APPEAL BY ECONERGY INTERNATIONAL LTD

AGAINST THE DECISION OF SHROPSHIRE COUNCIL TO REFUSE PLANNING PERMISSION FOR ERECTION OF AN UP TO 30 MW SOLAR PV ARRAY, COMPRISING GROUND MOUNTED SOLAR PV PANELS, VEHICULAR ACCESS, INTERNAL ACCESS TRACKS, LANDSCAPING AND ASSOCIATED INFRASTRUCTURE, INCLUDING SECURITY FENCING, CCTV, CLIENT STORAGE CONTAINERS AND GRID CONNECTION INFRASTRUCTURE, INCLUDING SUBSTATION BUILDINGS AND OFF-SITE CABLING

AT LAND AT BERRINGTON

PROOF OF EVIDENCE OF MR SAM FRANKLIN BSc (Hons) MSc MRICS FAAV FBIAC MISoilSci

PINS REF:	**APP/L3245/W/23/3332543**
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1. Qualifications and Experience

1.1 My name is Sam Franklin, and I am the Director of Landscope Land and Property Ltd, which I established and have operated since 2001. I have a BSc with Honours in Agriculture from Newcastle University and am a Professional Member of the Institute of Soil Scientists and Life Member of the British Society of Soil Science, with over 35 years' experience of agriculture, soils, planning and rural property. I am a Practitioner Member of the Institute of Environmental Management and Assessment and a Fellow of the British Institute of Agricultural Consultants.

1.2 I have considerable practical soils-based experience including regularly preparing agricultural land classification assessments for private clients, local planning authorities and planning consultancies. I have completed a number of soil and environment-based courses at Cranfield University including soil classification, soil survey, land evaluation and soil and water management, together with an MSc. I am also a member of the Agricultural Land Drainage Panel of the Lands Tribunal, a Member of the Royal Institution of Chartered Surveyors and a Fellow of the Central Association of Agricultural Valuers.

1.3 My agricultural and soils experience is comprehensive, having grown up on a mixed livestock and arable farm in Bedfordshire, also having worked on other livestock, arable and vegetable farms in the wider area, as well as administering sheep and cattle enterprises for the RSPB in a variety of locations around the UK and previously being co-director of a farming company in Cambridgeshire. I have lived most of my life around the family farm and have been involved in the operation of the farming business for 40 years. I previously managed an agricultural portfolio for the former Bedfordshire County Council with minerals and land restoration projects and spent two years working for the Overseas Development Agency/Department for International Development on a land and agricultural development project.

1.4 I regularly undertake agricultural related appraisals for Local Planning Authorities in the Eastern and East Midlands Regions including agricultural land classification and other soil-based assessments, general agricultural and equestrian appraisals, and wider rural planning advice. In the last five years, I have undertaken over 250 separate agricultural related appraisals for LPAs, in addition to a similar number of tasks for private clients. Between 2010 and 2014 I worked as a consultant to Natural England undertaking soil husbandry and soil and water assessments as part of the Catchment Sensitive Farming initiative. More recently I have given evidence at Solar Farm planning inquiries for National Infrastructure Projects. In the last 5 years I have prepared more than 40 Agricultural Land Classification reports relating to solar and renewable energy alone.

1.5 The evidence I have prepared and provide in this proof is true and I confirm the opinions expressed are my true and professional opinions.

1.6 My evidence relates to agricultural land classification specifically and the agricultural and farming impact generally.

1.7 My evidence is set out in the following order:

1. Qualifications and Experience
2. Instructions
3. Description of the site and its surroundings
4. Policy & Guidance
5. Agricultural Land Quality of Site
6. Application Site Compared with Land around Shrewsbury
7. Food Security and Food Imports
8. Farm Diversification
9. Summary and Conclusions

1.8 I first inspected the appeal site in January 2024. I am familiar with the general area having travelled through it on many occasions in the past and I have undertaken land and farming based appraisals in the area on occasion.

2. Instructions

2.1 My company was contacted in January 2024 to ask if we would provide independent expert evidence at appeal. We were subsequently awarded the work, and during January 2024, I visited the site and undertook a limited agricultural land quality and soil resource survey of it. My evidence considers the results of the appellants' ALC survey (CD 1.3), Draft Soil Management Report, (CD 1.19) and the appellant's Agricultural Production Assessment (CD 1.20), a letter from Balfours dated 9/10/23 (CD 9.10) and the Sequential Site Selection Report (CD 1.13) if the site were to be developed as proposed by them.

2.2 The background to my instructions is explained in the decision notice dated 27th September 2023 and in particular the 1st reason for refusal which stated:

REASONS FOR REFUSAL

Loss of Best and Most Versatile Land

1. *88.2% of the land within the 44.09-hectare site is best and most versatile quality with 54.1% being the higher Grade 2 quality. It is not considered that the renewable energy benefits of the proposals or the applicant's justifications for this choice of site are sufficient to outweigh the adverse impact of losing the arable production potential of this best and most versatile land for the 40-year duration of the proposed solar farm, assuming the land is physically capable of reverting to intensive arable production at the end of this time period. The proposals are therefore contrary to paragraph 174B of the NPPF and Core Strategy Policy CS6 (and the accompanying explanatory paragraphs). The proposal is also contrary*

to policy DP26(part 2.k) of the emerging Shropshire Local Plan which states that solar farm developments should use lower grade land in preference to best and most versatile land.

2.3 The site has been surveyed by ADAS for agricultural land grading purposes and that report identifies the site as being 88% best and most versatile.

2.4 Reason for refusal 1 indicates that there is a policy objection to development on BMV land and such information that has been submitted to the Local Planning Authority to assess the likely impact of the development on the potential loss of best and most versatile agricultural land led to a refusal. An Agricultural Land Classification Report was finalised in August 2022 and submitted by the applicant in September 2022. An Agricultural Production Assessment was then submitted in January 2022. Overall, the ALC report found the site to be mostly Grade 2, partially subgrade 3a and partially subgrade 3b.

2.5 The extent to which I agree with the ALC report's methodology, terminology and judgement is recorded in the statement of common ground. In this proof, I have identified a number of omissions in its approach. These, together with points of disagreement, are reported in the relevant sections of this proof.

3. Description of the Site and its Surroundings

3.1 The appeal site is a collection of undeveloped fields, primarily arable land, in use for combinable crop growing with small areas of grassland and woodland. The appeal site comprises an area of approximately 44 hectares of agricultural fields and cable route within the open countryside west of the hamlet of Berrington.

3.2 The topography of the site is gently sloping down towards the southern area of the proposed development which drops gently from around 90m AOD at the northern boundary to just 70m AOD near Cantlop Mill.

4. Policy and Guidance

National Policy

4.1 Section 11 of the National Planning Policy Framework Dec 2023 (NPPF), Making Effective Use of Land, states in paragraph 123 and 124:-

123. Planning policies and decisions should promote an effective use of land in meeting the need for homes and other uses, while safeguarding and improving the environment and ensuring safe and healthy living conditions. Strategic policies should set out a clear strategy for accommodating objectively assessed needs, in a way that makes as much use as possible of previously-developed or 'brownfield' land49.

124. Planning policies and decisions should:

a) encourage multiple benefits from both urban and rural land, including through mixed use schemes and taking opportunities to achieve net environmental gains – such as developments that would enable new habitat creation or improve public access to the countryside;

b) recognise that some undeveloped land can perform many functions, such as for wildlife, recreation, flood risk mitigation, cooling/shading, carbon storage or food production; […]

4.2 Paragraph 180 and 181 of the NPPF provides government policy regarding agricultural land. It states:-

15. Conserving and enhancing the natural environment

180. Planning policies and decisions should contribute to and enhance the natural and local environment by:

a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);

b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;

c) maintaining the character of the undeveloped coast, while improving public access to it where appropriate;

d) minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and

f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.

181. Plans should: distinguish between the hierarchy of international, national and locally designated sites; allocate land with the least environmental or amenity value, where consistent with other policies in this Framework62; take a strategic approach to maintaining and enhancing networks of habitats and green infrastructure; and plan *for the enhancement of natural capital at a catchment or landscape scale across local authority boundaries.*

4.3 Footnote 62 states:-

Where significant development of agricultural land is demonstrated to be necessary, areas of poorer quality land should be preferred to those of a higher quality. The availability of agricultural land used for food production should be considered, alongside the other policies in this Framework, when deciding what sites are most appropriate for development.

4.4 Local Policy (Cores Strategy)

Cores Strategy Policy CS6 states:-

CS6 : Sustainable Design and Development Principles

To create sustainable places, development will be designed to a high quality using sustainable design principles, to achieve an inclusive and accessible environment which respects and enhances local distinctiveness and which mitigates and adapts to climate change. This will be achieved by:

• Requiring all development proposals, including changes to existing buildings, to achieve applicable national standards, or for water use, evidence based local standards as reflected in the minimum criteria set out in the sustainability checklist. This will ensure that sustainable design and construction principles are incorporated within new development, and that resource and energy efficiency and renewable energy generation are adequately addressed and improved where possible. The checklist will be developed as part of a Sustainable Design SPD;

• Requiring proposals likely to generate significant levels of traffic to be located in accessible locations where opportunities for walking, cycling and use of public transport can be maximised and the need for car based travel to be reduced;

And ensuring that all development:

• Is designed to be adaptable, safe and accessible to all, to respond to the challenge of climate change and, in relation to housing, adapt to changing lifestyle needs over the lifetime of the development in accordance with the objectives of Policy CS11;

• Protects, restores, conserves and enhances the natural, built and historic environment and is appropriate in scale, density, pattern and design taking into account the local context and character, and those features which contribute to local character, having regard to national and local design guidance, landscape character assessments and ecological strategies where appropriate;

• Contributes to the health and wellbeing of communities, including safeguarding residential and local amenity and the achievement of local standards for the provision and quality of open space, sport and recreational facilities.

• Is designed to a high quality, consistent with national good practice standards, including appropriate landscaping and car parking provision and taking account of site characteristics such as land stability and ground contamination;

• Makes the most effective use of land and safeguards natural resources including high quality agricultural land, geology, minerals, air, soil and water;

• Ensures that there is capacity and availability of infrastructure to serve any new development in accordance with the objectives of Policy CS8.

Proposals resulting in the loss of existing facilities, services or amenities will be resisted unless provision is made for equivalent or improved provision, or it can be clearly demonstrated that the existing facility, service or amenity is not viable over the long term.

4.5 The supporting text to the policy also indicates:-

4.87 The Spatial Strategy of concentrating development in Shrewsbury, the Market Towns and key settlements and the allocation of sites for development in the SAM Dev DPD will have regard to the quality of soil, water and air, including particularly the designated Air Quality Management Areas within Shropshire.

4.6 CS6 does not distinguish between the different grades that make up best and most versatile and therefore where a site is or is predominantly best and most versatile CS6 does not support development.

4.7 DP26(part 2.k) of the Draft Local Plan also states:-

DP26. Strategic, Renewable and Low Carbon Infrastructure
The delivery of sustainable communities in Shropshire relies on the provision of new strategic infrastructure and the continued operation of existing strategic infrastructure. Proposals which are likely to affect an internationally designated wildlife site will require a project level HRA in accordance with Policy DP12.

Existing Strategic Infrastructure
1. Development will be expected to demonstrate that it will not adversely affect, either directly or indirectly, the continued operation and potential expansion of existing strategic infrastructure.

New Strategic Infrastructure
Non-wind renewable and low carbon development
2. Non-wind renewable and low carbon development will be supported where its impact is, or can be made, acceptable. To aid in this determination, all applications should be accompanied by an assessment of the proposal's effect on the following during both the construction and operational stages:

a. Visual amenity (including the considerations within Policy DP17);
b. Landscape character (including the considerations within Policy DP17);
c. Natural assets (including the considerations within Policy DP12);
d. Historic assets (including the considerations within Policy DP23);
e. Air quality, noise and public amenity (including the considerations within Policy DP18);
f. Water quality and water resources noise (including the considerations within Policy DP19);
g. Traffic generation and the nature of vehicle movements;
h. The Shropshire Hills AONB (including the considerations within Policy DP24);
i. Hydropower applications should pay attention to fish stocks and normally be accompanied by a Flood Risk Assessment (see also Policy DP21);
j. Biomass, energy from waste, biogas and anaerobic digestion proposals should also address the impact on vibration, odour and dust (the latter for biomass and energy from waste only). Opportunities to recover heat and power are encouraged in accordance with Policy SP3; and
k. Large scale ground mounted solar photovoltaic solar farm proposals should show how they have made effective use of previously developed and non-agricultural land. Where a proposal requires the use of agricultural land, poorer quality land should be used in preference to land of a higher quality (see also Policy DP18). Proposals should allow for continued agricultural use wherever possible and/or encourage biodiversity improvements around arrays. The assessment should pay particular attention to the impact of glint and glare on neighbouring land uses and residential amenity as well as aircraft safety, (including defence operations).

3. The assessment should be proportionate to the development proposed and include sufficient information to allow for an accurate evaluation of all impacts, both negative and positive. It should cover necessary ancillary development such as security measures, lighting, access tracks and fencing. Impacts should be considered cumulatively against those existing or consented development types with similar impacts in the surrounding area. Mitigation measures to remove or reduce adverse impacts should be identified.

Wind energy development
4. In addition to the above criteria for non-wind schemes, proposals for wind energy development of any scale (excluding microgeneration) will only be approved if: a. The proposed site is in an area identified as suitable for wind energy development in an adopted Neighbourhood Plan; and b. Following consultation, it can be demonstrated that the planning impacts identified by affected local communities have been fully addressed and therefore the proposal has their backing. Monitoring and Decommissioning

5. Where planning permission establishes performance standards, applicants will be expected to demonstrate compliance through the submission of regular monitoring reports.

6. Proposals for temporary infrastructure will be expected to include measures for satisfactory restoration, including progressive restoration, of the site at the earliest practicable opportunity to an agreed after-use or to a state capable of beneficial afteruse.

7. Where appropriate, planning obligations will be sought in order to secure the after-use, long term management and maintenance of the site.

5 Agricultural Land Quality of Site

5.1 There is no dispute between the parties that the proposals will result in the development of at least 44 hectares of agricultural land for at least 40 years and, according to the appellant's own ALC report (CD 1.3) around 88% of this land is Best and Most Versatile.

Geology and Soils

5.2 The geological maps show the underlying geology to be of the Salop Formation – a mudstone, sandstone conglomerate. Described as sedimentary bedrock and formed between 309.5 and 272.3 million years ago during the Carboniferous and Permian periods. The surface, drift material, primarily leading to soil-forming over the majority of the appeal site is shown as Till, a clay based medium with an area of sand and gravel, mainly in the west of the site. The soils over much of the site are shown as predominantly deep reddish fine loamy soils with some deep well drained coarse loamy soils, which are widespread across the region. A 1:250,000 scale soil map of the wider area in **Appendix 1,** shows that Salwick (572m) Association predominate the site, as further detailed in **Appendix 2.** These soils are common across the District in general and the further west midlands region.

ALC Methodology

5.3 The standard method for assessing ALC is known as *The Revised Guidelines for Agricultural Land Classification* (MAFF 1988) (CD 9.1). It sets out in detail a process for assessing the soil and agricultural limitations using:

(a) climatic data,

(b) the depth to any slowly permeable layer (subsoil clay on this site);

(c) the texture of the topsoil and/or the stone content in the soil;

(d) the soil depth and structure;

(d) interactive soil based considerations, including wetness, droughtiness and

(e) the amount of Calcium Carbonate in the top 25cm of soil.

Together these assessments and calculations allow the grading of agricultural land. There is no other recognised methodology in England for grading agricultural land.

5.4 The normal density of soil sampling is detailed in Natural England guidance note TIN049 (CD 9.4). It recommends a density of sampling at 1 per hectare. In the appellants case, around 41 samples have been taken and assessed in order to determine the grade or grades of the appeal land. This is slightly short of the total number, but I do not consider the unsurveyed area to be dramatically different, having inspected the site.

5.5 The appellant's ALC asserts on Page 6 that with regard to land of Grade 1 quality, *no land of this quality has been mapped*. However, the report does indicate:-

Grade 2

Land of this quality is mapped across the southern part of the site. <u>Included within the land mapped as Grade 2 are profiles of Grade 1 land quality</u>.

5.6 This is the only substantial reference to the Grade 1 land in the report and there is no clear explanation of the numbers of borings, where those Grade 1 areas are, or why they have been downgraded to Grade 2.

5.7 Closer examination of the auger bore results from the Appendix 3 of the ADAS ALC (CD 1.3) shows that indeed 13 boring sites were identified as of Grade 1 quality. 12 of these individual borings were in locations where there were clusters of three or more borings together and only one site isolated. The report and survey results for auger sample points 8, 14, 15, & 23; 27,28, 33 & 34; and 39, 40 & 41 are all shown as Grade 1. The additional sample point where Grade 1 land was found in a single location has been ignored (sample point 13).

5.8 A map (**Appendix 3**) shows the location of the three main clusters of Grade 1 land across the site, which are mostly in the southern part of site.

5.9 Within the Introduction Section of the 1988 Guidelines, interpretation of the guidelines is explained:-

A degree of variability in physical characteristics within a discrete area is to be expected. If the area includes a small proportion of land of different quality, the variability can be considered as a function of the mapping scale. Thus, small, discrete areas of a different ALC grade may be identified on large scale maps, whereas on smaller scale maps it may only be feasible to show the predominant grade. However, where soil and site conditions vary significantly and repeatedly over short distances and impose a practical constraint on cropping and land management a 'pattern' limitation is said to exist. This variability becomes a significant limitation if, for example, soils of the same grade but of contrasting texture occur as an extensive patchwork thus complicating soil management and cropping decisions or resulting in uneven crop growth, maturation or quality.

5.10 These guidelines therefore anticipate a certain amount of within-field variation of soils and the grading that can or should be ascribed to each area. The ADAS report does not explain why 13 hectares of Grade 1 land (around 30%) of the overall site is downgraded to Grade 2. Except in the case of the more isolated auger boring 13, I consider that showing the Grade 1 land on the ALC report's Appendix 3 map would be appropriate in these circumstances, particularly as the area of Grade 1 is slightly greater than the area of Grade 2. It does amount to a significant proportion of the overall site. There are three distinct areas of Grade 1 land shown in **Appendix 3**.

5.11 A letter from Balfours on behalf of the owners dated 9th October 2023 (CD 9.10) tries to explain the variation in soil quality across the site, indicating that the land is poor or variable for cereal production. Their explanation of soil texture is not reflected in the ALC report, or the draft Soil Management Report (CD 9.11), where none of the soils are described as 'clay', or 'very light sand'. These soil textures (sand, and clay) are however clearly described in the 1988 Guidelines. Both the ALC and Soil Management Report refer to three main soil types across the site and all are loams. In reality, this land is highly productive land, with irrigation available and is better suited to horticultural crop production, where any droughtiness can be remedied by irrigation. It is perhaps not surprising that cereal production on the site is variable.

Availability of Irrigation

5.12 The Introduction section of the 1988 Guidelines indicates:-

2. Where limitations can be reduced or removed by normal management operations or improvements, for example cultivations or the installation of an appropriate underdrainage system, the land is graded according to the severity of the remaining limitations. Where an adequate supply of irrigation water is available this may be taken into account when grading the land (Section 3.4).

5.13 Section 3.4 of the 1988 Guidelines sets out the limitations of any enhancement due to Irrigation:-

Irrigation

Irrigation can significantly enhance the potential of agricultural land, especially in drier areas, and should therefore be taken into account in ALC grading where it is current or recent practice. In determining the effect of irrigation on ALC grade, the following factors should be taken into account:

i) adequacy of irrigation water supply *ii) the range of crops to which water is usually applied*

iii) climate and soil factors.

When considering the effects of irrigation on ALC grading, it should normally be assumed that potatoes, responsive field vegetable and fruit crops and, in drier areas, sugar beet would receive irrigation water but that cereals, oilseed rape and grass would not. Furthermore, irrigation will generally be of less benefit, and therefore have less influence on ALC grade in wetter areas and on heavier land which may not be well suited to growing irrigation-responsive crops. Even on more flexible land in drier areas, because irrigation is likely to benefit only part of the full range of crops which could be grown, it will usually upgrade land by no more than one grade or subgrade.

5.14 The appellant's ALC has found that 88% of the site is BMV land and that most is Grade 2, quality. According to the report at least nine borehole sites are Grade limited by droughtiness (borings 1, 2, 3, 4, 17, 25, 35, 37, and 38). Given that irrigation is clearly available on site, with the reservoir at Cliff Hollow, it is reasonable to consider upgrading land, where it is limited by droughtiness, to a higher grade. None of the borings identified as Grade 1 quality are limited by drought, but there are three clusters of borings where land is considered limited by drought. **Appendix 4** shows these areas. Again, upgrading the land due to irrigation does not change the overall percentage of BMV, but an additional four hectares would become Grade 2 from Grade 3a and five hectares would become Grade 1 from Grade 2.

5.15 Taken together, the actual Grade 1 found on site, by ADAS and land upgraded due to irrigation availability is shown in the table below. It is from a total of 41.4 hectares not the 44 hectares of entire site:-

ALC Grades across the Site allowing for Irrigation and Grade 1 found

ALC Grade	Description	Area (%)	Area (Ha)
Grade 1	Excellent	41.0	17.0
Grade 2	Very Good	22.8	9.4
Grade 3a	Good	20.3	8.4
Grade 3b	Moderate	11.8	4.9
Unsurveyed		4.1	1.7
TOTAL		100	41.4

5.16 **Appendix 5** shows the combined effect of actual Grade 1 borings and irrigation availability on the land grading.

5.17 Comprehensive guidance on the production of ALC reports is also provided by IEMA (Institute of Environmental Management & Assessment (IEMA) Guide: A New Perspective on Land and Soil in Environmental Impact Assessment) (CD9.12).

5.18 It states clearly in Annex C that:-

Detailed soil surveys are carried out using OS base maps at scales of 1:10,000 or larger, with soil auger samples taken at an appropriate density to map variations in soil types (usually at a density of one sample per hectare on a 100m grid). Depending on the variability of the soil and site characteristics, supplementary auger and soil pits are investigated within this grid to fine-tune the boundaries between different soil types. This, for example, is considered by Defra and Natural England to be a definitive level of detail for ALC and soil resource surveys for the restoration of surface mineral sites, and in broad terms, it might be considered applicable to the rest of the UK.

5.19 The MAFF 1988 Revised Guidelines also indicate that, small, discrete areas of any different ALC grade may be identified on large-scale maps, (TIN049 recommends scales of 1:10,000), whereas on smaller scale maps it may only be feasible to show the predominant grade. In this case as the ALC survey is detailed and the map is larger scale, it is reasonable to consider that there are discrete areas of better land.

Long Term Effects

5.20 The stated impact of this scheme is that the proposed development is "temporary", and the proposed development is "reversible". My concern is that after 40 years the site may not be able to return to arable farming and that land quality may also be affected. There is little evidence provided that the site will ever return to formal agriculture, let alone arable farming, or that its fertility and soil health will be maintained.

5.21 The agricultural land classification report and outline soil management plan does not include information such as measurements of current organic matter content of the soil or soil carbon/nutrient stocks, making it impossible to assess the success or failure of the site construction, management and dismantling regimes to deliver any carbon capture benefits. However, **Appendix 6** to my proof identifies that there are arable based systems whereby carbon can be captured such that the perceived benefits of taking this land out of production can be minimised, whilst food production is maintained. These include minimal tillage, regenerative farming techniques, Controlled Traffic Farming and the spreading of rock residues onto farmland. Indeed, as set out a Farmers Weekly article in **Appendix 7**, a farm contractor from Thaxted (Jeremy Durrant, EW Davies Farms) undertaking arable farming is able to demonstrate improvements in soil structure, and soil health whilst reducing costs, using Controlled Traffic Farming.

5.22 This part of Shropshire is a mainly arable farming area and whilst there are sheep and other livestock farms, they tend to be small and disparate. Even allowing for the possibility of sheep grazing it is likely that there will be times when graziers cannot be found – the landowners are not sheep farmers. **Appendix 8** to my proof sets out some concerns regarding the issues associated with sheep grazing under panels.

The reality is that grass often does not grow well under the panels and bare earth, or weeds can become a problem that need to be sprayed or cut.

Soil Damage During Construction

5.23 There is little or no stoniness in the top 25-30cm of soils across the whole site and in places the top soils are also clay loams, with similar subsoils. The soils at the appeal site when they are wet, are particularly vulnerable to compaction and soil damage, which can be difficult to remedy and can therefore last for the duration of the project and beyond, following construction activities at decommissioning - soil types with only moderate resilience to structural damage when being trafficked include such heavy soils where clay content is greater than 27% and rainfall is less than 700mm.

5.24 Photographs in **Appendix 9** to my proof show the kinds of soil structural damage that can occur during construction. Once the soils are damaged it is difficult to remedy using normal agricultural equipment, as the panels, once installed, prevent ease of cultivation, such that compaction and structural damage can remain until panels are removed or beyond. The compaction can cause long term drainage issues that affect soil quality.

5.25 A detailed soil management plan is essential for the construction, operation and decommissioning of the Solar Site.

6 Appeal Site Compared with Land around Shrewsbury Area

6.1 I have assessed the agricultural quality of other land around Shrewsbury using the following information:

- 1:250,000 MAFF Provisional Agricultural Classification of the Eastern Region, published in the 1970s,
- 1:250,000 Soil Map of West Midlands,
- 1:50,000 geological data, and
- Published agricultural land classification maps of various blocks of land around the area, obtained mainly from the database maintained by Natural England and from other planning applications.

6.2 Generally the area around Shrewsbury is considered to be of Grade Two and Grade 3 ‘undifferentiated’ land (**Appendix 10**). The Appeal Site broadly reflects this distinction. The published strategic maps showing likelihood of BMV indicate a high incidence of BMV in the locality and across the wider District (**Appendix 11**).

6.3 Whilst North Shropshire is widely reported to have a high incidence of BMV, there is a considerable amount of land as Grade 3 and 4 potentially available and this has not been adequately explored in the Alternative Sites Assessment.

6.4 The proposed development would take this agricultural land from productive use for at least 40 years, without sufficiently demonstrating a lack of available poorer quality land in the local area, or alternative locations such as brownfield sites.

6.5 As an example an analysis of the Appellant’s ST site DS8, which is one of the closest to the appeal site, and relatively close to the existing Boreton scheme. DS8 was ruled out, for the following reasons:

1. Cumulative impact
2. PROW proximity and visual impact
3. Proximity to Historic Assets

6.6 Reading the Alternative Site Assessment suggests that DS8 appears to have similar issues as the appeal site. In terms of BMV, whilst no ALC survey has been undertaken over DS8, the provisional map shows the general area as one of Grade 3 quality (**Appendix 10**) and the Likelihood of BMV is shown as moderate to high (**Appendix 11**).

6.7 The cumulative effect of loss of farmland is of real concern locally and nationally. In a recent statement Dr Dan Poulter, MP for Central Suffolk and North Ipswich stated:- *"I should note that while there are alternatives to consuming high-quality agricultural land for producing green energy, there are few alternatives to agricultural land for the production of food".*

6.8 The impacts of the proposed development on the agricultural land resource, as described by the appellant, are based on the assumption that the development is judged to be merely a temporary use, despite a projected, lengthy 40-year plus timespan. The construction and operational phases of the development are only considered in this context.

7. Food Security and Food Imports

7.1 The loss of any productive arable land to growing crops is a relevant issue in terms of the protection of Best and Most Versatile land, paragraph 124b of the NPPF recognises the importance of undeveloped land and the role it can play in food production. Nearly half of what we eat in the UK comes from abroad, and two-thirds of that has in recent years come from the EU. The NFU confirm that UK self-sufficiency is only at 58%. With the recent war in Ukraine, problems in the Middle East affecting the Suez Canal and the uncertainty of supply of core commodities such as wheat, there have been both supply issues and huge price fluctuations. This has refocussed attention on food security in the UK and the need to protect productive farmland from development and long-term decline.

7.2 “There are three cornerstones on which a prosperous farming sector must be built and which any government should use to underpin its farming policy. They are boosting productivity, protecting the environment, and managing volatility” (source Minette Batters, NFU president, Feb 2023). The country must “never take our food security for granted,” she said, **Appendix 12**.

7.3 The United Kingdom Food Security Report (CD 9.5) states:-

Food security is a complex and multi-faceted issue. It is structured around five principal ‘themes’, each addressing an important component of modern-day food security in the UK. They are as follows:

- *Global food availability, which describes supply and demand issues, trends and risk on a global scale, and how they may affect UK food supply;*
- *UK food supply, which looks at the UK’s main sources of food at home and overseas;*
- *Supply chain resilience, which outlines the physical, economic, and human infrastructure that underlies the food supply chain, and that chain’s vulnerabilities;*
- *Household-level food security, which deals with issues of affordability and access to food; and*
- *Food safety and consumer confidence, which details food crime and safety issues.*

7.4 The report notes that the biggest medium to long term risk to the UK’s domestic production comes from climate change and other environmental pressures like soil degradation, water quality and biodiversity. Wheat yields dropped by 40% in 2020 due to heavy rainfall and droughts at bad times in the growing season. This is an indicator of the effect that increasingly unreliable weather patterns may have on future production. When UK production is reduced, we are more dependent on imported commodities. The war in Ukraine has highlighted the vulnerabilities of such a strategy.

7.5 The UK has a productive agricultural sector and a domestic agri-food manufacturing industry that produces food to high standards. The amounts and types of food produced are driven by market forces and consumer demand for goods, rather than by assessment of overall quantity of food or of self-sufficiency. Many factors affect the output of domestic production, including:-

- The availability and suitability of land for particular forms of production.
- Inputs such as labour, water, fertiliser, pesticides, and seeds.
- Climate and environmental factors such as soil health and rainfall.

7.6 In 2020, 71% of UK land area was used for agricultural production, the majority of this being grassland for grazing rather than crops. Not all land is suitable for growing crops, and some is suitable only for specific crops, particularly those in the BMV categories.

7.7 The United Kingdom Food Security Report notes:-

Domestic production faces a number of long-term and short-term risks, including soil degradation, drought and flooding, diseases, risks to fuel and fertiliser supplies, and changing labour markets. In the long term, climate change impacts ***are likely to have a negative effect on the proportion of high-grade arable farmland available in the UK****.*

8. Farm Diversification

8.1 The land subject of this appeal is not currently entered into any of the environmental schemes described in the Agricultural Production Assessment Report (CD 1.2) and as such the 'loss' or expiry of the HLS scheme does not directly affect the appeal site. It is however potentially eligible for the Sustainable Farming Incentive (SFI) with payment rates that cover the loss of Single farm Payment (**Appendix 13)**. The loss of Single Farm Payment can be mitigated by joining the SFI and continuing farming of the land. The ADAS assessment report confirms:-

The Sustainable Farming Incentive (SFI) is the first of 3 new environmental schemes being introduced under the Agricultural Transition Plan. The other 2 schemes are Local Nature Recovery and Landscape Recovery. The SFI was launched in June 2022. SFI aims to help farmers manage land in a way that improves food production and is more environmentally sustainable.

8.2 Since the publication of the ADAS report payment rates for SFI have been published and it is possible to mitigate the loss of BPS during the transition period and beyond.

8.3 The Report goes on to indicate that the HLS grassland areas on the farm can be improved and more intensively managed:-

The HLS grassland will have previously been low yielding due to the restrictions in management practices, as these restrictions are now lifted increases in productivity can be made on these land parcels.

8.4 In reality, that land was entered into HLS because it was low yielding and well suited to environmental management and the SFI provides an opportunity to enter this low intensity land into a suitable scheme (LIG1) generating up to £151 per hectare.

8.5 If the solar scheme goes ahead the appeal site will not be eligible for the remaining BPS money or any SFI income going forward.

9. Summary and Conclusions

9.1 The presence of 88% BMV demonstrates that the proposal does not meet policy CS6 and DP26. These policies clearly state that BMV land should be avoided, unless certain criteria are met, for development. The NPPF requires policies and decisions to protect and enhance soils as well as recognise the economic and other benefits of the best and most versatile agricultural land, this application does not achieve this.

9.2 The ALC report identifies 88% of the site as BMV making the site inappropriate in accordance with CS6 and NPPF. Analysis of the ALC report suggests that the largest area of the site is in fact Grade 1 – excellent quality and with the benefit of irrigation more land is Grade 2 quality.

9.3 The use is described as temporary, but it is still very long term and will take productive land out of arable farming and potentially horticulture, if it proceeds.

9.4 This proof does not challenge the accuracy of the data in the ALC document, however, the appellant's ALC report does not highlight the Grade 1 land found on site nor does it take into account the availability of irrigation in the calculations and assessments of droughtiness. Consequently, much of the site is downgraded due to droughtiness, which could be remedied by irrigation.

9.5 The stated benefits of taking land out of arable farming by putting the land into grassland and solar panels can be achieved by the continuation of arable farming utilising minimal tillage techniques and other regular farming practices can achieve all of the carbon storage, biodiversity and soil improvements whilst maintaining the land in production.

9.6 There is no baseline measurement of soil carbon to demonstrate improvements in soil carbon over the life of the project. However, there is a risk to soil structure and drainage during the construction period that could cause long term damage to the soil quality.

9.7 There is little concrete evidence provided that taking excellent and very good quality land out of arable production for the erection of the solar panels will return the land to similar quality in 40 years' time or that it will somehow be improved. Some of the land will be permanently lost due to the construction of tracks, bases for infrastructure and the substation.

9.8 The land is currently eligible for the Sustainable Farming Incentive which would compensate for the loss of Basic Payment Scheme income going forward. If the land is entered into the solar proposal, it will lose both of these income streams.

10. List of Appendices

1. Soil Map of general area
2. Salwick soil description
3. Map of Grade 1 found on the site by ADAS
4. Map of Drought prone soils that can be upgraded due to irrigation
5. Combined Map of Upgraded land due to Grade 1 and Irrigation
6. Anglia Farmer Article
7. Alternative ways to sequester carbon
8. Sheep Grazing under panels
9. Soil damage during construction and management
10. Map of Agricultural Land Classification Grades in the general area
11. Map of Likelihood of Best and Most Versatile Land locally

11. List of Core Documents Referred To

Appellants Agricultural Land Classification

MAFF Revised guidelines and criteria for grading the quality of agricultural land

Technical Information Note 049 Natural England

IEMA A New Perspective on Land and Soil in Environmental Impact Assessment

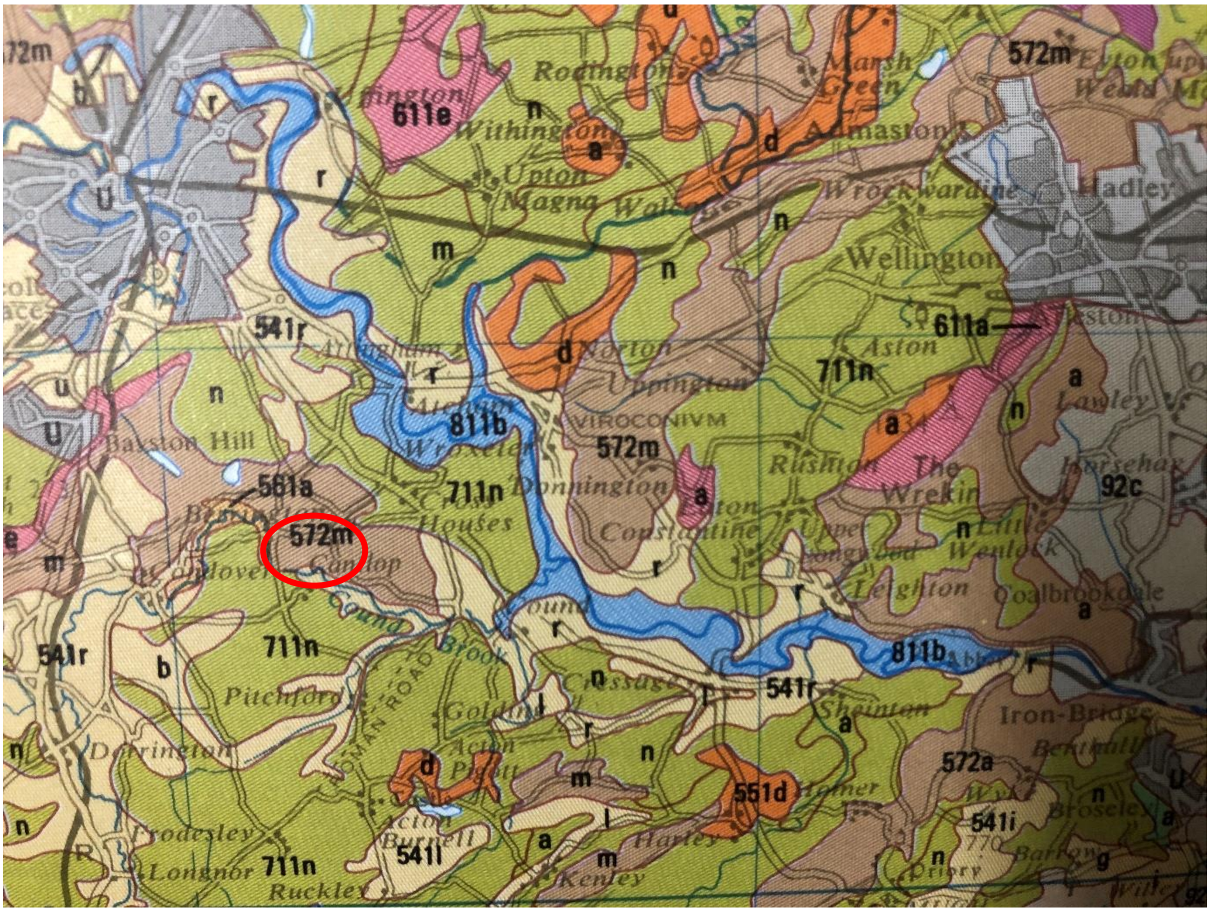
National Planning Policy Framework

Core Strategy and Shropshire Draft Local Plan

UK Food Security Report 2021

Balfours letter dated 9/10/2023

Outline Soil Resource Management Plan (V2)



Soil Map of The Area

Appendix 2

0572m SALWICK Detailed Description

This association, developed in reddish till and glaciofluvial drift, consists of fine loamy soils with slight seasonal waterlogging, and well drained coarse loamy soils. It occurs sporadically throughout the Midlands and Northern England, and locally in Wales. The land is mainly gently or moderately sloping, often forming broad ridges rising above low ground which carries surface-water gley soils. The dominant Salwick series, stagnogleyic argillic brown earths, has coarse loamy upper horizons overlying dense fine loamy reddish till. The subsidiary Wick soils, typical brown earths, are developed in coarse loamy glaciofluvial drift and are very porous. In places, similar but fine loamy glaciofluvial drift gives gleyic brown earths of the Hopsford series. Where coarse loamy horizons greater than 40 cm thick overlie the till Nupend soils are found; these were formerly mapped as a deep sandy loamy phase of the Salwick series by Hollis (1978). Soils belonging to the Arrow series, developed in coarse loamy drift, are also included. Clifton soils are found on low-lying, wet ground. The association covers about 327 km^2 in the Midlands, mainly in Shropshire, Staffordshire and Cheshire but also in Derbyshire, Leicestershire and Warwickshire. It ranges from sea level on the Wirral to 185 m O.D. in Derbyshire. In Staffordshire, it is widespread west and north-west of Wolverhampton from where it extends to Cressage and Wellington in Shropshire. The Wick series is the main subsidiary soil with Hopsford and Arrow soils common. Clifton soils occur in a few small depressions. Around Claverley, thick (greater than 40 cm) coarse loamy horizons overlie the till and give a larger proportion of Nupend soils than elsewhere. On the Wirral, east of Crewe, and around Macclesfield, the land is undulating and surrounded by low-lying areas of stagnogley soils (Clifton and Salop associations). Here Wick soils are the main associate with Newport and Arrow series. Hopsford soils are less common than further south and Nupend soils are rare. In parts of Derbyshire and around Lichfield the soils are more stony than elsewhere because the drift is partly derived from the underlying Triassic Pebble Beds. Nupend soils are common and reddish, coarse loamy Aldridge series, stagnogleyic brown podzolic soils, are included. Around Alcester the association is mapped on river terrace drift and Wick and Arrow soils are the main subsidiaries here. In Wales the association occupies undulating terrain with some kame and kettle topography on heterogeneous morainic drift. It commonly flanks the main valleys. Salwick series is the most extensive soil in reddish drift containing Devonian mudstone and sandstone. Wick soils which are brownish, coarser textured and more stony are developed in drift derived from Carboniferous rocks. The complex nature of the drift is such that other soils are widespread, notably reddish typical brown earths of the Newbiggin and Oglethorpe series.

The association occurs near Carlisle and on the east coast between Redcar and Whitby. In Cumbria, the Wick and Arrow series are the principal subsidiaries and there are occasional Newport and Ollerton soils, but Hopsford soils are rare. The soils vary markedly over short distances because coarser glaciofluvial deposits are interbedded with the till and sometimes replace it laterally. Where thin coarse deposits overlie till, Nupend soils are found. Clifton soils occur on flat sites and in depressions. On the east coast the deposits are predominantly fine loamy, Hopsford soils being more important than in the west. There are some Newbiggin soils but Wick and Arrow series rarely occur.

Soil Water Regime

Salwick and Hopsford soils suffer from seasonal waterlogging (Wetness Class III) although drainage can be improved to Wetness Class II and I respectively, particularly in districts where the field capacity period is less than 150 days. The well drained coarse loamy Wick soils are naturally well drained (Wetness Class I). Overall the soils readily absorb winter rainwater.

Cropping and Land Use

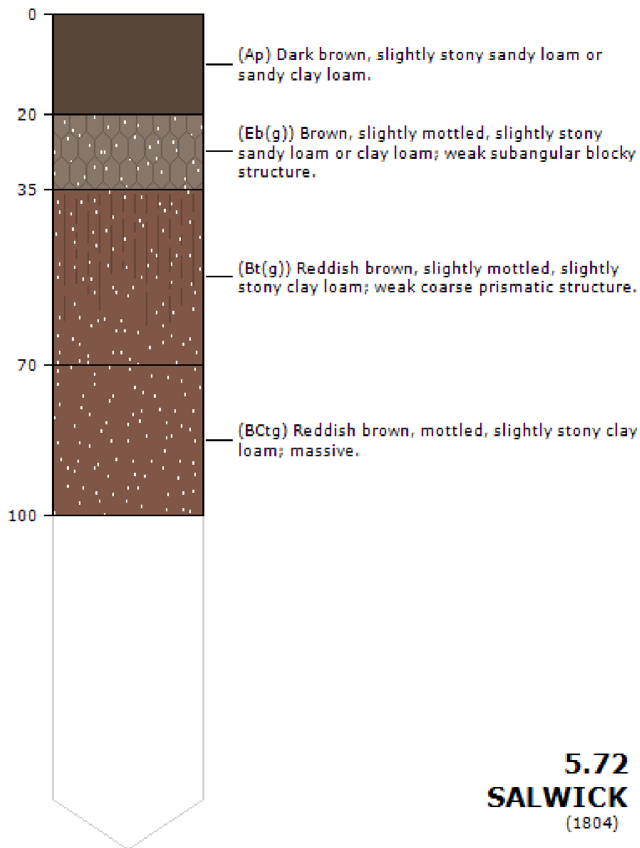
Much of the land is in arable farming with some short-term grassland, encouraged by the moderately easy management requirements and the gentle to moderate slopes. Cereals, potatoes and sugar beet are widely grown and in some places, for example between Wolverhampton and Bridgnorth, horticulture is important. Hardy nursery stock is grown around Stone in Staffordshire. Available reserves of soil water are moderate but there is a regular drought risk in the driest districts, for example around Bromsgrove and Cressage where all the component soils are moderately droughty for grass and potatoes but only slightly droughty for cereals. Potatoes are generally irrigated in most years whilst it is necessary for sugar beet in dry years only. Cultivations can be performed moderately easily and there is a long period for autumn landwork. There are sufficient good machinery work days in spring for most crops particularly on the Wick series. Although in the wetter areas opportunities are limited on Salwick series. Because of slowly permeable subsoils there is a period of delay after wetting before Salwick soils can be cultivated without risk of structural damage. Late harvesting of crops such as sugar beet and potatoes can also be difficult in wet years. Repeated arable cultivation can cause compaction particularly in fine loamy topsoils and regular subsoiling under suitable conditions is necessary to alleviate it. Grass is commonly used as a break in the arable rotation though permanent pasture is usually restricted to steep slopes. Poaching risk is negligible on well drained Wick soils, small on Hopsford and significant on Salwick soils. In Wales the association is used for mixed farming with grass and cereals but with the emphasis on dairying. There is also some horticulture, especially near Cardiff around Michaelstone.

Opportunities for cultivation are greatest in North Yorkshire, particularly on Salwick soils, so arable farming predominates there. Winter cereals and potatoes are the main crops, interspersed with ley grassland. Repeated cultivation can lead to compaction, particularly of fine loamy topsoils, and regular subsoiling under suitable conditions is necessary to alleviate it. On the limited area of grassland, poaching risk on Salwick soils is only moderate in North Yorkshire, compared with Cumbria.

5.72 SALWICK Definition

Major soil group:	05 brown soils	With dominantly brownish or reddish subsoils and no prominent mottling or greyish colours (gleying) above 40 cm depth. They are developed mainly on permeable materials at elevations below about 300 m.0.D. Most are in agricultural use.
Soil Group:	7 argillic brown earths	Loamy or clayey with an ordinary clay-enriched subsoil.
Soil Subgroup:	2 stagnogleyic argillic brown earths	(faintly mottled with slowly permeable subsoil)
Soil Series:		reddish medium loamy drift with siliceous stones

Brief Profile Description

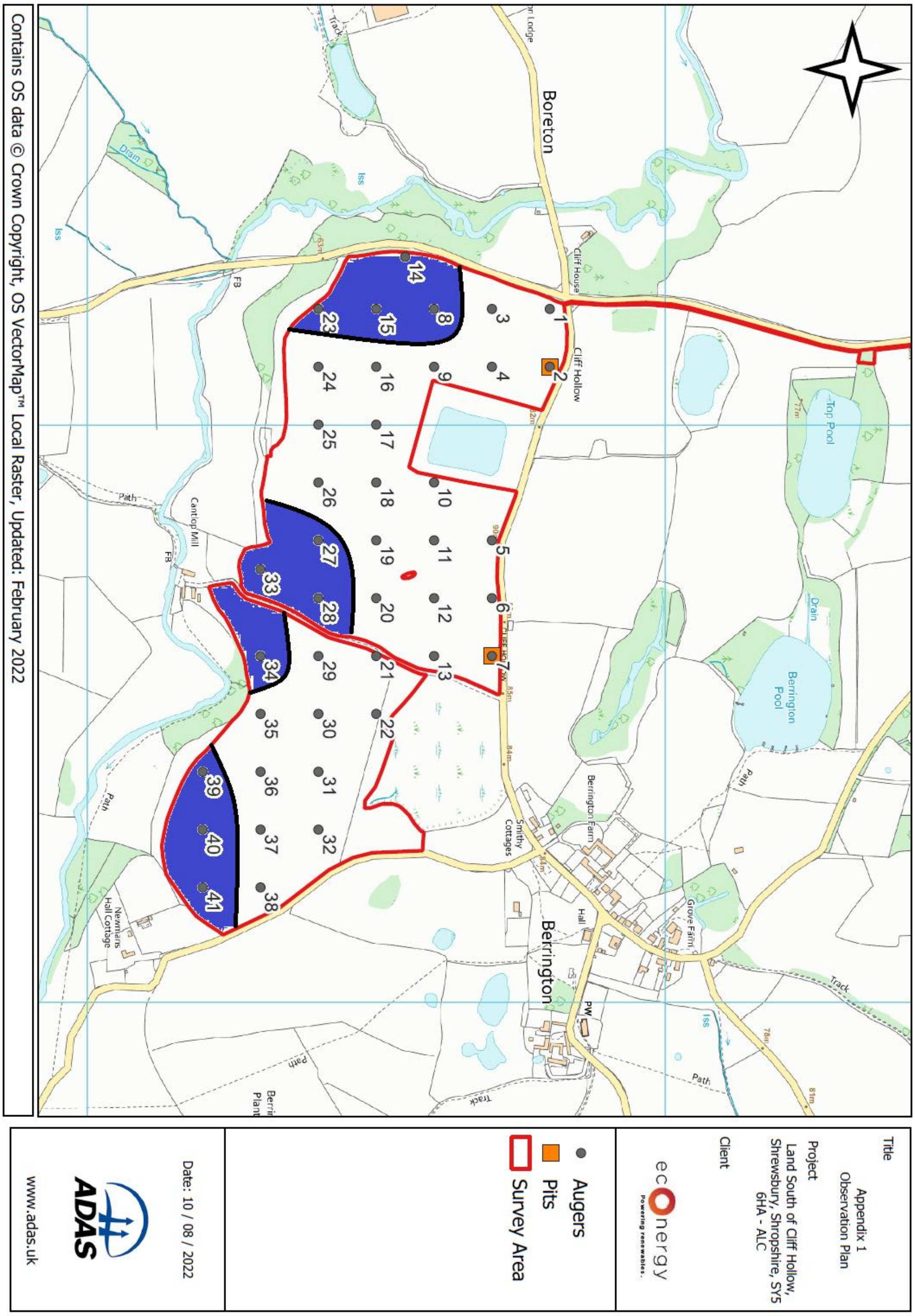


LandIS Land Information System Soil Series

Citation: To use information from this web resource in your work, please cite this as follows:

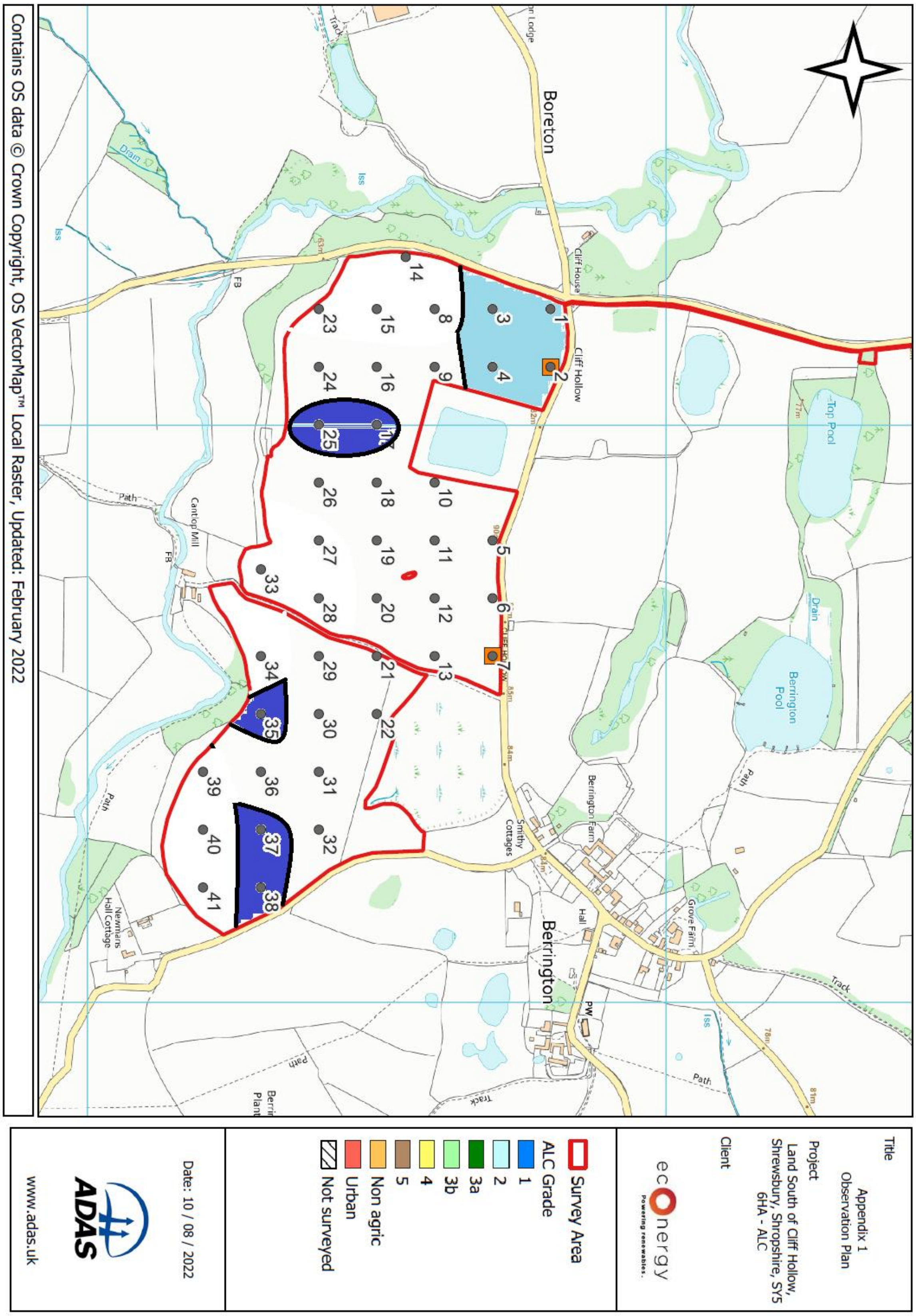
Cranfield University 2021. *The Soils Guide*. Available: www.landis.org.uk. Cranfield University, UK. Last accessed 02/07/2021

Appendix 3



Title
Appendix 1
Observation Plan
Project
Land South of Cliff Hollow, Shrewsbury, Shropshire, SY5 6HA - ALC
Client
econergy
Powering renewables.
Augers
Pits
Survey Area
Date: 10 / 08 / 2022
ADAS
www.adas.uk
Contains OS data © Crown Copyright, OS VectorMap™ Local Raster, Updated: February 2022
Boreton
Berrington
Cliff Hollow
Top Pool
Berrington Pool
Cantop Mill

Appendix 4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Project
Land South of Cliff Hollow,
Shrewsbury, Shropshire, SY5
6HA - ALC
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econergy
Powering renewables.
Survey Area
ALC Grade
1
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3b
4
5
Non agric
Urban
Not surveyed
Date: 10 / 08 / 2022
ADAS
www.adas.uk
Contains OS data © Crown Copyright, OS VectorMap™ Local Raster, Updated: February 2022
Boreton
Cliff House
Cliff Hollow
Top Pool
Berrington Pool
Berrington Farm
Smithy Cottages
Grove Farm
Berrington
Cantlop Mill
Newnham Hall Cottage
Path
Track
Drain
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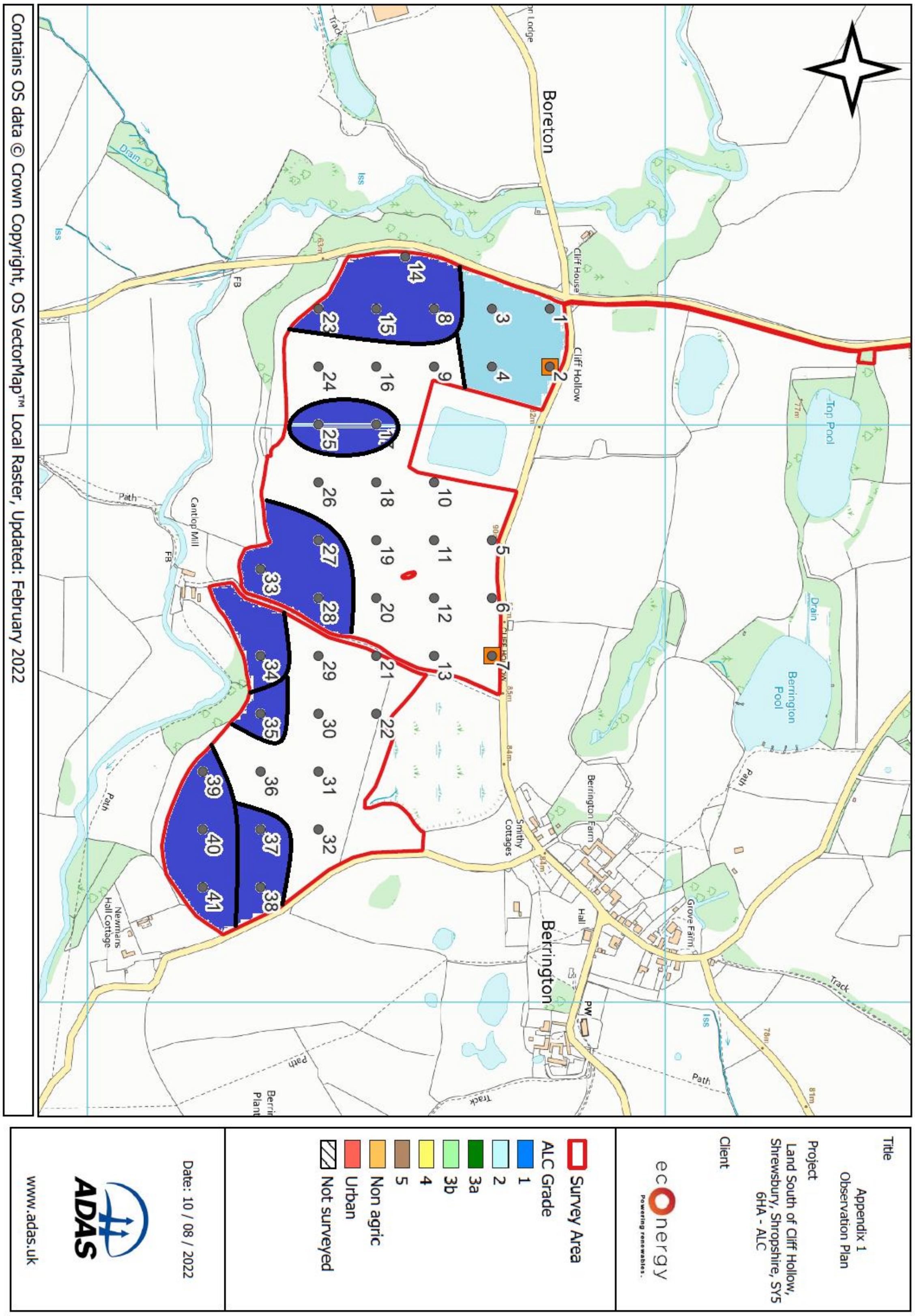
Appendix 5



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Contains OS data © Crown Copyright, OS VectorMap™ Local Raster, Updated: February 2022
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Cliff House
Cliff Hollow
Top Pool
Berrington Pool
Berrington
Berrington Farm
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Smithy Cottages
Cantlop Mill
Hall

Appendix 6

Alternative Ways to Sequester Carbon Dioxide

A recent scientific study has demonstrated that the use of ground rock, spread on farmland can capture far more carbon dioxide through 'farming' than renewable energy. (https://www.thetimes.co.uk/article/microsoft-funds-uk-climate-experiment-to-spread-crushed-rock-on-fields-6sjq5cwzz)

Microsoft is backing a pioneering effort to remove CO_2 from the atmosphere by scattering thousands of tonnes of crushed rock onto British fields. The technique, is designed to tackle global warming, with advocates suggesting it could play a large role in stabilising the climate.

In a pilot project, Microsoft will pay a Scottish company called Undo to spread 25,000 tonnes of finely crushed basalt rock, a quarrying by-product, on agricultural land in Scotland and the north of England.

The rock dust approach, called enhanced rock weathering (ERW) follows a research programme of the Leverhulme Centre for Climate Change Mitigation which confirms that spreading rock dust on farmland could suck billions of tonnes of carbon dioxide from the air every year, according to the first detailed global analysis of the technique.

The chemical reactions that degrade the rock particles lock the greenhouse gas into carbonates within months, and some scientists say this approach may be the best near-term way of removing $CO_2$from the atmosphere.

Basalt is the best rock for capturing CO_2, and many mines already produce dust as a by-product, so stockpiles already exist. ERW also reduces soil acidity; Basalt is preferred for ERW as it contains the calcium and magnesium needed to capture CO_2, as well as silica and nutrients such as potassium and iron, which are often deficient in intensively farmed soils.

Causes of soil compaction and how to beat it with Controlled Traffic Farming (CTF)

Farmers Weekly 23 October 2015

Soil degradation is a huge cost for farming, which was estimated at up to £1.4bn a year in a recent parliamentary report *Securing UK Soil Health*. Of this, flooding resulting from increased compaction is estimated to cost £233m a year.

The two main problems are compaction and the loss of organic matter, which is vital for soil structure and gives it much of its fertility. Both of these account for 80% of the £1.4bn cost.

Soil facts

- There are more microorganisms in a handful of soil than there are people on earth
- It takes 500 years to produce an inch of topsoil
- It greatly reduces flood risk by storing up to 3,750t water/ha
- About 10% of the world's carbon dioxide emissions are stored in soil
- Soil consists of 45% minerals, 25% water, 25% air and 5% organic matter

Causes of compaction

Shane Ward, director of soil and water management centre at Harper Adams University College points to increased machinery size as a factor in soil compaction.

"Over the past 20 years, one key element that has led to declining soil health is the growing mechanisation of farming and bigger tractors.

"It has been a gradual process, with machinery becoming more sophisticated and larger – with bigger, wider tyres to take the extra weight. This has taken its toll, having a direct physical effect on soil."

In addition, tractor drivers sealed in modern cabs are removed from action on the ground and are, therefore, less aware of the impact of machinery on the soil, he says.

Compaction reduces the water-holding capacity of soil by decreasing the air spaces between particles and consequently, you get more run-off and standing water.

"Run-off is not good. It can lead to soil erosion and contaminate water courses," says Prof Ward.

In addition, a healthy soil will hold on to nutrients better, reducing losses to the environment and promoting good crop growth. "Poor soil health is a restriction on crop yields and can lead to more disease, especially those in waterlogged conditions."

Assessing soils

The first place to start is by digging a soil pit, says Prof Ward. Examine the structure for any signs of damage that may need some repair work, such as deep cultivations to break up a plough pan.

Getting a spade out is especially valuable for determining if there is a hidden problem deeper in the soil profile.

"A rule of thumb is that compaction occurs at half the tyre width below the soil surface. So with more massive machines and bigger, wider tyres, this can be well below the plough layer.

Tim Chamen of CTF Europe explains that compaction at depth is governed by axle loading. "You can reduce tyre pressure or use tracks, but if the wheel load is high enough, you still get compaction at depth."

This damage occurs even with low ground-pressure systems, but it can't be seen because it is happening deep in the profile.

Prof Ward says this could catch out some farmers who are rotationally ploughing and believing this is breaking compaction.

Dr Chamen believes this hidden compaction could be the reason for the plateauing of wheat yields in recent years. He points to one trial looking at the impact of compaction under controlled conditions, where even after eight years, there was still a 1-2% yield penalty in wheat.

For this deep damage, Prof Ward says farmers need to consider using a ripper (subsoiler) to break up the pan, but again it has to be given a chance to recover and be managed over time.

How you manage fields after subsoiling is just as critical," says Dr Chamen, as soil is more vulnerable.

"You don't want to go in with machinery and end up back at square one."

Cracking compaction

That's why Dr Chamen believes prevention is key, as well as managing soils so they become more resilient. "It requires a range of measures, such as ensuring soils have a good level of organic matter."

Adding compost, manure and chopping straw will raise organic matter levels, as will cover crops. Minimising the period there is no crop growing by maintaining cover is good for soil structure.

Also check drainage. "If there is poor drainage, even with the best will in the world, none of the preventative measures will be successful," says Dr Chamen.

But the key thing farmer need to do is to avoid compaction in the first place by minimising trafficking.

"Trafficking damages the soil. It squashes out the air, squeezing it together, sealing up the surface and making it cloddy (see illustration)," he explains.

Switching cultivation system can help. He points to data showing that in a typical no-till system, about 45% of the field is trafficked. With a min-till system, this rises to 60-65% and with a traditional plough system, it's 85% of the area.

Controlled traffic farming

However, to get below 40% of the area being trafficked, farmers will need to adopt controlled traffic farming (CTF).

This is a system that confines compaction to the least possible area by the use of permanent traffic lanes. A satellite guidance system is a valuable component in making it work, says Dr Chamen.

There are three different tiers, depending on how much the machinery matches up in width, resulting in the area tracked:

- Tier 1 – 30-40% area tracked
- Tier 2 – 20-30% area tracked
- Tier 3 – 10-20% area tracked

Many farmers will point to the high investment cost of replacing machinery, but he says it can be done at low cost when put in place incrementally, as machinery is naturally replaced.

He encourages farmers to try tier 1 with their existing machinery, as some will match up and then they can see the benefits for themselves. “Seeing the benefits to soil will then encourage them to move to tier 2.”

For some crops, a full system is not possible. For example, sugar beet harvesting is not on a compatible width, but if you use CTF in the rest of the rotation, you will see improvement and after five to six years, soils will be more resistant to damage come the next sugar beet harvest.

From his experience, reducing compaction with CTF will lead to about 15% more yield (average across 15 different crops) in non-trafficked areas and when it covers 80% of the field (tier 3), this is a substantial gain.

As soils recover their natural structure, there is a 15% better nitrogen recovery, with up to four times better rainfall infiltration and a 10% increase in top soil porosity.

It’s not just soil health, Dr Chamen points to cost savings as soil becomes healthier – needing fewer passes – and can go shallower, with a 35% decrease in fuel use for crop establishment.

Healthier soils reduce the time it takes to produce a good seed-bed. “If it takes longer to produce a good seed-bed with poorer soil, the delay means you are likely to end up drilling in poorer conditions and increasing the risk of damaging soil.”

Case study

Jeremy Durrant, EW Davies Farms, Thaxted, Essex

One farmer seeing the benefits of controlled farming is Jeremy Durrant, who manages 1,300ha of cropping including wheat, oilseed rape, beans plus winter and spring barley.

“Six years ago, we were running an all plough-based system on Hanslope clay and we were expanding the area we farmed. But it was becoming clear that it was taking more time and effort to produce a good seed-bed and doing this over a larger area was not viable.”

“So we moved to a min-till system, however, we were getting cloddy seed-beds.

He explains that producing good seed-beds required more intensive cultivations and he was having to do quite a lot of subsoiling.

“This was not only time-consuming, but also expensive. We looked at reducing costs and decided to go with controlled traffic farming.”

Now fully on CTF with 12m wheelings and 36m tramlines, he estimates that the move has cut fuel use by 30-40% and requires less labour. The business has also gone from six tractors to two, supplemented with hired-in tractors at harvest.

Soil structure has improved year on year. “When we take on new land, it takes two full seasons before we see any noticeable difference and it continues to get better over time.

The improved soil structure resulting from less trafficking means Mr Durrant has gone from two/three passes with a cultivator typically covering 30-40ha in a day when establishing wheat, to a single pass with a lighter, wider cultivator covering 120ha a day.

“This gives you more flexibility on timing and it gives us confidence to delay drilling for grassweed control and still get good establishment.”

The improved soil health has allowed Mr Durant to cut cultivations further, direct drilling oilseed rape and spring crops. “This year all our oilseed rape (200ha) was drilled in a single 24-hour period.”

Direct drilling can boost profits and soil health

Better for light and heavy soils

A switch to direct drilling could help arable farmers improve soil health and business performance, suggests a study.

Average net profits rose by 15% under a direct drill system rather than full cultivation, according to the five-year study described as the UK's most comprehensive trial of crop establishment systems through a whole farm rotation.

Researchers also found that more ecological and environmental benefits were delivered by the direct drill system rather than the plough and drill.

Led by the Game & Wildlife Conservation Trust (GWCT) and Syngenta, the study was supported by NIAB monitoring and data analysis..

Arable rotation

It examined a full arable rotation on contrasting commercial farms at Loddington in Leicestershire and Lenham in Kent. Farms involved represented a spectrum of heavy to light land.

Belinda Bailey, of Syngenta UK, said the study provided rigorous scientific insight into the implications of adopting direct drill establishment. Researchers set out with no pre-conceived illusions as to which system would prove most effective, or a panacea for all situations, she added.

Seasonal challenges

"It has highlighted some of the potential pitfalls and the seasonal challenges across the different soil types and volatile market conditions. Overall, it has shown a no-till system can offer a more sustainable option for arable businesses in most situations."

Results found that yields of cereals, beans and oilseed rape yields were the same as with full cultivation establishment on the light land,. But yields were 7% lower on heavier soils in Leicestershire.

That said, the overall gross margin was better with the direct drill due to a 45% reduction in fuel use on both sites, combined with an 11% reduction in operating costs on heavy land and 7% lower on light land.

This gave a 14% and 16% improvement in net profit on the heavy soil and light land respectively over the five years. There was also a 50% improvement in work rate across both sites with direct drill establishment.

"That could give greater flexibility and resilience to increasing challenges of timely establishment in difficult weather conditions."

Work rates

"Improved work rate could also give some growers the opportunity to increase farmed area and spread costs further, or with the current high capital cost of machinery to explore opportunities to downsize their equipment and reduce soil impacts," explained Ms Bailey.

A reduction in fuel use and operational costs by adopting a direct drill system was a key driver in achieving a 9% reduction in carbon footprint.

This was through reduced cultivations on the light land soils, along with a 4% reduction on heavy land. >>

Belinda Bailey demonstrates green cover for soil enhancement

Below: A Dale drill used in conservation agriculture establishment trials

" No-till can offer a more sustainable option

>> Soil scientists also assessed an 8% reduction in soil greenhouse gas emissions on the heavy land and a 5% reduction on light land, compared to crops established with full cultivations.

The study showed no increase in soil emissions of nitrous oxide (NO2) under direct drilling. This had been a concern because compacted soil conditions can give rise to elevated levels of what is a serious greenhouse gas.

Soil structure remained excellent throughout the direct drill establishment rotation, the study found.

There was a 10% improvement on the light land, compared to repeated cultivations and no significant impact on the heavy land over the course of the five years.

Grass weed control

"Elevated organic matter levels seen with direct drill establishment over a longer term trial at Loddington, or where rotational ploughing may be utilised for grass weed control within a direct drill system, could alleviate any potential for compaction on heavy land," said Ms Bailey.

The trial also identified 112% more earthworms on light land and 13% in the heavy soils under the direct drill system, she addded.

Soil nutrient sampling showed no significant differences between the establishment systems for nitrogen, phosphate and potash or magnesium levels on either site over the five years. But they did highlight some seasonal variability, particularly in nitrogen and potash.

Biodiversity

Bird sightings – a further indicator of farm biodiversity – were significantly higher across the direct drilled areas throughout the rotation.

Bird recordings were notably elevated for skylarks, meadow pipit and thrush species in the period of the study, primarily due to increased ground cover and available surface food sources. "Direct drill establishment offers significant advantages," said Ms Bailey.

"The results positively demonstrate that as more growers make a transition towards direct drill or light till establishment systems there are clear advantages for the economic and ecological sustainability of the farm finances and biodiversity."

Study 'underlines benefits' of regenerative agriculture

Direct drilling aligns well with the government's new Sustainable Farming Incentive (SFI), which rewards farmers who look after the environment while producing food. Joe Stanley *(right)* is head of partnerships at the Game and Wildlife Conservation Trust, which hosted one of the trials at its Loddington farm in Leicestershire. There were advantages in the direct drill system in terms of integrated farm management practices, he said.

"We have been delighted to work alongside Syngenta on this long-term research project. These findings underscore the immense potential of Conservation Agriculture, and consequently Regenerative Agriculture.

"By making adaptations to establishment techniques, while keeping other inputs constant, we can achieve substantial cost savings in both time and money. Simultaneously, it can enhance profitability, contribute to environmental stewardship, and mitigate climate change.

"We are pleased to be continuing this work with Syngenta as we progress to a second, more 'regenerative' phase over the coming years, as we look to build on the solid data and foundations already built."

The Syngenta Conservation Agriculture & Sustainable Farming Systems project is a long-term pan-European research initiative.

Appendix 8

Sheep Grazing Under Panels

Whilst it is perfectly possible to graze the areas under and between the panels, it is unlikely to be very cost effective for a grazier. The difficulties of rounding up sheep and handling them, together with finding sick or wounded animals amongst the panels, makes the graziers workload harder and more complex.

As such the economics of moving sheep to and from the site will be marginal. However, most examples of sheep farming quoted do not charge much or anything for the grazing and this may make it sufficiently attractive for a local farmer or shepherd with a 'flying flock'.

Land in use for solar panels is generally ineligible for the normal agricultural subsidies, such as the Basic Payment Scheme (now being phased out) and the Environmental Land Management Scheme (ELMS). It does not prevent land from being managed in similar ways but there will be no payments available to farmers (eg graziers) for compliance and this could make farming less financially attractive going forward.

The site will probably have to be (re)seeded to grass, or species rich grassland, but this will probably occur after the panels have been sited on the land. In my experience grass does not grow well under the panels themselves. There are often areas that are dry and barren or that only host weeds species, due to heavy shading.


The reality often is that 'nothing' grows under the panels, or that only weeds grow and must be sprayed.

Appendix 9

Damage During Construction and Operation

Soils

The soils locally are mainly clay loams. Typically, these soils are slowly permeable, similar fine clay topsoils over clayey subsoils.

These soils can be badly affected by compaction, especially during the construction phase of the project. Experience from other solar sites built during poor conditions demonstrates the extent of damage that can be done. Contractors are often under severe time pressure to complete construction and will sacrifice soils in order to complete their works.

Compacted layers within the soil will affect drainage and it may cause areas of surface ponding across a field. Soil aggregate stability can be reduced by the construction, resulting in a degradation of soil physical quality. **Photo sheet 2 in Appendix 9** shows a timelapse series of photos of a solar farm during construction on similar soils. These deep soil compaction issues are difficult to remedy once the solar panels are installed.

As work progresses, so the soil conditions deteriorate. In more extreme circumstances due to the need to complete works within a deadline, serious soil damage can occur. Far from improving the status of land by taking it out of production, this soil damage can permanently harm the soils' productive capacity into the longer term, leading to a change in the soil-water regime.

Compaction caused during construction damages the soil structure and means that soil remains wet due to poor drainage. This in turn affects the fertility of the land, the type of grass and other plants that can grow and makes long term predictions about improved fertility due to taking land out of arable production, much less likely.

Damage During Management

The fine clay nature of these soils are slowly or moderately permeable in the topsoil, slowly permeable at depth in the growing season. Salwick soils respond to drainage measures and where annual rainfall is less than 600 mm can be improved to Wetness Class II. However here the rainfall is over 600mm per annum and even with under drainage the soils remain vulnerable.

As water washes off solar panels, it collects on the grassy areas between the panels, along with the incident rainfall falling. As such, the un-panelled areas receive most of the rainwater, whilst the areas under the panels remain much drier.

When machinery is used to cut the grass or clean the panels, damage to the soil can occur through excessive trafficking when wet. Again, contractual obligations and time pressure encourages operatives to work in less-than-ideal conditions and this can cause soil damage that persists.

Use of Machinery in Inappropriate Conditions on similar soils

Traditionally these soils would have been ploughed regularly and by using deeper cultivations such as subsoiling and mole draining, would help to improve drainage. However, once the solar farm is constructed it is not possible to remedy any damage under or close to the panels. Between the panels, deeper cultivations are limited due to the risk of damage to buried cables and the narrowness of layouts.

As such once layers of soil are compacted the compaction can persist for much of the life of the project and even beyond with only limited opportunity to remedy problems. Far from resting the land and improving its status, soil quality will suffer in such circumstances.

Conditions during construction **Photo Sheet 2**

1

2

3

4

5

6

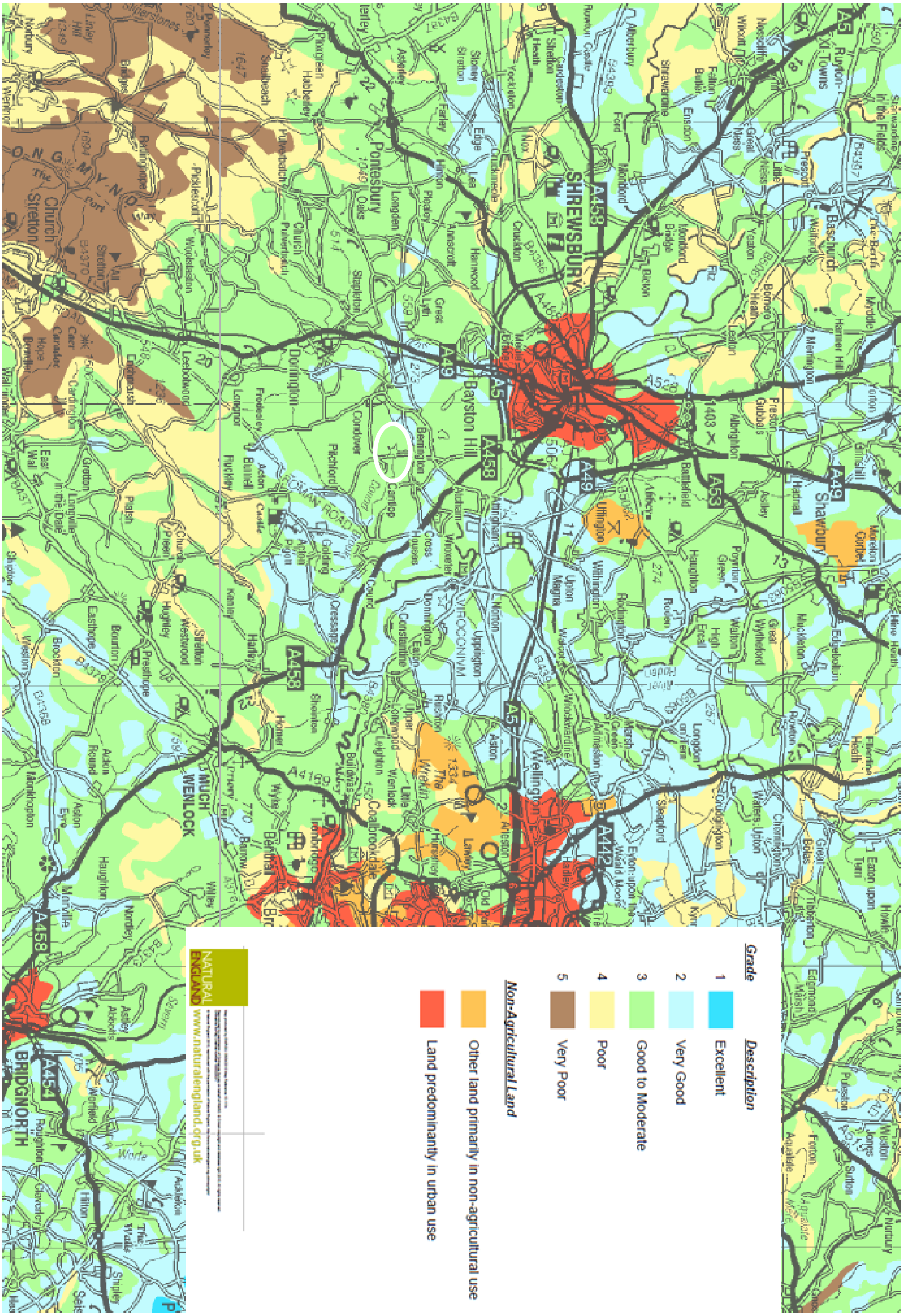
Conditions as construction proceeds

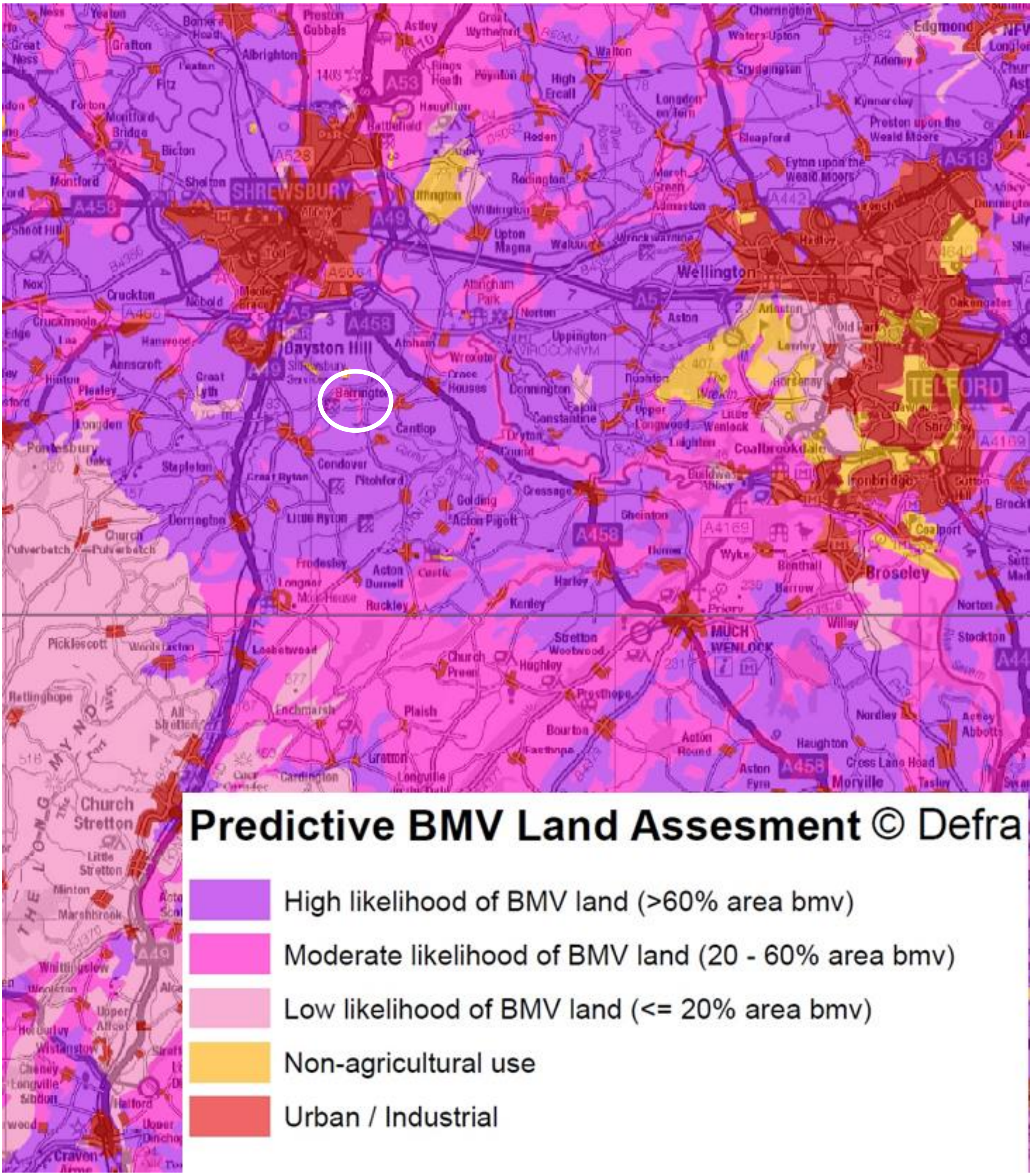
Commencement

Mid construction

Near completion

Examples of Localised Drainage Issues/ No Grass Under Panels


Grade
Description
1
Excellent
2
Very Good
3
Good to Moderate
4
Poor
5
Very Poor
Non-Agricultural Land
Other land primarily in non-agricultural use
Land predominantly in urban use
NATURAL ENGLAND
www.naturalengland.org.uk
SHREWSBURY
MUCH WENLOCK
BRIDGNORTH


Predictive BMV Land Assesment © Defra
High likelihood of BMV land (>60% area bmv)
Moderate likelihood of BMV land (20 - 60% area bmv)
Low likelihood of BMV land (<= 20% area bmv)
Non-agricultural use
Urban / Industrial

Appendix 12

NFU warns the clock is ticking for government to back British farming to feed a changing world

First published 21 February 2023

In the face of global turmoil, climate change, and rapidly rising world populations, the NFU is today warning that the clock is ticking for government to match warm words with actions to ensure British farmers and growers can continue to play their part in feeding and fuelling a changing and challenging world.

In the face of global turmoil, climate change, and rapidly rising world populations, the NFU is today warning that the clock is ticking for government to match warm words with actions to ensure British farmers and growers can continue to play their part in feeding and fuelling a changing and challenging world.

Delivering the opening address at NFU Conference, NFU President Minette Batters will lay out the three cornerstones needed to ensure a prosperous food and farming sector; one that delivers a secure, safe and affordable supply of British food, for both home markets and overseas, and recognises that farmers are the nation’s working conservationists in protecting and enhancing the environment.

“There are three key lessons we can take from this extraordinary year,” she will say. “As the global population continues to rise, and parts of the planet become less suited to producing the food we eat, we have an opportunity, and a duty, to get the best out of our maritime climate. Secondly, in the face of climate change, we should be unwavering in our commitment to achieving net zero and contributing to our energy security through on-farm renewables generation. And thirdly, we should never take our food security for granted.

“But the fact remains, volatility, uncertainty and instability are the greatest risks to farm businesses in England and Wales today. Critically, those consequences will be felt far beyond farming, they will be felt across the natural environment, and in struggling households across the country.

“Labour shortages and soaring energy prices are hitting the poultry industry, already reeling from avian influenza, as well as horticultural businesses and pig farms. Meanwhile, other sectors are facing an uncertain future as direct payments are phased out against a backdrop of huge cost inflation, with agricultural inputs having risen almost 50% since 2019. And the impact of this? UK egg production has fallen to its lowest level in nine years. In 2022, UK egg packers packed almost a billion fewer eggs than they did in 2019.

“This was also the year that the potential impact of climate change really hit home. The extraordinary temperatures we experienced in July topped the previous record by almost a degree and a half. While many parts of the country have experienced huge amounts of rainfall recently, impacting farming operations over autumn and winter, some counties still remain in official drought status.

“Despite all this, NFU members and the farmers and growers of Britain continued to bring in the harvest, to produce the nation’s food and to keep the country fed through tough times. We have seen progress; with the publication of the prospectus for the new Environmental Land Management Schemes; with increases to the Seasonal Agricultural Workers schemes; and in securing the establishment of the Trade and Agriculture Commission, leading to the Food and Drink Export Council and the placement of eight new agriculture attachés to sell British food overseas.

“More often than not – it has been incredibly hard getting government to back up its rhetoric with concrete actions. The time is nearly up for government to demonstrate its commitment to food and farming in our great country, not just by saying they support us, but by showing us they do. I won’t let the opposition off the hook either, I believe the rural vote will be crucial in the next election.

“There are three cornerstones on which a prosperous farming sector must be built and which any government should use to underpin its farming policy. They are boosting productivity, protecting the environment and managing volatility.

“But the clock is ticking. It’s ticking for those farmers and growers facing costs of production higher than the returns they get for their produce. It’s ticking for the country, as inflation remains stubbornly high, and the affordability and availability of food come under strain. It’s ticking for our planet, as climate change necessitates urgent, concerted action to reduce emissions and protect our environment. And it’s ticking for government – to start putting meaningful, tangible and effective meat on the bones of the commitments it has made. Commitments to promote domestic food production, to properly incentivise sustainable and climate friendly farming, to put farmers and growers at the heart of our trade policy, and to guarantee our food security. It really is time to back British farmers and back British food.”

Appendix 13

SFI 2023 and SFI Pilot payment rates

SFI Pilot payment rates

Code Action	Previous rate		New rate
SFI Pilot - Arable & Horticultural Land	Introductory	£32	£37
SFI Pilot - Arable & Horticultural Land	Intermediate	£60	£70
SFI Pilot - Arable & Horticultural Land	Advanced	£85	£99
SFI Pilot - Arable & Horticultural Soils	Introductory	£26	£29
SFI Pilot - Arable & Horticultural Soils	Intermediate	£41	£45
SFI Pilot - Arable & Horticultural Soils	Advanced	£60	£60
SFI Pilot - Hedgerows	Introductory	£20	£26
SFI Pilot - Hedgerows	Intermediate	£27	£34
SFI Pilot - Hedgerows	Advanced	£30	£37
SFI Pilot - Improved Grassland	Introductory	£29	£32
SFI Pilot - Improved Grassland	Intermediate	£70	£73
SFI Pilot - Improved Grassland	Advanced	£97	£103
SFI Pilot - Improved Grassland Soils	Introductory	£31	£34
SFI Pilot - Improved Grassland Soils	Intermediate	£53	£55
SFI Pilot - Improved Grassland Soils	Advanced	£84	£84
SFI Pilot - Low and no Input Grassland	Introductory	£22	£22
SFI Pilot - Low and no Input Grassland	Intermediate	£138	£197
SFI Pilot - Low and no Input Grassland	Advanced	£143	£215
SFI Pilot - Water Body Buffering	Introductory	£21	£25
SFI Pilot - Water Body Buffering	Intermediate	£37	£45
SFI Pilot - Water Body Buffering	Advanced	£43	£51
SFI Pilot - Farm Woodland	-	£49	£49
SFI Pilot - Create Buffer around 50% of your in-field trees	-	£12	£13
SFI Pilot - Create buffer around 75% of your in-field trees	-	£12	£13
Create buffers around in-field trees (Grassland)	-	£4	£4
SFI Pilot - Provide habitat for wading birds	-	£127	£127
SFI Pilot - Establish in-field grass strips or blocks on cultivated land	-	£0.06	£0.09

SFI 2023 payment rates

Code	Action	Previous rate	New rate
MOR1	-	£10.30 per ha and £265 per agreement per year	£10.60 per ha and £272 per agreement per year
SAM 1	Soil testing, assessment and Plan	£5.80 per ha and £95 per agreement per year	£6 per ha and £97 per agreement per year
SAM 2	Multi-species winter cover crops	£129	£129
SAM 3	Herbal leys	£382	£382
HRW1	Assess and record hedgerow condition	£3	£5
HRW2	Management of hedgerows	£10	£13
HRW3	Maintain existing hedgerow trees, or establish new ones	£10	£10
IPM1	Complete an integrated pest management (IPM) assessment and produce an IPM plan	£989	£1,129
IPM2	Establish and maintain flower-rich grass margins, blocks, or in-field strips	£673	£798
IPM3	IPM3 - Establish a companion crop	£55	£55
IPM4	IPM4 - No use of insecticide	£45	£45
NUM1	NUM1 - Complete a nutrient management (NM) assessment and produce an NM review report	£589	£652
NUM2	NUM2 - Establish and maintain legumes	£102	£102
NUM3	NUM3 - Legume fallow	£593	£593
AHL1	Pollen and nectar flower mix	£614	£739
AHL2	Winter bird food arable	£732	£853
AHL3	AHL3 - Establish and maintain grassy field corners and blocks	£590	£590
IGL1	Grassland field corners	£333	£333
IGL2	Winter bird food grassland	£474	£515
AHL4	4m-12m buffer on arable	£451	£515
IGL3	4m-12m buffer on grassland	£235	£235
LIG1	(LIG1) Manage grassland with very low nutrient inputs (outside SDAs)	£151	£151
LIG2	(LIG2) Manage grassland with very low nutrient inputs (SDAs)	£151	£151