AGRICULTURAL LAND CLASSIFICATION

LEEDS AND LANGLEY BY-PASS, KENT

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1 BACKGROUND

1 1 In connection with proposals for the Leeds and Langley By-Pass in Kent a detailed Agricultural Land Classification survey of two alternative routes was undertaken between June and September 1990

The villages of Leeds and Langley are situated on the B2163 just to the south-east of Maidstone in Kent The proposed blue route passes to the east of Leeds and Langley and extends from Rectory Farm on the A274 in the south across approximately 4 5 km to the junction of the B2163 and the A20 in the north Alternatively the proposed red route, which also begins at Rectory Farm on the A274 in the south passes to the west of Leeds and Langley extending across 4 1 km, to the junction of the A2020 and the A20 in the north

1 2 The alternative routes were surveyed using 110 cm and 120 cm Dutch soil augers with samples being taken at approximate 100 m intervals along the lengths A number of soil pits were inspected to enable more detailed soil description

Land-use

1 3 At the time of survey land-use along the 'blue' route comprised a mix of arable cropping (wheat barley and oilseed rape) and grassland being grazed by sheep A small area of orchard was also present
The land-use along the red route was considerably more varied with a mix of arable cropping, (principally wheat and barley) horticulture, (vegetables soft fruit and orchards) grassland supporting sheep and cattle with some under-used land

2 PHYSICAL FACTORS AFFECTING LAND QUALITY

Relief

2 1 Along the 'blue' route, relief varies considerably At the southern end the land lies at approximately 105 m A O D It rises gently towards the north-east reaching a maximum of 120 m A O D at Burberry Lane As the proposed route passes northwards from here the land falls steadily beyond Leeds village towards the A20 Just north of Ashbank the land falls steeply into a small wooded valley Gradients here act as a local limitation to agricultural land quality A minimum altitude of 50 m A O D occurs at the far northern end of the 'blue' route at its junction with the A20

Along the 'red route the land falls slightly from 105 m A O D at the southern end towards 95 m A O D at Langley Corner Farm It then rises very slightly northwards reaching a plateau of 100-105 m A O D To the immediate west of Leeds village the land begins to fall towards a lake-filled valley Around Brogden very localised steep slopes impose a limitation on agricultural land quality Beyond the lake, the land begins to rise once more, reaching 60 m A O D at the junction of the proposed route, the A2020 and the A20

Climate

2 2 Estimates of climatic variables, (adjusted for altitude), were obtained by interpolation from a 5 km grid database, (Met Office 1989) for a representative location in the survey area

Climatic variables

Grid Reference	TQ 824 541	TQ 825 520
Altitude (m A O D)	45	120
Accumulated temperature (° days Jan-June)	1455	1370
Average annual rainfall (mm)	696	730
Field capacity days	145	150
Moisture deficit wheat (mm)	116	106
Moisture deficit, potatoes (mm)	109	99

2 3 The important parameters in assessing an overall climatic limitation are accumulated temperature, which provides an indication of the warmth of a locality, and average annual rainfall which provides a measure of the degree of wetness of a locality The values for accumulated temperature and average annual rainfall indicate that the survey area is relatively warm and dry, both in regional and national terms There is no overall climatic limitation to the agricultural land quality at this locality Climatic factors do however influence interactive limitations between soil and climate specifically soil wetness and droughtiness

Geology and Soils

2 4 British Geological Survey, Sheet 288, Maidstone, (1976), indicates that both route options pass across Cretaceous Lower Greensand deposits with smaller areas of Pleistocene and Recent drift deposits

The proposed blue' route comprises Head deposits across much of the southern half with Hythe Beds (sandy limestone and calcareous sands) comprising most of the northern half Small outcrops of Atherfield Clay and Folkestone Beds also occur across the northern part of the route
The proposed red route almost entirely comprises Hythe Beds with smaller outcrops of Atherfield Clay and Folkestone Beds occurring towards the north

2 5 Soil Survey of England and Wales Sheet 6 (1983) Soils of South-East England, indicates the presence of a number of soil associations in this locality

The Malling association is mapped across most of the proposed red route and the north of the 'blue' route These soils are described as, 'fine loamy typical argillic brown earths over sandy limestone (ragstone) at depths below 80 cm , (SSEW, 1984) Across the southern part of the 'blue route the Marlow association has been mapped These soils are described as typical paleo-argillic brown earths with

flinty fine loamy upper horizons over well structured yellowish red clay ' (SSEW 1984) Towards the far north of both route options and occurring in association with Folkestone Beds soils of the Fyfield 2 association occur These are, 'loamy almost sandy typical argillic brown earths passing to sand or sandstone', (SSEW 1984)

2 6 Detailed field examination indicates the presence of a number of soil groups across the area surveyed

2 7 Much of the land surveyed comprises soils which have developed in association with Hythe Bed deposits, although there are several variants within this broad group

- Across the lower slopes profiles comprise medium textured topsoils and upper subsoils (ie medium clay loam or silty clay loam) which rest over heavier lower subsoils of clay or silty clay Although imperfectly drained as evidenced by gleying immediately above or within these clay horizons profiles are generally not slowly permeable and are thus assigned to wetness class I or II Occasional profiles become impenetrable, (to soil auger) over sandy ragstone at depths greater than about 80 cm
- Soils across the upper slopes particularly along the blue route are typically much more brashy (due to sandy ragstone fragments), and shallow over the Hythe Beds Medium textured topsoils, (ie, medium clay loam and silty clay loam) typically contain between 10 and 15% v/v sandy ragstone fragments >2 cm and become progressively more brashy with depth resting over impenetrable (to soil auger), ragstone at depths of about 50-100 cm
- The final variant occurs more locally and is characterised by deep well drained medium textured soils Medium clay loam and silty clay loam topsoils overlie similar textures to depth Profiles occasionally become brashy due to 10-20% v/v sandy ragstone fragments at depths greater than 80 cm

2 8 Across the northern part of the blue route especially around and to the north of Ashbank soils are extremely stony Profiles typically

comprise moderately stony (ie 18-20% v/v medium angular flints >2 cm), medium clay loam or (fine) sandy clay loam topsoils which pass to very stony subsoils of similar texture Stone contents of 25-50% v/v flints are common within 50 cm of the surface becoming 70-80% v/v flints below 50 cm

2 9 At the northern end of the red' route soils have developed in sandy Folkestone Beds Profiles typically comprise sandy silt loam or sandy loam topsoils overlying similar textures or sandy clay loam in the subsoil Profiles are slightly stony throughout having between 2 and 5% v/v flints and are well drained being assigned to wetness class I accordingly

3 AGRICULTURAL LAND CLASSIFICATION

3 1 The ALC grading of the two alternative route options is primarily determined by interactions between soil and climatic factors, namely wetness and droughtiness Locally other factors such as topsoil stoniness and gradient affect the land quality ALC grades 1 2, 3a and 3b have been mapped and the breakdown in terms of length of route and extent is given below

BLUE ROUTE

Grade	Length (m)	% of Total Length Surveyed
1	230	8
2	620	23
3a	920	34
3b	970	35
Total length of agricultural land surveyed	2740	100
Woodland) Not surveyed) Non-agricultural land)	1740	
Total length of route	4480	

RED ROUTE

Grade	Length (m)	% of Total Length Surveyed
1	600	16
2	1650	43
3a	1270	33
3b	300	8
Total length of agricultural land surveyed	3820	100
Not surveyed) Non-agricultural land)	280	
Total length of route	4100	

ALTERNATIVE RED ROUTE - A274 JUNCTION

Grade	Length (m)	% of Total Length Surveyed
2	350	55
3a	290	45
Total length of agricultural land surveyed	640	100
Total length of route	640	

3 2 Appendix 1 provides a generalised description of the grades and subgrades identified in this survey

3 3 BLUE ROUTE

The overall land quality along the 'blue route is lower relative to that found along the 'red route with grades 1 and 2 representing 8% and 23% respectively of the total agricultural length surveyed In addition the implications for agricultural land-take should this option be chosen would be slightly less detrimental to the national agricultural interest given that a considerable length of the proposed route is given over to non-agricultural uses, woodland being most

significant A small proportion of the proposed blue route was not surveyed at the request of the landowner

3 4 **RED ROUTE**

Generally the agricultural land quality along the proposed 'red' route is higher than that along the proposed blue route with grades 1 and 2 representing 16 and 43% respectively of the total agricultural length surveyed It is also important to note that only a very small proportion of the length surveyed is in non-agricultural use

3 5 The following paragraphs describe and explain the ALC grading along both routes surveyed Since the soil types observed along both proposed routes are broadly similar, as described in sections 2 7 to 2 9 it is not necessary to describe the land quality of the routes separately it is appropriate to deal with both proposed routes as one

3 6 Grade 1

Land of this quality occurs along both route options but not extensively Profiles are generally deep and well drained, occasionally resting over brashy sandy ragstone below about 1 m Medium textured topsoils and upper subsoils typically pass to slightly heavier textures in the lower subsoil which may be gleyed below about 45-50 cm, but is not slowly permeable, thereby qualifying for wetness class I Profiles may be slightly stony, containing brashy ragstone fragments throughout

Land of this quality has no or very minor limitations to agricultural use and is capable of supporting a wide range of agricultural and horticultural crops whose yields are high and relatively consistent

3 7 Grade 2

Land of this quality was mapped along both survey routes although it occurs most extensively along the proposed red' route Profiles are limited by a number of factors acting singly or in combination namely

slightly imperfect drainage, slight droughtiness and topsoil stone contents in the range 5-10% v/v >2cm

Those profiles which are limited by wetness show evidence of imperfect drainage in the form of gleying from about 28 to 50 cm depth Medium textured topsoils typically pass to heavier textures in the upper and lower subsoil but these are not slowly permeable despite being gleyed Wetness class II is assigned to these profiles

A number of profiles are prone to slight droughtiness as a result of soil textures and/or soil depth over sandy ragstone Profiles containing subsoil horizons of clay or sandy textures may be slightly droughty as a result of the reduced available water reserves which these textures hold Similarly profiles which rest over sandy ragstone between 80 and 100 cm have reduced available water for plant growth, as do deep soils which are slightly to moderately stony, (sandy ragstone fragments) throughout

Occasional profiles have between 5% and 10% v/v sandy ragstone fragments >2cm in the topsoil The associated increase in production costs through implement wear, reduction in crop quality and establishment cause these profiles to be slightly downgraded

Grade 2 has minor limitations which affect crop yield, cultivations or harvesting but overall this very good quality agricultural land can support a wide range of crops

3 8 <u>Grade 3a</u>

Land of this quality is associated with soil profiles which are moderately stony in the topsoil and throughout and/or rest over sandy ragstone at relatively shallow depth The principal limitations to the agricultural use of this land are thus, droughtiness and/or topsoil stoniness

Profiles are generally medium textured throughout but may contain up to 20% v/v sandy ragstone fragments and/or rest over brashy sandy ragstone

from about 55 cm Relatively shallow depths combined with slight to moderate stoniness throughout results in restricted water available for plant growth and a consequent moderate drought risk

Topsoil stone contents of 10-15% v/v sandy ragstone fragments >2 cm act to impose a limitation to agricultural use through increased costs reduced crop quality and reduced level and consistency of yields

3 9 Grade 3b

Land has been graded 3b across parts of both proposed routes The limitations acting to cause land to be assigned to this grade are similar to those described in previous sections ie wetness droughtiness and topsoil stone contents, but are more severe they may act singly or in combination In addition, a small area on both routes has been graded 3b on the basis of localised steep gradients

Many of the profiles assigned to this grade are principally limited by droughtiness resulting from relatively shallow depth over brashy sandy ragstone Profiles are medium textured and pass through a very stony subsoil typically containing 30-50% v/v sandy ragstone to become impenetrable (to soil auger) between 35 and 50 cm Soil moisture reserves are limited by this shallow depth thereby acting to impose a moderate to severe drought risk

The land adjacent to, and north of Ashbank on the proposed 'blue route is also extremely stony but profiles contain flints rather than sandy ragstone fragments these probably arising from the deposition of a drift deposit over the area These profiles have been assigned to grade 3b on the basis of droughtiness and/or topsoil stone contents between about 15 and 20% v/v
Localised areas with steep gradients as measured by an optical reading clinometer, have been assigned to grade 3b Gradients of 8-10° were recorded These would severely limit the possibility and safety of

mechanised farm operations which could be carried out

Overall, land of this quality is able to support a narrow range of moderately yielding crops, principally cereals and grass

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SOURCES OF REFERENCE

- BRITISH GEOLOGICAL SURVEY (1976) Sheet 288, Maidstone

- MAFF (1988) Agricultural Land Classification Revised guidelines and criteria for grading the quality of agricultural land

- METEOROLOGICAL OFFICE (1989) Climatological datasets for agricultural land classification

- SOIL SURVEY OF ENGLAND AND WALES (1983) Sheet 6 Soils of South-East England

- SOIL SURVEY OF ENGLAND AND WALES (1984) Bulletin 15 - Soils and their use in South-East England

APPENDIX 1
DESCRIPTION OF THE GRADES AND SUBGRADES

The ALC grades and subgrades are described below in terms of the types of limitation which can occur typical cropping range and the expected level and consistency of yield In practice the grades are defined by reference to physical characteristics and the grading guidance and cut offs for limitation factors in Section 3 enable land to be ranked in accordance with these general descriptions The most productive and flexible land falls into Grades 1 and 2 and Subgrade 3a and collectively comprises about one third of the agricultural land in England and Wales About half the land is of moderate quality in Subgrade 3b or poor quality in Grade 4 Although less significant on a national scale such land can be locally valuable to agriculture and the rural economy where poorer farmland predominates The remainder is very poor quality land in Grade 5 which mostly occurs in the uplands

Descriptions are also given of other land categories which may be used on ALC maps

Grade 1 – excellent quality agricultural land

Land with no or very minor limitations to agricultural use A very wide range of agricultural and horticultural crops can be grown and commonly includes top fruit soft fruit salad crops and winter harvested vegetables Yields are high and less variable than on land of lower quality

Grade 2 – very good quality agricultural land

Land with minor limitations which affect crop yield, cultivations or harvesting A wide range of agricultural and horticultural crops can usually be grown but on some land in the grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable root crops The level of yield is generally high but may be lower or more variable than Grade 1

Grade 3 – good to moderate quality agricultural land

Land with moderate limitations which affect the choice of crops timing and type of cultivation harvesting or the level of yield Where more demanding crops are grown yields are generally lower or more variable than on land in Grades 1 and 2

Subgrade 3a – good quality agricultural land

Land capable of consistently producing moderate to high yields of a narrow range of arable crops especially cereals or moderate yields of a wide range of crops including cereals grass oilseed rape, potatoes sugar beet and the less demanding horticultural crops

Subgrade 3b – moderate quality agricultural land

Land capable of producing moderate yields of a narrow range of crops principally cereals and grass or lower yields of a wider range of crops or high yields of grass which can be grazed or harvested over most of the year

Grade 4 – poor quality agricultural land

Land with severe limitations which significantly restrict the range of crops and/or level of yields It is mainly suited to grass with occasional arable crops (eg cereals and forage crops) the yields of which are variable In moist climates yields of grass may be moderate to high but there may be difficulties in utilisation The grade also includes very droughty arable land

Grade 5 – very poor quality agricultural land

Land with very severe limitations which restrict use to permanent pasture or rough grazing except for occasional pioneer forage crops

Descriptions of other land categories used on ALC maps

Urban

Built up or hard uses with relatively little potential for a return to agriculture including housing industry commerce education transport religious buildings cemeteries Also hard surfaced sports facilities permanent caravan sites and vacant land all types of derelict land including mineral workings which are only likely to be reclaimed using derelict land grants

Non agricultural

Soft uses where most of the land could be returned relatively easily to agriculture including golf courses private parkland public open spaces sports fields allotments and soft surfaced areas on airports/airfields Also active mineral workings and refuse tips where restoration conditions to soft after uses may apply

Woodland

Includes commercial and non commercial woodland A distinction may be made as necessary between farm and non farm woodland

Agricultural buildings

Includes the normal range of agricultural buildings as well as other relatively permanent structures such as glasshouses Temporary structures (eg polythene tunnels erected for lambing) may be ignored

Open water

Includes lakes ponds and rivers as map scale permits

Land not surveyed

Agricultural land which has not been surveyed

Where the land use includes more than one of the above land cover types eg buildings in large grounds and where map scale permits the cover types may be shown separately Otherwise the most extensive cover type will usually be shown

FIELD ASSESSMENT OF SOIL WETNESS CLASS

SOIL WETNESS CLASSIFICATION

Soil wetness is classified according to the depth and duration of waterlogging in the soil profile Six revised soil wetness classes (Hodgson in preparation) are identified and are defined in Table 11

Table 11 Definition of Soil Wetness Classes

Wetness Class	Duration of Waterlogging[1]
I	The soil profile is not wet within 70 cm depth for more than 30 days in most years[2]
II	The soil profile is wet within 70 cm depth for 31 90 days in most years *or* if there is no slowly permeable layer within 80 cm depth it is wet within 70 cm for more than 90 days but not wet within 40 cm depth for more than 30 days in most years
III	The soil profile is wet within 70 cm depth for 91 180 days in most years *or* if there is no slowly permeable layer within 80 cm depth it is wet within 70 cm for more than 180 days but only wet within 40 cm depth for between 31 and 90 days in most years
IV	The soil profile is wet within 70 cm depth for more than 180 days but not within 40 cm depth for more than 210 days in most years *or* if there is no slowly permeable layer within 80 cm depth it is wet within 40 cm depth for 91 210 days in most years
V	The soil profile is wet within 40 cm depth for 211 335 days in most years
VI	The soil profile is wet within 40 cm depth for more than 335 days in most years

[1] The number of days specified is not necessarily a continuous period

[2] In most years is defined as more than 10 out of 20 years

Soils can be allocated to a wetness class on the basis of quantitative data recorded over a period of many years or by the interpretation of soil profile characteristics site and climatic factors Adequate quantitative data will rarely be available for ALC surveys and therefore the interpretative method of field assessment is used to identify soil wetness class in the field The method adopted here is common to ADAS and the SSLRC