**SOUTH NORTHANTS DISTRICT LOCAL PLAN**
**LAND AT GRANGE PARK, COURTEEN HALL**

# RESPONSE TO PROPOSALS TO UPGRADE AGRICULTURAL LAND BY SOIL TRANSFER

## 1. INTRODUCTION

1.1 Proposals to upgrade areas of land presently of subgrades 3a and 3b quality by the transfer of soils from the proposed development land at Grange Park, Courteen Hall are contained within Section 3 of the Environmental Statement, prepared by Reading Agricultural Consultants (RAC), and a subsequent report solely on the soil transfer dated October 1994 prepared by RAC.

1.2 The area of land to be subject to surcharging using topsoil is identified within the Environmental Statement as being to the south of the M1 motorway. However, in the subsequent report on the soil transfer by RAC other areas of land are suggested as being suitable but are not directly identified.

1.3 The area of land identified to the south of the M1 motorway is described by RAC as being mostly 3b quality but with a small area of sloping grade 3a land in the east. The map of land quality produced by RAC also shows a thin band of grade 2 quality land between the areas of grades 3a and 3b.

1.4 In a survey undertaken by ADAS Statutory Group in September 1990 a narrow band of land within the area identified by RAC for soil transfer was surveyed for a potential road route and land quality mapped. Significant areas of subgrade 3a quality land were identified within the area mapped entirely as subgrade 3b by RAC. Some doubt therefore exists as to the extent of the land mapped as subgrade 3b within the area to the south of the M1 motorway.

## 2. SOIL TRANSFER PROPOSALS

2.1 It is proposed within the Environmental Statement by RAC that the land quality of areas of subgrades 3a and 3b would be upgraded to grade 2 quality land by the addition of suitable topsoil (Environmental Statement, p21). However, the proposal to upgrade land of 3a quality would appear to be unnecessary as this land is already classed as 'best and most versatile' and therefore should be protected in the National interest.

2.2 The technical appraisal of the soil transfer produced by RAC (Environmental Statement p25 paragraph 4.1) states that Figures 6 and 8 in the Ministry of Agriculture, Fisheries and Food (MAFF) revised criteria for Agricultural Land Classification (MAFF, 1988) should be used to re-assess the quality of the acceptor area following soil transfer. This should not be the case.

2.3 The procedure for the assessment of wetness class varies depending on whether a soil profile is disturbed or undisturbed. In undisturbed soils evidence of wetness within the profile will typically be indicated by grey and/or orange colours (gleying and mottling) depending on the extent and duration of saturation within the profile. In disturbed soils evidence of wetness may be remnants from the soil water regime prior to disturbance or colour changes indicating wetness may not have developed in the time since disturbance. Hence within disturbed soil profiles wetness class is assessed using only information on the depth to any slowly permeable layer within the profile and not evidence of mottling and gleying. Therefore even though the disturbance proposed within the areas of land to be surcharged consists only of adding topsoil, the evidence for soil wetness within the profile may not be relied upon to give an indication of the new soil water regime.

2.4 The soil profile of the proposed acceptor area for soil transfer is described as slowly permeable from 35-40 cm (Environmental Statement p22 paragraph 1.2) i.e. just below cultivation depth. Hence it is likely that cultivation of the soil

prevents the formation of a slowly permeable layer higher in the profile at present. Therefore if topsoil were added to such a profile the buried layers would no longer be within the reach of normal cultivation techniques and a slowly permeable layer would be likely to form within previously permeable soil horizons.

2.5 RAC put forward the findings within their report of October 1994 that a slowly permeable layer is at present only found within horizons that are clay textured. Hence no slowly permeable layer would form within heavy clay loam textured materials. However, the soil profile of the suggested acceptor area identified in the Environmental Statement (p22 paragraph 1.1) is:-

0 - 25 cm Heavy clay loam or clay

25 cm+ Clay

Therefore in an unspecified amount of the acceptor area the topsoil is clay textured and where the topsoil is heavy clay loam, clay textured material is found at only 25 cm depth. Given the propensity of the existing clay material within the acceptor area to form a slowly permeable layer at shallow depth it is likely that the clay textured soil horizons buried in the soil transfer would also become slowly permeable.

2.6 The textures of the topsoil to be used for the transfer are described as *predominantly medium sandy loam from existing grade 2 areas and medium* clay loam from grade 3a areas (Environmental Statement p23 paragraphs 2.1 and 2.2). Although similar textured material was encountered during surveys carried out on behalf of MAFF by the ADAS Statutory Group the extent of the lighter textured materials was limited. Topsoils were found to be predominantly medium and heavy clay loam textures and it is therefore likely that much of the proposed soil transfer will be using heavy clay loam textured materials. The use of this material will therefore have implications for the subsequent ALC grading of the site.

2.7 *The initial proposals in the Environmental Statement were to surcharge* acceptor areas with 25 cm of topsoil stripped from areas to be developed (Environmental Statement p24 paragraph 3.3). However, subsequently scenarios are set out within the RAC report of October 1994 that areas of 3b quality land should be surcharged with 30 cm or 47.5 cm thicknesses of topsoil for areas of present heavy clay loam and clay topsoil respectively (RAC 1994, p7). The resultant soil profiles are considered below.

Surcharging Option 1: For areas of existing heavy clay loam topsoils.

Addition of 30 cm thickness of topsoil which is likely to be medium or heavy clay loam.

| | |
|---|---|
| 0 - 30 cm | Medium/Heavy clay loam |
| 30 - 55 cm | Heavy clay loam (previous topsoil) |
| 55 cm + | Clay |

The existing slowly permeable layer would be buried to 65-70 cm, however it is likely that a slowly permeable layer will form in the clay subsoil up to 55 cm depth. Therefore if a slowly permeable layer exists in the disturbed soil profile at less than 60 cm then using Figure 7 in the MAFF guidelines (MAFF, 1988) such a profile would be assessed as wetness class III. If the topsoil texture of a wetness class III soil profile is heavy clay loam then the land would be ALC subgrade 3b.

Surcharging Option 2 For areas of existing clay topsoil.

Option 2a : Addition of 30 cm of topsoil, likely to be medium or heavy clay loam.

| | |
|---|---|
| 0-30 cm | Medium/Heavy clay loam |
| 30-55 cm | Clay (previous topsoil) |
| 55 cm + | Clay |

Therefore the outcome is likely to be as in option 1 but will the additional risk of a slowly permeable layer forming up to cultivation depth at 35 cm. A slowly permeable layer above 36 cm will result in a wetness class of IV and hence an ALC grade of 3b for medium or heavy clay loam topsoil.

Option 2b : Addition of 47.5 cm of topsoil, likely to be medium or heavy clay loam.

| | |
|---|---|
| 0-47.5 cm | Medium/Heavy clay loam |
| 47.5-72.5 cm | Clay (previous topsoil) |
| 72.5 cm + | Clay |

The existing slowly permeable layer would therefore be buried to over 80 cm, however, it is only necessary for a slowly permeable layer to form above 60 cm in the clay to result in a wetness class of III and hence an ALC grade of 3b for a heavy clay loam topsoil.

2.8 The RAC report on the soil transfer proposals states that 30 cm of topsoil will be stripped from the donor areas (RAC 1994, p8). However, the average topsoil thickness from the grade 2 and 3a areas is given as only 25 cm in the Environmental Statement (p23 paragraphs 2.1 and 2.2). RAC also state that 70 ha of grades 2 and 3a land will be lost through the development proposals and the topsoil from this area will be used to upgrade 47 ha of subgrade 3b land. This would result in a net loss of only 23 ha of best and most versatile land (RAC 1994, p8). If only a 25 cm thickness of topsoil is stripped from the 70 ha of existing grades 2 and 3a land and spread at a thickness of 45 cm on the poorer quality land then only 39 ha of land would be surcharged with the topsoil resource. This would result in a loss of 31 ha of best and most versatile land even *if the proposed upgrading of the land was successful.*

## 3.0 CONCLUSIONS

3.1 The addition of topsoil to a soil profile will not necessarily lead to an upgrading of the surcharged land.

3.2 A new slowly permeable layer is likely to form within the previous permeable horizons on surcharged land.

3.3 The method of assessment of wetness class must be using the criteria for disturbed soils.

3.4 There is doubt as to the extent of various grades of land in the acceptor and donor areas.

3.5 There is doubt as to the resource of lighter textured topsoil material available for transfer.

3.6 There is doubt as to the extent of land which could be surcharged with the available topsoil resources.

3.7 Therefore the whole concept of surcharging areas of poorer quality land to mitigate for the loss of good quality land in development areas is flawed by assumptions on procedures for assessment of wetness class and lack of practical detail.

Resource Planning Team
Huntingdon Statutory Centre

## 4.0 REFERENCES

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

Reading Agricultural Consultants (1994). "Grange Park", The Courteenhall Estate, Northamptonshire. Study of Soil Profile Permeability in selected areas of Grade 3 land.

## PART II

## 4. AGRICULTURAL LAND CLASSIFICATION

4.1 The Grange Park site has developed from a number of smaller sites during the planning process. Each of these smaller sites has been the subject of a detailed Agricultural Land Classification (ALC) survey, taking place in January 1990, January 1993 and February 1994.

4.2 The surveys were carried out by members of the Resource Planning Team in the ADAS Huntingdon Statutory Centre based in Cambridge. The land has been graded in accordance with the published MAFF guidelines and criteria (MAFF, 1988). A description of the ALC grades and subgrades is given in Appendix I.

4.3 The area and proportions of the ALC grades and subgrades within the surveyed land are shown in Map 1 and are summarised in Table 1.

**Table 1. Area (ha) of grades and other land**

| Grade/Other land | Area (ha) | % Surveyed area |
|---|---|---|
| 2 | 35.2 | 15.3 |
| 3a | 81.7 | 35.4 |
| 3b | 67.0 | 29.0 |
| Non-Agric. (inc. mineral workings) | 45.2 | 19.6 |
| Urban | 1.6 | 0.7 |
| Total Survey area | 230.7 | |

4.4 The fieldwork was conducted at an average density of one boring per hectare of land surveyed. A total of 210 borings and 10 soil pits were described. Non-agricultural areas such as woodland were not surveyed.

4.5 The grade 2, very good quality land, within the site was limited by minor wetness and occasionally slight droughtiness imperfections. Soils principally consisted of moderately well drained medium loamy soils derived from fluvio glacial gravel deposits or the lighter textured soils derived from boulder clay drift. These soils were usually assessed as wetness class II but in a limited number of areas wetness class I and III profiles occurred.

4.6 Subgrade 3a, good quality land, was found to be limited by wetness and workability restrictions. Soils principally consist of moderately drained (wetness classes II and III) fine loamy topsoils overlying slowly permeable clay subsoils. Where the soil profile was assessed as wetness class II the heavy clay loam topsoil prevented the land being a higher grade.

4.7 Subgrade 3b, moderate quality land, was limited by wetness and workability restrictions. Soils within this subgrade consist of alluvial soils along the valley bottoms and heavy soils on mid to upper slopes derived from boulder clay drift. The soil profiles generally consisted of clay or heavy clay loam topsoils overlying clay subsoil which in those soils derived from boulder clay drift may be calcareous at depth. These soils were assessed as wetness class III or IV which together with the clay or heavy clay loam topsoils limit the profiles to subgrade 3b.

4.8 Similar soils and grades or subgrades of land were found within the site in the survey undertaken by Reading Agricultural Consultants (RAC). However, the distribution of the various grades was often at variance with the surveys carried out by ADAS. Map 2 shows areas within the site where the grades in both the ADAS and RAC surveys agree.

4.9 Some areas within the site during the surveys by ADAS were considered borderline between two grades or subgrades from auger boring information only. Hence where this problem arose soil pits were dug to assess subsoil structural development and/or topsoil samples were taken for laboratory determination of particle size distribution to assess soil texture. Additionally, the topsoil was occasionally found to be calcareous which may allow for the soil profile to be upgraded, depending on clay content and climatic restrictions, as calcareous topsoils have better structure and are more easily worked than non-calcareous topsoils of a similar texture. Hence the main differences between the two surveys are likely to arise from the estimates of depth to a slowly permeable layer and the texture and calcareous nature of the topsoil. These parameters being important for the determination of wetness class and subsequent ALC grade.

## PART III

## TECHNICAL APPRAISAL OF PROPOSALS TO UPGRADE AGRICULTURAL LAND BY SOIL TRANSFER

### 5. INTRODUCTION

5.1 Proposals to upgrade areas of land presently of subgrades 3a and 3b quality by the transfer of soils from the proposed development land at Grange Park, Courteen Hall are contained within Section 3 of the Environmental Statement, prepared by Reading Agricultural Consultants (RAC), and a subsequent report solely on the soil transfer dated October 1994 prepared by RAC.

5.2 The area of land to be subject to surcharging using topsoil is identified within the Environmental Statement as being to the south of the M1 motorway. However, in the subsequent report on the soil transfer by RAC other areas of land are suggested as being suitable but are not directly identified.

5. The area of land identified to the south of the M1 motorway is described by RAC as being mostly 3b quality but with a small area of sloping grade 3a land in the east. The map of land quality produced by RAC also shows a thin band of grade 2 quality land between the areas of grades 3a and 3b.

5.4 In a survey undertaken by ADAS Statutory Group in September 1990 a narrow band of land within the area identified by RAC for soil transfer was surveyed for a potential road route and land quality mapped. Significant areas of subgrade 3a quality land were identified within the

area mapped entirely as subgrade 3b by RAC due to the calcareous nature of the topsoil. Some doubt therefore exists as to the extent of the land mapped as subgrade 3b within the area to the south of the M1 motorway.

## 6. SOIL TRANSFER PROPOSALS

6.1 It is proposed within the Environmental Statement by RAC that the land quality of areas of subgrades 3a and 3b would be upgraded to grade 2 quality land by the addition of suitable topsoil (Environmental Statement, p21). However, the proposal to upgrade land of 3a quality would appear to be unnecessary as this land is already classed as 'best and most versatile' and therefore should be protected in the National interest.

6.2 The technical appraisal of the soil transfer produced by RAC (Environmental Statement p25 paragraph 4.1) states that Figures 6 and 8 in the Ministry of Agriculture, Fisheries and Food (MAFF) revised criteria for Agricultural Land Classification (MAFF, 1988) should be used to re-assess the quality of the acceptor area following soil transfer. This should not be the case.

6.3 The procedure for the assessment of wetness class varies depending on whether a soil profile is disturbed or undisturbed. In undisturbed soils evidence of wetness within the profile will typically be indicated by grey and/or orange colours (gleying and mottling) depending on the extent and duration of saturation within the profile. In disturbed soils evidence of wetness may be remnants from the soil water regime prior to disturbance or colour changes indicating wetness may not have

developed in the time since disturbance. Hence within disturbed soil profiles wetness class is assessed using only information on the depth to any slowly permeable layer within the profile and not evidence of mottling and gleying (MAFF, 1988 Figure 6). Therefore even though the disturbance proposed within the areas of land to be surcharged consists only of adding topsoil, the evidence for soil wetness within the profile may not be relied upon to give an indication of the new soil water regime.

6.4 The soil profile of the proposed acceptor area for soil transfer is described as slowly permeable from 35-40 cm (Environmental Statement p22 paragraph 1.2) i.e. just below cultivation depth. Hence it is likely that cultivation of the soil prevents the formation of a slowly permeable layer higher in the profile at present. Therefore if topsoil were added to such a profile the buried layers would no longer be within the reach of normal cultivation techniques and a slowly permeable layer would be likely to form within previously permeable soil horizons.

6.5 RAC put forward the findings within their report of October 1994 that a slowly permeable layer is at present only found within horizons that are clay textured. Hence no slowly permeable layer would form within heavy clay loam textured materials. However, the soil profile of the suggested acceptor area identified in the Environmental Statement (p22 paragraph 1.1) is:-

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Therefore in an unspecified amount of the acceptor area the topsoil is clay textured and where the topsoil is heavy clay loam, clay textured material is found at only 25 cm depth. Given the propensity of the existing clay material within the acceptor area to form a slowly

permeable layer at shallow depth it is likely that the clay textured soil horizons buried in the soil transfer would also become slowly permeable.

6.6 The textures of the topsoil to be used for the transfer are described as predominantly medium sandy loam from existing grade 2 areas and medium clay loam from grade 3a areas (Environmental Statement p23 paragraphs 2.1 and 2.2). Although similar textured material was encountered during surveys carried out on behalf of MAFF by the ADAS Statutory Group the extent of the lighter textured materials was limited. Topsoils were found to be predominantly medium and heavy clay loam textures and it is therefore likely that much of the proposed soil transfer will be using heavy clay loam textured materials. The use of this material will therefore have implications for the subsequent ALC grading of the site and for the soil handling characteristics of this less easily worked material.

6.7 The initial proposals in the Environmental Statement were to surcharge acceptor areas with 25 cm of topsoil stripped from areas to be developed (Environmental Statement p24 paragraph 3.3). However, subsequently scenarios are set out within the RAC report of October 1994 that areas of 3b quality land should be surcharged with 30 cm or 47.5 cm thicknesses of topsoil for areas of present heavy clay loam and clay topsoil respectively (RAC 1994, p7). The resultant soil profiles are considered below.

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Surcharging Option 2 For areas of existing clay topsoil.

Option 2a : Addition of 30 cm of topsoil, likely to be medium

or heavy clay loam.

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| 0-30 cm | Medium/Heavy clay loam |
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Therefore the outcome is likely to be as in option 1 but will the additional risk of a slowly permeable layer forming up to cultivation depth at 35 cm. A slowly permeable layer above 36 cm will result in a wetness class of IV and hence an ALC grade of 3b for medium or heavy clay loam topsoil.

Option 2b : Addition of 47.5 cm of topsoil, likely to be medium or heavy clay loam.

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The existing slowly permeable layer would therefore be buried to over 80 cm, however, it is only necessary for a slowly permeable layer to form above 60 cm in the clay textured material to result in a wetness class of III and hence an ALC grade of 3b for a heavy clay loam topsoil.

6.8 The RAC report on the soil transfer proposals states that 30 cm of topsoil will be stripped from the donor areas (RAC 1994, p8). However, the average topsoil thickness from the grade 2 and 3a areas is given as only 25 cm in the Environmental Statement (p23 paragraphs 2.1 and 2.2). RAC also state that 70 ha of grades 2 and 3a land will be lost through the development proposals and the topsoil from this area will be used to upgrade 47 ha of subgrade 3b land. This would result in a net loss of only 23 ha of best and most versatile land (RAC 1994, p8). If only a 25 cm thickness of topsoil is stripped from the 70 ha of existing grades 2 and 3a land and spread at a thickness of 45 cm on the poorer quality land then only 39 ha of land would be surcharged with the

topsoil resource. This would result in a loss of 31 ha of best and most versatile land even if the proposed upgrading of the land was successful.

6.9 The difficulties in identifying the areas of the various grades and subgrades within the site were outlined earlier in Section 4. There are therefore practical difficulties in identifying the relevant soils for transfer within the site. This could only be overcome by extremely careful supervision by a suitably qualified person being present and directing all soil movement operations.

6.10 The bulk of the soils to be moved are likely to be of a heavy clay loam texture and hence will be very prone to structural damage and smearing if moved when moisture content is too high. Additionally the acceptor area consists of soils with heavy clay loam and clay textures. These materials are also prone to compaction and smearing if traversed by vehicles when wet. Very careful supervision would therefore be required to ensure no movements of soils occurred during or following adverse weather conditions. As the success of the soil transfer scheme relies on the lack of any slowly permeable layer within the acceptor area this is seen as unrealistic with the soil types within the site and acceptor area.

## 7.0 MAFF CASE

7.1 The addition of topsoil to a soil profile will not necessarily lead to an upgrading of the surcharged land.

7.2 A new slowly permeable layer is likely to form within the previous permeable horizons on surcharged land.

7.3 The method of assessment of wetness class must be using the criteria for disturbed soils.

7.4 There is doubt as to the extent of various grades of land in the acceptor and donor areas.

7.5 There is doubt as to the resource of lighter textured topsoil material available for transfer.

7.6 There is doubt as to the extent of land which could be surcharged with the available topsoil resources.

7.7 There is doubt as to the practicalities of the soil handling.

7.8 Therefore the whole concept of surcharging areas of poorer quality land to mitigate for the loss of good quality land in development areas is flawed by assumptions on procedures for assessment of wetness class and lack of practical detail.

## 8. REFERENCES

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

Reading Agricultural Consultants (1994). "Grange Park", The Courteen Hall Estate, Northamptonshire. Study of Soil Profile Permeability in selected areas of Grade 3 land.

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 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 levels of yields. It is mainly suited to grass with occasional arable crops (e.g. 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.