Plas Power Solar and Energy Storage Project

3.0.8 Outline Soil Resources Management Plan

February 2024

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PLAS POWER SOLAR AND ENERGY STORAGE PROJECT

OUTLINE SOIL RESOURCES MANAGEMENT PLAN

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Authorised By APK 02/24

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CONTENTS

1 INTRODUCTION

1.1 This document provides an outline Soil Resources Management Plan (oSRMP) for the proposed Plas Power Solar and Energy Project (hereafter referred to as 'the Proposed Development').

1.2 The objective of the oSRMP is to identify the importance and sensitivity of the soil resource and to provide specific guidance to reduce the risk of significant adverse effect on the soil resource as a result of the Proposed Development.

1.3 The oSRMP has been produced following the comments of PEDW in their Scoping Direction Addendum and the comments of the Soil, Peatland and Agricultural Land Use Planning Unit of the Welsh Government, 20th July 2023 appended to the Addendum Scoping Direction of 17th October 2023. That response suggested that soils be scoped into the ES, and that a soil management scheme should be prepared covering, in particular:

- soil stripping programme;
- soil handing techniques and procedure;
- size, location, construction and management of soil storage dumps;
- proposed after use and restoration programme.

1.4 This is an outline SRMP. To date limited field survey has been completed, and start dates and design details are not yet finalised. A detailed SRMP will be provided, which will include details of:

- soil stripping programme (for the tracks and inverters, plus the BESS);
- the location of soil storage for subsequent restoration of the tracks etc.

1.5 The oSRMP is structured as follows:

(i) section 2 sets out the reasons for and the scope of the oSRMP;
(ii) section 3 describes the soil resources and characteristics;
(iii) section 4 sets out key principles;
(iv) sections 5 - 8 set out the soil management requirements for key aspects of the Proposed Development:
  - section 5: construction compounds;
  - section 6: access tracks and fixed equipment;
  - section 7: solar arrays;
  - section 8: on-site trenching;
  - section 9: substation and BESS;

(v) sections 10, 11 and 12 set out operational and maintenance phase management and the principles required for decommissioning.

1.6 This oSRMP draws on professional experience with the installation of solar panels. It also draws on experience with the installation of underground services (especially pipelines), and with soil movement and restoration of agricultural land in connection with roads, quarries and golf courses. It draws from the detailed Agricultural Land Classification (ALC) survey by AMET Property (November 2022) of part of the site, and on other published data as referenced in this report.

Summary

1.7 Subject to planning consent and the discharge of conditions the installation process is expected to commence with initial enabling works in spring 2025. If weather permits this will include creating the access tracks. The bulk of the panel legs are expected to be installed within 12 to 18 months of commencement, and wherever practicable whilst soils are dry, between spring and autumn.

1.8 The operators recognise the need to carry out such work when soil conditions are suitable and are committed to that.

Note about Why Soils are Important

1.9 Soils are an important resource. The Environment Agency estimates that UK soils currently store about 10 billion tonnes of carbon, equal to about 80 years of greenhouse gas emissions[1]. Yet many biological processes and soil functions are thought to be under threat. 4 million hectares are at risk of compaction, including grassland areas. Therefore soils need to be managed so as not to damage or lose those important functions.

Advice and Guidance Drawn Upon

1.10 This document has drawn upon:

- Construction Code of Practice for the Sustainable Use of Soils on Construction Sites, Defra (2009);
- Working with Soils Guidance Note on Benefiting from Soil Management in Development and Construction, BSSS (2022);
- Building on Soil Sustainability: principles for soils in planning and construction, Lancaster University and partners (2022);
- Agricultural Good Practice for Solar Farms, BRE (2014);

[1] State of the Environment: Soils, Environmental Agency (2019)

- Good Practice Guide for Handling Soils in Mineral Workings, The Institute of Quarrying (2021).

1.11 This oSRMP draws on published data and soil survey of some areas. It is recognised that for the full SRMP additional survey of the subgrade 3 land will be necessary to map the areas of medium and heavy clay loam approximately.

2 SCOPE OF THE OSRMP

2.1 This oSRMP sets out:

- a description of the soil types and their resilience to being trafficked;
- an outline description of proposed access routes and details of how access will be managed to minimise impacts on soils;
- a description of works and how soil damage will be minimised and ameliorated;
- a methodology for monitoring soil condition, and criteria against which compliance will be assessed;
- and an outline of how soil will be protected at decommissioning.

2.2 the oSRMP covers, in general terms, the following requested by LQAS:

- soil stripping;
- soil handling techniques;
- size and management of soil storage bunds;
- proposed restoration programme and after use.

2.3 A detailed SRMP will be produced post consent to identify the final programme and locations of soil storage etc.

2.4 The installation of the solar panel framework, and the assembly of the panels, does not require the movement or disturbance of soils. Those works should not, therefore, result in localised disturbance or effects on soils or agricultural land quality. The oSRMP however particularly covers vehicle movements and related impacts, as those could result in compaction.

2.5 Trenching works to connect the panels to the infrastructure do have the potential to cause localised effects on soils. Localised damage will be minimised by good practice. This oSRMP sets out soil resilience, good practice and monitoring criteria. It considers the effect of trenching works.

2.6 In localised areas there is a need for access tracks or bases for infrastructure and equipment. In those localised areas soil will need to be stripped and moved, for stockpiling for subsequent restoration. This oSRMP sets out:

- a description of the soil types and their resilience to being stripped and handled;
- an outline map showing the areas proposed for being moved, soil thickness and type;
- a methodology for creating and managing stockpiles of soil;

- an outline methodology for testing soils prior to restoration, and a methodology for respreading and ameliorating compaction at restoration.

2.7 This oSRMP focuses on the construction phase and immediate aftercare, and on the decommissioning phase, especially to set principles to avoid creating compaction. There will be some long-term storage of soil for restoration uses at the decommissioning phase. Any soil removal at construction for future restoration (eg of the tracks) will be stored on site and labelled for subsequent return.

3 SOIL RESOURCES AND CHARACTERISTICS

The Site

3.1 The site is outlined in red on the Google Earth image below. As can be seen, the site is mostly grassland with some arable land to the north and north west.

Insert 1: Google Earth Image

3.2 The site is generally level or gently sloping, and can be seen in the following photographs.

Insert 2: Site and Photograph Locations

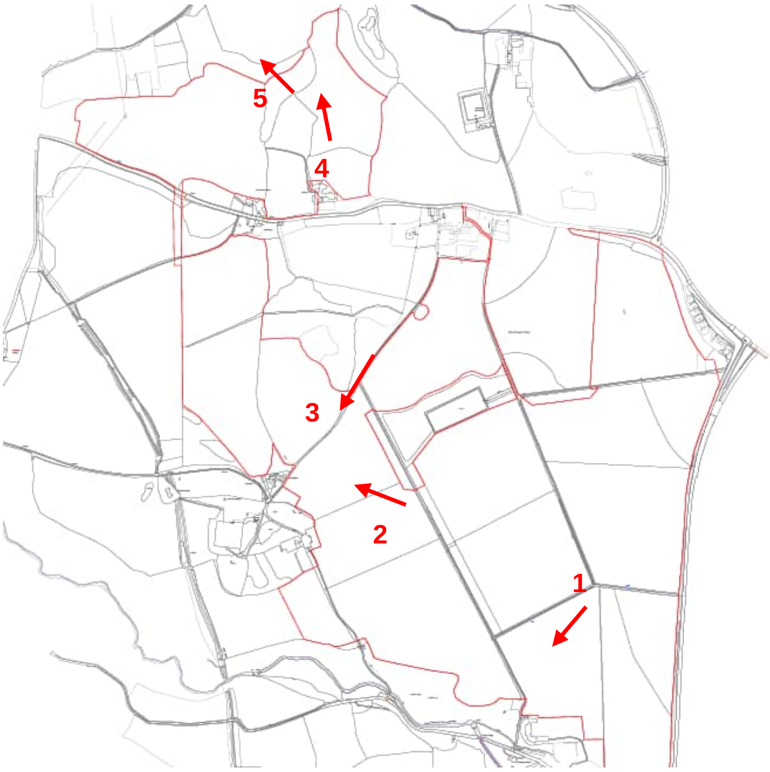


Photo 1: Looking South

Photo 2: Looking North-West

Photo 3:

Photo 4: Looking North

Photo 5: Unfarmed Area

3.3 The site is currently used for agricultural purposes, comprising of several agricultural fields, primarily used for pasture grazing, bounded by a mixture of mature woodland, trees, hedgerows and fencing. The northern fields are mostly in arable uses.

Site History

3.4 Much of the site formed part of an open cast mine in 1964 and subsequently a non-water fill in 1976. The site is currently used for agricultural purposes, comprising of agricultural fields, primarily used for pasture grazing, bounded by a mixture of mature woodland, trees, hedgerows and fencing. Parts of the northern parcel comprise arable land for the purpose of growing crops. The Proposed Development would support the continued use of the land for sheep grazing.

Geology and Topography

3.5 The geology of the site comprises a cover of Glacial Superficial deposits of either Glacial Till or Glaciofluvial sands and gravels overlying bedrock strata of the Pennine Lower and Middle Coal Measures. Cefn Rock sandstone is present in the northernmost part of the site. Whilst the site is located within a Mineral Resource Area, these deposits are recorded to extend significantly beyond the site boundary.

3.6 The topography of the site, based upon Ordnance Survey 1:10,000 mapping contours, generally falls from a high point of 180mAOD (metres above Ordnance Datum) within the north-western extent of the northern parcel of the site to approximately 102mAOD within the south-eastern extent of the southern land parcel.

Climate

3.7 The climate, assessed for ALC purposes for the ALC of parts of the site, has an average annual rainfall of about 930mm. This leads to a Field Capacity Days estimate of 208 days per year, again for ALC purposes.

Soils

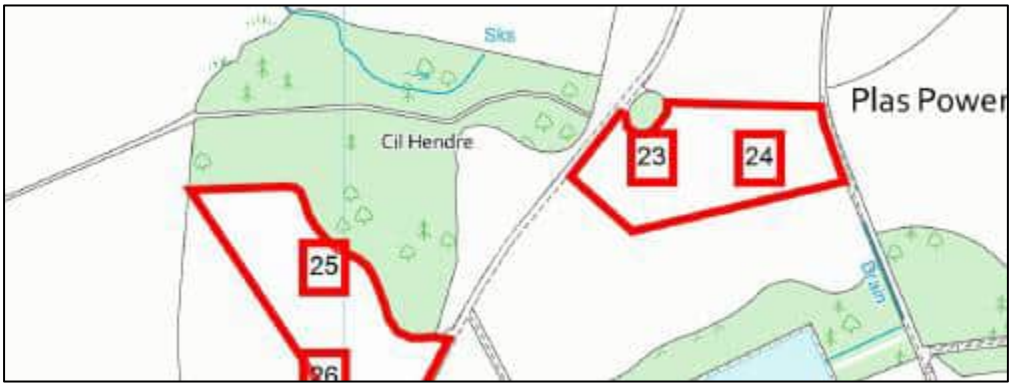
3.8 Much of the site is restored, so the historic soil has been disturbed.

3.9 In those areas that have been surveyed there was a high level of stoniness, as shown in the ALC report.

3.10 The soils identified medium clay loam, occasionally heavy clay loam, over a slowly permeable gleyed clay loam subsoil from between 25 and 50cm.

3.11 One area of very shallow soils was identified, at locations 23 and 24 below.

Insert 3: Locations 23 & 24



4 KEY PRINCIPLES

Terminology

4.1 In this oSRMP the following terminology is used:

- soil trafficking, which means vehicular passage over soils, but not physical disturbance;
- soil handling, which describes where soil is physically moved, such as by a mechanical digger.

Overview

4.2 For much of the installation process there is no requirement to handle (ie move or disturb) soils. Soils will need to be moved and disturbed to create temporary working compounds, and to create the tracks and small fixed infrastructure bases. Soils will need to be handled to enable cables to be laid, but those soils will be reinserted shortly after they are lifted out (ie this is a swift process). More significant works will be required to create the BESS.

4.3 For those limited areas where soil needs to be disturbed to create tracks and bases, the soil will be stored in suitably-managed bunds on the site. The soil needs to be looked after because it will be needed at the decommissioning phase to restore the land under the tracks and bases back to agricultural use, unless otherwise agreed with the landowner.

4.4 It is unlikely that subsoil will need to be removed to create the shallow tracks and bases, but if subsoil does need to be moved and stored, it will be stored separately to the topsoil, and clearly marked.

4.5 For the majority of the Proposed Development soils do not need to be disturbed. The effects on agricultural land quality and soil structure are therefore limited to the effects of vehicle passage (ie trafficking). This is agricultural land, so it is already subject to regular vehicle passage. Therefore the key consideration is to ensure that soils are passed over by vehicles (trafficked) when the soils are in a suitable condition, and that if any localised damage or compaction occurs (which is common with normal farming operations too), it is ameliorated suitably.

4.6 The key principles for successfully avoiding damage to soils are:

- timing;
- retaining soil profiles;
- avoiding compaction;
- ameliorating compaction; and
- retaining and storing soils for subsequent reuse.

Timing

4.7 The most important management decision/action to avoid adverse effects on soils is the timing of works. If the construction work takes place when soil conditions are sufficiently dry, then damage from vehicle trafficking and trenching will be minimal.

4.8 The installation process is unlikely to be restricted between April and October in a normal year. The weather in recent years has been very variable and work outside this period will be possible so long as soil conditions are suitable. The top soils are clayey and imperfectly drained, and so are susceptible to damage when wet. Accordingly the panels and trenches should mostly, so far as practicable, be installed before the soils become saturated. Final commissioning works are unlikely to create much need to traffic over the land, and could operate outside this window.

4.9 In some years, such as 2022-2023, extensive winter working opportunities existed because of long periods without rainfall. For winter working in the period November to March extra care is required, particularly for any activity that involves handling soils, a soil scientist shall be called out to inspect the land and provide advice prior to works commencing.

4.10 The soils are relatively resilient in summer to vehicle passage.

4.11 Any damage from vehicle trafficking in winter, which will be avoided so far as practicable, can generally be made good by mechanical husbandry once the soils start to dry in the spring.

4.12 In winter and early spring there is an increased risk of creating localised damage to soil structure from vehicle passage. There are obviously a great number of variables, such as recent rainfall pattern, whether the ground is frozen or has standing water, inevitable variations in soil condition across single fields, and the size and type of machinery driving onto the land. However, landwork in this period is most likely to result in the need for restorative works post installation and, so far as practicable, will be avoided.

4.13 As a general rule any activity that requires soil to be dug up and moved, such as cabling works, should be reduced so far as practicable during that period. Soils handled when wet tend to lose some of their structure, and this results in them taking longer to recover after movement, and potentially needing restorative works (eg ripping with tines) to speed recovery of damaged soil structure.

4.14 In localised instances where it is not practicable to avoid undertaking construction activities when soils are wet and topsoil damage occurs then soils can be recovered by normal agricultural management, using normal agricultural cultivation equipment (subsoiler, harrows, power harrows etc) once soils have dried adequately for this to take place. There may be localised wet areas in otherwise dry fields, for example, which are difficult to avoid.

Determining if Soils are Suitable

4.15 Soils should be friable when moved.

4.16 Basically with clayey soils of this type, if you can roll soil into a ball or a sausage easily and the soil holds that shape, it is too wet to travel over or move soils. This is illustrated in the photograph below. It is followed by a photograph indicating the type of physical impression the tractor movement can make in unsuitable conditions. Further guidance is given in Sheet A of the Good Practice Guide to Handling Soils in Mineral Workings, Institute of Quarrying (2021).

Inserts 4 and 5: Indication of When Soils are Too Wet

Retaining Soil Profiles

4.17 The successful installation of cabling requires a trench to be dug into the ground. Topsoils vary only slightly across the site and the coverage is generally 25-30cm.

4.18 As set out in the BRE Agricultural Good Practice Guidance for Solar Farms at page 3:

"**When excavating cable trenches, storing and replacing topsoil and subsoil separately and in the right order is important to avoid long-term unsightly impacts on soil and vegetation structure. Good practice at this stage will yield longer-term benefits in terms of productivity and optimal grazing conditions**".

4.19 In those areas where the soil is dug up (trenching and for compounds and access roads), the soils should be returned in as close to the same order, and in similar profiles, as it was removed.

Avoiding Compaction

4.20 This oSRMP sets out when soils should generally be suitable for being trafficked. There may be periods within this window, however, when periodic prolonged rainfall events result in soils becoming liable to damage from being trafficked or worked. In these (likely rare) situations, work should only continue with care, to minimise structural effects on the soils, until soils have dried, usually within 48 hours of heavy rain stopping.

Ameliorating Compaction

4.21 If localised compaction occurs during construction, it should be ameliorated. This can normally be achieved with standard agricultural cultivation equipment, such as subsoilers (if required), power harrows and rolls.

4.22 The amount of restorative work will vary depending upon the localised impact. Consequently where the surface has become muddy, for example in the photograph below, this can be recovered once the soil has dried, with a tine harrow and, as needed, a roller or crumbler bar. So far as possible this sort of damage should be avoided.

Inserts 6 and 7: Inter-row Ground Restoration: THIS IS AN EXAMPLE OF POOR PRACTICE FROM A DIFFERENT SITE

4.23 With the target construction programme from April to October this type of more extensive soil damage is unlikely to occur. In the November to March period particular care will be require to avoid causing this kind of disturbance to the soils. They can, as noted below, be restored but there is a time and cost implication.

4.24 If there is any localised problem, the type of machinery involved in restoration is shown below. This shows farming and horticultural versions.

Inserts 8 and 9: Type of Machinery Involved

4.25 If there are any areas where there has been localised damage to the soils due to vehicle passage, for example, a low wet area within a field which despite best efforts could not be avoided, this should be made good and reseeded at the end of the installation stage. This is not uncommon: most farmers will have times when they have to travel around the farm in a tractor in conditions where the tyres make deep impacts. This can happen during harvest time, for example, especially of late crops or in very wet harvest seasons. Whilst this is avoided so far as practicable, it occurs and the effects are made good when conditions are suitable.

4.26 The ground surface should be generally levelled prior to any seeding or reseeding.

4.27 Examples of areas that have been cultivated following the installation of panels, are shown below. These are the main vehicle trafficking routes. As can be seen, the area under and mostly between the panels, is not damaged.

Inserts 10 and 11: Localised Repairs (solar farm in Sussex)

Retaining Soils

4.28 At decommissioning stages the areas that will form the bases for the fixed infrastructure, can be returned to agricultural use. For this to be successful, the soils must have been retained on site, properly recorded or labelled so that they can be returned to the approximate position from where they came and stored properly for the lifetime of the scheme in an appropriately sized and managed bund.

4.29 No soil removed to construct the tracks will be removed from the site. It will all be stored on site for use at the decommissioning phase.

4.30 The storage bunds will be managed to prevent the growth of woody vegetation.

5 CONSTRUCTION COMPOUNDS

Construction Methodology

5.1 A temporary construction compound will need to be created at the start of construction and reinstated at the end.

5.2 Construction compounds are built by stripping topsoil and storing that in a bund on the edge of the site. A matting is then laid down, and stone imported and levelled, as shown below.

Insert 12: Newly-laid Construction Compound (Elsham-Lincoln Pipeline)

5.3 The matting prevents the stone from mixing with the subsoil, as shown below.

Insert 13: Matting

5.4 Topsoil is stored in a bund, as shown below. Guidance on this can be found in Box B1 of Sheet 2 of the Good Practice Guide for Handling Soils in Mineral Workings (Institute of Quarrying, 2021), *Insert 14: Topsoil Storage Bund (example from Lincolnshire)*

Movement of Soils

5.5 The soils need to be sufficiently dry to handle. If you can roll soil into a ball or a sausage easily and the soil holds that shape, it is too wet to travel over or move soils. This is illustrated in the photograph below.

Insert 15: Indication of When Soils are Too Wet

5.6 The topsoils will be stripped to a depth of 30cm, and placed in bunds on the edge of the compound, as shown above.

5.7 Short term storage of soil is shown above. If the soil is likely to be stored for in excess of six months then, depending upon timing, it should be seeded with grass. This binds the soil together and minimises erosion.

5.8 Therefore if the construction compound is not to be removed before the wet weather in the autumn, the bunds should be seeded with grass, as per the example below.

Insert 16: Grass-seeded Bund (photographed in Devon)

Removal

5.9 The removal of the construction compound should be timed for dry weather. That may be the following spring.

5.10 At the end of the construction process, the aggregate will be removed. This can be seen in progress below.

Insert 17: Start of Restoration of Construction Compound (example from Staffordshire)

5.11 The base area should be loosened when soils are dry and the topsoil then spread over the site to the original depth. This should be lightly cultivated.

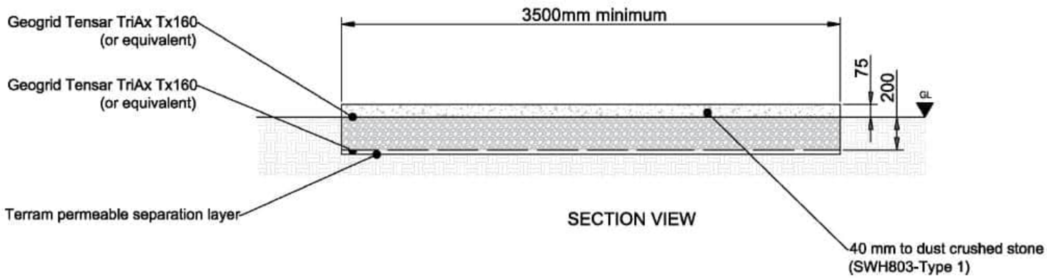
5.12 Panels can then be installed over the construction compound, or the area returned to agricultural use.

6 ACCESS TRACKS AND FIXED EQUIPMENT

Construction Methodology

6.1 The access tracks are created by stripping off some or all of the topsoil (to a depth of 200mm) and then adding an aggregate-based surface. Usually, the aggregate will be placed onto a permeable membrane, which allows water penetration but which prevents the aggregate from mixing with the topsoils or upper subsoils. A typical cross-section is shown below.

Insert 18: Access Track Cross Section



6.2 The small areas of fixed equipment normally stand on a gravel base area, as shown below. As these areas will be restored in the future, the construction is carried out as follows:

(i) topsoil to c 10-15cm is removed. This will be stored in a bund no more than 3m high at an agreed location, for use in future restoration;

(ii) a permeable terram layer is then laid;

(iii) the base of stone is then added, and forming put around before concrete is poured to create the pad, or stone is added to create the pad;

(iv) the equipment is then placed on top;

(v) further security fencing is added once the cabling and connections are complete.

6.3 A typical example of fixed equipment from an operating solar farm, is shown below.

Inserts 19: Typical Inverter Container (example from Monmouthshire)

Soil Management

6.4 Soil should be stripped when the soil is sufficiently dry and does not smear. This is a judgement that is easily made. If the soils can be rolled into a sausage shape in the hand which is not crumbly, or if rubbing a thumb across the surface causes a smudged smooth surface (a smear), the soil is generally too wet to strip or move without risk of structural damage. Topsoil depths are consistent across the site and a stripping depth of 30cm will be a suitable maximum depth for topsoil in most cases, although rarely will it need to be stripped to such a depth.

6.5 Soil stripping should be carried out in accordance with Defra "Construction Code of Practice for the Sustainable Use of Soils on Construction Sites" (Defra, 2009). The removed soil should be stored in bunds in accordance with the Construction Code of Practice.

6.6 The tracks involve the movement of soils. Therefore the soils are more susceptible to damage from mechanical moving. The topsoil will, however, be stored for the duration of the operational period. Accordingly if for operational reasons it is necessary to commence the construction of tracks and bases when soils are not in optimal condition, the soil to be stored should be stored initially in bunds of maximum 3 metres high.

6.7 This will allow the soils to dry. Shallow bunds can then be moved again once they are dry into larger bunds for long-term storage.

6.8 Once the soils are sufficiently dry, typically after two or three weeks, it will be possible to move the soils to long-term storage bunds.

6.9 As a general rule soil should not be moved during or within 24 hours of heavy rain.

Bund Management

6.10 Soil bunds should be no more than 3m in height to prevent anaerobic conditions in the base of the bund. The bund should be sown with a grass mix. This should be managed at least annually to prevent the growth of woody vegetation (eg brambles).

6.11 Examples of bunds are shown below.

Insert 20 and 21: Soil Bund Example (examples from Lincolnshire and Devon)

Reinstatement

6.12 Reinstatement of topsoil at the decommissioning phase should involve the following:

(i) removal of the stone from the track, and the membrane;

(ii) subsoiling in dry conditions along the route of the track and base areas to loosen the subsoil;

(iii) replacement of dry topsoil from the bunds, levelled and cultivated;

(iv) a second light compaction alleviation, eg with a tined cultivator, if needed;

(v) sowing with a crop or grass to get rooting into the profile as soon as practicable after replacement.

7 SOLAR ARRAYS

The Areas

7.1 The PV Arrays will be distributed across the Solar PV Site as shown on the application plans.

Construction Methodology

7.2 The process involves the following stages:

(i) marking-out and laying out of the framework. For this a vehicle needs to drive across the field possibly with a trailer, from which the legs are off-loaded by hand, or by use of a Bobcat such as that shown below delivering legs;

Insert 22: Bobcat Delivering Legs (example from Wiltshire)

(ii) pile driving in the legs. This involves a pile driver, knocking the legs down to a maximum 1.5m. The machinery is shown below;

Inserts 23 - 25: Pile Driving in the Legs

(iii) the frame is then constructed. The frame is brought onsite, bolted together, and the panels bolted on, as per the series of photographs below.

Inserts 26 - 28: Constructing the Frame. Note this is a very low panel

7.3 The installation should be carried out when the ground conditions are suitable (ie the soil is not so wet that vehicles cause tyre marks, such as shown below, deeper than about 10cm when travelling across the land). This will normally be between May and late September, which is a few weeks after soils should be dry and a few weeks before they would normally become wet. If conditions are suitable, this stage of the installation should create no soil structural damage or compaction, as shown below.

Inserts 29 and 30: Ground After Construction (example from Wiltshire)

Soil Management

7.4 As discussed earlier, the sausage test, should be used to determine suitability of the soils for working or access. In simple terms, if the soil is so wet that vehicles cause tyre marks, such as shown below, deeper than about 10cm when travelling across the land, conditions are not yet suitable. As construction is scheduled to start in spring, soils will normally be suitable.

Insert 31: Track Marks (example from Pembrokeshire)

7.5 In most years work access to the land is not restricted between April and October. Between those periods the ground conditions will normally be resilient to vehicle trafficking.

7.6 Between October and April the soils are more likely to be saturated and the propensity to being damaged, albeit in a way capable of rectification, is greatest. As a general rule, vehicular travel in these periods should be limited as much as practicable. It is recognised that rainfall is the factor that wets the soils, so a dry spring will offer different conditions to a wet spring, and this may mean that soil structural damage will inevitably result. This is outside the projected construction period.

7.7 This country sometimes experiences prolonged rainfall in the summer months that can saturate soils. If following a rainfall incident installation is causing rutting deeper than 10cm, activity should be minimised so far as practicable to allow soils to dry.

7.8 It is very unlikely that trafficking during construction when soils are relatively dry will result in compaction sufficient to require amelioration. However, if rutting has resulted the soil should be levelled by standard agricultural cultivation equipment such as tine harrows, once the conditions suit, and prior to seeding. This can be done with standard agricultural machinery, or with small horticultural-grade machinery such as is shown below.

Inserts 32 and 33: Horticultural Machinery

7.9 The objective is to get the surface to a level tilth for seeding/reseeding as necessary, as was shown earlier.

7.10 Grass growth will then recover or establish rapidly.

8 INSTALLATION OF ON-SITE TRENCHING

The Areas

8.1 This section refers to the cabling running within the consented area.

Construction Methodology

8.2 Cabling is done mostly with either a mini digger or a trenching machine. Trenches will typically be at depths of up to 1.0m where soil depth permits, although the CCTV trenching around the periphery could be shallower. An example trench, with the topsoil, placed on one side (0-30cm) and subsoil on the other (below 30cm), is shown below, and with the soil put back after cable installation.

Inserts 34 and 35: Cable Installation (example from Wiltshire)

8.3 It is important that topsoils are placed separately to the subsoils, and that they are then put back in reverse order, ie subsoils first.

8.4 The type of machinery used for trenching is shown below, taken from the BRE National Solar Centre “Agricultural Good Practice Guidance for Solar Farms” (2013).

Insert 36: Machinery Used (extract from BRE Good Practice Guidance)

Cable trenching, showing topsoil stripped and set to one side, with subsoil placed on the other side ready for reinstatement (photo courtesy of British Solar Renewables)

8.5 The trenches are typically narrow (mostly 40-70cm). If the topsoil was from grassland the grass will probably recover rapidly without the need to reseed. In bare soils the trench can be cultivated with the wider area for seeding to grass post installation.

Insert 37: Grass After 4 Weeks (natural recovery)

(The photos in this section were taken on heavy, clay soils with poorly draining subsoil, and the work was photographed in July and August 2015)

<u>Soil Management</u>

8.6 All trenching work will be carried out when the topsoil is dry and not plastic (ie it can be moulded into shapes in the hand).

8.7 The top 30cm will typically be dug off and placed on one side of the trench, for subsequent restoration. There is no need to strip the grass first.

8.8 The subsoils will then be dug out and placed on the other side of the trench, as per the example below.

Insert 38: Subsoils Dug out of the Trench

8.9 Once the cable has been laid, the subsoils will be placed back in the trench. Where there is a clear colour difference within the subsoils, so far as practicable the lower subsoil will be put back first and the upper subsoil above that, which is likely to happen anyway as the lower soil is at the top of the pile.

8.10 If dry and lumpy the subsoils will be pressed down by the bucket to speed settlement. If the soils are settling well no pressing-down is required.

8.11 The topsoil will then be returned onto the top of the trench. It is likely, and right, that the topsoil will sit a few centimetres higher than the surrounding level. This should be left to allow it to settle naturally as the soils become wetter.

8.12 If there is a surplus of topsoil this may be because the lower subsoils were dry and blocky and there are considerable gaps in the soil. These will naturally restore once the lower soils become wet again. If the trench backfilling will result in the soil being more than 5-10cm proud of surrounding levels, which is unlikely but possible, the topsoil should not be piled higher. It should be left to the side, and the digger would return once the trench has settled and add the rest of the topsoil onto the trench at that point.

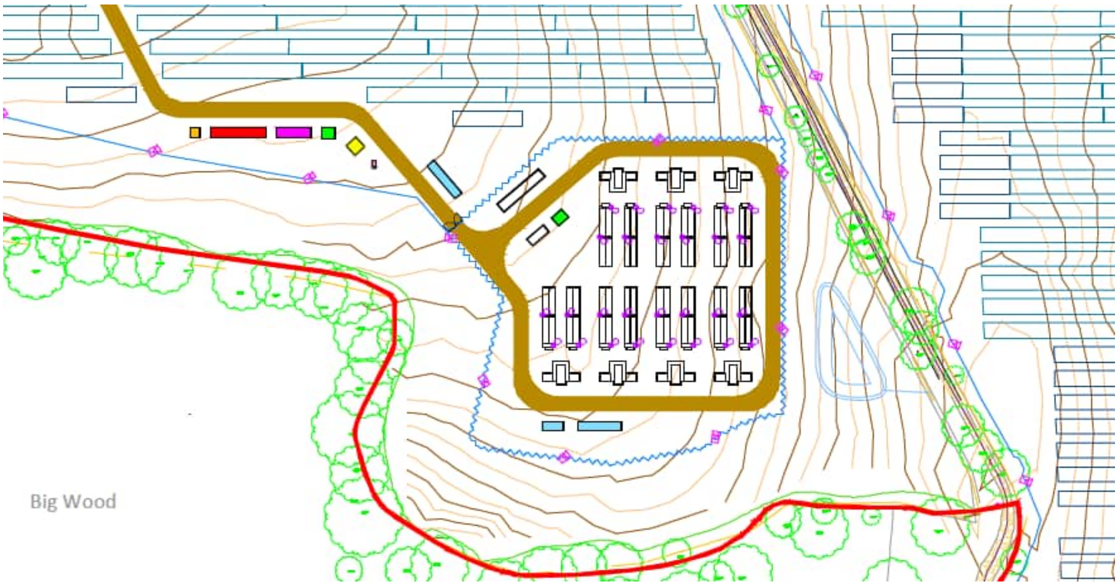
8.13 Any excess topsoil should not be piled higher than 5 – 10cm above ground level.

8.14 If considered appropriate, a suitable grass seed mix could be spread by hand over any parts of the trenches that would seem likely to benefit from extra grass.

9 SUBSTATION AND BATTERY COMPOUND

9.1 The battery compound is shown below.

Insert 39: BESS Proposal



9.2 This involves an area of about 0.7ha. This area may need to be levelled in part, and have a hard surface, which will be determined on site during construction.

9.3 Topsoil stripping will take place to create the area, and will be stored in a bund either beside the compound or against the edge of the field.

9.4 It will be necessary to level the site. This will involve movement of subsoils within the compound area (ie cut and fill), but no subsoils will need to be stored.

Insert 40: Example of Compound in Construction (example from Lincolnshire)

9.5 The volume of topsoil for storage will be of the order of 2,000 cubic metres, based on a compound size of 70m by 100m (7,000 sqm). At a strip depth of 30cm this would amount to 2,100 cubic metres.

9.6 Assuming a maximum bund height of 3m, and a level width of 3m at the top, with a slope of 45 degrees, the cross section will be 18 cubic metres per metre run. A bund length of the order of 120 metres in total would be required.

9.7 The bund should be managed, involving being cut at least once per year to prevent woody growth (eg brambles, elder) and to maintain grass growth, as this helps dissipate runoff and prevent erosion of the sides.

9.8 An example of long-term soil storage, this from a solar farm at Llanvapeley, Monmouth, is shown below.

Inserts 41 and 42: Long-Term Soil Storage (example from Monmouthshire)

9.9 The BESS area will be fenced.

9.10 An example of a large BESS, with the soil storage to the side (only partly visible in the photograph) is shown below.

Insert 43: Example of Part of a BESS and Bund (example from Herfordshire)

10 OPERATIONAL PHASE: LAND MANAGEMENT

Solar PV Arrays

10.1 The land around the Solar PV Arrays will be managed including by the grazing of sheep.

10.2 Panels grazed by sheep tend to be free of weeds, as shown below.

Insert 44: Sheep Grazing Under Panels (example from Bedforshire)

10.3 Any localised weed treatment can be carried out at the appropriate time of the year using a quad-mounted sprayer, or by hand using a strimmer or knapsack sprayer.

Ongoing Maintenance

10.4 There are many different cleaners on the market, some tractor based and some operated from smaller machines, such as below.

Insert 45: Cleaning of Solar Arrays

10.5 All the fields are wet in places, and therefore the cleaning should be timed so far as practicable to avoid the October to April period for the site. This is normal because the objective is to clean the panels before the peak summer generating period.

10.6 If vehicles, including farm vehicles, cause ruts in the soil these will naturally repair in time, especially as the land is grazed by sheep and their feet are excellent at levelling land. Alternatively a light harrow or rolling will restore the ruts, when the soil is still soft enough to roll but hard enough to not rut more.

Insert 46: Ruts Caused by Vehicles (example from Staffordshire)

10.7 If vehicles have caused rutting it is probably, as per the example above, only localised. In the photograph above this is a wet spot, and on the land either side of the ruts within the row there is no evidence of wheel indentation. If these areas are not levelled they will tend to sit with water in them.

10.8 Localised, small rutting should be repaired by either treading-in the edges with feet, by light rolling or harrowing, or adding a small amount of soil simply to fill-in the depression so that water does not collect there.

10.9 Deeper rutting will require either light harrowing in the drier period, or some soil adding, or both, before reseeding.

<u>Emergency Repairs</u>

10.10 For the duration of the operational phase there should be only localised and infrequent need to disturb soils, such as for repair of a cable. Any works involving trenching should be carried out, ideally, when the soils are dry but recognising that any works will be those of emergency repair, that may not be possible.

10.11 Accordingly if new cabling is needed and has to be installed in wet periods, soil will need to be disturbed, such as the example below.

Insert 47: Trench During Wet Period (example from Bedfordshire)

10.12 Any area disturbed should be harrowed or raked level once the soils have dried, and be reseeded. These areas will be small, and this can probably be done by hand.

11 OPERATIONAL PHASE: SOIL STORAGE

11.1 The critical part of successful long-term storage of soils is to place the soils into storage bunds when the soils are dry.

11.2 Ongoing maintenance should ensure that the bunds remain free from woody vegetation (eg brambles, elder) and that the soil bunds do not erode. For this reason the bunds should be seeded with a grassland mix, as the roots of the grasses will help bind the surface and prevent water channels forming.

11.3 At least once per year the bund should be managed, ideally by mowing or strimming.

11.4 An example of a bund that is seven years old, is shown below.

Insert 48: Soil Bund Example (example from Monmouthshire)

12 DECOMMISSIONING PRINCIPLES

12.1 Given the length of time before decommissioning it is likely that the ALC methodology will have been amended by then. Further, unless we are successful as a world, climate change may have altered the seasons and rainfall patterns. Therefore this guidance is prefaced with a requirement for a suitably qualified soil scientist to revisit the site prior to decommissioning, and to update the guidance and timing.

12.2 The objective is to remove panels and restore all fixed infrastructure areas to return the land to the same ALC grade and condition as it was when the construction phase commenced.

Removal of Panels

12.3 A qualified soil scientist should advise prior to decommissioning time. The effects of climate change in 40 years time may mean that these dates, applicable in 2024, are no longer applicable.

12.4 Once the panels have been unbolted and removed, the framework will then be a series of legs, as shown below.

Inserts 49 and 50: The Framework (examples from Wiltshire and Nottinghamshire)

12.5 These will be removed by low-ground pressure machines, in a reverse operation to the installation. These machines will provide a pneumatic tug-tug-tug vertically upwards. This will break the seal between soil and leg, and once that surface tension is released the leg will come out easily.

12.6 The legs will be loaded onto trailers and removed.

12.7 There will be no significant damage to the soils, and no significant compaction.

<u>Removal of Cables</u>

12.8 Cables buried less than 1 metre deep will be removed. This is likely to need a trench to be dug. This will be done is done mostly with either a mini digger or a trenching machine. Cabling will mostly be at depths of 0.8m where soil depth permits, although the CCTV trenching around the periphery could be shallower. An example trench, with the topsoil placed one side (0-20/25cm) and subsoil on the other (below 20-25cm), is shown below, and with the soil put back after cable installation.

Insert 51: Example Trench

Insert 52: Topsoil Replaced

12.9 The type of machinery used for trenching is shown below, taken from the BRE National Solar Centre "Agricultural Good Practice Guidance for Solar Farms" (2013).

Insert 53: Machinery Used for Trenching

Cable trenching, showing topsoil stripped and set to one side, with subsoil placed on the other side ready for reinstatement (photo courtesy of British Solar Renewables)

12.10 Once the trench has been backfilled it can be left for cultivation with the rest of the field post removal of panels.

Removal of Fixed Infrastructure

12.11 Switchgear, such as that shown below, will need to be removed.

Insert 54: Switchgear

12.12 Low ground pressure vehicles, and cranes, will be needed to lift the decommissioned units onto trailers, and removed from site. An example is shown below.

Insert 55: Example of Low Ground Vehicles

Case Steiger Quadtrac used to deliver inverters and other heavy equipment to site under soft ground conditions (photo courtesy of British Solar Renewables)

12.13 Any concrete bases will need to be broken up. This will most likely involve breaking with a pneumatic drill to crack the concrete, after which it can be dug up and loaded onto trailers and removed.

12.14 The ground beneath the base may then benefit from being subsoiled, to break any compaction. This can be done by standard tractor-mounted equipment, such as the following examples.

Inserts 56 and 57: Example of Tractor Mounted Equipment

<u>Tracks</u>

12.15 The tracks will be the last fixed infrastructure removed. The tracks will have been used for vehicle travel during the decommissioning stage. The tracks will also be used for removal of material from the tracks themselves, which will be removed from the furthest point first.

12.16 The stone will be removed and any matting removal. The base will then be loosened by subsoiler or deep tine cultivators, depending on specific advice given by the soil expert at the time following and analysis of soil compaction and condition.

<u>Reinstatement of Soils</u>

12.17 Topsoil from the storage bunds will then be returned and spread to the depth removed (typically 10-15cm). The area will then be cultivated, probably in combination with the whole of each field.

<u>Fences and Gates</u>

12.18 This will be removed in the summer months, after the panels have been removed. This will involve a tractor and trailer. The CCTV cabling is shallow buried and will probably pull out without the need for trenching, but if required tranches will be dug, as described above, and replaced in order once the cables have been removed.

<u>Cultivation</u>

12.19 The fields will be handed back to the farmers. Whether they are handed back as grassland or sprayed off and cultivated, will be determined in discussions with each landowner.

Annex A

Agricultural Land Classification Report (Amet Property)

amet PROPERTY

Agricultural Land Classification
Plas Power Solar Farm

Client: Lightsource Renewable UK Development LTD
Project: Plas Power Solar Farm
Date: 7th November 2022 – Issue 2
Issued By: James Fulton MRICS FAAV

CONTENTS

1. EXECUTIVE SUMMARY

1.1 This report assesses the Agricultural Land Classification (ALC) grading of 25.1Ha, of agricultural land at Plas Power near Wrexham.

1.2 The limiting factor is found to be soil wetness on all of the land to the north and west, and droughtiness on the shallow soils over rock to the east, both of which are a combination of the soils found on site and the climatic regime.

1.3 The land is graded as follows:

Grade 3a:	1.6 Ha	6.4%
Grade 3b:	21.5 Ha	83.7%
Grade 4:	2.0 Ha	7.9%

2. Introduction

2.1 Amet Property Ltd have been instructed by Lightsource Renewable UK Development LTD to produce an Agricultural Land Classification (ALC) report on an a 25.1-hectare site at Plas Power to the west of Wrexham in support of a planning application for a solar farm with associated infrastructure.

2.2 The report's author is James Fulton BSc (Hons) MRICS FAAV who has worked as a chartered surveyor, agricultural valuer, and agricultural consultant since 2004, has a degree in agriculture which included modules on soils and over 10 years' experience in advising farmers on soil structure and cultivation methods and in producing agricultural land classification reports.

2.3 The report is based on site visits conducted on the 10th of September and 28th October 2022. During the site visits conditions were dry and sunny. During the inspection four trial pits were dug, these would ordinarily be to 120cm but in all cases the land became impenetrable before 120cm was reached. In addition to the trial pits an augur was used to take approximately one sample per hectare on the proposed development site with smaller trial pits and stone counts at some of these locations to confirm soil structure and colour where it was not clear from the augur samples. A plan of augur points can be found at ***appendix 1***. The trial pit locations were selected as they were representative of the soils found on site. Where subsoils were inspected with a spade, descriptions of structure have been recorded based on the soil survey field handbook[1]; where an augur has been used the structure is described as good, moderate or poor based on figure 9,10 and 11 in the MAFF[2] (1988) guidance.

2.4 During the first sampling visit subsoil state was very dry making it extremely difficult to determine structure and in some cases, soils were so hard as to prevent auguring at all. The soil state was much better for the second visit and soil horizons could be inspected to allow for an assessment of the site.

2.5 The site extends 25.1Ha of arable and grassland spread across 9 fields or part fields. The elevation of the site ranged from 128m to 168m AOD and is gently sloping.

2.6 Further information has been obtained from the MAGIC website, the Soil Survey of England and Wales, the British Geological Survey, the Meteorological Office and 1:250,000 series Agricultural Land Classification maps.

2.7 The collected information has been judged against the Ministry of Agriculture Fisheries and Food Agricultural Land Classification of England and Wales revised guidelines and criteria for grading the quality of agricultural land. The

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[1] Hodgson, JM (1997) Soil Survey Field Handbook

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

contents and format of the report is further informed by the BSSS guidance (2022)[3].

2.8 The principal factors influencing agricultural production are climate, site and soil and the interaction between them MAFF (1988)[4] & Natural England (2012)[5].

3. Published Information

3.1 The British Geological Survey 1:50,000 scale map shows the bedrock geology to be Pennine Lower Coal Measures Formation and Pennine Middle Coal Measures Formation – mudstone, siltstone and sandstone. Superficial deposits are described as Till, Devensian – Diamicton.

3.2 The national soils map shows the site to be largely Brickfield 2 Association – Slowly permeable waterlogged fine loamy soils and Nercwys Association – Deep fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging. The two most easterly sample points (23 and 24) are shown to be Neutral restored opencast – Restored opencast coal workings. Slowly permeable seasonally waterlogged compacted fine loamy and clayey disturbed soils. Often stony with thin topsoils.

3.3 The Welsh Assembly Government predictive ALC shows the areas to be grade 3a.

[3] British Society of Soil Science (2022) – Guidance Document 1 – Working with Soil Guidance Note on Assessing Agricultural Land Classification Surveys in England and Wales
[4] MAFF (1988) - *Agricultural Land Classification of England and Wales. Revised guidelines and criteria for grading the quality of agricultural land.* MAFF Publications
[5] Natural England (2012) - *Technical Information Note 049 - Agricultural Land Classification: protecting the best and most versatile agricultural land*, Second Edition

4. CLIMATE

4.1 Climate has a major, and in places overriding, influence on land quality affecting both the range of potential agricultural uses and the cost and level of production.

4.2 There is published agro-climatic data for England and Wales provided by the Meteorological Office, such data for the subject site is listed in the table below.

Agro-Climatic Data – Full details can be found at ***appendix 2***

Grid Reference	330019 350727
Altitude (ALT)	153.17
Average Annual Rainfall (AAR)	930.97
Accumulated Temperature - Jan to June (ATO)	1301.01
Duration of Field Capacity (FCD)	207.73
Moisture Deficit Wheat	76.75
Moisture Deficit Potatoes	59.74

4.3 The main parameters used in assessing the climatic limitation are average annual rainfall (AAR), as a measure of overall wetness; and accumulated temperature (ATO), as a measure of the relative warmth of a locality.

4.4 The AAR and ATO limit the site to Grade 2.

4.5 The site is shown to be in flood zone A – areas at little or no risk of fluvial or coastal/tidal flooding. There was no evidence of flooding seen during the site visit and it is considered that will not result in a limitation to land grade.

5. STONINESS

5.1 There were stones found in almost every sample point on the site. The stones were generally medium to large and occasionally very large. Stones were of various shapes from rounded to tabular and angular. A number of stone counts were carried out alongside estimates.

Very large stones at Sample point 8

Stone count at sample point 12

6. GRADIENT

6.1 The steepest areas of the site are only a gentle slope with gradient never representing the most limiting factor to land grade.

7. SOILS

7.1 The soils found on site largely follow the expectations set by the national soils map. Full information on the sample points along trial pit descriptions and photographs can be found at ***appendix 3***.

7.2 There were two distinct soil types found on site.

Sample points 23 and 24 were a very shallow (15-20cm) very stony medium clay loam topsoil over rock.

The rest of the site was a medium clay loam (occasionally heavy clay loam) topsoil over a slowly permeable gleyed clay loam subsoil from between 25 and 50cm.

7.3 Soil Texture and depth do not provide a direct limitation to land grade across the majority of the site but the soil depth at sample points 23 and 24 does limit the area to grade 3b although this is not the most limiting factor at this sample point.

INTERACTIVE FACTORS

8. WETNESS

8.1 An assessment of the wetness class of each sample point was made based on the flow chart at Figure 6 in the MAFF guidance. The wetness class and topsoil texture were then assessed against Table 6 of the MAFF guidance to determine the ALC grade according to wetness. The wetness assessment can be found at ***appendix 4***.

Medium clay loam over slowly permeable clay loam subsoil

8.2 Where the slowly permeable gleyed horizon started at between 25 and 30cm when combined with the FCD of 207.73 result in a wetness class of IV based on Figure 7 in the MAFF guidance. Where the gleyed horizon starts at between 40 and 70cm with a slowly permeable layer starting at 50cm the wetness class is found to be III.

8.3 Table 6 for between 176 and 225 FCD, wetness class IV and medium clay loam topsoil results in a grade 3b limitation. Where the wetness class is III the medium clay loam topsoil gives a limitation of grade 3a and th heavy clay loam topsoil gives a limitation of grade 3b.

8.4 Wetness was not a limiting factor on the shallow soils.

9. DROUGHTINESS

9.1 Droughtiness limits are defined in terms of moisture balance for wheat and potatoes using the formula:

MB (Wheat) = AP (Wheat) - MD (Wheat)

and

MB (Potatoes) = AP (Potatoes) - MD (Potatoes)

Where:
MB = Moisture Balance
AP = Crop Adjusted available water capacity
MD = Moisture deficit

9.2 Moisture deficit for wheat and potatoes can be found in the agro-climatic data and are as follows:

MD (Wheat) = 76.75
MD (Potatoes) = 59.74

9.3 Crop adjusted available water is calculated by reference to the total available water and easily available water which is calculated by reference to soil texture and structural condition and the stone content. The moisture balance was calculated for the trial pit locations and the locations where droughtiness was considered likely to be a limiting factor and can be found at ***appendix 4***

9.4 The very shallow soils and high stone count at sample points 23 and 24 result in droughtiness being the most limiting factor inthis area.

10. AGRICULTURAL LAND CLASSIFICATION

10.1 The Agricultural Land Classification provides a framework for classifying land according to which its physical or chemical characteristics impose long-term limitations on agricultural use. The limitations can operate in one or more of four principle ways: they may affect the range of crops that can be grown, the level of yield, the consistency of yield and the cost of obtaining it.

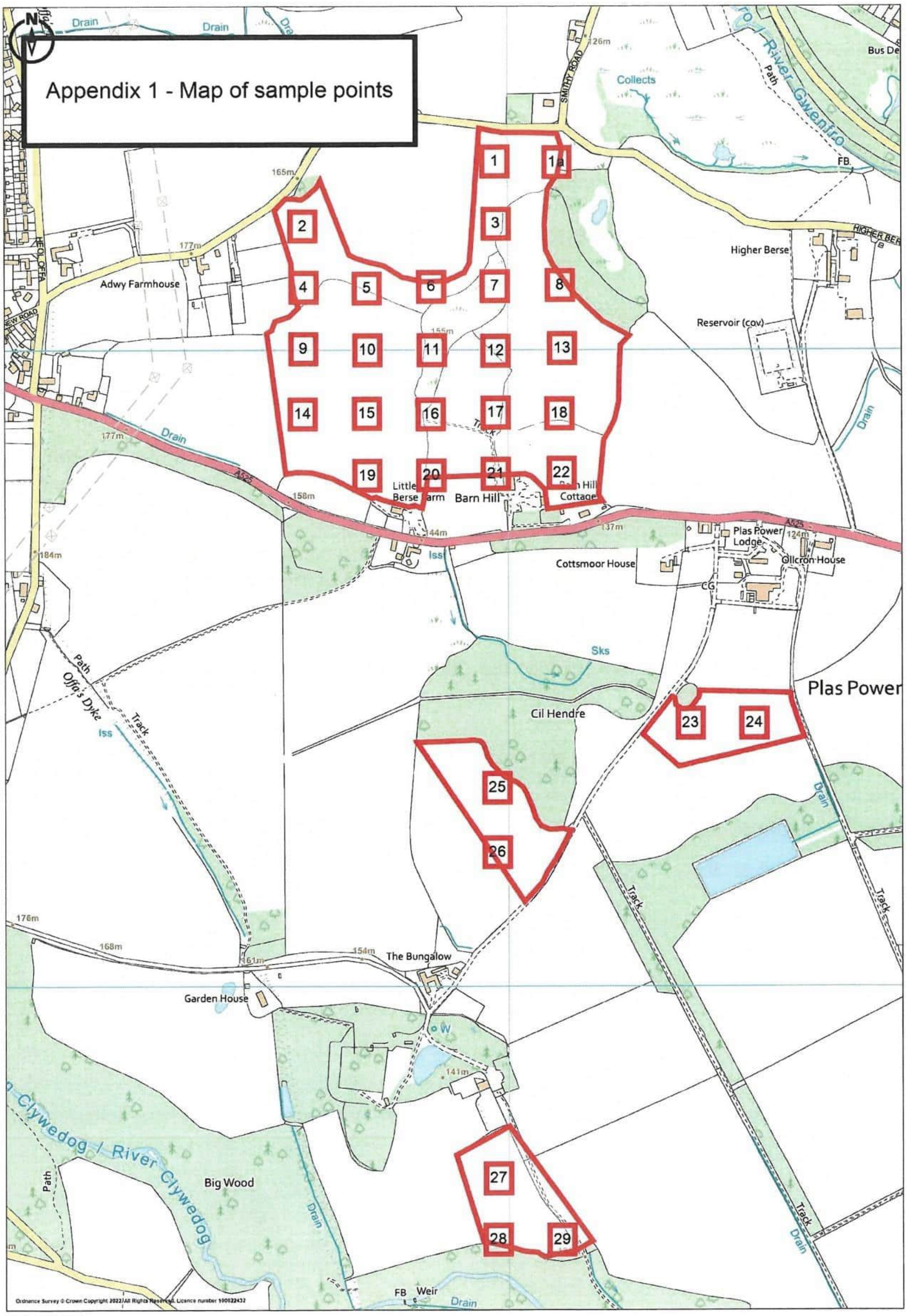
10.2 The principle physical factors influencing agricultural production are climate, site and soil and the interactions between them which together form the basis for classifying land into one of 5 grades; grade 1 being of excellent quality and grade 5 being land of very poor quality. Grade 3 land, which constitutes approximately half of all agricultural land in the United Kingdom is divided into 2 subgrades – 3a and 3b. A full definition of all of the grades can be found at ***appendix 5.***

10.3 This assessment sets out that the site is variously limited by both wetness and droughtiness.

10.4 The breakdown of land by classification is:

Grade 3a:	1.6 Ha	6.4%
Grade 3b:	21.5 Ha	83.7%
Grade 4:	2.0 Ha	7.9%

10.5 A plan of the land grading can be found at ***appendix 6***.



Promap
LANDMARK INFORMATION

Plotted Scale - 1:8000. Paper Size - A4

Appendix 2 – Climatic Data

Site Details: Plas Power

Grid reference (centre of site): 330019 350727

Altitude: Mean 153.17m AOD

Climatic data from surrounding locations:

Grid Reference	ALT	AAR	LR_AAR	ASR	ATO	ATS	MDW	MDP	FCD
33003500	112	903	0.8	400	1348	2246	83	68	204
33003550	95	790	0.7	375	1365	2265	89	76	183
33503500	65	754	1.1	340	1403	2309	100	89	175
33503550	61	751	1	340	1405	2311	100	89	173

Altitude Adjusted

Grid Reference	AAR	ATO	FCD	MDW	MDP	Proximity Adjustment
33003500	935.94	1301.07	208.76	76.47	59.40	94.90%
33003550	830.72	1298.69	188.89	80.18	64.38	2.87%
33503500	850.99	1302.49	189.02	84.16	68.21	1.62%
33503550	843.17	1299.93	186.33	84.09	68.10	0.62%

Appendix 3 - Plas Power (Wrexham) - Sep 22

		Topsoil					Subsoil 1						Subsoil 2						Subsoil 3	
Sample No	Altitude	Depth	Texture	Colour	Stoniness	Mottles	Depth	Texture	Colour	Stoniness	Mottles	Structure	Depth	Texture	Colour	Stoniness	Mottles	Structure	Depth	Texture
1	139	0-25	MCL	10YR 3/3	5%		25-50	CL	10YR 4/4	5%	FOB	WMSAB	50-80	CL	10YR 5/3	5%	CO	WMAB	80	IMP
1a	135	0-25	MCL	10YR 3/3	5%		25-60	CL	10YR 5/3	5%	CO	Poor	60	IMP						
2	165	0-30	MCL	10YR 3/3	5%		30-50	CL	10YR 5/3	5%	CO	Poor	50	IMP						
3	140	0-20	MCL	10YR 3/3	5%		20-50	CL	10YR 4/4	5%	FOB	Moderate	50-70	CL	10YR 5/3	5%	CO	Poor	70	IMP
4	164	0-30	MCL	10YR 3/3	5%		30-50	CL	10YR 5/3	5%	CO	Poor	50	IMP						
5	157	0-25	MCL	10YR 3/3	5%		25-50	CL	10YR 5/3	5%	CO	Poor	50	IMP						
6	153	0-30	MCL	10YR 3/3	5%		30-50	CL	10YR 4/4	5%	FOB	Moderate	50-80	CL	10YR 5/3	5%	CO	Poor	80	IMP
7	145	0-30	HCL	10YR 3/3	5%	CO	30-50	CL	10YR 4/4	5%	FOB	Moderate	50-80	CL	10YR 5/3	5%	CO	Poor	80	IMP
8	141	0-30	MCL	10YR 3/3	15%		30-50	CL	10YR 5/3	5%	CO	Poor	50	IMP						
9	164	0-25	MCL	10YR 3/3	10%		25-50	CL	10YR 5/3	5%	CO	Poor	50	IMP						
10	158	0-25	MCL	10YR 3/3	10%		25-50	CL	10YR 5/3	5%	CO	Poor	50	IMP						
11	151	0-30	HCL	10YR 3/3	5%	CO	30-50	CL	10YR 4/4	5%	FOB	Moderate	50-70	CL	10YR 5/3	5%	CO	Poor	70	IMP
12	144	0-30	MCL	10YR 3/3	5%		30-50	CL	10YR 5/3	5%	CO	Poor	50	IMP						
13	143	0-25	MCL	10YR 3/3	15%		25-50	CL	10YR 5/3	5%	CO	Poor	50	IMP						
14	164	0-25	MCL	10YR 3/3	5%		25-50	CL	10YR 5/3	5%	CO	Poor	50	IMP						
15	157	0-25	MCL	10YR 3/3	5%		25-50	CL	10YR 5/3	5%	CO	Poor	50	IMP						
16	151	0-25	MCL	10YR 3/3	10%		25-50	CL	10YR 5/3	5%	CO	Poor	50	IMP						
17	147	0-25	MCL	10YR 3/3	10%		25-80	CL	10YR 5/3	5%	CO	Poor	80	IMP						
18	148	0-30	MCL	10YR 3/3	10%		30-70	CL	10YR 5/3	5%	CO	Poor	70	IMP						
19	168	0-25	MCL	10YR 3/3	15%		25-80	CL	10YR 5/3	5%	CO	Poor	80	IMP						
20	158	0-30	MCL	10YR 3/3	5%	CO	30-80	CL	10YR 5/3	5%	CO	Poor	80	IMP						
21	151	0-30	MCL	10YR 3/3	5%	CO	30-60	CL	10YR 5/3	5%	CO	Poor	60	IMP						
22	148	0-25	MCL	10YR3/3	5%		25-80	CL	10YR 5/3	5%	CO	Poor	80	IMP						
23	132	0-20	MCL	10YR3/3	25%		20	IMP												
24	128	0-15	MCL	10YR 3/3	25%		15	IMP												
25	147	0-30	MCL	10YR 3/3	<5%		30-50	MCL	10YR 5/3	<5%	CO	Poor	50	IMP						
26	143	0-30	MCL	10YR 3/3	5%		30-50	MCL	10YR 5/3	<5%	CO	Poor	50	IMP						
27	134	0-25	MCL	2.5Y 3/3	15%		25-50	MCL	10YR 5/3	<5%	CO	Poor	50	IMP						
28	135	0-30	MCL	2.5Y 3/3	15%		30-50	MCL	10YR 5/3	<5%	CO	Poor	50	IMP						
29	132	0-30	MCL	2.5Y 3/3	15%		30-50	MCL	10YR 5/3	<5%	CO	Poor	50	IMP						
	153.17																			

Appendix 3b – Trial Pit Descriptions

Sample Point No. 1	
Horizon 1	0-25cm Dark brown (10YR 3/3) medium clay loam with 5% small hard subrounded stones
Horizon 2	25-50cm Dark yellowish brown (10YR 4/4) clay Loam with a weak medium subangular blocky structure, firm consistence, few ochreous and black mottles and 5% small hard subrounded stones.
Horizon 3	50-80cm Brown (10YR 5/3) clay loam with a weak medium angular blocky structure, firm consistence, common ochreous mottles and less than 0.5% biopores
Pictures	

Horizon 1	Horizon 2
	

Slowly permeable layer	From 50cm
Gleying	From 50cm
Wetness Class	III
Wetness limitation	3a
MB Wheat	49.94
MB potatoes	48.19
Droughtiness Limitation	1
Soil depth limitation	1
Stoniness limitation	1

Sample Point No. 17	
Horizon 1	0-25cm Dark brown (10YR 3/3) medium clay loam with 5% small hard subrounded stones
Horizon 2	25-50cm Brown (10YR 5/3) clay loam with a weak medium angular blocky structure, firm consistence and less than 0.5% biopores
Pictures	

Horizon 1	Horizon 2
	

Slowly permeable layer	From 25cm
Gleying	From 25cm
Wetness Class	IV
Wetness limitation	3b
MB Wheat	3.39
MB potatoes	24.19
Droughtiness Limitation	2
Soil depth limitation	1
Stoniness limitation	1

Sample Point No. 23	
Horizon 1	0-20cm Dark brown (10YR 3/3) medium clay loam with 25% medium and large hard subangular tabular stones
Horizon 2	20cm – Impenetrable due to rock layer
Pictures	

Horizon 1

Slowly permeable layer	None
Gleying	None
Wetness Class	I
Wetness limitation	1
MB Wheat	-49.56
MB potatoes	-59.81
Droughtiness Limitation	4
Soil depth limitation	3b
Stoniness limitation	4

Sample Point No. 25	
Horizon 1	0-25cm Dark brown (10YR 3/3) medium clay loam with 5% small hard subrounded stones
Horizon 2	25-50cm Brown (10YR 5/3) clay loam with a weak medium angular blocky structure, firm consistence and less than 0.5% biopores
Pictures	
Horizon 1	Horizon 2
	
Slowly permeable layer	From 25cm
Gleying	From 25cm
Wetness Class	IV
Wetness limitation	3b
MB Wheat	3.39
MB potatoes	24.19
Droughtiness Limitation	2
Soil depth limitation	1
Stoniness limitation	1

ANALYTICAL REPORT

Report Number	**34263-22**	**W250**	**AMET PROPERTY**
Date Received	**15-SEP-2022**		**HENWICK BARN**
Date Reported	**27-SEP-2022**		**BULWICK**
Project	**SOIL**		**CORBY**
Reference	**AMET PROPERTY**		**NORTHANTS**
Order Number			**NN17 3DU**

Laboratory Reference		**SOIL578904**	**SOIL578905**	**SOIL578906**	**SOIL578907**						
Sample Reference		**PLAS 25TS**	**PLAS 25SS**	**PLAS 1ATS**	**PLAS 20TS**						
Determinand	**Unit**	**SOIL**	**SOIL**	**SOIL**	**SOIL**						
Coarse Sand 2.00-0.63mm	% w/w	7	6	10	6						
Medium Sand 0.63-0.212mm	% w/w	12	16	14	16						
Fine Sand 0.212-0.063mm	% w/w	18	19	16	18						
Silt 0.063-0.002mm	% w/w	38	38	37	38						
Clay <0.002mm	% w/w	25	21	23	22						
Stones >50mm	% w/w	0.0	0.0	0.0	0.0						
Stones 20-50mm	% w/w	2.0	0.0	0.0	1.5						
Stones 2-20mm	% w/w	0.9	1.9	2.6	1.8						
Organic Matter LOI	% w/w	5.1	3.2	7.5	6.2						
Neutralising Value as CaCO3 eq.	% w/w	<1	<1	1.7	1.0						
Neutralising Value as CaO eq.	% w/w	<1	<1	<1	<1						
Textural Class **		MCL	MCL	MCL	MCL						

Notes

Analysis Notes	The sample submitted was of adequate size to complete all analysis requested. The results as reported relate only to the item(s) submitted for testing. The results are presented on a dry matter basis unless otherwise stipulated.
Document Control	**This test report shall not be reproduced, except in full, without the written approval of the laboratory.**

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ANALYTICAL NOTES		
Report Number	**34263-22**	**W250 AMET PROPERTY**
Date Received	**15-SEP-2022**	**HENWICK BARN**
Date Reported	**27-SEP-2022**	**BULWICK**
Project	**SOIL**	**CORBY**
Reference	**AMET PROPERTY**	**NORTHANTS**
Order Number		**NN17 3DU**
Notes		
Reported by	** Please see the attached document for the definition of textural classes. *Myles Nicholson* Natural Resource Management, a trading division of Cawood Scientific Ltd. Coopers Bridge, Braziers Lane, Bracknell, Berkshire, RG42 6NS Tel: 01344 886338 Fax: 01344 890972 email: enquiries@nrm.uk.com	

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ADAS (UK) Textural Class Abbreviations

The texture classes are denoted by the following abbreviations:

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

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

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

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

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

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

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

Appendix 4 - Wetness and droughtiness assesment

	Wetness Assesment			Grade	Grade by
	Depth to		Wetness	According to	most limiting
Sample No	SPL	Gley	Class	Wetness	factor
1	50	40-70	III	3a	3a
1a	25	<40	IV	3b	3b
2	30	<40	IV	3b	3b
3	50	40-70	III	3a	3a
4	30	<40	IV	3b	3b
5	25	<40	IV	3b	3b
6	50	40-70	III	3a	3a
7	50	40-70	III	3b	3b
8	30	<40	IV	3b	3b
9	25	<40	IV	3b	3b
10	25	<40	IV	3b	3b
11	50	40-70	III	3b	3b
12	30	<40	IV	3b	3b
13	25	<40	IV	3b	3b
14	25	<40	IV	3b	3b
15	25	<40	IV	3b	3b
16	25	<40	IV	3b	3b
17	25	<40	IV	3b	3b
18	30	<40	IV	3b	3b
19	25	<40	IV	3b	3b
20	30	<40	IV	3b	3b
21	30	<40	IV	3b	3b
22	25	<40	IV	3b	3b
23			I	2	4
24			I	2	4
25	30	<40	IV	3b	3b
26	30	<40	IV	3b	3b
27	25	<40	IV	3b	3b
28	30	<40	IV	3b	3b
29	30	<40	IV	3b	3b

Appendix 5 - Description of ALC Grades

Grade 1 - excellent quality agricultural land Land with no or very minor limitations to agricultural use. A very wide range of agricultural and horticultural crops can be grown and commonly includes top fruit, soft fruit, salad crops and winter harvested vegetables. Yields are high and less variable than on land of lower quality.

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

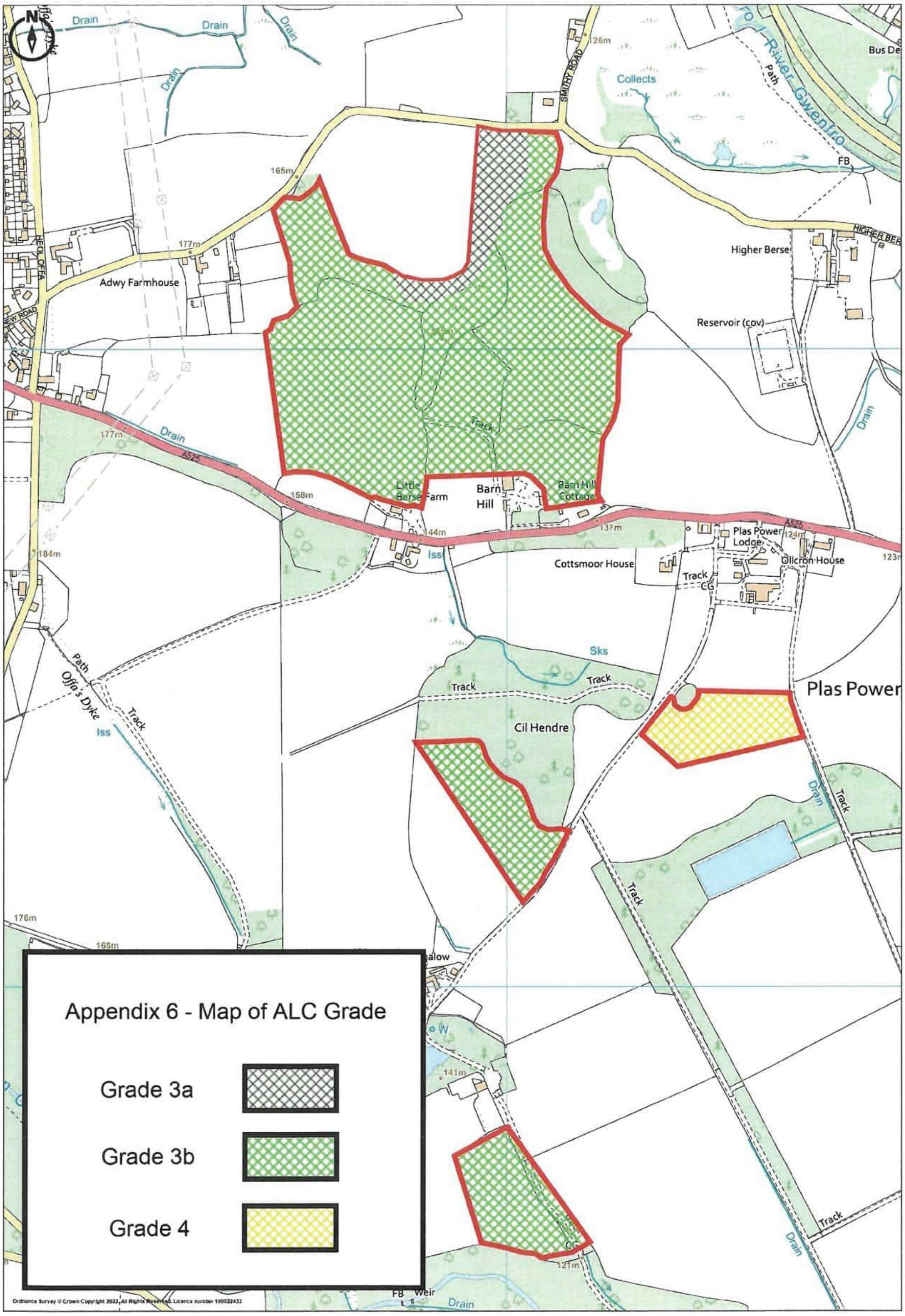
Grade 3 - good to moderate quality agricultural land Land with moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. Where more demanding crops are grown yields are generally lower or more variable than on land in Grades 1 and 2.

Subgrade 3a - good quality agricultural land Land capable of consistently producing moderate to high yields of a narrow range of arable crops, especially cereals, or moderate yields of a wide range of crops including cereals, grass, oilseed rape, potatoes, sugar beet and the less demanding horticultural crops.

Subgrade 3b - moderate quality agricultural land Land capable of producing moderate yields of a narrow range of crops, principally cereals and grass or lower yields of a wider range of crops or high yields of grass which can be grazed or harvested over most of the year.

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

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



Promap
LANDMARK INFORMATION

Plotted Scale - **1:8000**. Paper Size - **A4**

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