



LIGHTSOURCE
RENEWABLE ENERGY LIMITED

PLANNING, DESIGN AND ACCESS STATEMENT

SOLAR PHOTOVOLTAIC INSTALLATION



LAND TO THE WEST OF DELPH ROAD,
PEN-Y-CAE, WREXHAM, LL14 1TU

DOC REFERENCE: Land West of Delph
Road

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Lightsource Renewable Energy Limited
Level 7, 33 Holborn
London
EC1N 2HT

Company Number 7129343

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Prepared by	Jessica Gittoes	Position	Senior Planner
Reviewed by	Penelope Laurenson MRTPI	Position	Planning Manager

EXECUTIVE SUMMARY

- The proposal is for a 5MW solar farm, capable of generating enough clean electricity to power 1300 typical households.
- The solar farm would avoid 2200 tonnes of carbon dioxide emissions associated with electricity generation each year, thus reducing the carbon footprint of Cefn and Pen-y-Cae. This is the equivalent of 500 cars off the road.
- The proposed solar farm will not have any significant adverse impact on landscape, ecology or hydrology. It is envisaged that the proposal will:
 - integrate into the surrounding landscape through the intervening topography, existing landscape features; proposed new planting and low profile nature of the site;
 - provide a net gain of biodiversity through a number of appropriate mitigation and sensitive design measures, and a wide range of enhancement measures set out in the biodiversity management plan;
 - manage the disposal of surface water runoff through a sustainable drainage strategy, involving implementation of swales.
- The Landscape and Visual Impact Assessment (LVIA) demonstrates the proposed development will be successfully accommodated within the existing landscape without causing any unacceptable long-term harm to the landscape character, visual amenity or existing landscape attributes of the area. The intervening topography, built form and landscape features make this site suitable for the development. The low profile of the panels means they will not be easily perceptible in the majority of views from public viewpoints and the layering effects of intervening existing mature boundary vegetation and structures will successfully integrate them into the landscape.
- The Ecology Appraisal considers the potential for impacts on birds, terrestrial mammals, amphibians, reptiles and invertebrates. Overall impacts are considered to be negligible and with appropriate mitigation and sensitive design measures, impacts on protected and notable species will be avoided. Assessment results show the current arable land use is of low ecological value. The inclusion of habitat enhancement measures such as the seeding and management of structured grassland, planting of new native hedgerows and new tree belt with understorey will serve to provide a net biodiversity gain at a local level.
- The Drainage Strategy and Flood Consequence Assessment, concludes the implementation of Sustainable Drainage Systems (SuDS) in the form of swales, will effectively manage disposal of surface water runoff from the proposed development.
- The Heritage Asset Settings Impact Assessment assesses the effects of proposed development on a heritage asset. Six listed buildings, one Conservation Area, and a small portion of the buffer zone of the Pontcysyllte Aqueduct and Canal World Heritage Site (WHS) lie within 1km of the site. Of these assets, there is a potential for a negligible effect on the significance of Wynn Hall (Grade II* Listed Building), Former Vicarage at Pen-y-Cae (Grade II Listed Building), Pen-y-Cae Conservation Area, and the WHS. No impacts are identified for other heritage assets.

- Mining Instability Review concludes the site stability status cannot fully be determined due to availability of data. In order to confirm the stability of the ground conditions a suitable survey is scheduled to be carried out and the results issued to the Council.
- Sheep will be grazed under and between the rows of solar panels, which allows for a dual productive use of the site, through the generation of renewable energy and the continued agricultural use of the land.
- At the end of the solar farm's life, the site will be decommissioned, with all infrastructure removed from the site, and the site restored to its original condition for future agricultural use.
- The majority of the components of the solar farm can be recycled or reused at the end of the solar farms operational life.
- The proposed solar farm is consistent with national and local policy, and will contribute to the country's renewable energy generation targets.

1 INTRODUCTION

1.1 GENERAL

This planning, design and access statement has been prepared in support of a planning application for full temporary permission for the development of a ground mounted photovoltaic (PV) solar energy generation system (solar farm). The solar farm has been designed to accommodate sheep grazing on site, thus providing a dual productive function of renewable energy generation and agricultural production.

The site is located at Land to the West of Delph Road, Pen-y-Cae, Wrexham, LL14 1TU. The application area is 10.5ha in size being part of a larger 42ha field. It is proposed to install solar modules covering approximately 3ha. The reason the proposed solar panels and associated infrastructure will cover only 28.5% of the site is that sufficient gaps must be provided between the rows of panels, to avoid one row shading another, and sufficient setbacks need to be provided from boundary vegetation, particularly on the southern boundary to avoid shading. The design of the proposed Layout Plan has been prepared to maximise energy production within the available area of land, taking into account the site specific constraints. The grassy avenues between the rows of panels, and the grass growing beneath the panels, will be grazed by sheep.

The purpose of the development is to convert daylight into electricity. This solar development will have a generation capacity of approximately 5 megawatts (MW), which is enough to power 1300 typical homes¹, and save approximately 2200 tonnes in CO₂ emissions per annum – the equivalent of removing 500 standard cars from the road each year.

1.2 APPLICATION STRUCTURE

This Planning and Design and Access Statement is accompanied by the following reports:

- Landscape and Visual Impact Assessment
- Ecological Appraisal
- Biodiversity Management Plan
- Archaeological Desk Based Assessment
- Heritage Asset Settings Impact Assessment
- Drainage Strategy and Flood Consequence Assessment
- Construction, Decommissioning and Traffic Management Method Statement
- Transport Statement
- Mining Instability Review
- Statement of Community Involvement

¹The intensity and duration of daylight levels in any given location is steady and predictable when compared year on year (though obviously this fluctuates throughout the year). Therefore the annual daylight levels in a given location can be estimated relatively accurately without extensive prior monitoring (as required for wind turbines). Determining the number of typical households that a solar farm will generate electricity for is a simple calculation whereby the average yearly daylight yield is multiplied by the energy output capacity of the solar panels (minus expected losses, which varies around the country depending on the quality of the grid, but is typically around 10%). This number is then divided by 3,300kwh, which is the Ofgem stated national average for yearly electricity usage for a typical household in the UK.

We use the average number of households the solar farm is likely to generate power for annually as a representative figure to put the capacity in to perspective. Of course, the electricity will be used by a mix of residential dwellings, businesses, factories and farming operations depending on the demand from nearby energy users at any given time of day.

- Agricultural Land Classification

The following plans are also enclosed:

- Layout Plan
- Topographic Survey
- Mounting Frame and Panel Elevation
- Fence Elevation
- Inverter Elevation
- Transformer Elevation
- Switchgear Elevation
- CCTV Camera Elevation
- Site Aux Transformer Elevation
- Communications Building Elevation
- Storage Building Elevation
- DNO Building Elevation
- Client Side Substation Elevation

1.3 THE NEED FOR RENEWABLE ENERGY IN THE UK

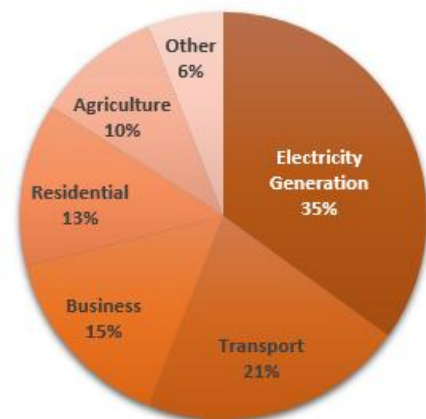
Energy generation is required to meet the electricity demands of households, businesses, factories and services in the UK. The availability of electricity is fundamental to supporting the modern way of life. Aside from the very few living off-grid, the majority of us require on-demand electricity both in our homes and businesses, and electricity black outs cause significant disruptions.

A significant proportion of UK electricity supply is generated from fossil fuels. Declining reserves of fossil fuels in the UK Continental Shelf are making the UK increasingly reliant on imports at a time of increased global demand.² Around a fifth of power stations in the UK are due to close within this decade as they come to the end of their operational lives or are deemed too polluting.³

With a large proportion of the UK's energy being generated from fossil fuels, we are exposed to potential energy security issues, including fluctuating international market prices and disruptions to fuel supplies through geopolitical conflicts.

Our reliance on fossil fuels also makes us one of the world's more prolific emitters of greenhouse gases and other pollutants. Based on 2013 figures, the UK is the 12th largest emitter of carbon dioxide in the world.⁴

In 2012, the single largest contributor to these emissions was the electricity generation sector which creates 35% of the



² Department of Energy and Climate Change (2012) *Energy Security Strategy*, www.decc.gov.uk

³ Department of Energy and Climate Change (2012) *Energy Security Strategy*, www.decc.gov.uk

⁴ European Joint Research Centre and Netherlands Environmental Assessment Agency (2015) *EDGAR – CO2 time series 1990 – 2013 per Region/Country*

UK's carbon emissions, with the transport sector in second place at 21%.⁵ The pie chart opposite shows the UK carbon emissions breakdown by sector.

The UK Government is committed to meeting its legally binding targets for reducing the country's carbon footprint, and a key component of this strategy is increasing the levels of renewable energy generation in the UK. This will also have the benefit of insulating the UK from volatility in the global fossil fuel markets, by increasing our energy self-sufficiency.

These two key reasons (security of supply and carbon dioxide footprint reduction) for increasing our renewable electricity generation capacity are well recognised by the Government, and as discussed later in this report, the NPPF clearly states that applicants are not required to demonstrate the overall need for renewable or low carbon energy in the UK.

Solar PV is a proven technology⁶ – having been in commercial production since the 1950s – and it has a significant role to play in increasing the capacity of our electricity generation from renewable sources.

1.4 ABOUT LIGHTSOURCE

Lightsource Renewable Energy Ltd (Lightsource) is the United Kingdom's leading solar energy generator. We are primarily focused on utility scale ground and roof mounted photovoltaic installations, which we maintain and operate, selling the electricity generated either for use on the national grid network, or directly to a specific high energy user. We have also installed solar panels on the roofs of over 100 schools across the United Kingdom, providing them with clean energy as well as a learning resource kit.

Lightsource are committed to the long term maintenance of our solar farms, we have internal Asset Management and Operations and Maintenance teams, with regionally based staff who manage all of our built assets.

For more information on Lightsource and our existing portfolio of solar sites please visit our website: www.lightsource-re.co.uk.

⁵ Source: Department of Energy and Climate Change (2014) *Statistical Release: 2012 UK Greenhouse Gas Emissions, Final Figures*

⁶ It is sometimes quoted that solar panels have a low efficiency. What this is referring to is the ratio of actual energy produced versus potential energy generation if the sun stayed at the midday position 24 hours a day. Obviously daylight levels vary throughout the day, growing stronger toward midday, and weaker at sunrise and sunset – this does not mean that solar panels themselves are inefficient – it is just the natural limitation on the amount of energy they are realistically able to produce from natural daylight, compared to the amount they would be able to produce if daylight levels were always at their peak.

2 SITE DEVELOPMENT

2.1 SITE SELECTION

Site selection is critical to ensuring that an efficient, technically and economically viable solar farm can be developed without causing significant adverse environmental impacts.

Of the hundreds of potential sites we assess every year at Lightsource, we proceed to planning with less than 10% of these, with the other 90% either unviable technically, unable to achieve grid connection, or considered inappropriate from a planning policy and environmental impact point of view. The stages of our site selection process are detailed below.

2.1.1 PHASE 1: DESKTOP ASSESSMENT

Our site selection process begins with a detailed desktop assessment assessing the following four critical criteria:

1. Technical suitability of the site for operating a solar PV system
 - o Site size (minimum of 20acres)
 - o Irradiation (daylight) levels and potential energy yield
 - o Orientation and topography
 - o Access point
2. Grid connection feasibility
 - o Availability of grid capacity
 - o Proximity of nearest overhead line (11/33kV)
 - o Likely ease/difficulty of accessing grid connection point
3. Planning Issues
 - o National and Local level designations (landscape, ecology, heritage)
 - o Heritage assets
 - o Flood risk
 - o Agricultural land grading
 - o Neighbouring land uses
 - o Potential visual receptors
4. Site Availability
 - o Landlord willing to rent/sell land for a solar farm development

At the desktop stage, the following area was assessed:



A site visit was recommended for the entire area.

2.1.2 PHASE 2: SITE VISIT

For sites that pass the desktop assessment, we then undertake site visits to further assess the suitability of the site. A key focus for the site visit is assessing the potential a site has for unacceptable visual impact. Other criteria assessed on site include:

1. Technical suitability of the site for operating a solar PV system
 - o Confirmation of site orientation and topography
 - o On-site shading
 - o Confirmation of appropriate access for construction traffic
2. Grid connection feasibility
 - o Proximity of nearest overhead line (11/33kV)
3. Planning Issues
 - o Actual visual receptors, and extent of site visibility
 - o Potential for additional planting to screen views
 - o Flora and fauna
4. Site Availability
 - o Meeting with the landlord

The following area was assessed during the site visit:



All the fields in the western section of the site were discarded following the site visit. It was determined that the topography of these fields had a greater potential for visual impact to sensitive receptors such as heritage assets, surrounding properties and footpaths. The lower lying and visually contained nature of the eastern fields were a key reason for progressing these fields.

2.1.3 PHASE 3: PLANNING AND GRID APPLICATIONS

Based on a favourable desktop assessment and site visit, the decision was made to begin preparation of the planning application, and to submit the grid application.

The below aerial shows the fields that were assessed for the technical reports accompanying this planning application.



An appraisal of the subject site taken forward in this planning application is provided in Section 3.

2.2 PRE-APPLICATION ENGAGEMENT WITH THE COUNCIL

We began our site specific pre-application engagement by producing an indicative layout and writing to Wrexham Borough Council to formally request a Screening Opinion to determine the requirement for an Environmental Impact Assessment (EIA) to accompany a planning application for the proposed solar farm.

As required under Regulation 5 of the Town and Country Planning (Environmental Impact Assessment) (England & Wales) Regulations 2011 (as amended), a site location plan and description of the proposal was included in the written documentation and submitted in December 2014. The Council's Screening Opinion determined that an Environmental Statement was not required for the proposal (Council ref: ENQ/2014 /0397).

This application is accompanied by a Statement of Community Involvement, which sets out the pre-application engagement undertaken with the local community and other stakeholders.

3 SITE CONTEXT

3.1 SITE DESCRIPTION

The 10.5ha field is currently used for grazing stock. The site has the following characteristics:

- In the past, the site area has been actively worked for coal extraction by mining. Major landscape remodelling evidently took place sometime between 1985 and 1994 at the site and surrounding areas comprising the backfilling of the opencast mine and the re-shaping of the entire hillside slope. During this period the local road pattern was altered to the current layout.
- The site gently slopes to the southwest from Delph Road, then the landform gradually begins to rise towards the horizon from the western boundary.
- A formal Agricultural Land Classification survey has identified the fields as being subgrade 4.
- The site predominantly comprises intensively managed grassland in an agricultural landscape with low species diversity. A mix of intact and defunct and largely species poor hedgerows bound the fields and part of the site. A strip of young plantation mixed woodland bounds the site to the north and east. Two other smaller areas of young mixed plantation woodland are present along the site boundary to the west.
- There are no water features or bodies within the site, however there is a large artificial pond 20m to the south.

3.2 LOCAL CONTEXT

The site is located within an agricultural setting which was historically a mining area. The local area has the following characteristics:

- The site is bounded to the east and north by Delph Road and an existing belt of vegetation. To the west and south a mixture of hedgerow and woodland characterise the boundaries.
- The village of Acrefair is approximately 600m to the south of the site and the nearby village of Pen-y-Cae is 1.2km to the north-west. The larger settlements of Ruabon and Cefn Mawr lie approximately 2.28 km to the east and 1.71 km to the south respectively. To the east and west of the site, areas of remnant extractive activity is scattered throughout the landscape.
- The western edge of the Clwydian Range and Dee Valley Area of Outstanding Natural Beauty (AONB) is situated approximately 1.52 km from the site. The site is locally designated as a Green Barrier and in close proximity to a Special Landscape Area (SLA) known as Ardunel Tirlum Arbenning.
- The site does not form part of any statutory or non-statutory designated site for nature conservation. One SSSI is located within 5km of the site boundary, three SAC within 10km and five non-statutory designated sites located within 2km.
- Six Grade II Listed Buildings are within 1km of the site, located in Pen-y-Cae or at Wynn Hall. Two Grade II* Listed Buildings are located 1.5km southeast and 1.8km east of the site. There are no Scheduled Monuments within 1km of the site. Within 5km of the site, there are three

Conservation Areas, Pen-y-Cae, Ruabon (Rhiwabon) and Pontcysyllte Aqueduct. Pen-y-Cae Conservation Area lies 850m north of the site. The Pontcysyllte Aqueduct and Canal WHS lies 2.6km south-south-west of the site at its closest. Much of the canal runs through the south-west quadrant of the 5km study area around the site, lying between 2km and 5km from the site boundary.

- A residential property exists adjacent to the southern boundary and has partial views into the site through an existing mature hedgerow. A further two residential properties are located approximately 70m to the east and southeast however have no views into the site due to existing vegetation.

Detailed descriptions of the visual, ecological, and archaeological setting of the site are provided in the relevant reports accompanying this application.

4 PROPOSED DEVELOPMENT

4.1 PROPOSED USE

Lightsource proposes to install and operate an array of photovoltaic (PV) solar panels on the site, as shown in the accompanying Layout Plan, to convert daylight into electricity. The PV panels will have an energy generation capacity of approximately 5MW, and will output electricity equivalent to the power requirements of 1300 typical households per year. The energy generated will be fed directly into the local power grid network for use by the nearest points of demand.

The solar farm will be a temporary, medium term, use of the site. At the end of its operational life (approximately 30 to 35 years), all equipment associated with the solar farm will be removed from the site, and minor remediation works undertaken to backfill any excavated areas.

4.2 CHARACTER

As demonstrated in Section 2, Lightsource undertakes a robust site selection process to ensure that the siting of the solar farm has a minimal visual and environmental impact on its surroundings. Appropriate design considerations, together with a comprehensive landscaping scheme, serve to sustain and enhance the local character of the area whilst also increasing the ecological value of the site.

4.2.1 DESIGN COMPONENTS

The solar farm will be comprised of the following components, shown in the Layout Plan and Elevations, all of which are designed and warranted to last at least 25 years.

Solar Panels: Solar PV panels, with a combined energy generation capacity of approximately 5MW, will be installed. The panels will be approximately 1.959m x 0.995m x 0.05m.

The mounted solar panels will have a maximum height of 2.5m above ground level and at the lower end will be 800mm above the ground, allowing for sheep to graze the grass beneath the panels.

The glass surfaced panels are coated to maximise daylight absorption, and thus minimise glare potential.

Mounting Frames: The panels will be attached in a 4 in landscape configuration to mounting frames at an angle of between 20-30 degrees, to optimise daylight capture. The panels are fixed in place and will not move to 'track' the sun. The mounting frames will be made of either galvanized aluminium or steel and will have a rough matt finish, rather than a polished finish.

The mounting frames are pile driven into the ground, and no concrete foundations are required.



Ninnis Solar Farm, Cornwall



Frame structures prior to attachment of panels

The base of the frame piles are thin 'H' or 'Z' shapes, thus they have very little impact on the ground and do not require any prior excavation. The frames are driven to a depth of approximately 1.5m. At the end of their operational life when the site is decommissioned, the frame piles are simply pulled out from the ground causing minimal ground disturbance.

Inverters: The panels generate Direct Current (DC) electricity which must be converted into Alternating Current (AC) before being feed into the local electricity grid network.

Central inverters are housed in a cabin like structure of approximately 3m high x 5m long x 2m wide and painted green. The Central Inverter is mounted on a concrete base. A total of 3 inverters are required, as shown in the Layout Plan.



Inverter Building, Hatchlands Solar Farm, Devon

Transformers: The transformer transforms electrical energy from one circuit to another, and allows for the energy generated to be fed into the local grid network. The transformer is housed separately from the Inverters, in a green cabin approximately 3m high x 6m long x 3m wide. A total of 2 transformers are required as shown on the Layout Plan.



Inverter (centre), Little Trevease Solar Farm, Cornwall

Switchgear Substations: Substations are the onsite point of connection from where electricity flows into the grid network via the connection cable. The substation houses the site switchgear which acts as a safety mechanism to protect the solar farm from any fault in the grid network and vice versa. It disconnects electrical circuits if there is a fault in the system, much like a household fuse box.

Two sets of switchgear are required, one to shut the grid off from the solar farm (referred to as the DNO Substation) and a second to shut the solar farm off from the grid (referred to as the Client Side or Customer Substation).

The DNO requires a security light to be affixed to the exterior of the DNO substation for health and safety reasons – if an emergency repair crew is required in hours of darkness the light allows them to safely access the substation to undertake the repair work. The motion sensor light only activates when the substation is approached; it will not be illuminated on a permanent basis. No other site lighting is required or proposed.



DNO Substation, Little Trevease Cornwall



Customer Substation, Tavells Farm, Hampshire

Perimeter Fence: A 2m high agricultural timber and wire fence will be installed around the solar farm. This fence type has been selected for its appropriateness in a rural setting, and its visual permeability.

The purpose of the fence is to deter theft or vandalism, and prevent unauthorised access to the solar farm. The solar farm will be an unmanned site, and whilst solar farms are safe and we regularly take educational tours through our operational sites, it is important that unauthorised or unaccompanied access is prevented in case there is a fault in the system that presents a health or safety risk.



Fence at Tavells Solar Farm, Hampshire

Security Cameras: In order to monitor the site and detect any unauthorised access, motion sensor CCTV cameras will be erected around the site perimeter on poles of approximately 3 metres in height as shown on the Layout Plan. The cameras are directed into the solar farm, avoiding impinging on the privacy of nearby properties, and employ infrared technology so no lighting is required.



CCTV camera in left hand corner of above photo.

Communications Building: A communications building is required to enable 24hour remote monitoring of performance and security. The monitoring equipment rapidly identifies any faults, as well as relaying security camera footage. The proposed building will measure approximately 4m in length x 3m in width and 2.5m in height. An aerial of satellite dish may be affixed to the cabinet if reception issues necessitate it.



Communications Building, Little Trevease, Cornwall

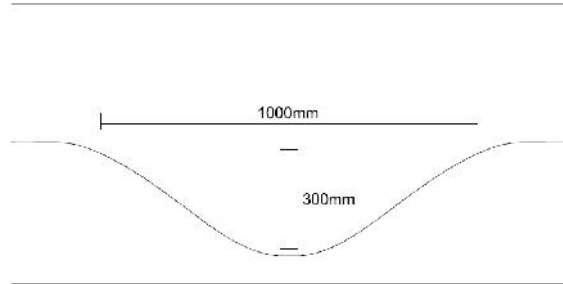
Composting Toilet

A composting toilet is provided on site for Operations and Maintenance staff, and for tours of the site by community groups, schools or councillors. The toilet is waterless, chemical free and self-composting, made from sustainably logged wood, thus it is compatible with the environmental aims of the development. The toilet uses a dehydration process resulting in an odour free compost which is collected annually for further processing off-site.



Swale: It is proposed to construct a swale to improve runoff and reduce flood risk on site.

The location of the proposed swale is shown at Appendix 6 of the Drainage Strategy and Flood Consequence Assessment, and the cross section opposite provides the elevation.



The rows of the panel arrays will form a regular pattern, and the grass growing beneath and between the rows of panels will help to green the appearance of the site. The intention is to minimise views of the scheme such that it blends into the landscape. Although solar farms consist of built infrastructure mixed with natural elements, they are not necessarily unattractive, and can form features of interest.

Visual montages showing “before” views and “after” visual simulations of what the proposed development will look like are included with the accompanying Landscape and Visual Impact Assessment. The below photos show examples of some of Lightsource’s operational solar farms, to show what solar farms look like. Lightsource is happy to take Council staff and Councillors to visit one of our operational solar farms should they wish, so that they are able to see one close up and gain an appreciation for what the proposed development will look like once constructed.



Higher Pirzwell Solar Farm, Devon



Barton Solar Farm, Devon



Ninnis Solar Farm, Cornwall



Benbole Solar Farm, Cornwall

4.2.2 LAYOUT

The proposed Layout submitted with this application has been prepared by Lightsource’s in house Technical Team to make the most efficient use of the land available, whilst taking into account on site features such as shading from boundary vegetation and woodland and accommodating grazing.

If planning permission is granted, then Lightsource will engage a specialist Engineering, Procurement and Construction (EPC) firm to prepare the final detailed design layout and construct the solar farm,

and will also finalise details with the Distribution Network Operator for their substation. The proposed Layout and elevations are based on informed assumptions of the most likely options for equipment and their positioning, however it may be that availability of equipment, or specific site requirements, mean that the final detailed design differs in some minor respects from the proposed layout. To address this, Lightsource proposes a Condition as outlined in Section 4.6 of this report.

The total area of the development will be 10.5 hectares, with the area of ground covered by the rows of solar panels and associated infrastructure totalling 28.5% of the site area; the remainder of the site being grassed land constituting the gaps between the rows of solar panels, and between the fence and the solar farm.

The plans accompanying this application include:

- Layout Plan
- Topographic Survey
- Mounting Frame and Panel Elevation
- Fence Elevation
- Inverter Elevation
- Transformer Elevation
- Switchgear Elevation
- CCTV Camera Elevation
- Site Aux Transformer Elevation
- Communications Building Elevation
- Storage Building Elevation
- DNO Building Elevation
- Client Side Substation Elevation

4.2.3 LANDSCAPE AND VISUAL IMPACT

The main impact associated with solar farms is the visible change to the site within which it is built. It is considered that the combination of retention and enhancement of existing planting, together with proposed new planting, will result in a strong landscape framework for the proposed development which in the longer term will enhance the landscape of the existing site.

The site is not covered by any statutory landscape designations. The site is locally designated as a Green Barrier and is in close proximity to a SLA. Within 1.5 km of the site lies Clywdian Range and Dee Valley AONB. Based on the analysis within the LVIA it is anticipated that the proposed development will be partly visible from the AONB and the SLA. However the majority of views from these designated landscapes are partial only and screened by the existing landform and intervening vegetation and built form. Whilst the wider landscape surrounding the site, is primarily agricultural in nature, it is punctuated by and already accommodates a wide range of human influences and infrastructure. The presence of existing infrastructure and development within the wider landscape, including that of the SLA and AONB is demonstrable of the fact that the wider landscape is quite capable of accepting infrastructure in its rural setting. In this context, the character, appearance and amenity of the local landscape will continue to prevail with the proposed solar farm development in place. The effects on visual amenity within these areas are therefore considerably reduced.

A planting plan included within the accompanying LVIA details the proposed landscaping work. The landscaping includes new hedgerow planting to infill gaps in existing vegetation along the southern boundary and internal field boundaries and a new tree belt with understorey along the eastern boundary. Planting will take place in the first planting season following completion of the solar farm.

4.2.4 CULTURAL HERITAGE

The Heritage Assets Settings Impact Assessment confirms no designated archaeological assets of national significance are recorded within the site itself. Six listed buildings, one Conservation Area, and a small portion of the buffer zone of the Pontcysyllte Aqueduct and Canal WHS lie within 1km of the site. Of these assets, there is a potential for a negligible effect on the significance of Wynn Hall (Grade II* Listed Building), Former Vicarage at Pen-y-Cae (Grade II Listed Building), Pen-y-Cae Conservation Area, and the WHS. No impacts are identified for the other assets. Regarding the WHS in particular, it is not considered, that the scale of any potential effect will undermine the Outstanding Universal Values (OUV) which define the WHS. This is discussed further section 7.3 Local Planning Policy.

Within the wider area, between 1km and 5km from the site, conservation areas, listed buildings of Grades I and II*, Scheduled Monuments, Registered Parks and Gardens, and Registered Historic Landscapes have been assessed for potential impacts on their settings. As a result of distance from the site, intervening topography, vegetation and urban areas, it is considered that no more than a negligible effect on the significance of the following assets will arise as a result of the proposed development: Wat's Dyke (Scheduled Monument), Ruabon Mountain Round Barrow (Scheduled Monument), Wynnstay Hall (Registered Park and Garden GI), and Ruabon Mountain and Cysyllte Historic Landscape Character Areas.

The Archaeology Desk Based Assessment identified a very low potential for features of archaeological interest of any period within the site. The site has been subject to substantial disturbance as a result of coalmining and other industrial activities in the 19th and 20th centuries. Towards the end of the 20th century the site was completely re-landscaped as part of land reclamation works. Any archaeological remains that have survived these actions are likely to be heavily degraded and fragmentary at best. This assessment concludes no further archaeology investigations or mitigation measures are required.

4.3 ACCESS AND MOVEMENT

Access to the site will via the existing agricultural access on Delph Road along the eastern boundary, as shown in the below aerial map. Visibility splays of 2.4 x 120 metres are available as shown in Appendix B of the accompanying Transport Statement. To lessen the traffic impact of construction, deliveries will be undertaken using a one-way system. Vehicles will approach the site from the north and leave in a southerly direction on Delph Road, effectively halving the number of construction vehicles past any given point. This system will also remove the incidence of construction vehicles meeting along the narrow roads in the vicinity of the site. The proposed traffic route is shown at Figure 2 of the accompanying Transport Statement.



Construction Traffic: This application is accompanied by a Construction, Decommissioning and Traffic Management Method Statement which provides detail on levels of construction traffic, how the site will be accessed and how construction traffic will be managed.

It is considered that the relatively low levels of traffic to be generated during the construction period will not result in any material adverse impact on traffic safety or traffic flows in the surrounding roading network.

Operational Traffic: Traffic generation during the operational life time of the solar farm will primarily be restricted to maintenance visits, including:

- 2-3 grass cuts a year (if sheep grazing does not keep grass sufficiently short).
- 2-4 visits per year to wash panels – this will involve bringing in a water cube on the back of a flatbed 4x4.
- Up to 20 visits per year to undertake maintenance activities – this will be in a transit van or 4x4 type vehicle.
- 4 visits per year to read the electricity meter – this will be in a transit van or 4x4 type vehicle.

As solar farms are still relatively new in many areas of the UK, Lightsource also occasionally undertakes educational tours of our operational solar farms.

Decommissioning Traffic: Decommissioning of the site will take approximately half the time that construction takes, and will require similar levels of traffic as the construction phase to remove infrastructure from site. Further detail is provided in the Construction, Decommissioning and Traffic Management Method Statement.

4.4 RECOMMENDED CONDITIONS

As detailed in Section 4.3 above, the final detailed design for the solar farm, as prepared by the EPC we engage to construct it, may have some minor differences from the proposed layout, though we always endeavour to keep these to a minimum. To ensure Council approval of the final detailed design layout and elevations prior to construction, Lightsource proposes the following pre-commencement condition:

“Prior to commencement of the development, full details of the final locations, design and materials to be used for the panel arrays, inverters, transformers, control room, switchgear substations and CCTV cameras shall be submitted to the local planning authority and agreed in writing.”

Alternatively, the Council may wish to attach a condition listing the approved plans, thus allowing for a Variation of Condition to be sought to amend the plans as required based on the final detailed design, for example:

“The development hereby permitted shall be carried out in accordance with the following approved plans, unless otherwise agreed in writing with the local planning authority:

- *Layout Plan*
- *Mounting Frame and Panel Elevation*
- *Fence Elevation*
- *Inverter Elevation*
- *Transformer Elevation*
- *Switchgear Elevation*
- *CCTV Camera Elevation”*

In order to condition the removal of the solar farm as part of the planning permission, Lightsource recommends the following condition wording:

“Within 6 months of the cessation of energy generation from the development, all infrastructure associated with the solar farm will be removed from the site, and the site restored to its original condition.”

Although solar farms have low operating costs, they are relatively expensive to develop, therefore if the Council requires a specific time bounded condition for decommissioning, then Lightsource requests that this be 30 years and 6 months from the date that construction starts on site. This will provide for 30 years of electricity generation, and 6 months for later decommissioning. We recommend the following wording:

“Within 6 months of the cessation of energy generation from the site, or a period of 30 years and 6 months following completion of construction, whichever is the sooner, all infrastructure associated with the solar farm will be removed from the site, and the site restored to its original condition.”

If the later condition is used we recommend including an additional condition requiring notice to be given to the LPA of the start of construction, for example:

“Written notice is to be given to the LPA at least 5 days prior to construction starting on site.”

5 ENVIRONMENTAL SUSTAINABILITY

5.1 RENEWABLE ENERGY GENERATION AND SECURITY OF SUPPLY

As discussed, increasing the capacity of renewable electricity generation in the UK is critical for reducing the country's carbon emissions and for improving our energy self-sufficiency to avoid the volatility in the global fossil fuel market.

A range of energy generation methods are required to ensure security of supply on the national grid network, and all options have their advantages and disadvantages. A comparison of solar farms with other energy generation options is provided in Appendix A.

5.2 BIODIVERSITY ENHANCEMENT

The RSPB's 2013 'State of Nature' report found that approximately 60% of British wildlife is in decline, much as a result of agricultural intensification and subsequent habitat loss.⁷ The RSPB and Natural England have both identified the opportunity that solar farm development presents for providing substantial wildlife gains, due to the extent of the unutilised area between panel rows and bordering the installation, combined with the low levels of disturbance from humans or machinery within the sites once operational.⁸⁹ Wildlife habitats can be provided in these areas that will boost numbers of bees and other pollinating and predatory insects, and provide enhanced feeding opportunities for birds and small mammals.¹⁰

In managing these habitats, nutrient input to the land and watercourse will also be significantly reduced in comparison to arable use. Soil health is essential for long term sustainability of farming, and solar farms could play an important role by resting soils through the life of the solar farm, allowing soil nutrients to restore naturally, without the need for regular use of fertilizers.¹¹

The majority of the application area currently has low ecological value, being grazed farmland. Biodiversity enhancement measures will be adopted with the aim of developing and maintaining wildlife habitats to provide a net gain for local biodiversity. New native hedgerow planting and a new tree belt with understorey will diversify the mix of species and provide additional shelter and foraging resources, as well as strengthening habitat connectivity with the wider landscape. Grassland will be managed to encourage more species and a structurally diverse habitat. Bird nest and bat roost boxes will be installed on suitable features along the perimeter of the site to encourage breeding birds and roosting bats. Mammal gates will be placed at appropriate locations around the perimeter fencing to allow the dispersal of wildlife through the site. Some of the brash generated from hedgerow management will be placed in piles in sunny locations, to create refuge cover for wildlife.

⁷ State of Nature Partnership (2013) *State of Nature: The State of Nature in the UK and its Overseas Territories*, www.rspb.org.uk/Images/stateofnature_tcm0-345839.pdf

⁸ Natural England (2011) *Solar parks: maximising environmental benefits*, Natural England Technical Information Note TIN101

⁹ State of Nature Partnership (2013) *State of Nature: The State of Nature in the UK and its Overseas Territories*, www.rspb.org.uk/Images/stateofnature_tcm0-345839.pdf

¹⁰ RSPB (2011) *Solar Power*, RSPB Briefing March 2011

¹¹ BRE (2014) *Biodiversity Guidance for Solar Developments*, Eds G.E. Parker and L Greene

The first solar farms in the UK were constructed in 2011, and a recent study of a selection of these by an independent ecologist identified numerous biodiversity gains when compared with agricultural fields used as controls in the study.¹²



Flower colonisation of Tavells Solar Farm, Hampshire



English Partridge at Wilburton Solar Farm, Cambridgeshire

The application site does not form part of any statutory or non-statutory designated site for nature conservation. One SSSI is located within 5km of the application site boundary, three SAC within 10km and five non-statutory designated sites located within 2km. None of these sites are considered to be ecologically or hydrologically linked to the site, which supports a low diversity of species typical of intensively managed grassland.

The field margins, hedgerows and immature woodland and scrub within and surrounding the site are likely to support a suite of farmland species, including potentially some species of conservation concern, such as linnet, yellowhammer, mistle thrush and tree sparrow. Therefore it is recommended that if vegetation clear works are necessary during the bird breeding season, a nest-search of all suitable habitats will be undertaken by a suitably experienced ecologist prior to works commencing.

Habitats to the margins of the site may potentially be used by small numbers of common reptile species however the site is relatively isolated within an agricultural landscape and reptiles are not considered likely to be present in anything other than small numbers, if at all. The construction area, comprising largely of open intensively managed arable land provides low suitability habitat for reptiles and amphibian species. Given the poor quality habitat for these species within the site, notably the lack of permanent waterbodies, and the low number of local records, the proposed development is considered likely to have negligible effects on local amphibian or reptile populations.

5.3 FARM DIVERSIFICATION AND SUPPORT

Around half of all UK farms undertake some form of activity that is outside of the core business of farming in order to support farm operations – this is farm diversification. Diversification can result in a more productive use of part of the farm estate and can provide a constant form of income to the farm as a balance to the traditional fluctuations in farm incomes; this can then be reinvested in farming activities.

Diversification into renewable energy will increase farm income security, reducing the farm owner's vulnerability to agricultural subsidy cuts and commodity price changes. Moreover, it can serve to

¹² Parker, C and McQueen, C (2013) *Can Solar Farms Deliver Significant Benefits for Biodiversity?*, Preliminary Study July-August 2013, Unpublished Report

protect the farming tradition by removing the incentive, seen increasingly often on farms, to sell parcels of land to maintain income for the benefit of the remainder of the holding. In this instance the solar farm represents an opportunity to provide a dual use of the site, harvesting the sun's energy to generate electricity, and agricultural production through the grazing of sheep.

5.4 USE OF AGRICULTURAL LAND

The proposal involves the development of a solar farm within 10.6ha of grazing land that was formally used for mining activities.

The solar farm will be a passive installation, harvesting the sun's energy to generate electricity for human consumption.

In the case of the proposed solar farm, the design specifically provides for an ongoing agricultural use of the site through sheep grazing. Lightsource has found sheep grazing to be beneficial in the operation and maintenance of our solar farms, as it largely avoids the need for mowing between and beneath the rows of panels.

The proposal provides for a dual productive use of the site – clean energy generation combined with agricultural production through grazing. There are also significant opportunities for habitat and biodiversity enhancement, as discussed later in this report.

A formal Agricultural Land Classification survey has identified the fields as being subgrade 4, which is low grade.

The proposed development will be a temporary use of the land. Solar farms do not involve the introduction of large areas of hard surfaces, and all infrastructure can be easily removed at the end of the solar farm's operational life, followed by a return to sole agricultural production.

5.5 AMENITY

Solar farms are not noisy developments. The PV panels, which comprise the main feature of solar farms, do not generate any perceptible noise.

The inverter cabinets are fitted with cooling fans, which generate a small amount of noise whilst the solar farm is operating during the day. However, the cabinets trap the majority of noise generated. Solar farms only operate during daylight hours, thus there is no noise generated at all in the evening, night and early morning, when ambient noise levels are typically lowest.

Lightsource has strict conditions relating to noise within the contracts we have with the specialist Engineering, Procurement and Construction (EPC) firms that we use to construct our solar farms. These conditions require that a maximum noise level of 35dBA is not exceeded at the site boundary.



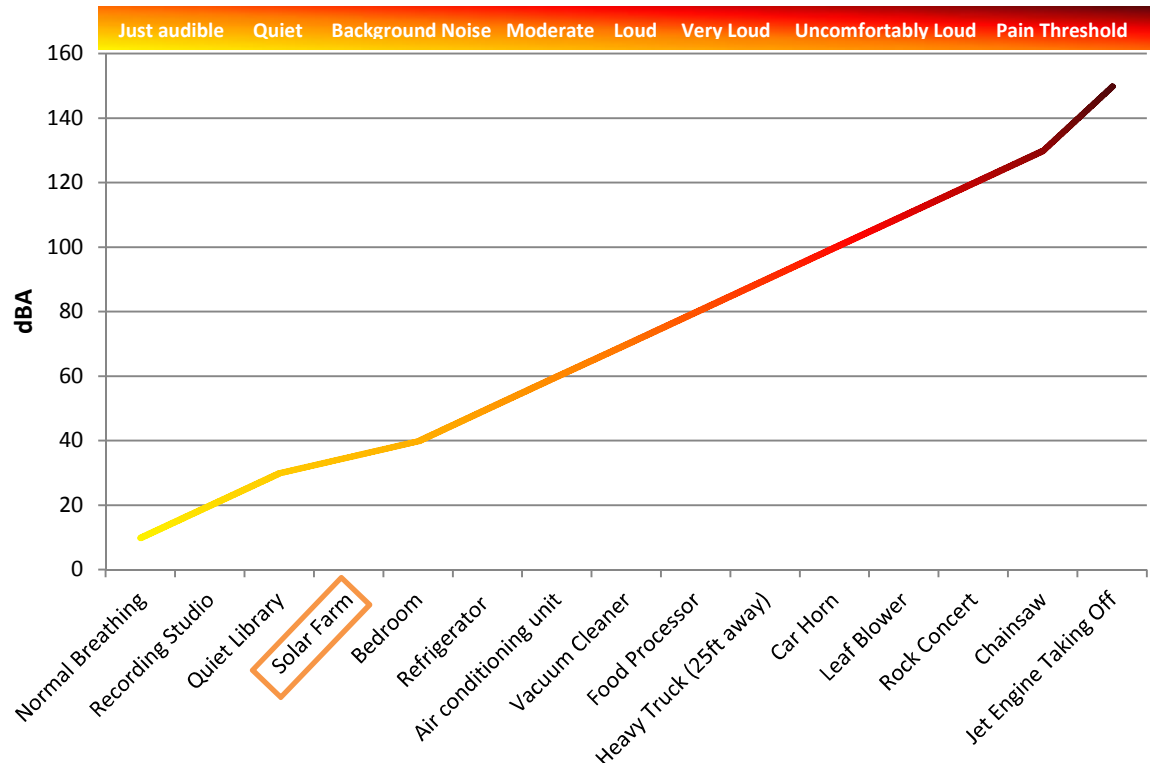
Sheep grazing at Trevemper Solar Farm, Cornwall



Lamb underneath array at Newlands Solar Farm, Devon

What this means in practice, is that there will be no audible noise beyond the site boundary once ambient noise is taken into account. To put the figure of 35dbA into perspective, a normal conversation typically ranges between 44 and 65dbA.

The graph below shows some typical noise levels as a comparison.



The solar farm does not involve any moving components; therefore there is no potential for any vibration impact. The development will not result in any emissions. To the contrary it will in fact help to reduce the level of CO₂ emissions in the UK associated with electricity generation.

5.6 GLINT AND GLARE

There is sometimes a misconception that PV panels might result in significant adverse glint and glare effects, with reflected sunlight creating a nuisance or even a safety risk for planes or traffic. This is not the case. The glass used to make the panels is not like window glass; it is specifically designed to absorb as much daylight as possible to convert to electricity, and therefore has a low level of reflectivity when compared to surfaces such as window glass, water or snow. Less than 9% of total incident visible light is reflected by PV panels, whereas normal glass reflects about 17%.

The potential for glint and glare from a solar farm is much lower than the potential for glint and glare from other man-made structures such as poly tunnels and glass houses, as well as natural features such as water or snow.

Glint refers to a specular reflection, produced as a direct reflection of the sun off of a surface. Glare refers to a continuous source of brightness, being the general reflection of a bright sky rather than a direct reflection of the sun.

In summer, once the sun reaches sufficient height in the south eastern sky, sunlight will fall directly on the panels and there may be a slight chance of glint occurring, however, the reflected beam will

be directed back into the sky toward the south west. During the winter, the location of the sun in the sky means light would be reflected back into the sky toward the west-southwest. Because most of the reflections from the panels will be skyward, the solar farm will not create a traffic hazard, or nuisance to residential properties.

This skyward reflection does not create a safety hazard for aeroplanes. In Germany and the USA it is common for PV systems to be installed on airport terminal buildings, or within airport grounds, and in 2012 solar panels were installed on the terminal buildings at Birmingham and Gatwick Airports in the UK.

5.7 FLOOD RISK

The proposed development will not result in any discernible change to quantity or rate of run-off from the site. The solar farm will not increase the risk of flooding on either the site, or the surrounding areas. A SuDS arrangement, by way of swales, are situated having regard to overland flow routes and will intercept extreme flows which may already run offsite. It is emphasised that the swales do not form part of a formal drainage scheme for the development but are provided as a form of 'betterment'. A plan of the drainage arrangements is included as Appendix 6 of the Drainage Strategy and Flood Consequence Assessment.

5.8 WASTE

The solar farm will not produce any waste, therefore no onsite waste storage or waste collection is required during operation.

5.9 CONSTRUCTION

The Construction, Decommissioning and Traffic Management Method Statement accompanying this application provides detailed information regarding the construction activities associated with developing the proposed solar farm. It is considered that any adverse effects on the surrounding area arising from the construction period will be minor and temporary only in nature.

5.10 DECOMMISSIONING

PV modules have an operational life of over 30 years, with most Tier 1¹³ panels still working at 80% of the original capacity after their 25 year warranty period, thus it is not anticipated that many will need to be replaced over the life of the system. Once the panels reach the end of their life, or earlier if a term is imposed through planning conditions, the site will be decommissioned, all infrastructure removed, and the site restored to its original state.

The Construction, Decommissioning and Traffic Management Method Statement accompanying this application provides detailed information regarding the decommissioning process.

¹³ Lightsource only use Tier 1 panels in their solar farms. 'Tier 1' refers to the top 20% of panels in terms of the efficiency, performance, and longevity.

6 COMMUNITY SAFETY AND BENEFIT

6.1 SITE SECURITY

The development will be secured by a 2m high timber and wire fence to demarcate the site and prevent access. Motion activated CCTV will be present within the site boundaries which will alert a security company of any unauthorised presence. If needed, security staff will then visit the site to further investigations. There will be no floodlighting used at the site.

The electricity generation sector is the single largest contributor to CO₂ emissions in the UK through the burning of fossil fuels. An increase in our renewable, zero and low carbon energy generation capacity will result in a reduction not only in our carbon emissions, but also in the other air pollutants that are emitted during the burning of fossil fuels. Prolonged exposure to elevated levels of air pollution affects the human respiratory and inflammatory systems. The emissions associated with energy generation through fossil fuel burning, including sulphur dioxide, nitrogen oxide, and carbon dioxide, as well as fine particulates, are particularly problematic for people with lung or heart conditions. Whilst the impact of this particular solar farm alone is unlikely to result in a measureable impact on air quality or people's health – the cumulative positive impact of a growing zero and low carbon energy sector will reduce air pollution, and thus reduce the risk posed to human health.

6.2 COMMUNITY BENEFIT

6.2.1 COMMUNITY BENEFIT FUND

Lightsource believes that the local communities housing major renewable energy developments should be recognised for their contribution to our country's need for secure, 'home-grown', cleaner forms of energy. Lightsource is committed to providing a long term commitment to benefit the host communities of our solar farms.

A community benefit payment has been offered to Cefn Community Council and Pen-y-Cae Community Council to be applied toward a project or projects to benefit the local community at the discretion of the Community Council. There is no expectation of the Community Councils' support during the planning process or that they would withhold any objection to Lightsource's planning application.

6.2.2 EMPLOYMENT OPPORTUNITIES

There are likely to be work opportunities generated for local contractors during the construction and on-going operation of the solar farm. The specialist Engineering, Procurement and Construction firms engaged by Lightsource to undertake detailed design and construction of our solar farms, typically employ local contractors as part of their work force during the construction period. As part of the community engagement process Lightsource has specifically sought to develop a database of local suppliers and contractors whose services could be engaged during and post construction.

Lightsource also typically engages local contractors to undertake general maintenance activities on site, as well as employing regionally based Operations and Maintenance staff to manage the operational solar farms.

6.2.3 CARBON FOOTPRINT REDUCTION

The Cefn and Pen-y-Cae areas will benefit from a reduction in their carbon footprint. The electricity generated by the solar farm will enter the local grid network and will be utilised at the closest points of demand, meaning that more of the electricity used by the Cefn and Pen-y-Cae areas will be from a clean renewable source, as opposed to from the burning of fossil fuels.

7 PLANNING POLICY

7.1 INTERNATIONAL POLICY

The UK is a signatory to the EU Renewables Directive (2009), under which our legally binding target is for 15% of total UK energy consumption to be generated from renewables by 2020, with this target rising to 80% by 2050.

The UK's Renewable Energy Strategy (RES) sets out how the UK will increase its renewable energy generation and reduce greenhouse gas emissions. The Strategy is based on a scenario of 30% of electricity, 12% of heat and 10% of transport being generated from renewables by 2020. In 2012 UK electricity generation from renewable sources was 11.3%, an increase of 1.9% from 2011,¹⁴ and in 2013 this had risen to 13.9%.¹⁵ A substantial increase will be required in order to achieve 30% within the next five years.

On behalf of the European Union, the Vienna University of Technology and the Energy Economics Group published an assessment of the progress each EU member state has made towards meeting their 2020 targets. In relation to the UK, the report states that *"it is not expected that its 2020 RES [Renewable Energy Sources] target can be achieved under baseline conditions...Thus, the UK is a candidate for importing surplus RES deployment of other Member States that are not needed for their own target fulfilment. The energy produced from RES has to nearly double in 2020 to fulfil the UK target when compared to the baseline case."*¹⁶ Unless the rate of deployment for renewable energy generation schemes increases, the UK is likely to miss its legally binding targets.

7.2 NATIONAL POLICY

7.2.1 NATIONAL ENERGY POLICY

The UK Government is committed to meeting our renewable energy targets, which are set out in national policy through the Climate Change Act of 2008. Section 13 of this Act states that there is a duty for the Secretary of State to prepare proposals and policies for meeting carbon reduction targets. These obligations fall to Local Planning Authorities.

In 2011 the Department of Energy and Climate Change published the UK Renewable Energy Roadmap, which was updated in 2013. This presents the framework for the delivery of renewable energy deployment in the UK; it reiterates the UK Government's commitment to meeting our renewable energy targets. 2013 also saw the publication of the UK Solar PV Strategy Roadmap which states that *"Solar photovoltaic (PV) technology is a mature, proven technology and is a reliable source of renewable energy with an important role to play in the UK energy generation mix."* Paragraph 13 of this Strategy notes that presently solar PV accounts for 12% of renewable electricity capacity in the UK.

¹⁴ Department of Energy and Climate Change (2013) *Digest of UK Energy Statistics*

¹⁵ Department of Energy and Climate Change (2014) *Digest of UK Energy Statistics (DUKES)*

¹⁶ Vienna University of Technology & Energy Economics Group (2014) *2020 RES Scenarios for Europe – Are Member States Well on Track for Achieving 2020 RES Targets?*

The Welsh Government Energy Policy Statement (March 2010) provides key policy direction on renewable energy schemes, by setting a target of being in a position where almost all local energy needs can be met by low carbon energy production.

7.2.2 NATIONAL PLANNING POLICY

Planning Policy Wales (Edition 6, Feb 2014), sets out the land use planning policies of the Welsh Assembly Government, and is supplemented by a series of Technical Advice Notes (TANs). Planning Policy Wales and the relevant TANs are material to decisions on planning applications.

Planning Policy Wales (Feb 2014)

As set out in paragraph 4.2.2, the Welsh planning system “*provides for a presumption in favour of sustainable development.*” Section 4.3 details the core principles which underpin the approach to planning policy for sustainable development, these include:

- *Engagement and involvement, ensuring that everyone has the chance to obtain information, see how decisions are made and take part in decision-making;*
- *Respect for environmental limits, so that resources are not irrecoverably depleted or the environment irreversibly damaged. This means, for example, mitigating climate change, protecting and enhancing biodiversity, minimising harmful emissions, and promoting sustainable use of natural resources;*
- *Tackling climate change by reducing the greenhouse gas emissions that cause climate change and ensuring that places are resilient to the consequences of climate change;*

The proposal for a solar farm to generate energy from a renewable resource (daylight) without generating greenhouse emissions, and the community engagement work undertaken pre-application, are consistent with these core principles.

Section 4.4 sets out the sustainability objectives that the Welsh Assembly Government seeks to deliver through planning policies, decisions and proposals, including:

- *Support the need to tackle the causes of climate change by moving towards a low carbon economy. This includes facilitating development that reduces emissions of greenhouse gases in a sustainable manner, provides for renewable and low carbon energy sources at all scales and facilitates low and zero carbon developments.*
- *Contribute to the protection and improvement of the environment, so as to improve the quality of life, and protect local and global ecosystems. In particular, planning should seek to ensure that development does not produce irreversible harmful effects on the natural environment and support measures that allow the natural heritage to adapt to the effects of climate change. The conservation and enhancement of statutorily designated areas and of the countryside and undeveloped coast; the conservation of biodiversity, habitats, and landscapes; the conservation of the best and most versatile agricultural land; and enhancement of the urban environment all need to be promoted.*

The proposal for a solar farm is consistent with the above objective.

As noted in paragraph 4.5.1, tackling climate change is considered to be a “*fundamental part of delivering sustainable development.*” The Welsh Assembly Government has set out a commitment to tackling climate change and reducing the carbon footprint of Wales.

Paragraph 4.5.2 sets out the Welsh Assembly Government's goal of achieving at least a 40% reduction in all greenhouse gas emissions by 2020 (against a 1990 baseline). The approach to climate change is two-fold, focusing both on the reduction of emissions to avoid the worst impacts of climate change, and preparing for the consequences of climate change. As noted in paragraph 4.5.7, actions to minimise climate change include facilitating the delivery of sustainable forms of energy.

Paragraph 12.10.1 sets out the matters that local planning authorities should take into account in determining applications for renewable energy developments:

- *The contribution a proposal will play in meeting identified national, UK and European targets and potential for renewable energy, including the contribution to cutting greenhouse gas emissions;*
- *The wider environmental, social and economic benefits and opportunities from renewable and low carbon energy development;*
- *The impact on the natural heritage, the Coast and the Historic Environment;*
- *The need to minimise impacts on local communities to safeguard quality of life for existing and future generations;*
- *Ways to avoid, mitigate or compensate identified adverse impacts;*
- *The impacts of climate change on the location, design, build and operation of renewable and low carbon energy development. In doing so consider whether measures to adapt to climate change impacts give rise to additional impacts;*
- *Grid connection issues where renewable (electricity) energy developments are proposed; and*
- *The capacity of and effects on the transportation network relation to the construction and operation of the proposal.*

The site has been chosen due to its location in close proximity to a viable grid connection, as well as low agricultural land grade, former use for mining and the limited visibility of the site. In addition, the proposal has been designed to accommodate sheep grazing, avoid impacts on ecological resources and provide a net gain to habitats and species through a range of biodiversity enhancement measures.

The proposal will contribute to local and national renewable energy generation targets, whilst minimising any potential adverse effects on the surrounding environment.

Technical Advice Note 8: Planning for Renewable Energy (July 2005)

With regard to the TANs, TAN 8: Planning for Renewable Energy, is focused on delivering renewable energy targets through the planning system and is therefore of particular relevance to this proposal. In paragraph 2. 1 it is recognised that the planning system has an important part to play in achieving the Welsh Assembly Government's commitment to enable the development of all forms of renewable energy.

The TAN was prepared in 2005, and as such does not consider large scale ground mounted solar installations which were not yet an established development form in the UK. Therefore, it is important to also take into account more recent guidance from the Welsh Assembly Government regarding large scale solar.

Practice Guidance: Planning Implications of Renewable and Low Carbon Energy Development

The Guidance document was produced in February 2011 to assist local planning authorities in determining applications for renewable and low carbon energy developments. The guidance summarises the key issues for consideration when determining an application for a solar array:

- Landscape and visual impacts
- Glint and glare
- Ecology
- Historic environment
- Agriculture
- Hydrology and flood risk
- Cumulative impacts

Each of these matters are addressed both within this report, and the accompanying technical assessments.

7.3 LOCAL PLANNING POLICY

The relevant local planning framework is made up of the Wrexham Unitary Development Plan, adopted in 2005. The Wrexham Unitary Development Plan 2 (LDP2) 2013 to 2028 is currently under preparation, with a preferred strategy currently being formulated. Currently, this Plan is not expected to be adopted until 2016, and as such no weight has been applied in this instance.

7.3.1 WREXHAM UNITARY DEVELOPMENT PLAN 1996 – 2011

The following District-wide Strategic Policies are considered relevant to the proposal:

Policy PS2 *Development must not materially detrimentally affect countryside, landscape/townscape character, open space, or the quality of the natural environment.*

Policy PS3 *Development should use previously developed brownfield land comprising vacant, derelict or underused land in preference to the use of greenfield land, wherever possible, particularly so where greenfield land is of ecological, landscape or amenity value, or comprises agricultural land of grades 1, 2 or 3a quality.*

Policy PS11 *Encouragement will be given to proposals which improve the biodiversity value of sites and to the establishment of local nature reserves where the nature conservation and landscape interest of the land will be protected and enhanced.*

Policy PS12 *Proposals for the generation of energy from renewable sources will be supported provided that the wider environmental benefits are not outweighed by any detrimental impacts of the proposed development (including any electricity transmission facilities needed) on the landscape, public safety, and the local environment.*

This framework sets the presumption in favour of renewable energy developments, provided any adverse effect associated with them is not unacceptable, which is consistent with National Policy. The site has been located and designed so as to be minimal in terms of its visual impact, it is considered that over time any adverse effect on the landscape elements and features that currently characterise the site will diminish and instead there will be an overall net beneficial effect upon the tree, hedgerow and grassland resource with the proposed development in place.

The proposal incorporates a number of biodiversity enhancement measures, which will enhance the overall ecological resource on site. As discussed in section 5.1.2, solar farms are now well documented as to their potential for biodiversity gain, and the measures proposed seek to ensure this is applicable to this proposal.

Finally, the site is located on agricultural land classified as subgrade 4, thus ensuring that the best and most versatile land is avoided from development and retained for agricultural use.

In addition to the above, the following specific policies are also relevant to the proposal:

Policy EC1 *Within Green Barriers, development will only be granted planning permission if it is for agriculture, forestry, essential facilities for outdoor sport and recreation, cemeteries and other uses of land which maintain the openness of the Green Barrier and do not conflict with the purpose of including land within it.*

The proposed development will aid in safeguarding the countryside through the following sensitive design measures:

- Sufficient gaps between the rows of panels, to avoid one row shading another, with the solar panels and associated infrastructure covering only 28.5% of the site;
- low level height of the overall proposed development;
- passive nature of the proposed development, and;
- temporary, medium term, use of the site.

In addition the LVIA concludes the proposed solar farm can be effectively accommodated without causing an unacceptable level of harm to the wider landscape's character or appearance. This Planning, Design and Access Statement also concludes there will be no significant adverse impact on heritage and ecological interests. The scale of the proposed development, will make a valuable contribution to the generation of renewable electricity at a local level, by generating renewable energy equivalent to the annual energy consumption of 1300 households and offsetting more than 2200 tonnes of CO2 per year. On this basis the principle of development is considered to be acceptable in this location.

Policy EC4 *Development proposals should provide for the conservation and management of hedgerows, trees, orchards, woodland, wildlife and other natural landscape and water features, and include new planting in order to enhance the character of the landscape and townscape. Development which results in the loss or significant damage to valuable trees, important hedgerows or ancient woodland sites will not be permitted.*

No tree or vegetation removal is proposed to facilitate the construction or operation of the solar farm. The Biodiversity Management Plan states the boundary hedgerows and trees within the site will be protected with fencing as necessary during the construction phase to prevent works encroaching within the root protection zone in-line with *BS 5837:2012 Trees in relation to design, demolition and construction*. As an initial step, the security fencing will be installed and will provide protection to the boundary hedgerows and trees adjacent to the site.

Policy EC5 *Within Special Landscape Areas, priority will be given to the conservation and enhancement of the landscape. Development, other than for agriculture, small-scale farm-based and other rural enterprises, and essential operational development by utility service providers, will be strictly controlled. Development will be required to conform to a high standard of design and*

landscaping, and special attention will be paid to minimising its visual impact both from nearby and distant viewpoints.

The proposal has been sited and designed so as to minimise its visual impact on the surrounding environment. Given the low lying nature of the site, intervening topography, well established boundary screening and proposed new planting, there is little potential for adverse effect on the surrounding landscape. Accordingly it is considered that the proposal will not adversely affect the character of the Special Landscape Area in this instance.

Policy EC7 *Within, and in close proximity to, conservation areas, the priority will be to preserve and/or enhance those buildings, structures, streets, trees, open spaces, archaeological remains, views, and other elements which contribute to the unique character of the area. New buildings and alterations or additions to existing buildings in conservation areas, whether listed as of special architectural or historic interest or not, must reflect the design and character of the area as a whole and the form, scale, detailing and materials of existing buildings.*

Three conservation areas are within 5km of the site Pen-y-Cae, Ruabon (Rhiwabon) and Pontcysyllte Aqueduct. Pen-y-Cae Conservation Area lies within 1 km of the site 850m north. The western boundary of Ruabon Conservation Area lies 1.8km east of the site, and the northern boundary of the Pontcysyllte Aqueduct Conservation Area lies 1.8km south of the site. Both of these Conservation Areas lie wholly outside the Zone of Theoretical Visibility (ZTV), and are inwardly-focussed and have no intervisibility with the site. The southern boundary of Pen-y-Cae Conservation Area lies 850m north of the site and is shielded from the site by the modern Chapel Street and Hall Street, and the buildings (mainly housing) along these streets. As a result, there is no intervisibility with the site, and the site forms no part of the setting of the Conservation Area. Conservation Areas have been fully considered within section 5.3 of the Heritage Asset Settings Impact Assessment accompanying this planning application.

Policy EC9 *Alterations or additions to, and development or redevelopment within the curtilage of, buildings or structures listed as of special architectural or historic interest must respect the setting and character of the listed buildings or structures.*

There are six listed buildings within 1km of the site. All of these are located towards the northern end of the 1km search area, in Pen-y-Cae, or at Wynn Hall. Four of the Listed Buildings lie outside the ZTV. Given the lack of any strong associative relationships with the site, and the lack of intervisibility between these assets and the site, it is considered that the proposed development will result in no impact to their significance. As such they are not considered to require further assessment. Two of the Listed Buildings (Former Vicarage, Pen-y-Cae and Wynn Hall) lie on the margin of the ZTV and are fully assessed within section 5.1 of the Heritage Asset Settings Impact Assessment. The assessment concludes that given that the site can easily be screened by further planting, and given the very limited contribution the site currently makes to the setting of both assets, it is considered that the proposed development will make no more than a negligible change to the setting of the assets, and therefore would have a negligible impact on the significance of the Listed Buildings.

Policy EC11 *Development which would adversely affect the site or setting of a Scheduled Ancient Monument or archaeological site of national significance will not be permitted. Development that directly affects non-scheduled sites of archaeological importance will only be permitted if an archaeological investigation has been carried out to determine the nature, extent and significance of the remains, and this investigation indicates that in-situ preservation is not justified, and a programme of excavation and recording has been agreed. Development will also be carefully*

controlled to ensure that the setting of non-scheduled sites of archaeological importance is not harmed where appropriate.

As mentioned in section 4.2.4, as a result of distance from the site, intervening topography, vegetation and urban areas, it is considered that no more than a negligible effect on the significance of the following assets will arise as a result of the proposed development: Wat's Dyke (Scheduled Monument) and Ruabon Mountain Round Barrow (Scheduled Monument). Scheduled Monuments have been fully considered within section 5.2 of the Heritage Asset Settings Impact Assessment accompanying this planning application. The Pontcysyllte Aqueduct and Canal WHS lies 2.6km south-south-west of the site at its closest point. Given the broad extent of any such views, the distance from the site, and capacity to screen the proposed development, it is considered that the solar farm, once construction, will make no more than a negligible change to the wider setting of the WHS buffer zone. As the site is not visible from the inscribed area of the WHS itself, it can be considered that the proposed development will have no more than a negligible impact on the significance of the WHS, and in practice will have no impact on the OUV of the WHS. This conclusion is explored in more detail within section 5.4 of the Heritage Asset Settings Impact Assessment.

7.4 GRID CONNECTION LEGISLATION

This planning application does not include the works or infrastructure associated with the connection to the grid network except for the onsite substation/switchgear.

Works required for the underground cable to connect the solar farm to the electricity grid network are undertaken by the Distribution Network Operator as a Statutory Undertaker under Part 17, Class G(a) of the General Permitted Development Order.

8 CONCLUSION

The Land to the west of Delph Road solar farm will increase the UK's sustainable, locally generated, energy supply, by providing enough clean energy to power 1300 households. Growing our renewable energy generation capacity will both reduce our carbon emissions and enhance security of energy supply by lowering our reliance on volatile international fossil fuel markets. The proposal also provides the opportunity to enhance biodiversity values.

Government policy promotes the development of large and small scale renewable energy developments, provided that the environmental impacts of individual proposals are acceptable, or can be made so through mitigation strategies.

The proposed location has a number of advantages. From an energy generation perspective the relatively flat/gentle south facing slope is ideal for maximising daylight capture, and proximity to existing National Grid substation infrastructure provides for efficient transmission of the electricity generated. The site is located on agricultural land subgrade 4, was previously mined for coal and will be well screened as a result of both existing and proposed planting, making it ideal for a solar farm.

It is considered that the impacts of the proposal will be acceptable, and where potential environmental impacts have been identified, detailed assessments have been undertaken and these accompany this application.

Consultation has been undertaken with the LPA, local Community Councils and local community, and issues raised during this engagement process have been addressed as detailed in the accompanying Statement of Community Involvement.

The proposal has been shown to comply with the relevant planning policy framework therefore, planning permission should be granted.

APPENDIX A – COMPARISON OF ENERGY GENERATION OPTIONS

Energy Generation Method	Comparison with Solar Farms
Wind Farms 	• A 1MW turbine is typically 80m high to the hub, with a ground to blade tip height of 120m, thus they have a much wider reaching visual impact than solar farms. • Solar farms are very quiet, and do not create noise and vibration issues for local communities, as wind farms sometimes can. • Solar farms are static and passive with no moving parts. Thus they do not draw attention through movement like turbine blades, and pose no threat to birds. • Wind turbines only produce energy when the wind is strong enough, but not too strong. Solar panels produce electricity during all daylight hours. • Wind turbines do produce a large amount of energy based on the small ground area that they require.
Hydropower 	• Hydropower is limited by the availability of large rivers. • The creation of the dam lake destroys the local habitats in the areas that are flooded, as well as impacting on downstream river ecosystems by altering the river flow. • Hydropower can produce large volumes of energy throughout the day, so long as water is available. • Effects of dams are significant in comparison with the low impact nature of a network of comparatively small solar farms.
Anaerobic Digestion 	• Whilst biomass energy production results in lower carbon emissions than fossil fuel energy generation methods, the operation of solar farms results in zero carbon emissions. • Solar farms do not emit any air pollutants or odours. • Anaerobic digestion plants require less land than solar farms; however, they still involve large industrial style buildings.
Nuclear 	• Nuclear power has the benefit of being able to generate large amounts of electricity at any time of day. • Nuclear power stations are large buildings, with much greater visual impacts on the local surrounding area than a network of comparatively small scale solar farms.

	• Nuclear waste is highly toxic and expensive to dispose of. • Uranium is mined in large scale open cast mines, impacting significantly on the country of origin. • New nuclear power station developments require far higher subsidies than those provided for renewable electricity generation options. 
Fossil Fuels 	• The burning of fossil fuels to create energy is currently cheaper than renewable energy methods; however it results in significant carbon emissions, and other air pollutants. • Fossil fuels are a non-renewable resource, and the UK is often at the mercy of global price fluctuations. • Extraction of fossil fuels including mining, fracking, and oil wells can have significant adverse impacts. • Solar panels have a lifespan of over 30 years, whereas coal can only be burnt once. • Solar farms do not emit any air pollutants or odours.