

Geology of the HS2 route through the Chilterns and the Colne Valley

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The speaker's firm (Peter Brett Associates - PBA) has worked for a variety of Petitioners and local authorities on 3 sections of the HS2 route – Euston Station, the Colne Valley and the Chilterns – and has presented the results to the Parliamentary Select Committee charged with finalising the route.

Colne Valley

The HS2 route was chosen following alignment studies and follows in part an existing rail corridor, emerging from a tunnel beneath London to cross the Colne Valley upon a long, curving viaduct. PBA, working for the London Borough of Hillingdon, examined the prospect of a tunnel instead of the viaduct, which crosses flooded gravel workings in the valley floor and has a lot of potential impact. 2 possible routes were examined, one of them on the existing government route. The geology comprises river gravels on London Clay, the Lambeth Group and Chalk with solution features down to 30m+ depth. Account has to be taken also of the effects of periglacial weathering beneath the valley floors. The proposed tunnel would pass through Seaford and Lewes Nodular Chalk with the water table near the ground surface.

Chilterns

The route chosen following alignment studies follows the approximate line of the valley of the River Misbourne. Most of the route is in Buckinghamshire, though the southern end crosses through the edge of Hertfordshire. The tunnel portal is just inside the M25 and a “green”, cut-and-cover tunnel will bypass Wendover. PBA, working for Buckinghamshire County Council, proposed an alternative continuing the tunnel to the edge of the Chilterns Area of Outstanding Natural Beauty north-west of Wendover. The Select Committee did not accept the long tunnel proposal but considered extending some of the “green” tunnels.

Geology was taken from the 1:50,000 digital geological map plus the borehole data available from BGS and comprises alluvium in the Misbourne Valley, head deposits, clay with flints, terrace gravels in the Misbourne Valley (from the proto-Thames), London Clay, Lambeth Group and Chalk, with Greensand and Gault Clay at the northern end in the Aylesbury area.

Potential geohazards include possible fault locations, the base level of dissolution extending to 50m depth and periglacial effects also extend to 50m depth. There are quite a few natural cavities within the area with the Beaconsfield Gravel, for example, deeply piped into the Chalk. There are also occasional chalk mines recorded not far off the route alignment and more mines are suspected. There are 3 crossings of the Misbourne Valley and examples of past instability on the Chiltern escarpment. A long tunnel has less risk than the government line, which rises up to the top of the Chilterns.

There are hydrogeological and geological concerns at Wendover in that the “green” tunnel cuts down to the water table zone and will potentially impact groundwater flow to springs in the Wendover Valley. The Government propose a pumped scheme to mitigate. In contrast, the PBA long tunnel parallels the groundwater flow so will not impact the feed to springs.

Geoconservation concerns relate to the “sustainable” placement of excavated materials, of which there are likely to be 3Mm³ from the cuttings. It is likely that this will change the landscape character of the area, particularly regarding infilling in dry valleys, as will the “green” tunnels creating linear, flat zones above them.

Examples of geohazards

The presentation concluded with a number of examples of geohazards within the area and close to the HS2 route:

A – The Greenway, Chalfont St Peter had a subsidence problem due to a deep clay plug beneath the property within a solution feature that extended to more than 50m depth. The geology is Beaconsfield Gravel over Chalk.



B – Welders Lane, Chalfont St Peter had a 30-40m deep solution feature and subsidence was caused by a change in the drainage.



C – Wooburn Green Lane, Beaconsfield had a 3m diameter, 2m deep hole develop in a sports field.



D – Amersham Road, Beaconsfield had a swimming pool, which collapsed following leakage over a weekend.

E – Chalkwells in the area were largely sunk for agricultural purposes to lime the clay with flints soils and also for brick-making.

F – Cockpole Green mine is a small-scale pillar and stall mine in the area.

G – Quite near Cliveden on a hillside falling into a dry valley a 35m wide landslide was triggered by rainfall/leaking water pipes causing undermining of a building constructed on a piled raft. The connecting services were damaged and an access road destroyed downhill of the property.