

## **An Introduction to MountainViews Hill Surveying**

In the second half of 2010 a group of regular contributors to MountainViews met to discuss organising ourselves into a committee to assist the site founder Simon Stewart in some aspects of the site management.

Since our list of summits is one of our most important resources it was decided to elect (or coerce) a geography officer to take charge and develop it.

As I had a background in engineering I was, it seems, the natural choice!

The lists that MountainViews maintains are,

The Arderins, 500m+ and 30m prominence, 404 summits,

The Carns, 400 to 499m with 30m prominence, 337 summits,

The Binnions, 399m with 150m prominence, 202 summits,

The traditional Vandeleur-Lynam List, 600m+ and 15m prominence, 269 summits.

The Highest 100 with 100m prominence,

The 900s, 14 x 900m summits also constituting the 3000 footers,

The County List the 27 highest points, not necessarily summits,

The Local 100 located near where the member is based,

There were a number of summits identified that would need to be checked for height, prominence and location to clarify if they fitted the criteria for our various lists.

I set about this task with a certain level of trepidation.

### **Checking of Lists**

Having reviewed our summit data list I needed to begin checking marginal entries to be certain they qualified for inclusion on our lists.

I needed to check some for prominence and some for what lists they fall into.

It was decided not to eliminate any summit without first running all possible checks on it.

It is interesting to note we have 113 summits on our list with a prominence of 30 metres or less.

There was also the issue of queries on summit position, prominence, etc received from MountainViews members which needed to be addressed.

In the past this summit data was checked by studying any available maps for usable data. These maps ranged from the 1:50,000 Discovery Series to the older 25 inch and 6 inch maps. Sometimes you could be lucky and find summit or col spot heights on these maps but often estimates would have to be made using contour interpolation.

This method formed the basis for lists such as the Arderins and the Vandeleur –Lynam. More recently Mountainviews had pioneered the uploading of GPS summit data by its users.

However what we now needed to do was slightly different to this, we needed a survey led approach that would produce verifiable results, this had not been undertaken in Irelands mountains before,

At the outset this looked to be a difficult task, but advice received from Jim Bloomer and John Barnard at the Database of British and Irish Hills regarding the various considerations to take into account when deciding on a summits location or prominence and on the surveying methods they employ was very useful. If you have an interest in this topic I would recommend you go to [http://www.hills-database.co.uk/summits\\_and\\_cols.pdf](http://www.hills-database.co.uk/summits_and_cols.pdf) to find out more.



*Surveying with an Abney level on Knockeenatoung, Galty Mountains*

Initially an Abney level (a handheld Victorian survey instrument) and a laser distance measure were my basic tools for determining the actual summit and documenting surrounding features.

These were used in conjunction with a Garmin gps60 csx averaged to projected accuracy of 2 metres and a detailed survey notebook.

We also had a Nikon Total Station EDM with a range of 1 km, as our primary instrument for measuring prominence.

It was extremely accurate but was line of sight equipment and while it could determine prominence it needed a suitable reference benchmark to determine height relative to OS datum accurately. Such benchmarks are not easy to come by in Irelands Mountains.

I set up a Survey team to assist me

This consisted of 2 volunteers to help me carrying this equipment as it and its tripod weighed approximately 12 kgs. However we managed only 2 surveys using the Total Station method and it became clear to me that an alternative solution that was less cumbersome than a total station and more accurate than the Abney method had to be found.



*Lasers in the Mist, Stumpa Duloigh*

## **Differential GPS**

Towards the end of 2011 the opportunity arose to access the use of one of the latest DGPS units on the market . The Trimble GeoExplorer unit is a top of the range high accuracy differential GPS unit suitable for survey field work. It is capable of decimeter (10 cm) accuracy horizontally and vertically. It has a 220 channel GNSS receiver capable of tracking GPS and GLONASS(Russian) satellites at the same time using an integrated dual frequency (L1/L2) GNSS antenna.

The GeoXH also incorporates “ Floodlight” satellite shadow reduction technology to all you to obtain positions with increased accuracy in difficult locations with weak satellite signals. The Gnss receiver can calculate the optimal accuracy each second without imposing strict masks and giving a good indication of the quality of data being received. The GeoXH downloads satellite location information each time it is started up giving it up to the minute satellite location data creating a distinct advantage over older pre-programmed units. The use of differential GPS (i.e. using a fixed base station to reference and crosscheck data) also greatly enhances data collection.



*Trimble DGPS near Brandon North Top, Brandon range*

Effectively the base station is placed at a known co-ordinate and receives the same signal as the roving unit and can determine the error contained in the satellite data. Post processing allows the roving units data to be compared to this base data and corrections applied. The post processing software allows us to download Rinex data from any of the OSI base stations and use this to post process our collected data.

All GPS data is collected using the World Geodetic Datum of 1984, the latitude/longitude coordinate system and the height Above Ellipsoid altitude date reference. The data is converted to the local Irish grid after post processing.

Further information can be viewed at

<http://www.trimble.com/mappingGIS/whitepapers.aspx>

This is a handheld instrument that weighs approximately 1 kg making it very portable, it is also able obtain a satellite fix and record the point data very quickly. This allows for the gathering of multiple points during a day's surveying in the hills.

After some practice runs in January 2012 the first summit survey undertaken was on Carrigshouk in the Dublin /Wicklow mountains on the 11 February 2012 by Simon Stewart and me. After an hour of wandering around on its boggy linking col we determined its prominence was 30.7 metres with a summit height of 572.5 metres. Thus Carrigshouk became the first addition to our Arderin list to be verified by DGPS.



*Preparing to Measure,*

In 2012 MountainViews gathered survey data on 60 different summits. That is an average of nearly 5 per month. This data was incorporated in our book “A Guide to Ireland’s Mountain Summits”.

And if you see a man standing on a summit staring intently at a large yellow calculator , that’ll be me for at least the next 20 years or thereabouts, so be sure and say hello.

John Fitzgerald, 2013