STATEMENT OF PHYSICAL CHARACTERISTICS

Springfield Farm, Beaconsfield

1. BACKGROUND

1.1 The 50.2 ha site was inspected on October 23 and 24, 1990, in connection with a proposal to extend the quarry for mineral extraction. The site lies directly to the south of the M40 at Beaconsfield in Buckinghamshire. The site surrounds an existing quarry, previously surveyed by ADAS in 1983.

1.2 The site was surveyed, using 110 and 120 cm Dutch augers on a grid survey at 100 metre intervals. Four soil pits were also examined to provide further information on soil characteristics.

1.3 Land Use

At the time of the survey, the site was under oilseed rape and cereals.

2. PHYSICAL FACTORS AFFECTING LAND QUALITY

2.1 Relief

The site lies at approximately 100-105 m A.O.D. falling gently towards the east. Gradient does not form a limitation affecting land quality of the site.

2.2 Climate

Estimates of climatic variables were obtained by interpolation from a 5 km grid database (Met. Office 1989), for a representative point in the survey area:

Grid Ref: SU59301894

ACCUMULATED TEMP (° days Jan - July)	1396
AVERAGE ANNUAL RAINFALL (mm)	715
FIELD CAPACITY DAYS	150
MOISTURE DEFICIT WHEAT (mm)	100
POTATOES (mm)	91

2.3 The most important parameters in assessing an overall climatic limitation are: average annual rainfall, (a measure of overall wetness), and accumulated temperature, (a measure of the relative warmth of a locality).

The climatic factors per se place no limitation on land quality, on this site but do affect interactive limitations between soil and climate, namely soil wetness and droughtiness.

2.4 Geology and Soils

NERC Assessment of British Sand and Gravel Resources (IGS 1971) shows the site to be underlain by glacial sands and gravels. The above report describes two geological borings made over the site. These both show various head deposits over sand and gravel, with the possibility of gravel and sand occurring within a metre of the surface.

2.5 The Soil Survey of England and Wales Sheet 6, (SSEW, 1983) maps this area as the Sonning 2 association, described in the accompanying legend as "well drained flinty coarse, loamy soils, associated with stony permeable seasonally waterlogged fine loamy over clayey soils, and coarse loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging".

2.6 Detailed field examination of the soils indicates the occurrence of four soil types across the site.

2.7 The first and most extensive type consists of a stony sandy silt loam topsoil, over an extremely stony sandy loam. This type covers much of the central part of the site.

2.8 A second type consists of a moderately stony sandy loam topsoil, over sand or gravel, and is chiefly found to the east of the quarry.

2.9 A third type consists of a deep very slightly stony sandy loam over sand, and is found exclusively in the north eastern corner of the site.

2.10 The final type, comprises deep, very slightly stony, light and medium loams over medium silts, loams and clays. Typically evidence of slowly permeable horizons is found in the subsoil. These soils are located to the north and west of the quarry, and also along the southern boundary of the site.

3. AGRICULTURAL LAND CLASSIFICATION

3.1 The ALC grading of the survey area is primarily determined by interactions between climatic and soil factors, namely wetness and droughtiness with soil exhibiting a drought limitation being more extensive. In addition, high stone content is a significant limitation at some locations. ALC grades 2, 3a, 3b and 4 have been mapped. The map accompanying this report was prepared prior to a revised planning application covering a slightly smaller area. A breakdown of the grades as indicated on the original plan is given below.

		ha	% total area	% agricultural area
Grade 2	-	8.0	15.9	16.5
3a	-	17.3	34.5	35.8
3b	-	22.2	44.2	46.0
4	-	0.8	1.6	1.7
Woodland	-	0.3	0.6	
Non-Agric.	-	1.6	3.2	
		50.2	100.0	100

Total area of agricultural land : 48.3 ha

Measurements taken from the same plan for the revised application area are as follows:

Grade	Area (ha)	% Total Area	% Agricultural Area
2	6.7	14.4	14.9
3a	16.3	35.0	36.4
3b	21.0	45.2	46.9
4	0.8	1.7	1.8
Non-Agr	1.7	3.7	
Total	46.5	100	100

Total area of agricultural land : 44.8 ha.

Grade 2

3.2 Land of this quality occurs in two areas, firstly to the northwest of the quarry workings, and secondly in the south of the site. This grade is made up of those soils described in para 2.10 namely deep silty and clayey soils. The soils typically comprise silt loams, fine sandy silt loam or medium silty clay loam topsoils overlying similar subsoils usually becoming progressively heavier with depth. They are frequently gleyed between 40-60 cm and usually slowly permeable within 80 cm, although in some instances profiles are permeable and affected by ground water. Minor wetness limitations (wetness class II) are the main factor influencing land quality within this mapping unit, but at occasional locations topsoil stone contents of 5-10% of flints >2 cm is also important.

Grade 3a

3.3 Land of this quality occurs in two areas, firstly to the northeast of the existing quarry, and secondly to the south. To the northeast soils have predominantly sandy loam topsoils over a

similar or coarser upper subsoil before passing into sand at relatively shallow depth. They are typically only very slightly stony (<5% v/v flints) and limited to grade 3a due to a moderate drought risk.

3.4 In the southern area graded 3a the soils are shallower and slightly finer in texture being shallow (40-50 cm) sandy silt loams overlying sand and gravel. The chief limitations is again droughtiness due to the shallow depth of loamy material above the sand and gravel. These soils are slightly stony with topsoils having 4-12% v/v flints (>2 cm).

3.5 At occasional locations similar, but less well drained varients to the soils described in para 3.2, are found. These are allocated to wetness class III and with medium clay loam topsoils are appropriately placed in grade 3a.

Grade 3b

3.6 Grade 3b land occurs in three main blocks. Soils in this mapping unit are typically well drained, shallow and stony with more severe drought and stoniness limitations compared with similar soils graded 3a. Topsoils are typically sandy loams or sandy silt loams either resting directly over sand and gravel or with an intermediate similar textured but very stony subsoil before the sand and gravel is reached. Topsoil stone content is typically high in the range 15-30% v/v flints >2 cm with up to 20% v/v flints <2 cm in size. Drought and high topsoil stone content are thus the main limitation in terms of agricultural land quality.

Grade 4

3.7 A small area of grade 4 has been identified southwest of the existing quarry. Much of this area appears to have been disturbed with evidence of building materials, rubble and stones found. Some of this area has not been cultivated presumably due to the rubble/stone contamination of the soil.

4. SOIL RESOURCES

4.1 An overlay accompanying the ALC map illustrates the pattern of soil resources on the site. This has been compiled using data from the current survey, the earlier 1983 survey data from covering the site of the existing quarry, and data supplied by the applicants consultants (Rural Planning Services). 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 sampled to a maximum depth of 100-120 cm during survey work. In some cases soil resources will extent below this depth.

Typical profiles from each soil unit are described below:

The topsoil depths given are mean values for the unit.

4.2 Unit 1

0 - 29 cm	Non calcareous dark greyish brown/dark brown (Munsell colour 10YR 4/2, 3/3), sandy silt loam, stony - variable but up to 33% flints (eg. 13% >2 cm, 20% <2 cm).
29 - 50 cm	Yellowish brown (Munsell colour 10YR 5/4), sandy loam/sandy silt loam, extremely stony - 70% small flints.
50 cm+	Brown (Munsell colour 7.5YR 5/4) sand, stony - 20% flints and rounded hard stones.

Subsoils are too stony to be structurally assessed meaningfully.

4.3 Unit 2

0 - 30 cm	Non calcareous, dark greyish brown/dark brown (Munsell colour 10YR 4/2, 3/3), medium sandy loam, stony - For example, 26% flints (18% >2 cm, 8% <2 cm).
30 - 62 cm	Yellowish brown/dark yellowish brown (Munsell colour 10YR 5/4, 4/6), sandy loam/sandy silt loam, stony - 37% flints and hard stones. (17% >2 cm, 20% <2 cm). Single grain structure.
62 - 90 cm	Dark yellowish brown (Munsell soil colours 10YR 4/6) sand, extremely stony - 60% hard rounded stones, single grain structure.

4.4 Unit 3

0 - 31 cm	Non calcareous dark greyish brown (Munsell colours 10YR 4/2), sandy loam, very slightly stony - (eg. 1 - 2% flints).
31 - 45 cm	Dark yellowish brown/strong brown (Munsell colours 10YR 4/6, 7.5YR 5/4) sandy loam, stoneless, single grain structure.
45 - 55 cm	Dark yellowish brown (Munsell colours 10YR 4/6), loamy sand, stoneless, single grain structure.
55 - 70 cm	Dark yellowish brown (Munsell colours 10YR 4/6), sand, slightly stony - 1 - 2% hard rounded stones, single grain structure.
78 cm	The horizon above may continue down to over 110 cm or an impenetrable layer (of sand or gravel) may be found between 70 - 110 cm.

4.5 Unit 4

0 - 29 cm	Dark greyish brown/dark brown (Munsell colours 10YR 3/2, 3/3), non calcareous sandy silt loam/medium silty clay loam/medium clay loam, slightly stony - eg. 4% flints.
29 - 58 cm	Yellowish brown (Munsell colour 10YR 5/6), medium/heavy silty clay loam/silty loam, moderately well developed coarse sub-angular blocky, friable, over 0.5% biopores >0.5 mm.
48 - 78 cm	Brown/light brown (Munsell colour 10YR 6/3, 5/3), heavy silty clay loam, becoming mottled and gleyed, coarse sub-angular/prismatic structure, friable, over 0.5% biopores >0.5 mm.
78 cm+	Light brown (Munsell colour 10YR 6/3) silty clay, mottled and gleyed, moderately strongly developed coarse angular blocky, firm, slowly permeable.

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APPENDIX I

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 II

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.