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Ministry of
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HOWICK QUARRY EXTENSION

Agricultural Land Classification and Statement of Physical Characteristics January 1997

Resource Planning Team
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ADAS Leeds

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AGRICULTURAL LAND CLASSIFICATION AND STATEMENT OF PHYSICAL CHARACTERISTICS REPORT

HOWICK QUARRY EXTENSION, NORTHUMBERLAND

Introduction

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) and Statement of Physical Characteristics survey of 7.9 ha of land at Howick, near Alnwick. The survey was carried out during January 1997.

2. The survey was commissioned by the Ministry of Agriculture, Fisheries and Food (MAFF) Land Use Planning Unit, Northallerton in connection with the proposal to extract stone from the site. This survey supersedes any previous ALC surveys.

3. The work was conducted by members of the Resource Planning Team in the Leeds Statutory Group in ADAS. The land has been graded in accordance with the published MAFF ALC guidelines and criteria (MAFF, 1988). A description of the ALC grades and subgrades is given in Appendix I.

4. At the time of survey the land on the site was all under permanent grass with the exception of a strip of mixed woodland adjoining the road in the east and north.

Summary

5. The findings of the survey are shown on the enclosed ALC map. The map has been drawn at a scale of 1:5,000. It is accurate at this scale but any enlargement would be misleading.

6. The area and proportions of the ALC grades and subgrades on the surveyed land are summarised in Table 1.

Table 1: Area of grades and other land

Grade/Other land	Area (hectares)	% Total site area	% Surveyed Area
Subgrade 3a	4.8	60.7	65.7
Subgrade 3b	0.4	5.1	5.5
Grade 4	1.8	22.8	24.7
Grade 5	0.3	3.8	4.1
Other land	0.6	7.6	-
Total surveyed area	7.3	-	100
Total site area	7.9	*100*	-

7. The fieldwork was conducted at an average density of one boring per hectare. A total of ten borings and two soil pits were described.

8. Subgrade 3a, good quality land, occurs in the centre and east. The soils are well or moderately well drained and consist of slightly stony light-textured topsoils overlying slightly stony light to medium-textured upper subsoils and slightly stony medium to heavy-textured lower subsoils. Whin Sill bedrock typically begins at between 55 cm and 90 cm depth. Soil droughtiness and a pattern restriction are the grade-limiting factors in this case.

9. Subgrade 3b, moderate quality land, occurs in the south-western corner of the site. The soils are poorly drained and consist of very slightly stony medium clay loam topsoils overlying slightly stony heavy clay loam subsoils which are both gleyed and slowly permeable. The subsoils begin at around 30 cm depth and soil wetness is the factor which restricts this land to Subgrade 3b.

10. Grade 4, poor quality land, is found in the west and south-east where light-textured topsoils and, in places, thin upper subsoils, overlie Whin Sill bedrock at between 15 cm and 30 cm depth. The variation in soil depth gives a pattern limitation but many profiles are also restricted to Grade 4 by soil depth and/or soil droughtiness.

11. Grade 5, very poor quality land, occurs in the far west of the site in an area previously subject to stone extraction. The soils are shallow and bedrock outcrops to the soil surface at many points. The grade-limiting factors in this case are microrelief, soil depth and pattern restrictions.

12. Other land on this site occurs in the north and east and consists of mixed woodland.

Soils Resources

13. One main soil type occurs on this site. A light-textured topsoil (medium sandy loam or medium sandy silt loam) with a median thickness of 25 cm overlies either outcrops of Whin Sill, or light to medium-textured upper subsoils (mean thickness 18 cm) and medium to heavy-textured lower subsoils (mean thickness 45 cm). Where the upper and lower subsoils do occur they in turn are underlain by Whin Sill at an average depth of 90 cm.

Factors Influencing ALC Grade

Climate

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

15. The key climatic variables used for grading this site are given in Table 2 and were obtained from the published 5km grid datasets using the standard interpolation procedures (Met. Office, 1989).

Table 2: Climatic and altitude data

Factor	Units	Values
Grid reference	N/A	NU 237176
Altitude	m, AOD	60
Accumulated Temperature	day°C (Jan-June)	1270
Average Annual Rainfall	mm	686
Field Capacity Days	days	176
Moisture Deficit, Wheat	mm	90
Moisture Deficit, Potatoes	mm	75

16. 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.

17. 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 (ATO, January to June), as a measure of the relative warmth of a locality.

18. The combination of rainfall and temperature at this site means there is an overriding climatic limitation of Grade 2.

Site

19. The land is typically gently to moderately sloping (2-4°) with a northerly or north-easterly aspect and as such gradient does not limit ALC grade in any area on this site. There is no risk of flooding on the site but an area in the west where stone has been quarried in the past is limited to Grade 5 by a microrelief limitation which precludes the use of most agricultural machinery.

Geology and soils

20. The north of the site is mapped as being underlain by Carboniferous Middle Limestone and the south as Quartz-dolerite intrusion (Whin Sill) but the field survey suggests that Whin Sill actually underlies the whole site. The solid geology is overlain by shallow drift consisting of till but the Whin Sill outcrops to the surface at several points in the south of the site (BGS, Sheet 6, Alnwick).

21. The soils on the site have been mapped by the Soil Survey of England and Wales (Soils of England and Wales, Sheet 1, Northern England) as belonging to the Nercwys and Malvern associations but the field survey suggests that only soils of the Malvern association are actually present.

Agricultural Land Classification

22. The details of the classification of the site are shown on the attached ALC map and the area statistics of each grade are given in Table 1.

Subgrade 3a

23. Much of the centre and east of the site falls in Subgrade 3a (good quality agricultural land). The soils are well or, in a few cases, moderately well drained, and fall in Wetness Classes I and II (see Appendix II). Medium sandy loam or medium sandy silt loam topsoils overlie medium sandy loam, medium clay loam or medium silty clay loam upper subsoils and medium silty clay loam, heavy silty clay loam or sandy clay loam lower subsoils. Whin Sill at between 55 cm and 90 cm depth in this area. The topsoils and subsoils are slightly stony (8-12% hard stones in the topsoil, 8-15% hard stones in the subsoil) and the ALC grade of the land is restricted by soil droughtiness and by a pattern limitation which prevents deeper profiles from being mapped together as a separate unit.

Subgrade 3b

24. A small area of Subgrade 3b, moderate quality agricultural land, occurs in the south-west. The soils are poorly drained (Wetness Class IV) which medium clay loam topsoils overlying gleyed and slowly permeable heavy clay loam subsoils at around 30 cm depth. The topsoils are very slightly stony (5% hard stones) and the subsoils are slightly stony (7% hard stones) but soil wetness is the grade-limiting factor in this case.

Grade 4

25. Grade 4, poor quality agricultural land, occurs in the west and south-east. The soils are well drained (Wetness Class I) but thin, typically consisting of medium sandy loam or medium sandy silt loam topsoils (and, in places, thin upper subsoils) overlying Whin Sill at between 15 cm and 30 cm depth. The depth to bedrock is variable over short distances and this gives rise to a pattern limitation which makes regular ploughing of the land inadvisable. Both soil depth and soil droughtiness create further limitations which also restrict the land to Grade 4.

Grade 5

26. Grade 5, very poor quality agricultural land, occurs in the far west of the site in an area which has been previously quarried. The soils are very shallow and bedrock outcrops to the surface at several points. This small area lies below the level of the surrounding land and its microrelief precludes the use of any but the most basic agricultural machinery. The factors which limit this land to Grade 5 are, therefore, microrelief, soil depth, and pattern restrictions.

Other land

27. Other land on this site consists of a strip of mixed woodland in the north and east adjoining the B1339.

Statement of Physical Characteristics

28. One main soil type was identified on the site, a description of which is given below. Topsoil and subsoil resources are shown on the accompanying maps, along with soil thickness and volume information. A representative profile pit description is given in Appendix III.

a. Soil Type 1 (T1/U1/L1), derived from shallow drift overlying Whin Sill

This soil type covers the whole site and is characterised by a light-textured topsoil and, in most areas, a light to medium-textured upper subsoil and a medium to heavy-textured lower subsoil. Whin Sill generally begins at between 20 cm and 90 cm from the soil surface.

Soil Resources

Topsoil

29. Unit T1 covers the whole site. It is light-textured, consisting of medium sandy loam or medium sandy silt loam, and very slightly to slightly stony, with between 5% and 8% very small to medium hard stones in most cases. Large stone and boulders occur in places where the Whin Sill bedrock lies close to the soil surface. Topsoil T1 has a strongly developed fine and medium subangular blocky structure and a median unit thickness of 25 cm.

Upper Subsoil

30. Unit U1 occurs over most of the site although in parts of the west and south-east, where the Whin Sill outcrops to particularly shallow depth, it is absent. Unit U1 is light to medium-textured (consisting of medium sandy loam, medium clay loam or medium silty clay loam) and slightly stony, containing between 8% and 12% very small to medium hard stones. It has a strongly developed medium and coarse subangular blocky structure and a mean thickness of 18 cm.

Lower Subsoil

31. Lower subsoil L1 underlies topsoil T1 and upper subsoil U1. It is medium to heavy-textured, consisting of medium silty clay loam, heavy silty clay loam or sandy clay loam, and it has a strongly developed coarse angular blocky and medium prismatic structure. This lower subsoil is slightly stony, containing between 7% and 15% very small to medium hard stones, and it has a mean thickness of 45 cm.

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SOURCES OF REFERENCE

British Geological Survey (1972) *Sheet No. 6, Alnwick (Solid and drift). 1:50,000 scale.* BGS: 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 (1983) *Sheet 1, Soils of Northern England, 1:250,000 scale.* SSEW: Harpenden.

Soil Survey of England and Wales (1984) *Soils and their Use in Northern England* SSEW: Harpenden

APPENDIX I

DESCRIPTIONS OF THE GRADES AND SUBGRADES

Grade 1: Excellent Quality Agricultural Land

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

Grade 2: Very Good Quality Agricultural Land

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

Grade 3: Good to Moderate Quality Land

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

Subgrade 3a: Good Quality Agricultural Land

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

Subgrade 3b: Moderate Quality Agricultural Land

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

Grade 4: Poor Quality Agricultural Land

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

Grade 5: Very Poor Quality Agricultural Land

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

APPENDIX II

SOIL WETNESS CLASSIFICATION

Definitions of Soil Wetness Classes

Soil wetness is classified according to the depth and duration of waterlogging in the soil profile. Six soil wetness classes are identified and are defined in the table below.

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 only wet within 40 cm depth for 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 present within 80 cm depth, it is wet within 70 cm for more than 180 days, but only wet within 40 cm depth for between 31-90 days in most years.
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 210 days in most years **or**, if there is no slowly permeable layer present 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.

Assessment of Wetness Class

Soils have been allocated to wetness classes by the interpretation of soil profile characteristics and climatic factors using the methodology described in *Agricultural Land Classification of England and Wales: Revised guidelines and criteria for grading the quality of agricultural land* (MAFF, 1988).

[1] The number of days is not necessarily a continuous period.
[2] 'In most years' is defined as more than 10 out of 20 years.

APPENDIX III

SOIL PROFILE DESCRIPTION

Soil Type 1: Derived from shallow drift overlying Whin Sill

Location: Grid Reference: NU 23701760

Land Use: Permanent grass

Slope: 2°N

Recent Weather: Cool and overcast

Depth (cm)	Horizon Description
0-28	Dark brown (7.5 YR 3/2) medium sandy loam; no mottles; very slightly stony, with approximately 5% very small to medium angular and subangular hard stones; moist, strongly developed fine and medium subangular blocky structure; firm; very porous; many very fine fibrous roots; slightly sticky; moderately plastic; non-calcareous; clear, smooth boundary.
28-40	Brown/dark brown (7.5 YR 4.3) medium sandy loam; no mottles; slightly stony, with approximately 7% very small to medium angular and subangular hard stones; moist; strongly developed medium and coarse subangular blocky structure; firm; very porous; many very fine fibrous roots; slightly sticky; moderately plastic; non-calcareous; clear, smooth boundary.
40-64	Brown (7.5 YR 5/3) heavy silty clay loam; common brown (7.5 YR 5/4) and few strong brown (7.5 YR 5/8) mottles; slightly stony, with approximately 7% very small to medium angular and subangular hard stones; moist; strongly developed coarse angular blocky and medium prismatic structure; very firm; slightly porous; common very fine fibrous roots; moderately sticky; very plastic; non-calcareous; sharp wavy boundary.
64+	Very hard igneous rock (Whin Sill)