AECOM

EAST YORKSHIRE SOLAR FARM

East Yorkshire Solar Farm

EN010143

Environmental Statement

Volume 2, Appendix 15-5: Soil Health Analysis Data
Document Reference: EN010143/APP/6.2

Regulation 5(2)(a)
Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

November 2023
Revision Number: 00

2009

BOOM-POWER.CO.UK

BOOM POWER

Prepared for:

East Yorkshire Solar Farm Limited

Prepared by:

AECOM Limited

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Plate

Tables

1. Purpose of this Appendix

1.1.1 The purpose of this appendix is to set out the results of the Soil Health testing undertaken for East Yorkshire Solar Farm (hereafter referred to as the Scheme) and the methodology used to collect the data. A description of the Scheme is presented in **Chapter 2: The Scheme, ES Volume 1 [EN010143/APP/6.1].**

2. Background

2.1.1 Soil Health testing was undertaken in response to consultation with Natural England through the Scheme's Discretionary Advice Service (DAS) agreement (411969 DAS East Yorkshire Solar Farm). In which Natural England advised '*soil sampling to include SOM, pH, and macronutrients can inform appropriate soil re-use as set out in Defra's Construction Code of Practice for the Sustainable Use of Soils on Construction Sites. This may be particularly important to firstly identify areas of the Site most appropriate for habitat enhancement. Secondly, this testing will also be important for areas identified for habitat enhancement to inform the most suitable habitats, including the most appropriate seed mix etc'*.

2.1.2 The majority of soils within the Solar PV Site will not be disturbed by construction operations and any soils which are stripped and stored will be restored (to their original location) within the Site. Therefore, this information is not required to inform soil reuse.

2.1.3 Habitat enhancement and delivery of ecological mitigation can only be undertaken in parts of the Site which will remain in the control of the Applicant post-construction (Solar PV Site and Ecology Mitigation Area). In terms of the identification of areas of site suitable for habitat enhancement/ ecology mitigation, this has been driven by factors other than soil type (for example screening and buffer requirements) thereby negating the need for wide scale sampling across the Solar PV Site. The potential usefulness of such data for informing habitat creation/mitigation is acknowledged and therefore targeted sampling has been undertaken in 16 areas identified for enhancement/mitigation at the time the surveys were undertaken. These are identified in **Figure 15-5-1** presented in **Annex A.**

3. Methodology

3.1.1 The sample collection methodology followed that prescribed by NRM Laboratories as set out in their guidance document The Soil Health Handbook (Ref. 1). Which is briefly summarised below. Sample areas were kept below five hectares (ha) where possible in line with the guidance.

3.1.2 A composite sample was taken from each of the 16 areas shown in Figure 15-5-1 presented in Annex A. Component samples were collected in a 'W' sample pattern as far as possible allowing for presence of standing crop. A

minimum of four component samples were taken in each sample area, with a greater number of samples collected in larger areas. Sample locations avoided irregular patches such as gateways, tramlines, headlands and land in proximity to trees and hedges. Approximately 500g of soil was taken from each component sample location. Any clumps of vegetation or root material were removed from the sample as this skews the Organic Matter content analysis. As many stones as possible were removed from the sample. The samples should be collected between depths of

a. Arable and cultivated soils, 0 to15 cm

b. Permanent grassland, 0 to 7.5 cm.

3.1.3 Following thorough mixing, a final composite sample for each area of approximately 500 g was submitted to NRM Laboratories for analysis using their Soil Health Analysis Suite. This tests for:

a. Soil pH – This influences nutrient interactions, root development and microbial population dynamics:

b. Available Phosphorus – Major impact on root development, root exudate formation and plant-microbe interactions. Essential for biological nitrogen fixation:

c. Available Potassium – Related to nitrogen uptake, carbohydrate formation and bulk plant development. Low K status during times of stress can have a major impact on the composition and amount of exudate production. This can therefore impact on microbial activity around the root system:

d. Available Magnesium – Central to nitrogen and potassium uptake, photosynthesis and can influence the composition of root exudate production:

e. Soil Particle Size Distribution – Relative percentage of sand, silt and clay, soil textural classification is central to RB209 fertiliser recommendations and soil erosion risk assessment. Soil texture influences nutrient and moisture retention, microbial population dynamics and carbon sequestration:

f. Soil Organic Matter – An essential component of stable soil aggregates, influencing nutrient and water retention, soil structure and plant-microbe interactions; and

g. Respiration rate – Carbon dioxide evolution is directly related to soil respiration, a general measure of biological activity, indicating microbial biomass, carbon sequestration and nitrogen mineralization rates.

3.1.4 The above data are also used by NRM to prescribe a measure of Soil Health using the Soil Health Index which rates soil health on a sliding scale from 0 to 4 with 0 being Very Low and 4 being High as shown in **Plate 1.**

3.1.5 The results of the Soil Health Analysis are presented in **Annex B.**

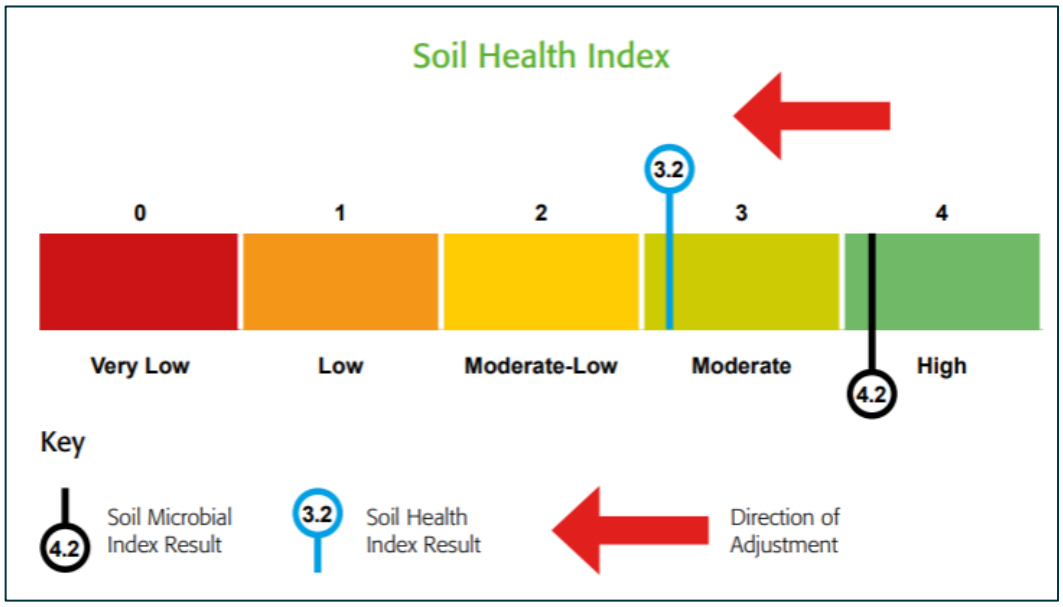


Plate 1. Example of Soil Health Index chart

3.1.6 **Table 1** lists each of the 16 sample areas, identifying which Solar PV Area and field they are located in (shown in **Figure 15-5-1** presented in **Annex A**), the sample ID number (as shown on the analytical reports in **Annex B**) and the approximate size of the sample area.

3.1.7 It is noted that since the analysis was undertaken, design changes have resulted in sample area 1e.6 no longer being within the Order limits. However these data are still provide for completeness and as there is a large degree of uniformity in soil type and land use across the Solar PV Site.

Table 1. Sample locations and Sample ID numbers

Solar PV Area / Field	Sample ID	Approx. sample area (ha)
1a / 1a.6	EYSF 1a.6	2.5
1a/ 1a.14	EYSF 1a.14	4.8
1b/ 1b.1	EYSF 1b.1	3.0
1b/ 1b.2	EYSF 1b.2	3.0
1e / 1e.6	EYSF 1e.6	7.0
1e / 1e.11	EYSF 1e.11	6.0
1e / 1e.14	EYSF 1e.14	8.5
1e / 1e.15	EYSF 1e.15	9.5
2a/ 2a.3	EYSF 2a.3	5.5
2c / 2c	EYSF 2c	5.0
2e / 2e.4	EYSF 2e.4	4.0
2f / 2f	EYSF 2f	5.5

2g / 2g.6	EYSF 2g.6	5.0
3b / 3b.1	EYSF 3b.1	4.5
3b / 3b.2	EYSF 3b.2	4.5
3c / 3c.6	EYSF 3c.6	3.5

3.1.8 The results of the Soil Health Analysis are presented in **Annex B.**

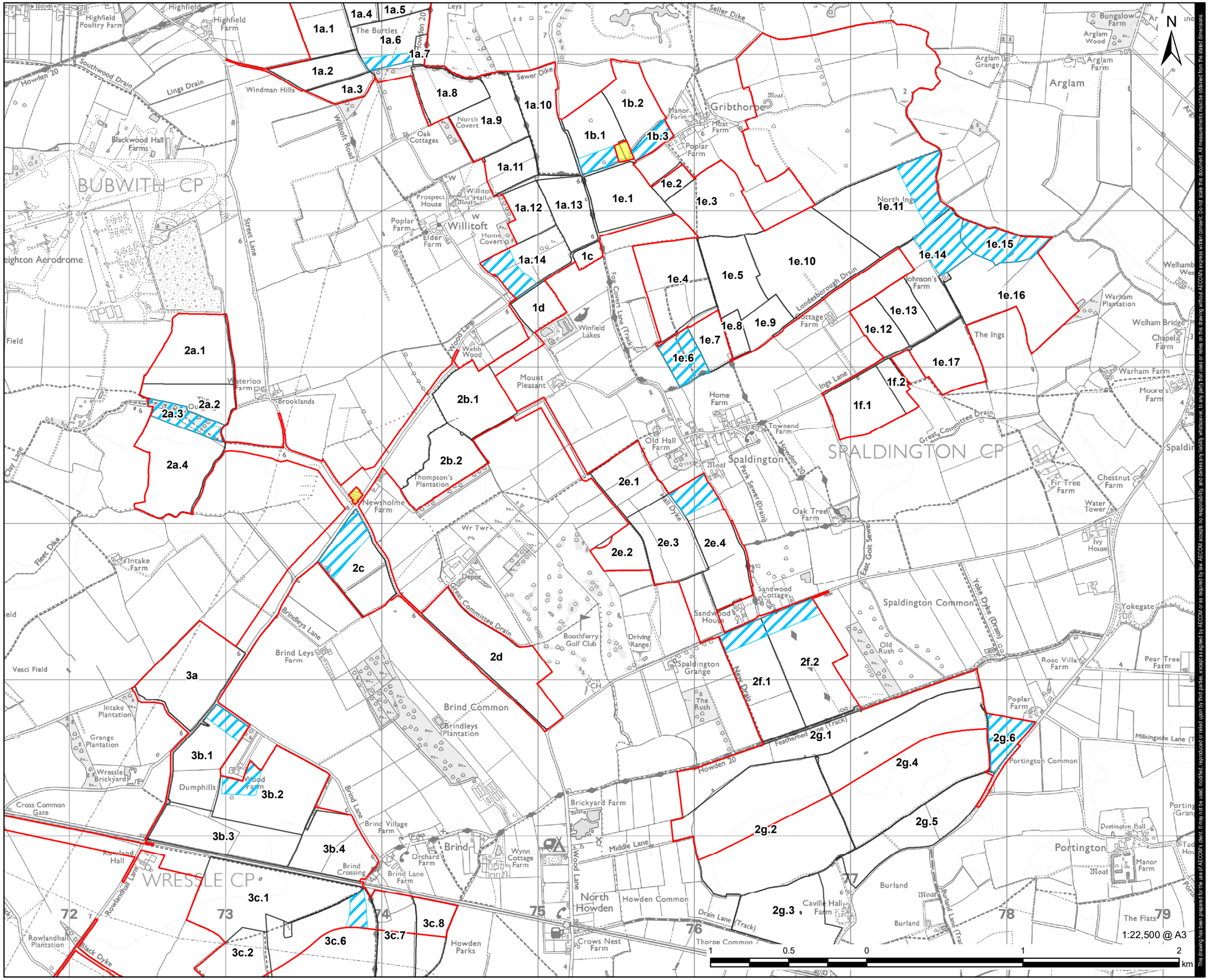
4. References

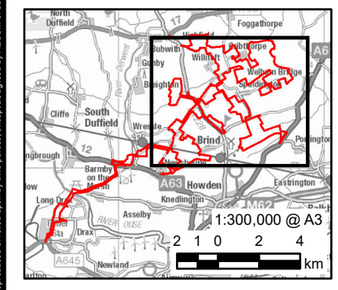
Ref. 1 NRM Laboratories. The Soil Health Handbook: A guide and interpretation for the NRM Soil Health Analytical Package.

Annex A: Figures

Revision: 0 Drawn: LP Checked: AK Approved: EB Date: 2023-11-14

Filename: I:\5004 - Information Systems\60683115_Boom Power\02_Maps\Environmental Statement\App15-5_Soil Health Analsis Data\SHAD_ES_Fig15-5-1_Areas_of_Sample_Collection_Soil_Health_Analysis_A3_20231114_R0.mxd





AECOM

PROJECT

East Yorkshire Solar Farm

CLIENT

East Yorkshire Solar Farm Limited

CONSULTANT

AECOM Limited
Midpoint,
Alencon Link
Basingstoke, RG21 7PP
www.aecom.com

LEGEND

- Order limits
- Land not included in the Order limits
- Field Boundary (xx.xx = Solar PV Area.Field Number)
- Soil Health Analysis Sample Collection Location

NOTES

ISSUE PURPOSE

Environmental Statement

PROJECT NUMBER

60683115

FIGURE TITLE

Areas of Sample Collection for Soil Health Analysis

FIGURE NUMBER

Appendix 15-5-1

Annex B: NRM Soil Health Analysis

REPORT

Report No. 79926 **Sample No.** 636053 **Sample Ref.** EYSF 2G.6	**Cropping:** *Spring Wheat into Grassland* **Field Area:** 5 Ha	**Farm Details:** PROJECT 60683115-EYSF PROJECT 60683115	**Client:** **W634** GARY MCCLEAN AECOM 6TH FLOOR 1 NEW YORK STREET MANCHESTER M1 4HD
Date Received: 17/07/2023	**Date Reported:** 25/07/2023		

Soil Chemical Analysis

	Index	Result	Low	Marginal	Target	Marginal	High
P	4	55.8 mg/l					
K	4	433 mg/l					
Mg	4	176 mg/l					
Organic Matter (LOI)		4.5%					

			Very Acid	Acid	Neutral	Alkali	Very Alkali
Soil pH		7.5					

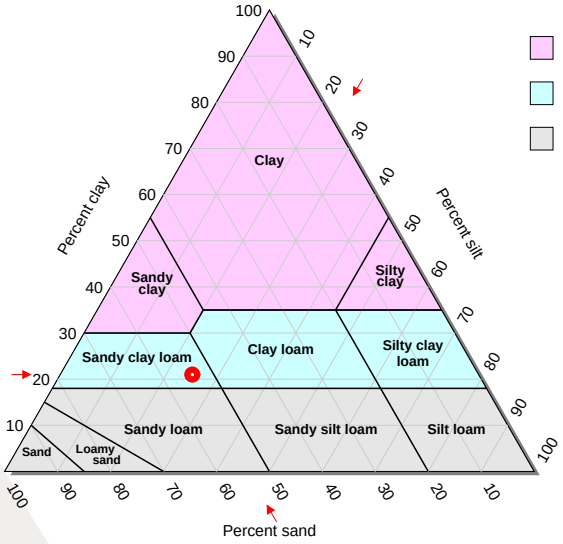
Where no future crop code has been given, levels are calculated assuming an arable crop. If general fertiliser and lime recommendations have been requested, these are given on the following sheets. The analytical methods used are as described in DEFRA Reference Book 427. The index values are determined from the DEFRA Fertiliser Recommendations RB209 9th Edition.

Microbial Activity

CO_2 - C	137 mg/kg	Low	Moderate	Good	High
	Cropped				
	Grass land				

Benchmarked relative to UK agricultural mineral soils.

Textural Classification

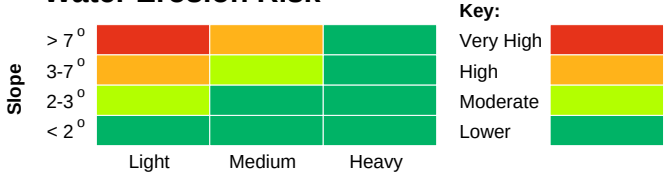


Heavy Soil
Medium Soil
Light Soil

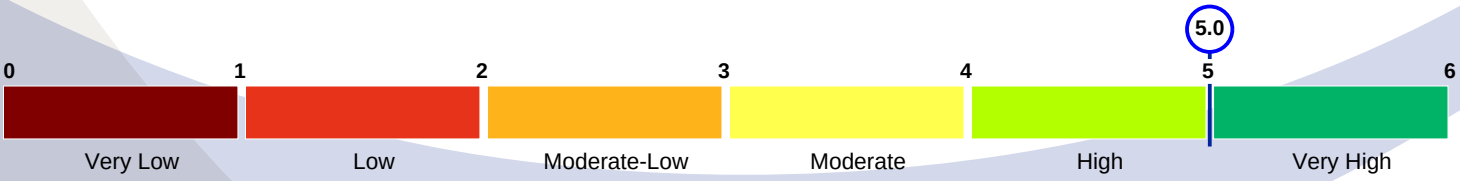
Breakdown:	Sand **54%**	Silt **25%**	Clay **21%**
Soil Textural Class:		Sandy Clay Loam	
Major Soil Classification:		Medium	
Calcium Carbonate Content:		<1%	Non-calcareous
Slope:		0°	

In very calcareous soils (>10% calcium carbonate) the silt and clay sized fractions are likely to contain particles of carbonate which may result in the incorrect classification of soil type.

Water Erosion Risk



Soil Health Index - Based on soil chemical, physical and biological results.



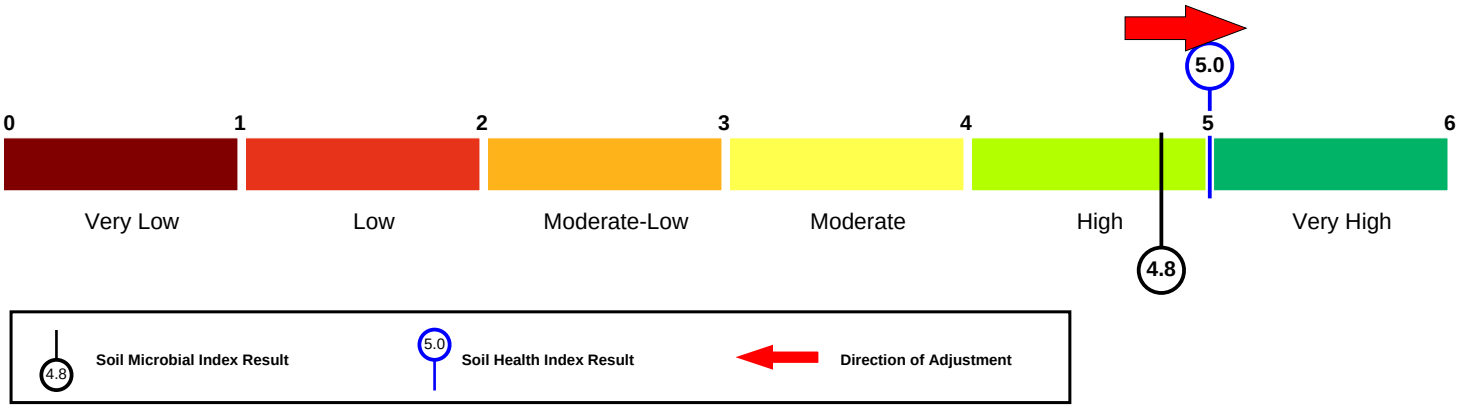
NRM Coopers Bridge, Braziers Lane, Bracknell, Berkshire RG42 6NS
Tel: +44 (0) 1344 886338 **Fax:** +44 (0) 1344 890972 **Email:** enquiries@nrm.uk.com

REPORT (Continued)

Laboratory Reference:

Report No. 79926
Sample No. 636053
Date Reported: 25/07/2023

Soil Health Index Adjustments



Adjustments to the above soil microbial index are made to create the Soil Health Index. The results from the chemical and physical tests summarised on the first page are used to make these adjustments. The table below provides the justification to these adjustments.

Parameter	Adjustment	Justification
pH	Slight Negative	Your soil pH is slightly above the optimum range. Some cation micronutrients such as iron, manganese, zinc and copper may become less available to the plant at this level. See section 4.1 of the soil health handbook for more information on the influence of high soil pH.
P	Slight Negative	Phosphorus availability is high and may be restricting plant uptake of micro-nutrients, limiting root exudate production and plant-microbe interactions. This in turn will reduce the impact of microbes on soil aggregate formation and Carbon capture. Phosphorus loss from this soil may be high during erosion events. See section 4.2 of the soil health hand book for more information on the importance of phosphorus to plant health.
K	No Adjustment	Potassium availability is high and may restrict Magnesium uptake, leading to lower chlorophyll production and reduced nitrogen uptake. Root exudate production may be restricted, particularly during periods of heat or moisture stress. This in turn will reduce the impact of microbes on soil aggregate formation and carbon capture. See section 4.2 of the soil health handbook for more information on the influence of potassium on soil health.
Mg	No Adjustment	Magnesium availability is high but should still provide plants with improved ability to recover nitrogen, manufacture root exudates and tolerate environmental stress. See section 4.2 of the soil health handbook for more information on the influence of magnesium on soil health.
Soil Texture	No Adjustment	This soil texture provides a suitable aggregate platform for air and water exchange that favours plant-microbe interactions. Provided soil carbon levels are adequate, microbial respiration rates should be readily sustainable. For more information on how soil texture influences soil health see section 3.1 of the soil health handbook.
Soil Organic matter	Large Positive	Organic matter is above average and is making a positive contribution to soil structure, nutrient retention, water holding and microbial activity. In addition, this level of organic matter is reducing soil erosion risk. Microbial conversion of organic matter will be making a valuable contribution to nitrogen and phosphorus availability. For information on how organic matter influences the health of your soil see section 3.2 of the soil health handbook.

NRM Coopers Bridge, Braziers Lane, Bracknell, Berkshire RG42 6NS
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REPORT (Continued)

Laboratory Reference:

Report No. 79926
Sample No. 636053
Date Reported: 25/07/2023

Field Observations

Parameter	Observation	Comment
Soil Compaction	Absent	Soil compaction can have a major impact on Soil Health and severely limits the performance of your field. The reduced soil pore size will lead to inhibition of root growth and emergence, poor aeration, slow movement of nutrients through the soil and a build-up of toxic gases and root exudates. Compaction can cause a shift in microbial populations from aerobic to anaerobic this will cause a rapid increase in the production of gaseous nitrogen released to the atmosphere denitrification of nitrate. See section 6.6 of the Soil Health Handbook for more information on soil compaction.
Earthworms per cubic foot	0	The presence of earthworms can be a good indication of a health soil system. They thrive in soils rich in organic matter and nutrients and with good aeration all major components of Soil Health. Earthworms in turn improve the health of a soil. They ingest soil particles as they burrow which increases the availability of nutrients both from the chemical and physical breakdown of minerals and organic matter. The burrowing activity also increases the aeration of the soil. For more information on the role of Earthworms in Soil health please see section 6.6 of the handbook.
Nutrient Deficiency	Absent	Nutrient deficiency symptoms in your crop can be the first sign that there is either an imbalance of nutrients in the soil inhibiting uptake or that there is a deficiency of particular nutrients. It is often possible to identify the deficiency from the characteristics of the symptoms however there are some symptoms that could indicate a number of possible deficiencies. If the deficiency issues are not highlighted from the chemical analysis of the major nutrients, additional analysis of trace elements may be required to aid identification of the deficiency/imbalance. There are a number of published descriptions of nutrient deficiencies in crops and these should be referred to when making your assessment. Symptoms of the major nutrient deficiencies (P, K and Mg) are described in section 4 of the handbook.

REPORT (Continued)

Report No. 79926 **Sample No.** 636054 **Sample Ref.** EYSF 3B.1	**Cropping:** *Other Crop into Grassland* **Field Area:** 4.5 Ha	**Farm Details:** PROJECT 60683115-EYSF PROJECT 60683115	**Client:** **W634** GARY MCCLEAN AECOM 6TH FLOOR 1 NEW YORK STREET MANCHESTER M1 4HD
Date Received: 17/07/2023	**Date Reported:** 25/07/2023		

Soil Chemical Analysis

	Index	Result	Low	Marginal	Target	Marginal	High
P	2	20.6 mg/l					
K	2+	191 mg/l					
Mg	6	585 mg/l					
Organic Matter (LOI)		5.6%					

			Very Acid	Acid	Neutral	Alkali	Very Alkali
Soil pH		7.1					

Where no future crop code has been given, levels are calculated assuming an arable crop. If general fertiliser and lime recommendations have been requested, these are given on the following sheets. The analytical methods used are as described in DEFRA Reference Book 427. The index values are determined from the DEFRA Fertiliser Recommendations RB209 9th Edition.

Microbial Activity

CO_2 - C	86 mg/kg	Low	Moderate	Good	High
	Cropped				
	Grass land				

Benchmarked relative to UK agricultural mineral soils.

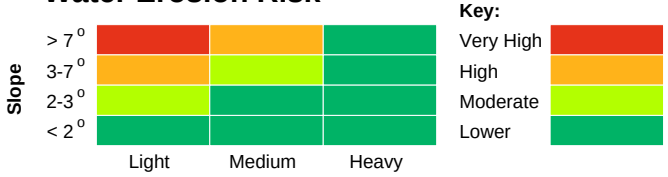
Textural Classification

Heavy Soil
Medium Soil
Light Soil

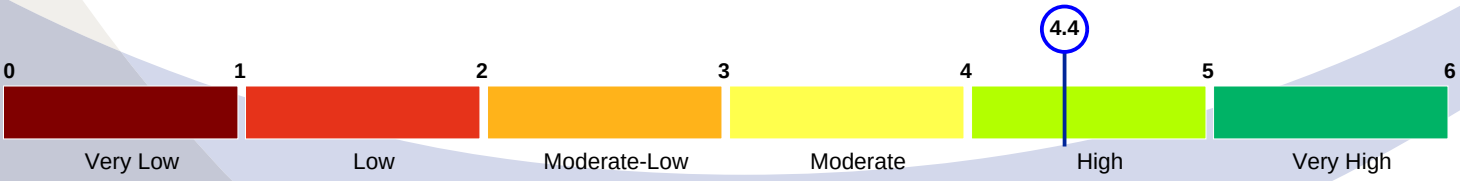
Breakdown:	Sand **30%**	Silt **36%**	Clay **34%**
Soil Textural Class:		Clay Loam	
Major Soil Classification:		Medium	
Calcium Carbonate Content:		<1%	Non-calcareous
Slope:		0°	

In very calcareous soils (>10% calcium carbonate) the silt and clay sized fractions are likely to contain particles of carbonate which may result in the incorrect classification of soil type.

Water Erosion Risk



Soil Health Index - Based on soil chemical, physical and biological results.



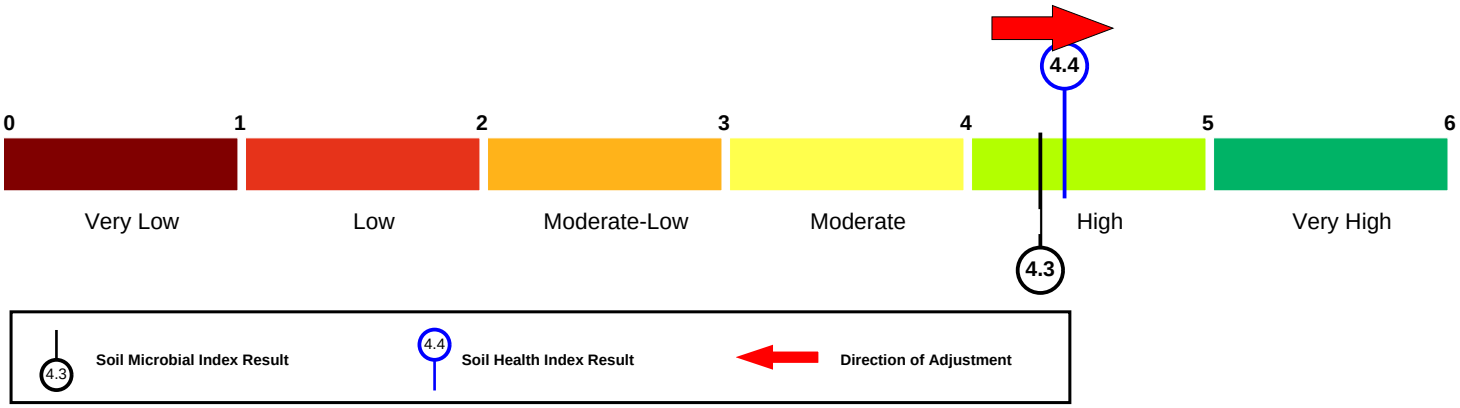
NRM Coopers Bridge, Braziers Lane, Bracknell, Berkshire RG42 6NS
Tel: +44 (0) 1344 886338 **Fax:** +44 (0) 1344 890972 **Email:** enquiries@nrm.uk.com

REPORT (Continued)

Laboratory Reference:

Report No. 79926
Sample No. 636054
Date Reported: 25/07/2023

Soil Health Index Adjustments



Adjustments to the above soil microbial index are made to create the Soil Health Index. The results from the chemical and physical tests summarised on the first page are used to make these adjustments. The table below provides the justification to these adjustments.

Parameter	Adjustment	Justification
pH	Slight Negative	Your soil pH is slightly above the optimum range. Some cation micronutrients such as iron, manganese, zinc and copper may become less available to the plant at this level. See section 4.1 of the soil health handbook for more information on the influence of high soil pH.
P	No Adjustment	Phosphorus availability should be adequate to encourage effective root development and associated microbial activity. See section 4.2 of the soil health hand book for more information on the importance of phosphorus to plant health.
K	No Adjustment	Potassium availability is adequate for good leaf and root development. Plant-microbe interactions should be optimal. See section 4.2 of the soil health handbook for more information on the influence of potassium on soil health.
Mg	Slight / Moderate Negative	Your soil magnesium concentration is very high. Magnesium toxicity issues in plants is very rare however high levels of magnesium can interact with potassium and cause a reduced uptake of potassium by the plant. Your crop may experience potassium deficiency symptoms. See section 4.2 of the soil health handbook for more information on the influence of magnesium on soil health.
Soil Texture	No Adjustment	The fine micro-aggregate structure of this soil type maintains low exchange rates of air and water, resulting in very slow conversion or loss of soil carbon. Microbial respiration rates will be regulated by soil temperature and available carbon sources, which may be lower than other mineral soil types, but should be sustained over very long periods of time. For more information on how soil texture influences soil health see section 3.1 of the soil health handbook.
Soil Organic matter	Large Positive	Organic matter is above average and is making a positive contribution to soil structure, nutrient retention, water holding and microbial activity. In addition, this level of organic matter is reducing soil erosion risk. Microbial conversion of organic matter will be making a valuable contribution to nitrogen and phosphorus availability. For information on how organic matter influences the health of your soil see section 3.2 of the soil health handbook.

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REPORT (Continued)

Laboratory Reference:

Report No. 79926
Sample No. 636054
Date Reported: 25/07/2023

Field Observations

Parameter	Observation	Comment
Soil Compaction	Absent	Soil compaction can have a major impact on Soil Health and severely limits the performance of your field. The reduced soil pore size will lead to inhibition of root growth and emergence, poor aeration, slow movement of nutrients through the soil and a build-up of toxic gases and root exudates. Compaction can cause a shift in microbial populations from aerobic to anaerobic this will cause a rapid increase in the production of gaseous nitrogen released to the atmosphere denitrification of nitrate. See section 6.6 of the Soil Health Handbook for more information on soil compaction.
Earthworms per cubic foot	0	The presence of earthworms can be a good indication of a health soil system. They thrive in soils rich in organic matter and nutrients and with good aeration all major components of Soil Health. Earthworms in turn improve the health of a soil. They ingest soil particles as they burrow which increases the availability of nutrients both from the chemical and physical breakdown of minerals and organic matter. The burrowing activity also increases the aeration of the soil. For more information on the role of Earthworms in Soil health please see section 6.6 of the handbook.
Nutrient Deficiency	Absent	Nutrient deficiency symptoms in your crop can be the first sign that there is either an imbalance of nutrients in the soil inhibiting uptake or that there is a deficiency of particular nutrients. It is often possible to identify the deficiency from the characteristics of the symptoms however there are some symptoms that could indicate a number of possible deficiencies. If the deficiency issues are not highlighted from the chemical analysis of the major nutrients, additional analysis of trace elements may be required to aid identification of the deficiency/imbalance. There are a number of published descriptions of nutrient deficiencies in crops and these should be referred to when making your assessment. Symptoms of the major nutrient deficiencies (P, K and Mg) are described in section 4 of the handbook.

REPORT (Continued)

Report No. 79926 **Sample No.** 636055 **Sample Ref.** EYSF 3B.2	**Cropping:** *Spring Wheat into Grassland* **Field Area:** 4.5 Ha	**Farm Details:** PROJECT 60683115-EYSF PROJECT 60683115	**Client:** **W634** GARY MCCLEAN AECOM 6TH FLOOR 1 NEW YORK STREET MANCHESTER M1 4HD
Date Received: 17/07/2023	**Date Reported:** 25/07/2023		

Soil Chemical Analysis

	Index	Result	Low	Marginal	Target	Marginal	High
P	1	13.4 mg/l					
K	1	96.7 mg/l					
Mg	6	502 mg/l					
Organic Matter (LOI)		5.1%					

			Very Acid	Acid	Neutral	Alkali	Very Alkali
Soil pH		7.3					

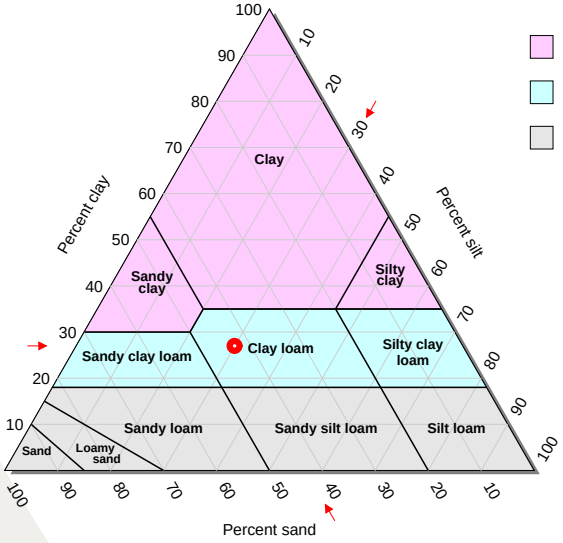
Where no future crop code has been given, levels are calculated assuming an arable crop. If general fertiliser and lime recommendations have been requested, these are given on the following sheets. The analytical methods used are as described in DEFRA Reference Book 427. The index values are determined from the DEFRA Fertiliser Recommendations RB209 9th Edition.

Microbial Activity

CO_2 - C	119 mg/kg	Low	Moderate	Good	High
	Cropped				
	Grass land				

Benchmarked relative to UK agricultural mineral soils.

Textural Classification

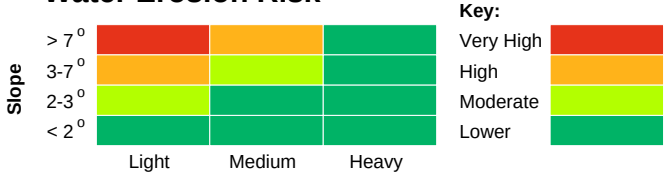


Heavy Soil
Medium Soil
Light Soil

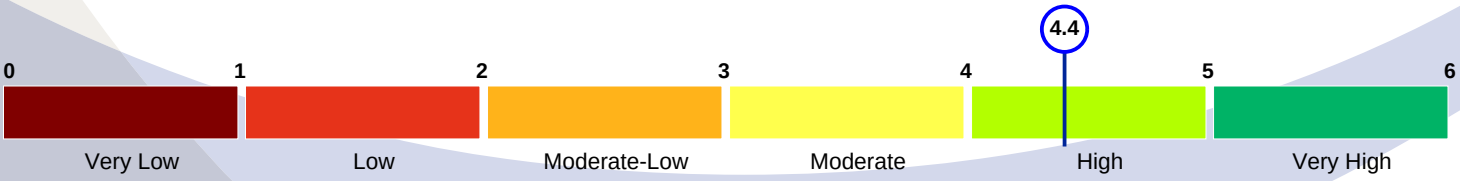
Breakdown:	Sand **43%**	Silt **30%**	Clay **27%**
Soil Textural Class:		Clay Loam	
Major Soil Classification:		Medium	
Calcium Carbonate Content:		<1%	Non-calcareous
Slope:		0°	

In very calcareous soils (>10% calcium carbonate) the silt and clay sized fractions are likely to contain particles of carbonate which may result in the incorrect classification of soil type.

Water Erosion Risk



Soil Health Index - Based on soil chemical, physical and biological results.



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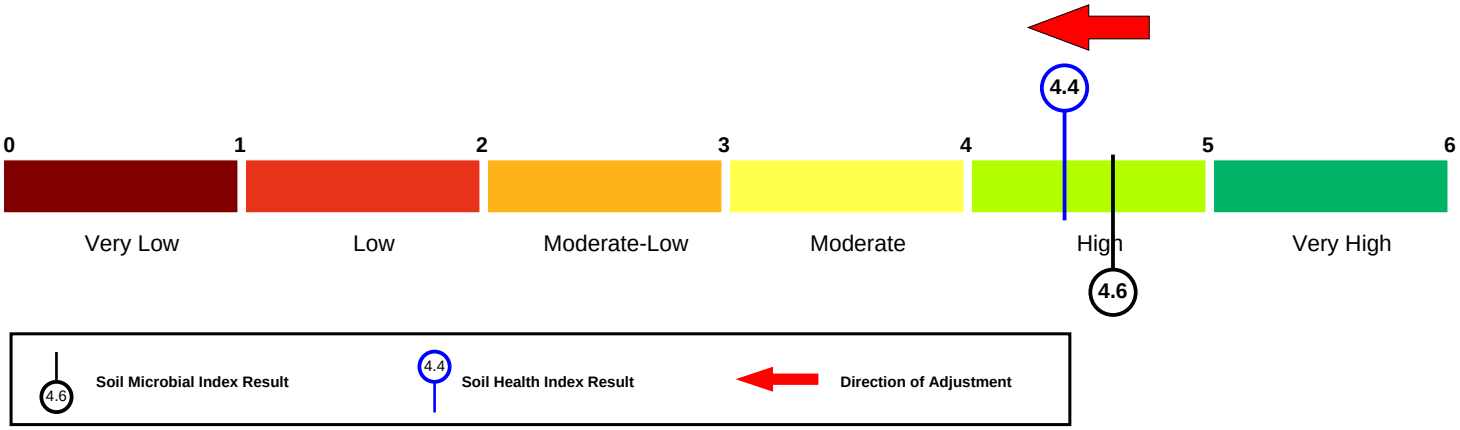
Tel: +44 (0) 1344 886338 **Fax:** +44 (0) 1344 890972 **Email:** enquiries@nrm.uk.com

REPORT (Continued)

Laboratory Reference:

Report No. 79926
Sample No. 636055
Date Reported: 25/07/2023

Soil Health Index Adjustments



Adjustments to the above soil microbial index are made to create the Soil Health Index. The results from the chemical and physical tests summarised on the first page are used to make these adjustments. The table below provides the justification to these adjustments.

Parameter	Adjustment	Justification
pH	Slight Negative	Your soil pH is slightly above the optimum range. Some cation micronutrients such as iron, manganese, zinc and copper may become less available to the plant at this level. See section 4.1 of the soil health handbook for more information on the influence of high soil pH.
P	Slight / Moderate Negative	Phosphorus availability is low and will be affecting plant root development. This in turn will influence plant-microbe interactions and the ability for roots to produce suitable exudate to maintain or stimulate beneficial microbial activity. See section 4.2 of the soil health hand book for more information on the importance of phosphorus to plant health.
K	Slight Negative	Potassium availability is low, affecting canopy and root development, and potentially restricting plant uptake of nitrogen. Movement of soluble sugars from leaf to root will be low, affecting root exudate production and plant-microbe interactions. This situation will increase in severity as soil moisture deficit and air temperature increases. See section 4.2 of the soil health handbook for more information on effects of low potassium on plant health.
Mg	Slight / Moderate Negative	Your soil magnesium concentration is very high. Magnesium toxicity issues in plants is very rare however high levels of magnesium can interact with potassium and cause a reduced uptake of potassium by the plant. Your crop may experience potassium deficiency symptoms. See section 4.2 of the soil health handbook for more information on the influence of magnesium on soil health.
Soil Texture	No Adjustment	The fine micro-aggregate structure of this soil type maintains low exchange rates of air and water, resulting in very slow conversion or loss of soil carbon. Microbial respiration rates will be regulated by soil temperature and available carbon sources, which may be lower than other mineral soil types, but should be sustained over very long periods of time. For more information on how soil texture influences soil health see section 3.1 of the soil health handbook.
Soil Organic matter	Large Positive	Organic matter is above average and is making a positive contribution to soil structure, nutrient retention, water holding and microbial activity. In addition, this level of organic matter is reducing soil erosion risk. Microbial conversion of organic matter will be making a valuable contribution to nitrogen and phosphorus availability. For information on how organic matter influences the health of your soil see section 3.2 of the soil health handbook.

NRM Coopers Bridge, Braziers Lane, Bracknell, Berkshire RG42 6NS
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REPORT (Continued)

Laboratory Reference:

Report No. 79926
Sample No. 636055
Date Reported: 25/07/2023

Field Observations

Parameter	Observation	Comment
Soil Compaction	Absent	Soil compaction can have a major impact on Soil Health and severely limits the performance of your field. The reduced soil pore size will lead to inhibition of root growth and emergence, poor aeration, slow movement of nutrients through the soil and a build-up of toxic gases and root exudates. Compaction can cause a shift in microbial populations from aerobic to anaerobic this will cause a rapid increase in the production of gaseous nitrogen released to the atmosphere denitrification of nitrate. See section 6.6 of the Soil Health Handbook for more information on soil compaction.
Earthworms per cubic foot	0	The presence of earthworms can be a good indication of a health soil system. They thrive in soils rich in organic matter and nutrients and with good aeration all major components of Soil Health. Earthworms in turn improve the health of a soil. They ingest soil particles as they burrow which increases the availability of nutrients both from the chemical and physical breakdown of minerals and organic matter. The burrowing activity also increases the aeration of the soil. For more information on the role of Earthworms in Soil health please see section 6.6 of the handbook.
Nutrient Deficiency	Absent	Nutrient deficiency symptoms in your crop can be the first sign that there is either an imbalance of nutrients in the soil inhibiting uptake or that there is a deficiency of particular nutrients. It is often possible to identify the deficiency from the characteristics of the symptoms however there are some symptoms that could indicate a number of possible deficiencies. If the deficiency issues are not highlighted from the chemical analysis of the major nutrients, additional analysis of trace elements may be required to aid identification of the deficiency/imbalance. There are a number of published descriptions of nutrient deficiencies in crops and these should be referred to when making your assessment. Symptoms of the major nutrient deficiencies (P, K and Mg) are described in section 4 of the handbook.

REPORT (Continued)

Report No. 79926 **Sample No.** 636056 **Sample Ref.** EYSF 3C.6	**Cropping:** *Other Crop into Grassland* **Field Area:** 3.5 Ha	**Farm Details:** PROJECT 60683115-EYSF PROJECT 60683115	**Client:** **W634** GARY MCCLEAN AECOM 6TH FLOOR 1 NEW YORK STREET MANCHESTER M1 4HD
Date Received: 17/07/2023	**Date Reported:** 25/07/2023		

Soil Chemical Analysis

	Index	Result	Low	Marginal	Target	Marginal	High
P	2	21.0 mg/l					
K	2-	139 mg/l					
Mg	5	339 mg/l					
Organic Matter (LOI)		3.6%					

			Very Acid	Acid	Neutral	Alkali	Very Alkali
Soil pH		7.6					

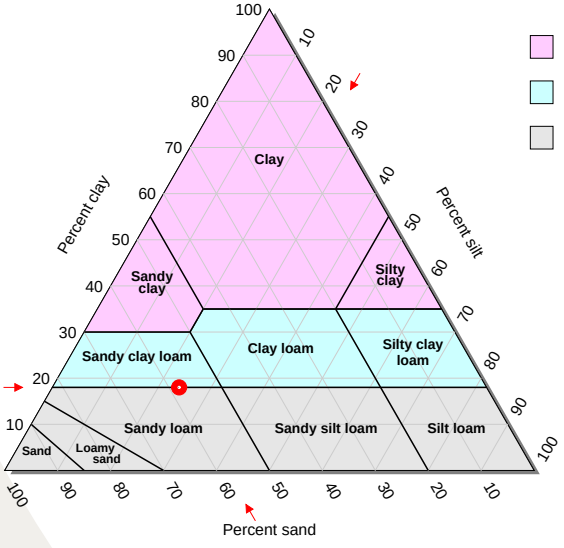
Where no future crop code has been given, levels are calculated assuming an arable crop. If general fertiliser and lime recommendations have been requested, these are given on the following sheets. The analytical methods used are as described in DEFRA Reference Book 427. The index values are determined from the DEFRA Fertiliser Recommendations RB209 9th Edition.

Microbial Activity

CO_2 - C	105 mg/kg	Low	Moderate	Good	High
	Cropped				
	Grass land				

Benchmarked relative to UK agricultural mineral soils.

Textural Classification

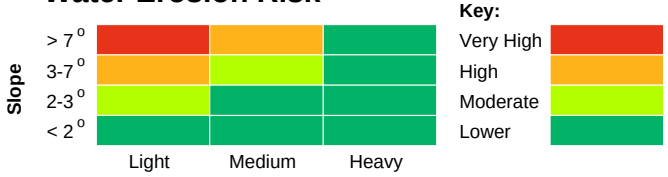


Heavy Soil
Medium Soil
Light Soil

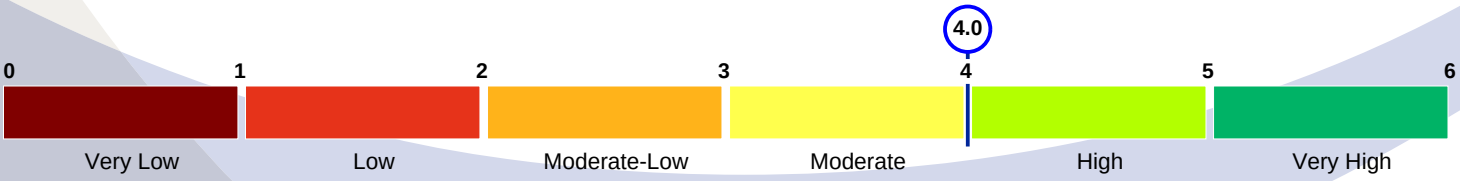
Breakdown:	Sand **58%**	Silt **24%**	Clay **18%**
Soil Textural Class:		Sandy Loam	
Major Soil Classification:		Medium	
Calcium Carbonate Content:		<1%	Non-calcareous
Slope:		0°	

In very calcareous soils (>10% calcium carbonate) the silt and clay sized fractions are likely to contain particles of carbonate which may result in the incorrect classification of soil type.

Water Erosion Risk



Soil Health Index - Based on soil chemical, physical and biological results.



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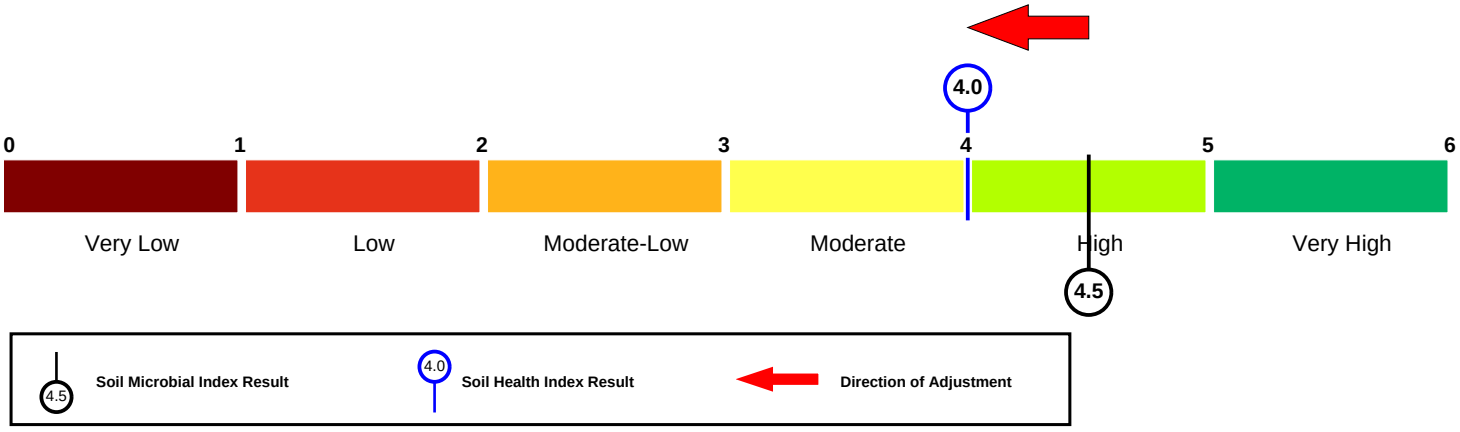
REPORT (Continued)

Laboratory Reference:

Report No. 79926
Sample No. 636056
Date Reported: 25/07/2023

Soil Health Index Adjustments



Adjustments to the above soil microbial index are made to create the Soil Health Index. The results from the chemical and physical tests summarised on the first page are used to make these adjustments. The table below provides the justification to these adjustments.

Parameter	Adjustment	Justification
pH	Large Negative	Your soil pH is high. Cation trace elements essential for plant health and growth may become locked up in the soil making them unavailable for uptake by the plant. See section 4.1 of the soil health handbook for more information on the influence of high soil pH.
P	No Adjustment	Phosphorus availability should be adequate to encourage effective root development and associated microbial activity. See section 4.2 of the soil health hand book for more information on the importance of phosphorus to plant health.
K	No Adjustment	Potassium availability is adequate for good leaf and root development. Plant-microbe interactions should be optimal. See section 4.2 of the soil health handbook for more information on the influence of potassium on soil health.
Mg	Slight Negative	Magnesium availability is high and may be restricting plant uptake of potassium, which will influence leaf and root development. Plant-microbe interactions may be affected by poor root exudate production. This in turn will reduce the impact of microbes on soil aggregate formation and carbon capture. See section 4.2 of the soil health handbook for more information on the influence of magnesium on soil health.
Soil Texture	Slight / Moderate Negative	The open structure of this soil type encourages high exchange rates of air and water, leading to rapid oxidation of soil carbon. Microbial respiration rates can be high, but difficult to sustain over time. For more information on how soil texture influences soil health see section 3.1 of the soil health handbook.
Soil Organic matter	Slight / Moderate Positive	Organic matter is above average and is making a positive contribution to soil structure, nutrient retention, water holding and microbial activity. In addition, this level of organic matter is reducing soil erosion risk. For information on how Organic matter influences the health of your soil see section 3.2 of the soil health handbook.

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Tel: +44 (0) 1344 886338 **Fax:** +44 (0) 1344 890972 **Email:** enquiries@nrm.uk.com

REPORT (Continued)

Laboratory Reference:

Report No. 79926
Sample No. 636056
Date Reported: 25/07/2023

Field Observations

Parameter	Observation	Comment
Soil Compaction	Absent	Soil compaction can have a major impact on Soil Health and severely limits the performance of your field. The reduced soil pore size will lead to inhibition of root growth and emergence, poor aeration, slow movement of nutrients through the soil and a build-up of toxic gases and root exudates. Compaction can cause a shift in microbial populations from aerobic to anaerobic this will cause a rapid increase in the production of gaseous nitrogen released to the atmosphere denitrification of nitrate. See section 6.6 of the Soil Health Handbook for more information on soil compaction.
Earthworms per cubic foot	0	The presence of earthworms can be a good indication of a health soil system. They thrive in soils rich in organic matter and nutrients and with good aeration all major components of Soil Health. Earthworms in turn improve the health of a soil. They ingest soil particles as they burrow which increases the availability of nutrients both from the chemical and physical breakdown of minerals and organic matter. The burrowing activity also increases the aeration of the soil. For more information on the role of Earthworms in Soil health please see section 6.6 of the handbook.
Nutrient Deficiency	Absent	Nutrient deficiency symptoms in your crop can be the first sign that there is either an imbalance of nutrients in the soil inhibiting uptake or that there is a deficiency of particular nutrients. It is often possible to identify the deficiency from the characteristics of the symptoms however there are some symptoms that could indicate a number of possible deficiencies. If the deficiency issues are not highlighted from the chemical analysis of the major nutrients, additional analysis of trace elements may be required to aid identification of the deficiency/imbalance. There are a number of published descriptions of nutrient deficiencies in crops and these should be referred to when making your assessment. Symptoms of the major nutrient deficiencies (P, K and Mg) are described in section 4 of the handbook.

REPORT (Continued)

Report No. 79926 **Sample No.** 636057 **Sample Ref.** EYSF 1E.14	**Cropping:** *Spring Wheat into Grassland* **Field Area:** 8.5 Ha	**Farm Details:** PROJECT 60683115-EYSF PROJECT 60683115	**Client:** **W634** GARY MCCLEAN AECOM 6TH FLOOR 1 NEW YORK STREET MANCHESTER M1 4HD
Date Received: 17/07/2023	**Date Reported:** 25/07/2023		

Soil Chemical Analysis

	Index	Result	Low	Marginal	Target	Marginal	High
P	2	19.0 mg/l					
K	2-	176 mg/l					
Mg	6	358 mg/l					
Organic Matter (LOI)		8.0%					

			Very Acid	Acid	Neutral	Alkali	Very Alkali
Soil pH		7.0					

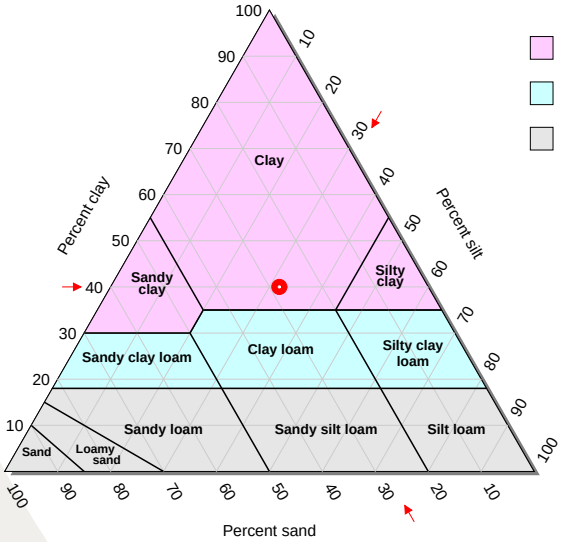
Where no future crop code has been given, levels are calculated assuming an arable crop. If general fertiliser and lime recommendations have been requested, these are given on the following sheets. The analytical methods used are as described in DEFRA Reference Book 427. The index values are determined from the DEFRA Fertiliser Recommendations RB209 9th Edition.

Microbial Activity

CO_2 - C	132 mg/kg	Low	Moderate	Good	High
	Cropped				
	Grass land				

Benchmarked relative to UK agricultural mineral soils.

Textural Classification

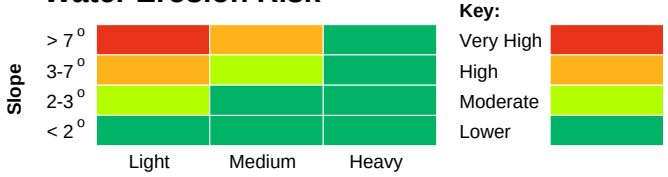


Heavy Soil
Medium Soil
Light Soil

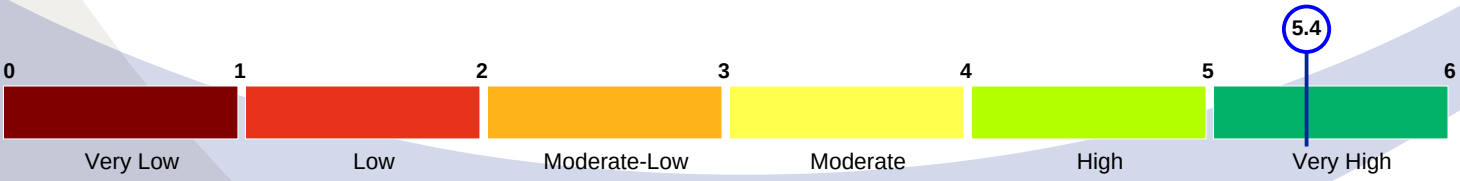
Breakdown:	Sand **28%**	Silt **32%**	Clay **40%**
Soil Textural Class:		Clay	
Major Soil Classification:		Heavy	
Calcium Carbonate Content:		<1%	Non-calcareous
Slope:		0 °	

In very calcareous soils (>10% calcium carbonate) the silt and clay sized fractions are likely to contain particles of carbonate which may result in the incorrect classification of soil type.

Water Erosion Risk



Soil Health Index - Based on soil chemical, physical and biological results.



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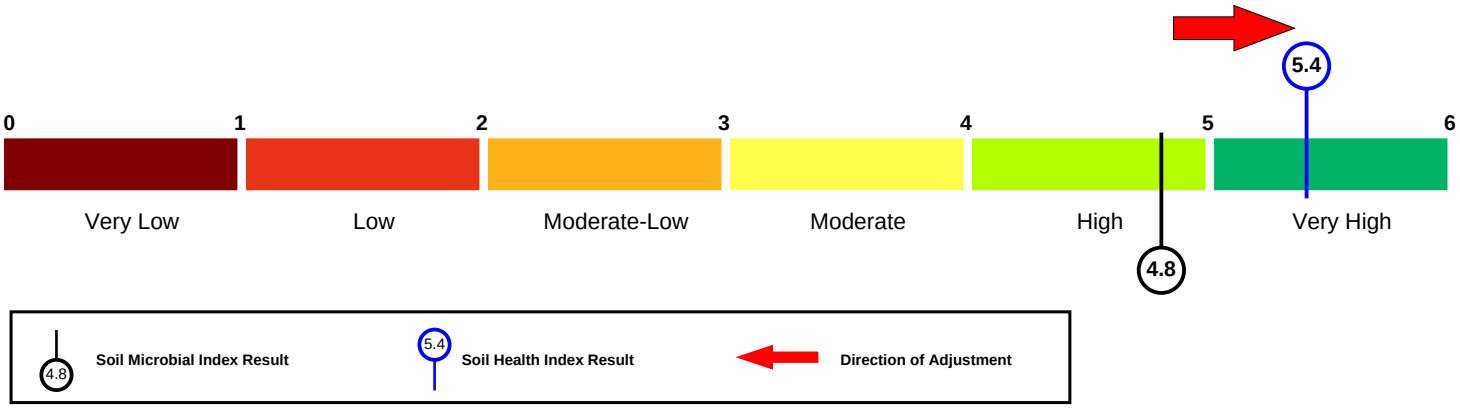
REPORT (Continued)

Laboratory Reference:

Report No. 79926
Sample No. 636057
Date Reported: 25/07/2023

Soil Health Index Adjustments



Adjustments to the above soil microbial index are made to create the Soil Health Index. The results from the chemical and physical tests summarised on the first page are used to make these adjustments. The table below provides the justification to these adjustments.

Parameter	Adjustment	Justification
pH	Slight Negative	Your soil pH is slightly above the optimum range. Some cation micronutrients such as iron, manganese, zinc and copper may become less available to the plant at this level. See section 4.1 of the soil health handbook for more information on the influence of high soil pH.
P	No Adjustment	Phosphorus availability should be adequate to encourage effective root development and associated microbial activity. See section 4.2 of the soil health hand book for more information on the importance of phosphorus to plant health.
K	No Adjustment	Potassium availability is adequate for good leaf and root development. Plant-microbe interactions should be optimal. See section 4.2 of the soil health handbook for more information on the influence of potassium on soil health.
Mg	Slight / Moderate Negative	Your soil magnesium concentration is very high. Magnesium toxicity issues in plants is very rare however high levels of magnesium can interact with potassium and cause a reduced uptake of potassium by the plant. Your crop may experience potassium deficiency symptoms. See section 4.2 of the soil health handbook for more information on the influence of magnesium on soil health.
Soil Texture	Large Positive	The fine micro-aggregate structure of this soil type maintains low exchange rates of air and water, resulting in very slow conversion or loss of soil carbon. Microbial respiration rates will be regulated by soil temperature and available carbon sources, which may be lower than other mineral soil types, but should be sustained over very long periods of time. For more information on how soil texture influences soil health see section 3.1 of the soil health handbook.
Soil Organic matter	Large Positive	Organic matter is above average and is making a positive contribution to soil structure, nutrient retention, water holding and microbial activity. In addition, this level of organic matter is reducing soil erosion risk. Microbial conversion of organic matter will be making a significant contribution to nitrogen and phosphorus availability. This soil is now classed as "organic" rather than "mineral" and fertiliser recommendations need to reflect this. For information on how organic matter influences the health of your soil see section 3.2 of the soil health handbook.

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Tel: +44 (0) 1344 886338 **Fax:** +44 (0) 1344 890972 **Email:** enquiries@nrm.uk.com

REPORT (Continued)

Laboratory Reference:

Report No. 79926
Sample No. 636057
Date Reported: 25/07/2023

Field Observations

Parameter	Observation	Comment
Soil Compaction	Absent	Soil compaction can have a major impact on Soil Health and severely limits the performance of your field. The reduced soil pore size will lead to inhibition of root growth and emergence, poor aeration, slow movement of nutrients through the soil and a build-up of toxic gases and root exudates. Compaction can cause a shift in microbial populations from aerobic to anaerobic this will cause a rapid increase in the production of gaseous nitrogen released to the atmosphere denitrification of nitrate. See section 6.6 of the Soil Health Handbook for more information on soil compaction.
Earthworms per cubic foot	0	The presence of earthworms can be a good indication of a health soil system. They thrive in soils rich in organic matter and nutrients and with good aeration all major components of Soil Health. Earthworms in turn improve the health of a soil. They ingest soil particles as they burrow which increases the availability of nutrients both from the chemical and physical breakdown of minerals and organic matter. The burrowing activity also increases the aeration of the soil. For more information on the role of Earthworms in Soil health please see section 6.6 of the handbook.
Nutrient Deficiency	Absent	Nutrient deficiency symptoms in your crop can be the first sign that there is either an imbalance of nutrients in the soil inhibiting uptake or that there is a deficiency of particular nutrients. It is often possible to identify the deficiency from the characteristics of the symptoms however there are some symptoms that could indicate a number of possible deficiencies. If the deficiency issues are not highlighted from the chemical analysis of the major nutrients, additional analysis of trace elements may be required to aid identification of the deficiency/imbalance. There are a number of published descriptions of nutrient deficiencies in crops and these should be referred to when making your assessment. Symptoms of the major nutrient deficiencies (P, K and Mg) are described in section 4 of the handbook.

REPORT (Continued)

Report No. 79926 **Sample No.** 636058 **Sample Ref.** EYSF 1E.15	**Cropping:** *Perm Pasture into Grassland* **Field Area:** 9.5 Ha	**Farm Details:** PROJECT 60683115-EYSF PROJECT 60683115	**Client:** **W634** GARY MCCLEAN AECOM 6TH FLOOR 1 NEW YORK STREET MANCHESTER M1 4HD
Date Received: 17/07/2023	**Date Reported:** 25/07/2023		

Soil Chemical Analysis

	Index	Result	Low	Marginal	Target	Marginal	High
P	1	11.4 mg/l					
K	2+	211 mg/l					
Mg	5	310 mg/l					
Organic Matter (LOI)		38.6%					

			Very Acid	Acid	Neutral	Alkali	Very Alkali
Soil pH		5.4					

Where no future crop code has been given, levels are calculated assuming an arable crop. If general fertiliser and lime recommendations have been requested, these are given on the following sheets. The analytical methods used are as described in DEFRA Reference Book 427. The index values are determined from the DEFRA Fertiliser Recommendations RB209 9th Edition.

Microbial Activity

CO_2 - C	166 mg/kg	Low	Moderate	Good	High
	Cropped				
	Grass land				

Benchmarked relative to UK agricultural mineral soils.

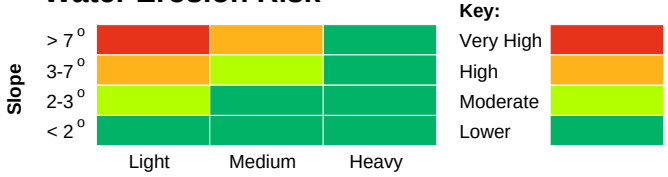
Textural Classification

Heavy Soil
Medium Soil
Light Soil

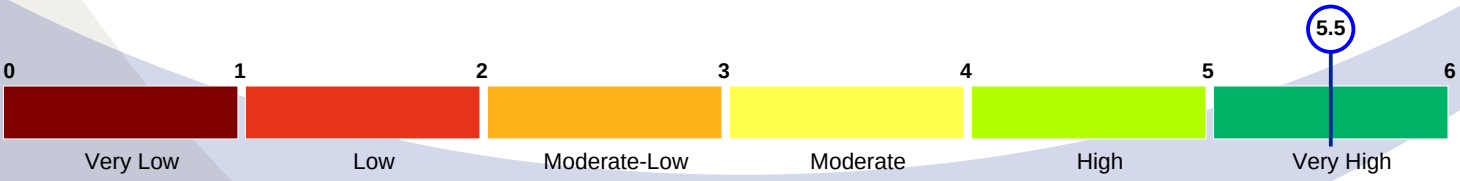
Breakdown:	Sand **13%**	Silt **37%**	Clay **50%**
Soil Textural Class:		Clay	
Major Soil Classification:		Peaty	
Calcium Carbonate Content:		<1%	Non-calcareous
Slope:		0 °	

In very calcareous soils (>10% calcium carbonate) the silt and clay sized fractions are likely to contain particles of carbonate which may result in the incorrect classification of soil type.

Water Erosion Risk



Soil Health Index - Based on soil chemical, physical and biological results.



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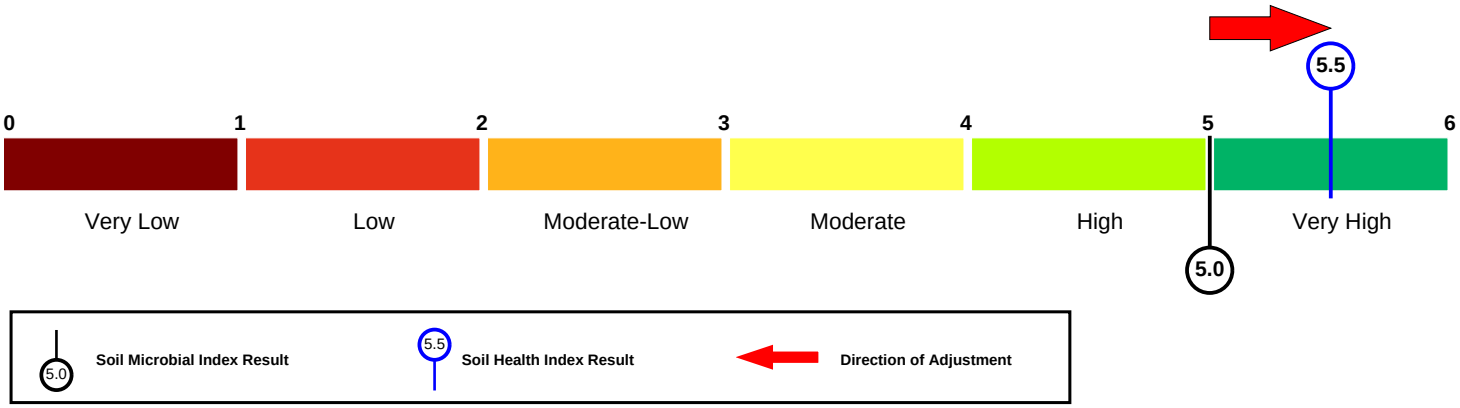
REPORT (Continued)

Laboratory Reference:

Report No. 79926
Sample No. 636058
Date Reported: 25/07/2023

Soil Health Index Adjustments



Adjustments to the above soil microbial index are made to create the Soil Health Index. The results from the chemical and physical tests summarised on the first page are used to make these adjustments. The table below provides the justification to these adjustments.

Parameter	Adjustment	Justification
pH	Slight Negative	pH is lower than the desired level for optimum plant growth. Macronutrients such as phosphorus can become less available to the plant and may be bound to soil particles. This pH range may be more suited to grassland environments. See section 4.1 of the soil health handbook for more information on the effects of low soil pH.
P	Slight / Moderate Negative	Phosphorus availability is low and will be affecting plant root development. This in turn will influence plant-microbe interactions and the ability for roots to produce suitable exudate to maintain or stimulate beneficial microbial activity. See section 4.2 of the soil health hand book for more information on the importance of phosphorus to plant health.
K	No Adjustment	Potassium availability is adequate for good leaf and root development. Plant-microbe interactions should be optimal. See section 4.2 of the soil health handbook for more information on the influence of potassium on soil health.
Mg	Slight Negative	Magnesium availability is high and may be restricting plant uptake of potassium, which will influence leaf and root development. Plant-microbe interactions may be affected by poor root exudate production. This in turn will reduce the impact of microbes on soil aggregate formation and carbon capture. See section 4.2 of the soil health handbook for more information on the influence of magnesium on soil health.
Soil Texture	Large Positive	The fine micro-aggregate structure of this soil type maintains low exchange rates of air and water, resulting in very slow conversion or loss of soil carbon. Microbial respiration rates will be regulated by soil temperature and available carbon sources, which may be lower than other mineral soil types, but should be sustained over very long periods of time. For more information on how soil texture influences soil health see section 3.1 of the soil health handbook.
Soil Organic matter	Large Positive	Organic matter is above average and is making a positive contribution to soil structure, nutrient retention, water holding and microbial activity. In addition, this level of organic matter is reducing soil erosion risk. Microbial conversion of organic matter will be making a significant contribution to nitrogen and phosphorus availability. This soil is now classed as "organic" rather than "mineral" and fertiliser recommendations need to reflect this. For information on how organic matter influences the health of your soil see section 3.2 of the soil health handbook.

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REPORT (Continued)

Laboratory Reference:

Report No. 79926
Sample No. 636058
Date Reported: 25/07/2023

Field Observations

Parameter	Observation	Comment
Soil Compaction	Absent	Soil compaction can have a major impact on Soil Health and severely limits the performance of your field. The reduced soil pore size will lead to inhibition of root growth and emergence, poor aeration, slow movement of nutrients through the soil and a build-up of toxic gases and root exudates. Compaction can cause a shift in microbial populations from aerobic to anaerobic this will cause a rapid increase in the production of gaseous nitrogen released to the atmosphere denitrification of nitrate. See section 6.6 of the Soil Health Handbook for more information on soil compaction.
Earthworms per cubic foot	0	The presence of earthworms can be a good indication of a health soil system. They thrive in soils rich in organic matter and nutrients and with good aeration all major components of Soil Health. Earthworms in turn improve the health of a soil. They ingest soil particles as they burrow which increases the availability of nutrients both from the chemical and physical breakdown of minerals and organic matter. The burrowing activity also increases the aeration of the soil. For more information on the role of Earthworms in Soil health please see section 6.6 of the handbook.
Nutrient Deficiency	Absent	Nutrient deficiency symptoms in your crop can be the first sign that there is either an imbalance of nutrients in the soil inhibiting uptake or that there is a deficiency of particular nutrients. It is often possible to identify the deficiency from the characteristics of the symptoms however there are some symptoms that could indicate a number of possible deficiencies. If the deficiency issues are not highlighted from the chemical analysis of the major nutrients, additional analysis of trace elements may be required to aid identification of the deficiency/imbalance. There are a number of published descriptions of nutrient deficiencies in crops and these should be referred to when making your assessment. Symptoms of the major nutrient deficiencies (P, K and Mg) are described in section 4 of the handbook.

REPORT (Continued)

Report No. 79926 **Sample No.** 636059 **Sample Ref.** EYSF 2A.3	**Cropping:** *Grassland into Grassland* **Field Area:** 5.5 Ha	**Farm Details:** PROJECT 60683115-EYSF PROJECT 60683115	**Client:** **W634** GARY MCCLEAN AECOM 6TH FLOOR 1 NEW YORK STREET MANCHESTER M1 4HD
Date Received: 17/07/2023	**Date Reported:** 25/07/2023		

Soil Chemical Analysis

	Index	Result	Low	Marginal	Target	Marginal	High
P	2	18.4 mg/l					
K	1	92.8 mg/l					
Mg	5	282 mg/l					
Organic Matter (LOI)		10.9%					

			Very Acid	Acid	Neutral	Alkali	Very Alkali
Soil pH		6.1					

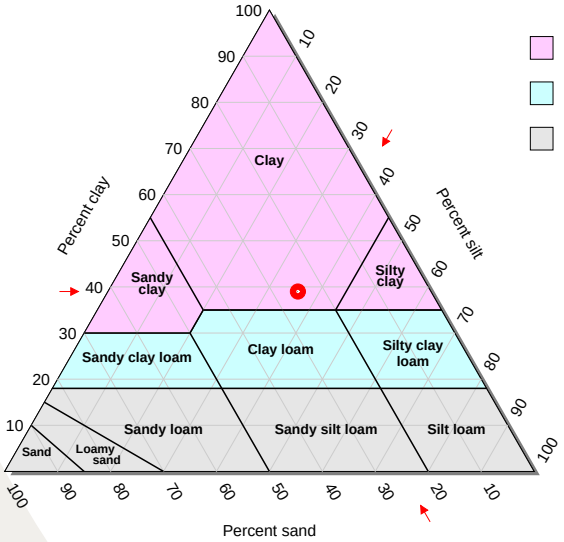
Where no future crop code has been given, levels are calculated assuming an arable crop. If general fertiliser and lime recommendations have been requested, these are given on the following sheets. The analytical methods used are as described in DEFRA Reference Book 427. The index values are determined from the DEFRA Fertiliser Recommendations RB209 9th Edition.

Microbial Activity

CO_2 - C	172 mg/kg	Low	Moderate	Good	High
	Cropped				
	Grass land				

Benchmarked relative to UK agricultural mineral soils.

Textural Classification

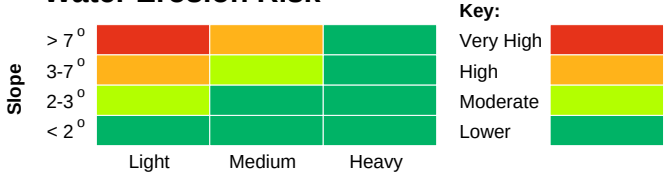


Heavy Soil
Medium Soil
Light Soil

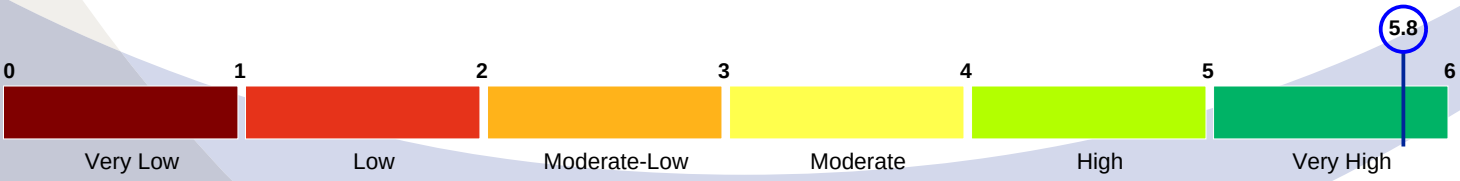
Breakdown:	Sand **25%**	Silt **36%**	Clay **39%**
Soil Textural Class:		Clay	
Major Soil Classification:		Organic	
Calcium Carbonate Content:		<1%	Non-calcareous
Slope:		0 °	

In very calcareous soils (>10% calcium carbonate) the silt and clay sized fractions are likely to contain particles of carbonate which may result in the incorrect classification of soil type.

Water Erosion Risk



Soil Health Index - Based on soil chemical, physical and biological results.



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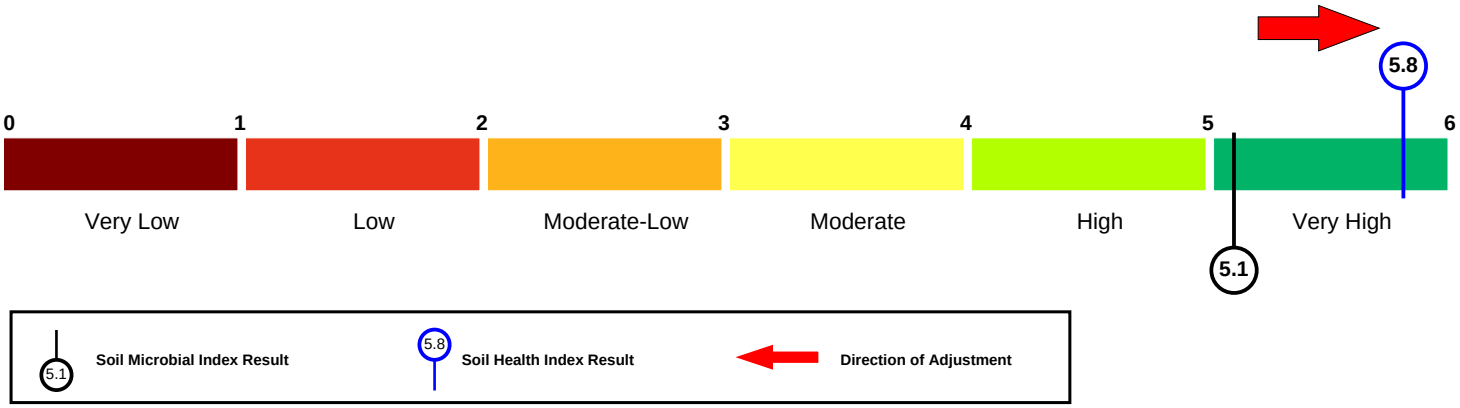
REPORT (Continued)

Laboratory Reference:

Report No. 79926
Sample No. 636059
Date Reported: 25/07/2023

Soil Health Index Adjustments



Adjustments to the above soil microbial index are made to create the Soil Health Index. The results from the chemical and physical tests summarised on the first page are used to make these adjustments. The table below provides the justification to these adjustments.

Parameter	Adjustment	Justification
pH	No Adjustment	Your Soil pH is within the optimum range for healthy plant growth. The pH of the soil will not be contributing to nutrient deficiencies or declines in microbial populations. See section 4.1 of the soil health handbook for more information on how soil pH can influence the health of a soil system.
P	No Adjustment	Phosphorus availability should be adequate to encourage effective root development and associated microbial activity. See section 4.2 of the soil health hand book for more information on the importance of phosphorus to plant health.
K	Slight Negative	Potassium availability is low, affecting canopy and root development, and potentially restricting plant uptake of nitrogen. Movement of soluble sugars from leaf to root will be low, affecting root exudate production and plant-microbe interactions. This situation will increase in severity as soil moisture deficit and air temperature increases. See section 4.2 of the soil health handbook for more information on effects of low potassium on plant health.
Mg	Slight Negative	Magnesium availability is high and may be restricting plant uptake of potassium, which will influence leaf and root development. Plant-microbe interactions may be affected by poor root exudate production. This in turn will reduce the impact of microbes on soil aggregate formation and carbon capture. See section 4.2 of the soil health handbook for more information on the influence of magnesium on soil health.
Soil Texture	Large Positive	The fine micro-aggregate structure of this soil type maintains low exchange rates of air and water, resulting in very slow conversion or loss of soil carbon. Microbial respiration rates will be regulated by soil temperature and available carbon sources, which may be lower than other mineral soil types, but should be sustained over very long periods of time. For more information on how soil texture influences soil health see section 3.1 of the soil health handbook.
Soil Organic matter	Large Positive	Organic matter is above average and is making a positive contribution to soil structure, nutrient retention, water holding and microbial activity. In addition, this level of organic matter is reducing soil erosion risk. Microbial conversion of organic matter will be making a significant contribution to nitrogen and phosphorus availability. This soil is now classed as "organic" rather than "mineral" and fertiliser recommendations need to reflect this. For information on how organic matter influences the health of your soil see section 3.2 of the soil health handbook.

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REPORT (Continued)

Laboratory Reference:

Report No. 79926
Sample No. 636059
Date Reported: 25/07/2023

Field Observations

Parameter	Observation	Comment
Soil Compaction	Absent	Soil compaction can have a major impact on Soil Health and severely limits the performance of your field. The reduced soil pore size will lead to inhibition of root growth and emergence, poor aeration, slow movement of nutrients through the soil and a build-up of toxic gases and root exudates. Compaction can cause a shift in microbial populations from aerobic to anaerobic this will cause a rapid increase in the production of gaseous nitrogen released to the atmosphere denitrification of nitrate. See section 6.6 of the Soil Health Handbook for more information on soil compaction.
Earthworms per cubic foot	0	The presence of earthworms can be a good indication of a health soil system. They thrive in soils rich in organic matter and nutrients and with good aeration all major components of Soil Health. Earthworms in turn improve the health of a soil. They ingest soil particles as they burrow which increases the availability of nutrients both from the chemical and physical breakdown of minerals and organic matter. The burrowing activity also increases the aeration of the soil. For more information on the role of Earthworms in Soil health please see section 6.6 of the handbook.
Nutrient Deficiency	Absent	Nutrient deficiency symptoms in your crop can be the first sign that there is either an imbalance of nutrients in the soil inhibiting uptake or that there is a deficiency of particular nutrients. It is often possible to identify the deficiency from the characteristics of the symptoms however there are some symptoms that could indicate a number of possible deficiencies. If the deficiency issues are not highlighted from the chemical analysis of the major nutrients, additional analysis of trace elements may be required to aid identification of the deficiency/imbalance. There are a number of published descriptions of nutrient deficiencies in crops and these should be referred to when making your assessment. Symptoms of the major nutrient deficiencies (P, K and Mg) are described in section 4 of the handbook.

REPORT (Continued)

Report No. 79926 **Sample No.** 636060 **Sample Ref.** EYSF 2C	**Cropping:** *Spring Wheat into Grassland* **Field Area:** 5 Ha	**Farm Details:** PROJECT 60683115-EYSF PROJECT 60683115	**Client:** **W634** GARY MCCLEAN AECOM 6TH FLOOR 1 NEW YORK STREET MANCHESTER M1 4HD
Date Received: 17/07/2023	**Date Reported:** 25/07/2023		

Soil Chemical Analysis

	Index	Result	Low	Marginal	Target	Marginal	High
P	3	33.8 mg/l					
K	2-	169 mg/l					
Mg	6	401 mg/l					
Organic Matter (LOI)		6.0%					

			Very Acid	Acid	Neutral	Alkali	Very Alkali
Soil pH		7.5					

Where no future crop code has been given, levels are calculated assuming an arable crop. If general fertiliser and lime recommendations have been requested, these are given on the following sheets. The analytical methods used are as described in DEFRA Reference Book 427. The index values are determined from the DEFRA Fertiliser Recommendations RB209 9th Edition.

Microbial Activity

CO_2 - C	115 mg/kg	Low	Moderate	Good	High
	Cropped				
	Grass land				

Benchmarked relative to UK agricultural mineral soils.

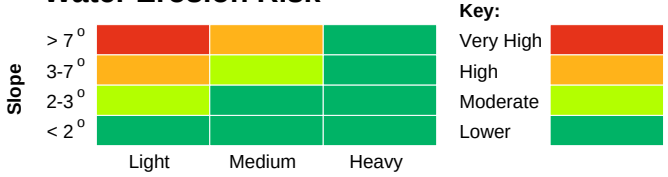
Textural Classification

Heavy Soil
Medium Soil
Light Soil

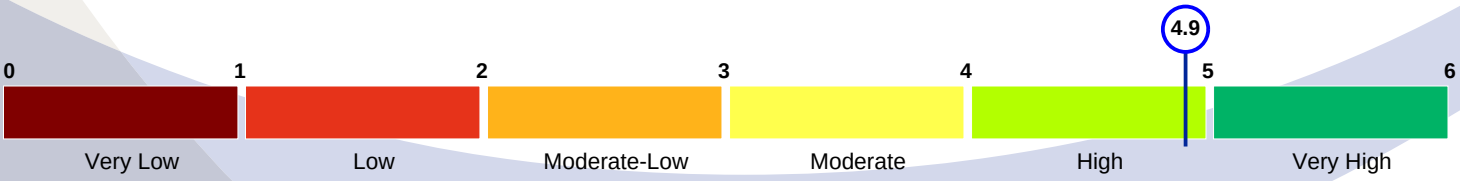
Breakdown:	Sand **22%**	Silt **49%**	Clay **29%**
Soil Textural Class:		Clay Loam	
Major Soil Classification:		Medium	
Calcium Carbonate Content:		<1%	Non-calcareous
Slope:		0 °	

In very calcareous soils (>10% calcium carbonate) the silt and clay sized fractions are likely to contain particles of carbonate which may result in the incorrect classification of soil type.

Water Erosion Risk



Soil Health Index - Based on soil chemical, physical and biological results.



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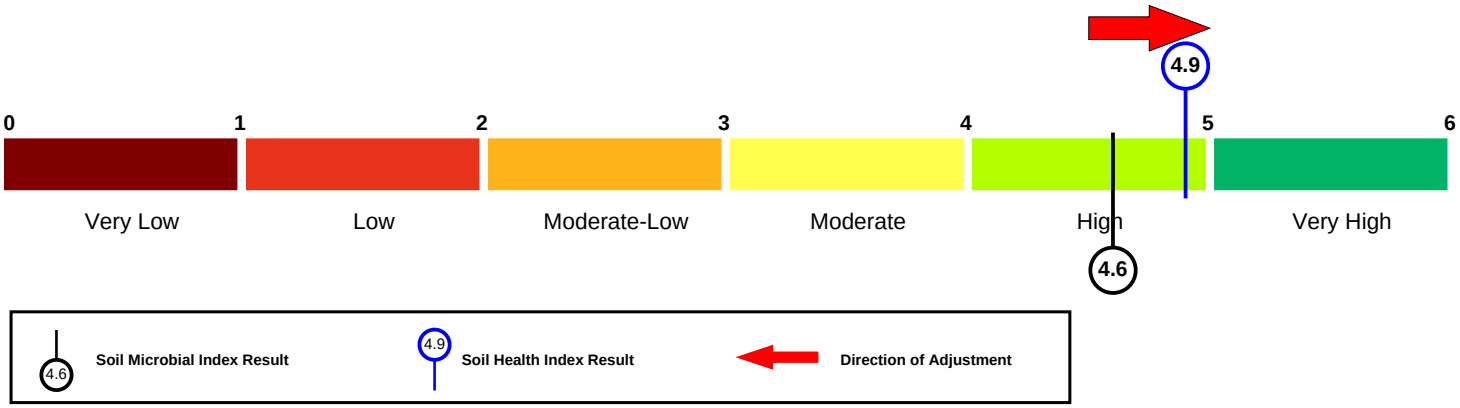
REPORT (Continued)

Laboratory Reference:

Report No. 79926
Sample No. 636060
Date Reported: 25/07/2023

Soil Health Index Adjustments



Adjustments to the above soil microbial index are made to create the Soil Health Index. The results from the chemical and physical tests summarised on the first page are used to make these adjustments. The table below provides the justification to these adjustments.

Parameter	Adjustment	Justification
pH	Slight Negative	Your soil pH is slightly above the optimum range. Some cation micronutrients such as iron, manganese, zinc and copper may become less available to the plant at this level. See section 4.1 of the soil health handbook for more information on the influence of high soil pH.
P	Slight / Moderate Positive	Phosphorus availability is above adequate and can provide a stimulus to root production, resulting in higher root exudate production and stronger plant-microbe interactions. See section 4.2 of the soil health hand book for more information on the importance of phosphorus to plant health.
K	No Adjustment	Potassium availability is adequate for good leaf and root development. Plant-microbe interactions should be optimal. See section 4.2 of the soil health handbook for more information on the influence of potassium on soil health.
Mg	Slight / Moderate Negative	Your soil magnesium concentration is very high. Magnesium toxicity issues in plants is very rare however high levels of magnesium can interact with potassium and cause a reduced uptake of potassium by the plant. Your crop may experience potassium deficiency symptoms. See section 4.2 of the soil health handbook for more information on the influence of magnesium on soil health.
Soil Texture	No Adjustment	The fine micro-aggregate structure of this soil type maintains low exchange rates of air and water, resulting in very slow conversion or loss of soil carbon. Microbial respiration rates will be regulated by soil temperature and available carbon sources, which may be lower than other mineral soil types, but should be sustained over very long periods of time. For more information on how soil texture influences soil health see section 3.1 of the soil health handbook.
Soil Organic matter	Large Positive	Organic matter is above average and is making a positive contribution to soil structure, nutrient retention, water holding and microbial activity. In addition, this level of organic matter is reducing soil erosion risk. Microbial conversion of organic matter will be making a valuable contribution to nitrogen and phosphorus availability. For information on how organic matter influences the health of your soil see section 3.2 of the soil health handbook.

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REPORT (Continued)

Laboratory Reference:

Report No. 79926
Sample No. 636060
Date Reported: 25/07/2023

Field Observations

Parameter	Observation	Comment
Soil Compaction	Absent	Soil compaction can have a major impact on Soil Health and severely limits the performance of your field. The reduced soil pore size will lead to inhibition of root growth and emergence, poor aeration, slow movement of nutrients through the soil and a build-up of toxic gases and root exudates. Compaction can cause a shift in microbial populations from aerobic to anaerobic this will cause a rapid increase in the production of gaseous nitrogen released to the atmosphere denitrification of nitrate. See section 6.6 of the Soil Health Handbook for more information on soil compaction.
Earthworms per cubic foot	0	The presence of earthworms can be a good indication of a health soil system. They thrive in soils rich in organic matter and nutrients and with good aeration all major components of Soil Health. Earthworms in turn improve the health of a soil. They ingest soil particles as they burrow which increases the availability of nutrients both from the chemical and physical breakdown of minerals and organic matter. The burrowing activity also increases the aeration of the soil. For more information on the role of Earthworms in Soil health please see section 6.6 of the handbook.
Nutrient Deficiency	Absent	Nutrient deficiency symptoms in your crop can be the first sign that there is either an imbalance of nutrients in the soil inhibiting uptake or that there is a deficiency of particular nutrients. It is often possible to identify the deficiency from the characteristics of the symptoms however there are some symptoms that could indicate a number of possible deficiencies. If the deficiency issues are not highlighted from the chemical analysis of the major nutrients, additional analysis of trace elements may be required to aid identification of the deficiency/imbalance. There are a number of published descriptions of nutrient deficiencies in crops and these should be referred to when making your assessment. Symptoms of the major nutrient deficiencies (P, K and Mg) are described in section 4 of the handbook.

REPORT (Continued)

Report No. 79926 **Sample No.** 636061 **Sample Ref.** EYSF 2E.4	**Cropping:** *Spring Wheat into Grassland* **Field Area:** 4 Ha	**Farm Details:** PROJECT 60683115-EYSF PROJECT 60683115	**Client:** **W634** GARY MCCLEAN AECOM 6TH FLOOR 1 NEW YORK STREET MANCHESTER M1 4HD
Date Received: 17/07/2023	**Date Reported:** 25/07/2023		

Soil Chemical Analysis

	Index	Result	Low	Marginal	Target	Marginal	High
P	2	20.0 mg/l					
K	2+	185 mg/l					
Mg	6	409 mg/l					
Organic Matter (LOI)		6.4%					

			Very Acid	Acid	Neutral	Alkali	Very Alkali
Soil pH		6.2					

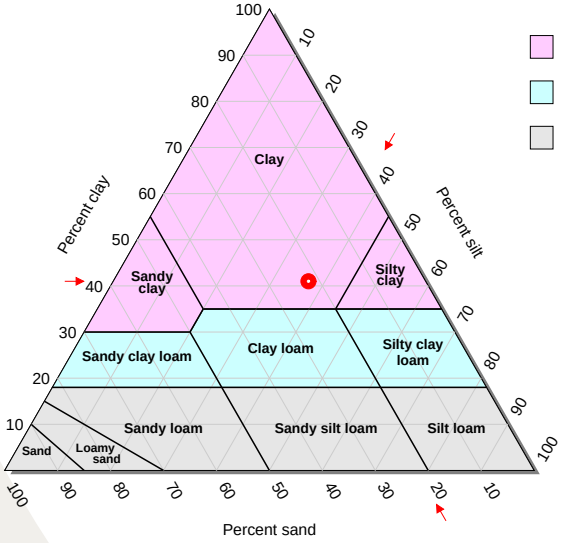
Where no future crop code has been given, levels are calculated assuming an arable crop. If general fertiliser and lime recommendations have been requested, these are given on the following sheets. The analytical methods used are as described in DEFRA Reference Book 427. The index values are determined from the DEFRA Fertiliser Recommendations RB209 9th Edition.

Microbial Activity

CO_2 - C	115 mg/kg	Low	Moderate	Good	High
	Cropped				
	Grass land				

Benchmarked relative to UK agricultural mineral soils.

Textural Classification

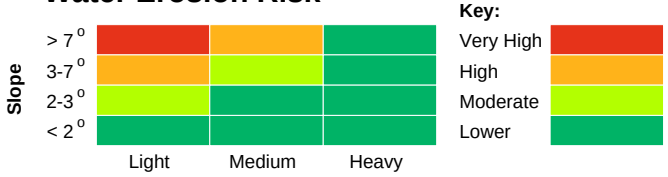


Heavy Soil
Medium Soil
Light Soil

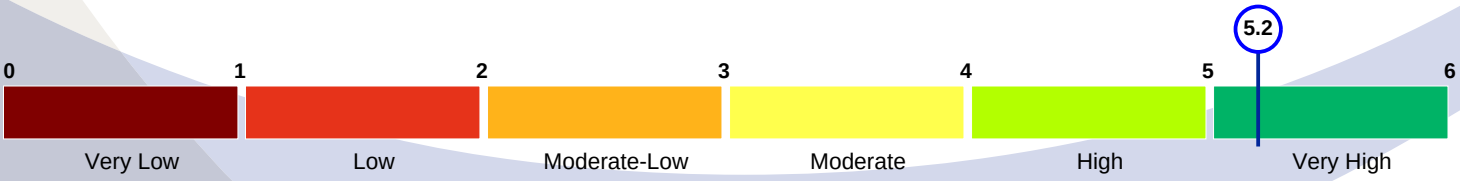
Breakdown:	Sand **22%**	Silt **37%**	Clay **41%**
Soil Textural Class:		Clay	
Major Soil Classification:		Heavy	
Calcium Carbonate Content:		<1%	Non-calcareous
Slope:		0°	

In very calcareous soils (>10% calcium carbonate) the silt and clay sized fractions are likely to contain particles of carbonate which may result in the incorrect classification of soil type.

Water Erosion Risk



Soil Health Index - Based on soil chemical, physical and biological results.



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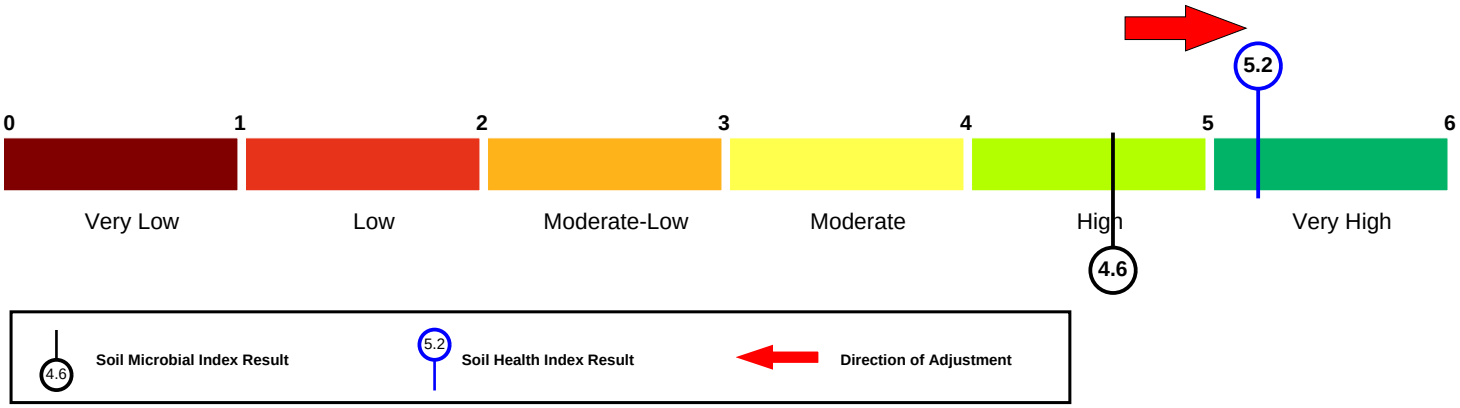
REPORT (Continued)

Laboratory Reference:

Report No. 79926
Sample No. 636061
Date Reported: 25/07/2023

Soil Health Index Adjustments



Adjustments to the above soil microbial index are made to create the Soil Health Index. The results from the chemical and physical tests summarised on the first page are used to make these adjustments. The table below provides the justification to these adjustments.

Parameter	Adjustment	Justification
pH	No Adjustment	Your Soil pH is within the optimum range for healthy plant growth. The pH of the soil will not be contributing to nutrient deficiencies or declines in microbial populations. See section 4.1 of the soil health handbook for more information on how soil pH can influence the health of a soil system.
P	No Adjustment	Phosphorus availability should be adequate to encourage effective root development and associated microbial activity. See section 4.2 of the soil health hand book for more information on the importance of phosphorus to plant health.
K	No Adjustment	Potassium availability is adequate for good leaf and root development. Plant-microbe interactions should be optimal. See section 4.2 of the soil health handbook for more information on the influence of potassium on soil health.
Mg	Slight / Moderate Negative	Your soil magnesium concentration is very high. Magnesium toxicity issues in plants is very rare however high levels of magnesium can interact with potassium and cause a reduced uptake of potassium by the plant. Your crop may experience potassium deficiency symptoms. See section 4.2 of the soil health handbook for more information on the influence of magnesium on soil health.
Soil Texture	Large Positive	The fine micro-aggregate structure of this soil type maintains low exchange rates of air and water, resulting in very slow conversion or loss of soil carbon. Microbial respiration rates will be regulated by soil temperature and available carbon sources, which may be lower than other mineral soil types, but should be sustained over very long periods of time. For more information on how soil texture influences soil health see section 3.1 of the soil health handbook.
Soil Organic matter	Large Positive	Organic matter is above average and is making a positive contribution to soil structure, nutrient retention, water holding and microbial activity. In addition, this level of organic matter is reducing soil erosion risk. Microbial conversion of organic matter will be making a valuable contribution to nitrogen and phosphorus availability. For information on how organic matter influences the health of your soil see section 3.2 of the soil health handbook.

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REPORT (Continued)

Laboratory Reference:

Report No. 79926
Sample No. 636061
Date Reported: 25/07/2023

Field Observations

Parameter	Observation	Comment
Soil Compaction	Absent	Soil compaction can have a major impact on Soil Health and severely limits the performance of your field. The reduced soil pore size will lead to inhibition of root growth and emergence, poor aeration, slow movement of nutrients through the soil and a build-up of toxic gases and root exudates. Compaction can cause a shift in microbial populations from aerobic to anaerobic this will cause a rapid increase in the production of gaseous nitrogen released to the atmosphere denitrification of nitrate. See section 6.6 of the Soil Health Handbook for more information on soil compaction.
Earthworms per cubic foot	0	The presence of earthworms can be a good indication of a health soil system. They thrive in soils rich in organic matter and nutrients and with good aeration all major components of Soil Health. Earthworms in turn improve the health of a soil. They ingest soil particles as they burrow which increases the availability of nutrients both from the chemical and physical breakdown of minerals and organic matter. The burrowing activity also increases the aeration of the soil. For more information on the role of Earthworms in Soil health please see section 6.6 of the handbook.
Nutrient Deficiency	Absent	Nutrient deficiency symptoms in your crop can be the first sign that there is either an imbalance of nutrients in the soil inhibiting uptake or that there is a deficiency of particular nutrients. It is often possible to identify the deficiency from the characteristics of the symptoms however there are some symptoms that could indicate a number of possible deficiencies. If the deficiency issues are not highlighted from the chemical analysis of the major nutrients, additional analysis of trace elements may be required to aid identification of the deficiency/imbalance. There are a number of published descriptions of nutrient deficiencies in crops and these should be referred to when making your assessment. Symptoms of the major nutrient deficiencies (P, K and Mg) are described in section 4 of the handbook.

REPORT (Continued)

Report No. 79926 **Sample No.** 636062 **Sample Ref.** EYSF 2F	**Cropping:** *Broad Beans into Grassland* **Field Area:** 5.5 Ha	**Farm Details:** PROJECT 60683115-EYSF PROJECT 60683115	**Client:** **W634** GARY MCCLEAN AECOM 6TH FLOOR 1 NEW YORK STREET MANCHESTER M1 4HD
Date Received: 17/07/2023	**Date Reported:** 25/07/2023		

Soil Chemical Analysis

	Index	Result	Low	Marginal	Target	Marginal	High
P	1	10.6 mg/l					
K	1	106 mg/l					
Mg	5	313 mg/l					
Organic Matter (LOI)		4.6%					

			Very Acid	Acid	Neutral	Alkali	Very Alkali
Soil pH		6.8					

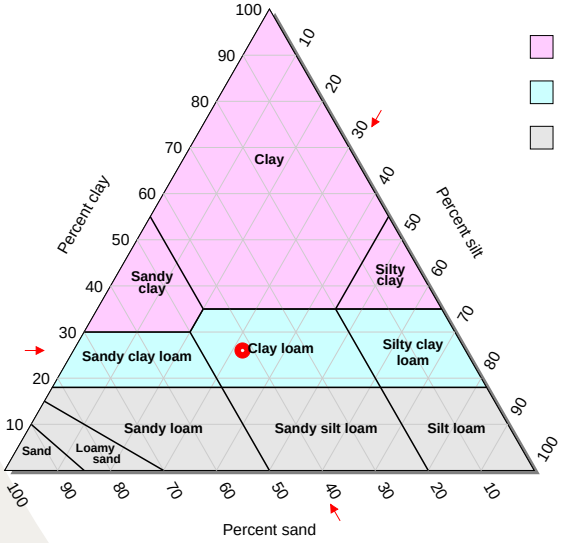
Where no future crop code has been given, levels are calculated assuming an arable crop. If general fertiliser and lime recommendations have been requested, these are given on the following sheets. The analytical methods used are as described in DEFRA Reference Book 427. The index values are determined from the DEFRA Fertiliser Recommendations RB209 9th Edition.

Microbial Activity

CO_2 - C	76 mg/kg	Low	Moderate	Good	High
	Cropped				
	Grass land				

Benchmarked relative to UK agricultural mineral soils.

Textural Classification

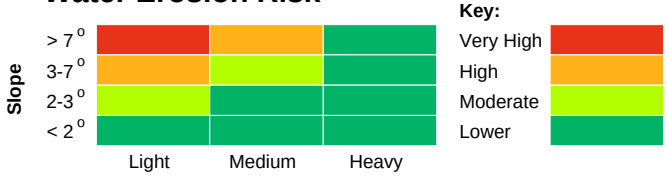


Heavy Soil
Medium Soil
Light Soil

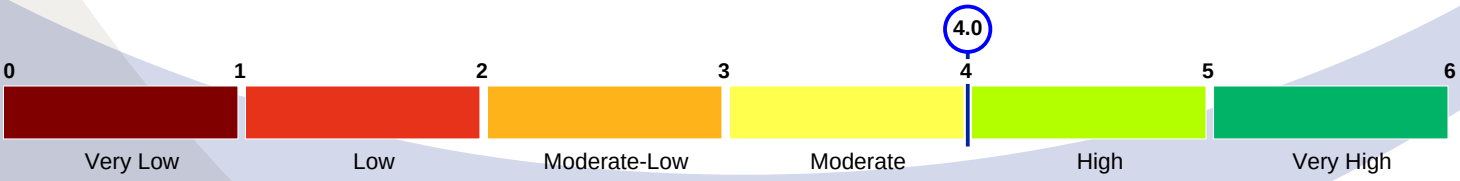
Breakdown:	Sand **42%**	Silt **32%**	Clay **26%**
Soil Textural Class:		Clay Loam	
Major Soil Classification:		Medium	
Calcium Carbonate Content:		<1%	Non-calcareous
Slope:		0°	

In very calcareous soils (>10% calcium carbonate) the silt and clay sized fractions are likely to contain particles of carbonate which may result in the incorrect classification of soil type.

Water Erosion Risk



Soil Health Index - Based on soil chemical, physical and biological results.



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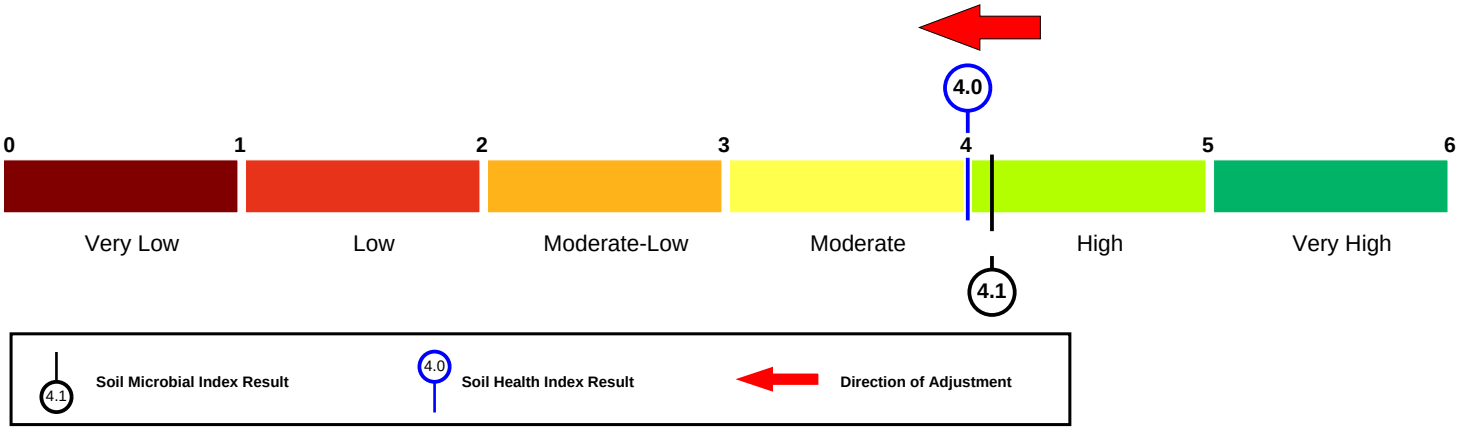
REPORT (Continued)

Laboratory Reference:

Report No. 79926
Sample No. 636062
Date Reported: 25/07/2023

Soil Health Index Adjustments



Adjustments to the above soil microbial index are made to create the Soil Health Index. The results from the chemical and physical tests summarised on the first page are used to make these adjustments. The table below provides the justification to these adjustments.

Parameter	Adjustment	Justification
pH	Slight Negative	Your soil pH is slightly above the optimum range. Some cation micronutrients such as iron, manganese, zinc and copper may become less available to the plant at this level. See section 4.1 of the soil health handbook for more information on the influence of high soil pH.
P	Slight / Moderate Negative	Phosphorus availability is low and will be affecting plant root development. This in turn will influence plant-microbe interactions and the ability for roots to produce suitable exudate to maintain or stimulate beneficial microbial activity. See section 4.2 of the soil health hand book for more information on the importance of phosphorus to plant health.
K	Slight Negative	Potassium availability is low, affecting canopy and root development, and potentially restricting plant uptake of nitrogen. Movement of soluble sugars from leaf to root will be low, affecting root exudate production and plant-microbe interactions. This situation will increase in severity as soil moisture deficit and air temperature increases. See section 4.2 of the soil health handbook for more information on effects of low potassium on plant health.
Mg	Slight Negative	Magnesium availability is high and may be restricting plant uptake of potassium, which will influence leaf and root development. Plant-microbe interactions may be affected by poor root exudate production. This in turn will reduce the impact of microbes on soil aggregate formation and carbon capture. See section 4.2 of the soil health handbook for more information on the influence of magnesium on soil health.
Soil Texture	No Adjustment	The fine micro-aggregate structure of this soil type maintains low exchange rates of air and water, resulting in very slow conversion or loss of soil carbon. Microbial respiration rates will be regulated by soil temperature and available carbon sources, which may be lower than other mineral soil types, but should be sustained over very long periods of time. For more information on how soil texture influences soil health see section 3.1 of the soil health handbook.
Soil Organic matter	Large Positive	Organic matter is above average and is making a positive contribution to soil structure, nutrient retention, water holding and microbial activity. In addition, this level of organic matter is reducing soil erosion risk. Microbial conversion of organic matter will be making a valuable contribution to nitrogen and phosphorus availability. For information on how organic matter influences the health of your soil see section 3.2 of the soil health handbook.

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REPORT (Continued)

Laboratory Reference:

Report No. 79926
Sample No. 636062
Date Reported: 25/07/2023

Field Observations

Parameter	Observation	Comment
Soil Compaction	Absent	Soil compaction can have a major impact on Soil Health and severely limits the performance of your field. The reduced soil pore size will lead to inhibition of root growth and emergence, poor aeration, slow movement of nutrients through the soil and a build-up of toxic gases and root exudates. Compaction can cause a shift in microbial populations from aerobic to anaerobic this will cause a rapid increase in the production of gaseous nitrogen released to the atmosphere denitrification of nitrate. See section 6.6 of the Soil Health Handbook for more information on soil compaction.
Earthworms per cubic foot	0	The presence of earthworms can be a good indication of a health soil system. They thrive in soils rich in organic matter and nutrients and with good aeration all major components of Soil Health. Earthworms in turn improve the health of a soil. They ingest soil particles as they burrow which increases the availability of nutrients both from the chemical and physical breakdown of minerals and organic matter. The burrowing activity also increases the aeration of the soil. For more information on the role of Earthworms in Soil health please see section 6.6 of the handbook.
Nutrient Deficiency	Absent	Nutrient deficiency symptoms in your crop can be the first sign that there is either an imbalance of nutrients in the soil inhibiting uptake or that there is a deficiency of particular nutrients. It is often possible to identify the deficiency from the characteristics of the symptoms however there are some symptoms that could indicate a number of possible deficiencies. If the deficiency issues are not highlighted from the chemical analysis of the major nutrients, additional analysis of trace elements may be required to aid identification of the deficiency/imbalance. There are a number of published descriptions of nutrient deficiencies in crops and these should be referred to when making your assessment. Symptoms of the major nutrient deficiencies (P, K and Mg) are described in section 4 of the handbook.

REPORT (Continued)

Laboratory Reference:

Report No. 79926
Date Reported: 25/07/2023

Fertiliser Recommendations

The phosphate and potash recommendations shown below, are those required to replace the offtake and maintain target soil indices. The larger recommended applications for soils below target index will allow the soil to build up to this target index over a number of years. Not applying fertiliser to soils which are above target index will allow the soil to run down over a number of years to the target index.
The recommendation should be increased or decreased where yields are substantially more or less than that specified. The amount to apply can be calculated using the expected yield and values for the offtake of phosphate and potash per tonne of yield given in the RB209 9th edition.
All recommendations are given for the mid-point of each Index.
Where a soil analysis value (as given by the laboratory) is close to the range of an adjacent Index, the recommendation may be reduced or increased slightly taking account of the recommendation given for the adjacent Index. Small adjustments of less than 10 kg/ha are generally not justified.
Efficient use of P and K is most likely to be achieved on soils that are well structured and enable good rooting.
For visual evaluation of soil structure (VESS), a score on 1 or 2 would be considered adequate.
Don't forget to deduct nutrients applied as organic manures.
For Nitrogen recommendations please refer to the RB209 9th edition or seek advice from an FACTS qualified adviser.
Target Indices:
Arable, Forage, Grassland and Potato Crops: P Index 2, K Index 2-
(In rotations where most crops are Autumn-sown, soils are in good condition and P is applied annually, high index 1 can be an adequate target.)
Vegetables and Bulbs: P Index 3, K Index 2+
(If vegetables are only grown occasionally as part of an arable rotation, it would be most economic to target index 2 for arable and forage crops.)
Fruit Vines and Hops: P Index 2, K Index 2, Mg Index 2
(Note: Cider apples respond to K Index 3, Mg Index 3)

Field Name / Ref / Soil Type	*Last Crop / Next Crop*		*P2O5*	*K2O*	*MgO*		*Lime*
EYSF 2G.6	**S Wheat**	*Units/Acre*				*T/Ac*	**0**
636053 / Light	**Grassland**	*Kg/Ha*				*Te/Ha*	**0**

In the first season after Autumn or Spring sowing, deduct the amount of phosphate and potash applied to the seedbed from the recommendations.

Field Name / Ref / Soil Type	*Last Crop / Next Crop*		*P2O5*	*K2O*	*MgO*		*Lime*
EYSF 3B.1	**Other Crop**	*Units/Acre*				*T/Ac*	**0**
636054 / Light	**Grassland**	*Kg/Ha*				*Te/Ha*	**0**

Please see previous sample for crop specific notes.

Field Name / Ref / Soil Type	*Last Crop / Next Crop*		*P2O5*	*K2O*	*MgO*		*Lime*
EYSF 3B.2	**S Wheat**	*Units/Acre*				*T/Ac*	**0**
636055 / Medium	**Grassland**	*Kg/Ha*				*Te/Ha*	**0**

Please see previous sample for crop specific notes.

Field Name / Ref / Soil Type	*Last Crop / Next Crop*		*P2O5*	*K2O*	*MgO*		*Lime*
EYSF 3C.6	**Other Crop**	*Units/Acre*				*T/Ac*	**0**
636056 / Medium	**Grassland**	*Kg/Ha*				*Te/Ha*	**0**

Please see previous sample for crop specific notes.

Field Name / Ref / Soil Type	*Last Crop / Next Crop*		*P2O5*	*K2O*	*MgO*		*Lime*
EYSF 1E.14	**S Wheat**	*Units/Acre*				*T/Ac*	**0**
636057 / Heavy	**Grassland**	*Kg/Ha*				*Te/Ha*	**0**

Please see previous sample for crop specific notes.

Field Name / Ref / Soil Type	*Last Crop / Next Crop*		*P2O5*	*K2O*	*MgO*		*Lime*
EYSF 1E.15	**P Pasture**	*Units/Acre*				*T/Ac*	**0**
636058 / Peaty	**Grassland**	*Kg/Ha*				*Te/Ha*	**0**

Please see previous sample for crop specific notes.

Field Name / Ref / Soil Type	*Last Crop / Next Crop*		*P2O5*	*K2O*	*MgO*		*Lime*
EYSF 2A.3	**Grassland**	*Units/Acre*				*T/Ac*	**0**
636059 / Organ.	**Grassland**	*Kg/Ha*				*Te/Ha*	**0**

Please see previous sample for crop specific notes.

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REPORT (Continued)

Laboratory Reference:
Report No. 79926
Date Reported: 25/07/2023

Fertiliser Recommendations (continued)

Field Name / Ref / Soil Type	*Last Crop / Next Crop*		*P2O5*	*K2O*	*MgO*		*Lime*
EYSF 2C	**S Wheat**	*Units/Acre*				*T/Ac*	**0**
636060 / Organ.	**Grassland**	*Kg/Ha*				*Te/Ha*	**0**

Please see previous sample for crop specific notes.

Field Name / Ref / Soil Type	*Last Crop / Next Crop*		*P2O5*	*K2O*	*MgO*		*Lime*
EYSF 2E.4	**S Wheat**	*Units/Acre*				*T/Ac*	**0**
636061 / Organ.	**Grassland**	*Kg/Ha*				*Te/Ha*	**0**

Please see previous sample for crop specific notes.

Field Name / Ref / Soil Type	*Last Crop / Next Crop*		*P2O5*	*K2O*	*MgO*		*Lime*
EYSF 2F	**Broad Bean**	*Units/Acre*				*T/Ac*	**0**
636062 / Organ.	**Grassland**	*Kg/Ha*				*Te/Ha*	**0**

Please see previous sample for crop specific notes.

Fertiliser recommendations are based on **DEFRA RB209 (Ninth Edition - 2017).** If a nutrient is deficient and no recommendation is given, either no recommendation is given in RB209 or we have insufficient data to give a recommendation. Apply Lime to the nearest half Ton / Tonne.
NRM is a UKAS accredited laboratory to ISO/IEC 17025

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REPORT

Report No. 79927 **Sample No.** 636063 **Sample Ref.** EYSF 1A.6	**Cropping:** *Spring Wheat into Grassland* **Field Area:** 2.5 Ha	**Farm Details:** PROJECT 60683115-EYSF PROJECT 60683115	**Client:** **W634** GARY MCCLEAN AECOM 6TH FLOOR 1 NEW YORK STREET MANCHESTER M1 4HD
Date Received: 17/07/2023	**Date Reported:** 25/07/2023		

Soil Chemical Analysis

	Index	Result	Low	Marginal	Target	Marginal	High
P	2	18.8 mg/l					
K	2-	137 mg/l					
Mg	4	193 mg/l					
Organic Matter (LOI)		5.2%					

			Very Acid	Acid	Neutral	Alkali	Very Alkali
Soil pH		6.2					

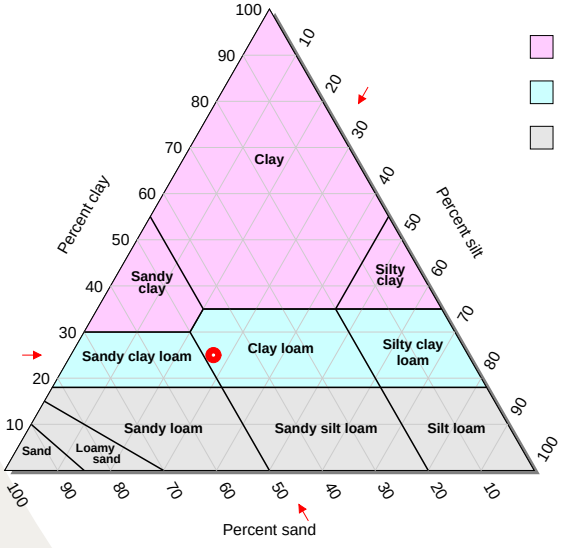
Where no future crop code has been given, levels are calculated assuming an arable crop. If general fertiliser and lime recommendations have been requested, these are given on the following sheets. The analytical methods used are as described in DEFRA Reference Book 427. The index values are determined from the DEFRA Fertiliser Recommendations RB209 9th Edition.

Microbial Activity

CO_2 - C	102 mg/kg	Low	Moderate	Good	High
	Cropped				
	Grass land				

Benchmarked relative to UK agricultural mineral soils.

Textural Classification

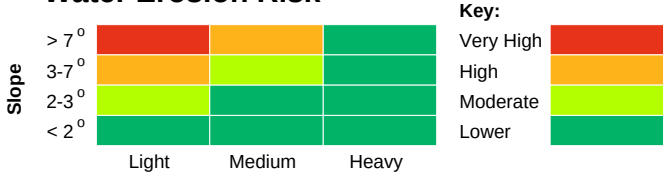


Heavy Soil
Medium Soil
Light Soil

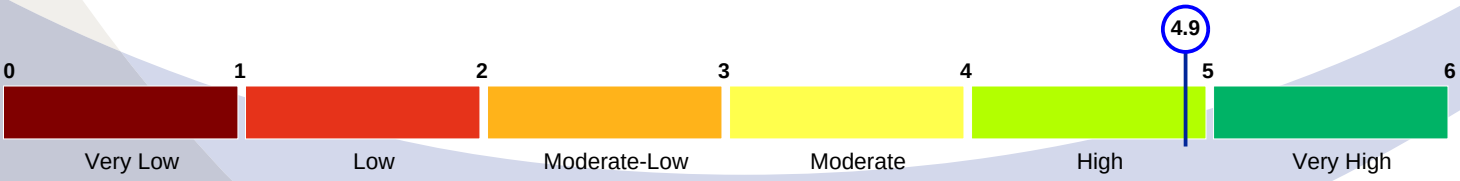
Breakdown:	Sand **48%**	Silt **27%**	Clay **25%**
Soil Textural Class:		Clay Loam	
Major Soil Classification:		Medium	
Calcium Carbonate Content:		<1%	Non-calcareous
Slope:		0 °	

In very calcareous soils (>10% calcium carbonate) the silt and clay sized fractions are likely to contain particles of carbonate which may result in the incorrect classification of soil type.

Water Erosion Risk



Soil Health Index - Based on soil chemical, physical and biological results.



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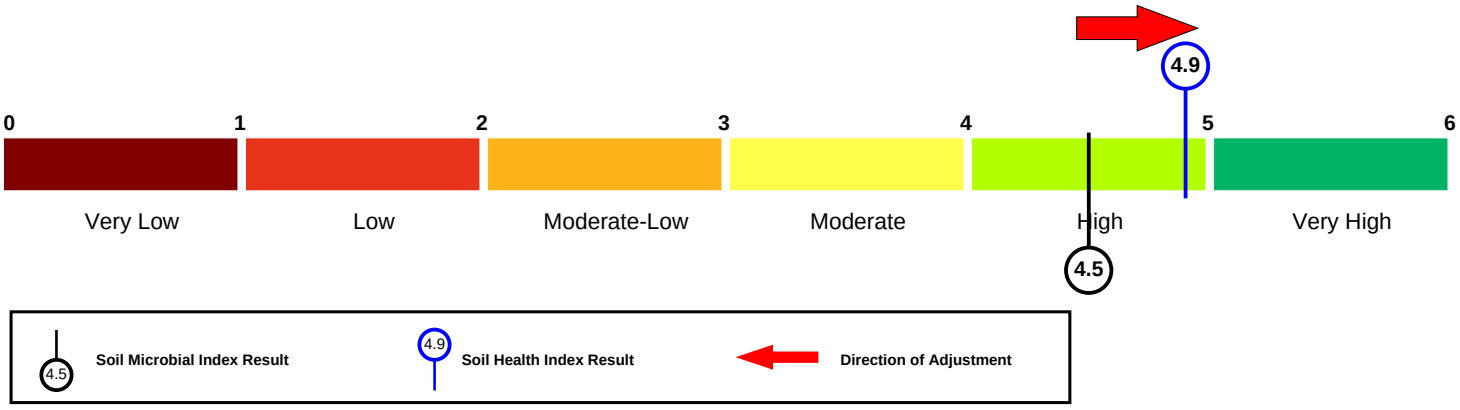
REPORT (Continued)

Laboratory Reference:

Report No. 79927
Sample No. 636063
Date Reported: 25/07/2023

Soil Health Index Adjustments



Adjustments to the above soil microbial index are made to create the Soil Health Index. The results from the chemical and physical tests summarised on the first page are used to make these adjustments. The table below provides the justification to these adjustments.

Parameter	Adjustment	Justification
pH	No Adjustment	Your Soil pH is within the optimum range for healthy plant growth. The pH of the soil will not be contributing to nutrient deficiencies or declines in microbial populations. See section 4.1 of the soil health handbook for more information on how soil pH can influence the health of a soil system.
P	No Adjustment	Phosphorus availability should be adequate to encourage effective root development and associated microbial activity. See section 4.2 of the soil health hand book for more information on the importance of phosphorus to plant health.
K	No Adjustment	Potassium availability is adequate for good leaf and root development. Plant-microbe interactions should be optimal. See section 4.2 of the soil health handbook for more information on the influence of potassium on soil health.
Mg	No Adjustment	Magnesium availability is high but should still provide plants with improved ability to recover nitrogen, manufacture root exudates and tolerate environmental stress. See section 4.2 of the soil health handbook for more information on the influence of magnesium on soil health.
Soil Texture	No Adjustment	The fine micro-aggregate structure of this soil type maintains low exchange rates of air and water, resulting in very slow conversion or loss of soil carbon. Microbial respiration rates will be regulated by soil temperature and available carbon sources, which may be lower than other mineral soil types, but should be sustained over very long periods of time. For more information on how soil texture influences soil health see section 3.1 of the soil health handbook.
Soil Organic matter	Large Positive	Organic matter is above average and is making a positive contribution to soil structure, nutrient retention, water holding and microbial activity. In addition, this level of organic matter is reducing soil erosion risk. Microbial conversion of organic matter will be making a valuable contribution to nitrogen and phosphorus availability. For information on how organic matter influences the health of your soil see section 3.2 of the soil health handbook.

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REPORT (Continued)

Laboratory Reference:

Report No. 79927
Sample No. 636063
Date Reported: 25/07/2023

Field Observations

Parameter	Observation	Comment
Soil Compaction	Absent	Soil compaction can have a major impact on Soil Health and severely limits the performance of your field. The reduced soil pore size will lead to inhibition of root growth and emergence, poor aeration, slow movement of nutrients through the soil and a build-up of toxic gases and root exudates. Compaction can cause a shift in microbial populations from aerobic to anaerobic this will cause a rapid increase in the production of gaseous nitrogen released to the atmosphere denitrification of nitrate. See section 6.6 of the Soil Health Handbook for more information on soil compaction.
Earthworms per cubic foot	0	The presence of earthworms can be a good indication of a health soil system. They thrive in soils rich in organic matter and nutrients and with good aeration all major components of Soil Health. Earthworms in turn improve the health of a soil. They ingest soil particles as they burrow which increases the availability of nutrients both from the chemical and physical breakdown of minerals and organic matter. The burrowing activity also increases the aeration of the soil. For more information on the role of Earthworms in Soil health please see section 6.6 of the handbook.
Nutrient Deficiency	Absent	Nutrient deficiency symptoms in your crop can be the first sign that there is either an imbalance of nutrients in the soil inhibiting uptake or that there is a deficiency of particular nutrients. It is often possible to identify the deficiency from the characteristics of the symptoms however there are some symptoms that could indicate a number of possible deficiencies. If the deficiency issues are not highlighted from the chemical analysis of the major nutrients, additional analysis of trace elements may be required to aid identification of the deficiency/imbalance. There are a number of published descriptions of nutrient deficiencies in crops and these should be referred to when making your assessment. Symptoms of the major nutrient deficiencies (P, K and Mg) are described in section 4 of the handbook.

REPORT (Continued)

Report No. 79927 **Sample No.** 636064 **Sample Ref.** EYSF 1B.1	**Cropping:** *Spring Wheat into Grassland* **Field Area:** 3 Ha	**Farm Details:** PROJECT 60683115-EYSF PROJECT 60683115	**Client:** **W634** GARY MCCLEAN AECOM 6TH FLOOR 1 NEW YORK STREET MANCHESTER M1 4HD
Date Received: 17/07/2023	**Date Reported:** 25/07/2023		

Soil Chemical Analysis

	Index	Result	Low	Marginal	Target	Marginal	High
P	3	26.2 mg/l					
K	2+	197 mg/l					
Mg	5	348 mg/l					
Organic Matter (LOI)		7.9%					

			Very Acid	Acid	Neutral	Alkali	Very Alkali
Soil pH		7.0					

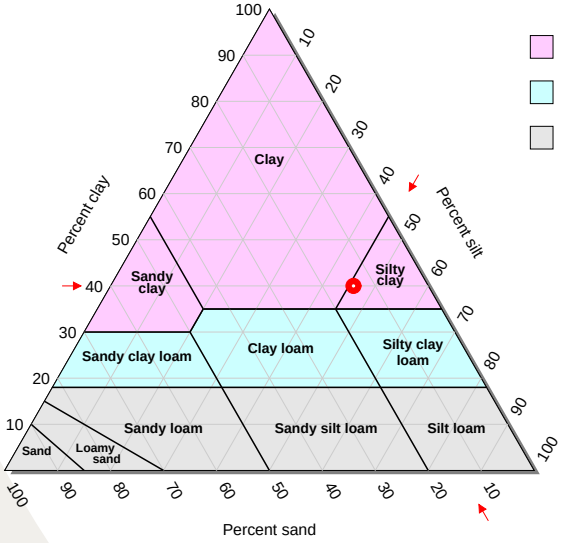
Where no future crop code has been given, levels are calculated assuming an arable crop. If general fertiliser and lime recommendations have been requested, these are given on the following sheets. The analytical methods used are as described in DEFRA Reference Book 427. The index values are determined from the DEFRA Fertiliser Recommendations RB209 9th Edition.

Microbial Activity

CO_2 - C	148 mg/kg	Low	Moderate	Good	High
	Cropped				
	Grass land				

Benchmarked relative to UK agricultural mineral soils.

Textural Classification

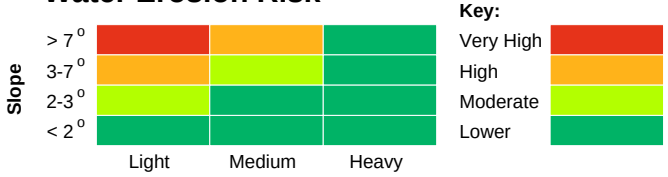


Heavy Soil
Medium Soil
Light Soil

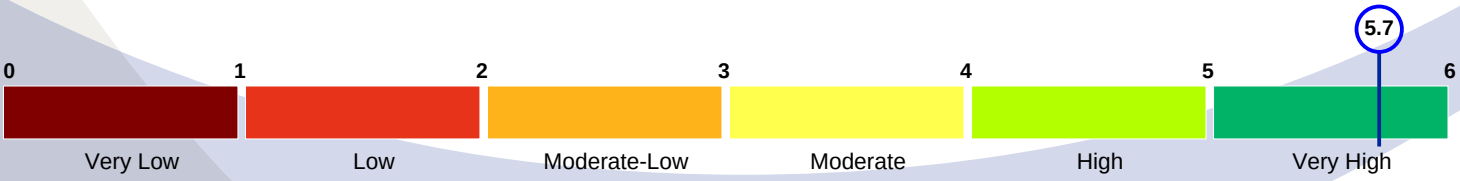
Breakdown:	Sand **14%**	Silt **46%**	Clay **40%**
Soil Textural Class:		Silty Clay	
Major Soil Classification:		Heavy	
Calcium Carbonate Content:		<1%	Non-calcareous
Slope:		0°	

In very calcareous soils (>10% calcium carbonate) the silt and clay sized fractions are likely to contain particles of carbonate which may result in the incorrect classification of soil type.

Water Erosion Risk



Soil Health Index - Based on soil chemical, physical and biological results.



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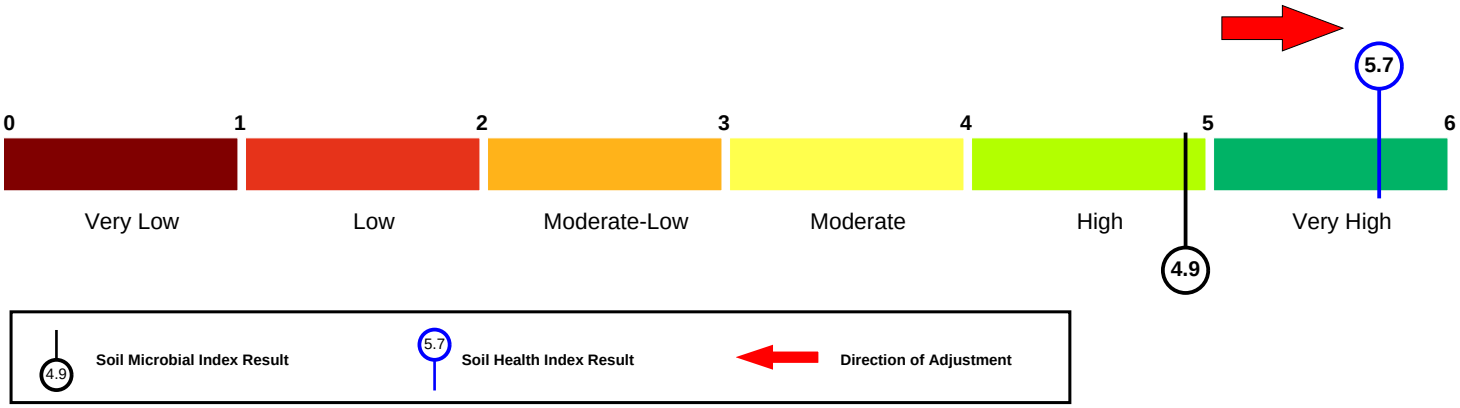
REPORT (Continued)

Laboratory Reference:

Report No. 79927
Sample No. 636064
Date Reported: 25/07/2023

Soil Health Index Adjustments



Adjustments to the above soil microbial index are made to create the Soil Health Index. The results from the chemical and physical tests summarised on the first page are used to make these adjustments. The table below provides the justification to these adjustments.

Parameter	Adjustment	Justification
pH	Slight Negative	Your soil pH is slightly above the optimum range. Some cation micronutrients such as iron, manganese, zinc and copper may become less available to the plant at this level. See section 4.1 of the soil health handbook for more information on the influence of high soil pH.
P	Slight / Moderate Positive	Phosphorus availability is above adequate and can provide a stimulus to root production, resulting in higher root exudate production and stronger plant-microbe interactions. See section 4.2 of the soil health hand book for more information on the importance of phosphorus to plant health.
K	No Adjustment	Potassium availability is adequate for good leaf and root development. Plant-microbe interactions should be optimal. See section 4.2 of the soil health handbook for more information on the influence of potassium on soil health.
Mg	Slight Negative	Magnesium availability is high and may be restricting plant uptake of potassium, which will influence leaf and root development. Plant-microbe interactions may be affected by poor root exudate production. This in turn will reduce the impact of microbes on soil aggregate formation and carbon capture. See section 4.2 of the soil health handbook for more information on the influence of magnesium on soil health.
Soil Texture	Moderate Positive	The fine micro-aggregate structure of this soil type maintains low exchange rates of air and water, resulting in very slow conversion or loss of soil carbon. Microbial respiration rates will be regulated by soil temperature and available carbon sources, which may be lower than other mineral soil types, but should be sustained over very long periods of time. For more information on how soil texture influences soil health see section 3.1 of the soil health handbook.
Soil Organic matter	Large Positive	Organic matter is above average and is making a positive contribution to soil structure, nutrient retention, water holding and microbial activity. In addition, this level of organic matter is reducing soil erosion risk. Microbial conversion of organic matter will be making a significant contribution to nitrogen and phosphorus availability. This soil is now classed as "organic" rather than "mineral" and fertiliser recommendations need to reflect this. For information on how organic matter influences the health of your soil see section 3.2 of the soil health handbook.

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REPORT (Continued)

Laboratory Reference:

Report No. 79927
Sample No. 636064
Date Reported: 25/07/2023

Field Observations

Parameter	Observation	Comment
Soil Compaction	Absent	Soil compaction can have a major impact on Soil Health and severely limits the performance of your field. The reduced soil pore size will lead to inhibition of root growth and emergence, poor aeration, slow movement of nutrients through the soil and a build-up of toxic gases and root exudates. Compaction can cause a shift in microbial populations from aerobic to anaerobic this will cause a rapid increase in the production of gaseous nitrogen released to the atmosphere denitrification of nitrate. See section 6.6 of the Soil Health Handbook for more information on soil compaction.
Earthworms per cubic foot	0	The presence of earthworms can be a good indication of a health soil system. They thrive in soils rich in organic matter and nutrients and with good aeration all major components of Soil Health. Earthworms in turn improve the health of a soil. They ingest soil particles as they burrow which increases the availability of nutrients both from the chemical and physical breakdown of minerals and organic matter. The burrowing activity also increases the aeration of the soil. For more information on the role of Earthworms in Soil health please see section 6.6 of the handbook.
Nutrient Deficiency	Absent	Nutrient deficiency symptoms in your crop can be the first sign that there is either an imbalance of nutrients in the soil inhibiting uptake or that there is a deficiency of particular nutrients. It is often possible to identify the deficiency from the characteristics of the symptoms however there are some symptoms that could indicate a number of possible deficiencies. If the deficiency issues are not highlighted from the chemical analysis of the major nutrients, additional analysis of trace elements may be required to aid identification of the deficiency/imbalance. There are a number of published descriptions of nutrient deficiencies in crops and these should be referred to when making your assessment. Symptoms of the major nutrient deficiencies (P, K and Mg) are described in section 4 of the handbook.

REPORT (Continued)

Report No. 79927 **Sample No.** 636065 **Sample Ref.** EYSF 1B.2	**Cropping:** *Oilseed Rape into Grassland* **Field Area:** 3 Ha	**Farm Details:** PROJECT 60683115-EYSF PROJECT 60683115	**Client:** **W634** GARY MCCLEAN AECOM 6TH FLOOR 1 NEW YORK STREET MANCHESTER M1 4HD
Date Received: 17/07/2023	**Date Reported:** 25/07/2023		

Soil Chemical Analysis

	Index	Result	Low	Marginal	Target	Marginal	High
P	4	48.0 mg/l					
K	2-	155 mg/l					
Mg	5	275 mg/l					
Organic Matter (LOI)		6.8%					

			Very Acid	Acid	Neutral	Alkali	Very Alkali
Soil pH		7.1					

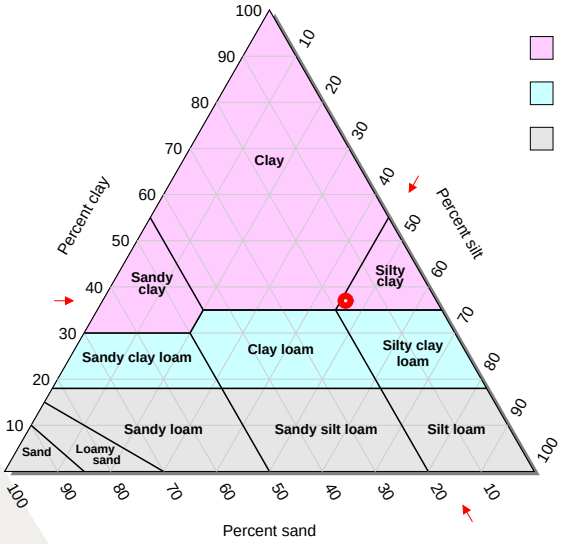
Where no future crop code has been given, levels are calculated assuming an arable crop. If general fertiliser and lime recommendations have been requested, these are given on the following sheets. The analytical methods used are as described in DEFRA Reference Book 427. The index values are determined from the DEFRA Fertiliser Recommendations RB209 9th Edition.

Microbial Activity

CO_2 - C	127 mg/kg	Low	Moderate	Good	High
	Cropped				
	Grass land				

Benchmarked relative to UK agricultural mineral soils.

Textural Classification

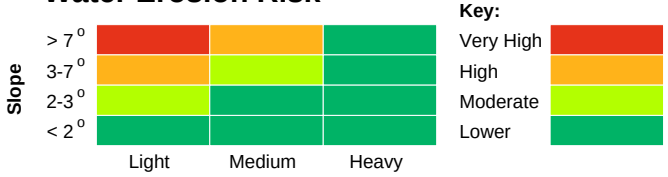


Heavy Soil
Medium Soil
Light Soil

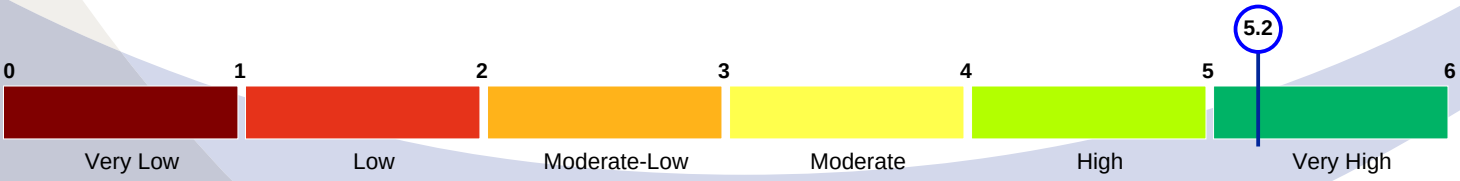
Breakdown:	Sand **17%**	Silt **46%**	Clay **37%**
Soil Textural Class:		Silty Clay	
Major Soil Classification:		Heavy	
Calcium Carbonate Content:		<1%	Non-calcareous
Slope:		0°	

In very calcareous soils (>10% calcium carbonate) the silt and clay sized fractions are likely to contain particles of carbonate which may result in the incorrect classification of soil type.

Water Erosion Risk



Soil Health Index - Based on soil chemical, physical and biological results.



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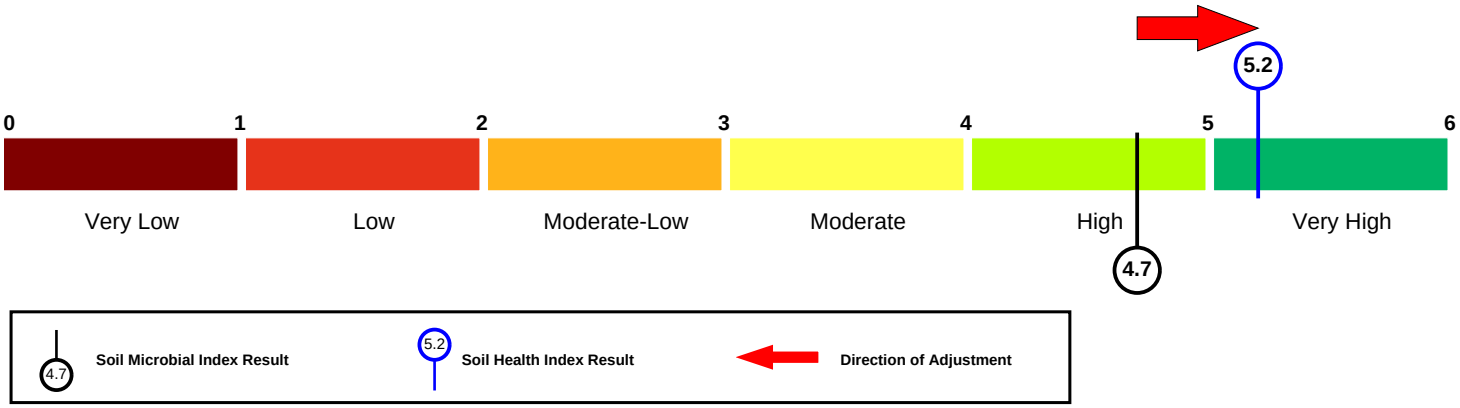
REPORT (Continued)

Laboratory Reference:

Report No. 79927
Sample No. 636065
Date Reported: 25/07/2023

Soil Health Index Adjustments



Adjustments to the above soil microbial index are made to create the Soil Health Index. The results from the chemical and physical tests summarised on the first page are used to make these adjustments. The table below provides the justification to these adjustments.

Parameter	Adjustment	Justification
pH	Slight Negative	Your soil pH is slightly above the optimum range. Some cation micronutrients such as iron, manganese, zinc and copper may become less available to the plant at this level. See section 4.1 of the soil health handbook for more information on the influence of high soil pH.
P	Slight Negative	Phosphorus availability is high and may be restricting plant uptake of micro-nutrients, limiting root exudate production and plant-microbe interactions. This in turn will reduce the impact of microbes on soil aggregate formation and Carbon capture. Phosphorus loss from this soil may be high during erosion events. See section 4.2 of the soil health hand book for more information on the importance of phosphorus to plant health.
K	No Adjustment	Potassium availability is adequate for good leaf and root development. Plant-microbe interactions should be optimal. See section 4.2 of the soil health handbook for more information on the influence of potassium on soil health.
Mg	Slight Negative	Magnesium availability is high and may be restricting plant uptake of potassium, which will influence leaf and root development. Plant-microbe interactions may be affected by poor root exudate production. This in turn will reduce the impact of microbes on soil aggregate formation and carbon capture. See section 4.2 of the soil health handbook for more information on the influence of magnesium on soil health.
Soil Texture	Moderate Positive	The fine micro-aggregate structure of this soil type maintains low exchange rates of air and water, resulting in very slow conversion or loss of soil carbon. Microbial respiration rates will be regulated by soil temperature and available carbon sources, which may be lower than other mineral soil types, but should be sustained over very long periods of time. For more information on how soil texture influences soil health see section 3.1 of the soil health handbook.
Soil Organic matter	Large Positive	Organic matter is above average and is making a positive contribution to soil structure, nutrient retention, water holding and microbial activity. In addition, this level of organic matter is reducing soil erosion risk. Microbial conversion of organic matter will be making a significant contribution to nitrogen and phosphorus availability. This soil is now classed as "organic" rather than "mineral" and fertiliser recommendations need to reflect this. For information on how organic matter influences the health of your soil see section 3.2 of the soil health handbook.

NRM Coopers Bridge, Braziers Lane, Bracknell, Berkshire RG42 6NS
Tel: +44 (0) 1344 886338 **Fax:** +44 (0) 1344 890972 **Email:** enquiries@nrm.uk.com

REPORT (Continued)

Laboratory Reference:

Report No. 79927
Sample No. 636065
Date Reported: 25/07/2023

Field Observations

Parameter	Observation	Comment
Soil Compaction	Absent	Soil compaction can have a major impact on Soil Health and severely limits the performance of your field. The reduced soil pore size will lead to inhibition of root growth and emergence, poor aeration, slow movement of nutrients through the soil and a build-up of toxic gases and root exudates. Compaction can cause a shift in microbial populations from aerobic to anaerobic this will cause a rapid increase in the production of gaseous nitrogen released to the atmosphere denitrification of nitrate. See section 6.6 of the Soil Health Handbook for more information on soil compaction.
Earthworms per cubic foot	0	The presence of earthworms can be a good indication of a health soil system. They thrive in soils rich in organic matter and nutrients and with good aeration all major components of Soil Health. Earthworms in turn improve the health of a soil. They ingest soil particles as they burrow which increases the availability of nutrients both from the chemical and physical breakdown of minerals and organic matter. The burrowing activity also increases the aeration of the soil. For more information on the role of Earthworms in Soil health please see section 6.6 of the handbook.
Nutrient Deficiency	Absent	Nutrient deficiency symptoms in your crop can be the first sign that there is either an imbalance of nutrients in the soil inhibiting uptake or that there is a deficiency of particular nutrients. It is often possible to identify the deficiency from the characteristics of the symptoms however there are some symptoms that could indicate a number of possible deficiencies. If the deficiency issues are not highlighted from the chemical analysis of the major nutrients, additional analysis of trace elements may be required to aid identification of the deficiency/imbalance. There are a number of published descriptions of nutrient deficiencies in crops and these should be referred to when making your assessment. Symptoms of the major nutrient deficiencies (P, K and Mg) are described in section 4 of the handbook.

REPORT (Continued)

Report No. 79927 **Sample No.** 636066 **Sample Ref.** EYSF 1A.14	**Cropping:** *Spring Wheat into Grassland* **Field Area:** 4.8 Ha	**Farm Details:** PROJECT 60683115-EYSF PROJECT 60683115	**Client:** **W634** GARY MCCLEAN AECOM 6TH FLOOR 1 NEW YORK STREET MANCHESTER M1 4HD
Date Received: 17/07/2023	**Date Reported:** 25/07/2023		

Soil Chemical Analysis

	Index	Result	Low	Marginal	Target	Marginal	High
P	3	28.2 mg/l					
K	2-	176 mg/l					
Mg	6	381 mg/l					
Organic Matter (LOI)		5.5%					

			Very Acid	Acid	Neutral	Alkali	Very Alkali
Soil pH		6.4					

Where no future crop code has been given, levels are calculated assuming an arable crop. If general fertiliser and lime recommendations have been requested, these are given on the following sheets. The analytical methods used are as described in DEFRA Reference Book 427. The index values are determined from the DEFRA Fertiliser Recommendations RB209 9th Edition.

Microbial Activity

CO_2 - C	127 mg/kg	Low	Moderate	Good	High
	Cropped				
	Grass land				

Benchmarked relative to UK agricultural mineral soils.

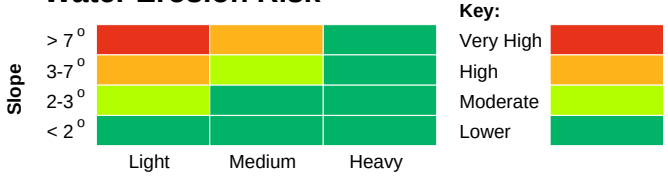
Textural Classification

Heavy Soil
Medium Soil
Light Soil

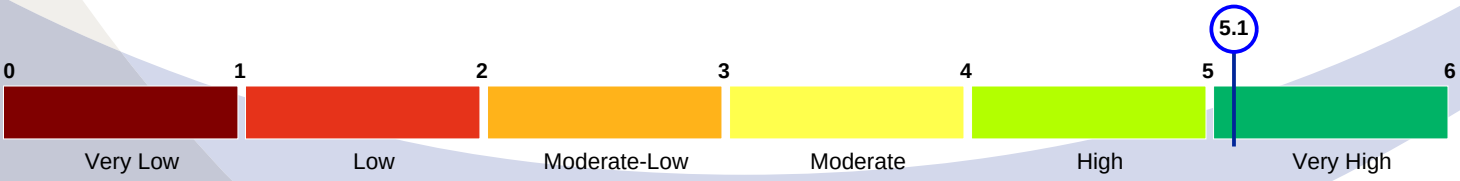
Breakdown:	Sand **29%**	Silt **39%**	Clay **32%**
Soil Textural Class:		Clay Loam	
Major Soil Classification:		Medium	
Calcium Carbonate Content:		<1%	Non-calcareous
Slope:		0°	

In very calcareous soils (>10% calcium carbonate) the silt and clay sized fractions are likely to contain particles of carbonate which may result in the incorrect classification of soil type.

Water Erosion Risk



Soil Health Index - Based on soil chemical, physical and biological results.



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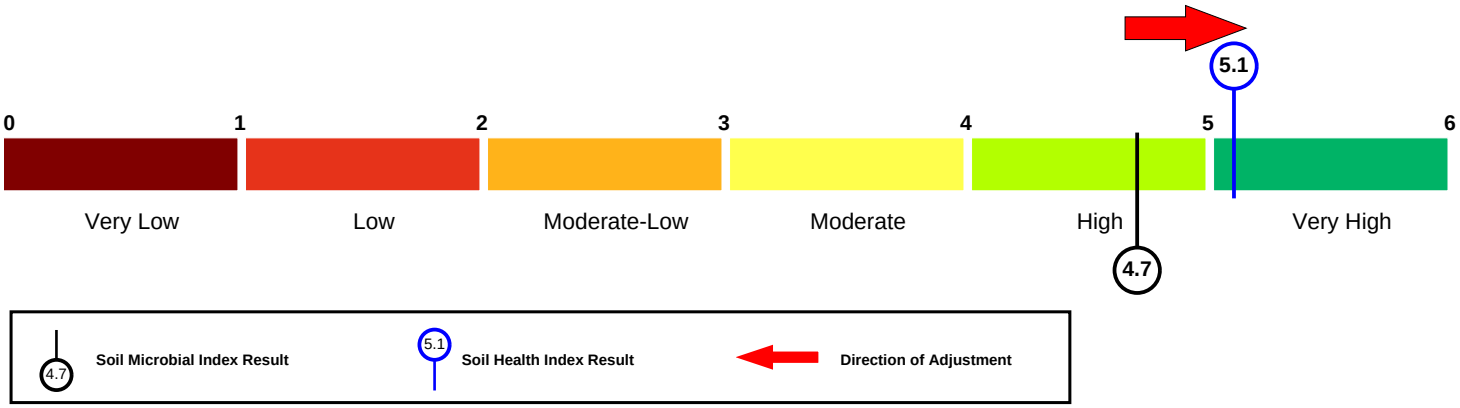
Tel: +44 (0) 1344 886338 **Fax:** +44 (0) 1344 890972 **Email:** enquiries@nrm.uk.com

REPORT (Continued)

Laboratory Reference:

Report No. 79927
Sample No. 636066
Date Reported: 25/07/2023

Soil Health Index Adjustments



Adjustments to the above soil microbial index are made to create the Soil Health Index. The results from the chemical and physical tests summarised on the first page are used to make these adjustments. The table below provides the justification to these adjustments.

Parameter	Adjustment	Justification
pH	No Adjustment	Your Soil pH is within the optimum range for healthy plant growth. The pH of the soil will not be contributing to nutrient deficiencies or declines in microbial populations. See section 4.1 of the soil health handbook for more information on how soil pH can influence the health of a soil system.
P	Slight / Moderate Positive	Phosphorus availability is above adequate and can provide a stimulus to root production, resulting in higher root exudate production and stronger plant-microbe interactions. See section 4.2 of the soil health hand book for more information on the importance of phosphorus to plant health.
K	No Adjustment	Potassium availability is adequate for good leaf and root development. Plant-microbe interactions should be optimal. See section 4.2 of the soil health handbook for more information on the influence of potassium on soil health.
Mg	Slight / Moderate Negative	Your soil magnesium concentration is very high. Magnesium toxicity issues in plants is very rare however high levels of magnesium can interact with potassium and cause a reduced uptake of potassium by the plant. Your crop may experience potassium deficiency symptoms. See section 4.2 of the soil health handbook for more information on the influence of magnesium on soil health.
Soil Texture	No Adjustment	The fine micro-aggregate structure of this soil type maintains low exchange rates of air and water, resulting in very slow conversion or loss of soil carbon. Microbial respiration rates will be regulated by soil temperature and available carbon sources, which may be lower than other mineral soil types, but should be sustained over very long periods of time. For more information on how soil texture influences soil health see section 3.1 of the soil health handbook.
Soil Organic matter	Large Positive	Organic matter is above average and is making a positive contribution to soil structure, nutrient retention, water holding and microbial activity. In addition, this level of organic matter is reducing soil erosion risk. Microbial conversion of organic matter will be making a valuable contribution to nitrogen and phosphorus availability. For information on how organic matter influences the health of your soil see section 3.2 of the soil health handbook.

NRM Coopers Bridge, Braziers Lane, Bracknell, Berkshire RG42 6NS
Tel: +44 (0) 1344 886338 **Fax:** +44 (0) 1344 890972 **Email:** enquiries@nrm.uk.com

REPORT (Continued)

Laboratory Reference:

Report No. 79927
Sample No. 636066
Date Reported: 25/07/2023

Field Observations

Parameter	Observation	Comment
Soil Compaction	Absent	Soil compaction can have a major impact on Soil Health and severely limits the performance of your field. The reduced soil pore size will lead to inhibition of root growth and emergence, poor aeration, slow movement of nutrients through the soil and a build-up of toxic gases and root exudates. Compaction can cause a shift in microbial populations from aerobic to anaerobic this will cause a rapid increase in the production of gaseous nitrogen released to the atmosphere denitrification of nitrate. See section 6.6 of the Soil Health Handbook for more information on soil compaction.
Earthworms per cubic foot	0	The presence of earthworms can be a good indication of a health soil system. They thrive in soils rich in organic matter and nutrients and with good aeration all major components of Soil Health. Earthworms in turn improve the health of a soil. They ingest soil particles as they burrow which increases the availability of nutrients both from the chemical and physical breakdown of minerals and organic matter. The burrowing activity also increases the aeration of the soil. For more information on the role of Earthworms in Soil health please see section 6.6 of the handbook.
Nutrient Deficiency	Absent	Nutrient deficiency symptoms in your crop can be the first sign that there is either an imbalance of nutrients in the soil inhibiting uptake or that there is a deficiency of particular nutrients. It is often possible to identify the deficiency from the characteristics of the symptoms however there are some symptoms that could indicate a number of possible deficiencies. If the deficiency issues are not highlighted from the chemical analysis of the major nutrients, additional analysis of trace elements may be required to aid identification of the deficiency/imbalance. There are a number of published descriptions of nutrient deficiencies in crops and these should be referred to when making your assessment. Symptoms of the major nutrient deficiencies (P, K and Mg) are described in section 4 of the handbook.

REPORT (Continued)

Report No. 79927 **Sample No.** 636067 **Sample Ref.** EYSF 1E.6	**Cropping:** *Spring Wheat into Grassland* **Field Area:** 7 Ha	**Farm Details:** PROJECT 60683115-EYSF PROJECT 60683115	**Client:** **W634** GARY MCCLEAN AECOM 6TH FLOOR 1 NEW YORK STREET MANCHESTER M1 4HD
Date Received: 17/07/2023	**Date Reported:** 25/07/2023		

Soil Chemical Analysis

	Index	Result	Low	Marginal	Target	Marginal	High
P	1	12.0 mg/l					
K	2+	221 mg/l					
Mg	6	447 mg/l					
Organic Matter (LOI)		9.5%					

			Very Acid	Acid	Neutral	Alkali	Very Alkali
Soil pH		6.2					

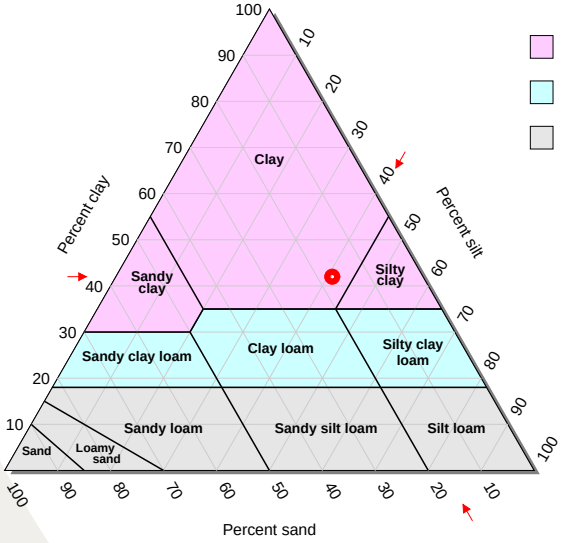
Where no future crop code has been given, levels are calculated assuming an arable crop. If general fertiliser and lime recommendations have been requested, these are given on the following sheets. The analytical methods used are as described in DEFRA Reference Book 427. The index values are determined from the DEFRA Fertiliser Recommendations RB209 9th Edition.

Microbial Activity

CO_2 - C	119 mg/kg	Low	Moderate	Good	High
	Cropped				
	Grass land				

Benchmarked relative to UK agricultural mineral soils.

Textural Classification

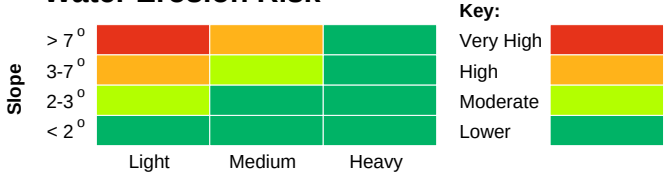


Heavy Soil
Medium Soil
Light Soil

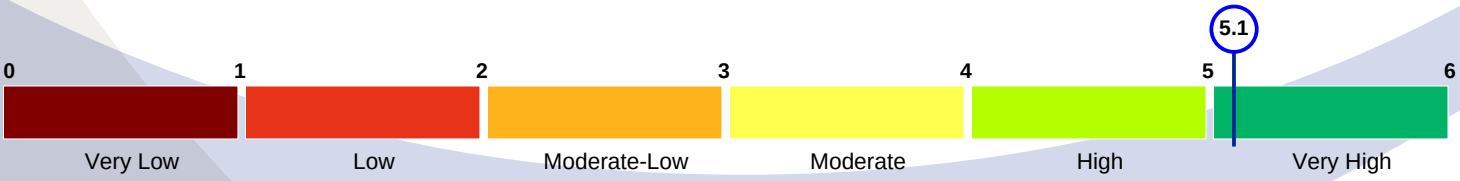
Breakdown:	Sand **17%**	Silt **41%**	Clay **42%**
Soil Textural Class:		Clay	
Major Soil Classification:		Heavy	
Calcium Carbonate Content:		<1%	Non-calcareous
Slope:		0°	

In very calcareous soils (>10% calcium carbonate) the silt and clay sized fractions are likely to contain particles of carbonate which may result in the incorrect classification of soil type.

Water Erosion Risk



Soil Health Index - Based on soil chemical, physical and biological results.



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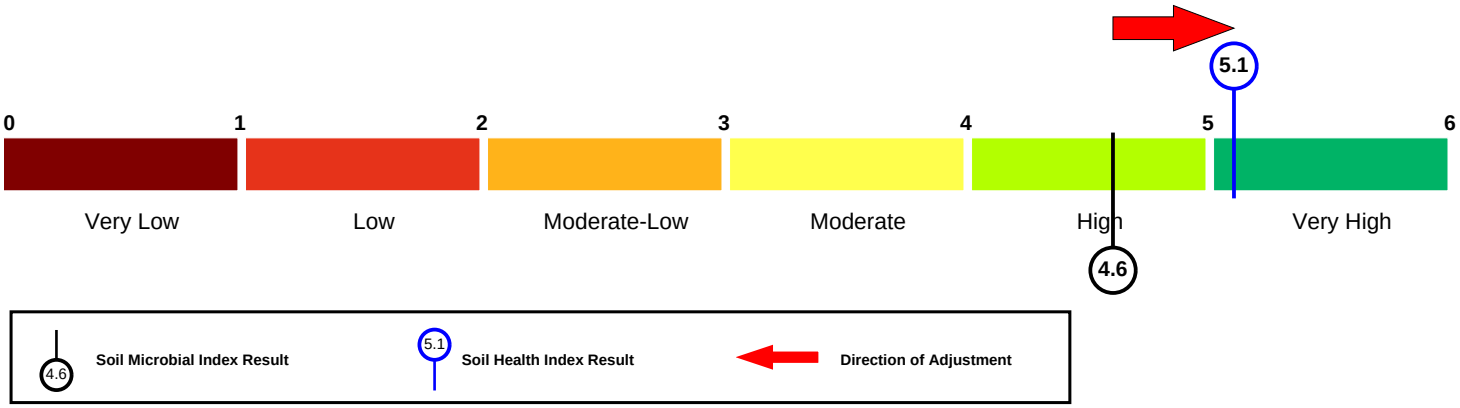
Tel: +44 (0) 1344 886338 **Fax:** +44 (0) 1344 890972 **Email:** enquiries@nrm.uk.com

REPORT (Continued)

Laboratory Reference:

Report No. 79927
Sample No. 636067
Date Reported: 25/07/2023

Soil Health Index Adjustments



Adjustments to the above soil microbial index are made to create the Soil Health Index. The results from the chemical and physical tests summarised on the first page are used to make these adjustments. The table below provides the justification to these adjustments.

Parameter	Adjustment	Justification
pH	No Adjustment	Your Soil pH is within the optimum range for healthy plant growth. The pH of the soil will not be contributing to nutrient deficiencies or declines in microbial populations. See section 4.1 of the soil health handbook for more information on how soil pH can influence the health of a soil system.
P	Slight / Moderate Negative	Phosphorus availability is low and will be affecting plant root development. This in turn will influence plant-microbe interactions and the ability for roots to produce suitable exudate to maintain or stimulate beneficial microbial activity. See section 4.2 of the soil health hand book for more information on the importance of phosphorus to plant health.
K	No Adjustment	Potassium availability is adequate for good leaf and root development. Plant-microbe interactions should be optimal. See section 4.2 of the soil health handbook for more information on the influence of potassium on soil health.
Mg	Slight / Moderate Negative	Your soil magnesium concentration is very high. Magnesium toxicity issues in plants is very rare however high levels of magnesium can interact with potassium and cause a reduced uptake of potassium by the plant. Your crop may experience potassium deficiency symptoms. See section 4.2 of the soil health handbook for more information on the influence of magnesium on soil health.
Soil Texture	Large Positive	The fine micro-aggregate structure of this soil type maintains low exchange rates of air and water, resulting in very slow conversion or loss of soil carbon. Microbial respiration rates will be regulated by soil temperature and available carbon sources, which may be lower than other mineral soil types, but should be sustained over very long periods of time. For more information on how soil texture influences soil health see section 3.1 of the soil health handbook.
Soil Organic matter	Large Positive	Organic matter is above average and is making a positive contribution to soil structure, nutrient retention, water holding and microbial activity. In addition, this level of organic matter is reducing soil erosion risk. Microbial conversion of organic matter will be making a significant contribution to nitrogen and phosphorus availability. This soil is now classed as "organic" rather than "mineral" and fertiliser recommendations need to reflect this. For information on how organic matter influences the health of your soil see section 3.2 of the soil health handbook.

NRM Coopers Bridge, Braziers Lane, Bracknell, Berkshire RG42 6NS
Tel: +44 (0) 1344 886338 **Fax:** +44 (0) 1344 890972 **Email:** enquiries@nrm.uk.com

REPORT (Continued)

Laboratory Reference:

Report No. 79927
Sample No. 636067
Date Reported: 25/07/2023

Field Observations

Parameter	Observation	Comment
Soil Compaction	Absent	Soil compaction can have a major impact on Soil Health and severely limits the performance of your field. The reduced soil pore size will lead to inhibition of root growth and emergence, poor aeration, slow movement of nutrients through the soil and a build-up of toxic gases and root exudates. Compaction can cause a shift in microbial populations from aerobic to anaerobic this will cause a rapid increase in the production of gaseous nitrogen released to the atmosphere denitrification of nitrate. See section 6.6 of the Soil Health Handbook for more information on soil compaction.
Earthworms per cubic foot	0	The presence of earthworms can be a good indication of a health soil system. They thrive in soils rich in organic matter and nutrients and with good aeration all major components of Soil Health. Earthworms in turn improve the health of a soil. They ingest soil particles as they burrow which increases the availability of nutrients both from the chemical and physical breakdown of minerals and organic matter. The burrowing activity also increases the aeration of the soil. For more information on the role of Earthworms in Soil health please see section 6.6 of the handbook.
Nutrient Deficiency	Absent	Nutrient deficiency symptoms in your crop can be the first sign that there is either an imbalance of nutrients in the soil inhibiting uptake or that there is a deficiency of particular nutrients. It is often possible to identify the deficiency from the characteristics of the symptoms however there are some symptoms that could indicate a number of possible deficiencies. If the deficiency issues are not highlighted from the chemical analysis of the major nutrients, additional analysis of trace elements may be required to aid identification of the deficiency/imbalance. There are a number of published descriptions of nutrient deficiencies in crops and these should be referred to when making your assessment. Symptoms of the major nutrient deficiencies (P, K and Mg) are described in section 4 of the handbook.

REPORT (Continued)

Report No. 79927 **Sample No.** 636068 **Sample Ref.** EYSF 1E.11	**Cropping:** *Oilseed Rape into Grassland* **Field Area:** 6 Ha	**Farm Details:** PROJECT 60683115-EYSF PROJECT 60683115	**Client:** **W634** GARY MCCLEAN AECOM 6TH FLOOR 1 NEW YORK STREET MANCHESTER M1 4HD
Date Received: 17/07/2023	**Date Reported:** 25/07/2023		

Soil Chemical Analysis

	Index	Result	Low	Marginal	Target	Marginal	High
P	1	9.8 mg/l					
K	2-	129 mg/l					
Mg	5	306 mg/l					
Organic Matter (LOI)		5.4%					

			Very Acid	Acid	Neutral	Alkali	Very Alkali
Soil pH		6.9					

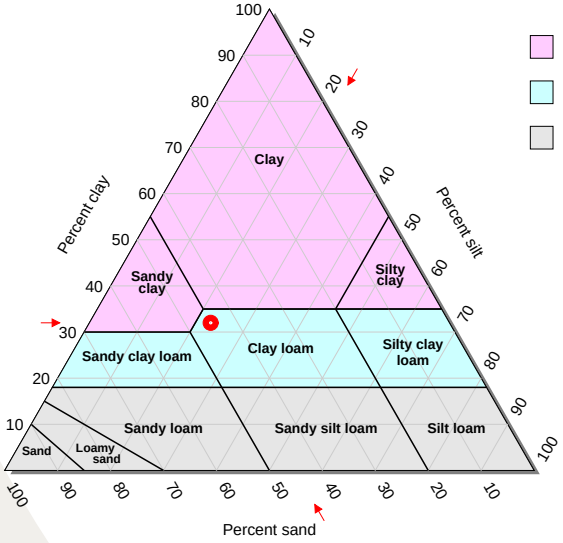
Where no future crop code has been given, levels are calculated assuming an arable crop. If general fertiliser and lime recommendations have been requested, these are given on the following sheets. The analytical methods used are as described in DEFRA Reference Book 427. The index values are determined from the DEFRA Fertiliser Recommendations RB209 9th Edition.

Microbial Activity

CO_2 - C	119 mg/kg	Low	Moderate	Good	High
	Cropped				
	Grass land				

Benchmarked relative to UK agricultural mineral soils.

Textural Classification

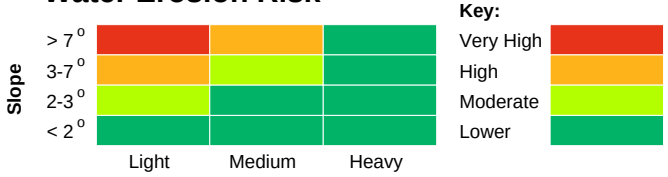


Heavy Soil
Medium Soil
Light Soil

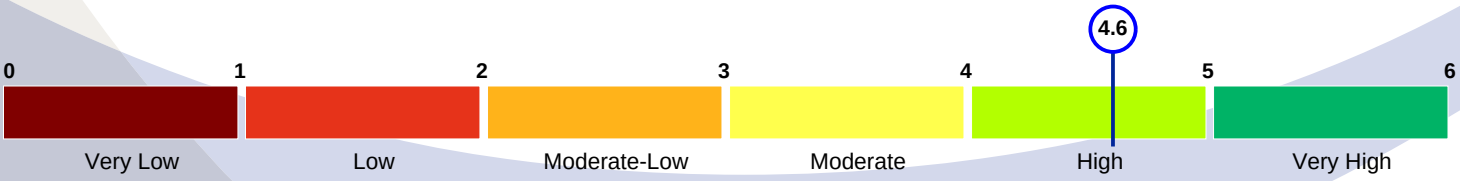
Breakdown:	Sand **45%**	Silt **23%**	Clay **32%**
Soil Textural Class:		Clay Loam	
Major Soil Classification:		Medium	
Calcium Carbonate Content:		<1%	Non-calcareous
Slope:		0°	

In very calcareous soils (>10% calcium carbonate) the silt and clay sized fractions are likely to contain particles of carbonate which may result in the incorrect classification of soil type.

Water Erosion Risk



Soil Health Index - Based on soil chemical, physical and biological results.



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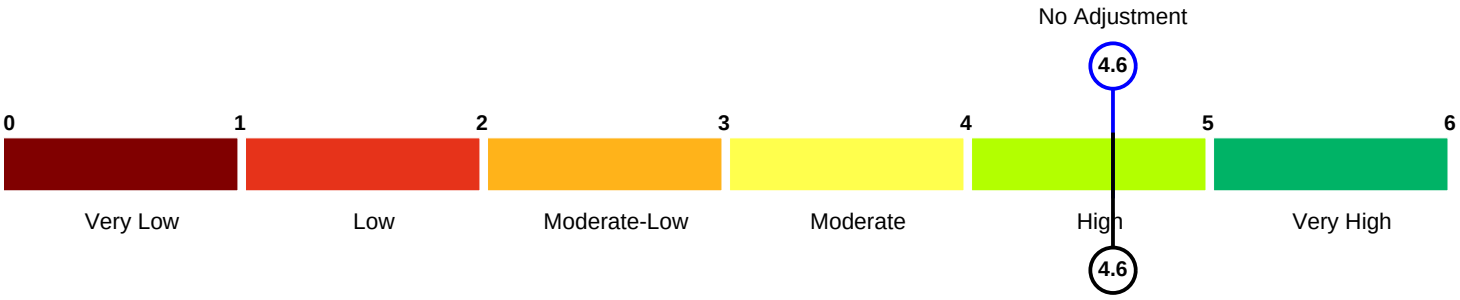
REPORT (Continued)

Laboratory Reference:

Report No. 79927
Sample No. 636068
Date Reported: 25/07/2023

Soil Health Index Adjustments



Parameter	Adjustment	Justification
pH	Slight Negative	Your soil pH is slightly above the optimum range. Some cation micronutrients such as iron, manganese, zinc and copper may become less available to the plant at this level. See section 4.1 of the soil health handbook for more information on the influence of high soil pH.
P	Slight / Moderate Negative	Phosphorus availability is low and will be affecting plant root development. This in turn will influence plant-microbe interactions and the ability for roots to produce suitable exudate to maintain or stimulate beneficial microbial activity. See section 4.2 of the soil health hand book for more information on the importance of phosphorus to plant health.
K	No Adjustment	Potassium availability is adequate for good leaf and root development. Plant-microbe interactions should be optimal. See section 4.2 of the soil health handbook for more information on the influence of potassium on soil health.
Mg	Slight Negative	Magnesium availability is high and may be restricting plant uptake of potassium, which will influence leaf and root development. Plant-microbe interactions may be affected by poor root exudate production. This in turn will reduce the impact of microbes on soil aggregate formation and carbon capture. See section 4.2 of the soil health handbook for more information on the influence of magnesium on soil health.
Soil Texture	No Adjustment	The fine micro-aggregate structure of this soil type maintains low exchange rates of air and water, resulting in very slow conversion or loss of soil carbon. Microbial respiration rates will be regulated by soil temperature and available carbon sources, which may be lower than other mineral soil types, but should be sustained over very long periods of time. For more information on how soil texture influences soil health see section 3.1 of the soil health handbook.
Soil Organic matter	Large Positive	Organic matter is above average and is making a positive contribution to soil structure, nutrient retention, water holding and microbial activity. In addition, this level of organic matter is reducing soil erosion risk. Microbial conversion of organic matter will be making a valuable contribution to nitrogen and phosphorus availability. For information on how organic matter influences the health of your soil see section 3.2 of the soil health handbook.

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REPORT (Continued)

Laboratory Reference:

Report No. 79927
Sample No. 636068
Date Reported: 25/07/2023

Field Observations

Parameter	Observation	Comment
Soil Compaction	Absent	Soil compaction can have a major impact on Soil Health and severely limits the performance of your field. The reduced soil pore size will lead to inhibition of root growth and emergence, poor aeration, slow movement of nutrients through the soil and a build-up of toxic gases and root exudates. Compaction can cause a shift in microbial populations from aerobic to anaerobic this will cause a rapid increase in the production of gaseous nitrogen released to the atmosphere denitrification of nitrate. See section 6.6 of the Soil Health Handbook for more information on soil compaction.
Earthworms per cubic foot	0	The presence of earthworms can be a good indication of a health soil system. They thrive in soils rich in organic matter and nutrients and with good aeration all major components of Soil Health. Earthworms in turn improve the health of a soil. They ingest soil particles as they burrow which increases the availability of nutrients both from the chemical and physical breakdown of minerals and organic matter. The burrowing activity also increases the aeration of the soil. For more information on the role of Earthworms in Soil health please see section 6.6 of the handbook.
Nutrient Deficiency	Absent	Nutrient deficiency symptoms in your crop can be the first sign that there is either an imbalance of nutrients in the soil inhibiting uptake or that there is a deficiency of particular nutrients. It is often possible to identify the deficiency from the characteristics of the symptoms however there are some symptoms that could indicate a number of possible deficiencies. If the deficiency issues are not highlighted from the chemical analysis of the major nutrients, additional analysis of trace elements may be required to aid identification of the deficiency/imbalance. There are a number of published descriptions of nutrient deficiencies in crops and these should be referred to when making your assessment. Symptoms of the major nutrient deficiencies (P, K and Mg) are described in section 4 of the handbook.

REPORT (Continued)

Laboratory Reference:
Report No. 79927
Date Reported: 25/07/2023

Fertiliser Recommendations

The phosphate and potash recommendations shown below, are those required to replace the offtake and maintain target soil indices. The larger recommended applications for soils below target index will allow the soil to build up to this target index over a number of years. Not applying fertiliser to soils which are above target index will allow the soil to run down over a number of years to the target index.
The recommendation should be increased or decreased where yields are substantially more or less than that specified. The amount to apply can be calculated using the expected yield and values for the offtake of phosphate and potash per tonne of yield given in the RB209 9th edition.
All recommendations are given for the mid-point of each Index.
Where a soil analysis value (as given by the laboratory) is close to the range of an adjacent Index, the recommendation may be reduced or increased slightly taking account of the recommendation given for the adjacent Index. Small adjustments of less than 10 kg/ha are generally not justified.
Efficient use of P and K is most likely to be achieved on soils that are well structured and enable good rooting.
For visual evaluation of soil structure (VESS), a score on 1 or 2 would be considered adequate.
Don't forget to deduct nutrients applied as organic manures.
For Nitrogen recommendations please refer to the RB209 9th edition or seek advice from an FACTS qualified adviser.
Target Indices:
Arable, Forage, Grassland and Potato Crops: P Index 2, K Index 2-
(In rotations where most crops are Autumn-sown, soils are in good condition and P is applied annually, high index 1 can be an adequate target.)
Vegetables and Bulbs: P Index 3, K Index 2+
(If vegetables are only grown occasionally as part of an arable rotation, it would be most economic to target index 2 for arable and forage crops.)
Fruit Vines and Hops: P Index 2, K Index 2, Mg Index 2
(Note: Cider apples respond to K Index 3, Mg Index 3)

Field Name / Ref / Soil Type	*Last Crop / Next Crop*		*P2O5*	*K2O*	*MgO*		*Lime*
EYSF 1A.6	**S Wheat**	*Units/Acre*				*T/Ac*	**0**
636063 / Heavy	**Grassland**	*Kg/Ha*				*Te/Ha*	**0**

In the first season after Autumn or Spring sowing, deduct the amount of phosphate and potash applied to the seedbed from the recommendations.

Field Name / Ref / Soil Type	*Last Crop / Next Crop*		*P2O5*	*K2O*	*MgO*		*Lime*
EYSF 1B.1	**S Wheat**	*Units/Acre*				*T/Ac*	**0**
636064 / Medium	**Grassland**	*Kg/Ha*				*Te/Ha*	**0**

Please see previous sample for crop specific notes.

Field Name / Ref / Soil Type	*Last Crop / Next Crop*		*P2O5*	*K2O*	*MgO*		*Lime*
EYSF 1B.2	**Wint. Rape**	*Units/Acre*				*T/Ac*	**0**
636065 / Medium	**Grassland**	*Kg/Ha*				*Te/Ha*	**0**

Please see previous sample for crop specific notes.

Field Name / Ref / Soil Type	*Last Crop / Next Crop*		*P2O5*	*K2O*	*MgO*		*Lime*
EYSF 1A.14	**S Wheat**	*Units/Acre*				*T/Ac*	**0**
636066 / Medium	**Grassland**	*Kg/Ha*				*Te/Ha*	**0**

Please see previous sample for crop specific notes.

Field Name / Ref / Soil Type	*Last Crop / Next Crop*		*P2O5*	*K2O*	*MgO*		*Lime*
EYSF 1E.6	**S Wheat**	*Units/Acre*				*T/Ac*	**0**
636067 / Heavy	**Grassland**	*Kg/Ha*				*Te/Ha*	**0**

Please see previous sample for crop specific notes.

Field Name / Ref / Soil Type	*Last Crop / Next Crop*		*P2O5*	*K2O*	*MgO*		*Lime*
EYSF 1E.11	**Wint. Rape**	*Units/Acre*				*T/Ac*	**0**
636068 / Heavy	**Grassland**	*Kg/Ha*				*Te/Ha*	**0**

Please see previous sample for crop specific notes.

Fertiliser recommendations are based on **DEFRA RB209 (Ninth Edition - 2017).** If a nutrient is deficient and no recommendation is given, either no recommendation is given in RB209 or we have insufficient data to give a recommendation. Apply Lime to the nearest half Ton / Tonne.
NRM is a UKAS accredited laboratory to ISO/IEC 17025

NRM Coopers Bridge, Braziers Lane, Bracknell, Berkshire RG42 6NS
Tel: +44 (0) 1344 886338 **Fax:** +44 (0) 1344 890972 **Email:** enquiries@nrm.uk.com