AGRICULTURAL LAND CLASSIFICATION
PROPOSED A1(M) IMPROVEMENTS
BALDOCK TO ALCONBURY

Contents

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1.0 INTRODUCTION

1.1 An Agricultural Land Classification (ALC) survey was carried out over the majority of the proposed 40 km route for the A1(M) improvement between Baldock and Alconbury. Two areas of the proposed corridor were excluded from the survey, namely the extreme southern end where a small area (approximately 0.6 km) follows the line of the existing A1 road, and a section from the south of Biggleswade to New Spring Farm (approximately 3 km), which also follows the existing road line closely. The survey work was carried out during October and November 1994.

1.2 The fieldwork was carried out along a 70 m wide corridor, with auger borings made every 100 m along either side and offset from each other. The maps however, have been produced depicting a 100 m wide corridor to enable the individual areas to be shown at this scale but area measurements have been made assuming a 70 m wide wayleave. A total of approximately 700 auger borings were made and these were complemented by 11 soil pits to help determine subsoil conditions in more detail.

Agricultural Land Classification System

1.3 The land has been graded using the MAFF Agricultural Land Classification system (MAFF, 1988) which assesses land quality based on its long term physical potential. Land is assigned to an ALC grade according to the degree to which its inherent physical characteristics impose long term limitations on agricultural use. 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 production. The ALC grade is determined by the most limiting factor present.

1.4 Five 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. The definitions of the five ALC grades are included in Annex 1.

Irrigation

1.5 Irrigation can significantly enhance the potential of agricultural land, especially in drier areas and is therefore taken into consideration in ALC grading where it is current or recent practice. Where an adequate irrigation water supply has been shown to be available, this has been taken into consideration in grading the land during this survey in accordance with the ALC guidelines.

Report Structure

1.6 For ease of reporting the route has been divided into three discrete sections which broadly correspond to the soils and geomorphology of the area. Section 1 comprises the land at the northern end of the route from Brampton to the River Great Ouse, Section 2 covers the area from the River Great Ouse to Biggleswade, while Section 3 consists of the short section at the southern end of the route from New Spring Farm to Radwell Grange. Each section is dealt with separately and in detail and a final summary has been produced drawing together the findings. The impact that the proposed route would have on the national and regional situation is also included in the summary section.

2.0 SECTION 1 - BRAMPTON TO THE RIVER GREAT OUSE

2.1 This section covers approximately 19.4 km of the route.

Climate

2.2 Climatic data for five locations on this section were obtained by interpolating information contained in the 5 km grid agricultural climatic dataset (Met Office, 1989). This information is shown in summary below:

Grid Ref.	TL190707	182656	155608	144573	145540
AAR (mm)	584	584	584	576	563
Altitude (m)	20	40	30	34	32
FCD	107	109	107	101	96
MD wheat (mm)	116	117	121	120	121
MD potatoes (mm)	111	111	117	116	117
Acc Temp. (°C)	1446	1426	1440	1438	1441
Climatic Grade	1	1	1	1	1

These climatic characteristics do not impose any climatic limitation on the ALC grade of the proposed route within this area.

Altitude and Relief

2.3 This section comprises gently rolling land ranging in altitude from approximately 20 m AOD at either end to approximately 40 m AOD on the western side of the village of Southoe. The route initially follows a south westerly direction before turning south at Wyboston and crosses a number of shallow valleys which contain small streams that drain the higher land to the west. Gradient and altitude however do not constitute any limitation to land quality within this section of the route with the exception of a small area of steeply sloping land at the southern end of the site where the land falls sharply to the floodplain. This area has slopes in excess of 7° and has therefore been limited to subgrade 3b.

Geology and Soils

2.4 The published drift edition geology maps for the area Sheet 187, Huntingdon (Geol Survey, 1975) and Sheet 204 Biggleswade (Geol Survey, 1976) shows this part of the route to be predominantly underlain by glacial boulder clays, with some outcrops of Oxford Clays on the sides of the shallow valleys. At the northern end around Brampton, 1st and 2nd terrace river gravels have been identified and a small area of 3rd terrace river gravels has been mapped to the north of the old A45 road at Hail Weston. Alluvium has been mapped in association with the River Kym, the Duloe Brook and the River Great Ouse.

2.5 The published reconnaissance scale (1:250 000) "Soils of Eastern England" map (Sheet 4, Soil Survey, 1983) shows the occurrence of three soil associations within this section of the proposed route. In the north, close to Brampton, a small area of Efford 1 Association (*1) has been mapped, which corresponds to the river terrace deposits referred to above, south of this a small area of Evesham 3 Association occurs (*2). To the south of Buckden the remainder of the section has been mapped as Hanslope Association (*3).

2.6 The soils found during the current survey correlate reasonably well with the published map. Five distinct soil types have been identified in this section. Two small areas of clayey alluvium have been mapped at the extreme north and south of this section. These soils have a non-calcareous clay topsoil over similar textured subsoils, are stoneless throughout and have been assessed as wetness class III.

(*1) Efford 1 Association: Well drained slightly or moderately stony fine loamy soils on level or gently sloping river terraces over gravel, associated with similar permeable soils variably affected by groundwater.

(*2) Evesham 3 Association: Slowly permeable calcareous clayey and fine loamy over clayey soils developed on Jurassic and Cretaceous Clays. Some slowly permeable seasonally waterlogged non-calcareous clayey soils.

(*3) Hanslope Association: Slowly permeable calcareous clayey soils developed in chalky till.

2.7 In the vicinity of Brampton Lodge Farm a small area of coarse and fine loamy soils overlie gravels. These soils typically comprise medium sandy loam or sandy clay loam topsoils over sandy clay loam subsoils which overlie gravels at 60/70 cm depth. They are generally free draining and have been assessed as wetness class I.

2.8 Immediately to the south of the terrace soils described in paragraph 2.7, is an area of decalcified clay soils. These soils have a non-calcareous or very slightly calcareous clay topsoil over a similar textured upper subsoil with distinct ochreous mottling and is either non-calcareous or very slightly calcareous. Below approximately 50/60 cm depth the subsoils becomes calcareous with common chalk stones present. These soils have been assessed as wetness class III or occasionally wetness class II depending on the depth to gleying within the profiles. Similar soils were also found further to the south in small isolated areas.

2.9 The dominant soils within this section of the route, which occur extensively between Buckden and Wyboston are the calcareous clayey soils developed on the chalky boulder clays. These soils have a calcareous clay or heavy clay loam topsoil over brown clay upper subsoils which may or may not show ochreous mottling. Lower subsoils typically comprise strongly mottled grey chalky boulder clays at 40/70 cm depth, which are generally slowly permeable. The soils are calcareous throughout and contain common chalk stones. They have been assessed as wetness class II or III depending on the depth to gleying which indicates the degree of waterlogging within the subsoil horizons.

2.10 Around Hail Weston and again at the southern end of this section moderately well drained brown clayey soils have been mapped. These soils are similar in many respects to the better drained boulder clay soil described in paragraph 2.9 but have no chalky boulder clay present within the soil profile. A typical profile comprises heavy clay loam or occasionally clay topsoils which are often naturally calcareous, over a brown clay subsoil. Below 60 cm the soil may be gleyed, and contain occasional calcareous nodules. The soil profiles examined

have been classified as wetness class I or II and are generally stoneless throughout. Around Colesden Lodge Farm however, a stony variant has been mapped, which has a slightly stony topsoil, over a moderately stony subsoil. The stones generally comprise small and medium subangular and subrounded flints, with occasional limestone fragments.

Agricultural Land Classification

2.11 Section 1 of the route comprises predominantly grades 2 and 3a, with five small areas of grade 3b scattered throughout. The route also takes in a small area of mature broad leaved woodland to the west of Diddington, an irrigation reservoir to the north of Hail Weston and some farm buildings. The area mapped as urban comprises the existing A1 carriageway. The following table shows the areas of each grade in Section 1 of the route.

Grade	Area (ha)	%
2	70.9	52.2
3a	50.0	36.8
3b	9.9	7.3
Woodland	1.4	1.0
Open Water	0.4	0.3
Agricultural Buildings	0.6	0.5
Urban	2.6	1.9
TOTAL	135.8	100.0

Grade 2

2.12 The areas of grade 2 correspond with the better drained soils described above. At the northern end of the route, an area of grade 2 has been mapped which corresponds with the river terrace soils described in paragraph 2.7. The slight limitation associated with these soils is droughtiness due to the presence of moderately stony (>15% flints) lower subsoils horizons at depth. Moisture balance calculations indicate that they will be slightly droughty for both reference crops (wheat and potatoes) limiting the land to grade 2.

2.13 The better drained, clayey soils described in paragraphs 2.9 and 2.10 have been restricted to this grade due to slight workability and/or wetness restrictions. The wetness class II soils developed on the chalky boulder clays which dominate the central part of the section between Diddington and Hail Weston (see paragraph 2.9), generally have slowly permeable lower subsoil horizons resulting in short term seasonal waterlogging. This combined with the presence of naturally calcareous clay or heavy clay loam topsoils results in slight wetness and workability limitations.

2.14 The better drained land (see paragraph 2.10), which is mainly found toward the southern end of the section, will be limited to this grade by slight topsoil (i.e. heavy clay loams) workability restrictions. Despite the higher stone content found in the soils around Colesden Lodge Farm, moisture balance calculations indicate that this will only have a minor droughtiness restriction and will therefore also be included within grade 2.

Subgrade 3a

2.15 Land of this subgrade dominates the area between Hail Weston and Wyboston and also to the north and west of Buckden and correlates with the imperfectly drained soils developed on the chalky boulder clays. Land derived from these soils (see paragraph 2.9) is restricted to this subgrade due to wetness and workability restrictions. Soils are assessed as wetness class III due to the presence of a gleyed upper subsoil and a slowly permeable subsoil horizon starting within 55 cm depth. The presence of naturally calcareous clay or heavy clay loam topsoil combines with the wetness class to restrict the land to subgrade 3a.

2.16 At the southern end of this section, to the north of the A428 road, a small area of relatively shallow soils over limestone occur. These soils comprise calcareous clays and are moderately stony. Moisture balance calculations indicate that they will be moderately droughty for both wheat and potatoes and are therefore restricted to subgrade 3a.

Subgrade 3b

2.17 The alluvial soils which are found at the northern and southern ends of this section have been classified as subgrade 3b. These soils, which are described in paragraph 2.6 above have been assessed as wetness class III. Wetness combines with the non-calcareous clay topsoil textures to impose a significant wetness/workability restriction limiting the land to subgrade 3b. Included within this is an area of steep slopes (>7°) lying between the terrace and alluvial floodplain.

2.18 Two further areas of subgrade 3b have been mapped, one to the north of Buckden and the other to the south of Hail Weston. These areas correspond to the decalcified clay soils described in paragraph 2.8 which have been classified as wetness class III. Wetness combines with the non-calcareous heavy clay loam or clay topsoils to impose a moderately severe wetness/workability restriction limiting the land to this subgrade.

3.0 SECTION 2 - RIVER GREAT OUSE TO BIGGLESWADE

3.1 This section covers approximately 11.6 km of the route from the southern side of the River Great Ouse to the south west of Biggleswade where the proposed route rejoins the existing A1 road.

Climate

3.2 Climatic data for four locations on this section were obtained by interpolating information contained in the 5 km grid agricultural climatic dataset (Met Office, 1989). This information is shown in summary below:

Grid Ref.	TL149522	160489	176459	18443
AAR (mm)	553	542	547	546
Altitude (m)	25	22	24	34
FCD	94	93	94	94
MD wheat (mm)	121	121	121	120
MD potatoes (mm)	117	118	117	116
Acc Temp. (°C)	1450	1455	1453	1447
Climatic Grade	1	1	1	1

These climatic characteristics do not impose any climatic limitation on the ALC grade of the proposed route within this area.

Altitude and Relief

3.3 The topography within this section is generally subdued. At the northern end the land rises from approximately 15 m AOD on the floodplain of the River Great Ouse onto the associated river terrace deposits and rises gently to a high point of approximately 30 m AOD to the south west of Blunham. The route continues in a southerly direction falling slightly onto a relatively level traditional market garden and vegetable growing area associated with the terrace deposits of the River Ivel. The route then swings eastward crossing the floodplain of the River Ivel before joining the existing A1 carriageway at the A6001 road to the south west of Biggleswade at an altitude of approximately

30 m AOD. Gradient and altitude therefore do not impose any limitation to the ALC grading of this section of the route.

Geology and Soils

3.4 The published drift edition geology map for the area, Sheet 204, Biggleswade (Geol Survey, 1976) shows this section of the route to comprise predominantly 1st, 2nd and 3rd terrace river valley gravel associated with the two main river systems, with glacial gravels to the west. Alluvium has been mapped in the bottom of Great Ouse and Ivel valleys and small areas of boulder clay and Oxford Clay have been identified in the vicinity of Blunham.

3.5 The soils in this area have been mapped by the Soil Survey of England and Wales at both a reconnaissance level and a more detailed scale. The reconnaissance map (1:250 000 scale) for the area (Soil Survey, 1983) shows the occurrence of three soil associations within this part of the route. Very small areas of Thames Association (*1) have been mapped in the Great Ouse and Ivel valleys, Efford 1 Association (*2) from the Great Ouse valley to Upper Caldecote and Sutton 1 Association (*3) continuing through to the south of Biggleswade.

(*1) Thames Association: Stoneless mainly calcareous clayey soils affected by groundwater.

(*2) Efford 1 Association: Well drained fine loamy soils often over gravel, associated with similar permeable soils variably affected by groundwater.

(*3) Sutton 1 Association: Well drained fine and coarse loamy soils locally calcareous and in places shallow over calcareous gravels.

3.6 The more detailed 1:25 000 scale soil map Sheet TL14, Biggleswade (Soil Survey, 1987) covers the route from Mogerhanger in the north to Biggleswade. This map shows that to the south of the A603 road the proposed road route crosses four soil series. At the southern end the clayey soils of the Thames Series (*4) outcrop , while the remainder of the area comprises soils of the Sonning (*5), Ickford (*6) and Waterstock Series (*7).

3.7 The current survey corellates reasonably closely with the more detailed map. Six soil types have been identified throughout this section. At the northern end of this section on the floodplain of the River Great Ouse, clayey alluvial soils (see paragraph 2.6) have been mapped. At the southern end of the floodplain of the River Ivel the alluvial soils are highly calcareous and more silty. A typical profile comprises calcareous medium or heavy silty clay loam topsoils over plastic, stoneless silty clay subsoils. The soils are gleyed throughout and have been assessed as wetness class III.

3.8 On the river terrace deposits adjacent to the alluvial soils of both the River Great Ouse and River Ivel, coarse loamy soils over gravel have been mapped. A typical soil profile comprises slightly stony medium sandy loam topsoils over slightly stony, medium sandy loam or sandy clay loam subsoils, which become stonier with depth. The depth to the underlying gravel varies from

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(*4) Thames Series: Deep greyish mottled calcareous clays.

(*5) Sonning Series: Permeable flinty light loams with reddish subsoils over flint gravel at 40 to 80 cm depth.

(*6) Ickford Series: Permeable slightly mottled often calcareous medium loams over flint and chalk gravel at 40 to 80 cm depth.

(*7) Waterstock Series: Deep permeable slightly mottled medium loams with few or common flint stones throughout.

approximately 60 to 90 cm depth, with the shallower variants at the southern end of the route. These soils generally correspond with the soils mapped as the Sonning Series on the Soil Survey map (Soil Survey, 1987).

3.9 The relatively level land between Beeston and the road to the south of Upper Caldecote predominantly comprises very slightly stony fine loamy soils over sand and gravel. A typical profile comprises a medium clay loam or sandy loam topsoil over a well structured medium clay loam subsoil. The underlying sands and gravels are generally encountered between 70 and 100 cm depth. Similar soils are also found to the north and south of Barford Road on the western side of Blunham. These soils correlate with the Waterstock Series on the published soil map (Soil Survey, 1987).

3.10 Between Beeston and the A603 road the soils are similar to those described in paragraph 3.9 but become progressively more stony with depth and shallower to the gravel deposits. These soils typically have sandy clay loam topsoils over slightly or moderately stony sandy clay loam subsoil. The underlying calcareous sand and gravel or hoggin is generally encountered within 80 cm depth. These soils broadly correspond to the Ickford Series on the published soil map.

3.11 A small area of heavier textured soils correlating with the Drayton Series have been mapped to the northeast of Mogerhanger, where the route crosses a small dry valley. This area corresponds to the Oxford Clay outcrop shown on the geology map. These soils typically comprise non-calcareous heavy clay loam topsoils over brown heavy clay loam or clay upper subsoils. Below 50/60 cm depth the soil becomes a clay, greyer in colour and is strongly mottled. These soils, which are stoneless throughout and calcareous at depth, have been assessed as wetness class II.

3.12 On either side of the soils referred to in paragraph 3.11 lighter textured variants have been found where drift overlies the Oxford Clay. These soils have a sandy clay loam or clay loam topsoil over a brown heavy clay loam upper subsoil.

Calcareous, mottled clay with occasional chalk stones and flints is generally encountered at depth.

Agricultural Land Classification

3.13 This section of the route contains some of the best quality land in the area. There are two discrete areas of high quality land which tend to correlate with the intensive vegetable growing areas, namely between Blunham and the River Great Ouse and between Beeston and Upper Caldecote. Land in these two areas is predominantly grades 1 and 2. Irrigation is commonly practised and where sufficient water is available this has been taken into consideration when grading the land. The following table shows the areas of the individual grades for Section 2 of the proposed route.

Grade	Area (ha)	%
1	10.7	13.2
2	37.8	46.6
3a	24.3	29.9
3b	6.9	8.5
Urban	1.1	1.4
Woodland	0.1	0.2
Agricultural Buildings	0.2	0.2
TOTAL	81.1	100.0

Grade 1

3.14 Four areas of grade 1 have been mapped and these correlate with the deep fine loamy soils described in paragraph 3.9. These soils have moderately high available water capacities due to the good depth of moisture retentive subsoils above the gravel. Moisture balance calculations indicate that they are non or slightly droughty depending on the depth to the underlying gravel. They also generally occur in areas where an adequate irrigation supply is available enabling a wide range of crops to be grown. As a consequence of the irrigation facility all land throughout the area is non droughty and therefore has been graded 1.

Grade 2

3.15 Two main areas of grade 2 land have been mapped, one to the north and west of Blunham and the other between Beeston and the road to the south of Upper Caldecote, where the major limitation is slight droughtiness. These areas include similar soils (see paragraph 3.9) to those found in the areas of grade 1, but soils are either slightly more droughty due to: a shallower depth to the underlying gravels; containing higher stone contents or having an insufficient irrigation potential to warrant a reduction in drought stress. In addition, the deeper less stony variants of the coarse loamy soils described in paragraph 3.8 are also included within this grade. This land typically occurs at the northern end of the section where adequate irrigation facilities are available to help offset the effects of droughtiness caused by the presence of common lower profile stones in this area. All of this land is very versatile and is capable of growing a wide range of horticultural crops.

3.16 The fine loamy soils described in paragraph 3.12 which occur most extensively around the settlement of Chalton are also included within this grade. The land has a slight droughtiness limitation, and in some locations, where textures are heavier, there is also a minor wetness and workability restriction which limits the land to grade 2.

Subgrade 3a

3.17 The subgrade 3a land is concentrated in two main areas, one to the west of Sandy and a second on the western side of Biggleswade. The latter comprises the stonier variants of the coarse loamy soils described in more detail in paragraph 3.8. These soils are moderately droughty due to the presence of slightly stony subsoil horizons of relatively shallow depth over the gravels. Moisture balance calculations reveal that land comprising these soils will be restricted to subgrade 3a. An adequate irrigation facility does not exist to reduce the drought stress naturally inherent in these profiles.

3.18 A substantial area of land between the A603 and Beeston has also been mapped as subgrade 3a and the soils of this area are described in more detail in paragraph 3.10. These relatively shallow, stony soils have a moderate available water capacity and in this low rainfall area crops will suffer from drought in most years. No irrigation facilities exist in this area and consequently horticultural crops are generally not grown. Moderate droughtiness imperfections preclude the land from a higher grade.

3.19 The subgrade 3a land to the north of the A603 road comprises the heavy textured soils developed on the Oxford Clays (see paragraph 3.11). The wetness class has been assessed as II and this combined with the relatively heavy topsoil textures imposes a moderate wetness and workability restriction which excludes the land from a higher grade.

Subgrade 3b

3.20 The alluvial soils of the River Great Ouse and the Ivel valleys have been graded subgrade 3b and those of the former river have been described within paragraph 2.17 of Section 1. In the Ivel valley the alluvial soils, which are described in paragraph 3.7, are more silty and strongly calcareous, however, the area is subject to prolonged winter flooding in most years. This restricts the land use to permanent grass. Consequently the land has been downgraded to subgrade 3b.

3.21 A very small area of subgrade 3b land has also been identified to the south of the A603 road. This small area which occupies a minor depression, comprises imperfectly drained fine loamy soils. These soils have a shallow groundwater table and gleying indicates that they are waterlogged for long periods during the winter months. Consequently the land is restricted to subgrade 3b due to significant wetness and workability limitations.

4.0 SECTION 3 - NEW SPRING FARM TO RADWELL GRANGE

4.1 This section covers approximately 5 km where the proposed route runs to the east of the existing carriageway.

Climate

4.2 Climatic data for two locations on this section were obtained by interpolating information contained in the 5 km grid agricultural climatic dataset (Met Office, 1989). This information is shown in summary below:

Grid Ref.	TL214410	TL228379
AAR (mm)	555	568
Altitude (m)	68	50
FCD	98	103
MD wheat (mm)	117	119
MD potatoes (mm)	111	114
Acc Temp. (°C)	1405	1426
Climatic Grade	1	1

These climatic characteristics do not impose any climatic limitation on the ALC grade of the proposed route within this area.

Altitude and Relief

4.3 This section of the proposed route runs through undulating farmland, ranging in altitude from 45 m to 70 m AOD. The central part is flat and lowlying, with the land rising both to the north and south. Slopes are relatively gentle (<5°) and nowhere on this section does altitude or gradient impose any limitation to the ALC grading.

Geology and Soils

4.4 The published drift edition geology map Sheet 204, Biggleswade (Geol Survey, 1976) covers this section and shows that to the north of the water tower land comprises boulder clay deposits before dropping onto the Grey and Grey Blue Gault Clay on the lower lying area. To the south the land rises slightly onto the Lower Chalk with a small area of 1st terrace river gravel deposits found to the south of the Hinxworth Road. As the land rises once again to the south Lower Chalk is encountered.

4.5 The published reconnaissance scale (1:250 000) "Soils of Eastern England" map, (Sheet 4, Soil Survey, 1983) shows the occurrence of three soil associations within this section of the route. The northern part, corresponding to the boulder clay deposits comprises soils of the Cannamore Association(*1), which contain many similar soils to those described in the Hanslope Association at the northern end of the route. The lowlying land in the central portion is mapped as Evesham 3 Association (*2), with soils to the south mapped as the Milton Association (*3).

4.6 The current survey correlates reasonably well with the published soil and geology map through this section, with four soil types being identified. At the northern end of the section soils developed on chalky boulder clay have been

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(*1) Cannamore Association: Deep calcareous and non-calcareous fine loamy and clayey soils with slowly permeable subsoils and slight seasonal waterlogging.

(*2) Evesham 3 Association: Slowly permeable calcareous clayey and fine loamy over clayey soils developed on Jurassic and Cretaceous Clays. Some slowly permeable seasonally waterlogged non-calcareous clayey soils.

(*3) Milton Association: Deep permeable calcareous fine loamy soils on chalky drift variably affected by groundwater. Some similar shallower well drained soils over gravel in places. Complex soil pattern.

mapped. These soils are similar to those described in section 1 of the route (see paragraph 2.9) and typically comprise calcareous heavy clay loam topsoils over brown very calcareous clay upper subsoils. Below 50/65 cm depth the soils become gleyed and contain common chalk and flint stones. These soils have been assessed as wetness class II.

4.7 On the lowlying land in the central part of the section, heavy clay soils have been mapped. A typical profile consists of slightly calcareous, heavy clay topsoils over pale grey, calcareous, heavy clay subsoil, with common ochreous mottles. The soils are stoneless and generally become greyer in colour and contain occasional calcareous nodules at depth. At the time of survey the topsoils were very sticky and the subsoils plastic. These soils have been classified as wetness class III.

4.8 To the south, the land on either side of Hinxworth Road comprises fine loamy soils over sands and gravels. These soils are rather variable, with an area of deeper soils occurring immediately to the south of Hinxworth Road. Adjacent to the Cat Ditch the soils tend to be considerably more gravelly. A typical profile comprises a slightly stony medium clay loam topsoil over a pale greyish brown heavy clay loam or occasionally clay subsoil, which may or may not be mottled below approximately 50 cm depth. In the majority of profiles gravelly loamy medium sand or sand is encountered below 65 cm, although in the area referred to above on the southern side of Hinxworth Road the coarser textured material generally occurred below 80 cm depth. These soils show variable signs of gleying and have therefore been assessed as wetness class I or II.

4.9 At the southern end of the route where the land rises, mainly free draining fine loamy and clayey soils have been mapped. These soils have a brown calcareous, clay or heavy clay loam topsoil over a calcareous, clay subsoil. On the lower slopes the subsoil is paler and highly calcareous, while on the upper slopes the subsoil is generally brown in colour. Occasional profiles showed ochreous mottling at depth, but these were associated with auger borings close to the existing roads where localised drainage problems are more likely to

occur. On the whole the soils are free draining and have been assessed as wetness class I.

Agricultural Land Classification

4.10 Section 3 of the route comprises predominantly grades 2 and 3a, with an area of subgrade 3b associated with the lowlying Clay vale. This section also includes two small areas of non-agricultural land, which are mainly wooded and a section of the existing A1 carriageway. The following table shows the areas of each grade within Section 3 of the proposed route.

Grade	Area (ha)	%
2	17.4	50.8
3a	9.1	26.5
3b	4.1	11.8
Urban	2.8	8.2
Non-Agricultural	0.5	1.4
Woodland	0.4	1.3
TOTAL	49.0	100.0

Grade 2

4.11 The northern end of this section of the route has been classified as grade 2, and corellates with the soils developed from the chalky boulder clay deposits (see paragraph 4.6). These fine loamy over clayey soils have been assessed as wetness class II and therefore have a minor wetness limitation. The naturally calcareous topsoils increase the workability of these relatively heavy textured soils, consequently minor wetness and workability imperfections limit the land to grade 2.

4.12 The free draining fine loamy and clayey soils at the southern end of the route have also been included within this grade. These soils, which are described in paragraph 4.9, have been assessed as wetness class I. The workability of the clay textured topsoils is increased by their calcareous nature, consequently only

a minor workability restriction exists. This minor workability imperfection results in the area being classified as grade 2.

4.13 A small area of grade 2 land has also been identified to the south of the Hinxworth Road where the deep, fine loamy soils over sands and gravels have been mapped. These soils (see paragraph 4.8) are slightly droughty due to the presence of gravel at depth in the profile. Moisture balance calculations indicated that they will be slightly droughty for both reference crops. The slight droughtiness imperfection precludes the land from a higher grade.

Subgrade 3a

4.14 Two areas of subgrade 3a land have been mapped on the southern part of this section and correlate with the shallower fine loamy soils over gravel which are described in paragraph 4.8. These soils, which are moderately well drained, i.e. wetness class I/II, are generally easily worked due to the predominance of medium clay loam topsoils. Profiles are underlain by sand and gravel deposits at moderate depths, consequently the main limitation is droughtiness. Moisture balance calculations indicate that they will be slightly droughty for potatoes but moderately droughty for wheat. Consequently the land has been assigned to subgrade 3a.

4.15 A small area of subgrade 3a land has also been mapped to the south of the access road to Manor Farm. This area represents an intergrade between the better draining soils of the north and the poorly drained clayey soils on the low lying land. Land is precluded from a higher grade in this area due to moderate wetness and workability imperfections.

Subgrade 3b

4.16 Land comprising the heavy clay soils developed on the Gault Clay are restricted to subgrade 3b. These soils are described in paragraph 4.7 and have heavy clay textures throughout and a wetness class of III. Although they are naturally

calcareous they are particularly intractable due to the high clay content in all horizons. They are likely to be very moist and plastic for long periods of the year restricting the time when they can be worked without causing damage. Therefore the crops that can be grown is limited and the land is restricted to grade 3b due to significant wetness and workability imperfections.

5.0 SUMMARY AND CONCLUSIONS

5.1 The route surveyed for the proposed A1(M) improvement between Baldock and Alconbury extends to 39.5 km, and detailed soil inspections were carried out over a 35.9 km distance. Two small areas were not covered by the survey, as these largely followed the existing carriageway and therefore did not involve agricultural land. The proposed route is mainly to the west of the existing A1, with the exception of the stretch to the south of Biggleswade, where it runs just to the east of the existing carriageway.

5.2 The route can be divided into three distinct geomorphological sections. Land to the north of the River Great Ouse comprises gently rolling land which is predominantly underlain by boulder clay, while the section from the River Great Ouse southwards to Biggleswade has a more subdued topography and generally follows the river-terrace deposits of the River Great Ouse and River Ivel. To the south of Biggleswade, the land is once again gently undulating controlled by the underlying chalk strata which is covered by boulder clay and chalky drift.

Soils

5.3 Published soil data is available for the whole route at a reconnaissance scale and in more detail (1:25,000) for the central section. The reconnaissance map shows the northern section to comprise mainly heavy textured clayey soils with impeded drainage. The cropping within this section reflects this soil type with the area primarily supporting winter sown combinable crops, cereals and oilseed rape etc. The reconnaissance map shows much of the central section to

comprise coarse and fine loamy soils overlying gravels, although the more detailed map shows some small areas of fine loamy over clayey soils. The cropping again broadly reflects this pattern with horticultural cropping dominating the lighter textured soils of this section. The southern section of the route once again is predominantly mapped as fine loamy and clayey soils, with the cropping again dominated by winter sown combinable crops.

5.4 The findings of the current survey broadly agree with the published soil maps and the correlation in the in the central section with the more detailed soil map was generally found to be good. However, the variation that is permissible within an individual soil series can have a marked effect on ALC grading of an area (e.g. the depth range to the underlying gravels, or stone contents within a soil series can result in a soil series straddling one or even two grades in the ALC system).

Agricultural Land Classification

5.5 The published ALC maps for the proposed route (MAFF, 1969) show it to comprise mainly grades 1 and 2 with four small areas of grade 3, two of which correspond to the alluvial soils in the River Great Ouse and River Ivel valleys. The area of grade 3 mapped at the southern end correlates with the heavy textured soils found to the west of Hinxworth and the remaining area is mapped in the vicinity of the Diddington Brook. The central section is shown to comprise mainly grade 1, whilst the other two areas are shown as predominantly grade 2. A breakdown of the percentage of the individual grades for each section and for the whole route have been obtained from the published maps and are as follows:

Grade	Section 1	Section 2	Section 3	Total
	%	%	%	%
1	-	72	-	23
2	93	23	82	69
3	7	5	18	8

5.6 The current survey mapped a 70 m wide strip along the proposed route although the maps have been produced depicting a 100 m wide corridor to enable the individual areas to be shown at this scale. Area measurements however have been made assuming a 70 m wide wayleave. The following table (see Table 5.6) shows the areas and percentages of the individual grades within this strip for each section and also as a percentage of the whole route.

5.7 Comparison between the findings of the current survey and the published ALC data indicates a considerable discrepancy in certain parts of the route. It must however be remembered that the published 1 inch to the mile ALC maps were produced at a reconnaissance scale. Detailed information on soils was often not available and it was therefore not feasible to delineate accurately areas of less than about 80 ha.

5.8 The published map shows the northern section, Section 1, to comprise 93% grade 2, whereas the current survey has identified over half the area as grade 2, with a substantial area of subgrade 3a (36.8%). This may be partly explained by the presence of decalcified boulder clay soils which are less easily worked than their calcareous counterparts.

5.9 In Section 2, the published ALC map shows the majority of the area as grade 1, whereas the current survey shows a mix of grades 1, 2 and 3a with grades 1 and 2 predominating. When the published map was prepared it was assumed that most of this land was irrigated and that there was an adequate supply of irrigation water available. Recent studies including this survey have shown that this is not always the case. In addition it is probable that many of the soils are shallower and more stony than was originally thought. The southern section however bears a reasonable close relationship.

5.10 It has therefore been demonstrated that considerable variation from the published grades may be expected to occur over much of the area in the vicinity of the proposed route. However, while there may be differences in the

Table 5.6 AGRICULTURAL LAND CLASSIFICATION GRADES

Grade	Section 1		Section 2		Section 3		Total	
	Area ha	%	Area ha	%	Area ha	%	Area ha	%
1	-	-	10.7	13.2	-	-	10.7	8.9
2	70.9	52.2	37.8	46.6	17.4	50.7	126.1	45.5
3a	50.0	36.8	24.3	29.9	9.1	26.5	83.4	33.2
3b	9.9	7.3	6.9	8.5	4.1	11.9	20.9	8.3
Urban	2.6	1.9	1.1	1.4	2.8	8.2	6.5	2.6
Non-Agric	-	-	-	-	0.5	1.5	0.5	0.2
Woodland	1.4	1.0	0.1	0.2	0.4	1.2	1.9	0.8
Agric. Buildings	0.6	0.5	0.2	0.2	-	-	0.8	0.3
Open Water	0.4	0.3	-	-	-	-	0.4	0.2
TOTAL	135.8	100.0	81.1	100.0	34.3	100.0	251.2	100.1

actual ALC grades, the majority of the land will still be best and most versatile as shown on the provisional ALC maps.

Irrigation

5.11 Irrigation is regularly used, especially over the central section of the route, although on many holdings the amount of water available is limited and has been insufficient to warrant upgrading the land. Furthermore there are a number of holdings that do not currently hold an irrigation licence. As irrigation can have a bearing on the ALC grade of the area, contact has been made with the Anglian Region of the National Rivers Authority to determine whether there may be opportunity for further irrigation supplies to be made available in the future.

5.12 The NRA have indicated that as far as new irrigation licences are concerned there may be limited water available for winter storage. In addition summer surface extraction would be very limited and subject to strict conditions which may also be subject to cessation. With regard to new groundwater extraction licences there is little likelihood of any water being made available apart from some minor local abstractions from the gravel aquifer. It is therefore considered unlikely that any further substantial quantities of water would be made available in the future and therefore the current ALC grading is unlikely to be affected.

National and Local Impact due to the loss of land by the proposed route

5.13 The survey undertaken for the proposed route has identified a large percentage of high quality agricultural land with 87.6% being best and most versatile (grades 1, 2 and 3a). Furthermore 54.4% of the land area has been identified as grades 1 and 2. The building of the proposed route would result in a permanent loss of 220.2 ha of best and most versatile land of which 136.8 is grades 1 and 2.

5.14 The following table shows the areas and percentages of individual grades for England, Huntingdon District and Bedfordshire, based on the published provisional ALC maps.

Grade	England		Huntingdon		Bedfordshire	
	km²	%	km²	%	km²	%
1 & 2	21,477	16.4	447	49.3	407	32.8
3	62,610	47.9	353	38.9	600	48.4
4	14,172	10.9	13	1.4	20	1.6
5	10,514	8.0	0	0.0	0	0.0
Non Ag	10,125	7.8	65	7.2	108	8.7
Urban	11,715	9.0	29	3.2	105	8.5

5.15 The irreversible loss of 136.7 ha of grades 1 and 2 caused by the construction of the proposed route would have a very limited impact on the total reserve of these grades nationally. It represents a loss of 0.006% nationally. On a more local basis, the impact is lightly more important accounting for 0.16% of these grades in Huntingdon District and Bedfordshire.

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