CHAPTER 8
THE HITCHIN GAP

8.1. Introduction

The stratigraphies of the Hitchin and Stevenage Channels were described by Hopson *et al.* (1996) (Chapter 3). In their investigation of these deposits no detailed textural or lithological analyses were carried out. This work seeks to clarify the stratigraphy whilst adding to the pool of knowledge concerning the complex geology of this area.

In this chapter results from the borehole data have been combined with those from macrofabric and multivariate analyses (Chapters 6 & 7). Few exposures of till within the channel sequences exist, most information having been gleaned from auger and borehole samples. Unfortunately, due to the extreme diversity and rapid lateral and vertical variability of deposits within the channel sequences, it cannot be said with certainty that any of the deposits investigated as part of the present study are representative of those referred to by Hopson *et al.* (1996), although some relationships are suggested.

8.2. Subglacial contours

Using borehole records and the results of rather limited geophysical surveys, the BGS arrived at approximate subglacial topographies of the Hitchin and Stevenage Channels. Table 8.1 gives details of the BGS borehole data referred to throughout this chapter. This was published alongside the 1:50 000 sheet (221) of the Hitchin area. Using this map, a section has been constructed along the Hitchin Channel from borehole TL13SE5 at Pollards Nurseries (TL1873 2833) in the north, to Site 3 at Cannocks Wood (TL2240 2252) in the south, showing the bedrock surface (Figure 8.1). This figure clearly shows the uphill gradient created by subglacial waters under great hydrostatic pressure, assuming a southward flow.

Figure 8.2a (taken from part of the map of the solid geology with contours on the sub-Anglian surface, shown with Sheet 221) shows the outline of the southern part of the Hitchin Channel in relation to the boreholes investigated during this study. It is clear that in the light of the new borehole data this

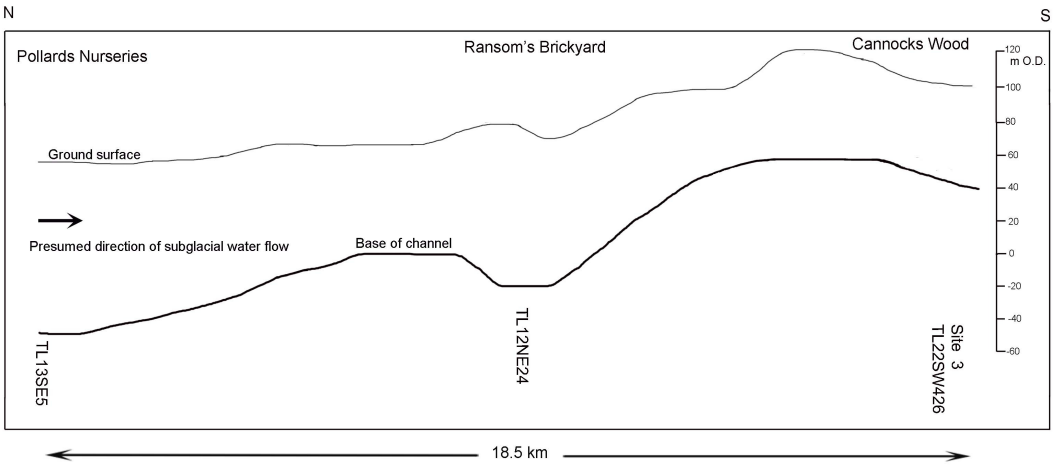


Figure 8.1. Profile along the centre of the Hitchin Channel showing clearly the uphill gradient from north to south.

contour map requires revision in the vicinity of the new boreholes at Sites 5 (St Ibbs), 8 (St Ippollitts) and 3 (Cannocks Wood), as described below.

Borehole name	BGS number	Grid reference
300 yds W of Hitchin Road, Langley	TL12SE3	TL1980 2480
Ransom's Brickyard	TL12NE24	TL1872 2855
300 yds NNW of Thistley Farm	TL12NE26	TL1870 2680
Avenue Farm, Gosmore	TL12NE27	TL1870 2703
Hitchin Priory By-Pass	TL12NE213	TL1819 2865
Hitchin Priory By-Pass 72	TL12NE211	TL1817 2867
Gosmore, Herts CH2	TL12NE223	TL1867 2759
Broad Meadow CH3	TL12NE224	TL1932 2772
Glaxo Site 2	TL22SW75	TL2300 2240
Glaxo	TL22SW52	TL2300 2240
Glaxo	TL22SW79	TL2300 2240
Pollards Nurseries	TL13SE5	TL1653 3493
Ippollitts Vicarage	TL12NE228	TL1986 2670

Table 8.1. BGS borehole data referred to in this Chapter.

Site 8, although just outside the channel shown on the BGS Sheet 221 (Figure 8.2a) penetrates approximately 59.5 m of drift deposits to approximately 5.5 m O.D. Therefore the boundary of the channel must actually lie somewhat to the east of Site 8, although it is tightly constrained by a bedrock height of 68.7 m O.D. in borehole TL12NE228 at Ippollitts Vicarage (Figure 8.2b). The borehole at Site 5, lying 750 m to the south of Site 8, recorded a basal 3.3 m of very chalky sand with cobbles at a height of 62.3 m O.D., believed to lie very close to the bedrock surface at the channel margin.

The BGS prepared a section based on a Bouguer gravity anomaly profile, along line 1 on Figure 8.2b (Chacksfield & Raines, 1992). None of the boreholes along this section reached the bedrock, therefore the base of the channel was inferred from the geophysical data. The section intersects the borehole TL12NE224 at Broad Meadow where the bedrock is considered to be close to 20 m O.D. The latter borehole is situated 0.6 km NNW of Site 8 mentioned above where the bedrock lay below 5.5 m O.D. Figure 8.3 (a & b) offer a comparison of the two sections along lines 1 and 2 on Figure 8.2b. It is

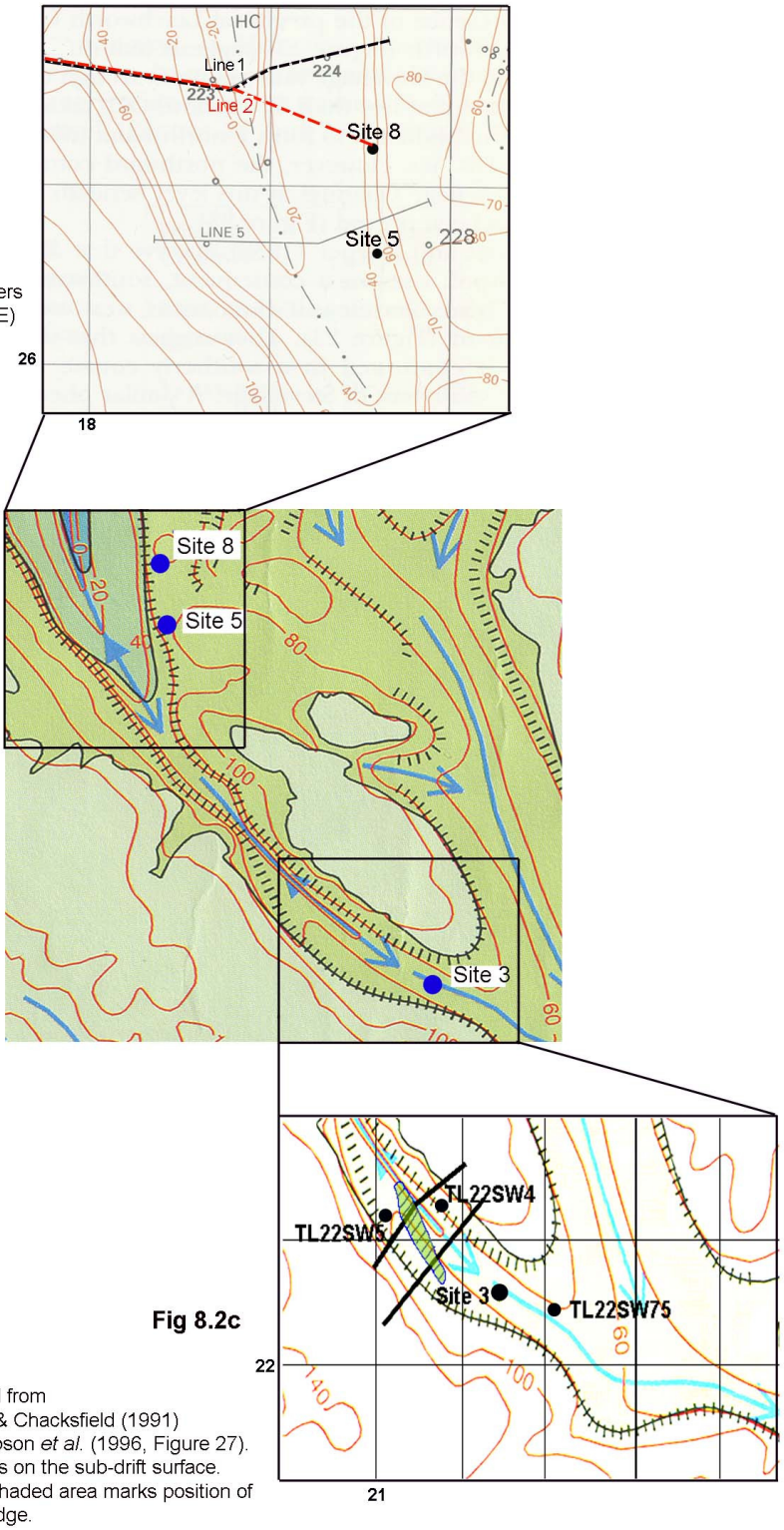


Fig. 8.2b

Modified from Hopson *et. al.*(1996, Figure 24)

BGS borehole numbers shown (prefix TL12NE)

Fig 8.2a

Modified from BGS 1:50,000 Sheet 221 (Hitchin) (Map of solid geology with contours on the sub-Anglian surface)

Fig 8.2c

Modified from Raines & Chacksfield (1991) and Hopson *et al.* (1996, Figure 27). Contours on the sub-drift surface. Green shaded area marks position of Chalk ridge.

Figure 8.2. Details of Hitchin Channel south of Hitchin

b) centred on Gosmore. Sections along Lines 1 & 2 are shown in Figure 8.3

c) the junction of the Hitchin and Stevenage Channels, showing position of chalk high ground (shaded green) in relation to Site 3.

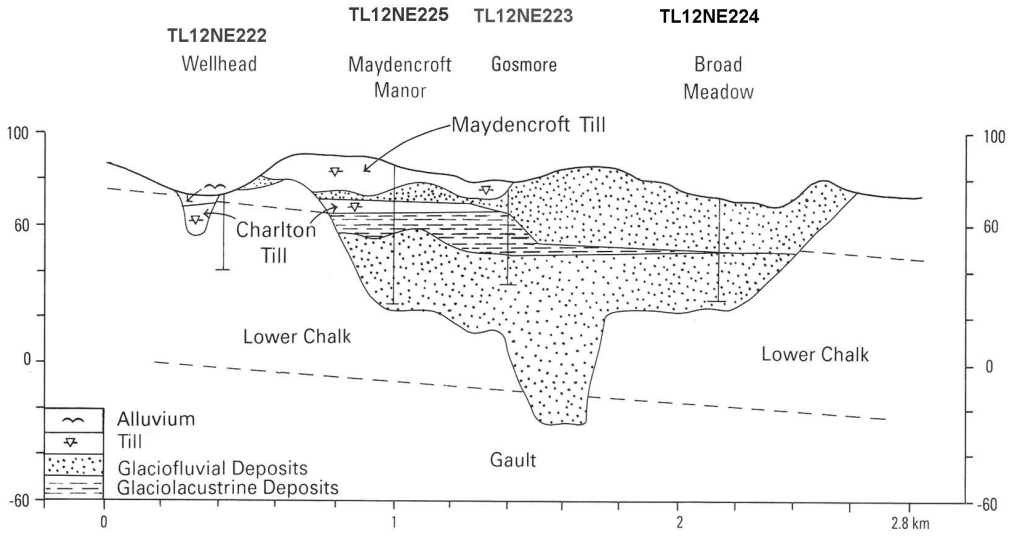


Figure 8.3. a: Interpretation of Hitchin Channel along Line 1 on Figure 8.2(b).
(Hopson et al., 1996)

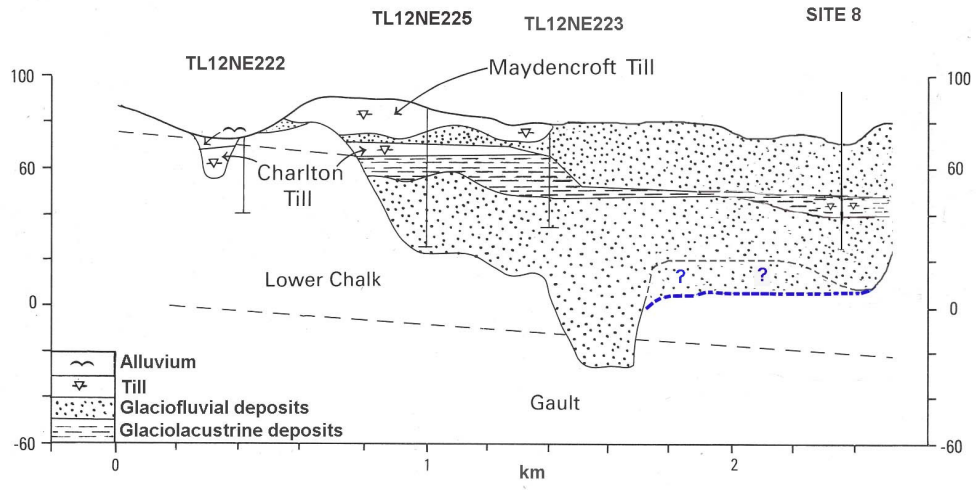


Figure 8.3. b: Interpretation of Hitchin Channel along Line 2 on Figure 8.2(b) for comparison.
(adapted from Hopson *et al.*, 1996)

possible that either a) the borehole at Site 8 penetrated a local hollow alongside the channel, or b) the base of the channel is considerably wider than shown on Figure 8.2a because the 20 m sub-Anglian contour line lies to the east of Site 8.

At the southern end of the Hitchin Channel the new borehole data presented in this study (Section 5.2) shows that at Site 3 (Cannocks Wood), bedrock occurs below 47.5 m O.D. Figure 8.2c shows two traverse lines constructed by Raines & Chacksfield (1991). They detected an area of low conductivity, suggested to imply the presence of a ridge of Chalk rising to a depth of between 2.5 m and 7.75 m O.D. within the channel near Langley (shown in blue on Figure 8.2c). The exact position of the southern end of this ridge is rather uncertain, but Site 3 lies within 800 m of its known position on the southernmost transect line. As suggested by Raines & Chacksfield, the Chalk ridge probably divides the channel into two, with deeper sections possibly reaching depths similar to that of Site 3, running along each side and continuing on to Langley, although at present there is no borehole evidence to confirm this. To the east of Site 3, boreholes TL22SW75, TL22SW52 and TL22SW79, prove Chalk bedrock at 75.5 m, 83.7 m and 76.9 m O.D. respectively. The position of the first of these boreholes is marked on Figure 8.2c, but all three are noted at the same grid reference (TL230224) by the BGS. The position of the 60 m sub-drift contour on Figure 8.2c is confirmed by the many boreholes constructed along the route of the A1(M) indicating that the channel continues to rise beyond Site 3 to reach 60 m O.D. approximately 1.2 km to the east.

Hopson *et al.* (1996) believed the base of the channel at Langley lies at 55 m O.D. As stated above, this study has proved till at Site 3 extends to 47.5 m O.D. Although subglacial erosion may not have extended as far south as Langley, subglacial drainage water escaped via the Langley spillway. This is evidenced by the presence of glaciofluvial sands and gravels in the Lower Beane Valley originating from both Hitchin and Stevenage Channels (Cheshire pers. comm). It is likely therefore, that sands and gravels are found below the lowest till recorded at Site 3 and the base of the channel is even lower, at less than 47.5 m O.D.

8.3. Deposits and stratigraphy

Figure 8.4 represents a section along the Hitchin channel from Site 11 (Primrose

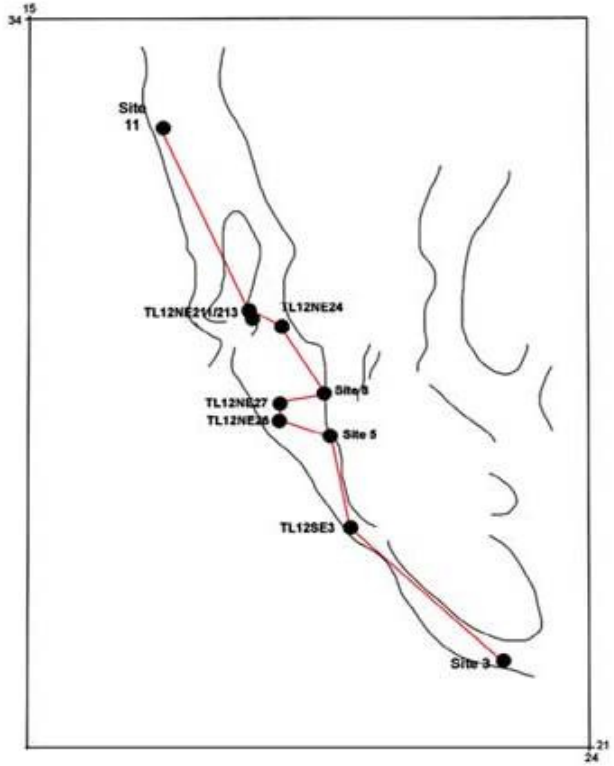
Hill Quarry) at Holwell in the north to Site 3 (Cannocks Wood) near Langley in the south (an additional copy of this figure is provided in the pocket inside the back cover, for ease of reference). Data for these two sites, together with that for Site 5 (St Ibbs) and Site 8 (St Ippollitts), are derived from the current study which is presented alongside data from the BGS boreholes shown in Table 8.1. This figure illustrates the lateral discontinuity and variety of deposits within the channel. In very few of the boreholes is it possible to determine whether a till represents a single or more than one ice advance, especially where it occurs as numerous thin bands or lenses. Further problems arise towards the centre of the channels where dewatering and settlement of deposits has occurred, resulting in variation in height of deposits that are probably equivalent. A very tentative attempt at correlation of these deposits is made, but any new data may necessitate large scale revision of the relationships shown here.

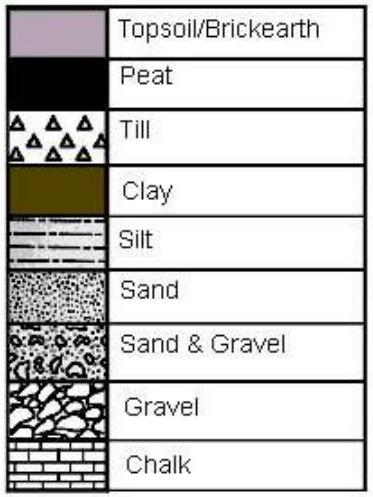
8.3.1. Stratigraphic relationships

A number of differences exist between the stratigraphy at Ransom's Brickyard (TL12NE24) interpreted as shown in Figure 8.4 and that offered by Hopson *et al.* (1996 - Figure 25a). These are:

- The borehole as represented in Figure 8.4 shows all the occurrences of deposits that are likely to represent till. These include deposits below that of the Priory Till – the latter considered by Aldiss (1992a) to represent the earliest major till unit in this channel.

- The till found at approximately 56.4 m O.D. at Ransoms Brickyard is interpreted in Figure 8.4 as part of the upper unit (Maydencroft Till) in this channel. Aldiss (1992a) however, considered it to be part of the Charlton Member laid down as waterlain/flow till deposited in a proglacial lake. According to the borehole log, a further 2 m thick band of till found at 42 m O.D. overlies 1 m of stiff clay and 2 m of sandy clay and sand which were probably deposited under lacustrine conditions. Therefore this till is considered to be the equivalent of the waterlain Charlton Member, possibly resulting from the wasting of dead ice.





On the following section names attributed to units by other authors are shown in blue.

Location and legend for Figure 8.4. – featured on the next two pages

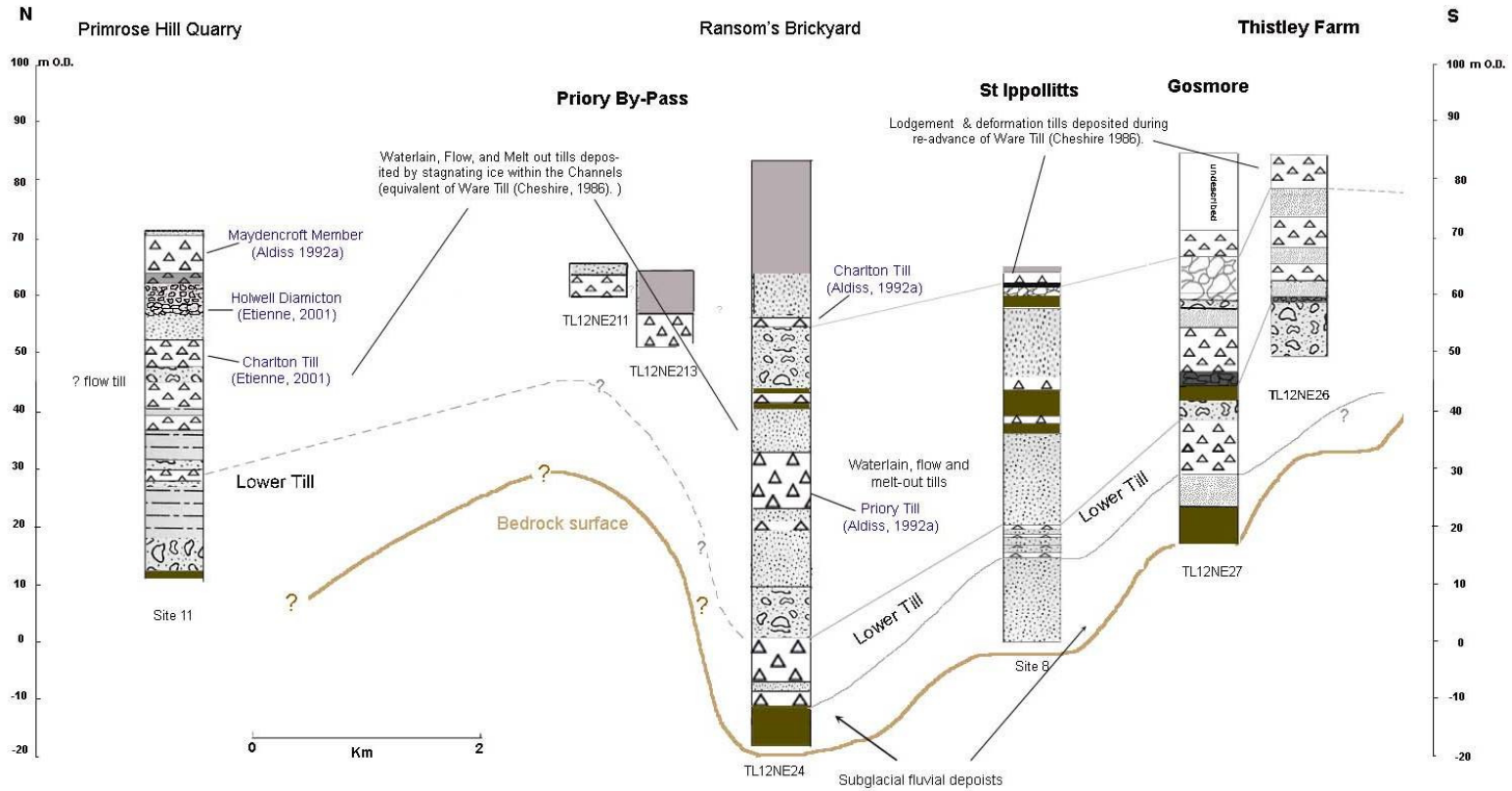


Figure 8.4. Section along the Hitchin Channel (continued on next page)
(see previous page for location and legend).

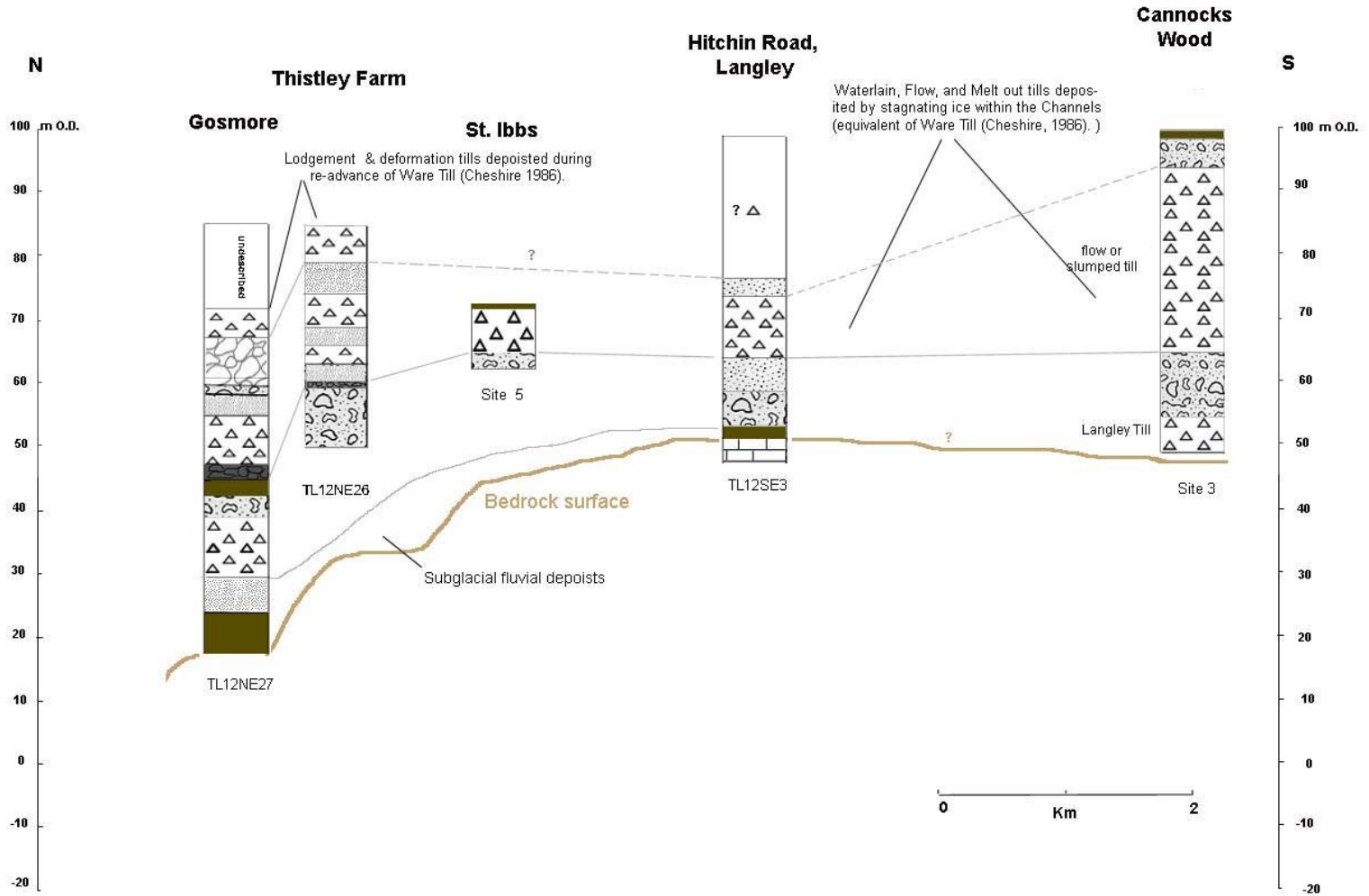


Figure 8.4. Section along the Hitchin Channel (continued from previous page).

The borehole at Ransom's Brickyard is sited in a deeper part of the Channel, and lying immediately above the bedrock (at approximately -20 m O.D) are deposits described variously as clay and stones, blue sandy clay, clayey sand and stones and stony clay. A similar description is given on the borehole log of deposits at the base of the Avenue Farm Gosmore borehole (TL12NE27), lying a further 1.5 km to the southwest. These probably represent the remnants of subglacial waterlain deposits, perhaps including a component of re-deposited Chalk. Towards the eastern margin of the channel at Site 8 (St Ippollitts) these deposits are replaced by dense silty sand.

8.3.2. Lower till

The earliest recorded till seen in this section is that found between -12.8 m and 0.6 m O.D. at Ransom's Brickyard (TL12NE24), while at Gosmore (TL12NE27) the lowest till lies between and 27.5 and 37.9 m O.D. The logs for these two boreholes indicate a difference in bedrock height of approximately 37 m, thus both these lower tills lie 7-10 m above the bedrock and are likely to represent the same unit. Also it is described as a sandy till in both of these boreholes. Between these two sites, at St Ippollitts (Site 8), a sample from 21.2 m O.D of chalky dark greyish brown stiff clay was retrieved. This forms bands interleaved with dense blue/grey silty sand.

At Thistley Farm (TL12NE26), despite being only 300 m from the Gosmore borehole (TL12NE27) where over 10 m of lower till is present, this till has apparently been replaced with "brown clay sand with minute rounded chalk gravel and flints".

A sandy till is also found at the base of the borehole at Site 3 (Cannocks Wood) between 47.5 m and 53.4 m O.D., named the Langley Till in this study. Particle size characteristics of the finer fraction of this till show similarities to that of the lower till at Site 8 at St Ippollitts (Chapter 7). The Langley Till is therefore tentatively correlated in this study with the lower till at Gosmore and Ransom's Brickyard.

8.3.3. Outwash deposits

Figure 8.4 shows that at Site 11 (Primrose Hill Quarry), Site 3 (Cannocks Wood), Site 8 (St Ippollits) and in boreholes TL12NE24 (Ransom's Brickyard) and

TL12NE27 (Gosmore), the lower till is overlain by glaciofluvial outwash deposits. These were described by Hopson *et al.* (1996) as waterlain chalky silty gravelly sands and sandy gravels, which are cyclic and coarsen upwards in the Gosmore borehole (TL12NE223).

8.3.4. Thistley Farm Member/Charlton Member

Above the outwash deposits at Sites 8 (St Ippollitts) and 11 (Primrose Hill Quarry) and boreholes at Ransom's Brickyard (TL12NE24) and Gosmore (TL12NE26 & TL12NE27) are a sequence of clays, clayey sand or sand deposits, interspersed with tills, the latter often present as thin bands. This series of deposits corresponds to the Thistley Farm Member (Lewis, 1999), the stratotype of which lies in a pit at TL190266, within 400 m of TL12NE26. Various waterlain/flow tills at the top of this sequence are correlated by Hopson *et al.* (1996) with the Charlton Member, seen near the River Hiz (TL181286). This sequence, as shown in Figure 8.4, is suggested to be more extensive than proposed by Aldiss (1992a) and Hopson *et al.* (1996).

In the Broad Meadow borehole (TL12NE224) northeast of Gosmore (Figure 8.2b), these deposits are described by Hopson *et al.* (1996) as consisting of frequently laminated and slumped fine grained sands and silts. Typical of quiet water sediments, they are considered to have been deposited in a proglacial lake formed during an ice retreat when hydrostatic pressure was reduced and no longer able to force subglacial waters over the Langley outfall. The current study shows this series of deposits include over 9 m of clay interspersed with till, seen to extend down to 38 m O.D. at Site 8 (St Ippollitts). At this site it is a dark grey relatively soft clay with much black shale and pockets of sand and silt, suggesting it is a waterlain till. Site 8 lies against the channel margin whereas the borehole at Ransom's Brickyard (TL12NE24) occupies a more central position in the Hitchin Channel, with deposits more likely to have suffered compaction and settling. Thus the till lying between 23.2 and 33.0 m O.D. at Ransom's Brickyard, suggested by Aldiss (1992a) to form part of the Priory Till (marked as such in Figure 8.4), is considered here to be an early part of the Charlton Member.

A sequence of tills and fine silts found at similar heights to those described above, are seen at Holwell, Site 11 (Primrose Hill Quarry). The tills have been correlated on the basis of stratigraphic position below the Lower Holwell Sands (see below) with the Charlton member (Etienne, 2001). A sample of till was obtained from this sequence as part of the current study, the macrofabric suggesting it is a flow till. Comparative analysis (Section 7.3) shows this till to possess similarities with Cheshire's Ware Member.

At the southern end of the Hitchin Channel in the borehole at Site 3 (Cannocks Wood), and possibly also at TL12SE3 (Hitchin Road, Langley) the glaciolacustrine sequence appears to be replaced by thick till units also present on the eastern boundary of the channel at Site 5 (St Ibbs). At Site 3 the till displays very variable a-axis clast dips unlike those typical of lodgement till and is interpreted in Chapter 6 as a possible flow or slumped till. This probably indicates the presence of stagnant or very slowly moving debris-rich ice. It is possible that the glaciolacustrine and fluvial deposits have been eroded prior to till deposition or that the melt-out tills here existed beside the mass of stagnating ice lying in the deeper section of the channel to the northwest.

Cheshire (1986) considered that a body of decaying Ware Till ice remained to the west of the North Hertfordshire Chalklands and in the Vale of St Albans during the advance that deposited the Stortford Till. It Is possible that this phase is represented by the Charlton Till deposits of Aldiss (1992a) and the upper till found during this study at the southern end of the Channel at Site 3.

8.3.5. Glaciofluvial deposits

Above the Charlton Member at Site 11 (Primrose Hill Quarry) are the Lower Holwell Sands, interpreted by Etienne (2001) as fluvial sands, followed by likely flash flood or mudflow deposits, in turn overlain by medium sands and gravels. He noted the presence of normal microfaults in this deposit, which he considered to be due to the melting of underlying bodies of stagnant ice. For this reason he correlated the Lower Holwell Sands (unit 13, Site 11) with deposits lying above the Charlton member elsewhere in the Hitchin Gap. Equivalent deposits can be seen in Figure 8.4 above the Middle Till (units 5 &7) at Site 8 (St Ippollitts) and above lower tills in boreholes TL12NE27 and TL12NE26 (Gosmore). Above the

tills at TL12SE3 and at Site 3 (Cannock Wood – Unit 4) are various fluvial deposits which presumably are equivalent to those at Holwell.

8.3.6. Upper till

The uppermost till seen in Site 11 (Holwell Diamicton) was correlated by Etienne (2001) with the Maydencroft Member, although this was found to exist mainly outside the channel sequences by Hopson *et al*. (1996).

The present investigation has shown similarities between both the middle and upper tills at Primrose Hill Quarry suggesting that both can be correlated with the Ware Member to the south and southeast of the study area. Results of statistical analyses in Chapter 7 also show that a till sample obtained from a height of 80 m O.D. at Site 9 (Maydencroft), close to the type-site of the Maydencroft Member, as well as that from Site 5 (St Ibbs) and the Upper Till at Site 3 (Cannocks Wood) are also associated with the Ware Till.

8.3.7. Summary

From the evidence examined in this study, it is considered that the lowest till found in the Hitchin and Stevenage Channels represents an early incursion into the Hitchin Gap. The overlying tills are all considered to be equivalents of Cheshire's Ware Till. The lower waterlain, flow and melt-out tills (Charlton Till of Aldiss,1992a) are suggested to have been formed by the wasting of dead ice trapped within the channels. A re-advance deposited the widespread surface tills found in the area, including the Maydencroft Member of Aldiss (1992a). An alternative possibility is that the re-advance of ice may be the equivalent of Cheshire's Stortford Member till, although this study has found no textural or lithological similarities between the two tills.

Thus, the lower till of the Hitchin Channel was laid down by an advance prior to that which deposited the first till in the Vale of St Albans (Cheshire, 1986).