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STATEMENT OF PHYSICAL CHARACTERISTICS

LAND AT NEW INN AND BYCELL FARMS, STOWE, BUCKS

MAFF Ministry of Agriculture Fisheries and Food

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1. BACKGROUND

1.1 Land on this 43 ha site was inspected on 20 and 21st June 1989. Soils were examined using a 1.2 m Dutch soil auger supplemented by soil pits as appropriate.

1.2 The majority of the site was in arable use (cereals and oilseed rape) with one grass paddock. The advanced growth stage of the oilseed rape crop prevented survey work within the largest field at the centre of the site (see plans). However, soil data for this part of the site was available from a Soil Survey and Land Research Centre (SSLRC) report commissioned by the applicants. This was used to supplement the MAFF survey findings.

2. PHYSICAL FACTORS AFFECTING LAND QUALITY

Relief

2.1 The land ranges in altitude from around 102 m A.O.D. at the southern tip of the site adjoining the Chackmore to Akeley road to 131 m A.O.D. in the extreme north. The site lies on a ridge of higher ground forming the upper valley slopes of the Ouse valley and the tributary stream which runs southwestward to join it. The land has gentle to moderate slopes (<7°); gradient is therefore not a limitation in terms of land quality.

Climate

2.2 Average annual rainfall for the site is around 690 mm (Met. Office, 1989) with an accumulated temperature*, a measure of the relative warmth of a locality, of 1365 day degrees, a value which is comparatively low for south-east England. A field capacity day period of 149 days (Met Office) is attained with moisture deficits of 101 mm and 91 mm for wheat and potatoes respectively. (Met Office, 1989).

2.3 In overall terms, climatic factors per se place no significant limitations on land quality within the survey area but interactions between climate and soil factors (wetness and droughtiness) are significant in the assessment of land quality.

Geology and Soils

2.4 There is no detailed published geological map sheet covering the area. However, detailed field survey work indicates that the surface geology comprises glacial gravel deposits and boulder clay.

* Median accumulated temperature above 0°C, January to June.

2.5 The boulder clay soils typically comprise very slightly stony (<5% stones), non-calcareous or very slightly calcareous (<1% $CaCO_3$), heavy clay loam or clay topsoil overlying a clay or heavy clay loam upper subsoil passing to a clay lower subsoil within 45-60 cm. Subsoils may become calcareous within 1 metre. Drainage status is variable ranging from wetness classes II to IV. Consequently these soils are limited by wetness and heavy soil textures.

2.6 Soils associated with the gravelly deposits typically comprise stony but lighter textured topsoils of sandy clay loam or medium clay loam; although occasional profiles of heavy clay loam were noted. These rest over progressively stonier subsoils of a similar texture before passing to hard impenetrable gravelly horizons from about 40-50 cm The major agricultural limitations of such soils are droughtiness and high topsoil stone content.

3. AGRICULTURAL LAND CLASSIFICATION (ALC)

3.1 The majority of the site is graded 3b with a smaller area in grade 3a. A breakdown of the area and extent of each grade is given below:-

Grade	Ha	%
3a	6.85	15.9%
3b	36.30	84.1%
Total	43.15	

It should be noted that 18.35 ha of the site was not surveyed by MAFF (see para 1.2). The ALC grading data was therefore derived from the SSLRC soils data for this portion of the site.

Grade 3

Subgrade 3a

3.2 Land of this quality occurs towards the western part of the site and encompasses a range of soil types including the better drained boulder clays and are less droughty varients of the gravelly soils. The better drained boulder clay soils typically comprise heavy clay loam topsoils over heavy clay loam upper subsoils which pass into slowly permeable lower subsoils below about 60 cm. Gleying is absent within the uppermost 40 cm and the soils are appropriately placed in wetness class II. Also included in grade 3a are heavier textured boulder clay soils which are naturally calcareous throughout the whole of the soil profile. These are usually better structured and therefore more workable.

3.3 The gravelly soils included in grade 3a comprise slightly stony calcareous heavy clay loam topsoils over gritty or slightly stony

clayey subsoil which pass into a limestone/gravel mix below 60 cm. Soils of this type are well drained but are limited by a moderate available water capacity and consequent risk of drought.

Subgrade 3b

3.4 Subgrade 3b land is mapped over the majority of the site and encompasses soils derived from both boulder clay and gravel deposits. The boulder clay soils typically comprise slightly stony non calcareous clay or heavy clay loam topsoils over slowly permeable clay subsoils. Gleying commonly occurs within 40-50 cm of the surface and the soils are thus allocated to wetness classes III and IV. The heavy soil textures and slow permeability makes these soils difficult to work and the flexibility of agricultural operations and cropping is therefore reduced.

3.5 The gravelly soils associated with land of this quality are generally located on the higher slopes of the site. They have a stony [up to 20% by volume of small and medium sized (<6 cm) flints] clay loam or sandy clay loam topsoil overlying a similar textured subsoil which becomes increasing stony with depth, before passing to compact impenetrable gravel horizons below about 40-50 cm. The main limitation to the agricultural use of such soils is moderate to low available water capacity causing crop drought-stress. Where topsoil stone content is in excess of 15% (by volume >2 cm)stone content alone is sufficient to place the land in grade 3b. This is due to the increase in production costs by causing extra wear and tear to implements and tyres; crop quality, germination and establishment may also be impaired and the nutrient capacity of the soils is reduced.

4. SOIL RESOURCES

4.1 The accompanying plan illustrating the distribution of soil types indicates the presence of four major types. It should be emphasised that this is not 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 soils were only sampled to a depth of 1.0 - 1.2 m maximum. In some cases useful soil forming materials may exist below this depth.

Soil Type 1

4.2 Type 1 is located towards the western part of the site and comprises non-calcareous or very slightly calcareous (<1% $CaCO_3$) soils derived from boulder clay. They typically comprise 25-30 cm of dark or very dark greyish brown topsoil which is no more than slightly stony (c. 5% flints). This passes to a similar brown or yellowish brown heavy clay loam over clay, or wholly clay subsoil which becomes paler and grey with depth. Subsoils have ochreous mottles and either become gleyed immediately below the topsoil or within 40-60 cm of the surface. Some profiles may contain gravelly layers or inclusions of sandier material. It is anticipated that there would be at least 1 metre (including topsoil) of potential soil forming material present.

Soil Type 2

4.3 This soil occupies the central part of the site and typically comprises 22-25 cm of slightly stony (c 5% minimum flints >2 cm) greyish brown or dark greyish brown topsoil of heavy clay loam or clay texture. This overlies an olive brown/light olive brown to greyish brown clay subsoil which may become silty clay at depths below 60 cm. It has ochreous mottling below (and sometimes within) the topsoil and is usually gleyed high in the profile. In common with soil type 1 it is derived from boulder clay, but is characterised by slightly heavy textures in the upper profile and by the presence of calcareous horizons immediately below the topsoil or from about 40-50 cm+. Occasional profiles have calcareous topsoils. Soil forming materials (including topsoil) extend to depths of at least 1 metre.

Soil Type 3

4.4 Soils in this grouping are derived from gravel deposits and are characterised by non or very slightly calcareous (<1% $CaCO_3$) medium clay loam or sandy clay loam topsoils between 20-30 cm deep. They are dark brown or dark gray brown in colour with a variable total stone content ranging from 5-20% by volume of flints. These rest over progressively flintier subsoils of similar texture and yellow brown or dark yellowish brown in colour. They become very gravelly and impenetrable (to soil auger and spade) below 40-50 cm. This lower subsoil material will pass into workable mineral at variable depths and this it is difficult to indicate the total depth potentially available soil forming materials present.

Soil Type 4

4.5 This soil type is developed over gravel deposits and typically comprises dark grey brown or dark brown medium clay loam or sandy clay loam topsoils between 22-30 cm deep. Stone content is variable with around 5-20% total volume of flint stones with up to 15%+ in some samples over 2 cm in size. Topsoils are often calcareous and rest over a yellowish brown stony subsoil of similar texture. This in turn passes to calcareous sandy and gravelly horizons containing flint and limestone gravel at 40-60 cm+. Since the lower subsoil material will pass into workable mineral at variable depth, it is difficult to indicate the total potentially available soil forming material present.

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SOURCES OF REFERENCE

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

Met. Office (1989) Climatological Datasets for Agricultural Land Classification.

Soil Survey and Land Research Centre (1988) Land Assessment for Sand and Gravel Working. Stowe, Bucks. (D.W. Cope).