WATER END, WELHAM GREEN, HERTFORDSHIRE

Swallow holes through superficial deposits into the Chalk below

The informally termed Water End 'estate' is an 11.3 hectare (27.9 acre) biological and geological site of Special Scientific Interest (SSSI) near Welham Green, Hertfordshire.

The site contains greater than 15 swallow holes of varying size (also known as dolines or sink holes), the only ones in chalk which are a permanent feature of the landscape.

Adjacent to the holes is a swamp area of willow carr which is biologically important, and in deep water there is Reed Sweetgrass. The site also has areas of woodland and grassland.

The swallow holes appear where two streams (Potterells Stream from the northeast and the obsequent Mimmshall Brook from the southeast) drain approximately 50km^2 of the London Clay Formation and Lambeth Group outcrop of the Barnet, Brookmans Park and Potters Bar area (Nowell, 1994). Potterells Stream has a smaller catchment to the east over London Clay Formation near Brookmans Park and glaciofluvial deposits near Welham Green. Both water courses sink very close to the boundary of the outcrop of the underlying chalk in normal weather conditions.

At times of low flow rates the active swallow holes are those at the highest points on the two streams, but with increased rainfall these become flooded, and the streams then terminate in a succession of other swallow holes downstream. Walsh & Ockendon (1982) mapped a total of 17 individual swallow holes.

However, In exceptional times of heavy rainfall the swallow holes cannot take all of the water of these streams and the depression around the swallow holes fills up and the entire area becomes a small 'lake' [informally termed 'Water End Lake'] - also known as an Uvala. An uvala is a large depression caused by the coalescing of a number of swallow holes. It is a Serbo-Croat term, one of many adopted to describe features of a Karstic landscape.

An idea of the maximum extent of the lake can be estimated from the strand line of the debris (a disappointingly very high proportion of plastic and other household/anthropogenic 'waste' constitutes this debris) in among the trees. When the lake is dry there is a slightly raised track (with marker posts) across the middle of the 'lake' bed which leads to the Car Park of the Woodman Inn.

The lake then overflows along a large, but normally dry, channel westward from the area beneath Swanland Road and the A1(M) and through North Mymms Park to join the headwaters of the River Colne. This overflow may be active for several days after heavy rain in the Barnet / Potters Bar area.

Woodridge & Kirkaldy (1937) suggested that before the Anglian glaciation, which blocked its valley with a considerable thickness of glaciofluvial deposits north of Water End, the Mimmshall Brook would have continued northward probably joining the proto-Thames near Stanborough. The westward course of the modern overflow channel toward Colney Heath

may have originated as a marginal meltwater channel around a temporary ice lobe extending southwards from the Hatfield area.

The underground water flows in solution tubes in the chalk and appears again in springs which feed the River Lea at various sites between Woolmers Park and Hoddesdon between 8-30km from Water End. This was confirmed by tracing samples of dye dropped into the swallow holes (Morris & Fowler, 1937). The direction of flow may be influenced by the 'minor' synclinal structure mapped with a ENE axial trend between Water End and Epping Green (and parallel to an anticline 3km south extending ENE from Radlett through Ridge and Newgate Street towards Broxbourne which plunges in the same direction; Sherlock & Pocock, 1924). The time taken for the subsurface water to travel the distance can be c. 7 days (or 5km/day) between Water End and the River Lea.

The underlying chalk is 'Upper Chalk' of the White Chalk Subgroup; currently undifferentiated Lewes Nodular/Seaford Chalk Formation of 86 - 93.5 Ma. It is characterised by abundant layers of nodular flints. The top surface of the chalk is irregular and often has solution pipes filled with younger Cenozoic or Pleistocene sediments.

*** Important Note: Take extra care** - This is an area of active swallow holes; an area of unstable muds and clays. best observed in winter or early spring when vegetation is low; **BUT**, importantly, when overall water level is also low - and ideally as part of a responsibly organised group excursion.

Access & Parking:

Warrengate Road in Water End is quite narrow but it is possible to park individual vehicles on isolated patches of verge on the east side of the road outside residential properties, commercial properties and the Woodman Inn Public House. However, it is much easier to use the car park of the Woodman Inn if taking refreshments there.

An alternative route to the site is by walking from Brookmans Park Railway Station (where there is also a Pay & Display Car Park) on the Moorgate/Kings Cross to Welwyn Garden City Line. Brookmans Park also has plenty of village centre on-road parking. A short walk from the station along Bradmore Lane (see map) leads to the east side of the site. There is no pedestrian sidewalk/pavement, but this road is relatively quiet in terms of traffic and is relatively safe to walk along - **please remember to walk to the right facing oncoming traffic.**

A third option is to use public footapths from Welham Green. Either south of Nash's Corner on the west side of Station Road the footpath leads to Potterells Stream upper swallow holes before linking to the northern edge of the Water End 'Lake Estate' or from Dixons Hill Road following a footpath across farmland to the point where the Overflow Channel exits the Water End area under Swanland Road.

Map:

OS Explorer 1:25000 scale St Albans & Hatfield 182

References:

Hertfordshire Geology & Landscape 2010. Ed. Catt.

GA Guide 30A - The London Region (North of the Thames). 1967.

Nowell 1994

Walsh & Ockendon (1982)

Woodridge & Kirkaldy (1937)

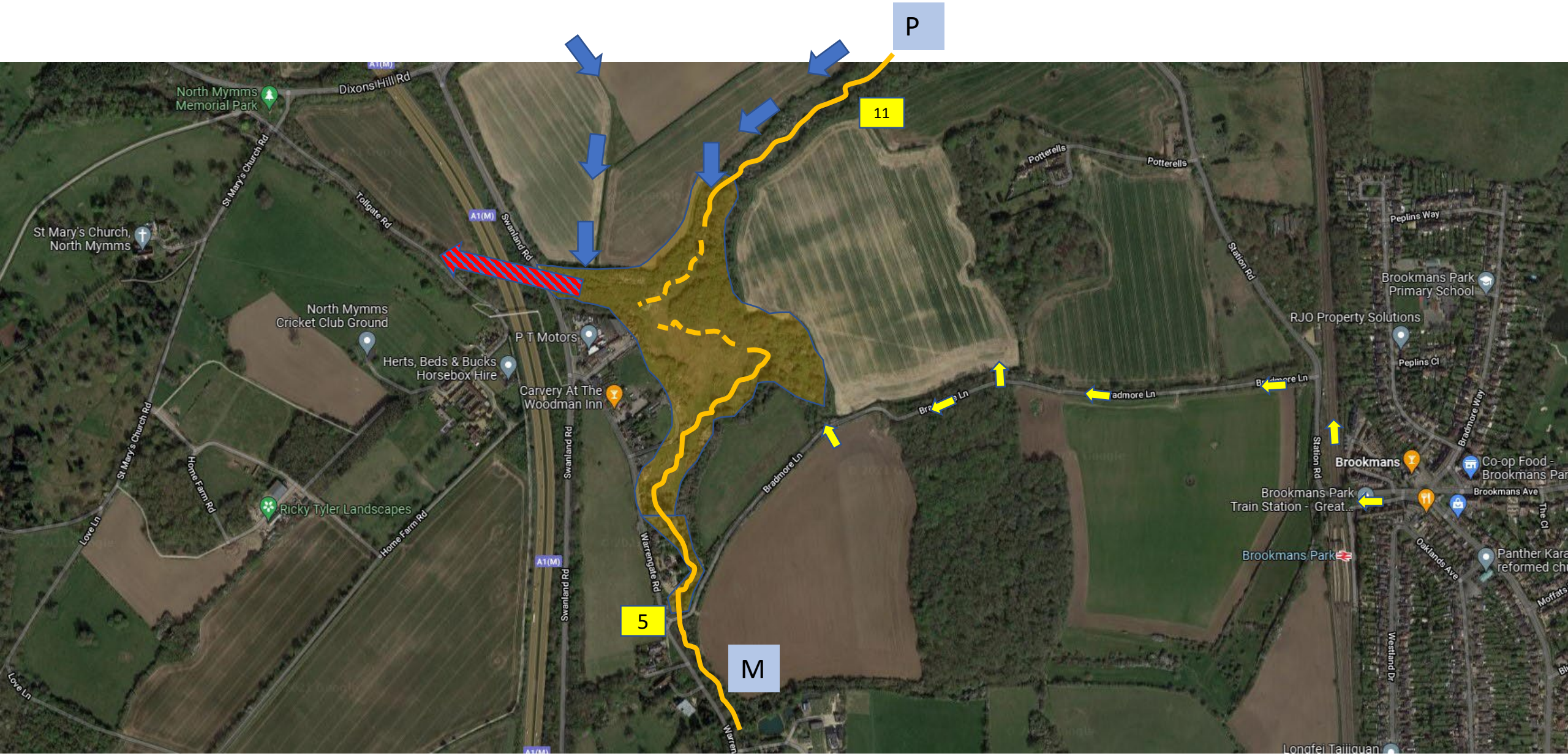
Morris & Fowler 1937

British Regional Geology. London & the Thames Valley. HMSO 1996.

Nearby attractions:

North Mymms Church

Castle Mount



Aerial view of Water End SSSI and environs – see key on following page

The Water End Swallow Hole “estate” is approximately enclosed by Grid References TL 229042 - TL 232043 - TL 231044 and TL 228044

Zoomed in Aerial view of Water End SSSI and environs – see key on following page

9 10 11 Reference points on the guided walk

Walking route from Brookmans Park Station

Approximate extent of the informally termed Water End 'estate'

Walking route from Welham Green

Overflow channel route

Approximate extent of Water End 'Lake' when in flood

P Potterells Stream – solid line ends at current 'sink' point [January 22 2022]

P Mimmshall Stream – solid line ends at current 'sink' point [January 22 2022]

Point 1: Woodman Inn Public House & Restaurant: Car park entrance (GR TL 229042; 51.72296°N 0.22187°W) = **/// tooth.tour.plot**

Point 2: HCCFP Waymarker Post: Access footpath across 'lake' in dry conditions marker (GR TL 230042; 51.72375°N 0.22056°W) = **/// belong.fight.twice**

Point 2a: Narrow footbridge across Mimmshall [dry] gulley = **/// budget.sobs.inches**

Point 3: Exit from Water End 'estate' at footpath waymarker post: (GR TL 231043; 51.72454°N 0.21892°W) = **/// badly.chief.nature**

Point 4: Exit onto Bradmore Lane at footpath waymarker post (GR TL 2325 042; 51.72294°N 0.21689°W) = **/// deal.bliss.green**

Point 5: Junction of Bradmore Lane & Warrengate Road; Mimmshall Brook entry to Water End 'estate' =

/// reduce.sits.next

Point 6: Footpath 032 entry/exit point to Water End 'estate' (GR 2280425; 51.72384°N 0.22276°W) = **/// orders.lifted.couches**

Point 7: Footpath entry/exit point to Water End 'estate' at overflow channel (GR TL228044; 51.72471°N 0.22319°W) = **/// early.rating.cooks**

Point 8: Entry/exit point to Water End 'estate' via Welham Green (GR TL228044; 51.72471°N 0.22319°W) = **/// mouth.model.hatch**

Point 9: Footpath entry/exit point to Water End 'estate' at HCCFP Waymarker post 34 & 54 (GR TL 230445; 51.72524°N 0.22109°W) = **/// aura.angel.jabs**

Point 9a: Current swallow hole position on Potterells stream =

/// locals.fault.jukebox

Point 10: Footpath entry/exit point to Water End 'estate' at Waymarker post =

/// quite.caged.charge

Point 11: Footpath entry/exit point to Potterells stream upper swallow hole (GR TL2330475) =

/// swift.draw.soup

Point 12: Footpath 30 entry/exit point to Potterells stream shutter dam & footbridge =

/// coal.sticks.powder

Point 13: Footpath 30 entry/exit point to Field boundary =

/// wipe.loops.rubble

Point 14: Waymarker post south of Point 9a; leading directing along dirt path to Point 6 =

/// sends.boxing.finds

Bradmore Lane approached from Brookmans Park Station: Footpath sign at (GR TL 236043) = **/// energetic.appeal.about** on Bradmore Lane - then diagonally across field to Point 3 =

/// badly.chief.nature

If underfoot conditions are not conducive to cross field access continue down Bradmore Lane to footpath sign at Point 4 = **/// deal.bliss.green** and follow footpath to Point 3 = **/// friend.idea.carbon** - accesses footpath across central part of Water End 'estate' in dry conditions - links to point 2 = **/// budget.sobs.inches**

Swanland Road: (Point 6) = **/// orders.lifted.couches** follow footpath between industrial buildings to reach northwest edge of lake at Point 6a = **/// panels.spray.combining** - dry

weather access to flowing water of overflow channel at north east edge by following footpath ahead to Point 6b = **/// stuck.tame.cross** - follow footpath out to Points 9a & 10.

The overflow channel is accessed from Swanland Road at Point 7= **/// early.rating.cooks**

Potterells Stream flowing left to right toward swallow hole position [out of shot]; December 2021. Photo L. Gallagher

Potterells Stream sink point January 2022. Photo L. Gallagher

Water End Lake covering central footpath through ‘estate’; close to Point 2a. Photo M. Howgate

Dry gulley of Mimmshall Brook at small bridge on central Path [Point 2a]; looking east. January 2022. Photo L. Gallagher

Water End Lake looking east from Point 2. January 2022. Photo L. Gallagher

Water End Lake looking east from Point 6a. January 2022. Photo L. Gallagher