1.
The geological setting of the coastal fringes of west Sussex, Hampshire and the Isle of Wight

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Introduction

This guide covers a significant part of southern Hampshire, a part of West Sussex and the Isle of Wight. The region is founded on Cretaceous and Palaeogene bedrock, the younger forming the final phase of sedimentation of the Hampshire Basin. The bedrock is covered by a thick and extensive succession of Quaternary superficial deposits subdivided into a number of units that represent a long Quaternary history as the landscape was denuded through numerous periglacial/temperate climatic cycles.

Although the inter-relationships and individual depositional histories of Quaternary sites are described in more detail elsewhere in this guide, the regional distribution of superficial deposits can be summarised as follows: early Quaternary residual deposits cap many of the hills and upper valley flanks on the Chalk Downs. An extensive spread of fluvial granular deposits of the proto-Solent River and its tributaries are developed through a large part of the Pleistocene and these pass laterally and vertically to associated marine and near-shore deposits in response to sea-level fluctuations. Finally, as sea-level rises, Holocene deposits, both fluviatile and marine were laid down as drowned valley fill, present day floodplains and as beach and near-shore deposits within the Solent and English Channel.

The bedrock, its structural evolution and the resulting topography profoundly affect the distribution of the Quaternary superficial cover and provide much of the material from which those deposits are formed. This brief geological history of the district will enable a better understanding of the landscape framework within which the Quaternary successions were deposited (relevant map publications for the region and related authored titles by members of the BGS are given as Appendices 1 and 2).

GEOLOGY

Structure and resulting topography

Structurally, the district falls within the Wessex Basin (Figure 1.1 inset) that extended over most of southern England, south of the London Platform and Mendip Hills. This Permian-Triassic to Cretaceous sedimentary basin is underlain at great depth by Palaeozoic strata which were strongly deformed during the Variscan Orogeny, a period of tectonic compression and mountain building culminating at the end of the Carboniferous (299 Ma — million years ago). The rocks of the 'Variscan Basement' are cut by several major, shallow southwards-dipping thrust zones and north-west-oriented wrench faults that have been identified principally from seismic reflection data. These Variscan basement thrust zones were reactivated at various times up to the Early Cretaceous as the Wessex Basin extended and was infilled with marine sediments. This crustal extension was accommodated on faults developed above these basement structures as a series of generally southward-throwing normal faults creating half-graben-like structures. The largest of these faults divide the basin into a series of sub-basins and beneath this district the Weald and Channel sub-basins are separated by the Hampshire–Dieppe High (also known as the Cranborne–Fordingbridge High) (Figure 1.1 inset). The boundary between these two sub-basins lies along the Portsdown–Middleton faults, which underlie the northern margin of the Portsdown and Littlehampton anticlines. Slightly different marine sedimentary successions were developed within these sub-basins up to the Early Cretaceous (145-99 Ma) whilst the intervening exposed highs suffered severe erosion (see for example Chadwick, 1986; Penn et al., 1987).

A further period of regional subsidence and relative sea-level rise (the Late Cretaceous [99-65 Ma] saw the highest relative sea level in Earth's history) resulted in coastal onlap and deposition of the Lower Greensand, Gault and Upper Greensand, and subsequently the Chalk Group. The Tethys Ocean eventually covered all the surrounding high areas, including the London Platform. Global sea-level fall at the end of the Cretaceous resulted in erosion of parts of the Upper Chalk and the development of a pre-Cenozoic unconformity. This was effectively the end of the Wessex Basin as a major structural unit however its influence on sedimentation and tectonics persisted through to the present day.

Deposition in Paleocene to Oligocene times, within a geographically more limited subsiding Palaeogene (59-23 Ma) or 'Tertiary' Basin, was followed by the onset of the compressive tectonic regime during the mid-Miocene (Alpine Orogeny) earth movements. This huge compressive event effectively reversed the sense of movement on the major bounding faults of the older Wessex Basin (Weald and Channel sub-basins) resulting in the inversion of these earlier basins and highs.

Compression effectively separated the London and Hampshire Palaeogene basins and created the reverse-faulted monoclinal structures best exemplified by the Hog's Back in Surrey and the Isle of Wight Monocline. A series of roughly east – west-trending strongly asymetric anticlines and synclines, formed at the

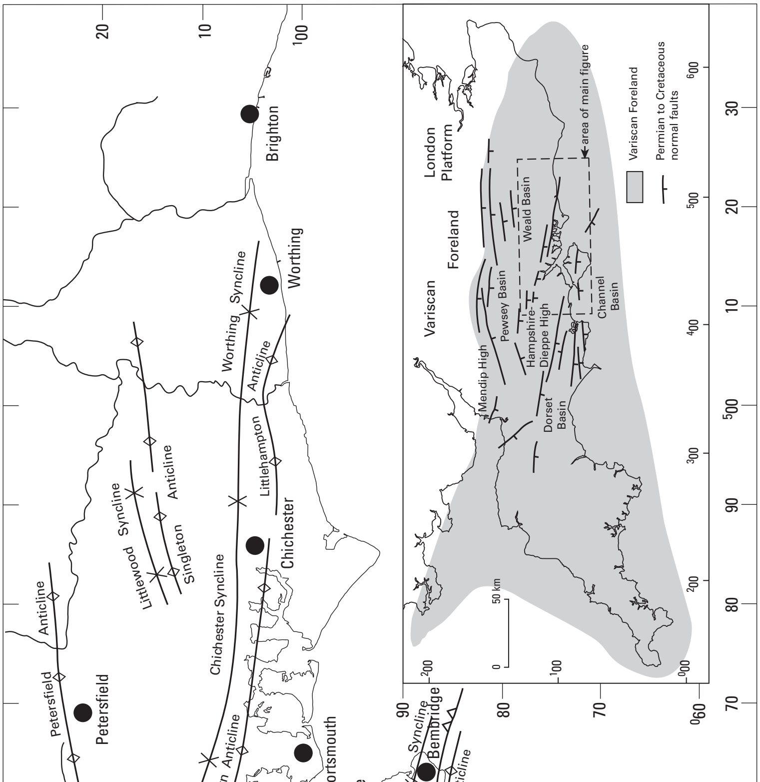

Figure 1.1 The structure of the Wessex and Hampshire basins.

same time, are the often less striking result of this compressive event. Maximum uplift is estimated at about 1500m (Simpson et al., 1989). This event, and the subsequent denudation and 'un-roofing' of the resultant structures, provide the 'grain' of the landscape that has subsequently guided the depositional events in this part of southern England (Figure 1.1).

The district covered by this field guide encompasses parts of five principal topographical entities, namely: the South Downs and Hampshire Plain; the south-western part of the Weald; the Hampshire Basin; the Solent and Sussex Coastal Plain; and the Isle of Wight (Figure 1.2).

In the northwest of the district the 'primary' northward-facing Chalk escarpment of the South Downs, whose maximum slope break occurs in the relatively hard Lewes Nodular Chalk Formation, represents the southern flank of the denuded Wealden Anticline. The view northward from the escarpment shows a series of arcuate ridges and vales representing the outcrop of Lower Cretaceous strata, a pattern that is modified by extensional normal faulting principally of mid-Cretaceous age.

Within the South Downs a further 'secondary' escarpment founded on the Newhaven Chalk Formation is represented by a laterally extensive series of 'flat-iron-like' upstanding bluffs. The maximum break of slope at the top of this secondary scarp effectively controls the distribution of the clay-with-flints deposits as it approximates crudely to the base-Palaeogene unconformity. The 'primary' and 'secondary' escarpments diverge south of Petersfield and around the Meons, with the primary scarp turning northward to form the closure of the western Weald, whilst the secondary escarpment carries westward towards Winchester and onwards towards the River Test, north of Romsey. This dissected secondary scarp reappears further west, south of Salisbury. Elements of this secondary scarp can also be identified further to the north where outliers of the higher Chalk strata are preserved. The area west of Petersfield, to the south of the Andover region and on towards Salisbury is often referred to as the Hampshire Plain in a structural sense. Salisbury Plain, which lies, further northward and westward within Wiltshire is its natural extension.

This Hampshire Plain is dissected by the major southward flowing chalk streams of the Itchen, Test and Avon, whilst to the east, shorter-course rivers such as the Meon, Ems, and Lavant drain the chalk downlands of southeast Hampshire and the far west of West Sussex. Further east the major rivers of the Arun and Adur, whose headwaters are in the Weald, cut deeply through the South Downs of West Sussex. Whether these deep gaps are the result of an inherited drainage

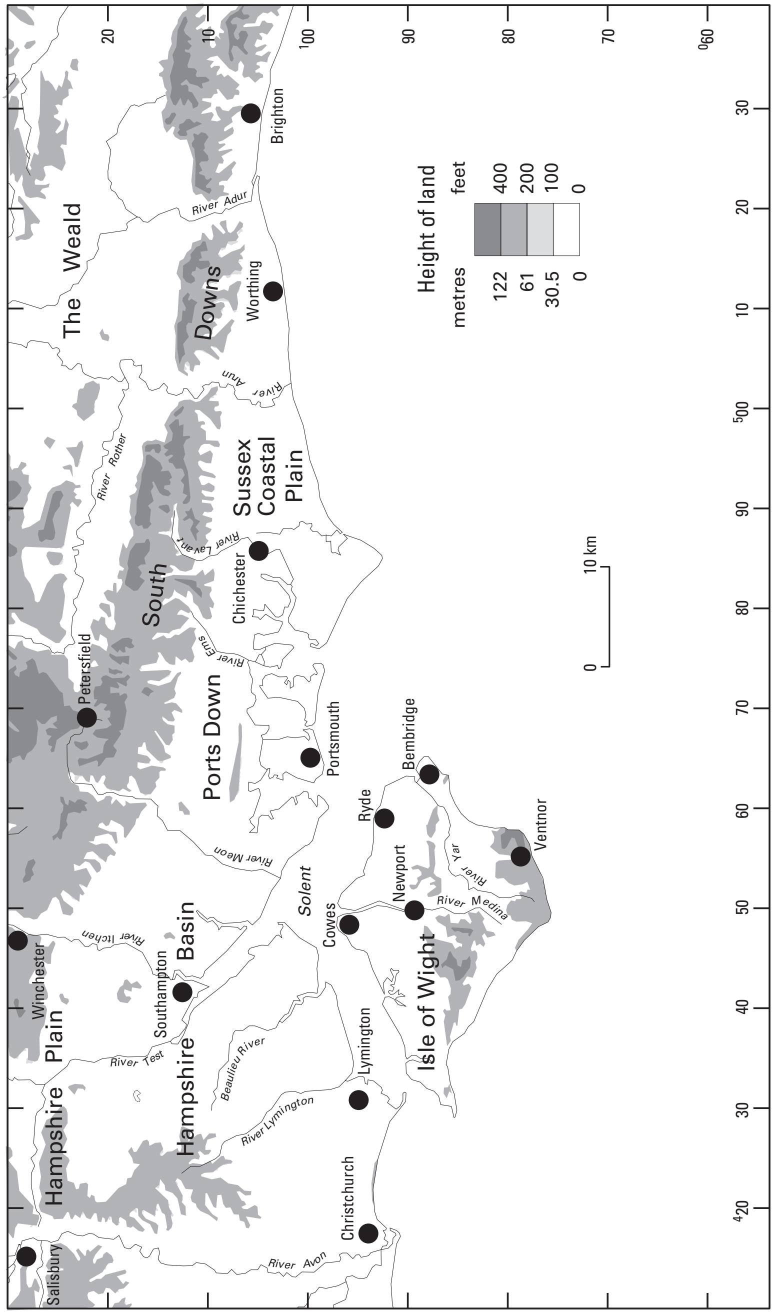

Figure 1.2 The topography of the district covered in this field guide.

from a former Palaeogene cover or as the result of short-course dip-slope chalk rivers (left bank tributaries of a Solent River) backcutting through the scarp and eventually capturing headwaters of a 'Wealden River', or a mixture of both these and neotectonics, is a matter of debate. Perhaps some light will be shed on this conundrum during this field meeting.

A further, topographically less imposing and more dissected, escarpment to the south of the chalk plain (the 'Tertiary' scarp) marks the edge of the Palaeogene strata and the Hampshire Basin proper. This escarpment is clear between Salisbury and towards the asymmetric anticline represented by Ports Down, but fades eastward on the northern flank of the Bere Forest and Chichester synclines where the Palaeogene strata are overlain by the Quaternary deposits of the Sussex Coastal Plain.

The 'Tertiary' scarp defines the eroded extent of the Palaeogene on the northern margin of Hampshire Basin. The southern boundary of which is the northern margin of the steeply-dipping chalk ridge formed by the Isle of Wight monocline (and its, now breached, extension westward from the Needles to Ballard Down north of Swanage in Dorset). In general the bedrock dips gently southward towards the synclinal axis that runs close to the monoclinal fold thereby creating a shallow topographical basin with a steep southern lip. Within the bedrock, to the west of this basin, minor synclines and anticlines and the change to a predominantly sandy Palaeogene succession, compounded by an extensive Quaternary cover, tend to produce a muted topography of shallow scarps and valleys. This muted topography is further disguised by the urban areas of Southampton, Portsmouth and their satellites. In the east, the topographically impressive Chalk inlier of the Ports Down asymmetric fold separates the main Palaeogene basin, with its thick succession, from the Bere Forest and Chichester synclines that preserve the youngest Lambeth and Thames group part of that succession.

The Sussex Coastal Plain with its extensive, but generally thin, Quaternary cover is defined to the north, by the Ports Down inlier and further east by a degraded cliff-line that runs north of Chichester towards Arundel and on eastward, as a separate element, towards Portslade west of Brighton. This broad, generally flat and low-lying plain, carries representatives of at least four distinct raised beach (see Quaternary overview) deposits and contains the famous Boxgrove Man (of 'Cromerian Complex' age) site within the highest raised beach successions. West of Ports Down this coastal plain loses its identity as it merges into the Solent coastal fringe with its cover of Solent River terrace deposits (e.g. Shephard-Thorn et al., 1982; Wyatt et al., 1984). Beneath the Solent, representatives of Pleistocene deposits are preserved within channels that were eroded to lower base-levels at times of glacial maxima. Bathymetry and isopachs show a distinct palaeovalley with up to 30 metres of infill trending along the eastern Solent. Offshore of Bembridge this valley turns sharply south and south-south west to join the so called 'Northern Palaeovalley' that follows a medial NNE – WSW route along the floor of the English Channel.

The Isle of Wight owes its distinctive diamond shape to the spinal east – west-trending steeply-dipping Chalk ridge. This is not a simple topographical structure but is interpreted as two *en-echelon* monoclinal folds (probably with a reverse faulting component on each of their northern limbs). These two Miocene-age compressional structures (including the Brighstone and Sandown anticlines) are offset from each other by a broad structural ramp area, central to the island, comprising shallow-dipping chalk. The prominence of this ridge owes much to the intense tectonic hardening of the Chalk. The westward continuation of this feature connected the island to the mainland between the Needles and Ballard Down in Dorset, effectively formed the southern margin of the developing Solent River, until it was breached during the Pleistocene. North of this major structure Palaeogene strata form a gently sloping topography to the present-day low cliffs on the margin of the Solent. This slope carries patchy fluviatile and marine deposits on the southern flank of the Solent River. To the south, a dissected topography founded on the Lower Cretaceous carries a thin Pleistocene 'terrace' cover with significant Holocene deposits associated with the present-day eastern and western Yar and the Medina River. All three rivers flow in gaps through the Chalk ridge, probably following north – south orientated faults within the bedrock.

Bedrock Geology

The bedrock geology and structure have a strong influence on the distribution and lithological character of the Quaternary deposits in this area. The sedimentary clasts incorporated into the Quaternary deposits are derived from within the Wessex Basin and principally from the Cretaceous and Palaeogene strata. Figure 1.3 and Table 1.1 and 1.1a give a guide to the principal lithological units present in the district and their age.

Representatives of the Lower Cretaceous strata are found south of the Isle of Wight Monocline (Brighstone and Sandown anticlines) on the Isle of Wight and within the Weald, to the northeast of the South Downs. They comprise the Wealden Group, Lower Greensand Group and Selborne Group.

The Chalk Group, represented by up to nine formations, forms the generally southward-dipping northern margin of the area (the Hampshire Plain or Downs

Table 1.1 The Principal units within the bedrock encountered in the district.

<table>
<tr><th>Series</th><th>Group</th><th colspan="2">Formation</th><th>Principal rock types</th></tr>
<tr><td colspan="2" rowspan="2"></td><th colspan="2">Hampshire Basin</th><td rowspan="2"></td></tr>
<tr><th>Western Basin</th><th>Eastern Basin</th></tr>
<tr><td>Oligocene</td><td rowspan="3">Solent</td><td colspan="2">Bouldnor</td><td>Marl, multicoloured mud</td></tr>
<tr><td rowspan="3">Late Eocene</td><td colspan="2">Bembridge Limestone</td><td>Limestone and marl</td></tr>
<tr><td colspan="2">Headon Hill</td><td>Mud, sand, marl and limestone</td></tr>
<tr><td rowspan="2">Barton</td><td colspan="2">Becton Sand</td><td>Fine sand</td></tr>
<tr><td rowspan="6">Mid Eocene</td><td colspan="2">Barton Clay</td><td>Muds and laminated muds</td></tr>
<tr><td rowspan="5">Bracklesham</td><td>Boscombe Sands</td><td rowspan="2">Selsey Sand</td><td>Fine sand[1]</td></tr>
<tr><td>Branscombe</td><td>Sand & mud[1], glauconitic sand</td></tr>
<tr><td rowspan="3">Poole</td><td>Marsh Farm</td><td>Sand, mud and lignite</td></tr>
<tr><td>Earnley</td><td>Sand & clay[1], glauconitic sand</td></tr>
<tr><td>Wittering</td><td>Sand[1], glauconitic sand & mud</td></tr>
<tr><td>Early Eocene</td><td>Thames</td><td colspan="2">London Clay</td><td>Cyclic silty clay to fine sand with rounded flint pebble beds</td></tr>
<tr><td>Paleocene</td><td>Lambeth</td><td>Reading</td><td>Reading (inc. Woolwich and Upnor)</td><td>Stiff multicoloured clay, sand and basal flint pebble bed</td></tr>
</table>

Table 1.1 (continued).

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<table>
<tr><th></th><th></th><th>Channel Basin</th><th>Weald Basin</th><th></th></tr>
<tr><td rowspan="9">Late Cretaceous</td><td rowspan="7">Chalk
White Chalk Subgroup</td><td colspan="2">Portsdown Chalk</td><td>Soft chalk, large flints[2]</td></tr>
<tr><td colspan="2">Culver Chalk</td><td>Soft chalk, large flints[2]</td></tr>
<tr><td colspan="2">Newhaven Chalk</td><td>Soft chalk, few flints, marl beds[2]</td></tr>
<tr><td colspan="2">Seaford Chalk</td><td>Firm chalk, flints[2]</td></tr>
<tr><td colspan="2">Lewes Nodular Chalk</td><td>Very hard nodular chalk, flints[2]</td></tr>
<tr><td colspan="2">New Pit Chalk</td><td>Firm blocky chalk[2]</td></tr>
<tr><td colspan="2">Holywell Nodular Chalk</td><td>Intensely hard and shelly chalk[2]</td></tr>
<tr><td rowspan="2">Chalk
Grey Chalk Subgroup</td><td colspan="2">Zig Zag Chalk</td><td>Marly chalk, gritty chalk and limestones[2]</td></tr>
<tr><td colspan="2">West Melbury Marly Chalk</td><td>Marly chalk and limestones[2]</td></tr>
<tr><td rowspan="11">Early Cretaceous</td><td rowspan="2">Selborne</td><td colspan="2">Upper Greensand</td><td>Sandstone, siltstone and chert</td></tr>
<tr><td>Gault</td><td rowspan="2">Gault</td><td rowspan="2">Ironstone and gritty sandstone[3], mudstone, calcareous concretions</td></tr>
<tr><td rowspan="5">Lower Greensand</td><td>Carstone</td></tr>
<tr><td>Sandrock</td><td>Folkestone</td><td>Sand and sandstone</td></tr>
<tr><td rowspan="2">Ferruginous Sand</td><td>Sandgate</td><td>Mudstone</td></tr>
<tr><td>Hythe</td><td>Sand and mudstone[3], calcareous sandstone</td></tr>
<tr><td colspan="2">Atherfield Clay</td><td>Mudstone, calcareous concretions</td></tr>
<tr><td rowspan="4">Wealden</td><td>Vectis</td><td>Weald Clay</td><td>Shale with sandstone[3], mudstone with thin limestone and sandstone beds</td></tr>
<tr><td rowspan="3">Wessex</td><td>Tunbridge Wells Sand</td><td>Sandstone, Siltstone with thin quartz pebble beds</td></tr>
<tr><td>Wadhurst Clay</td><td>Mudstone</td></tr>
<tr><td>Ashdown</td><td>Shale and sandstone[3], mudstone, sandstone</td></tr>
</table>

Notes for Table 1.1

1. Description of units within the western part of the Hampshire Basin.
2. All of the Chalk formations are tectonically hardened within the Isle of Wight Monocline and can form significant durable clasts locally within the Quaternary deposits.
3. Description of units within the Channel Sub-basin.

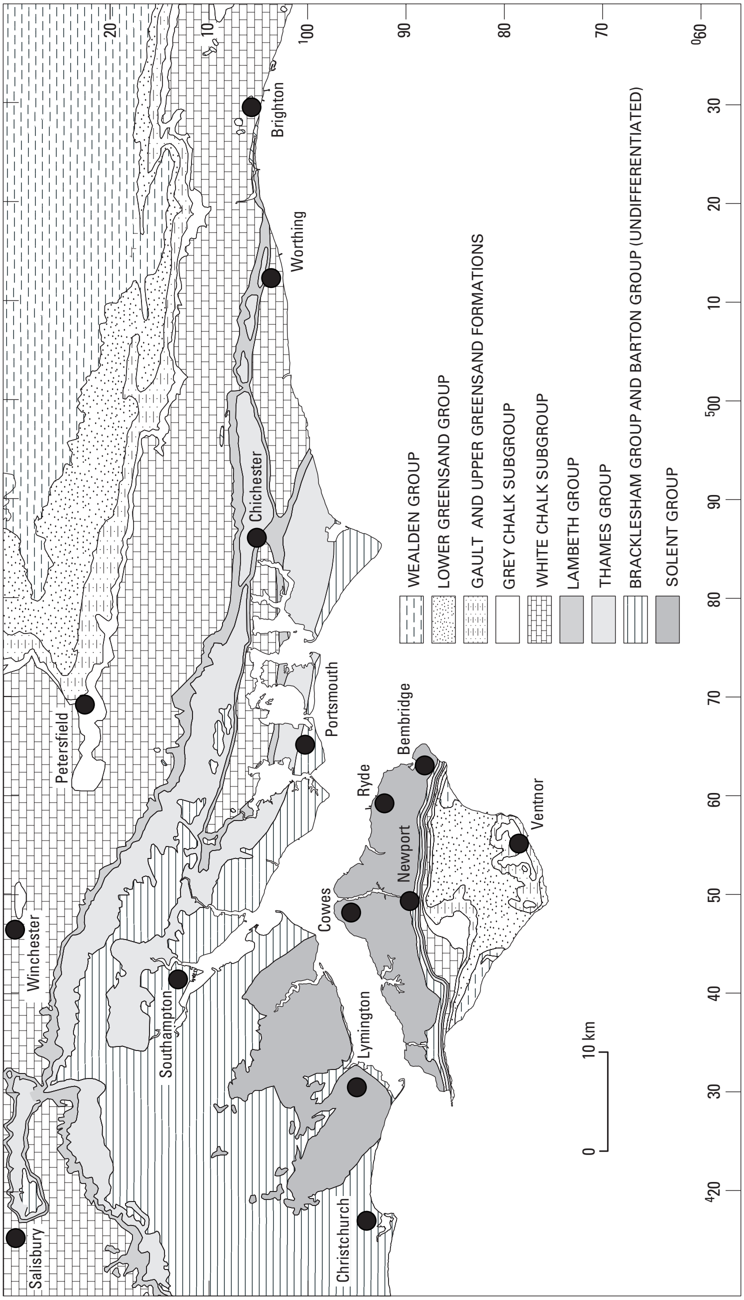

Figure 1.3 The bedrock geology of the district described in the field guide.

Table 1.1a. Current Series ages

System/Period/Subperiod	Series/Epoch	Age (Ma) of base
Quaternary	Anthropocene	0.0017
	Holocene	0.012
	Pleistocene (inc. Gelasian Stage)	2.58
Neogene	Pliocene	5.3
	Miocene	23.0
Palaeogene	Oligocene	33.9
	Eocene	55.8
	Paleocene	65.5
Cretaceous	Late	99.6
	Early	145.5

and the western extension of the South Downs). The Dean Hill – Winchester Anticline and Portsdown Anticline (and to a lesser extent the more heavily denuded Littlehampton Anticline) on the mainland, together with the Sandown and Brighstone structures on the Isle of Wight form very prominent ridges that for the most part confine the course of the proto-Solent and the extent of the Sussex/Hampshire Coastal Plain.

The greater part of the district is founded on Palaeogene strata that comprise five groups divided into numerous formations and members (Table 1.1). The strata are present within the major asymmetric Hampshire Basin Syncline that trends WNW – ESE across this district. In the west of the district the outcrop is delimited, to the south, by the Purbeck/Isle of Wight structure, and to the north, by the dipslope of the Chalk. To the east the outcrop bifurcates around the Ports Down and Littlehampton anticlines with only the older part of the Palaeogene succession preserved in the asymmetric Chichester and Bere Forest synclines to the north.

The Palaeogene strata of this district show an upward transition from an early terrestrial record, through a marine transgression, into nearshore, paludal environments and finally back to terrestrial deposition. They also pass laterally from more marine lithofacies in the east (around Selsey) to nearshore lithofacies in the west (Lymington and beyond) for a significant part of the middle Eocene.

These Palaeogene strata represent a significant part of the record of the Paleocene/Eocene Thermal Maxima and the decline into temperate (the Terminal Eocene Cooling Event), and eventually (although the Neogene record is substantially missing from southern Britain) glacial/interglacial cycles that characterise the Quaternary.

Quaternary

The Quaternary lithostratigraphy and depositional history are described in expanded overviews and the detailed descriptions later in this field guide. However, a short review of the superficial geology as depicted on current BGS geological maps will help to set the scene for this volume.

Because of the regional geomorphology setting south of the Quaternary glacial ice-sheet maxima, the majority of the Quaternary successions in the region comprise materials derived from within the confines of the Wessex Basin and principally, within that basin, from the Cretaceous and Palaeogene strata. There is little extra-basinal material introduced into the system other than within the marine or oldest fluviatile deposits. The simplified lithostratigraphy and distribution of the Quaternary deposits is shown in Figure 1.4.

About 25 Myr is estimated to have elapsed between the deposition of the youngest preserved Palaeogene and the oldest Quaternary deposits in this district. During the Quaternary, a further break in deposition occurred after the accumulation of the clay-with-flints and before the deposition of the younger Pleistocene superficial deposits. During the Pleistocene, sea level rose and fell in response to astronomical cycles, which influenced climate and the amount of water locked up in land-based ice caps. A number of glacial maxima affected southern England and at these times a periglacial environment was established in this area with much subaerial erosion by solifluction and by the action of an extensive river system eroding to much lower base levels.

During the intervening warm stages, marine transgressions resulting in the drowning of the lower courses of the incised river systems, principally the Solent River and its tributaries, and the breaching of the Straits of Dover and the Needles – Ballard Down chalk ridge (in so doing effectively 'capturing' the headwaters of the Solent River system). Beach and near-shore sediments were deposited along the margin of the English Channel. At least two degraded cliff lines related to those marine transgressions are preserved on the Sussex coastal plain. The southern flank of Ports Down forms the westward extension of those cliffs. The Quaternary deposits are described in groups in relation to their mode of origin. Within each group the deposits are given in ascending stratigraphical order where that is possible.

On the maps of the British Geological Survey superficial deposits are depicted in relation to a perceived process of deposition and relative age lithostratigraphy where this can be determined. This is an ongoing process with the currently available maps for Lymington and the Isle of Wight (both somewhat dated in

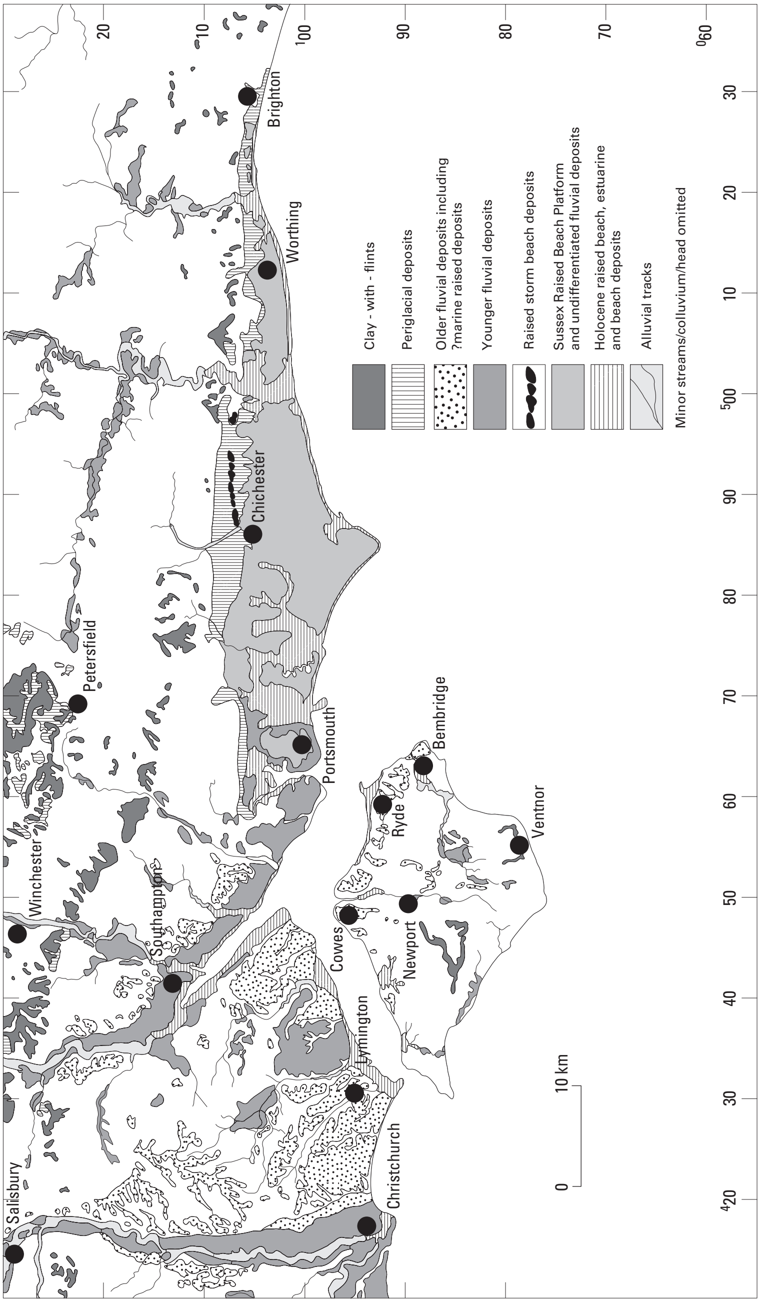

Figure 1.4 Simplified lithostratigraphy and distribution of the Quaternary deposits of the district covered in this field guide.

their interpretations) being under review currently. Thus, mapped divisions are related to five principal categories; namely Residual, Periglacial, Fluviatile, Marine and Aeolian. A sixth, related to man-made deposits (and voids), can with some justification be regarded as being confined within the Anthropocene. Inevitably this approach can lead to conflict particularly in depositional systems as dynamic and long-lived as the Solent River and its associated lateral marine equivalents, where process, climate and sea-level have such powerful influences on the type and distribution of deposits. The detailed pictures derived from intensive Quaternary studies, as exemplified by the many contributions to this guide, can nonetheless be encompassed in the more regional appraisal capable of being depicted on maps.

Short summaries of the deposits, as depicted on BGS maps for the region, are given below, but each is more comprehensively described and their significance determined in the overviews and individual locality contributions.

Clay-with-flints

The clay-with-flints is the principal residual deposit of the district. It is primarily a *remanié* deposit created by the modification of the original Palaeogene cover and dissolution of the underlying chalk. The clay-with-flints caps the high ground underlain principally by the higher formations of the Upper Chalk. The thickness of the clay-with-flints is estimated at about 5 to 6 m at its general maximum, but locally at sites where dissolution of the underlying chalk is most pronounced, this may reach to over 10 m thick. The basal surface of the deposit is generally represented by the sub-Palaeogene unconformity, but the deposit may be carried some distance below the generally planar surface in solution pipes. Some areas of clay-with-flints, apparently in situ, are mapped well below this projected sub-Palaeogene surface. Their preservation at this lower topographical level is open to debate but may be the result of neotectonics or perhaps wholesale mass movement.

There is preliminary evidence of at least three phases of development in this enigmatic deposit from a study around Soberton north of Portsmouth (Hopson, 1995) and it may well record events from the post-Miocene uplift of the area and degradation of the Palaeogene cover through to later solifluction events associated with periglacial cycles.

The margin of the clay-with-flints is sharply defined on the scarp edge but the boundary becomes diffuse on the Chalk dip slope. In places, this down-slope feather edge is obscured by a lateral passage into a solifluction deposit or head that itself may have a long developmental history.

Head

There is a wide variety of head deposits depicted on British Geological Survey maps. Their mode of formation is also variable although it is presumed that a major part in their deposition is as the result of solifluction, gravitational creep and colluvial reworking, but they may contain fluviatile and aeolian derived units. There is a continuum of process preserved in these deposits despite their often patchy occurrence. Older units, generally on steeper valley slopes, are probably directly derived from the clay-with-flints with lower slope and valley deposits progressively showing indications of periodic gravitational and fluviatile reworking. Indeed, it is presumed that the continuum of process culminates in truly fluviatile deposition where the materials become differentiated and have distinct geomorphological terrace associations. Thus the landscape can be divided into 'immature' areas where the process has not proceeded far down this course, through to 'mature' landscapes where periglacial and fluviatile materials are completely differentiated. For the most part this continuum of process is best seen in areas underlain by the Chalk Group as here the lack of surface water, during temperate phases at least, has aided the preservation of much of the deposits. It could be that any differentiation seen within these deposits may well record catastrophic single climatic events such as, by analogy, the Boscastle event in our recent history.

The broad sheet-like deposits are composed of locally derived materials. In some exposures the matrix contains chalk, particularly in accumulations formerly called 'dry valley' or 'coombe' deposits on older BGS maps, but elsewhere chalk is not present and may have been lost by decalcification.

Fluviatile deposits

Extensive tracts of fluviatile sandy gravels, generally about 6 m thick, are present in the area which borders the Solent. Smaller areas inland are associated with the major southward-draining rivers in the district. In general, the deposits comprise gravels and sandy gravels, but the higher terraces are clayey. In the Weald area the deposits are more sandy and many are graded as pebbly sands. In places, clayey and sandy silt and silty clay mask the underlying aggregate, perhaps indicating preservation of overbank or aeolian deposits at the top of each fluvial cycle.

For the most part the terrace aggradations and subsequent incisions are related to the 'Solent River' which developed in response to falling sea levels throughout the Pleistocene. Up to fourteen terrace aggradations are depicted on BGS maps. Although there is still considerable debate on the precise number and age of these terrace deposits.

Many of the high-level gravel aggradations in this district were formerly called the Plateau Gravel. For the most part these have been reclassified as terraces on recent maps of the Solent River, but the currently available Lymington and Isle of Wight maps still show the old designation. In the case of the IoW these deposits are probable remnants of the right bank Solent River terraces, or may also be deposits of right-bank northward-flowing tributaries of that river.

'Brickearth'

Over the Sussex Coastal Plain a deposit formerly described as 'brickearth' has an extensive outcrop. Its overall grain size and sorting suggest that these deposits are similar to continental loess. However, the presence of flint and other pebbles throughout the material suggest that wholesale remobilisation occurred probably by solifluction or fluviatile reworking and they are re-designated as undifferentiated river terrace deposits.

Alluvium

Narrow ribbons of alluvium are mapped along the floor of the valleys with flowing streams. It represents the fine-grained late-stage (mature) phase of river development with cut-off channels, overbank flood deposition and localised peat formation. In general, the deposit is thin, usually between 1 and 3 m in the upper reaches of rivers, but at major confluences and in the lower reaches of the larger rivers about 8 m have been proved. Such thicknesses of alluvium are known in the lower reaches of the major valleys, and some of these sequences are known to contain a stack of inter-fingering organic, calcareous tufa, fluviatile, estuarine and shallow marine elements indicating the 'rise and fall' of sea level change even in our most recent past.

Marine and estuarine deposits

Marine and estuarine deposits are represented by a wide range of lithologies, depositional environments, ages and height relative to former sea levels (at least four such beach levels are interpreted in this region). They comprise organic mud, channel sand, gravel and sand shoals, storm beach and shell banks and commonly interdigitate with fully fluviatile deposits in the lower reaches of major valleys. This group includes the older raised beach deposit described from the Boxgrove site later in this guide.

Landslides

Landslides are a ubiquitous feature of the Upper Greensand/Gault contact along much of the outcrop both within the Weald and on the Isle of Wight. Such features are also significant within the younger Palaeogene deposits on the Isle of Wight. The landforms, for the most part composites of sequential rotational slips and slab slides, are quite striking, with fault-like backscarps up to 30 m high, ponds trapped by slip slices, and hummocky ground usually with a prominent toe separating the slips from the undisturbed bedrock. The age of the slips is uncertain, almost certainly they were initiated under periglacial conditions, but the landforms are still remarkably fresh suggesting that some movement is more recent. They form a significant geomorphological feature in the landscape of the district but are frequently overlooked for their value in determining a denudation chronology.

APPENDIX 1.
BRITISH GEOLOGICAL SURVEY MAPS FOR FIELD GUIDE REGION

British Geological Survey. 1972. Horsham. England and Wales Sheet 302. Solid and Drift. 1:50 000. (Keyworth, Nottingham: British Geological Survey).

British Geological Survey. 1975. Lymington. England and Wales Sheet 330. Solid and Drift. 1:50 000. (Keyworth, Nottingham: British Geological Survey).

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APPENDIX 2.
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