



Cambridge Waste Water Treatment Plant Relocation Project  
Anglian Water Services Limited

# Environmental Statement

## Appendix 6.1: Baseline

### Agricultural Land

### Classification

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## 1 Introduction

### 1.1 Background

1.1.1 To support the development of the baseline in relation to agricultural land and soils, desktop and field surveys were completed in order to determine the distribution of Agricultural Land Classification (ALC) grades within the area of land required for the Proposed Development.

### 1.2 Document purpose and scope

1.2.1 This document reports on a soil survey that was undertaken to examine the soil resources and determine the distribution of ALC grades across the proposed WWTP.

1.2.2 This document also reports soil baseline information and provisional ALC grades of Waterbeach Pipeline based on desk study.

1.2.3 The soil properties identified have additionally been used to devise a Soil Management Plan (SMP) for the Proposed Development (Appendix 6.3, App Doc Ref 5.4.6.3) to ensure sustainable soil handling during the construction phase.

### 1.3 Guidance

1.3.1 The following sets out relevant guidance in relation the ALC. **Natural**

#### **England Technical Information Note TIN049**

1.3.2 This document entitled 'Agricultural Land Classification: protecting the best and most versatile agricultural land' (Natural England, 2009) states that 'where significant development of agricultural land is demonstrated to be necessary, local planning authorities should seek to use areas of poorer quality land in preference to that of higher quality'. It outlines how an ALC provides a method for assessing the quality of farmland to enable informed choices to be made about its future use within the planning system.

#### **Agricultural Land Classification of England and Wales**

1.3.3 ALC guidelines provide the industry standard framework for classifying land with respect to developments impacting agricultural land (Ministry of Agriculture, Fisheries and Food, 1998). The following grades describe the cropping potential of land depending on certain physical and chemical properties. Best and most versatile land is classified as grades 1, 2 and 3a.

1.3.4 Grade 1 (excellent quality agricultural land). 'Land with no or very minor limitations to agricultural use. A very wide range of agricultural and horticultural crops can be



grown and commonly includes top fruit, soft fruit, salad crops and winter harvested vegetables. Yields are high and less variable than on land of lower quality’.

1.3.5 Grade 2 (very good quality agricultural land). ‘Land with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural and horticultural crops can usually be grown but on some land in the grade there may be reduced flexibility due to difficulties with the production of more demanding crops such as winter harvested vegetables and arable root crops. The level of yield is generally high but may be lower or more variable than Grade 1’.

1.3.6 Grade 3 (good to moderate quality agricultural land). ‘Land with moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. Where more demanding crops are grown, yields are generally lower or more variable than on land in Grades 1 and 2’.

- Subgrade 3a (good quality agricultural land). ‘Land capable of consistently producing moderate to high yields of a narrow range of arable crops, especially cereals, or moderate yields of a wide range of crops including cereals, grass, oilseed rape, potatoes, sugar beet and the less demanding horticultural crops’.
- Subgrade 3b (moderate quality agricultural land). ‘Land capable of producing moderate yields of a narrow range of crops, principally cereals and grass or lower yields of a wider range of crops or high yields of grass which can be grazed or harvested over most of the year’.

1.3.7 Grade 4 (poor quality agricultural land). ‘Land with severe limitations which significantly restrict the range of crops and/or level of yields. It is mainly suited to grass with occasional arable crops (e.g. cereals and forage crops) the yields of which are variable. In moist climates, yields of grass may be moderate to high but there may be difficulties in utilisation. The grade also includes very droughty arable land’.

1.3.8 Grade 5 (very poor quality agricultural land). ‘Land with very severe limitations which restrict use to permanent pasture or rough grazing, except for occasional pioneer forage crops’.

## 1.4 Assumptions and limitations

1.4.1 Soil Resource Surveys (SRS) were scoped out for areas of land temporarily required for the installation of pipelines within the Proposed Development (Waterbeach Pipeline, Final Effluent (FE) and Storm Pipeline and the areas required for the intermediate shafts). This was deemed acceptable due to the temporary nature of the excavation in which the soils would be removed and placed appropriately alongside the trenches (segregating topsoil and subsoils), just prior to installation and reinstated in a timely fashion following installation of the pipelines.

1.4.2 All excavations, transient storage and reinstatement of soils along the pipeline routes will be overseen by a suitably qualified and experienced soil scientist.



## 2 Baseline information

### 2.1 Land use and topography

- 2.1.1 Aerial imagery and preliminary site walkover of land required for the proposed WWTP indicate principle use to be arable cropping.
- 2.1.2 While undertaking the ALC survey, winter wheat was identified in the fields in the west of the proposed WWTP and oilseed rape and beans in the east.
- 2.1.3 The land is generally flat with the highest point located within the area of land required for the proposed WWTP. Topography is indicated within Figure 15.4 of Chapter 15.
- 2.1.4 Aerial imagery indicate that land use in the Waterbeach zone comprises predominantly arable land. This was the area that wasn't surveyed.

### 2.2 Geology

- 2.2.1 Site geology influences soil formation and the various soil types found in specific regions. It should therefore be considered to aid assessment of design options, soil survey requirements, and soil management planning during construction activities. British Geological Survey (BGS) mapping (British Geological Survey, 2021) was consulted to identify superficial and bedrock geology over the survey area prior to an intrusive survey.

#### Superficial geology

- 2.2.2 There is no recorded superficial geology for the proposed WWTP, as per the Geology of Britain viewer. However, a strip of peat is recorded within 800m east of the proposed WWTP in the area close to the new outfall. River terrace deposits (sand and gravel sediment) are recorded within 1km south of the proposed WWTP.
- 2.2.3 Varying superficial deposits are present along the Waterbeach zone, these include River Terrace Deposits, Alluvium and peat deposits. **Bedrock geology**
- 2.2.4 The underlying bedrock for the proposed WWTP is recorded as West Melbury Marly Chalk Formation. This is a buff, grey and off-white, soft, marly chalk and hard grey limestone arranged in couplets.
- 2.2.5 The West Melbury Marly Chalk Formation comprises the bedrock along the southern section of the Waterbeach zone, with the Gault Formation comprising the bedrock across the remainder of the Waterbeach zone.



## 2.3 Soil resources

### Soil Associations

2.3.1 National soil association mapping (Cranfield University, 2021) suggests that the soils in the area of land required for the Proposed Development comprise ten soil associations, they are described as follows:

- **Adventurers' 1:** Deep peat soils. Flat land. Groundwater levels often controlled by ditches and pumps, some undrained areas. Risk of wind erosion.
- **Clayhythe:** Deep humose fine loamy over sandy and fine loamy over clayey soils mainly calcareous. Some peat soils. Groundwater controlled by ditches and pumps.
- **Evesham 3:** Slowly permeable calcareous clayey, and fine loamy over clayey soils. Some slowly permeable seasonally waterlogged non-calcareous clayey soils.
- **Midelney:** Stoneless clayey soils mostly overlying peat. Soils variably affected by groundwater which is, in places, controlled by ditches and pumps. Flat land. Risk of flooding locally.
- **Milton:** Deep permeable calcareous fine loamy soils variably affected by groundwater. Some similar shallower well drained soils over gravel in places. Complex soil patterns locally.
- **Peacock:** Deep humose calcareous clayey and non-calcareous fine loamy over clayey soils. Some peat soils. Groundwater controlled by ditches and pumps.
- **Reach:** Shallow humose fine loamy calcareous soils over chalk or chalk rubble with groundwater controlled by ditches and pumps.
- **Restored Coprolite:** Restored coprolite workings. Generally slowly permeable seasonally waterlogged calcareous fine loamy over clayey soils. Associated with disturbed calcareous fine loamy and occasional coarse loamy soils.
- **Swoffham Prior:** Well-drained calcareous coarse and fine loamy soils over chalk drift or rubble. Some similar shallow soils. Deep non-calcareous loamy soils in places. Striped and polygonal soil patterns locally.
- **Wantage 2:** Shallow well-drained calcareous silty soils over argillaceous chalk. Sometimes affected by groundwater. Deeper well-drained coarse loamy soils in places. Complex soil patterns locally.

### Provisional and previous Agricultural Land Classification

2.3.2 Provisional ALC data (Natural England, 2020) were initially consulted to establish a baseline understanding of the quality of agricultural land likely to be impacted by the





Proposed Development. ALC grades are defined in Section 1.3. Section 4 reports the results of the ALC survey subsequent to this baseline study and the results are mapped in Figure 6.2 Book of Figures- Agricultural Land and Soils (App Doc Ref 5.3.6).

- 2.3.3 Provisional data from the Magic Map (Department of Environment, Food and Rural Affairs, 2021) application suggests that the land required for the construction of the proposed WWTP and Landscape Masterplan comprises Grade 2 agricultural land. In concurrence, the Natural England map for the 'Likelihood of Best and Most Versatile (BMV) Agricultural Land' (Map Reference: NE170809-1016-779 (Natural England, 2017)) indicates that there is a high likelihood of BMV land on the survey site (i.e. >60% of the area is BMV land).
- 2.3.4 No previous ALC survey data were available for the area contained within the Scheme Order Limits.

## 2.4 Climatological data and flooding

- 2.4.1 Climatological data and flood risk are important physical factors that influence soil resources.

### Climatological data

- 2.4.2 Climate exerts influence on soil formation, soil properties and the agricultural potential of the land. Table 2-1 displays the climatological data for the Proposed Development centered around grid reference TL 495 609 as recorded by the Met Office (Met Office, 2021). Field capacity days are 96, which are low (less than 225) and indicate that the land may not be prone to waterlogging. Average rainfall is lower than the UK average recorded by the Met Office. The accumulated temperature above 0°C (January to June) (AT0) is higher than 1125 day-degrees and can therefore be considered warm enough for sustained cereal production (Hallett & Jones, 1993).

**Table 2-1: Climatological data for the area of the Proposed Development**

Variable	Measurement
National Grid Reference	TL 495 609
Altitude (m)	8
Average annual rainfall (mm)	570
Lapse rate for average annual rainfall (LAAR) (mm/m)	0.4
Average summer rainfall (April to September) (mm)	300
Accumulated temperature above 0° C (January to June)	1458



Accumulated temperature above 0° C (April to September)	2460
Moisture deficit for winter wheat (mm)	121
<b>Variable</b>	<b>Measurement</b>
Moisture deficit for potatoes (mm)	117
Field capacity days	96

**Flood risk**

2.4.3 The Environment Agency’s Flood Map for Planning (Environment Agency, 2021) was used to identify flood zones. Flood risk is relevant because soils function as water stores for flood attenuation. The requirement for contractors to monitor and manage flood risk may affect soil resources during construction. Flood zones were reported with the following designations:

- Flood Zone 1 – less than 1 in 1,000 annual probability of river flooding.
- Flood Zone 2 – between a 1 in 100 and 1 in 1,000 annual probability of river flooding.
- Flood Zone 3 – 1 in 100 or greater annual probability of river flooding.

2.4.4 The area of land required for the construction of the proposed WWTP (including FE and Storm Pipeline and Outfall) and Landscape Masterplan is located in flood zone 1 (less than 1 in 1,000 annual probability of river flooding) and Flood Zone 2 (1 in 100 and 1 in 1,000 annual probability of river flooding).

2.4.5 The area of land temporarily required for the construction of the northern extent of the Waterbeach pipeline (up to 1.6km) is within Flood Zone 2.

2.4.6 Further assessment on flood risk has been completed and reported within the Flood Risk Assessment (FRA) (Appendix 20.1, App Doc Ref 5.4.20.1)

### 3 Survey methodology

#### 3.1 Survey locations

3.1.1 An ALC survey was undertaken on an area of approximately 100ha in the area of land required for the proposed WWTP and landscape masterplan, to the north of the A14 between Fen Ditton and Horningsea (Figure 6.3 Book of Figures- Agricultural Land and Soils 5.3.6). Ten fields were surveyed, and labelled G036-1, G036-10, R037-1, R037-2, R037-3, R037-4, R037-5, Y039-1, Y039-2 and Y039-4 (Figure 6.3 Book of Figures- Agricultural Land and Soils 5.3.6).



## 3.2 Survey approach

- 3.2.1 An ALC survey was undertaken in accordance with the 'Agricultural Land Classification of England and Wales' (Ministry of Agriculture, Fisheries and Food, 1998) and the Soil Survey Handbook (Hodgson, 1997), to determine the distribution of agricultural land grades across the survey locations.
- 3.2.2 The survey was undertaken between 22nd and 26th November 2021 by suitably qualified soil scientists.
- 3.2.3 Edelman (Dutch) hand augers were used to take cores to a depth of 120cm or bedrock, whichever was shallower. The cores were distributed across the survey site in a grid formation every 100m, satisfying and exceeding the requirement for 1 auger bore per hectare (Figure 6.3 Book of Figures- Agricultural Land and Soils 5.3.6).
- 3.2.4 The auger points were positioned using a handheld GPS with a pre-loaded survey boundary and auger bore locations.
- 3.2.5 Two soil pits were also included to further examine the soil profile and structure. To avoid buried services, Cable Avoidance Tool and Generator (CAT and Genny) equipment was used to scan auger locations and a buried service plan was consulted.
- 3.2.6 The ALC survey comprised an assessment for soil horizon depth, texture, mottling, stoniness, structure, ped strength, carbonate content, slope and presence of roots. Soil calcareousness was determined by the addition of hydrochloric acid (10%). Soil colour was classified according to a Munsell Soil Colour Chart (Munsell, 2010).
- 3.2.7 Sampling of topsoil and subsoil was additionally carried out for laboratory analysis of nutrient concentrations and organic matter content.
- 3.2.8 Soil sampling was undertaken in accordance with the guidelines outlined in Natural England Technical Information Note TIN035 (Natural England, 2008). Samples were taken from each field and placed in clean polythene bags. These comprised 25 cores bulked together to give a composite sample (500 g). A gouge auger was used to take the 25 topsoil cores (to a depth of ~25cm) and the 25 subsoil cores (~25 – 50cm), distributed in a W pattern across the field.

## 3.3 Analysis

- 3.3.1 The soil samples were tested by NRM Laboratories (UK) for pH, available phosphorus (P), potassium (K) and magnesium (Mg), and organic matter. The results were interpreted as per Natural England TIN036 (Natural England, 2008), and British Standard's topsoil specification (British Standards Institution, 2015) and subsoil specification (British Standards Institution, 2013).
- 3.3.2 The laboratory analysis records are located within Appendix A.2.

## 4 Survey results

### 4.1 Soil resources

#### Main soil types

4.1.1 The soils are generally well drained, calcareous soils with few to common flints at various depths. Three major soil types were identified in the survey (Figure 6.4 Book of Figures- Agricultural Land and Soils (App Doc Ref 5.3.6)). Soil type 1 is shallow, very calcareous loam over chalk, chalk rubble or chalk drift (Figure 4.1). Soil type 2 is very calcareous deep loam (Figure 4.2). Soil type 3 is very calcareous deep soil with loam over loamy sand or sand (Figure 4.3). The soils over the proposed WWTP vary within distance. Figure 4.4 indicates the frequent variation and complex pattern of the soils. Detailed auger borehole data are in Appendix A.2.



**Figure 4.1: Soil Type 1 – Shallow calcareous loam**

*Source: Mott MacDonald, November 2021*



**Figure 4.2: Soil Type 2 – Deep calcareous loam**

*Source: Mott MacDonald, November 2021*



**Figure 4.3: Soil Type 3 – Calcareous loam over loamy sand or sand**

*Source: Mott MacDonald, November 2021*



**Figure 4.4: Soil pattern**

Source: Mott MacDonald, November 2021 **Soil**

### **nutrients**

4.1.2 The results of laboratory soil nutrient analyses are displayed in Table 4-1 (and attached in Appendix 13) and interpreted following Natural England TIN036 (Natural England, 2008) and British Standard specifications (British Standards Institution, 2015) and (British Standards Institution, 2013). Most soils are classified as low fertility calcareous soils as per British Standard specifications (British Standards Institution, 2015) and (British Standards Institution, 2013) for soils with <5% soil organic matter, <20mg P/L, >20% clay, and a pH>7. The distribution of specific nutrients phosphorous (P), potassium (K) and Magnesium (Mg) is shown in Appendices A.5 – A.10. The results are summarised below:

- Topsoil P levels are mostly low, with one field having very low levels and two fields having moderate levels.
- Most subsoil P levels are very low, with two fields having low levels.
- Topsoil K levels are mostly moderate, whilst subsoil levels are mostly low.
- Topsoil Mg levels range from low to moderate, whilst subsoil Mg is low. The low nutrient levels and fertility of the soils within the land required for the proposed WWTP and landscape masterplan is ideal for the establishment of biodiverse habitats, which are commonly associated with low available P levels.
- Field R037-2 is an exception with moderate P levels and is therefore categorised as multipurpose soil, which may not be suitable for biodiverse habitats.



**Table 4-1: Soil nutrient levels**

Field	Soil	p	Organic Layer H matter (LOI)	Phosphor (ous um um n r %)	Potassi (mg/L)	Magnesi (mg/L)	Descriptio		
G036-1	Subs oil	8.2	3.4	8.6 (VL)*	118 (L)	35 (L)	Low fertility		
	Tops oil	8.1	4.8	11.2 (L)*	81 (L)	38 (L)			
	Subs oil	8.4	3.0	7.0 (VL)*	48 (L)	26 (L)			
G03610	Tops oil	8.2	3.6	10.8 (L)*	126 (M)	35 (L)		calcareous soil	
R037-1	Tops oil	8	3.3	13.6 (L)*	137 (M)	41 (L)			
	Subs oil	8.1	2.7	7.4 (VL)*	112 (L)	34 (L)			
R037-2	Tops oil	8.2	3.1	20.8 (M)*	156 (M)	43 (L)			Multipurpose soil
	Subs oil	8.3	2.6	6.4 (VL)*	77 (L)	37 (L)			Low fertility
R037-3	Tops oil	8	3.6	12 (L)*	149 (M)	52 (M)			calcareous soil
	Subs oil	7.7	2.8	7.4 (VL)*	113 (L)	43 (L)			
R037-4	Tops oil	8	3.3	11 (L)*	149 (M)	54 (M)			
	Subs oil	8.2	3	9.8 (L)*	132 (M)	49 (L)			
R037-5	Tops oil	8.2	3.1	19.8 (M)*	205 (M)	44 (L)			
	Subs oil	8.4	2.6	9.6 (L)*	145 (M)	38 (L)			
Y039-2	Tops oil	8	3.8	8.4 (VL)*	134 (M)	42 (L)			
	Subs oil	7.7	3.5	6.6 (VL)*	92 (L)	40 (L)			



Y039-4	Tops oil	8	5.7	13.8 (L)*	120 (L)	46 (L)
	Subs oil	8.1	4.9	9.4 (VL)*	96 (L)	43 (L)
Y039-1	Tops oil	7.5	3.9	13 (L)*	140 (M)	51 (M)
	Subs oil	7.3	3.4	8 (VL)*	106 (L)	50 (L)

\*VL, Very Low; L, Low; M, Moderate as classified by Natural England TIN036

### Soil volumes

4.1.3 This section reports on soil volume in relation to the area of land subject to soil resource survey.

4.1.4 Table 4-2 summarises the average thickness of topsoil and subsoils for each field within the area surveyed and provides an estimate of approximate soil volumes likely to be generated by soil stripping (rounded to the nearest 100 m<sup>3</sup>. The thickness of each horizon was estimated from the soil texture descriptions of each borehole as per Appendix A.2 and reported in Table 4-3 and (Figure 6.4 Book of Figures- Agricultural Land and Soils, App Doc Ref 5.3.6).

**Table 4-2: Average soil thickness and approximate volumes**

Field	Area (m <sup>2</sup> )	Average horizon thickness (cm)			Approximate volume (m <sup>3</sup> )		
		Topsoil	Upper subsoil	Lower subsoil	Topsoil	Upper subsoil	Lower subsoil
<b>G036-2</b>	6,500	30	20	70	2,000	1,300	4,600
<b>G036-10</b>	21,500	28	29	54	6,000	6,200	11,600
<b>R037-1</b>	119,500	28	23	38	33,500	27,500	45,400
<b>R037-2</b>	225,800	26	37	49	58,700	83,500	110,600
<b>R037-3</b>	158,800	27	30	48	42,900	47,600	76,200
<b>R037-4</b>	177,400	28	31	21	49,700	55,000	37,300
<b>R037-5</b>	21,400	27	27	-	5,800	5,800	-
<b>Y039-1</b>	65,000	28	43	40	18,200	27,900	26,000
<b>Y039-2</b>	94,200	25	38	43	23,600	35,800	40,500
<b>Y039-4</b>	16,000	30	30	60	4,800	4,800	9,600

**Table 4-3. Average soil layer thickness per soil type**

Soil type    Average horizon thickness (cm)





	Topsoil	Upper subsoil	Lower subsoil
<b>Type 1</b>	28	21	24
<b>Type 2</b>	27	22	48
<b>Type 3</b>	27	25	47

## 4.2 Agricultural Land Classification

### Climatic limitations

4.2.1 Climate does not pose a significant limiting factor on crop production, as demonstrated by the accumulated temperature of 2460°C above 0°C and 570mm of average annual rainfall on the Proposed Development (Met Office 2021). Therefore, the land is considered Grade 1 for climatic limitation.

### Gradient and microrelief

4.2.2 The site gradient is generally level between 0 – 1 degrees with only a few very gentle slopes in fields R037-5, R037-4 and Y039-1. As such, gradient and microrelief are not considered to represent limiting factors. **Flooding**

4.2.3 The study area is located within Environment Agency Flood Zones 1, 2 and 3 (Appendix 20.1, App Doc Ref 5.4.20.1: Flood Risk Assessment). Fluvial flood risk associated with flood zones can be summarised as follows:

- Flood Zone 1 has a less than 1 in 1,000 year (0.1%) annual probability of river flooding;
- Flood Zone 2 has a 1 in 1,000 year to 1 in 100 year (0.1% to 1%) annual probability of river flooding; and
- Flood Zone 3 has a greater than 1 in 100 year (1%) annual probability of river flooding.

4.2.4 The proposed WWTP is located within Flood Zone 1 (low risk of fluvial flooding). The Proposed Development includes below-ground pipelines and a tunnel linking existing and proposed infrastructure, some elements of which are located within Flood Zones 2 and 3 (medium to high risk of fluvial flooding).

4.2.5 This does not represent a site limitation in relation to soil resource management. **Soil texture and structure**

4.2.6 As stated in Section 4.1 and soil textures in soil profile characteristics Appendix A.2, the soils within the land required for the proposed WWTP generally comprise very calcareous loamy topsoils with few to common hard stones over either loamy subsoils, greyish chalk, chalk rubble, or occasionally loamy sand or sand.



4.2.7 In relation to the areas where soil survey has been completed the soils are well drained with few mottles in lower subsoils or chalk and have a moderate structure overall. No slowly permeable layers were observed in soil profiles. This indicates that in general, there is no soil texture and structure limitation. **Soil depth and stoniness**

4.2.8 Soil depth within the area of land surveyed generally reaches 1.2m, or around 39 – 115cm when the soils occur over chalk or chalk rubble. The flints and pebbles from topsoils are lightly or very lightly stony. These give a depth Grade of 1 – 3a, and a stoniness Grade of 1 – 2, but these Grades are overridden by other Grades of other factors.

#### **Chemical limitations**

4.2.9 No evidence of long-term agricultural limitations caused by soil chemical properties was observed within the area of land subject to survey. As such, there are no chemical limitations considered to impact the ALC Grade assigned to the area of land required for the proposed WWTP and landscape masterplan. **Erosion**

4.2.10 No evidence of soil erosion was observed during the survey, and therefore erosion is not considered an agricultural limitation in this location. **Interactive limitations**

4.2.11 Soil wetness and droughtiness were assessed to examine limitations from climate, site and soils data collected during the ALC survey for each auger borehole. These are included within Appendix A.2. The calculation indicates that the wetness Grades of the soils is 1 and 2, and droughtiness is Grades 2, 3a and 3b (Figure 6.2 Book of Figures- Agricultural Land and Soils App Doc Ref 5.3.6).

#### **ALC Grades**

4.2.12 Assessment of all limiting factors discussed in Section 4.2 confirmed soil droughtiness (Interactive Limitations), to be the most common deciding factor within the surveyed area.

4.2.13 The ALC of the area of land required for the proposed WWTP and landscape masterplan falls under Grades 2, 3a and 3b. (Figure 6.2 Book of Figures- Agricultural Land and Soils App Doc Ref 5.3.6)

## **5 Conclusion**

5.1.1 The area and distribution of overall ALC Grades in the surveyed area (100 ha) are displayed in Figure 6.2 Book of Figures- Agricultural Land and Soils (App Doc Ref 5.3.6) and are summarised as follows:

- Grade 2 (very good quality agricultural land): 30 ha, 30% of the surveyed area of the area of land required for the proposed WWTP;
- Grade 3a (good to moderate quality agricultural land): 50 ha, 50% of the surveyed area of the area of land required for the proposed WWTP; and



- Grade 3b (moderate quality agricultural land): 20 ha, 20% of the surveyed area of the area of land required for the proposed WWTP.

5.1.2 For agricultural land not subjected to the ALC survey, it has been classified as follows (based on provisional ALC grades):

- Grade 1 (excellent quality agricultural land);
- Grade 2 (very good quality agricultural land);
- Grade 3 (good to moderate quality agricultural land); and
- Grade 4 (poor quality agricultural land).



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## Appendices



## Appendix A.1 – Auger borehole Soil Profile Characteristics

Auger Borehole	Horizon (cm)	Texture	Soil Matrix Colour	Mottling*	CaCo3 %	Organic Matter %	Wetness Grade	Drought Grade (Wheat)	Drought Grade (Potato)	Overall ALC Grade
AB 1	0 – 27	hCL	7.5YR3/4	None	>10%	4 – 5	2	3b	3a	3b
	27 – 58	hCL	7.5YR3/4	None	>10%					
AB 2	0 – 26	hCL	7.5YR3/4	None	>10%	3	2	3b	3b	3b
	26 – 48	hCL	7.5YR3/4	None	>10%					
AB 3	0 – 27	hCL	7.5YR3/4	None	>10%	5	2	3b	3a	3b
	27 – 58	hCL	7.5YR3/4	None	>10%					
AB 4	0 – 28	hCL	10YR4/2	None	>10%		2	3a	3a	3a
	28 – 55	hCL	10YR5/2	Few	>10%					
	55 – 80	hCL	10YR7/0	Few	>10%					
AB 5	0 – 26	hCL	10YR4/3	None	>10%		2	2	3a	3a
	26 – 53	hCL	10YR5/3	Few	>10%					
	53 – 76	hCL	10YR7/0	Few	>10%					
	76 – 120	mSL	10YR7/0	Common	>10%					
AB 6	0 – 25	SCL	7.5YR3/4	None	>10%	4 – 5	1	3a	3a	3a
	25 – 48	SCL	7.5YR3/4	None	>10%					
	48 – 75	SCL	7.5YR6/4	None	>10%					



AB 7	0 – 26	mCL	7.5YR3/4	None	>10%	5	1	3b	3b	3b
	26 – 48	mCL	7.5YR3/4	None	>10%					

Auger Borehole	Horizon (cm)	Texture	Soil Matrix Colour	Mottling*	CaCo3 %	Organic Matter %	Wetness Grade	Drought Grade (Wheat)	Drought Grade (Potato)	Overall ALC Grade
AB 8	0 – 29	hCL	7.5YR3/4	None	>10%	5	2	3b	3b	3b
	29 – 45	hCL	7.5YR7/6	None	>10%					
AB 9	0 – 32	mCL	7.5YR3/4	None	>10%	5	1	3b	2	3b
	32 – 70	SCL	7.5YR7/6	None	>10%					
	70+			None	>10%					
AB 10	0 – 28	hCL	7.5YR4/3	None	>10%	5	2	3b	3b	3b
	28 – 45	hCL	7.5YR4/3	None	>10%					
	45+		2.5YR7/1	None	>10%					
AB 11	0 – 26	mCL	10YR4/3	None	>10%		1	3a	3a	3a
	26 – 67	hCL	10YR5/3	Few	>10%					
	67 – 88	hCL	10YR7/0	None	>10%					
AB 12	0 – 24	mCL	10YR4/3	None	>10%		1	3a	3a	3a
	24 – 50	hCL	10YR5/3	Few	>10%					
	50 – 88	hCL	10YR7/0	None	>10%					



AB 13	0 – 26	mCL	7.5YR3/4	None	>10%	5	1	2	2	2
	26 – 40	mCL	7.5YR3/4	None	>10%					
	40 – 70	SCL	7.5YR4/3	None	>10%					
	70 – 120	SCL	7.5YR6/4	None	>10%					
AB 14	0 – 28	mCL	7.5YR3/4	None	>10%	5	1	2	2	2
	28 – 40	mCL	7.5YR3/4	None	>10%					

Auger Borehole	Horizon (cm)	Texture	Soil Matrix Colour	Mottling*	CaCo3 %	Organic Matter %	Wetness Grade	Drought Grade (Wheat)	Drought Grade (Potato)	Overall ALC Grade
	40 – 120	mCL	7.5YR7/6	None	>10%					
AB 15	0 – 25	mCL	7.5YR3/4	None	>10%	5	1	2	3a	3a
	25 – 42	mCL	7.5YR3/4	None	>10%					
	42 – 120	SCL	7.5YR7/8	None	>10%					
AB 16	0 – 26	mCL	7.5YR3/4	None	>10%	5	1	3a	2	3a
	26 – 40	mCL	7.5YR3/4	None	>10%					
	40 – 75	SCL	7.5YR4/3	None	>10%					
	75 – 100	SCL	7.5YR7/8	None	>10%					
AB 17	0 – 30	mCL	7.5YR2.5/2	None	>10%	8	1	2	2	2
	30 – 60	hCL	7.5YR6/4	None	>10%					





	60 – 120	hCL	7.5YR7/8	None	>10%					
AB 18	0 – 25	hCL	7.5YR3/4	None	>10%	5	2	3b	3a	3b
	25 – 35	hCL	7.5YR3/4	None	>10%					
	35 – 65	hCL	7.5YR4/3	None	>10%					
AB 19	0 – 25	hCL	7.5YR4/3	None	>10%	4	2	3b	3b	3b
	25 – 45	hCL	7.5YR4/3	None	>10%					
	45+		2.5YR7/1	Few	>10%					
AB 20	0 – 30	hCL	7.5YR3/4	None	>10%	5	2	3b	3a	3b
	30 – 65	hCL	7.5YR3/4	None	>10%					
	65+		2.5YR7/1	None	>10%					

Auger Borehole	Horizon (cm)	Texture	Soil Matrix Colour	Mottling*	CaCo3 %	Organic Matter %	Wetness Grade	Drought Grade (Wheat)	Drought Grade (Potato)	Overall ALC Grade
AB 21	0 – 29	hCL	7.5YR4/3	None	>10%		2	3b	3a	3b
	29 – 55	hCL	7.5YR4/3	None	>10%					
	55+		2.5YR7/1	None	>10%					
AB 22	0 – 28	mCL	10YR4/2	None	>10%		1	3a	3a	3a
	28 – 52	hCL	10YR5/3	None	>10%					
	52 – 68	hCL	10YR7/0	None	>10%					



	68 – 90	SL	10YR7/0	None	>10%					
AB23	0 – 34	mCL	7.5YR3/3	None	>10%	5	1	2	3a	3a
	34 – 58	mCL	7.5YR3/4	None	>10%					
	58 – 107	SL	10YR7/0	None	>10%					
	107+			None	>10%					
AB 24	0 – 28	mCL	7.5YR3/4	None	>10%	5	1	3b	2	3b
	28 – 45	mCL	7.5YR3/4	None	>10%					
	45 – 68	mCL	7.5YR4/3	None	>10%					
AB 25	0 – 30	mCL	7.5YR3/4	None	>10%	5	1	3a	2	3a
	30 – 52	SCL	7.5YR4/3	None	>10%					
	52 – 75	mSL	7.5YR4/3	None	>10%					
AB 26	0 – 30	hCL	7.5YR3/4	None	>10%	5	2	2	2	2
	30 – 80	hCL	7.5YR4/3	None	>10%					
	80 – 110	mCL	7.5YR7/8	None	>10%					

Auger Borehole	Horizon (cm)	Texture	Soil Matrix Colour	Mottling*	CaCo3 %	Organic Matter %	Wetness Grade	Drought Grade (Wheat)	Drought Grade (Potato)	Overall ALC Grade
AB 27	0 – 29	hCL	7.5YR3/4	None	>10%	5	2	3a	2	3a
	29 – 42	hCL	7.5YR4/3	None	>10%					



	42 – 75	hCL	7.5YR7/8	Few	>10%					
AB 28	0 – 30	hCL	7.5YR3/4	None	>10%	5	2	2	2	2
	30 – 65	hCL	7.5YR4/3	None	>10%					
	65 – 120	SCL	7.5YR7/8	None	>10%					
AB 29	0 – 30	hCL	7.5YR2.5/3	None	>10%	7 – 8	2	2	3a	3a
	30 – 40	hCL	7.5YR2.5/3	None	>10%					
	40 – 75	hCL	7.5YR4/3	None	>10%					
	75 – 120	hCL	7.5YR4/3	None	>10%					
AB 30	0 – 27	hCL	7.5YR3/4	None	>10%	6	2	3a	2	3a
	27 – 42	hCL	7.5YR3/4	None	>10%					
	42 – 75	hCL	7.5YR4/3	None	>10%					
AB 31	0 – 27	hCL	7.5YR3/2	None	>10%	4 – 5	2	3a	2	3a
	27 – 80	hCL	7.5YR4/2	None	>10%					
	80+		2.5YR7/1	Few	>10%					
AB 32 (Pit 1)	0 – 27	SCL	7.5YR3/2	None	>10%	4 – 5	2	3a	3a	3a
	27 – 78	SCL	7.5YR4/2	None	>10%					
	78+		2.5YR7/1	Few	>10%					
	0 – 30	hCL	7.5YR4/3	None	>10%	4				



Auger Borehole	Horizon (cm)	Texture	Soil Matrix Colour	Mottling*	CaCo3 %	Organic Matter %	Wetness Grade	Drought Grade (Wheat)	Drought Grade (Potato)	Overall ALC Grade
AB 33	30 – 120	hCL	7.5YR7/1	Few	>10%		2	3a	2	3a
AB 34	0 – 28	mCL	10YR4/2	None	>10%		1	3a	3a	3a
	28 – 56	hCL	10YR4/3	None	>10%					
	56 – 85	hCL	2.5Y8/3	Few	>10%					
AB 35	0 – 30	mCL	7.5YR3/2	None	>10%		1	3a	2	3a
	30 – 47	mSCL	7.5YR4/3	Few	>10%					
	47 – 87	mSL	7.5YR4/4	None	>10%					
	87 – 120		7.5YR6/1	Few	>10%					
AB 36	0 – 26	mCL	10YR4/2	None	>10%		1	2	3a	3a
	26 – 55	SCL	10YR4/4	Few	>10%					
	55 – 82	SCL	10YR7/0	Few	>10%					
	82 – 120	mSL	7.5YR5/6	None	>10%					
AB 37	0 – 29	mCL	7.5YR3/4	None	>10%	4 – 5	1	3b	3b	3b
	29 – 48	mCL	7.5YR3/4	None	>10%					
	48 – 68	hZCL	7.5YR7/1	Few	>10%					



	68+		2.5YR7/1	Few	>10%					
AB 38	0 – 28	mCL	10YR4/3	None	>10%		1	3a	3a	3a
	28 – 62	SCL	10YR5/3	Few	>10%					
	62 – 82	SCL	10YR5/4	Few	>10%					
	0 – 23	mCL	10YR4/2	None	>10%					

Auger Borehole	Horizon (cm)	Texture	Soil Matrix Colour	Mottling*	CaCo3 %	Organic Matter %	Wetness Grade	Drought Grade (Wheat)	Drought Grade (Potato)	Overall ALC Grade
AB 39	23 – 46	SCL	7.5YR5/6	Few	>10%		1	3a	3a	3a
	46 – 92	SCL	10YR7/0	None	>10%					
	0 – 25	mCL	10YR4/2	None	>10%					
25 – 50	SCL	10YR4/3	None	>10%						
50 – 68	SCL	10YR7/0	Few	>10%						
68 – 90	SCL	10YR7/0	None	>10%						
AB 41	0 – 25	mCL	10YR3/2	None	>10%		1	3a	3a	3a
	25 – 45	SCL	10YR5/3	None	>10%					
	45 – 72	SCL	10YR7/0	Common	>10%					
	72 – 120	mS	10YR7/8	None	>10%					



AB 42	0 – 30	hCL	7.5YR2.5/3	None	>10%	6 – 7	2	2	2	2
	30 – 60	hCL	7.5YR3/4	None	>10%					
	60 – 85	hCL	7.5YR4/3	None	>10%					
	85 – 115	mCL	7.5YR7/8	Few	>10%					
AB 43	0 – 29	mCL	7.5YR3/4	None	>10%	4	1	3b	3a	3b
	29 – 39	mCL	7.5YR5/3	None	>10%					
	39+		2.5YR7/1	None	>10%					
AB 44	0 – 27	SCL	10YR4/2	None	>10%		1	3b	3a	3b
	27 – 62	SCL	10YR4/3	None	>10%					
	0 – 26	SCL	10YR4/2	None	>10%					

Auger Borehole	Horizon (cm)	Texture	Soil Matrix Colour	Mottling*	CaCo3 %	Organic Matter %	Wetness Grade	Drought Grade (Wheat)	Drought Grade (Potato)	Overall ALC Grade
AB 45	26 – 50	SCL	10YR4/3	None	>10%		1	3a	3a	3a
	50 – 65	SCL	10YR7/0	None	>10%					
	65 – 96	mSL	10YR7/0	None	>10%					
AB 46	0 – 26	mCL	10YR4/2	None	>10%		1	3a	3a	3a
	26 – 55	SCL	10YR5/4	Few	>10%					
	55 – 88	SCL	10YR4/5	Few	>10%					



AB 47	0 – 28	mCL	7.5YR3/4	None	>10%	4 – 5	1	2	2	2
	28 – 48	mCL	7.5YR3/4	None	>10%					
	48 – 88	mSL	10YR7/8	None	>10%					
	88 – 120	SCL	7.5YR7/1	Few	>10%					
AB 48	0 – 28	mCL	10YR4/2	None	>10%		1	2	3a	3a
	28 – 48	SCL	7.5YR5/6	None	>10%					
	48 – 80	SCL	10YR7/0	Few	>10%					
	80 – 120	SCL	10YR7/0	None	>10%					
AB 49	0 – 27	SCL	10YR4/2	None	>10%		1	3a	3a	3a
	27 – 48	SCL	10YR5/3	Few	>10%					
	48 – 95	mSL	10YR7/0	None	>10%					
AB 50	0 – 27	mCL	10YR4/3	None	>10%		1	2	2	2
	27 – 55	hCL	10YR4/4	Few	>10%					
	55 – 85	SCL	10YR5/4	Common	>10%					

Auger Borehole	Horizon (cm)	Texture	Soil Matrix Colour	Mottling*	CaCo3 %	Organic Matter %	Wetness Grade	Drought Grade (Wheat)	Drought Grade (Potato)	Overall ALC Grade
	85 – 120	SCL	10YR7/0	None	>10%					
AB 51	0 – 27	mCL	10YR4/3	None	1%		1	2	3a	3a



	27 – 56	SCL	10YR4/4	Few	>10%					
	56 – 72	SCL	10YR5/4	Common	>10%					
	72 – 120	SCL	10YR7/0	None	>10%					
AB 52	0 – 28	hCL	7.5YR2.5/3	None	>10%	6	2	2	2	2
	28 – 50	hCL	7.5YR4/3	None	>10%					
	50 – 70	SCL	7.5YR7/8	None	>10%					
	70 – 115	LmS	7.5YR7/6	None	>10%					
AB 53	0 – 28	hCL	7.5YR3/4	None	>10%	5	2	2	2	2
	28 – 97	hCL	7.5YR4/3	None	>10%					
AB 54	0 – 27	mCL	10YR4/2	None	>10%		1	3b	3a	3b
	27 – 46	hCL	10YR4/3	None	>10%					
	46 – 70	SCL	10YR7/0	Few	>10%					
AB 55	0 – 28	mCL	10YR4/2	None	5%		1	3b	3a	3b
	28 – 46	hCL	10YR5/3	Few	5%					
	46 – 74	SCL	10YR7/0	Few	>10%					
AB 56	0 – 28	mCL	10YR4/2	None	>10%		1	2	3a	3a
	28 – 45	SCL	10YR4/4	Few	>10%					
	45 – 70	SCL	10YR7/0	Few	>10%					





Auger Borehole	Horizon (cm)	Texture	Soil Matrix Colour	Mottling*	CaCo3 %	Organic Matter %	Wetness Grade	Drought Grade (Wheat)	Drought Grade (Potato)	Overall ALC Grade
	70 – 120	mSL	10YR6/4	None	>10%					
AB 57	0 – 26	mCL	7.5YR3/4	None	>10%		1	2	2	2
	26 – 39	mCL	7.5YR3/4	None	>10%					
	39 – 82	mSL	7.5YR7/8	None	>10%					
	82 – 108	LmS	7.5YR7/8	None	>10%					
AB 58	0 – 25	mCL	10YR4/2	None	5%		1	3a	3a	3a
	25 – 46	SCL	10YR5/3	Few	>10%					
	46 – 70	SCL	10YR7/0	Few	>10%					
	70 – 120	mSL	10YR7/0	None	>10%					
AB 59	0 – 27	SCL	10YR4/2	None	>10%		1	3a	2	3a
	27 – 50	SCL	10YR5/3	Few	>10%					
	50 – 96	mSL	10YR7/0	Few	>10%					
AB 60	0 – 28	SCL	10YR4/2	None	>10%		1	3a	3a	3a
	28 – 65	SCL	10YR5/3	Few	>10%					
	65 – 92	LmS	7.5YR5/6	Few	>10%					
	92 – 120	mS	7.5YR5/6	None	>10%					
AB 61	0 – 25	mCL	10YR4/2	None	5%		1	3a	3a	3a



	25 – 58	SCL	10YR5/3	Few	>10%					
	58 – 75	SCL	10YR5/3	Few	>10%					
	75 – 88	mSL	10YR7/0	None	>10%					

Auger Borehole	Horizon (cm)	Texture	Soil Matrix Colour	Mottling*	CaCo3 %	Organic Matter %	Wetness Grade	Drought Grade (Wheat)	Drought Grade (Potato)	Overall ALC Grade
AB 62	0 – 26	mCL	10YR4/2	None	>10%		1	3a	3a	3a
	26 – 65	hCL	10YR5/3	Few	>10%					
	65 – 105	mS	7.5YR5/6	Few	>10%					
	105 – 120	mS	10YR7/0	None	>10%					
AB 63	0 – 30	hCL	7.5YR3/4	None	>10%	5	2	2	2	2
	30 – 95	hCL	7.5YR4/3	None	>10%					
AB 64	0 – 25	mCL	10YR4/2	None	>10%		1	3b	3a	3b
	25 – 45	mCL	10YR4/4	Few	>10%					
	45 – 85	mSL	10YR7/0	None	>10%					
AB 65	0 – 30	mCL	10YR4/2	None	1%		1	3a	3a	3a
	30 – 56	SCL	10YR5/3	Few	5%					
	56 – 70	SCL	7.5YR5/6	Few	5%					
	70 – 85	mSL	7.5YR5/6	None	5%					



AB 66	0 – 25	mCL	10YR4/2	None	5%		1	2	2	2
	25 – 42	hCL	10YR4/4	None	5%					
	42 – 75	SCL	10YR5/4	Few	5%					
	75 – 120	SCL	10YR5/6	Few	>10%					
AB 67	0 – 27	mCL	7.5YR3/4	Few	>10%	5	1	2	2	2
	27 – 40	mCL	7.5YR3/4	None	>10%					
	40 – 90	hCL	7.5YR6/4	None	>10%					

Auger Borehole	Horizon (cm)	Texture	Soil Matrix Colour	Mottling*	CaCo3 %	Organic Matter %	Wetness Grade	Drought Grade (Wheat)	Drought Grade (Potato)	Overall ALC Grade
	90 – 120	SCL	7.5YR5/6	None	>10%					
AB 68	0 – 26	mCL	10YR4/2	None	1%		1	2	3a	3a
	26 – 45	SCL	10YR5/3	Few	>10%					
	45 – 75	SCL	10YR7/0	None	>10%					
	75 – 120	mSL	10YR7/0	Few	>10%					
AB 69	0 – 26	mCL	10YR4/2	None	1%		1	2	3a	3a
	26 – 55	SCL	10YR4/4	None	5%					
	55 – 82	SCL	7.5YR5/6	Few	>10%					
	82 – 120	SL	10YR5/6	Few	>10%					



AB 70	0 – 28	SCL	10YR4/2	None	5%		1	2	3a	3a
	28 – 55	SCL	7.5YR5/6	Few	>10%					
	55 – 100	mSL	10YR6/4	Few	>10%					
	100 – 120	mS	10YR6/4	None	>10%					
AB 71	0 – 25	SCL	10YR4/2	None	5%		1	3a	3a	3a
	25 – 62	SCL	7.5YR5/6	Few	>10%					
	62 – 85	mSL	10YR6/4	Common	>10%					
	85 – 110	mS	10YR6/4	Few	>10%					
AB 72	0 – 25	hCL	10YR4/2	None	>10%		2	3a	2	3a
	25 – 55	hCL	10YR4/4	Few	>10%					
	55 – 72	SCL	7.5YR5/6	Common	>10%					

Auger Borehole	Horizon (cm)	Texture	Soil Matrix Colour	Mottling*	CaCo3 %	Organic Matter %	Wetness Grade	Drought Grade (Wheat)	Drought Grade (Potato)	Overall ALC Grade
	72 – 90	SCL	10YR7/0	Few	>10%					
AB 73	0 – 27	hCL	7.5YR3/4	None	>10%	5	2	2	2	2
	27 – 65	hCL	7.5YR4/3	None	>10%					
	65 – 95	hZCL	7.5YR7/8	None	>10%					
AB 74	0 – 27	hCL	10YR4/2	None	>10%		2	3b	3a	3b



	27 – 58	hCL	10YR45/7	Few	>10%					
AB 75	0 – 26	SCL	10YR4/2	None	5%		1	3a	3a	3a
	26 – 33	SCL	10YR6/6	Few	>10%					
	33 – 78	SL	10YR7/8	Few	>10%					
	78 – 120	mSL	10YR7/0	None	>10%					
AB 76	0 – 24	mCL	10YR4/2	None	5%		1	3a	3a	3a
	24 – 48	hCL	10YR4/4	Few	5%					
	48 – 62	SCL	10YR7/0	Few	>10%					
	62 – 120	SCL	10YR7/0	None	>10%					
AB 77	0 – 25	hCL	7.5YR3/4	None	>10%	5	2	2	2	2
	25 – 40	hCL	7.5YR3/4	None	>10%					
	40 – 85	hCL	7.5YR6/4	None	>10%					
	85 – 115	hCL	7.5YR7/8	Few	>10%					
AB 78	0 – 25	mCL	7.5YR3/4	None	1%	5	1	3a	2	3a
	25 – 39	mCL	7.5YR3/4	None	5%					

Auger Borehole	Horizon (cm)	Texture	Soil Matrix Colour	Mottling*	CaCo3 %	Organic Matter %	Wetness Grade	Drought Grade (Wheat)	Drought Grade (Potato)	Overall ALC Grade
	39 – 85	SCL	7.5YR6/4	None	>10%					



AB 79	0 – 25	mCL	10YR4/2	None	5%		1	3a	3a	3a
	25 – 45	SCL	10YR4/4	Few	5%					
	45 – 85	SCL	10YR7/0	Few	>10%					
	85 – 120	SCL	10YR7/0	Few	>10%					
AB 80	0 – 25	mCL	10YR4/2	None	5%		1	2	3a	3a
	25 – 56	hCL	10YR4/4	Few	>10%					
	56 – 85	mSL	7.5YR5/6	Common	>10%					
	85 – 120	mSL	10YR7/0	Few	>10%					
AB 81	0 – 26	hCL	10YR4/2	None	>10%		2	2	2	2
	26 – 54	hCL	10YR4/4	Few	>10%					
	54 – 88	SCL	10YR5/4	Common	>10%					
	88 – 120	SCL	10YR7/0	Few	>10%					
AB 82	0 – 30	hCL	7.5YR3/4	None	>10%	5	2	2	2	2
	30 – 45	SCL	7.5YR6/4	None	>10%					
	45 – 90	mSL	7.5YR7/6	None	>10%					
	90 – 120	LmS	7.5YR7/6	None	>10%					
AB 83	0 – 24	hCL	10YR4/2	None	>10%		2	2	2	2
	24 – 55	hCL	10YR4/4	Few	>10%					
	55 – 90	SCL	10YR5/4	Common	>10%					



Auger Borehole	Horizon (cm)	Texture	Soil Matrix Colour	Mottling*	CaCo3 %	Organic Matter %	Wetness Grade	Drought Grade (Wheat)	Drought Grade (Potato)	Overall ALC Grade
	90 – 120	SCL	10YR7/0	Few	>10%					
AB 84	0 – 25	mCL	10YR4/2	None	5%		1	2	3a	3a
	25 – 57	SCL	10YR5/4	Few	5%					
	57 – 78	mSL	7.5YR5/6	Few	>10%					
	78 – 120	mS	10YR6/8	Few	>10%					
AB 85	0-27	hCL	7.5YR3/4	None	>10%	4	2	2	2	2
	27 – 38	hCL	7.5YR3/4	None	>10%	4				
	38 – 55	hCL	7.5YR3/4	None	>10%					
	55 – 78	SCL	7.5YR3/4	None	>10%					
	78+	SCL	2.5YR5/2	None	>10%					
AB 86	0 – 27	mCL	7.5YR3/4	None	5%	5	1	1	2	2
	27 – 50	mCL	7.5YR3/4	None	5%					
	50 – 90	SCL	7.5YR4/3	None	5%					
	90 – 120	mSL	7.5YR6/4	None	>10%					
AB 87	0 – 25	mCL	10YR4/2	None	5%		1	2	2	2
	25 – 56	hCL	10YR5/4	Few	5%					
	56 – 82	SCL	7.5YR5/6	Common	>10%					



	82 – 120	mSL	10YR7/0	Few	>10%					
AB 88	0 – 29	mCL	10YR4/2	None	5%		1	2	3a	3a
	29 – 65	SCL	10YR5/4	Few	>10%					

Auger Borehole	Horizon (cm)	Texture	Soil Matrix Colour	Mottling*	CaCo3 %	Organic Matter %	Wetness Grade	Drought Grade (Wheat)	Drought Grade (Potato)	Overall ALC Grade
	65 – 90	mSL	7.5YR5/6	Common	>10%					
	90 – 120	mSL	10YR7/0	Few	>10%					
	AB 89	0 – 25	hCL	10YR4/2	None	>10%				
	25 – 58	hCL	10YR4/4	Common	>10%					
	58 – 100	SCL	10YR5/4	Common	>10%					
	100 – 120	SCL	10YR7/0	Few	>10%					
AB 90	0 – 30	hCL	7.5YR3/4	None	>10%	5	2	2	2	2
		30 – 60	hCL	7.5YR6/4	None	>10%				
		60 – 105	mCL	7.5YR7/8	None	>10%				
AB 91	0 – 25	hCL	10YR4/2	None	>10%		2	3a	3a	3a
		25 – 54	hCL	10YR4/4	Common	>10%				
		54 – 82	SCL	10YR5/4	Common	>10%				
AB 92	0 – 25	hCL	7.5YR3/4	None	>10%	5	2	2	2	2





	25 – 95	hCL	7.5YR7/6	None	>10%					
	95 – 120	hCL	7.5YR7/1	None	>10%					
AB 93	0 – 28	mCL	7.5YR3/4	None	5%	5	1	2	2	2
	28 – 45	mCL	7.5YR3/4	None	5%					
	45 – 105	SCL	7.5YR5/6	None	>10%					
	105 – 120	SCL	2.5YR5/2	None	>10%					
	0 – 26	mCL	7.5YR3/4	None	5%	4 – 5				

Auger Borehole	Horizon (cm)	Texture	Soil Matrix Colour	Mottling*	CaCo3 %	Organic Matter %	Wetness Grade	Drought Grade (Wheat)	Drought Grade (Potato)	Overall ALC Grade
AB 94	26 – 45	mCL	7.5YR3/4	None	5%		1	2	2	2
	45 – 95	hCL	7.5YR4/3	None	5%					
	95 – 120	hCL	7.5YR6/4	Few	5%					
AB 95	0 – 28	SCL	10YR4/2	None	5%		2	3a	3a	3a
	28 – 56	SCL	10YR4/4	Few	>10%					
	56 – 98	SCL	10YR7/0	None	>10%					
AB 96	0 – 26	mCL	10YR4/2	None	>10%		1	2	3a	3a
	26 – 52	SCL	10YR5/4	Few	>10%					
	52 – 84	SCL	10YR7/0	Few	>10%					



	84 – 120	mS	10YR6/8	Few	>10%					
AB 97	0 – 29	mCL	7.5YR3/4	None	>10%	5	1	3b	3a	3b
	29 – 60	mCL	7.5YR7/6	Few	>10%					
	60 – 115	LmS	7.5YR7/8	None	>10%					
AB 98	0 – 27	mCL	7.5YR3/4	None	>10%	5	1	2	2	2
	27 – 43	mCL	7.5YR3/4	None	>10%					
	43 – 95	mCL	7.5YR4/3	None	>10%					
	95 – 120	mCL	7.5YR3/4	None	>10%					
AB 99	0 – 26	mCL	10YR4/2	None	5%		1	2	2	3a
	26 – 62	SCL	10YR4/4	Few	>10%					
	62 – 120	mSL	10YR7/0	Common	>10%					
<b>Auger Borehole</b>	<b>Horizon (cm)</b>	<b>Texture</b>	<b>Soil Matrix Colour</b>	<b>Mottling*</b>	<b>CaCo3 %</b>	<b>Organic Matter %</b>	<b>Wetness Grade</b>	<b>Drought Grade (Wheat)</b>	<b>Drought Grade (Potato)</b>	<b>Overall ALC Grade</b>
AB 100	0 – 27	mCL	7.5YR3/4	None	>10%	5	1	3a	2	3a
	27 – 79	mCL	7.5YR3/4	Few	>10%					
AB 101	0 – 27	mCL	7.5YR3/4	None	>10%	5	1	3a	2	3a
	27 – 79	mCL	7.5YR3/4	Few	>10%					
AB 102	0 – 30	mSL	7.5YR3/4	None	>10%	5	1	2	3a	3a
	30 – 50	mSL	7.5YR6/4	None	>10%					



	50 – 120	mSL	7.5YR6/4	None	>10%					
AB Pit 2	0 – 30	mCL	7.5YR3/4	None	>10%	4 – 5	1	2	3a	3a
	30 – 60	mCL	7.5YR3/4	None	>10%					
	60 – 100	mSL	7.5YR4/4	None	>10%					
	100 – 120	mZCL	7.5YR6/1	None	>10%					

**Key for Auger Bore Log**

**Soil Texture**

mS, medium sand; LmS, loamy medium sand; mSL, medium sandy loam; mCL, medium clay loam; mZCL, medium silty clay loam; hCL, heavy clay loam; hZCL, heavy silty clay loam; SCL, sandy clay loam

**Mottling**

None: 0%

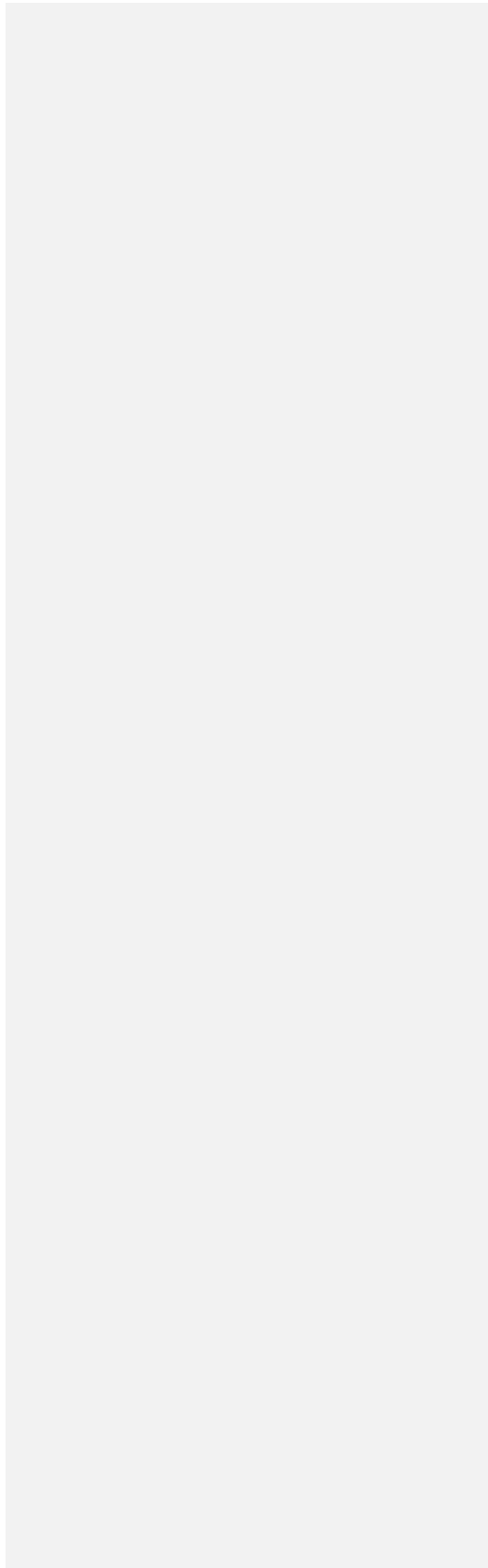
Few: <2%

Common: 2 – 20%

\*Munsell colour code system



## Appendix A.2 – Soil Laboratory Analysis





**ANALYTICAL REPORT**

<b>Report Number</b>	78842-21	W680	MATT BARKER
<b>Date Received</b>	03-DEC-2021		
<b>Date Reported</b>	10-DEC-2021		
<b>Project</b>	SOIL		
<b>Reference</b>	ANGLIAN WATER		
<b>Order Number</b>	100102041		

Laboratory Reference		SOIL537704	SOIL537705	SOIL537706	SOIL537707	SOIL537708				
Sample Reference		PIT 1 TOPSOIL	PIT 2 TOPSOIL	PIT 2 SUBSOIL	PIT 2 SUBS OIL CHALKY	PSD 75				
Determinand	Unit	SOIL	SOIL	SOIL	SOIL	SOIL				
Sand 2.00-0.063mm	% w/w	51	55	57	53	52				
Silt 0.063-0.002mm	% w/w	25	24	23	25	25				
Clay <0.002mm	% w/w	24	21	20	22	23				
Textural Class **		SCL	SCL	SCL	SCL	SCL				

**Notes**

Analysis Notes: The sample submitted was of adequate size to complete all analysis requested. The results as reported relate only to the item(s) submitted for testing. The results are presented on a dry matter basis unless otherwise stipulated.

Document Control: **This test report shall not be reproduced, except in full, without the written approval of the laboratory.**

Reported by: *Myles Nicholson*  
 Natural Resource Management, a trading division of Cawood Scientific Ltd.  
 Coopers Bridge, Braziers Lane, Bracknell, Berkshire, RG42 6NS  
 email: enquiries@nrm.uk.com

## ADAS (UK) Textural Class Abbreviations

The texture classes are denoted by the following abbreviations:

<b>Class</b>	<b>Code</b>
Sand	S
Loamy sand	LS
Sandy loam	SL
Sandy Silt loam	SZL
Silt loam	ZL
Sandy clay loam	SCL
Clay loam	CL
Silt clay loam	ZCL
Clay	C
Silty clay	ZC
Sandy clay	SC

For the *sand*, *loamy sand*, *sandy loam* and *sandy silt loam* classes the predominant size of sand fraction may be indicated by the use of prefixes, thus:

vf	Very Fine (more than 2/3's of sand less than 0.106 mm)
f	Fine (more than 2/3's of sand less than 0.212 mm)
c	Coarse (more than 1/3 of sand greater than 0.6 mm)
m	Medium (less than 2/3's fine sand and less than 1/3 coarse sand).

The subdivisions of *clay loam* and *silty clay loam* classes according to clay content are indicated as follows:

M	medium (less than 27% clay)
H	heavy (27-35% clay)

Organic soils i.e. those with an organic matter greater than 10% will be preceded with a letter O.

Peaty soils i.e. those with an organic matter greater than 20% will be preceded with a letter P.

# ANALYSIS REPORT



Contact : MATT BARKER  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]

**W680**

Client : ANGLIAN WATER

Please quote the above code for all enquiries

Distributor : COST CODE 100102041

Sample Matrix : Agricultural Soil

Laboratory Reference  
Card Number 81205/21

Date Received 03-Dec-21  
Date Reported 10-Dec-21

## SOIL ANALYSIS REPORT

Laboratory Sample Reference	Field Details			Index			mg/l (Available)		
	No.	Name or O.S. Reference with Cropping Details	Soil pH	P	K	Mg	P	K	Mg
547763/21	1	<b>R037-3 TOPSOIL</b> <i>No cropping details given</i>	8.0	1	2-	2	12.0	149	52
547764/21	2	<b>R037-3 SUBSOIL</b> <i>No cropping details given</i>	7.7	0	1	1	7.4	113	43
547765/21	3	<b>Y039-2 TOPSOIL</b> <i>No cropping details given</i>	8.0	0	2-	1	8.4	134	42
547766/21	4	<b>Y039-2 SUBSOIL</b> <i>No cropping details given</i>	7.7	0	1	1	6.6	92	40



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547767/21	5	<b>G036-2 TOPSOIL</b> No cropping details given	8.0	1	2-	1	14.8	135	41
547768/21	6	<b>G036-2 SUBSOIL</b> No cropping details given	8.2	0	1	1	7.4	105	45

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 AHDB Fertiliser Recommendations RB209 9th Edition.

Released by ..... *Sandy Cameron*  
..... *10/12/21*

On behalf of NRM Date

## MICRO NUTRIENT REPORT

DATE **10th December 2021**  
SAMPLES FROM **ANGLIAN WATER**

MATT BARKER  
MOTT  
MACDONALD  
10 TEMPLE BACK  
BRISTOL  
BS1 6FL  
Tel: 0117 9069500

Reference: 81205/547763/21	Field Name: R037-3 TOPSOIL	Result (*)	Deficient	Marginal	Target	Marginal	Excessive
Organic matter (LOI) %	3.6	1	OM level	data not av	ilable for th	s crop	

Reference: 81205/547764/21	Field Name: R037-3 SUBSOIL	Result (*)	Deficient	Marginal	Target	Marginal	Excessive
Organic matter (LOI) %	2.8	1	OM level	data not av	ilable for th	s crop	

Reference: 81205/547765/21	Field Name: Y039-2 TOPSOIL	Result (*)	Deficient	Marginal	Target	Marginal	Excessive
Organic matter (LOI) %	3.8	1	OM level	data not av	ilable for th	s crop	

Reference: 81205/547766/21	Field Name: Y039-2 SUBSOIL	Result (*)	Deficient	Marginal	Target	Marginal	Excessive
Organic matter (LOI) %	3.5	1	OM level	data not av	ilable for th	s crop	

Reference: 81205/547767/21	Field Name: G036-2 TOPSOIL	Result (*)	Deficient	Marginal	Target	Marginal	Excessive
Organic matter (LOI) %	4.4	1	OM level	data not av	ilable for th	s crop	

Reference: 81205/547768/21	Field Name: G036-2 SUBSOIL	Result (*)	Deficient	Marginal	Target	Marginal	Excessive
Organic matter (LOI) %	3.4	1	OM level	data not av	ilable for th	s crop	

# ANALYSIS REPORT



**Notes (\*)**

(1) NRM considers Organic soils to contain between 10-20% organic material with Peaty soils containing over 20% . The optimum ranges for Organic Matter which have been set are dependent on the soil type and the cropping but these must be viewed as guidance values only.

DATE 10th December 2021  
 SAMPLES FROM ANGLIAN WATER

MATT BARKER

SAMPLED BY COST CODE 100102041

Report reference 81205/21

**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)

A lime recommendation is usually for a 20cm depth of cultivated soil or a 15cm depth of grassland soil. Where soil is acid below 20 cm and soils are ploughed for arable crops, a proportionately larger quantity of lime should be applied. However, if more than 10 t/ha is needed, half should be deeply cultivated into the soil and ploughed down, with the remainder applied to the surface and worked in.

For established grassland or other situations where there is no, or only minimal soil cultivation, no more than 7.5 t/ha of lime should be applied in one application.

In these situations, applications of lime change the pH below the surface very slowly. Consequently, the underlying soil should not be allowed to become too acidic because this will affect the root growth and thus limit nutrient and water uptake, which will adversely affect yield.

Field Name / Ref / Soil Type	Last Crop / Next Crop	P2O5	K2O	MgO	Lime (Arable)	(Grass)
<b>R037-3 TOPSOIL</b> 547763	<b>Not Given / Not Given</b>	Units/Acre			T/Ac	0
		Kg/Ha			Te/Ha	0
<b>R037-3 SUBSOIL</b> 547764	<b>Not Given / Not Given</b>	Units/Acre			T/Ac	0
		Kg/Ha			Te/Ha	0
<b>Y039-2 TOPSOIL</b> 547765	<b>Not Given / Not Given</b>	Units/Acre			T/Ac	0
		Kg/Ha			Te/Ha	0
<b>Y039-2 SUBSOIL</b> 547766	<b>Not Given / Not Given</b>	Units/Acre			T/Ac	0
		Kg/Ha			Te/Ha	0
Field Name / Ref / Soil Type	Last Crop / Next Crop	P2O5	K2O	MgO	Lime (Arable)	(Grass)



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**G036-2 TOPSOIL**                      **Not Given / Not Given**

*Units/Acre*  
*Kg/Ha*

*T/Ac*    **0**            **0**  
*Te/Ha*   **0**            **0**

Fertiliser recommendations are based on **AHDB RB209 (Ninth Edition)**. 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

*Report continued.....*

DATE SAMPLES    **G036-2 SUBSOIL 547768 /**  
FROM                      **10th December 2021**  
                                  **ANGLIAN WATER**

MATT BARKER  
MOTT MACDONALD

## ANALYSIS REPORT



SAMPLED BY

Report reference    COST CODE 100102041

81205/21

Fax:

*Field Name / Ref / Soil Type*

### Fertiliser Recommendations

Fertiliser	recommendations are	<i>Last Crop / Next Crop</i>	<i>P2O5</i>	<i>K2O</i>	<i>MgO</i>	<i>Lime (Arable)</i>	<i>(Grass)</i>
		<b>Not Given / Not Given</b>				<i>T/Ac</i> <b>0</b>	<b>0</b>
			<i>Units/Acre</i>			<i>Te/Ha</i> <b>0</b>	<b>0</b>
			<i>Kg/Ha</i>				

based on **AHDB RB209 (Ninth Edition)**. 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

# ANALYSIS REPORT



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NRM, Coopers Bridge, Braziers Lane, Bracknell, Berkshire RG42 6NS

Contact : MATT BARKER

[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]

**W680**

Please quote the above code for all enquiries

Client : ANGLIAN WATER

Distributor : COST CODE 100102041  
t: +44(0)1344 886338 w: www.cawood.co.uk/nrm

Laboratory Reference

Card Number 81206/21



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NRM, Coopers Bridge, Braziers Lane, Bracknell, Berkshire RG42 6NS

Sample Matrix : Agricultural Soil

Date Received	03-Dec-21
Date Reported	13-Dec-21

## SOIL ANALYSIS REPORT

Laboratory Sample Reference	Field Details		Soil pH	Index			mg/l (Available)		
	No.	Name or O.S. Reference with Cropping Details		P	K	Mg	P	K	Mg
547769/21	1	<b>R037-1 TOPSOIL</b> <i>No cropping details given</i>	8.0	1	2-	1	13.6	137	41
547770/21	2	<b>R037-1 SUBSOIL</b> <i>No cropping details given</i>	8.1	0	1	1	7.4	112	34
547771/21	3	<b>R037-4 TOPSOIL</b> <i>No cropping details given</i>	8.0	1	2-	2	11.0	149	54
547772/21	4	<b>R037-4 SUBSOIL</b> <i>No cropping details given</i>	8.2	1	2-	1	9.8	132	49
547773/21	5	<b>R037-5 TOPSOIL</b> <i>No cropping details given</i>	8.2	2	2+	1	19.8	205	44
547774/21	6	<b>R037-5 SUBSOIL</b> <i>No cropping details given</i>	8.4	1	2-	1	9.6	145	38

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 AHDB Fertiliser Recommendations RB209 9th Edition.

Released by ..... *Nina Mansfield*  
..... *13/12/21*

On behalf of NRM Date

### MICRO NUTRIENT REPORT

DATE                    **13th December 2021**  
SAMPLES FROM    **ANGLIAN WATER**

MATT BARKER

██████████  
██████████  
██████████  
██████████

# ANALYSIS REPORT



BS1 6FL

Tel: 0117 9069500

Reference: 81206/547769/21	Field Name: R037-1 TOPSOIL	Result	(*)	Deficient	Marginal	Target	Marginal	Excessive
Organic matter (LOI) %		3.3	1	OM level	data not available for this crop			

Reference: 81206/547770/21	Field Name: R037-1 SUBSOIL	Result	(*)	Deficient	Marginal	Target	Marginal	Excessive
Organic matter (LOI) %		2.7	1	OM level	data not available for this crop			

Reference: 81206/547771/21	Field Name: R037-4 TOPSOIL	Result	(*)	Deficient	Marginal	Target	Marginal	Excessive
Organic matter (LOI) %		3.3	1	OM level	data not available for this crop			

Reference: 81206/547772/21	Field Name: R037-4 SUBSOIL	Result	(*)	Deficient	Marginal	Target	Marginal	Excessive
Organic matter (LOI) %		3.0	1	OM level	data not available for this crop			

Reference: 81206/547773/21	Field Name: R037-5 TOPSOIL	Result	(*)	Deficient	Marginal	Target	Marginal	Excessive
Organic matter (LOI) %		3.1	1	OM level	data not available for this crop			

Reference: 81206/547774/21	Field Name: R037-5 SUBSOIL	Result	(*)	Deficient	Marginal	Target	Marginal	Excessive
Organic matter (LOI) %		2.6	1	OM level	data not available for this crop			

**Notes (\*)**

(1) NRM considers Organic soils to contain between 10-20% organic material with Peaty soils containing over 20% . The optimum ranges for Organic Matter which have been set are dependent on the soil type and the cropping but these must be viewed as guidance values only.

DATE 13th December 2021  
 SAMPLES FROM ANGLIAN WATER

SAMPLED BY COST CODE 100102041

Report reference 81206/21

MATT BARKER

[Redacted signature block]

**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.

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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)

A lime recommendation is usually for a 20cm depth of cultivated soil or a 15cm depth of grassland soil. Where soil is acid below 20 cm and soils are ploughed for arable crops, a proportionately larger quantity of lime should be applied. However, if more than 10 t/ha is needed, half should be deeply cultivated into the soil and ploughed down, with the remainder applied to the surface and worked in.

For established grassland or other situations where there is no, or only minimal soil cultivation, no more than 7.5 t/ha of lime should be applied in one application.

In these situations, applications of lime change the pH below the surface very slowly. Consequently, the underlying soil should not be allowed to become too acidic because this will affect the root growth and thus limit nutrient and water uptake, which will adversely affect yield.

Field Name / Ref / Soil Type	Last Crop / Next Crop	P2O5	K2O	MgO	Lime (Arable) (Grass)	
<b>R037-1 TOPSOIL</b>	<b>Not Given / Not Given</b>				T/Ac	0
<b>547769  </b>		Units/Acre			Te/Ha	0
		Kg/Ha				0

Field Name / Ref / Soil Type	Last Crop / Next Crop	P2O5	K2O	MgO	Lime (Arable) (Grass)	
<b>R037-1 SUBSOIL</b>	<b>Not Given / Not Given</b>				T/Ac	0
<b>547770  </b>		Units/Acre			Te/Ha	0
		Kg/Ha				0

Field Name / Ref / Soil Type	Last Crop / Next Crop	P2O5	K2O	MgO	Lime (Arable) (Grass)	
<b>R037-4 TOPSOIL</b>	<b>Not Given / Not Given</b>				T/Ac	0
<b>547771  </b>		Units/Acre			Te/Ha	0
		Kg/Ha				0

Field Name / Ref / Soil Type	Last Crop / Next Crop	P2O5	K2O	MgO	Lime (Arable) (Grass)	
<b>R037-4 SUBSOIL</b>	<b>Not Given / Not Given</b>				T/Ac	0
<b>547772  </b>		Units/Acre			Te/Ha	0
		Kg/Ha				0

Field Name / Ref / Soil Type	Last Crop / Next Crop	P2O5	K2O	MgO	Lime (Arable) (Grass)	
<b>R037-5 TOPSOIL</b>	<b>Not Given / Not Given</b>				T/Ac	0
<b>547773  </b>		Units/Acre			Te/Ha	0
		Kg/Ha				0

Fertiliser recommendations are based on **AHDB RB209 (Ninth Edition)**. 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

Report continued.....

DATE SAMPLES **R037-5 SUBSOIL 547774 |**  
 FROM 13th December 2021  
 ANGLIAN WATER

MATT BARKER  
 MOTT MACDONALD

## ANALYSIS REPORT



SAMPLED BY

10 TEMPLE BACK  
 BRISTOL

Report reference COST CODE 100102041

BS1 6FL

81206/21

Tel: 0117 9069500

Fax:

Field Name / Ref / Soil Type

### Fertiliser Recommendations

Last Crop / Next Crop	P2O5	K2O	MgO	Lime (Arable) (Grass)	
<b>Not Given / Not Given</b>				T/Ac	0
	Units/Acre			Te/Ha	0
	Kg/Ha				0

# ANALYSIS REPORT

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Fertiliser recommendations are based on **AHDB RB209 (Ninth Edition)**. 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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Contact : MATT BARKER

[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]

**W680**

Please quote the above code for all enquiries

Client : ANGLIAN WATER

Distributor : COST CODE 100102041

Sample Matrix : Agricultural Soil

Laboratory Reference	
Card Number	81207/21

Date Received	03-Dec-21
Date Reported	13-Dec-21

## SOIL ANALYSIS REPORT

Laboratory Sample Reference	Field Details		Soil pH	Index			mg/l (Available)		
	No.	Name or O.S. Reference with Cropping Details		P	K	Mg	P	K	Mg
547775/21	1	<b>R037-2 TOPSOIL</b> <i>No cropping details given</i>	8.2	2	2-	1	20.8	156	43
547776/21	2	<b>R037-2 SUBSOIL</b> <i>No cropping details given</i>	8.3	0	1	1	6.4	77	37
547777/21	3	<b>Y039-4 TOPSOIL</b> <i>No cropping details given</i>	8.0	1	1	1	13.8	120	46
547778/21	4	<b>Y039-4 SUBSOIL</b> <i>No cropping details given</i>	8.1	0	1	1	9.4	96	43
547779/21	5	<b>G036-10 TOPSOIL</b> <i>No cropping details given</i>	8.2	1	2-	1	10.8	126	35

# ANALYSIS REPORT



547780/21	6	<b>G036-10 SUBSOIL</b> No cropping details given	<b>8.2</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>8.6</b>	<b>118</b>	<b>35</b>
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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 AHDB Fertiliser Recommendations RB209 9th Edition.

Released by ..... *Nina Mansfield*  
..... *13/12/21*

On behalf of NRM Date

## MICRO NUTRIENT REPORT

DATE **13th December 2021**

MATT BARKER

SAMPLES FROM **ANGLIAN WATER**

Reference: <b>81207/547775/21</b>	Field Name: <b>R037-2 TOPSOIL</b>	Result (*)	Deficient	Marginal	Target	Marginal	Excessive
Organic matter (LOI) %	3.1	1	OM level	data not av	liable for th	s crop	

Reference: <b>81207/547776/21</b>	Field Name: <b>R037-2 SUBSOIL</b>	Result (*)	Deficient	Marginal	Target	Marginal	Excessive
Organic matter (LOI) %	2.6	1	OM level	data not av	liable for th	s crop	

Reference: <b>81207/547777/21</b>	Field Name: <b>Y039-4 TOPSOIL</b>	Result (*)	Deficient	Marginal	Target	Marginal	Excessive
Organic matter (LOI) %	5.7	1	OM level	data not av	liable for th	s crop	

Reference: <b>81207/547778/21</b>	Field Name: <b>Y039-4 SUBSOIL</b>	Result (*)	Deficient	Marginal	Target	Marginal	Excessive
Organic matter (LOI) %	4.9	1	OM level	data not av	liable for th	s crop	

Reference: <b>81207/547779/21</b>	Field Name: <b>G036-10 TOPSOIL</b>	Result (*)	Deficient	Marginal	Target	Marginal	Excessive
Organic matter (LOI) %	3.6	1	OM level	data not av	liable for th	s crop	

Reference: <b>81207/547780/21</b>	Field Name: <b>G036-10 SUBSOIL</b>	Result (*)	Deficient	Marginal	Target	Marginal	Excessive
Organic matter (LOI) %	3.4	1	OM level	data not av	liable for th	s crop	

**Notes (\*)**

- (1) NRM considers Organic soils to contain between 10-20% organic material with Peaty soils containing over 20% . The optimum ranges for Organic Matter which have been set are dependent on the soil type and the cropping but these must be viewed as guidance values only.

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DATE 13th December 2021  
 SAMPLES FROM ANGLIAN WATER

MATT BARKER

SAMPLED BY COST CODE 100102041

Report reference 81207/21

**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)

A lime recommendation is usually for a 20cm depth of cultivated soil or a 15cm depth of grassland soil. Where soil is acid below 20 cm and soils are ploughed for arable crops, a proportionately larger quantity of lime should be applied. However, if more than 10 t/ha is needed, half should be deeply cultivated into the soil and ploughed down, with the remainder applied to the surface and worked in.

For established grassland or other situations where there is no, or only minimal soil cultivation, no more than 7.5 t/ha of lime should be applied in one application.

In these situations, applications of lime change the pH below the surface very slowly. Consequently, the underlying soil should not be allowed to become too acidic because this will affect the root growth and thus limit nutrient and water uptake, which will adversely affect yield.

Field Name / Ref / Soil Type	Last Crop / Next Crop	P2O5	K2O	MgO	Lime (Arable)	(Grass)
<b>R037-2 TOPSOIL</b>	<b>Not Given / Not Given</b>	Units/Acre			T/Ac	0
<b>547775 I</b>		Kg/Ha			Te/Ha	0
<b>R037-2 SUBSOIL</b>	<b>Not Given / Not Given</b>	Units/Acre			T/Ac	0
<b>547776 I</b>		Kg/Ha			Te/Ha	0
<b>Y039-4 TOPSOIL</b>	<b>Not Given / Not Given</b>	Units/Acre			T/Ac	0
<b>547777 I</b>		Kg/Ha			Te/Ha	0
<b>Y039-4 SUBSOIL</b>	<b>Not Given / Not Given</b>	Units/Acre			T/Ac	0
<b>547778 I</b>		Kg/Ha			Te/Ha	0
<b>G036-10 TOPSOIL</b>	<b>Not Given / Not Given</b>	Units/Acre			T/Ac	0
<b>547779 I</b>		Kg/Ha			Te/Ha	0

Fertiliser recommendations are based on AHDB RB209 (Ninth Edition). 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

Report continued.....

# ANALYSIS REPORT



DATE 13th December 2021  
SAMPLES FROM ANGLIAN WATER

MATT BARKER

SAMPLED BY COST CODE 100102041

Report reference 81207/21

## Fertiliser Recommendations

Field Name / Ref / Soil Type	Last Crop / Next Crop	P2O5	K2O	MgO	Lime (Arable)	(Grass)
G036-10 SUBSOIL	Not Given / Not Given	Units/Acre			T/Ac	0
547780 /		Kg/Ha			Tc/Ha	0

Fertiliser recommendations are based on **AHDB RB209 (Ninth Edition)**. 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.  
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Contact : MATT BARKER  
 [REDACTED]  
 [REDACTED]  
 [REDACTED]  
 [REDACTED]  
 [REDACTED]

**W680**

Please quote the above code for all enquiries

Client : ANGLIAN WATER

Sample Matrix : Agricultural Soil

Laboratory Reference	
Card Number	81234/21
Date Received	06-Dec-21
Date Reported	13-Dec-21

## SOIL ANALYSIS REPORT

Laboratory Sample Reference	Field Details		Soil pH	Index			mg/l (Available)		
	No.	Name or O.S. Reference with Cropping Details		P	K	Mg	P	K	Mg
547870/21	1	<b>YO39-A TOPSOIL</b> <i>No cropping details given</i>	<b>7.5</b>	<b>1</b>	<b>2-</b>	<b>2</b>	<b>13.0</b>	<b>140</b>	<b>51</b>
547871/21	2	<b>YO39-1 SUBSOIL</b> <i>No cropping details given</i>	<b>7.3</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>8.8</b>	<b>106</b>	<b>50</b>

*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 AHDB Fertiliser Recommendations RB209 9th Edition.*

# ANALYSIS REPORT



Released by .....*Nina Mansfield*  
.....*13/12/21*

On behalf of NRM Date

## MICRO NUTRIENT REPORT

DATE **13th December 2021**  
SAMPLES FROM **ANGLIAN WATER**

MATT BARKER  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]

Reference: <b>81234/547870/21</b>	Field Name: <b>YO39-A TOPSOIL</b>	Result	(*)	Deficient	Marginal	Target	Marginal Excessive
Organic matter (LOI) %		3.9	1	OM level	data not av	ilable for th	s crop

Reference: <b>81234/547871/21</b>	Field Name: <b>YO39-1 SUBSOIL</b>	Result	(*)	Deficient	Marginal	Target	Marginal Excessive
Organic matter (LOI) %		3.4	1	OM level	data not av	ilable for th	s crop

### Notes (\*)

- (1) NRM considers Organic soils to contain between 10-20% organic material with Peaty soils containing over 20% . The optimum ranges for Organic Matter which have been set are dependent on the soil type and the cropping but these must be viewed as guidance values only.

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DATE 13th December 2021  
SAMPLES FROM ANGLIAN WATER

MATT BARKER

SAMPLED BY

Report reference 81234/21

### 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)

A lime recommendation is usually for a 20cm depth of cultivated soil or a 15cm depth of grassland soil. Where soil is acid below 20 cm and soils are ploughed for arable crops, a proportionately larger quantity of lime should be applied. However, if more than 10 t/ha is needed, half should be deeply cultivated into the soil and ploughed down, with the remainder applied to the surface and worked in.

For established grassland or other situations where there is no, or only minimal soil cultivation, no more than 7.5 t/ha of lime should be applied in one application.

In these situations, applications of lime change the pH below the surface very slowly. Consequently, the underlying soil should not be allowed to become too acidic because this will affect the root growth and thus limit nutrient and water uptake, which will adversely affect yield.

Field Name / Ref / Soil Type	Last Crop / Next Crop	P2O5	K2O	MgO	Lime (Arable)	(Grass)	
YO39-A TOPSOIL	Not Given / Not Given	Units/Acre			T/Ac	0	0
547870 /		Kg/Ha			Te/Ha	0	0

Field Name / Ref / Soil Type	Last Crop / Next Crop	P2O5	K2O	MgO	Lime (Arable)	(Grass)	
YO39-1 SUBSOIL	Not Given / Not Given	Units/Acre			T/Ac	0	0
547871 /		Kg/Ha			Te/Ha	0	0

Fertiliser recommendations are based on AHDB RB209 (Ninth Edition). 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

Contact : MATT BARKER

Client : ANGLIAN WATER

**W680**

Please quote the above code for all enquiries

Local Rep : EMILY MARR

Laboratory Reference

Card Number 81343/21

Date Received 09-Dec-21

# ANALYSIS REPORT



Telephone : \_\_\_\_\_ Date Reported 20-Dec-21

Sample Matrix : Agricultural Soil

## SOIL ANALYSIS REPORT

Laboratory Sample Reference	Field Details		Soil pH	Index			mg/l (Available)		
	No.	Name or O.S. Reference with Cropping Details		P	K	Mg	P	K	Mg
548386/21	1	<b>G036-1 TOPSOIL</b> <i>No cropping details given</i>	<b>8.1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>11.2</b>	<b>81</b>	<b>38</b>
548387/21	2	<b>G036-1 SUBSOIL</b> <i>No cropping details given</i>	<b>8.4</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>7.0</b>	<b>48</b>	<b>26</b>

*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 AHDB Fertiliser Recommendations RB209 9th Edition.*

Released by ..... *Nina Mansfield*  
..... *20/12/21*

On behalf of NRM Date



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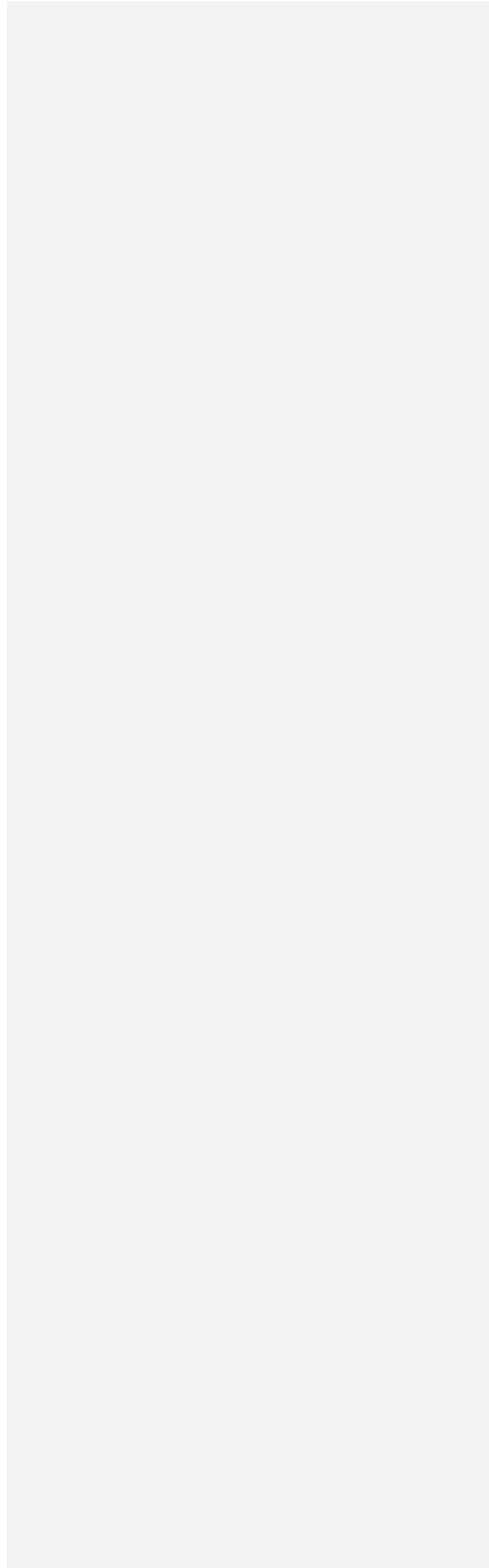


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NRM, Coopers Bridge, Braziers Lane, Bracknell, Berkshire RG42 6NS



## MICRO NUTRIENT REPORT

DATE **20th December 2021**

MATT BARKER

SAMPLES FROM **ANGLIAN WATER**

[REDACTED]  
 [REDACTED]  
 [REDACTED]  
 [REDACTED]  
 [REDACTED]

Reference: 81343/548386/21	Field Name: G036-1 TOPSOIL	Result	(*)	Deficient	Marginal	Target	Marginal	Excessive
Organic matter (LOI) %		4.8	1	OM level	data not av	liable for th	s crop	

Reference: 81343/548387/21	Field Name: G036-1 SUBSOIL	Result	(*)	Deficient	Marginal	Target	Marginal	Excessive
Organic matter (LOI) %		3.0	1	OM level	data not av	liable for th	s crop	

**Notes (\*)**

(1) NRM considers Organic soils to contain between 10-20% organic material with Peaty soils containing over 20% . The optimum ranges for Organic Matter which have been set are dependent on the soil type and the cropping but these must be viewed as guidance values only.

# ANALYSIS REPORT



DATE 20th December 2021  
SAMPLES FROM ANGLIAN WATER

MATT BARKER

SAMPLED BY EMILY MARR

Report reference 81343/21

## 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)

A lime recommendation is usually for a 20cm depth of cultivated soil or a 15cm depth of grassland soil. Where soil is acid below 20 cm and soils are ploughed for arable crops, a proportionately larger quantity of lime should be applied. However, if more than 10 t/ha is needed, half should be deeply cultivated into the soil and ploughed down, with the remainder applied to the surface and worked in.

For established grassland or other situations where there is no, or only minimal soil cultivation, no more than 7.5 t/ha of lime should be applied in one application.

In these situations, applications of lime change the pH below the surface very slowly. Consequently, the underlying soil should not be allowed to become too acidic because this will affect the root growth and thus limit nutrient and water uptake, which will adversely affect yield.

Field Name / Ref / Soil Type	Last Crop / Next Crop	P2O5	K2O	MgO	Lime (Arable)	(Grass)	
<b>G036-1 TOPSOIL</b>	<b>Not Given / Not Given</b>	Units/Acre			T/Ac	0	0
<b>548386 /</b>		Kg/Ha			Te/Ha	0	0

Field Name / Ref / Soil Type	Last Crop / Next Crop	P2O5	K2O	MgO	Lime (Arable)	(Grass)	
<b>G036-1 SUBSOIL</b>	<b>Not Given / Not Given</b>	Units/Acre			T/Ac	0	0
<b>548387 /</b>		Kg/Ha			Te/Ha	0	0

Fertiliser recommendations are based on AHDB RB209 (Ninth Edition). 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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PAAG



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## Get in touch

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Calling our Freephone information line on [0808 196 1661](tel:08081961661)



Writing to us at **Freepost: CWWTPR**

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