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HS2

High Speed Rail (Crewe – Manchester) Environmental Statement

Volume 5: Appendix AG-001-0MA03

Agriculture, forestry and soils

MA03: Pickmere to Agden and Hulseheath Agriculture, forestry and soils assessment

M37

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Department for Transport

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High Speed Two (HS2) Limited
Two Snowhill
Snow Hill Queensway
Birmingham B4 6GA

Telephone: 08081 434 434

General email enquiries: HS2enquiries@hs2.org.uk

Website: www.hs2.org.uk

A report prepared for High Speed Two (HS2) Limited:

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MWJV
Mott MacDonald | WSP

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Contents

Tables

1 Introduction

1.1.1 This report is an appendix to the agriculture, forestry and soils assessment. It presents the following for the Pickmere to Agden and Hulseheath community area (MA03):

- agriculture and soils baseline data for agricultural land, including open spaces and natural soils within urban areas; and
- a summary of the farm holding impact assessment.

1.1.2 Additional data used for the agriculture, forestry and soils assessment are set out in Background Information and Data (BID) report Agriculture, forestry and soils baseline data (BID AG-002-0MA03)[1].

[1] High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Background and Information Data, Agriculture, forestry and soils baseline data,* BID AG-002-0MA03. Available online at: https://www.gov.uk/government/collections/hs2-phase-2b-crewe-manchester-environmental-statement.

2 Soils and agricultural land classification

2.1 Background

2.1.1 An element of the assessment of the effects of the route of the Proposed Scheme upon agriculture is concerned with the consideration of the quantity and quality of the agricultural land affected. The determination of the quality of agricultural land is undertaken by the application of a secondary evaluation of the interaction of soil and other physical parameters in accordance with a prescribed methodology. That methodology is set out in guidelines[2] prepared by the Ministry of Agriculture, Fisheries and Food (MAFF) in 1988 which enables the classification of land by qualitative grade in accordance with the Agricultural Land Classification (ALC) system. This establishes the inherent productive capability of agricultural land which can be considered on a consistent basis throughout England and Wales.

2.1.2 The approach taken to the collection and collation of baseline data on soil types present, and the other physical characteristics of topography, climate and drainage in the Pickmere to Agden and Hulseheath area is described. The baseline data are described and how the MAFF evaluation methodology has been applied to provide the definitive classification of the quality of agricultural land affected by the route of the Proposed Scheme. This provides the baseline for the assessment of the effects of the project on agricultural land and soils which is detailed in Volume 2, Community Area report: Pickmere to Agden and Hulseheath (MA03), Section 4 Agriculture, forestry and soils.

2.1.3 This document should be read with reference to the Agriculture, forestry and soils baseline data contained in the Background Information and Data (BID) report (BID AG-002-0MA03)[1] and Volume 5, Agriculture, forestry and soils Map Book (AG-02-303 and AG-04-309b to AG-04-312a-L1).

2.2 Soils and agricultural land classification surveys - methodology

2.2.1 During the EIA process, soil and ALC information has been considered on two levels. The soils and agricultural land quality baseline conditions reported have been established from initial desktop studies and then with regard to subsequent site-specific surveys, where necessary and possible. The data are presented in this context with that derived from the material and interpretation of publicly available sources addressed first, followed by that

[2] Ministry of Agriculture, Fisheries and Food (MAFF) (1988), *Agricultural Land Classification of England and Wales: Revised guidelines and criteria for grading the quality of agricultural land.*

derived from site specific surveys whereby the initial desk-based work has been extended and/or validated.

2.2.2 At both levels the data have been evaluated in accordance with the MAFF methodology for assessing the quality of agricultural land. The review of available existing ALC information has concentrated on the extent of detailed post-1988 survey information. There were substantive changes to the ALC system in 1988 which rendered previously available information less useful.

2.2.3 The ALC system is concerned with the classification of agricultural land according to the extent to which physical or chemical characteristics impose long-term limitations on agricultural use. The main limiting factors are climate, the physical character of a site, and soil. These factors and their interactions enable land to be attributed to one of five qualitative grades, with Grade 1 being the highest quality and Grade 5 the lowest. Grade 3 land which is the most extensive grade is divided into two subgrades; 3a and 3b.

2.2.4 Of relevance to the assessment of the environmental effects of the route of the Proposed Scheme is that land falling within Grades 1 and 2 and Subgrade 3a of the ALC is determined by planning policy to comprise the best and most versatile (BMV) agricultural land.

2.2.5 The physical factors influencing the agricultural capability of land are considered within the ALC assessment methodology as follows. The main climatic factors are temperature and rainfall. Site factors are gradient, microrelief and flood risk. Relevant soil characteristics are texture, structure, depth and stoniness. These factors can act either separately or in combination influence agricultural capability. The most important interactive limitations are soil wetness and droughtiness.

2.2.6 Soil wetness expresses the extent to which excess water imposes restrictions on crop growth and cultivations. The ALC methodology provides an approach which combines an assignment of soil to one of six categories of wetness class (WC) (I-VI with I being the most freely draining), the texture of the topsoil (sandy textures being freely draining and clays generally poorly draining), and the climatic regime expressed in terms of the number of days when the soil cannot absorb additional water (Field Capacity Days, FCD).

2.2.7 A similar approach is adopted towards the consideration of soil droughtiness. This seeks to determine the extent to which a combination of climate, soil and crop requirements provide adequate reserves of soil moisture during the growing season. The magnitude and duration of any shortfall represents a potential limitation of the land to maintain particular crops.

2.2.8 Soil droughtiness is determined in the ALC methodology with reference to an indicative drought risk based on two crops, winter wheat and maincrop potatoes. The average soils moisture balance for these crops is calculated on the basis of two parameters. Firstly, the measure of the quantity of water held in the soil profile which can be taken up by the specified crop, and secondly the moisture deficit which is the balance between rainfall and potential evaporation calculated over a critical part of a growing season. Land quality is

derived from the moisture balance, this being the difference between the two parameters, with a negative difference relating to increasingly poorer quality in the ALC system.

2.3 Soils and agricultural land classification surveys - publicly available information

2.3.1 Initially, the assessment of the impacts on soils and agricultural land quality was based on publicly available data gathered by desk based studies. This related primarily to the identification of soil resources in the study area, the associated physical characteristics of geology, topography and climate which underpin the assessment of agricultural land quality, and the disposition of land uses. The main sources of information have included:

- National Soil Map[3];
- Soils and Their Use in Midland and Western England; regional reconnaissance mapping showing soil associations (groupings of spatially related soil types)[4];
- solid and superficial deposits from the Geology of Britain viewer[5];
- grid point meteorological data for ALC of England and Wales[6];
- Provisional ALC of England and Wales (1:250,000)[7];
- Defra Likelihood of Best and Most Versatile Agricultural Land mapping (1:250,000)[8];
- agri-environment schemes[9]; and
- aerial photography.

2.3.2 Publicly available existing detailed ALC information is generally at a mapped scale of 1:10,000 based on field surveys of soils and agricultural land quality carried out by MAFF and the Soil Survey of England and Wales (SSEW). A desk based assessment of soils and agricultural land quality was based on this publicly available data.

[3] Cranfield University (2001), *The National Soil Map of England and Wales 1:250,000 scale,* Cranfield University: National Soil Resources Institute.

[4] Soil Survey of England and Wales (1984), *Soils and Their Use in Midland and Western England*, Harpenden.

[5] British Geological Survey, *Geology of Britain Viewer.* Available online at: www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html.

[6] Meteorological Office (1989), *Grid point Meteorological data for Agricultural Land Classification of England and Wales and other Climatological Investigations.*

[7] Ministry of Agriculture, Fisheries and Food (1983), *Agricultural Land Classification of England and Wales (1:250,000).*

[8] Department for Environment, Food and Rural Affairs (2005), *Likelihood of Best and Most Versatile Agricultural Land (1:250,000).*

[9] Multi-Agency Geographical Information for the Countryside (MAGIC). Available online at: www.magic.gov.uk.

2.3.3 Existing detailed MAFF ALC survey data covering agricultural land within the study area is available for land at Heyrose Farm[10], located approximately 500m to the south of the M6 motorway, and at High Legh Park Golf Course[11].

2.3.4 Findings of the desk based studies based on publicly available information are described in the following section. The location and extent of different soil types and ALC grades/subgrades are influenced by topography and drainage, by geology and soil parent materials, and by climate which are now described in turn.

2.4 Soil parent materials

2.4.1 This section only considers geology as a soil parent material[12]. The soil association developed in each parent material is identified below. The soil associations are described under 'Description and distribution of soil types'.

2.4.2 The most common soil parent material, which is present over the whole study area, comprises reddish glacial deposits such as till and glaciofluvial sand and gravel deposits, which are mainly overlying Bollin Mudstone. The soils developed from and within this parent material belong to the Salop association.

2.4.3 There are glaciofluvial sheet deposits along the Agden Brook, Birkin Brook, Mobberley Brook and, to a lesser extent, in the valley of the River Bollin. Where this parent material, which comprises sand and gravel, is seasonally waterlogged by a fluctuating groundwater table, it produces soils in the Blackwood association. On river terraces, and in older glaciofluvial deposits, sands and gravels give rise to deep and well drained soils in the Wick 1 association.

2.5 Topography and drainage

2.5.1 Topography in the area is broadly flat and located within the Cheshire Plain, incised by river courses and streams, with many ponds present. The land rises from an elevation of approximately 35m above Ordnance Datum (AOD) at the southern boundary of the study area to approximately 50m AOD at the M6 motorway at Arley Green. To the north of the motorway, the elevation continues to rise to approximately 70m AOD near Hoo Green but descends to approximately 60m AOD at the M56 motorway at Arley Green. Between the southern boundary of the study area and the M56, there are no slopes with a gradient in

[10] Ministry of Agriculture, Fisheries and Food (MAFF) (1994), *Agricultural Land Classification*, *Tabley Superior*, MAFF Ref ALCW03194.

[11] Ministry of Agriculture, Fisheries and Food (MAFF) (1993), *Agricultural Land Classification, High Legh Park Golf Course*, MAFF Ref ALCW08993.

[12] British Geological Survey. A 'parent material' is a soil-science name for a weathered rock or deposit from and within which a soil has formed. In the UK, parent materials provide the basic foundations and building blocks of the soil, influencing their texture, structure, drainage and chemistry. Available online at: Soil Parent Material Model - British Geological Survey (bgs.ac.uk).

excess of seven degrees. To the north of the M56 motorway at Agden Hall, the land falls from approximately 60m AOD to approximately 25m AOD down a northeast facing slope to the floodplain of the River Bollin.

2.6 Agro-climate

2.6.1 The local agro-climatic factors have been interpolated from the Meteorological Office's standard 5km grid point dataset at three representative points within the study area shown in Table 1. There is some variation across the study area.

2.6.2 Average annual rainfall is between 781mm to 829mm, generally increasing further north. FCDs range from 185 days to 195 days. Moisture deficits are between 87mm to 93mm for wheat and 74mm to 82mm for potatoes, with the lower values occurring on the higher ground.

2.6.3 Accumulated temperature is the excess of daily air temperatures above a selected threshold temperature (0°C), summed over a specified period (January to June which is the critical growth period for most crops). The accumulated temperature within the study area is between 1,385 and 1,423 day °C.

Table 1: Interpolated agro-climatic data

Agro-climatic parameter	SJ704761 Near Pickmere	SJ712815 Near Mere	SJ717856 Near Agden
Altitude (mAOD)	30	61	58
Average annual rainfall (mm)	781	802	829
Accumulated temperature >0°C (day°)	1,423	1,385	1,387
Field capacity days (days)	185	190	195
Average moisture deficit, wheat (mm)	93	89	87
Average moisture deficit, potatoes (mm)	82	76	74

2.7 Description and distribution of soil types

2.7.1 The characteristics of the soils are described in the SSEW regional bulletin covering the study area and their distribution is illustrated on the National Soil Map[3]. The soils are grouped into soil associations of a range of soil types that are spatially related and are summarised in Table 2. Their distribution is shown on map AG-02-303 (Volume 5, Agriculture, forestry and soils Map Book).

Table 2: Soil associations

Soil association: code shown on map AG-02-304	Soil association: name	Description	Wetness class
711m	Salop	Slowly permeable seasonally waterlogged reddish fine loamy over clayey, fine loamy and clayey soils associated with fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging.	IV
541r	Wick 1	Deep well drained coarse loamy and sandy soils locally over gravel. Some similar soils affected by groundwater. Slight risk of water erosion.	I
821b	Blackwood	Deep permeable sandy and coarse loamy soils, affected by fluctuating groundwater.	III-IV

2.7.2 The National Soil Map shows the general distribution of the following three soil associations in the study area:

- soils grouped in the Salop association are predominant in this study area. This association comprises slowly permeable and seasonally waterlogged clay loams over clay soils (WC III to IV). They are developed in reddish glacial deposits, i.e. till and glaciofluvial sand and gravel deposits;
- the Wick 1 association is found in a small region of the study area, near High Legh. This association consist of soils that are well drained (WC I) coarse loamy typical brown earths, and in glaciofluvial and terrace drift of variable stoniness; and
- the Blackwood association is found in a small area in the far north of the study area. These soils are developed in glacial river deposits, which are variable in stone content and frequently overlie clay deposited in glacial lakes, or glacial till, at depth. Where undrained, the Blackwood soils are waterlogged for long periods during the winter (WC III and IV). These soils experience fluctuating levels of groundwater. Where the water-table has been lowered, the soils are well drained (WC I) or only slightly seasonally waterlogged (WC II).

2.7.3 Soils of the Blackwood and Salop associations are described further in the Soils Guide[3] which is available at Cranfield University's Landis website.

2.7.4 Detailed descriptions for the dominant soil series in the Salop, Wick 1 and Blackwood associations, and are given in Table 3.

Table 3: Dominant soil series

Soil series	
Salop series	
0 – 25cm	Very dark greyish brown (10YR3/3) slightly stony clay loam; moist; moderately developed medium angular blocky; low packing density; moderately weak soil strength; few very fine fibrous roots; non-calcareous; sharp smooth boundary.
25 – 45cm	Brownish grey (2.5Y5/2) slightly stony clay loam very many fine strong brown (7.5YR5/8) mottles; moist; moderate medium subangular blocky or prismatic structure; medium packing density; moderately firm ped strength; few very fine fibrous roots; non-calcareous; few irregular soft ferri-manganiferous concentrations; abrupt smooth boundary.
45 – 100cm	Yellowish red (10YR4/1) slightly stony clay with many medium yellowish brown (10YR5/6) mottles; very moist. Moderate coarse prismatic structure, moderately developed coarse prismatic with dark greyish brown (10YR4/2) faces; medium packing density; moderately firm soil strength; few very fine fibrous roots; non-calcareous; few rounded ferri-manganiferous nodules; clear smooth boundary.
100 – 120cm	Reddish brown (10YR4/2) slightly stony clay with many medium reddish brown (5YR4/4) mottles; massive or coarse prismatic structure; sometimes with calcium carbonate concentrations; very moist; moderately developed medium prismatic with dark grey (10YR4/1) faces; medium packing density; moderately weak soil strength; common very fine fibrous roots; non-calcareous; common rounded soft ferruginous concentrations; abrupt wavy boundary.
Wick series	
0cm – 14cm	Very dark greyish brown (10YR3/2) stoneless clay loam or clay; moderately developed fine subangular block; low packing density; moderately porous; moderately weak soil strength; moderately firm ped strength; abundant fine fibrous roots; slightly calcareous; abrupt smooth boundary.
14cm – 69cm	Strong brown (7.5YR5/4) mottled, stoneless clay; moderate coarse angular blocky structure. Medium packing density; moderately firm soil and ped strength; abundant fine fibrous roots; non-calcareous; few irregular soft ferri-manganiferous concentrations; abrupt smooth boundary.
69cm – 120cm	Brown (7.5YR5/4) and yellowish red (5YR4/6) very friable loamy sand; stony with subangular and rounded gravel and small stones; weak medium angular and subangular blocky breaking to fine crumb and single grain; very abundant fine and medium pores and common fine fissures; low organic matter; few fine fibrous roots.
Blackwood series	
0cm – 20cm	Very dark greyish brown (10YR3/2), loose slightly stony or stoneless loamy sand; mainly small and medium subrounded quartzite pebbles; weak fine and medium granular; abundant fine pores; common fine fibrous roots; clear abrupt boundary.
20cm – 35cm	Pale brown (10YR6/3), slightly stony loamy sand; mainly medium and large subrounded quartzite pebbles; common very pale brown (10YR7/3), light grey (10YR 7/2) and light yellowish brown (10YR 6/4) prominent mottles; single grain to weak medium coarse subangular blocky structure; gradual wavy boundary.
35cm – 90cm	Light brownish grey (10YR6/2), slightly stony loamy sand to sand; mainly medium and large subrounded quartzite pebbles; common brown (10YR5/3), pale brown (10YR6/3) and very pale brown (10YR7/3) mottles; single grain to weak medium coarse subangular blocky structure; gradual wavy boundary.
90cm – 120cm	Greyish brown (10YR5/2) loamy sand to sand, stoneless; common brown (10YR5/3), pale brown (10YR6/3) and very pale brown (10YR7/3) mottles; single grain structure.

2.8 Soil and land use interactions

2.8.1 As described earlier, the assessment of the quality of agricultural land is derived from the consideration of the extent to which long-term limitations are placed on agricultural productive capability by the key physical factors, either individually or interactively. The publicly available information and general familiarisation with the study area established the following limitations and interactions.

Agricultural land quality

2.8.2 The principal physical factors influencing agricultural production and land quality in this study area are climate, site and soil and the interactions between them. Soil wetness and workability and gradient of slope are particularly relevant limitations in this area.

Agro-climatic limitations

2.8.3 The local agro-climatic factors have been interpolated from the Meteorological Office's standard 5km grid point dataset at three points within the study area, as set out in Table 2. Average annual rainfall is from 781mm to 829mm, increasing with altitude. FCDs range from 185 days to 195 days. Moisture deficits are 87mm to 93mm for wheat and 74mm to 82mm for potatoes, with the lower values occurring on the higher ground.

2.8.4 Climate itself does not place any limitation upon the land in this study area, but the interactions of climate with soil characteristics are important in determining the wetness and droughtiness limitations of the soil.

Site limitations

2.8.5 The assessment of site limitations is primarily concerned with the way in which topography influences the use of agricultural machinery and hence the cropping potential of land. In addition, gradient influences the risk of soil erosion on cultivated land, particularly where the soil is weakly structured. Gradient and microrelief are not limiting to agricultural land quality across the study area.

2.8.6 Flood risk is potentially limiting to agricultural land quality within the study area in the floodplain of the following: Smoker Brook in the south near Pickmere, Waterless Brook/Arley Brook, Tabley Brook to the north of Flittogate Farm, and Agden Brook in the north near Agden Brook Farm. The land in these floodplains is classed as predominantly Flood Zone 3, in which there is a 1 in 100 or greater annual probability of flooding.

Soil limitations

2.8.7 The main soil properties which affect the cropping potential and management requirements of land are texture, structure, depth, stoniness and chemical fertility. Together they influence

the functions of soil and affect the water availability for crops, drainage, workability and trafficability. The main soil characteristics within the study area are:

- slowly permeable and seasonally waterlogged clay loams over clay soils in reddish drift;
- deep well drained coarse loamy and sandy soils locally over gravel, variably affected by fluctuating groundwater; and
- deep permeable sandy and coarse loamy soils developed in glacial river deposits, which are variable in stone content and frequently overlie clay deposited in glacial lakes, or glacial till, at depth.

2.8.8 Soil depth and chemical limitations are not encountered in this study area.

Interactive limitations

2.8.9 The physical limitations which result from interactions between climate, the site and soil are soil wetness, droughtiness and erosion. Each soil can be allocated a WC based on soil structure, evidence of waterlogging and the number of FCDs; the topsoil texture then determines its ALC Grade in accordance with the MAFF ALC guidelines. The conclusions reached on the quality of agricultural land in the study area from the initial desk-based consideration are as follows.

2.8.10 Where soils in the Salop association are slowly permeable and seasonally waterlogged (WC III to IV) clay loams over clay soils in reddish drift, agricultural land quality is limited mainly by soil wetness to mainly Subgrade 3a or Subgrade 3b. Where the WC is IV and the topsoil is heavy clay loam, the land is Grade 4.

2.8.11 Deep light loamy and sandy soils of the Wick 1 association are most affected by soil droughtiness. The severity of limitation is determined by factors such as topsoil and subsoil textures, stone content and depth to the sandstone bedrock. As crop moisture deficits are moderate to moderately small droughtiness limitations are mostly slight to Grade 2, but may be as severe as Subgrade 3b.

2.8.12 The quality of agricultural land with soils in the Blackwood series is limited by soil wetness to Grade 2 where the subsoil is seasonally waterlogged (WC III) or Subgrade 3a where the subsoil is waterlogged for long periods over the winter (WC IV). Where the agricultural land is drained (WC I and WC II), soil in the Blackwood series are limited by soil droughtiness to Grade 2 or Subgrade 3a.

2.9 Soils and agricultural land classification surveys - detailed soil/ALC field surveys

2.9.1 The collection of site-specific information on soil resources and physical conditions has enabled a refinement and extension of published information on agricultural land quality. The analysis of the additional baseline information (topography and soils) identifies

individual soil types and definitive agricultural land quality in accordance with the methodology prescribed by MAFF.

2.9.2 Site specific soils data have been collected through the observation of individual soil profiles at density of one observation per hectare across the study area; this being the degree of detail required for a definitive agricultural land classification. The characteristics of soil profiles were recorded to a maximum depth of 120cm where possible, or to any impenetrable layer, in relation to the following attributes:

- soil texture;
- significant stoniness;
- colour (including local gley and mottle colours);
- consistency;
- structural condition;
- free carbonate; and
- depth.

2.9.3 Soil WC was inferred from the matrix colour, presence or absence of, and depth to, greyish and ochreous gley mottling and/or poorly permeable subsoil layers at least 15cm thick. Soil available water capacity, relevant to the assessment of drought risk, was estimated from texture, structure, organic matter content, stone content and profile depth.

2.9.4 Soil data associated with post-1988 detailed ALC surveys are available from Natural England. A full archive of the soil data collected from field surveys undertaken on behalf of HS2 Ltd is presented as a series of soil survey proformas in a separate Background Information and Data (BID) report Agriculture, forestry and soils baseline data (BID AG-002-0MA03)[1].

2.9.5 The detailed soil data confirm the presence in the study area of the soil series relating to the soil associations shown on the National Soil Map. Representative soil profiles from the Blackwood, Salop, Crannymoor, Turbary Moor and Conway are described in Table 4.

Table 4: Dominant soil series within study area taken from site survey data

Soil series	
Salop series (371000, 380600)	
0 – 30cm	Dark greyish brown (10YR4/2) sandy clay loam; moist; moderately developed medium angular blocky; low packing density; moderately weak soil strength; few very fine fibrous roots; non-calcareous; sharp smooth boundary.
30 – 40cm	Dark greyish brown (10YR4/2) sandy clay loam; moist; moderate medium subangular blocky or prismatic structure; medium packing density; moderately firm ped strength; few very fine fibrous roots; non-calcareous; abrupt smooth boundary.
40 – 50cm	Greyish brown (10YR5/2) sandy clay loam with many mottles; very moist. Moderate coarse prismatic structure; medium packing density; moderately firm soil strength; few very fine fibrous roots; non-calcareous; few rounded ferri-manganiferous nodules; clear smooth boundary.
50 – 80cm	Grey (10YR6/1) slightly stony clay loam with many mottles; massive or coarse prismatic structure; sometimes with calcium carbonate concentrations; very moist; medium packing density; moderately

Soil series	
	weak soil strength; common very fine fibrous roots; non-calcareous; common rounded soft ferruginous concentrations; abrupt wavy boundary.
80 – 120cm	Grey (5YR6/1) clay with many mottles; massive or coarse prismatic structure; sometimes with calcium carbonate concentrations; very moist; medium packing density; moderately weak soil strength; common very fine fibrous roots; non-calcareous; abrupt wavy boundary.
Wick series (371700, 384600)	
0 – 30cm	Very dark greyish brown (10YR3/2) medium sandy loam; slightly stony with small subangular and rounded igneous pebbles; moderate medium and coarse subangular blocky breaking to fine crumb; abundant fine and medium pores and common fine fissures; moderate organic matter; abundant fine fibrous roots; narrow even boundary.
30 – 40cm	Brown (10YR4/3) medium sandy loam; slightly stony with small subangular and rounded igneous pebbles; moderate medium and coarse subangular and angular blocky breaking to fine crumb; abundant fine and medium pores and common fine fissures; low organic matter; common fine fibrous roots; earthworms present; sharp undulating boundary.
40 – 120cm	Yellowish brown (10YR5/6) loamy sand; few mottles; stony with subangular and rounded gravel and small stones; weak medium angular and subangular blocky breaking to fine crumb and single grain; very abundant fine and medium pores and common fine fissures; low organic matter; few fine fibrous roots.
0 – 30cm	Very dark greyish brown (10YR3/2) medium sandy loam; slightly stony with small subangular and rounded igneous pebbles; moderate medium and coarse subangular blocky breaking to fine crumb; abundant fine and medium pores and common fine fissures; moderate organic matter; abundant fine fibrous roots; narrow even boundary.
Blackwood series (371700, 386600)	
0 – 40cm	Black (10YR2/1), medium sandy loam; mainly small and medium subrounded quartzite pebbles; weak fine and medium granular; abundant fine pores; common fine fibrous roots; clear abrupt boundary.
40 – 60cm	Very dark brown (10YR2/2), sandy loam; mainly medium and large subrounded quartzite pebbles; single grain to weak medium coarse subangular blocky structure; gradual wavy boundary.
60 – 70cm	Very dark brown (10YR2/2), loamy medium sand; mainly medium and large subrounded quartzite pebbles; single grain to weak medium coarse subangular blocky structure; gradual wavy boundary.
70 – 75cm	Brown (7.5YR5/2) medium sand, stoneless; common mottles; single grain structure.

2.9.6 Where there is no available published information and it has not been possible to undertake a detailed survey of agricultural land affected by the route of the Proposed Scheme, professional judgement has been used to extrapolate from known data to provide a comprehensive ALC coverage.

2.9.7 The assessment of the quality of agricultural land in the study area based on publicly available data and additional detailed survey data have been reviewed, and the final conclusions on the distribution of agricultural land in the various grades of the ALC in the study area are shown on maps in Volume 5, Agriculture, forestry and soils (AG-04-309b to AG-04-312a-L1).

2.9.8 The distribution of agricultural land in the different grades is shown in Table 5.

Table 5: Distribution of grades of agricultural land in the study area

Grade	Area (ha)	% of study area	% of Agricultural land area
1	0.0	0	0
2	55.4	10.9	13.8
3a	217.3	42.7	54.1
BMV subtotal	**272.7**	**53.6**	**67.9**
3b	129.1	25.4	32.1
4	0.0	0	0
5	0.0	0	0
Non agricultural	107.4	21.0	-
Total area	**509.2**	**100**	**100**

3 Assessment of effects on holdings

3.1.1 The effects on land holdings have been assessed according to the methodology set out in the in the Environmental Impact Assessment Scope and Methodology Report (SMR), (See Volume 5, Appendix CT-001-00001).

3.1.2 The land holdings assessed in this section are also presented in Volume 2, Community Area report: Pickmere to Agden and Hulseheath (MA03), Section 4 Agriculture, forestry and soils and shown on the Volume 5, Agriculture, forestry and soils Map Book (AG-01-309b to AG-01-312a-L1).

3.1.3 A summary of the assessment is provided in Table 6. The nature of the impacts considered includes:

- temporary and permanent land required from the holding;
- the temporary and permanent severance of land;
- the permanent loss of key farm infrastructure; and
- disruption (particularly noise and dust) on land uses and the holding's operations.

3.1.4 These impacts occur primarily during the construction phase of the Proposed Scheme.

Table 6: Summary of assessment of impacts and effects on holdings

Holding reference, name, description and sensitivity to change	Temporary impacts and effects	Permanent impacts and effects
MA03/1 Roses Farm, including Smoker Hill Farm and Flittogate Farm Majority of the holding rented from the Crown Estate on a Farm Business Tenancy (FBT), some from other third-party owners on annual agreements 291ha arable and beef cattle holding Medium sensitivity to change	Land required: Medium 46.9ha; 16% of holding required for the construction of the Pickmere embankment, Arley Brook viaduct, Flittogate Lane diversion, B5391 Pickmere Lane realignment, Smoker Brook viaduct north satellite compound and transfer node, soil stores and utility diversions. Severance: Low Land severed and access will be possible via Tabley Inferior Footpath 1/1 accommodation underbridge. Disruption: Negligible Overall temporary assessment: Moderate adverse due to the proportion of land required	Land required: Low 25.3ha; 9% of holding required for the Pickmere viaduct, the Arley Brook viaduct, Flittogate Lane diversion, B5391 Pickmere Lane realignment, balancing ponds, ecological and landscape mitigation. Severance: Low Access to severed land will be possible via Tabley Inferior Footpath 1/1 accommodation underbridge. Infrastructure effects: Negligible (It is noted that the residential property and buildings at Flittogate Farm will be demolished but these do not form part of the Roses Farm tenancy). Overall permanent assessment: Negligible
MA03/2 Cheshire Showground	Land required: High 26.1ha; 22% of holding required for the construction of Pickmere embankment, Pickmere Lane	Land required: Low 6.2ha; >5% of holding required for the Pickmere embankment, PROW and access diversions, balancing

Holding reference, name, description and sensitivity to change	Temporary impacts and effects	Permanent impacts and effects
121ha leased from the Crown Estate under Farm Business Tenancy (FBT) to 2035 Permanent grassland holding with ancillary grazing High sensitivity to change	satellite compound, Public Rights of Way (PROW) and access diversions, soil stores and utility diversions. Severance: Low Following consultation with the management committee for the showground, vehicular access across the showground will not be provided but an underpass for non-motorised users will be provided. Disruption: Low Dust and general construction activities may reduce uptake of the showground facilities during construction. Overall temporary assessment: Major adverse due to the proportion of land required	ponds, ecological and landscape mitigation. Severance: Low Vehicular access across the showground will not be possible but an underpass for non-motorised users will be provided. Infrastructure effects: Negligible Overall permanent assessment: Moderate adverse due to the proportion of land required and severance
MA03/3 Frog Lane Farm Owner occupied (485ha), FBT (160ha) 645ha Dairy, arable and potato farm. Diversified activities include bulk milk tank repairs and tyre repairs. High sensitivity to change	Land required: Negligible 9.5ha; 1% of holding required for the construction of the School Lane realignment, Frog Lane realignment and utility diversions. Severance: Negligible Disruption: Negligible Overall temporary assessment: Minor adverse	Land required: Negligible 1.6ha; <1% of holding required for the School Lane and Frog Lane realignments. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Minor adverse
MA03/4 School Farm Owner occupier 9.7ha equestrian stud farm (commercial) Medium sensitivity to change	Land required: High 3.2ha; 33% of holding required for the construction of the Pickmere Lane realignment, School Lane realignment and the Arley Brook viaduct. Severance: Negligible Disruption: Low Riding and exercising horses close to construction activities may need to be limited. Overall temporary assessment: Major/ moderate adverse due to the proportion of land required	Land required: High 2.5ha; 25% of holding required for the Pickmere Lane realignment and ecological and landscape mitigation. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Major/moderate adverse due to the proportion of land required
MA03/5 Land at School Lane* 51ha grassland holding Medium sensitivity to change	Land required: Negligible 0.8ha; 2% of holding required for the construction of the School Lane realignment and utility diversions. Severance: Negligible Disruption: Negligible	Land required: Negligible <0.1ha; <1% of holding required for the School Lane realignment. Severance: Negligible Infrastructure effects: Negligible

Holding reference, name, description and sensitivity to change	Temporary impacts and effects	Permanent impacts and effects
	Overall temporary assessment: Negligible	Overall permanent assessment: Negligible
MA03/6 Land at Frog Lane* 1.5ha grassland holding Low sensitivity to change	Land required: Medium 0.2ha; 15% of holding required for the construction of the School Lane and Frog Lane realignments. Severance: Negligible Disruption: Negligible Overall temporary assessment: Minor adverse	Land required: Low 0.1ha; 9% of holding required for the School Lane and Frog Lane realignments. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Negligible
MA03/7 Tabley Brook Farm* 7.1ha grassland holding Medium sensitivity to change	Land required: Medium 1.2ha; 17% of holding required for the construction of the Heyrose embankment, Budworth Road satellite compound and soil stores. Severance: Negligible Disruption: Negligible Overall temporary assessment: Moderate adverse due to the proportion of land required	Land required: Negligible <0.1ha; <1% of holding required for ecological mitigation. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Negligible
MA03/8 Windmill Nurseries Owner occupied 2.4ha horticultural unit with glasshouses and standing-out areas High sensitivity to change	Land required: High 1.9ha; 78% of holding required for the construction of the Heyrose embankment and soil stores. Severance: Negligible Disruption: Negligible Overall temporary assessment: Major adverse due to the proportion of land required	Land required: High 1.4ha; 57% of holding required for the Heyrose embankment, Budworth Road, auto-transformer station and landscape mitigation. Severance: Negligible Infrastructure effects: High Demolition of residential dwelling and glasshouses. Overall permanent assessment: Major adverse due to the proportion of land required and property demolition
MA03/9 Heyrose Farm Owner occupied 32ha arable and grassland holding (arable cropping managed by contractors). The farm includes Heyrose Golf Club. Medium sensitivity to change	Land required: High 20.3ha; 63% of holding required for the construction of the Heyrose embankment, soil stores and utility diversions. Severance: Medium Access to the residual farmland will be possible via public highways. Disruption: Negligible Overall temporary assessment: Major/moderate adverse due to the proportion of land required	Land required: High 9.0ha; 28% of holding required for the Heyrose embankment, ecological and landscape mitigation. Severance: Medium Access to the residual farmland will be possible via public highways. Infrastructure effects: High Demolition of residential dwelling and agricultural buildings. Overall permanent assessment: Major/moderate adverse due to the

Holding reference, name, description and sensitivity to change	Temporary impacts and effects	Permanent impacts and effects
		proportion of land required and property demolition
MA03/10 Feldy Green Cottage* 15ha grassland holding Medium sensitivity to change	Land required: Medium 2.7ha; 18% of holding required for utility diversions. Severance: Negligible Disruption: Negligible Overall temporary assessment: Moderate adverse due to the proportion of land required	Land required: Negligible No land permanently required. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Negligible
MA03/11 East Feldy Farm (A)* 4.0ha grassland holding Medium sensitivity to change	Land required: Low 0.2ha; 6% of holding required for utility diversions. Severance: Negligible Disruption: Negligible Overall temporary assessment: Minor adverse	Land required: Negligible No land permanently required. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Negligible
MA03/12 East Feldy Farm (B)* 11ha grassland holding Medium sensitivity to change	Land required: Medium 1.3ha; 12% of holding required for utility diversions. Severance: Negligible Disruption: Negligible Overall temporary assessment: Moderate adverse due to the proportion of land required	Land required: Negligible No land permanently required. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Negligible
MA03/13 Gore Farm Owner occupied 166ha arable, beef cattle (54 suckler cows, selling heavy store cattle) and sheep (650 ewes, selling lambs). Diversified activities include paper drying mill and phone mast. Medium sensitivity to change	Land required: Negligible 4.2ha; 3% of holding required for utility diversions. Severance: Negligible Disruption: Negligible Overall temporary assessment: Negligible	Land required: Negligible <0.1ha; <1% of holding permanently required. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Negligible
MA03/14 Old Feldy Farm* 20ha grassland holding Medium sensitivity to change	Land required: Negligible 0.9ha; 4% of holding required for utility diversions. Severance: Negligible Disruption: Negligible Overall temporary assessment: Negligible	Land required: Negligible No land permanently required. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Negligible
MA03/15 Gorsefields Farm* 28ha grassland and arable holding Medium sensitivity to change	Land required: Negligible 0.3ha; 1% of holding required for utility diversions. Severance: Negligible	Land required: Negligible No land permanently required. Severance: Negligible Infrastructure effects: Negligible

Holding reference, name, description and sensitivity to change	Temporary impacts and effects	Permanent impacts and effects
	Disruption: Negligible Overall temporary assessment: Negligible	Overall permanent assessment: Negligible
MA03/16 Fields Farm* 11ha grassland and arable holding Medium sensitivity to change	Land required: Low 0.7ha; 6% of holding required for utility diversions. Severance: Negligible Disruption: Negligible Overall temporary assessment: Minor adverse	Land required: Negligible No land permanently required. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Negligible
MA03/17 Hollowood Farm Owner occupier 63ha grassland holding laid to grass and used for rearing beef cattle and winter grazing for sheep. Diversified activities include a phone mast. Medium sensitivity to change	Land required: High 14.6ha; 23% of holding required for the construction of the Heyrose embankment, M6 viaduct south satellite compound, Hollowood Farm accommodation access realignment, soil stores and utility diversions. Severance: Low Access to severed farmland will be possible via the Tabley Superior Restricted Byway 4/1 accommodation underbridge. Disruption: Negligible Overall temporary assessment: Major/moderate adverse due to the proportion of land required	Land required: Low 5.4ha; 9% of holding required for the Heyrose embankment, Hollowood Farm accommodation access realignment, balancing ponds and associated access, and landscape mitigation. Severance: Low Access to severed farmland will be possible via the Tabley Superior Restricted Byway 4/1 accommodation underbridge. Infrastructure effects: Negligible Overall permanent assessment: Minor adverse
MA03/18 Land at Smith Cottage* 24ha grassland holding Medium sensitivity to change	Land required: Low 1.3ha; >5% of holding required for utility diversions. Severance: Negligible Disruption: Negligible Overall temporary assessment: Minor adverse	Land required: Negligible 0.3ha; 1% of holding required. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Negligible
MA03/19 Knowlspit Farm with Bentleyhurst Farm 130ha dairy unit rented from the Mere Estate on an FBT. 340 dairy cows High sensitivity to change	Land required: High 26.4ha; >20% of holding required for the construction of the Mere Bridleway 1/1 realignment, M6 viaduct north satellite compound, Hoo Green transfer node and utility diversions. Severance: Low Access to residual farmland will be possible via the Mere Bridleway 1/1 accommodation underpass. Disruption: Negligible	Land required: Negligible 1.2ha; 1% of holding required for the Mere Bridleway 1/1 realignment. Severance: Low Access to residual farmland will be possible via the Mere Bridleway 1/1 accommodation underpass. Infrastructure effects: Negligible Overall permanent assessment: Moderate adverse due to severance

Holding reference, name, description and sensitivity to change	Temporary impacts and effects	Permanent impacts and effects
	Overall temporary assessment: Major adverse due to the proportion of land required	
MA03/20 Winterbottom Farm 80ha sheep (750 ewes) farm rented from the Mere Estate, half on an Agricultural Holdings Act (AHA) tenancy, half on an FBT. Medium sensitivity to change	Land required: High 75.4ha; 94% of the holding required for the construction of the Over Tabley embankment, Hoo Green South embankments Nos.1, 2 and 3 and their respective retaining walls, Hoo Green viaduct, Hoo Green north embankment, various soil stores, construction compounds and utility diversions. Severance: Negligible Insofar as there will be virtually no residual farmland available during construction access will not be required. Once construction activities cease access to residual farmland will be possible via the Mere Bridleway 1/1 accommodation underpass. Disruption: Low Potential for dust arising from construction to affect housed livestock. Overall temporary assessment: Major/moderate adverse due to the proportion of land required	Land required: High 33.9ha; 42% of the holding required for the Over Tabley embankment, Hoo Green South embankments Nos.1, 2 and 3 and their respective retaining walls, Hoo Green viaduct, Hoo Green north embankment, ecological and landscape mitigation. Severance: Low Access to residual farmland will be possible via the Mere Bridleway 1/1 accommodation underpass. Infrastructure effects: Negligible Overall permanent assessment: Major/moderate adverse due to the proportion of land required
MA03/21 Land at Winterbottom Lane* 1.8ha grassland holding Low sensitivity to change	Land required: High 1.8ha; 100% of holding required for utility diversions. Severance: Negligible Disruption: Negligible Overall temporary assessment: Moderate adverse due to the proportion of land required	Land required: Negligible No land permanently required. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Negligible
MA03/22 Yew Tree Farm Effectively owner occupied – either owned by occupier or rented on an AHA tenancy from parents. 81ha arable and dairy (90 cows) Diversified activities include renting land to model aeroplane club. High sensitivity to change	Land required: Medium 12.2ha; 15% of the holding required for the construction of the Hoo Green north cutting, Hoo Green Lane diversion, A50 realignment, soil stores and utility diversions. Severance: Medium Access to grazing land may be compromised during utility diversion works. Disruption: Low	Land required: Low 7.5ha; 9% of the holding required for the Hoo Green north cutting, Hoo Green Lane diversion, A50 realignment, ecological and landscape mitigation. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Moderate adverse due to the proportion of land required

Holding reference, name, description and sensitivity to change	Temporary impacts and effects	Permanent impacts and effects
	Potential for dust arising from construction to affect housed livestock. Overall temporary assessment: Major/moderate adverse due to the proportion of land required	
MA03/23 Moss Farm and Park Farm Moss Farm - 34ha owner occupied; Park Farm- 53ha rented on AHA. 87ha arable and beef cattle (store cattle reared to 18 months) Medium sensitivity to change	Land required: Medium 10.5ha; 12% of holding required for the construction of the High Legh cutting, Peacock Lane realignment, Peacock Lane satellite compound and soil stores. Severance: Negligible Disruption: Negligible Overall temporary assessment: Moderate adverse due to the proportion of land required	Land required: Low 7.4ha; 8% of holding required for the High Legh cutting, Peacock Lane realignment, ecological and landscape mitigation. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Minor adverse
MA03/24 Brookheyes Farm* 11ha grassland holding Medium sensitivity to change	Land required: High 10.7ha; 97% of the holding required for the construction of the Hoo Green north cutting, A50 realignment, A50 main compound, soil stores and utility diversions. Severance: Negligible Disruption: Negligible Overall temporary assessment: Major/moderate adverse due to the proportion of land required	Land required: High 3.3ha; 30% of the holding required for the Hoo Green north cutting, A50 realignment, ecological and landscape mitigation. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Major/moderate adverse due to the proportion of land required.
MA03/25 Hulme Barn Farm Owner occupied 81ha mainly arable with grassland (haylage) Medium sensitivity to change	Land required: High 49.9ha; 62% of holding required for the construction of the High Legh cutting, High Legh west cutting, Hulseheath south embankment, Bowden View transfer node, soil stores and utility diversions. Severance: Low Disruption during installation of utility diversions may preclude cropping over part of the land for a temporary period. Disruption: Negligible Overall temporary assessment: Major/moderate adverse due to the proportion of land required	Land required: Medium 14.7ha; 18% of holding required for the High Legh cutting, High Legh west cutting, Hulseheath south embankment, ecological and landscape mitigation. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Moderate adverse due to the proportion of land required

Holding reference, name, description and sensitivity to change	Temporary impacts and effects	Permanent impacts and effects
MA03/26 Land at Bowden View Farm* 11ha grassland holding Medium sensitivity to change	Land required: High 11.3ha; 100% of holding required for the construction of the High Legh cutting, Hulseheath south embankment, Bowden View transfer node, soil stores and utility diversions. Severance: Negligible Disruption: Negligible Overall temporary assessment: Major/moderate adverse due to the proportion of land required	Land required: High 6.6ha; 58% of holding required for the High Legh cutting, Hulseheath south embankment, ecological and landscape mitigation. Severance: Negligible Infrastructure effects: High Demolition of residential dwelling and agricultural buildings. Overall permanent assessment: Major/moderate adverse due to the proportion of land required and property demolition
MA03/27 Land at Wrenshot House* 6.9ha equestrian (non-commercial) Low sensitivity to change	Land required: High 1.4ha; >20% of holding required for the construction of the High Legh cutting, High Legh west cutting, soil stores and utility diversions. Severance: Negligible Disruption: Low Riding and exercising horses close to construction activities may need to be limited. Overall temporary assessment: Moderate adverse due to the proportion of land required	Land required: Low 0.6ha; 9% of holding required for the High Legh cutting, High Legh west cutting, ecological and landscape mitigation. Severance: Negligible Infrastructure effects: High Demolition of equestrian buildings. Overall permanent assessment: Moderate adverse due to property demolition
MA03/28 Land at Mere Hall Farm* 50ha arable holding Medium sensitivity to change	Land required: Medium 7.9ha; 16% of holding required for utility diversions. Severance: Negligible Disruption: Negligible Overall temporary assessment: Moderate adverse due to the proportion of land required	Land required: Negligible <0.1ha; <1% of holding permanently required. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Negligible
MA03/29 Land at Hulse Heath Lane, Bucklow Hill 4.4ha grassland holding Medium sensitivity to change	Land required: High 4.1ha; 94% of holding required for utility diversions. Severance: Negligible Disruption: Negligible Overall temporary assessment: Major/moderate adverse due to the proportion of land required	Land required: Negligible No land permanently required. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Negligible
MA03/30 Hulse Heath Farm* 0.8ha grassland holding Low sensitivity to change	Land required: High 0.4ha; 48% of holding required for utility diversions. Severance: Negligible	Land required: Negligible No land permanently required. Severance: Negligible Infrastructure effects: Negligible

Holding reference, name, description and sensitivity to change	Temporary impacts and effects	Permanent impacts and effects
	Disruption: Negligible Overall temporary assessment: Moderate adverse due to the proportion of land required	Overall permanent assessment: Negligible
MA03/31 Land at Chapel Lane, Bucklow Hill (1)* 1.6ha grassland holding Low sensitivity to change	Land required: High 1.5ha; 93% of holding required for utility diversions. Severance: Negligible Disruption: Negligible Overall temporary assessment: Moderate adverse due to the proportion of land required	Land required: Low 0.1ha; 8% of holding permanently required. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Negligible
MA03/32 Land at Peacock Lane, Millington (1) Owner occupied 15ha grassland holding let to others Low sensitivity to change	Land required: High 12.1ha; 81% of holding required for the construction of the High Legh west cutting, Hulseheath south embankment, Wrenshot Lane transfer node, soil stores and utility diversions. Severance: High Land will be severed by both the main line and the Manchester Spur with access unavailable. Disruption: Negligible Overall temporary assessment: Moderate adverse due to the proportion of land required and severance	Land required: High 10.2ha; 68% of holding required for the High Legh west cutting, Hulseheath south embankment, ecological and landscape mitigation. Severance: Medium Access to residual severed land will be available via the public highway and HS2 access tracks. Infrastructure effects: Negligible Overall permanent assessment: Moderate adverse due to the proportion of land required
MA03/33 Gorse Cottage Farm Owner occupied 4.5ha grassland holding let to others Low sensitivity to change	Land required: High 3.6ha; 80% of holding required for the construction of the Hulseheath south embankment, soil stores and utility diversions. Severance: Negligible Disruption: Negligible Overall temporary assessment: Moderate adverse due to the proportion of land required	Land required: High 2.5ha; 56% of holding required for the Hulseheath south embankment, ecological and landscape mitigation. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Moderate adverse due to the proportion of land required
MA03/34 Land at Peacock Lane, Millington (2)* 2.0ha grassland Low sensitivity to change	Land required: High 1.2ha; 60% of holding required for the construction of Peacock Lane realignment, soil stores and utility diversions. Severance: Negligible Disruption: Negligible	Land required: Negligible <0.1ha; <1% of the holding required. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Negligible

Holding reference, name, description and sensitivity to change	Temporary impacts and effects	Permanent impacts and effects
	Overall temporary assessment: Moderate adverse due to the proportion of land required	
MA03/35 Middle Moss Farm 4.6ha grassland Low sensitivity to change	Land required: High 3.6ha; 79% of holding required for the construction of the High Legh cutting and soil stores. Severance: Negligible Disruption: Negligible Overall temporary assessment: Moderate adverse due to the proportion of land required	Land required: High 3.0ha; 66% of holding required for the High Legh cutting, ecological and landscape mitigation. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Moderate adverse due to the proportion of land required
MA03/36 Little Moss Farm 0.6ha grassland Low sensitivity to change	Land required: Negligible <0.1ha; 5% of holding required for the construction of Peacock Lane realignment. Severance: Negligible Disruption: Negligible Overall temporary assessment: Negligible	Land required: Negligible <0.1ha; <1% of holding required for the Peacock Lane realignment. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Negligible
MA03/37 Woolstencroft Farm Part owned (52ha) Part rented from National Trust (87ha) Other land rented locally 139ha dairy (300 cows) holding utilising 75ha grazing with off-site arable cropping High sensitivity to change	Land required: Low 13.7ha; 10% of dairy grazing land required for the construction of the High Legh cutting, Heatley south embankment, Bridgewater Canal satellite compound and soil stores. Severance: Low Access to severed farmland will be possible by passing under the Bridgewater Canal viaduct. Disruption: Negligible Overall temporary assessment: Moderate adverse due to the proportion of land required	Land required: Negligible 5.7ha; 4% of dairy grazing land required for the High Legh cutting, Heatley south embankment and ecological and landscape mitigation. Severance: Low Access to severed farmland will be possible by passing under the Bridgewater Canal viaduct. Infrastructure effects: Negligible Overall permanent assessment: Moderate adverse due to severance
MA03/38 Abbey Leys Farm Owner occupied 40ha organic holding with farm shop, free range poultry and arable crops Medium sensitivity to change	Land required: Low 3.7ha; 9% of holding required for the construction of the High Legh cutting and soil stores. Severance: Negligible Disruption: Negligible Overall temporary assessment: Minor adverse	Land required: Low 2.2ha; 6% of holding required for the High Legh cutting, ecological and landscape mitigation. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Minor adverse
MA03/39 Scandia House, Moss Lane Owner occupied	Land required: High 1.3ha; 36% of holding required for the construction of the High Legh cutting and soil stores	Land required: High 0.8ha; 23% of holding required for the High Legh cutting, ecological and landscape mitigation

Holding reference, name, description and sensitivity to change	Temporary impacts and effects	Permanent impacts and effects
3.6ha residential with grassland paddock Low sensitivity to change	Severance: Negligible Disruption: Negligible Overall temporary assessment: Moderate adverse due to the proportion of land required	Severance: Negligible Infrastructure effects: High Demolition of agricultural building. Overall permanent assessment: Moderate adverse due to the proportion of land required and property demolition
MA03/40 Agden Brook Farm Mainly owner occupied (431ha) and includes Little Heatley Farm, Wet Gate Lane. Also includes Warburton Park (113ha) which is rented on an FBT; other land rented on various annual agreements (333ha) 877ha Dairy (460 cows), beef cattle (300 sold per annum), arable (440ha), potatoes on contract Diversified activities include property rentals. High sensitivity to change Agden Brook Farm has land in both MA03 and MA04, with the assessment reported here and in MA03 Volume 2 report	Land required: Medium 137.2ha; 16% of holding required: (in MA03) for the construction of the Agden cutting, Lymm south embankment, Lymm north embankment, Agden Lane satellite compound, M56 west satellite compound, Agden Brow transfer node, A56 Lymm Road satellite compound, PROW and farm access diversions and utility diversions. And, in MA04 for the construction of the Lymm north embankment, Heatley south embankment, Spring Lane and Wet Gate Lane realignments, Warburton embankment, Manchester Ship Canal viaduct and associated satellite compound, soil stores and utility diversions. Severance: Medium Access to land severed at Warburton Park via public highways. Access to land at Agden Brook Farm possible via Agden Brook Farm accommodation underbridge. Disruption: Low Potential for dust arising from construction to affect housed livestock. Overall temporary assessment: Major/moderate adverse due to the proportion of land required and severance	Land required: Negligible 35.6ha; 4% of holding required: (in MA03) for the Agden cutting, Lymm south embankment, Lymm north embankment, PROW and farm access diversions, ecological and landscape mitigation. And, in MA04 for the Lymm north embankment, Heatley south embankment, Spring Lane and Wet Gate Lane realignments, Warburton embankment, Manchester Ship Canal viaduct, ecological and landscape mitigation Severance: Low Access to residual farmland will be possible via Agden Brook Farm accommodation underbridge and by passing under the Manchester Ship Canal viaduct. Infrastructure effects: Negligible Overall permanent assessment: Moderate adverse due to severance
MA03/41 Booth Bank Farm* 8.6ha grassland holding with children's activity farm Medium sensitivity to change	Land required: High 6.0ha; 69% of holding required for utility diversions. Severance: Negligible Disruption: Negligible	Land required: Negligible <0.1ha; <1% of holding required. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Negligible

Holding reference, name, description and sensitivity to change	Temporary impacts and effects	Permanent impacts and effects
	Overall temporary assessment: Major/moderate adverse due to the proportion of land required	
MA03/42 Thowler Lane Farm* 1.5ha equestrian (non-commercial) Low sensitivity to change	Land required: High 1.2ha; 77% of holding required for utility diversions. Severance: Negligible Disruption: Negligible Overall temporary assessment: Moderate adverse due to the proportion of land required	Land required: Negligible No land permanently required. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Negligible
MA03/43 Lane at Agden Lane* 0.4ha grassland holding Low sensitivity to change	Land required: High 0.4ha; 100% of holding required for utility and highway diversions. Severance: Negligible Disruption: Negligible Overall temporary assessment: Moderate adverse due to the proportion of land required	Land required: High 0.3ha; 83% of holding required for highway diversion. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Moderate adverse due to the proportion of land required
MA03/44 Land at Booth Bank Cottage* 1.5ha grassland holding Low sensitivity to change	Land required: High 0.9ha; 60% of holding required for utility diversions. Severance: Negligible Disruption: Negligible Overall temporary assessment: Moderate adverse due to the proportion of land required	Land required: Negligible No land permanently required. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Negligible

** It has not been possible to arrange farm impact assessment interviews with these holdings. Publicly available sources have been used to obtain the information presented.*

hs2.org.uk

High Speed Two (HS2) Limited
Two Snowhill
Snow Hill Queensway
Birmingham B4 6GA
Freephone: 08081 434 434
Minicom: 08081 456 472
Email: HS2enquiries@hs2.org.uk