



Patrick Stephenson Ltd
Agricultural Consultants

August 2025

Patrick Stephenson Ltd

Agricultural Land Classification and Soil Resources

Land east of Knowsley Lane, Knowsley, L34 0EB.

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Contents	Page No.
1.0 Introduction	3
2.0 Site and Climatic Conditions	4
3.0 Agricultural Land Quality	5
4.0 Conclusion	8
Appendix 1 – Site Location	9
Appendix 2 - Laboratory Data	10
Appendix 3 – Soil Profile Summaries	22
Appendix 4 – Sampling Points	29
Appendix 5 – Detailed ALC Map	30
Appendix 6 – Pit Descriptions and Photographs	31
Appendix 7 – Agricultural Land Classification	38

1.0 Introduction

- 1.1 Patrick Stephenson Ltd (RAC) is instructed by Hallam Land to investigate the Agricultural Land Classification (ALC) and soil resources of land south of Knowsley village and east of the B1594 ('the Site'). The envelope covers approximately 33.75 hectares for development of which 20.63ha will be built on 10.30 green infrastructure and 3 ha of retained woodland and the land is at Grid Reference SJ 4372 9475.
- 1.2 Guidance for assessing the quality of agricultural land in England and Wales is set out in the Ministry of Agriculture, Fisheries and Food (MAFF) revised guidelines and criteria for grading the quality of agricultural land¹, summarised in Natural England's Technical Information Note (TIN) 049² and "Specifications for Topsoil" British Standards Institute 2007³.
- 1.3 Agricultural land in England and Wales is graded between 1 and 5, depending on the extent to which physical or chemical characteristics impose long-term limitations on agricultural use. The principal physical factors influencing grading are climate, site and soil which, together with interactions between them, form the basis for classifying land into one of the five grades.
- 1.4 Grade 1 land is excellent quality agricultural land with very minor or no limitations to agricultural use. Grade 2 is very good quality agricultural land, with minor limitations which affect crop yield, cultivations or harvesting. Grade 3 land has moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield, and is subdivided into Subgrade 3a (good quality land) and Subgrade 3b (moderate quality land). Grade 4 land is poor quality agricultural land with severe limitations which significantly restrict the range of crops and/or level of yields. Grade 5 is very poor-quality land, with very severe limitations which restrict use to permanent pasture or rough grazing.
- 1.5 Land, which is classified as Grades 1, 2 and 3a in the ALC system is defined as 'best and most versatile' (BMV) agricultural land.
- 1.6 As explained in Natural England's TIN049, the whole of England and Wales was mapped from reconnaissance field surveys in the late 1960s and early 1970s, to provide general strategic guidance on agricultural land quality for planners.

¹ MAFF (1988) - Agricultural Land Classification of England and Wales. Revised guidelines and criteria for grading the quality of agricultural land. MAFF Publications (Appendix 7)

² Natural England (2012) - Technical Information Note 049 - Agricultural Land Classification: protecting the best and most versatile agricultural land, Second Edition

³ "Specifications for Topsoil" British Standards Institute 2007 ³.

This Provisional Series of maps was published on an Ordnance Survey base at a scale of One Inch to One Mile (1:63,360).

The Provisional ALC map shows the site as Grade 3. However, TIN049 explains that:

"These maps are not sufficiently accurate for use in assessment of individual fields or development sites, and should not be used other than as general guidance. They show only five grades: their preparation preceded the subdivision of Grade 3 and the refinement of criteria, which occurred after 1976. They have not been updated and are out of print. A 1:250 000 scale map series based on the same information is available. These are more appropriate for the strategic use originally intended ..."

1.7 TIN049 goes on to explain that a definitive ALC grading should be obtained by undertaking a detailed survey according to the published guidelines, at an observation density of one boring per hectare. This survey follows the detailed methodology set out in the ALC guidelines.

2.0 Site and Climatic Conditions

2.1 The Site is located immediately to the south of Knowsley village and is bounded to the west by the B1594 and to the east by the Ash Plantation, Ordnance Survey (OS) SJ4372 9475. The proposed development area covers approximately 33.75 ha. Appendix 1 shows the proposed development land location. The land to the south is flat (0-3°)

Agro-climatic conditions

2.2 Agro-climatic data for the site have been interpolated from the Meteorological Office's standard 5km grid point data set, at a representative altitude of 65m AOD, and are given in Table 1. The site is dry and moderately warm. Moisture deficits are very large, and the number of Field Capacity Days is high (average for lowland England is 150) so there are limited opportunities for agricultural field work. There is overriding climatic limitation to agricultural land quality with the limit being Grade 2. The Metropolitan Weather Office data for the Knowsley area is shown below.

Table 1. Climatological Data

Altitude	65 m
Accumulated temperature January-June C°	1381
Average Annual Rainfall	950 mm
Field Capacity Days	220

Moisture Deficit Winter Wheat	77
Moisture Deficit Potato	61

Soil Parent Material and Soil Type

2.3 The parent material is described as Reddish Till. The soil in the area, described by the LANDIS 2km grid, as 711m SALOP Slowly permeable seasonally waterlogged reddish fine loamy over clayey, fine loamy and clayey soil. Soil quality is described as moderate and the typical land use is 'Dairying on short term and permanent grassland, some cereals in drier districts'

3.Agricultural land quality

Soil survey methods

29 soil profiles (Appendix 4) were examined using narrow-gauge augers at an observation density of approximately one per hectare, in accordance with the established recommendations for ALC surveys². 3 soil pits were excavated to 70cm depth to examine soil structure. At each observation point the following characteristics were assessed for each soil horizon up to a maximum of 100cm or any impenetrable layer:

- soil texture.
- significant stoniness.
- colour (including localised mottling).
- Consistency.
- Structural condition.
- free carbonate.
- and depth.

⁴ British Geological Survey (2023). BGS Geology Viewer, <https://www.bgs.ac.uk/map-viewers/bgs-geology-viewer>

⁵ Soil Survey of England and Wales (1984). Soils of Eastern England (1:250,000), Sheet 4, Bulletin 13.

3.2 Three pits were dug to confirm soil physical and chemical properties with samples taken from each topsoil and subsoil respectively and submitted for laboratory determination of particle size distribution, pH, organic matter content and nutrient contents (P, K, Mg). Results are in Appendix 2.

3.3 Soil Wetness Class (WC) is determined from the matrix colour, presence or absence of, and depth to, greyish and ochreous gley mottling, and slowly permeable subsoil layers at least 15cm thick, in relation to the number of Field Capacity Days at the location.

3.4 Soil droughtiness is investigated by the calculation of moisture balance equations (given in Appendix 2). Crop-adjusted Available Profile Water (AP) is estimated from texture, stoniness and depth, and then compared to a calculated moisture deficit (MD) for the standard crops wheat and potatoes. The MD is a function of potential evapotranspiration and rainfall. Grading of the land can be affected if the AP is insufficient to balance the MD and droughtiness occurs.

Soil types

3.5 Soil profiles have been described according to Hodgson⁵, which is the recognised source for describing soil profiles and characteristics according to the revised ALC guidelines. Appendices 3 and 6 have the detailed point descriptions

3.6 The topsoil's are broadly divided into three types of sandy loams, sandy silty loams and sandy clay loams. The better grade soils (3a) had either slightly deeper topsoil (0-35cm) or had a sub layer of sandy clay loam in the upper profile over silty clay loam.

3.7 Limitations to higher grades were field capacity days coupled with the topsoil depth and the occurrence of gleying.

3.8 The soils are moderate to high in phosphorus, moderate in potassium and low in available magnesium (see Appendix 2). Soil organic matter levels to 25cm depth are above average for arable soils in the pit A but below average for Pit B and C. Typical soils are;-

Sandy silty loam over sandy clay loam

0-25 cm	5 YR Value 5 Chroma 10 in the Munsell soil colour charts light Dark reddish brown slightly stony sandy to silty clay loam. Indistinct boundary good pore space and root presence. Coal pieces present. Sub angular blocky structures. No calcareous presence sandy loam, silty clay with no stone by volume. Top 30 cm is loose, Coarse granular. Very friable, distinct boundary to subsoil. No calcareous material
25-70 cm	5YR Value 6 Chroma 12 Indistinct boundary. Small stones. Reddish brown slightly stony with massive prismatic structure gleying past 40 cm.

Sandy clay loam over clay loam

0-25 cm	5 YR Value 3 Chroma 16 in the Munsell soil colour charts Sandy Clay Loam to silty clay loam, Indistinct boundary good pore space and root presence. Coal and chalk pieces present.
25-70 cm	5YR Value 5 Chroma 16 Dark reddish brown clay loam, medium stones chalk pieces throughout. Coarse prismatic structure mottled and gleyed at 300.

Agricultural land classification and site limitations

3.9 Assessment of agricultural land quality has been carried out according to the revised ALC guidelines¹.

3.10 The profiles are a mix of wetness, class III, and IV. Gleying and soil depth is the main difference within the soil groups.

3.11 The ALC distribution of the site is shown in Appendix 5 and in Table 2 below.

Table 2 - Summary of ALC Grades

Grade/Subgrade	Approximate Area Ha	Area %
3a	1.5	4.5
3b	29.2	86.6
Non Agricultural	3.0	8.9
Total	31.0	100

4.0 CONCLUSION

The area surveyed showed that there were isolated pockets of Grade 3a however the majority of the site was Grade 3b and would not be classified as the 'best and most versatile'. Detailed ALC work carried out in the vicinity (Canrow Farm and Croxteth Brook) would confirm that much of the land in the vicinity would be classified as either grade 2, or 3a. The proposed development would, in agricultural terms not be important on a local regional, or national basis.

Appendix1 -Site Location



Appendix 2 – Laboratory Results
Pit A Topsoil

Analysis Results (SOIL)

Customer	ARABLE ADVISOR 74 MIDDLETON RD PICKERING	Distributor	MR P STEPHENSON SWAINSEA HOUSE 74 MIDDLETON ROAD PICKERING NORTH YORKSHIRE YO18 8NH
Sample Ref	KNOWSLEY A TOP	Date Received	15/05/2025 (Date Issued: 27/05/2025)
Sample No	G168252/01 / KNOWLSEY		
Crop	GRAZED GRASS (CATTLE)		

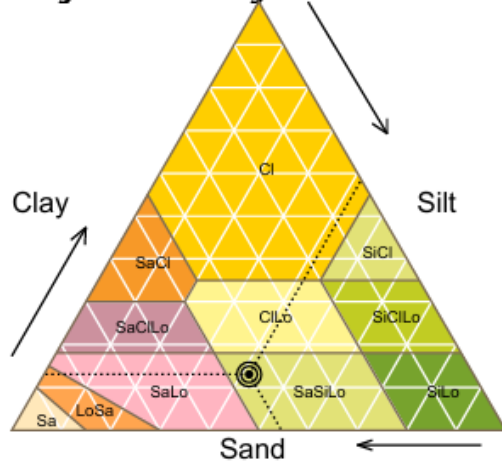
Analysis	Result	Guideline	Interpretation	Comments
pH	6.3	6.0	Normal	Adequate level. Maintain pH to ensure optimum nutrient availability and ideal conditions for an active soil biology.
Phosphorus (ppm)	22	16	Normal	(Index 2) 20 kg/ha P2O5 (16 units/acre).
Potassium (ppm)	64	121	Low	(Index 1) 30 kg/ha K2O (24 units/acre). Avoid applications in spring if there is a history of Hypomagnesaemia.
Magnesium (ppm)	135	51	High	(Index 3) Adequate level.
Calcium (ppm)	1672	2000	Slightly Low	Below optimum level. If pH low, and Mg adequate, consider using calcium liming material.
Sulphur (ppm)	5	10	Low	Consider treatment for optimum grass growth.
Boron (ppm)	0.99	0.50	Normal	Adequate level.
Copper (ppm)	16.5	8.0	Normal	Adequate level.
Iron (ppm)	1090	50	Normal	Adequate level.
Manganese (ppm)	12	35	Very Low	Consider treatment for optimum grass growth.
Molybdenum (ppm)	0.08	<0.5	Normal	No problems anticipated.
Sodium (ppm)	22	90	Very Low	PRIORITY FOR LIVESTOCK HEALTH.
Zinc (ppm)	3.6	7.0	Low	PRIORITY FOR LIVESTOCK HEALTH.
C.E.C. (meq/100g)	12.0	15.0	Slightly Low	Cation Exchange Capacity indicates a slightly low nutrient holding ability - soil applied nutrients could be readily leached. Where possible foliar applied nutrients should be recommended.
Organic Matter (LOI) (%)	4.3	3.0	Normal	Good. Soils with medium to high levels of organic matter would generally be expected to have a good potential fertility and good structure, moisture retention and water infiltration. Ensure appropriate soil management practices are used to maintain organic matter levels.
Organic Carbon (LOI) (%)	2.5	1.7	Normal	Normal (See Organic Matter comment). Organic carbon is the measurable component of organic matter. Organic carbon and organic matter can be broken into distinct 'pools'. These pools include labile/active (particulate, almost entirely decomposed, readily available microbe foodsource), humus carbon (decomposing carbon) and recalcitrant organic carbon (resistant to decomposition). Each of these pools are involved in different soil processes (see: Active Carbon).

Analysis Results (SOIL)

Customer ARABLE ADVISOR
Sample Ref KNOWSLEY A TOP
Sample No G168252/01 / KNOWLSEY
Crop GRAZED GRASS (CATTLE)

Distributor MR P STEPHENSON
Date Received 15/05/2025 (Date Issued: 27/05/2025)

Physical Analysis



Analysis	Result (%)
Sand	45.42
Silt	41.54
Clay	13.04
Soil Type	SaSiLo Sandy Silt Loam

Property	Assessment
Available Water	Low to Medium
Drainage Rate	Rapid
Inherent Fertility	Low to Medium
Potential C.E.C.	Low to Medium
Leaching Risk	High to Moderate
Warming Rate	Rapid

Biological Analysis



Analysis	Result	Ideal
Solvita Burst CO ₂ -C (ppm)	N/A	>70
Organic Carbon (%)	N/A	
Total Nitrogen (%)	N/A	
C:N Ratio	N/A	10-12
Calculated Parameters		Result
Microbial Biomass (mg/kg)	N/A	
Solvita Potentially Mineralizable Nitrogen (kg N/ha)	N/A	
Soil Assessment Score	N/A/100	

Pit A Sub Soil

Analysis Results (SOIL)

Customer ARABLE ADVISOR
74 MIDDLETON RD
PICKERING

Distributor MR P STEPHENSON
SWAINSEA HOUSE
74 MIDDLETON ROAD
PICKERING
NORTH YORKSHIRE
YO18 8NH

Sample Ref KNOWSLEY A SUB

Date Received 15/05/2025 (Date Issued: 27/05/2025)

Sample No G168252/02 / KNOWLSEY

Crop GRAZED GRASS (CATTLE)

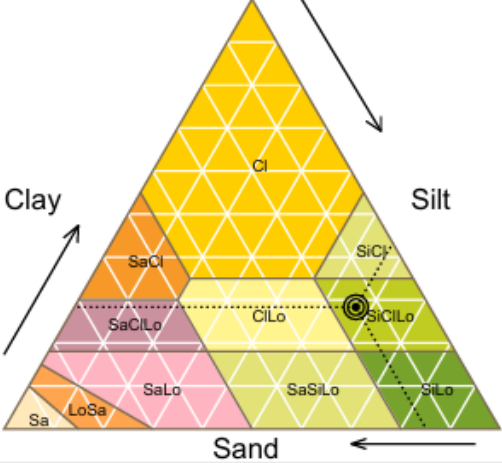
Analysis	Result	Guideline	Interpretation	Comments
pH	6.3	6.0	Normal	Adequate level. Maintain pH to ensure optimum nutrient availability and ideal conditions for an active soil biology.
Phosphorus (ppm)	15	16	Low	(Index 1) 50 kg/ha P2O5 (40 units/acre).
Potassium (ppm)	31	121	Very Low	(Index 0) 60 kg/ha K2O (48 units/acre). Avoid applications in spring if there is a history of Hypomagnesaemia.
Magnesium (ppm)	97	51	Normal	(Index 2) PRIORITY FOR LIVESTOCK HEALTH. Apply 25 kg/ha MgO (20 units/acre) every three to four years. Further applications may be required if there is a history of hypomagnesaemia.
Calcium (ppm)	1229	2000	Low	Below optimum level. If pH low, and Mg adequate, consider using calcium liming material.
Sulphur (ppm)	5	10	Low	Consider treatment for optimum grass growth.
Boron (ppm)	0.76	0.50	Normal	Adequate level.
Copper (ppm)	6.8	8.0	Slightly Low	PRIORITY FOR LIVESTOCK HEALTH.
Iron (ppm)	774	50	Normal	Adequate level.
Manganese (ppm)	4	35	Very Low	Consider treatment for optimum grass growth.
Molybdenum (ppm)	0.04	<0.5	Normal	No problems anticipated.
Sodium (ppm)	12	90	Very Low	PRIORITY FOR LIVESTOCK HEALTH.
Zinc (ppm)	1.4	7.0	Very Low	PRIORITY FOR LIVESTOCK HEALTH.
C.E.C. (meq/100g)	8.2	15.0	Low	Cation Exchange Capacity indicates a low nutrient holding ability - soil applied nutrients will be readily leached. Where possible foliar applied nutrients should be recommended.
Organic Matter (LOI) (%)	1.8	3.0	Low	Low. Soils with medium to high levels of organic matter would generally be expected to have a good potential fertility and good structure, moisture retention and water infiltration. Investigate soil conditions to establish if soil management practices can improve levels of organic matter.
Organic Carbon (LOI) (%)	1.1	1.7	Low	Low (See organic matter comment). Organic carbon is the measurable component of organic matter. Organic carbon and organic matter can be broken into distinct 'pools'. These pools include labile/active (particulate, almost entirely decomposed, readily available microbe foodsource), humus carbon (decomposing carbon) and recalcitrant organic carbon (resistant to decomposition). Each of these pools are involved in different soil processes (see: Active Carbon).

Analysis Results (SOIL)

Customer ARABLE ADVISOR
Sample Ref KNOWSLEY A SUB
Sample No G168252/02 / KNOWLSEY
Crop GRAZED GRASS (CATTLE)

Distributor MR P STEPHENSON
Date Received 15/05/2025 (Date Issued: 27/05/2025)

Physical Analysis



Analysis	Result (%)
Sand	14.89
Silt	56.77
Clay	28.34
Soil Type	SiClLo Silty Clay Loam

Property	Assessment
Available Water	High to Medium
Drainage Rate	Medium
Inherent Fertility	Medium
Potential C.E.C.	Medium
Leaching Risk	Moderate
Warming Rate	Rapid to Medium

Biological Analysis



Analysis	Result	Ideal
Solvita Burst CO2-C (ppm)	N/A	>70
Organic Carbon (%)	N/A	
Total Nitrogen (%)	N/A	
C:N Ratio	N/A	10-12
Calculated Parameters		Result
Microbial Biomass (mg/kg)	N/A	
Solvita Potentially Mineralizable Nitrogen (kg N/ha)	N/A	
Soil Assessment Score	N/A/100	

Pit B Topsoil

Analysis Results (SOIL)

Customer ARABLE ADVISOR
74 MIDDLETON RD
PICKERING

Distributor MR P STEPHENSON
SWAINSEA HOUSE
74 MIDDLETON ROAD
PICKERING
NORTH YORKSHIRE
YO18 8NH

Sample Ref KNOWSLEY B TOP

Date Received 15/05/2025 (Date Issued: 27/05/2025)

Sample No G168252/03 / KNOWLSEY

Crop GRAZED GRASS (CATTLE)

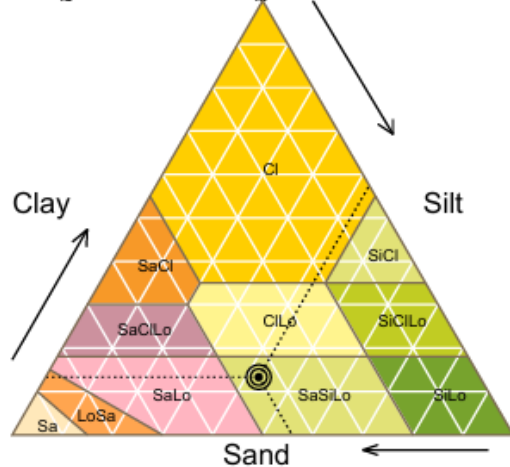
Analysis	Result	Guideline	Interpretation	Comments
pH	6.4	6.0	Normal	Adequate level. Maintain pH to ensure optimum nutrient availability and ideal conditions for an active soil biology.
Phosphorus (ppm)	22	16	Normal	(Index 2) 20 kg/ha P ₂ O ₅ (16 units/acre).
Potassium (ppm)	100	121	Low	(Index 1) 30 kg/ha K ₂ O (24 units/acre). Avoid applications in spring if there is a history of Hypomagnesaemia.
Magnesium (ppm)	74	51	Normal	(Index 2) PRIORITY FOR LIVESTOCK HEALTH. Apply 25 kg/ha MgO (20 units/acre) every three to four years. Further applications may be required if there is a history of hypomagnesaemia.
Calcium (ppm)	1393	2000	Low	Below optimum level. If pH low, and Mg adequate, consider using calcium liming material.
Sulphur (ppm)	3	10	Very Low	Consider treatment for optimum grass growth.
Boron (ppm)	0.81	0.50	Normal	Adequate level.
Copper (ppm)	16.7	8.0	Normal	Adequate level.
Iron (ppm)	1139	50	Normal	Adequate level.
Manganese (ppm)	27	40	Low	Consider treatment for optimum grass growth.
Molybdenum (ppm)	0.05	<0.5	Normal	No problems anticipated.
Sodium (ppm)	20	90	Very Low	PRIORITY FOR LIVESTOCK HEALTH.
Zinc (ppm)	4.2	7.0	Low	PRIORITY FOR LIVESTOCK HEALTH.
C.E.C. (meq/100g)	9.0	15.0	Low	Cation Exchange Capacity indicates a low nutrient holding ability - soil applied nutrients will be readily leached. Where possible foliar applied nutrients should be recommended.
Organic Matter (LOI) (%)	2.3	3.0	Slightly Low	Slightly low. Soils with medium to high levels of organic matter would generally be expected to have a good potential fertility and good structure, moisture retention and water infiltration. Investigate soil conditions to establish if soil management practices can improve levels of organic matter.
Organic Carbon (LOI) (%)	1.4	1.7	Slightly Low	Slightly Low (See Organic Matter comment). Organic carbon is the measurable component of organic matter. Organic carbon and organic matter can be broken into distinct 'pools'. These pools include labile/active (particulate, almost entirely decomposed, readily available microbe foodsource), humus carbon (decomposing carbon) and recalcitrant organic carbon (resistant to decomposition). Each of these pools are involved in different soil processes (see: Active Carbon).

Analysis Results (SOIL)

Customer ARABLE ADVISOR
Sample Ref KNOWSLEY B TOP
Sample No G168252/03 / KNOWLSEY
Crop GRAZED GRASS (CATTLE)

Distributor MR P STEPHENSON
Date Received 15/05/2025 (Date Issued: 27/05/2025)

Physical Analysis



Analysis	Result (%)
Sand	44.14
Silt	42.55
Clay	13.31
Soil Type	SaSiLo Sandy Silt Loam

Property	Assessment
Available Water	Low to Medium
Drainage Rate	Rapid
Inherent Fertility	Low to Medium
Potential C.E.C.	Low to Medium
Leaching Risk	High to Moderate
Warming Rate	Rapid

Biological Analysis



Analysis	Result	Ideal
Solvita Burst CO ₂ -C (ppm)	N/A	>70
Organic Carbon (%)	N/A	
Total Nitrogen (%)	N/A	
C:N Ratio	N/A	10-12
Calculated Parameters	Result	
Microbial Biomass (mg/kg)	N/A	
Solvita Potentially Mineralizable Nitrogen (kg N/ha)	N/A	
Soil Assessment Score	N/A/100	

Pit B Sub Soil

Analysis Results (SOIL)

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Sample Ref KNOWSLEY B SUB

Date Received 15/05/2025 (Date Issued: 27/05/2025)

Sample No G168252/04 / KNOWLSEY

Crop GRAZED GRASS (CATTLE)

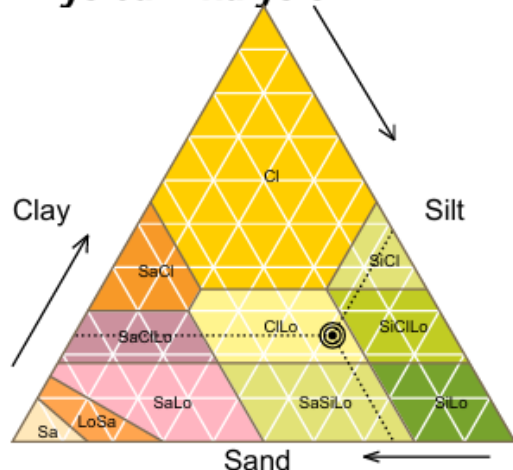
Analysis	Result	Guideline	Interpretation	Comments
pH	6.4	6.0	Normal	Adequate level. Maintain pH to ensure optimum nutrient availability and ideal conditions for an active soil biology.
Phosphorus (ppm)	31	16	High	(Index 3) Adequate level.
Potassium (ppm)	63	121	Low	(Index 1) 30 kg/ha K ₂ O (24 units/acre). Avoid applications in spring if there is a history of Hypomagnesaemia.
Magnesium (ppm)	62	51	Normal	(Index 2) PRIORITY FOR LIVESTOCK HEALTH. Apply 25 kg/ha MgO (20 units/acre) every three to four years. Further applications may be required if there is a history of hypomagnesaemia.
Calcium (ppm)	1123	2000	Low	Below optimum level. If pH low, and Mg adequate, consider using calcium liming material.
Sulphur (ppm)	5	10	Low	Consider treatment for optimum grass growth.
Boron (ppm)	0.72	0.50	Normal	Adequate level.
Copper (ppm)	10.4	8.0	Normal	Adequate level.
Iron (ppm)	550	50	Normal	Adequate level.
Manganese (ppm)	23	40	Low	Consider treatment for optimum grass growth.
Molybdenum (ppm)	0.04	<0.5	Normal	No problems anticipated.
Sodium (ppm)	18	90	Very Low	PRIORITY FOR LIVESTOCK HEALTH.
Zinc (ppm)	2.2	7.0	Very Low	PRIORITY FOR LIVESTOCK HEALTH.
C.E.C. (meq/100g)	6.3	15.0	Low	Cation Exchange Capacity indicates a low nutrient holding ability - soil applied nutrients will be readily leached. Where possible foliar applied nutrients should be recommended.
Organic Matter (LOI) (%)	1.7	3.0	Low	Low. Soils with medium to high levels of organic matter would generally be expected to have a good potential fertility and good structure, moisture retention and water infiltration. Investigate soil conditions to establish if soil management practices can improve levels of organic matter.
Organic Carbon (LOI) (%)	1.0	1.7	Low	Low (See organic matter comment). Organic carbon is the measurable component of organic matter. Organic carbon and organic matter can be broken into distinct 'pools'. These pools include labile/active (particulate, almost entirely decomposed, readily available microbe foodsource), humus carbon (decomposing carbon) and recalcitrant organic carbon (resistant to decomposition). Each of these pools are involved in different soil processes (see: Active Carbon).

Analysis Results (SOIL)

Customer ARABLE ADVISOR
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Sample No G168252/04 / KNOWLSEY
Crop GRAZED GRASS (CATTLE)

Distributor MR P STEPHENSON
Date Received 15/05/2025 (Date Issued: 27/05/2025)

Physical Analysis



Analysis	Result (%)
Sand	24.09
Silt	51.52
Clay	24.39
Soil Type	ClLo Clay Loam

Property	Assessment
Available Water	Medium to High
Drainage Rate	Medium to Slow
Inherent Fertility	Medium to High
Potential C.E.C.	Medium to High
Leaching Risk	Moderate to Low
Warming Rate	Medium

Biological Analysis



Analysis	Result	Ideal
Solvita Burst CO ₂ -C (ppm)	N/A	>70
Organic Carbon (%)	N/A	
Total Nitrogen (%)	N/A	
C:N Ratio	N/A	10-12
Calculated Parameters	Result	
Microbial Biomass (mg/kg)	N/A	
Solvita Potentially Mineralizable Nitrogen (kg N/ha)	N/A	
Soil Assessment Score	N/A/100	

Pit C Topsoil

Analysis Results (SOIL)

Customer ARABLE ADVISOR
74 MIDDLETON RD
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Sample No G168252/05 / KNOWLSEY

Crop GRAZED GRASS (CATTLE)

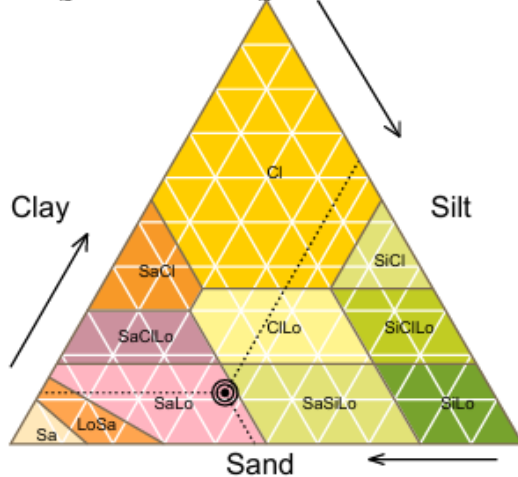
Analysis	Result	Guideline	Interpretation	Comments
pH	5.5	6.0	Slightly Low	Slightly low. An acidic environment will reduce soil nutrient availability and the efficiency of any applied fertilisers or organic materials. A sub optimum pH will also impact on soil microbial populations and rates of activity. Refer to lime requirement.
Lime Req. (t/ha)	4.0			
Phosphorus (ppm)	18	16	Normal	(Index 2) 20 kg/ha P2O5 (16 units/acre).
Potassium (ppm)	169	121	Normal	(Index 2) Adequate level for grazing system.
Magnesium (ppm)	71	51	Normal	(Index 2) PRIORITY FOR LIVESTOCK HEALTH. Apply 25 kg/ha MgO (20 units/acre) every three to four years. Further applications may be required if there is a history of hypomagnesaemia.
Calcium (ppm)	1130	2000	Low	Below optimum level. If pH low, and Mg adequate, consider using calcium liming material.
Sulphur (ppm)	2	10	Very Low	Consider treatment for optimum grass growth.
Boron (ppm)	0.65	0.50	Normal	Adequate level.
Copper (ppm)	21.3	8.0	Normal	Adequate level.
Iron (ppm)	1051	50	Normal	Adequate level.
Manganese (ppm)	38	5	Normal	Adequate level.
Molybdenum (ppm)	0.04	<0.5	Normal	No problems anticipated.
Sodium (ppm)	19	90	Very Low	PRIORITY FOR LIVESTOCK HEALTH.
Zinc (ppm)	6.5	7.0	Slightly Low	PRIORITY FOR LIVESTOCK HEALTH.
C.E.C. (meq/100g)	10.3	15.0	Slightly Low	Cation Exchange Capacity indicates a slightly low nutrient holding ability - soil applied nutrients could be readily leached. Where possible foliar applied nutrients should be recommended.
Organic Matter (LOI) (%)	2.8	3.0	Slightly Low	Slightly low. Soils with medium to high levels of organic matter would generally be expected to have a good potential fertility and good structure, moisture retention and water infiltration. Investigate soil conditions to establish if soil management practices can improve levels of organic matter.

Analysis Results (SOIL)

Customer ARABLE ADVISOR
Sample Ref KNOWSLEY C TOP
Sample No G168252/05 / KNOWLSEY
Crop GRAZED GRASS (CATTLE)

Distributor MR P STEPHENSON
Date Received 15/05/2025 (Date Issued: 27/05/2025)

Physical Analysis



Analysis	Result (%)
Sand	52.34
Silt	36.13
Clay	11.53
Soil Type	SaLo Sandy Loam

Property	Assessment
Available Water	Low to Medium
Drainage Rate	Rapid
Inherent Fertility	Low to Medium
Potential C.E.C.	Low to Medium
Leaching Risk	High to Moderate
Warming Rate	Rapid

Biological Analysis



Analysis	Result	Ideal
Solvita Burst CO2-C (ppm)	N/A	>70
Organic Carbon (%)	N/A	
Total Nitrogen (%)	N/A	
C:N Ratio	N/A	10-12
Calculated Parameters	Result	
Microbial Biomass (mg/kg)	N/A	
Solvita Potentially Mineralizable Nitrogen (kg N/ha)	N/A	
Soil Assessment Score	N/A/100	

Pit C Sub soil

Analysis Results (SOIL)

Customer ARABLE ADVISOR
74 MIDDLETON RD
PICKERING

Distributor MR P STEPHENSON
SWAINSEA HOUSE
74 MIDDLETON ROAD
PICKERING
NORTH YORKSHIRE
YO18 8NH

Sample Ref KNOWSLEY C SUB

Date Received 15/05/2025 (Date Issued: 27/05/2025)

Sample No G168252/06 / KNOWLSEY

Crop GRAZED GRASS (CATTLE)

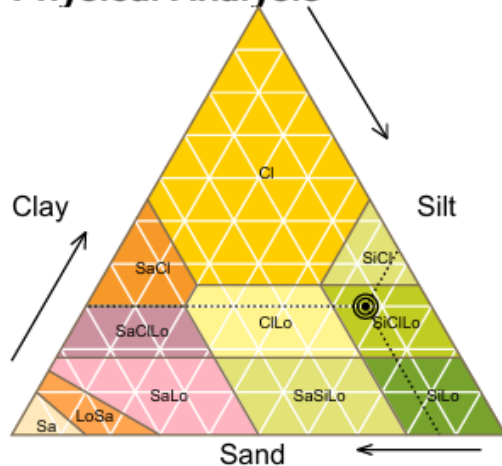
Analysis	Result	Guideline	Interpretation	Comments
pH	6.0	6.0	Normal	Adequate level. Maintain pH to ensure optimum nutrient availability and ideal conditions for an active soil biology.
Phosphorus (ppm)	11	16	Low	(Index 1) 50 kg/ha P2O5 (40 units/acre).
Potassium (ppm)	80	121	Low	(Index 1) 30 kg/ha K2O (24 units/acre). Avoid applications in spring if there is a history of Hypomagnesaemia.
Magnesium (ppm)	81	51	Normal	(Index 2) PRIORITY FOR LIVESTOCK HEALTH. Apply 25 kg/ha MgO (20 units/acre) every three to four years. Further applications may be required if there is a history of hypomagnesaemia.
Calcium (ppm)	1201	2000	Low	Below optimum level. If pH low, and Mg adequate, consider using calcium liming material.
Sulphur (ppm)	4	10	Very Low	Consider treatment for optimum grass growth.
Boron (ppm)	0.75	0.50	Normal	Adequate level.
Copper (ppm)	14.5	8.0	Normal	Adequate level.
Iron (ppm)	668	50	Normal	Adequate level.
Manganese (ppm)	50	20	Normal	Adequate level.
Molybdenum (ppm)	0.06	<0.5	Normal	No problems anticipated.
Sodium (ppm)	22	90	Very Low	PRIORITY FOR LIVESTOCK HEALTH.
Zinc (ppm)	8.3	7.0	Normal	Adequate level.
C.E.C. (meq/100g)	9.3	15.0	Low	Cation Exchange Capacity indicates a low nutrient holding ability - soil applied nutrients will be readily leached. Where possible foliar applied nutrients should be recommended.
Organic Matter (LOI) (%)	2.4	3.0	Slightly Low	Slightly low. Soils with medium to high levels of organic matter would generally be expected to have a good potential fertility and good structure, moisture retention and water infiltration. Investigate soil conditions to establish if soil management practices can improve levels of organic matter.
Organic Carbon (LOI) (%)	1.4	1.7	Slightly Low	Slightly Low (See Organic Matter comment). Organic carbon is the measurable component of organic matter. Organic carbon and organic matter can be broken into distinct 'pools'. These pools include labile/active (particulate, almost entirely decomposed, readily available microbe foodsource), humus carbon (decomposing carbon) and recalcitrant organic carbon (resistant to decomposition). Each of these pools are involved in different soil processes (see: Active Carbon).

Analysis Results (SOIL)

Customer ARABLE ADVISOR
Sample Ref KNOWSLEY C SUB
Sample No G168252/06 / KNOWLSEY
Crop GRAZED GRASS (CATTLE)

Distributor MR P STEPHENSON
Date Received 15/05/2025 (Date Issued: 27/05/2025)

Physical Analysis



Analysis	Result (%)
Sand	13.33
Silt	56.67
Clay	30.00
Soil Type	SiClLo Silty Clay Loam

Property	Assessment
Available Water	High to Medium
Drainage Rate	Medium
Inherent Fertility	Medium
Potential C.E.C.	Medium
Leaching Risk	Moderate
Warming Rate	Rapid to Medium

Biological Analysis



Analysis	Result	Ideal
Solvita Burst CO ₂ -C (ppm)	N/A	>70
Organic Carbon (%)	N/A	
Total Nitrogen (%)	N/A	
C:N Ratio	N/A	10-12
Calculated Parameters		Result
Microbial Biomass (mg/kg)	N/A	
Solvita Potentially Mineralizable Nitrogen (kg N/ha)	N/A	
Soil Assessment Score	N/A/100	

Appendix 3- Soil Profile Summaries and Droughtiness Calculations

Soil pit details

Pit	Texture	Depth mm	Colour	Munsell	Comments	AP WW	AP Pots	Wetness	Grade
A Top	Sandy Silty Loam	0-350	Dark Reddish Brown	5 YR Value 5 Chroma 10	Dark reddish brown slightly stony sandy to silty clay loam. Indistinct boundary good pore space and root presence. Coal pieces present. Sub angular blocky structures. No calcareous presence	106	96	III	3a
A Sub	Coarse Sandy Clay Loam	350-800		Value 6 Chroma 12	Indistinct boundary. Small stones. Reddish brown slightly stony with massive prismatic structure gleying past 40 cm.				
B Top	Silty sandy loam to sandy clay loam	0-300	Dark brown	Value 3 Chroma 6	Sandy Clay Loam to silty clay loam, Indistinct boundary good pore space and root presence. Coal and chalk pieces present.	91	81	III	3b
B Sub	Clay loam	300-700	Very Dark Brown	Value 5 Chroma 6	Dark reddish brown clay loam, medium stones chalk pieces throughout. Coarse prismatic structure mottled and gleyed at 300				
C Top	Silty Sandy Loam	0-250	Reddish colour	Value 6 Chrome 12	Reddish brown slightly stoney, sub angular blocky structure. Some small stones chalk present throughout, good	105	95	III	3a

					pore structure. Distinct boundary.				
C Sub	Sandy Clay Loam Clay Loam	250- 400 400- 700	Reddish brown to orange clay	Value 8 Chroma 6	Distinct boundary between coarse reddish brown sandy clay loam and orange clay loam. Medium to coarse prismatic structure with poor pore spaces compacted throughout. Strong mottling and some gleying from 400mm. Chalk present				

Appendix 3- Sampling Point Descriptions

SOIL PROFILE SURVEY RESULTS

SITE: KNOWSLEY

SOIL PROFILE SURVEY RESULTS

Soil Type Key:

O- ORGANIC

C- CLAY

S- SAND

L- LOAM

Z- SILT

P- PEAT

Hole	Grid ref	Texture	Depth cm	Stones	Wetness Class
1	N53 26 892	SCL	0-40	Few stones	III
38M	W002 50 837	CL	40+	GLEYPING WET below 30 cm	
2	N53 26 943	SCL	0-30	Very disturbed	III
38M	W002 50 857	CL	30+	DEBRIS INFILL Gleyed below 40cm	
3	N53 26 961	ZSL	0-35		III
42M	W002 50 787	SCL	35-60	DISTURBED	
		CL	60+	GLEYPING AT 40 CM	
4	N53 26 964	ZSL	0-30	VERY DISTURBED	III
40M	W002 50 725	SCL	30-40	PIECES OF COAL/BRICK Unable to get below 40cm	
5	N53 26 898	ZSL	0-25	VERY DISTURBED	III
38M	W002 50 744	SL	25-50	WET/MOTTLED	

6	N53 26 834	SL	0-35	COAL BITS Mottled below 30cm	III
37M	W002 50 733	COARSE SCL	35-45		
		ZCL	45+	GLEYPING 60CM	
7	N53 26 776	ZSL	0-30	Medium to small stones through profile no calcareous material	IV
40M	W002 50 728	SCL	30 +	30+ GLEYPING/WET	
8	N53 26 705	SZL	0-35	Medium to small stones through profile no calcareous material	IV
45M	W002 50 723	COARSE SCL	35-70	40+ GLEYPING/WET	
9	N53 26 652	SZL	0-30	Medium to small stones through profile no calcareous material	IV
38M	W002 50 763	SCL	30-50	40+ GLEYPING/COAL	
		CL	50-70		
10	N53 26 634	SZL	0-30	Medium to small stones through profile no calcareous material	IV
37M	W002 50 886	SCL	30-60	40+ GLEYPING/COAL	
		CL	40-60		
11	N53 26 630	SZL	0-30	Small stones through profile no calcareous material	IV
37M	W002 50 997	SCL	30-60	40+ GLEYPING/COAL	
		CL	40-60		
12	N53 26 629	SZL	0-30	Small stones through profile calcareous material	IV
37 M	W002 51 106	SCL	30-60	40+ GLEYPING/COAL	
		CL	40-60		
13	N53 26 643	SZL	0-30	Small stones through profile calcareous material	IV
31M	W002 51 243	SCL	30-60	40+ GLEYPING/COAL	
		CL	40-60		
14	N53 26 694	SZL	0-25	Medium to small stones through	IV

29M	W002 51 265		CAN DIG NO LOWER	profile calcareous material	
15	N53 26 738	SZL	0-35	Medium to small stones through	IV
31M	W002 51 265	SCL	35-45	profile calcareous material Mottling at 30cm	
		CL	45+	40CM GLEYING	
16	N53 26 798	SZL	0-30	Medium to small stones through	IV
30M	W002 51 272	SCL	30-45	profile calcareous material	
		CL	45+	35CM GLEYING	
17	N53 26 829	SZL	0-20	Medium to small stones through	IV
30M	W002 51 183	SCL	20-40	profile calcareous material	
		CL	40-70	30+CM MOTTILING Gleyed from 40cm	
18	N53 26 830	SZL	0-30	Medium to small stones through	IV
30M	W002 51 082	SCL	30-45	profile calcareous material Mottling from 30cm	
		CL	45-75	40+CM GLEYING	
19	N53 26 774	SZL	0-25	Medium to small stones through	IV
27M	W002 51 075	SCL	25-35	profile calcareous material	
		CL	35-60	30+CM GLEYING	
20	N53 26 766	SCL	0-25	Medium to small stones through	III
32M	W002 51 172	COARSE SCL	25-35	profile calcareous material	
		CL	35+	COAL pieces Gleyed from 30cm	
21	N53 26 721	SL	0-25	Medium to small stones through	IV

33M	W002 51 176	COARSE SCL ZCL	25-35 35+	profile calcareous material COAL pieces 30+CM GLEYING	
22 30M	N53 26 673 W002 51 176	SL ZCL CL	0-25 25-40 40-70	Medium to small stones through profile calcareous material COAL pieces 40+CM GLEYING	III
23 31M	N53 26 683 W002 51 070	ZSL SCL CL	0-25 25-40 40-70	Medium to small stones through profile calcareous material COAL pieces 40+CM GLEYING	III
24 34M	N53 26 720 W002 51 072	SL ZCL CL	0-25 25-40 40-70	Medium to small stones through profile calcareous material COAL pieces 30+CM GLEYING	IV
25 35M	N53 26 765 W002 50 991	SZL SL SCL	0-30 30-60 60+	Some stones small to medium. Mottling from 30cm Red conglomerate at depth stones small to medium over 20%	III
26 37M	N53 26 720 W002 50 929	SZL SL SCL	0-30 30+50 50+	Some stones small to medium. Mottling from 30cm Red conglomerate at depth stones small to medium over 20%	III
27 37M	N53 26 763 W002 50 881	SZL COARSE SCL CL	0-25 25-40 40+	Medium to small stones through profile no calcareous material COAL pieces 30+ GLEYING	IV
28 32M	N53 26 818 W002 51 002	SZL SL	0-30 30+50	Some stones small to medium. Mottling from 30cm Red conglomerate at depth stones small to medium over 20%	III

		SCL	50+	Gleying from 50cm	
29	N53 26 837	SZL	0-30	Medium to small stones through profile no calcareous material	IV
32M	W002 50 931	SCL	30-40	COAL pieces	
		CL	40+	40+ GLEYING	

Appendix 4-Sampling points



Appendix 5-Detailed ALC map



Key

Grade 3a	
Grade 3b	
Non Agricultural	

Appendix 6 – Pit Descriptions and Photographs

Soil Pit Location



Soil Pit Description

Pit A Topsoil



Dark reddish brown slightly stony sandy to silty clay loam. Indistinct boundary good pore space and root presence. Coal pieces present. Sub angular blocky structures. No calcareous presence.

Pit A Subsoil



Indistinct boundary between sandy clay loam and clay loam. Small stones. Reddish brown slightly stony with massive prismatic structure gleying past 40 cm.

Pit B
Topsoil



Dark Brown Sandy Clay Loam to silty clay loam, Indistinct boundary good pore space and root presence. Coal and chalk pieces present.

Pit B Sub soil



Dark reddish brown clay loam, medium stones chalk pieces throughout. Coarse prismatic structure mottled and gleyed at depth

Pit C Topsoil



Reddish brown slightly stoney, sub angular blocky structure. Some small stones chalk present throughout, good pore structure. Distinct boundary.

Pit C Subsoil



Distinct boundary between coarse reddish brown sandy clay loam and orange clay loam. Medium to coarse prismatic structure with poor pore spaces compacted throughout. Strong mottling and some gleying from 300mm.

Appendix 7 Agricultural Land Classification

The quality of land is assessed using the ALC Scheme, established by Defra, which provides a method for assessing the quality of farmland, so informed choices can be made about its future use within the planning system. It also helps underpin the principles of sustainable development.

Definitions and Grades

The ALC system classifies land into 1 through to 5 Grades, with Grade 3 further subdivided into Grade 3a and 3b, see Table 1. Consistent with national guidance, Grades 1, 2 and 3a represents the 'best and most versatile' land.

The 'best and most versatile' land' is considered to be the most flexible, productive and efficient in response to inputs, and which can best deliver future crops for food and non-food uses such as biomass, fibres and pharmaceuticals. Current estimates are that Grade 1 and 2 together form about 21% of all farmlands in England; Sub-Grade 3a contains a similar amount.

The ALC system is used by Defra and others to give advice to local planning authorities, developers and the public if development is proposed on agricultural land or other 'Greenfield' sites that could grow crops. The General Development (Procedure) Order refers to the 'best and most versatile' land policy in requiring statutory consultations with Defra.

The ALC grading system is also used by commercial consultants to advise clients on land use and planning issues.

The classification is based on the long-term physical limitations of land for agricultural use. Factors affecting the Grade are climate, site and soil characteristics.

Climate: temperature and rainfall; aspects, exposure and frost risk

Site: gradient, micro relief and flood risk

Soil: texture, structure, depth and stoniness; chemical properties which cannot be corrected

The combination of climate and soil factors determines soil wetness and droughtiness. Wetness and droughtiness influence the choice of crops grown and the level and consistency of yields, as well as the use of land for grazing livestock. The Classification is also concerned with the inherent potential of land under a range of farming systems. The current agricultural use, or intensity of use, does not affect the ALC Grade.

Versatility and Yield

The physical limitations of land have four main effects on the way land is farmed.

These are:

- the range of crops which can be grown
- the level of yield
- the consistency of yield
- the cost of obtaining the crop

The ALC gives a high Grade to land which allows more flexibility in the range of crops that can be grown (its 'versatility') and which require lower inputs. These higher Grades (1, 2,3a) also take into account the ability to produce consistently high yields of a narrower range of crops.

Table 1- Definitions of Land Classification Grades

Grade	Definition
Grade 1 – Excellent Quality Agricultural Land	Land with no or very minor limitations to agricultural use. A very wide range of agricultural and horticultural crops can be grown and commonly includes top fruit, soft fruit, salad crops and winter harvested vegetables. Yields are high and less variable than on land of lower quality.
Grade 2 – Very Good Quality Agricultural Land	Land with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural and horticultural crops can usually be grown but on some land in the Grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable root crops. The level of yield is generally high but may be lower or more variable than Grade 1.

Grade 3 – Good to Moderate Quality Agricultural Land	Land with moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. Where more demanding crops are grown yields are generally lower or more variable than on land in Grades 1 and 2.
Sub-Grade 3a – Good Quality Agricultural Land	Land capable of consistently producing moderate to high yields from a narrow range of arable crops, especially cereals, or moderate yields from a wide range of crops including cereals, grass, oilseed rape, potatoes, sugar beet and the less demanding horticultural crops.
Sub-Grade 3b – Moderate Quality Agricultural Land	Land capable of producing moderate yields of a narrow range of crops, principally cereals and grass or lower yields from a wider range of crops or high yields of grass which can be grazed or harvested over most of the year.
Grade 4 – Poor Quality Agricultural Land	Land with severe limitations which significantly restrict the range of crops and/or level of yields. It is mainly suited to grass with occasional arable crops, the yields of which are variable. The Grade includes very droughty arable land.
Grade 5 – Very Poor Quality Agricultural Land	Land with very severe limitations, which restrict use to permanent pasture or rough grazing, except for occasional pioneer forage crops.