BIDWELLS

SHEEPWASH SOLAR FARM- ECKLEY FARMS AGRICULTURAL LAND USE STATEMENT

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DISTRIBUTION OF FOOD AND DRINK ENTERPRISES IN KENT

1.0 Executive Summary

This report explores the issues relating to the current and potential use of agricultural land at Eckley Farms, Marden and the impact of a proposed solar energy farm. The study assesses the relative importance of the current agricultural land use in a local and national context and the consequences for the existing agricultural business. The main conclusions of the report are as follows:

- The proposed development will not result in the permanent loss of a finite national resource (BMV land), as agricultural production can be resumed following the expiry of a temporary planning consent and the reinstatement and remediation of the land.
- BMV land is relatively prevalent in Kent so, if it is accepted that development must take place to facilitate sustainable growth, utilising a site where the land is comprised of predominantly subgrade 3b rather than BMV land is an efficient solution.
- Large parts of Kent are designated as Areas of Outstanding Natural Beauty (AONB) and therefore it is preferable to avoid development in these sensitive landscapes and it is more efficient to develop subgrade 3b to higher grades.
- The farming regime which can be adopted will largely be determined by the potential of the poorest quality land on the Site which in this case is subgrade 3b).
- Crop choice, which is limited by the versatility of the poorest soil on the site, is restricted to conventional combinable commodity crops, for which the UK fluctuates in and out of a trade deficit/surplus position year on year. The land cannot viably produce specialist niche crops for which the UK is consistently a net importer, so the implications of its temporary loss are not material at a national or regional scale.
- Solar energy is one of the most effective and efficient forms of renewable energy production for the site. Alternatives, such as growing maize for anaerobic digestion, have negative impacts for soils structure, soil erosion and wider environmental impacts, while delivering lower energy yields per unit area of land.
- The proposed development will not affect the viability of the remaining farm business as the land represents only 7.5% of the total land farmed, but it will provide a diversified income stream compatible with current operations.
- The proposed development has the potential to deliver wider environmental benefits such as improvements to soil structure and health, carbon sequestration and habitat and biodiversity improvements.
- The proposed development would generate a consistent income and help to protect the farming business against inherent volatility associated with global commodity markets and seasonal weather patterns, as well as the significant risks associated with the withdrawal of agricultural support following the UK's departure from the EU.

2.0 Introduction

2.1 Background

The Sheepwash Solar Energy Farm (the proposed development) will be located on c.39 hectares of land approximately a mile (1.6 kilometres) west of Marden (‘the Site’). It will have the capacity to generate up to c.40 megawatts of solar energy per annum and 15 megawatts of battery energy storage, directly supplying the National Grid. A plan of the Site is included at Appendix 1.

The current agricultural occupier of the Site is Eckley Farms – a principally arable enterprise growing winter wheat, winter barley, barley, oats, oilseed rape, beans and linseed.

2.2 Scope

This report explores the issues relating to the use of the Site for a renewable energy development It presents a structured and objective assessment, focusing on the impact of the development on agriculture and soils within the development area, at farm level, and nationally.

It covers the following principal areas in considering the impact of development:

- An overview of the findings of previous soils surveys, detailing their wider implications;
- The importance of the existing agricultural use in the context of the current UK market. This section focuses on the UK's net exportable surplus of many cereal crops and the relative importance of this parcel to the UK's overall production levels;
- The ability of the remaining agricultural holding and farming business to remain viable should the proposed development be consented;
- The temporary removal of agricultural land from its current production regime;
- The potential for continued agricultural use (grazing) in conjunction with the proposed development and the associated environmental benefits.

3.0 Physical Characteristics and Land Grade

3.1 Agricultural Land Classification (ALC)

The Agricultural Land Classification (ALC) provides a framework for classifying land according to the extent to which its physical or chemical characteristics impose long-term limitations on agricultural use. The limitations can operate in one or more of four principal ways by affecting: the range of crops which can be grown; yield potential; yield consistency; and the cost of obtaining that yield. The classification system gives considerable weight to flexibility of cropping, albeit the cropping potential and not its current or historic use.

Land is classified into 5 grades based on the principal factors of soil type, climate and location. Grades 1, 2 and subgrade 3a signify the most productive land and make up approximately one-third of agricultural land in England and Wales. Approximately half of agricultural land in England and Wales is classified as subgrade 3b and grade 4 of moderate to poor quality. While less significant at a national scale, subgrade 3b and grade 4 land can be locally important in areas with generally poor-quality land[1]. The remaining poorest quality grade 5 land occurs mainly in upland areas.

The initial survey of agricultural land occurred between 1967 and 1974 using Ordinate Survey maps on a 1-inch to 1-mile scale. These are broad scale maps meaning that they only serve as a guide without the accuracy to classify individual fields. Detailed field level analysis has been carried out in line with the Ministry for Agriculture, Fisheries and Food (MAFF)[2] guidelines to establish the agricultural land classification of the planning application area (c.84 hectares). As a result, land at the Site is classified as:

- **Grade 2 (9%)** - Land with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural and horticultural crops can usually be grown, but on some land in the grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable root crops. The level of yield is generally high but may be lower or more variable than Grade 1.
- **Subgrade 3a (38%)** - 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 (53%)** - Land with moderate limitations affecting crop yield, cultivations and harvesting. Capable of producing moderate yields of cereals but not well suited to horticultural or root crops.

It is important to note the farming regime which can be adopted will largely be determined by the potential of the poorest quality land on the Site, thereby limiting the extent to which the capacity of the higher quality land can be exploited (see Sections 4.2).

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

[2] MAFF (1988). *Agricultural Land Classification of England and Wales. Revised guidelines and criteria for grading the quality of agricultural land*. MAFF Publications.

3.2 Climatic Conditions

Climatic conditions for the Site are typical for Kent which is notably warmer and sunnier than most of England. Kent on average receives 10% more hours of sunshine per year than the England average and is often 1-2 degrees warmer[3] with the temperature difference being more pronounced at the extremes of winter and summer.

3.3 Best and Most Versatile (BMV) Land

As can be seen, just under half (47%)[4] of the Site is classified as grade 2 and subgrade 3a so falls into the category of 'Best and Most Versatile' (BMV) Land. BMV land is a finite national resource, with the National Planning NPPF 2019 requiring Local Planning Authorities to take account of the economic and productivity impact of developments. The main policy objective around the preservation of BMV land is to protect national food security and ensure the efficient use of resources, with a preference for development on poor quality agricultural land.

3.4 Soil Series

With a relatively homogenous climate across much of the UK, soil type (along with topography) heavily influences the natural plant and microbe communities found on any site and thus dictates the productive capacity, versatility and resilience of land which is in agricultural production. Soil is also a fragile resource which can be irreversibly degraded if it is not managed appropriately, particularly through intensive agricultural regimes.

The Site is made up of two main soil types, the Shabbington association in the west and Fladbury 3 association in the east. Both these associations are prevalent on river terraces and are characterised as fine loamy or silty soils over a sandy or gravelly base. These are liable to periodic waterlogging, which does impact agricultural performance, and which is evident at the Site where areas of poor crop establishment are a result of soils sitting wet for extended periods.

3.5 Soil Depth

Soil depth helps determine the available water capacity of a soil. Shallowness affects cropping in other ways, notably by influencing the range and type of cultivations which can be carried out but also by restricting nutrient uptake, root growth and anchorage. Therefore, it is necessary to specify minimum soil depth requirements for the ALC grades and subgrades. Table 1 below derived from the MAFF revised guidelines and criteria for grading quality of agricultural land 1988, shows the minimum soil depth above fragmented or consolidated rock for the ALC grades present at the Site. For more technical information see Appendix 2, Reading Agricultural Consultants ALC and soil resources report.

Table 1: Soil Grade According to Soil Depth

GRADE/ SUBGRADE	DEPTH LIMITS (CM)
2	45
3a	30
3b	20

[3] Met Office (2021), *UK Climate Averages*
[4] Reading Agricultural Consultants (2022), *Statkraft UK Ltd- Agricultural Land Classification and Soil Resources*

Average topsoil depth varies across the Site, but at an average of 26.9cm (being below the threshold to be classified as 3a). This average figure suggests that some areas of the site have a relatively thin topsoil layer which could contribute to their below average performance.

3.6 Drainage, Wetness and Flooding

In addition to slope, flood risk and geology, soil type plays a key role in determining the drainage and wetness of soils. Soils within the Shabbington and Fladbury 3 associations are moderately susceptible to prolonged saturation generally falling under imperfectly drained Wetness Class (WC) III. The Site follows this trend and soils are WC III meaning the soil profile is wet within 70 cm for 91-180 days most years but only wet within 40cm for between 31 and 90 days in most years.

In addition to being WC III, the land is also Flood Class 3 meaning it is expected to flood at least once every hundred years. However, local sources have confirmed that the Site floods approximately one year in twenty, which is credible given a main river runs along the eastern boundary of the Site.

Soil surveys showed that true drought was rarely if ever a problem across any part of the Site as soils have on the whole good water reserves. However, potential for drought is what prevented the small area of Grade 2 land from being classed as Grade 1 (see Section 4.2 below).

3.7 Texture and Structure

Soil texture and structure have a major influence on water retention, water movement and aeration in soils and therefore its suitability as a medium for plant growth. Texture class is determined by the relative proportions of sand, silt and clay particles and the amount of organic matter in a soil horizon and thus can be indicative of the soil's fertility.

The entire Site falls under the texture class of clay which is characterised by limitations to workability and drainage. However, these limitations are slight at the level of Grade 2 and Grade 3a and incidentally, soil wetness and impact of ground water have a much greater impact on performance.

Soil structure is influenced considerably by soil texture and is described by reference to the size, shape and degree of development of the aggregated primary particles and their pores and fissures that make up the soil, known as peds. In well-structured soils, peds are clearly identifiable, stable and contain a high proportion of pores and fissures which facilitate the movement of air, water and roots through the soil. Soils demonstrating the best structure and texture are usually those where there has been least disturbance, such as under permanent pasture, and where cultivations have not disturbed the soil, contributing to an established root network that assists structural development.

3.8 Stone Content

The physical properties of stones, such as quantity, size, shape, and hardness dictate the limitations they impose to the soil's agricultural productivity. Stones impede cultivation, harvesting, and crop growth and reduce available water capacity, with larger stones posing a more detrimental impact. Increased stoniness contributes to higher costs of production and maintenance costs due to the additional wear and tear caused to apparatus and tyres as well as physical power demands on machinery to pull through stony soil. Stoniness is not a major issue at the Site as soil surveys have assessed it to be typically stone-less with two small patches (c.5% of the site) classed as slightly stony.

3.9 Summary

The Site on the whole has good quality soils but with some workability limitations, resulting from risk of waterlogging impacting timeliness of operations and establishment of some crops. These are to a degree compensated for by warmer and sunnier than average climate meaning the Site is well suited to arable production.

4.0 Soil Versatility and Productivity

4.1 Versatility of Cropping

Crop choice is limited by the potential of the poorest quality soil on the Site. The Site has historically been used to grow a rotation of conventional combinable arable crops, including winter wheat, winter barley, spring barley, spring oats, winter beans and Oilseed rape as well as the less conventional but still relatively common linseed.

The current cropping regime, with the inclusion of linseed for which there is often a premium, therefore represents the financially optimal form of conventional agricultural land use that the Site can viably sustain. The production of high valuer value root, vegetable or horticultural crops is not economically viable on the Site and unlikely to become so in the foreseeable future due to the soil characteristics detailed above.

4.2 Productivity

While the current rotation is the most economically viable, the proximity of the Site to a major water course with a high groundwater level resulting in high susceptibility to waterlogging mean crop establishment is an issue. This was acutely apparent in the 2019 and 2020 seasons where the Site has experienced exceptionally wet autumns limiting when machinery could get on the land to drill crops and impacting early growth stages. Patches of damaged crop from standing water are noted in the ALC report[5]. Fortunately, yields were to an extent able to recover due to an exceptionally warm and dry summer.

Several studies have shown that one of the early impacts of climate change are increasingly wet autumns and winters[6] which have a disproportionate impact on soils at high risk of waterlogging and therefore puts the Site's ability to maintain current performance at equal risk when compared to other land within the farming business.

4.3 Renewable Energy from Agriculture

Producing energy from arable land is not a new concept. Historically, vast swathes of the country were put to pasture and oats to feed horses – the main means of transport prior to the motor car. Growing crops for energy have seen significant growth in the last decade as AD plants have sprung up around the country using crops, food waste and slurry from dairy to produce biogas. In the last couple of years building of new AD plants has stalled but, even so, in 2019 31%[7] of the UK maize crop went to biogas production.

While growing energy crops for AD has the potential to generate reasonable returns, the distance to an AD plant from the Site is a key limiting factor. There are two farm fed AD plants within a viable distance of the Site at Chart Sutton approximately 10 miles north and at Benenden approximately 12 miles south. Maize production for use in this AD plant could therefore be adopted on the Site, without requiring any planning or other statutory consents. However, the process of harvesting

[5] Reading Agricultural Consultants (2022), *Statkraft UK Ltd- Agricultural Land Classification and Soil Resources*

[6] Harkness et al. (2020) *Adverse weather condition for UK wheat production under climate change*, Agricultural and Forest Meteorology, vol. 282-283, https://www.sciencedirect.com/science/article/pii/S0168192319304782

[7] DEFRA (2020), *Crops Grown for Bioenergy in the UK: 2019,* https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/943264/nonfood-statsnotice2019-10dec20v3.pdf

maize is machine intensive leading to considerable soil compaction as well as creating soil erosion. This is because fields are left bare post-harvest with no tight stubble cover during late autumn and winter until spring drilling season. As a result, they are susceptible to soil run off during wet winter weather. Maize is also a nutrient heavy crop acting as a heavy draw from the soil and often requiring fertiliser use above that of winter cereals. At a local level farm traffic would increase during the harvest period as maize harvesting is intensive as it requires both farm equipment and haulage for harvesting and delivery to the end user.

In conclusion, although maize could viably be grown on the Site for feedstock supply to an AD plant, there are negative impacts with respect to land, soil, and highways.

The use of land for solar energy is substantially more efficient than for a maize energy crop. The annualised energy yield per hectare as a solar energy farm is 734MWh. For maize, assuming a high yield of 50 tonnes of whole crop maize per hectare giving an average biogas yield of 210m3, the energy yield per hectare would equate to approximately 19.5MWh per annum for a Combined Heat and Power (CHP) plant.

5.0 Local and National Agricultural Importance

This section considers the relative importance of the Site in a local and national context to establish whether it is an appropriate location for the proposed development. The two main questions to be answered are:

a) Does the land on the Site represent an exceptional agricultural resource locally or nationally?
b) Does the Site have the potential to viably produce products for which the UK is deficient, or which cannot be produced elsewhere?

Due to the 2020 growing season being especially poor (due to high levels of rainfall during the winter drilling period followed by drought in spring) and the impacts of Covid-19 in 2021,this report mainly uses data from 2019 and prior which is more representative of both national and farm production potential.

5.1 National Economy

It is common amongst developed western economies for agriculture to make a minimal contribution to gross value and employment. In the UK, between 2018 and 2019 Gross Value Added (GVA) from agriculture rose by 6.5% to £10.4 billion[8] but this still only represents 0.53% of the national economy. This is due to a multitude of factors such as a level and type of growth in the wider economy; agriculture's value position within the supply chain; government policy and changing behaviours. This is not to say that agriculture has been static. There has been continual advancement in total productivity resulting in increases of 60%[9] between 1973 and 2018. However, over a much longer period the national economy has seen greater growth in higher value sectors, with higher levels of employment outweighing the productivity gains in agriculture (hence agriculture's proportional contribution has declined). Therefore, significant changes in the agricultural sector, such as large-scale land use change, have limited impact on the national economy.

UK agriculture is highly advanced and mechanised, with over 72%[10] (17.5 million hectares) of the UK land area being farmed with much of the remainder under some form of management and little to no true wilderness. Of this, the total arable cropped area was just over 4.5 million hectares. In the context of the national arable cropped area the Site is therefore not significant, especially when considered against year on year fluctuations in cropped area.

A further impact of an advanced and mechanised agricultural sector is a long-standing trend of continually reducing employment. Statistics from the Department for Food and Rural Affairs (DEFRA) show that agriculture made up just 1.45%[11] of jobs in the UK which demonstrates the limited impact the agricultural sector has on employment nationally.

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8 DEFRA (2020), *Agriculture in the UK 2019,* pp. 37, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/950618/AUK-2019-07jan21.pdf
9 DEFRA (2020), *Agriculture in the UK 2019,* pp. 52, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/950618/AUK-2019-07jan21.pdf
10 DEFRA (2020), *Agriculture in the UK 2019,* pp. 15, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/950618/AUK-2019-07jan21.pdf
11 DEFRA (2020), *Agriculture in the UK 2019,* pp. 43, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/950618/AUK-2019-07jan21.pdf

5.2 Local Economy

Agriculture in the South East of England has been historically important due its primary role of feeding London throughout the city's dramatic growth during the industrial period of the 19th and early 20th centuries. London's economic dominance meant the importance of the agriculture sector persisted longer into the 20th century than in other areas of the country, but developments in shipping and proximity to the great ports in London and the resulting access to cheaper imports of agricultural goods meant that Kent eventually fell into line with the rest of the country becoming reliant on the tertiary (service) sector. Today, while agriculture's economic contribution is limited, the horticulture sector in Kent is strategically important accounting for two thirds if UK top fruit production and one third of all strawberry production[12]. In addition, Kent has a notably strong logistics industry partly due to it being the key link between London and the Port of Dover but also hosting the high-speed rail link to Europe.

Despite the rapid development of other sectors, agriculture still plays a key role in Kent's economy, with 2.6%[13] of jobs being in food and drink production and 63.6% of these in primary crop and animal production; 0.18% above national average. However, this is principally driven by the horticulture sector, specifically top fruit and soft fruit that has a disproportionally high labour requirement in production and processing due to the impracticalities of mechanisation for handling delicate produce. This is a specialised subsector (significantly overrepresented to Kent) so enterprises occur in clusters historically surrounding appropriate land but more recently to capture the efficiencies of supplier networks and associated economic infrastructure. This to an extent skews overall figures as there are many areas of Kent where more conventional farming systems are employed (such as Eckley Farms) and where agriculture's economic contribution is more consistent with national averages. Appendix 4 illustrates the distribution of food and drink enterprises throughout Kent.

Eckley Farms is notably not part of this unique subsector or located in a cluster that bolsters agriculture's economic performance in the area. Rather, its economic contribution is in line with national figures and less relevant in a local context. Furthermore, given the number of agricultural employment opportunities in the immediate vicinity, the impact of the removal of c.39 hectares of conventionally cropped land (which equates to a fraction of one agricultural worker), has a negligible impact on employment in the local area.

Kent is the most populated non-metropolitan county in England and has the second highest population density in the South East, 4.5 residents per hectare[14] compared to England average of 4.3 residents per hectare. This level of population pressure, combined with lack of previously developed sites and significant areas of designated landscape, means most new development in Kent is expected to take place on undesignated greenfield land. A large area of Kent is designated as the Kent Downs Area of Outstanding Natural Beauty (AONB) as well as the High-Weald AONB which are afforded a higher-level landscape protection mandating a default position to refuse major development within AONB boundaries. Therefore, if it is accepted that greenfield development outside the AONB *per se* is necessary within the County, it is preferable that the majority of this is on widely available subgrade 3a and non BMV subgrade 3b land rather than grade 2 or grade 1.

[12] JBA Consulting (2020), *Climate Change Risk and Impact Assessment for Kent and Medway Part 2: Agriculture Sector Summary*, pp.1 https://www.kent.gov.uk/__data/assets/pdf_file/0016/111382/CCRIA-for-Kent-and-Medway-part-two-agricultural-sector-summary.pdf

[13] Kent Analytics (2021), *Statistical Bulletin March 2021- Food & Drink Production Industries in Kent,* pp. 9, https://www.kent.gov.uk/__data/assets/pdf_file/0014/90410/Food-and-drink-production-industries-in-Kent.pdf

[14] Kent Analytics (2021), *Statistical Bulletin July 2021- Mid-year Population Estimates: Total population of Kent authorities,* pp 5, https://www.kent.gov.uk/__data/assets/pdf_file/0018/14724/Mid-year-population-estimates-total-population-of-Kent-bulletin.pdf

As the proposed form of decentralised renewable energy generation must necessarily be located close to the point of demand, it cannot be located in another region to limit the cumulative impact of BMV loss at a national scale. It is also widely accepted that renewable energy is a necessary to facilitate sustainable population growth and given Kent's climatic conditions (above average sunshine hours) the County is well suited to solar power generation.

5.3 Production and Supply

This section seeks to establish the extent to which the agricultural production output from the Site is significant at national and local level.

Produce from the Site enters major commodity markets. The primary influences on the total UK production of agricultural commodities are the weather and long-term market trends.

The crops grown at the Site are winter wheat, winter barley, oilseed rape, winter beans, oats and linseed. Winter wheat, winter barley and spring barley are classed as major UK crops, grown in arable regions across the country and are less limited to specific soil types like specialist crops (e.g. root vegetables, potatoes, salads, brassica vegetables). In 2019 the Site's total production from spring barley was 456 tonnes. The total UK production of these crops in 2019[15] was 16.2 million tonnes, 1.4 million tonnes and 4.5 million tonnes respectively. The removal of two fields which perform below national and farm averages, would not therefore have a significant effect on the UK's total production of these crops.

International trade is similarly affected by weather and long-term market trends. Despite significant annual variation, the UK does have an approximate long-term average net trade balance. The bulk of exports are made up of the raw commodities produced at the Site (wheat and barley), but this fluctuates greatly due to growing conditions in both domestic and foreign markets as well as the quality demands of millers and processors. Appendix 3 includes data on the UK wheat and barley trade balance and whole sector international trade. For example, un-milled wheat had a net exportable surplus of £147 million in 2016 followed by a net deficit of £249 million in 2017[16] due to harsh drought of 2017.

These national production and supply figures show that, although the Site does contribute to national food requirements in years of deficit, the produce mainly enters international commodity markets for which the UK trade balance fluctuates in and out of a net surplus/deficit position. Most importantly, the Site is not capable of producing specialist crop types where production cannot be easily substituted and for which the UK consistently runs a trade deficit.

The horticulture sector is uniquely prevalent in Kent due to the soil and climatic conditions and strategically important to the UK. The UK nationally runs a persistent trade deficit when it comes to fruit which is 2019 was £10.2 billion[17] with exports just 11.3% of the value of imports. Production of these crops does generate a higher gross margin per hectare, especially top fruit and soft fruit, and therefore could be seen as a higher value land use while keeping BMV land in food production. However, as detailed above, top fruit and soft fruit are highly specialist crops requiring specialist expertise, significant capex. to establish and, despite a certain degree of insulation from commodity

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[15] DEFRA (2020), *Agriculture in the UK 2019,* pp. 66, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/950618/AUK-2019-07jan21.pdf

[16] DEFRA (2020), *Agriculture in the UK 2019,* pp. 138, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/950618/AUK-2019-07jan21.pdf

[17] DEFRA (2020) *Food Statistics in your pocket: Global and UK supply*. https://www.gov.uk/government/statistics/food-statistics-pocketbook/food-statistics-in-your-pocket-global-and-uk-supply

markets, are affected by weather events to a much greater extent and therefore carry more financial risk. Furthermore, the majority of horticulture production takes place on grade 1 and grade 2 land to the north of the Site and therefore a solar development occurring on predominantly subgrade 3b land not in a horticulture cluster, does not compromise what is a key subsector of UK agriculture.

5.4 Summary of Local and National Importance

The Site is located in a region where BMV land is relatively prevalent. However, as the Site is not the highest quality BMV land (being predominately subgrade 3b) its removal from food production would not compromise the strategically important fruit production sector. Furthermore, given the pressures from population and higher-level designations, the preference should be to develop a site that does not comprise meaningful areas of grade 1 and grade 2 land. The Site can only viably produce commodity crops for which the UK's trade balance is continually fluctuating in and out of a surplus position.

As the proposed renewable energy development must be sited near the source of energy demand, it cannot be located on lower quality land in another region to limit the cumulative impact on BMV at a national scale. That being the case, we conclude that the Site can more appropriately accommodate non-agricultural uses of this nature than better performing and more versatile land elsewhere in the region.

6.0 Impact on the Farming Business

6.1 Eckley Farms

The current agricultural occupier, Eckley Farms, is principally an arable enterprise growing winter wheat, winter barley, spring barley, spring oats and winter beans. The Site constitutes 7.5% of the total arable area of the business.

6.2 Existing Use

Removal of land from arable rotation will have an impact on the farming business as less land to cultivate reduces the agricultural productivity of the holding. The proposed development covers fields that are very much average

At a basic level, removing this land from arable production will decrease the workload and alleviate pressure during busy periods. This will allow for greater flexibility to carry out operations at the optimal time and conditions. It will also reduce the pressure on summer capacity as the current cropping regime of oilseed rape alongside predominantly winter cereals means harvest and drilling cross over resulting in one task having to be prioritised over the other depending on the year and limiting the Farms ability to capitalise on optimal conditions. However, a reduction in the land area to be harvested will increase the machinery cost per hectare - an increase in inefficiency. In this case the impact on machine efficiency is likely to be limited and balanced by the benefits on workload and flexibility.

Currently, as a wholly arable enterprise, the business has a relatively high exposure to the risks associated with commodity price fluctuations, weather, and environmental conditions. This is combined with the traditional inconsistency in cash flow associated with arable farming, as nearly all income is in the autumn as crops are sold post-harvest whereas outgoings occur year-round. There are exceptions, but this depends on growing contracts and specifications of processors. Consequentially, while long-term income levels may be relatively secure there is high short-term income risk as the business is reliant on only a few crops. Therefore, it is important for arable businesses to diversify their income sources to secure consistent income during times of low commodity prices and adverse environmental events. The development will provide the farm with a source of income which is not prone to the volatility it is otherwise exposed to such as climatic events and global commodity markets.

6.3 The Farming Business

It is well understood that the agriculture industry is about to go through a turbulent period of transition due to subsidy reform following the UK's departure from the EU; changes to what wider society expects from agriculture; and a much greater focus on sustainability and the environment. All farms across the UK are in the process of reviewing their operations to work out how to remain profitable through diversification. Attractive opportunities will naturally be synergistic and complimentary to the already established business. According to the Department for Environment, Food and Rural Affairs (DEFRA), diversification brought in £740 million of income to UK farmers in 2018/19 up 6% on the previous year. This is a figure that is expected to rise. The range of add-on businesses that are common in the sector are B&B, wedding venue, glamping and investing in renewable energy generation. For 39% of farms that included diversified services in their accounts in 2018/2019, new income accounted for at least a quarter of overall income.

The impact of the potential harms and benefits associated with the removal of land from arable production are related to land area and productivity. The land area is proportionally small (only

7.5% of the arable land across the holding) therefore the impact on the farming business as a whole will be minimal and temporary. Furthermore, the loss is more than offset by the benefits of securing a diversified income stream with a more consistent cashflow profile for the farming business.

7.0 Wider Environmental Benefits

The primary purpose of this development is renewable energy generation but in addition there are wider and more long-term, environmental benefits. These include reductions in soil erosion, carbon sequestration and habitat and biodiversity enhancements.

7.1 Soil Erosion and Health

Soil erosion and reductions in organic matter are a serious concern for UK agriculture. Heavy cultivation practices have meant soil is consistently turned year on year breaking up the natural structure and degrading the organic matter. Organic matter is one of the key components of topsoil that makes it a usable resource as without it, topsoil cannot host habitats and produce food. In 2006, around 18% of organic matter present in topsoil in 1980 had been lost[18].

The main benefit of the development with regard to soil carbon comes from averted loss. As land is no longer subject to intensive heavy cultivation, soil erosion and reduction in organic matter is immediately reduced. If the development takes place in conjunction with complimentary management practices, such as low intensity grazing, long-term improvements to soil health can be achieved that will increase levels of organic matter and soil fertility.

7.2 Habitat and Biodiversity

Intensive arable farming has been held partly responsible for widespread reductions in biodiversity within our countryside, especially in farmland species. This is acutely apparent when considering farmland birds and invertebrates. Since the 1970s farmland bird populations have decreased by 56%[19] and species previously prevalent in Kent such as the Corn Bunting have decreased by 90%[20]. The development will have a positive impact on habitat and biodiversity, due to reducing synthetic fertilisers and agrichemicals inputs and conversion of the land between and under the solar arrays to botanically diverse grassland which can support several rare farmland species.

A study carried out in 2016[21] across 11 solar farms in the south of the UK showed that, where a diverse grassland mix was established, there were significant biodiversity gains within one growing season when compared with intensive arable and grazing on the same farm. There is therefore within the proposed development the potential to directly target species that are in decline benefitting both the immediate local area and national populations of these species.

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18 Parliamentary Office of Science and Technology (2006), *UK Soil Degradation.* https://www.parliament.uk/globalassets/documents/post/postpn265.pdf

19 S.J. Harris, D. Massimino, S. Gillings, M.A. Eaton, D.G. Noble, D.E. Balmer, D. Proctor, J.W. Pearce-Higgins, P. Woodcock (2018), *The Breeding Bird Survey 2017, BTO Research Report 706*. British Trust for Ornithology, Thetford

20 I.J. Bateman and B. Balmford (2018), *Public Funding for Public Goods: A post brexit perspective on principles for agricultural policy.*

21 H. Montag, G. Parker, T. Clarkson, (2016), *The effects of solar farms on local biodiversity: a comparative study.* Clarkson, Woods & Wuchford Biodiversity

7.3 Carbon Sequestration and Averted Loss

As well as changing behaviours within society, a key tool to tackling the climate crisis is developing areas that can sequester carbon.

Academic literature suggests that grasslands in general have the potential to sequester between 0.2 and 0.4 tonnes of CO_2 or equivalent per hectare per year, with some specific forms of habitat and management exceeding this range. Therefore, the habitat underneath and between the solar arrays has the potential to sequester carbon. Furthermore, there is also the additional benefit of averted loss resulting from the cessation of arable operations. Soil carbon is inherently vulnerable as any form of disturbance results in a carbon release. As the land would be removed from arable production there would be an immediate reduction in soil disturbance thereby averting the carbon loss that would otherwise occur if arable farming continued on the Site.

8.0 Future Agricultural Production at the Site

8.1 Temporary Loss of Current Use

Increasingly degraded soils will present a considerable challenge to UK agriculture in the coming decades. This degradation has occurred not only due to historic mismanagement and misdirection of farm policy, but also production methods and crop rotations that over stress the soil which in some cases has led to decreases in soil productivity and soil erosion which occurs due to heavy cultivation and, for certain crops leaving land bare between sowing and harvesting. Therefore, one of the added benefits of the proposed development is that it will reduce the incremental long-term impact of soil erosion as the soil will have continuous vegetative cover.

In the context of BMV land the proposed development is only a temporary removal from agricultural production. Unlike a housing development, farming can resume at the end of the temporary planning consent, so the proposed development would not bring about the permanent loss of agricultural land. Instead, the proposed development acts a long-term break without intensive arable production and soils can regenerate bringing about improvements in soil health, structure and levels of organic matter. The extent to which soils could be regenerated will be contingent on management and the habitat type that is developed on the Site. Nonetheless it is a fact that when the land returns to agricultural use the soils will be at least as productive as they were prior to the proposed development and potentially improved.

8.2 Continued Agricultural Use

Land used for solar energy generation will cease to be used for arable production but is still compatible with sheep grazing. The land will not therefore be wholly lost to agriculture during the period of a temporary consent.

Grazing sheep will not only contribute to the UK's food production and offset in part the UK's overall reliance on imports (45% of all food[22]) but also locally produced high-quality meat is more sustainable than imports. Low intensity grazing is also a valuable management tool for achieving wider environmental benefits, for example a natural contribution to improving soil fertility.

[22] DEFRA (2020) *Food Statistics in your pocket: Global and UK supply*. https://www.gov.uk/government/statistics/food-statistics-pocketbook/food-statistics-in-your-pocket-global-and-uk-supply

9.0 Conclusions

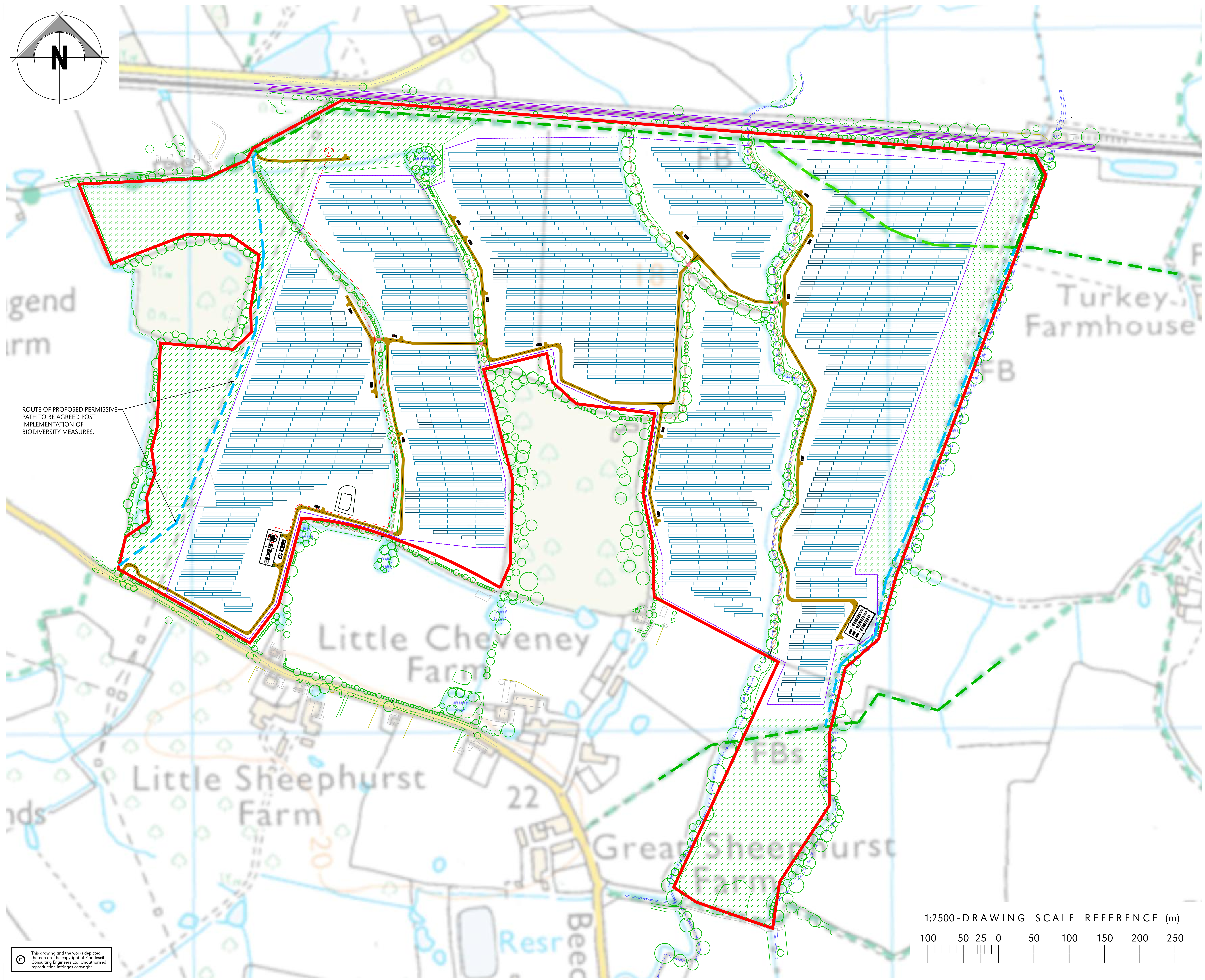
While the quality of land at the Site is important in a national context, it is not at local level as subgrade 3a and subgrade 3b are common throughout Kent. It is likely that some development will necessarily need to occur on BMV land in the region to sustain a high population and avoid development on land under more sensitive designations (AONBs).

The Site's potential is limited to the growing of combinable commodity crops for which the UK fluctuates in and out of a net trade surplus. It does not currently contribute, or have the potential to contribute, to the strategically significant horticulture sector in the County. The proposed location of the development is therefore consistent with the key policy objective, in that it represents an efficient use of some of the poorer, less versatile, and less resilient land in the region.

The proposed development will only result in the temporary cessation of arable production on 7.5% of the farm's land but agricultural production can continue in the form of grazing. The proposed development also has the potential to deliver significant wider environmental benefits, such as improvements to soil structure and health, carbon sequestration and habitat and biodiversity enhancements.

The leasing of agricultural land for non-agricultural purposes is recognised as an important form of income diversification for the farm business which will support the agricultural activities on the rest of the farm thereby helping to mitigate the risks associated with volatile commodity prices, weather patterns and the pressures associated with the changes to the EU and UK agricultural support regime.

APPENDIX 1
SITE PLAN



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GENERAL NOTES:

1. All dimensions noted are in millimetres unless stated otherwise.
2. All levels to be above Ordnance Survey Datum defined levels (A.O.Dm) unless noted otherwise.
3. Do not scale from this drawing, if dimensions are not clear ask.
4. This document has been created in accordance with Plandescil Ltd. Terms & Conditions along with the scope of works provided by the client to Plandescil Ltd. Any use of this document other than for its original purpose is prohibited, Plandescil Ltd. accept no liability for any third party uses of this document.
5. Plandescil Ltd. to be immediately notified of any suspected omissions or discrepancies.
6. This drawing is to be read in conjunction with the following Plandescil drawings
   - 27899 - 051 Rev 0 - Proposed Solar Farm Aerial Site Location Plan
   - 27899 - 052 Rev 0 - Proposed Solar Farm Framework Plan and System Summary
   - 27899 - 053 Rev 0 - Proposed Solar Farm Footpath & Boundary Layout
7. All setting out to be coordinated by the Contractor and to be checked onsite prior to construction.

LEGEND

- Railway
- Existing Roads
- Connection Route
- Perimeter Fence (4,500 m)
- Boundary
- Public Footpath (Existing)
- Public Footpath Removed (Proposed)
- Public Footpath Relocation (Proposed)
- Permissive Footpath (Proposed)
- Biodiversity Area (8.78 ha)
- Maintenance Track
- Ditch Crossing
- Ditch
- Water
- Trees
- Power Station (x16)
- Battery Energy Storage System
- HV Compound
- PV Structure 2P30
- PV Structure 2P15
- Existing Properties

PROPOSAL ONLY
NOT CDM 2015 COMPLIANT

Note: Proposed site plan and information from Statkraft, no survey or design work undertaken by Plandescil Ltd. Drawing adapted from Statkraft drawing SCUKX-MARDN-000 100 (G)

Statkraft

ISSUED FOR CLIENT REVIEW

Rev	Date	Rev By	Chkd	Description
B	08-02-22	DAD	AF	Amendments to Boundary & Footpath
A	01-02-22	DAD	AF	Minor Amendments
0	18-01-22	-	AF	First Issue

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Client
Origin Power Servcies Ltd

Project
Proposed Solar Farm, Land North of Sheephurst Lane, Marden, Tonbridge

Drawing Title
Proposed Solar Farm Site Layout

Scale U.N.O.	Date	Drawn By
1:2500 (A1)	January 2022	DAD

Drawing No.	Rev
27899/050	B

APPENDIX 2
READING AGRICULTURAL CONSULTANTS: ALC AND SOIL RESOURCES

March 2022

Statkraft UK Limited
Agricultural Land Classification and Soil Resources

of

Land off Sheephurst Lane, Marden, Kent

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Long Toll, Woodcote,
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Table of Contents

1 Introduction

1.1 Reading Agricultural Consultants Ltd (RAC) is instructed by Statkraft UK Limited to investigate the Agricultural Land Classification (ALC) and soil resources of land off Sheephurst Lane, Marden, Kent, by means of a detailed survey of soil and site characteristics.

1.2 Guidance for assessing the quality of agricultural land in England and Wales is set out in the Ministry of Agriculture, Fisheries and Food (MAFF) revised guidelines and criteria for grading the quality of agricultural land (1988)[1], and summarised in Natural England's Technical Information Note 049[2].

1.3 Agricultural land in England and Wales is graded between 1 and 5, depending on the extent to which physical or chemical characteristics impose long-term limitations on agricultural use. The principal physical factors influencing grading are climate, site and soil which, together with interactions between them, form the basis for classifying land into one of the five grades.

1.4 Grade 1 land is excellent quality agricultural land with very minor or no limitations to agricultural use. Grade 2 is very good quality agricultural land, with minor limitations which affect crop yield, cultivations or harvesting. Grade 3 land has moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield, and is subdivided into Subgrade 3a (good quality land) and Subgrade 3b (moderate quality land). Grade 4 land is poor quality agricultural land with severe limitations which significantly restrict the range of crops and/or level of yields. Grade 5 is very poor quality land, with very severe limitations which restrict use to permanent pasture or rough grazing.

1.5 Land which is classified as Grades 1, 2 and 3a in the ALC system is defined in Annex 2 of the NPPF[3] as best and most versatile (BMV) agricultural land.

1.6 As explained in Natural England's TIN049, the whole of England and Wales was mapped from reconnaissance field surveys in the late 1960s and early 1970s, to provide general strategic guidance on agricultural land quality for planners. This Provisional Series of maps was published

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[1] **MAFF (1988).** *Agricultural Land Classification of England and Wales. Revised guidelines and criteria for grading the quality of agricultural land*. http://publications.naturalengland.org.uk/file/5526580165083136

[2] **Natural England (2012).** *Technical Information Note 049 - Agricultural Land Classification: protecting the best and most versatile agricultural land*. http://publications.naturalengland.org.uk/file/4424325

[3] **Ministry of Housing, Communities and Local Government (2021)**. *National Planning Policy Framework.* https://www.gov.uk/government/publications/national-planning-policy-framework--2

on an Ordnance Survey base at a scale of One Inch to One Mile (1:63,360). The Provisional ALC map shows the site undifferentiated Grade 3. However, TIN049 explains that:

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

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

1.8 The site has not been surveyed previously, and the nearest detailed survey data to the north and east of Marden show that land in this locality has been classified as a mix of Grades 2, 3a and 3b.

2 Site and climatic conditions

General features, land form, drainage and flood risk

2.1 The site extends to approximately 74.5ha, comprising seven arable fields to the north of Sheephurst Lane and south of a railway line to the west of Marden. At the time of survey, the fields were cropped in winter beans or wheat with some grass margins in Countryside Stewardship.

2.2 Topography is level apart from a slight rise on land adjoining Sheephurst Lane. The land is 18m to 20m above Ordnance Datum (AOD). There are no gradient limitations to agricultural land quality.

2.3 Most of the land lies on or adjacent to a floodplain, though groundwater is well controlled by a network of quite deep functioning ditches.

Agro-climatic conditions

2.4 Agro-climatic data have been interpolated from the Meteorological Office's standard 5km grid point dataset at a representative altitude of 18m AOD, and are given in Table 1. The site is warm and drier than much of Kent, with large crop moisture deficits possible. The number of days when soil is at Field Capacity is slightly below average for lowland England (150) which makes the land favourable for agricultural field work. There is no overriding climatic limitation to agricultural land quality.

Table 1: Local agro-climatic conditions

Parameter	
Grid Reference	TQ 572495 144693
Average Annual Rainfall	671 mm
Accumulated Temperatures >0°C	1,492 day
Field Capacity Days	139 days
Average Moisture Deficit, wheat	124 mm
Average Moisture Deficit, potatoes	122 mm

Soil parent material and soil type

2.5 The underlying geology is mapped by the British Geological Survey[4] as Weald Clay described as dark grey, thinly-bedded mudstones (shales) and mudstones with subordinate siltstones and fine- to medium-grained sandstones, which include some shelly limestone layers. The last is shown on the rising land in the south-west of the site.

2.6 All the flat land within the site is shown as covered by superficial deposits, either of River Terrace clay and silt or Alluvium in the east.

2.7 The Soil Survey of England and Wales soil mapping[5] (1:250,000 scale) shows Shabbington association in the west of the site and Fladbury 3 association in the east. Shabbington association soils are fine loamy or silty passing to sandy or gravelly base, and are naturally subject to seasonal fluctuating waterlogging (Wetness Class (WC) III or IV). However, installation of effective drainage schemes can improve them to WC II or I. Fladbury 3 soils can have issues of slow permeability limiting improvement to WC III.

3 Agricultural land quality

Soil survey methods

3.1 In total, 93 soil profiles were examined using an arable gouge auger at an observation density of more than one per hectare which is greater than the established recommendations for ALC surveys[2]. Five soil pits were also excavated to examine structure and stone content. The locations of observations are indicated on Figure RAC/9221/1. At each observation point the

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[4] **British Geological Survey (2021).** *Geology of Britain viewer*, http://mapapps.bgs.ac.uk/geologyofbritain/home.html

[5] **Soil Survey of England and Wales (1984).** *Soils of South East England* (1:250,000), Sheet 6

following characteristics were assessed for each soil horizon up to a maximum of 120cm or any impenetrable layer:

- soil texture
- significant stoniness
- colour (including localised mottling)
- consistency
- structural condition
- free carbonate; and
- depth.

3.2 Six topsoil samples (composites 0-25cm depth) were submitted for laboratory determination of particle size distribution, pH, organic matter content and nutrient contents (P, K, Mg). Results are given in Appendix 1.

3.3 Soil nutrient levels are low in the west of the site and good in the east. Organic matter levels are mostly suboptimal for heavier soils. All the land has alkaline pH. These factors can be ameliorated and are not a basis for classifying the land. Minimal tillage is improving the structure in the surface but causing firmer blockier structures in the *lower* topsoil (14-28cm), Appendix 3.

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

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

Agricultural land classification

3.6 Assessment of agricultural land quality has been carried out according to the MAFF revised ALC guidelines (1988)[1]. Soil profiles have been described according to Hodgson (1997)[6] which is the

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[6] **Hodgson, J. M. (Ed.) (1997).** *Soil survey field handbook.* Soil Survey Technical Monograph No. 5, Silsoe.

recognised source for describing soil profiles and characteristics according to the revised ALC guidelines.

3.7 Plate 1 below shows soils according to superficial geology, differentiating between those formed on River Terrace deposits (C), on Alluvium (Y) and on Weald Clay (G). Medium topsoil textures for each type are shown as 2; heavier topsoil textures as 3; and clayey topsoil textures as 4.

Plate 1: Soil Types

3.8 The soil types are summarised below in the following table.

Table 2: Description of soil types

Code C2	**Medium textured topsoil on River Terrace deposits**
Topsoil	At least 28cm of stoneless or very slightly stony medium clay loam, brownish (2.5Y5/4 in the Munsell soil colour charts[7]).
Upper Subsoil	Clay loam, greyish brown or brown (2.5Y5/3 or 5/4) with some mottles overlying more compact manganiferous clay loam or clay starting at 35-45cm, which has restricted permeability.
Lower Subsoil	Friable permeable clay loam or sandy clay loam starts at 50-60cm, slightly stony with many manganese and grey mottles, dominant colour can be strong brown (7.5YR6/8). Passes to stonier sandy material within 1m.

[7] **Munsell Color (2009).** *Munsell Soil Color Book*. Grand Rapids, MI, USA

Limitations	The compact layer may be as little as 15cm thick and should respond to subsoiling. WC is II or III which, coupled with medium topsoil, sets ALC Grade at 2 or 3a. Droughtiness limits some profiles to 3a. See Appendix 3 pit F.
Code C3	**Heavier topsoil on River Terrace deposits**
Topsoil	At least 28cm of stoneless heavy (silty) clay loam, brownish (2.5Y4/4 or 5/4). Friable in top 10cm, firmer blocky beneath.
Upper Subsoil	Heavy clay loam, greyish brown (2.5Y5/3) with some mottles overlying a compact manganiferous clayey layer starting at 35-45cm, which is slowly permeable.
Lower Subsoil	Permeable clay loam or sandy clay loam starts at 50-60cm, slightly stony with many manganese and grey mottles, dominant colour can be strong brown (7.5YR6/8). Passes to stonier sandy material within 1m, locally clayey.
Limitations	Slowly permeable layer often less than 15cm thick which acts as a barrier to rooting (to beans) but could be remedied by subsoiler. WC is II which, coupled with heavy loam topsoil, gives ALC Grade 3a. See Appendix 3 pit E. Where the subsoil clay is thicker or in lower lying areas, profiles are WCIII and ALC Grade 3b.
Code Y3c	**Calcareous loam on Alluvium**
Topsoil	At least 25cm of heavy clay loam, brownish (10YR4/3). Slightly stony with small ironstones and limestones. Slightly calcareous. Friable.
Upper Subsoil	Below 35cm is silty clay loam without stones. Greyish brown (2.5Y5/3) with some mottles and manganese layers.
Lower Subsoil	Slowly permeable starting 80-105cm: heavy silty clay loam or grey calcareous (Weald) clay.
Limitations	WC is II which, coupled with calcareous heavy clay loam topsoil, sets ALC Grade at 2. Drought limits to Grade 2.
Code Y2	**Medium silt on Alluvium**
Topsoil	At least 28cm of stoneless medium silty clay loam, brownish (2.5Y4/4). Friable.
Upper Subsoil	Heavy silty clay loam, greyish brown (2.5Y5/2-5/6) with some mottles or manganese below 35cm. Locally contains a compact silty clay layer within 60cm.
Lower Subsoil	Friable mottled strong-brown ochreous + manganiferous (silty) clay loam, locally dark brown (mainly manganese). Heavy (silty) clay loam below 80cm.
Limitations	WC is II or III which, coupled with medium topsoil, sets ALC Grade at 2 or 3a. Drought limits to Grade 2.
Code Y3	**Heavier silt on Alluvium**
Topsoil	At least 28cm of heavy silty clay loam, brownish (2.5Y4/4 or 5/4). Stoneless (locally a few hard stones). Friable with firmer blocks in lower topsoil.
Upper Subsoil	Medium silty clay loam, greyish brown (2.5Y5/3-5/6) with some mottles over a compact manganiferous clayey layer starting at 35-45cm.
Lower Subsoil	Friable mottled strong-brown ochreous + manganiferous (silty) clay loam. Denser greyer clayey layers occur below 70cm. Locally, Weald Clay within 1m.
Limitations	The compact slowly permeable layer in upper subsoil is often < 15cm deep and can be subsoiled. WC is usually II but III where the clayey layers are more extensive. Coupled with heavier topsoil this sets ALC Grade at 3a, sometimes 3b.
Code Y4	**Clayey land on Alluvium**
Topsoil	About 25cm of stoneless silty clay, brownish (2.5Y4/4 or 5/4). Firm blocky structures, except in drill rows.
Upper	Clay or silty clay, varying from slightly mottled to common mottles (colour

Subsoil	2.5Y5/3-7/1). Slowly permeable within 35cm but of variable thickness (10 to 30cm).
Lower Subsoil	Friable mottled strong-brown (7.5YR6/8) manganiferous (silty) clay loam overlying within 80cm silty clay or greenish grey (7.5GY7/1) Weald clay, especially along north.
Limitations	Where compact slowly permeable in upper subsoil is < 15cm it can be subsoiled. According to clay depths, WC varies from II to IV but because of the clayey topsoil the land cannot be rated higher than ALC Grade 3b. See Appendix 3, pits A and B.
Code G2	**Medium soils on Weald Clay and limestone**
Topsoil	About 28cm of slightly stony medium clay loam, brownish (10YR4/4). Very friable.
Upper Subsoil	Clay start depth varies from 30 to 70cm, overlain by heavy silty clay loam. Upper subsoil is olive-brown (2.5Y5/6) with a few mottles, locally slightly calcareous.
Lower Subsoil	Clay, light (greenish) grey (10-7.5GY-7/1) with many ochreous/ manganese mottles. Slowly permeable; can contain very stony (limestone) layers within 80cm.
Limitations	WC III or II. Bean growth seems unrestricted. ALC Grade limited to 3a or 2 due to wetness and/or droughtiness. See Appendix 3 pit D.
Code G3	**Heavy land on Weald Clay (and Limestone)**
Topsoil	At least 25cm of stoneless heavy (silty) clay loam locally silty clay, brownish (2.5Y4/4 or 5/4). Friable breaking into subangular blocks.
Upper Subsoil	Clay start depth varies from 20 to 60cm, overlain by silty clay loam or silty clay - grey (2.5Y5/3) to yellowish-brown (5/6) with common iron or manganese mottles. Very slightly calcareous.
Lower Subsoil	Firm clay, light (greenish) grey (10-7.5GY-7/1) with many ochreous and some manganese. Slowly permeable, passes to very dense mudstone within 1m. Locally calcareous.
Limitations	WC III (locally IV) due to slowly permeable subsoil within 45cm. Bean growth seems restricted by compaction; patches of weed or no establishment. Heavier topsoil sets Grade at 3b (wetness). See Appendix 3 pit C.

3.9 The main limitations to agricultural land quality at the site are soil wetness, droughtiness and flooding/groundwater.

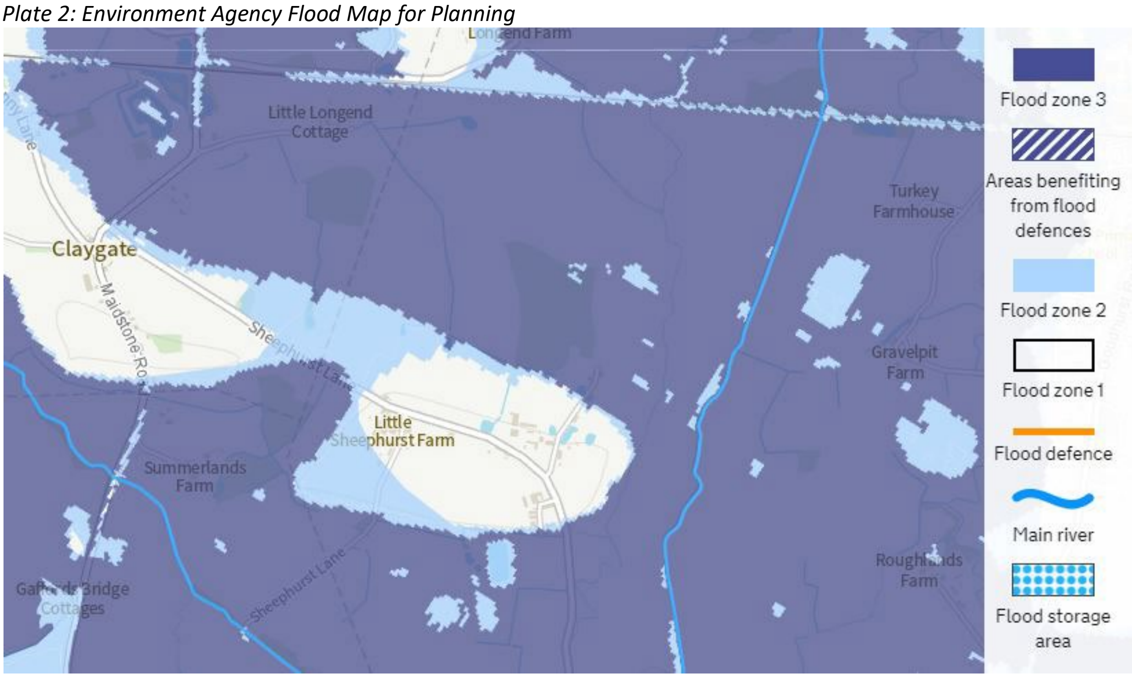
3.10 **Wetness/Workability.** Many of the River Terrace and Alluvial soils are characterised by thin clayey or compact layers in the upper subsoil overlying looser material below 50cm (see Appendix 3 Pits A, E and F). These compact layers can be remedied by subsoiling and are not a grade limitation unless they are at least 15cm thick. Profiles classified as Subgrade 3b either have silty clay topsoil or are WC III with heavy silty clay loam topsoil. Profiles with medium clay loam topsoils are limited to Grade 2 or 3a depending on WC.

3.11 The Weald clay subsoils are slowly permeable, although the presence of traces of carbonate in the clay upper subsoil assist soil structure (Appendix III, pit C) but cannot rate higher than WC III.

3.12 **Droughtiness.** Most soils have good water reserves for deep rooted crops, and are limited to Grade 2 (3a on some deep clay profiles). Other profiles are downgraded to Subgrade 3a because of limited water supply to 70cm for shallower rooted crops (Appendix 2).

3.13 **Flood risk.** As shown in Plate 2, most of the site is shown as being at moderate risk of flooding (Flood Zone 3), with the main river running along the eastern edge of the site. Groundwater was not encountered in any of the profiles. The high concentrations of manganese fragments in the lower subsoil indicate fluctuating groundwater but much is relic historical, since most fields now have functioning deep ditches to lower the water table.

Plate 2: Environment Agency Flood Map for Planning



3.14 According to one local source, the land is usually dry but floods seriously in about one year in twenty. Unless this happens in summer, Grade cannot be lowered to less than 2 on flood risk. There were however some areas of poor crop establishment noted during the survey which correspond with water collecting hollows, and which are downgraded to Subgrade 3b. Some problem patches in the south-eastern field (shown as Flood Zone 2) might be related to spring-line effects as well as from the restricted permeability of the Weald clay.

3.15 The areas of each ALC grade are given in Table 3 and their distribution is shown in Figure RAC/9221/2.

Table 3: ALC areas

Grade	Description	Area (ha)	%
Grade 2	Very good quality	6.9	9
Subgrade 3a	Good quality	28.2	38
Subgrade 3b	Moderate quality	39.4	53
Total		74.5	100

Appendix 1: Laboratory Data

Soil Texture by Particle Size Analysis

Determinand	A	B	C	E	F	G	Units
Sand 2.00-0.063 mm	12	9	23	20	31	11	% w/w
Silt 0.063-0.002 mm	52	51	49	43	42	56	% w/w
Clay <0.002 mm	36	40	28	35	27	33	% w/w
Organic Matter	4.9	3.6	3.3	3.8	3.2	3.4	% w/w
Texture	Silty Clay	Silty Clay	Heavy Clay loam	Heavy Silty Clay Loam	Heavy Clay Loam	Heavy Silty Clay Loam	

Nutrients, pH and Organic Matter

Determinand	A	B	C	E	F	G	Units
Soil pH	7.9	7.2	7.8	7.8	7.8	7.6	
Phosphorus (P)	26.6 (3)	32.6 (3)	10.6 (1)	8.4 (0)	9.4 (0)	23.8 (2)	mg/l (av)
Potassium (K)	193 (2+)	211 (2+)	97 (1)	87 (1)	81 (1)	174 (2-)	mg/l (av)
Magnesium (Mg)	81 (2)	153 (3)	62 (2)	76 (2)	71 (2)	79 (2)	mg/l (av)

ADAS indices in parenthesis, 0 very low, 1 low, 2/2- medium, 3/2+ good.

Appendix 2: Soil Profile Summaries and Droughtiness Calculations

Wetness / workability limitations are determined according to the methodology given in Appendix 3 of the ALC guidelines, MAFF 1988

Droughtiness calculations are made according to the methodology given in Appendix 4 of the ALC guidelines, MAFF 1988.

Grades are shown for drought, wetness and any other soil or site factors which are relevant. The overall Grade is set by the most limiting factor and shown on the right.

Stone types		
%	TAv	EAv
hard	1	0.5
Soft	4	3
Soft	Mn and other fragments	

Climate Data	
MDwheat	124
MDpotato	122
FCD	139
AAR	671

Wetness Class Guidelines	*II*	*III*	*IV*	*V*
SPL within 80cm, gleying within 40cm	>65cm	37-65cm	<37cm	
SPL within 80cm, gleying at 40-70cm	>47 cm	<47cm		
No SPL but gleying within 40cm	coarse subsoil	*I*	other cases	*II*

Climate
1492 D°
Limitation
Grade 1

Maximum depth of auger penetration is underlined

Site No.		Depth cm		Texture	$CaCO_3$	Colour	Mottle colour	abund-ance	stone% hard	stone% Soft	Struct-ure	APwheat mm	AP potato mm	Gley	SPL	WC	Wetness grade WE	Final Grade	Limiting Factor(s)
1	T	0	30	mCL		2.5Y5/4			2		-	53	53			*II*	2	**3a**	DR
		30	50	mCL	n	2.5Y5/3	Fe	com	10			29	29	y					
		50	80	SZL			Mn	many	15	10		26	27	y					
		80	120	SL					30		poor	23	0	y					
											Total	**131**	**109**		FL.flood risk			EA Fz3	
											MB	7	-13						
											Droughtiness grade (DR)	2	3a		Beans (tall)				
2	T	0	25	mCL		2.5Y4/4			0		-	45	45			*III*	3a	**3a**	WE DR
		25	32	mCL	n	2.5Y5/3	Fe	com	0			11	11	y					
		32	45	hZCL	n	2.5Y5/4	Mn	many	0	10	m/poor	17	17	y					
		45	55	C			Mn	few	0		poor	10	13	y	(y)				
		55	75	mCL		7.5YR6/8	Mn	com	5	5		18	22	y					
		75	90	SCL					20			12	0	y					
		90	120	SCL					30			21	0	y					
						Thin					Total	**136**	**109**		FL.flood risk			EA Fz3	
						SPL					MB	12	-13						
											Droughtiness grade (DR)	2	3a		Beans (tall)				
3	T	0	30	hCL	n	2.5Y4/4			0		-	54	54			*III*	3b	**3b**	WE
		30	45	hZCL		2.5Y6/3	Fe	com	0		m/poor	22	22	y	(y)				
		45	50	ZC		10Y7/1	Fe	many	5		poor	6	6	y	(y)				
		50	85	SCL		7.5R6/8	Mn	many	20	5		27	23	y					
		85	120	SL					30			27	0	y					
						Compact Upper subsoil					Total	**136**	**105**		FL.flood risk			EA Fz3	
											MB	12	-17						
											Droughtiness grade (DR)	2	3a		Beans (short and part bare)				

4	T	0	25	hCL	n	2.5Y5/4			0		-	45	45			*IV*	3b	**3b**	WE GW
		25	34	hZCL		2.5Y5/3	Fe	com	0		m/poor	13	13	y					
		34	49	C		7.5Y7/1	Fe	many	0		poor	20	20	y	(y)				
		49	85	SCL		7.5R6/8	Mn	many	10	10		30	26	y					
		85	120	SL					30		poor	20	0	y					
						Compact					Total	**128**	**104**		FL.flood risk			EA Fz3	
						Upper subsoil					MB	4	-18		GW.Groundwater			low spot	3b
											Droughtiness grade (DR)	3a	3a		Beans (bare patches nearby)				
5	T	0	28	hZCL	n	2.5Y5/4			0		-	53	53			*III*	3b	**3b**	WE
		28	42	hZCL		2.5Y5/6	Mn	few	0		m/poor	20	20						
		42	63	C		7.5Y7/1	Fe	many	0		poor	20	27	y	y				
		63	72	mCL		7.5R6/8	Mn	many	10	10		8	9	y					
		72	120	SL					30		poor	28	0	y					
						Compact					Total	**128**	**110**		FL.flood risk			EA Fz3	
						Upper subsoil					MB	4	-12						
											Droughtiness grade (DR)	3a	3a		Beans				
6	T	0	30	hCL	n	2.5Y5/4			2		-	53	53			*II*	3a	**3a**	WE DR
		30	44	hCL		2.5Y5/6	Fe	com	2		m/poor	19	19	(y)					
		44	50	C		7.5Y7/1	Fe	many	0		poor	8	8	y	(y)				
		50	80	SZL		7.5R6/8	Mn	many	5	10		29	30	y					
		80	120	SL					30		poor	23	0	y					
						Compact					Total	**132**	**110**		FL.flood risk			EA Fz3	
						Upper subsoil					MB	8	-12						
											Droughtiness grade (DR)	2	3a		Beans				
7	T	0	25	CL	n	2.5Y5/3			0		-	45	45			*III*	3b	**3b**	WE
		25	35	hZCL		2.5Y5/4			0			17	17						
		35	44	ZC		2.5Y5/4	Fe	few	0		m/poor	12	12						
		44	85	C	slight	10Y7/2	Mn	many	0	10	poor	30	31	y	y				
		85	120	MSt					0		poor	18	0	y	y				
						Weald					Total	**122**	**106**		FL.flood risk			EA Fz3	
						Clay					MB	-2	-16						
											Droughtiness grade (DR)	3a	3a		Beans				
8	T	0	25	ZC	n	2.5Y4/2			0		-	43	43			*II*	3b	**3b**	WE GW
		25	50	hCL		2.5Y4/4			0			40	40						
		50	80	hCL		2.5Y5/3	Fe	com	10		poor	21	24	y	y				

		80	120	MSt					0		poor	20	0	y	y				
						Subsoil					Total	**124**	**107**		FL.flood risk			EA Fz3	
						moist					MB	0	-16		GW.Groundwater			spring?	3b
											Droughtiness grade (DR)	3a	3a		Beans (bare patch)				
9	T	0	30	CL	n	10YR4/4			0		-	54	54			II	3a	**3a**	WE DR
		30	40	ZC		2.5Y6/4	Fe	com	0			15	15	y					
		40	75	ZC		2.5Y6/4	grey	many	0		m/poor	32	36	y					
		75	80	hCL		10YR3/3	Mn	pred		10		5	0	y					
		80	120	C		7.5YG7/1		many	0		poor	28	0	y	y				
											Total	**134**	**105**		FL.flood risk			EA Fz3	
											MB	10	-17						
						Weald Clay					**Droughtiness grade (DR)**	2	3a		Beans (better)				
10	T	0	28	hZCL	n	2.5Y4/4			2		-	52	52			III	3b	**3b**	WE
		28	42	hZCL		2.5Y5/4	Mn	few	2		m/poor	20	20	(y)					
		42	85	C/CL		7.5Y7/1	Fe	many	0		poor	35	35	y	y				
		85	100	SCL		7.5R6/8	Mn	many	5	10		13	0	y					
		100	120	SL					20		poor	13	0	y					
						Mottled					Total	**133**	**107**		FL.flood risk			EA Fz3	
						38cm					MB	9	-15						
											Droughtiness grade (DR)	2	3a		Beans				
11	T	0	28	hCL	n	2.5Y5/4			2		-	49	49			II	3a	**3a**	WE DR
		28	35	hZCL		2.5Y5/4	Mn	few	2			12	12						
		35	49	C		2.5Y5/3	Fe	com	0		poor	18	18	y	(y)				
		49	65	SCL		7.5R6/8	Mn	many	10	10		14	20	y					
		65	120	SL					30			43	5	y					
											Total	**136**	**105**		FL.flood risk			EA Fz3	
											MB	12	-17						
											Droughtiness grade (DR)	2	3a		Beans (short)				
12	T	0	25	hZCL	n	2.5Y5/4			0		-	48	48			II	3a	**3a**	WE DR
		25	37	hZCL		2.5y5/3	Fe	com	0			20	20	y					
		37	50	ZC		2.5Y5/3	Mn	com	5		poor	15	15	y	(y)				
		50	80	mCL		7.5R6/8	Mn	many	5	10		26	28	y					
		80	100	SL			Mn	many	10	10		18	0	y					
		100	120	SL					30			16	0	y					
											Total	**143**	**111**		FL.flood risk			EA Fz3	
											MB	19	-11						

										Droughtiness grade (DR)		2	3a		Beans (short)				
13	T	0	28	CL	n	2.5Y4/4			0		-	50	50			*II*	3a	**3a**	WE DR
		28	35	hCL		2.5Y5/4	Fe	few	0			11	11						
		35	44	ZC		2.5Y5/3	FeMn	com	5		poor	10	10	y	(y)				
		44	65	mCL	slight	7.5R6/8	Mn	many	10	10		21	28	y					
		<u>65</u>	120	SL					30			43	5	y					
						Compact Upper subsoil					Total	**136**	**105**		FL.flood risk			EA Fz3	
											MB	12	-17						
										Droughtiness grade (DR)		2	3a		Beans (mod)				
14	T	0	27	mCL		10YR5/4			0		-	49	49			*II*	2	**2**	WE DR
		27	35	mCL	n	10YR6/4	Fe	few	0			13	13						
		35	65	hCL	n	2.5Y5/4	Fe	com	0			39	48	y					
		65	80	LC			Mn	many	5	10	poor	9	6	y	y				
		80	100	SCL		7.5YR6/8	Mn	com	5	5		18	0	y					
		<u>100</u>	120	SL					30			16	0	y					
											Total	**144**	**115**		FL.flood risk			EA Fz3	
											MB	20	-7						
										Droughtiness grade (DR)		2	2		Beans				
15	T	0	20	hCL	n	2.5Y5/4			0		-	36	36			*III*	3b	**3b**	WE
		20	35	hZCL		2.5Y5/4	Fe	few	0		m/poor	22	22						
		35	60	C		10Y7/1	Fe	many	0		poor	27	33	y	y				
		60	100	hZCL		7.5R6/8	Grey	com	5		m/poor	31	14	y					
		<u>100</u>	120	Mst					0		poor	10	0	y	y				
						SPL					Total	**125**	**104**		FL.flood risk			EA Fz3	
						40cm					MB	1	-18						
										Droughtiness grade (DR)		3a	3a		Beans (short)				
16	T	0	28	hCL	n	2.5Y5/4			0		-	50	50			*III*	3b	**3b**	WE
		28	40	ZC		2.5Y5/4	Fe	few	0		m/poor	16	16						
		40	60	C		2.5Y5/3	FeMn	com	0	5	poor	19	25	y	y				
		60	90	mCL		10YR3/3	Mn	pred	10	10		25	13	y					
		90	120	hCL		7.5YR7/8	grey	many	5	5	m/poor	23	0	y					
						Upper subsoil					Total	**134**	**105**		FL.flood risk			EA Fz3	
											MB	10	-17						
										Droughtiness grade (DR)		2	3a		Beans (mod)				
17	T	0	28	mCL	slight	10YR4/4			2		-	49	49			*II*	2	**2**	WE DR

		28	35	mCL		2.5Y5/6	Fe	few	0		m/poor	10	10						
		35	68	mCL		2.5Y5/3	FeMn	com	0	5		40	51	y					
		68	120	C		7.5GY7/1	FeMn	com	0	5	poor	35	3	y	y				
											Total	**135**	**113**		FL.flood risk			EA Fz2	
											MB	11	-9						
						Weald Clay					**Droughtiness grade (DR)**	2	2		Beans (tall)				
18	T	0	30	mCL	trace	10YR4/4			0		-	54	54			*II*	2	**2**	WE DR
		30	70	hZCL		2.5Y5/6	Fe	few	0		m/poor	45	58						
		70	100	C		7.5YG7/1	FeMn	com	0	5	poor	20	0	y	y				
		100	120	Mst						5	poor	10	0	y	y				
											Total	**129**	**112**		FL.flood risk			EA Fz2	
											MB	5	-10						
						Weald Clay					**Droughtiness grade (DR)**	2	2		Beans (tall)				
19	T	0	20	hZCL	n	2.5Y5/4			0		-	38	38			*III*	3b	**3b**	WE
		20	35	C		2.5Y5/4	Fe	few	0			24	24						
		35	65	C	n	2.5Y5/3	Mn	com	5	5	poor	28	36	y	y				
		65	80	C		7.5YG7/1	Fe	many	0		poor	11	7	y	y				
		80	120	Mst					0		poor	20	0	y	y				
						Mn 40cm					Total	**120**	**104**		FL.flood risk			EA Fz2	
											MB	-4	-18						
						Weald Clay					**Droughtiness grade (DR)**	3a	3a		Beans (short)				
20	T	0	28	hCL	trace	2.5Y4/4			0		-	50	50			*IV*	3b	**3b**	WE
		28	55	C	n	2.5Y5/3	Fe	many	0		poor	32	35	y	y				
		55	100	C		7.5YG7/1	Fe	many	0		poor	32	20	y	y				
		100	120	Mst					0		poor	10	0	y	y				
						Moist					Total	**124**	**105**		FL.flood risk			EA Fz2	
											MB	0	-17						
						Weald Clay					**Droughtiness grade (DR)**	3a	3a		Beans (weedy)				
21	T	0	27	ZCL	n	2.5Y4/4			0		-	51	51			*III*	3b	**3b**	WE
		27	40	hZCL		2.5Y5/4	Fe	few	0			22	22						
		40	68	ZC	n	2.5Y5/3	FeMn	com	0	5	poor	23	32	y	y				
		68	80	C		7.5YG7/1	Fe	many	0		poor	8	3	y	y				
		80	120	Mst				many	20		poor	16	0	y					
						Mn 38cm					Total	**122**	**108**		FL.flood risk			EA Fz2	
						Moist					MB	-2	-14		GW.Groundwater			?	

						Weald Clay				Droughtiness grade (DR)		3a	3a		Beans (bare patch)				
22	T	0	28	hZCL	n	2.5Y4/4			0		-	53	53			III	3b	3b	WE
		28	42	ZC	n	2.5Y6/3	Fe	com	0			21	21	y					
		42	65	ZC		7.5YR6/8	grey	com	0		poor	20	28	y	y				
		65	100	C		7.5YG7/1	Fe	com	0		poor	25	7	y	y				
		100	120	Mst				many	0		poor	10	0	y	y				
											Total	**129**	**108**		FL.flood risk			EA Fz2	
											MB	5	-14		GW.Groundwater			?	
						Weald Clay				Droughtiness grade (DR)		2	3a		Beans (edge of bare patch)				
23	T	0	28	mCL		2.5Y4/4			0		-	53	53			IV	3b	3b	WE
		28	35	hZCL		2.5Y5/3	Fe	many	0			12	12	y					
		35	50	C	n	10Y7/1	Fe	many	0		poor	20	20	y	y				
		50	120	Mst					0		poor	35	16	y	y				
											Total	**120**	**101**		FL.flood risk			EA Fz2	
											MB	-4	-21						
						Weald Clay				Droughtiness grade (DR)		3a	3a		Beans (part bare)				
34	T	0	25	hZCL	n	2.5Y4/4			0		-	48	48			II	3a	3a	WE DR
		25	40	hZCL		2.5Y5/3	Fe	com	0			26	26	y					
		40	50	hZCL		2.5Y6/3	Mn	many	5	5	m/poor	13	13	y	(y)				
		50	65	SL	n	7.5YR6/8	Mn	many	20	5		13	17	y					
		65	120	SL					30			43	5	y					
						Mn layer					Total	**142**	**109**		FL.flood risk			EA Fz3	
						40cm					MB	18	-13						
										Droughtiness grade (DR)		2	3a		Beans (taller)				
35	T	0	30	mCL	n	2.5Y5/4			2		-	53	53			II	2	3a	DR
		30	45	hCL		2.5Y5/4	FeMn	few	2		m/poor	21	21	y					
		45	65	mCL		2.5Y6/3	Mn	many	2	10		21	29	y					
		65	80	SZL		7.5YR6/8	Mn	pred	10	10		14	7	y					
		80	120	SL					30			31	0	y					
						Mn starts					Total	**140**	**110**		FL.flood risk			EA Fz3	
						35cm					MB	16	-12						
										Droughtiness grade (DR)		2	3a		Beans (taller)				
36	T	0	28	hCL	n	2.5Y4/4			2		-	49	49			II	3a	3a	WE DR
		28	40	mCL		2.5Y6/4	Fe	few	0			19	19	y					
		40	80	mCL		2.5Y6/3	Mn	pred	5	10	m/poor	35	37	y					

		80	120	SCL					30			29	0	y					
						Mn layer					Total	**132**	**106**		FL.flood risk			EA Fz3	
						35cm					MB	8	-16						
											Droughtiness grade (DR)	2	3a		Beans (taller)				
37	T	0	30	mCL	n	2.5Y5/4			2		-	53	53			*III*	3a	**3a**	WE DR
		30	45	hCL		2.5Y5/3	Fe	com	2		m/poor	21	21	y					
		45	80	LC		7.5YR6/8	grey	many	5	10	poor	24	28	y	y				
		80	95	SCL		7.5YR6/8	Mn	pred	5	10		13	0	y					
		95	120	SL					30			20	0	y					
											Total	**131**	**101**		FL.flood risk			EA Fz3	
											MB	7	-21						
											Droughtiness grade (DR)	2	3a		Beans				
38	T	0	32	CL	n	2.5Y4/4			0		-	58	58			*II*	3a	**3a**	WE DR
		32	40	hCL		2.5Y5/3	Fe	com	0			13	13	y					
		40	60	C		2.5Y6/3	Mn	pred	0	10	poor	19	24	y	y				
		60	80	SCL		7.5R6/8	Fe	many	10			18	14	y					
		80	120	SL		7.5R6/8	Mn	many	25			34	0	y					
											Total	**141**	**108**		FL.flood risk			EA Fz3	
											MB	17	-14						
											Droughtiness grade (DR)	2	3a		Beans (taller)				
39	T	0	28	hCL	n	2.5Y4/4			0		-	50	50			*IV*	3b	**3b**	WE
		28	37	C		2.5Y5/3	Fe	com	0			14	14	y					
		37	100	C		7.5GY7/1	Fe	com	5		poor	49	41	y	y				
		100	120	Mst					15		poor	9	0	y	y				
											Total	**123**	**106**		FL.flood risk			EA Fz3	
											MB	-1	-16						
											Droughtiness grade (DR)	3a	3a		Beans (taller)				
40	T	0	25	hCL	n	2.5Y4/4			0		-	45	45			*IV*	3b	**3b**	WE
		25	35	hCL		2.5Y5/3	Fe	com	0			16	16	y					
		35	55	hCL		10GY7/1	MnFe	many	0	10	poor	21	22	y	y				
		55	80	mCL			MnFe	com	10	10		21	20	y					
		80	120	SCL					30			29	0	y					
											Total	**131**	**103**		FL.flood risk			EA Fz3	
											MB	7	-19						
											Droughtiness grade (DR)	2	3a		Beans				

41	T	0	25	hCL	n	2.5Y5/4			2		-	44	44			*IV*	3b	**3b**	WE GW
		25	48	C		7.5Y7/2	Fe	com	0		poor	30	30	y	y				
		48	70	hCL		7.5YR6/8	Mn	many	0		poor	16	26	y	y				
		70	95	SCL		7.5YR5/3	MnFe	many	5	5		23	0	y					
		95	120	SCL			Mn	many	5	5	poor	18	0	y					
											Total	**132**	**100**		FL.flood risk			EA Fz3	
											MB	8	-22		GW.groundwater			depression	3b
											Droughtiness grade (DR)	2	3a		Beans (bare areas)				
42	T	0	28	hCL	n	2.5Y5/3			0		-	50	50			*II*	3a	**3a**	WE DR
		28	35	hCL		2.5Y5/3	FeMn	com	0			11	11	y					
		35	68	hCL		10Y7/1	FeMn	many	5	5	m/poor	33	42	y					
		68	80	C		10Y7/1	Fe	many	5	5	poor	8	2	y	y				
		80	100	mCL		7.5R6/8	Mn	many	5	5	poor	13	0	y	y				
		100	120	SL					25		poor	12	0	y	y				
											Total	**128**	**106**		FL.flood risk			EA Fz3	
											MB	4	-16						
											Droughtiness grade (DR)	3a	3a		Beans (taller)				
43	T	0	30	hCL	n	2.5Y5/4			0		-	54	54			*III*	3b	**3b**	WE
		30	45	C		7.5GY7/1	Fe	many	0		poor	20	20	y	(y)				
		45	70	mCL		7.5YR5/3	Mn	many	0	5		27	39	y					
		70	85	hCL		7.5YR5/3	MnFe	many	0	5	poor	10	0	y	y				
		85	120	SCL			Mn	many	10	5	m/poor	27	0	y					
											Total	**138**	**112**		FL.flood risk			EA Fz3	
											MB	14	-10						
											Droughtiness grade (DR)	2	2		Beans				
44	T	0	29	mZCL	v.slight	2.5Y4/4			2		-	54	54			*II*	2	**3a**	DR
		29	34	mZCL	n	2.5Y5/4			2			8	8						
		34	55	ZC		2.5Y5/2	MnFe	many	5	10	m/poor	22	25	y	(y)				
		55	90	SCL		5YR6/6	Mn	com	5	5		32	21	y					
		90	120	SL					30			24	0	y					
						mCL-SL					Total	**140**	**108**		FL.flood risk			EA Fz3	
						55-90cm					MB	16	-14						
											Droughtiness grade (DR)	2	3a		Beans (tall)				
45	T	0	28	hCL	n	10YR4/4			2		-	49	49			*III*	3b	**3b**	WE
		28	45	hCL		2.5Y6/3	Mn	many	5			26	26	y					
		45	60	C		2.5Y6/3	MnFe	many	5	5	poor	12	18	y	y				
		60	90	mCL		7.5YR6/8	Mn	many	15	5		25	13	y					

		90	120	hCL					15		poor	18	0	y	y				
						Very Mn					Total	**131**	**106**		FL.flood risk			EA Fz3	
						35cm					MB	7	-16						
											Droughtiness grade (DR)	2	3a		Beans				
46	T	0	33	mCL	n	10YR4/4			2		-	58	58			//	2	**2**	WE DR
		33	50	hCL		2.5Y6/2	Mn	many	2	5		26	26	y					
		50	72	mCL		2.5Y6/2	MnFe	many	2	5		21	30	y					
		72	90	LC		7.5GY7/1	Mn	many	2	5	poor	12	0	y	y				
		90	120	Mst						5	poor	15	0	y	y				
											Total	**131**	**114**		FL.flood risk			EA Fz3	
											MB	7	-8						
											Droughtiness grade (DR)	2	2		Wheat				
47	T	0	29	hZCL	n	10YR5/4			0		-	55	55			//	3a	**3a**	WE
		29	45	hZCL		2.5Y5/4	Fe	few	0	5		26	26						
		45	79	mCL		2.5Y6/2	Mn	many	0	10		34	37	y					
		79	95	LC		7.5GY7/1	Mn	many	0	5	poor	11	0	y	y				
		95	120	mCL					0	5	poor	17	0	y	y				
						Much Mn					Total	**144**	**118**		FL.flood risk			EA Fz3	
						70cm					MB	20	-4						
											Droughtiness grade (DR)	2	2		Wheat				
48	T	0	30	hCL	n	2.5Y5/4			2		-	53	53			//	3a	**3a**	WE
		30	70	mCL		2.5Y5/3	FeMn	com	2			51	63	y					
		70	85	SZL		10YR3/3	Mn	pred	5	10		15	0	y					
		85	95	hCL		10Y7/1	FeMn	many		10	poor	7	0	y	y				
		95	120	mCL						10	poor	17	0	y	y				
						Mn starts					Total	**142**	**116**		FL.flood risk			EA Fz3	
						33cm					MB	18	-6						
											Droughtiness grade (DR)	2	2		Wheat				
49	T	0	30	hCL	n	2.5Y4/4			2		-	53	53			//	3a	**3a**	WE DR
		30	45	CL		2.5Y5/3	Fe	com	2			24	24	y					
		45	70	ZC		10Y7/1	Fe	many			m/poor	21	32	y	(y)				
		70	85	mCL		7.5YR6/8	Mn	com	0	10		14	0	y					
		85	120	hCL		10Y7/1	FeMn	many	0	5	poor	25	0	y	y				
											Total	**136**	**109**		FL.flood risk			EA Fz3	
											MB	12	-13						
											Droughtiness grade (DR)	2	3a		Wheat, in slight hollow				

50	T	0	30	CL	n	2.5Y5/4			2		-	53	53			*II*	3a	**3a**	WE DR
		30	44	CL		2.5Y5/4	Fe	few	10			20	20						
		44	68	mCL			Mn	many	10		m/poor	21	30	y					
		68	80	C		10Y7/1	Fe	com	0		poor	8	3	y	y				
		80	85	mCL		7.5YR6/8	MnFe	many	0	5	poor	3	0	y	y				
		85	120	hCL			MnFe	many	0	10	poor	23	0	y	y				
											Total	**130**	**106**		FL.flood risk			EA Fz3	
											MB	6	-16						
											Droughtiness grade (DR)	2	3a		Wheat				
51	T	0	25	mCL	n	2.5Y5/4			0		-	45	45			*III*	3a	**3a**	WE DR
		25	35	mCL		2.5Y5/4	Fe	few	0			16	16						
		35	50	hZCL		2.5Y6/2	Mn	many	0	5	m/poor	21	21	y					
		50	65	C		7.5YR5/3	MnFe	many	0	5	poor	10	19	y	y				
		65	85	CL/C			MnFe	many	0	5	m/poor	16	7	y	y				
		85	120	hCL			MnFe	many	0	10	poor	23	0	y	y				
											Total	**132**	**108**		FL.flood risk			EA Fz3	
											MB	8	-14						
											Droughtiness grade (DR)	2	3a		Wheat				
52	T	0	32	ZC	n	2.5Y4/4			0		-	54	61			*III*	3b	**3b**	WE
		32	55	C		10Y7/1	Fe	many	0		m/poor	30	33	y					
		55	60	C		10Y7/1	Mn	pred.	0		poor	4	7	y	y				
		60	85	hCL		7.5YR6/8	Mn	many	0	5	poor	17	11	y	y				
		85	120	Mst							poor	18	0	y	y				
											Total	**122**	**112**		FL.flood risk			EA Fz3	
						ZC-hZCL					MB	-2	-10						
						topsoil					**Droughtiness grade (DR)**	3a	2		Wheat, soil cracked				
53	T	0	31	ZC	n	2.5Y4/4			0		-	53	53			*III*	3b	**3b**	WE
		31	43	ZC		2.5Y5/3	MnFe	com	0	5		17	17	y					
		43	70	C		10Y7/1	Fe	many	0		poor	23	35	y	y				
		70	90	C/CL		7.5YR6/8	Mn	many	0	5	poor	14	0	y	y				
		90	120	MSt			MnFe	many	0		poor	15	0	y	y				
											Total	**122**	**105**		FL.flood risk			EA Fz3	
						ZC-hZCL					MB	-2	-17						
						topsoil					**Droughtiness grade (DR)**	3a	3a		Wheat, soil cracked				
54	T	0	25	hCL	n	2.5Y4/4			4		-	43	43			*IV*	3b	**3b**	WE
		25	35	hCL		2.5Y6/3	Fe	com	4			15	15	y					
		35	65	C		10Y7/1	Fe	many	0		poor	30	39	y	y				

		65	105	mCL		7.5YR6/8	Mngr	many	0	5		39	8	y					
		105	120	MSt					0		poor	8	0	y	y				
											Total	**135**	**105**		FL.flood risk			EA Fz3	
											MB	11	-17						
											Droughtiness grade (DR)	2	3a		Wheat, soil cracked				
55	T	0	30	hZCL	n	2.5Y4/4			0		-	57	57			*III*	3b	**3b**	WE
		30	45	hZCL		2.5Y5/3	Mn	com	0			26	26	y					
		45	55	hZCL		2.5Y6/2	Mn	many	0	10	poor	8	11	y	(y)				
		55	65	mCL		7.5YR6/8	Mn	many	0	10		9	15	y					
		65	90	C		10Y7/1	MnFe	many	0		poor	18	7	y	y				
		90	120	MSt					0		poor	15	0	y	y				
						Mn starts					Total	**133**	**115**		FL.flood risk			EA Fz3	
						35cm					MB	9	-7						
											Droughtiness grade (DR)	2	2		Wheat, soil cracked				
56	T	0	25	hZCL	n	2.5Y4/4			0		-	48	48			*II*	3a	**3a**	WE
		25	32	hZCL		2.5Y5/4	Fe	few	0			27	27						
		32	40	hZCL		2.5Y6/2	Mn	many	0	5	poor	16	19	y	(y)				
		40	65	mCL		7.5YR6/8	Mn	many	0	5		21	18	y					
		65	90	hCL		10Y7/1	MnFe	many	0		poor	6	0	y	y				
		90	120	MSt					0		poor	15	0	y	y				
						Compact Upper subsoil					Total	**133**	**112**		FL.flood risk			EA Fz3	
											MB	9	-10						
											Droughtiness grade (DR)	2	2		Wheat, soil cracked				
57	T	0	25	hZCL	n	2.5Y5/4			0		-	48	48			*III*	3b	**3b**	WE
		25	41	hZCL		2.5Y5/4	Fe	few	0			27	27						
		41	58	ZC			Mn	many	0	5	poor	16	20	y	y				
		58	80	mCL		7.5YR6/8	Mn	com	0	5		21	18	y					
		80	90	CL		10YR3/3	Mn	very	0	10	poor	7	0	y	y				
		90	120	MSt					0		poor	15	0	y	y				
						Compact Upper subsoil					Total	**133**	**113**		FL.flood risk			EA Fz3	
											MB	9	-9						
											Droughtiness grade (DR)	2	2		Wheat, soil cracked				
58	T	0	22	ZCL	n	2.5Y5/4			0		-	42	42			*II*	3a	**3a**	WE
		22	35	hZCL		2.5Y5/3	Fe	com	0			22	22	y					
		35	50	hCL			Mn	many	0	5	poor	17	17	y	(y)				
		50	85	SZL		2.5Y6/2	Mn	many	5	5		37	33	y					

		85	120	mCL					0	10	poor	23	0	y	y				
						Compact Upper subsoil					Total	**142**	**114**		FL.flood risk			EA Fz3	
											MB	18	-8						
											Droughtiness grade (DR)	2	2		Wheat				
59	T	0	30	hZCL	n	2.5Y5/4			0		-	57	57			*III*	3b	**3b**	WE
		30	38	hCL		2.5Y5/4	Fe	few	5		m/poor	11	11						
		38	55	LC			Mn	many		10	poor	17	20	y	y				
		55	72	mCL		7.5YR6/8	Mn	many		10		16	22	y					
		72	120	C		2.5Y7/1	Fe	many	0		poor	34	0	y	y				
						Compact Upper subsoil					Total	**134**	**110**		FL.flood risk			EA Fz3	
											MB	10	-12						
											Droughtiness grade (DR)	2	3a		Wheat, soil cracked				
60	T	0	27	mZCL	n	10YR5/4			0		-	51	51			*III*	3a	**3a**	WE
		27	40	hZCL		2.5Y5/4	Fe	few	0			22	22						
		40	55	LC			Mn	very	0	10	poor	15	17	y	y				
		55	80	mCL		7.5YR6/8	Mn	many	0	5		24	23	y					
		80	120	mCL						10	m/poor	32	0	y					
						Mn starts					Total	**144**	**114**		FL.flood risk			EA Fz3	
						38cm					MB	20	-8						
											Droughtiness grade (DR)	2	2		Wheat				
61	T	0	25	C	n	2.5Y4/4	Mn	few	0		-	43	43			*IV*	3b	**3b**	WE
		25	35	C	slight	5Y5/3	FeMn	com	0		poor	13	13	y	y				
		35	50	C		2.5Y6/3	FeMn	many	0	10	m/poor	20	20	y	(y)				
		50	65	CL		7.5YR6/8	Mn	many	0	10		14	22	y					
		65	80	ZC			FeMn	many	0	5	poor	10	6	y	y				
		80	120	C		10Y7/1	Mn	many		5	poor	27	0	y	y				
											Total	**127**	**104**		FL.flood risk			EA Fz3	
											MB	3	-18						
											Droughtiness grade (DR)	3a	3a		(spring) wheat				
62	T	0	30	ZC	n	10YR5/4	Mn	few	0		-	51	51			*IV*	3b	**3b**	WE
		30	50	LC		10YR7/1	Mn	many	0	5	poor	24	24	y	y				
		50	70	C		10Y7/1	FeMn	many	0		m/poor	15	29	y	(y)				
		70	80	hCL		10YR3/3	Mn	pred	0	15		9	0	y					
		80	120	C		7.5GY7/1	FeMn	many	0	5	poor	27	0	y	y				
											Total	**126**	**104**		FL.flood risk			EA Fz3	
						Weald					MB	2	-18						

						Clay LSS			**Droughtiness grade (DR)**			3a	3a		(spring) wheat				
63	T	0	25	hZCL	n	2.5Y4/4			0	0	-	48	48			//	3a	**3a**	WE DR
		25	40	hZCL		2.5Y5/6	Mn	com	0	5		25	25						
		40	54	ZC		2.5Y6/3	Mn	many	0	5	poor	14	16	y	(y)				
		54	70	mCL		10YR7/2	Mn	many	0	10		15	24	y					
		70	92	hCL		10Y7/1	FeMn	many	0	5	m/poor	18	0	y					
		92	120	C		7.5GY7/1	FeMn	many	0	5	poor	19	0	y	y				
											Total	**138**	**112**		FL.flood risk			EA Fz3	
						Weald					MB	14	-10						
						Clay 92cm			**Droughtiness grade (DR)**			2	3a		(spring) wheat				
64	T	0	25	hZCL	n	2.5Y4/4		few	2	2	-	46	46			///	3b	**3b**	WE
		25	35	ZC		2.5Y5/4	Mn	com	0			15	15	y					
		35	50	ZC		2.5Y6/3	Mn	many	0	10	poor	17	17	y	y				
		50	85	CL		7.5YR6/8	Mn	many	0	10		33	30	y					
		85	105	ZC			FeMn	many	0		m/poor	15	0	y	y				
		105	120	hCL			Mn	pred		20		13	0	y	y				
											Total	**138**	**107**		FL.flood risk			EA Fz3	
						Compact					MB	14	-15						
						35cm			**Droughtiness grade (DR)**			2	3a		(spring) wheat				
65	T	0	32	hZCL	n	2.5Y4/4			0	0	-	61	61			//	3a	**3a**	WE
		32	45	hZCL		2.5Y5/3	Mn	many	0	10		20	20	y					
		45	80	mCL		10YR7/2	Mn	many	0	10		35	37	y					
		80	120	hZCL		10Y7/1	FeMn	many	0	5	m/poor	31	0	y					
											Total	**148**	**118**		FL.flood risk			EA Fz3	
						Compact					MB	24	-4						
						45-50cm			**Droughtiness grade (DR)**			2	2		(spring) wheat				
66	T	0	27	mZCL	n	2.5Y5/4			0		-	51	51			//	2	**2**	WE DR
		27	35	mZCL		2.5Y5/6	Fe	few	0			14	14						
		35	50	ZC		2.5Y6/3	MnFe	many	0	10	poor	17	17	y	(y)				
		50	75	hZCL		2.5Y6/3	Fe	com	0			25	34	y					
		75	120	hCL		7.5YR6/8	Mn	many	0	10	poor	30	0	y	y				
											Total	**136**	**116**		FL.flood risk			EA Fz3	
						Compact					MB	12	-6						
						Upper subsoil			**Droughtiness grade (DR)**			2	2		Wheat				
67	T	0	35	mZCL	n	10YR4/4			0		-	67	67			//	2	**2**	WE DR

		35	42	hZCL		2.5Y5/2	Mn	few	0			12	12						
		42	50	C	n	10Y7/1	MnFe	many	0	5	poor	10	10	y	(y)				
		50	80	SZL		10YR4/3	Mn	many	0	10		31	31	y					
		80	120	CL		7.5YR6/8	Mn	many	0	5	poor	27	0	y	y				
											Total	**146**	**120**		FL.flood risk			EA Fz3	
						Compact Upper subsoil					MB	22	-2						
									Droughtiness grade (DR)			2	2		Wheat				
68	T	0	30	ZCL	n	2.5Y5/4			0		-	57	57			*III*	3a	**3a**	WE DR
		30	40	hZCL		2.5Y6/3	Mn	com	0	5	m/poor	14	14						
		40	65	ZC		2.5Y5/2	Mn	many	0	10	poor	21	28	y	y				
		65	100	hZCL		7.5YR6/8	FeMn	com	5	5	m/poor	26	7	y					
		100	120	mCL					0		poor	14	0	y	y				
						Mn 36cm					Total	**132**	**106**		FL.flood risk			EA Fz3	
						V.compact					MB	8	-16						
						40cm			**Droughtiness grade (DR)**			2	3a		Wheat				
69	T	0	25	hZCL	n	10YR4/4			4		-	46	46			*II*	3a	**3a**	WE DR
		25	40	mZCL		2.5Y5/3	Mn	com	4			25	25	y					
		40	50	C			Mn	pred	0	10	poor	12	12	y	(y)				
		50	80	mCL		10YR4/3	Mn	many		10		28	30	y					
		80	120	hCL		7.5YR6/8	Mn	many		10	poor	26	0	y	y				
											Total	**137**	**112**		FL.flood risk			EA Fz3	
						Mn starts					MB	13	-10						
						32cm			**Droughtiness grade (DR)**			2	3a		Wheat				
70	T	0	28	hZCL	n	10YR4/4			0		-	53	53			*III*	3b	**3b**	WE
		28	32	hZCL		2.5Y5/4	Mn	few	0			7	7						
		32	50	ZC		2.5Y5/2	Mn	many	0	10	poor	20	20	y	y				
		50	80	mCL		10YR4/2	Mn	many		10		28	30	y					
		80	120	C		2.5Y6/3	FeMn	com		5	poor	27	0	y	y				
											Total	**135**	**110**		FL.flood risk			EA Fz3	
						Compact Upper subsoil					MB	11	-12						
									Droughtiness grade (DR)			2	3a		Wheat, cracked soil				
71	T	0	28	mZCL	n	10YR4/4			2		-	52	52			*II*	2	**2**	DR WE
		28	35	mZCL		2.5Y5/4	Mn	few	2			12	12						
		35	50	hCL		5Y7/1	Mn	many	0	10	m/poor	20	20	y	(y)				
		50	80	SZL		10YR4/2	Mn	many	5	10		29	30	y					
		80	120	hCL		7.5YR6/8	Mn	many	0	10	poor	26	0	y	y				

											Total	**139**	**113**		FL.flood risk			EA Fz2	
											MB	15	-9						
											Droughtiness grade (DR)	2	2		Wheat				
72	T	0	27	ZCL	n	2.5Y5/4			0		-	51	51			*IV*	3b	**3b**	WE
		27	37	hZCL		2.5Y6/3	Mn	com	0			17	17	y					
		37	55	LC		2.5Y5/2	Mn	many	0	10	poor	18	21	y	y				
		55	75	hZCL		7.5YR6/8	Fe	com	5		m/poor	15	21	y					
		75	120	C		10Y7/1	FeMn	com	0	5	poor	31	0	y	y				
											Total	**133**	**110**		FL.flood risk			EA Fz3	
						Compact Upper subsoil					MB	9	-12						
											Droughtiness grade (DR)	2	3a		Wheat				
73	T	0	27	mZCL	n	2.5Y5/4			0		-	51	51			*III*	3a	**3a**	WE
		27	35	mZCL		2.5Y5/4	Mn	com	0	5		13	13	y					
		35	65	hCL		2.5Y6/2	MnFe	many	0	10		36	44	y					
		65	90	ZC		10Y7/1	Fe	com	0	5	poor	17	6	y	y				
		90	120	mCL		7.5YR6/8	Mn	com	0	5	m/poor	25	0	y	y				
											Total	**142**	**115**		FL.flood risk			EA Fz3	
											MB	18	-7						
											Droughtiness grade (DR)	2	2		Wheat				
74	T	0	28	hZCL	n	10YR4/4			0		-	53	53			*I*	2	**2**	WE DR
		28	50	hZCL		2.5Y5/4	Mn	few	0			37	37						
		50	70	mZCL		2.5Y5/2	Mn	com	0	5		19	33	y					
		70	80	mCL		2.5Y5/2	Mn	many	0	10		9	0	y					
		80	120	hCL		2.5Y6/3	Mn	com	0	5	poor	27	0	y	y				
											Total	**146**	**123**		FL.flood risk			EA Fz3	
											MB	22	1						
											Droughtiness grade (DR)	2	2		Wheat				
75	T	0	30	hZCL	n	10YR5/4			0		-	57	57			*II*	3a	**3a**	WE
		30	50	mZCL		2.5Y6/6			0			34	34						
		50	65	mZCL		2.5Y5/3	Fe	com	0		poor	9	18	y	y				
		65	80	mCL		7.5YR5/3	Mn	many	0	10	poor	10	6	y	y				
		80	120	hCL		7.5YR5/3	Mn	many	0	10	poor	26	0	y	y				
											Total	**136**	**115**		FL.flood risk			EA Fz3	
											MB	12	-7						
											Droughtiness grade (DR)	2	2		Wheat				

76	T	0	28	mZCL	n	10YR5/4			0		-	53	53			*II*	2	**2**	DR WE
		28	45	mZCL		2.5Y6/6			0			29	29						
		45	80	mCL		2.5Y5/2	Mn	many	0	10	m/poor	30	33	y					
		80	120	hCL		7.5YR5/3	Mn	many	0	10	m/poor	32	0	y					
											Total	**144**	**115**		FL.flood risk			EA Fz2	
											MB	20	-7						
											Droughtiness grade (DR)	2	2		Wheat				
77	T	0	28	mZCL	n	10YR5/4			0		-	53	53			*II*	2	**2**	WE DR
		28	35	mZCL		2.5Y6/6			0			12	12						
		35	85	hZCL		2.5Y5/2	Mn	many		10	m/poor	46	47	y					
		85	120	hCL		7.5YR5/3	Mn	many		10	poor	23	0	y					
											Total	**135**	**112**		FL.flood risk			EA Fz2	
											MB	11	-10						
											Droughtiness grade (DR)	2	2		Wheat				
78	T	0	27	mZCL	n	2.5Y5/4			0		-	51	51			*II*	2	**2**	WE DR
		27	70	mZCL		2.5Y6/4	Mn	com	0	5		57	70	y					
		70	90	hZCL		7.5YR6/8	Mn	many	0	10	m/poor	15	0	y	(y)				
		90	120	mCL		10YR3/3	Mn	pred		30	poor	17	0	y					
											Total	**141**	**122**		FL.flood risk			EA Fz3	
											MB	17	0						
											Droughtiness grade (DR)	2	2		Wheat				
80	T	0	30	hZCL		10YR4/4			0		-	57	57			*II*	3a	**3a**	WE
		30	85	C		2.5Y5/2	Fe	com	0		m/poor	55	58	y					
		85	120	hZCL		2.5Y5/3	Fe	com	0		m/poor	28	0	y					
											Total	**140**	**115**		FL.flood risk			EA Fz3	
											MB	16	-7						
											Droughtiness grade (DR)	2	2		Wheat (ex maize)				
81	T	0	30	hZCL	slight	10YR4/4			0	0	-	57	57			*I*	2	**2**	WE DR
		30	50	hZCL		2.5Y5/4	Fe	few	0	0	m/poor	29	29						
		50	105	hZCL		2.5Y5/3	Fe	com	0	5		53	33	y					
		105	120	ZC						10	poor	10	0	y	y				
											Total	**149**	**119**		FL.flood risk			EA Fz3	
											MB	25	-3						
											Droughtiness grade (DR)	2	2		Wheat (ex maize)				
82	T	0	30	CL	slight	10YR4/3			2	2	-	52	52			*II*	2	**2**	WE DR

		30	45	hCL	slight	2.5Y5/4	Fe	com	8	8		21	21						
		45	70	mZCL		2.5Y6/4	Mn	many	0	10		26	39	y					
		70	80	CL		10YR3/3	Mn	pred	0	15		9	0	y					
		80	105	hCL			Mn	many	0	10	m/poor	20	0	y					
		105	120	C	slight	7.5GY7/1	Fe	many		5	poor	10	0	y	y				
											Total	**138**	**112**		FL.flood risk			EA Fz3	
						V. compact					MB	14	-10						
						45 cm					**Droughtiness grade (DR)**	2	2		Wheat (ex maize)				
83	T	0	25	CL	slight	10YR4/3			4	4	-	42	42			*II*	2	**2**	WE DR
		25	35	hCL	slight	10YR5/3	Fe	com	8	8		14	14	y					
		35	80	mZCL		10YR6/3	Fe	com	0	5		56	57	y					
		80	120	hZCL						5	m/poor	31	0	y	y				
											Total	**142**	**113**		FL.flood risk			EA Fz3	
						Ironstone &					MB	18	-9						
						Limestone					**Droughtiness grade (DR)**	2	2		Wheat (ex maize)				
84	T	0	25	hCL	slight	10YR4/3			4	4	-	42	42			*II*	2	**2**	WE DR
		25	35	hCL	slight	10YR5/4	Fe	com	5	5		15	15	(y)					
		35	80	mZCL		10YR5/3	Fe	com	0	0		24	24	y					
		80	120	hZCL						10	poor	12	0	y	y				
											Total	**143**	**115**		FL.flood risk			EA Fz3	
						Ironstone &					MB	19	-7						
						Limestone					**Droughtiness grade (DR)**	2	2		Wheat (ex maize)				
85	T	0	25	hCL	slight	10YR4/3			4	4	-	42	42			*III*	3a	**3a**	WE
		25	35	hCL	slight	10YR5/4			2	2		15	15						
		35	50	C		10YR5/3	Fe	few	0	0		24	24	y	y				
		50	65	ZCL		10YR6/3	Fe	com	0	5		15	25	y					
		65	100	hCL			MnFe	many	0	5		34	8	y					
		100	120	ZC						20	poor	12	0	y	y				
											Total	**143**	**114**		FL.flood risk			EA Fz3	
						Ironstone &					MB	19	-8						
						Limestone					**Droughtiness grade (DR)**	2	2		Wheat (ex maize)				
86	T	0	30	ZCL	n	10YR4/2			2	2	-	55	55			*II*	3a	**3a**	WE
		30	50	hZCL		2.5Y5/6	Fe	few	2	2		33	33						
		50	80	mZCL		10YR5/3	Fe	com	2	2		29	33	y	y				
		80	100	hCL			Mn	many	0	10		19	0	y	y				
		100	120	ZC						20	poor	12	0	y	y				

											Total	**148**	**121**		FL.flood risk			EA Fz2	
											MB	24	-1						
											Droughtiness grade (DR)	2	2		Wheat				
87	T	0	28	hZCL	n	10YR4/4			0		-	53	53			*II*	3a	**3a**	WE
		28	40	hZCL		2.5Y5/4	Mn	few	0			20	20						
		40	50	hZCL		2.5Y5/3	Mn	com	0	5	m/poor	14	14	y					
		50	70	mCL			Mn	many	0	10		19	30	y					
		70	120	ZC/ZCL		7.5YR5/3	FeMn	many	0	10	m/poor	40	0	y	y				
											Total	**146**	**117**		FL.flood risk			EA Fz3	
											MB	22	-5						
											Droughtiness grade (DR)	2	2		Wheat				
88		0	30	hZCL	n	10YR4/4			0		-	51	51			*II*	3a	**3a**	WE DR
		30	50	hZCL		2.5Y5/3	FeMn	com	0		m/poor	29	29	y					
		50	80	CL		7.5YR6/8	MnFe	many	0	10		28	30	y					
		80	105	hCL			Mn	many	0	10	m/poor	20	0	y					
		<u>105</u>	120	hZCL						20	poor	8	0	y	y				
						Compact					Total	**136**	**110**		FL.flood risk			EA Fz3	
						45-50cm					MB	12	-12						
											Droughtiness grade (DR)	2	3a		Wheat				
89	T	0	25	ZC	n	2.5Y5/4			0		-	43	43			*II*	3b	**3b**	WE
		25	38	ZC		2.5Y5/4	Fe	com	0			20	20						
		38	50	C		2.5Y7/2	MnFe	many	0	5	poor	15	15	y	(y)				
		50	80	hCL		7.5YR6/8	Mn	many	0	10		28	30	y					
		80	90	hCL			Mn	many	0	10	poor	7	0	y	y				
		<u>90</u>	120	MSt		7.5GY7/1					poor	15	0	y	y				
											Total	**127**	**107**		FL.flood risk			EA Fz3	
						ZC-hZCL					MB	3	-15						
						border					**Droughtiness grade (DR)**	3a	3a		Wheat				
90	T	0	28	ZC	n	10YR4/4			0		-	48	48			*III*	3b	**3b**	WE
		28	38	ZC		2.5Y6/4	Fe	com	0			15	15	y					
		38	57	C		2.5Y6/3	MnFe	com	0	5	poor	20	24	y	y				
		57	70	ZCL		7.5YR6/8	Mn	many	0	10		12	20	y					
		80	120	ZC/ZCL		7.5YR5/3	FeMn	many	0	10	m/poor	32	0	y	y				
											Total	**126**	**107**		FL.flood risk			EA Fz3	
						hZCL-					MB	2	-15						
						ZC					**Droughtiness grade (DR)**	3a	3a		Wheat				

91	T	0	28	ZC	n	10YR5/4			0		-	48	48			*III*	3b	**3b**	WE
		28	37	ZC		10YR5/3	Fe	com	0			14	14	y					
		37	55	C		10Y7/1	MnFe	many	0	10	poor	19	22	y	y				
		55	70	hZCL			Mn	com	0	5		14	25	y					
		70	90	ZC		7.5YR5/3	FeMn	many	0	10	poor	13	0	y	y				
		90	120	C							poor	21	0	y	y				
											Total	**129**	**107**		FL.flood risk			EA Fz3	
						Weed					MB	5	-15						
						patches			**Droughtiness grade (DR)**			2	3a		Wheat				
92	T	0	30	ZC	n	10YR4/4			0		-	51	51			*II*	3b	**3b**	WE
		30	40	hZCL		2.5Y5/4	Fe	com	0			17	17						
		40	70	hZCL		2.5Y5/3	Mn	many	0	10	m/poor	28	40	y					
		70	82	CL		10YR3/3	Mn	pred	0	15		11	0	y					
		82	105	C		10Y7/1	MnFe	many	0	10	poor	15	0	y	y				
		105	120	MSt							poor	8	0	y	y				
											Total	**130**	**108**		FL.flood risk			EA Fz3	
						Very dense					MB	6	-14						
						85cm			**Droughtiness grade (DR)**			2	3a		Wheat				
93	T	0	25	C	n	2.5Y5/4			0		-	43	43			*IV*	3b	**3b**	WE
		25	33	ZC		2.5Y5/2	Mn	com	0			12	12						
		33	57	C		2.5Y6/3	MnFe	many	0	5	poor	26	30	y	y				
		57	85	hCL		10Y7/1	Mn	many	0	10	m/poor	22	17	y					
		85	100	CL			Mn	pred	0	15	poor	10	0	y	y				
		100	120	MSt							poor	10	0	y	y				
											Total	**122**	**102**		FL.flood risk			EA Fz3	
						Very dense					MB	-2	-20						
						85cm			**Droughtiness grade (DR)**			3a	3a		Wheat				
94	T	0	25	ZC	n	10YR5/4			0		-	43	43			*II*	3b	**3b**	WE
		25	35	ZC		2.5Y6/3	Fe	few	0			15	15						
		35	70	ZCL		2.5Y5/3	Fe	com	0	5	m/poor	36	49	y					
		70	100	ZC		10YR5/3	Fe	many	0	0	poor	21	0	y	y				
		100	120	C		7.5GY7/1	Fe	many	0		poor	14	0	y	y				
											Total	**129**	**106**		FL.flood risk			EA Fz3	
						Weed					MB	5	-16						
						patches			**Droughtiness grade (DR)**			2	3a		Wheat				

95	T	0	25	ZC	n	10YR5/4			0		-	43	43			*II*	3b	**3b**	WE
		25	35	ZC		2.5Y6/2	Fe	com	0			15	15	y					
		35	45	ZC		2.5Y7/2	Fe	many	0	5	poor	12	12	y	(y)				
		45	90	CL		10YR3/3	Mn	pred	0	10		45	37	y					
		90	120	hZCL		7.5YR6/8	FeMn	many	0	10	poor	17	0	y	y				
											Total	**131**	**106**		FL.flood risk			EA Fz3	
						hZCL-					MB	7	-16						
						ZC					**Droughtiness grade (DR)**	2	3a		Wheat				
96	T	0	30	ZC	n	10YR5/4	Mn	few	0		-	51	51			*IV*	3b	**3b**	WE
		30	52	C		10YR6/2	Fe	com	0		poor	27	29	y	y				
		52	83	ZC		7.5YR6/8	Mn	many	0	10	m/poor	22	23	y					
		83	100	C		7.5GY7/1	FeMn	many	0	10	poor	11	0	y	y				
		100	120	MSt							poor	10	0	y	y				
						Compact					Total	**121**	**102**		FL.flood risk			EA Fz3	
						33cm					MB	-3	-20						
											Droughtiness grade (DR)	3a	3a		Wheat				
97	T	0	27	ZC	n	10YR5/4			0		-	46	46			*II*	3b	**3b**	WE
		27	38	ZC		2.5Y5/4			0			17	17						
		38	50	C		10Y7/1	FeMn	com	0	5	poor	15	15	y	(y)				
		50	80	hZCL		7.5YR6/8	Mn	com		5		29	33	y					
		80	100	C		7.5GY7/1	Mn	many	0	10	poor	13	0	y	y				
		100	120	MSt							poor	10	0	y	y				
											Total	**130**	**110**		FL.flood risk			EA Fz3	
						Weald					MB	6	-12						
						Clay LSS					**Droughtiness grade (DR)**	2	3a		Wheat				
98	T	0	27	hZCL	n	10YR4/4			0		-	51	51			*II*	3a	**3a**	WE
		27	34	hZCL		2.5Y5/4			0			12	12						
		34	45	hCL		2.5Y6/4	FeMn	com	0	5	poor	13	13	y	(y)				
		45	80	hCL		7.5YR6/8	Mn	many		10		35	37	y					
		80	100	C		7.5GY7/1	FeMn	many	0	5	poor	14	0	y	y				
		100	120	Mst							poor	10	0	y	y				
											Total	**135**	**113**		FL.flood risk			EA Fz3	
						Weald					MB	11	-9						
						Clay LSS					**Droughtiness grade (DR)**	2	2		Wheat				
99	T	0	25	ZC	n	2.5Y5/4			0		-	43	43			*IV*	3b	**3b**	WE
		25	32	ZC		2.5Y5/3			0			11	11						
		32	65	C		10YR6/2	Fe	com	0	0	poor	34	43	y	y				

		65	83	hCL		7.5YR6/8	Mn	many	0	10		17	7	y					
		83	105	C		7.5GY7/1	FeMn	many	0	5	poor	15	0	y	y				
		105	120	MSt							poor	8	0	y	y				
						Compact					Total	**126**	**103**		FL.flood risk			EA Fz3	
						33cm					MB	2	-19						
											Droughtiness grade (DR)	3a	3a		Wheat				
100	T	0	29	hCL	n	10YR5/4			4		-	50	50			*II*	3a	**3a**	WE DR
		29	35	hZCL		2.5Y6/2	Fe	com	10			9	9	y					
		35	85	mZCL		2.5Y6/2	Fe	com	5		m/poor	47	48	y					
		85	120	hZCL		7.5YR6/8	FeMn	com	0	5	poor	20	0	y	y				
											Total	**127**	**108**		FL.flood risk			EA Fz3	
						Compact					MB	3	-14						
						35cm					**Droughtiness grade (DR)**	3a	3a		Wheat				
101	T	0	25	ZC	n	2.5Y5/3	Fe	com	0		-	43	43	y		*IV*	3b	**3b**	WE
		25	32	C		2.5Y5/2	Fe	com	0		m/poor	10	10	y					
		32	48	C		2.5Y6/2	FeMn	many	0	5	poor	21	20	y	y				
		48	70	hZCL		7.5YR5/3	FeMn	com	0	5		23	36	y					
		70	80	CL		10YR3/3	Mn	pred	0	15	poor	6	0	y	y				
		80	120	C		7.5GY7/1	FeMn	many	0		poor	28	0	y	y				
											Total	**130**	**109**		FL.flood risk			EA Fz3	
						Weald					MB	6	-13						
						Clay LSS					**Droughtiness grade (DR)**	2	3a		Wheat				
102	T	0	30	C	n	2.5Y5/4	Fe	com	0		-	51	51	y		*IV*	3b	**3b**	WE
		30	65	C		10Y7/1	FeMn	com	0	5	poor	35	44	y	y				
		65	85	mCL			Mn	many	0	10		19	7	y					
		85	120	ZC		10Y7/1	FeMn	many	0	5	poor	24	0	y	y				
											Total	**129**	**102**		FL.flood risk			EA Fz3	
						Weald					MB	5	-20						
						Clay LSS					**Droughtiness grade (DR)**	2	3a		Wheat				
103	T	0	35	ZC	n	2.5Y5/4			0		-	60	60			*II*	3b	**3b**	WE
		35	43	C		10Y7/1	FeMn	many	0	5	poor	10	10	y	(y)				
		43	70	mCL		7.5YR6/8	Mn	many	0	10		29	40	y					
		70	120	hZCL		10Y7/1	Mn	layers	0	5	poor	29	0	y	y				
											Total	**128**	**110**		FL.flood risk			EA Fz3	
											MB	4	-13						
											Droughtiness grade (DR)	3a	3a		Wheat				

104	T	0	26	ZC	n	10YR4/4			0		-	44	44			*III*	3b	**3b**	WE
		26	35	ZC		2.5Y5/3		few	0			14	14						
		35	50	C		2.5Y5/3	FeMn	com	0	5	poor	19	19	y	y				
		50	70	CL		7.5YR6/8	Mn	many	0	10		19	30	y					
		80	120	ZC			Mn	layers	0	5	poor	27	0	y	y				
											Total	**122**	**106**		FL.flood risk			EA Fz3	
						Very					MB	-2	-16						
						compact				**Droughtiness grade (DR)**		3a	3a		(spring) wheat				

Appendix 3: Soil pit descriptions and photographs

Pit A		Description (arable)
Ap	0-28 cm	Brown (10 YR 5/4) silty clay. Stoneless. Firm very coarse sub-angular blocks, coarse granular structure in root channels (direct drilled).
Btg	28-42 cm	Greyish (2.5Y 6/3) silty clay, with iron and manganese mottles. Some roots. Very firm coarse angular blocks (compact).
Bg	42-80 cm	Heavy clay loam (10YR 5/3) with many iron mottles and manganese fragments. 5% soft small stones. Dry, friable (fine subangular blocky) and permeable.

Geology: Alluvium, clayey and silty.
Comment: permeability is restricted in clayey upper subsoil, but this layer is less than 15cm thick and could be loosened by subsoiler. The lower subsoil is permeable but (historically was) subject to groundwater. WC is II but ALC grade is limited to Grade 3b because topsoil slightly exceeds 35% clay (Appendix I).

A: structures: clay subsoil 28-42cm

A : subsoil, some porosity

Pit B		Description (arable)
Ap	0-28 cm	Brown (10YR 4/3) silty clay. Stoneless. Firm medium sub-angular blocks with roots.
Bt	28-45 cm	Greyish-brown (2.5Y 5/3) clay, with a few iron mottles. Some roots and firm coarse sub-angular blocks.
Bg	45-75 cm	Silty clay, greyish brown (2.5Y 6/2). Very firm medium-coarse angular blocky structure, common iron and manganese mottles.
Cg	75 cm -	Clay, light greenish grey (7.5GY 7/1) with iron and manganese mottles.

Geology: clayey Alluvium over Weald Clay within 1m.
Comment: upper subsoil has reasonable structure but slowly permeable below 45cm and (historically) subject to groundwater. WC III and ALC Grade 3b. Topsoil has higher clay content (40%) than pit A.

<table>
<tr><td>B: structures: clay subsoil 28-42cm
</td><td>Subsoil below 45cm, low porosity, very firm
</td><td>Bluish-grey clay at depth
</td></tr>
</table>

Pit C		Description (arable)
Ap	0-26 cm	Brown (2.5Y 4/4) heavy clay loam. Traces of carbonate. Coarse prismatic breaking to medium/fine subangular blocks. Friable.
Bt	26-35 cm	Clay, light olive-brown (2.5Y 6/4) with common faint iron mottles. Some roots and earthworms. Firm medium prismatic structure. Very slightly calcareous.
Bw(g)	35-58 cm	Clay with very firm very coarse prismatic structure. Slightly calcareous (a few limestones). Increasing iron and manganese mottles with depth.
BCg	58 cm -	Clay, light greenish grey (7.5GY 7/1) with common iron and manganese mottles. Calcareous.

Geology: Weald Clay with "Paludina" limestone layers
Comment: upper subsoil is very clayey but not strongly mottled. $CaCO_3$ helps cracking and structure. However the profile cannot be rated higher than WC III and ALC Grade is 3b.

C: structures:

Upper Subsoil

Pit E		Description (arable)
Ap	0-28 cm	Brown (10 YR 4/4-5/4) heavy silty clay loam. Occasional lime particles. Top 10cm friable, below firm, fine subangular blocky to medium angular blocky.
Bt	28-43 cm	Clay, greyish (10YR 6/3) with common iron mottles. Some roots and earthworms. Very firm, very coarse angular blocks breaking to medium blocks (compact). Non-calcareous.
Bg	43-70 cm	Heavy clay loam, predominantly mottled >50% iron (7.5YR 6/6) and grey (7.5Y 7/1). Dry and friable, fine subangular blocky. Slightly stony increasing to moderately stony with depth
Cg	70 cm -	Auger stopped by stone.

Geology: River Terrace, clayey over loamy-stony.
Comment: permeability is restricted in clayey upper subsoil, but this layer could be loosened by subsoiler. Lower subsoil is permeable although (historically) subject to groundwater. WC is II which limits ALC to Grade 3a based on Wetness, as well as on Droughtiness.

E: structures

Subsoil above and below 43cm

Below 43cm is weakly structured dry very friable subsoil full of iron and manganese mottles with some hard stones.

Pit F		Description (arable)
Ap1	0-13 cm	Brown (10 YR 4/4) medium clay loam. Non-calcareous. Friable with coarse granular structure, many roots.
Ap2	13-28 cm	Brown (10 YR 5/4) heavy clay loam. Slightly compact prismatic structures. Fewer roots.
Eb(g)	28-42 cm	Heavy silty clay loam, brown (10YR 6/6 to 5/4), with some iron and manganese mottles. Some roots. Medium/coarse subangular blocky structure. Friable
Btg	42-60 cm	Silty Clay, dark greyish brown (2.5Y 6/2) with 30% iron and 10% manganese mottles. Firm, fragmenting to angular blocks on removal from pit.
	60-65 cm	Dark brown (10YR 3/3) layer of manganese fragments
Cg	65-90 cm	Heavy clay loam, permeable with increasing hard stones.

Geology: River Terrace, silty-clayey over loamy-stony.
Comment: permeability restricted clayey layer starts below 40cm. WC is III which limits ALC to Grade 3a on Wetness. Tall beans, despite some compaction in the lower topsoil.

F: structures

Subsoil below 42cm

Firm structures, strongly mottled silty clay

Location C: beans shorter with weed patches

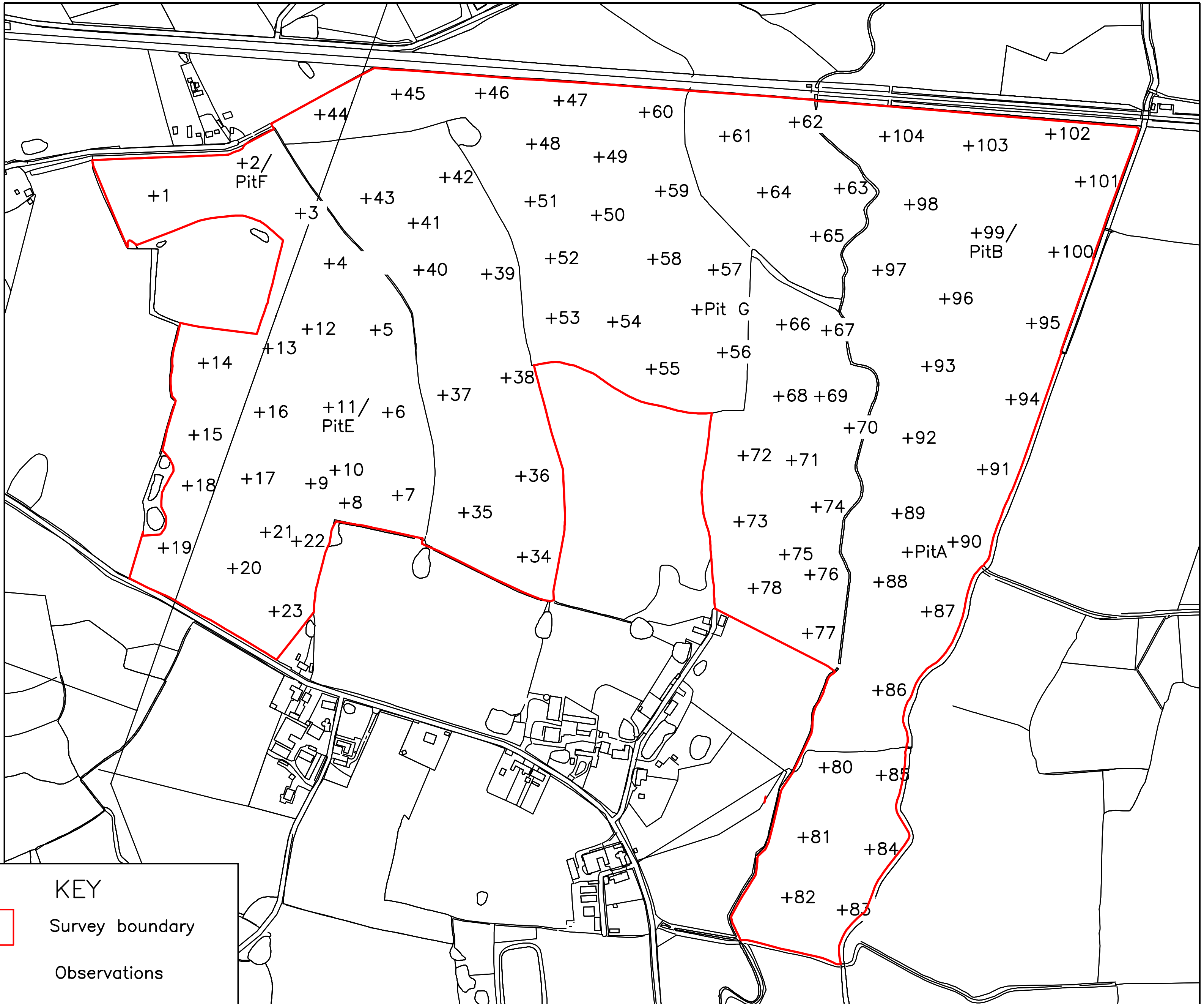
Location D: tall even bean crop

Location D: beans somewhat shorter (compaction stressed)

Location F: tall bean crop

Location B - even wheat crop

Location G - even wheat crop



KEY

(red box)	Survey boundary
+1	Observations
+P	Pit

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OBSERVATION MAPPING

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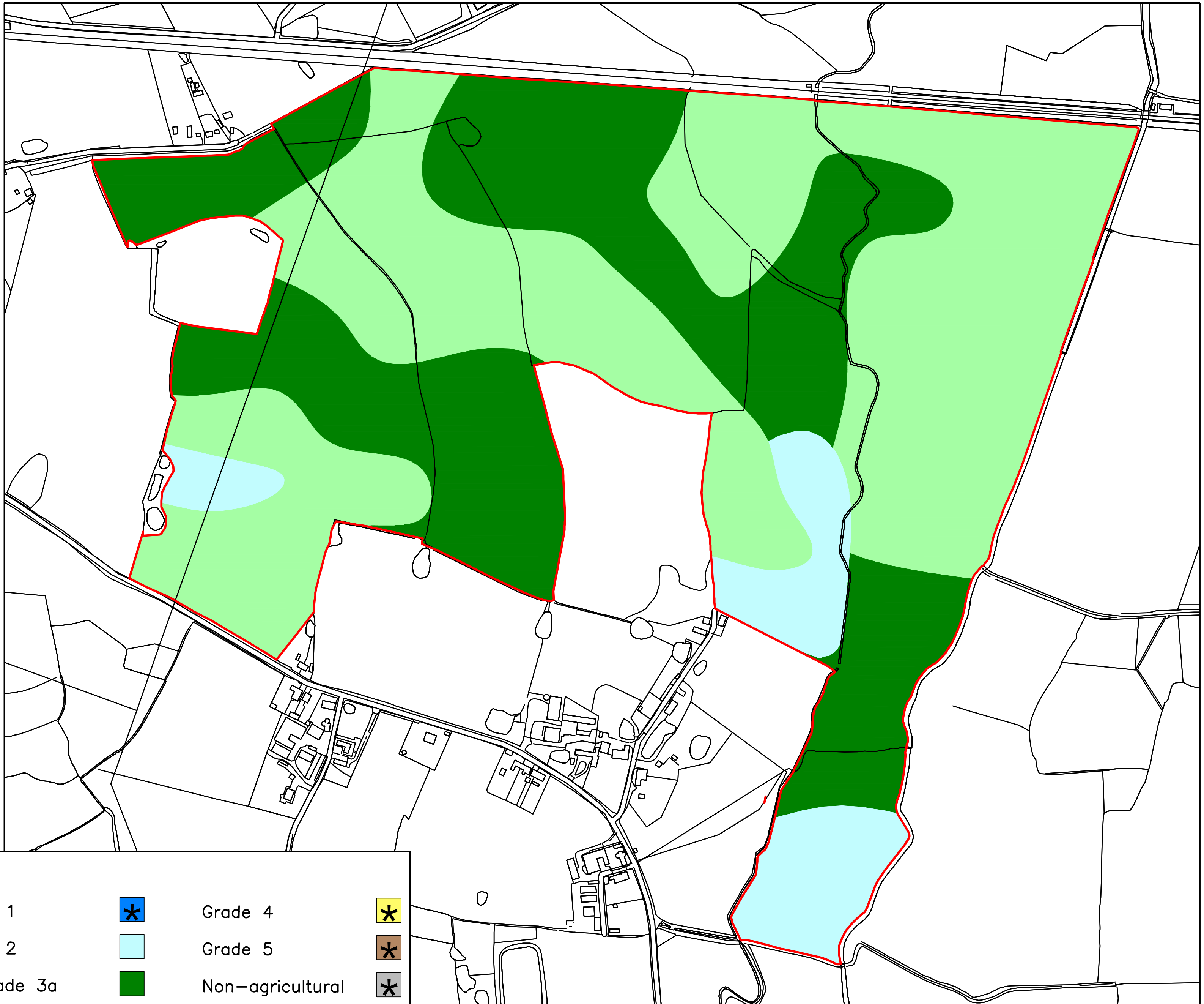

N

KEY

Grade 1	*	Grade 4	*
Grade 2		Grade 5	*
Subgrade 3a		Non–agricultural	*
Subgrade 3b		Not present	*

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1:7,500

0 100m 200m

Rev.	Comment	Date

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AGRICULTURAL LAND CLASSIFICATION MAPPING

Contract

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APPENDIX 3

UK INTERNATIONAL TRADE IN CEREALS

Table 2: Cereals Supply and Demand Balance Sheet 2018/19
(Source: AHDB)

(JULY - JUNE YEARS)

Links connect to relevant Defra/AHDB data pages

Thousand tonnes

		WHEAT								BARLEY							
		2013/14 2017/18 average	2015/16 estimate**	2016/17 estimate	2017/18 estimate	2018/19 May-19	2018/19 Sep-19	Absolute change May-19	% change on 17/18	2013/14 2017/18 average	2015/16 estimate	2016/17 estimate	2017/18 estimate	2018/19 May-19	2018/19 Sep-19	Absolute change May-19	% change on 17/18
(1)	Opening Stocks	2,144	2,434	2,787	1,755	1,718	1,718	-	-2%	1,269	1,497	1,367	1,105	1,076	1,076	-	-3%
(2)	Production	14,779	16,506	14,383	14,837	13,555	13,555	-	-9%	7,039	7,370	6,655	7,169	6,510	6,510	-	-9%
(3)	Imports	1,804	1,509	1,855	1,793	1,730	1,858	128	4%	122	159	106	105	80	70	-10	-33%
(4)	**Total Availability**	**18,727**	**20,449**	**19,025**	**18,386**	**17,003**	**17,131**	**128**	-7%	**8,430**	**9,026**	**8,128**	**8,379**	**7,666**	**7,657**	**-10**	-9%
(5)	Human and Industrial Consumption (b)	7,711	7,360	8,110	7,792	6,996	6,976	-20	-10%	1,897	1,833	1,863	1,881	1,903	1,903	-	1%
(5a)	(of which home grown)	6,580	6,416	7,169	6,765	5,968	5,923	-45	-12%	n/a	n/a	n/a	n/a	n/a	n/a	*	*
(6)	Usage as Animal Feed (c)	7,042	7,094	7,236	7,514	7,384	7,403	19	-1%	3,617	3,613	3,655	4,046	3,592	3,584	-8	-11%
(6a)	(of which home grown)	6,357	6,444	6,523	6,792	6,636	6,653	17	-2%	n/a	n/a	n/a	n/a	n/a	n/a	*	*
(6b)	(of which Compounders)	3,825	3,845	4,034	4,232	4,144	4,166	22	-2%	1,153	1,108	1,132	1,278	1,182	1,203	21	-6%
(6c)	(of which Integrated Poultry Units)	1,297	1,210	1,211	1,241	1,158	1,155	-3	-7%	59	49	53	59	48	50	2	-15%
(7)	Seed (d)	283	281	278	271	271	271	-	0%	179	182	189	183	183	183	-	0%
(8)	Other	76	79	72	74	68	68	-	-8%	35	37	33	36	33	33	-	-8%
(9)	**Total Domestic Consumption**	**15,111**	**14,814**	**15,696**	**15,651**	**14,719**	**14,718**	**-1**	-6%	**5,728**	**5,665**	**5,740**	**6,147**	**5,711**	**5,703**	**-8**	-7%
(10)	**Balance (4) - (9)**	**3,616**	**5,635**	**3,329**	**2,735**	**2,284**	**2,413**	**129**	-12%	**2,702**	**3,361**	**2,388**	**2,232**	**1,955**	**1,954**	**-1**	-12%
(11)	Exports (e)	1,425	2,848	1,438	448	300	358	58	-20%	1,355	1,994	1,026	1,101	910	863	-47	-22%
(12)	Intervention Stocks (e)	-	-	-	-	-	-		*	-	-	-	-	-	-	*	*
(13)	**Commercial End-Season Stocks (e)**	**2,051**	**2,787**	**1,755**	**1,718**	**1,984**	**1,911**	**-73**	11%	**1,285**	**1,367**	**1,105**	**1,076**	**1,045**	**1,091**	**46**	1%
(14)	(of which Estimated Operating stock requirement) (f)	1,522	1,500	1,560	1,600	1,550	1,550	-	-3%	751	760	760	770	780	780	-	1%
(15)	(of which free stock) (g)	529	1,287	195	118	434	361	-73	206%	534	607	345	306	265	311	46	2%
(16)	Surplus available for either export or free stock (10)-(12)-(14)-(17)	**1,954**	**4,135**	**1,633**	**567**	**734**	**720**	**-14**	27%	**1,889**	**2,601**	**1,371**	**1,408**	**1,175**	**1,174**	**-1**	-17%
(17)	Residual (10)-(11)-(13)			***136***	***568***		***144***					***257***	***54***				

Table 3: Trade in key commodities by value in real terms by 2019 prices

£ million — Calendar year

Commodity	Flow	2016	2017	2018	2019 (prov.)
Whisky	Imports	181	235	220	191
	Exports	4341	4650	4908	5033
Wine	Imports	3243	3346	3367	3482
	Exports	515	584	630	656
Cheese	Imports	1437	1627	1731	1726
	Exports	529	640	688	708
Poultry meat	Imports	1227	1222	1304	1213
	Exports	265	292	305	302
Poultry meat products	Imports	1026	1099	1100	1156
	Exports	115	129	141	122
Beef and veal	Imports	1077	1115	1189	997
	Exports	391	421	443	464
Wheat, unmilled	Imports	258	356	462	250
	Exports	405	107	64	183
Lamb and mutton	Imports	366	384	380	312
	Exports	347	400	374	399
Pork	Imports	824	981	869	951
	Exports	267	305	297	392
Breakfast cereals	Imports	270	285	304	319
	Exports	409	446	491	483
Milk and cream	Imports	111	153	183	140
	Exports	209	336	351	333
Bacon and ham	Imports	585	583	554	564
	Exports	44	56	63	66
Butter	Imports	295	379	367	290
	Exports	166	232	280	257
Eggs and egg products	Imports	183	182	175	152
	Exports	68	86	100	112
Fresh vegetables	Imports	2452	2501	2513	2538
	Exports	115	115	132	128
Fresh fruit	Imports	3834	3994	3855	3882
	Exports	119	157	159	155
Salmon (inc. smoked)	Imports	506	515	524	604
	Exports	611	749	647	822

Source: HMRC

APPENDIX 4
DISTRIBUTION OF FOOD AND DRINK ENTERPRISES IN KENT

Figure 1: Food and drink production enterprises in Kent and Medway MSOAs, 2020 (Source: UK Business Counts ONS)