DESIGN & ACCESS STATEMENT

In support of a planning application for the installation of Standalone Solar PV modules and Associated Infrastructure on land at Heywood Grange, Dilhorne, Staffordshire ST10 2PL

February 2015

Prepared By

aardvark environment matters

On behalf of

Elgar Middleton
Infrastructure & Energy

Project Quality Control Sheet

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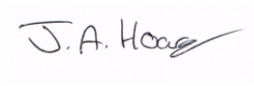
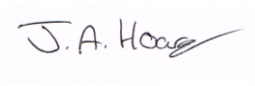
Signature			
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Location: Heywood Grange, Tickhill Lane, Dilhorne, Staffs. ST10 2PL

Grid Coordinates: 396046, 344411

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1 INTRODUCTION

1.1 Site Location

The site is located on land west of the village of Dilhorne, within the boundary of Staffordshire Moorlands District Council.

The site is located approximately 8.5km south east of Stoke-on-Trent, 3.0km north of Blythe Bridge and 4.5km north west of Cheadle. It is accessed via a farm track leading off from Tickhill Lane.

The immediate surroundings comprise of agricultural fields and woodlands.

The site is shown in the context of its surroundings by the red line area on Figure 1 below.

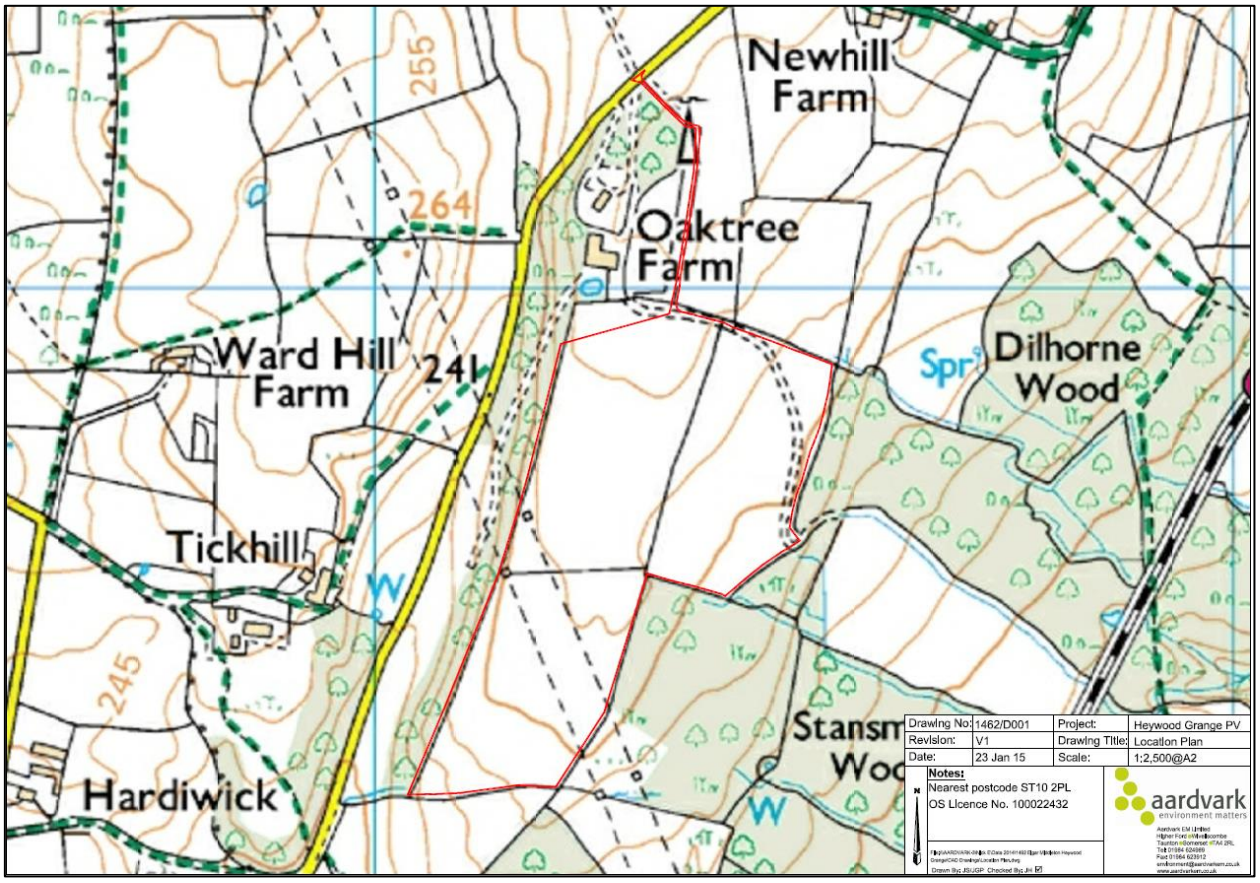

Figure 1 – Location Plan

1.2 Site Description

The site comprises agricultural land totalling approximately 14 ha as shown by the Proposed Site Plan. The site borders both Dilhorne Wood and Stansmore Wood to the east.

A general view across the site is shown in Plate 1. The field boundaries, which will be retained by the proposed development in order to maintain natural screening, comprise of mature hedgerows and trees.

The topography of the site is slightly undulating with gentle slopes towards the south. Elevation across the site ranges from approximately 239m AOD to 263m AOD.

Plate 1 - *General View across the site (looking east from the north western field)*

The land is currently in agricultural use and is classified as Grade 4 agricultural land on the Agricultural Land Classification Maps of England and Wales. A report produced by Smiths Gore, submitted with this application, finds that the land within the proposed development area at Heywood Grange is Grade 4; which is summarised as land with severe limitations producing a restricted range of crops.

2 USE & SUSTAINABILITY

2.1 Existing and Proposed Use

The proposed use of the site is for the generation of renewable energy from solar PV panels, to be exported to the National Grid.

The site design does not prohibit the grazing of livestock throughout the operation of the modules.

Following decommissioning of the modules, the land will be returned to agricultural use. There will be no constraints on returning the site to its current condition.

2.2 Site Selection

As an experienced renewable energy development company, Elgar Middleton always seek to follow best practice guidance when selecting sites for solar parks, ensuring that all sites brought forward for development are deemed suitable against a number of criteria including:

- The use of the non-agricultural or lower grade agricultural land;
- Opportunities to continue agricultural practices alongside solar development;
- Opportunities to utilise existing natural screening and provide enhancements to existing onsite biodiversity features.

The site was selected initially as it is well screened by mature hedges and woodland, with the accompanying Landscape and Visual Impact Assessment summarising that the site and the surrounding landscape has the capacity to accommodate the proposed development.

The site is currently used for livestock and horse grazing and in accordance with the latest planning guidance issued by BRE, a full agricultural land assessment was carried out to establish the agricultural land classification grade. This assessment was completed by Smiths Gore during November 2014, who concluded that the land is of a low agricultural quality, being grade 4.

The site is also close to and easily accessible from the M6 and the A52, causing minimum disruption during the construction phase as no delivery vehicles would need to pass through the nearby village of Dilhorne.

2.3 Electricity Generating Capacity

The concept layout, based on the maximum capacity of the site as 8.36MW has been calculated as producing an annual total of 1,140kWh per kW installed, therefore yielding approximately 9,540MWh per year in total.

These figures are based on the anticipated generational output of the solar array based on the site's solar irradiation and the candidate solar PV modules power curve. However, the benefits would vary depending on the actual solar irradiation harnessed by the array over a year and therefore it is more appropriate to consider the benefits as a range rather than an exact figure.

The proposed development will supply low carbon renewable energy into the local electricity distribution network which will be utilised locally when demand exists.

Based upon the UK average household consumption of 4,065kWh/year (DECC, 2013) the proposal would be equivalent of 2,347 homes.

The carbon offset over the lifetime of the installation using the DECC emission factor for the 'Valuation of energy use and greenhouse gas (GHG) emissions' of 0.3184 is estimated to be 3,037 tCO2 per annum when compared with electricity generated from fossil fuel sources.

Business rates will be payable on the completed and operational scheme, securing additional revenue for Staffordshire Moorlands District Council throughout the lifetime of this development.

3 DESIGN

The proposed development is for the erection of 32,270 solar photovoltaic (PV) modules, with associated infrastructure for export of renewable energy to the National Grid. There will be seven transformer/inverter buildings, as well as one private substation building, one DNO Substation building and one storage container, located adjacent to the grid connection point on the northern boundary of the site.

The scheme has been specifically designed to maximise the amount of electrical hours of production per hectare. The design layout takes into account topography, orientation, appropriate hedgerow buffer zones and mitigation planting.

The industry standard is for 1MW PV modules per 2.8 hectares, the design for Heywood Grange has achieved a design criteria of 8.36MWp into 13.72hectares, the equivalent of approximately 1MWp per 1.64 hectares.

Figure 2 below, and the corresponding scaled drawing submitted with the application, sets out the proposed Site Plan.

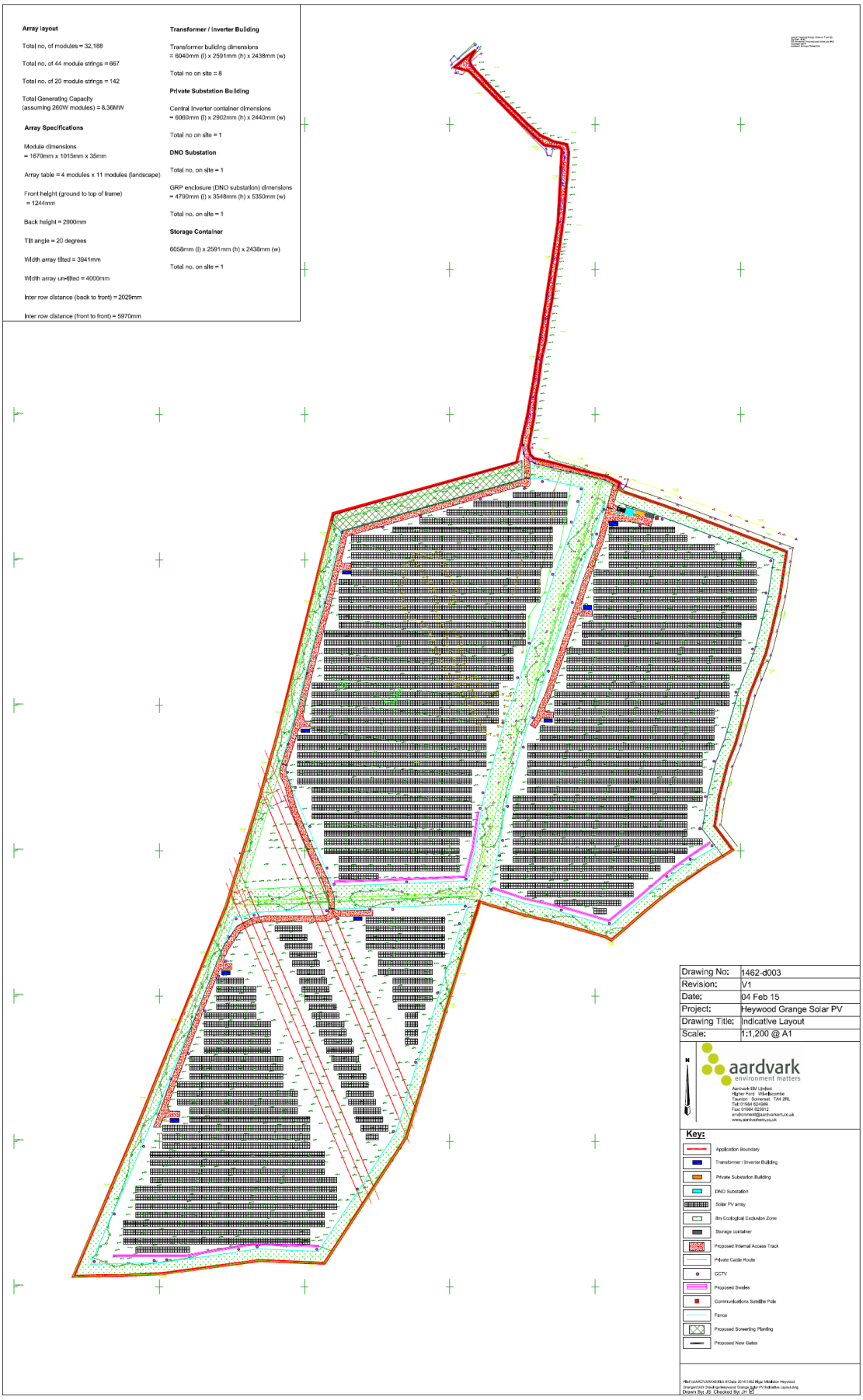

Figure 2 – Indicative Site Layout

4 LAYOUT & LANDSCAPING

The proposed site layout is the result of a detailed design process, however it is possible that the final built scheme will vary, dependant on the final appointed installer and site conditions. It is proposed that the final site design and layout can be secured by a pre-commencement condition imposed by Staffordshire Moorlands District Council.

4.1 Access Tracks and Paths

Access to the field will be via an existing agricultural field gateway that will not require alteration for the ingress and egress of site vehicles. There will be no permanent access tracks created as part of the construction of the proposed development, as construction traffic will utilise existing tracks. The necessity for temporary access tracks to extend the existing access into the site itself during construction will be decided based on the ground conditions at the time of installation.

During the operational period a maintenance track will run through the site. This will be surfaced using crushed hard core, maintaining a useable surface throughout the year.

The local public highways will remain unchanged in terms of traffic volume during the operational phase of the proposed development. During construction additional vehicles will be accessing and egressing the site via the Heywood Grange Farm complex and across Tickhill Lane using the existing farm track way, however construction of the solar farm is only a short period of approximately 10 weeks and all traffic impacts will be temporary.

Further detail is provided in the Construction Traffic Management Plan, submitted with the application.

4.2 Public Rights of Way

There are no public rights of way (PROW) within the site; however there are a number of paths running to the west of Tickhill Lane and through Dilhorne Wood to the east. These PROWs will not be directly impacted as a result of the proposal.

4.3 Site Levelling and Landscaping Works

The site is considered to be the most appropriate in the locality as it is visually discrete from sensitive receptors, as described in the LVIA and illustrated by the topographic survey.

It will not be necessary to conduct levelling works for the construction of the panels as they will be erected on driven posts and engineered to sit at the correct angle relative to the topography.

Minor re-levelling may be required for the construction of the transformer/inverter buildings, private & DNO substations and on-site storage container otherwise the panel mounting systems will account for any minor undulations across the field.

It will also be necessary to install a series of shallow swales at the lowest parts of the site in order to minimise any potential flood risk by channelling concentrated runoff from the modules, as proposed in the Flood Risk Assessment submitted with this planning application. These are shown on the Proposed Site Plan.

All existing hedgerows and field margins on the site are to be retained and enhanced where appropriate, in accordance with the submitted landscape and ecological management plan and will be maintained as approved for the duration of the approved development.

4.4 The PV Modules

The proposed concept layout will occupy approximately 14 hectares.

The panels will be approximately 1670 x 1000 x 35mm with the rows spaced approximately 2029mm apart as shown in the cross section diagram in Figure 3 below.

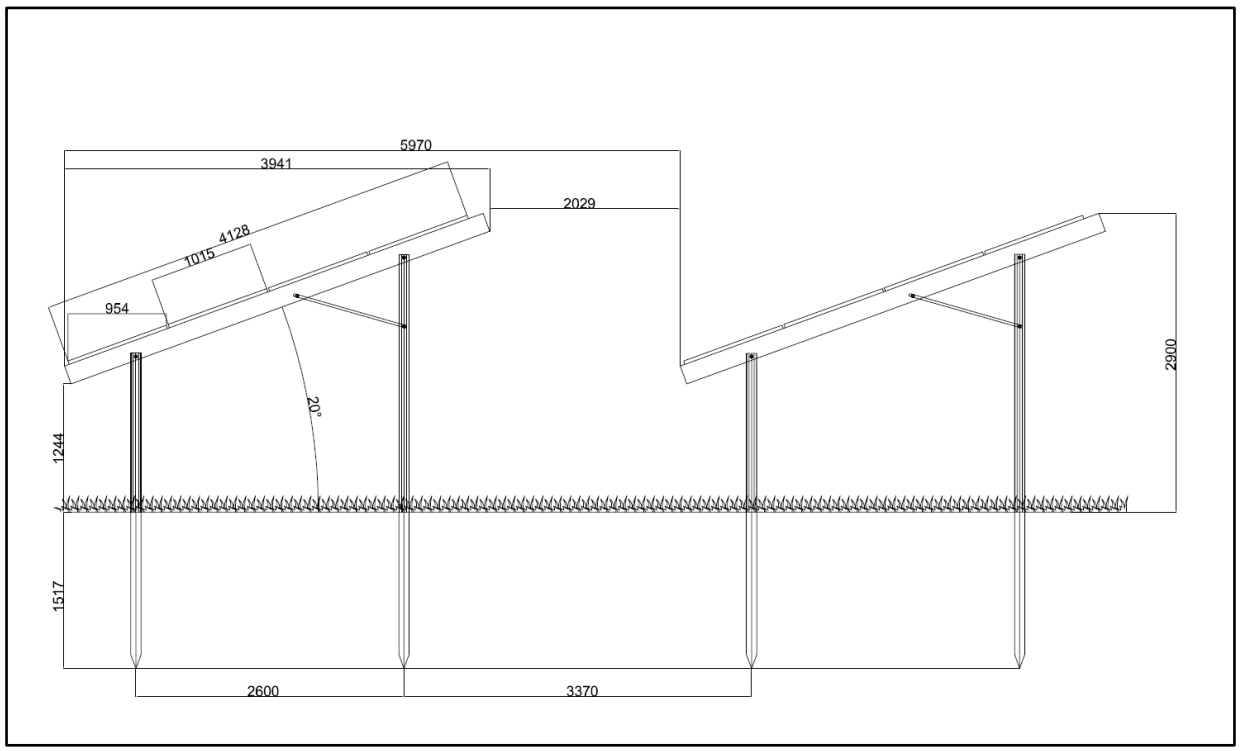

Figure 3 – Cross section of panel and mounting system

The lifetime of the panels, degradation and power generation depend on the environmental impact of an individual site; the effect of longevity on their performance is limited. Research by Hanwha SolarOne, a leading manufacturer, suggests that a PV installation should produce electricity for 35 years and longer, indeed they state that *'it is not at all unreasonable to believe that PV modules would still be producing economically viable kW of free electricity 50 years after they have been installed'.* This illustrates the high quality of the proposed panels.

The aluminium frame mounting system as shown in the cross section drawing will stand approximately 1244mm off the ground at the front of the panel and 2900mm at the rear with an approximate gradient of 20^{o}.

It is proposed that the installation will be mounted on driven posts measuring 1.5m approximately in depth. This is dependent on ground conditions on site.

The longevity of the proposed component parts means that there is anticipated to be minimal maintenance (other than routine performance checks and for general wear and tear) during the operational period of the scheme. Similarly, replacements will be due only to failure or third party interference as opposed to a planned maintenance programme.

4.5 Transformers/Inverter Buildings

The transformer/inverter units will connect the solar arrays to the sub-stations. These will comprise metal clad or GRP units on a concrete plinth with approximate dimensions of 6040mm (l) x 2591mm

(h) x 2438mm(w). The maximum height including the plinth will be 3000mm as shown on the Inverter Transformer Building Elevation & Plan submitted.

The transformers, sub-stations and arrays will be connected by cables laid underground following the internal maintenance track ways as shown on the submitted site layout plan. The trench will be excavated to standard dimensions approximately 450mm wide, 1200mm deep in accordance with best practice.

4.6 Grid Connection and Sub-Stations

The DNO has confirmed a grid connection capacity for the export of energy generated from the proposed scheme.

The DNO substation and private substations will be constructed at the northern boundary of the development. The DNO substation will be located outside of the security fence to allow 24/7 access and include an area of hard standing for a car parking space.

Cables connecting the substation to the Point of Connection will be laid underground in trenches excavated to standard dimensions approximately 450mm wide and 1200mm deep, in accordance with best practice the Distributive Network Operators standard specifications. The trenches will then be backfilled with suitable material and the ground level reinstated allowing for a period of settlement.

4.7 Security, Fencing and Lighting

In addition to the existing protection afforded by the hedges and trees a security fence and CCTV cameras will be constructed around the perimeter of the site.

The security fence is designed in terms of colour and height to assimilate into the visual landscape and will be green mesh with an approximate height of 2065mm as shown in the submitted drawing. Gates will be installed at the entrance to the site and where necessary internally to allow access between the fields of the development. An example of the fencing proposed is shown below.

Plate 1 – Example of Security Fencing

As a requirement for insurance by the financial investors in the scheme, CCTV cameras will be erected at 50–60m intervals around the perimeter of the site. The passive surveillance system will be infrared and at a maximum height of 3000mm. It is proposed that the mounting poles will be coloured in moss green (RAL6005). Full details of the cameras proposed are shown in the submitted CCTV Elevation Drawing.

4.8 Miscellaneous

A container will be sited next to the sub-station at the northern boundary of the site to provide on-site storage for maintenance equipment. This will comprise a standard steel shipping container with approximate dimensions of 6058mm x 2438mm x 2591mm as per the submitted Storage Container Drawing.

4.9 Landscaping

The majority of the proposed development components are 3000mm or less in height; therefore in general terms it is capable of being screened by the mature hedgerows and woodland surrounding the site which is typical of the area.

Mitigation measures incorporated into the scheme design include measures to reduce the visual prominence of the solar arrays. It is proposed that a new holly hedgerow and tree planting is added to the northern perimeter to assist in minimising visual impact from the stables at Oak Tree Farm.

Mitigation varies in scale depending on location and nature of development. In this case, the scale of development requires a small level of mitigation to assist with assimilation into the natural setting. In general the aspirations of the proposed mitigation can be summarised as follows:-

- During construction, protect existing vegetation in accordance with BS:5837 '*Trees in relation to design, demolition and construction*'

- No change to the existing levels of the site
- Provision of a minimum 8m buffer on either side of existing ditches
- Ensure construction operations do not conflict with conservation interests such as the seasonal requirements of flora and fauna
- Reinforce any gaps in existing hedgerows with native species. This will enhance screening of the development, including low level activity on site, and create a visual foil for higher elements in the long term
- Consider the colour and texture of materials to be recessive against the backdrop of existing vegetation
- Fences and other ancillary items to be commensurate with the setting.

A detailed landscape and ecological management plan is submitted with the application.

5 APPEARANCE

5.1 PV Modules

The concept layout submitted with the application, is based on 32,270 x 260W panel solar PV modules with dimensions of 1670mm x 1015mm x 35mm. The total number and dimensions of the solar PV modules may change from those used in the site layout provided, subject to the make and model of the solar PV modules chosen. The modules are typically no more than 35mm in depth. The module frame is aluminium, with the mounting system being galvanised steel (with matt finish), fixed to the ground by 1500mm (approximate) driven post ground fixings (geology and ground condition dependent).

Each module is dark blue-grey in colour. Modules will be chosen that have an anti-reflective coating and have a matt grey metallic trim, to ensure that glint and glare are minimised. The impact of both glint and glare is considered in further detail in the Landscape and Visual Impact Assessment submitted with this report. Care has been taken to determine the best angle of pitch (20^{o}) that will both optimise efficiency of absorption, whilst minimising visual impact.

5.2 Additional Structures

The transformer/inverter buildings and substations will comprise powder coated steel containers or GRP buildings. The storage container will also be clad in powder coated steel. All these structures will be coloured Moss Green (RAL 6005).

5.3 Site/Construction Buildings

It is anticipated that the construction team will put in place a temporary work compound including site office and welfare facilities located within the land holding of Heywood Grange. All temporary works and protective fencing will be removed post construction during the operational phase.

The following temporary buildings and structures will be in place during the construction period:

- Site Office - 4 containers 6/2.4/2.4m
- Toilets - 2 containers 6/2.4/2.4m
- Parking area for workers
- Storage containers - up to 4 containers 6/2.4/2.4m
- Delivery and unloading area
- Open Storage area for plant and equipment

Additional Information:

- Security Fence - Heras Fence at the entrance, in front of office and welfare containers as well as around car park.
- Trees & Hedgerows - Existing mature trees and hedgerow boundaries will be suitably protected in line with best practice and British Standard BS5837 ‘Trees in relation to design, demolition and construction (2005)’.

All the above will be removed on completion of the construction works.

5.4 Lighting, CCTV and Security

External lighting will be used during the construction period only between the hours of 07.00 and 19.00. There is no requirement for external lighting during the operational period except for an emergency light on the outside of the DNO sub-station and the private switchgear containers.

The CCTV poles and security fence will be green.

6 ACCESS

6.1 Access to site

All deliveries will arrive via the main Heywood Grange Farm complex, which benefits from suitable buildings for offloading and storage facilities during the construction period. This arrangement uses two main access points from the Highway connected by an existing field track:

- The existing entrance to Heywood Grange; and
- An existing field access track, which requires crossing Tickhill Lane to the south of the main Farm complex

Both accesses are considered suitable benefitting from adequate existing visibility for the direction of travel and sizes of vehicles required.

Access tracks will be created running down the western edge of each field to provide access for construction and maintenance during operation. The necessity for temporary access tracks to extend the existing access any further into the site during construction will be decided based on the ground conditions at the time of installation.

All long term access tracks will be surfaced using locally sourced hard-core.

A proposed construction phase route to the site for delivery of the component parts for the development has been provided within the Construction Traffic Management Plan and summarised in the section below.

6.2 Construction Traffic

A Construction Traffic Management Plan has been submitted with the application.

There will be minimal impact on the local traffic network resulting from the proposal during the construction phase, and no impact during the operational phase of the proposed development.

Delivery of the components would be by standard HGVs as the panels are palletised and the switchgears/transformers do not require abnormal loads. Construction traffic would not require additional escorting to site and the delivery schedule will be coordinated to minimise impact on the local highway network and impact on the local residents' amenity. The delivery schedule can be agreed in advance with the Local Authority's Highways Team. The proposed route from the A52 is shown in Figure 4 below.

Figure 4 – Proposed Construction Traffic Delivery Route

It is not anticipated that delivery, construction, maintenance or decommissioning vehicles would contribute to significant increases in local traffic. The final route taken by vehicles during construction will be dependent on the contractor chosen to undertake the installation.

If there are any periods of wet weather during the construction period a temporary wheel wash will be located on site for all vehicles exiting on to the public highway to avoid depositing mud onto the road. Similarly, in excessively dry periods the public highways immediately adjacent to the site entrance will be swept if there is excessive dust.

6.3 Operational Traffic

Post construction, site traffic will be minimal comprising cars and small commercial vehicles assessing the site for maintenance or operational purposes.

6.4 Traffic Summary

The peak construction rate of the project would be 15-20 traffic movements a week for the delivery of modules, mounting systems and electrical balance of plant. These deliveries would take place over a period of around 6-8 weeks of the installation and construction phase of the project.

Given the scale of construction activity proposed it is considered that the local road network will be readily able to accommodate the small number of additional vehicles during the construction of the solar array.

6.5 Construction Programme

It is anticipated that the construction of the proposed development will take approximately 10-12 weeks with work being undertaken 7 days a week. The Parish Council and local highways department will be notified prior to commencement on site and provided with a copy of the Construction Programme. During construction contact details for an on-site representative will be made available.

The poles for mounting the PV modules and substructure will be assembled first. This involves the ramming of galvanised steel poles into the ground and subsequent assembly of the substructure.

The PV modules are mounted on a steel sub structure and screwed through their aluminium frame and the steel rails. Modules are designed as shatter proof and will be lifted into position to be mounted in landscape orientation with four modules arranged above each other in rows.

During construction a number of ground work installation teams will work on the site to establish the posts into the ground using tracked ramming vehicles, each team expecting to erect 300 poles in a day. Other teams will then assemble the structural mountings and fix the PV panels onto the structure.

The substructure will be attached to the poles using battery operated power tools and hand operated tools for fixing. The pile driving will not exceed 80db. Vibration is only very local and will not exceed an area of 5m^2.

No activities audible from the boundary of the nearest noise sensitive receptor shall take place on Sundays during the construction period or at times outside 07.00 and 19.00.

No vehicular deliveries including all Heavy Goods Vehicle (HGV) movements shall arrive, be received or despatched from the site outside the hours of 07:00 to 19:30 (or dusk if earlier) Monday to Friday and 07:00 to 17:30 on Saturdays.

6.6 Decommissioning

The design life of the modules is in excess of 40 years. However, if prior to the end of planning consent, the applicant decides to decommission, replace or refit the modules, or if required to by condition following a period of 12 months of non-continuous generation, an appropriate method statement based on the preferred option for decommissioning will be prepared and submitted to the Council for their consideration and agreement.

Should the modules be decommissioned, this will be undertaken within 6 months of notice given to the Council and is anticipated to take approximately 8-10 weeks and follow the construction stages in reverse. Reinstatement will occur at each stage of the decommissioning and all waste removed from site to a suitably licensed facility.

The proposed scheme including the penetrative ground fixings are fully reversible and all structures can be removed from the site and the land reinstated to agricultural use. The majority of the component parts, including the aluminium framework and silicon in the module panels, can be recycled for other uses. Any waste will be removed from site to a suitably licensed facility.

Vehicle movements are anticipated to be the same as per the construction period.