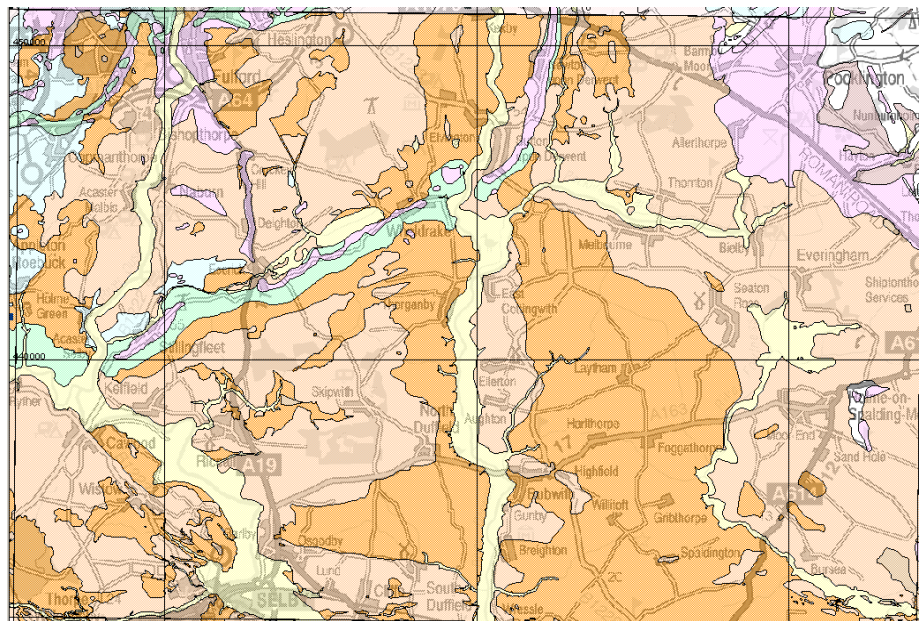




# Field Guide to the Glacial Evolution of the Vale of York

Integrated Geoscience Surveys (Southern Britain)  
Internal Report IR/04/106





BRITISH GEOLOGICAL SURVEY

INTERNAL REPORT IR/04/106

# Field Guide to the Glacial Evolution of the Vale of York

Ford, J.F., Kessler, H.K., Price, S.J., Hall, M. & Cooper, A.H.

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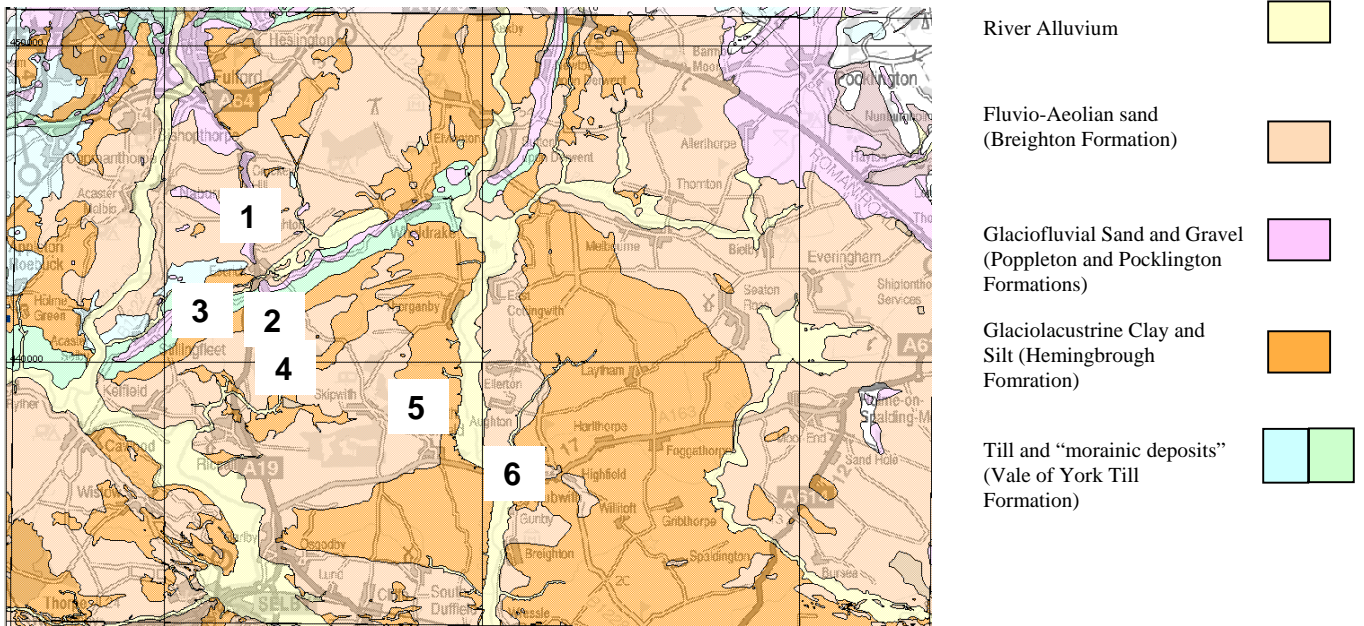
York, Quaternary, field guide.

*Bibliographical reference*

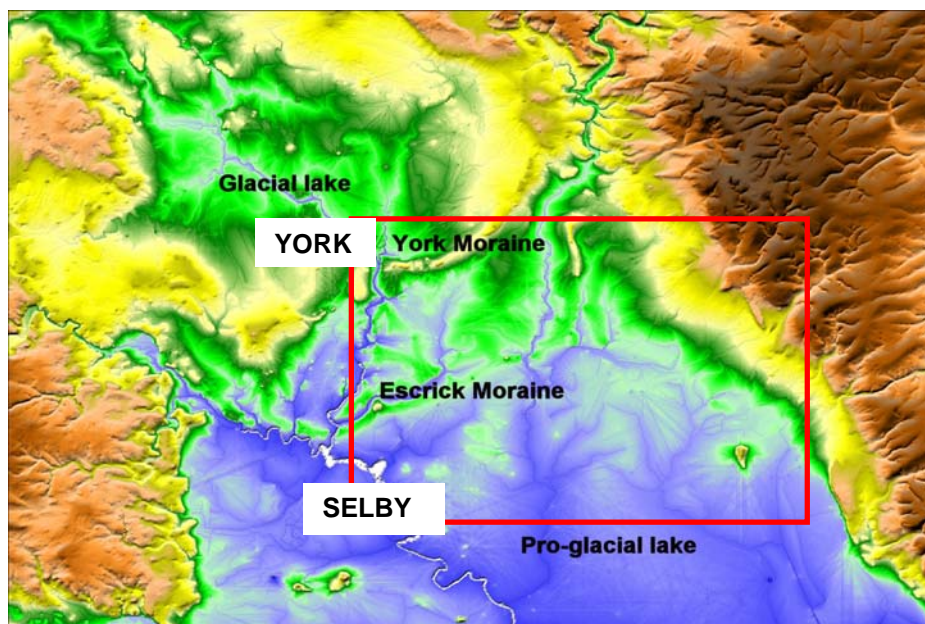
FORD, J.F., KESSLER, H.K., PRICE,  
S.J., HALL, M. & COOPER, A.H.  
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evolution of the Vale of York,  
Field Guide. *British Geological  
Survey Internal Report*,  
IR/04/106



## GEOLOGY, TOPOGRAPHY AND FIELDTRIP LOCALITIES

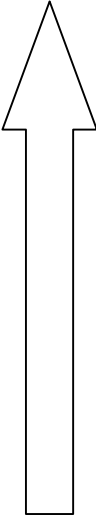


The following figure shows the Superficial Geology map for the Selby area (Geological 1:50,000 Sheet 71, 1973). Field localities are indicated for reference



Digital Elevation Model (DEM) of the Vale of York showing ground elevation and main geomorphological "domains". Blue areas are low, yellow, red and darker colours are higher (derived from Centre of Ecology and Hydrology (CEH), Ordnance Survey dataset). The outline of the Superficial Geology map for the Selby area is shown in red.

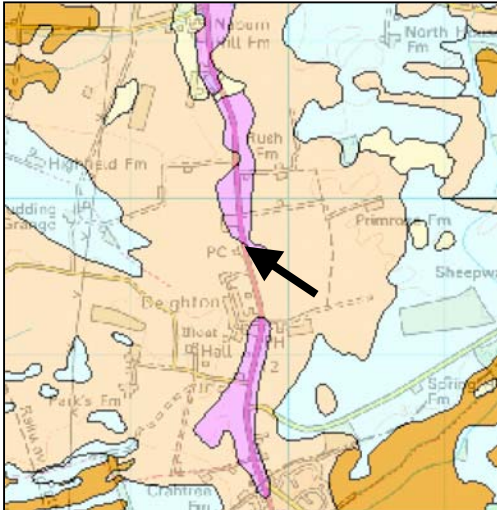
**GENERALISED CHRONOLOGY OF QUATERNARY EVENTS OBSERVED DURING FIELD TRIP**

RELATIVE AGE	EVENT	LITHOSTRATIGRAPHY	LOCATION
 <p>YOUNGEST</p> <p>OLDEST</p>	Post glacial deposition of recent river deposits	Alluvium	Bubwith (6)
	Silting up of pro glacial lake or removal of ice dam at Humber Gap and incision of fluvial drainage systems	Brighton Sand Formation	Skipwith Common (5) and Biffa Clay Pit, Stillingfleet
	Melting and northward retreat of Vale of York ice and exposure of ice contact glaciofluvial sediments	Poppleton Glaciofluvial Formation (Crockey Hill Esker Member)	Deighton (1)
	Melting and northward retreat of Vale of York ice front with continued deposition of glaciolacustrine sediments south of Escrick	Hemingbrough Formation (Thorganby Clay Member, Lawns House Farm Sand Member)	Little Skipwith (4)
	Maximum southward advance of Vale of York ice as far as Escrick	Vale of York Till Formation including Escrick and York Moraine Members	Stillingfleet (3)
	Deposition of pro-glacial, glaciolacustrine sediments ahead of southward advancing Vale of York ice	Hemingbrough Formation (Park Farm Clay Member)	Biffa Clay Pit (2)

## FIELD LOCALITIES

1. LOCATION: **CROCKEY HILL ESKER, LAY-BY, NORTH DEIGHTON**  
[462700, 444700]  
FEATURE: **GLACIOFLUVIAL, ICE CONTACT DEPOSITS (ESKER)**

*To examine the geomorphology and significance of sediments deposited by ice contact glaciofluvial processes (Poppleton Glaciofluvial Formation).*

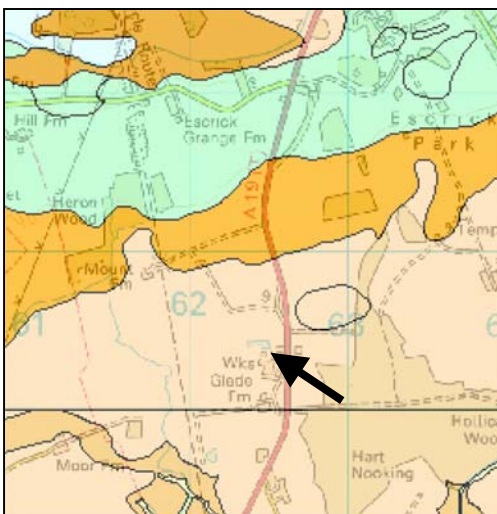


Notes:

Excerpt of 1:50,000 scale Superficial Geology showing the Crockey Hill Esker (not to scale)

2. LOCATION: **BIFFA CLAY PIT, EAST OF STILLINGFLEET (ENTER VIA WORKS FROM A19)** [462100, 440300]  
FEATURE: **GLACIOLACUSTRINE SEQUENCE AND GLACIOTECTONIC DEFORMATION**

*To examine typical laminated glaciolacustrine silt, clay and sand and possible tectonism associated with ice advance (Hemingbrough Glaciolacustrine Formation). Brief observation of contact and sediments of overlying sand (Breighton Sand Formation).*

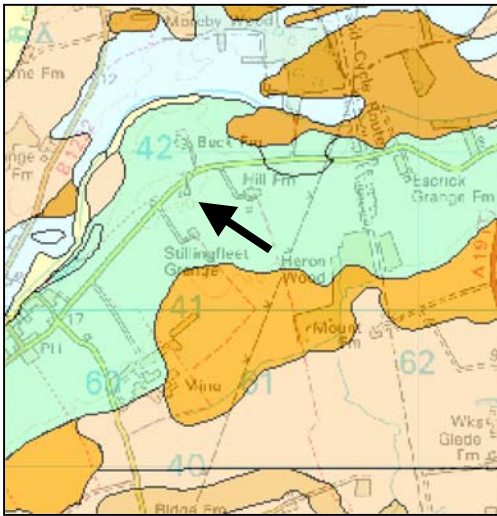


Notes:

Excerpt of 1:50,000 scale Superficial Geology showing the Crockey Hill Esker (not to scale)

3. LOCATION: **STILLINGFLEET RADIO MAST** [460500, 441800]  
 FEATURE: **MORaine (TILL) AND STILLINGFLEET MINE PIT HEAD**

*To examine geomorphology and till sediments of Escrick Moraine (Escrick Moraine Member).  
 Brief discussion of Stillingfleet Mine and associated geohazards.*

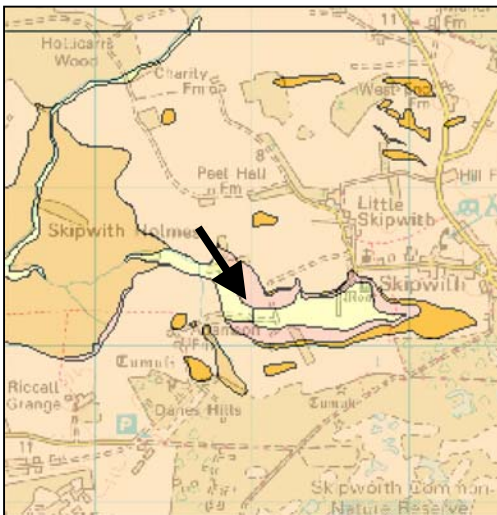


Notes:

Excerpt of 1:50,000 scale Superficial Geology showing the Stillingfleet Radio Mast area (not to scale)

4. LOCATION: **LITTLE SKIPWITH**, TRACK TO SITE LEADS WESTWARDS FROM ROAD AT END OF HOUSES IN LITTLE SKIPWITH [464800, 438800]  
 FEATURE: **GLACIOLACUSTRINE SEQUENCE AND RUNNING SAND GEOHAZARDS**

*To examine glaciolacustrine sand and silt and implications for possible geohazards (Lawns House Farm Sand Member of Hemingbrough Glaciolacustrine Formation).*



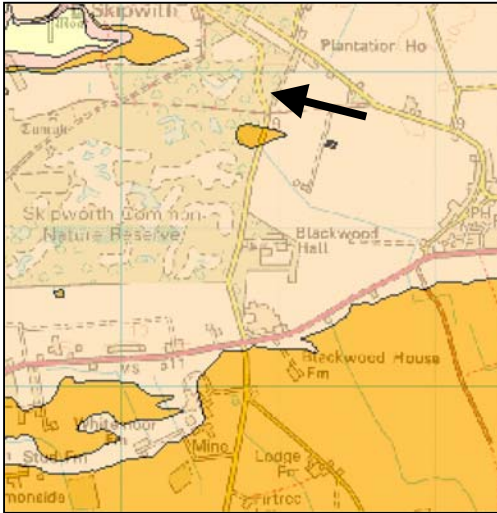
Notes:

Excerpt of 1:50,000 scale Superficial Geology showing Little Skipwith (not to scale)



5. LOCATION: **SKIPWITH COMMON** [466900, 437800]  
 FEATURE: **FLUVIO-AEOLIAN “COVER” SANDS AND PEAT EXTRACTION**

*To examine latest glacial and/or post-glacial fluvio-aeolian sand including buried peat horizons (Brighton Sand Formation) and evidence of former peat extraction.*

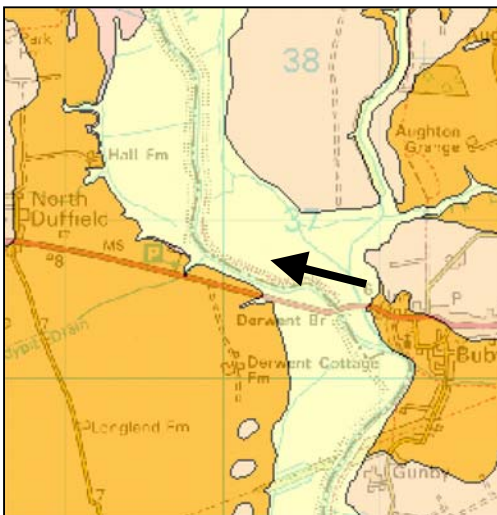


Notes:

Excerpt of 1:50,000 scale Superficial Geology showing Skipwith Common (not to scale)

6. LOCATION: **RIVER DERWENT, SMALL CAR PARK BETWEEN BUBWITH AND NORTH DUFFIELD** [469700, 443600]  
 FEATURE: **RIVER DERWENT ALLUVIUM AND FLOODING HAZARDS**

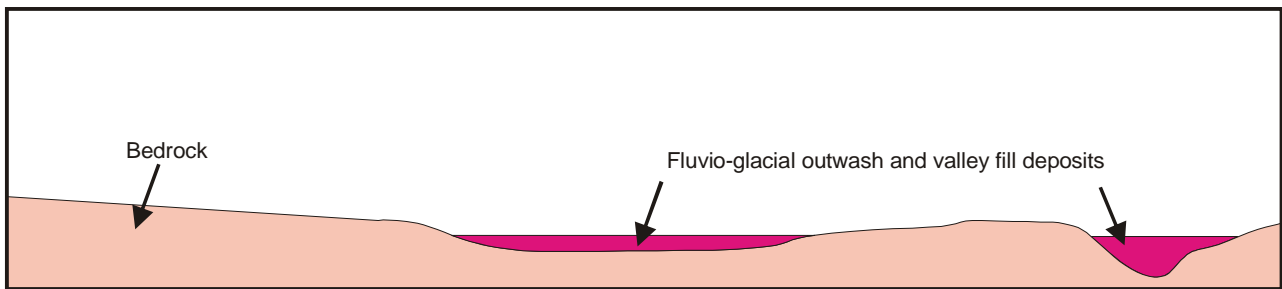
*To examine geomorphology of post-glacial alluvium and hazards associated with flooding.*



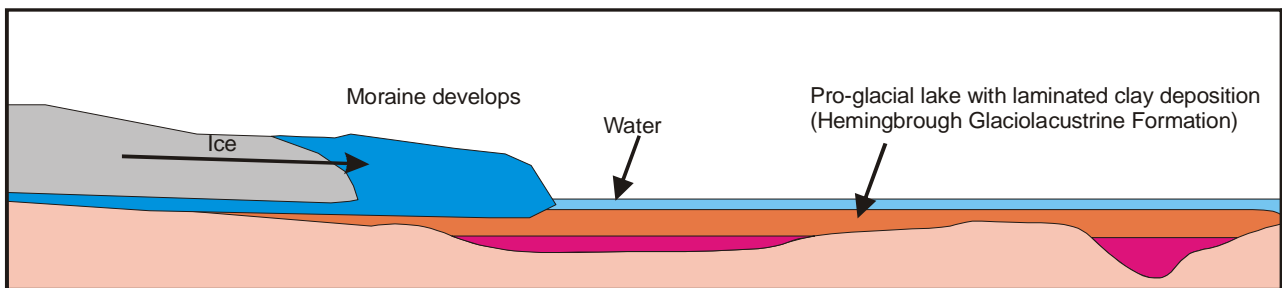
Notes:

Excerpt of 1:50,000 scale Superficial Geology showing the course of the River Derwent (not to scale)

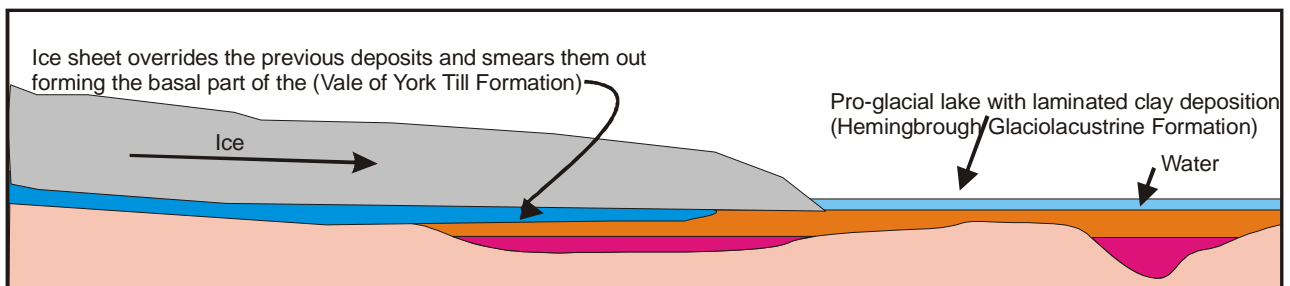
## SCHEMATIC MODEL OF THE GLACIAL EVOLUTION OF THE VALE OF YORK



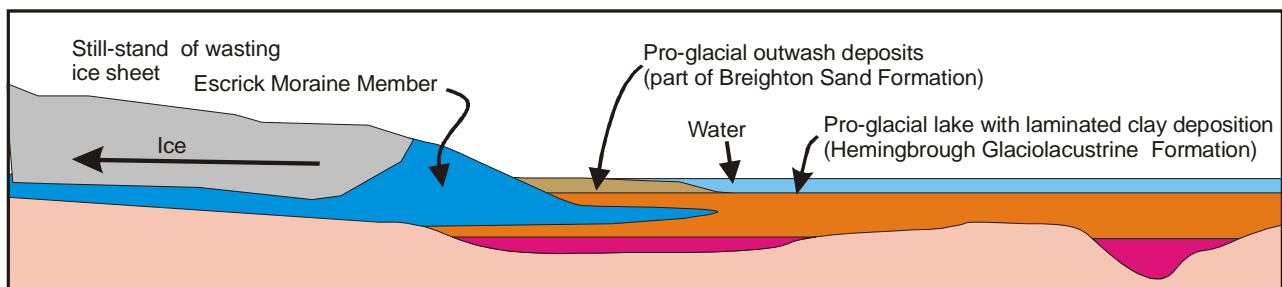
1. Pre-existing pre-Devensian topography and incision of drainage during the advance of the Devensian ice, deep weathering of the bedrock, topography partially filled in with fluvial and fluvio-glacial outwash and valley fill deposits.



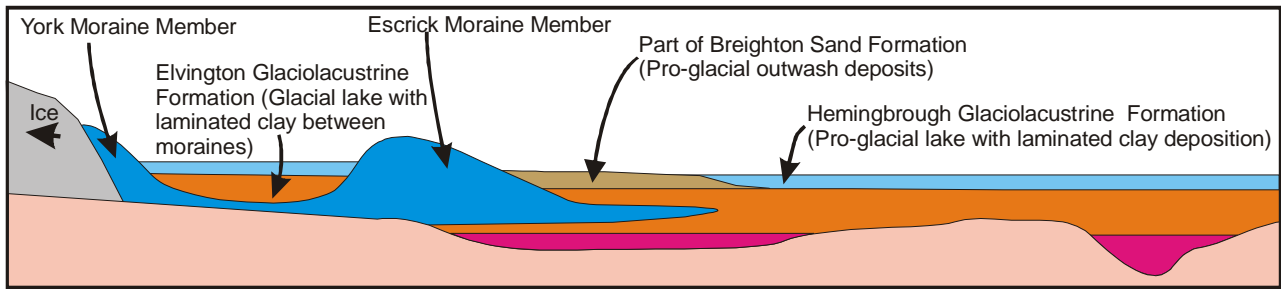
2. Ice advances over the pre-existing topography and valley fill deposits, moraine develops at still-stands with the, pro-glacial lake and laminated clay deposits of the Hemingbrough Formation in front of ice sheet.



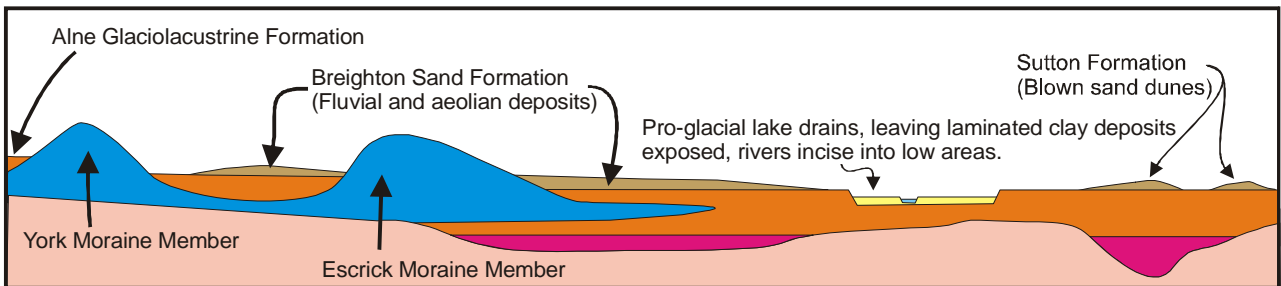
3. Ice advances over the pre-existing deposits smearing out the moraine forming part of the Vale of York Till Formation over the Hemingbrough Glaciolacustrine Formation; the ice possibly floated on the pro-glacial lake depositing dropstones from icebergs.



4. Ice retreats, and the pro-glacial lake continues in front of the developing Eskrick Moraine. At the same time, Fluvio-glacial outwash and river terraces spill into lake forming spreads of sand and some gravel.



5. Ice retreats further north and a new pro-glacial lake develops between the Escrick Moraine and the new moraine formed at York. Laminated clay lake deposits (Elvington Glaciolacustrine Formation) develop between the moraines and the Hemingbrough Glaciolacustrine Formation continues to be deposited in front of the Escrick Moraine Member.



6. Ice retreats completely and the proglacial lake drains, fluvial and aeolian sedimentation and reworking of the sediments occurs and the rivers become incised.

## **GEOLOGICAL EXPLANATION**

### **Hemingbrough Glaciolacustrine Formation**

The Hemingbrough Glaciolacustrine Formation forms a laterally and vertically persistent unit that is interpreted to underlie over 90% of the area and gradually thins towards the south. This unit comprises a thick sequence, commonly up to 20m thick of thinly to thickly laminated, stiff clay and silt with occasional to common sand beds. The elevation of the top of the unit is between 6 and 8mOD.

The lower consistent thick silt and clay unit is called the *Park Farm Member*.

The sand beds in the upper part of the sequence are commonly completely saturated and tend to form “running sand” horizons. These silty sands have been named *Lawn House Farm Member* and occur in the study area as a consistent bed.

Overlying the Lawn House Farm Member is a younger clay unit comprising of laminated clay and silt called the *Thorganby Clay Member*. This upper clay laps onto the moraine from the south where as the lower lake sequence continues under the moraine to the north.

Between Escrick and Newton-upon-Derwent, in the York area, where the sequence is in contact with till, cobbles and boulders are commonly preserved in the sequence.

The clay and silt beds were most likely deposited in a low energy, pro-glacial lake environment that developed ahead of the southward advancing Vale of York ice. The Lawn House Farm Sands are possibly the outwash formed when the ice was approaching its final position at Escrick and therefore increasing the coarseness of the deposit.



Typical laminated clay and silt glacial lake deposits of the Hemmingbrough Formation. In the Crockey Hill borehole (SE64NW293, [463621, 445504]) these underlie the till of the Vale of York Formation.



Thorganby Clay overlying the sands of the Lawn House Farm Member (both of the Hemmingbrough Formation)– note watertable in the sands. Ponds near Rossmore Lodge [473000, 444400]

## **Vale of York Till Formation**

The Vale of York Till Formation is present as a basal till to the north of the Escrick moraine and as “morainic” or melt out till on the moraine itself. It is inferred from borehole and other evidence that the Vale of York till does not extend further south than Escrick.

The Vale of York Till Formation is deposited directly by ice and consequently displays a range of grain sizes and variation in lithology, ranging from sandy, gravelly clay with common cobbles and boulders to slightly clayey sand and gravel. Carboniferous limestone and sandstone dominate the clast content.

This unit commonly overlies silt and clay of the Hemingbrough Glaciolacustrine Formation or directly overlies bedrock. Exposure of the contact between morainic deposits and the underlying lake sediments in the Newton Clay pit have shown clear evidence of thrusting and glaciotectonics which suggests that the ice has overridden this deposit.



Till core from the Vale of York Formation from the Crockey Hill borehole [463621, 445504]

## **Poppleton Glaciofluvial Formation (including the Crockey Hill Esker Member)**

The Poppleton Glaciofluvial Formation is present in the York City area and to the north west of this location. It commonly overlies sandy, gravelly clay of the Vale of York Till Formation or directly overlies bedrock.

The material comprises bedded sand and gravel, gravelly sand or sandy gravel with rare clay horizons.

The sand and gravel was probably deposited by fluvial systems under, within and on top of the southward advancing ice. During northward melting and retreat of the ice, the material previously trapped within the ice would have been subsequently exposed to form the observed linear tracts of sand and gravel (eskers).



Newton Upon Derwent Clay pit [472700, 450300] showing glaciotectonics, the features in the face sloping gently to the left are thrust surfaces pushed through the glaciolacustrine lake clays in front of the Escrick Moraine.

### **Brighton Sand Formation**

The Brighton Sand Formation forms a blanket of sediment cover that variably overlies the Vale of York Till Formation, Hemingbrough Glaciolacustrine Formation, Elvington Glaciolacustrine Formation and the Alne Glaciolacustrine Formation. In places the Brighton Sand Formation has been removed by subsequent erosive processes to leave older sediments exposed.

The Brighton Sand Formation is dominated by silty coarse to fine sand that commonly has a coarse base and fines upwards. Low angle or parallel cross bedding has been observed. Thin clay beds or laminae and peaty horizons are also common.



The Skipwith sands exposed north of Skipwith [465150, 439400]

The Brighton Sand Formation may have formed by a complex interaction of two main processes. Much of the sand may have initially been deposited by an event at the end of the Vale of York glacial period by southward flowing fluvial systems that also may have initiated the main river drainage systems seen today. The sediments were probably subsequently modified and redistributed by Aeolian (wind blown) processes.

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## **CONTACT DETAILS**

Further Information and Contact Details:

British Geological Survey  
Kingsley Dunham Centre  
Nicker Hill  
Keyworth  
Nottingham  
NG12 5GG

TEL: 0115 936 3100  
FAX: 0115 936 3200  
WEBSITE: [www.bgs.ac.uk](http://www.bgs.ac.uk)

## **EMAIL**

JON FORD  
HOLGER KESSLER  
SIMON PRICE  
MIKE HALL  
Dr ANTHONY H COOPER  
(*DISTRICT GEOLOGIST YORKSHIRE & HUMBERSIDE*)

[jford@bgs.ac.uk](mailto:jford@bgs.ac.uk)  
[hke@bgs.ac.uk](mailto:hke@bgs.ac.uk)  
[sprice@bgs.ac.uk](mailto:sprice@bgs.ac.uk)  
[mhall@bgs.ac.uk](mailto:mhall@bgs.ac.uk)  
[ahc@bgs.ac.uk](mailto:ahc@bgs.ac.uk)