

# BELVOIR SOLAR FARM

## ENVIRONMENTAL ENHANCEMENT STRATEGY

PREPARED BY PEGASUS GROUP ON BEHALF OF JBM SOLAR PROJECTS 10  
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Organic sheep grazing / dual use of land

## ENVIRONMENTAL ENHANCEMENT STRATEGY OBJECTIVES

- To preserve and enhance the existing landscape features and character of the Site.
- To reinstate landscape features within the Site, which may have previously been lost through historic farming practices, to strengthen the local landscape character.
- To implement a range of on-Site habitat enhancement and improvements to encourage wildlife and enhance biodiversity.
- To provide areas of new planting to aid in preserving the visual amenity of local residents and visitors to the surrounding area.
- To enhance the access and recreational opportunities through the introduction of permissive footpaths and improvements to the existing on-Site Public Right of Way footpaths.
- To introduce interpretation and information boards as educational resources to encourage a better understanding of the solar farm and the benefits of renewable energy, and the ecological and landscape enhancements which are proposed across the Site.
- To create an historic trail with interpretation boards.
- To create log pile seating areas that will act as outdoor classrooms and meeting spaces for groups from the local schools.
- To contribute to local sustainability initiatives and to improve community facilities within the Site and surrounding area.



01



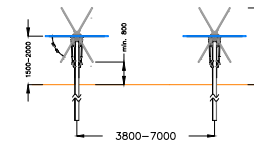


# PROPOSALS

- 1.1 **The solar farm on land at Belvoir, Leicestershire is being proposed by JBM Solar and is intended to use the latest photovoltaic technology** to produce approximately 49.9 megawatts of renewable energy. The development is intended to be erected for a period of 40 years and has been designed to be constructed and operated without any Government subsidy. Solar is now considered to be one of the most cost-effective sources of clean renewable electricity generation in the UK.
- 1.2 The proposals include a series of solar panels, which would be up to 3.0m in height and set out in linear rows. **The solar panels would be based on a simple metal framework which will move to track the sun.** The inverter and transformer blocks would be located along the internal access tracks on the periphery of the fields. The Site would be enclosed by a steel mesh 'deer style' fencing of standard design with large aperture galvanised mesh stretched on wire and supported by wooded posts of approximately 2.0m in height.
- 1.3 The proposed substation compound would be located adjacent to an existing pylon located on the Site, towards the southern part of the Site. **The solar panels and associated infrastructure would be set back from the field boundaries to avoid the root protection zones of any existing trees and hedgerows and to prevent any overshadowing.**
- 1.4 Footpaths F82/3, F90/2 and byways F85b/1 and F85b/2 which run through and around the Site would be retained on their current alignment and set within a 10m wide Green Infrastructure Enhancement Corridor.
- 1.5 The proposed construction and operational access to the Site will be gained via the existing access point on Castle View Road. **The proposed internal access tracks would follow field boundaries and utilise the existing gaps in vegetation or existing field access points** wherever possible.
- 1.6 **The proposed development would use a limited palette of both environmentally recessive colours and materials.** The photovoltaic panels are designed to absorb the light rather than reflect it, and with their dark appearance are designed to appear recessive in the landscape. The finishes to the inverter cabins and other ancillary infrastructure would be in colours that are agreed with the Local Planning Authority.

## Tracker table details

Table front view – 1 modules in portrait  
scale 1:100 @A3

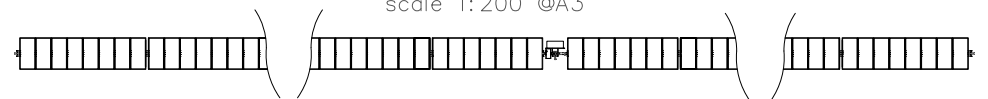


Variable pitch distance depending on ground conditions

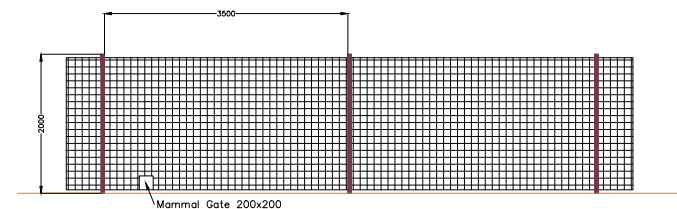
Table side view  
scale 1:200 @A3



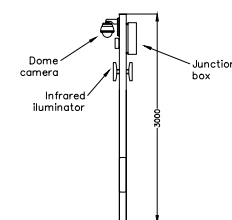
Table top view  
scale 1:200 @A3



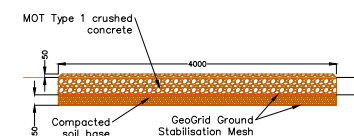
## Typical fence, track and CCTV details



Timber post & wire fence



CCTV pole



Access track cross section



02





## THE SURROUNDING AREA

- 2.1 The prevailing land use across the surrounding landscape is agricultural. **Field boundaries are predominantly formed by hedgerows, which often contain scattered hedgerow trees.** There is a small block of trees within the south east corner of the Site. A small watercourse, known as Winterbeck runs broadly north-south along the western boundary of the Site. The disused Grantham Canal meanders to the west and along the southern boundary of the site. Managed woodland and plantations occur further to the south, generally along the scarp of the Belvoir Castle ridgeline such as Cliff Wood. Vegetation cover generally comprises field boundary trees, small woodlands, tree belts and avenues (focusing on Belvoir Castle), and along watercourses and settlements.
- 2.2 **The Site is situated between the settlements of Redmile, Bottesford, Muston and Woolsthorpe-by-Belvoir.** Small and medium scale built form is generally confined to the surrounding settlements of Bottesford, with domestic and agricultural scale buildings occurring in Muston and other smaller villages. The distinctive but distant form of the Belvoir Castle sits on high ground to the south. The A52(T) forms the dominant built infrastructure at the northern edge of the site. Villages are linked by smaller, quiet local roads. **Pylons cross the southern part of the Site and connect to an extensive network that crosses the countryside to the northwest and southeast.**
- 2.3 The surrounding area may best be described as rural, gently undulating agricultural land typical of the Vale of Belvoir. Fields are generally rectilinear, many of which have been bisected by the realignment of the A52(T) to create a bypass route to the villages of Bottesford and Easthorpe. Field boundaries are formed largely by well-managed hedgerows, with intermittent mature hedgerow trees and some small woodland blocks. Managed woodland and plantations occur further to the south, generally along the scarp of the Belvoir Castle ridgeline such as Cliff Wood.
- 2.4 The landform of the Site rises in the north east towards Muston (between 39 to 47m AOD) and surrounded by areas of higher ground. Land rises toward the south with Belvoir Castle (over 2km away) occupying higher ground at c.120m AOD. The topography slopes gently down to the low-lying floor of the Vale of Belvoir at c. 26 to 30m AOD to the northwest. Hedgerows and hedgerow trees, along with occasional blocks of woodland introduce a relatively high level of enclosure at lower elevations. Elevated locations are open, offering distant and often unrestricted views across the Vale landscape.
- 2.5 There is a network of Public Rights of Way (PRoW) across the landscape surrounding the Site. **A series of footpaths and bridleways cross the surrounding landscape and provide a comprehensive network of routes** that connect the local settlements of Bottesford, Muston and Redmile.
- 2.6 **The Site does not fall within any statutory or non-statutory landscape designations.** Muston National Nature Reserve and area of SSSI is located adjacent to the redline boundary. With regard to surrounding designations, Belvoir Castle is Grade I Listed building, Conservation Area and Registered Park and Garden lying approximately 2.2km to the south of the Site. **There are no International or European designated sites (Ramsar, Special Protection Area or Special Areas of Conservation) within close proximity of the Site.**





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Wild Cherry

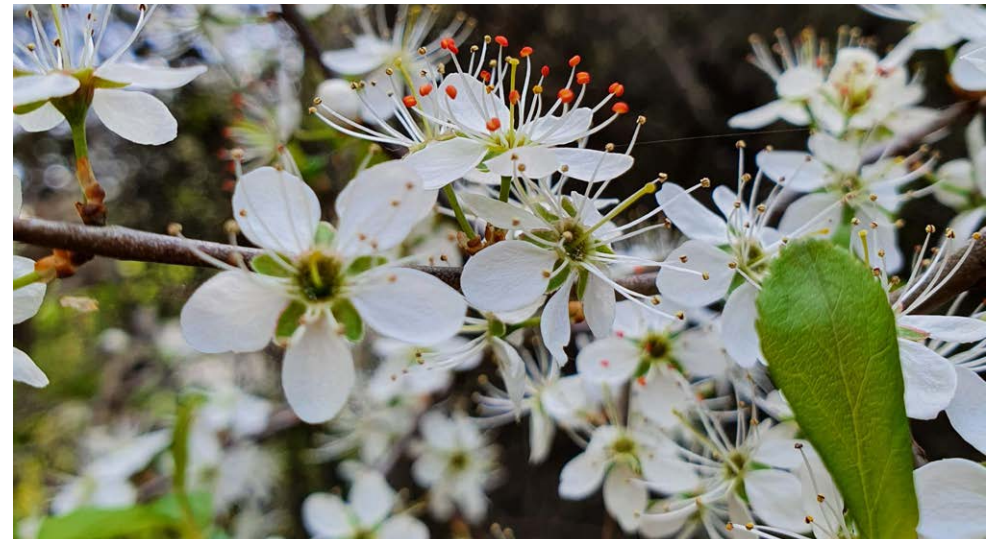


## LANDSCAPE PROPOSALS

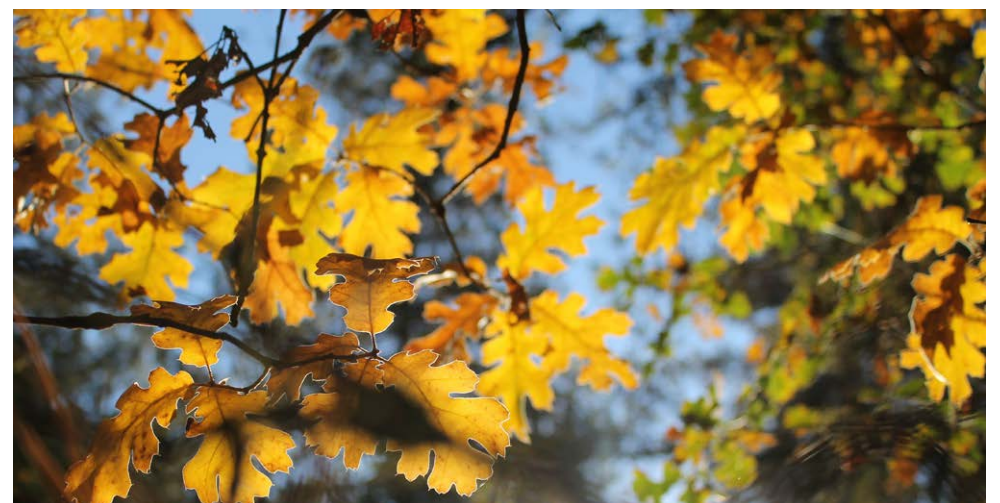
- 3.1 As part of the proposed development, hedgerow and native tree planting will **take place across the Site**.
- 3.2 **The planting proposals would enhance and reinforce the landscape structure across the Site**, which in turn would be beneficial in terms of strengthening the local landscape character in line with the guidelines for the 'Vale of Belvoir' landscape character area.
- 3.3 Landscape enhancements proposed across the Site include:
- Proposing a **new native tree belt** (10m wide) along a section of the eastern boundary softening the edge with Muston.
  - Implementing new lengths of hedgerow along footpaths and **accommodating the routes within a 10m wide Green Infrastructure Enhancement Corridor** which includes wildflower buffers/margins.
  - **Reinforcing and enhancing the retained hedgerows across the Site** to strengthen the landscape framework and local landscape character.
  - Enclosing the open field boundaries with new lengths of native hedgerow.
  - **Planting a species-rich grassland** on the land beneath and surrounding the panels and **creating a botanically diverse species-rich wildflower grassland** outside of the security fence and alongside the retained and proposed on-Site footpaths.
  - An area of **complimentary species diverse meadowland** is proposed adjacent to Muston Meadows SSSI/NNR at the eastern edge of the site.
  - An area of **complimentary species diverse grassland** habitat adjacent to Muston Meadows SSSI/NNR in the south east corner of the site.
  - Areas of **ponds/scrapes** with **tussocky grass/wildflower planting, hibernaculum, logpile, insect hotels** are proposed throughout the site.
  - A permissive path will link from footpath F90/2 to link up with bridleway F85b/2 creating a **looped walk**.
  - **Bat** and **bird boxes**, and **Sky lark nesting areas** are proposed throughout the site.
  - Four **interpretation boards** are proposed are proposed around the site.
  - **Beehives** are located in the south east corner of the site.
  - **Outdoor classrooms and picnic areas** will be located at the south west and north east corners of the looped walk.
  - A **canalside community orchard** is located within the southern end of the site.
- 3.4 Proposed tree species would include English oak, Hazel, Field maple, Wild cherry and Common hawthorn. Proposed shrubs include Common hawthorn, Blackthorn, Hazel, Field maple, Elder, Dog rose, Guelder rose and Common dogwood.

### Hedgerows and Hedgerow Trees

- 3.5 Once mature, the proposed hedgerow vegetation across the Site would be maintained at around 3.0m in height. New planting would typically take place in the autumn. Management of the new hedgerows will involve pruning back the new plants to approximately 150mm in height immediately after planting. In the second year, the previous season's growth will be trimmed back by approximately half to encourage more bushy growth. In the third year, the lateral and lead branches and shoots will require trimming to give a more even shape, suitable for providing shelter and wildlife protection. Once the hedgerow has matured and become more established and has thickened up with stouter growth, then mechanical trimming can be used.



Blackthorn



English Oak



- 3.6 Any proposed hedgerow trees would be either single or double staked with 75mm diameter stakes, depending on the size and age of the tree specified. Tree stakes and ties will be regularly checked during the establishment period and adjusted as necessary to ensure that the developing trees are not damaged.
- 3.7 There will be a minimal pruning policy for trees as pruning wounds can provide a source of infection. Formative pruning of new trees will only be carried out to remove dead and diseased wood and to create a well-balanced tree with a single leader. Clear stems of 1.8 metres will be maintained by rubbing off any shoots and when the trees reach 5 to 6 metres high lower branches will be removed to give a canopy height of approximately 2.4 metres.
- 3.8 Existing hedgerows across the Site will be retained within the development with access tracks utilising existing gaps or field accesses. The existing hedges on Site will need to be trimmed every two or three years in rotation. This will allow for species such as the Hawthorn to flower and fruit more freely, which in turn will benefit insects, birds, and small mammals. Trimming of established hedgerows will normally be done by machine but new hedgerow planting will typically be done by hand during the first three years of establishment to assure a good shape and dense bushy growth to the base.
- 3.9 The aim of trimming both new and established hedges is to produce a hedge that is roughly A-shaped. A-shaped hedges are more able to resist the wind and provide shelter to a range of birds, mammals, and insect.
- 3.10 **Where hedgerows within the Site have become neglected, they will be restored**, using coppicing, radical trimming and or layering techniques to encourage new growth at the base and top, or left and supplemented with additional planting to produce a more substantial belt of vegetation.
- 3.11 Existing and proposed hedgerows adjacent to the on-Site footpaths and across the Site would be maintained at 3.0m high once established, which is considered to be in keeping with the existing landscape character.

## Tree Belts and Groups

- 3.12 **The areas of tree planting would contain a mix of native trees**, planting patterns would avoid man-made grids and lines and should group the same species in more organic groups of 5-7 plants. Native trees would be double staked and checked regularly during the establishment period and adjusted as necessary to ensure that the developing trees are not damaged. Pruning would be kept to a minimum and only be carried out to remove dead and diseased wood and to create a well-balanced tree with a single leader. Within the tree group, clear stems of 1.8 metres will be maintained by rubbing off any shoots and when the trees reach 5 to 6 metres high lower branches will be removed to give a canopy height of approximately 2.4 metres to create a comprehensive landscape feature. In the long term, trees within the tree groups and belts could potentially be managed as pollards adding structural diversity.
- 3.13 Tree belts alongside existing hedgerows will be managed at over 3 meters to ensure that they contribute substantially to screening the proposals, but ensure that the solar panels do not become overshadowed.









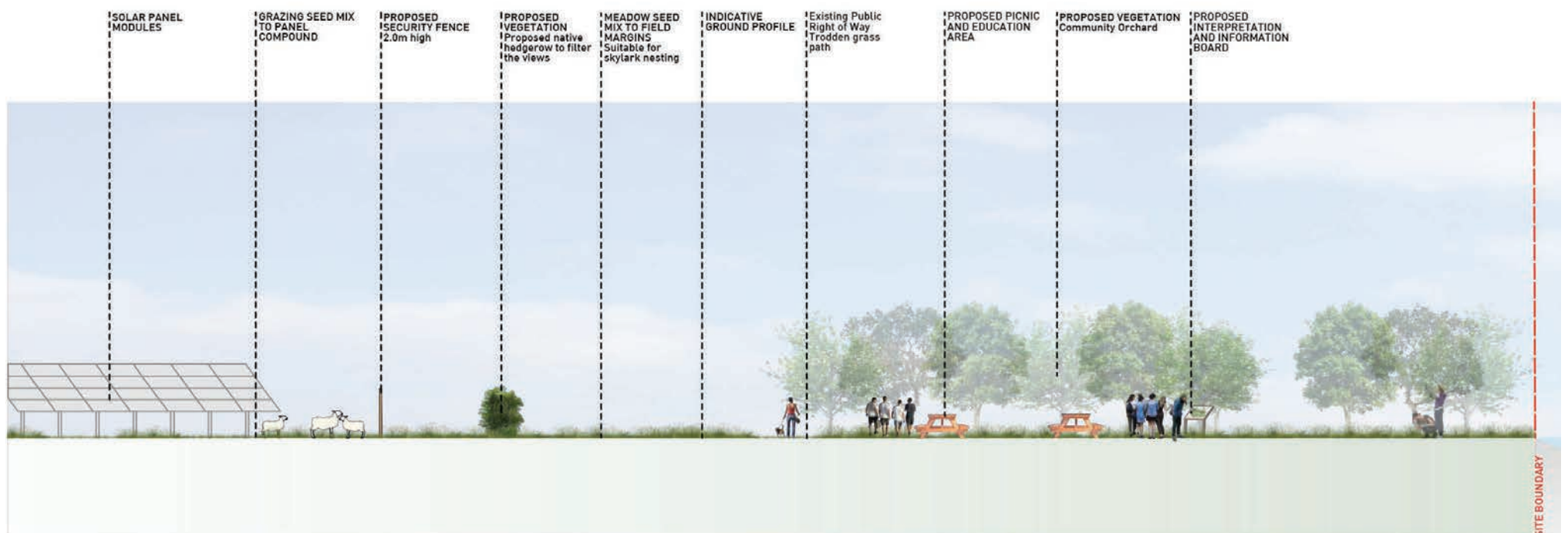
04



## ACCESS AND RECREATION

- 4.1 **The existing footpaths which cross the southern parcel of the Site have been accommodated within the development on their current alignments.** The footpaths would be contained within substantial 'green infrastructure enhancement corridors' and set within wildflower grassland. **Interpretation and information boards would be provided** and a new hedgerow located alongside one side of the footpath would over time aid in screening views of the largest area of panels. **The green infrastructure enhancement corridor would be approximately 10m wide**, to avoid creating a tunnel effect to ensure users do not feel crowded or overwhelmed by the proposals and to ensure some degree of rural character is retained.
- 4.2 As part of the proposals, **a new permissive footpath** would be promoted as a new wildlife walk and would travel past the proposed community orchard, the outdoor classrooms, picnic areas, information and interpretation boards and insect hotel, and then along the disused canal which passes through the southern parcel of the Site. It is the intention that there would be a gradual and sensitive approach to the management of existing vegetation to respect the existing wildlife whilst allowing users to safely travel along the wildlife walk.

- 4.3 **New way marker posts** will be erected to help direct walkers along these footpaths and to encourage local residents and visitors to walk the newly created circular walk, passing by interpretation and information boards explaining the various aspects of the solar farm development. Sections of the existing footpaths which are overgrown as they enter the Site will be cleared where necessary.



Indicative Site Cross Section





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## ECOLOGY

- 5.1 The layout of the proposed development has been designed to avoid higher value habitats including field boundary features such as trees, hedgerows, ditches, and ponds within and adjoining the Site.
- 5.2 Management practices through the operational lifetime of the development are proposed that will enhance the Site for the benefit of local wildlife. The design and long-term management of the land seeks to maintain and improve functionality through protecting and enhancing potentially important wildlife corridors. Across the Site, there has been a 173.38% Biodiversity Net Gain for habitat units in comparison to the existing situation and 15.78% Net Gain for hedgerow units.
- 5.3 Habitat enhancement measures proposed for the Site include:
- The creation of **species-rich grassland** on the land beneath and surrounding the panels to replace currently intensively managed arable land of very low biodiversity interest.
  - The creation of **botanically diverse species-rich wildflower grassland** outside of the security fencing, including alongside the retained and proposed on-Site footpaths.
  - The creation of **new native species-rich hedgerows**, tree belts and groups including **native tree species**, are proposed as part of the design.
  - The creation of a **community orchard** that would be populated with local varieties of fruit trees.
  - **Beehives** positioned to benefit from meadow flowers and located away from overhanging trees.
  - The inclusion of **significant enhancements areas for skylarks and fieldfares**.
  - **Bat roost boxes** and **bird nest boxes** will be installed on suitable trees across the Site.
  - **Otter holts** positioned in secluded locations next to existing watercourses within the Site to provide shelter and a safe refuge to encourage otters to recolonise and breed.
  - **Hedgehog nest boxes** will be positioned in sheltered and undisturbed locations for breeding and overwintering.
  - **Insect hotels** will be positioned in sheltered undisturbed locations for a range of invertebrates to utilise.
  - **Log piles and, amphibian** and **reptile hibernacula features** will be positioned close to ponds and hedgerow bases and will provide valuable refuge and overwintering opportunities for a range of species.



Bee on wild flower



Bat box



Fieldfare foraging on berry crop



Skylark enhancement areas



Hedgehog log pile



Bird nest box with Blue Tit



- **Mammal gates** or small gaps at the base of the perimeter fence at suitable locations will be provided to allow wildlife to move into and out of the Site and maintain connectivity with the wider landscape.
- The incorporation of **wetland features** including pond habitat enhancements.
- The inclusion of scrapes which would be seasonally wet to **provide important feeding areas for breeding wading birds such as lapwings.**

## Species Rich Grassland

- 5.4 Construction of the proposed solar farm will involve temporary disturbance to low ecological value arable and improved grassland, with extensive areas of grassland of higher biodiversity value established thereafter and maintained for the lifetime of the operational Site. **Over time the areas of species-rich grassland will restore nutrients to the soil and allow it to recover so it can serve future farming generations.**
- 5.5 Construction of solar farms requires very low levels of direct and permanent land take. The BRE guidance<sup>1</sup> states that, as panels are raised above the ground on posts, over 95% of a Site used for solar farm development is still accessible for plant growth and complementary agricultural activities, such as conservation grazing (BRE, 2014). The RSPB briefing note on Solar Energy also states that biodiversity gains are possible where intensively cultivated arable or grassland is converted to extensive grassland and/or wildflower meadows between and/or beneath solar panels and in field margins (RSPB, 2014<sup>2</sup>).
- 5.6 **A significant benefit to wildlife will therefore be achieved through the creation of species-rich grassland across the Site,** including new wildflower meadow replacing existing intensively managed arable and grassland. **This structurally and species diverse grassland will provide refuge and foraging resources for a range of wildlife** and will over time benefit a much wider variety of amphibians, reptiles, small mammals, bats, and birds, with the cessation of intensive agricultural management and pesticide applications. Birds such as Skylark and Fieldfare breed on these species-rich grasslands and benefit from the rich insect life, as this provides essential feeding for chicks.

1 <https://www.bre.co.uk/filelibrary/pdf/Brochures/NSC-Biodiversity-Guidance.pdf>  
 2 RSPB (2014) Solar Energy: RSPB Policy Briefing, December 2014. RSPB: Sandy. Available at [https://www.rspb.org.uk/Images/Solar\\_power\\_briefing\\_tcm9-273329.pdf](https://www.rspb.org.uk/Images/Solar_power_briefing_tcm9-273329.pdf).

- 5.7 **Flower-rich habitats, such as meadows, are crucial to supporting pollinators including bees, moths, butterflies, and hoverflies,** by providing good sources of nectar and pollen throughout the summer, as well as shelter and nest sites. An independent scientific review commissioned by Defra in 2013<sup>3</sup> identified the loss of flower-rich habitat as the likely primary cause of the recorded decline in diversity of wild bees and other pollinating insects. Crops such as raspberries, apples, and pears, in particular, need insect pollination to produce good yields of high-quality fruit. As part of the development, several beehives will be positioned to benefit from meadow flowers and located away from overhanging trees. Making sure to leave plenty for the bees' winter reserves, the beekeepers can bottle the excess reserves of honey produced in their hives each year and use samples as a means for spreading the word on their efforts to enhance species richness and diversity across the country. The natural, lightly-filtered honey can be gifted to key stakeholders, including partner schools, to highlight their belief that the enhancement of biodiversity should be a core responsibility for renewable energy companies. **Partner schools will also be offered lessons both in the classroom and out on Site at the beehives with a qualified beekeeper during the honey harvesting periods.**

## Hedgerows, Trees and Orchard

- 5.8 **The hedgerows and tree belts due to their linear form would act as ecological wildlife corridors,** linking isolated trees, existing areas of woodland and existing hedgerows within the site, to landscape features in the surrounding landscape. Improving and reinstating hedgerow boundaries within the site would provide further habitat connectivity.
- 5.9 **The arrangement of the panels within the Site allows for generous margins to be implemented around existing hedgerows and trees to respect the root protection zones.** The invertebrates attracted to these field margins will provide food for a variety of once common farmland bird species such as lapwing.
- 5.10 The structure of proposed hedgerows and, tree belts and groups, would be further enhanced by introducing native species of different ages to create habitat opportunities.
- 5.11 **Orchards are a mosaic** habitat and the area proposed on the Site would contain elements of tussocky and meadow grassland, hedgerows and hedgerow trees. These individual habitats combine in the orchard to create a wildlife haven that can support a broad range of insects, birds and mammals.

3 Vanbergen A.J., Heard M.S., Breeze T., Potts S.G., Hanley N., (2014) 'Status and value of pollinators and pollinating services'.



- 5.12 From a wildlife perspective, standing decaying wood is one of the most valuable elements of the orchard habitat. Insect larvae of species like the stag beetle, rhinoceros beetle and the rare noble chafer live exclusively in decaying wood, which in turn provide a great food source for foraging animals such as shrews, voles and birds looking for larvae to eat. Small rodents in turn would also attract owls and other predators to the orchard.
- 5.13 Windfall fruit left on the trees would provide an important source of food in the autumn and winter, ensuring the survival of a range of creatures including birds like fieldfares, redwings, thrushes and blackbirds and mammals such as badgers, hedgehogs and hares. Decomposing fruit also feeds moths and other insects, providing prey for bats as they prepare for hibernation.



Species rich grassland meadow / pollinator friendly vegetation





**The Solar Power Trail**

*Things to look for on the trail*

- 1. Observe the solar panels and their orientation. How are they positioned? What is the angle? How do you think this affects the amount of solar radiation they receive?
- 2. Look for the solar inverters and transformers. How are they connected to the solar panels? How do you think they work?
- 3. Observe the solar tracking system. How does it work? How do you think it affects the amount of solar radiation the panels receive?

UConn Solar Center



## EDUCATION AND INTERPRETATION

- 6.1 The solar farm is intended to become an **educational resource both for school children and the wider community**. Log pile seating areas and picnic areas will act as outdoor classrooms and meeting spaces for groups from the local schools or other interested groups, who may wish to learn more about solar farms as a renewable energy resource and the contribution they make to combatting climate change. There is an opportunity to use the trunks of trees which have been felled locally to construct the circular amphitheatre style seating area. The proposed seating will be set within areas of wildflower meadow to create an attractive environment for the visitors and located adjacent to the existing and permissive footpaths.
- 6.2 **A series of permanent interpretation and information boards will be set up along the footpaths within the Site** and will provide educational benefits to the local communities and visitors. The boards will encourage a better understanding of the solar farm and the benefits of renewable energy, and how ecology is being preserved and enhanced as part of the comprehensive ecological and landscape strategy. The boards will also enable local children to learn about how enhancements such as the large areas of species-rich wildflower meadow will support pollinators such as bees, and how they play a key role in pollinating flowers and crops. Lessons would be offered to partner schools in the classroom and out on Site at the beehives with a qualified beekeeper during the honey harvesting periods.
- 6.3 **Local schools will benefit from electronic links with the Site, thereby, for example, allowing pupils to monitor the levels of electricity generated and carbon dioxide saved** and thereby enabling a greater understanding of the technology and the environmental benefits it brings.



Wildflower planting beneath solar panels



Log seating



Heritage interpretation board



Biodiversity interpretation board

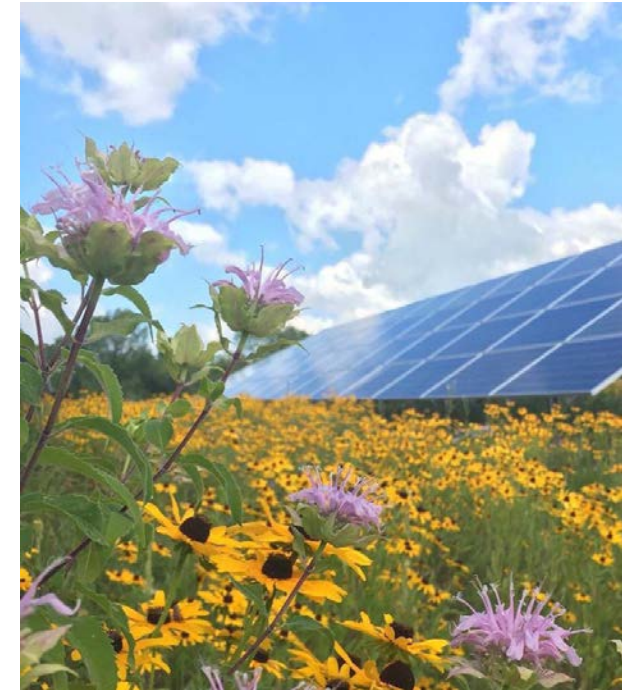




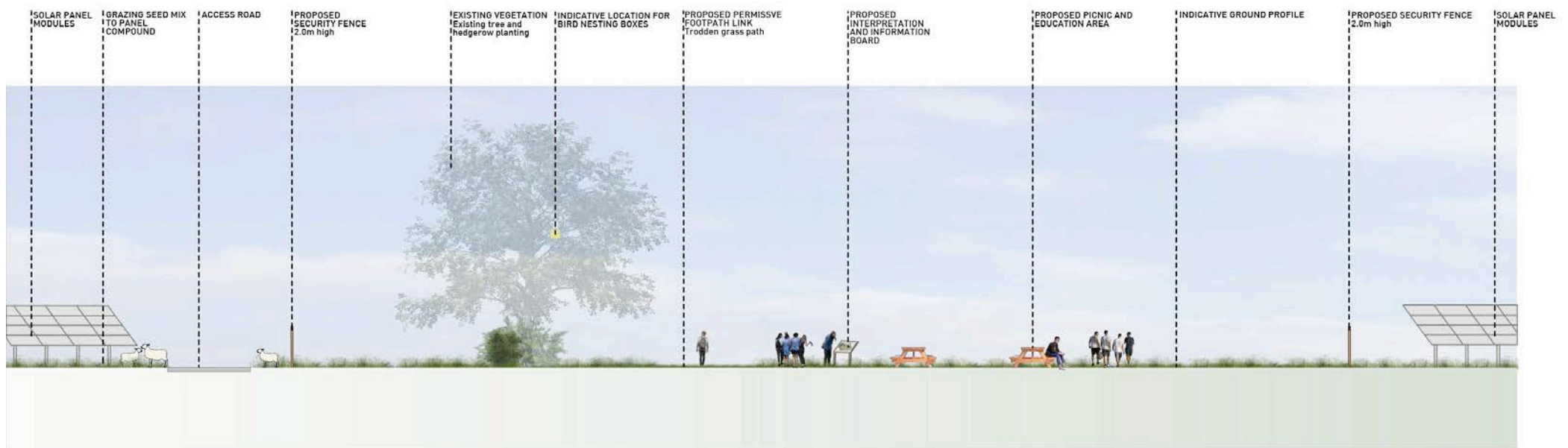
Pond scrape / habitat creation for birds/reptiles



Wildflower planting beneath solar panels

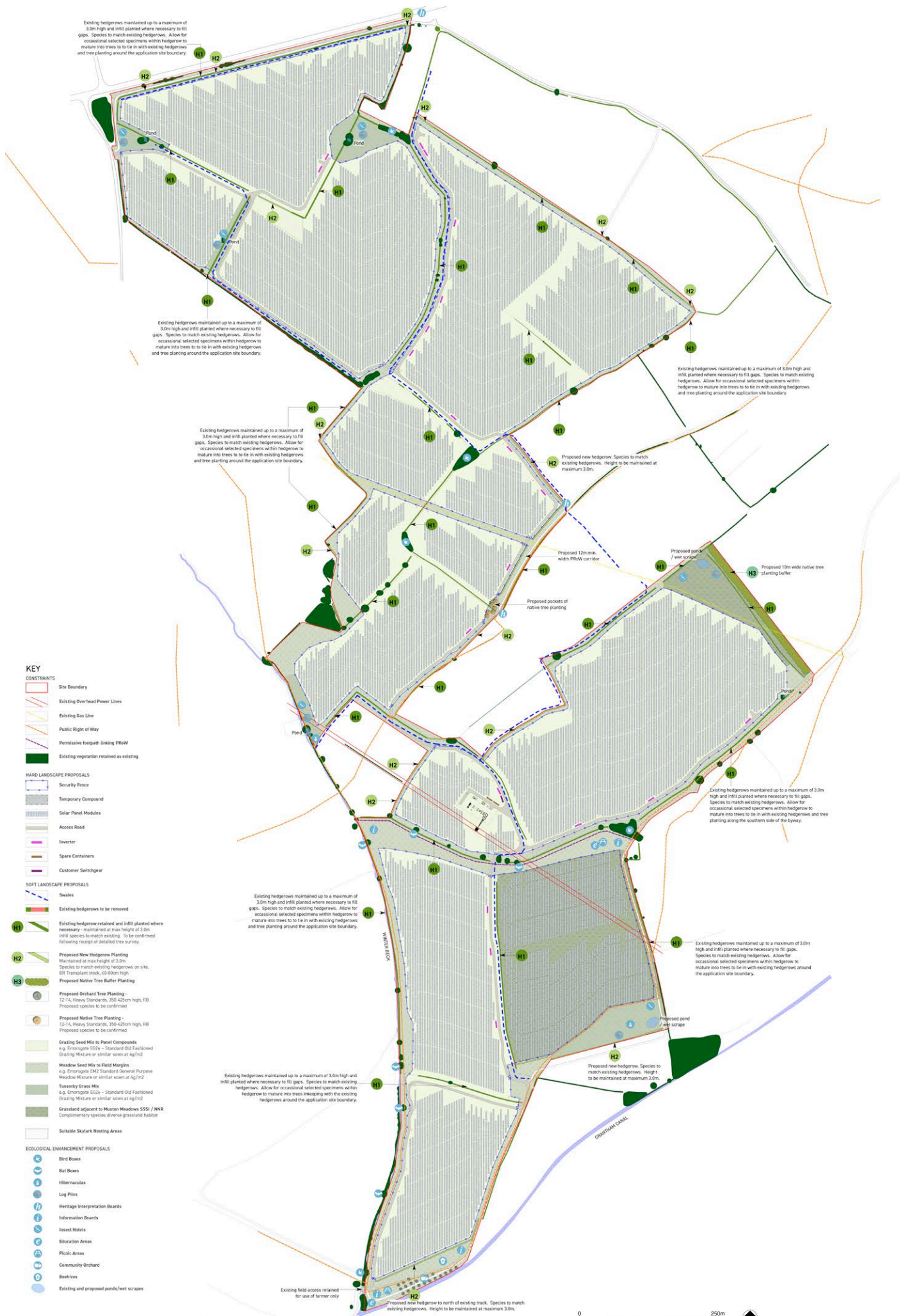


Species rich grassland meadow / pollinator friendly vegetation



Indicative Site Cross Section





Proposed Site Layout



07



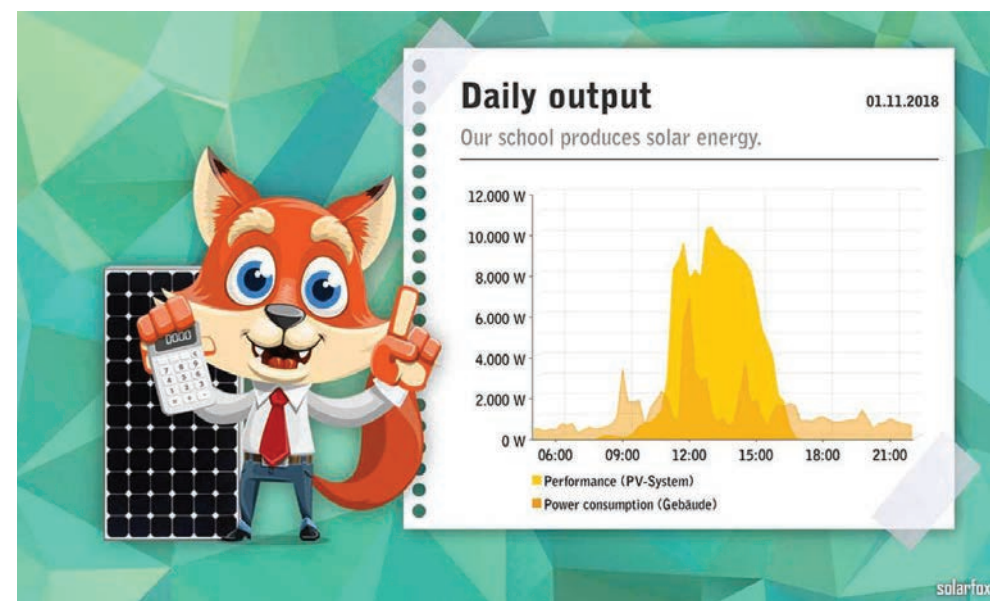


## COMMUNITY BENEFIT BUILDINGS

6.4 **At JBM, we are committed to ensuring local communities become active stakeholders in our solar schemes.** In line with planning guidance, we, therefore, welcome the opportunity to engage with parish councils to discuss potential Community Benefit projects. Our standard offering across all our projects is to **fund rooftop solar installations on community buildings, of up to 50kW across one or multiple community buildings**, for example, schools, churches, parish halls or other community buildings. In schools, the rooftop solar installation can be coupled with a solar display system located in the school reception so that children can track the live solar energy generation and learn about solar energy. Not only that it will help schools and the local community reduce their carbon footprint and their costs and enable sustainable practices both inside and outside the school gate.



School children with solar panels



Source: Solarfox