Appendix 13.1 N.A Duncan & Associates Agricultural Land Classification (ALC) at Oakington Barracks, November 2001.

1 Introduction and Summary

N A Duncan & Associates were instructed by Fairhurst Environment Division on behalf of the Ministry of Defence, Defence Estates to carry out an Agricultural Land Classification (ALC) survey of Oakington Airfield, Cambridgeshire.

The survey site comprises the old airfield and barracks. Part of the area of the old barracks is now used by the Home Office as a Reception Centre, with the remainder of the buildings being unused. The airfield is disused for military purposes, but many of the old runways and hard standing areas, together with some small buildings are still present. Some major landscaping work has been carried out over the southern half of the airfield, where a lake and some mounds have been constructed and some of the old runways removed. A number of tree plantations have also been planted within this area. The landscaped area is now used as grazing land. The majority of the remainder of the airfield is used for agricultural purposes, with arable cropping at the northern end of the site and all the remaining land under permanent grass and used for silage production with the aftermath being grazed. The site occupies an area of approximately 290 ha.

The survey was carried out in November 2001 and a total of 74 auger bore observations were made over the agricultural area, backed up with four soil pits. The location of the observations are shown on Plan NAD 222 which accompanies this report

Four distinct soil types have been mapped across the site. At the northern and southern ends of the site, poorly draining heavy clay soils have been identified. Two similar soil types occupy much of the central and eastern part of the airfield comprising loamy soils. The major difference between the two is the presence of calcareous gravelly material at moderate depth in one with other comprising loamy material to depth. A further soil type was identified comprising an intergrade between the loamy soils in the central area and the clayey soils to the north and south. These soils typically comprise loamy and slightly gravelly upper layers over slowly permeable clay at moderate depth. The soils in the landscaped area have been markedly disturbed giving rise to a variety of different soil profiles. A description of the soil types is given in section 3 and the soil pit descriptions representing the various soil types are presented in Appendix 1 to this report.

The land has been classified using the guidelines and criteria contained in the Agricultural Land Classification of England and Wales (MAFF, 1988). The deep loamy soils occupying the central part of the site have been mapped as Grade 2, whilst the shallower loamy soils overlying gravelly substrate or slowly permeable

clay have been classified as Subgrade 3a. The poorly draining clayey soils at the northern and southern ends of the airfield have been classified as Subgrade 3b, whilst the more seriously disturbed landscaped area has been mapped as Grade 4. A description of the site's grading is given in Section 4 and the amount of land falling within each grade is set out in Table 2 on page 7. Plan NAD 223 shows the mapping of the ALC grades across the site.

The published 1:63,360 scale Provisional ALC map, Sheet No. 135 (MAFF 1971) shows the majority of the site mapped as non-agricultural, with a small area of agricultural land classified as Grade 2 and Grade 3 at the northern end of the area. These maps were based on a reconnaissance field survey using criteria of the original ALC system (MAFF 1966). The ALC system was revised in 1988 and this revised system has been used in the current detailed survey.

2 Agricultural Land Classification System

The land has been classified using the guidelines contained in the Agricultural Land Classification of England and Wales (MAFF, 1988). This system provides a framework for classifying land according to the extent to which its physical or chemical characteristics impose long-term limitations on agricultural use. The limitations can operate in one or more of four principle ways: they may affect the range of crops which can be grown, the level of yield, the consistency of yield and the cost of obtaining it. The classification gives considerable weight to the flexibility of cropping, whether actual or potential, but the ability of some land to produce consistently high yields of a somewhat narrower range of crops is also taken into account.

The principal factors influencing agricultural production are climate, site and soils. The main climatic factors which are taken into account are temperature and rainfall, although account is also taken of exposure, aspect and frost risk. The site factors used in the classification system are gradient, microrelief and flood risk. Soil characteristics of particular importance are texture, structure, depth and stoniness. In some situations where chemical properties may influence the long-term potential of the land, these are taken into account.

These factors result in varying degrees of constraint on agricultural production. They can act either separately or in combination, the most important interactive limitations being soil wetness and droughtiness. The grade or subgrade of the land is determined by the most limiting factor present. Five grades of land are recognised ranging from Grade 1 - land of excellent quality, to Grade 5 - land of very poor quality. Grade 3, which constitutes about half the agricultural land in England and Wales is divided into two subgrades designated 3a and 3b.

Details of the ALC system are contained in the Revised Guidelines and Criteria for grading agricultural land in England and Wales (MAFF, 1988). Descriptions of the grades and subgrades are provided in Appendix 2.

3 Physical Factors affecting land quality

3.1 CLIMATE

Climate affects land grading through the assessment of an overall climatic limitation and also through interactions with soil characteristics.

The key climatic variables used for grading the site are given in Table 1 and were obtained from the published 5km grid datasets using the standard interpolation procedures (Met. Office, 1989).

3.2 TABLE 1: CLIMATIC INTERPOLATION

Factor	Oakington Airfield, Cambridgeshire
Grid reference	TL 410 660
Altitude	10 m AOD
Accumulated Temperature	1455 day °C
Average Annual Rainfall	545 mm
Field Capacity Days	88 days
Moisture Deficit, Wheat	118 mm
Moisture Deficit, Potatoes	113 mm
Climatic Grade	1

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. The number of field capacity days indicates the length of time over winter that soils could be wet and difficult to work. Moisture deficits for wheat and potatoes are an indication of droughtiness through the growing season.

The details given in Table 1 indicate that the climatic grade for the area is Grade1. Climatic factors however can also interact with soil properties to influence soil droughtiness and wetness. The site is located in an area of low rainfall and moderately high moisture deficits. Droughtiness therefore will be a major limiting factor in this area and soils will need a high available water capacity to avoid excessive drought stress to crops during the summer months

3.3 RELIEF

The majority of the site is mainly flat in keeping with its former use as an airfield. The altitude of the site is approximately 10 m AOD.

Some mounds have been constructed in the landscaped area, giving rise to localised moderately steep slopes. Relief however is not considered to be an overriding factor on any part of the airfield.

3.4 SOILS

The area has been mapped by the Soil Survey of England and Wales both at a scale of 1 inch to the mile (Soil Surv. 1966) and at a 1:250,000 scale (Soil Surv. 1983). The former shows the area to be occupied by 6 major soil series. The northern and southern parts of the site are mapped mainly as the Denchworth and Wicken series, which comprise slowly permeable clayey soils developed in Jurassic clays. The central area comprises soils of the Landbeach and Milton series. These two soils are both loamy soils and are distinguished by the Milton soils having deep loamy subsoils whilst the Landbeach soils overlie calcareous gravelly material at moderate depths. St Lawrence series and Aldreth series have also been mapped which comprise fine loamy drift overlying clay at depth.

Four distinct soil types have been mapped during the current survey and these correlate well with those described above.

Plan NAD 222 shows the distribution of the soil types mapped during the current survey.

3.5 SOIL TYPE 1 (SEE PIT 3, APPENDIX 1)

These soils have been mapped at the northern and southern ends of the site and comprise slowly permeable clayey soils developed in Jurassic clay. These soils typically have a dark greyish brown, non calcareous heavy clay loam topsoil overlying an olive brown clay upper subsoil with distinct ochreous mottles. Below 45-50 cm depth the lower subsoil is typically a light grey clay with common distinct ochreous mottles. The subsoil structure is typically angular blocky with very few coarse pores. The soils are generally stoneless throughout the subsoil, but secondary calcium carbonate concentrations are common at depth. These soils are typically slowly permeable below 45-50 cm depth and have been assessed as Wetness Class III (see Appendix 3).

3.6 SOIL TYPE 2 (SEE PIT 2, APPENDIX 1)

Soil Type 2 has been mapped in the central part of the site and comprises well or moderately well drained deep loamy soils. These soils typically have a dark brown, medium clay loam or sandy clay loam topsoil with few small flint stones overlying a yellowish brown medium clay loam upper subsoil. Below 60-70 cm depth the lower subsoil is typically a strong brown or yellowish brown sandy clay loam with faint ochreous mottles and/or manganese concretions. The subsoil horizons have a coarse subangular blocky structure and common worm channels. The soils are slightly stony throughout and have been assessed as Wetness Class I or occasionally II.

3.7 SOIL TYPE 3 (SEE PIT 1, APPENDIX 1)

Associated with the soils described above (Soil Type 2) are the loamy soils overlying sand and gravel. These soils have similar upper subsoil horizons but overlie sand and gravel below about 70-80 cm depth. A typical soil profile has a dark brown medium clay loam or sandy clay loam topsoil with few small flint stones overlying a yellowish brown clay loam subsoil, which becomes sandy clay

loam or sandy loam with depth. Faint ochreous mottles and/or manganese concretions are often encountered at depth due to a fluctuating groundwater table in the underlying gravel strata. Below 70-80 cm depth is a pale yellowish grey strongly calcareous gravelly coarse sand. The stones are typically very small and constitute approximately 35-40% of the material by volume. These soils have also been assessed as Wetness Class I/II.

3.8 SOIL TYPE 4 (SEE PIT 4, APPENDIX 1)

A further soil type has been mapped which is an intergrade between the clayey soils found at the northern and southern ends of the site and the better drained loamy soils occupying the central part of the airfield. These soils comprise loamy drift overlying the slowly permeable clay. A typical profile has a non calcareous dark brown medium or heavy clay loam or sandy clay loam topsoil overlying a greyish brown heavy clay loam or sandy clay loam upper subsoil with distinct ochreous mottles. Below 50-70 cm depth the lower subsoil is typically a light grey clay or sandy clay with distinct ochreous mottles. The upper subsoil is coarse subangular blocky whilst the lower subsoil is typically coarse angular blocky. These soils have been assessed as Wetness Class II or III.

4 Agricultural Land Classification

The site has been classified in accordance with the criteria contained in the Agricultural Land Classification of England and Wales (MAFF, 1988). A breakdown of the individual grades in terms of area and percentage of the site is given below in Table 2. The distribution of the grades is shown on Plan NAD 223.

4.1 TABLE 2: DISTRIBUTION OF GRADES AND SUBGRADES

Land at Oakington Airfield, Cambridgeshire		
Grade	Area (ha)	% of site
Grade 2	50.0	17.2
Subgrade 3a	61.9	21.3
Subgrade 3b	33.2	11.5
Grade 4	59.4	20.5
Woodland/Scrub	30.8	10.6
Urban	54.7	18.9
Total	290.0	100

4.2 GRADE 2

The deep loamy soils mapped as Soil Type 2 have been classified as Grade 2. The major limitation associated with these soils is droughtiness. These soils have a moderately high available water capacity, but moisture balance calculations indicate that in this low rainfall area, such soils will be slightly droughty especially for the shallower rooting crops, such as potatoes, restricting the land to Grade 2.

4.3 SUBGRADE 3A

Soil Types 3 and 4 have both been classified as Subgrade 3a. In the case of Soil Type 3 the major limitation is due to droughtiness. These soils overlie sands and gravels below approximately 70 cm depth and examination of the soil profile in soil pit 1 indicates that the plant roots do not penetrate this material. Soil moisture balance calculations indicate that under the prevailing climatic conditions these soils are moderately droughty for both reference crops (wheat and potatoes) restricting the land to Subgrade 3a.

In the case of Soil Type 4 the major limitation is wetness and workability due to the presence of a slowly permeable clay lower subsoil. These soils have been assessed as Wetness Class II or III depending on the depth to the slowly permeable clay. Topsoil textures typically range from heavy clay loam to sandy clay loam and consequently such soils have a moderate workability restriction as evidenced by the poaching from the cattle hooves. This wetness and workability limitation restricts the land to Subgrade 3a.

4.4 SUBGRADE 3B

Subgrade 3b has been mapped at the northern and southern ends of the site where the poorly draining clayey soils (Soil Type 1) have been mapped. These

soils have non calcareous heavy clay loam or clay topsoils overlying clay subsoil horizons. The subsoils are typically slowly permeable within 45 cm depth and as such the soils have been assessed as Wetness Class III. The heavy textured topsoil means that these soils have moderately severe workability limitations restricting the time that the soils can be trafficked or cultivated without causing damage. This moderately severe limitation therefore restricts the land to Subgrade 3b.

4.5 GRADE 4

The landscaped area has been mapped as Grade 4 due to the major disturbance that has occurred. Several mounds have been constructed using the clay extracted from the new lake and there is a limited amount of topsoil overlying the clay, ranging from 10 to 20 cm depth. The land in between the mounds is disturbed in places whilst in others undisturbed profiles were encountered. Individual observations within this area range from Grade 2 to Grade 4, although many of the undisturbed soil profiles are typically Soil Types 1 and 4. Due to the disturbance that has occurred in this area the land is now only suitable as grazing land. And hence the area has been mapped as Grade 4.

4.6 WOODLAND/SCRUB

A number of areas of Other Land have been identified, these include woodland plantations, scrub land and a small lake.

4.7 URBAN

This category includes the built up area of the former barracks and other outlying buildings, together with the runways and areas of hard standing.

Footnote: Due to the former use of the area as an airfield, there are likely to be numerous obstructions within the agricultural areas resulting from underground service ducts, drainage conduits etc. Much of the airfield is currently under permanent pasture and whilst some of these were noted during the survey, they were not taken into consideration when grading the area. These obstructions could result in some difficulties if the land were cultivated and could result in some localised down grading.

5 References

Ministry of Agriculture, Fisheries and Food (1966) *Agricultural Land Classification.* Tech Report No 11. MAFF London.

Ministry of Agriculture, Fisheries and Food (1971) *Agricultural Land Classification Map (Provisional) Sheet No. 135.*MAFF London

Ministry of Agriculture, Fisheries and Food (1988) *Agricultural Land Classification of England and Wales: Revised guidelines and criteria for grading the quality of agricultural land*. MAFF: London.

Met. Office (1989) *Climatological Data for Agricultural Land Classification*. Met. Office: Bracknell.

Soil Survey of England and Wales (1966) *The Soils of the District around Cambridge.* Harpenden.

Soil Survey of England and Wales (1984) *Soils and their Land Use in Eastern England England. Bulletin No 13.* Harpenden

ANNEXE 1

SOIL PIT DESCRIPTIONS

(Location of soil pits are shown on Plan NAD 222)

Soil Pit 1 (Soil Type 3)

Land Use Permanent Grass

0-27 cm Dark brown (10YR4/3) medium clay loam/sandy clay loam, 2% subangular flints, friable, very many fine and very fine roots, non calcareous, clear smooth boundary
27-50 Yellowish brown (10YR 5/5) heavy clay loam, 5% subangular flints, no mottles, moderate medium and coarse subangular blocky structure, friable, many fine roots, non calcareous, gradual smooth boundary
50-70 Yellowish brown (10YR5/5) sandy clay loam, 10-15% subangular flints, few faint ochreous mottles, weak medium subangular blocky structure, friable, common fine roots, few manganiferrous concretions, non calcareous, abrupt smooth boundary
70-120+ Light grey (10YR7/3) coarse sand, 35% very small rounded flints, single grain, loose, no roots, calcareous, waterlogged

Wetness Class I/II
Moisture Balance (wheat) 0 mm
Moisture Balance (potatoes) +3 mm Grade 3a drought

Soil Pit 2 (Soil Type 2)

Land Use Permanent grass

0-25 cm Dark brown (7.5YR4/3) medium clay loam, 3-4% small subangular flints, very many fine and very fine roots, non calcareous, clear smooth boundary
25-70 Brown (7.5YR5/4) medium clay loam (sandy), 1-2% small flints, no mottles, moderate coarse breaking to medium subangular blocky structure, friable, common fine roots, non calcareous, clear smooth boundary
70-120+ Strong brown (7.5YR5/5) medium sandy loam with sandy clay loam lenses, 1-2% small flints, weak coarse subangular blocky structure, friable, common fine roots, non calcareous.

Wetness Class I		
Moisture Balance (wheat)	+39 mm	
Moisture Balance (potatoes)	+1 mm	Grade 2 drought

Soil Pit 3 (Soil Type 1)

Land Use Cereal stubble

0-30 cm Dark grey brown (2.5Y4/2) heavy clay loam/clay, few 7.5YR4/6 ochreous mottles, 1-2% small angular flints, few fine roots, clear smooth boundary
30-50 Grey brown (2.5Y5/3) clay, <1% stones, common distinct 10YR6/6 ochreous mottles, moderate coarse subangular blocky breaking to medium and fine angular blocky structure, firm, few fine roots, non calcareous, clear smooth boundary
50-80+ Greyish brown (5Y5/2) clay, no stones, common distinct 2.5Y5/6 ochreous mottles, strong coarse angular blocky structure, firm, plastic, very few fine roots, few becoming common CaCO3 concretions

Wetness Class III
Moisture Balance (wheat) +16 mm
Moisture Balance (potatoes) -2 mm Subgrade 3b wetness

Soil Pit 4 (Soil Type 4)

Land Use Permanent grass

0-27 cm Dark brown (10YR4/3) heavy clay loam, 2-3% small & medium subangular flints, very many fine and very fine roots, non calcareous, clear smooth boundary
27-50 Yellowish brown (10YR5/4) heavy clay loam, 3-4% small flints, moderate coarse subangular blocky structure, friable, common fine roots, non calcareous, clear smooth boundary
50-100+ Light grey brown (2.5Y6/3) clay, <1% flints, common distinct 10YR5/6 ochreous mottles, moderate coarse angular blocky structure, firm. few fine and very fine roots, slightly calcareous

Wetness Class II
Moisture Balance (wheat) +14 mm
Moisture Balance (potatoes) -4 mm Subgrade 3a wetness

ANNEXE 2

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 Wetness Classes

Class I The soil profile is not wet within 70 cm depth for more than 30 days in most years

Class II The soil profile is wet within 70 cm depth for 30-90 days in most years

Class III The soil profile is wet within 70 cm for 90-180 days in most years

Class IV The soil profile is wet within 70 cm depth for more than 180 days, but not wet within 40 cm depth for more than 180 days in most years

Class V The soil profile is wet within 40 cm depth for more than 180 days, and is usually wet within 70 cm for more than 335 days in most years

Class VI The soil profile is wet within 40 cm depth for more than 335 days in most years

(Source: Soil Survey Field Handbook – Soil Survey of England and Wales, 1976)

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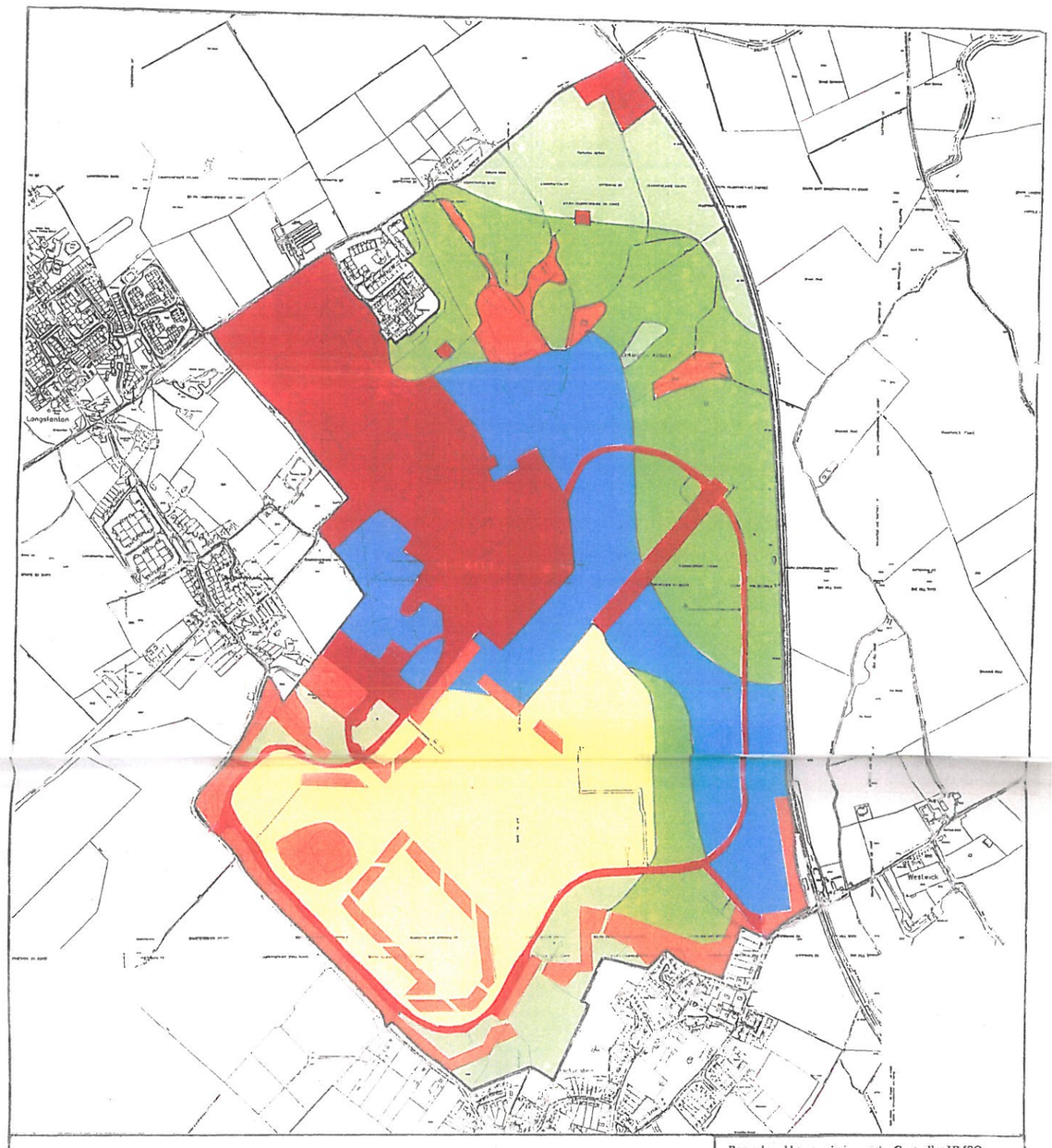

LEGEND

ALC Grades		Other Land	
Grade 2		Woodland/scrub	
Subgrade 3a		Urban	
Subgrade 3b			
Grade 4			

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N. A. Duncan & Associates

Title
AGRICULTURAL LAND CLASSIFICATION
Land at
OAKINGTON AIRFIELD, CAMBRIDGESHIRE

Client
DEFENCE ESTATES, MINISTRY OF DEFENCE

Drawing No.
NAD 223

Date
Nov 2001

Scale
1:10000

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DRAFT 2 - 9th October 2004 (includes land in centre of site based on published soil map)

LAND AT LONGSTANTON, CAMBRIDGESHIRE

SOILS AND AGRICULTURAL LAND CLASSIFICATION

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October 2004

LAND AT LONGSTANTON, CAMBRIDGESHIRE

SOILS AND AGRICULTURAL LAND CLASSIFICATION

SUMMARY

The soils on the site include those developed more or less directly over Jurassic or Cretaceous clays (Denchworth and Wicken series), in assorted kinds of loamy superficial drift over clay (St Lawrence, and Aldreth series) and in loamy drift over sand and gravel (Milton and Landbeach series) or Lower Greensand (Oakington series). The clayey Denchworth and Wicken series have impeded drainage due to slowly permeably subsoils (mainly Wetness Class) while the others are better drained (Wetness Class II or I).

About 15% of the of the site surveyed so far (as at 4th October 2004) is in Grade 2, associated with the deeper of the deeper Milton and St Lawrence profiles in the west of the land north and south of the golf course and on some of the St Lawrence profiles alongside the Oakington to A14 road, where slight to moderately summer droughtiness is the main limitation..

Subgrade 3a where droughtiness is the main limitation occurs on land with the shallower profiles of the Milton series and adjacent Landbeach series both north and south of the golf course and on the small area of land off St Michael's Lane. Also in Subgrade 3a because of droughtiness are the narrow strip of Aldreth series alongside the Longstanton to A14 road and the rare occurrence of the Oakington series adjacent to the Oakington to A14 road, near Oakington village. Land with soils developed more or less directly over Cretaceous and Jurassic Clays suffer from a winter wetness and workability limitation. They give, by strict application of the ALC Guidelines, Subgrade 3a land on the calcareous Wicken series in relatively small patches north and south of the golf course, at the northern end of the strip alongside the Longstanton to A14 road and in the south of the strip along the Oakington to A14 road. Also in Subgrade 3a because of a wetness limitation are the lighter and/or better drained examples of the non-calcareous Denchworth series, with the only significant area being in the south of the section along the Longstanton to A14 road. About 50% of the site surveyed so far is in Subgrade 3a

Most of the non-calcareous Denchworth soils, however, are in Subgrade 3b, notably in the western parts of the land north and south of the golf course, the central part of the strip along the Longstanton to A14 road and along the route of the central link road. About 35% of the site surveyed so far is in Subgrade 3b.

LAND AT LONGSTANTON, CAMBRIDGESHIRE

SOILS AND AGRICULTURAL LAND CLASSIFICATION

1 INTRODUCTION

1.1 This report describes the soils and Agricultural Land Classification (ALC) of various blocks of agricultural land in the vicinity of Longstanton, Cambridgeshire which are part of the potential Northstowe development site.

1.2 It is based on a study of published information (see Appendix 1) and site inspections carried out on various dates in September and October 2004. Auger borings were made at locations determined by the National Grid at a density of about one per hectare.

1.3 Land quality has been assessed using the revised guidelines and criteria for the Agricultural Land Classification system introduced in January 1989. A combined soils and ALC map is attached.

1.4 Access to some land in the centre of the site and on the edge of Oakington village was denied and the soil and ALC information for this area has been derived from the published 1:63,360 soil map.

1.5 The rest of this report deals in turn with a brief description of the various blocks of land investigated (Section 2), the geology and soils (Section 3) and the detailed Agricultural Land Classification (Section 4).

2 SITE DESCRIPTION

Location and Landuse

2.1 The various blocks of land investigated and their land use are as follows:-

Location and ownership/option	Land use
Land north of the golf course (Brown and the Henry Family)	Grassland and some not in agricultural use
Land south of the golf course (Wilcon, Ely Diocese and Burges & French)	Mainly grassland but including land used for nursery crops (Wilcon/Larkfield Nursery) and an arable field in the extreme west (Wilcon)
Land off St Michael's Lane (T & R Sivewright)	Rig & furrow grassland
Land alongside the Longstanton to A14 road (T Sivewright and Welney Farms)	Arable
Central Link Road between the Longstanton to A14 road and the Oakington to A14 road (Graves, County Council and Pearson & Bailey; some information from published soil map only)	Arable
Land west of Oakington (Pearson & Bailey, Young and Chapman; information from published soil map only)	Arable
Land alongside the Oakington to A14 road (Welney Farms and County Council)	Arable, with some recent tree planting alongside the road

Topography

2.2 All the land is on the so-called Clay Lowland north-west of Cambridge and is generally flat at an altitude of around 10-15m a.o.d.

Climate

2.3 The climatic information needed to apply the Agricultural Land Classification system has been obtained from the Met Office's standard 5km grid point data set for two representative points on the site and is as follows:-

	NW of Longstanton	S of Longstanton
Reference Point:-	TL 405670	TL 400650
Altitude (m):-	10	12
Average Annual Rainfall AAR (mm):-	543	545
Accumulated Temperature ATO (day degrees):-	1455	1453
Moisture Deficit for wheat (mm):-	118	118
Moisture Deficit for potatoes (mm):-	113	113
Field Capacity Duration (days):-	89	88

3 GEOLOGY AND SOILS

Published Information

3.1 The site is shown on the 1:50,000 drift geological maps for the area (Sheets 187, Huntingdon and 188, Cambridge) as mainly Kimmeridge Clay, Ampthill Clay and Oxford Clay of Jurassic age and Gault Clay of Cretaceous age These are overlain in places by terrace gravels notably in a band through Longstanton village and on towards Oakington. There is a narrow band of Lower Greensand running along part of the site between Oakington and the A14 road.

3.2 The area covered by geological sheet 188 has been mapped by the Soil Survey of England and Wales during the 1960s. This has been extrapolated and simplified for the area covered by Sheet 187 and adjacent areas on the relevant sheet of the 1:250,000 National Soil Map (Sheet 4 Eastern England).

3.3 The 1:63,360 map for Sheet 188 indicates that spreads of thin superficial drift are more extensive than shown on the geological map. The survey also found that the surface layers of many of the "solid" geological formations have been re-worked, probably by periglacial conditions during intensely cold periods in the past. This has involved the incorporation of a greater or lesser amount of superficial material into the surface horizons.

3.4 The Sheet 188 soil map shows the distribution of what are termed soil series. These are groupings of soils with essentially similar profiles developed in lithologically similar parent materials and which are named after the locality where first described.

3.5 The National Soil Map uses broader groupings called Soil Associations which are collections of related series but whose individual distribution can be determined only by a more detailed survey.

3.6 It is convenient to continue using the soil series names for describing the distribution of soils encountered during the site survey (see below). They also greatly assist in determining the ALC gradings (see Section 4) since, by and large, there is a close correlation between a particular soil series and the ALC grading of the land where it occurs.

3.7 The soil series concerned are as follows:-

Soil series and map symbol	Parent Material	Profile Features
Denchworth (Da)	Reworked Jurassic clays	Poorly drained soils with clay loam or clay topsoil over greyish mottled clay subsoil; non-calcareous in the surface
Wicken (Wk)	Reworked Jurassic and Cretaceous clays	Poorly drained soils with clay loam or clay topsoil over greyish mottled clay subsoil; calcareous
St Lawrence (Sl)	Drift with Jurassic or Cretaceous clays	Imperfectly or poorly drained soils with clay loam or sandy clay loam topsoil and sandy clay loam or sandy clay upper subsoil over greyish mottled clay at depth
Aldreth (Ak)	Drift with Jurassic or Cretaceous clays	Imperfectly drained soils with clay loam or clay topsoil, greyish mottled clay subsoil and with yellowish brown gravelly material at depth
Milton (Mm)	Gravelly loams	Imperfectly or freely drained soils with clay loam or sandy clay loam topsoil and subsoil; sometimes gravelly at depth
Landbeach (Lk)	Gravelly loams	Freely drained soils, often stony, with sandy clay loam or sandy loam topsoil and subsoil over sand or gravel
Oakington (Ok)	Drift with Lower Greensand material	Imperfectly drained soils with clay loam or sandy clay loam topsoil and mottled clay loam subsoil

3.8 The Denchworth and Wicken soils are characterised by their heavy textures and consequent impeded drainage so that they are usually in Wetness Class III on a scale ranging from I (freely drained) to VI (virtually a swamp). The Denchworth series is non-calcareous at least in the topsoil and upper subsoil though it may become calcareous at depth, while the whole of the profile of the Wicken series is calcareous.

3.9 The Aldreth, St Lawrence and Oakington series are both lighter in texture and somewhat better drained, typically Wetness Class II, than the Denchworth and Wicken series. This is due to the presence of a loamy superficial drift.

3.10 The main difference between them is that the Aldreth series has a distinct, but usually thin, yellowish brown, gravelly layer of unknown origin at depth, the St Lawrence overlies clay and the Oakington is over Lower Greensand sands and loams.

3.11 On the National Soil Map the areas of clay in the vicinity are shown as either Association 712b DENCHWORTH or 411c EVESHAM 3 depending on whether the soils are predominantly non-calcareous or calcareous respectively. The loamier soils associated with the terrace gravels and Lower Greensand are in Association 541A BEARSTED 1.

Site Inspection

3.12 The site inspection found soils conforming to one or other of the soil series listed above, in the locations indicated by the published soil map where this covered the area in question or typical of the Association shown on the National Soil Map.

3.13 For the land to which access was denied in the centre of the site and on the edge of Oakington village the soil information was derived from the published 1:63,360 soil map.

3.14 Soils with very clayey, slowly permeable subsoils and consequent impeded drainage (Wetness Class III) have been placed in the Denchworth or Wicken series depending on whether the topsoil is non-calcareous (Denchworth) or calcareous (Wicken).

3.15 These soils are found in the east of the land north and south of the golf course where they are all under grass. Similar soils, but in arable use, are found in the strip along the Longstanton to A14 road, along the route of the central link road and in the south of the strip along the Oakington to A14 road.

3.16 The published soil map indicates Wicken soils on the unsurveyed land south-west of Oakington village, but not immediately adjacent to the current built-up area. Calcareous Wicken soils are also shown along the unsurveyed part of the central access road, but since non-calcareous Denchworth soils have been found further west, the distinct possibility arises that some of the unsurveyed access road and even the land closer to Oakington village may also have at least some Denchworth soils

3.17 Where there is loamy drift over clay at depth the drainage of the profiles is generally better (Wetness Class II). Such soils are generally placed in the St Lawrence series and have textures in the clay loam to sandy clay loam range, often becoming stony at depth. They can be either calcareous or non-calcareous.

3.18 Some of the profiles allocated in this survey to the St Lawrence series are somewhat heavier in texture than those described in the Memoir accompanying the published map, but have better drainage than the Wicken or Denchworth series soils to which they could otherwise have been allocated.

3.19 St Lawrence soils are commonest in the transition zone between the soils formed more or less directly over clay (Denchworth and Wicken) and the lighter textured and better drained soils over terrace gravels. Accordingly they are found mainly in the centre and west of the land north and south of the golf course, but also in the south of the strip along the Longstanton to A14 road and part of the strip along the Oakington to A14 road.

3.20 The unsurveyed land south-west of Oakington village has, according to the published soil map, a narrow strip of St Lawrence series soils closest to the village, with Wicken soils slightly further away (see above).

3.21 The Aldreth series is reserved for those profiles with a distinctive yellowish brown layer of calcareous gravel at depth. Profiles of this series are relatively rare and are significant only in the north of the strip along the Longstanton to A14 road, although isolated profiles occur elsewhere.

3.22 Soils over terrace gravels have been allocated either to the Milton or Landbeach series on the basis of their stoniness and depth to gravelly substrate.

3.23 Profiles which are relatively stonefree and have no gravelly layer within about 70cm of the surface have been placed in the Milton series. Their textures are typically clay loams or sandy clay loams throughout and are either freely drained (Wetness Class I) or have slight drainage impedance (Wetness Class II).

3.24 These are the typical soils associated with the terrace gravels on the site and so are found in the east of the land north and soil of the golf course.

3.25 Stonier and or shallower profiles are classed as the Landbeach series and these tend to be well drained (Wetness Class I). They are relatively rare on the land surveyed so far, being found only in the west of the land south of the golf course.

3.26 Soils of the Oakington series are relatively rare. They are shown on the published soil map in a small area to the south of Oakington village. Survey work on adjacent land alongside the Oakington to A14 road, also shown as Oakington series, confirmed their presence. They consist of generally well drained (Wetness Class I) sandy clay loams over Lower Greensand derived material.

4 AGRICULTURAL LAND CLASSIFICATION

Published Information

4.1 The published 1:63,360 ALC map (Sheet 135, Cambridge and Ely) shows the agricultural land on the site as Grades 2 and undifferentiated Grade 3. The Grade 2 is broadly where there are the better drained more loamy soils (St Lawrence, Aldreth, Milton, Landbeach and Oakington series) and the Grade 3 where there are heavier, wetter soils over clay (Denchworth and Wicken). The area of the Oakington Barracks is shown as land not in agricultural use.

4.2 In the accompanying Report, the Milton series is specifically mentioned at giving land both in Grade 2 and the upper part of 3 i.e. Subgrade 3a but the other series are not fully discussed. For the Grade 3 over clays it is recognised that these are mainly calcareous and give land in the middle of the grade i.e. what would now be in Subgrade 3b.

Revised Guidelines and Criteria

4.3 Since the published 1:63,360 ALC maps were drawn up the ALC system has been significantly revised and the following discussion of the ALC is based on the revised guidelines and criteria.

4.4 The ALC gradings have been derived by applying the guidelines to the soils found during the actua survey work. Simiular gradings were then given to the corresponding soils shown on the published soil map for the areas to which access was denied.

4.5 The main limitation of the soils over clay is winter wetness and associated workability difficulties. This is assessed by considering the Wetness Class of the profiles (mostly Wetness Class III) and the texture of the topsoils (mostly heavy clay loams and clays). In a relatively dry climatic are such as this, the guidelines indicate a grading of 3a where the topsoils are calcareous and 3b where they are not. This results in a higher grading than was, more subjectively, given in the Report accompanying the published ALC map which considered even the calcareous varieties to be only in Subgrade 3b.

4.6 Thus, this is an example of one of the cases of "grade elevation" which has resulted by the introduction of the revised ALC system. Certainly, during the field survey it was considered amazing that some of the profiles which were found to be simply clay topsoil over "raw" clay subsoils actually produced Subgrade 3a land because they happened to be calcareous.

4.7 It is considered very doubtful if a farmer would actually notice any practical difference between the 3a and 3b land over clay and would probably rate such land no better than 3b. However strict application of the ALC guidelines results in much of it being classed as Subgrade 3a, simply because the topsoil is calcareous or, in many cases, only very slightly calcareous.

4.8 There are a few instances of Subgrade 3a profiles over clay because of either lighter textured topsoils e.g. medium clay loams or slightly better drainage i.e. Wetness Class II, but these are the exception rather than the rule.

4.9 On the more loamy soils, wetness is not such a significant limitation, although in some cases, application of the ALC rules would result in a 3a grading rather than Grade 2 on the basis of a winter wetness consideration. More significant in most cases, and listed as the main limitation of such soils in Appendix 2, is summer droughtiness in this climatically very dry area.

4.10 This is assessed by comparing the ability of the soil profiles to supply moisture during the summer with the climatic parameter of crop-adjusted moisture deficit. The methodology requires calculation of the moisture holding capacity of the soil profiles which, in turn, is related to horizon depths, textures, structures and stoniness.

4.11 The appropriate calculations have been carried out for all the profiles where this is a significant limitation and has lead to the conclusion that the deeper profiles of the Aldreth, St Lawrence and Milton series give Grade 2 land, some of the shallower stonier profiles of the Milton and St Lawrence series and all of the stonier sandier Landbeach soils give Subgrade 3a land. No profiles were encountered which are so droughty as to be in Subgrade 3b.

4.12 Plotting these results on a map and, by convention, ignoring isolated profiles atypical of those surrounding them results in the attached ALC map.

4.13 The general picture which emerges is of Grade 2 land on the deeper Milton and St Lawrence profiles in the west of the land north and south of the golf course and on some of the St Lawrence profiles alongside the Oakington to A14 road. The areas of St Lawrence soils shown on the published soil map close to Oakington village are assumed to be Grade 2, but there may be some Subgrade 3a areas which could only be determined by an actaul survey of this land

4.14 Subgrade 3a where droughtiness is the main limitation occurs on land with the shallower profiles of the Milton series and adjacent Landbeach series both north and south of the golf course and on the small area of land off St Michael's Lane. Also in this Subgrade (3a) because of droughtiness are the narrow strip of Aldreth series alongside the Longstanton to A14 road and the rare occurrence of the Oakington series adjacent to the Oakington to A14 road, near Oakington village.

4.15 Land with soils developed more or less directly over Cretaceous and Jurassic Clays suffer from a winter wetness and workability limitation. They give, by strict application of the ALC Guidelines, Subgrade 3a land on the calcareous Wicken series in relatively small patches north and south of the golf course, at the northern end of the strip alongside the Longstanton to A14 road and in the south of the strip along the Oakington to A14 road.

4.16 Also in Subgrade 3a because of a wetness limitation are the lighter and/or better drained examples of the non-calcareous Denchworth series, with the only significant area being in the south of the section along the Longstanton to A14 road.

4.17 Most of the non-calcareous Denchworth soils, however, are in Subgrade 3b, notably in the western parts of the land north and south of the golf course, the central part of the strip along the Longstanton to A14 road and along the route of the central link road.

4.18 The unsurveyed area on the central access road and near Oakington village which is shown on the published map as Wicken series has been assumed to be in Subgrade 3a. However, as noted during the discussion of the soils (see above), there is a reasonable possibility that there will be at least some patches of Denchworth soils giving Subgrade 3b land. These could only be determined by an actaul survey of this land.

Overall ALC of the Site

4.19 *It is usual to give table of the areas and relative proportions of the ALC grades, but since the survey work is not yet complete, it is not appropriate to do this at the present stage. Roughly speaking, however, about 15% Grade 2, 50% Subgrade 3a and 35% of Subgrade 3b on the land surveyed so far.*

APPENDIX 1 - **PUBLISHED INFORMATION CONSULTED**

Geological Survey, Sheets 187 (Huntingdon) and 188 (Cambridge) 1:50,000

Soil Survey of England and Wales, National Soil Map, Sheet 4 (Eastern England), 1:250 000 and accompanying Regional Bulletin

Soil Survey of England and Wales, *The Soils of the District around Cambridge (Sheet 188)* 1:63:360 and accompanying Memoir

Agricultural Land Classification, Sheet 135 (Cambridge and Ely) 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

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

APPENDIX 2 - SUMMARY OF AUGER BORINGS

Where the information is given in italics, this has been obtianed from the published soil map and not by actual survey

No	General Location	Soil Series	Wetness Class	Topsoil Texture*	Main Limitation	ALC
1	N of Golf Course	St Lawrence	II	hcl (calc)	Droughtiness	2
2	N of Golf Course	Milton	I	hcl (calc)	Droughtiness	2
3	N of Golf Course	Milton	I	hcl	Droughtiness	2
4	N of Golf Course	Denchworth	III	hcl	Wetness	3b
5	N of Golf Course	Denchworth	III	hcl	Wetness	3b
6	N of Golf Course	Wicken	III	hcl (calc)	Wetness	3a
7	N of Golf Course	Wicken	III	hcl (calc)	Wetness	3a
8	N of Golf Course	Wicken	III	hcl (calc)	Wetness	3a
9	N of Golf Course	Milton	I	hcl (calc)	Droughtiness	2
10	N of Golf Course	Milton	I	hcl	Droughtiness	2
11	N of Golf Course	Milton	I	mcl (calc)	Droughtiness	3a
12	N of Golf Course	Milton	I	hcl (calc)	Droughtiness	3a
13	N of Golf Course	Milton	I	hcl (calc)	Droughtiness	3a
14	N of Golf Course	Disturbed				3b
15	S of Golf Course	Not used - Outside survey area				
16	S of Golf Course	Denchworth	III	c	Wetness	3b
17	S of Golf Course	Denchworth	III	c	Wetness	3b
18	S of Golf Course	Not used - Outside survey area				
19	S of Golf Course	Denchworth	III	c	Wetness	3b
20	S of Golf Course	Denchworth	III	c	Wetness	3b
21	S of Golf Course	Denchworth	III	c	Wetness	3b
22	S of Golf Course	Denchworth	III	c	Wetness	3b
23	S of Golf Course	Wicken	III	c (calc)	Wetness	3a
24	S of Golf Course	Wicken	III	c (calc)	Wetness	3a
25	S of Golf Course	Denchworth	III	c	Wetness	3b
26	S of Golf Course	Denchworth	III	c	Wetness	3b
27	S of Golf Course	Denchworth	III	c	Wetness	3b
28	S of Golf Course	Wicken	III	c (calc)	Wetness	3a
29	S of Golf Course	Wicken	III	c (calc)	Wetness	3a
30	S of Golf Course	Denchworth	III	c	Wetness	3b
31	S of Golf Course	Denchworth	III	c	Wetness	3b
32	S of Golf Course	Denchworth	III	c	Wetness	3b
33	S of Golf Course	Denchworth	III	c	Wetness	3b
34	S of Golf Course	Wicken	III	c (calc)	Wetness	3a
35	S of Golf Course	Wicken	III	c (calc)	Wetness	3a
36	S of Golf Course	Wicken/Milton	III	hcl (calc)	Wetness	3a
37	S of Golf Course	Wicken	III	c (calc)	Wetness	3a
38	S of Golf Course	Denchworth	III	c	Wetness	3b
39	S of Golf Course	Denchworth	III	c	Wetness	3b
40	S of Golf Course	Denchworth	III	c	Wetness	3b
41	S of Golf Course	Milton	II	scl (calc)	Droughtiness	3a
42	S of Golf Course	Milton	II	scl (calc)	Droughtiness	3a

No	General Location	Soil Series	Wetness Class	Topsoil Texture*	Main Limitation	ALC
43	S of Golf Course	Landbeach	I	msl	Droughtiness	3a
44	S of Golf Course	Landbeach	I	msl	Droughtiness	3a
45	S of Golf Course	Landbeach	I	msl	Droughtiness	3a
46	S of Golf Course	Milton	I	scl	Droughtiness	2
47	S of Golf Course	St Lawrence	II	scl (calc)	Droughtiness	3a
48	S of Golf Course	Milton	I	scl	Droughtiness	2
49	S of Golf Course	Milton	I	scl	Droughtiness	2
50	S of Golf Course	Milton	I	scl	Droughtiness	2
51	S of Golf Course	Milton	I	scl	Droughtiness	2
52	S of Golf Course	Milton	I	scl	Droughtiness	2
53	S of Golf Course	Milton	I	scl	Droughtiness	2
54	St Michael's Lane	St Lawrence	III	scl	Wetness	3a
55	St Michael's Lane	St Lawrence	III	scl	Wetness	3a
56	St Michael's Lane	St Lawrence	III	scl	Wetness	3a
57	St Michael's Lane	St Lawrence	III	scl	Wetness	3a
58	St Michael's Lane	St Lawrence	III	scl	Wetness	3a
59	Longstanton to A14	Wicken	III	hcl (calc)	Wetness	3a
60	Longstanton to A14	Wicken	III	hcl (calc)	Wetness	3a
61	Longstanton to A14	Denchworth	III	hcl	Wetness	3b
62	Longstanton to A14	Wicken	III	hcl (calc)	Wetness	3a
63	Longstanton to A14	Aldreth	II	hcl	Droughtiness	3a
64	Longstanton to A14	Wicken	III	c (calc)	Wetness	3a
65	Longstanton to A14	Wicken	III	hcl (calc)	Wetness	3a
66	Longstanton to A14	Wicken	III	c (calc)	Wetness	3a
67	Longstanton to A14	Aldreth	II	scl	Droughtiness	3a
68	Longstanton to A14	Aldreth	II	hcl	Droughtiness	3a
69	Longstanton to A14	Aldreth	II	scl	Droughtiness	3a
70	Longstanton to A14	Non-agricultural				
71	Longstanton to A14	Aldreth	II	hcl	Droughtiness	3a
72	Longstanton to A14	Denchworth	III	hcl/c	Wetness	3b
73	Longstanton to A14	Denchworth	III	hcl	Wetness	3b
74	Longstanton to A14	Denchworth	III	hcl/c	Wetness	3b
75	Longstanton to A14	Denchworth	III	hcl	Wetness	3b
76	Longstanton to A14	Denchworth	III	mcl	Wetness	3a
77	Longstanton to A14	Denchworth	III	hcl	Wetness	3b
78	Longstanton to A14	Denchworth	II	hcl	Wetness	3a
79	Longstanton to A14	Denchworth	III	hcl/c	Wetness	3b
80	Longstanton to A14	Denchworth	III	mcl	Wetness	3a
81	Longstanton to A14	Denchworth	III	mcl	Wetness	3a
82	Longstanton to A14	Denchworth	III	hcl/c	Wetness	3b
83	Longstanton to A14	St Lawrence?	III	mcl	Wetness	3a
84	Longstanton to A14	St Lawrence?	III	mcl	Wetness	3a
85	Central Link Road	Denchworth	III	hcl	Wetness	3b
86	Central Link Road	Denchworth	III	hcl	Wetness	3b
87	Central Link Road	Denchworth	III	hcl	Wetness	3b
88	Central Link Road	Denchworth	III	hcl/c	Wetness	3b

No	General Location	Soil Series	Wetness Class	Topsoil Texture*	Main Limitation	ALC
89	Central Link Road	Wicken	III	hcl/c (calc)	Wetness	3a
90	Central Link Road	Denchworth	III	hcl	Wetness	3b
91	Central Link Road	Denchworth	III	hcl	Wetness	3b
92	Central Link Road	Wicken	III	hcl (calc)	Wetness	3a
93	Central Link Road	Denchworth	III	hcl	Wetness	3b
94	Central Link Road	Denchworth	III	hcl	Wetness	3b
95	Central Link Road	Denchworth	III	hcl	Wetness	3b
96	Central Link Road	Denchworth	III	hcl	Wetness	3b
97	Central Link Road	Wicken	III	hcl (calc)	Wetness	3a
98	Central Link Road	Denchworth	III	hcl	Wetness	3b
99	Central Link Road	*Wicken*	*III*	*hcl (calc)*	*Wetness*	*3a*
100	Central Link Road	*Wicken*	*III*	*hcl (calc)*	*Wetness*	*3a*
101	Central Link Road	*Wicken*	*III*	*hcl (calc)*	*Wetness*	*3a*
102	Central Link Road	*Wicken*	*III*	*hcl (calc)*	*Wetness*	*3a*
103	Central Link Road	*Wicken*	*III*	*hcl (calc)*	*Wetness*	*3a*
104	West of Oakington	*St Lawrence*	*II*	*scl (calc)*	*Droughtiness*	*2*
105	West of Oakington	*Wicken*	*III*	*hcl (calc)*	*Wetness*	*3a*
106	West of Oakington	*St Lawrence*	*II*	*scl (calc)*	*Droughtiness*	*2*
107	West of Oakington	*St Lawrence*	*II*	*scl (calc)*	*Droughtiness*	*2*
108	West of Oakington	*St Lawrence*	*II*	*scl (calc)*	*Droughtiness*	*2*
109	West of Oakington	*Wicken*	*III*	*hcl (calc)*	*Wetness*	*3a*
110	West of Oakington	*Wicken*	*III*	*hcl (calc)*	*Wetness*	*3a*
111	West of Oakington	*Wicken*	*III*	*hcl (calc)*	*Wetness*	*3a*
112	West of Oakington	*Wicken*	*III*	*hcl (calc)*	*Wetness*	*3a*
113	West of Oakington	*Wicken*	*III*	*hcl (calc)*	*Wetness*	*3a*
114	West of Oakington	*Wicken*	*III*	*hcl (calc)*	*Wetness*	*3a*
115	West of Oakington	*St Lawrence*	*II*	*scl (calc)*	*Droughtiness*	*2*
116	West of Oakington	*St Lawrence*	*II*	*scl (calc)*	*Droughtiness*	*2*
117	West of Oakington	*St Lawrence*	*II*	*scl (calc)*	*Droughtiness*	*2*
118	West of Oakington	*Wicken*	*III*	*hcl (calc)*	*Wetness*	*3a*
119	West of Oakington	*Wicken*	*III*	*hcl (calc)*	*Wetness*	*3a*
120	West of Oakington	*Wicken*	*III*	*hcl (calc)*	*Wetness*	*3a*
121	West of Oakington	*Wicken*	*III*	*hcl (calc)*	*Wetness*	*3a*
122	West of Oakington	*Wicken*	*III*	*hcl (calc)*	*Wetness*	*3a*
123	West of Oakington	*St Lawrence*	*II*	*scl (calc)*	*Droughtiness*	*2*
124	West of Oakington	*Wicken*	*III*	*hcl (calc)*	*Wetness*	*3a*
125	West of Oakington	*Wicken*	*III*	*hcl (calc)*	*Wetness*	*3a*
126	West of Oakington	*St Lawrence*	*II*	*scl (calc)*	*Droughtiness*	*2*
127	West of Oakington	*Wicken*	*III*	*hcl (calc)*	*Wetness*	*3a*
128	West of Oakington	*Wicken*	*III*	*hcl (calc)*	*Wetness*	*3a*
129	West of Oakington	*Wicken*	*III*	*hcl (calc)*	*Wetness*	*3a*
130	West of Oakington	*Wicken*	*III*	*hcl (calc)*	*Wetness*	*3a*
131	West of Oakington	*St Lawrence*	*II*	*scl (calc)*	*Droughtiness*	*2*
132	West of Oakington	*St Lawrence*	*II*	*scl (calc)*	*Droughtiness*	*2*
133	West of Oakington	*Wicken*	*III*	*hcl (calc)*	*Wetness*	*3a*
134	West of Oakington	*Wicken*	*III*	*hcl (calc)*	*Wetness*	*3a*

No	General Location	Soil Series	Wetness Class	Topsoil Texture*	Main Limitation	ALC
135	West of Oakington	*Wicken*	*III*	*hcl (calc)*	*Wetness*	*3a*
136	West of Oakington	*Oakington*	*I*	*scl/msl*	*Droughtiness*	*3a*
137	West of Oakington	*Oakington*	*I*	*scl/msl*	*Droughtiness*	*3a*
138	West of Oakington	*Oakington*	*I*	*scl/msl*	*Droughtiness*	*3a*
139	West of Oakington	*Oakington*	*I*	*scl/msl*	*Droughtiness*	*3a*
140	West of Oakington	*Oakington*	*I*	*scl/msl*	*Droughtiness*	*3a*
141	West of Oakington	*Oakington*	*I*	*scl/msl*	*Droughtiness*	*3a*
142	West of Oakington	*Oakington*	*I*	*scl/msl*	*Droughtiness*	*3a*
143	Oakington to A14	Oakington	I	scl/msl	Droughtiness	3a
144	Oakington to A14	Oakington	I	scl	Droughtiness	3a
145	Oakington to A14	Oakington	I	scl	Droughtiness	3a
146	Oakington to A14	St Lawrence	II	scl	Droughtiness	2
147	Oakington to A14	St Lawrence	II	scl	Droughtiness	2
148	Oakington to A14	St Lawrence	II	scl	Droughtiness	2
149	Oakington to A14	St Lawrence	II	scl	Droughtiness	2
150	Oakington to A14	St Lawrence	II	scl	Droughtiness	2
151	Oakington to A14	Denchworth	II	c	Wetness	3a
152	Oakington to A14	Wicken	III	c (calc)	Wetness	3a
153	Oakington to A14	Wicken	III	c (calc)	Wetness	3a
154	Oakington to A14	Wicken	III	c (calc)	Wetness	3a
155	Oakington to A14	Wicken	III	c (calc)	Wetness	3a

*Textures are abbreviated:-

c - clay
hcl - heavy clay loam
mcl - medium clay loam
msl - medium sandy loam
scl - sandy clay loam
sc - sandy clay

calc - slightly or moderately calcareous

AGRICULTURAL LAND CLASSIFICATION

NOON FOLLY FARM, BAR HILL, CAMBRIDGESHIRE

1. BACKGROUND

1.1 The site, an area of 89.3 hectares, is the subject of an application for the development of a shopping centre complex near Bar Hill, Cambridgeshire. MAFF surveyed the site in February 1990 and May 1991 to assess the agricultural land quality.

2. PHYSICAL FACTORS AFFECTING LAND QUALITY

Climate

2.1 Climate data for the site was obtained from the published agricultural climatic dataset (Met Office, 1989). This indicates that for the survey area the annual average rainfall is 548 mm (21.6"). This data also indicates that field capacity days are 89 and moisture deficits are 118 mm for wheat and 113 mm for potatoes. These climatic characteristics do not impose any climatic limitations on the ALC grading of the survey area.

Altitude and Relief

2.2 The land surveyed falls gently from the A604 road from an altitude of 20m to 14m AOD. Microtopographic variation occurs to the west and north of Noon Folly Farm where a broken area of raised land traverses the site. Gradient and altitude do not constitute limitations to the ALC grade.

Geology and Soils

2.3 The published 1:50,000 scale drift edition geology sheet 187 (Geological Survey of Great Britain 1975) shows the survey area to comprise mainly Kimmeridge Clay with a smaller area of Ampthill Clay towards the northern corner of the site.

2.4 The Soil Survey of England and Wales have mapped the soils in the area on two occasions; firstly, provisionally in 1973 at a scale of 1:63,360 and secondly, in 1983, at a reconnaissance scale of 1:250,000. These maps show the occurrence of the Denchworth Association (*1) and the Evesham 3 Association (*2) respectively. Both of these soil associations are derived from Jurassic and Cretaceous Clays. During the current survey a more detailed inspection of the soils was carried out; this survey confirmed the predominance of clayey soils on site.

Two main soil types occur over the site.

2.4.1 The central part of the site comprises well bodied soils which contain stony layers in the lower horizons. The profiles typically comprise heavy clay loam or occasionally clays to depths 40/70 cm. Below this, profiles become very stony* and consist of a matrix of sand and clay loam lenses. At depth 70/110 cm+ soils generally merge into gleyed clays, however, at sporadic intervals to the north of Noon Folly Farm and west of the Sub. Station the stony layers extend to 120 cm. Depth to and width of calcareous horizons, within these profiles, varies markedly across the site.

2.4.2 In the northern third, the southwest corner and the eastern edge of the site a finer textured less stony soil variant outcrops. This soil typically comprises medium clay or occasionally heavy clay loam topsoils over decalcified clays. At depth 55/90 cm+ profiles are often calcareous due to the presence of carbonate nodules. Occasionally, towards the northeast corner of the site slightly stony bands occur in the subsoil.

(*1) Denchworth Association 1973: Gleyed brown calcareous soil (Grey calcareous and non calcareous Jurassic and Cretaceous Clays).

(*2) Evesham 3 Association 1983: Slowly permeable calcareous clayey and fine loamy over clayey soils. Some slowly permeable seasonally waterlogged non-calcareous clayey soils (Jurassic and Cretaceous Clay).

* Stony: Stones comprise very small, small and medium flints.

3. AGRICULTURAL LAND CLASSIFICATION

3.1 The definition of the Agricultural Land Classification grades are included in Appendix 1.

3.2 The table below shows the breakdown of ALC grades in hectares and % terms for the survey area.

	AGRICULTURAL LAND CLASSIFICATION	
Grade	ha	%
3a	14.9	16.7
3b	62.1	69.5
Non Agricultural	3.8	4.3
Urban	8.3	9.3
Agricultural Buildings	0.2	0.2
TOTAL	89.3	100

3.3 Subgrade 3a

Two small areas of raised land west and north of Noon Folly Farm have been mapped as 3a. Two situations occur in association with the better drained variant of the soils described in paragraphs 2.4.1 and 2.4.2.

3.3.1 Auger boring information indicates that the western profiles (described in paragraph 2.4.1) contain narrow stony bands (typically 20-25 cm thick) which occur at depths 45/60 cm+. The presence of these stones, acts to reduce the waterholding capacity of these profiles, thus profiles are moderately droughty. Furthermore, profile pit observations indicate that below these stony horizons the gleyed clay encountered is slowly permeable. As a result the profile wetness is assessed as wetness class II. Consequently, moderate droughtiness, wetness and workability imperfections restrict this land to subgrade 3a (good quality agricultural land).

Consequently significant wetness and workability imperfections exclude this land from a higher grade.

3.5 Urban and Non Agricultural Land

The Bar Hill residential area roundabout and associated embankments have been mapped as urban and non agricultural land respectively.

May 1991

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Appendix 1

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 with affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. When more demanding crops and 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 yield of which are variable. In most 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.

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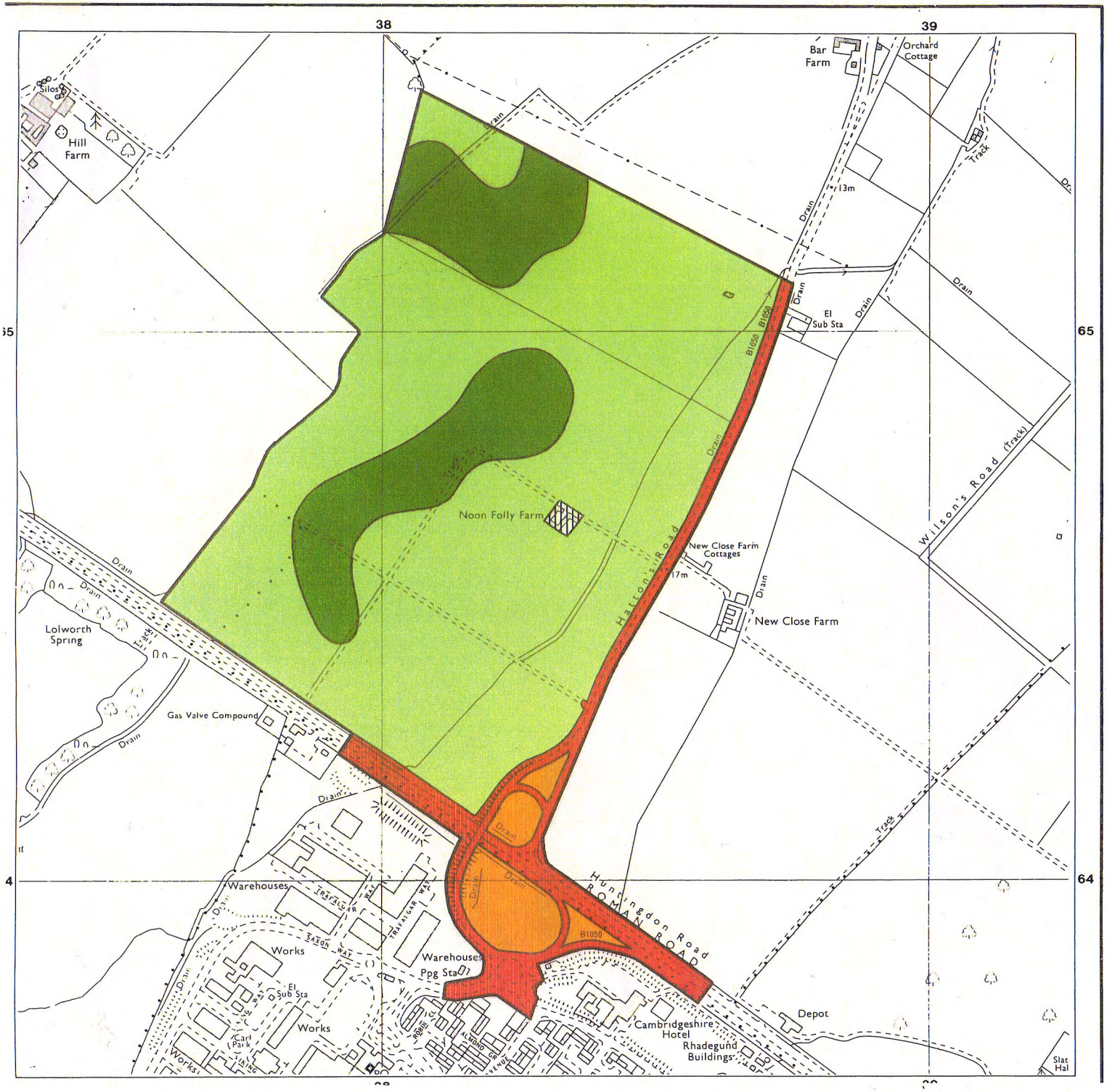

Agricultural Land Classification

Noon Folly & Bar Farms, Cambs

AGRICULTURAL LAND

Agricultural Grades

Agricultural Land Quality

Grade 1 *

Grade 2 *

Grade 3 a

Grade 3 b

Grade 4 *

Grade 5 *

Very high

Very low

Disturbed *

Agricultural Buildings

Unsurveyed *

NON AGRICULTURAL LAND

Land predominantly in urban use

Other land primarily in non-agricultural use

* Land in this category does not occur on this map

SOURCE MAPS Base maps taken from the O.S. **1 : 10000**

TL 36 NE, SE

This map is accurate only at the scale shown.
Any enlargement could be misleading

Scale 1:10000

100 0 100 200 300 400 500

Metres

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MAFF Ministry of Agriculture Fisheries Food