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STATEMENT OF PHYSICAL CHARACTERISTICS

MANOR HOUSE FARM

HATFORD OXON

MAFF Ministry of Agriculture Fisheries and Food

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LAND AT MANOR HOUSE FARM, HATFORD, OXON

AGRICULTURAL LAND CLASSIFICATION

1 BACKGROUND

1 1 The 27 8 ha site which lies north-west of Hatford and to the north of the A417 in Oxfordshire was surveyed on 5 and 6 October 1989 in connection with mineral extraction proposals It is bounded to the north by Sandy Lane and partially to the south by field boundaries and Brick-Kiln Copse The remaining site boundaries are not marked by any marked physical features

1 2 The site was surveyed using a 110 cm and 120 cm Dutch soil augers with samples being taken at approximately 100 m intervals across the site

Land Use

1 3 At the time of survey (October 1989) most of the western half of the site was under a newly germinating winter cereal crop whilst the eastern half was under grassland grazed by bullocks A small area adjacent to Brick-Kiln Copse was intercropped with mustard and barley (game cover?)

2 PHYSICAL FACTORS AFFECTING LAND QUALITY

Relief

2 1 The altitude of the site varies between approximately 80 m A O D and 95 m A O D with the highest land occurring towards the north and west falling gently towards Frogmore Brook which runs in a south-easterly direction to the south of the site

Although slopes of approximately 5 were noted on the site gradient is not a significant limitation in terms of land quality in this locality

Climate

2 2 The average annual rainfall for this area occurs within the range 657 mm to 668 mm (Met Office 1989) The median accumulated temperature above 0 C between January and June a measure of the relative warmth of a locality ranges between 1414 day degrees and 1431 day degrees (Met Office 1989) The site is at field capacity for around 135 days which provides a measure of the effect of climate on the soil water regime Crop adjusted moisture deficients are 106 mm for wheat and 99 mm for potatoes at an altitude of 95 m A O D and 109 mm for wheat and 101 mm for potatoes at 80 m A O D

2 3 Climate factors per se place no limitation on agricultural land quality but do affect interactive limitations between soil and climate namely soil wetness and droughtiness

Geology and Soils

2 4 British Geological Survey Sheet 253 Abingdon (1971) shows the site to be underlain by Jurassic Corallian Beds comprising limestone sand silt and clay deposits The site lies on the dipslope of this formation where a valley feature has developed exposing a sequence of deposits These are believed to range from the Upper Corallian Osmington Oolite Series of detrital and oolitic limestones on the highest ground through the Lower Corallian Calcareous Grit comprising uncemented sands sometimes with clay lamellae mid-slopes to alluvium with fen peats on the lower slopes adjacent to Frogmore Brook (Jarvis 1973)

2 5 Soil Survey of England and Wales Sheet 253 Abingdon (Jarvis 1973) shows there to be a complex pattern of soils across the site Detailed field examination of the soils indicates that there are three broad groups present across the site

2 6 The first group of soils are found in association with the Corallian limestone deposits on the site and typically rest

over limestone at depths between 40 and 60 cm from the surface They commonly comprise (fine) sandy clay loam or sandy loam topsoils which are usually very slightly stony - moderately stony (ie c 2% - 15% small and medium limestone brash) These overlie similar textures or medium/heavy clay loam or occasionally loamy sand and medium sand in the upper subsoil and become progressively impenetrable due to the presence of soft bedded oolitic limestone All soils are slightly calcareous and well drained (wetness class 1) but are limited by drought-risk caused by the presence of limestone at relatively shallow depth

2 7 The second soil group is the most extensive across the site and is characteristically deep stoneless to very slightly stony and well drained Soils typically comprise medium sandy loam or loamy medium sand or occasionally medium clay loam topsoils overlying similar textures in the upper subsoil and passing to medium sand in the lower subsoil at variable depths This sandy lower subsoil commonly contains inclusions of thin clay lamellae whose origin could be pedological and/or geological (Jarvis 1973 pp 99-100) The soils in this group are well drained and are thus appropriately placed in wetness class I but are again limited by a low to moderate available moisture capacity causing droughtiness

2 8 The third group of soils occurs in a limited area of the site in association with a wet flush whose presence is believed to be due to the emergence of a dip slope spring on the low lying land adjacent to Frogmore Brook The soils here appear permanently affected by groundwater and consequently exhibit characteristics of poor drainage and peat development They typically comprise peaty loam topsoils overlying organic sandy clay loam or sandy loam in the upper subsoil passing to sandy clay and medium sand at depth Below approximately 90 cm the soils are very wet and anaerobic The poor drainage status of these soils places them within wetness classes III or IV

3 AGRICULTURAL LAND CLASSIFICATION

3 1 The ALC grading of the survey area is primarily determined by interactions between climate and soil factors namely wetness and droughtiness ALC grades 2 3a and 3b have been mapped and a breakdown of these grades in terms of area and extent is given below

Grade	ha	% of total agricultural land
2	4 0	14%
3a	12 2	44%
3b	11 6	42%
Total agricultural area	27 8	
Total area	27 8	

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

Grade 2

3 3 Land of this quality occupies approximately 14% (4 0 ha) of the total agricultural land on the site and occurs mainly towards the south-eastern corner

Profiles typically comprise medium sandy loam topsoils overlying either similar textures or loamy medium sand in the subsoil and passing to medium sand at depth Some profiles contain lenses of clay within the sand These soils are well drained (wetness class I) although there is occasional evidence of groundwater within the profiles Soil textural conditions and climatic factors at this locality combine to render these soils prone to slight droughtiness However such land is easy working and capable of growing a range of agricultural and horticultural crops

Grade 3a

3 4 Land of this quality occupies 44% (12 2 ha) of the total agricultural land on the site and occurs in two main situations

In the north-western part of the site soils are characteristically relatively shallow over limestone Topsoils are typically slightly stony (upto 5-10% small limestone brash) (fine) sandy clay loam fine sandy loam or sandy loam textures overlying similar textures or occasionally heavy clay loam in the upper subsoil and becoming impenetrable (to soil auger) over limestone at about 60-65 cm depth They are well drained (wetness class I) but a combination of shallow depth variable content of limestone brash and textural and climatic factors results in a moderate droughtiness limitation causing in potentially lower and less consistent yields

3 5 Much of the rest of the Grade 3a land occurs across the mid-slopes of the site Soil profiles typically comprise very slightly stony medium sandy loam loamy medium sand or sandy clay loam topsoils overlying similar textures in the upper subsoil and passing to medium sand at variable depths This sandy lower subsoil often contains inclusions of clay lamellae as described previously Soils fall into wetness class I being well drained and the major limitation to land quality is therefore droughtiness

Grade 3b

3 6 Land of this quality occupies 44% (11 6 ha) of the total agricultural land on the site and as with Grade 3a land occurs in three situations

3 7 Firstly across the centre of the site soils are characteristically shallow over limestone Topsoil stone content is variable from about 2 12% of brashy limestone (2-6 cm) Profiles typically comprise (fine) sandy clay loam sandy loam or occasionally medium clay loam topsoils overlying similar textures containing a high proportion of brashy limestone These become impenetrable over limestone at depths between 40 and 60 cm from

the surface They are well drained soils (wetness class I) but are restricted in terms of agricultural potential by a droughtiness limitation resulting from the interaction of shallow depth soil textural conditions including the occurrence of variable amounts of limestone brash and climatic factors at this location

3 8 Secondly towards the north-east of the site adjacent to Sandy Lane soils are deep sandy and well drained Topsoil textures are typically loamy medium sand directly overlying medium sand in the subsoil from about 30 cm The lower subsoil commonly contains inclusions of thin grey clay lamellae These soils are well drained and are thus assigned to wetness class I but are limited by drought risk

3 9 Lastly at the far south of the site near Frogmore Brook a low-lying poorly drained area of wet flushes/springs has resulted in the development of peaty soils Profiles typically comprise peaty loam topsoils overlying organic sandy clay loam or sandy loam in the upper subsoil and passing to medium sand and/or medium clay at depth Being permanently affected by groundwater these soils are subject to drainage imperfections and have been allocated to wetness classes III/IV Wetness is therefore the major limitation to agricultural use on these soils

4 SOIL RESOURCES

4 1 The accompanying soil unit map illustrates the pattern of soil resources on the site It should be emphasized that this is <u>not</u> a soil stripping map but merely an illustration of soil resources available for restoration on the site When considering these details it is important to remember that the soils were only sampled to a maximum depth of 120 cm during survey work In some cases soil resources may extend below this depth Three units have been identified

Unit 1

4 2 This unit broadly corresponds with those soils previously discussed in paragraph 2 6 of the ALC report Topsoils typically comprise approximately 27 cm (range = 22-30 cm) of slightly calcareous-calcareous dark greyish brown or dark brown (10YR 4/2 or 10YR 4/3) (fine) sandy clay loam which approaches medium sandy loam at some locations Stone content varies from 2-15% of small and medium sized limestone stones (>2 cm) Subsoils are typically between 10-35 cm of dark yellowish brown dark brown or occasionally brownish yellow (10YR 4/4 10YR 4/3 10YR 6/6) sandy clay loam medium/heavy clay loam or occasionally lighter loamy sand or sandy loam A soft bedded gritty limestone is usually encountered between 40 60 cm from the surface The upper subsoil is generally slightly stony to stony (2-15% limestone) becoming very brashy (c 50% soil 50% limestone mix) directly above the limestone

4 3 Where described the upper subsoil had a moderately well developed coarse subangular blocky structure of friable consistence containing more than 0 5% biopores >0 5 mm diameter The structural conditions of the lower subsoil were difficult to evaluate due to the very high proportion of brashy limestone within the soil matrix The limestone itself was relatively soft and bedded with roots observed to at least 70 cm in cracks and fissures

Unit 2

4 4 This unit broadly corresponds with those soils previously discussed in paragraph 2 7 The topsoils typically comprise approximately 28 cm (range 23-30 cm) of dark brown or dark greyish brown (10YR 4/3 10YR 3/3 or 10YR 4/2) medium sandy loam or loamy medium sand (occasionally sandy clay loam or medium clay loam) They are variably calcareous (around 1% $CaCO_3$) and may be very slightly to slightly stony

4 5 Subsoils are very slightly stony (2-3% medium and large limestone stones) typically 70 cm deep and comprising dark yellowish brown or brownish yellow (10YR 4/4 10YR 4/6 10YR 5/4 or 10YR 6/6) medium sandy loam and loamy medium sand in the upper part overlying light olive brown or olive yellow (2 5Y 5/6 2 5Y 6/6 2 5Y 6/8) medium sand in the lower subsoil The sand lower subsoil is reached at variable depths within the unit although there is a tendency for the upper subsoil to be shallowest towards the north east of the site Across the remainder of the unit the sand is not encountered above about 70 cm The lower subsoils commonly contain clay lamellae

4 6 Where described the subsoil structure in both upper and lower horizons were moderately well developed coarse subangular blocky with peds of friable consistence More than 0 5% biopores >0 5 mm were noted including a number of worm channels indicative of the porosity of these soils

Unit 3

4 7 This unit broadly corresponds with the soils described in paragraph 2 8 of the ALC section Topsoils typically comprise approximately 28 cm (range = 25 30 cm) of stoneless black (10YR 2/1) peaty loam This rests over subsoils which comprise 20-25 cm of dark grey or very dark greyish brown (10YR 4/1 or 10YR 3/2) organic sandy clay loam or sandy loam upper subsoil overlying at least 40 cm of light brownish grey dark greyish brown light grey or dark grey (2 5Y 6/2 2 5Y 4/2 5Y 6/1 or 5Y 4/1) sandy clay loam or sandy clay textures passing to light brownish grey or yellowish (2 5Y 6/2 or 2 5Y 7/8) medium sand at depth At one location peat was recorded to 65 cm before passing to a mineral horizon At depths below about 1 metre the soils become wet and anaerobic due to permanent saturation by groundwater

4 8 Where described the mineral horizons were believed to have coarse blocky structures although assessment was difficult due to the

saturated state of the soil Peat subsoil horizons were well humidified and had platey/coarse angular blocky structures of friable consistence

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Sources of Reference

BRITISH GEOLOGICAL SURVEY (1971) Sheet 253 Abingdon

JARVIS M G (1973) Soils of the Wantage and Abingdon District Soil Survey of England and Wales

MAFF (1985) Agricultural Land Classification of England and Wales Revised guidelines and criteria for grading the quality of Agricultural land

METEOROLOGICAL OFFICE (1989) Climatological datasets for Agricultural Land Classification

DESCRIPTION OF THE GRADES AND SUBGRADES

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

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

Grade 1 – excellent quality agricultural land

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

Grade 2 – very good quality agricultural land

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

Grade 3 – good to moderate quality agricultural land

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

Subgrade 3a – good quality agricultural land

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

Subgrade 3b – moderate quality agricultural land

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

Grade 4 – poor quality agricultural land

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

Grade 5 – very poor quality agricultural land

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

Descriptions of other land categories used on ALC maps

Urban

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

Non agricultural

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

Woodland

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

Agricultural buildings

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

Open water

Includes lakes ponds and rivers as map scale permits

Land not surveyed

Agricultural land which has not been surveyed

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

APPENDIX

FIELD ASSESSMENT OF SOIL WETNESS CLASS

SOIL WETNESS CLASSIFICATION

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

Table 11 Definition of Soil Wetness Classes

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

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

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

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