

Survey of Beauty Hill and its Col

28th May 2020

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Introduction

Beauty Hill (DoBIH hill number 19693) lies approximately 15km NNW of Aberdeen and about 600m west of the B999, near Kingseat (NJ908205). The possibility that it qualifies as a Tump due to the col being in a railway cutting where the same cutting had eliminated the natural col was first raised by Chris Pearson in an email on 31st January 2020. Tumps require a drop of 30m or more so the spot height at the summit of 168m and a spot height of 133m on a minor road above and very close to the high point of the old railway line (NJ 8964 2106) suggested that the hill was worth investigating. No survey was attempted before the coronavirus lockdown came into effect at the end of March but as the hill was within walking distance of the surveyors' house, surveys of the col and summit were able to be made despite these restrictions.

Equipment and Conditions for the Survey

No GPS receiver equipment was available to determine precise heights and positions so heights were determined by line surveying from the flush bracket of an OS triangulation pillar near the summit and an OS rivet near the col. Positions were determined using a Satmap Active 20 handheld GPS device capable of receiving data from 24 satellites. Line surveying was conducted using a Leica NA320 professional automatic level (20x magnification) and a 1m E-staff extendable to 5m.

The col and summit were surveyed on different dates (8th May and 19th May respectively); on both days the weather was warm and dry with little wind and clear visibility. The col was re-surveyed on 24th May.

Col Survey

An OS rivet is present in the granite stonework of a road bridge over the old Aberdeen to Ellon railway line. OS archive data states that the height of this rivet is 135.816m, located at NJ 8979 2120 – see photo on left. A second photograph (next page) shows the view from this bridge, south along the railway line towards the Beauty Hill col, about 300m away. The line survey was conducted from the rivet, down the side of the cutting and along the bed of the old railway to the highest point as determined by staff readings taken around the high point area. The initial reading was



taken with the staff placed directly on top of the rivet. The line survey work-sheet is reproduced below. The highest point along the bed of the railway was determined to be at NJ 89564 21023. This location is approximately 300m south of the railway bridge containing the OS rivet.



| Point Number | Horizontal Line | | | Lower Stadia Line | | | Upper Stadia Line | | | Error |
|-----------------------------------|-----------------------|-----------------------|--------------------|-----------------------|-----------------------|--------------------|-----------------------|-----------------------|--------------------|--------|
| | Backsight R metres | Foresight F metres | Height H metres | Backsight R metres | Foresight F metres | Height H metres | Backsight R metres | Foresight F metres | Height H metres | |
| From OS rivet | 0.042 | 4.932 | -4.890 | | | | | | | |
| | 0.405 | 1.065 | -0.660 | 1.782 | 0.847 | 0.935 | 1.998 | 1.282 | 0.716 | |
| | 1.829 | 1.064 | 0.765 | 1.690 | 0.883 | 0.807 | 1.968 | 1.248 | 0.720 | -0.001 |
| | 1.855 | 1.100 | 0.755 | 1.700 | 0.928 | 0.772 | 2.010 | 1.272 | 0.738 | 0.000 |
| | 1.865 | 1.185 | 0.680 | 1.715 | 1.048 | 0.667 | 2.015 | 1.322 | 0.693 | 0.000 |
| | 1.652 | 1.414 | 0.238 | 1.527 | 1.290 | 0.237 | 1.777 | 1.539 | 0.238 | -0.001 |
| Height gain from rivet (135.816m) | | | -3.112 | | | | | | | |
| Col height | | | 132.7 | | | | | | | |

The line survey to the col from the rivet showed a drop of 3.112m giving a col height, to the nearest 0.1m of 132.7m. On 24th May a reverse line survey from the col to the rivet via the road was performed which gave a drop from the rivet of 3.104m (i.e. a closing error of 0.008m) so the drop to the nearest 0.1 metre is unchanged and the height of the col is confirmed as 132.7m. The work-sheet for this repeat survey is shown below.

| Point Number | Horizontal Line | | | Lower Stadia Line | | | Upper Stadia Line | | | Error |
|-------------------------------|-----------------------|-----------------------|--------------------|-----------------------|-----------------------|--------------------|-----------------------|-----------------------|--------------------|-------|
| | Backsight R metres | Foresight F metres | Height H metres | Backsight R metres | Foresight F metres | Height H metres | Backsight R metres | Foresight F metres | Height H metres | |
| From col on railway | 3.772 | 1.987 | -1.785 | 3.680 | 1.808 | 1.872 | 3.864 | 2.166 | 1.698 | 0.00 |
| | 0.828 | 2.292 | -1.464 | 0.705 | 1.980 | -1.275 | 0.951 | 2.594 | -1.643 | 0.01 |
| | 1.362 | 1.454 | -0.092 | 1.117 | 1.262 | -0.145 | 1.607 | 1.646 | -0.039 | 0.00 |
| | 1.930 | 0.700 | 1.230 | 1.700 | 0.550 | 1.150 | 2.160 | 0.850 | 1.310 | 0.00 |
| | 1.727 | 0.082 | 1.645 | 1.665 | 0.051 | 1.614 | 1.789 | 0.113 | 1.676 | 0.00 |
| | | | 0.000 | | | | | | | |
| Height gain from col to rivet | | | 3.104 | | | | | | | |

Summit survey

Ordnance Survey mapping shows a 168m spot height about 130m from a trig point with a 167m height. The height of the flush bracket is 167.624m and this was measured to be 53cm above level ground at the side of the pillar (see red arrow in photograph), making the ground height 167.09m. The level and

staff were used to locate the highest point on ground to the north in the vicinity of the 168m spot height. The spot height location was found to be about 30m to the north of the highest position, located at NJ 90812 20617. A short line survey was conducted from this position to the trig point flush bracket.

| Point Number | Horizontal Line | | | Lower Stadia Line | | | Upper Stadia Line | | | Error |
|-------------------------|-----------------------|-----------------------|--------------------|-----------------------|-----------------------|--------------------|-----------------------|-----------------------|--------------------|-------|
| | Backsight R metres | Foresight F metres | Height H metres | Backsight R metres | Foresight F metres | Height H metres | Backsight R metres | Foresight F metres | Height H metres | |
| Summit | | | | | | | | | | |
| 19/05/2020 | | | | | | | | | | |
| | 1.075 | 1.683 | -0.608 | 1.018 | 1.530 | -0.512 | 1.132 | 1.836 | -0.704 | 0.000 |
| | 1.893 | 1.332 | 0.561 | 1.773 | 1.201 | 0.572 | 2.013 | 1.462 | 0.551 | 0.000 |
| Height gain from summit | | | -0.047 | | | | | | | |

The line survey showed the summit to be 4.7cm above ground at the base of the trig point making the summit 167.1m. The distance between the summit and the trig point is approximately 90m.

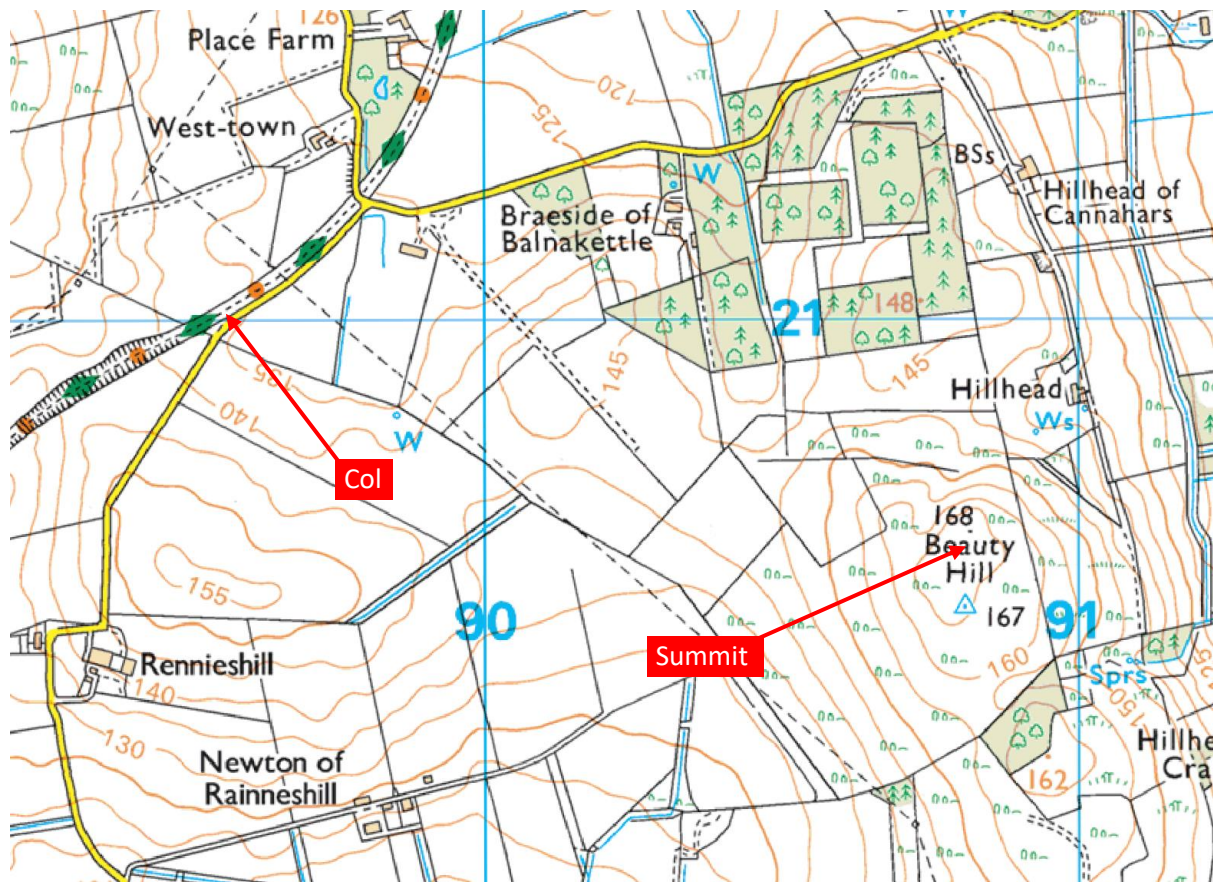
Summit of Beauty Hill (white marker in ground in front of gorse)



Beauty Hill trig pillar



1:25,000 Ordnance Survey map extract showing summit and col positions.



Conclusions

The survey produced the following results:

| | | |
|---------|----------------|--------|
| Summit: | NJ 90812 20617 | 167.1m |
| Col: | NJ 89564 21023 | 132.7m |
| Drop: | 34.4m | |

Beauty Hill is therefore confirmed as a Tump. The hill number in the Database of British and Irish Hills is 19693.

Dave Marshall