

OWS COURSE SETTING OUT PROCEDURE

This procedure has been prepared to assist persons taking on this responsibility and assumes access to the following:

- Google Earth
- Water Proof GPS (currently using Magellan eXplorist 110 - operating instructions are available on line). Alternatively iPad (with cellular connectivity) or iPhone in waterproof case will suffice.

Notes on using Smartphone (iPhone or Android):

1. Ensure Location Services for Maps is turned on.
2. Depending on your device and available services, Location Services uses a combination of cellular, Wi-Fi, Bluetooth, and GPS to determine your location. If you're not within a clear line of sight to GPS satellites, your device can determine your location using crowd-sourced Wi-Fi and cell tower locations or iBeacons.

Accuracy depends on which service is being used

- 3G iPhone w/ GPS ~ 8 meters
- 3G iPhone w/ WiFi ~ 74 meters
- 3G iPhone w/ Cellular positioning ~ 600 meters

3. Plastic and metal cases can significantly reduce the GPS reception and hence accuracy
4. The Magellan eXplorist 110 has an accuracy of approximately 6 metres.

Preparation

Establish the course layout in conjunction with the Event Manager and the following guidelines:

- Establish a distance from the beach to the course base (this is also the Start buoy location). Avoid setting buoys on sand bars (suggest 75 to 85 meters). Check with local SLS Club water depth is at least 2 metres over the entire course at low tide and bottom conditions will hold buoy anchors.
- Establish a course length to minimise demand on Water Cover (better to have three laps of a short course rather than two laps of a long course).
- If two events are to be held on the same course determine if alternate start points are required by calculation the course lengths as shown below.
- Ensure the separation of legs of the course is sufficient to avoid cross over by swimmers (suggest minimum of 40 meters).

CALCULATE COURSE LENGTH

Example - 3 Kilometre Event - three laps plus the Start to Finish distance of 85 meters and separation of 40 meters.

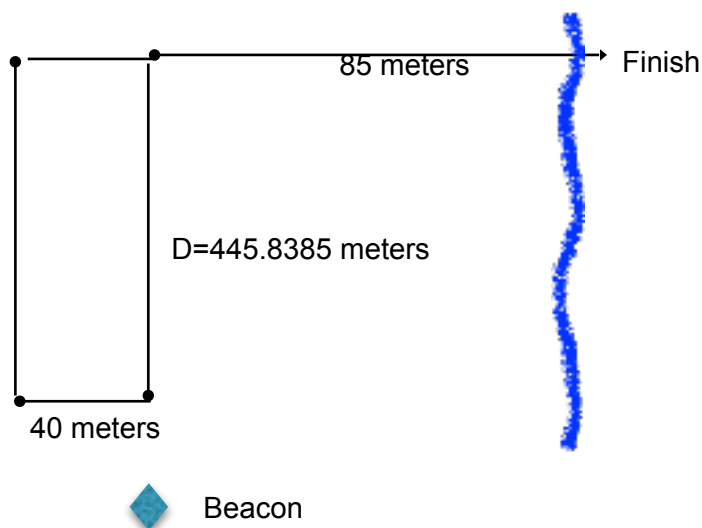
$$3000 = 85 + (6 \times 40) + (6 \times D) \text{ - Solving for D}$$

$$D = (3000 - 85 - (6 \times 40)) / 6 \text{ gives the length of the course (445.83 meters)}$$

Check the same course for a 1 Kilometre Event

$(2 \times 445.83) + (2 \times 40) + 85 = 1056.66$ - the course is too long therefore you need to obtain a determination from the Event Manager if a secondary buoy is to be used for the start of the "1 Kilometre" event.

Sketch the course and label the turn buoys, Finish point and any other features such as fixed beacons that may assist with setting out the course.



Use Google Earth to establish a “Finish” location

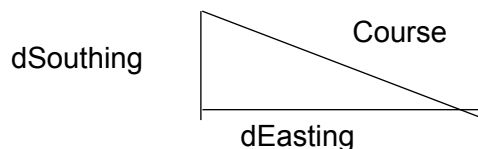
- Open Google Earth - go to the tab **Google Earth**
- Open “Preferences”
- Go to second row of settings
 - Under “Show Lat/Long” - set to “Universal Transverse Mercator”
 - Under “Units of Measurement” - set to Meters, Kilometres
- On Google Earth go to the location where the Event is to be held and look for a suitable location for the Finish point noting sand bars and high tide marks. Check this location on the site one month prior to the event. Also confirm tide heights and times (<http://www.bom.gov.au/australia/tides>) to make sure the finish can be set up several hours before the Event.
- Once you are satisfied with this location select the tab “Add Placemark”, move the Placemark to the location selected for the finish. In the drop down screen “Google Earth - New Placemark” change the title to “Finish”. You can also change the marker by clicking on the box to the right of the title. Note the location of the Finish Placemark “Zone”, “Easting” and “Southing” from the table. Then select OK to save the “Finish” Placemark.

Use Google Earth to set out the course

1. Zoom in on the course location as this will assist with Ruler measurement accuracy. Select the “Ruler” tab and measure a distance of 85 meters from the “Finish Placemark to the “Start” buoy approximately perpendicular to the shore by click and dragging the pointer.
WITHOUT MOVING THE POINTER note the Bearing in the Ruler box and note the location of the Start buoy “Zone”, “Easting” (m E) and “Southing” (m S) at the bottom right hand corner of the Google Earth screen.
2. Select “Add Placemark”. In the drop down screen “Google Earth - New Placemark” change the title to Start. You can also change the marker by clicking on the box to the right of the title. Add the location of the Start “Zone”, “Easting” and “Northing” for the Placemark (noted above). Then select OK to save the “Start” Placemark.
3. At this stage you may choose continue setting out the remainder of the buoys using the same method as above remembering to make sure the bearing for parallel legs are the same while adjacent leg bearings are 90 degrees to the base leg. This method is less accurate but is perhaps more consistent with the ability of Water Cover IRB operators to place the buoys.

Use Calculation to set out the course

- An alternative to the above procedure may be used to accurately calculate the location of the buoys by using right angle triangles where the hypotenuse is the course leg length and the opposite and adjacent sides are dEasting (Easting for first point minus Easting for second point) or dSouthing (Southing for first point minus Southing for second point)(as shown below). Note dE and dS are directional - check if added or subtracted by moving the pointer to the calculated coordinates on Google Earth.



Using calculation to determine coordinates for the buoys enables checking of diagonals and leg lengths for accuracy and square as well as distance to any feature such as fixed beacons.

2017 OWS Championship Course Setting Out

Point	S	dS Point to Point	E	dE Point to Point	Point to Point	Distance	Diagonal	
1	6130156.00	40.00	271734.00	118.43	1 to 3	125.00		
2	6130128.83	12.83	271653.45	37.88	2 to 3	39.99		
2a	6130074.80	54.03	271671.69	18.24	2 to 2a	57.03		
3	6130116.00	422.39	271615.57	142.67	3 to 4	445.83	3 to 5	447.6
4	6129693.61	12.83	271758.24	37.88	4 to 5	39.99	2 to 4	447.7
5	6129706.44	422.39	271796.12	142.67	5 to 2	445.83		
8	6129735.13	41.52	271881.17	122.93	4 to 8	129.75		
Beacon	6129619.15		271827.76		B to 5	92.85	2	538.7

Refer to Google Earth layout

Once the Southing and Easting for all buoys has been calculated or noted, in Google Earth Add Placemark for all buoys as described above.

Zoom in on the course to fill the screen and print the screen showing all buoys and features

Enter buoy location into the GPS

Enter the buoy locations into the GPS following the procedure recommended in the User Manual.

Each buoy must have a unique name (e.g Marion Masters open water swim Buoy 2 may be "MM OWS 2")

Check the course on the GPS Map to see that all buoys are located and in the correct relative positions.

Entering buoy location in iPhone Maps

Coordinates for iMaps and Google Maps must be entered in Decimal Degrees. The quickest way to get the coordinates is to open Google Earth, go to Preferences, in the table Select Lat/Long, select "Decimal Degrees". Close preferences and go to you course where you have set out the buoys. place the cursor over one buoy and select Edit then "get Info" - the pop up for the Placemark will show coordinates as Latitude and Longitude in decimal degrees. Create a table and enter coordinates for all Placemarks (Latitude then Longitude including any negative signs) on the course (this can be done by copy and paste)

On iPhone.

Open Maps - in the search field - add coordinates (latitude space longitude include any negative signs)

Swipe on “Information for location and tap “Add to favourites”.

Give a name to the location (e.g Start or, Buoy 2 etc.)

When you have entered all coordinates you will be able to track you location to place the buoys in the desired location.

Google maps is similar

Setting out the course

Prior to the Event give the IRB operators a copy of the Google Earth print and point out any land marks and features that will assist them to place buoys as close as possible to their correct location.

After all buoys have been placed on the course go in the IRB to check and if necessary correct all buoy placements. **It should be noted that the accuracy of all GPS’s vary by as much as 10 meters therefore using line of sight with other buoys and known features may be suitable.**

Advise the Event Manager when the placement of the buoys is completed.

