

Bexhill to Hastings Link Road Stage 2

Solis and Agricultural Land Classification

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Appendices

Appendix 1 Information Consulted

1 Introduction

- 1.1 This report provides a description of the likely soils and Agricultural Land Classification (ALC) of the general area between Bexhill and Hastings which is the Stage 2 Study area for the proposed Link Road.
 - 1.2 It is based on a study of published information (see Appendix) and the results of various Agricultural Land Classification surveys for sites in the south of the area and, in particular a report by W. A. D. Whitfield of Landlook, for a survey along the two route options carried out in July 2004.
 - 1.3 Section 2 of the report describes the general location and those factors which influence the ALC gradings i.e. topography and flood risk, climate and soils, including geology. Section 3 provides a description of the likely ALC grades to be identified within the study area based on the published information available. Section 4 contains a summary of this detailed desk top study.
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2 Study of Published Information

Location

- 2.1 The land lies between Bexhill and Hastings and consists of the flat valley bottom of the Asten stream which ends at Coombe Haven together with the adjacent valley sides of the stream and its tributaries. The agricultural land in the valley bottom is mainly under grass, while the land on the valley sides is variously in arable use or grassland, with some substantial areas of woodland.

Topography and Flood Risk

- 2.2 There is a marked contrast in topographical conditions between the flat valley bottom and the adjacent valley sides. There is no topographic limitation *per se* on the valley bottom, but this is an area which is at risk from flooding. However, as noted in the Landlook report, no data for the duration of inundation seem to be available.
- 2.3 The valley sides have marked slopes but are only locally steeper than 7° (approximately 1 in 8) at which point a direct gradient limitation has to be considered in the ALC system. The steepest land is in the east, on the west-facing slopes west of Upper Wilting Farm, and on either side of the spur of land on which Byne's Farm is located in the north of the area.

Climate

- 2.4 Climatic data has been obtained from the Met Office's standard 5km grid point data set for three representative points two on the higher ground in the east and west and one on the valley bottom in the centre, as set out in the following table.

	East	West	Central Valley
Reference Point	TQ 771110	TQ750095	TQ760105
Altitude (m)	40	30	10
Average Annual Rainfall AAR (mm)	793	784	780
Accumulated Temperature ATO (day degrees)	1480	1493	1515
Moisture Deficit for wheat	117	119	121

(mm)			
Moisture Deficit for potatoes (mm)	112	116	118
Field Capacity Duration (days)	165	162	162

- 2.5 The data do not indicate any climatic limitation *per se* but it may be noted that the field capacity duration (the length of time over the winter when soils are likely to remain moist or wet) is fairly long. This puts poorly drained and/or heavy textured soils at a comparative disadvantage as compared with better drained and/or light and medium textured soils.

Geology

- 2.6 The local bedrock in the area is of Wealden (early Cretaceous) age. These were laid down about 145 to 130 million years ago as part of a large estuarine delta. When the delta was growing the deposits are siltstones and fine sandstones e.g. the Ashdown Beds and Tunbridge Wells Sand while clays, e.g. the Wadhurst Clay, were deposited when estuarine conditions prevailed. However, less major alternations of conditions are common so that within, for example, the deltaic Ashdown Beds there are what are shown on the geological map for the area as bands of "Clay in Ashdown Beds". Some of this which was particularly thick in the Hastings area was formerly called the Fairlight Clay. Conversely, within the estuarine Wadhurst Clay there are beds of siltstone and fine sandstone collectively referred to as "Sand in Wadhurst Clay".
- 2.7 These Cretaceous deposits have been subsequently uplifted, folded and faulted before being eroded in more recent times, particularly by the action of running water. Thus the courses of the various streams and rivers in the area are cut into the Cretaceous sediments, but are themselves floored by alluvium, usually clayey, laid down within the past few thousand years.
- 2.8 Between Bexhill and Hastings the main valley sides are formed mainly in siltstones and fine sandstones of the Ashdown Beds. Wadhurst Clay, including inter-bedded sandstones and siltstones, tends to occur on the higher ground, particularly on the north-east edge of Bexhill (in the vicinity of Worsham Farm), on the western edge of Hastings (around Harley Shute) and along the northern edge of the area from around Upper Wilting Farm, through land north of Adam's Farm to Byrne's Farm. Tunbridge Wells Sand is found only in the extreme west, near Preston hall and in an insignificantly small area in the extreme east, to the north of Harley Shute.
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3 Agricultural Land Classification of the Study Area

Soils

- 3.1 There is no detailed soil map for the area and so the only published source of information is Sheet 6 (South East England) of the 1:250,000 National Soil Map. This shows geographic groupings of soils called Soil Associations, usually related to specific parent materials. Because of scale limitations, only major areas of each Association are shown but recourse to larger scale geological maps allows some refinement particularly where, as here, two of the main associations are linked to sandy and clayey Wealden rocks respectively. Each Association contains a collection of soils which tend to occur together, but are often quite different because of, for example, local small-scale changes in geology or topography. The distribution of these different soil type, which is often of relevance to the ALC gradings can usually be determined only by a detailed site inspection.
- 3.2 The areas of sandstones and siltstones e.g. the Ashdown Beds, the “Sand in Wadhurst Clay” and the Tunbridge Wells Sand are shown as having soils of Association 572i CURTISDEN. The clayey formations i.e. the Wadhurst Clay and the “Clay in Ashdown Beds” have soils of Association 711i WICKHAM 5. The third Association shown on the National Soil map is Association 813d FLADBURY 3 on the river alluvium.
- 3.3 The CURTISDEN Association (572i) is described as a collection of “silty soils over siltstone with slowly permeable subsoils and slight seasonal waterlogging. Some similar well drained soils. Some well drained coarse loamy soils. Slumping locally”. It is typically developed over Cretaceous and Jurassic siltstone and sandstone. The silty soils with slowly permeable subsoils and slight seasonal waterlogging belong to the Curtisden series *per se*, while the “similar well drained soils” and “well drained coarse loamy soils” are the Atrim and Bearsted series respectively. Although not mentioned in the general description of the Association, wetter soils of the Cranbrook, Stanway or Wickham series are found on less permeable strata or downslope from spring-lines at junctions between permeable and less permeable strata. Many of the soils in the Association, even those with medium textures, have slowly permeable compact subsoils which cause drainage impedence. However, with artificial drainage (which is assumed to have been installed when making an ALC assessment), they can be improved to Wetness Classes II or III on a scale ranging from I (well drained) to VI (virtually a swamp). In general, the soils have good supplies of moisture for crop growth, unless rooting depth is limited by the occurrence of hard strata near the surface which is mainly the case in the better drained profiles. Because the soils contain large amounts of silt and fine sand they are susceptible to capping and the formation of plough pans which can lead to increased run-off and, occasionally, to gully erosion on cultivated land. In general, however, this Association
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has some of the better soils on the Wealden rocks. Arable cropping is common and grass provides good yields with relatively little risk of poaching by stock.

- 3.4 The WICKHAM 5 Association (711i) is described as a collection of “slowly permeable seasonally waterlogged fine loamy over clayey soils, fine silty over clayey and clayey soils, locally reddish. Some coarse loamy soils with slowly permeable subsoils and slight seasonal waterlogging.” It is developed in drift over Cretaceous clay and sandstone. These soils are generally heavier in texture and less well drained than those of the CURTISDEN Association. The “fine loamy over clayey” and “fine silty over clayey” soils are together classed as the Wickham series *per se* and are developed in thin, locally derived superficial “drift” over the actual Wealden strata. Where this is absent, the soils are clayey throughout and would be classed as the Denchworth series. A range of other soils are found where there are bands of sandstone or siltstone and these represent the “coarse loamy soils with slowly permeable subsoils and slight seasonal waterlogging” of the Association description. These include the Curtisden series, typical of the CURTISDEN Association, but here only a fairly minor component of the WICKHAM 5 Association. In general the soils of the WICKHAM 5 Association are heavier in texture and more poorly drained than those of the CURTISDEN Association. For example, typical Wickham series soils can be in Wetness Class IV, even after artificial drainage, but some other component soils can be better drained. The Report accompanying the National Soil Map sheet comments that “Wickham soils and difficult to cultivate” and have only a few days in spring when conditions are suitable, making autumn cultivations a virtual necessity. Arable cropping is, however, possible. Grass production is limited both by restricted yield in the summer and the risk of poaching by stock early or late in the season. The overall impression that this land is less flexible and of generally poorer quality than that in the CURTISDEN Association.
- 3.5 The valley bottom has soils of the FLADBURY 3 Association (813d), developed in clayey river alluvium. This association is described as a collection of: “Stoneless clayey, fine silty and fine loamy soils affected by groundwater. Flat land. Risk of flooding.” The main soil present is the Fladbury series a grey coloured, heavy textured, poorly or very poorly drained soil. The slow permeability of the profiles, the high water-table and flat topography which makes obtaining drainage outfall difficult or impossible, means that much of this land is very wet. It is typically in Wetness Class IV or V with some particularly low, wet areas actually in Grade VI. There may, however, be areas of slightly better drained soils with medium textures of the Conway and Enborne series but, as with other Associations, detailed mapping would be required to discover their extent. The Report accompanying the National Soil Map sheet specifically notes that in Coombe Haven the clayey alluvium overlies peat at the floodplain margins giving soils of the Middelney series. This Association is almost entirely under grass because of the high groundwater levels and flood risk and has, traditionally, provided grazing land in areas where adjacent higher ground has been given over to arable cropping.
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Agricultural Land Classification

- 3.6 The 1:63,360 provisional ALC map, Sheet 184 (Hastings) shows a large proportion of the area as Grade 4, including all the agricultural land on the alluvium and much of the higher ground on Ashdown Beds and Wadhurst Clay to the north. The higher ground on Ashdown Beds and Wadhurst Clay on the southern edge of the valley shown as undifferentiated Grade 3. However, the accompanying Report considers such land as generally in the middle or lower part of the grade which would translate to Subgrade 3b in the revised ALC system.
- 3.7 It thus comes as a considerable surprise to find that detailed surveys within the area on behalf of DEFRA or its predecessors and by Landlook along the proposed Link Road routes have identified a considerable amount of Grade 2 and Subgrade 3a, with an almost negligible amount of Grade 4. However, other than the Landlook one, these surveys have tended to include little or none of the alluvial land on the valley bottoms i.e. the poorest land in the area, so are “biased” towards land likely to be of better quality. What is particularly amazing is to find gradings as high as Grade 2 or even, in a couple of locations, Grade 1 on land which is considered to be, in effect, Subgrade 3b on the south of the valley. Apparently similar land on the same geological parent materials on the northern side of the valley is actually classed as Grade 4.
- 3.8 To some extent this wide discrepancy between what appears on the published ALC map and what results from more detailed investigations is due to the revised ALC criteria introduced in 1989. These have had the effect of raising the grades of land in SE England where, as here, wetness has been one of the major limitations. What this “grade escalation” has meant is that it is now almost impossible to find any Grade 4 land other than on extremely wet and/or clayey soils. Thus much of the sort of land on Wealden Clays which would historically have been considered as Grade 4, now becomes Subgrade 3b at worst, and even Subgrade 3a where surface textures are lighter.
- 3.9 As mentioned in the Landlook report the main factors affecting the ALC gradings in the area are wetness and, to a lesser extent, droughtiness. There are some areas of steep slopes on some of the valley sides which are the main limiting factor locally and, in the valley bottom, the flood risk situation also has to be considered.
- 3.10 The problem of wetness resulting from impeded drainage is widespread, even on the soils over the more permeable sandstone and siltstone strata but particularly on those over clayey substrates. Application of the criteria for assessing a wetness limitation to typical soils of each Association suggests that the CURTISDEN Association would typically give land no worse than Subgrade 3a and possibly some Grade 2. As far as wetness is concerned the well drained soils which are, however, fairly uncommon, could qualify for Grade 1. Typical soils of the WICKHAM 5 Association give Subgrade 3b or, where either better drained or with medium surface textures, Subgrade 3a. Grade 4 is “impossible” even though, as discussed above, this is what the subjective view was of the quality of such land when the published ALC maps were compiled.
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- 3.11 Even on the alluvium in the valley bottom, strict application of the criteria results in the lowest grading being Subgrade 3b (as in the Landlook report) unless some pessimistic assumptions are made in respect of Wetness Class and the impossibility of artificial drainage. Such assumptions appear to have been made in some of the surveys done on behalf of DEFRA or its predecessors where some of the alluvium is shown as Grade 4. It has to be said that, irrespective of what may result from the application of the revised ALC guidelines, the valley bottom land is undoubtedly the poorest in the area and if there is any Grade 4 land to be recognised, then this is it.
- 3.12 As far as droughtiness is concerned, most of the soils do not suffer from this as a major limitation, but would result in a maximum grading of Grade 2 even for the better drained soils unless the subsoil structure is better than usual.
- 3.13 As already noted, there are some steep valley sides where slopes in excess of 7° (see section on Topography above) would limit the land to Subgrade 3b, but it would need detailed topographic maps or site inspections to delineate these accurately.
- 3.14 The Landlook report notes that no data for the duration of inundation on the valley bottom seem to be available. Thus applying the ALC flood risk criteria is not feasible, though it is possible that a perceived flood risk would limit this land to Grade 4.
- 3.15 The overall picture which emerges is that the land shown on the accompanying map as CURTISDEN Association over the Ashdown Beds, "Sand in Wadhurst Clay" or Tunbridge Wells Sand is likely to give land typically of Subgrade 3a. There is the likelihood of some Grade 2 on the better drained areas and Subgrade 3b on steeper slopes or where there are wetter, heavier textured soils on bands of clay within the predominantly sandy or silty bedrock. As a rough estimate, it is thought that a detailed survey would show this Association to consist of about 60% Subgrade 3a, 20% Grade 2 and 20% Subgrade 3b i.e. of significantly better quality than the Subgrade 3b or Grade 4 suggested on the published ALC Map and in its accompanying Report. The accompanying plan shows the CURTISDEN Association as "Mainly Subgrade 3a with some Grade 2 and some Subgrade 3b."
- 3.16 The WICKHAM 5 gives generally poorer land, predominantly Subgrade 3b because of a wetness limitation on the poorly drained soils over clay which dominate this Association. The better drained soils on the sandstone bands within the clay would be expected to give mainly Subgrade 3a, with any Grade 2 being found only exceptionally. The revised ALC criteria mean that Grade 4 will not be found unless conditions are exceptionally wet. As a rough estimate, it is thought that a detailed survey would show this Association to consist of about 70% Subgrade 3b and 30% Subgrade 3a. The accompanying plan shows the WICKHAM Association as "Mainly Subgrade 3b with some Subgrade 3a."
- 3.17 The poorest land in the area is that belonging to the FLADBURY 3 Association on the valley bottom alluvium. The highest possible grading is Subgrade 3b but, as discussed above, Grade 4
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is a more realistic grading. The accompanying plan shows the FLADBURY 3 Association as "Subgrade 3b/Grade 4."

3.18 On the basis of land quality, the situation is:-

Grade 2 is likely to be found as a relatively small proportion of the land over the sandy and silty bedrock formations in the area (CURTISDEN Association) where the soils are well drained, with Grade 1 only in exceptional circumstances.

Subgrade 3a is the typical grading for the land over the sandy and silty bedrock formations in the area (CURTISDEN Association) where the medium textured soils are limited by wetness due to slowly permeable, compact subsoils. Similar soils on sandstone and siltstone bands within the areas dominated by clayey bedrock (WICKHAM 5 Association) would also give Subgrade 3a.

Subgrade 3b is the typical grading for the poorly drained soils over the Wadhurst Clay, the "Clay in Ashdown Beds" and bands of clay within the sandstone and siltstone dominated areas.

Grade 4 is realistically the grading which should be applied to the wet, clayey soils on the alluvium in the valley bottom although strict application of the ALC criteria and an optimistic view of the possibilities for artificial drainage would allow Subgrade 3b.

4 Summary

- 4.1 Three main kinds of agricultural land can be identified, linked to the geological parent materials:-
- 4.2 Silty soils with slowly permeable subsoils and slight seasonal waterlogging of the CURTISDEN Association are the commonest soils where the bedrock is predominantly sandstone or siltstone i.e. the Ashdown Beds, and Sand in Wadhurst Clay shown on the geological map. These give mainly ALC Subgrade 3a land because of a moderate wetness limitation, but with some Grade 2 where there is better profile drainage and Subgrade 3b on the steeper slopes or where wetter, heavier textured soils occur on bands of clay within the predominantly sandy or silty bedrock.
- 4.3 Slowly permeable soils with clay at depth and developed in drift over clayey bedrock of the WICKHAM 5 Association are found on areas shown on the geological map as Wadhurst Clay or Clay in Ashdown Beds. The land is predominantly ALC Subgrade 3b because of a wetness limitation. Better drained soils on the sandstone bands within the clay would be expected to give Subgrade 3a land.
- 4.4 The poorest land in the area is that belonging to the FLADBURY 3 Association on the valley bottom alluvium which is mainly clay but with the possibility of peat at depth. The highest possible grading is Subgrade 3b although Grade 4 is a more realistic grading.
- 4.5 It may be noted that the area is a good example of the “grade escalation” which has resulted from the introduction of the revised ALC criteria in 1989. The published ALC map, which was based on somewhat subjective assessments, shows much of the area as Grade 4 and even the Grade 3 is regarded as that which would now be classed as Subgrade 3b. Application of the revised criteria now means that much of this, even the previous Grade 4, can be Subgrade 3a or even Grade 2, even though the intention was try to maintain the gradings previously applied.
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Appendices

Appendix 1

Information Consulted

Information Consulted

Geological Map Sheet 320/321 (Hastings and Dungeness) 1:50,000

Soil Survey of England and Wales, National Soil Map Sheet 6 (South East England), 1:250,000 and accompanying Regional Bulletin.

Agricultural Land Classification, Sheet 184 (Hastings), Provisional, 1:63,360 and accompanying Report.

Agricultural Land Classification of England and Wales. *Revised guidelines and criteria for grading the quality of agricultural land*. October 1988. (Introduced in January 1989).

The Met. Office *Climatological data for Agricultural Land Classification*. January 1989.

Captions to Map

Code	Soil Association	Description	Geology	ALC
572i	CURTISDEN	Silty soils over siltstone with slowly permeable subsoils and slight seasonal waterlogging. Some similar well drained soils. Some well drained coarse loamy soils. Slumping locally	Predominantly sandstone or siltstone i.e. the Ashdown Beds, and Sand in Wadhurst Clay	Mainly Subgrade 3a with some Grade 2 and some Subgrade 3b.
711i	WICKHAM 5	Slowly permeable seasonally waterlogged fine loamy over clayey soils, fine silty over clayey and clayey soils, locally reddish. Some coarse loamy soils with slowly permeable subsoils and slight seasonal waterlogging.	Drift over predominantly clayey strata i.e. Wadhurst Clay or Clay in Ashdown Beds.	Mainly Subgrade 3b with some Subgrade 3a.
813d	FLADBURY 3	Stoneless clayey, fine silty and fine loamy soils affected by groundwater. Flat land. Risk of flooding.	Clayey alluvium often with peat at depth	Subgrade 3b/ Grade 4.

Main areas of non-agricultural land shown in orange