Biodiversity Monitoring Strategy

Solar Farm at Forest Gate,

Pewsham, Chippenham

Prepared for Eden FG Solar Ltd

by

Wychwood Biodiversity

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Report Date	Version	Authors	Approved
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Introduction

This Monitoring Strategy report has been prepared to discharge Condition 9 of planning permission PL/2021/06112 (Wiltshire Council, 2023), for the approved solar farm at Forest Gate, Pewsham, Chippenham, Wiltshire. Condition 9 stipulates that a monitoring strategy is developed to ensure the long-term management of landscape and ecological features retained and created by the development, for the benefit of visual amenity and biodiversity for the lifetime of the scheme.

Biodiversity monitoring is vital to assess the ecological progress of the site towards clear targets, which if not met, will result in adaptive management actions. Intervention should be undertaken if further work is needed to remedy an issue, for example failure of habitat establishment or the presence of invasive animal and plant species, such as Japanese Knotweed *Fallopia japonica*.

This Monitoring Strategy has been prepared with consideration of the existing habitats and species confirmed on site, as detailed in the Full Ecological Assessment (FEA) (Wychwood Biodiversity, 2022a); and the proposed new habitats and enhancements on existing habitats, as detailed in the Biodiversity Management Plan (BMP) (Wychwood Biodiversity, 2022b). The monitoring requirements and schedules detailed herein expands upon those summarised in the BMP.

The strategy consists of two sections: first, monitoring key biodiversity indicators; and second, monitoring the progress of newly created and enhanced habitats towards their target state.

The status of key biodiversity indicators is presented first, drawing upon survey results detailed in the FEA. Key biodiversity indicators are those which provide an indication of the ecological health of the site, and include species groups, the biodiversity net gain metric and selected ecosystem services. The proposed monitoring activity, key indicators to be surveyed, monitoring frequency over the lifetime of the solar farm, and the required time of year to undertake the monitoring activities are detailed for each indicator in turn.

The second section details the monitoring of newly created and enhanced habitats towards their desired target state. This section follows the same structure as the first, detailing monitoring activity, key indicators, and frequency. In addition, a component on recommended remedial measures is included where issues are identified during monitoring.

Both sections are accompanied by tabulated schedules detailing monitoring frequency and timings. The report concludes with information on the organisation responsible for undertaking the monitoring strategy for the lifetime of the installation.

This monitoring strategy has been developed in accordance with Solar Energy UK best practice guidance for ecological monitoring (SEUK, 2022); and shall be implemented in full in accordance with the approved details for the entire operational lifetime of the installation.



Figure 1. Forest Gate site and field numbers

Monitoring key biodiversity indicators

The following key biodiversity elements have been selected as indicators of the ecosystem health of the site. Each will require monitoring at various stages throughout the lifetime of the installation. Tracking the status of each element over 40 years will be achieved through a specific survey and report schedule. Details of the pre-construction status of each key biodiversity element on site has been summarised, along with the respective monitoring activity (method), key indicators to be surveyed, survey frequency and timings. The section ends with a table presenting the proposed monitoring schedule for biodiversity surveys at Forest Gate (Table 1.), and a table indicating the time of year the surveys are required to take place (Table 2.).

Bats

At least 14 bat species were recorded within the application area and adjacent land during the survey period. These included serotine bat *Eptesicus serotinus*, Brandt's/whiskered bat *Myotis brandtii/mystacinus*, Daubenton's bat *Myotis daubentonii*, Natterer's bat *Myotis nattereri*, Leisler's bat *Nyctalus leisleri*, common noctule *Nyctalus noctule*, Nathusius' pipistrelle *Pipistrellus nathusii*, common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*, and brown long-eared bat *Plecotus auratus*; and the rarer barbastelle *Barbastella barbastellus*, greater horseshoe bat *Rhinolophus ferrumequinum*, lesser horseshoe bat *Rhinolophus hipposideros*, and possible Bechstein's

bat *Myotis bechsteinii*. Bat activity was concentrated along hedgerows, the woodland edge, and field margins.

The new habitats proposed for creation are expected to improve this site for foraging and commuting bats. Such improvements will be monitored with bat surveys.

Monitoring activity

Bat surveys will record bat presence and species across the site and assess the usage of existing and new habitats (hedgerows, trees, ponds, and grasslands).

Each bat survey will follow good practice guidance for surveying bats (Collins, 2016), and will include the following two components:

i) One bat activity survey undertaken by two surveyors. This survey is to focus on Fields 1-4 and all areas of newly created habitat.

ii) One static detector survey, which will involve the deployment of 4 detectors over 5 nights. The detectors will be deployed at locations of interest – e.g., near substations and generators, and new ponds, grassland, trees, and hedgerows.

Key indicators

- All bat species, with a particular focus on barbastelle, Bechstein's, greater horseshoe and lesser horseshoe.
- The areas of notable bat activity and the abundance of each species.

Frequency

Once annually for the first 5 years, including baseline survey (three visits in year 1), then every 3 years thereafter.

Time of year

The baseline survey in year 1 is to comprise three surveys undertaken in the spring, summer, and autumn. To ensure a comprehensive and consistent comparison of bat species presence and abundance over the lifetime of the solar farm, annual surveys will be repeated within the same month as the baseline survey. This approach is necessary because bat activity and emergence exhibit seasonal variations. Activity & static surveys can be carried out together or separately.

Breeding birds

A total of 46 bird species were recorded inside the study area during the survey period. Twenty species were classified as either confirmed or probable breeders, including nine notable species: common woodpigeon *Columba palumbus*, rook *Corvus frugilegus*, Eurasian skylark *Alauda arvensis*, common whitethroat *Sylvia communis*, Eurasian wren *Troglodytes troglodytes*, dunnock *Prunella modularis*, house sparrow *Passer domesticus*, Eurasian bullfinch *Pyrrhula pyrrhula*, and common linnet *Linaria cannabina*. The ground nesting skylark was observed throughout the site, with eight territories registered across Fields 3, 5, 6, 7 and 10. The remaining breeding species were concentrated along vegetated field boundaries or woodland edge.

The new woodland habitats proposed for creation are expected to improve this site for several species breeding birds. Such improvements will be monitored with breeding bird surveys.

Monitoring activity

As per the scoping guidance of the RSPB, the bird survey is to follow the Common Bird Census (CBC) method (Marchant, 1983) adapted for the surveying of breeding birds. On each visit, one experienced ornithologist is to walk a pre-set route, ideally along each field boundary, thus allowing the interior of each field to be examined from all sides. All birds seen or heard will be recorded and any breeding behaviour will be noted, with a particular focus on ground nesting species and those of elevated conservation or legislative status. Breeding bird surveys will be undertaken between 06:00 and 11:00.

Key indicators

- All bird species, with a focus on ground nesting species and those of elevated conservation or legislative status.
- The location and breeding behaviour of each bird, and number of registrations for each species.

Frequency

Twice annually during breeding season for the first 5 years, then every 3 years thereafter.

Time of year

Twice during the breeding season; once during the early part of the breeding season (April) and once during the peak breeding season (May).

Great crested newts

Great crested newt *Triturus cristatus* (GCN) were confirmed to breed in Pond 2 (just outside the site boundary), which is located adjacent to Field 4, to the west of the A4. No ponds east of the A4 were found to support GCN. The grassland habitat around Pond 2 was considered suitable foraging and commuting habitat for GCN and other amphibian species.

Once established, the three new ponds and single scrape proposed for creation could support breeding GCN. The species potential presence and breeding status will be assessed with GCN surveys.

Monitoring activity

Great crested newt (GCN) surveys will be undertaken to assess GCN presence and breeding activity in the offsite Pond 2, and the onsite new ponds and scrape. The surveys will first comprise eDNA sampling on all waterbodies on site, followed by the standard methodology for determining GCN abundance on waterbodies that are shown to support GCN (Oldham, 2000). This will comprise torch surveys, bottle trapping and egg searches undertaken over 4 visits from mid-March to mid-June, ensuring at least 2 visits take place between mid-April and mid-May.

Key indicators

Great crested newt presence, breeding activity and population size in and around ponds.

Frequency

One suite of great crested newt surveys will take place in the second year of the solar farm being operational, then again in years 10 and 20.

Time of year

GCN surveys will be undertaken between mid-March and June. At a minimum, four survey visits are required, with at least half of the visits during the period between mid-April and mid-May.

Invertebrates

No invertebrates of note were observed on site during the survey period; however, several species of crickets, butterflies, moths, bees, and other common invertebrates were observed in the fields of pasture during the summer. Nonetheless, the site was considered to provide a range of foraging and refuge habitats for invertebrates, including hedgerows, standing dead wood, long grassland, and mature broadleaved trees.

The proposed habitat enhancements on site are expected to significantly increase the invertebrate diversity, and this change will be monitored with invertebrate surveys.

Monitoring activity

Prior to the survey, ten 100m transects will be placed across entire site. Each transect will start at the location of each botanical quadrat (excluding the under-panel quadrats); allowing for assumptions to be made between the two groups. During the survey, the transect routes will be walked at a steady slow pace, and all key indicator species counted. Invertebrate surveys will be undertaken during daylight hours, ideally on a sunny, warm day.

Key indicators

- Butterflies and bumblebees (pollinators) will be the two indicator groups counted; however, other invertebrate species of interest can also be counted if an accurate identification can be made.
- The areas of notable pollinator activity and the abundance of each species.

Frequency

Invertebrate surveys will be undertaken once annually for the first 5 years, then every 3 years thereafter.

Time of year

Invertebrate surveys are best undertaken from June to late July; the period when pollinators are most abundant.

Plants

No notable plant species were recorded on site during the survey period; however, three notable plant and one notable grass species were present in the adjoining Stanley Abbey Farm Meadows CWS: green-winged orchid *Anacamptis morio*, lousewort *Pedicularis sylvatica*, and creeping forget-me-not *Omphalodes verna*.

The proposed grassland enhancements on site are expected to significantly increase the botanical diversity, and this change will be monitored through botanical surveys.

Monitoring activity

Botanical surveys are to follow guidance provided by the National Vegetation Classification (NVC) (Rodwell, 2006). Quadrat locations will be assigned to the site prior to the initial baseline survey to allow changes to the botany to be monitored over multiple years. Fifteen quadrats will be plotted in total: 5 between the panels, 5 under the panels, and 5 along the field margins. Within each $1m^2$ quadrates, all plant species and their coverage will be recorded, in addition to sward height, thatch cover, and moss cover.

Key indicators

All plant grass and herb species on site, with a particular focus on the seed mix for new grassland habitats.

Frequency

Botanical surveys will be undertaken once annually for the first 5 years, then every 3 years thereafter.

Time of year

Best undertaken from late May to the end of June, which is considered the optimal period. Surveying outside this period is possible but considered sub-optimal. Where possible the survey should be undertaken prior to cutting on the site.

Biodiversity Net Gain

The initial biodiversity net gain calculation was made using version 3.1 of the Natural England calculator. The calculation is based upon baseline conditions for existing habitats and hedgerows on site. These were compared with the proposed habitat types and conditions post-development. Initial habitats are as described in the Habitats section of the Full Ecological Assessment (Wychwood Biodiversity, 2022a).

The scores from the calculator are as follows:

Existing habitats and hedgerows

224.14 habitat units on site

75.11 hedgerow units on site

Post-intervention

63.46 habitat units on site

87.00 hedgerow units on site

Resulting in a net gain of

17.55% total habitats onsite

15.83% on site hedgerow

The full calculation can be found in the separate Biodiversity Net Gain Calculator Version 3.1 spreadsheet for Forest Gate.

Monitoring activity

To allow for biodiversity net gain (BNG) progress to be tracked, habitat surveys will be required to monitor the status of each habitat at various stages throughout the lifetime of the solar farm. An experienced ecologist will classify all habitats on site according to the UK Habitat Classification (UKHab) guidance (Bucher et al, 2020a & b), and score their condition according to Natural England's condition assessment methodology (Natural England, 2021b) The resulting classification and scores for each habitat will be inputted into the BNG metric (Natural England, 2021a) and compared with baseline (or previous years) scores, to track changes to habitats on site, and to ensure they are meeting their target classification and condition specified in the Landscape and Ecological Management Plan (Wychwood Biodiversity, 2023a).

The results of the biodiversity net gain assessment will be presented in a separate BNG report, following CIEEM guidance (CIEEM, 2021).

Key indicators

All habitats (i.e., grassland, woodland and scrub, waterbodies, and artificial surfaces), hedgerows (i.e., hedgerows and lines of trees), and rivers (i.e., rivers, streams, and ditches).

The UKHab criteria required to achieve the target classification for each habitat (Butcher B, 2020a), as set out in the LEMP (Wychwood Biodiversity, 2023a).

The condition assessment criteria required to achieve the target condition for each habitat (Natural England, 2021b), as set out in the LEMP.

The resulting biodiversity units for each habitat, and the percentage change of biodiversity units tracked during each assessment.

Frequency

A biodiversity net gain assessment will be undertaken once in Year 1 and again in Year 5, then every six years thereafter.

Time of year

UKHab classification surveys can be undertaken year-round, though habitat condition assessments should be undertaken between April to October inclusive, when deciduous and annual plants are identifiable.

Soil

The soil at Forest Gate was not sampled during, or before, the planning application determination period, however the online Soilscapes Map (Cranfield Soil and Agrifood Institute, 2023) indicates the soil in the local area is slightly acid loam and clay. The soil is also likely to be relatively high in nutrients due to previous years of agricultural use.

Monitoring activity

Soil sampling will be undertaken to determine soil type and structure, and to track nutrient levels within the soil. 500g samples will be collected adjacent to each botanical quadrat location and combined into one container. This sample will be sent to a laboratory for analysis, and the results will be presented in the monitoring report.

Key indicators

Soil samples will be analysed for carbon percentage, pH, NPK nutrient levels, and physical structure.

Frequency

Soil analysis will be undertaken once in Year 1 and again in Year 5, then every six years thereafter.

Time of year

Soil samples can be collected year-round, though it is important that all samples are collected at the same time of year.

Ecosystem services

Monitoring activity

Ecosystem services will be assessed using the 'solar park impacts on ecosystem services' (SPIES) tool. SPIES decision support tool provides an accessible, evidence- based assessment of the impacts of solar park management on biodiversity, natural capital, and ecosystem services for the UK solar industry (Randle-Boggis et al, 2020).

Key indicators

Changes to habitat management approaches, from initial pre-construction baseline to LEMP prescriptions, including any further developments throughout the lifetime of the installation.

Frequency

An ecosystem services assessment will be undertaken once in Year 1 and again in Year 5, then every six years thereafter.

Time of year

SPIES is an online tool; therefore, the ecosystems services assessment can be undertaken at any time during the year.

Table 1. Monitoring schedule for key biodiversity elements

Year	Biodiversity surveys and frequency							
	Bat activity survey	Breeding bird survey	GCN pond survey	Invertebrate survey	Botanical survey	BNG assessment	Soil analysis	Ecosystem services
1	3	2		1	1	1	1	1
2	1	2	4	1	1			
3	1	2		1	1			
4	1	2		1	1			
5	1	2		1	1	1	1	1
6								
7								
8	1	2		1	1			
9								
10								
11	1	2	4	1	1	1	1	1
12								
13								
14	1	2		1	1			
15								
16								
17	1	2		1	1	1	1	1
18								
19								
20	1	2	4	1	1			
21								
22								
23	1	2		1	1	1	1	1
24								
25								
26	1	2		1	1			
27								
28								
29	1	2		1	1	1	1	1
30								
31								
32	1	2		1	1			
33								
34								
35	1	2		1	1	1	1	1
36								
37								
38	1	2		1	1			
39								
40								

Table 2. Suitable timings for each biodiversity survey

Monitoring survey	Surveyor	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Bat activity survey year 1	Licensed Ecologist												
Bat activity survey annual	Licensed Ecologist												
Breeding bird survey	Ecologist												
GCN survey	Licensed Ecologist												
Invertebrate survey	Ecologist												
Botanical survey	Ecologist												
BNG assessment	Ecologist												
Soil analysis	Ecologist												
Ecosystem services	Ecologist												

Optimal	
Possible but suboptimal	
Not advised	

Grouping biodiversity monitoring surveys and reports

Three groupings of biodiversity monitoring surveys and subsequent reports will be applied to Forest Gate, with differing frequencies and survey requirements.

Baseline biodiversity surveys

A suite of baseline surveys covering all key biodiversity elements will be undertaken during the first year of the solar farm's operation. The results of these surveys can be used as a baseline in the future to track changes to each biodiversity element. Baseline surveys will typically include:

- Bat survey
- Breeding bird survey
- Great crested newt pond survey
- Invertebrate survey
- Botanical survey
- Biodiversity net gain assessment
- Soil analysis
- SPIES assessment

Following the initial suite of baseline surveys, a detailed survey report will be produced. This report will be used as the baseline in the future to determine the progress of the new habitats, and monitor changes to the key biodiversity elements on site for the lifetime of the solar farm. The report will include results of all baseline biodiversity surveys, an initial UKHab map, and an initial SPIES assessment. The biodiversity net gain assessment report will be produced separately.

Long term biodiversity monitoring surveys

Following the baseline survey, annual surveys typically take place for the first 5 years, followed by surveys every 3 years thereafter; or once every 6 years. Long-term surveys will track changes to the key biodiversity elements and highlight any issues that need action with management alterations or

additional mitigations. With regards to Forest Gate, long-term monitoring would include the following surveys grouped by frequency:

Annually for the first 5 years, then every 3 years thereafter:

- Bat survey
- Breeding bird survey
- Invertebrate survey
- Botanical survey

Once in Year 1 and Year 5, then every six years thereafter:

- Biodiversity net gain assessment
- Soil sampling
- SPIES assessment

Once in Year 2, Year 10, and Year 20

- Great crested newt pond survey

Results of each annual and triennial suite of monitoring surveys will be presented in a detailed monitoring report, which will include two fundamental components: an evaluation of each biodiversity survey, comparing the results of previous years and tracking any significant changes; and recommendations to maintain and further increase the biodiversity on site, which will be provided in text and summarised in a management map. The biodiversity net gain assessment reports will be produced separately.

Monitoring the progress of new and enhanced habitats

This section presents the plan to monitor the progress of newly created and enhanced habitats towards their target state. The process of establishing new habitats and the enhancement of existing habitats will take some time, and it is not possible to forecast the precise rate of change and the subsequent ecological response. For this reason, an ongoing biodiversity monitoring programme for new and existing habitats will be required.

All new and existing habitats will be monitored as part of the biodiversity surveys. Monitoring in the first five years will oversee the establishing new habitats, with the aim to assess the progress of these habitats against clear targets, which if not met, will result in adaptive management actions. Intervention should be undertaken if further work is needed to remedy an issue. These issues may include failure of habitat establishment or the presence of invasive animal and plant species, such as Japanese Knotweed.

The below habitats have been grouped in broad categories, and individually classified according to the UK Habitats Classification (Butcher, 2020a & b) and the Biodiversity Net Gain Metric (Natural England, 2021).

Figure 2. LEMP map showing the location of habitats



Grassland habitats

Focal habitats

Modified grassland (UKHab code: g4)

- Existing grassland – in Fields 1-6 & 8-10.
- Diverse grassland - established in existing arable field (Field 7) and any areas of existing grassland damaged during construction.

Other neutral grassland (UKHab code: g3c)

- Species rich grassland - established along the margins of Field 4.
- Tussock grassland - established around the site margins, between the security fence and the boundary hedgerows.

Monitoring activity

Monitoring the progress of new grassland habitats would be incorporated into the biodiversity monitoring surveys. Issues observed and recommendations for management alterations would be fed back to the developer/owner/asset operator and included in the monitoring reports.

An experienced ecologist will inspect the condition of the existing and newly established grassland areas, to determine if they are progressing towards their target state. If problems are identified, then recommendations for supplementary seeding or green hay, or whether management interventions are needed to better encourage establishment, will be made. These visual assessments will be further informed by the results of the annual botanical surveys and soil sampling,

The ecologist will also assess whether the cutting regime is suitable, depending on the growth vigour and the species that have established; and where the grassland is grazed by livestock, the ecologist will assess whether the stock density is appropriate for the area.

The ecologist will also assess the grassland for excessive weed growth, noting that it is common for annual weeds to appear during the first 2-3 years of growth, largely due to the high nutrient content in the soil left over from previous years of arable farming.

Key indicators

- Botanical diversity within the sward.
- Sward structure and overall grassland structure.
- Presence of invertebrates and other animal species that indicate grassland health.
- Impacts from high or low grazing intensity, such as areas of exposed ground or excessive growth of vigorous grasses.
- Presence of weeds, such as creeping thistle *Cirsium arvense*, and invasive plant species such as Japanese knotweed.
- The UKHab criteria required to achieve the target habitat classification for each grassland type (Butcher B, 2020a), as set out in the LEMP (Wychwood Biodiversity, 2023a).
- The condition assessment criteria required to achieve the target condition for each grassland habitat (Natural England, 2021b), as set out in the LEMP.

Frequency

Monitoring of grassland habitats will take place twice during the first year, annually for the following four years and then every three years thereafter.

Time of year

Monitoring of grassland habitats can be undertaken year-round, though ideally April to September inclusive when herbs are in flower and grasses are developing seed heads.

Remedial measures

If the ecologist determines that the botanical composition of a grassland habitat has not reached the target criteria specified in the LEMP (Wychwood biodiversity, 2023a) measures will be taken to enhance species diversity. This can involve re-sowing target areas with an appropriate seed mix, or applying green hay cut from species-rich grasslands in the locality.

If the assessment shows that the cutting regime is negatively affecting the grassland sward structure and botanical diversity, management will be adjusted as required. Altering the timing, frequency, and intensity of the cutting regime can promote the growth of desired native plant species and limit the dominance of aggressive grasses.

For areas managed with a grazing regime, stock densities should be increased if there is a rise in uneaten grass, vigorous unpalatable grasses, and a decline in low-growing flora. Whereas, during wetter periods, the density of livestock may require reducing, to limit the amount of ground exposed through treading. Exposed ground and sward break-up can lead to the colonisation of unwanted and aggressive weed species.

Perennial weeds such as creeping thistle will be treated if they become a widespread problem; however, with appropriate grassland management these species should disappear over time. If plant

species listed by DEFRA as invasive (UK Government, 2020) are found, the advice of suitably qualified ecologist would need to be sought.

Woody habitats

Focal habitats

Lines of trees (UKHab code: w1g6)

- Existing lines of trees - throughout the site.

Hedgerows (UKHab code: h2)

- Existing hedgerows - throughout the site.
- Infilled existing hedgerows - along the eastern boundary of Field 7.
- Widened existing hedgerow - along the eastern boundary of Field 7.

Hedgerows – priority habitat (UKHab code: h2a)

- New species rich hedgerows - along the security fence-line south-east of the solar farm, alongside Close Wood and Derry Wood, and along the new west boundary of Field 3.
- Wetland hedging - along the east boundary of Field 4, to the west of the A4.

Mixed scrub (UKHab code: h3h)

- Native scrub areas - planted in numerous locations across the site.

Other woodland, broadleaved (UKHab code: w1g)

- Native tree and shrub belt - north of the A4, in Fields 9 and 10.
- Native woodland copse - within separate small field to the south of the A4.

Lowland mixed deciduous woodland (UKHab code: w1f)

- Existing woodland edge - Derry Wood and Close Wood.

Monitoring activity

A tree specialist would be responsible for assessing the health and progress of woody habitats such as new hedgerows and tree standards.

The tree specialist will assess the condition of hedgerows, trees, and scrub with a visual inspection, looking for signs of disease, pests, decay, structural issues, and evidence of excessive herbivore browsing. Based on the assessment, the specialist will provide recommendations to the asset manager for management alterations, or time sensitive remedial measures.

Key indicators

- Leaf condition.
- Tree and hedgerow crown density.
- Tree structural integrity.
- The presence of fungal or pest infestations.

- Decay or cavity formation.
- Root system health.
- The UKHab criteria required to achieve the target habitat classification for each woody habitat, as set out in the LEMP.
- The condition assessment criteria required to achieve the target condition for each woody habitat, as set out in the LEMP.

Frequency

Monitoring of woody habitats will take place during Years 2 and 5 after construction.

Time of year

Monitoring woody habitats can be undertaken year-round, though ideally between late autumn and early spring when the trees are largely leafless, which make it easier to assess their structure, health, and overall condition.

Remedial measures

Dead, dying, or diseased trees can usually be left standing, though may need to be removed and replaced to prevent disease, pests, or fungus from spreading to other trees. Structurally hazardous trees may also need to be removed or cut back, to avoid human injury or damage to site infrastructure.

Dead or dying shrubs or hedgerows should always be replaced. If shrubs are replaced, the ground must first be assessed for soil quality and drainage efficiency, as these factors may underpin why the shrubs are failing to survive. If the soil and drainage is deemed inappropriate for that species of shrub, an alternative more tolerant species may be used as a replacement.

Newly planted trees are susceptible to movement in high winds, resulting in the breakage of the new fragile root systems. If there is evidence of this, installing additional tree support systems will help to reinforce structural stability.

Excessive browsing from deer can kill shrubs, particularly young whips before they are fully established. If existing tree guards are deemed insufficient at protecting the young shrubs, temporary deer fencing may be required around the area in question, to allow the shrubs to fully establish and tolerate natural browsing from herbivores.

Wetland habitats

Monitoring elements

Artificial lake or pond (UKHab code: g362)

- Proposed scrape - in the north of Field 4.

Ponds - Priority Habitat (UKHab code: g19)

- Three proposed wildlife ponds - located in the south corner of Field 6, the north corner of Field 7, and on the eastern boundary of Field 7.

Natural pond (UKHab code: g364)

- The existing Pond 2, adjacent to the north boundary of Field 4 (outside the application site boundary).

Monitoring activity

Monitoring the progress of new wetland habitats would be undertaken by an ecologist, and typically incorporated in the biodiversity monitoring surveys. Issues observed and recommendations for management alterations would be fed back to the asset manager and included in the monitoring reports.

The ecologist will visually inspect the condition of each pond and scrape, checking for overshading from marginal vegetation, the presence of invasive or pernicious plant species, excessive accumulation of organic debris, excessive algal growth, and for evidence that the water levels are remaining consistent throughout the year.

Key indicators

- Shading levels.
- Presence of invasive aquatic and semi-aquatic plants.
- Quantity of organic debris.
- Algae growth.
- Quantity of pond weed and marginal plants.
- Presence of invertebrates and other animal species that indicate grassland health.
- Water levels.
- The UKHab criteria required to achieve the target habitat classification, as set out in the LEMP (ponds only).
- The condition assessment criteria required to achieve the target condition for ponds, as set out in the LEMP (ponds only).

Frequency

Monitoring of the wetland habitats on site will take place twice during the first year, annually for the following four years and then every three years thereafter.

Time of year

Surveying wetland habitats can be undertaken year-round, though ideally between late spring and early summer when aquatic plants and algae are in full growth.

Remedial measures

It is important to avoid excessive shading over ponds, particularly on the southern shoreline. If trees and scrub start shading large areas of the ponds, vegetation will be thinned to allow sunlight to return; and aquatic vegetation will be managed as needed to ensure around 50% open water is maintained.

To prevent margin vegetation from becoming overgrown, low level livestock grazing can be implemented, if possible, though annual mowing once a year may be required during the winter months. It is important to leave a small proportion of the edges ungrazed or uncut to allow the growth

of taller marginal vegetation. This will create structural diversity and habitat variety; beneficial to invertebrates and provide cover for precocial and fledgling birds.

Any pernicious plant species found within or around the pond will be removed manually, and no chemical herbicides will be applied. If plant species listed by DEFRA as invasive (UK Government, 2020) are found, the advice of suitably qualified ecologist would need to be sought.

Nitrate run off from adjacent fields can result in an accelerated growth of algae and weeds, which can swamp the water body; ultimately starving it of oxygen. Pond weed may need to be removed and discarded elsewhere. Ideally a minimum of 50% of clear water should be present at all times of the year. If algae need controlling, it may be necessary to plant more scrub along the edges to increase shading or introduce oxygenating plants to the water.

Nutrient levels in the water can also be reduced by removing organic debris, such as fallen leaves or branches from the surface; and adding bails of barley straw to the pond. Reducing nutrient levels in the water will make it more difficult for algae to persist.

Table 3. Monitoring strategy for new habitats

Habitat type	New habitats	Surveyor	Frequency	Time of year											
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Grassland	Diverse grassland Tussock grassland Species rich grassland	Ecologist	Twice during the first year, annually for the following four years and then every three years thereafter.												
Woodland	Native scrub areas Hedgerows Copse and tree belt	Tree specialist	During years 2 and 5 after construction.												
Wetland	Ponds Scrape	Ecologist	Twice during the first year, annually for the following four years and then every three years thereafter.												

Organisation responsible for monitoring

The asset owner, currently Eden FG Solar Ltd, will be responsible for implementing the monitoring strategy throughout the life of the project. Surveys will be undertaken by qualified and experienced ecologists with the necessary licensing to undertake the surveys required. If there is a change to the body or organisation responsible for biodiversity monitoring, the local planning authority will be notified within three months of such a change.

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