Planning Relay Courses

Part 3 – Event preparation, arena layout, and result publication (with an Australian focus)

In parts 1 and 2, we looked at the principles of relay course design and sprint relay courses. In this part we'll look at recent major Australian relay competitions (2022 Australian Championships and Australian Schools Championships, and 2023 Oceania Championships) for an insight into the practical considerations required to run a successful relay competition. Thanks to Russell Bulman, Aislinn Prendergast, and David Marshall respectively for providing the course details, and to Debbie Dodd for insights into the workflow required for the Australian schools relay and Australian relay championships.

Relays vs individual races – what are the differences?

The fundamental steps involved in conducting an orienteering relay competition are comparable to those involved in staging individual races:

- Plan the courses.
- Accept entries.
- Print maps.
- Stage the race.
- Publish results.

What makes relays more challenging to organise is the fact that each of these steps is more complex than the equivalent step in individual competitions.

In parts 1 and 2, we looked at the course planning step. Here are the rest of the steps.

Accepting entries

When people enter a relay competition such as the Australian or Oceania Championships, quite often they won't know at the time of the entry who else will be in their team. To accommodate this, organisers usually set up two events in the entry system (in Australia this is Eventor) – one event that allows individuals to enter their desired age class, and the other for final teams that are put together by team managers from the individual entries. Here's an example from the 2023 Oceania Relay Championships:

Thu 12/1	Oceania Championships Relay - St Helens - Individual Entry
	Oceania Championships Relay - St Helens - Team Management & Results

Map Printing

Once entries have closed, you have a pretty good idea of the final number of teams that will be competing, and the age classes that those teams will be competing in. It is important to build some flexibility into the allocation of team numbers as not all classes will have entry numbers which are exact multiples of three (for three-person relays).

In contrast to individual competitions, where all competitors in a class run the same course, there are many courses (or more precisely, course variations) that competitors in a given relay class can run. The organisers must therefore ensure that the map the runner takes from the map-issue area (either from a "graveyard" stake or from a "clothesline" - see the **Arena layouts** section below) must be the same course variation that is assigned to the runner in the event management software.

A simple bib with team number and runner number (e.g. 101-1) is recommended. It is also recommended that team numbers start at 11 to avoid confusing leg numbers with team numbers. Use of non-numeric team identifiers (or identifiers with more than two parts such as 3-2-1) is not recommended.

From a runner's perspective, being able to quickly identify the correct map is crucial to a successful event. Not only does it it greatly reduce the risk of an incorrect map being taken, it also makes it easier for volunteers setting up the map-issue area and assisting runners when they pick up their maps.

Extra maps

It's simple enough to print additional maps for individual competitions (typically 5-10 extra maps per course), but extra *team* maps are required for relays, and ideally each team map should identify the team and runner numbers (for example: Team 11, leg 1 – see example below from the 2023 Oceania Championships).

In relays, teams *in aggregate* will run the same course, but the *individual team members* will run *different* courses, so maps are specific to each team member, whereas in individual competitions, each competitor on a course will have the same course printed on their map.

In addition to printing three extra maps *per team* (four extra for sprint relays), adding teams to event management software is more complex than adding individual runners. If your event management software supports the option, you can create additional (empty) teams (with assigned variations).

One option that might allow late-entries would be to print extra maps for teams in mixed classes (with varying navigational difficulty), and short men's classes, which would allow men and women to compete as official teams. Obviously, late entries shouldn't anticipate that they will be able to compete in their preferred class.

Team/bib numbers

It's essential that the maps issued to each team match the courses that are assigned to each team in the event management software.

In this example from Condes, teams 101, 102, and 103 have the following variations:

⊟ **Course: 1**						
⊟ **Class: M21E**						
101	Gold Diggers	M21E	1	☐ AaA	☐ BaB	☐ Cb
102	Claim Jumpers	M21E	1	☐ BaB	☐ CaA	☐ Ab
103	Pit Ponies	M21E	1	☐ CaB	☐ AaA	☐ Bb

Ideally the team and leg numbers will be printed on the maps by the course-planning software - this assists both the runners when they enter the map-issue area, and event volunteers in directing runners to their maps if required. Depending on the how the map is printed, this can be either on the front or the back of the map.

Examples of team identification data from the sample events

In the Australian Relay and Australian Schools Relay, course name/number and course variation were shown on the map. The Oceania relay maps showed course part (a map flip was used for most courses), team number, and leg number.

For these competitions, the information was printed on the front of the map.

Staging the race

Arena layouts

Relays almost always start at the arena, so when choosing a map for a relay competition (especially a major competition), it is useful to have an open area big enough to accommodate the competitors in the mass start. If this is not available, successive mass starts for first leg runners could be an option (make sure you allocate the correct mass-start times for all classes).

Common layouts for mass starts are “graveyards” and “clotheslines” (see images below).

Graveyards

- Useful for small to medium-sized events if the maps don’t have team and leg number information printed on them. A team number is required for the stake holding the maps (and attached to the base of the stake). Maps are rolled around the stake and held in place by a rubber band, with each team member taking the ‘top’ map when they arrive at the stake.
- They require a flat area (oval, paddock) without buried infrastructure (e.g. irrigation/watering pipes, plumbing, electrical conduits).
- For big events, the number of stakes and team-number plates could be difficult to transport.
- Time-consuming to set up, especially in hard or rocky ground.
- If rubber bands are used to hold the map on the stake, the discarded bands should be collected after the event.

Clotheslines

- Ideal if each map has team and leg number information on it.
- Requires suitable anchor points for the lines (for example, conveniently spaced trees).
- If no trees are available, the anchor points for the lines will have to be adequately braced as reasonable tension is required on the lines to ensure they don't sag under the weight of the maps. In the picture below, tensioned fencing wire was used. At the Oceania relays, ratchet tie-down straps were used to tension the lines.
- Be sure to allow sufficient line for the number of teams – four maps per metre of line for A4 maps is a good rule of thumb.
- Don't forget to buy an adequate number of clothes pegs!

"Graveyard" (Australian Schools Championships, 2022) – steel rods to hold the maps, no splinters and easy to hammer into hard earth. Ideally, each stake will have a protective cap to avoid potential injury.

"Clothesline" (Tasmanian Relay Championships, 2022) – fencing wire strung between conveniently placed trees.

The Australian and Oceania relays used a hybrid arrangement, with the first leg runners being issued their maps prior to the start (no stakes required), with second and third leg runners taking their maps from a "clothesline".

The race briefing and the mass start.

Relays typically have a race briefing 15-20 minutes before the scheduled mass start, where organisers demonstrate the start and changeover procedure (and advise first leg runners that they need to clear their SI cards!) Public address equipment should be used to ensure that competitors hear the briefing.

Once the briefing is finished, first leg runners make their way to the map-issue area ("graveyard" or "clothesline"), where there should be plenty of "Clear" and "Check" boxes.

For safety reasons (see OA rule 23.10 *The organisers must ensure that at the end of the competition all competitors have been accounted for),* it is good practice to have the first leg competitors punch a check box as they enter the map-issue area. Second and third leg runners should do the same as they enter the changeover area. No cars left in the car park, or no worried parents enquiring as to the whereabouts of their child does not satisfy the requirements of rule 23.10!

It's important that the mass start doesn't become a mass stampede. Make sure that bottlenecks are avoided. Ideally, the start area should be relatively flat and free of obstructions underfoot that could lead to competitors tripping, with the potential for injury, especially if a "graveyard" style map issue area is used. While steel stakes are easier to hammer into hard ground than wooden stakes, there is potential for serious injury with steel stakes, so if used, they should be capped. Spectators should also be kept clear of the path to the first controls. If an ideal area is unavailable, staggered mass starts could be used (for example, by class or course at one- or two-minute intervals). Teams should be seeded, with the fastest teams in the front row and the slowest at the back.

The mass-start time is pre-set in event management software, so for the sake of accurate recording of the leg times for first leg runners, it is important to adhere to the advertised mass-start time. If there is any delay, the actual start time must be recorded, and the event management software updated.

Secondary mass starts (also called mini-mass starts)

Inevitably, some teams will have runners who are much slower than the predicted winning times for each leg. Secondary mass starts give later leg runners the opportunity to compete and complete their courses before the event time limit/course closure.

Applicable rules:

- *OA rule 22.12 With the approval of the OA Controller the organiser may arrange mass starts for the later legs for relay teams that have not changed over. Times for these should be advertised in the event information and should not be scheduled before at least 80% of the competitors on that leg are anticipated to have passed through the changeover.*
- *IOF rule 22.13 With the approval of the IOF Event Adviser the organiser may arrange mass starts for the later legs for relay teams that have not changed over.*

The usual procedure is to have just one secondary mass start for second and third leg runners, although it is feasible that more than one mini-mass start could be used, for example, one for second leg runners and another for third leg runners. At the 2022 Australian championships, first leg runners started at 10:00, and there was only one additional mass start (all remaining second and third leg runners started at 12:00, and the course closure was 13:30).

The timing of secondary mass start(s) should be announced over the PA system so that all potential participants have adequate time to prepare for it.

The secondary mass start will be from the changeover area, and there will be runners waiting expectantly for their team-mates to finish (e.g. their team-mates have gone through a pre-warning radio control), as well those who have no expectation of seeing their team-mates. Runners whose team-mates are reasonably expected to arrive before the secondary mass-start should not be impeded.

Event management software implications of secondary mass starts.

Make sure you are familiar with your event management software's requirements for secondary mass starts:

1. Some software simply assumes that competitors starting before their team-mate has finished will have started in the secondary mass start.
2. Some software requires that competitors in the secondary mass start are specifically identified (e.g. by punching a check box which is downloaded after the competitors have started).

Option 1 is obviously the simplest to deal with, but if your software uses the second option, you will have to design processes to accommodate it, for example, by separating the secondary mass-starters from the normal change-over starters and recording them with a cleared check box assigned to the secondary mass start. In practice, it's unlikely that option 2 will present any problems.

Pre-warnings

In order to assist runners waiting for their team-mates, some form of pre-warning is highly recommended. Options include:

- Radio controls that all competitors punch towards the end of the courses.
- An arena run-through or a spectator control in the latter part of the course.

The Change-over

The finish control at the 2022 Australian Schools Relay Championships with the change-over area in the distance – note that competitors record a finish time before tagging their team-mates.

The reason for having the finish punch before the change-over is that the finish time of the earlier leg runner becomes the start time for the later leg runner. If runners tag before recording a finish, it's possible that anomalies could arise, for example, if the earlier leg runner:

1. forgets to punch the finish before downloading.
2. punches sometime after tagging, thus inadvertently affecting their own leg time and that of the later leg runner.
3. punches the finish sometime after tagging and in the meantime a secondary mass start has commenced.

The Finish

There are two important things to note with a relay finishing order:

1. In close finishes, placings are determined by the order in which competitors cross the finish line, NOT the time recorded on their SI card. This is because timing to the nearest second could show runners as having the same finish time, even though there might be a significant gap between them. In the 2023 IOF rules, rule 23.5 now allows for sub-second timing to correctly show the finish order: *"In races with mass or chasing starts, the results may show tenths of a second in order to correctly represent how competitors crossed the finish line."*
2. OA and IOF rules differ with respect to placings of teams who start in secondary mass starts and teams who change over in the ordinary way (i.e. by team-mates tagging).

   The applicable rules are:

- ***OA Rule 23.7*** *In competitions with mass or chasing starts, finish judges rule on the final placings based on the order that competitors' chests cross the finish line.*
- ***OA Rule 24.8*** *In relays where there are mass starts for later legs, the sum of the individual times of the team members must determine the placings of the teams that have taken part in such mass starts.*
  A team having started in the subsequent mass start may be permitted to have an official result ahead of a team that did not start in that mass start; the team with a faster combined time is placed higher.
- ***IOF Rule 23.9*** *In competitions with mass or chasing starts, finish judges must rule on the final placings based on the order that competitors' chests cross the finish line. A jury member must be present at the finish line.*
- ***IOF Rule 24.8*** *In relays where there are mass starts for later legs, the sum of the individual times of the team members determines the placings of the teams that have taken part in such mass starts.*
  Teams taking part in mass starts for later legs are placed after all teams which have changed over and finished in the ordinary way.

Ideally, your event management software will allow you to choose the option appropriate to the rules being used for the competition, but if the software doesn't offer both options, it might be necessary to manually adjust placings.

Troubleshooting

"What could possibly go wrong?"

Orienteering is a complex sport to organise, and relays add to the usual complexity. The fact that our competitions are well organised is a tribute to the dedication and professionalism of event organisers, but inevitably there will be glitches.

To mitigate the stress and time loss associated with these glitches, it is highly recommended that you have a dedicated troubleshooting desk operated by someone experienced with both the event management software and the organising of relay competitions.

Here are some of the problems that could arise, and suggestions on how to deal with them.

1. Last-minute team changes

Team changes should be handled in the first instance by the team at the registration desk, and the information then passed on to the finish team (ideally the troubleshooting desk) so they can update the software without hindrance.

As a minimum, the following information should be collected at the registration/enquiry desk:

The team number and where applicable, the team name of the team requesting the change.

The change required (for example, withdrawal of the complete team; a change to the team composition; a change to an individual team member's details – e.g. a new SI card number).

The carnival bib number(s) of affected team members for multi-race competitions (this is useful where the event management software can update name/SI number/club name from the carnival bib number).

A pre-printed form for competitors to fill out with the require information is recommended.

If a complete team is withdrawing from the competition, it's possible that one or more of the team members will be joining other teams. Generally, the event management software will require that team members are deleted from existing teams before they can be added to new teams, so the order in which changes are made is important.

Enter-on-the-day competitors asking to be added to incomplete teams should be discouraged!

2. Course mismatches

It's possible that when runners download, some of them will be shown as mis-punching due to a mismatch between the course they ran, and the course assigned to them in the event management software:

- If this is a runner error (i.e. they took the incorrect map), then the runner and his or her team are disqualified (see section 4 below for further discussion of this problem).
- If it's organiser error (e.g. the wrong course variation was assigned to the runner in the event management software, or an incorrect map was attached to the graveyard stake or clothesline) then if possible, the runner (and their team) should be reinstated (for example by having the actual variation run assigned to the runner) and the problem referred to the organiser and the event controller.

3. Changes to SI cards after competitors finish their race

In individual races, start officials can check competitors' cards and tell the finish team of changes. In relay competitions, the nature of mass-starts makes this checking procedure difficult (or impossible)

to implement. If a competitor's SI card is not recognised when they download, they should be directed to the troubleshooting desk and the correct SI card number assigned to them.

One situation where this problem might occur is when competitors change their SI cards during a multi-event competition and inform the organising team of the change in the expectation (quite reasonably) that the change will be made for future races in the carnival. Although the changes might be made to competitor details in individual events, the change might not happen if team information is downloaded from Eventor the day before the competition – in this case, competitors' SI numbers will be those registered for them in Eventor.

One way of minimising this problem is to include competitors' SI numbers on the team information provided to team managers so that the managers can ask team members to confirm their details. However, it should be anticipated that some old SI numbers will slip through, so it is prudent that procedures are in place to deal with the situation.

4. What to do when a competitor takes the wrong map

If a competitor takes another team's map, it's not just a case of finding another map for the disadvantaged team! If the disadvantaged team is to run a valid *aggregate course*, the replacement map will have to be a map with the *same variation* as the map incorrectly taken.

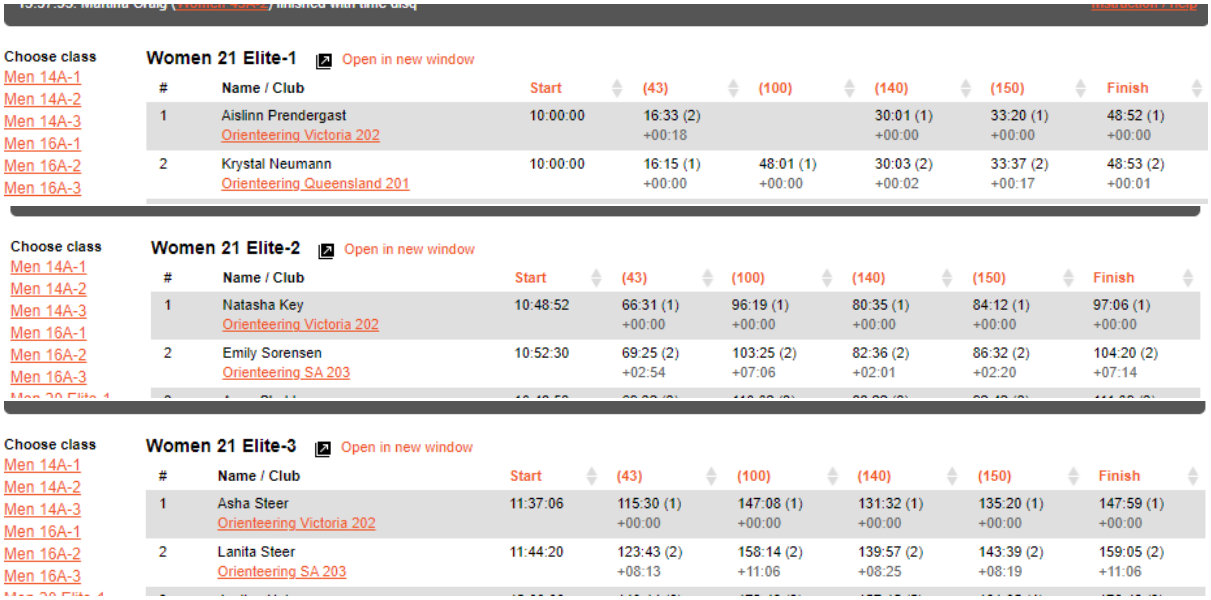
The usual procedure is to disqualify the offending team, and the disadvantaged team is forced to withdraw. Under this scenario, it's unfortunate that competitors don't get the chance to compete, so here are some options that would at least allow the disadvantaged team to continue in the race should they wish to do so (although their result might eventually be shown as unofficial):

- Have a spare map for each course (or two spare maps for sprint relays – one for the women's course and one for the men's course). If the last leg has been designed "so that the very last part of the last leg is the same for all runners" (see discussion on this requirement below – **Course planning considerations**), a leg 3 map should also be available. Although the spare map might not be the same variation as that assigned, it allows the runner to compete.
- If there are teams that have obviously not started (and were to have run on the same course as the affected team), use one of their maps.
- If the team does continue in the race, the disadvantaged team-runner's course will most likely differ from that assigned in the event management software, so unless the course variation is noted by an event official and the event management software updated before the disadvantaged runner finishes, the runner will probably be shown as mis-punching at download so the course variation assigned will have to be updated.

Publishing results

During the event

As with individual events, the simplest way to publish results is via an online result service (for example, *liveresultat.orientering.se*). This service requires that your event management software supports the link, and that internet access is available at the competition arena. If there is no internet access, you might be able to run a local network with *liveresultat* on a local web server (expert advice required!).



Choose class
Men 14A-1
Men 14A-2
Men 14A-3
Men 16A-1
Men 16A-2
Men 16A-3

Women 21 Elite-1 Open in new window

#	Name / Club	Start	(43)	(100)	(140)	(150)	Finish
1	Aislinn Prendergast Orienteering Victoria 202	10:00:00	16:33 (2) +00:18		30:01 (1) +00:00	33:20 (1) +00:00	48:52 (1) +00:00
2	Krystal Neumann Orienteering Queensland 201	10:00:00	16:15 (1) +00:00	48:01 (1) +00:00	30:03 (2) +00:02	33:37 (2) +00:17	48:53 (2) +00:01

Choose class
Men 14A-1
Men 14A-2
Men 14A-3
Men 16A-1
Men 16A-2
Men 16A-3

Women 21 Elite-2 Open in new window

#	Name / Club	Start	(43)	(100)	(140)	(150)	Finish
1	Natasha Key Orienteering Victoria 202	10:48:52	66:31 (1) +00:00	96:19 (1) +00:00	80:35 (1) +00:00	84:12 (1) +00:00	97:06 (1) +00:00
2	Emily Sorensen Orienteering SA 203	10:52:30	69:25 (2) +02:54	103:25 (2) +07:06	82:36 (2) +02:01	86:32 (2) +02:20	104:20 (2) +07:14

Choose class
Men 14A-1
Men 14A-2
Men 14A-3
Men 16A-1
Men 16A-2
Men 16A-3

Women 21 Elite-3 Open in new window

#	Name / Club	Start	(43)	(100)	(140)	(150)	Finish
1	Asha Steer Orienteering Victoria 202	11:37:06	115:30 (1) +00:00	147:08 (1) +00:00	131:32 (1) +00:00	135:20 (1) +00:00	147:59 (1) +00:00
2	Lanita Steer Orienteering SA 203	11:44:20	123:43 (2) +08:13	158:14 (2) +11:06	139:57 (2) +08:25	143:39 (2) +08:19	159:05 (2) +11:06

The screenshots above show progressive results for the W21E class at the 2023 Australian Relay Championships.

After the event

Liveresultat results will be provisional. Final results should be published on Eventor either via its native result format:

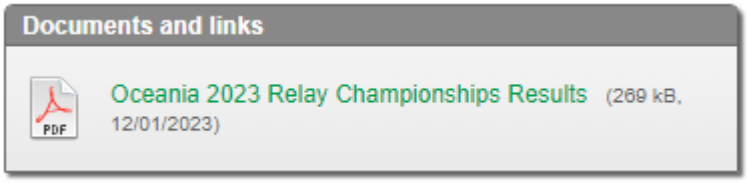
Australian Relay Championships - Wattle Gully (Campbells Creek) - RESULTS | Orienteering Victoria / Yarra Valley Orienteering Club | Orienteering Victoria | 204 | nat | R | M

Women 21 Elite 7 starting competitors

Leg 1 | Leg 2 | Leg 3 | Total

Plac	Name	Leg time	Leg pl	Leg diff	Time	Co plac	Diff
1	Orienteering Victoria 202				2:27:59		
	1. Aislinn Prendergast	48:52			48:52		
	2. Natasha Key	48:14			1:37:06		
	3. Asha Steer	50:53			2:27:59		

… or if the teams set up in Eventor can't be linked to your event management software, results can be exported and posted in the *Documents and links* section of the event:



Documents and links

Oceania 2023 Relay Championships Results (269 kB, 12/01/2023)

M21A

Pos	No.	Team Name Club	Country Competitors	Lap 1 Pos	Lap 2 Pos	Lap 3 Pos	Total
1st	12	Orienteering Australia		39:27 (3)	35:13 (1)	39:46 (1)	**114:26**
		Patrick Jaffe, Aston Key, Brodie Nankervis					
2nd	11	New Zealand		39:01 (2)	38:33 (2)	50:08 (3)	**127:42**
		Zefa Fa'avae, Toby Scott, Jonty Oram					

Information to be included in the published results

IOF rule 24.5: *The official results must include all participating competitors. In relays, the results must include the competitors' names in running order and times for their legs.*

OA rule 24.5: *The official results must include the following information:*

- *Class (and course if applicable)*
- *Length of course*
- *Number of controls*
- *The names of all participating competitors*
- *Each competitor's club, team, Association or Federation as appropriate*
- *Each competitor's time*

In relays, the results shall include the competitors' names in running order and times for their legs as well as the course combinations that each competitor ran.

Course planning considerations

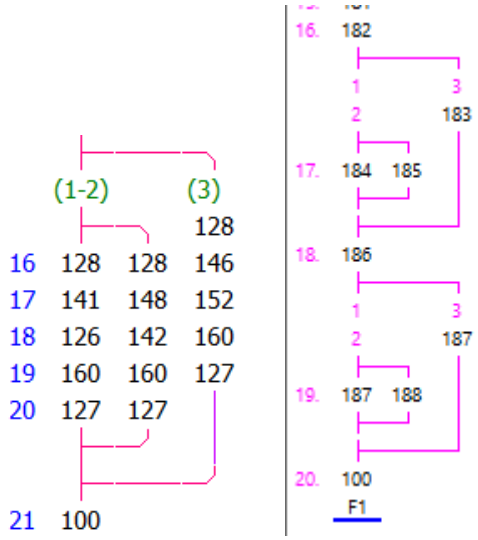
Both the IOF and Australian rules (Appendix 6, section 4.2 and Appendix 8, section 4.2 respectively), have a requirement regarding the last part of the course (AUS rules, recommended) and the last part of the last leg (IOF rules, mandatory):

IOF: *For fairness reasons the very last part of the last leg must be the same for all runners.*

OA: *For reasons of fairness, the very last part of a leg should be the same for all runners on that particular leg.*

We can assume that "*the very last part*" does not refer to the finish chute, but as it's not defined, it's up to the course planner and event controller to interpret the length and number of controls involved.

How is this requirement achieved? Here are examples from the 2022 Australian champs (Condes) and the 2022 European champs (OCAD):



The course planners have used a combination of a “regular fork” within a “leg fork” (Condes) and a “team variation” within a “leg variation” (OCAD) to ensure that the leg 3 runners all run the same course for the last controls (approximately 1.2 km for both races on these courses).