Econergy

Berrington Solar Park Agricultural Production Assessment

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ADAS GENERAL NOTES

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1 INTRODUCTION

This report has been prepared from the information supplied on 30/11/2022 at a meeting held at Berrington Farm between Tony Turner, ADAS with landowner, Sir Charles Holcroft, Philp Pateman Econergy and Frances Steer of Balfours. The aim is to provide an assessment of the impact of installing a solar park on the agricultural productivity of the farm.

Agricultural land use in England*

- The utilised agricultural area (UAA) is 8.9 million hectares in 2022 and accounts for 69% of the total area of England.
- The total area available for cropping accounts for just over half (55%) of UAA and has remained broadly stable at just under 4.9 million hectares in 2022.
- Permanent grassland accounts for an additional 41% of UAA and has increased by 2.4% to just over 3.6 million hectares in 2022.

Utilised agricultural area

The utilised agricultural area includes all arable and horticultural crops, uncropped arable land, land used for outdoor pigs, temporary and permanent grassland, and common rough grazing. The total utilised agricultural area in England is 8.9 million hectares in 2022 and accounts for 69% of the total England area. The utilised agricultural area in England has remained stable around 9 million hectares since 2001.

* https://www.gov.uk/government/statistics/agricultural-land-use-in-england

Berrington Farm

The farm extends to 152.6 ha, with the land predominantly used for arable cropping and dairy grazing. The arable land is farmed using regenerative farming techniques to minimise soil disturbance and loss of nutrients.

Historically most of the land was farmed under an arable rotation, however in March 2012, 58.0 ha were entered into an “Entry Level (ELS) and Higher-Level (HLS) Stewardship Agreement”. The primary focus of this agreement was to protect and enhance the Berrington Pool Site of Special Scientific Interest, with 8.88 ha of fens created and restored (Note this type of habitat comes under the designations HQ7/HQ8 for HLS). As part of this agreement 36.31 ha of species-rich, semi-natural grassland was restored (HK7). These areas of HLS grassland are let to a local dairy farmer on a grazing license. This land together with the other land farmed is shown in Figure 2 further in this report.

During the stewardship agreement the Entry Level stewardship payments totalled £4,578 annually while the High-Level stewardship payments totalled £11,846. Additionally, in 2021, £12,688 of basic payment was received.

The stewardship payments are paid to the farmer to make up for loss of production due to the restrictions put on the land within the agreement.

Most of the fields in the HLS scheme within option HK7 were subject to the following management conditions:

- *Manage the grassland to achieve the indicators by grazing with cattle for at least 6 weeks between May and September/cutting and removing field-dried hay after 1 July. In years when hay is taken, graze the aftermath. Where spring grazing takes place exclude livestock at least 7 weeks before cutting for hay.*

- *Well-rotted farmyard manure may be applied at a maximum rate of 9 tonnes/ha (4 tonnes/acre) every other year, but not within 10 metres of a watercourse. There must be no other application of nutrients such as fertilisers, other organic manures or waste materials including sewage sludge. No FYM should be applied on steep ground next to areas of fen habitat.*

The limit on applying a nutrient total of 9 tonnes/ha of well-rotted FYM every two years will have restricted the grass growth on these fields. Cattle FYM contains 6.0kg N/tonne so this would be an equivalent of a total of 54kg N/ha every two years, however since only 10 % of this N is available, only 5.4kg N/ha would be available to the following crop. This inevitably reduced the yield potential on these fields. Figure 1 is taken from the industry guidance document - RB209 section 3, Grass and Forage crops and shows the relationship between N application rate and grass production in tonnes of DM/ha.

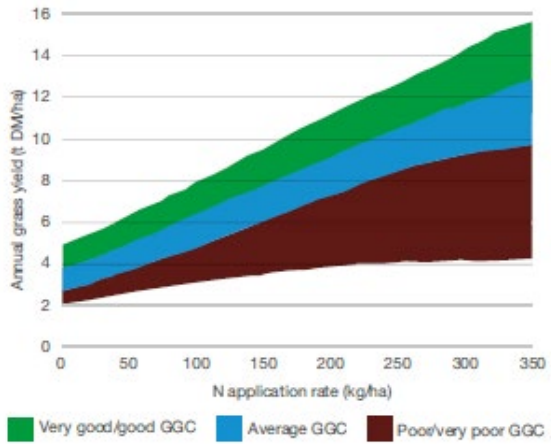


Figure 1. Indicative grass dry matter yield by Grass Growth Class (GGC). Grass swards greater than three years old with minimal clover and low to moderate soil nitrogen supply (SNS). Figure from RB209 Section 3.

Table 1 below shows the potential yield by increasing Nitrogen application rates for grass silage crops.

Table 1: Nitrogen recommendations for grass silage. Table from RB209 Section 3.

Target annual DM yield[a]	N application rate				Total N applied[b]
	First cut	Second cut	Third cut	Fourth cut	
t/ha	kg N/ha				
5–7	70	-	-	-	70
7–9	80	50	-	-	130
9–12	100	75	75[c]	-	250
12–15+	120	90	70[c]	30[c]	310[d]

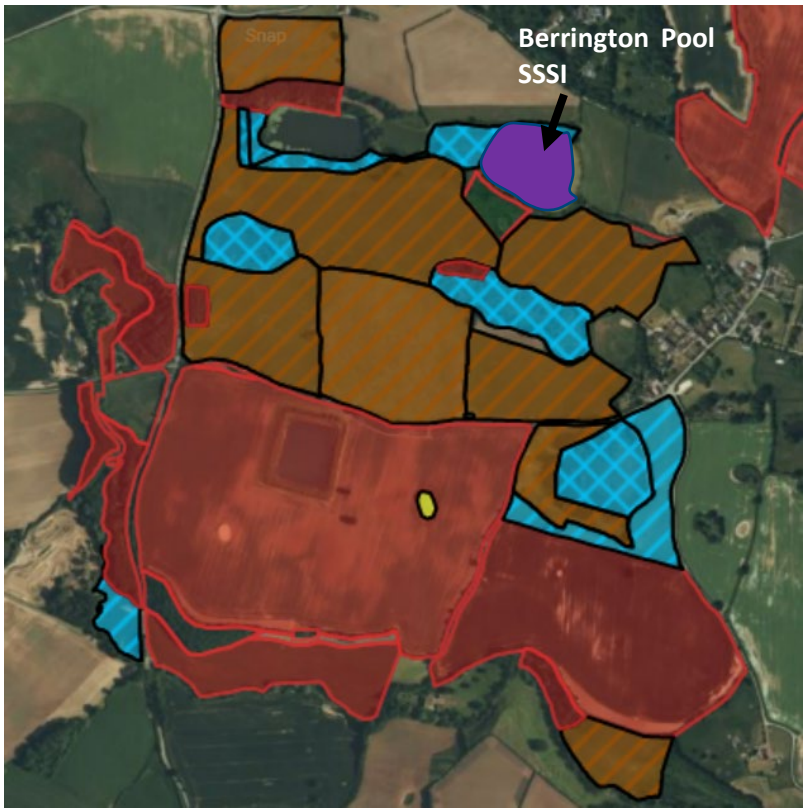
a. DM yield as harvested in the field for all cuts combined. Does not include spoilage in the clamp. Fresh yield is four times these values if the silage is 25% DM.

b. As manufactured fertiliser and crop available nitrogen from organic materials.

c. If previous growth has been severely restricted by drought, reduce or omit this application.

d. This total N could be applied to a three-cut system (yielding around 15 t DM/ha), with the fourth cut recommendation of 30 kg N/ha being split between the second and third cuts.

The effect of low inputs being applied to those fields in stewardship will have meant that dry matter production from the grassland will have been reduced. This in turn would have resulted in lower stocking rates and consequently reduced income from agricultural activities.



Map	HLS Option	HLS Code
	Owned land not under agreement	N/A
	Restoration/ maintenance of species-rich, semi- natural grassland	HK7/HK6
	Reversion to unfertilized/ low input grassland to prevent erosion/run-off	HJ3/HJ4
	Floristically enhanced grass margin	HE10
	Creation/ restoration of fen	HQ7/HQ8

Figure 2. Map of farmed land highlighting the land in the High-Level Stewardship Agreement (1/3/12- 28/02/22)

Figure 2 shows the area of land which was previously included in the Higher-Level stewardship scheme and the land that was not in it. The land in the stewardship scheme is much more undulating than the land not in the scheme and as a result would not be suitable as a site for the solar panels as some of it is also north facing.

1.1 Impact of BPS Reduction during the Agricultural Transition

The Agricultural Transition will see the reduction of direct payment to farmers, in the form of The Basic Payment Scheme (BPS). This process began in 2021 with a percentage reduction across payment bands as illustrated in the table below, with the highest payments taking the largest percentage reductions.

The percentage cuts shown are calculated as a proportion of the 2020 BPS payment. After 2021 the reductions are increased by 15% per year until 2024.

Table 2: Percentage BPS reductions 2021-2024

Payment banding BPS cut for that portion				
Scheme Year	2021	2022	2023	2024
up to £30,000	5%	20%	35%	50%
£30,000 - £50,000	10%	25%	40%	55%
£50,000 - £ 150,000	20%	35%	50%	65%
over £150,000	25%	40%	55%	70%

The calculation is performed in increments and thus a £40,000 BPS will have a 5% reduction applied to £30,000 and a 10% reduction applied to the remaining £10,000. Thus, this BPS would reduce by £2,500 to £37,500 in 2021 and by £20,500 to £19,500 in 2024.

To date the reductions have been confirmed for the period 2021-2024 and we know that the last payment will be in 2027, therefore ADAS have assumed to reduce the payment in the last four years by equal amounts, but this may change when more is known in respect of delinking. Delinked payments will be introduced in 2024 and after this time recipients will not be required to continue farming in order to receive payments in each of the remaining years of the agricultural transition. There will be no need to be farming the land or own payment entitlements. Instead, payment will be based on a reference period, to be determined, of 2018-2020, 2018-2022 or 2022 only. When delinked payments are introduced, they will replace the current BPS in its entirety (including the young farmer payment) for all farmers for the remaining years of the agricultural transition. Delinking will not be optional for farmers.

Current environment schemes such as Higher-Level stewardship and Countryside Stewardship will be phased out over the transition period and replaced with other schemes. 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. Farmers will be paid to provide public goods, such as improved water quality, biodiversity, climate change mitigation, animal health and welfare. Currently the level of payments made to farmers is not known.

1.2 Subsidies BPS reductions

Table 3: The effect of the BPS reduction for Berrington Farm.

2020 BPS Excluding stewardship	**£12,688**							
	2021	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
BPS Baseline Payment	**£12,688**	**£12,688**	**£12,688**	**£12,688**	**£12,688**	**£12,688**	**£12,688**	**£12,688**
0 - <30,000	£634	£2,538	£4,441	£6,344	£6,344	£6,344	£6,344	£6,344
30,000 - <50,000								
50,000 - <150,000								
>=150,000								
Reduction 2025-2028					£1,586	£1,586	£1,586	£1,586
Cumulative Reduction	**£634**	**£2,538**	**£4,441**	**£6,344**	**£7,930**	**£9,516**	**£11,102**	**£12,688**
Future BPS payments	**£12,054**	**£10,150**	**£8,247**	**£6,344**	**£4,758**	**£3,172**	**£1,586**	**£0**

The farm business will lose a significant proportion of its income over the next few years. As a result of this the business needs to find replacement income to at least maintain the status quo or increase profitability further. Many farm businesses are in a similar position. There is a need to maintain farm incomes, so farmers in general are looking at ways to mitigate the loss of BPS and other subsidy payments. These include the following:

1. Improving technical performance
2. Reducing costs
3. Alternative uses for land and Buildings
4. Diversification

Over the last 30 years majority of farmers having been striving to achieve points 1 and 2 as the price for commodities have generally remained static whereas costs have constantly been increasing. With the effect of the price's issues over the last year, squeezing margins even further, many farmers are now looking at points 3 and 4, to achieve their goals to maintain or increase farm incomes.

1.3 Effect of these changes at Berrington Farm

With the impending reduction of BPS income because of the agricultural transition and because the HLS scheme ended in 2022, the farm is exploring alternative revenue streams to maintain viability. One of these alternative revenue streams is to use the land to generate electricity via the installation of Solar panels on some arable land and improve productivity on some of the land that has now come out of stewardship.

1.4 Solar Park

Figure3. Map of proposed solar park

The solar park will if approved, be installed on two fields totalling 41.4 hectares. The area in between the panels and where no panels were sited would be sown with grass/clover leys. The soil types in these fields are predominantly classified as grade 2 by a recent ALC report (22.4ha), with areas of the site classified as grade 3a (12.4ha) and grade 3b (4.9ha). This land was not in the Higher-Level stewardship scheme. Solar panels would cover 36 ha on which only sheep could be grazed and 5.4 ha of grass for other uses such as silage production or more intensive grazing.

1.5 Maintaining Whole Farm Productivity

While land will need to be taken out of arable production over the lifetime of the solar park, the expiration of the HLS agreement provides an opportunity to offset any losses in productivity that might occur. 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.

The solar panels on this site will be semi-permanent frame mounted PV units, able to be removed with limited damage to the fields at the end of their lifetime, allowing arable crops to be grown again at this site after the decommissioning of the solar park. The solar installation will provide valuable income for the farm business.

Overall, the increased agricultural productivity from the land no longer in the HLS scheme should enable overall production to be maintained.

1.6 Protecting the SSSI

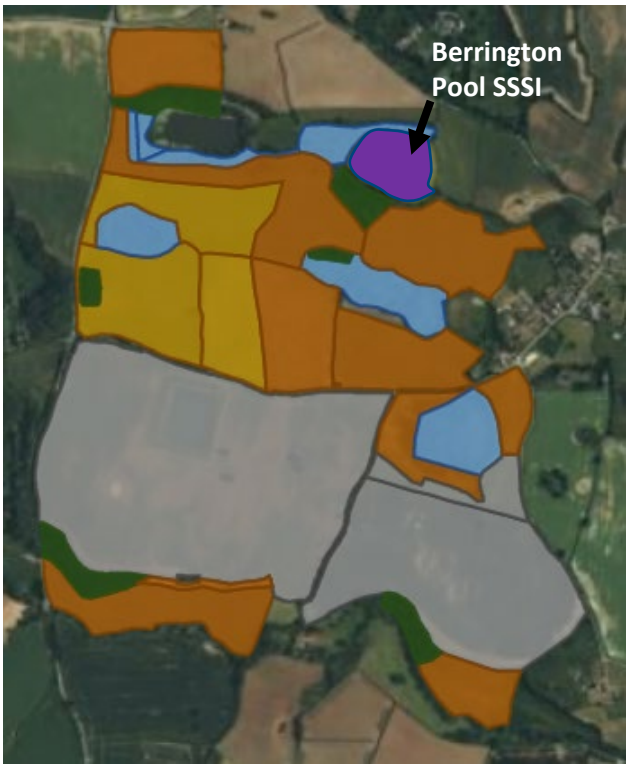
Berrington Pool SSSI borders the farm to the north. Therefore, any changes in land management should take this into consideration, in particular any changes that would require increased fertiliser applications. In our calculations we have sought to minimise the impact of increased agricultural production on the land bordering the SSSI by identifying the drainage patterns of the land, predominantly through contour mapping reinforced by a site visit. The landowner will make every effort to protect the SSSI by adopting best practises. These could include overseeding with clover to minimise fertiliser applications on those area next to the SSSI, thus protecting the water quality of the SSSI.

Figure 4. Map of contours on land surrounding Berrington Pool SSSI

1.7 Predicted Agricultural Production

Map	Land use
	Solar Park
	Arable/ Productive Grassland
	Low Input Clover/Ryegrass
	Wetland
	Woodland

Figure 5. Plan 1 - Future land use and field boundaries



Map	Land use
	Solar Park
	Arable/ Productive Grassland
	Low Input Clover/Ryegrass
	Wetland
	Woodland

2 CONCLUSIONS

In summary, this agricultural business is facing a challenging future and will need to adapt if it is to remain economically viable. It is therefore critical to the longevity of the farm, that a purposeful approach is taken now, whilst opportunities are available and not at the end of the transitional period in 2028.

As outlined in this document, income is falling due to:

1. The agricultural transition

2. The end of the HLS scheme and lack of detail about future funding streams

3. Rising costs of agricultural inputs

To maintain productivity, the business must consider alternative land usages, whilst weighing up how to maximise the potential of the land coming out of the HLS scheme. The proposed solar farm will not only provide an additional income stream to support the wider agricultural enterprise but will also allow areas around the SSSI to be used less intensively, thereby enabling its status to be maintained.

Revenue through solar development (and other forms of renewable infrastructure) represents a significant investment opportunity for farmers in 2023. Agricultural land, which is typically flat, and open, provides a perfect location for development of this nature. The solar proposal near Berrington, is a particularly poignant example of how this can work to great effect. The revenue and biodiversity net gains facilitated through the existing areas of land under HLS, will be offset through the installation of the solar farm on the application site. More importantly, the land previously under the HLS has the potential to be utilised again for crop production, offsetting the loss of yield on the application site, meaning there could be little to no loss in agricultural productivity on the farm as a whole. Not only does this allow the farm to continue to achieve viability and output, but it will also power 7,000 homes and contribute to the creation of a reliable, independent energy generation in the UK.

It is also important to highlight that the proposal is a temporary installation, with a lifespan of 40 years and this will not necessarily be a permanent business model for the farm. However, what it does provide, is reassurance for a set period of time to the landowner, that the business can remain active and viable. This is particularly important, given the social-economic climate, and the need for local employment opportunities and cheap, locally sourced food.

Overall, the 58 ha of wider landholdings, has the potential to offset a significant portion, if not all of, the loss of cereal output from the application site. In this respect, there is scope for the proposal, to have a wholly beneficial impact to both the output and the viability of the existing farm business.

3 APPENDIX

HLS agreement

Table 4. Table of HLS agreement options

RLR field number	Alternative RLR number	RLR field size (ha)	HLS Code	Description	Area (ha)
SJ51066733		1.04	HJ4	Reversion to low input grassland to prevent erosion/run-off	1.04
SJ51069392		5.26	HK7	Restoration of species-rich, semi- natural grassland	5.26
SJ51079207		1.56	HQ8	Creation of fen	1.56
			HQ12	Wetland grazing supplement	1.56
SJ51079327		0.33	HQ7	Restoration of fen	0.33
			HQ12	Wetland grazing supplement	0.33
SJ51079943		3.06	HK7	Restoration of species-rich semi- natural grassland	3.06
SJ52061353		29.7	EF1	Field corner management	1.37
			HE10	Floristically enhanced grass margin	0.07
SJ52062086		7.55	HK7	Restoration of species-rich, semi- natural grassland	7.55
SJ52064494		2.59	HQ7	Restoration of fen	2.59
			HQ12	Wetland grazing supplement	2.59
SJ52065180	SJ52064778	4.45	HK7	Restoration of species-rich, semi- natural grassland	3.55
			HK18	Supplement for haymaking	3.55
SJ52065761		4.65	HK7	Restoration of species-rich, semi- natural grassland	2.12
			HQ7	Restoration of fen	2.53
			HQ12	Wetland grazing supplement	2.12
SJ52066407		2.14	HK6	Maintenance of species-rich, semi natural grassland	2.14
SJ52066436	SJ52065835	17.78	HJ3	Reversion to unfertilised grassland to prevent erosion/runoff	2.59
SJ52070323		0.91	HQ7	Restoration of fen	0.91
SJ52071410		9.78	HK7	Restoration of species-rich, semi- natural grassland	9.78
SJ52073420	SJ52073527	0.07	HQ7	Restoration of fen	0.07
			HQ12	Wetland grazing supplement	0.07
SJ52073525	SJ52073527	0.87	HQ7	Restoration of fen	0.89
			HQ12	Wetland grazing supplement	0.89
SJ52076604		4.99	HK7	Restoration of species-rich, semi natural grassland	4.99
			HK18	Supplement for haymaking	4.99
SJ54064092		5.63	ED2	Take archaeological features out of cultivation	5.63
Total Ha in Agreement					**58.03**