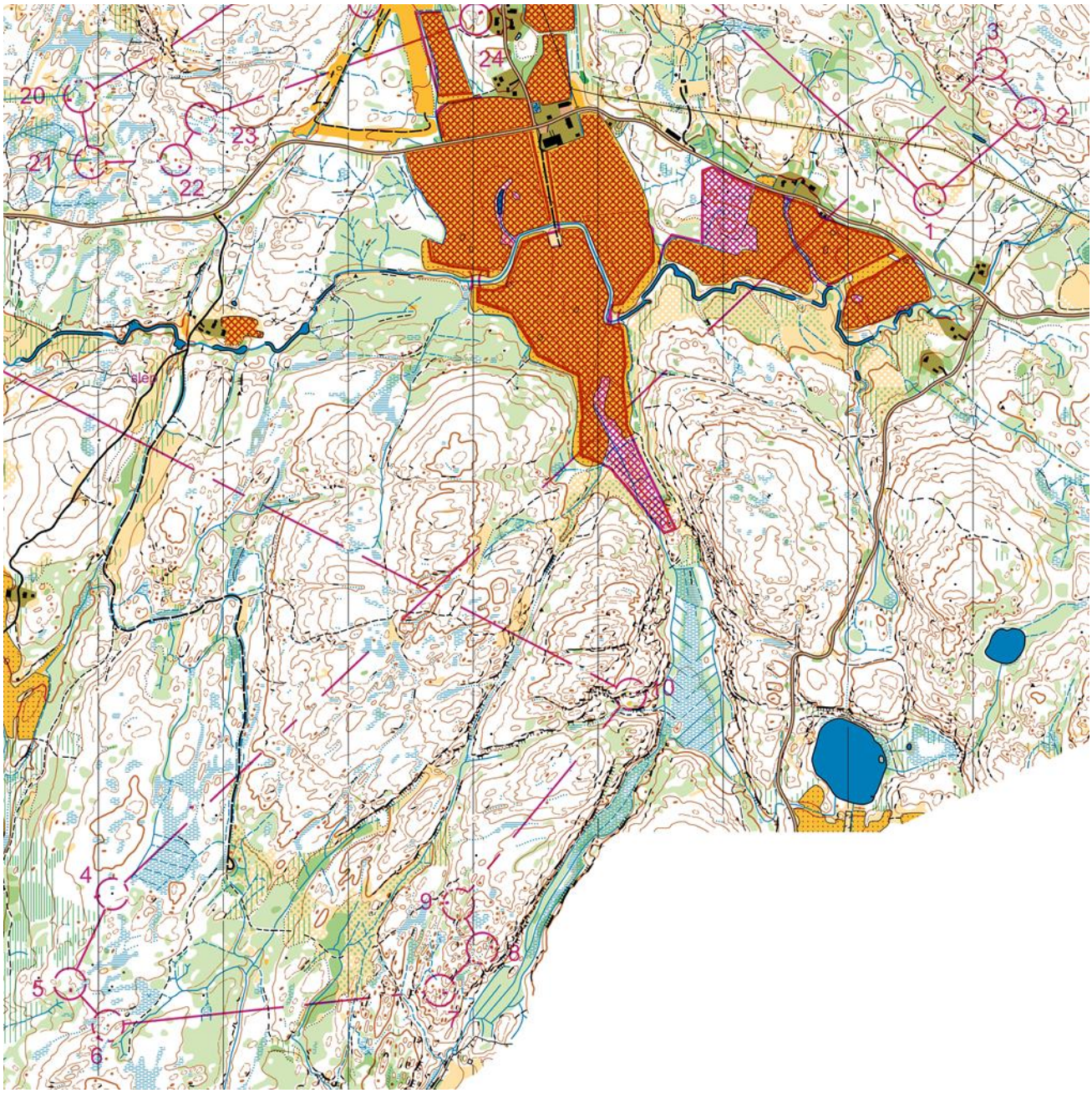
Planning courses that meet these features means that the Course Planner should identify the detailed areas allowing for difficult orienteering and areas well suited for very long and challenging route choice legs. A route choice leg in Long Distance can be very long and is ideally still challenging to execute even after the route choice has been made. It is good practice to have a few shorter legs after a route choice leg in order to force the athlete to change technique (and possibly allow for a TV-sequence). In Long Distance courses, the most detailed areas, should be avoided.

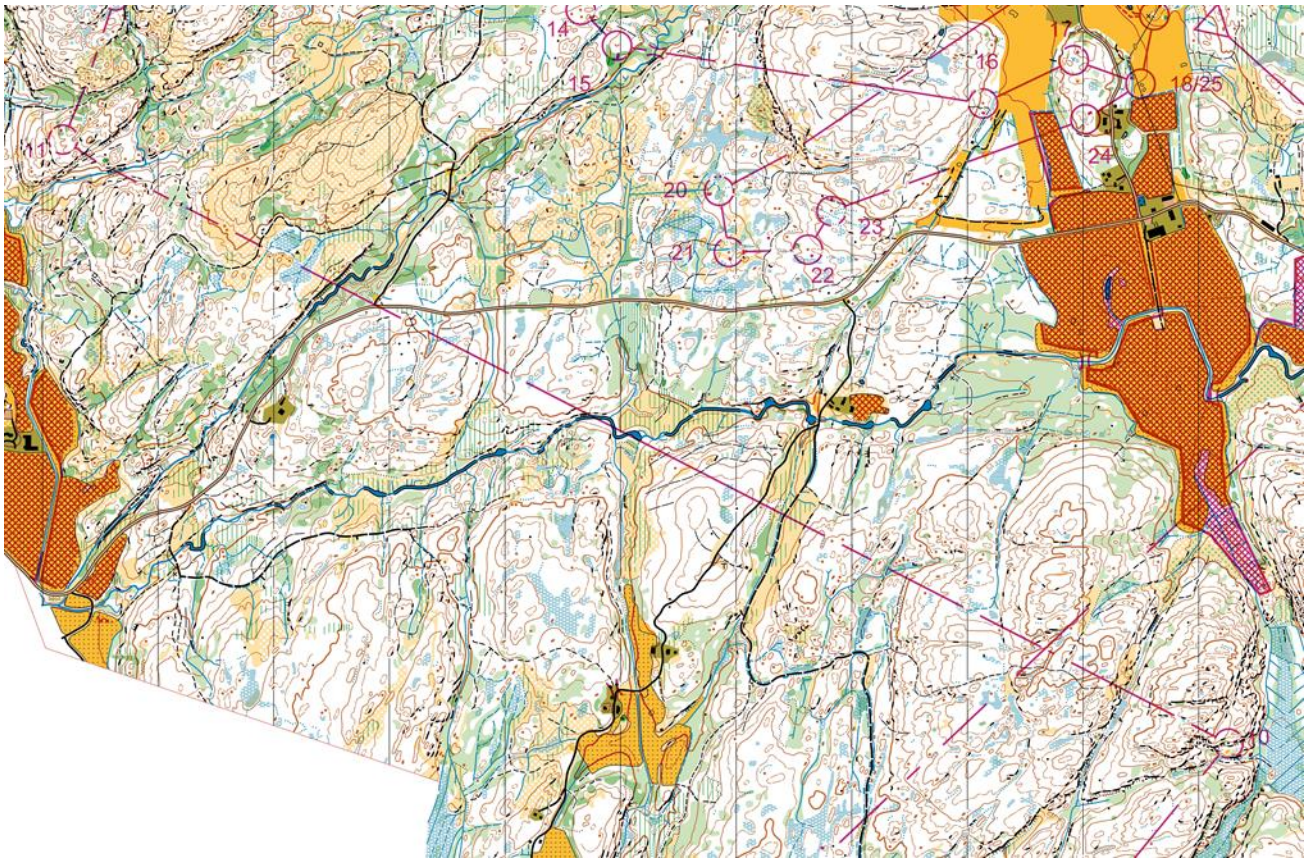
Long legs are typically 10% to 15% of the overall course length and can sometimes be 20% if the terrain allows it. The same principles apply to WMOC Long courses, the difference being that lengths are scaled down to suit the shorter total course lengths.

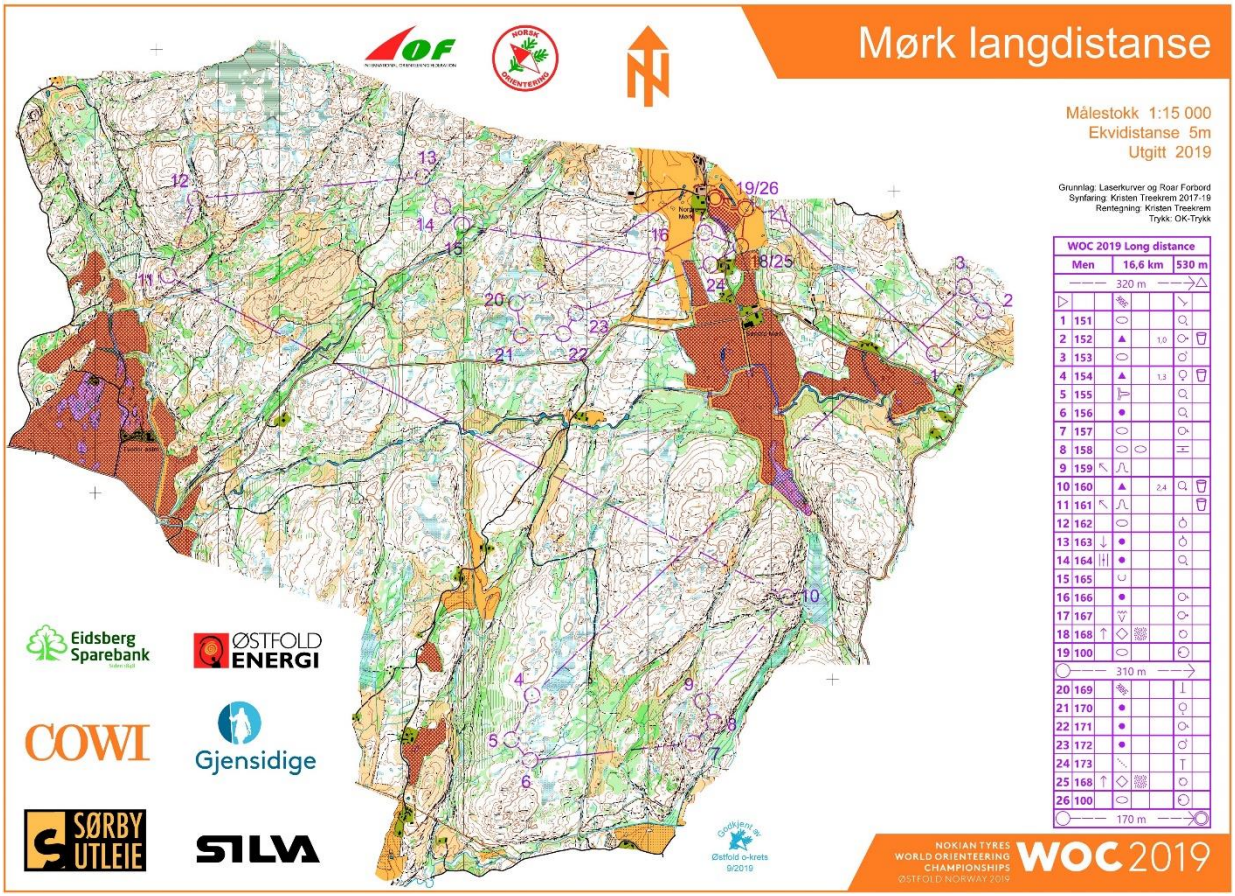
Key features of a good route choice leg are:

- offers several (distinctly) different choices
- the best route choice may not be obvious at first sight
- runners on different route choices should lose sight of each other
- runners with different strengths should choose different routes
- time differences between the different routes should be big enough to be relevant (a good choice and execution should be rewarded)
- the easiest to execute route choice should in general not be the fastest overall
- orienteering during the leg still needs to be challenging on the fastest route (a fast route choice should not only be a road choice)

For the Long distance there should be varying terrain, varying speed and varying route choices. Also, varying orienteering techniques will be needed. In WOC2019, two of the legs covered about 40% of the whole course.



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Utgitt 2019
Grunnlag: Laserkurver og Roar Forbord
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Rentegning: Kristen Treekrem
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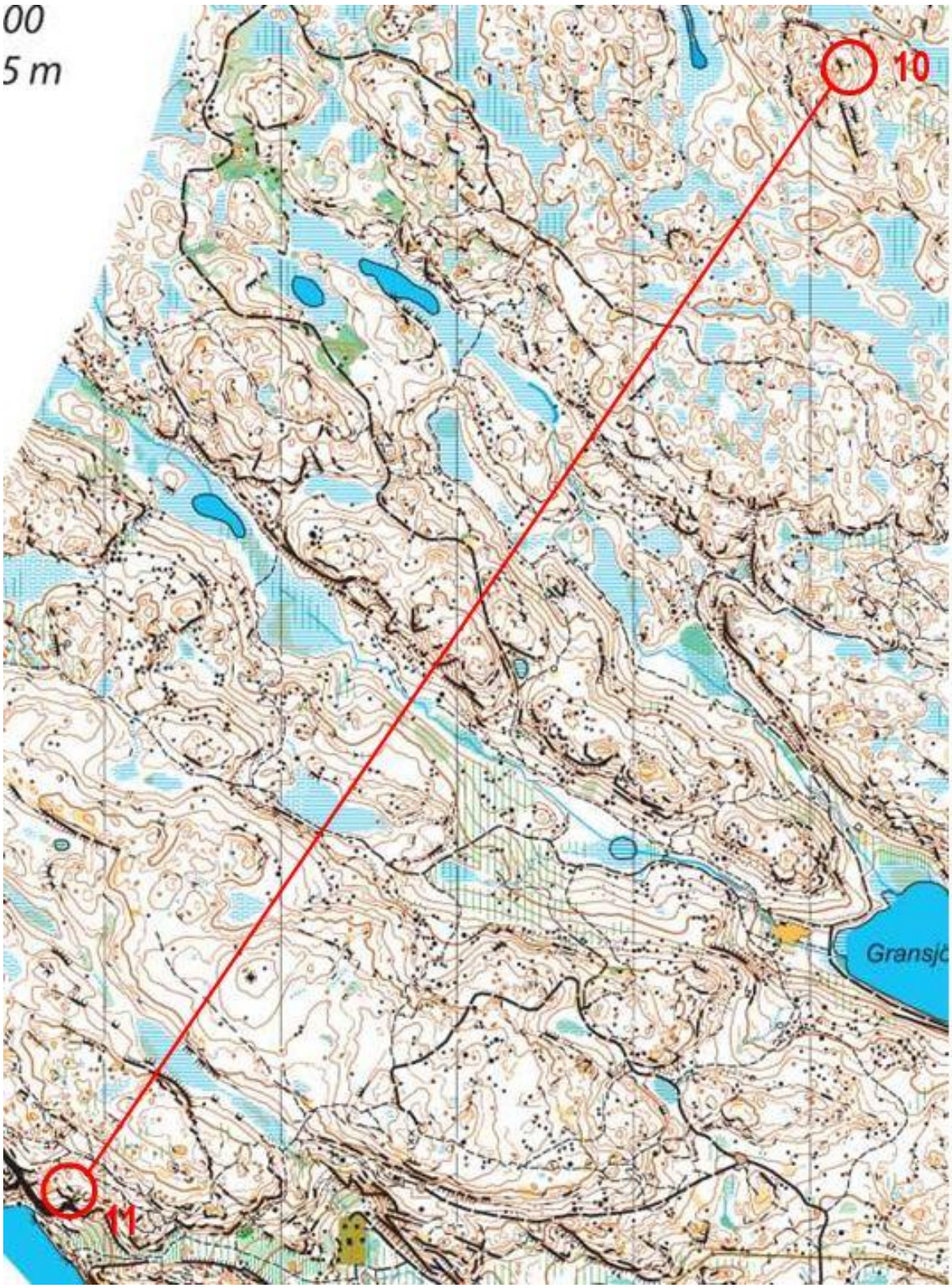
WOC 2019 Long distance
Men
16,6 km
530 m
320 m
310 m
170 m
Eidsberg Sparebank
ØSTFOLD ENERGI
COWI
Gjensidige
SØRBY UTLEIE
SILVA
NOKIAN TYRES WORLD ORIENTEERING CHAMPIONSHIPS
ØSTFOLD NORWAY 2019
WOC 2019

***Tove Alexandersson, SWE**: One of the most important details to make a Long distance course is some good longer legs. Preferably at least one leg that is over 1.5 km. To make it really good this leg should be a bit more complex than just straight or around, it's good if there are some micro route choices also in the main route choice.*

Example: O-Ringen 2019 E5, leg 10-11



4.3 Relay

Rules Appendix 6: 4 RELAY

4.1 The profile

The Relay profile is team competition. It takes place in a non-urban (mostly forested) environment. The format is built on a technically demanding concept, more similar to the concept of the Middle than the Long distance. Some elements characteristic of the Long distance, like longer, route-choice legs should occur, allowing competitors to pass each other without making contact. Good Relay terrain has characteristics that make runners lose eye contact with each other (such as denser vegetation, many hills/depressions etc.). Terrain with continuous good visibility is not suitable for the Relay.

4.2 Course planning considerations

The Relay is a spectator friendly event in offering a competition between teams, head-to-head, and with the first to finish being the winner. The Arena layout and the course planning must consider this (e.g. when forking is used, the time difference between alternatives should be small). The competitors should, on each leg, pass the Arena, and if possible runners should be visible from the Arena while approaching the last control. An appropriate number of intermediate times (possibly with in-forest commentators) should be provided (as well as TV-controls shown on screen in the Arena). The mass start format requires a course planning technique separating runners from each other (e.g. forking). The best teams should be carefully allocated to different forking combinations. For fairness reasons the very last part of the last leg shall be the same for all runners. Spectators are not allowed along the course except for parts passing the Arena (including controls at the Arena).

4.3 The map

The standard ISOM specification shall be followed. The map scale is 1:10000.

4.4 Winning time, start interval and timing

The winning time (the total time for the winning team) shall be 90-105 minutes for both the women's relay and the men's relay. Within the total time, the time for different legs may vary. No leg should be longer than 40 minutes or shorter than 30 minutes. The Relay is a mass start format and consists of three legs for both women and men. In WOC timing shall preferably be made by electronic means, but manual systems may be used. At the finish line there shall be photo-finish equipment to assist in judging the placings.

Key features of a Relay are:

- team competition, all legs might be decisive
- high speed, often in close proximity to other runners
- based on the Middle distance concept with slightly fewer controls and more emphasis on route choice legs in the non-forked parts of the course

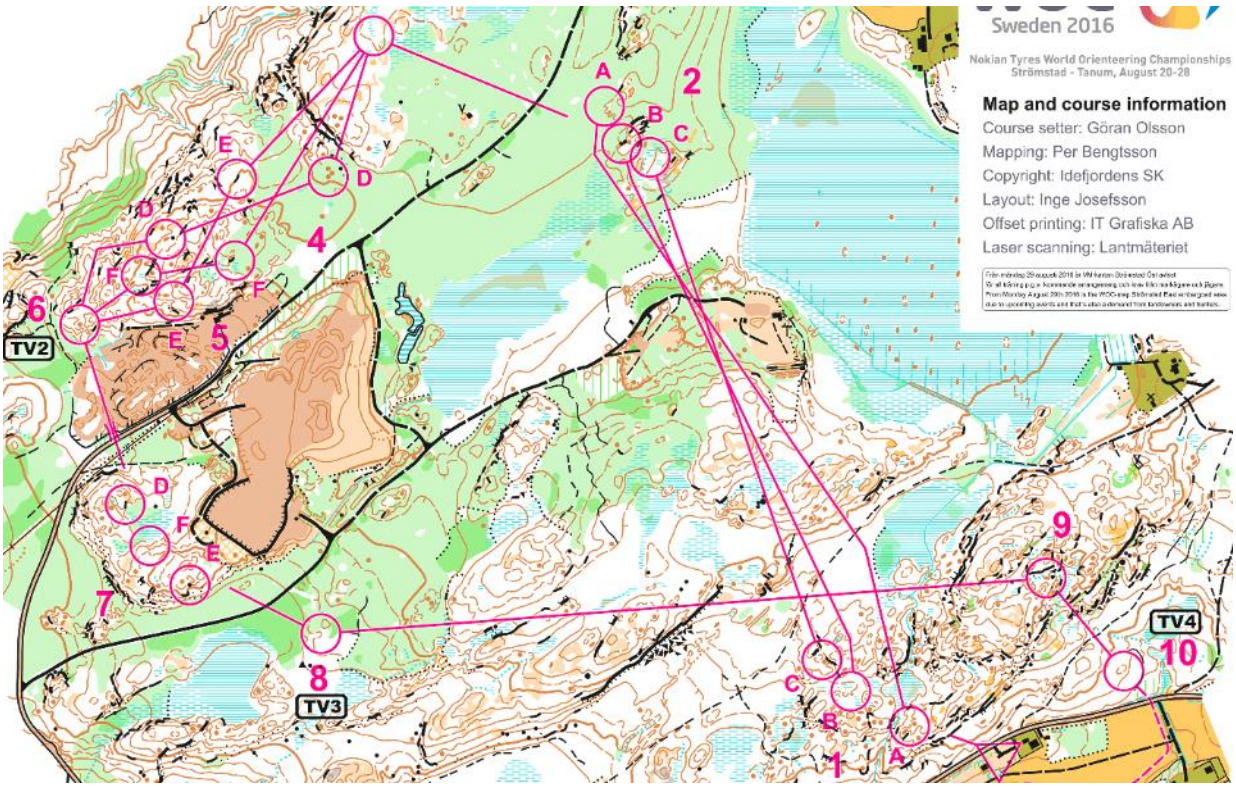
Planning courses that meet these features means that the Course Planner should identify the more detailed areas preferably with low visibility where to have forking. In Relay it is more important to have route choice legs than to have many controls in detailed areas. It is good to have forking crossings each other in order to stress the not so skilled athletes. Whereas forking may be in areas with low visibility, relays must also have legs in areas with very good visibility since this allows TV to show how widespread the field is. Controls in such very visible areas may be slightly less difficult since the leading runners will otherwise be more easily caught up from behind.

Key features for good relay forking are:

- forking is introduced to force runners to do their own orienteering and not just follow those up front
- if possible, there should be a bit of a surprise element in the forking (not only 1 control in the forking)
- the different forking must be equally fast to run for runners of the same capacity
- it is ideal for different forking to have different best route choices
- practice shows that 3-5 forking per leg are optimal for a WOC Relay
- forking shall be understandable for the audience
- no forking in the last part of the last leg (head to head competition) for fairness reasons

"In the relay, emphasis should be on route choice, varying terrain, various orienteering techniques and especially attractiveness for spectators. Fairness is mandatory."

Example of good forking, WOC2016, Sweden



Planning for TV and GPS

Further information about this may be found in the WOC Manual chapter 33 and the **IOF TV Manual** at https://orienteering.sport/iof/communication/

GPS tracking for events with TV coverage

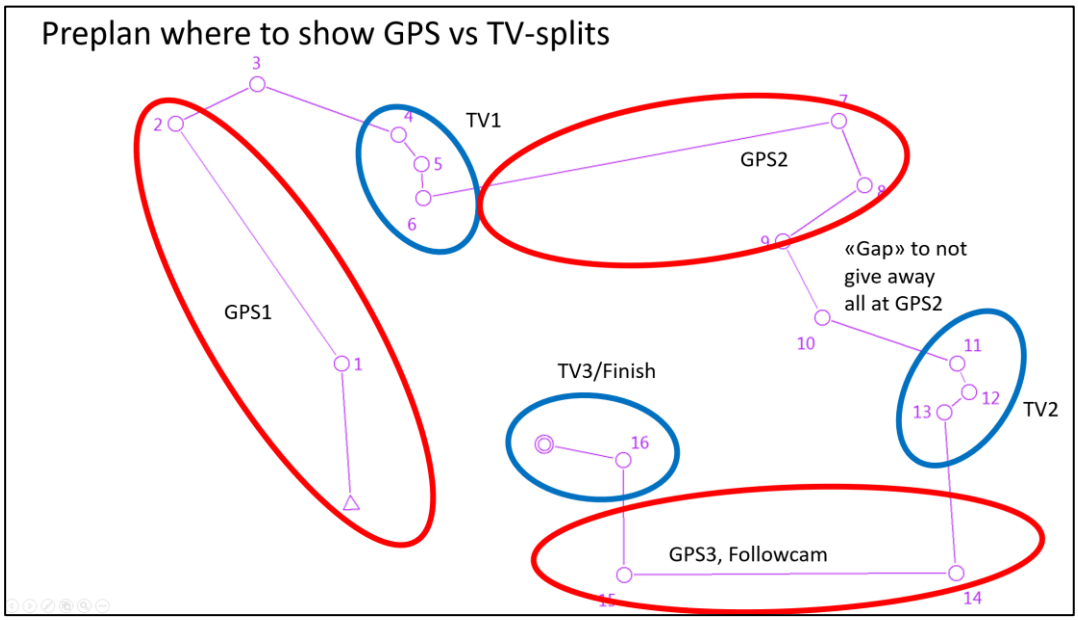
During all World Class Events GPS-tracking must be offered. During the planning phase, the complete courses should be run through with a GPS-tracking unit of the type to be used in the competition to

(1) Find out if there are areas where mobile data coverage is poor as this has to be taken into account when planning TV-coverage where there are areas with poor mobile coverage. For individual start races this can be accounted for by not planning to show live GPS in these sections, see discussion below. For relay

this can be accounted for by showing GPS with increased delay in these areas, but this has to be carefully planned, and ideally these areas should be avoided in the course-planning if possible.

(2) Find out if there are GPS-inaccuracies around any of the control points. If there are large inaccuracies around control points, i.e. if the GPS tracks do not go through the centre of the control point, this can be corrected for in some of the GPS-tracking software solutions for the TV-production.

When planning an interval-start forest competition format (Long or Middle), there will typically be two TV-sections for the Middle (ideally around 1/3 and 2/3 of the course) and three to four TV-sections for the Long (placement depends on where on the course the long route choice legs are, different approaches are possible). Specific sections of the course should be planned for showing GPS-tracking as "replay-to-live", to be shown either ahead of or right after the TV-controls (see red circles in the below figure). Poor mobile coverage may be (more) acceptable in the earlier parts of each of these GPS-areas. Preferably there should be at least 4-5 minutes of running from a route choice leg with special GPS-focus to a TV-control, but this is not critical if the terrain does not allow for it.



5. Course planning and TV production

Close cooperation between the course planners and the production team is needed for a successful TV production.

The contact must be established as early as possible to avoid unnecessary (spoiled) work for the course planners. The TV producer will come up with special requirements which will clearly have an influence on the courses. As a course planner for a High Level Event, you have to realise that **"It is difficult to create the world's best course in a high level event with TV coverage"**. It is often a question of compromise. Normally you will not have the final ideas from the TV producer when you start planning your courses. However, you can consider general requirements from TV producers.

Pay attention regarding how to lay cables in the best way to all the places where you need pictures and intermediate times from the terrain (camera positions, time controls).

TV-legs need 3 controls (within 60-150 seconds from each other), as shown below.

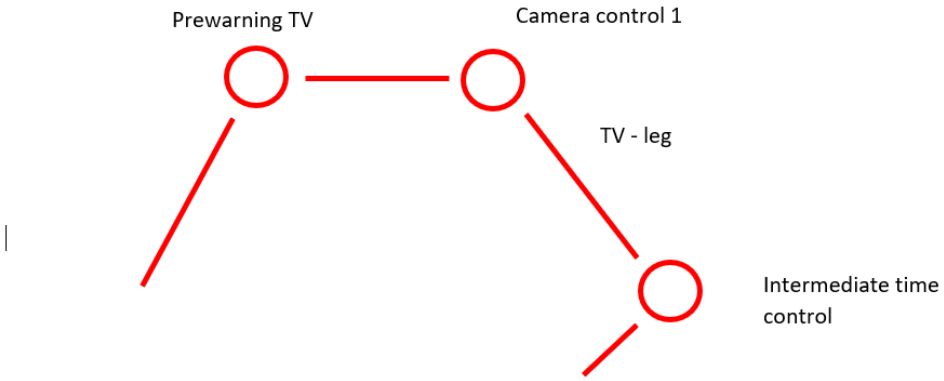


Figure 1. Section of orienteering course with respect to TV production

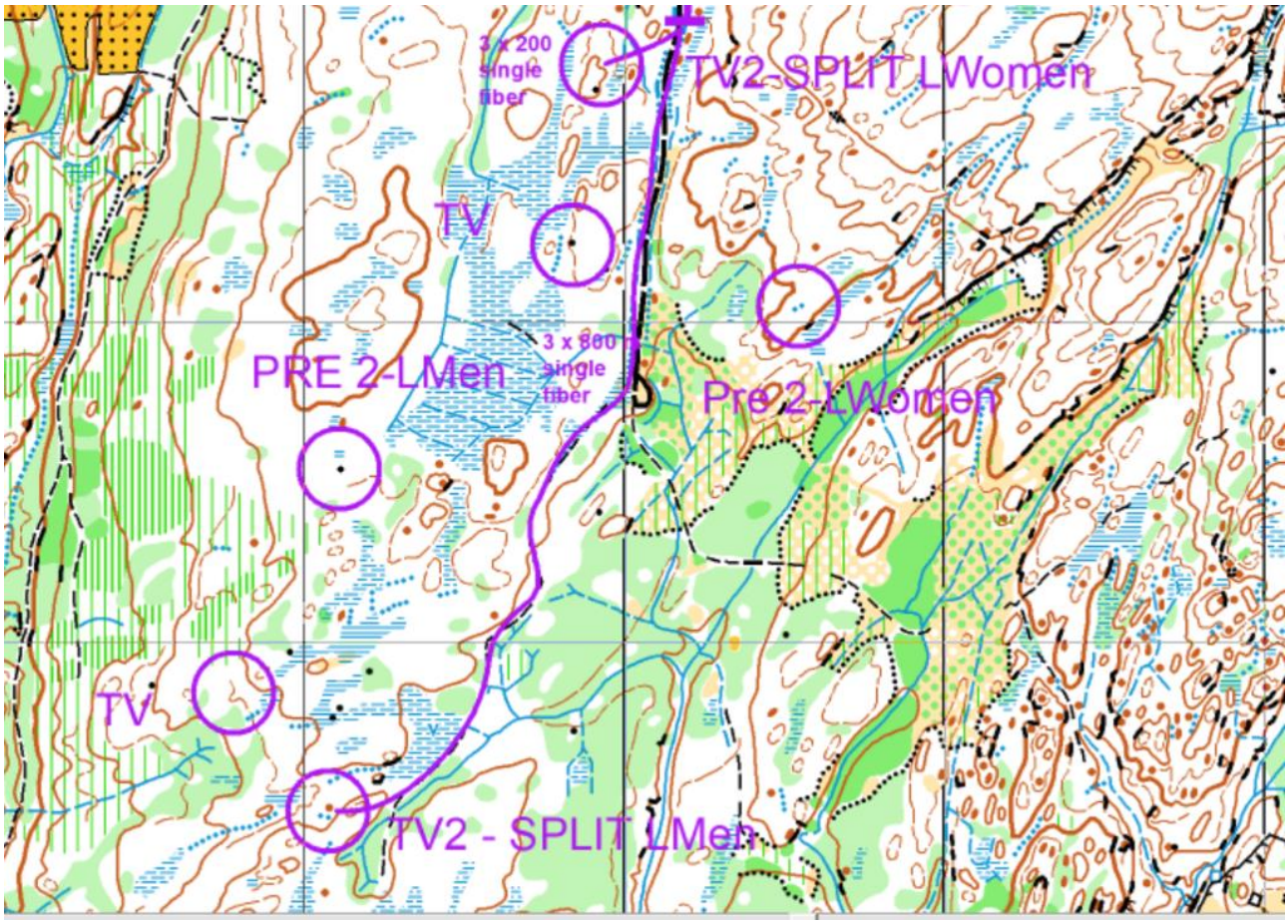


Figure 2. Example from TV 2 at WOC 2019 long distance Pre warning and TV legs in women and men classes

It is optimal to have the prewarning ca. 1.30 minutes before the runner appears in the first camera (should not be under 1 min or above 2.30). The TV sequence will normally last for 1 to 2 minutes. The example above shows that you can move a camera to a different control between the races to save resources (few cameras).

If a course contains several TV legs, it is required that the TV viewers can easily distinguish them.

Refreshment control shouldn't be shown on TV camera records (prewarning is ok!). Refreshment service on the arena passages is accepted.

Photo controls shouldn't be combined with TV-controls.

For optimal TV coverage it is better to have the Start on the arena and an arena passage during the race. This means that you need a quarantine zone close to the arena.

However, sporting fairness and terrain possibilities must be balanced against TV production. If necessary, the Start can be removed away from the arena, in which case you need TV-camera at the Start. Remember to find suitable routes for laying cables.

The table below shows the advised number of TV sections related to the competition format. In addition, there should be cameras at the Start, at the arena passage and at the Finish.

There should be the same number of TV sections for both men and women (exceptions can be done on Long distance). This means you must normally plan the same TV-sections for women and men, to save on resources and costs.

Type of course	Number of TV-sections out on the course	Remarks
Long distance	3-4	2-3 cameras on each section
Middle distance	2	2-3 cameras on each section
Relay	3-4	1-2 cameras on each section

Proposed number of TV – sections related to competition format.

The camera sections should be distributed as evenly as possible on the course. It is preferable to have more cameras towards the finish for Relays.

As an example, TV production from a Long distance competition requires 12 to 15 cameras for a full production (including Start and arena production). Normally the distance for laying cables will reach 8 to 10 km.

In cases of limited access to cameras, the production must be scaled down relatively according to the resources.

Since TV production is strongly linked to GPS tracking, it is necessary to test the transmission signals in due time before the race. If the mobile coverage is poor, you must put out extra resources to get the necessary quality required by the TV producers.

A TV-production can't be successful unless GPS tracking and timing can be a great part of what is shown on the screen.

Since several companies have to cooperate to give all necessary input to the production team during the race, you need a skilled coordinator in the organisation to check out the interfaces and make the agreements.

There will need to be several meetings and surveys well before the race date.

As a goal, the course planners must have the final agreements with the TV production team as soon as possible before the competition. The SEA must be involved as soon as possible into TV discussions.

6. Media and spectators

Media

The course planner should provide a photo control not far away from the arena. For fairness reasons this control must not be too difficult to find, since runners should not have any advantage if there are photographers out there or not. The course planner shall point out the photographers position close to the control. This control must be common for women and men. No refreshment or brand tape are allowed at the photo control. There should be enough light at this control in all weather conditions.

Photo Control 151 at WOC 2019 – the detail on the right shows the running direction out of the control and the dedicated (marked) positions nearby the control for the photographers.

Planning for Photo Controls at WOC 2019

- an organised transport to the photo control
- taking photos from dedicated (marked) positions nearby the controls (guided by a media person who knows the details: briefing of this guide in the morning of the competition day or the evening before)
- remember the brief of the photographer
- transport back to the arena after the last runner has passed the photo control
- taking photos from the last runners at the finish line

Spectators

There must be an arena passage to satisfy the spectators. The course planner must also consider if it is possible to have the Start at the arena to give an extra experience for media and spectators (otherwise viewing conditions could be better from home – it's the atmosphere in the arena, that provides something extra for on-site viewers).

An alternative or a supplement to an arena passage is a spectator control which can be seen from the arena. The spectator control must have a prewarning control to simplify the speaker's job.

A Prewarning control must be 1 to 2 minutes before the arena.

Managing a Course Planning Project

In the previous chapters, we have outlined the requirements for good courses, discussed how to set good courses and how the course should be adapted to the requirements of making the event friendly to TV-viewers, media and spectators.

However, a crucial prerequisite for being successful as a course planner is the course planner's ability to work with people fulfilling many other roles in the organisation and thus make sure high quality is preserved throughout by systematically removing any possible cause of failure.

These roles must be well defined in the organisation

- Course Planner as described in section 3
- The course controller, who acts as a coach and a challenger in the early phases of the work and an independent controller and/or monitor of the controlling work in the later phases of the work. This role may be undertaken by a National Controller, a Day controller or a third person. But for one specific race this role must be clearly allocated to one single person
- Test runner – A skilled orienteer running the course long time before the competition with the aim of giving feedback to the course planner about things that worked well and things that could be improved – and feedback as to whether the winning time is expected to be met.
- Check runner - A skilled orienteer running the course with the actual competition map in the early morning of the race day (after the e-card readers have been placed) looking for everything that might not be correct. Calls the Course Planner immediately if something is wrong.
- Event Adviser role – as a minimum (IOF Competition Rule 31.8), the EA
    - approves the courses after assessing their quality, including degree of difficulty, control siting and equipment, chance factors and map correctness
    - checks any course splitting method and course combinations
- The National Controller assists the Event Adviser (31.4) and the way in which the EA liaises with the planning team needs to be established at an early stage.

The Course Planner and the Course Controller work together throughout the project, whereas Test runners and Check runners are called upon at specific times.

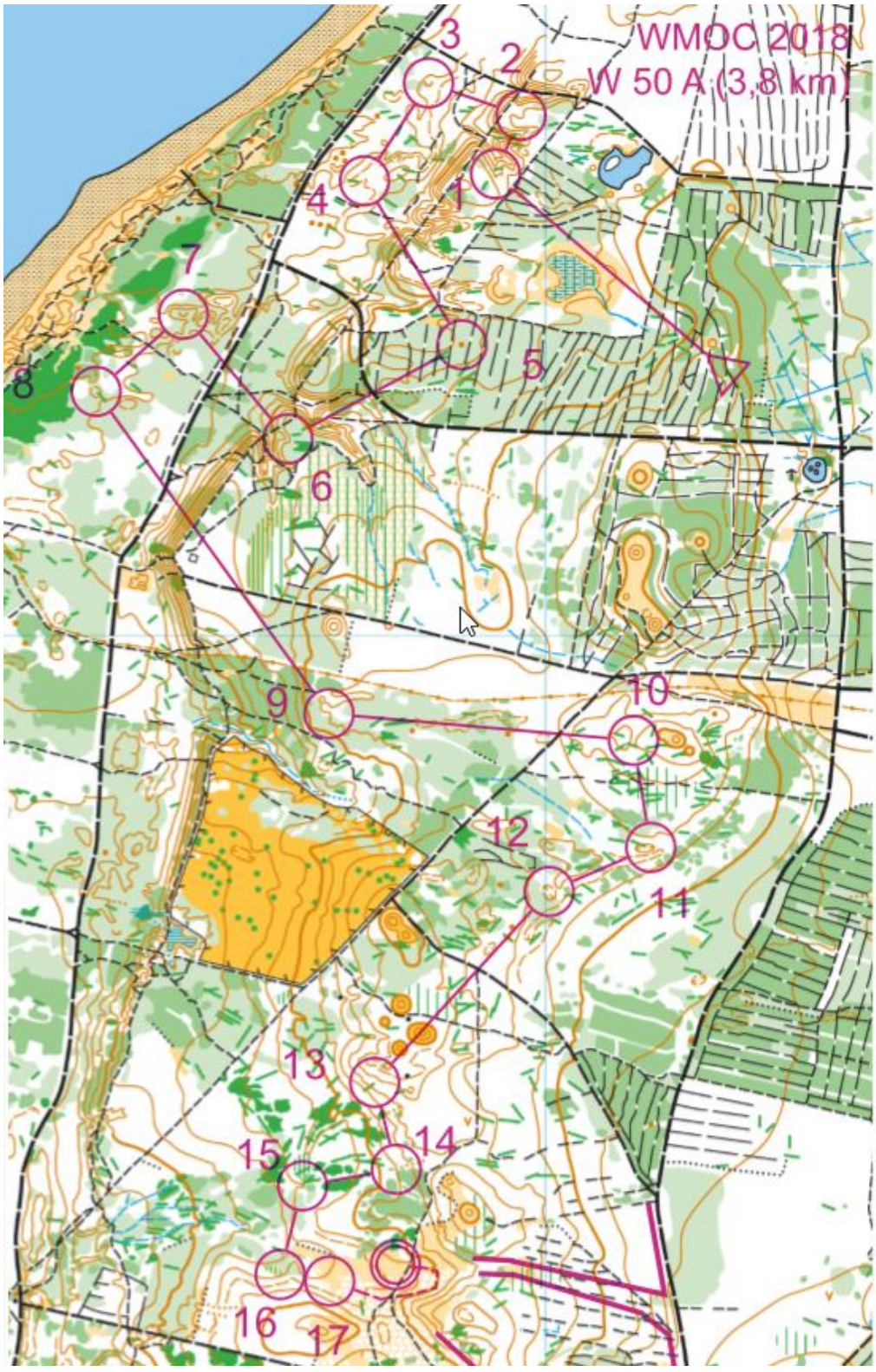
The key element of course planning is to start early enough and allocate sufficient time for the work. The *Course Planning Project Management Tool* is an Excel workbook that is recommended for all course planners to use. It includes a Timing-sheet with a list of actions to be managed from the early start until the event is over. Many roles in addition to those above are found in the sheet. The Course planner should identify the owners of those roles in due time before the activity is to be done.

The *Course Planning Project Management Tool* has several tabs in the workbook. When using these tabs consistently, the Course Planner and the Course controller have a common framework for making sure that all issues are dealt with.

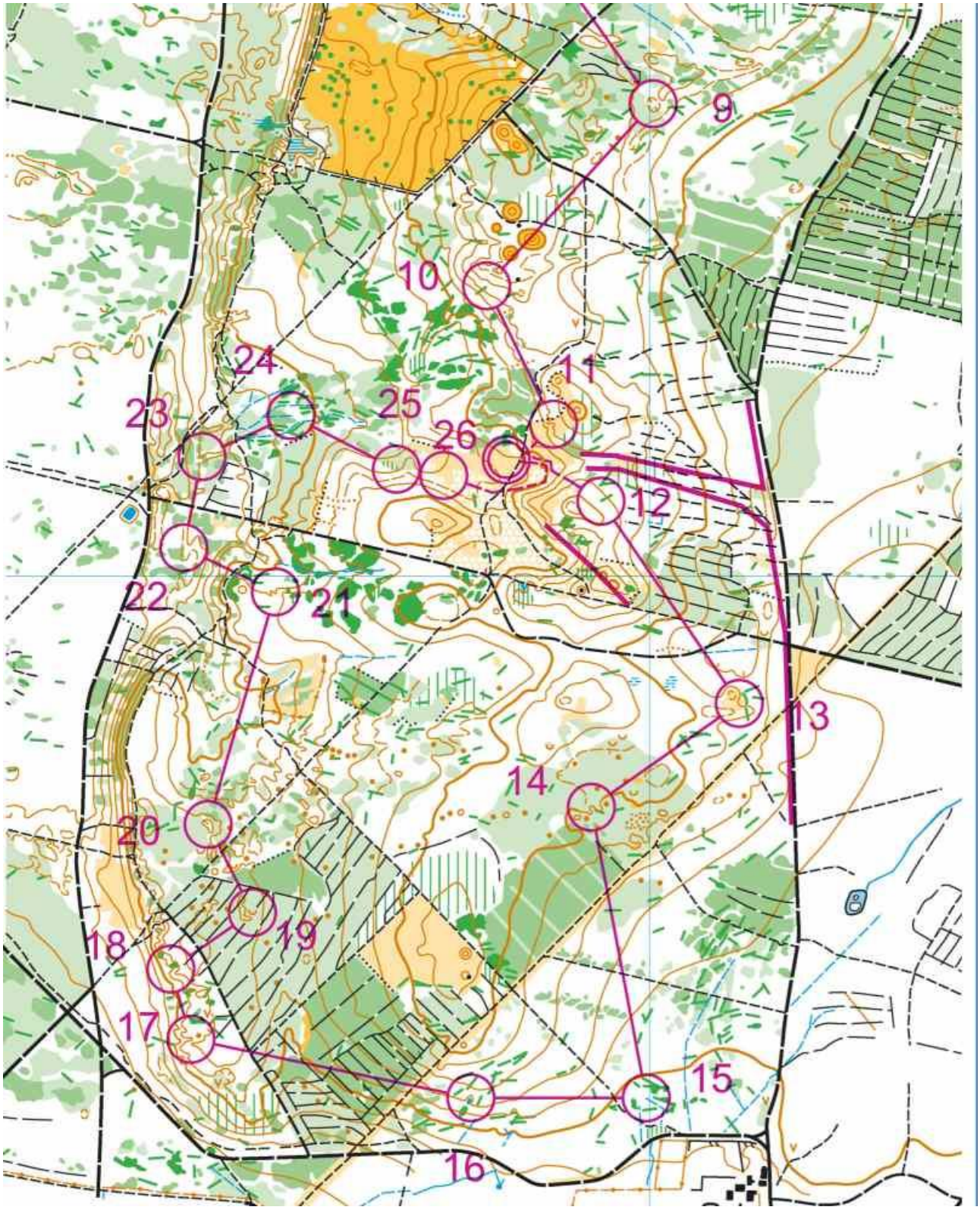
In the Timing-tab of the tool, the first column indicates before which of the SEA visits in a HLE, the task is scheduled to have been performed. Ideally, the SEA will take out the checklist during his/her visit and receive verification and proof that the tasks have been completed.

Appendix 1: Middle Distance course examples

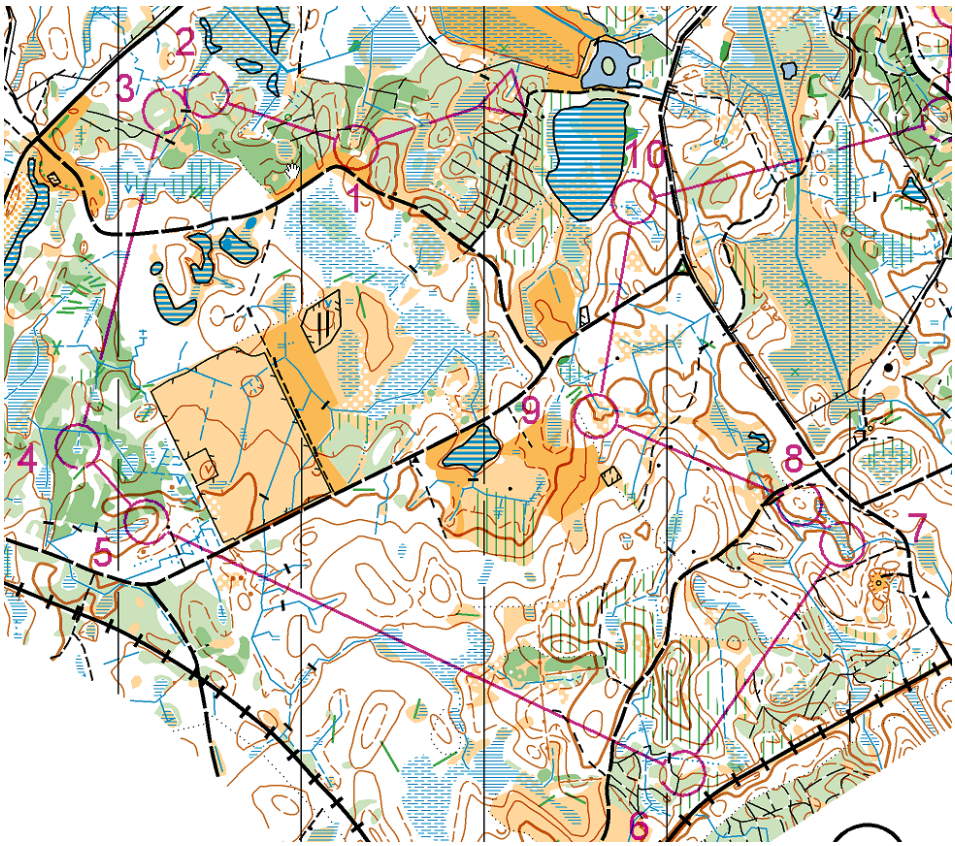
WMOC 2018 – W 50 A Middle distance Final. *The course varies between short technical legs, short route choice legs and longer more simple legs with possibility of increasing the speed. There are angles at most of the controls. Furthermore, a part of the terrain with low visibility had been selected.*



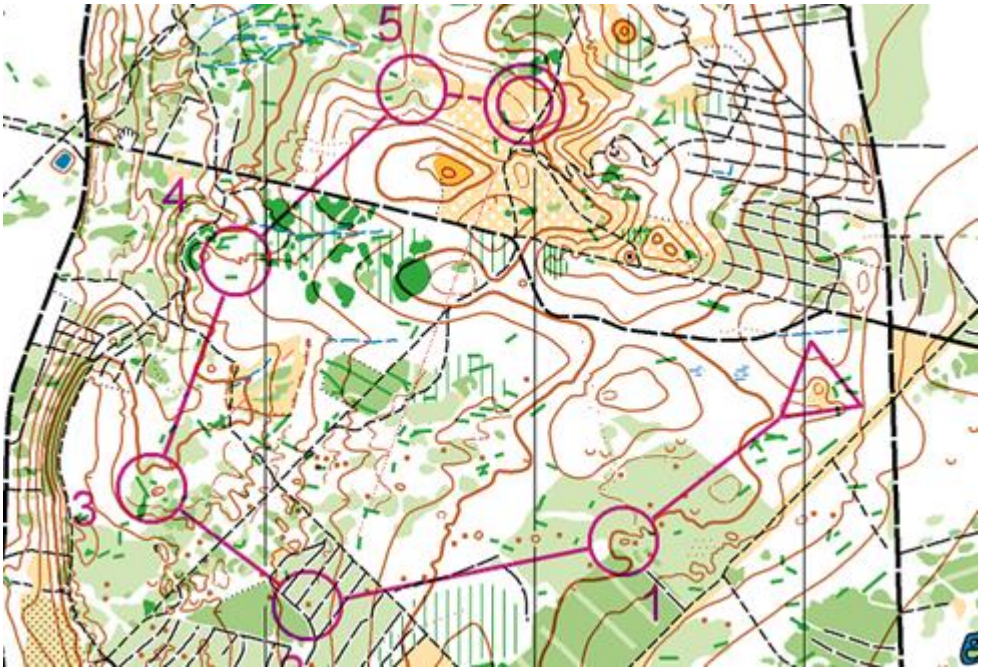
WMOC 2018 – M 35 A Middle distance Final – last loop. *The course has an easy control just after the arena passage and from there the course varies between very tricky controls and more easy ones. The runner is forced to change technique. Due to constraints from course corridors for other classes, this part of the course misses longer route choice legs.*



WRE Race, Middle Distance M 21. *The start of the course is set in a low visibility area putting demands on navigation skills. Due to terrain conditions, the course suffers from lack of route choice possibilities, but the longer legs put a requirement on change of speed and technique.*

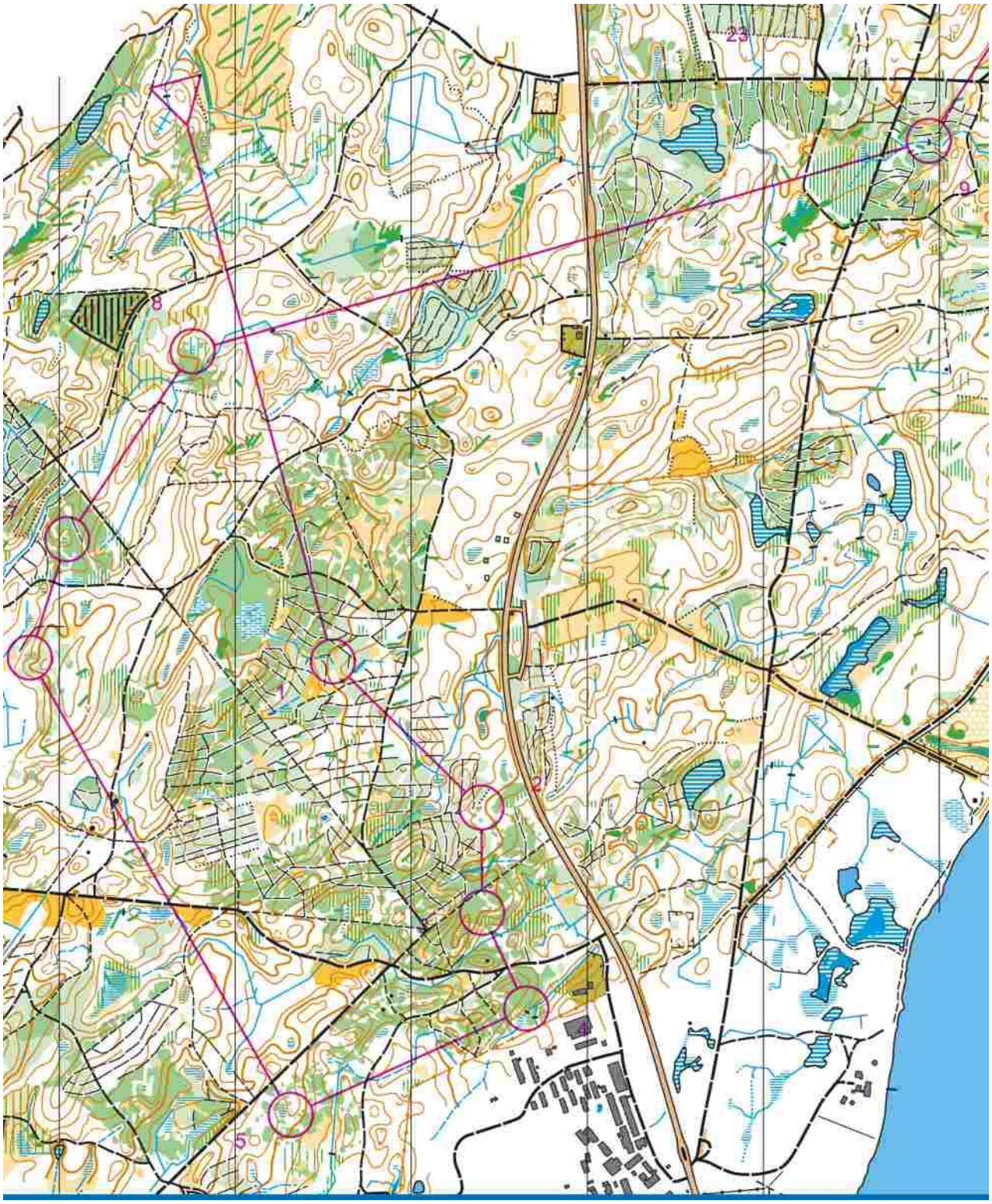


What to avoid in Middle Distance. *Insufficient change in angle. Insufficient difference in length of legs. Note that the single legs may be acceptable, but the course is not.*

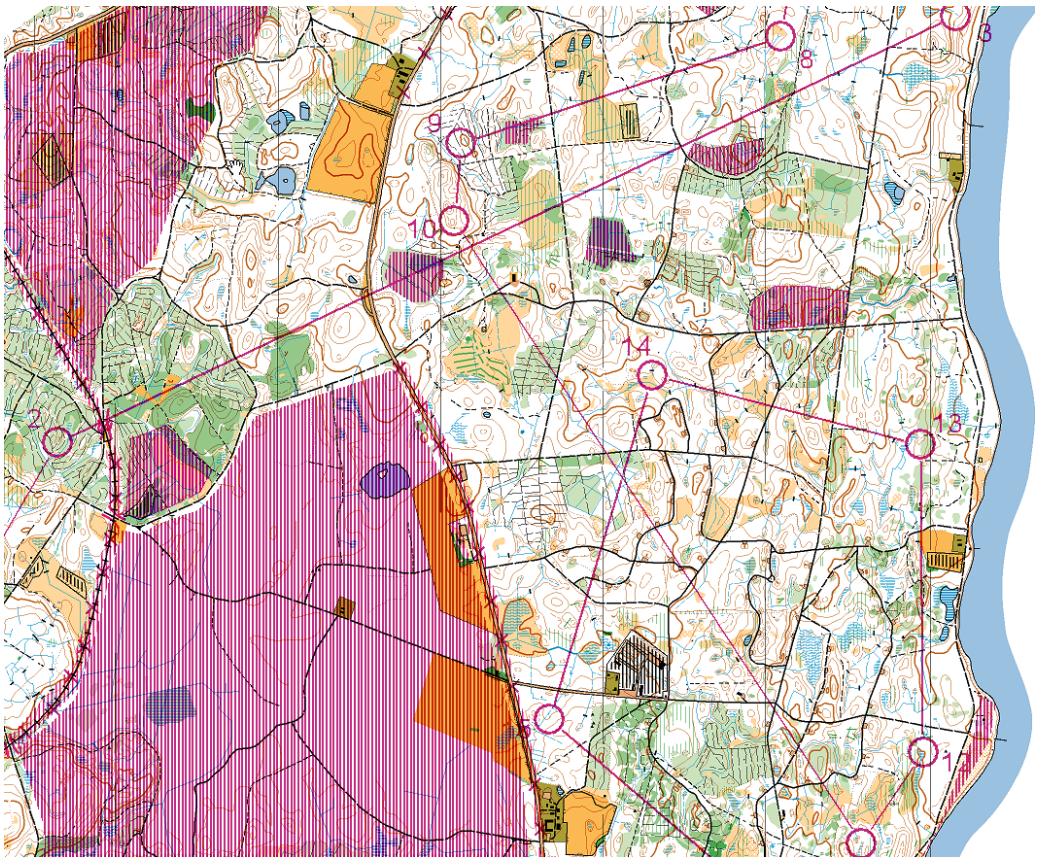


Appendix 2: Long Distance course examples

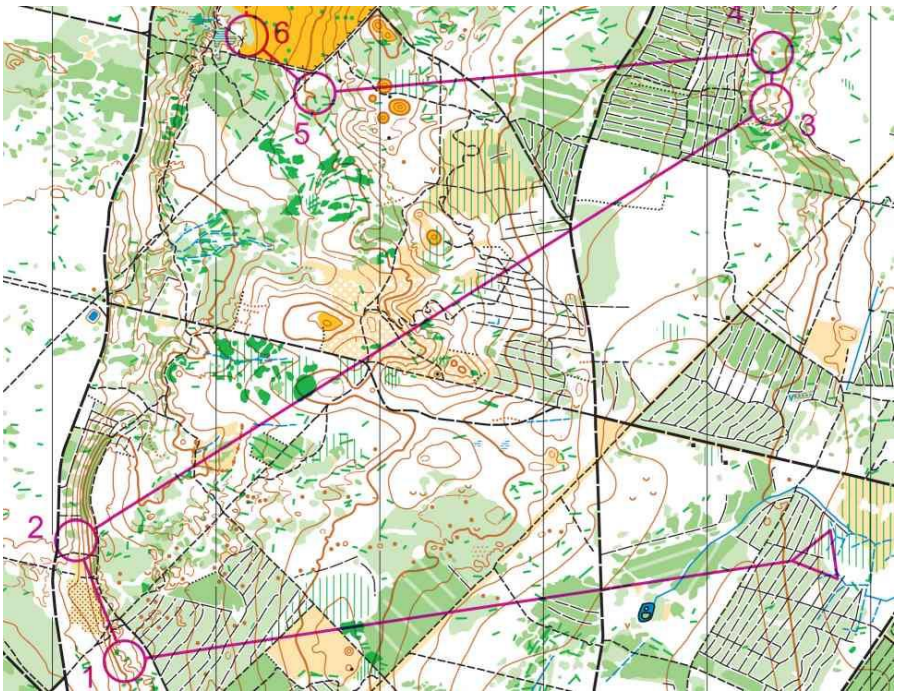
WMOC 2018 – M 35 A Long distance Final – first loop. *There is a route choice leg from the start, but it is not decisive. In this type of terrain shorter legs also have route choices since you must decide to go straight or follow paths. Apart from this, the course varies between short intricate legs and longer route choice legs.*



Danish Ultra Long distance championships 2015 – M 21. *It is possible to set courses with very long legs even in terrains with many forest roads. Most route choices will have some forest road running, but still you need to make careful route choices.*

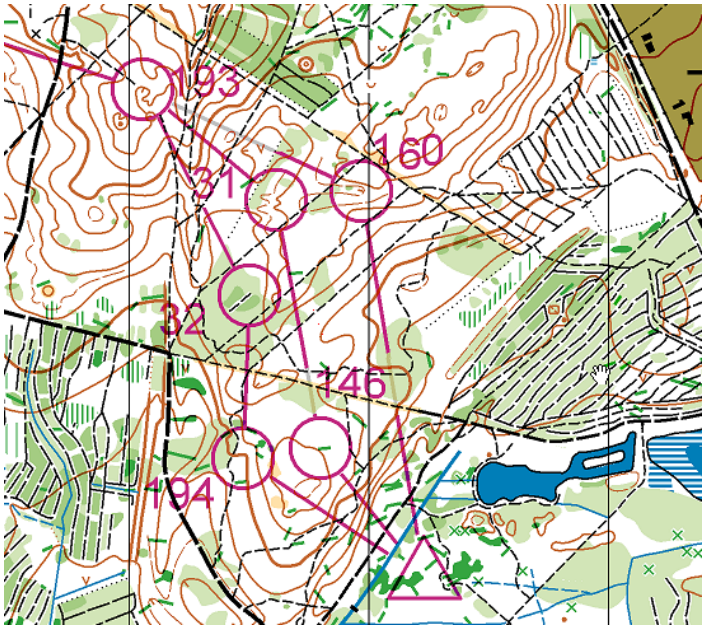


What to avoid in Long Distance. *Legs that are just long and not really have any route choices. Legs going through the interesting areas without having any controls there.*

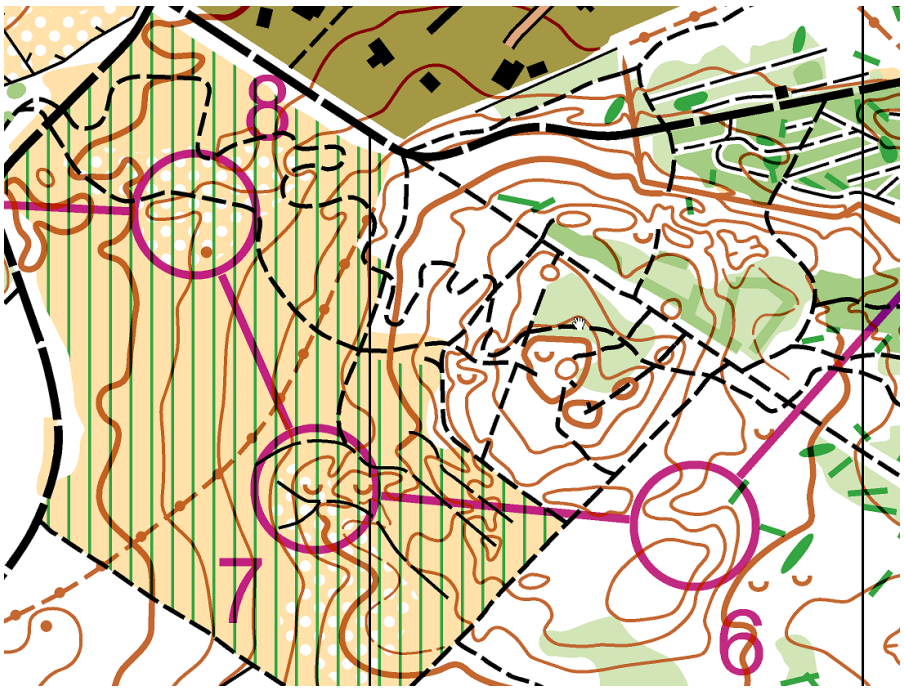


Appendix 3: Relay course examples

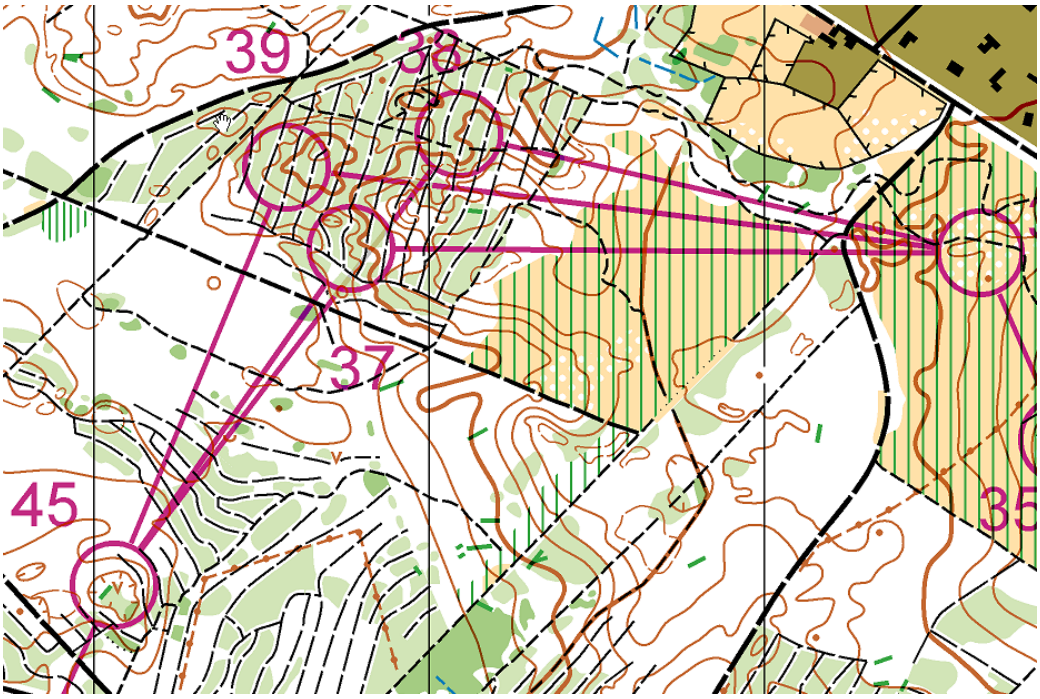
Forking example. *The leg to 160 is 50 metres longer than the others, but more simple. In this example, one might evaluate if the two left alternatives are more difficult than the (longer) right one.*



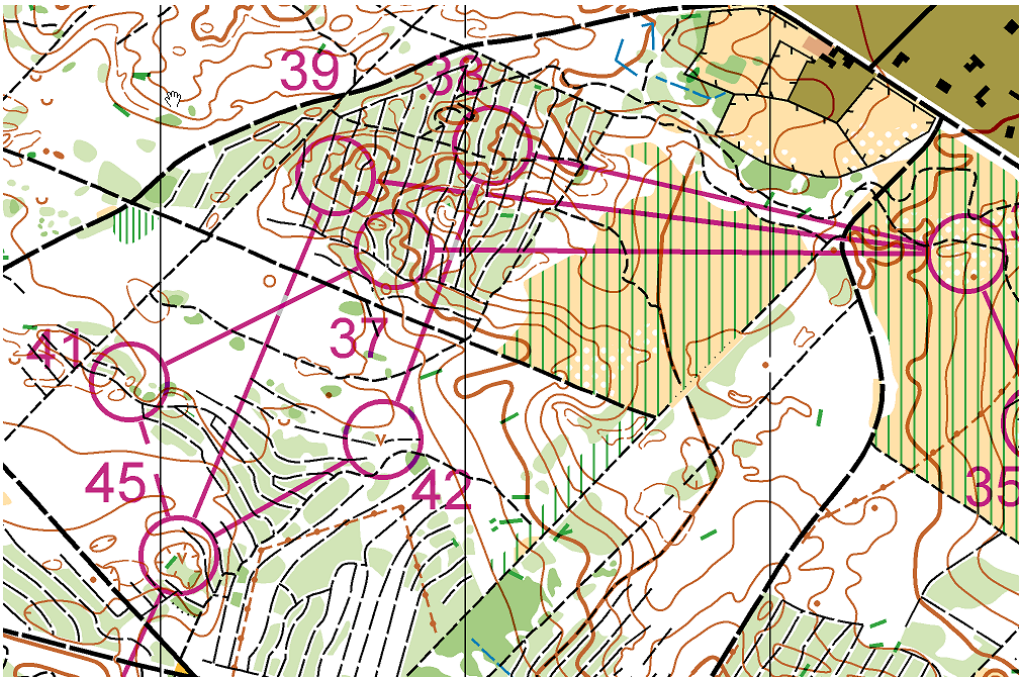
TV example in Relay. *TV prewarning could be at control 6. Cameras can be placed in the open area showing the distribution of runners when running through the open area..*



Example of <u>what to avoid</u> in forking. *When coming from the east, the forking through 37 is 100 metres shorter than the one through 39. This would give an unfair advantage to those having 37 in the beginning.*



This is a better solutions for forking. *The gaffles now have the same length. However, care should be taken to have the flag at 42 being placed correctly on the edge of the pit. Otherwise teams having 42 first risk losing time trying to locate the pit. Crossing forkings may put additional stress on the runners which, in this case, is a good thing.*

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