

AGRICULTURAL LAND CLASSIFICATION
AND SOIL PHYSICAL CHARACTERISTICS

BIRCH PIT,
NEAR COLCHESTER
ESSEX

AGRICULTURAL LAND CLASSIFICATION AND SOIL

PHYSICAL CHARACTERISTICS

SEMI-DETAILED SURVEY

BIRCH PIT, NEAR COLCHESTER, ESSEX

1. BACKGROUND

- 1.1 This 107 ha site was inspected during October 1992 in connection with sand and gravel mineral abstraction proposals. The site was surveyed at a semi-detailed level with a total of 50 soil inspections made using a hand held Dutch soil auger. This data was supplemented by observations from five soil profile pits and by information on soils supplied by the applicant. At the time of the survey land to the west of the abandoned mineral workings (Birch Pit) was in arable use, supporting cereals and oilseed rape. To the east and north of Brake's Farm the land was largely under grass. The central part of the site comprised of Birch Pit with associated soil/overburden stores and a lagoon, together with land in various stages of restoration, which was mainly under grass.
- 1.2 On the provisional 1:63,360 scale Agricultural Land Classification (ALC) map, (MAFF, 1974) the survey area is shown as predominately grade 3, with the central area mapped as non-agricultural. A small area of grade 2 land is shown as occurring in the south, to the east of Palmer's Farm. The current survey was undertaken to provide a more detailed representation of agricultural land quality and soil physical characteristics of land within the application area.

2. SITE PHYSICAL FACTORS AFFECTING LAND QUALITY

Climate

- 2.1 Climate data for the site was extrapolated from data contained within the published agricultural climatic dataset (Met Office, 1989). This indicates that average annual rainfall is 571 mm (22.8") and that the field capacity days are 99. Moisture deficits of 125 mm and 122 mm were recorded for wheat and potatoes respectively. The accumulated temperature (Jan-June) is approximately 1400 degrees Celsius. These characteristics do not impose any limitations on ALC grade.

Altitude and Relief

- 2.2 The site mainly occupies gently sloping land with gradients of 1 to 3° between altitudes of 31 m and 41 m above OD. Although some steeper slopes (up to a gradient of 8°) were recorded in the disturbed and restored areas of the site this did not constitute an overriding limitation to land quality where they occurred.

3. SOIL PHYSICAL CHARACTERISTICS

Geology

- 3.1 The published 1:50,000 scale Solid and Drift edition geology map, sheet 223 (Braintree) (Geological Survey of Great Britain, 1982) shows the site to comprise of three different Quaternary Drift deposits. To the west of the abandoned mineral working glacial boulder clay is mapped, whilst to the centre and east of the site Kesgrave sands and gravels are shown to occur. Also mapped in the east, to the north of Brake's Farm are glacial sands and gravels.

Soils

- 3.2 No detailed soil map exists for this area, however the generalised 1:250,000 scale soils map (Soil Survey of England and Wales, 1983) shows the site to comprise mainly of the Wix* Soil Association. However, to the west of the abandoned mineral working the Hanslope** Soil Association is mapped in conjunction with the glacial boulder clay drift and a small area of the Tendring*** Soil Association occurs in the north east of the site in association with the glacial sands and gravels (see paragraph 3.1).

* Wix Association: Deep permeable coarse loamy soils affected by groundwater. Associated with well drained sandy and coarse loamy soils and some slowly permeable seasonally waterlogged fine loamy over clayey and clayey soils giving patterned ground locally. Slight risk of water erosion.

** Hanslope Association: Slowly permeable calcareous clayey soils. Some slowly permeable non-calcareous clayey soils. Slight risk of water erosion.

*** Tendring Association: Deep often stoneless coarse loamy soils. Some slowly permeable seasonally waterlogged coarse and fine loamy over clayey soils. Patterned ground locally.

3.3 The current survey indicated the presence of two main soil types within the areas of undisturbed land surrounding the existing pit area. In general the soils identified on the arable land west of the site broadly support those shown on the generalised soils map, whilst those occurring on grassland in the east of the site are slightly heavier than indicated on the published map. Further soil resources exist within the areas of the abandoned mineral workings both within soil/overburden bunds and as crudely restored grassland. Further work would be required to estimate the quantity of soil or soil making materials present.

Soil Type/Area 1 (refer to Appendix 2 and Soil Types Map)

3.3.1 This soil type occurs over the western side of the site. Profiles typically comprise non-calcareous medium sandy silt loams or occasionally medium clay loam topsoils which locally contain up to 15% stone (>2cm). The upper subsoils consist of clay loams, clay or occasionally medium sandy silt loam which are very slightly or non-calcareous. The lower subsoil occurs below an average depth of 60 cm and consists of clays which can be slightly calcareous to the north and east of Palmer's Farm. The majority of the clayey soils have a slowly permeable layer within 40 cm and therefore have mainly been assessed as wetness class III with occasional wetness class II profiles occurring in lighter soil types.

Soil Type/Areas 2 (refer to Appendix 2 and Soil Types Map)

3.3.2 These soils occur on the eastern side of the site and comprise of very slightly to moderately stony medium sandy silt loam or occasionally medium clay loam topsoils. These overlie slightly stonier similarly textured upper subsoils. At a depth of 70-80 cm a heavier textured clay lower subsoil occurs which is very slightly or non-calcareous. These soils are typically well drained and have been assessed as wetness class I or occasionally wetness class II.

Soil Type/Area 3 (restored land, refer to Appendix 2 and Soil Types Map)

3.3.3^D These soils occur in the centre of the site and have been partially restored approximately ten years ago. The soils are variable, often the topsoils are missing (or contaminated with subsoil). The heavy textured non-calcareous clay and heavy clay loam subsoils varied in stone content and were usually impenetrable below 40-80 cm depth.

Soil Type/Area 4 (refer to Appendix 2 and Soil Types Map)

3.3.4 This area occurs adjacent to soil type/area 3, in the centre of the site. The soil resource has mainly been removed and soil storage/overburden bunds occur locally.

4. AGRICULTURAL LAND CLASSIFICATION

4.1 The site is predominately graded 3a, with smaller areas of 2 and 3b in the east. A small area of grade 4 together with a larger area of non-agricultural land occurs in the central area. A breakdown of ALC grades in hectares and percentage terms is provided below.

ALC grade	ha	%
2	4.8	4.5
3a	58.7	54.8
3b	1.4	1.3
4	12.2	11.4
Non-Agricultural	29.4	27.4
Agricultural Buildings	<u>0.5</u>	<u>0.5</u>
TOTAL	<u>107.0</u>	<u>100.0</u>

Grade 2

4.2 Located to the north-east of Brake's Farm the area of grade 2 is associated with the less stony variant of soil type 2 which is more fully described in paragraph 3.3.2. These soils are well drained but due to the locally dry climate have a slight droughtiness limitation. Heavier and/or less well drained profiles are also limited by minor wetness imperfections.

Subgrade 3a

4.3 The majority of the site has been graded 3a and occurs in two main areas.

4.4 On the western side of the site this grade is entirely associated with type/area 1 (see paragraph 3.3.1). Topsoil stone content (>2 cm) is locally in the range of 10-15% which excludes land from grade 2. As it has not been possible to map these areas of

stone separately the entire area has been graded 3a although areas of less stony grade 2 land do occur locally.

- 4.5 The second area of subgrade 3a land is associated with soil type 2 (see paragraph 3.3.2) and occurs over the eastern side of the site. Due to the presence of profile stone these soils have a *reduced available water capacity and therefore suffer from summer droughtiness*. In addition topsoil stone content is locally between 10 and 15%, thereby excluding land from grade 2. Droughtiness and locally topsoil stone content are therefore the overriding limitations to land quality.

Subgrade 3b

- 4.6 This occurs in a small area east of Brake's Farm and is associated with soil type 2 (see paragraph 3.3.2). This area has a topsoil stone content (>2 cm) of between 15 and 20% limiting this land to 3b.

Grade 4

- 4.7 This corresponds with the restored land found in area/soil type 3 (see paragraph 3.3.3) in the central part of the site. Much of this land is currently under grass, and due to the absence of topsoil in most areas is not considered suitable for arable use and has therefore been graded 4.

REFERENCES

- MAFF, (1988). Agricultural Land Classification of England and Wales. Revised guidelines and criteria for grading the quality of agricultural land.
- MAFF, (1974). 1:63,360 scale Agricultural Land Classification Sheet No. 149 (Provisional).
- METEOROLOGICAL OFFICE (1989). Grid point meteorological data for ALC of England and Wales, and other climatological investigations.
- GEOLOGICAL SURVEY OF GREAT BRITAIN (1982). 1:50,000 scale solid and drift edition geology map, sheet number 223 (Braintree).
- SOIL SURVEY OF ENGLAND AND WALES (1983). 1:250,000 scale soil map, sheet 4 (Eastern England).
- SOIL SURVEY OF ENGLAND AND WALES (1984). Bulletin Number 13, Soils and their use in Eastern England.

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 include 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 crops. The level of yields 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 winter 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 levels 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.

Appendix 2

STATEMENT OF SOIL PHYSICAL CHARACTERISTICS

BIRTH PIT, NEAR COLCHESTER, ESSEX

SOIL TYPE/AREA 1 (46.1 ha)

Topsoil	Texture	:	medium sandy silt loam, occasionally medium clay loam or rarely heavy clay loam.	
	CaCO ₃	:	mainly non-calcareous	
	Colour	:	10YR4/3 dark brown	
	Stone	:	in the range very slightly stony to slightly stony (1-15%), typically 2-5% comprising small to medium flints (approximately half of the total stones are >2 cm).	
	Depth	:	25-35 cm	
	Structure	:	cultivated zone - not applicable	
	Boundary	:	abrupt smooth or clear smooth	
	Roots	:	common fine and very fine	
	Upper Subsoil*	Texture	:	variable:- clay loam, clay or occasionally medium sandy silt loam.
		CaCO ₃	:	very slightly or non-calcareous
Colour		:	variable, typically 10YR5/4 and 10YR5/6 yellowish brown and 10YR5/3 brown; also includes 10YR6/3 pale brown; 2.5Y5/4 light olive brown and 2.5Y6/4 light yellowish brown.	
Stone		:	in the range very slightly stony to moderately stony (1-20%), typically 2-5%, with higher concentrations occurring locally east of Palmer's Farm. Comprising small to medium flints and occasionally chalk fragments.	
Depth		:	50-75 cm, typically 60 cm	
Structure		:	weakly developed coarse angular and subangular blocky.	
Consistence		:	friable to firm	
Porosity		:	<0.5% biopores	
Roots		:	common fine and very fine	
Boundary		:	not recorded	

* may contain more than one discrete horizon

Lower Subsoil	Texture	:	clay
	CaCO ₃	:	variable, typically very slightly or non-calcareous, however often slightly calcareous north and east of Palmer's cottage.
	Colour	:	variable, typically 10YR5/6 and 5/4 yellowish brown and 10YR5/3 brown; also includes 2.5Y6/4 light yellowish brown and 10YR6/3 pale brown.
	Stone	:	in the range very slightly stony to moderately stony (2-30%), typically 2-10% with higher concentrations locally east of Palmer's Farm. Size distribution as above.
	Depth	:	120 cm plus
	Structure	:	weakly developed coarse and medium prismatic.
	Consistence	:	friable to firm
	Porosity	:	>0.5% biopores
	Roots	:	common fine and very fine

SOIL TYPE/AREA 2 (20.7 ha)

Topsoil

Texture : medium sandy silt loam, occasionally medium clay loam.

CaCO₃ : very slightly or non-calcareous

Colour : 10YR4/3 dark brown

Stone : in the range very slightly stony to moderately stony (1-20%), typically 2-5% comprising small to medium flints (approximately one third of the total stone is >2 cm).

Depth : 25-40 cm

Structure : cultivated zone - not applicable

Boundary : abrupt smooth or clear wavy

Roots : many fine and very fine

Upper Subsoil

Texture : variable:- medium sandy silt loam, medium and heavy clay loam.

CaCO₃ : very slightly or non-calcareous

Colour : variable, typically 10YR5/4 and 10YR5/6 yellowish brown; also includes 7.5YR5/4 brown and 7.5YR5/6 strong brown.

Stone : in the range very slightly stony to very stony (2-50%), typically 5-10%, locally more stony to the east. Size distribution as above.

Depth : 70-80 cm

Structure : weakly developed coarse subangular blocky.

Consistence : friable

Porosity : approximately 1% biopores

Roots : common fine and very fine

Boundary : not recorded

Lower Subsoil	Texture	:	clay
	CaCO ₃	:	very slightly or non-calcareous
	Colour	:	variable, typically 7.5YR5/4 brown and 7.5YR5/6 strong brown; occasionally 10YR5/4 yellowish brown.
	Stone	:	in the range very slightly stony to very stony (2-50%), typically 5-10%, locally more stony to the east of Brake's Farm. Size distribution as above.
	Depth	:	120 cm plus
	Structure	:	weakly developed medium and coarse subangular blocky.
	Consistence	:	friable
	Porosity	:	approximately 1% biopores
	Roots	:	common fine and very fine

SOIL TYPE/AREA 3 (12.5 ha)

Topsoil

only present in a small area in northern part of restored area.

Texture : heavy clay loam and clay
 CaCO₃ : non-calcareous
 Colour : variable, typically 10YR4/2 dark greyish brown; also includes 10YR4/4 dark yellowish brown; 7.5YR5/4 brown and 7.5YR5/6 strong brown.

Stone : in the range very slightly stony to moderately stony (5-30%) small and medium subangular flints and subrounded pebbles.

Depth : 15-30 cm where present
 Structure: : cultivated zone - not applicable
 Boundary :
 Roots :

Subsoil*

The majority of this soil type/area consists of only this horizon.

Texture : clay and heavy clay loam
 CaCO₃ : non-calcareous
 Colour : variable, includes 10YR5/8 and 10YR5/4 yellowish brown; 7.5YR4/6 and 7.5YR5/6 strong brown and 7.5YR5/4 brown.

Stone : in the range slightly stony to moderately stony (10-20%). Size distribution as above.

Depth : 40-80 cm
 Structure : not recorded
 Consistence : " "
 Porosity : " "
 Roots : " "

* may contain more than one discrete horizon.

SOIL TYPE/AREA 4 (27.2 ha)

Soil resource predominantly removed. (Where soil is still present topsoil is missing). Soil storage/overburden bunds occur locally.

BIRCH PIT
NEAR COLCHESTER
ESSEX

MAP 1: AGRICULTURAL LAND CLASSIFICATION
MAP 2: SOIL TYPES
MAP 3: LOCATION OF SOIL PITS