

# High Speed Rail (Crewe – Manchester) Environmental Statement

## Volume 5: Appendix AG-001-0MA05

### **Agriculture, forestry and soils**

MA05: Risleigh to Bamfurlong

Agriculture, forestry and soils assessment

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## Department for Transport

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# 1 Introduction

- 1.1.1 This report is an appendix to the agriculture, forestry and soils assessment. It presents the following for the Risley to Bamfurlong area (MA05):
- 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-002-0MA05)<sup>1</sup>.

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<sup>1</sup> High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Background and Information Data, Agriculture, forestry and soils baseline data*. BID AG-002-0MA05. 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<sup>2</sup> 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 Risley to Bamfurlong 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: Risley to Bamfurlong (MA05), Section 4 Agriculture, forestry and soils (2EV01-ARP-EV-TEM-000-000242).
- 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 AG-002-0MA05)<sup>1</sup> and the Volume 5 Agriculture, forestry and soils Map Book (AG-02-305 and AG-04-314b to AG-04-318).

### 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

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

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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 is based on publicly available data gathered by desk based studies. This relates 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<sup>3</sup>;
- Soils and Their Use in Midland and Western England; regional reconnaissance mapping showing soil associations (groupings of spatially related soil types)<sup>4</sup>;
- solid and superficial deposits from the Geology of Britain viewer<sup>5</sup>;
- grid point meteorological data for ALC of England and Wales<sup>6</sup>;
- Provisional ALC of England and Wales (1:250,000)<sup>7</sup>;
- Defra Likelihood of Best and Most Versatile Agricultural Land mapping (1:250,000)<sup>8</sup>;
- agri-environment schemes<sup>9</sup>; 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.

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

<sup>4</sup> Soil Survey of England and Wales (1984), *Soils and Their Use in Midland and Western England*, Harpenden.

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

<sup>6</sup> Meteorological Office (1989), *Grid point Meteorological data for Agricultural Land Classification of England and Wales and other Climatological Investigations*.

<sup>7</sup> Ministry of Agriculture, Fisheries and Food (1983), *Agricultural Land Classification of England and Wales (1:250,000)*.

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

<sup>9</sup> Multi-Agency Geographical Information for the Countryside (MAGIC), Available online at: [www.magic.gov.uk](http://www.magic.gov.uk).



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- 2.3.3 Existing detailed ALC survey data covering agricultural land within the study area is available at Appelton Thorn<sup>10</sup>, Culcheth<sup>11</sup> and land off Silver Lane, Risley<sup>12</sup>. In addition, consideration has been given to detailed ALC information available within 2km of the study area, including Culcheth Site 19<sup>13</sup>, and Glazebrook Site 13<sup>14</sup> and MSA Junction 22 M62 at Winick<sup>15</sup>.
- 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 A full description of the geological characteristics of the Risley to Bamfurlong area is provided in Volume 5: Appendix AG-001-0MA05, Volume 2, Community Area report: Risley to Bamfurlong (MA05) Section 10, Land quality and Section 15, Water resources and flood risk. This section only considers geology as a soil parent material<sup>16</sup>. The soil association developed in each parent material is identified below. Individual soil associations are described under 'Description and distribution of soil types' below.
- 2.4.2 Glacial till, comprising sandy silt clay with gravel, is widespread across the study area from Culcheth to beyond Golborne in the north. This parent material gives rise to soils in the Salop association.
- 2.4.3 Greyish till derived from Pennine Middle Coal Measures Formation (comprising coal seams, mudstone, siltstone and sandstone) is located in the northern extent of the study area. This parent material produces slowly permeable and seasonally waterlogged clay loam soils in the Brickfield 3 association.

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<sup>10</sup> Ministry of Agriculture, Fisheries and Food (MAFF) (1990), *Agricultural Land Classification, Warrington Local Plan – Appleton Thorn*, MAFF Ref ALCW01590.

<sup>11</sup> Ministry of Agriculture, Fisheries and Food (MAFF) (1993), *Agricultural Land Classification, Warrington Local Plan – Culcheth Site 11*, MAFF Ref ALCW06293.

<sup>12</sup> Ministry of Agriculture, Fisheries and Food (MAFF) (1991), *Agricultural Land Classification, Silver Lane, Risley*, MAFF Ref ALCW04391.

<sup>13</sup> Ministry of Agriculture, Fisheries and Food (MAFF) (1995), *Agricultural Land Classification, Warrington Local Plan – Culcheth Site 19*, MAFF Ref. ALCW18095.

<sup>14</sup> Ministry of Agriculture, Fisheries and Food (MAFF) (1993), *Agricultural Land Classification, Warrington Local Plan – Glazebrook Site 13*, MAFF Ref. ALCW06093.

<sup>15</sup> Ministry of Agriculture, Fisheries and Food (MAFF) (1994), *Agricultural Land Classification, Winwick*, MAFF Ref. ALCW06394.

<sup>16</sup> 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 \(bgs.ac.uk\)](http://Soil Parent Material Model - British Geological Survey (bgs.ac.uk)).

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- 2.4.4 Glaciofluvial sheet deposits, comprising sand and gravel, are present intermittently beneath the land required for the Proposed Scheme between the M62 motorway and south of Culcheth. Where this parent material is seasonally waterlogged by a fluctuating groundwater table, it produces soils in the Blackwood association.

## 2.5 Topography and drainage

- 2.5.1 Topography in the area is broadly level and rises in elevation from approximately 20m above Ordnance Datum (AOD) near the M62 motorway, to approximately 35m AOD to the south of Culcheth. This southern section of the Proposed Scheme comprises some peat land, including Holcroft Moss, and includes several peat workings, man-made lakes and ponds and a landfill site at Risley.
- 2.5.2 Between Culcheth and Golborne, the land undulates over gentle gradients (approximately 2 to 3 degrees) between elevations of approximately 35m AOD to 40m AOD. The land comprises fields which are enclosed by hedgerows and dotted with small ponds. Similar topography and elevation continues north of Golborne to the northern end of the area. There are no slopes within the study area with a gradient exceeding 7 degrees.
- 2.5.3 Drainage of the agricultural land within the study area is predominantly via Holcroft Lane Brook, along a tributary of Hey Brook, Carr Brook, Small Brook, Windy Bank Brook, Nan Holes Brook and Coffin Lane Brook.

## 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 from 875mm to 920mm, increasing with altitude. FCDs range from 207 days to 217 days. Moisture deficits are between 81mm to 87mm for wheat and 67mm to 74mm 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 1,412 and 1,426 day °C.

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**Table 1: Interpolated agro-climatic data**

Agro-climatic parameter	SJ670940 Culcheth	SJ633970 Golborn	SD604007 Abram
Altitude (mAOD)	21	33	29
Average annual rainfall (mm)	875	911	920
Accumulated temperature >0°C (day°)	1,426	1,412	1,416
Field capacity days (days)	207	216	217
Average moisture deficit, wheat (mm)	87	83	81
Average moisture deficit, potatoes (mm)	74	69	67

## 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<sup>3</sup>. 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-02-305 (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
1021	Turbary Moor	Peat soils on lowland raised bog peats. Well drained where land is improved for arable by pumped ditches and field drains.	I
821b	Blackwood	Deep permeable sandy and coarse loamy soils in glaciofluvial drift, affected by fluctuating groundwater.	III-IV
713g	Brickfield 3	Loamy and clayey soils that are seasonally waterlogged.	IV

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2.7.2 The National Soil Map shows the general distribution of the following four 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;
- from the southern boundary at Glazebrook Moss to approximately 500m north of the M62 there is an area of peat, in which deep, earthy peat soils of the Turbary Moor association are formed. Wetness class will vary depending on the level of the water-table and duration of waterlogging during the winter months. These peat soils hold large amounts of water available for crops;
- to the south of Culcheth, there are deep, permeable sandy and sandy loam soils which belong to the Blackwood association. 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); and
- in the far north of the study area, there are loamy and clayey soils in the Brickfield 3 association. These surface-water gley soils are waterlogged for long periods during the winter (WC IV) but can be improved by drainage to WC III. Much of this association is under permanent grass for livestock and dairying.

2.7.3 The four soil associations above are described further in the Soils Guide<sup>17</sup> which is available at Cranfield University's Landis website.

2.7.4 Detailed descriptions for the dominant soil series in the Salop, Turbary Moor, Brickfield and Blackwood associations, and are given in Table 3.

**Table 3: Dominant soil series**

Soil series	
<b>Salop series</b>	
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

<sup>17</sup> Cranfield University (2017), *The Soils Guide*. Available online at: [www.landis.org.uk](http://www.landis.org.uk).

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<b>Soil series</b>	
	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.
<b>Turbary series</b>	
0 – 20cm	Black (5YR2.5/1) humified peat.
20 – 40cm	Dark reddish brown (5YR2.5/2) fibrous or semi-fibrous peat with moss and heather remains.
40 – 120m	Dark brown (7.5YR3/2) fibrous or semi-fibrous peat with cotton grass, some moss and heath remains.
<b>Blackwood series</b>	
0 – 20cm	Very dark greyish brown (10YR3/2) slightly stony to stoneless loamy sand; moist; moderately developed medium angular blocky; low packing density; moderately weak soil strength; few very fine fibrous roots; non-calcareous; sharp smooth boundary.
20 – 350cm	Pale brown (2.5Y5/2) slightly stony loamy sand with very many fine strong brown (7.5YR5/8) mottles; moist; weak medium and coarse subangular blocky structure; medium packing density; moderately firm ped strength; few very fine fibrous roots; non-calcareous; few irregular soft ferri-manganiferous concentrations; abrupt smooth boundary.
35 – 90cm	Light brownish grey (10YR4/1) slightly stony loamy sand with many medium yellowish brown (10YR5/6) mottles; very moist. Weak medium subangular blocky or single grain 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.
90 – 100cm	Greyish brown (10YR4/2) slightly or moderately stony sand with many medium reddish brown (5YR4/4) mottles; single grain structure; 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.
<b>Brickfield series</b>	
0 – 20cm	Very dark greyish brown (10YR3/2), slightly stony medium clay loam.
20 – 50cm	Greyish brown (10YR5/2), slightly stony medium clay loam with a moderate medium subangular blocky structure. Many distinct ochreous mottles (10YR6/6).
50 – 120m	Grey (10YR5/1), moderately stony, heavy clay loam with a weak, coarse angular blocky structure. Many distinct ochreous mottles (10YR6/8).

## 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 875mm to 920mm, increasing with altitude. FCDs range from 207 days to 217 days. Moisture deficits are 81mm to 87mm for wheat and 67mm to 74mm 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 alongside Holcroft Lane Brook, a tributary of Hey Brook, Carr Brook, Small Brook, Windy Bank Brook, Nan Holes Brook and Coffin Lane Brook. Site-specific data on duration and frequency of flooding for these watercourses in terms of Table 2 'Grade according to flood risk in summer' and Table 3 'Grade according to flood risk in winter' in the ALC Guidelines<sup>2</sup> are not available. 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. Further details are provided in Volume 2, Community Area report: Risley to Bamfurlong (MA05), Section 15, Water resources and flood risk.

## 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;
  - peat soils on lowland raised bog peats affected by fluctuating groundwater;

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- deep permeable sandy and coarse loamy soils in glaciofluvial drift, affected by fluctuating groundwater; and
- loamy and clayey soils that are seasonally waterlogged.

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, soil-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 ALC guidelines<sup>2</sup>. 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 in Grade 4.
- 2.8.11 Agricultural land with deep, fibrous peat soils in the Turbary Moor association holds large amounts of water available for crops. Wetness class varies depending on the level of the water-table and duration of waterlogging during the winter months. MAFF detailed ALC at Chat Moss<sup>17</sup>, located approximately 1km to the northeast of the study area, has determined that agricultural land with peaty Turbary Moor soils is Grade 1 (see Section 2.3).
- 2.8.12 The quality of agricultural land with soils in the Blackwood series is limited by soil wetness to Subgrade 3a where the subsoil is seasonally waterlogged (WC III) or Subgrade 3b 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 more likely to be limited by soil droughtiness to 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

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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 area 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 Document (BID AG-002-0MA05)<sup>1</sup>.

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	
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.



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Soil series	
<b>Turbary series</b>	
0 – 20cm	Black (5YR2.5/1) humified peat.
20 – 40cm	Dark reddish brown (5YR2.5/2) fibrous or semi-fibrous peat with moss and heather remains.
40 – 120m	Dark brown (7.5YR3/2) fibrous or semi-fibrous peat with cotton grass, some moss and heath remains.
<b>Brickfield series</b>	
0 – 20cm	Very dark greyish brown (10YR3/2), slightly stony medium clay loam.
20 – 50cm	Greyish brown (10YR5/2), slightly stony medium clay loam with a moderate medium subangular blocky structure. Many distinct ochreous mottles (10YR6/6).
50 – 120m	Grey (10YR5/1), moderately stony, heavy clay loam with a weak, coarse angular blocky structure. Many distinct ochreous mottles (10YR6/8).
<b>Blackwood series</b>	
0 – 20cm	Very dark greyish brown (10YR3/2) slightly stony to stoneless loamy sand; moist; moderately developed medium angular blocky; low packing density; moderately weak soil strength; few very fine fibrous roots; non-calcareous; sharp smooth boundary.
20 – 350cm	Pale brown (2.5Y5/2) slightly stony loamy sand with very many fine strong brown (7.5YR5/8) mottles; moist; weak medium and coarse subangular blocky structure; medium packing density; moderately firm ped strength; few very fine fibrous roots; non-calcareous; few irregular soft ferri-manganiferous concentrations; abrupt smooth boundary.
35 – 90cm	Light brownish grey (10YR4/1) slightly stony loamy sand with many medium yellowish brown (10YR5/6) mottles; very moist. Weak medium subangular blocky or single grain 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.
90 – 100cm	Greyish brown (10YR4/2) slightly or moderately stony sand with many medium reddish brown (5YR4/4) mottles; single grain structure; 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.

- 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 in Volume 5, Agriculture, forestry and soils Map (AG-04-314b to AG-04-318).
- 2.9.8 The distribution of agricultural land in the different grades is shown in Table 5.

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

Grade	Area (ha)	% of study area	% of Agricultural land area
1	35.6	9.5	14.0
2	2.8	0.7	1.1
3a	47.2	12.5	18.6
BMV subtotal	<b>85.6</b>	<b>22.7</b>	<b>33.7</b>
3b	153.1	40.6	60.2
4	15.4	4.1	6.1
5	0.0	0	0
Non agricultural	122.6	32.6	-
<b>Total area</b>	<b>376.7</b>	<b>100</b>	<b>100</b>

### 3 Assessment of effects on holdings

- 3.1.1 The effects on land 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: Risley to Bamfurlong (MA05), Section 4 Agriculture, forestry and soils and shown on Volume 5, Agriculture, forestry and soils Map Book (AG-01-314b to AG-01-318-C1).
- 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
MA05/1 Franks Farm Owner occupied 188ha arable holding Alternative medicine (homeopathy) treatments provided. Medium sensitivity to change	Land required: Medium 32.5ha; 17% of holding required for construction of the Glazebrook embankment, Culcheth south embankment, M62 west viaduct, agricultural access and Public Right of Way (PROW) diversions, M62 west viaduct south satellite compound and transfer node, M62 west viaduct north satellite compound and transfer node and soil stores. Severance: Low Access to the residual farmland will be possible via Risley east accommodation underbridge. Disruption: Negligible Overall temporary assessment: Moderate adverse due to the proportion of land required	Land required: Low 17.6ha; 9% of holding required for the Glazebrook embankment, Culcheth south embankment, M62 west viaduct, agricultural and PROW diversions. Severance: Low Access to the residual farmland will be possible via Risley east accommodation underbridge. Infrastructure effects: Negligible Overall permanent assessment: Minor adverse
MA05/2 Land west of Franks Farm* 13ha Arable holding Medium sensitivity to change	Land required: High 6.6ha; 51% of holding required for access to the M62, Junction 11 and mitigation areas. Severance: Negligible	Land required: High 4.2ha; 32% of holding required for access to the M62, Junction 11 and ecological mitigation. Severance: Negligible

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Holding reference, name, description and sensitivity to change	Temporary impacts and effects	Permanent impacts and effects
	Disruption: Negligible Overall temporary assessment: Major/moderate adverse due to the proportion of land required	Infrastructure effects: Negligible Overall permanent assessment: Major/moderate adverse due to the proportion of land required
MA05/3 Ratcliffe House Farm Owner occupied 50ha arable and beef cattle holding with equestrian activities Diversified activities include equestrian livery Medium sensitivity to change	Land required: High 10ha; >20% of holding required for construction of the Culcheth south embankment, agricultural and PROW diversions, and soil stores. 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: Medium 6.6ha; 13% of holding required for the Culcheth south embankment, and agricultural and PROW diversions. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Moderate adverse due to the proportion of land required
MA05/4 New Hall Farm Owner occupied 21ha arable and beef cattle holding Medium sensitivity to change	Land required: High 12ha; 57% of holding required for construction of the Culcheth south embankment, agricultural and PROW diversions, and soil stores. Severance: Negligible Disruption: Negligible Overall temporary assessment: Major/moderate adverse due to the proportion of land required	Land required: High 6.4ha; 31% of holding required for the Culcheth south embankment and agricultural and PROW diversions. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Major/moderate adverse due to the proportion of land required
MA05/5 Bates Farm Owner occupied 79ha arable, beef cattle and sheep holding Medium sensitivity to change	Land required: High 23.5ha; 30% of holding required for the construction of the Culcheth cutting, A574 Warrington Road realignment and soil stores. Severance: Medium Access to severed farmland available via public highway though access may be compromised during construction. Disruption: Negligible Overall temporary assessment: Major/moderate adverse due to the proportion of land required	Land required: High 19.1ha; 24% of holding required for the Culcheth cutting, the A574 Warrington Road realignment, ecological and landscape mitigation. Severance: Medium Access to severed farmland available via public highway. Infrastructure effects: Negligible Overall permanent assessment: Major/moderate adverse due to the proportion of land required and severance
MA05/6 New Hey Farm Owner occupied 130ha beef cattle holding Medium sensitivity to change	Land required: Negligible 3.8ha; 3% of holding required for the A574 Warrington Road realignment, A574 Warrington Road satellite compound and soil stores. Severance: High	Land required: Negligible 3.2ha; 2% of holding required for the A574 Warrington Road realignment. Severance: Negligible Infrastructure effects: Negligible

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	<p>Access to severed land may not be possible during the construction phase.</p> <p>Disruption: Negligible</p> <p>Overall temporary assessment: Major/moderate adverse due to severance</p>	<p>Overall permanent assessment: Negligible</p>
<p>MA05/7            Yew Tree Farm            Owner occupied            1ha grassland holding            Low sensitivity to change</p>	<p>Land required: Negligible            &lt;0.1ha; &lt;1% of holding required for utility diversions.</p> <p>Severance: Negligible</p> <p>Disruption: Negligible</p> <p>Overall temporary assessment: Negligible</p>	<p>Land required: Negligible</p> <p>No land permanently required.</p> <p>Severance: Negligible</p> <p>Infrastructure effects: Negligible</p> <p>Overall permanent assessment: Negligible</p>
<p>MA05/8            Glaziers Lane Farm            Agricultural land managed by others; residential properties let.            23ha arable holding            Medium sensitivity to change</p>	<p>Land required: High            10.9ha; 47% of holding required for construction of the Culcheth cutting, Glaziers Lane realignment, Culcheth Link Road and soil stores.</p> <p>Severance: Negligible</p> <p>Disruption: Negligible</p> <p>Overall temporary assessment: Major/moderate adverse due to the proportion of land required</p>	<p>Land required: High            9ha; 39% of holding required for the Culcheth cutting, Glaziers Lane realignment, Culcheth Link Road, ecological and landscape mitigation.</p> <p>Severance: Negligible</p> <p>Infrastructure effects: High</p> <p>Residential and agricultural buildings demolished.</p> <p>Overall permanent assessment: Major/moderate adverse due to the proportion of land required and property demolition</p>
<p>MA05/9            Phillips Farm            Owner occupied            27ha arable holding with large coarse fishing lakes and associated infrastructure            Retail outlets in converted agricultural buildings.            Medium sensitivity to change</p> <p>Fishing lakes – high sensitivity            Agricultural land – medium sensitivity</p>	<p>Land required: Medium            5.1ha; 19% of holding required for the Culcheth cutting, the Glaziers Lane realignment and the Wigshaw Lane realignment.</p> <p>Severance: Low</p> <p>New highway access provided.</p> <p>Disruption: Low</p> <p>Fishing lakes may need reorganisation as construction commences and dust and construction activities may reduce uptake during that period.</p> <p>Overall temporary assessment: Moderate adverse due to the proportion of land required</p>	<p>Land required: Medium            2.9ha; 11% of holding required for the Culcheth cutting, the Glaziers Lane realignment, the Wigshaw Lane realignment and ecological and landscape mitigation.</p> <p>Severance: Negligible</p> <p>New highway access provided.</p> <p>Infrastructure effects: High</p> <p>Residential and commercial properties demolished.</p> <p>Overall permanent assessment: Major/moderate adverse due to property demolitions</p>
<p>MA05/10            Blakeley Farm            Owner occupied</p>	<p>Land required: High            4.8ha; 32% of holding required for construction of the Culcheth north</p>	<p>Land required: High            4.1ha; 27% of holding required for the Culcheth north embankment,</p>

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15ha arable and grassland holding Low sensitivity to change	embankment, PROW diversions and soil stores. Severance: Negligible Disruption: Negligible Overall temporary assessment: Moderate adverse due to the proportion of land required	PROW diversions, and ecological and landscape mitigation. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Moderate adverse due to the proportion of land required.
MA05/11 Hill Top Farm Owner occupied 26ha equestrian livery Medium sensitivity to change	Land required: Low 2.3ha; 9% of holding required for construction of the Culcheth north embankment, PROW diversions and soil stores. Severance: Negligible Disruption: Low Riding and exercising horses close to construction activities may need to be limited. Overall temporary assessment: Minor adverse	Land required: Low 2.1ha; 8% of holding required for the Culcheth north embankment, PROW diversions, ecological and landscape mitigation. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Minor adverse
MA05/12 Broseley Hall Farm 57ha equestrian livery Medium sensitivity to change	Land required: Low 5.5ha; 10% of holding required for construction of the Culcheth north embankment and soil stores. Severance: Negligible Disruption: Low Riding and exercising horses close to construction activities may need to be limited. Overall temporary assessment: Minor adverse	Land required: Low 4.2ha; 7% of holding required for construction of the Culcheth north embankment and woodland habitat creation. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Minor adverse
MA05/13 Johnsons Farm Owner occupied 59ha organic dairy holding High sensitivity to change	Land required: Negligible 2.9ha; 5% of holding required for construction of the Culcheth north embankment and soil stores. Severance: Negligible Disruption: Negligible Overall temporary assessment: Minor adverse	Land required: Negligible 2.5ha; 4% of holding required for construction of the Culcheth north embankment, ecological and landscape mitigation. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Minor adverse
MA05/14 Clough Farm * Owner occupied 10ha equestrian livery Medium sensitivity to change	Land required: Negligible 0.5ha; 5% of holding required for construction of the Lowton cutting, B5027 Wilton Lane realignment, Liverpool to Manchester railway south satellite compound and soil stores. Severance: Negligible	Land required: Negligible 0.3ha; 3% of holding required for the Lowton cutting, B5027 Wilton Lane realignment, and ecological and landscape mitigation. Severance: Negligible Disruption: Negligible

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	<p>Disruption: Low</p> <p>Riding and exercising horses close to construction activities may need to be limited.</p> <p>Overall temporary assessment: Minor adverse</p>	<p>Overall temporary assessment: Negligible</p>
<p>MA05/15</p> <p>White's Farm</p> <p>Owner occupied</p> <p>15ha equestrian (commercial)</p> <p>Diversified activities include skip-hire business.</p> <p>Medium sensitivity to change</p>	<p>Land required: High</p> <p>7.1ha; 47% of holding required for construction of the Lowton cutting, B5027 Wilton Lane realignment, Liverpool to Manchester railway south satellite compound and soil stores.</p> <p>Severance: Negligible</p> <p>Disruption: Low</p> <p>Riding and exercising horses close to construction activities may need to be limited.</p> <p>Overall temporary assessment: Major/moderate adverse due to the proportion of land required</p>	<p>Land required: High</p> <p>4.6ha; 31% of holding required for construction of the Lowton cutting, B5027 Wilton Lane realignment, ecological and landscape mitigation.</p> <p>Severance: Negligible</p> <p>Infrastructure effects: High</p> <p>Residential and agricultural buildings demolished.</p> <p>Overall permanent assessment: Major/moderate adverse due to the proportion of land required and property demolition</p>
<p>MA05/16</p> <p>Carr Farm</p> <p>Tenanted farm let on annual agreements</p> <p>30ha arable holding</p> <p>Medium sensitivity to change</p>	<p>Land required: High</p> <p>12.6ha; 42% of holding required for construction of the Lowton cutting, A580 East Lancashire Road main compound and soil stores.</p> <p>Severance: Medium</p> <p>Land parcels will be severed but access will be possible from the public highway.</p> <p>Disruption: Negligible</p> <p>Overall temporary assessment: Major/moderate adverse due to the proportion of land required</p>	<p>Land required: High</p> <p>6.1ha; &gt;20% of holding required for the Lowton cutting.</p> <p>Severance: Medium</p> <p>Land parcels will be severed but access will be possible from the highway.</p> <p>Infrastructure effects: Negligible</p> <p>Overall permanent assessment: Major/moderate adverse due to the proportion of land required</p>
<p>MA05/17</p> <p>Birchalls Farm</p> <p>Owner occupied</p> <p>100ha arable and beef cattle holding</p> <p>Medium sensitivity to change</p>	<p>Land required: High</p> <p>22.8ha; 23% of holding required for construction of the Lowton cutting, B5027 Wilton Lane realignment, B5027 Wilton Lane satellite compound, A580 East Lancashire Road main and satellite compounds, and soil stores.</p> <p>Severance: Medium</p> <p>Land parcels will be severed but access will be possible from the public highway.</p> <p>Disruption: Negligible</p>	<p>Land required: Medium</p> <p>10.6ha; 11% of holding required for the Lowton cutting, B5027 Wilton Lane realignment, ecological and landscape mitigation.</p> <p>Severance: Medium</p> <p>Land parcels will be severed but access will be possible from the highway.</p> <p>Infrastructure effects: High</p> <p>Residential and agricultural buildings demolished.</p>

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	Overall temporary assessment: Major/moderate adverse due to the proportion of land required	Overall permanent assessment: Major/moderate adverse due to property demolition
MA05/18 Cheetham Fold Farm* 13ha equestrian livery and riding school Medium sensitivity to change	Land required: High 9ha; 69% of holding required for the construction of the Lowton cutting, Lowton south embankment and soil stores. Severance: Negligible Disruption: Medium 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 2.7ha; 21% of holding required for the Lowton cutting, Lowton south embankment, PROW diversions and replacement community facilities. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Major/moderate adverse due to the proportion of land required
MA05/19 Warren Croft Farm 4ha equestrian livery and riding school Medium sensitivity to change	Land required: Medium 0.6ha; 14% of holding required for the construction of the Lowton cutting, Lowton south embankment and soil stores. Severance: Negligible Disruption: Medium Riding and exercising horses, especially in covered riding school, which is close to construction activities, may need to be limited. Overall temporary assessment: Moderate adverse due to the proportion of land required and disruption	Land required: Medium 0.5ha; 13% of holding required for the Lowton cutting, Lowton south embankment, and landscape mitigation. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Moderate adverse due to the proportion of land required
MA05/20 Red House Farm Rented on a lifetime tenancy 13ha beef cattle holding Medium sensitivity to change	Land required: High 3.7ha; 28% of holding required for construction of the Pennington embankment and PROW diversions. Severance: High Land severed and no access available. Disruption: Negligible Overall temporary assessment: Major/moderate adverse due to the proportion of land required and severance	Land required: Medium 2.4ha; 18% of holding required for the Pennington embankment, PROW diversions and landscape mitigation. Severance: High Land severed and no access available. Infrastructure effects: Negligible Overall permanent assessment: Major/moderate adverse due to severance
MA05/21 Land at Slag Lane 4ha grassland holding Low sensitivity to change	Land required: Low 0.4ha; 9% of holding required for construction of the Lowton cutting,	Land required: Low 0.3ha; 7% of holding required for the Lowton cutting, Pennington



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	<p>Pennington embankment and PROW diversions.</p> <p>Severance: Negligible</p> <p>Disruption: Negligible</p> <p>Overall temporary assessment: Negligible</p>	<p>embankment, PROW diversions and landscape mitigation.</p> <p>Severance: Negligible</p> <p>Infrastructure effects: Negligible</p> <p>Overall permanent assessment: Negligible</p>
<p>MA05/22</p> <p>Bancroft Kennels</p> <p>Owner occupied</p> <p>2.1ha grassland holding with kennels and a cattery</p> <p>Low sensitivity to change</p>	<p>Land required: High</p> <p>2.1ha; 100% of holding required for construction of the Pennington embankment, Slag Lane realignment and PROW diversions.</p> <p>Severance: Negligible</p> <p>Disruption: Negligible</p> <p>Overall temporary assessment: Moderate adverse due to the proportion of land required</p>	<p>Land required: High</p> <p>2.0ha; 96% of holding required for the Pennington embankment, Slag Lane realignment, PROW diversions, ecological and landscape mitigation.</p> <p>Severance: Negligible</p> <p>Infrastructure effects: High</p> <p>Residential and kennel/cattery buildings demolished.</p> <p>Overall permanent assessment: Moderate adverse due to the proportion of land required and property demolition</p>
<p>MA05/23</p> <p>Laburnum Farm</p> <p>5ha grassland holding offering kennels and canine activity centre</p> <p>Low sensitivity to change</p>	<p>Land required: High</p> <p>1.7ha; 35% of holding required for construction of the Pennington embankment, Slag Lane realignment and PROW diversions.</p> <p>Severance: High</p> <p>Land severed and no access available.</p> <p>Disruption: Negligible</p> <p>Overall temporary assessment: Moderate adverse due to the proportion of land required and severance</p>	<p>Land required: High</p> <p>1.6ha; 32% of holding required for the Pennington embankment, Slag Lane realignment, PROW diversions and landscape mitigation.</p> <p>Severance: High</p> <p>Land severed and no access available.</p> <p>Infrastructure effects: High</p> <p>Residential and kennel buildings demolished.</p> <p>Overall permanent assessment: Moderate adverse due to the proportion of land required, severance and property demolition</p>
<p>MA05/24</p> <p>Lowton Riding Centre</p> <p>Owner occupied</p> <p>6ha equestrian (commercial)</p> <p>Medium sensitivity to change</p>	<p>Land required: Negligible</p> <p>0.1ha; 2% of holding required for construction of the Slag Lane realignment.</p> <p>Severance: Negligible</p> <p>Disruption: Medium</p> <p>Riding and exercising horses, especially in riding school, which is close to construction activities, may need to be limited.</p> <p>Overall temporary assessment: Moderate adverse due to disruption</p>	<p>Land required: Negligible</p> <p>0.1ha; &lt;1% of holding required for the Slag Lane realignment.</p> <p>Severance: Negligible</p> <p>Infrastructure effects: Negligible</p> <p>Overall permanent assessment: Negligible</p>
MA05/25	Land required: High	Land required: Medium

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72 Slag Lane Owner occupied 26ha Equestrian livery, horse breeding and sheep Phone mast as diversified activity. Medium sensitivity to change	10.8ha; 41% of holding required for construction of the Pennington embankment, Slag Lane realignment and utility diversions. Severance: Medium Land severed but access available via public highway. Disruption: Negligible Overall temporary assessment: Major/moderate adverse due to the proportion of land required	5.0ha; 19% of holding required for the Pennington embankment, Slag Lane realignment and landscape mitigation. Severance: Medium Land severed but access available via public highway. Infrastructure effects: Negligible Overall permanent assessment: Moderate adverse due to the proportion of land required and severance
MA05/26 Land north of 72 Slag Lane* 5ha grassland holding Low sensitivity to change	Land required: High 4ha; 80% of holding required for construction of the Pennington embankment, PROW and agricultural diversions, and landscape mitigation. Severance: Negligible Disruption: Negligible Overall temporary assessment: Moderate adverse due to the proportion of land required	Land required: High 4.0ha; 80% of holding required for the Pennington embankment, PROW and agricultural access diversions, and landscape mitigation. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Moderate adverse due to the proportion of land required
MA05/27 Byrom Hall* 5ha grassland holding Low sensitivity to change	Land required: High 1.8ha; 36% of holding required for the construction of the Slag Lane realignment and 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 required for the Slag Lane realignment. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Negligible
MA05/28 Forestry land at Golborne* 35ha forestry and open access land Low sensitivity to change	Land required: High 13.4ha; 38% of holding required for construction of the Pennington embankment, PROW and utility diversions. Severance: Low Access to the residual land will be possible via Golborne Footpath 33 accommodation underbridge. Disruption: Low Dust and construction activities may limit uptake of public access to land. Overall temporary assessment: Moderate adverse due to the proportion of land required	Land required: High 9.0ha; 26% of holding required for the Pennington embankment, PROW diversions and landscape mitigation. Severance: Low Access to the residual land will be possible via Golborne Footpath 33 accommodation underbridge. Infrastructure effects: Negligible Overall permanent assessment: Moderate adverse due to the proportion of land required

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 MA05: Risley to Bamfurlong  
 Agriculture, forestry and soils assessment

Holding reference, name, description and sensitivity to change	Temporary impacts and effects	Permanent impacts and effects
MA05/29 Windy Bank Farm Owner occupied 36ha arable and grassland holding Medium sensitivity to change	Land required: High 33.1ha; 92% of holding required for construction of the Pennington embankment, PROW diversions and ecology mitigation. Severance: Negligible Disruption: Negligible Overall temporary assessment: Major/moderate adverse due to the proportion of land required	Land required: High 30.8ha; 86% of holding required for the Pennington embankment, PROW diversions and ecology mitigation. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Major/moderate adverse due to the proportion of land required
MA05/30 Land at Lowton* 4ha grassland holding Low sensitivity to change	Land required: Medium 0.4ha; >10% of holding required for construction of the Pennington embankment and soil stores. Severance: Negligible Disruption: Negligible Overall temporary assessment: Minor adverse	Land required: Medium 0.4ha; >10% of holding required for the Pennington embankment, PROW diversions and ecology mitigation. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Minor adverse
MA05/31 Lightshaw Hall Owner occupied 23ha arable and grassland holding Medium sensitivity to change	Land required: Low 1.2ha; >5% of holding required for construction of the Pennington embankment and Lightshaw Lane realignment. Severance: Negligible Disruption: Negligible Overall temporary assessment: Minor adverse	Land required: Negligible 0.5ha; 2% of holding required for the Pennington embankment and Lightshaw Lane realignment. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Negligible
MA05/32 Wigan Road Farm Owner occupied 22ha arable and beef cattle holding Medium sensitivity to change	Land required: Medium 2.7ha; 12% of holding required for construction of the A573 Wigan Road realignment. Severance: Medium Land severed but access available via public highway. Disruption: Negligible Overall temporary assessment: Moderate adverse due to the proportion of land required and severance	Land required: Low 1.6ha; 7% of holding required for the A573 Wigan Road realignment. Severance: Medium Land severed but access available via public highway. Infrastructure effects: Negligible Overall permanent assessment: Moderate adverse due to severance
MA05/33 Sewerage Farm* 42ha arable and grassland holding Medium sensitivity to change	Land required: Medium 4.9ha; 12% of holding required for utility diversions. Severance: Negligible Disruption: Negligible	Land required: Negligible No land permanently required. Severance: Negligible Infrastructure effects: Negligible Overall permanent assessment: Negligible

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	Overall temporary assessment: Moderate adverse due to the proportion of land required	
MA05/34 Diggle Green Farm* 45ha arable and grassland holding Medium sensitivity to change	Land required: Negligible 0.2ha; <1% 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
MA05/35 Balmer's Farm* 32ha grassland holding Medium sensitivity to change	Land required: High 18.2ha; 57% of holding required for construction of the Pennington embankment, A573 Wigan Road realignment and utility diversions. Severance: Medium Land severed but accessible via realigned A573. Disruption: Negligible Overall temporary assessment: Major/moderate adverse due to the proportion of land required	Land required: High 9.8ha; 31% of holding required for the Pennington embankment, A573 Wigan Road realignment, landscape and ecology mitigation. Severance: Medium Land severed but accessible via realigned A573. Infrastructure effects: Negligible Overall permanent assessment: Major/moderate adverse due to the proportion of land required
MA05/36 Aye Bridge Farm Owner occupied 40ha grassland holding with beef cattle Medium sensitivity to change	Land required: High 18.4ha; 46% of holding required for construction of the Pennington embankment, Pennington viaduct, A573 Wigan Road realignment, utility diversions, soil stores and A573 Wigan Road satellite compound. Severance: Medium Land severed by the main alignment and the A573 realignment; access available on the public highway. 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 11.3ha; 28% of holding required for the Pennington embankment, Pennington viaduct, A573 Wigan Road realignment, landscape and ecology mitigation. Severance: Medium Land severed by the main alignment and the A573 realignment; access available on the public highway. Infrastructure effects: Negligible Overall permanent assessment: Major/moderate adverse due to the proportion of land required
MA05/37 Locker Lane Farm Owner occupied 57ha arable and grassland holding Medium sensitivity to change	Land required: Low 4.3ha; 8% of holding required for construction of the Abram embankment and soil stores. Severance: Low	Land required: Negligible 2.3ha; 4% of holding required for a balancing pond and landscape mitigation. Severance: Low

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	Land severed but access maintained via Footpath Ashton-in-Makerfield 22/30 accommodation underbridge Disruption: Negligible Overall temporary assessment: Minor adverse	Land severed but access maintained via Footpath Ashton-in-Makerfield 22/30 accommodation underbridge Infrastructure effects: Negligible Overall permanent assessment: Minor adverse
MA05/38 Bryn Hall Farm and Landgate Farm 1122 arable and grassland holding Diversified activities include green waste composting company and commercial shoot. Medium sensitivity to change	Land required: Negligible 0.2ha; <1% 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

*\* 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.*

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