Cambs 37/90

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PIONEER CONCRETE (HOLDINGS) LIMITED

STATEMENT ON AGRICULTURAL LAND CLASSIFICATION AND SITE/SOIL PHYSICAL CHARACTERISTICS

LAND AT NEW GHANT FARM, MANEA, CAMBRIDGESHIRE

1.0 SUMMARY

1.1 This 85 hectare site was inspected for Pioneer Concrete (Holdings) Limited during February and March 1991, in connection with possible proposals to extract sand and gravel. Detailed site investigations indicate that the soils are very uniform in nature comprising moderately deep peaty loam upper horizons overlying loamy subsoils derived from the underlying river terrace gravels. These free draining soils are highly water retentive and under the MAFF Agricultural Land Classification System (MAFF, 1988) the site is graded 1. Brief details of the MAFF ALC system are included in Appendix 1.

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STATEMENT ON AGRICULTURAL LAND CLASSIFICATION & SITE/SOIL PHYSICAL CHARACTERISTICS

LAND AT NEW GHANT FARM, MANEA, CAMBRIDGESHIRE

2.0 INTRODUCTION

2.1 This report provides information on agricultural land quality and site/soil physical characteristics for 83.3 hectares of agricultural land which are the subject of a proposed mineral extraction for sand and gravel.

2.2 The site, which lies adjacent to New Ghant Farm, Manea, was inspected during February and March 1991. A total of 85 soil inspections were made on site based on a structured 100 metre grid. At each grid point information was collected to a maximum depth of 110 cm and this was supplemented by further data from four representative soil profile pits. The results of this survey and the location of individual sampling points are shown on maps A to D.

2.3 At the time of survey the land was in an arable rotation, typical crops including cereals, oilseed rape, potatoes, sugar beet, carrots, beetroot and onions.

2.4 On the one inch to mile provisional Agricultural Land Classification map sheet number 135 (MAFF, 1971), the site is predominantly shown as grade 2 , with smaller areas of grade 1 located east of New Ghant Farm, and to the north of the site. Since this map is of a reconnaissance nature and designed primarily for strategic planning purposes, the current survey was undertaken to provide more detailed site - specific information on land quality, and on the physical characteristics of the soils.

3.0 SITE PHYSICAL FACTORS

Climate

3.1 Site specific climate data has been obtained by interpolating information contained in the 5 kilometre grid agroclimatic dataset, compiled by the Meteorological Office (Met Office, 1989). This shows average annual rainfall to be 539 mm (21.6 inches) which is low by national standards. Field capacity days at 90 per annum are also low. The accumulated temperature for the Manea area is 1455° Celsius. This parameter measures the cumulative build up of warmth available for crop growth, and in conjunction with rainfall, influences the development of soil moisture deficits (SMD).*

Relief Drainage and Irrigation

3.2 The site occupies level land at, or just below 0 metres above ordance datum (mean sea level). The site is underdrained and regional water tables are controlled by a series of dykes and pumps which relay water into the Sixteen Foot and Forty Foot drains. During summer, dyke water levels are maintained at a higher level for irrigation purposes. Licences permitting the abstraction of up to 4 million gallons of water are reported to be held by each of the occupiers on site, although it is understood these quantities are rarely fully exploited.

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* SMD: represents the balance between rainfall and potential evapo-transpiration. For ALC purposes the soil moisture deficits developing under a winter wheat and maincrop potato crop are considered. These reference crops have been selected because they are widely grown and in terms of their susceptibility to drought are representative of a wide range of crops. Soil moisture deficits of 114 mm and 118 mm are recorded for wheat and potatoes respectively.

Geology

3.3 The geology of this area is shown on the 1:50,000 scale solid and drift edition geological map, sheet number 173 (Geol Surv, 1980). With the exception of a very small area of land in the southwest corner, this map shows the majority of the site to comprise of Nordelph Peat. This is underlain by first and second terrace river gravels, which in turn rest on Ampthill Clay. Very small exposures of river terrace gravels and Ampthill Clay are mapped as occurring in the south west corner of the site.

4.0 SOIL PHYSICAL FACTORS

4.1 The soils occurring on site are mainly mapped as Adventurers Series* on the one inch to one mile soil map produced by the Soil Survey (SSEW, 1973). Field Survey observations broadly confirm this description and indicate that over the majority of the site soils are relatively uniform in nature.

4.2 Typically profiles comprise 35 cm to 45 cm of peaty loam or occasionally loamy peat overlying sandy loam, sandy clay loam and medium clay loam upper subsoils which typically overlie slightly heavier clay loam, sandy clay and clay lower subsoils below 50-70 cm depth. Lower subsoils may extend to in excess of one metre, but usually overlie lighter loamy sand, sand, or gravel below 80/90 cm.

4.3 In some locations on site, notably in the vicinity of New Ghant Farm, in the north east corner, and alongside the central part of the western boundary, peaty loam and loamy peat textures extend to between 50 to 90 cm in depth.

4.4 Profiles are mainly non calcareous in the upper horizons (except where limed) but usually become increasingly calcareous with depth, where a whitish highly calcareous shell marl horizon is often evident.

4.5 In a very few locations on site, typically where the peaty upper horizon extends to between 40 and 50 cm depth, subsoil acidity was noted. pH readings in these few areas rarely recorded values below 5.0, and soil pit examination confirmed that roots were able to successfully penetrate these acid horizons into the underlying non acidic mineral subsoil, thus avoiding a potential drought stress situation.

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*Adventurers' 2 series: Deep peat soils over variable subsoils, usually sandy, sometimes gravelly. Sandy soils with a peaty or humose surface horizon. Complex soil patterns locally. Flat land. Groundwater levels controlled by ditches and pumps.

4.6 Usually profiles are only very slightly stony in upper horizons, and become slightly, or moderately stony with depth. (Stone content comprises small and very small subangular flints).

4.7 Due to the presence of numerous interconnected root channels and continuous reed and worm channels the soils are permeable and free draining (wetness class I).

4.8 A full description of soil physical characteristics including depth, texture and structural details of individual horizons is provided in Appendix 2.

5.0 AGRICULTURAL LAND CLASSIFICATION

5.1 Following detailed site soil investigations based on an auger boring density of one per hectare, the site is classified as grade 1.

5.2 This overall grade includes auger borings which, in a very few locations are/or approach grade 2, either due to a reduced depth of peaty loam topsoil and/or to a particularly stony subsoil. Due to their very sporadic occurrence, and due to the availability of an irrigation water supply on site, these auger borings are not delineated separately.

5.3 Over the majority of the site moderately deep peaty loam upper horizons are present which hold large reserves of plant available water. Moisture balance figures* of in excess of + 40 for wheat and + 30 for potatoes are recorded for the majority of profiles making the land eligible for grade 1 on droughtiness grounds. Due to their permeable free draining nature (see paragraph 3.7) the soils are assessed as wetness class I, and are eligible for grade 1 on wetness grounds.

5.4 Consequently the land is easily worked over a long period, and is capable of supporting consistently high yields of a wide range of arable and horticultural crops.

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*Moisture Balance figures: These result when the amount of water held within a soil profile, and available to a specific crop, is offset against the soil moisture deficit for that crop. (See paragraph 2.1). For ALC purposes the water available to a winter cereal and maincrop potato crop are considered. The moisture balance figures resulting indicate the relative degree of the drougtiness limitation present (if any) and relate directly to ALC grade.

March 1991

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SOURCES OF REFERENCE

GEOLOGICAL SURVEY OF ENGLAND AND WALES, 1980. 1:50,000 Solid + Drift Edition Geology map, sheet number 173 (Ely).

SOIL SURVEY OF ENGLAND AND WALES, 1973. 1:63,360 scale Soil Map (Ely). Sheet number 173.

MINISTRY OF AGRICULTURE, FISHERIES AND FOOD, 1971. 63,360 scale provisional ALC map, number 135.

MINISTRY OF AGRICULTURE, FISHERIES AND FOOD, 1988. Agricultural Land Classification of England and Wales. (Revised guidelines & Criteria for grading the quality of agricultural land).

METEOROLOGICAL OFFICE, 1989. Climate data extracted from the published agro climatic dataset.

THE AGRICULTURAL LAND CLASSIFICATION SYSTEM

1. Agricultural Land Classification (ALC) assesses land quality based on its long term physical potential. The ALC system grades land according to the degree to which its inherent physical characteristics impose long term limitations on agricultural use.

2. The main physical factors which are taken into account in assessing ALC grade are climate site and soil. These may act singly, or in combination to result in varying degrees of constraint on agricultural use. The ALC grade is determined by the most limiting factor present.

3. The main grades of land are recognised ranging from grade 1 land of excellent quality to grade 5 land of very poor quality. Other issues, such as the location of farms, the standard of fixed equipment and the accessibility of land do not affect grading although they may influence land use decisions.

DESCRIPTION OF GRADES

Grade 1 - excellent quality agricultural land

4. 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

5. 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 in than Grade 1.

Grade 3 - good to moderate quality agricultural land

6. Land with moderate limitations which affect the choice of crops, 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

7. 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

8. 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

9. 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 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

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

APPENDIX 2

DETAILED SOIL PHYSICAL CHARACTERISTICS

TOPSOIL

Depth: in the range 30-90 cm, typically 35-45 cm

Texture: peaty loam, occasionally loamy peat. May contain horizons of humified peat at depth.

CaCO3: non calcareous, except where limed.

pH: 6.0 or 7.0, very occasionally 4.0 or 5.0 between depths of 40-50 cm.

Colour: Black

Stone: Very slightly stony (1 or 2%)
Comprising small and very small subangular flints

Structure: cultivation zone is non compact to 30/35 cm. Structureless or weak fine granular structure 30/35 plus.

Boundary: smooth, abrupt

Roots: many fine and very fine

UPPER SUBSOIL

Depth: in the range 50-100 cm; typically 50/70 cm

Texture: Sandy loam, sandy clay loam or medium clay loam; rarely fine sandy loam or heavy clay loam

CaCO3: typically non or very slightly calcareous

Colour: typically light grey, light brownish grey very pale brown, pale brown or light yellowish brown.

Stone: very slightly to slightly stony (typically 1-10%). Size distribution as above.

Structure: typically moderately developed coarse subangular blocky with few coarse angular blocky. May be predominantly angular blocky or slightly platey above 45/50 cm.

Consistence: friable

Porosity: typically 1-2% biopores (exceeding 5mm in diameter), comprising numerous interconnected root channels and continuous vertical reed and worm channels. These channels are preserved within the subsoil by red or strong brown coatings of iron.

Boundary: clear, smooth or wavy, or merging

Roots: many or common fine and very fine

LOWER SUBSOIL

Depth: in the range 70 to 120 cm, typically 80/90 cm

Texture: heavy clay loam, clay or sandy clay, less frequently silty clay loam.

CaC03: very slightly calcareous becoming increasingly calcareous with depth.

Colour: friable, frequently light brownish grey or greyish brown, together with brownish yellow or yellowish brown.

Stone: Slightly to moderately stony (typically in the range 5% to 25%) size distribution as above.

Structure: moderately developed coarse and very coarse subangular blocky with few coarse angular blocky.

Consistence: friable or firm

Porosity: as upper subsoil

Roots: common fine and very fine

GRAVELLY SUBSTRATE

Typically occurs below 80/90 cm and comprises sand, loamy sand, sandy loam textures with variable quantities of gravel. Usually becomes increasingly stony with depth. Often preceded by a strongly calcareous shell marl horizon which may give rise to a narrow horizon of silty clay loam, or sandy clay loam above the gravel.

VARIATIONS

In a 200 metre wide strip extending northwest from New Ghant Farm, lighter upper subsoil textures extend to depth.

See Map B for main locations of deeper peaty surface horizons

WETNESS CLASS 1