



Drift Filled Hollows of the Kennet Valley potential processes, form and implications for risk assessment

Philip E.F. Collins¹, Vanessa J. Banks² and Peter Reading¹

1. Brunel University London
2. British Geological Survey

Buried Hollows in the London Basin & Surrounds
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**British
Geological Survey**
NATURAL ENVIRONMENT RESEARCH COUNCIL

Outline

- Questions about hollows
- Context of the Kennet features
- Locations
- Findings and implications
- Outstanding questions

What?

Where?

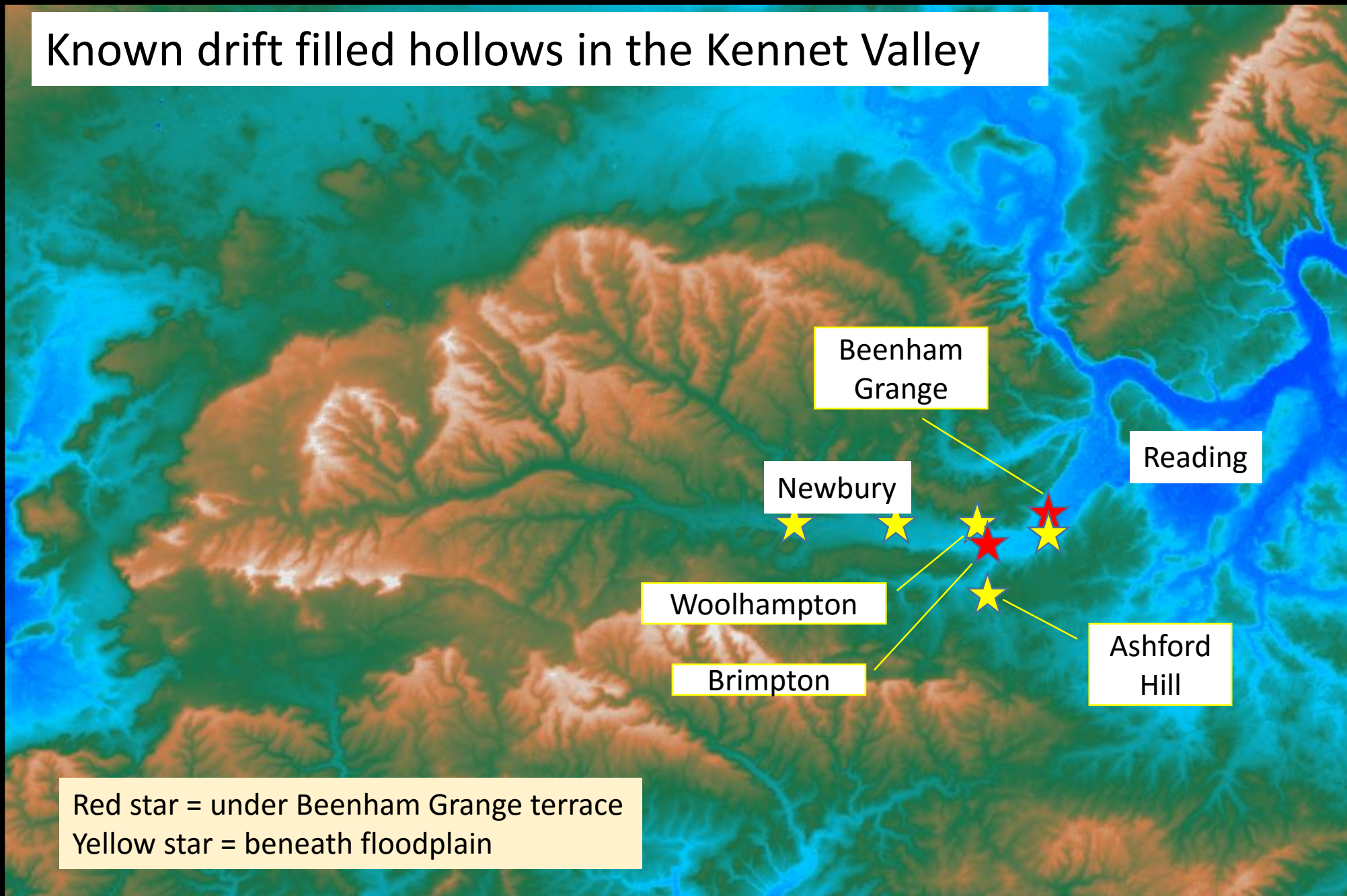
How big?

Age?

Active/passive?

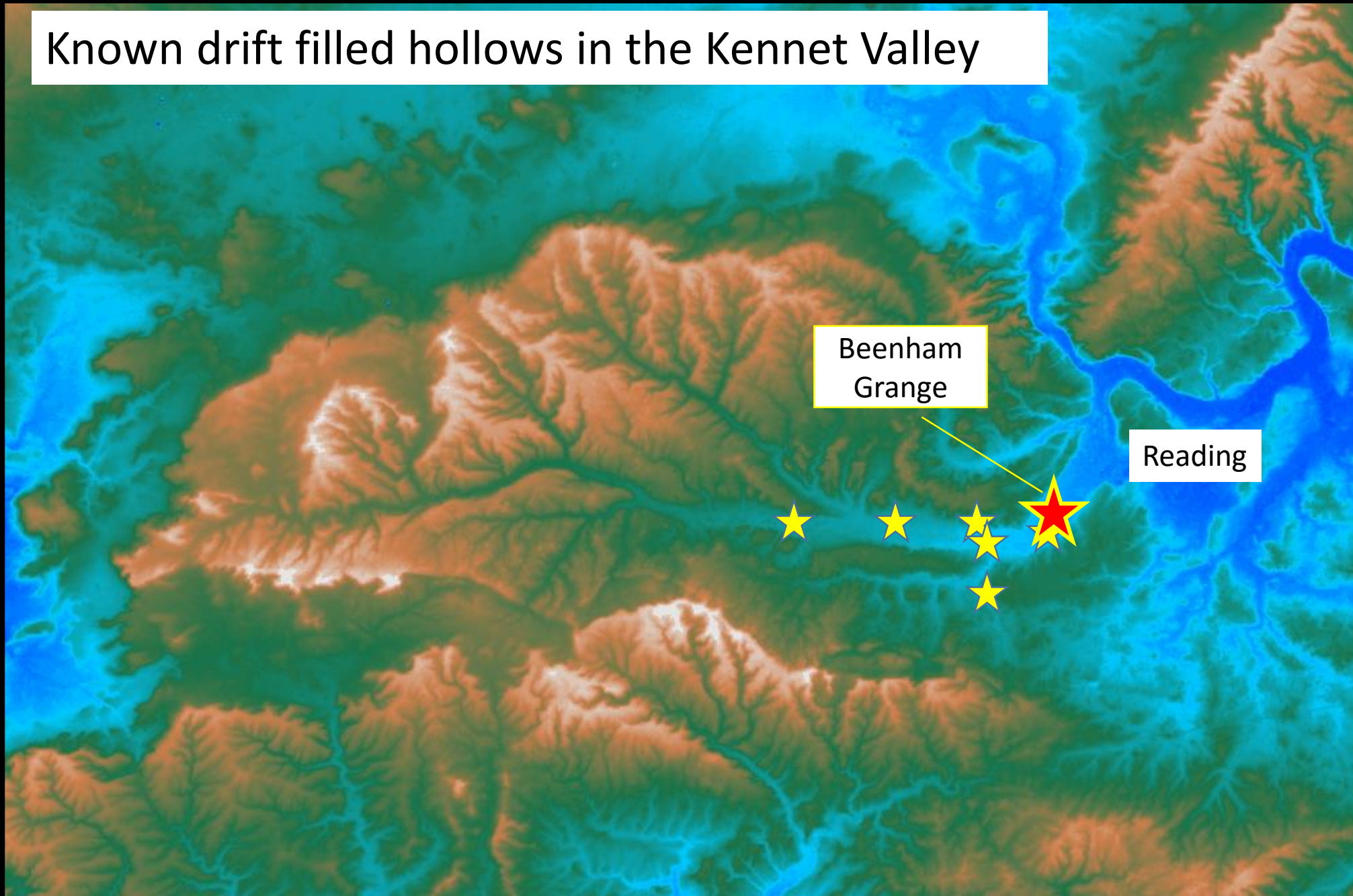
Origin(s) ?!

Known drift filled hollows in the Kennet Valley



Red star = under Beenham Grange terrace
Yellow star = beneath floodplain

Known drift filled hollows in the Kennet Valley



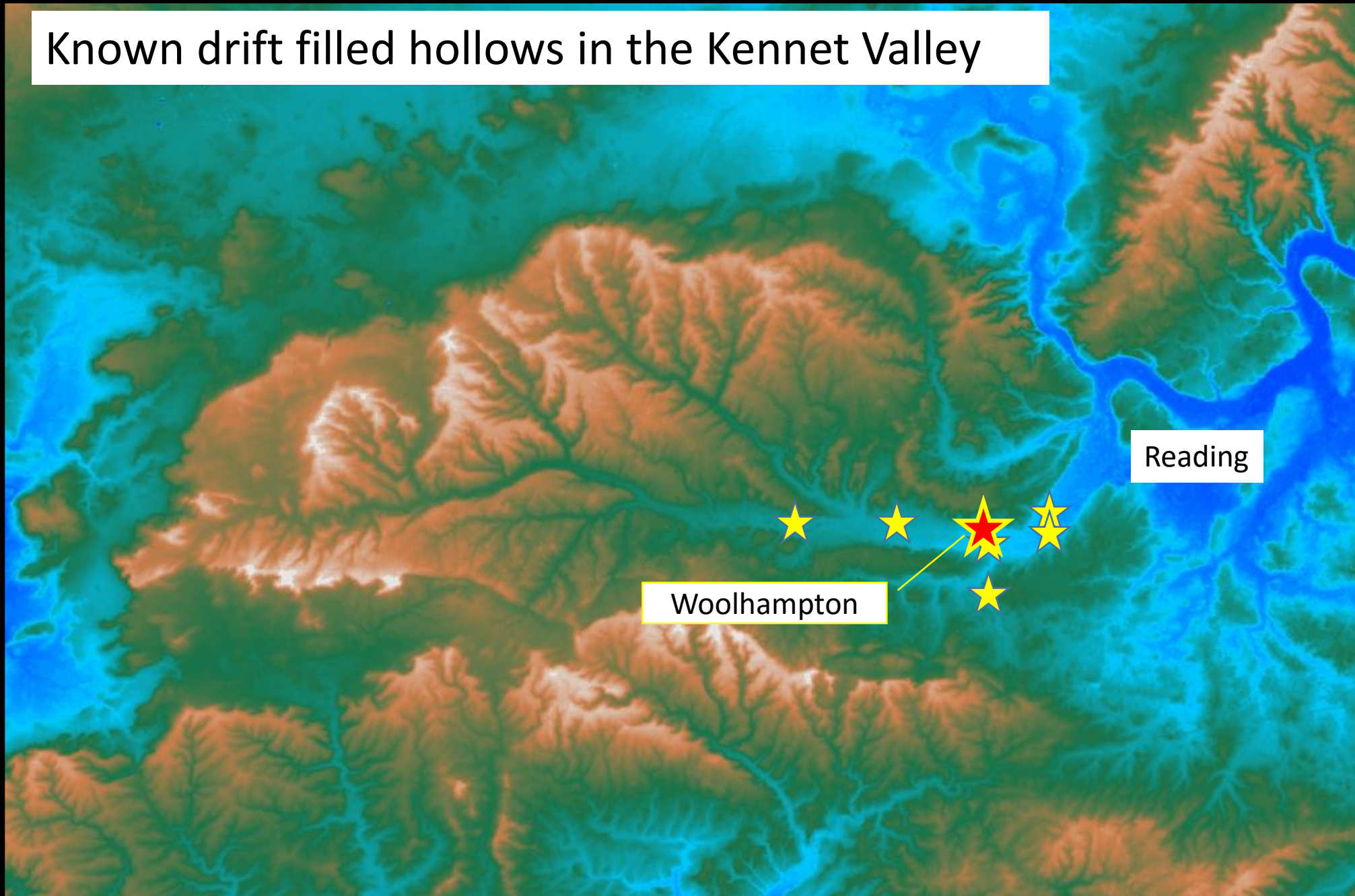
Beenham Grange

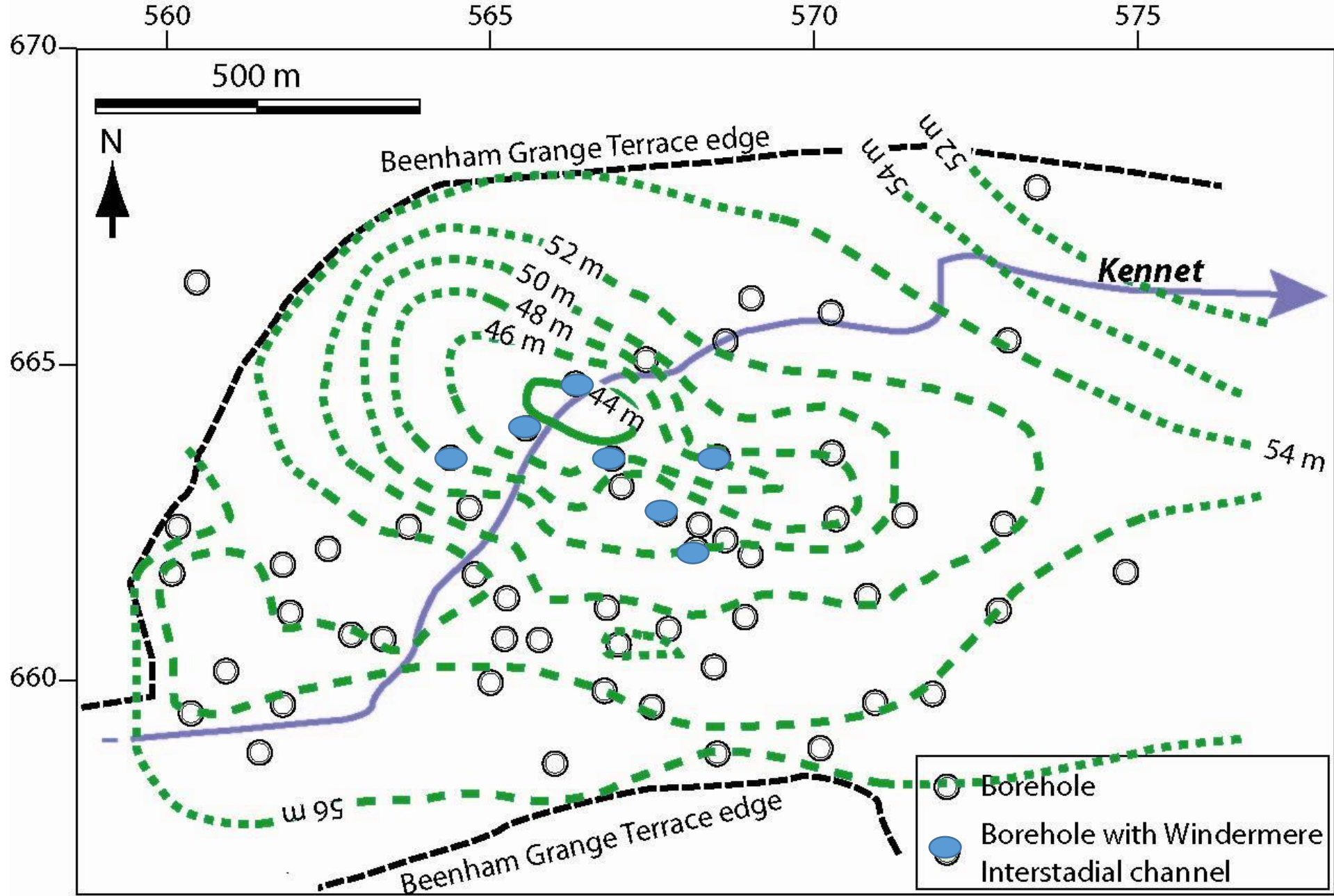


Key to photograph

- | | | | |
|---|----------------------------|---|------------------------------|
| 1 | stripped top of gravel | 4 | bench 1 |
| 2 | upper planar bedded gravel | 5 | lower 'tilted' gravel |
| 3 | bench 2 | 6 | sloping London Clay rockhead |

Known drift filled hollows in the Kennet Valley





Closed rockhead depression, Woolhampton. Collins et al. 2006

West

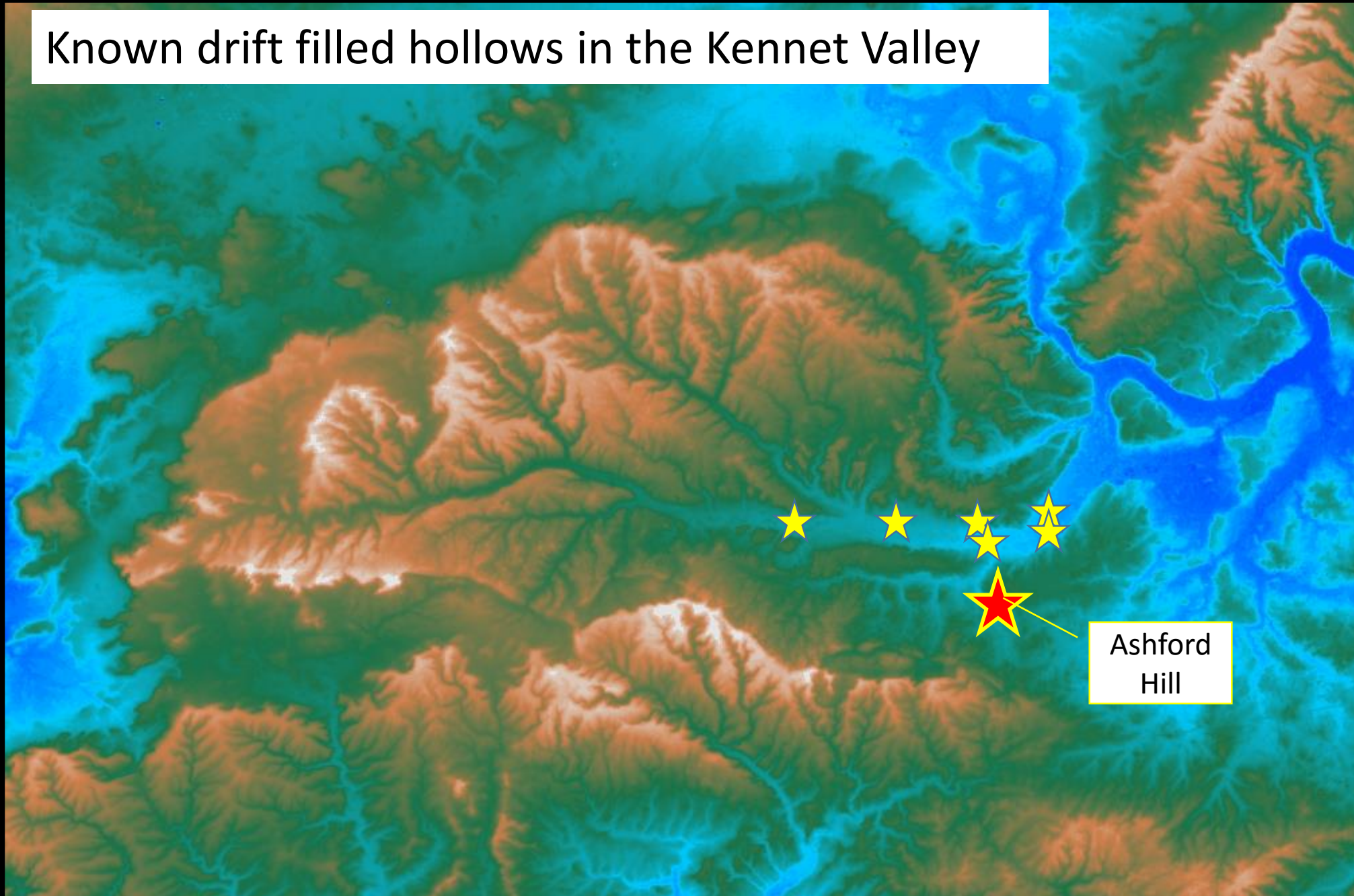
East



The Woolhampton Hollow (Late Devensian Lateglacial infill)

- Infilling over <10,000 years (top 4-6 m in ~1,000 years)
- End of MOIS 2 (periglacial-temperate-periglacial)
- Tilted bed (dark in photo), parallel to surface of London Clay

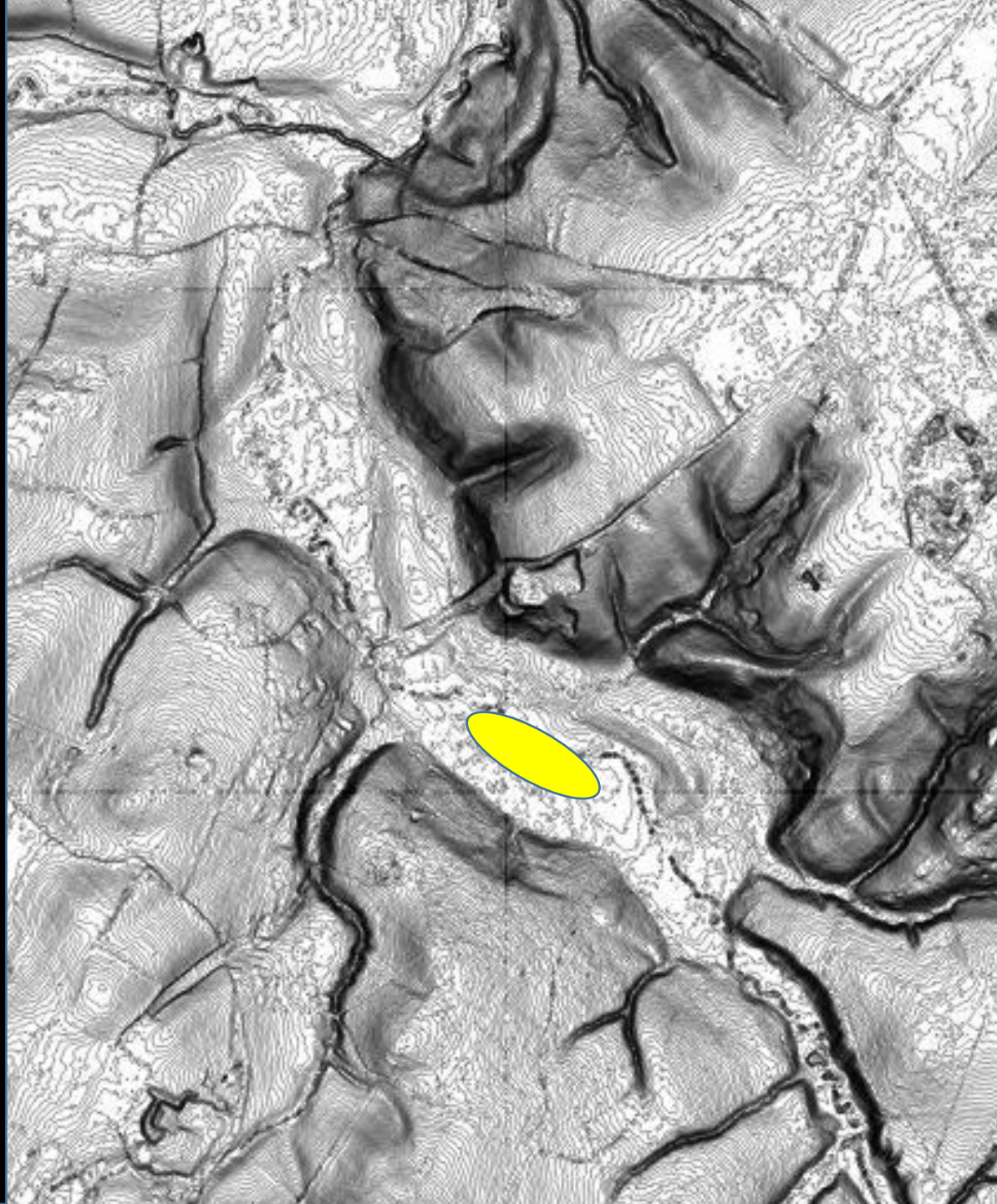
Known drift filled hollows in the Kennet Valley



Ashford Hill:

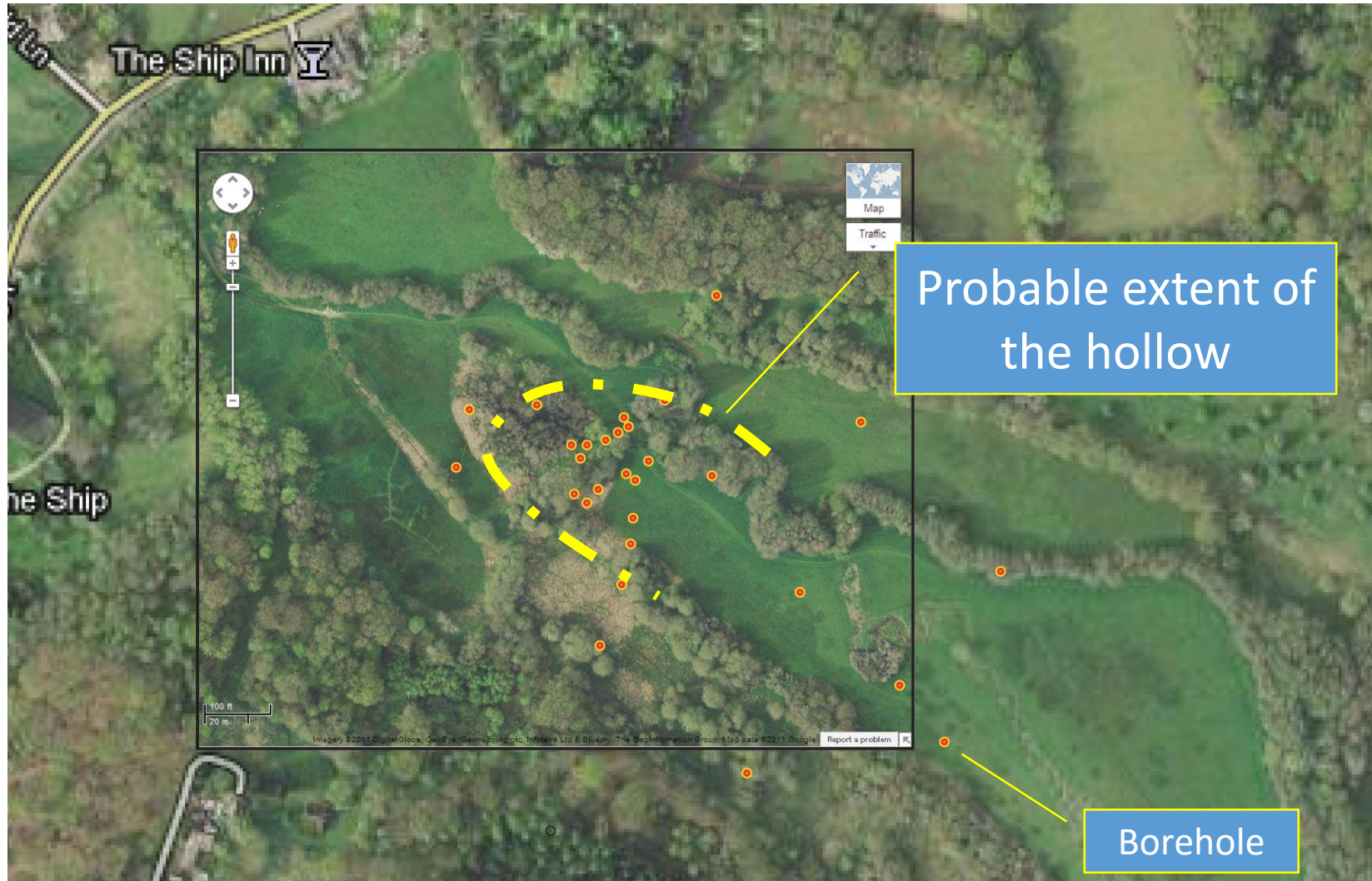
2m Lidar data (Environment Agency,
OGL)
25cm contour

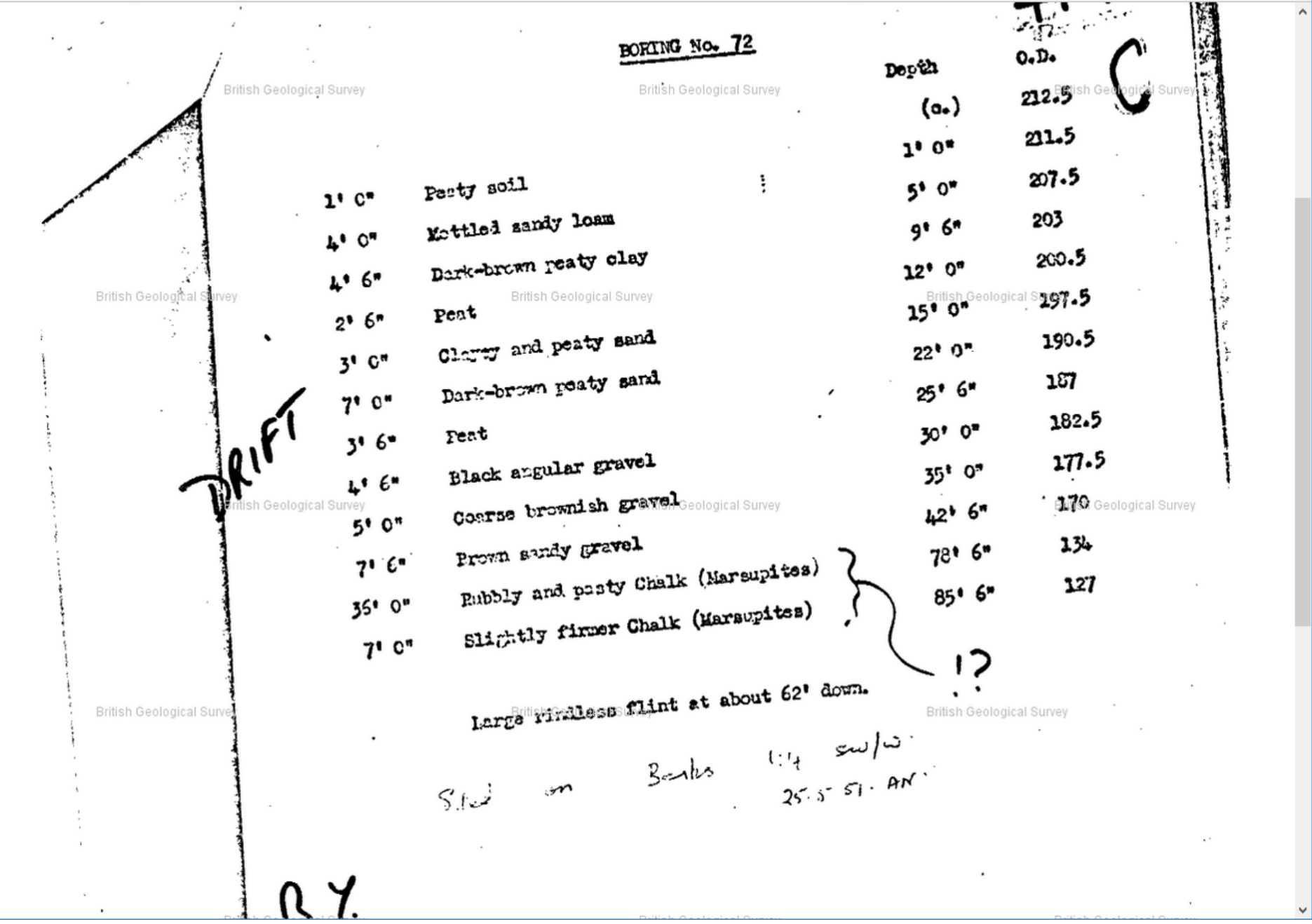
1 km

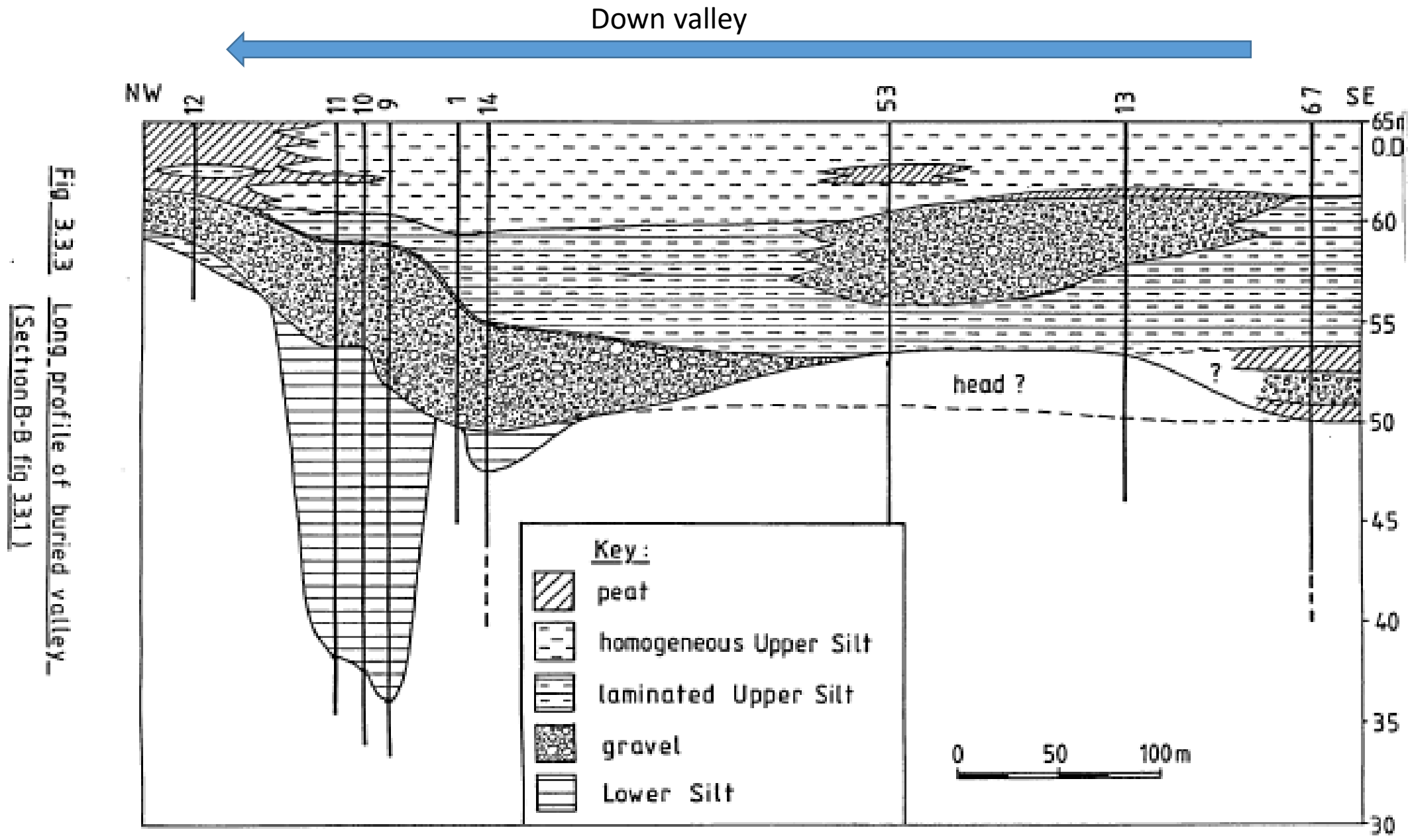


Ashford Hill: existing boreholes

(Hawkins 1953, Hill 1985)





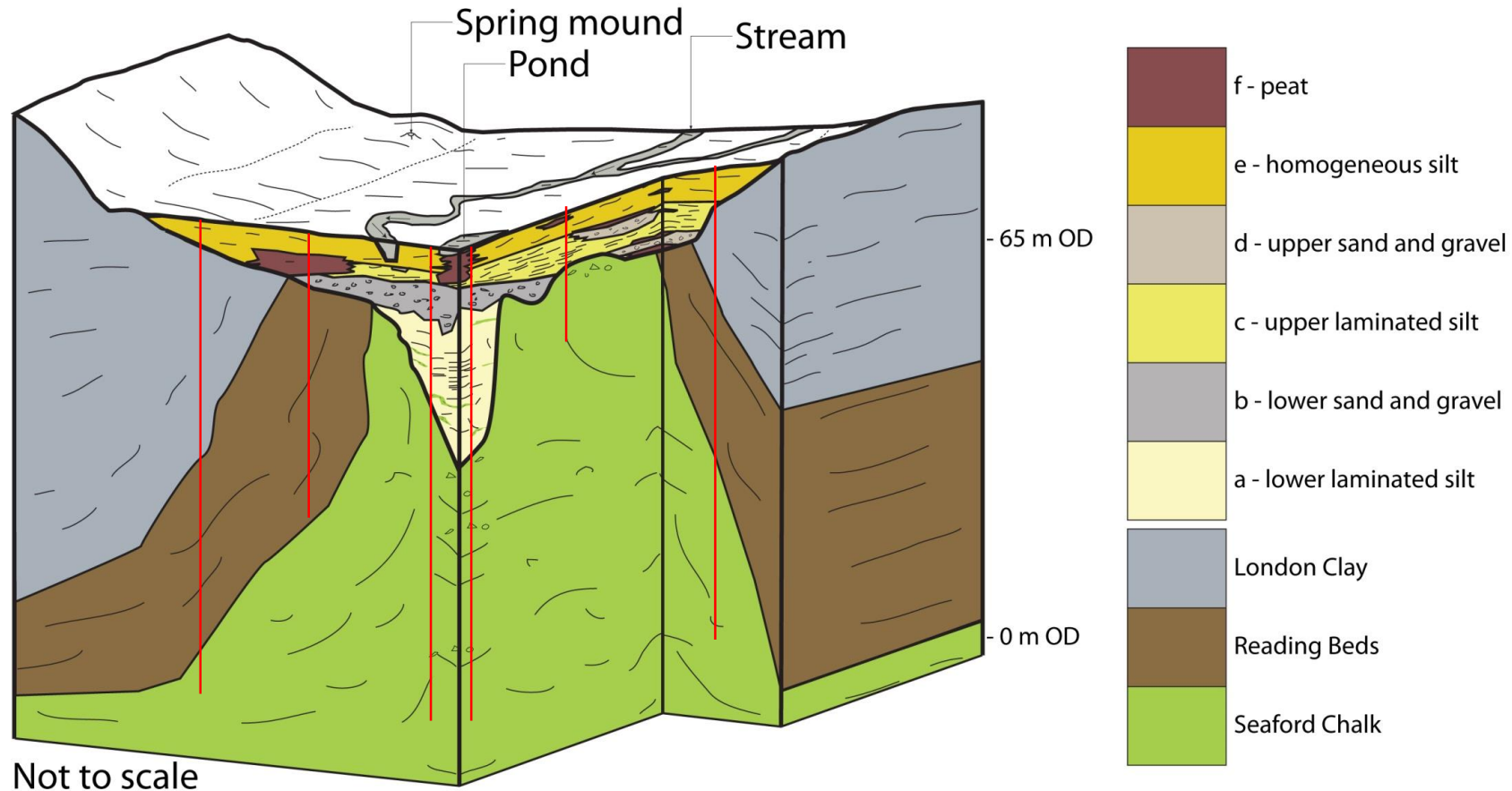


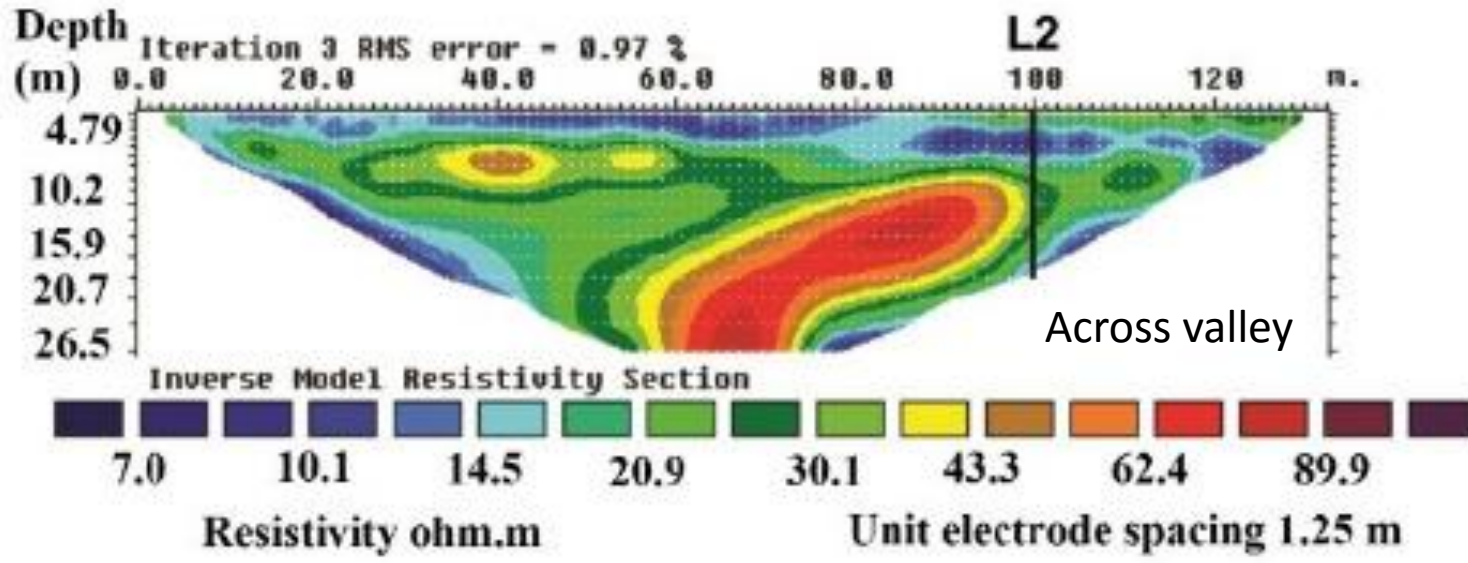
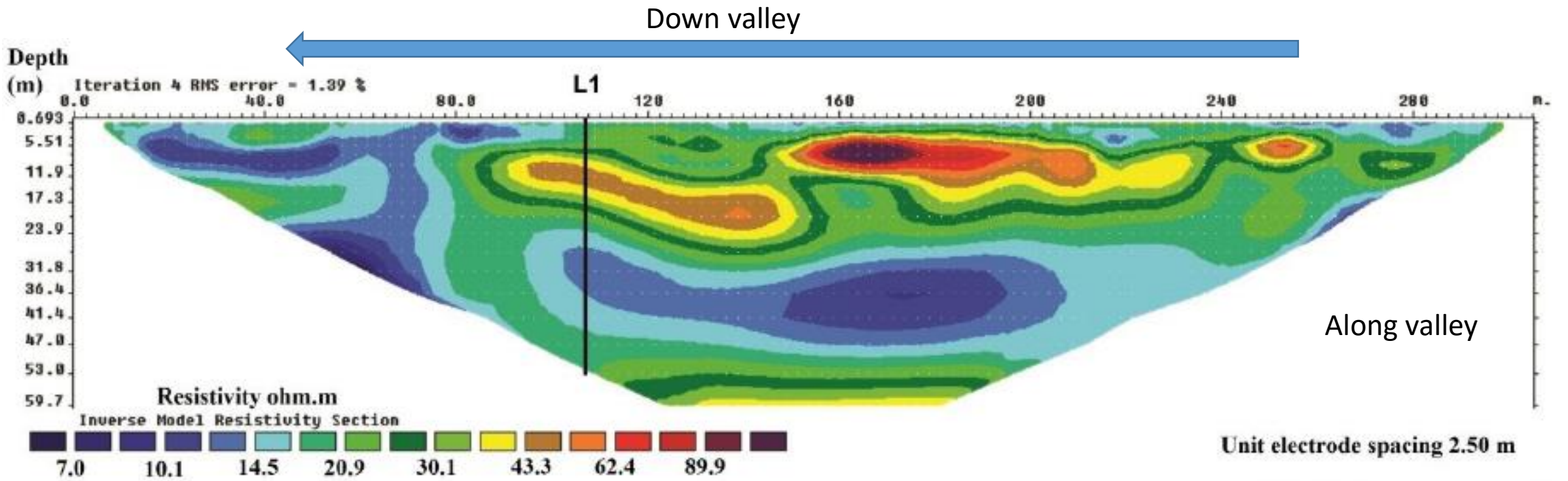
Ashford Hill: along valley section of superficial deposits

Fig 3.3.3 Long profile of buried valley
(Section B-B fig 3.3.1)

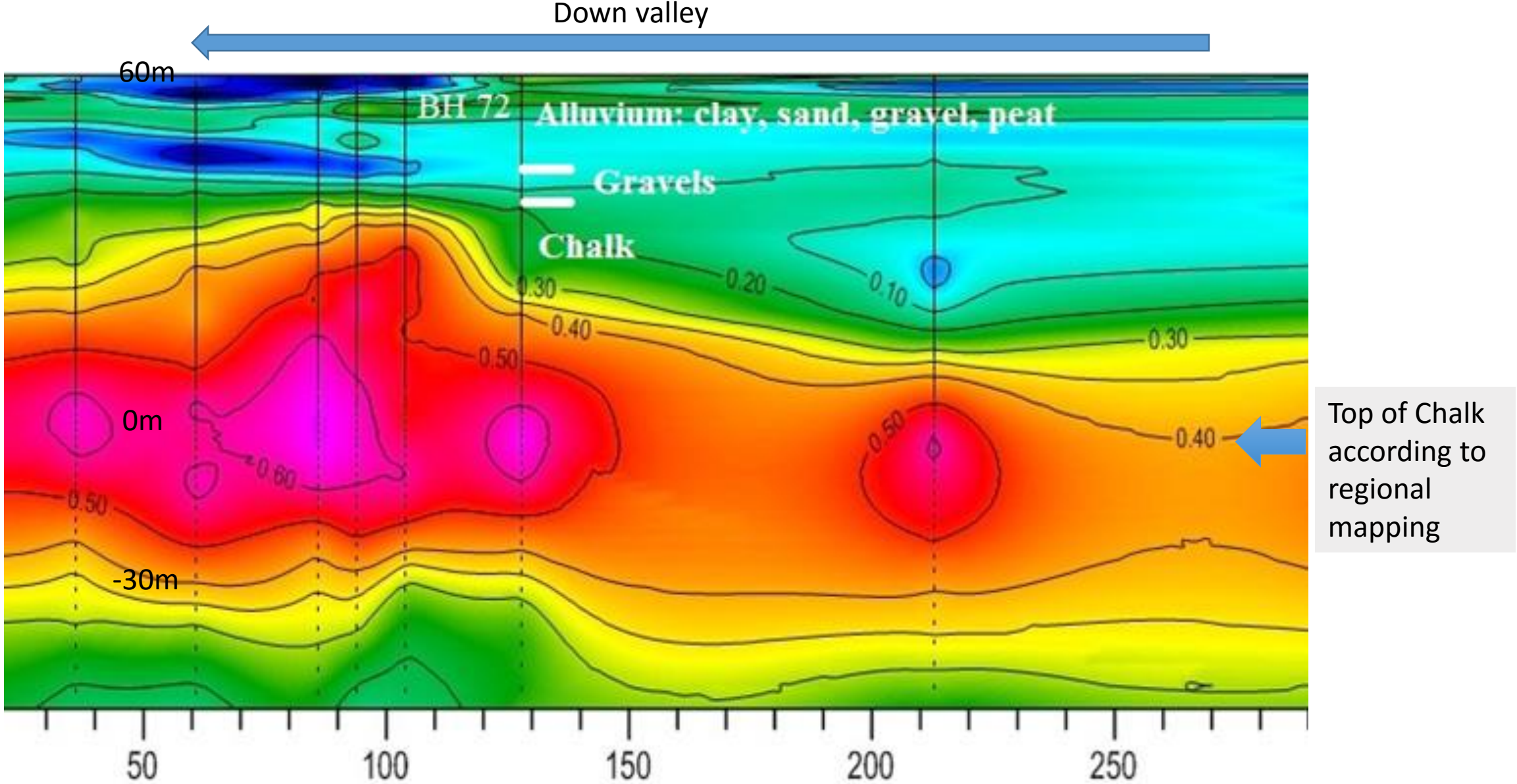
Ashford Hill Conceptual Ground Model...

...and what we actually have borehole evidence of



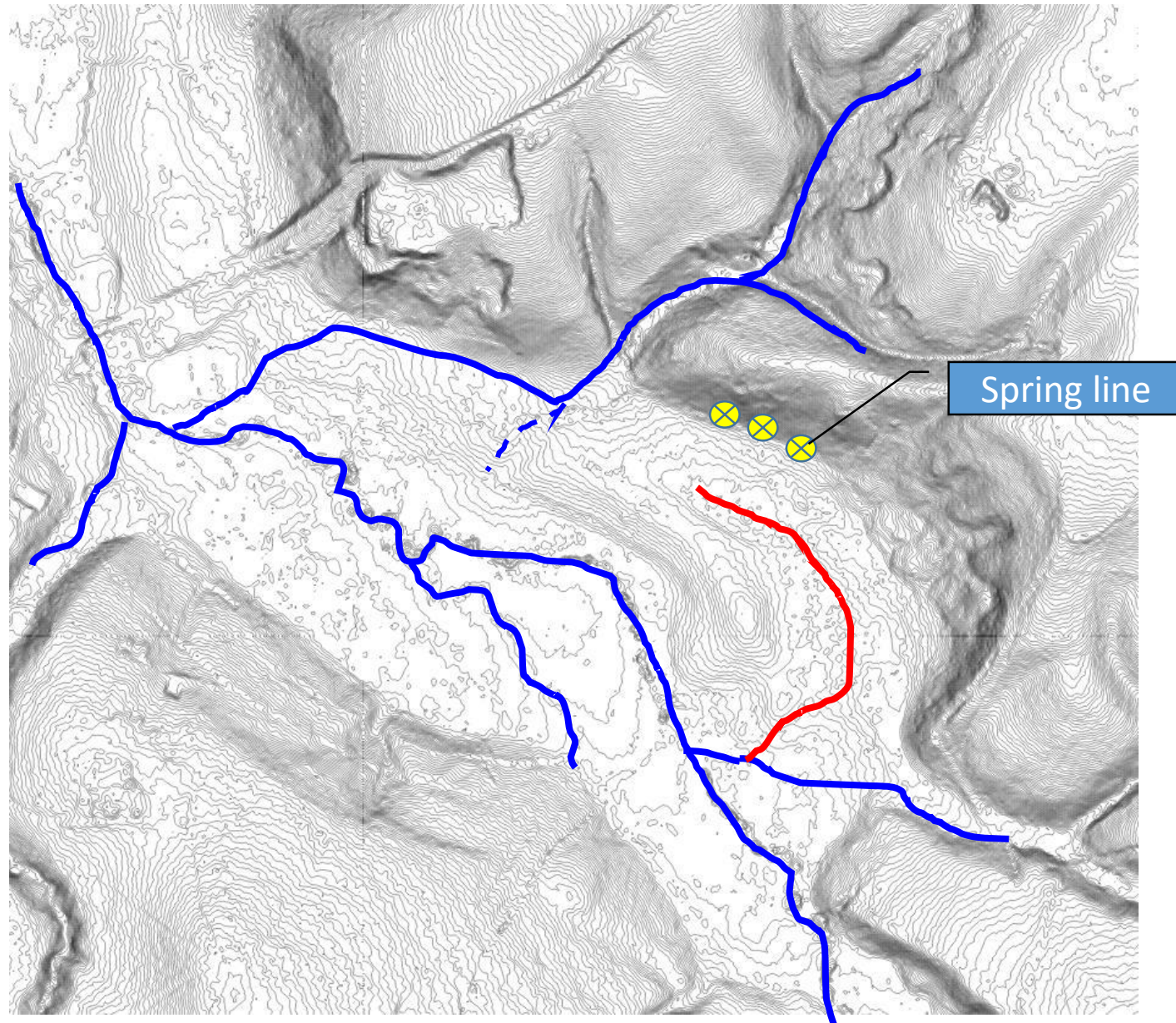


Ashford Hill, ERT profiles (Raines et al. 2015)



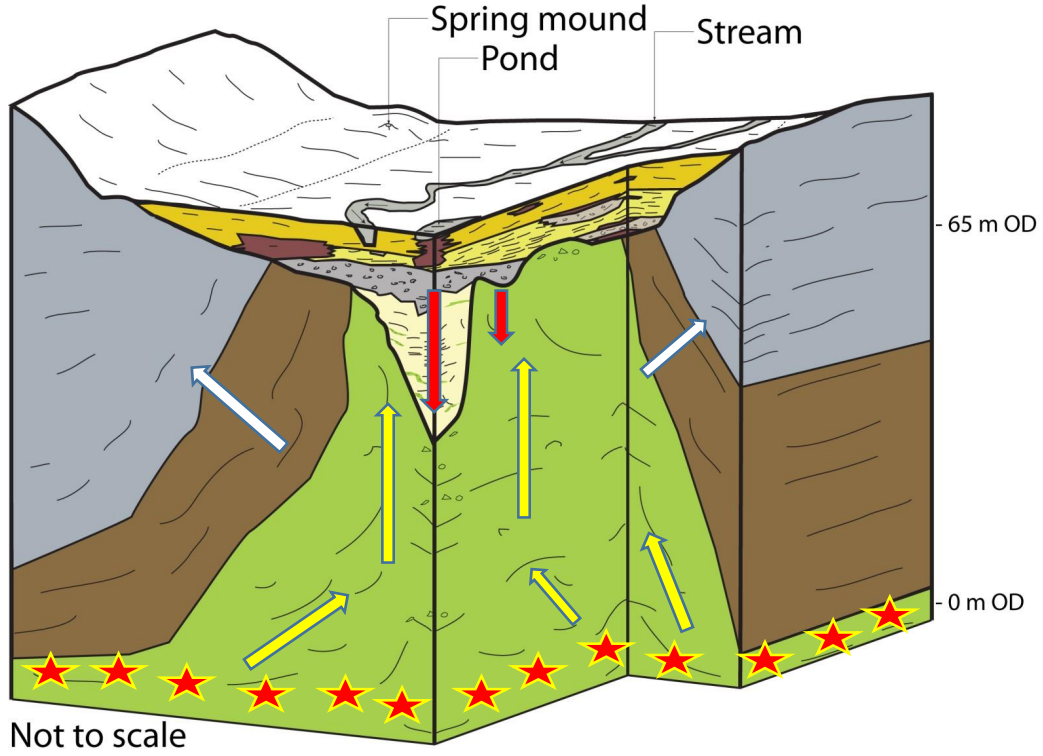
Ashford Hill: Tromino survey parallel to valley axis, impedance (H/V) vs depth

BGS©NERC. 2015. (Raines et al. 2015)




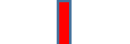


Spring line

← 300 m →



To understand how this happened, a time sequence would be useful

1.  Fracturing of Chalk
2.  Injection of Chalk putty and breccia
3.  Heave of Reading Beds & London Clay
4.  Subsidence

Cold stage(s)

Mid-Late Devensian (?)

Late Devensian Lateglacial (to present?)

Ashford Hill - chronology

| Phase | Timing | Dates | Evidence |
|--------------------|-------------------------------|---|--|
| Late subsidence | 18 th C to present | ~1700AD to now | Pond, peat, clay pipe |
| Stability? | Holocene | ~11.5-0.3ka BP | Floodplain deposits |
| Main subsidence | Late Devensian | After ~20kaBP Before Holocene | Disrupted laminated silts, gravel Warped strata |
| Diapir emplacement | Late Devensian? | After ~30-20kaBP Before Holocene (?) | Back-tilted(?) terrace |
| Chalk brecciation | Quaternary | Unknown, probably one or more stadials | Likely to reflect deep freeze-thaw (permafrost) |
| Valley formation | Anglian to present | ~450ka BP - present | Morphostratigraphy |

Findings

- Hollow infills reflect different time periods
- Infilling, where datable, occurred under cold and warm conditions
- Depth of infill enabled by episodic(?) synsedimentary subsidence
- The 'hollows' at Woolhampton and Ashford Hill cannot be adequately dated by the surface age or basal unconformity – they are diachronous
- Hollow location at Ashford Hill linked to Chalk diapir
- Possibly tilted landforms may indicate emplacement after c. 30-20 k BP
- No diagnostic evidence for pingos

Outstanding questions

- Are the Kennet hollows analogues for some of those in London?
- What was the mechanism for Chalk diapirism?
- Did geological faults/joints play a role?
- Is subsidence purely due to dissolution? (could dewatering be involved?)
- Are any of the hollows still forming?
- Could 'passive' features be reactivated to present an active hazard?