

## South Downs National Park Public Inquiry

### Part 2: Boundaries

# **The Geology of the South Downs' Dip Slope and Associated Areas in South East Hampshire and West Sussex**

## Proof of Evidence

*by*

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*on behalf of*



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## **1 Introduction**

- 1.1 I am a professional geologist with over 30 years of experience as a lecturer in Engineering Geology at the University of Portsmouth, and as a consultant in Engineering Geology and Geophysics. Previous to this my employment included 3 years with the British Geological Survey.
- 1.2 For all of this time, I have maintained an interest in local geology through teaching, research and consultancy. I have published several papers in national and international journals relating to the geology of South-east England, particularly the Chalk formation.
- 1.3 I have lived in Rowlands Castle for 28 years and have recently served on the Parish Council, as well as several committees concerned with local planning and environmental issues.
- 1.4 My evidence is provided to support, on geological grounds, the inclusion of the additional areas of countryside to the north and west of Rowlands Castle village, and to the east of Catherington, as shown in Figure 1.

## **2 The South Downs**

- 2.1 The core of the South Downs National Park is generally accepted as being the long narrow strip of chalk uplands between Winchester and Eastbourne. In geomorphological terms it is an escarpment, with the steep scarp slope to the north, which is particularly well developed between Petersfield and Eastbourne, and a long shallow dip slope.
- 2.2 Geologically, the escarpment forms the southern flank of the Wealden 'dome' and is mainly composed of the Chalk formation, which has a shallow dip to the south; approximately 5 degrees in East Hampshire. Further west, the escarpment widens out to a plateau, because the Chalk is thicker and the dip is less. The chalk areas around Littlehampton and at Portsdown Hill, in South Hampshire, are not part of the South Downs chalk escarpment.
- 2.3 The extent of the outcrop of the Chalk in the South Downs, i.e. where the chalk is less than 1m from the ground surface, and as copied from UK South Geological Sheet 2, is shown in Figure 2. Comparison with the boundary of the South Downs National Park shows that almost all of the chalk of the South Downs escarpment has been included within the designated National Park.
- 2.4 At its eastern end the chalk dip-slope is truncated by chalk cliffs, in West Sussex it is fringed by a coastal plain, and, in south-east Hampshire, the Chalk dips at a shallow angle beneath Tertiary age sediments into the Forest of Bere synform (down fold in the geological structure).
- 2.5 Figure 3 is a north-south geological cross section for West Sussex, near Chichester, which shows modification of the chalk dip-slope by coastal erosion during the last Ice Age. A raised beach cut into the Chalk at 30m above sea-level is covered by Quaternary sediments and is sharply truncated to the north by an ancient buried chalk cliff.

- 2.6 The coastal lowland to the south of the chalk downs is a gently inclined planar landscape down to the flat coastal plain at 10m above sea-level around Old Fishbourne. In south-east Hampshire, the equivalent landscape is found to the south of Portsdown Hill, e.g. on Portsea Island and Hayling Island.
- 2.7 Figure 4 indicates, by the use of a greatly exaggerated vertical scale, that this is very different to the geology and topography at Horndean, which is close to Catherington and Rowlands Castle. In the Horndean area, the upper surface of the chalk is an erosional surface, but it gradually descends at about 5 degrees southwards to the centre of the Forest of Bere synform. (This synform is essentially an elongated basin structure, with an east west trend, but there are only very minor outcrops of Tertiary sediments to the east of Westbourne because of the Quaternary erosion and deposition. The marine incursion was further inland in West Sussex than East Hants because of the absence of chalk hills, resulting from the eastward plunge of the Portsdown antiform).

### **3 Chalk Dip-Slope in East Hampshire**

- 3.1 Figure 1 shows the southern extent of the outcrop of the Chalk in East Hampshire, in more detail, based upon IGS Sheet 316 (Fareham). Comparison with the designated boundary of the South Downs National Park (Section U) indicates that a significant area of chalk countryside has been omitted from the National Park.
- 3.2 The results of a similar comparison for all other sections of the South Downs National Park boundary are shown in Table 1. This clearly indicates that only within Section U have extensive areas of chalk countryside of the South Downs escarpment been excluded from the National Park. Other excluded chalk areas are either much smaller, or else have been diminished in quality by urbanisation or quarrying, or are covered by drift deposits.
- 3.3 The two areas proposed for inclusion within the National Park, i.e. land to the north and west of Rowlands Castle village (except Havant Thicket and part of Stein Wood), and a smaller area to the east of Catherington, are within this excluded area of Chalk in Section U. These areas have been highlighted in Figure 2.
- 3.4 These areas have soils derived from the chalk, and thin drift deposits, such as Clay with Flints and Flint Gravel, which are typical of much of the dip-slope included within the designated South Downs National Park. The ecology is, therefore, essentially the same.
- 3.5 These areas also have chalk landscape features, which are typical of the southern edge of the chalk dip-slope, such as chalk slopes, dolines and gravel filled valleys. Adjacent areas on the chalk escarpment dip-slope with similar landscape features, e.g. within Stanstead Park, have been included within the designated South Downs National Park. (Dolines are closed circular depressions related to dissolution of the underlying chalk. Swallow-holes are dolines which allow localised ingress of surface water into the chalk. These features are found all along the southern boundary of the chalk dip-slope in Hampshire and Sussex.).

#### **4 Havant Thicket and Stein Woods (West)**

- 4.1 These are areas of woodland to the west of Rowlands Castle village, which were formerly part of the Forest of Bere, and geologically lie within the Forest of Bere synform at the featheredge of the Tertiary strata overlying the Chalk formation.
- 4.2 The western part of Stein Woods is adjacent to the southern boundary of the chalk outcrop and has several geological features related to the chalk, such as flint gravel soils and circular subsidence dolines.
- 4.3 Havant Thicket is partly upon clays and sands of the Reading Formation and partly upon mudrocks of the London Clay. Geologically this area is identical to West Walk, Wickham, which has been included within the designated South Downs National Park.

#### **5 Conclusions**

- 5.1 There are sound geological reasons for inclusion of the indicated area of countryside to the north and west of Rowlands Castle village, and a smaller area to the east of Catherington, within the South Downs National Park.
- 5.2 There are other similar areas on the dip-slope of the South Downs chalk escarpment, and upon adjacent Tertiary strata, which have been included within the South Downs National Park.