

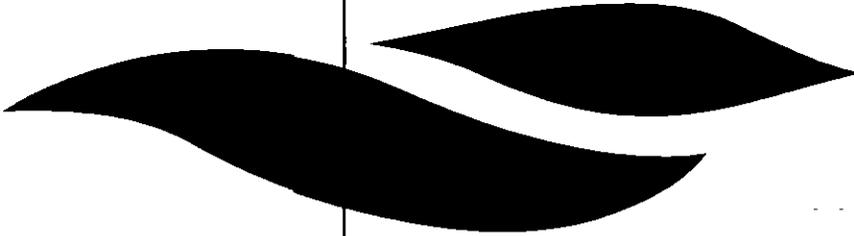
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**FARMING AND RURAL CONSERVATION AGENCY**  
*An Executive Agency of the Ministry of Agriculture, Fisheries and Food and the Welsh Office*

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**VALE OF WHITE HORSE LOCAL PLAN  
Land Around Wantage and Grove  
Oxfordshire**

**Agricultural Land Classification  
ALC Map and Report  
Semi-detailed survey**

**March 1999**

**Resource Planning Team  
Eastern Region  
FRCA Reading**

**RPT Job Numbers: 3304/16-18/99  
3304/22-24/99  
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**AGRICULTURAL LAND CLASSIFICATION REPORT**

**VALE OF WHITE HORSE LOCAL PLAN**

**LAND AROUND WANTAGE AND GROVE, OXFORDSHIRE**

**SEMI-DETAILED SURVEY**

**INTRODUCTION**

1. This report presents the findings of a series of semi-detailed Agricultural Land Classification (ALC) surveys on approximately 310 hectares of land around the settlements of Wantage and Grove in Oxfordshire. The surveys were carried out during March 1999 by the Farming and Rural Conservation Agency (FRCA)<sup>1</sup> on behalf of the Ministry of Agriculture, Fisheries and Food (MAFF) in connection with MAFF's statutory input to the Vale of White Horse Local Plan. These surveys supersede any previous ALC information for this land.
2. The fieldwork was conducted by members of the Resource Planning Team in the Eastern Region of FRCA. The land has been graded in accordance with the published MAFF ALC guidelines and criteria (MAFF, 1988). A description of the ALC grades is given in Appendix I. At the time of survey agricultural land uses on the sites were varied, including both arable and grassland. The areas mapped as 'Other Land' include housing, allotment gardens, a recreation ground, woodland, a section of disused canal, streams, tracks, a research facility as well as the remains of old runways and other hardstanding areas associated with an abandoned airbase.
3. The findings of the survey are shown on the enclosed ALC maps. The maps have been drawn at a scale of 1:15,000. They are accurate at this scale but any enlargement would be misleading. The area and proportions of the ALC grades and subgrades on the surveyed land across all the sites are summarised in Table 1.

**Table 1: Land around Wantage and Grove - Area of grades and other land**

Grade/Other land	Area (hectares)	% surveyed area	% site area
2	83.9	30.8	27.0
3a	97.0	35.6	31.3
3b	85.7	31.5	27.6
4	5.8	2.1	1.9
Agricultural Land Not Surveyed	4.0	-	1.3
Other land	34.0	-	11.0
<b>Total surveyed area</b>	<b>272.4</b>	<b>100</b>	<b>87.8</b>
<b>Total site area</b>	<b>310.4</b>	<b>-</b>	<b>100</b>

<sup>1</sup> FRCA is an executive agency of MAFF and the Welsh Office

## FACTORS INFLUENCING ALC GRADE

### Climate

4. Climate affects the grading of land through the assessment of an overall climatic limitation and also through interactions with soil characteristics. The key climatic variables used for grading each site are given in the site specific paragraphs below and were obtained from the published 5km grid datasets using the standard interpolation procedures (Met. Office, 1989). The climatic criteria are considered first when classifying land as climate can be overriding in the sense that severe limitations will restrict land to low grades irrespective of favourable site or soil conditions. The main parameters used in the assessment of an overall climatic limitation are average annual rainfall (AAR), as a measure of overall wetness, and accumulated temperature (AT0, January to June), as a measure of the relative warmth of a locality.
5. The combination of rainfall and temperature for all of the sites means that there is no overall climatic limitation. Local climatic factors, such as exposure and frost risk are also not believed to affect land quality. All sites are climatically Grade 1.

### Site

6. The area surveyed lies at altitudes in the range 70-135m AOD; much of the land is at or below 100m AOD. The highest area is to the south of Wantage where the land rises sharply onto chalk downland. The lowest land is to the north and west of Grove at around 70m AOD. Most of the gradients within the site are slight, except to the south of Wantage where the land rises sharply onto the chalk plateau of the Lambourn Downs. Only a small proportion of this land has gradients sufficient to adversely affect agricultural land quality.

### Geology and soils

7. The most detailed published geological information for the areas surveyed (BGS, 1971) shows the land to be underlain by a series of geological formations overlain in some areas by drift deposits. The areas immediately underlain by solid geology are principally in the south and west. The solid deposits represented are all Cretaceous in age and include Lower Chalk, Upper Greensand and Gault Clay. Drift deposits in the area overlie the Gault Clay and Upper Greensand. They comprise first and second terrace gravel deposits over the Gault Clay to the west and north of Grove; head and younger coombe deposits overlying the boundary between Upper Greensand and Gault Clay between Wantage and Grove and alluvium along the lines of Letcombe Brook and Woodhill Brook.
8. According to the most recent published soils information for this area (SSEW, 1983), the land is underlain by five soil associations, namely Grove, Denchworth, Block, Harwell and Wantage 1. Other more detailed information (SSGB, 1973) maps a similar range of soils at a series level which are all incorporated within the associations.
9. Grove association soils are mapped in the north. This association is described as comprising, 'Moderately permeable fine loamy calcareous soils over chalky gravel affected by groundwater. Some fine loamy over clayey soils with slowly permeable subsoil and slight seasonal waterlogging. Some slowly permeable seasonally waterlogged clayey soils.' (SSEW,

1983). Soils of this nature were encountered in this area but were not as widespread as indicated on the Soil Survey map (SSEW, 1983).

10. Denchworth association soils are mapped in the west and are described as, 'Slowly permeable seasonally waterlogged clayey soils with similar fine loamy over clayey soils. Some fine loamy over clayey soils with only slight seasonal waterlogging and some slowly permeable calcareous clayey soils. Landslips and associated irregular terrain locally.' (SSEW, 1983). Soils of this nature were encountered over a larger area than that indicated on the Soil Survey map (SSEW, 1983).
11. The Block association is mapped over a small area in the south-west. They are described as comprising, 'Moderately permeable calcareous loamy soils over chalky gravel variably affected by groundwater.' (SSEW, 1983). These were encountered to a limited extent only in this area.
12. Harwell association soils are mapped as underlying Wantage town itself and extending east and west mainly over the Upper Greensand geology. The soils are described as comprising, 'Well drained loamy soils over sandstone and some similar soils with slight seasonal waterlogging. Shallow stony soils locally. Some slowly permeable seasonally waterlogged fine loamy or fine silty over clayey soils mainly on scarp slopes. Risk of water erosion.' (SSEW, 1983). Soils of this general nature were encountered in those areas which generally lie at around 100m AOD, i.e. land in the east of this survey area.
13. The Wantage 1 soil association overlies the Chalk to the south of Wantage. These soils are described as comprising, 'Well drained calcareous silty soils, in places shallow over argillaceous chalk.' (SSEW, 1983). Soils of this nature were encountered during the surveys carried out in this area.

#### **LAND EAST OF GROVE ROAD, WANTAGE (FRCA reference 3304/24/99)**

14. This area of land totals 39.8 ha lying to the east of Grove Road between Wantage and Grove. A total of 21 borings and 3 soil pits was described. The location of the auger borings and pits is shown on the sample location map in Appendix II where details of the soils data are also presented. The survey comprises approximately one-third of the total area originally described by the Vale of White Horse District Council as Wg 2.
15. The climatic details for the site are given in Table 2 below. The survey area lies between approximately 82m and 104m AOD. The majority of the site is level though it falls through gentle gradients westwards. In the west, gradient alone is sufficient to restrict land quality to Subgrade 3b. The site is not affected by microrelief or flooding.
16. The geology shows that this area is predominantly underlain by Cretaceous Upper Greensand with some head and younger coombe deposits located to the west of the site.
17. The soils are mapped as the Harwell series over the majority of the site with soils of the Hendred series mapped over the Coombe deposits (SSGB, 1973). These series form part of the Harwell association as described in paragraph 12.

**Table 2: Climatic and altitude data**

Factor	Units	Values	
		SU402887	SU409889
Grid reference	N/A	SU402887	SU409889
Altitude	m, AOD	85	100
Accumulated Temperature	day°C (Jan-June)	1426	1409
Average Annual Rainfall	mm	659	666
Field Capacity Days	days	141	142
Moisture Deficit, Wheat	mm	106	104
Moisture Deficit, Potatoes	mm	99	96
Overall climatic grade	N/A	Grade 1	Grade 1

18. The agricultural land in this area has been classified as Grade 2 (very good quality) and Subgrade 3b (moderate quality). The principal limitations to land quality are soil droughtiness and gradient. The details of the classification of the site are shown on the attached ALC map and the area statistics of each grade are given in Table 3 below.

**Table 3: Land east of Grove Road, Wantage - Area of grades and other land**

Grade/Other land	Area (hectares)	% surveyed area	% site area
2	35.6	93.0	89.4
3b	2.7	7.0	6.8
Other land	1.5	-	3.8
Total surveyed area	38.3	100	96.2
Total site area	39.8	-	100

**Grade 2**

19. Land of very good quality occurs over the majority of the site. The land was found to have a minor droughtiness limitation. The soils in this unit are characterised by soil pits 1P, 2P and 3P (Appendix II). The soils are well drained (Wetness Class I) and non-calcareous. Iron staining is evident in some profiles as the result of weathering of the parent material but is not indicative of gleying. The soils comprise medium silty clay loam topsoils overlying similar upper subsoils. These pass into lower subsoils that are either similarly textured or are heavy clay loams or heavy silty clay loams containing 10–45% fine soft sandstone or 40% silt rock. The combination of soil textures and stone contents, together with the local climatic regime, means that profiles often have restricted reserves of water. This leads to a slight risk of drought stress to plants in most years and means that this land can be classified no better than Grade 2.

**Subgrade 3b**

20. Gradient alone in the west restricts land quality to Subgrade 3b. Slopes were measured at between 7–11°. This is sufficient to restrict the safe and efficient use of certain agricultural machinery and so restrict the crops that may be grown in this area.

**LAND NORTH OF THE PORT WAY, WANTAGE (FRCA reference 3304/16/99)**

21. This area totals 44.3 ha of land located to the north of the Port Way, east of Wantage town. In total, 22 borings and 2 soil pits were described. The survey corresponds to the area described by the Vale of White Horse District Council as Wg 3.
22. The climatic details for the site are given in Table 4 below. The survey area lies between approximately 97m and 105m AOD. The highest land occurs in the north of the site and falls through gentle gradients southwards. The site is not affected by microrelief or flooding.

**Table 4: Climatic and altitude data**

Factor	Units	Values	
		SU415889	SU414884
Grid reference	N/A	SU415889	SU414884
Altitude	m, AOD	100	100
Accumulated Temperature	day°C (Jan-June)	1409	1409
Average Annual Rainfall	mm	667	669
Field Capacity Days	days	142	143
Moisture Deficit, Wheat	mm	105	105
Moisture Deficit, Potatoes	mm	96	96
Overall climatic grade	N/A	Grade 1	Grade 1

23. The geology of the site is predominately Upper Greensand with some Head and younger Coombe deposits in the south-east.
24. The soils are mapped as the Harwell series over the majority of the site with soils of the Ardington series mapped over the Head and younger Coombe deposits (SSGB, 1973). These series are components of the Harwell association as described in paragraph 12.
25. The agricultural land at this site has been classified as Grade 2 (very good quality) and Subgrade 3a (good quality). The main limitations to land quality are soil droughtiness and soil wetness respectively. The details of the classification of the site are shown on the attached ALC map and the area statistics of each grade are given in Table 5, below.

**Table 5: Land north of the Port Way, Wantage - Area of grades and other land**

Grade/Other land	Area (hectares)	% surveyed area	% site area
2	32.9	76.5	74.3
3a	10.1	23.5	22.8
Other land	1.3	-	2.9
Total surveyed area	43.0	100	97.1
Total site area	44.3	-	100

## Grade 2

26. Land of very good quality, occurs over the majority of the site. The land was found to have a minor droughtiness limitation. The soils in this unit are characterised by soil pit 2P (Appendix II) and droughtier conditions by soil pit 1P of the adjacent survey (3304/17/99). The soils are well drained (Wetness Class I) and non-calcareous. Iron staining is evident in some profiles as the result of weathering of the parent material but is not indicative of gleying. Soils comprise very slightly stony (5% total fine soft sandstone by volume) medium silty clay loam topsoils overlying similar upper subsoils with 2% total fine soft sandstone. These pass into similar lower subsoils extending to a depth of at least 120cm. Droughtier conditions occur where profiles are impenetrable to the auger at variable depths in the range 75–90cm over weathered malmstone. Soil pit 1P, on the adjacent survey, is representative of these soils and is also classified as Grade 2. It comprises a very slightly stony (2% flints by volume) medium silty clay loam overlying a similarly textured upper subsoil with 2% silt rock. This passes to a very slightly stony (5% silt rock) heavy silty clay loam lower subsoil before passing to a slightly stony (10% fine soft sandstone) heavy clay loam. The combination of soil textures and stone contents, together with the local climatic regime, means that profiles have slightly restricted reserves of water. This leads to a slight risk of drought stress to plants in most years and means that this land can be classified no better than Grade 2.

## Subgrade 3a

27. Land of good quality has been mapped in the south of the site. The principal limitation is soil wetness. Soils in this unit are characterised by soil pit 1P (see Appendix II) and comprise a non-calcareous medium silty clay loam topsoil. This overlies a gleyed heavy silty clay loam upper subsoil before passing to a poorly structured silty clay subsoil. The lower clay horizon is slowly permeable and has the effect of restricting drainage to the extent that in the local climate Wetness Class III is most appropriate. The combination of imperfect drainage, topsoil textures and local climate assigns this land to Subgrade 3a. Excessive soil wetness may adversely affect crop growth and development. It is also likely to limit the flexibility of the land by reducing the number of days when the soil is in a suitable condition for cultivation, trafficking by machinery or grazing by livestock. Occasional observations of both a slightly better and slightly worse quality have been included in this map unit as they were of too scattered a distribution to be mapped separately at this scale of survey.

**LAND SOUTH OF THE PORT WAY, WANTAGE (FRCA reference 3304/17/99)**

28. This area totals 22.2 ha of land to the south of the Port Way, to the east of Wantage town. In total, 13 borings and 2 soil pits were described. The location of the auger borings and pits is shown on the attached sample location map and the details of the soils data are presented in Appendix II. The survey corresponds to the area described by the Vale of White Horse District Council as Wg 4.
29. The climatic details for the site are given in Table 6 below. The survey area lies between approximately 97m and 105m AOD. The highest land occurs in the south of the site and falls through gentle gradients to the north-west. The site is not affected by microrelief or flooding.

**Table 6: Climatic and altitude data**

Factor	Units	Values	
Grid reference	N/A	SU414881	SU416880
Altitude	m, AOD	100	105
Accumulated Temperature	day°C (Jan-June)	1409	1404
Average Annual Rainfall	mm	671	674
Field Capacity Days	days	143	144
Moisture Deficit, Wheat	mm	105	104
Moisture Deficit, Potatoes	mm	96	95
Overall climatic grade	N/A	Grade 1	Grade 1

30. The geology of the site is predominately Upper Greensand with some Head and younger Coombe deposits in the east.
31. The soils are mapped as the Harwell series over the majority of the site with soils of the Ardington series mapped over the Head and younger Coombe deposits (SSGB, 1973). These series are components of the Harwell association as described in paragraph 12.
32. The agricultural land at this site has been classified as Subgrade 3a (good quality). The main limitations to land quality are soil wetness or, less frequently, soil droughtiness. The details of the classification of the site are shown on the attached ALC map and the area statistics of each grade are given in Table 7, below.

**Table 7: Land South of the Port Way, Wantage - Area of grades and other land**

Grade/Other land	Area (hectares)	% surveyed area	% site area
3a	20.2	100	91.0
Other land	2.0	-	9.0
Total surveyed area	20.2	100	91.0
Total site area	22.2	-	100

### Subgrade 3a

33. All of this survey area has been classified as Subgrade 3a on the basis of a soil wetness or a soil droughtiness limitation. The profiles are variable in nature due to the interbedded and complicated pattern of the parent materials from which they are derived. As a result of this inherent variability, occasional borings of better quality were found but were too scattered to be mapped separately at this scale.
34. Profiles affected by soil wetness restrictions typically comprise variably calcareous, medium clay loam or medium silty clay loam topsoils which are stoneless or very slightly stony (containing up to 3% total flints and/or ironstone fragments). These rest over similar, or slightly heavier textured, upper subsoils. Lower subsoils are encountered at depths between 42 and 48cm; these comprise clays or silty clays that are poorly structured with low porosity. As a result, soil drainage is significantly impeded. Soil Pit 2 (see Appendix II) is representative of this soil type. The combination of these drainage characteristics (Wetness Class III) and the prevailing climate gives rise to Subgrade 3a. The soil wetness limitation is likely to affect crop growth and development, as well as influence the number of days when the land is suitable for cultivation and/or grazing by livestock.
35. Profiles affected by a soil droughtiness limitation comprise variable topsoils which range from fine sandy silt loam to heavy silty clay loam textures, are variably calcareous, and are very slightly stony (containing up to 2% total hard rock). These overlie heavy silty clay loam or heavy clay loam subsoils which contain up to 10% silt rock/fine soft sandstone. The subsoils are variably drained but often show evidence of impeded drainage in the form of gleying. As a result, Wetness Class I or II has been assigned to these soils. At depths between 50cm and 60cm, the soils were impenetrable (to the soil auger) over fine soft sandstone/silt rock. Soil inspection Pit 1 (Appendix II) is typical of these profiles. In Pit 1, a compact, weathered fine soft sandstone/silt rock horizon was encountered at 50cm which continues to depth. Plant roots could not penetrate this horizon. The combination of soil texture, the amount of soft sandstone and siltstone and the effective rooting depth restricts the water available to crops such that there is a risk of drought stress to the plants in most years. This will result in a reduction in the level and consistency of yields. This land can therefore be graded no higher than Subgrade 3a.

**LAND NORTH-WEST OF WANTAGE (FRCA reference 3304/22/99)**

36. The area surveyed to the west of the town of Wantage totals 104.1 ha. It adjoins the town of Wantage and the village of East Challow and extends northwards towards the industrial areas adjacent to the disused airfield between Wantage and Grove. In total, 55 borings and 4 soil pits were described. The location of the auger borings and pits is shown on the attached sample location map and the details of the soils data are presented in Appendix II. The survey comprises the land originally described by the Vale of White Horse District Council as Wg 10 and includes approximately one quarter of the area delineated as Wg 11. The remainder of Wg 11 was not surveyed.
37. The climatic details for the site are given in Table 8 below. The survey area lies between approximately 75m and 105m AOD. The highest land occurs in the south of the site and falls towards the centre of the site around Woodhill Brook. The remainder of the site to the north of the stream rises gently. The majority of the gradients on the site are shallow but towards the south one area has moderate gradients of sufficient slope to adversely affect land quality and restrict it to Subgrade 3b. The site is not affected by microrelief and is unlikely to be significantly affected by flooding, as Woodhill Brook is a small stream which runs in a deeply incised channel.

**Table 8: Climatic and altitude data**

Factor	Units	Values		
		SU384895	SU387884	SU383880
Grid reference	N/A	SU384895	SU387884	SU383880
Altitude	m, AOD	80	100	105
Accumulated Temperature	day°C (Jan-June)	1432	1410	1405
Average Annual Rainfall	mm	660	674	681
Field Capacity Days	days	142	145	147
Moisture Deficit, Wheat	mm	107	104	104
Moisture Deficit, Potatoes	mm	99	95	94
Overall climatic grade	N/A	Grade 1	Grade 1	Grade 1

38. The geology in the south is predominately Upper Greensand. This passes through second terrace drift deposits in the north to Gault Clay which prevails over the remainder of the site.
39. The soils are mapped as including the Harwell association where the Upper Greensand and terrace drift geology occurs with Denchworth and a small area of Block association soils mapped where the site is underlain by Gault Clay. These associations are as described in paragraphs 11 and 12.
40. The agricultural land at this site has been classified as Grade 2 (very good quality), Subgrade 3a (good quality) and Subgrade 3b (moderate quality). Limitations to land quality include soil droughtiness, soil wetness and gradient. The details of the classification of the site are shown on the attached ALC map and the area statistics of each grade are given in Table 9 below.

**Table 9: Land north-west of Wantage - Area of grades and other land**

Grade/Other land	Area (hectares)	% surveyed area	% site area
2	15.4	17.2	14.8
3a	26.3	29.3	25.3
3b	48.0	53.5	46.1
Agricultural Land Not Surveyed	4.0	-	3.8
Other land	10.4	-	10.0
Total surveyed area	89.7	100	86.2
Total site area	104.1	-	100

### Grade 2

41. Very good quality land is mapped in the south of this survey area. The principal limitation here is topsoil workability due to the heavy topsoils present in this area. Some profiles were limited by soil wetness alone where the topsoils were marginally lighter. Soil profiles commonly comprise a heavy clay loam or heavy silty clay loam topsoil passing to similar and clay subsoils. The majority of these subsoils showed no evidence of soil wetness within 70cm and are considered well drained (Wetness Class I). The heavy topsoils cause land versatility to be adversely affected as winter access is likely to be restricted. This restriction alone is sufficient to limit land quality to Grade 2. Some of the profiles present in this area were adjudged to have medium silty clay loam topsoils but often contained other indications of soil wetness such as ochreous mottling and/or slowly permeable clay horizons within 70–80cm. These fall into Wetness Class II and are classified as Grade 2. Topsoil workability and slight soil wetness have the effect of slightly restricting the versatility of the land so that certain highly demanding or winter harvested crops may not be successfully grown. However high yields are still likely to be attained from a wide range of crops.

### Subgrade 3a

42. Good quality land is mapped in three separate units in the east, west and south-west of the survey area. The most common limitation to land use in this subgrade is soil wetness; soil droughtiness is prevalent in some areas especially in the south-western unit.
43. The most common soil type comprises a heavy clay loam, heavy silty clay loam or, occasionally, clay topsoil passing to similarly textured subsoil horizons. Upper subsoils rarely showed signs of drainage impedance and were discovered to be moderately structured in the representative soil pit (1P, see Appendix II). However, from between 50 and 75cm the lower subsoils contain ochreous mottles and are poorly structured (moderately developed coarse angular blocky). These factors are indicative of impeded drainage and increase the likelihood of the land being unsuitable for grazing and other landwork during wetter periods of the year. Within the local climate the depth to the slowly permeable horizons leads this land to be placed in Wetness Class II. With the heavy topsoils present in these areas Subgrade 3a is the most appropriate classification. Excessive soil wetness may adversely affect crop growth and development. It can also limit the flexibility of the land by reducing the number of days when the soil is in a suitable condition for cultivation, trafficking by machinery or grazing by livestock.

44. The good quality land mapped in the south west of this survey area is principally limited by soil droughtiness. Soil Pit 3 (see Appendix II) is representative of this soil unit. The soils comprise heavy silty clay loam topsoils and upper subsoils which pass to medium silty clay loam lower subsoils. Within the profile 2% flints and 2% silt rock were noted in the topsoil and upper subsoil, rising to 23% chalk by volume from 42cm in the lower subsoil. The volume of chalk in the lower subsoil causes root penetration to cease at approximately 75cm and restricts plant water availability in the local climate to a level whereby Subgrade 3a is most appropriate. Soil droughtiness is likely to restrict plant growth as there may not be sufficient water available for plant growth throughout the growing season and as such maximum yields may not be realised. No evidence of soil wetness was noted within the profile and as such this area is classified as Wetness Class I.

### **Subgrade 3b**

45. The moderate quality land within this survey area is located in the north, and is most often on ground which slopes towards Woodhill Brook. The substrate in this area is mapped as Gault Clay. The land is principally limited by soil wetness. The soils typically comprise a heavy clay loam or clay topsoil which directly overlies a gleyed and slowly permeable subsoil. Soil Pit 2 from the adjacent site (3304/18/99) confirms the poor structural condition of the subsoil as moderately developed coarse angular blocky with <0.5% biopores visible in a heavily gleyed matrix. The effects of soil wetness are described above in paragraph 66 but in this area they are more severe and access to the land for cultivations etc. is more limited.

**LAND NORTH-WEST OF DENCHWORTH ROAD, GROVE (FRCA reference 3304/18/99)**

46. This area totals 73.5 ha and is located on a disused airfield west/south-west of Grove and north-west of Wantage. In total, 38 borings and 4 soil pits were described during the survey. The location of the auger borings and pits is shown on the attached sample location map and the details of the soils data are presented in Appendix II. The survey area is that mapped by the Vale of White Horse District Council as Wg 12.
47. The climatic details of the site are given in the Table 10 below. The area is virtually flat lying between 80m and 85m AOD. The slightly higher land is towards the centre of the survey area and falls very gently away to the north, east and west. The site is not adversely affected by microrelief or flooding.

**Table 10: Climatic and altitude data**

Factor	Units	Values
Grid reference	N/A	SU393893
Altitude	m, AOD	85
Accumulated Temperature	day°C (Jan-June)	1426
Average Annual Rainfall	mm	658
Field Capacity Days	days	141
Moisture Deficit, Wheat	mm	106
Moisture Deficit, Potatoes	mm	98
Overall climatic grade	N/A	Grade 1

48. The geology map (BGS, 1971) shows this area to be predominantly underlain by second terrace drift deposits which are bordered by Cretaceous Gault Clay in the west, south and east. In the east, first terrace drift deposits are mapped.
49. The soils across the majority of the site are shown as comprising the Grove association with Denchworth soils bordering to the west (SSEW, 1983). The earlier more detailed soil map of the area (SSGB, 1973) includes the airfield as an unsurveyed area. These soils are as described in paragraphs 9 and 10.
50. The majority of the agricultural land at this site has been classified as Subgrade 3a (good quality) with smaller areas of Subgrade 3b (moderate quality) and Grade 4 (poor quality). The main limitations to land quality are soil droughtiness, soil wetness, topsoil workability and the presence of disturbed areas along the lines of old runways. The details of the classification of the site are shown on the attached ALC map and the area statistics of each grade are given in Table 11 below.

**Table 11: Land north-west of Denchworth Road, Wantage - Area of grades and other land**

Grade/Other land	Area (hectares)	% surveyed area	% site area
3a	40.4	58.9	54.9
3b	22.4	32.6	30.5
4	5.8	8.5	7.9
Other land	4.9	-	6.7
Total surveyed area	68.6	100	93.3
Total site area	73.5	-	100

### Subgrade 3a

51. The majority of the site is mapped as good quality land. Principal limitations in this unit includes soil wetness, soil droughtiness and topsoil workability. Soils in this area that are principally restricted by soil droughtiness typically contain a heavy clay loam, heavy silty clay or clay topsoil, passing to a clay or silty clay upper subsoil overlying medium to heavy silty clay loam subsoils. Stone contents in the topsoil are typically in the range 2–5% flints by volume, although up to 15% was recorded. In the upper subsoil 5–10% flints was common. This horizon also occasionally contained up to 15% chalk fragments. The lower subsoil contained between 20 and 50% chalk. In a few observations the chalky drift horizon was penetrated and a weathered shattered chalk was encountered at depths in excess of 75cm. More typically however the chalky drift horizon was impenetrable to the soil auger between 60 and 100cm. In soil pits 1P and 4P (Appendix II) roots were observed to be restricted by the presence of the chalky drift. Roots were able to penetrate between 12 and 21cm into the chalky substrate. This has the effect of restricting water availability to any crops grown in these areas such that Subgrade 3a is most appropriate on the basis of soil droughtiness. This has the effect of restricting plant growth by causing insufficient water to be available to crops throughout the growing season.
52. Some of the areas mapped as Subgrade 3a are limited by a combination of soil wetness and topsoil workability as a result of the presence of poorly drained horizons and heavy topsoils. Soil profiles in these areas typically comprise clay or heavy clay loam topsoils which pass to similar upper subsoils overlying a gleyed and slowly permeable lower subsoil. The depths of the clay are such the soils are placed in Wetness Classes I and II. The heavy nature of the topsoils produces a classification of Subgrade 3a. Excessive soil wetness may adversely affect crop growth and development. It can also limit the flexibility of the land by reducing the number of days when the soil is in a suitable condition for cultivation, trafficking by machinery or grazing by livestock. These factors may be exacerbated by shallow groundwater which was occasionally encountered.

### Subgrade 3b

53. The moderate quality land within this survey area is located towards the margins of the site, on slightly sloping ground which does not have the benefit of a drift deposit overlying the Gault Clay. The land is principally limited by soil wetness. The soils typically comprise a heavy clay loam or clay topsoil which directly overlies a gleyed and slowly permeable subsoil. Soil pit 3P

confirms the poor structural conditions of the subsoil (moderately developed coarse angular blocky with <0.5% biopores visible in a heavily gleyed matrix).

#### Grade 4

54. Poor quality land has been mapped in two strips across the site. The land in this area has been disturbed in the past by being part of runways associated with the land's previous use as an airbase. The runways have been mechanically broken up and seeded with grass. The apparent soil resource is severely limited and these areas are suited only to rough grazing. Ploughing may be possible although the areas were generally not penetrable beyond a maximum of 30cm. A small trial pit was dug in one location which showed the topsoil to contain abundant concrete fragments. The area has a severe soil droughtiness limitation that would inhibit growth of all but the hardiest crops and its current use as grassland for rough grazing is the best that might be expected.

**LAND EAST OF DENCHWORTH ROAD, WANTAGE (FRCA reference 3304/23/99)**

55. This area totalling 26.5 ha of land is located between Wantage and Grove. The site is split by a disused canal - to the south the land is in agricultural use but to the north it is currently in a non-agricultural recreational use. In total, 8 borings and 1 soil pit were described. The location of the auger borings and pits is shown on the attached sample location map and the details of the soils data are presented in Appendix II. The survey comprises the area originally described by the Vale of White Horse District Council as Wg 13.
56. The climatic details for the site are given in Table 12 below. The survey area is virtually flat, lying at approximately 80m AOD. The site is not affected by microrelief or flooding.

**Table 12: Climatic and altitude data**

Factor	Units	Values
Grid reference	N/A	SU397893
Altitude	m, AOD	80
Accumulated Temperature	day°C (Jan-June)	1432
Average Annual Rainfall	mm	654
Field Capacity Days	days	140
Moisture Deficit, Wheat	mm	106
Moisture Deficit, Potatoes	mm	99
Overall climatic grade	N/A	Grade 1

57. The geology of the site is predominately first river terrace gravels overlying Gault Clay. In the south west, Gault is mapped, while along the south-eastern flank of the site is a very small band of alluvium is mapped associated with the Letcombe Brook.
58. The soils are predominantly mapped as the Grove series. Towards the south-east of the site the Ford-End and Hendred series are shown by the Soil Survey of Great Britain (1973). These series are components of the Grove association described in paragraph 9.
59. The agricultural land at this site has been classified as Subgrade 3b. The main limitation to land quality is soil wetness. The details of the classification of the site are shown on the attached ALC map and the area statistics of each grade are given in Table 13 below.

**Table 13: Land east of Denchworth Road, Wantage - Area of grades and other land**

Grade/Other land	Area (hectares)	% surveyed area	% site area
3b	12.6	100	47.5
Other land	13.9	-	52.5
Total surveyed area	12.6	100	47.5
Total site area	26.5	-	100

60. Typical soil profiles comprise calcareous, very slightly stony, heavy silty clay loam topsoils over calcareous clay upper and lower subsoils. In some cases, the clay subsoils pass into

slightly lighter textured (heavy silty clay loam) horizons, which may reflect the presence of malmstone. Profiles are typified by the soil pit, 1P (see Appendix II). Evidence from the pit indicated that the subsoils are gleyed and slowly permeable, therefore, downward water movement through the profile is impeded. In the local climate, the profiles in this unit are poorly drained (Wetness Class IV) which, in combination with the fine textured topsoils, places the soils in Subgrade 3b. The soil wetness limitation imparts a restriction on access to the land for cultivations and/or grazing and also restricts the range of crops that can be produced and the level and consistency of yields that can be achieved. Within the Subgrade 3b unit, borings of better quality were observed, due to insufficient depth of slowly permeable layer or absence of mottling. As such, these profiles are imperfectly to moderately well drained. However, these were isolated borings and were insufficient to form a discrete mapping unit.

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## APPENDIX I

### DESCRIPTIONS OF THE GRADES AND SUBGRADES

#### **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 or horticultural crops can usually be grown but on some land of this 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 land.

#### **Grade 3: Good to Moderate Quality Land**

Land with moderate limitations which affect the choice of crops, the timing and type of cultivation, harvesting or the level of yield. When 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 the level of yields. It is mainly suited to grass with occasional arable crops (e.g. 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 severe limitations which restrict use to permanent pasture or rough grazing, except for occasional pioneer forage crops.

## SOIL PROFILE DESCRIPTIONS: EXPLANATORY NOTE

Soil pit and auger boring information collected during ALC fieldwork is held on a computer database. This uses notations and abbreviations as set out below.

### Boring Header Information

1. **GRID REF:** national 100 km grid square and 8 figure grid reference.
2. **USE:** Land use at the time of survey. The following abbreviations are used:

ARA: Arable	WHT: Wheat	BAR: Barley
CER: Cereals	OAT: Oats	MZE: Maize
OSR: Oilseed rape	BEN: Field beans	BRA: Brassicae
POT: Potatoes	SBT: Sugar beet	FCD: Fodder crops
LIN: Linseed	FRT: Soft and top fruit	FLW: Fallow
PGR: Permanent pasture	LEY: Ley grass	RGR: Rough grazing
SCR: Scrub	CFW: Coniferous woodland	OTH: Other
DCW: Deciduous woodland	BOG: Bog or marsh	SAS: Set-Aside
HTH: Heathland	HRT: Horticultural crops	PLO: Ploughed

3. **GRDNT:** Gradient as estimated or measured by a hand-held optical clinometer.
4. **GLEYSPL:** Depth in centimetres (cm) to gleying and/or slowly permeable layers.
5. **AP (WHEAT/POTS):** Crop-adjusted available water capacity.
6. **MB (WHEAT/POTS):** Moisture Balance. (Crop adjusted AP - crop adjusted MD)
7. **DRT:** Best grade according to soil droughtiness.
8. If any of the following factors are considered significant, 'Y' will be entered in the relevant column:

MREL: Microrelief limitation	FLOOD: Flood risk	EROSN: Soil erosion risk
EXP: Exposure limitation	FROST: Frost prone	DIST: Disturbed land
CHEM: Chemical limitation		

9. **LIMIT:** The main limitation to land quality. The following abbreviations are used:

OC: Overall Climate	AE: Aspect	ST: Topsoil Stoniness
FR: Frost Risk	GR: Gradient	MR: Microrelief
FL: Flood Risk	TX: Topsoil Texture	DP: Soil Depth
CH: Chemical	WE: Wetness	WK: Workability
DR: Drought	ER: Erosion Risk	WD: Soil Wetness/Droughtiness
EX: Exposure		

### Soil Pits and Auger Borings

1. **TEXTURE:** soil texture classes are denoted by the following abbreviations:

S: Sand	LS: Loamy Sand	SL: Sandy Loam
SZL: Sandy Silt Loam	CL: Clay Loam	ZCL: Silty Clay Loam
ZL: Silt Loam	SCL: Sandy Clay Loam	C: Clay
SC: Sandy Clay	ZC: Silty Clay	OL: Organic Loam
P: Peat	SP: Sandy Peat	LP: Loamy Peat
PL: Peaty Loam	PS: Peaty Sand	MZ: Marine Light Silts

For the sand, loamy sand, sandy loam and sandy silt loam classes, the predominant size of sand fraction will be indicated by the use of the following prefixes:

F: Fine (more than 66% of the sand less than 0.2mm)
M: Medium (less than 66% fine sand and less than 33% coarse sand)
C: Coarse (more than 33% of the sand larger than 0.6mm)

The clay loam and silty clay loam classes will be sub-divided according to the clay content:

M: Medium (<27% clay) H: Heavy (27-35% clay)

2. **MOTTLE COL:** Mottle colour using Munsell notation.
3. **MOTTLE ABUN:** Mottle abundance, expressed as a percentage of the matrix or surface described:  
F: few <2% C: common 2-20% M: many 20-40% VM: very many 40% +

4. **MOTTLE CONT:** Mottle contrast:

- F: faint - indistinct mottles, evident only on close inspection
- D: distinct - mottles are readily seen
- P: prominent - mottling is conspicuous and one of the outstanding features of the horizon

5. **PED. COL:** Ped face colour using Munsell notation.

6. **GLEYS:** If the soil horizon is gleyed a 'Y' will appear in this column. If slightly gleyed, an 'S' will appear.

7. **STONE LITH:** Stone Lithology - one of the following is used:

<b>HR:</b>	all hard rocks and stones	<b>FSST:</b>	soft, fine grained sandstone
<b>ZR:</b>	soft, argillaceous, or silty rocks	<b>CH:</b>	chalk
<b>MSST:</b>	soft, medium grained sandstone	<b>GS:</b>	gravel with porous (soft) stones
<b>SI:</b>	soft weathered igneous/metamorphic rock	<b>GH:</b>	gravel with non-porous (hard) stones

Stone contents (>2cm, >6cm and total) are given in percentages (by volume).

8. **STRUCT:** the degree of development, size and shape of soil peds are described using the following notation:

Degree of development	<b>WK:</b> weakly developed	<b>MD:</b> moderately developed
	<b>ST:</b> strongly developed	
Ped size	<b>F:</b> fine	<b>M:</b> medium
	<b>C:</b> coarse	
Ped shape	<b>S:</b> single grain	<b>M:</b> massive
	<b>GR:</b> granular	<b>AB:</b> angular blocky
	<b>SAB:</b> sub-angular blocky	<b>PR:</b> prismatic
	<b>PL:</b> platy	

9. **CONSIST:** Soil consistence is described using the following notation:

<b>L:</b> loose	<b>FM:</b> firm	<b>EH:</b> extremely hard
<b>VF:</b> very friable	<b>VM:</b> very firm	
<b>FR:</b> friable	<b>EM:</b> extremely firm	

10. **SUBS STR:** Subsoil structural condition recorded for the purpose of calculating profile droughtiness:

G: good M: moderate P: poor

11. **POR:** Soil porosity. If a soil horizon has less than 0.5% biopores >0.5 mm, a 'Y' will appear in this column.

12. **IMP:** If the profile is impenetrable to rooting a 'Y' will appear in this column at the appropriate horizon.

13. **SPL:** Slowly permeable layer. If the soil horizon is slowly permeable a 'Y' will appear in this column.

14. **CALC:** If the soil horizon is calcareous, a 'Y' will appear in this column.

15. **Other notations:**

- APW:** available water capacity (in mm) adjusted for wheat
- APP:** available water capacity (in mm) adjusted for potatoes
- MBW:** moisture balance, wheat
- MBP:** moisture balance, potatoes