GREEN HILL
SOLAR FARM

# Green Hill Solar Farm
# EN010170

## Environmental Statement
## Appendix 9.1: Preliminary Ecological Appraisal

Prepared by: Clarkson & Woods Ltd.

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# Summary of Key Design Constraints

Table 1 below summarises the key ecological constraints, and the potential implications on scheme design. Please note that this report currently excludes Green Hill G, as this parcel was added to the scheme at a later date. This PEA will be updated to include Green Hill G in due course.

Inclusion of suitable buffers and consideration of the provision of mitigation habitat within the environmental masterplanning design process is crucial, to ensure there is sufficient allowance to deliver the best possible outcomes for biodiversity as the design is refined.

Constraints set out with the summary table below are coloured according to the significance of the constraint on site design and mitigation requirements. Constraints coloured in **Yellow** are of low significance, with impacts likely avoidable. Those coloured in **Orange** are of moderate significance, where impacts can be avoided or reduced to acceptable levels through careful planning. Those coloured in **Red** represent a significant constraint, where impacts should be avoided or where mitigation requirements are likely to be considerable.

**Table 1: Key Design Constraints Summary Table**

| Ecological Feature | | Design Considerations |
|---|---|---|
| **Designated Sites** | | |
| International Designated Sites | Upper Nene Valley Gravel Pits SPA – situated immediately adjacent to part (BESS3) of the proposed Green Hill BESS, plus all land parcels, with the exception of Green Hill A, located within 10km of this SPA habitat network. | Exclude BESS3 from the development footprint (see also Enhancement Opportunities) or, where this is not possible, establish appropriate undeveloped buffer (at least 50m) from the SPA boundary.<br>Mitigation for loss and fragmentation of foraging habitats upon target overwintering species (golden plover and lapwing), which may include avoiding particular fields identified as Functionally Linked Land (to the SPA) or, where this is not possible, provision of suitable foraging habitat at alternative locations in appropriate proximity to the Upper Nene Valley Gravel Pits SPA, sufficient in area and with good sightlines. |
| National and Local Designated Sites | Upper Nene Valley Gravel Pits SSSI – situated immediately adjacent to part of Green Hill BESS site (BESS3). | Same as 'International Designated Sites' above, in addition to the potential for mitigation measures to extend to include avoidance of the disturbance of Schedule 1 breeding bird species, where such species (e.g. bittern, Cetti's warbler) are confirmed to be nesting or rearing young active nests nearby. |
| | Grendon Lakes LWS. | As above – situated at Green Hill BESS. |

| Ecological Feature | | Design Considerations |
|---|---|---|
| | Horn Wood LWS immediately adjacent to Green Hill F. | Exclude from development and establish a buffer of 30m from ancient woodland, including vehicle routes onto and through Site. |
| | Bozeat Verge LWS 20m south of Green Hill F. | Outside of development area, will be retained. Access routes to prevent risk of heavy vehicles, travelling to/from/turning into Site, from driving over/increasing dust deposition onto the verge. |
| | Bozeat Meadows SSSI 75m east of Green Hill F at the closest point. | Outside of development area, will be retained. Specific mitigation measures considered disproportionate as the meadows are separated from Site by an A-road. |
| **Habitats, including Priority Habitats** | | |
| Arable Field Margins | Arable field margins with moderate botanical diversity present across Site. | Retain existing arable field margins (include within buffer zones), exploring options for continued cultivation in targeted areas to ensure sward and ground conditions remain suitable for arable weed community establishment. |
| Other Neutral Grassland | Present across Site but generally contained to margins and field corners of smaller fields. Includes areas with some irreplaceable habitat characteristics. | Retain and protect existing grassland fields and margins of this habitat type where possible, implementing appropriate management to prevent any reduction in diversity over time. Avoid development within fields that have additional valuable grassland characteristics, such as FF20 and also FF12 to a lesser extent. |
| Broadleaved Woodland | Small woodland parcels present on Site but with more extensive parcels immediately adjacent, including priority ancient woodland (Horn Wood LWS and Sywell Woods). | Retain all on-site woodland habitat.<br>Protect on-site and adjacent woodland with a minimum 20m buffer from development area (exc. Fencing), increasing to at least 30m for ancient woods. |
| Ponds | 19 ponds recorded across Site which add important wetland habitat diversification into the landscape. | Retain all ponds, protecting with no development buffers of at least 20m, potentially increasing to 50m where protected species (e.g. great-crested newts) confirmed - refer to relevant species section below. |
| Hedgerows | A network of hedgerows present across Site forming important habitat connectivity across Site and into the surrounding landscapes. Mature trees frequently recorded within the hedgerow network. | Minimise hedgerow loss through utilising existing access gaps where possible.<br>Minimum 15m buffer either side of every hedgerow (or greater should Root Protection Zones (RPZs) dictate). |
| Individual (Rural) Trees | 18 mature, in-field standard trees not associated with field boundaries forming important stepping stones between woodland and boundary habitats. | Protect with minimum buffer at least 10m, but potentially increasing to 12m for trees with high bat roosting potential (see 'Bats' below) or individual tree RPZ (whichever is greater).<br>No development within RPZs. |

| Ecological Feature | | Design Considerations |
|---|---|---|
| Ditches | Network of dry and wet ditches present across Site with the majority associated with hedgerows, woodland or field boundaries. | Minimum 8m buffer either side of stand-alone wet ditches, ideally 15m and increasing to 50m for those connected to protected sites (i.e. Green Hill BESS) in addition to the confirmed Battery Energy Storage Site. |
| Rivers and Streams | Rivers and streams present at Green Hill A, E, F and BESS. | Minimum 15m buffer either side of on-site minor watercourses, increasing to 30m for major watercourses, or where connected to protected sites (refer to 'Ditches' above). |
| **Protected Species and Species of Conservation Concern** | | |
| Badger | A large number of setts have been recorded across Site, including badger setts within field centres, notably at Green Hill E. | Minimum 30m buffer from Main, Subsidiary or Annexe setts, reducing to a minimum 15m buffer from smaller (Outlying) setts. |
| Bats | Bat activity survey results to date have recorded a range of foraging and commuting bats species anticipated for the local, including rarer species such as barbastelle.<br>A large number of trees and a small number of buildings within and adjacent to Site hold potential to support roosting bats. | Minimum 15m buffer from all hedgerows, tree lines and woodland to preserve core bat habitat. |
| | | Individual trees with bat roost potential: 15m (high) buffers, 10m (moderate) or 8m (low). |
| | | Hedgerows to be planted connecting all in-field trees with bat roost potential to existing hedgerow network or woodland edge habitat, including the appropriate buffers as described above. |
| | | Retain buildings with bat roost potential, with the provision of appropriate buffers to retain connectivity to suitable foraging and commuting habitats. |
| Otters | Confirmed on Site at Green Hill B, E, F and BESS.<br>Likely to use other watercourse and wet ditches for foraging and dispersing, but also open fields. | Minimum 15m buffer from watercourses and 8m from ditches.<br>Any required crossings should ideally utilise existing crossing points. |
| Water Vole | Water vole have been confirmed to be present within the ditch network, at the time of writing Green Hill E and BESS. | Minimum 10m buffer from watercourses with confirmed water vole presence.<br>Any required crossings should ideally utilise existing crossing points. |
| Dormouse | Considered unlikely to be present, given their restricted range within the vicinity and reintroduced population being isolated from Site. | Recommended buffers and mitigation for hedgerows and woodlands would retain suitable habitat, in the unlikely event they are in fact present. |
| GCN | The presence of GCN has been confirmed at Green Hill F, but within on-site ponds and within 250m likely requiring further survey. | Minimum 50m buffer from ponds returning positive eDNA records, reducing to 20m for other ponds.<br><br>GCN District Level Licensing would likely reduce all required pond buffers to 20m. |

| Ecological Feature | | Design Considerations |
|---|---|---|
| Reptiles | Widespread reptiles are likely to be present within the field boundary habitat across Site, potentially also within sympathetically managed grassland fields. | Retain field boundary habitats within suitably wide protective buffers and fields with suitable habitat throughout. |
| Birds of Open Farmland | Diverse range of overwintering waders and ground-nesting species recorded, including golden plover and lapwing associated with the UNVGP SPA. | Mitigation for the loss of confirmed Functionally Linked Land with the UNVGP SPA, which may include retention of optimal foraging habitat used by plovers, or provision of alternative foraging areas.<br>Mitigation for displacement of ground-nesting bird (chiefly skylark) territories will be required, including the provision of open fields either within Site or potentially utilising off-site areas.<br>The provision of suitable habitat for these species is likely to be considerable, but with exact requirements to be determined on completion of required bird surveys. |
| Other Birds | Records to date include a relatively diverse assemblage of overwintering and breeding birds present that will primarily utilise resources within hedgerows and associated field margins, but within the framework of the wider farmed landscape.<br>Schedule 1 species also noted in the data search, but including osprey at Green Hill B. | Retain suitable habitat, protecting individual trees with buffers at least 10m (but informed by RPZs), minimum 15m buffer from hedgerows and minimum 20m buffer from woodland field boundary habitats.<br>Provision of cultivated areas of carefully managed wild bird seed areas for overwintering populations of foraging grainivores.<br>Re-siting of the osprey nesting platform at Green Hill B is advised, or else this feature will need protection with a substantial buffer (TBC, but may be up to 300m) if nesting ospreys are present. |
| Invertebrates | Diverse grassland and field boundaries (including arable field margins) likely to be of moderate to high value generally poor within arable fields. | Retain field boundary habitats (including field margins), diverse grassland habitats and ponds with suitably wide protective buffers. |

# Summary of Enhancement Opportunities

Table 2 below sets out the key opportunities for ecological enhancement across the Scheme, as fully described within Table 6. Recommended enhancements seek to deliver maximum benefits for biodiversity, both in terms of achieving increased empirical Biodiversity Net Gain (BNG) across Site, and through the delivery of habitat and species-specific benefits within the local landscape.

At this stage, exact locations for enhancements have not been provided. It is recommended that the landscape and design specialists are engaged at an early stage in the masterplanning environmental design process, to identify the optimal locations for habitat enhancement and creation for both biodiversity and landscape. This will ensure sufficient space is built-in to the design. Inclusion of enhancement opportunities within scheme design would ensure environmental benefits are delivered in line with Local and National Planning Policies.

**Table 2: Key Enhancement Opportunities Summary Table**

| Ecological Feature | Opportunities for Enhancement | Focal Species |
|---|---|---|
| **Designated Sites and Priority Habitats** | | |
| Designated Sites | Enhance connectivity around designated sites through habitat creation and/or appropriate habitat management surrounded adjacent designated sites (e.g. wetland features, floodplain grazed meadows, grassland corridors, hedgerow and scrub planting). | All species |
| | Ensure use of appropriate seed mixes for the soils present on Site, but with consideration of nearby designated sites to expand the area of priority habitats (such as calcareous grassland, Bozeat Meadows SSSI). | |
| | Increase the extent and condition of habitats of high distinctiveness across Site though appropriate and targeted management, informed by Natural England National Habitat Networks mapping, which can be tailored towards considerable gains in BNG units. | |
| | Community contributions towards interpretation and access and other wildlife sites within the consultation zone of Upper Nene Valley Gravel Pits SPA to reduce and divert human impacts and disturbance affecting this internationally important site. | |
| Off-site Priority Habitats | Habitat creation and/or management to enhance connectivity between off-site priority habitats, e.g. by strengthening the existing intervening hedgerow and river buffer network, or creation of additional scrub/woodland planting. | All species |
| | Consult National Habitat Network Mapping and increase the extent of priority habitat in the local landscape through targeted habitat creation and/or appropriate habitat management within Site. | |

| Ecological Feature | Opportunities for Enhancement | Focal Species |
|---|---|---|
| | As above, but enhancements that will extend existing priority habitats beyond the redline boundary to strengthening habitat connectivity within the local landscape. | |
| **Habitats** | | |
| Arable Field Margins | Ongoing management of arable margins to ensure retention of arable weed communities, but also to increase species structural diversity of existing field margins to benefit a range of species, including pollinators and farmland birds. | Rare and threatened arable plants, in addition to all listed protected species, but to a lesser extent for birds of open farmland and otter |
| | Creation of new arable field margin habitat within Site, managing such margins to maximise biodiversity value and connectivity between ecological corridors across Site and into the local landscape. | |
| | Inclusion of annual (rotational across Site) cultivation of a proportion of retained field margins, to maintain arable farmland and habitats that will support the establishment of arable weeds on cultivated ground. | |
| Grassland | Extensive creation of species-rich grassland habitat that will replace existing arable crops. To be seeded with appropriate seed mixes and managed to maximise biodiversity value, ideally through grazing. Considerable biodiversity gains are likely to be achieved through change of land-use. | All listed protected species, excluding otter and water vole |
| | Enhance retained other neutral grassland to improve species and structural diversity, targeting areas adjacent off-site designated sites for high distinctiveness grassland within the local landscape (see above). | |
| | Enhance existing modified grassland habitats to higher distinctiveness grassland through appropriate management, oversowing and low-intensity grazing or alternative management approaches (e.g. cutting). | |
| Scrub | Enhance retained areas of scrub by increasing species diversity with the addition more species, ensuring chosen species will deliver successional foraging resources throughout the year. | All listed protected species, especially breeding birds, however to a lesser extent for otter and water vole |
| | Creation of addition scrub habitat within the Site to strengthen the habitat connectivity between existing woody habitats, as well as creation a mosaic of habitat types. | |
| Woodland | Enhance retained woodland habitat by improving tree health, structural diversity and establishment of ground flora, via implementation of sympathetic management practices. Consider replacement of any ash trees with dieback. | All species |
| | Additional woodland creation to increase the extent of habitats of high ecological value. This would likely contribute a delivery in BNG, especially where woodland is planted in previously arable areas. | |

| Ecological Feature | Opportunities for Enhancement | Focal Species |
|---|---|---|
| | Woodland creation and management to improve habitat connectivity between existing woody habitats, through management measures as described above. | |
| Ponds | Enhancement of existing ponds to increase biodiversity value through appropriate management, including scrub removal to reduce overshading and possible targeted sediment removal. Installation of fencing also to prevent livestock access. | Amphibians (including GCN), water vole, otter, aquatic invertebrates, foraging birds, breeding birds and reptiles |
| | Restoration of ghost ponds and creation of new wildlife ponds and wetland features to increase the extent and connectivity of the local wetland network. New ponds should be connected to existing waterbodies by biodiverse terrestrial habitat corridors to facilitate movement of species. | |
| Hedgerows and Lines of Trees | Infill planting of existing hedgerows with native species to increase species-richness, provision of successional foraging resources and improved structural integrity | All species excluding otter and water vole |
| | Creation of new hedgerow features, providing ecological corridors between existing priority habitats, woodland blocks, trees and other isolated features. Additional hedgerows will seek to improve habitat connectivity within the Sites and into the local landscape (including towards local strategic policies) and would also potentially deliver considerable gains for BNG linear units. | |
| | Maintain and appropriate manage adjacent habitat to increase the diversity of adjacent habitats | |
| Individual trees | Connecting existing, isolated or in-field trees with suitability for roosting bats into the hedgerow network or adjacent woodland through creation of new hedgerows with suitable buffers (Figures B1-B7 refers). | Primarily invertebrates, breeding birds (not associated within open farmland), bats and reptiles |
| | Planting of additional standard trees within fields. | |
| | Management of existing individual trees to promote tree health and longevity, and development of ecological niches/veteran features, which includes the retention of dead trees. | |
| | Inclusion of traditional orchard planting to increase woodland planting diversity | |
| Ditches | Plug planting of aquatic plant species within existing wet ditches to increase species diversity and foraging resources for a range of species. | All species may benefit, but primarily aquatic invertebrates, otters, water voles and amphibians |
| | Management to reduce prevalence of rank grasses, scrub and ruderal vegetation within channels ingress light ingress supporting aquatic and marginal plant species to colonise, increasing habitat suitability for a range of protected species. | |
| | Increase water-retention ability of dry ditches within the Sites through hydrologically informed modifications, targeting ditches that would increase connectivity between existing watercourses/wet ditches and key habitat, particularly within Green Hill A, D, E and F. | |

| Ecological Feature | Opportunities for Enhancement | Focal Species |
|---|---|---|
| | Creation of new wet ditches to increase the extent and connectivity of this habitat. This would also significantly contribute to achieving BNG for watercourse units. | |
| | Community contribution towards Invasive Non-Native Species management and control programme to control INNS presence, thus preventing further loss of protected species and to potentially support recovery of some species. | |
| Rivers and Streams | Management of riparian habitats to promote botanical and structural diversity of bankside vegetation, including establishment of tussocky grassland, scrub and woody features. | All species may benefit, but primarily aquatic invertebrates, otters, water voles |
| | More ambitious measures would include reprofiling of ditch banks and hydrological modifications to reduce rapid run-off at times of peak flow, recover flood pulses and increase lateral connectivity with adjacent wetland features. | |
| Artificial Habitat Enhancements | Provision of additional habitat enhancement features within the Sites, including:<br>• Bat roost boxes & bespoke roost structures (~1-2 features per 10ha)<br>• Bird boxes (~1-2 boxes per 10ha)<br>• Specialist raptor & owl boxes in targeted locations<br>• Dormouse boxes (~1 box per 10ha of suitable habitat)<br>• Hibernacula (~ feature per 20ha)<br>• Log/brash piles (~1 feature per 20ha)<br><br>Provision of these enhancements would benefit the following species: roosting bats, nesting birds (including owls and other birds of prey), dormice, widespread reptiles and amphibians, hedgehogs and invertebrates. | Roosting bats, nesting birds (inc. owls and other birds of prey), dormice, widespread reptiles and amphibians, hedgehogs, and invertebrates. |

# Introduction, Aims and Appraisal Scope

Clarkson and Woods Ltd. was commissioned by Green Hill Solar Park Ltd. to carry out a Preliminary Ecological Appraisal (PEA) for all land parcels included within the Green Hill Solar Farm project for proposed solar-PV and associated infrastructure development. In total, seven parcels of land, situated between Northampton and Wellingborough in Northamptonshire, were initially subject to baseline habitat walkover surveys. These collective land parcels are referred to hereafter as 'the Site', or individually as Green Hill A-F and Green Hill BESS (Battery Energy Storage System). Development proposals are at an early design stage and comprise the development of a Nationally Significant Infrastructure Project scale solar farm, containing a 500MW capacity solar energy production and associated infrastructure, including Battery Energy Storage System components. This is referred to as 'the Scheme'.

This PEA incorporates the results of baseline UK Habitat (UKHab) walkover surveys of the Site, carried out by Clarkson and Woods Ltd in August 2023 and January 2024; supplemented by environmental desk studies and partial datasets from detailed ecological surveys completed to date, including: bat activity surveys, otter and water vole surveys and diurnal and nocturnal wintering bird surveys. The aims of this PEA Report are:

- To describe the habitats present across the Site and their potential to support protected or otherwise notable species and habitats capable of being material considerations within the DCO process.
- To set out the results of a desk study based on third party ecological records for the Site, and appropriate surrounding area (supplied by Northamptonshire Biodiversity Records Centre (NBRC) and Northamptonshire Bat Group), and in the context of Local and National Planning Policy. Open-source, national environmental data records were also reviewed.
- To outline any key ecological constraints to the development of the Site.
- To identify where further surveys to establish baseline conditions or develop mitigation or compensatory measures may be required, and to outline timing considerations.
- To broadly discuss avoidance, mitigation or compensation measures likely to be required to minimise potential ecological impacts.
- To outline options for ecological enhancement and delivery of Biodiversity Net Gain (BNG) and key considerations around how they may be secured, managed and monitored.

This PEA contains habitat information from within the red line boundaries (the option land boundaries) only, however, a desk-based general assessment of the surrounding landscape was made to provide landscape context for the Sites.

Under CIEEM guidelines, PEA Reports are not considered suitable on their own for inclusion with an eventual planning/DCO application. However, their content is intended to inform, support and enhance the masterplanning design process. It is anticipated that the results of further detailed ecological survey work will be reported separately in due course and will serve to underpin an eventual Preliminary Environmental Information Report (PEIR) and Environmental Impact Assessment (EIA). No appraisal of proposed cable route options associated with the proposed development are provided within this report.

## Site Description Summary:

The Sites are spread over an area covering ~980ha between the settlements of Northampton, Wellingborough, Kettering and Bozeat, as shown in Figure 1 and Figure 2 below.

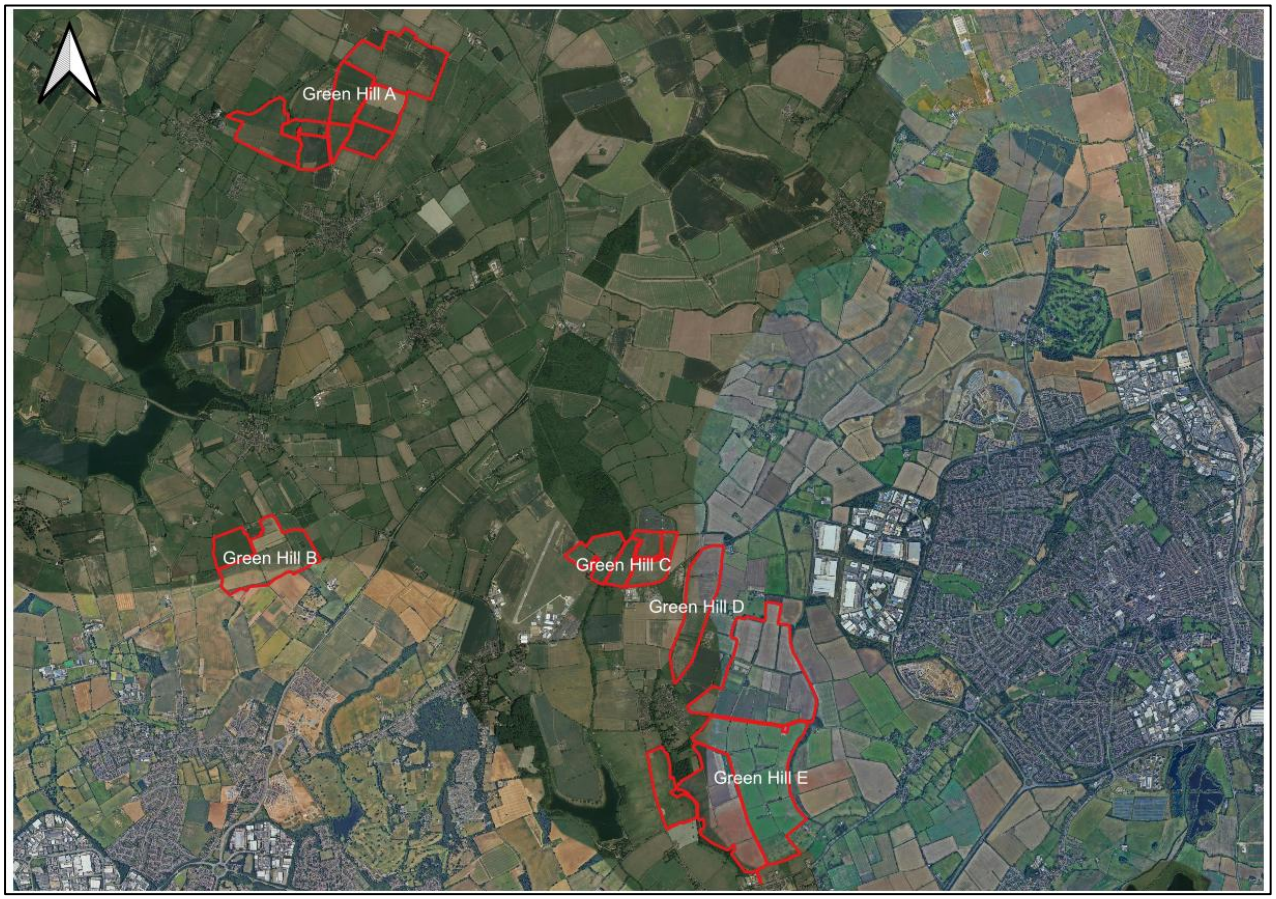


**Figure 1: Location of Site (Green Hill A – E)**

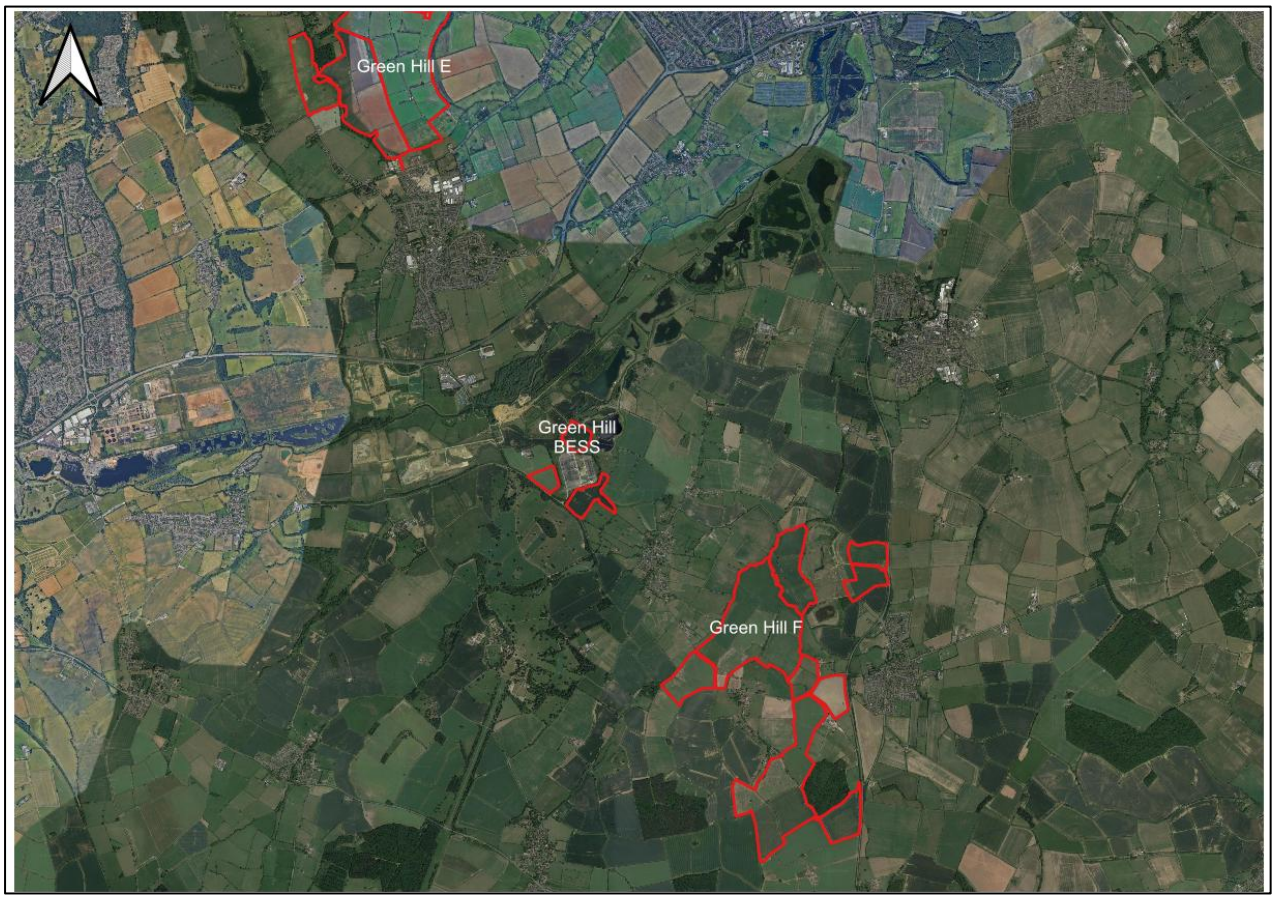


**Figure 2: Location of Site (Green Hill F and BESS)**

The Site predominantly comprises large, open, and flat to gently undulating arable fields characterised by winter-sown cereal crops, cover crops (brassicas) and some grasslands (grazed and permanent pasture). Cropland habitats accounted for approximately 84% of the total area of Green Hill A-F and BESS, whilst grassland habitats accounted for approximately 14% of the total site area.

Narrow arable field margins were often present, some evidently seeded and likely managed as agri-environment conservation measures. Some field corners, small fields and occasional large fields not included within arable crop rotation (at the time of survey) formed larger conservation management areas.

Grassland habitats mostly comprised modified grassland (accounting for approximately 9% of the total site area and 65% of all grassland areas), but Other Neutral Grassland (ONG) was also recorded (currently accounting for 5% of the total site area and 35% of all grassland areas). This habitat was generally recorded within smaller fields or grazed pastures, and most commonly at Green Hill F within grazed pasture, although it should be noted that the habitat surveys of Green Hill F were completed outside of the optimal season for identifying grassland types, and so these results are subject to change. Small areas of tall ruderal vegetation were recorded across Site, restricted to boundaries and extending from hedgerows and other boundary features or associated with unmanaged areas, such as surrounding ponds.

Several ponds (19x) were recorded across the Sites, typically associated with the ditch network. However, occasional larger ponds were recorded, such as within fields at Green Hill B and Green Hill E.

Fields were bounded by a network of managed hedgerows, in varying condition and of differing ecological value. All recorded hedgerows were native, including occasional species-rich hedgerows, and were generally in moderate or good condition (in accordance with Biodiversity Net Gain condition assessment methodology). Many hedgerows were associated with ditches, wet agricultural ditches, rivers and streams. Some hedgerows are potentially classed as 'Important'

under the Hedgerows Regulations, although this should be clarified through collaboration with the Landscape consultant. Occasional agricultural buildings were present within Site, in addition to associated infrastructure, such as hardcore tracks.

Occasional small parcels and belts of broadleaved woodland were recorded within Site, but with several more substantial areas of woodland (including some ancient woodland) bounding the Sites. Several large in-field trees were recorded, of which a small number were noted as having veteran or ancient characteristics.

The series of drainage ditches frequently recorded alongside hedgerow features included both wet and dry ditches. The majority were found to be dry at the time of the survey, but many of those within Green Hill A, E, F and BESS would be expected to hold water for extended periods of the year. Larger rivers were also recorded at these same land parcels, with connectivity into the surrounding landscape, including the River Nene.

The Site's habitats are very much typical of the surrounding landscape, which is a combination of elevated and undulating farmed landscapes; predominately arable fields interspersed with occasional pasture grassland, woodlands, small settlements and farmsteads, linked by minor and single-track roads. Small settlements and villages in close proximity to Site include Earls Barton, Easton Maudit and Mears Ashby, with Grendon and Walgrave also nearby. Green Hill B – Green Hill E are situated between the larger conurbations of Northampton and Wellingborough.

The Site is also situated across the extensive river network and floodplains of the River Nene, which forms a mosaic of wetland habitats separating Green BESS and Green Hill F from all other land parcels to the north of the River Nene. These wetland habitats include open water and valuable marginal features, including sparsely-vegetated islands, gravel bars and shorelines, reedbeds, marsh, wet ditches, rush pasture, rough grassland, scattered scrub, plus wet, floodplain woodland supporting internationally important waterbird populations. Other large waterbodies likely to be used by these bird populations include nearby Pitsford Reservoir and Sywell Reservoir, situated to the north in closest proximity to Green Hill B and C.

### Surveys Carried Out to Date

Please note that this PEA was prepared prior to the addition of Green Hill G (Meikle land). As a result, no survey or assessment work relating to Green Hill G is currently included. This PEA will be updated at a later date to include details of Green Hill G.

Given the later addition of the Green Hill F (Castle Ashby Estate) land, this land parcel has not been subject to the same level of survey effort to date, in comparison to the rest of the Site. The following surveys have been carried out on Green Hill A-E and the BESS Site (updated as of mid-May 2024):

- UKHab surveys to characterise habitats present, including an assessment of potential for protected species (August 2023 – Oct' 2023)
- Six diurnal wintering bird survey visits (Oct 2023 – March 2024)
- Three nocturnal overwintering bird survey visits (Feb 2024 – March 2024)
- Two diurnal breeding bird survey visits (March 2024 –April 2024)
- Four deployments of static bat detectors (August – Oct 2023, April 2024)
- Two otter and water vole survey visits of suitable watercourses (Sept 2023, April 2024)

At Green Hill F, at the time of writing the following surveys have been completed:

- UKHab surveys to characterise habitats present, including an assessment of potential for protected species but **excluding** habitat condition assessments (January 2024)
- Four diurnal wintering bird survey visits (Dec 2023 – March 2024)
- Three nocturnal overwintering bird survey visits (Feb 2024 – March 2024)
- Two diurnal breeding bird survey visits (March 2024 –April 2024)
- One deployment of static bat detectors (April 2024)
- One otter and water vole survey visit of suitable watercourses (April 2024)

Further ecological survey requirements identified are set out within Table 7 at the end of this report, together with the associated time constraints and schedule of work.

### Consultation

Natural England has been contacted via the organisation's Discretionary Advice Service (DAS) for consultation relating to survey scope, particularly with regards to the Upper Nene Valley Gravel Pits SPA. Two meetings have taken place to date, but with consultations ongoing. No further consultation with statutory or non-statutory third parties has been carried out to date, however, considering the potential for impacts upon a number of protected and notable species, combined with the desired timescales applied to the project, it is recommended that the indicated scope and approach to further survey is consulted on with local authorities and their non-statutory conservation bodies (Wildlife Trust, RPSB) consultees, in addition to statutory consultation with Natural England, at an early stage.

# Desk Study

## Methodology:

Environmental data searches were purchased from Northamptonshire Biodiversity Records Centre (NBRC) and Bedfordshire and Luton Biodiversity Recording and Monitoring Centre (BRMS) pertaining to 2km from the boundary of the Sites. The scope of the data search included records of Species of Conservation Concern (SoCC), as well as details of any non-statutory designated sites (i.e. Local Wildlife Sites (LWSs) and Wildlife Trust Reserves (WTRs). This was supplemented by a request for bat records within 2km of the Sites from Northamptonshire Bat Group. This desk study includes a filtered subset of the data search results, focussed on records made since the year 2000, and any other records of particular relevance to the Site. A search of Clarkson and Woods' own in-house species records was also made using the same search parameters.

In addition to these records, both the DEFRA Magic Map Application and the Natural England Open Data Geoportal were searched for designated site, habitat and species information. This included a search for 'International' designated sites for nature conservation within 10km of the Site boundary. Internationally designated sites include Special Areas of Conservation (SACs), Special Protection Areas (SPAs), and Ramsar sites, as well as proposed or potential SACs, SPAs and Ramsar sites. This search area was extended to 30km for internationally designated sites for which migratory birds or bats are listed as a qualifying feature.

Nationally designated sites (e.g. National Nature Reserves (NNRs) and Sites of Special Scientific Interest (SSSIs)), plus Local Nature Reserves (LNRs) were also searched for within a radius of 5km.

A search for Habitats of Principal Importance (HPIs) (known as Priority Habitats) was also conducted, identifying priority habitats listed under the UK Biodiversity Action Plan (BAP). Species of Principal Importance (SPIs) were captured within the local record centre data search and, although not recently updated, local Biodiversity Action Plans[1] were also referred to as these contain local knowledge that has previously informed conservation strategies for the local area.

DEFRA's Magic Map Application was also checked for granted European Protected Species (licences) within 2km of the Site. Naturespace's GCN Risk Zones for District Level Licensing dataset was also requested to provide high-level information on confirmed and predicted GCN occurrence across the Site.

## General Desk Study Results – Habitats:

Designated Sites:

The Upper Nene Valley Gravel Pits (UNVGP) Special Protected Area (SPA) and RAMSAR site falls within 30km of site, with the 10km consultation zone (as defined within the UNVGP Supplementary Planning Document[2]) covering all parcels excluding Green Hill A (situated approx. 12km to the north-west of the SPA). Green Hill B is approx. 7.5km from the UNVGP SPA, whereas Green Hill C – F are situated between approx. 2.5 – 6.5km from the SPA. The distance from Green Hill BESS site, comprised of three fields, ranges from immediately adjacent to the redline boundary to 800m away.

The UNVGP SPA comprises a network of exhausted sand and gravel pits extending across approximately 35km of alluvial deposits of the River Nene floodplain. Forming an extensive mosaic of wetland habitats, the SPA supports major overwintering bird assemblages with over 20,000 wildfowl and wading birds, including bittern *Botaurus stellaris*, coot *Fulica atra,* several duck species, great crested grebe *Podiceps cristastus*, golden plover *Pluvialis apricaria* and lapwing *Vanellus vanellus.* Annex 1 species (under Article 4.1 of Directive 20009/147/EC) include wintering bittern and golden plover. The presence and abundance of overwintering gadwall *Anas strepera* and mute

[1] Northamptonshire Biodiversity Action Plan (3rd edition, 2015-2020). Available at: https://www.northnorthants.gov.uk/conservation-and-protection/biodiversity [Accessed 15th April 2024].
[2] Upper Nene Valley Gravel Pits Special Protection Area Supplementary Planning Document - August 2015. Available at: https://www.westnorthants.gov.uk/supplementary-planning-documents-spds-other-guides-and-village-design-statements/west [Accessed 25th April 2024]

swan *Cygnus olor* meet additional criteria supporting the identification of Wetlands of International Importance.

National designated sites included 11 Sites of Scientific Interest (SSSI) situated within 5km of the Site redline boundary, with full details included in Table 3 below. The SSSI Impact Risk Zones associated with these nationally important sites and the scale and nature of the proposed development initiates the need for consultation with Natural England regarding the potential impacts of these proposals upon each individual site.

**Table 3: Nationally Designated and Statutory Local Designated Sites within 5km of the Site**

| Site Name | Area (ha) | Reason for Designation | Distance from Site (approx.) |
|---|---|---|---|
| Upper Nene Valley Gravel Pits SSSI | 1382 | This SSSI largely overlaps with the Upper Nene Gravel Pits SPA habitats, comprising open water and valuable marginal features, including sparsely-vegetated islands, gravel bars and shorelines, reed swamp, marsh, wet ditches, rush pasture, rough grassland, scattered scrub, plus the addition of a rare example of floodplain woodland.<br>Designated for its nationally important breeding bird assemblages, including the largest nesting colony of grey herons *Ardea cinerea* in Northamptonshire. | Immediately adjacent to part of Green Hill BESS redline (BESS 3)<br>At least 2.5km for all remaining land parcels |
| Bozeat Meadow SSSI | 3 | Unimproved grassland with mature hedgerows across medieval ridge and furrow system | 0.075km east Green Hill F, at the closest point<br>3km southeast Green Hill BESS |
| Pitsford Reservoir SSSI | 415 | Freshwater reservoir with botanically diverse surrounding habitats, such as grassland, scrub, wetland, woodland, scrub, with many county rarities recorded. | 0.75km north Green Hill B<br>1.3km southwest Green Hill A<br>4.7km west Green Hill C<br>5km west Green Hill D |
| Summer Leys LNR | 48 | A component of the Upper Nene Valley Gravel Pits SSSI with extensive wetland habitat, including fen, swamp, marshland and neutral grassland | 2km north-east Green Hill BESS |
| Hardwick Lodge Meadow SSSI | 10 | This is a large area of diverse permanent pasture with an exceptionally rich and varied grassland flora that, in turn, supports uncommon invertebrates. | 1.5km north Green Hill C<br>1.7km northwest Green Hill D<br>2.5km northwest Green Hill E<br>3.6km southeast Green Hill A<br>3.7km northeast Green Hill B |
| Badsaddle, Withmale Park and Bush Walk Woods SSSI | 25 | Ancient coppice woodland with oak and ash on wet calcareous soils with diverse ground flora | 1.8km southeast Green Hill A<br>2.7km north Green Hill C<br>3.1km southeast Green Hill D<br>4km southeast Green Hill E<br>4.3km northeast Green Hill B |
| Birch Spinney and Mawsley Marsh SSSI | 12 | Marsh habitat with diverse flora (Mawsley Marsh) and rare ash-maple woodland partly on peat | 2km north of Green Hill A |
| Crowfields Common LNR | 9 | Rough species-rich grassland over ridge and furrow habitats with well-established hedgerows, adjacent to the village of Moulton | 2km south of Green Hill B<br>4.7km west Green Hill E<br>4.8km southwest Green Hill C |
| Dungee Corner Meadow SSSI | 5 | Traditionally managed hay meadow, east of Bozeat, with diverse grassland flora and locally rare green-winged orchid population | 2.1km east Green Hill F |
| Glamis Meadow and Wood LNR | 9.5 | Within the town of Wellingborough, a stream runs through this site, which also features woodland and grassland. | 2.9km northeast Green Hill E<br>3.6km east Green Hill D<br>4.1km east Green Hill C |

| Site Name | Area (ha) | Reason for Designation | Distance from Site (approx.) |
|---|---|---|---|
| Wollaston Meadows SSSI | 14 | An extension of the Upper Nene Valley Gravel Pits SSSI, comprised of species-rich hay fields with hedgerows along the banks of the River Nene | 3.5km northeast Green Hill BESS<br>4km southeast Green Hill E<br>4km northeast Green Hill F |
| Lings Wood LNR | 20 | Nearing the outskirts of Northampton, plantation and naturally regenerating woodland with scrub, ponds and acid grassland and various amphibians | 3.6km west Green Hill E<br>4.1km south Green Hill B<br>4.5km southwest Green Hill D<br>4.7km southwest Green Hill C |
| Yardley Chase SSSI | 358 | Semi-natural habitats on military site supporting unimproved grassland and woodland with diverse butterfly assemblages and significant great-crested newt population | 3.9km southwest Green Hill F<br>5km southwest Green Hill BESS |
| Irchester Old Lodge Pit Geological SSSI | 0.5 | Geologically important Middle Jurassic period site with exposes of white limestone, especially fossilised molluscs. | 4.6km southwest Green Hill BESS and Green Hill F |
| Scrub Field LNR | 5 | Bradlaugh Fields Park in suburban Northampton and comprises unimproved, semi-natural limestone grassland with ancient hedgerow | 4.6km southwest Green Hill B |
| Odell Great Wood SSSI | 85 | Wet ash-maple woodland, including woodland rides, with exceptionally rich flora and associated fauna | 4.8km east of Green Hill F |

Within the NBRC and BRMS data searches, 37 Local Wildlife Site (LWS) and 1 Wildlife Trust Reserve (WTR) were identified with 2km of the Site. Further details are included within Table 4 below.

**Table 4: Non-Statutory Locally Designated Sites within 2km of the Site**

| Site Name | Area (ha) (approx.) | Reason for Designation | Distance from Site (approx.) |
|---|---|---|---|
| Grendon Lakes LWS | 126 | Mosaic of wetland habitats (within the UNVGP SPA/SSSI) qualifying as a LWS due to the variety of species of stonewort and other wetland vegetation | Within the redline boundary Green Hill BESS |
| Horn Wood LWS | 24 | An ancient woodland with at least 14 ancient woodland indicators recorded. | Immediately adjacent to the southern fields of Green Hill F |
| Bozeat Verge LWS | 0.6 | Species-rich grassland wildflower verge (road cutting on the A509, Bozeat) supporting many pollinator species. | 0.02km south Green Hill F |
| Grendon Lakes North LWS | 34 | Mosaic of wetland habitats (within the UNVGP SPA/SSSI) inc. open water, wet grassland and mire habitats and at least ten fen, swamp and marsh indicators | 0.25km north Green Hill BESS |
| Bozeat Cemetery LWS | 0.8 | Species-rich meadow grassland within cemetery | 0.28km east Green Hill F |
| Cold Oak Copse LWS | 43 | Ancient woodland with at least six ancient woodland indicators recorded | 0.32km west Green Hill F |
| Sywell Reservoir and Country Park LWS | 48 | Recreational Country Park with diverse neutral grassland, scrub woodland, open water and swamp marginal habitats. | 0.37km west Green Hill E<br>1.4km southwest Green Hill D |
| Grendon Quarter Pond LWS | 4 | Fishing lake with good marginal vegetation and tall trees, hydrologically connected to the UNVGP SPA | 0.45km south Green Hill BESS<br>1.5km northwest Green Hill F |
| Long Furlong and Old Pastures LWS | 70 | Large area of replanted ancient woodland with diverse range of ancient woodland indicator | 0.5km southwest Green Hill F |
| Bozeat Glebe Meadow LWS | 1 | Former traditional hay-meadow with reasonable diverse flora | 0.515km east Green Hill F |
| Walgrave East Meadow LWS | 6 | Neutral grassland meadow with two streams fringed with rush pasture | 0.6km southeast Green Hill A |

| Site Name | Area (ha) (approx.) | Reason for Designation | Distance from Site (approx.) |
|---|---|---|---|
| Yardley Brook Field LWS | 2.5 | Species-rich calcareous grassland associated within the old earthworks | 0.6km west Green Hill F |
| Bozeat Wood LWS | 4 | Oak-ash woodland, possibly ancient in origin, with interesting ground flora | 0.63km southeast Green Hill F |
| Broughton Green Lane LWS | 3 | Green land and good wildlife corridor supporting ancient woodland indicators and diverse range of invertebrates | 0.7km east of Green Hill A |
| Earls Barton Meadow LWS | 6 | Floodplain meadow site diverse grassland including neutral grassland indicators | 0.7km northwest Green Hill BESS |
| Wilby Meadows Stream LWS | 0.15 | A length of Wilby Brook designated for its water vole colony – (this watercourse continues west and bounds the southern edge of Green Hill E approx. 1km from Site) | 0.7km east of Green Hill E |
| Earl's Barton Carr LWS | 20 | Large area of wet woodland (within the UNVGP SSSI) on former gravel workings with at least ten fen, swamp, marsh indicator species | 0.7km northwest Green Hill BESS |
| Pitsford Water Wildlife Trust Reserve (WTR) | 180 | Important waterbird habitat during winter where four main streams enter the reserve and form large bays of shallow water across connected valleys, exposing stretches of mud and foraging areas for migrating waders over winter – (within the Pitsford Reservoir SSSI) | 0.75km north Green Hill B<br>1.3km southwest Green Hill A |
| Scotland Pond LWS | 3.5 | Large angling lake fringed with marginal and emergent vegetation | 0.78km south Green Hill BESS<br>1.8km northwest Green Hill F |
| Earls Barton Lock Lake LWS | 26 | Nene Valley gravel pit (within the UNVGP SPA) with abundant marginal vegetation and at least 13 wetland indicator species | 0.8km north of Green Hill BESS |
| Old Poors Gorse LWS | 10 | Species-rich woodland with at least 35 indicator species | 0.9km north Green Hill A |
| Highcroft Farm Meadow LWS | 1.5 | Neglected meadow with an excellent invertebrate assemblage and supporting habitats considered likely to improve through restoration | 1km east Green Hill A |
| The Basin LWS | 2.5 | Narrow lake at Castle Ashby Estate with good cover of emergent and marginal vegetation providing habitat for birds and amphibians | 1.1km southwest Green Hill BESS<br>1.9km northwest Green Hill F |
| Hog Hole Spinney LWS | 5 | Largely ash and oak broadleaved woodland on sandy soils, with a dense scrub layer below, and largest woodland for several kilometres | 1.1km southwest of Green Hill B |
| Par Pond LWS | 3 | Long lake within parkland habitat at Castle Ashby Estate with well-vegetated with emergent and marginal vegetation | 1.1km west Green Hill F<br>1.7km south Green Hill BESS |
| Park Farm Industrial Estate LWS | 7.5 | A large industrial estate on the outskirts of Wellingborough but with a matrix of grassland, scrub and woodland that, with appropriate management, could improve as a LWS | 1.2km west Green Hill E<br>1.6km west Green Hill D |
| Castle Ashby Parkland LWS | 4.5 | Woodland within Castle Ashby parkland estate with a variety of parkland and semi-natural species, including semi-natural ground flora and several ancient woodland species | 1.2km south Green Hill BESS<br>1.3km west Green Hill F |
| Menagerie Pond LWS | 2 | Lake within the Castle Ashby Estate parkland supporting a thick extent of emergent vegetation and occasional aquatics, with many invertebrates | 1.2km south Green Hill BESS<br>1.3km west Green Hill F |
| Vivians Covert LWS | 5 | Small covert with at least seven ancient woodland indicators species | 1.3km east Green Hill E<br>1.4km east Green Hill D<br>1.9km east Green Hill C |
| Warren Ponds LWS | 0.3 | Extending the habitat for Par Pond LWS and the habitat corridor, supporting a range of bird and amphibian species | 1.3km west Green Hill F<br>2km south Green Hill BESS |
| Castle Ashby Woodland LWS | 2.5 | Species-rich broadleaved woodland likely originating from the establishment of Castle Ashby Estate parkland, including a large amount of wych elm | 1.4km southwest Green Hill F<br>2km west Green Hill BESS |

| Site Name | Area (ha) (approx.) | Reason for Designation | Distance from Site (approx.) |
|---|---|---|---|
| Cow Pasture Spinney LWS | 9 | A long, narrow shelterbelt (woodland) spinney with variable groundcover including woodland indicators, also freshwater stream with emergent vegetation | 1.4km south Green Hill B |
| Hardwick Wood LWS | 40 | Ancient woodland, with connectivity to Sywell Wood, mainly replanted with a mixture of oak and spruce and multiple ancient woodland indicators | 1.5km north Green Hill C<br>2km northwest Green Hill D |
| Ecton Gravel Pits LWS | 50 | Three gravel pit pools, north of the River Nene, varying in size and shape providing a mixture of wildlife habitats | 1.7km north-west Green Hill BESS |
| Hardwick Road Verge LWS | 0.2 | Species-rich neutral grassland on the northern and southern section of Hardwick Verge | 1.7km southwest Green Hill D<br>2km southwest Green Hill C |
| Engine Pond LWS | 2.3 | A well-established pond, with emergent vegetation and abundant dragonflies and damselflies | 1.8km southwest Green Hill BESS |
| Wilby Way Meadows LWS | 5.6 | Neutral grassland site with species-rich patches of grassland, but richness declining due to poor management | 1.9km east Green Hill E |
| Hardwater Meadows LWS | 28 | Species-rich grassland, including wetland vegetation and indicator species around the pond and previous river channel | 2km northeast of Green Hill BESS |

Local BAP:

The following Habitats of Principal Importance (HPIs) are considered relevant to the Site, given either their presence on-site or within the surrounding landscape (noted as present within 2km of the site using Priority Habitat open-source data or Environmental Records Centre data). The off-site habitats have been included on the basis that on-site enhancements may impact habitat connectivity between priority habitats impacting their biodiversity value. All have targeted Habitat Action Plans included within the Northamptonshire BAP, (2015-2020).

Priority Habitats:

- Arable field margins
- Coastal and floodplain grazing marsh
- Good quality semi-improved grassland
- Hedgerows
- Lowland calcareous grassland
- Lowland fen
- Lowland meadow
- Lowland mixed deciduous woodland
- Ponds
- Reedbed
- Rivers
- Traditional orchards

The National Habitat Network sets out the geographic extent and location of Habitat Networks for 18 priority habitats based primarily, but not exclusively, on the priority habitat inventory. It also serves as a guide for targeting habitat restoration or creation in 'Network Enhancement Zones', to build resilience around important habitats. The Network should be consulted when considering habitat protection, creation and enhancement opportunities associated with the Scheme.

A search of priority habitats revealed the following priority habitat parcels within the Site, or else suitably close to the redline boundary for the Site to fall within a Network Enhancement Zone:

- Green Hill A: One deciduous woodland parcel.
- Green Hill B: None.
- Green Hill C: Two deciduous woodland parcels. Ancient woodland lies adjacent offsite to northwest – potential to restore woodland in adjacent fields.
- Green Hill D: Traditional orchard lies offsite to southwest – potential to enhance habitat in Network Enhancement Zone 1.
- Green Hill E: Three deciduous woodland parcels. Traditional orchard lies offsite to west – potential to enhance habitat in Network Enhancement Zone 1.
- Green Hill BESS: Three deciduous woodland parcels, one reed bed parcel. Reedbed lies offsite to northwest – potential to enhance habitat in Network Enhancement Zone 1.
- Green Hill F: Three deciduous woodland parcels. Ancient woodland and lowland calcareous grassland lie offsite – potential to restore, expand and enhance.

A map of priority habitats present within 2km of Site is provided in Appendix A (Figures A6 – A7 refer).

## General Desk Study Results - Species:

Species of Conservation Concern

The following species include both those identified as priority within Northamptonshire locally, with all others of relevance to the county but also of national importance as identified within the Northamptonshire BAP (2015-2020). National Species of Principal Importance (as listed under the Natural Environment and Communities (NERC) Act, 2006) have also been included below.

*Northamptonshire BAP Species*

- Barn owl
- Black hairstreak
- Black poplar
- Plot's elm
- Lime bark beetle
- Nightingale
- Palmate newt

*UK Species of Principal Importance (with relevance to Northamptonshire)*

- Bats (multiple species)
- Birds (multiple species)
- Brown hare
- Fishes (brown/sea trout *Salmo trutta,* European eel and spined loach)
- Fungi (Violet crowncup *Sarcosphaera coronaria*, yellow bird's nest *Monotropa hypopitys*)
- Harvest mouse
- Hazel dormouse
- Invertebrates (multiple moths)
- Herptiles (adder, common lizard, common toad, grass snake, slow worm and great crested newt)
- Otter
- Polecat
- Water vole
- Western European hedgehog

*Badger*

NBRC returned 152 records of badger since 2000, with records returned within 2km of Green Hill A, B, C, D, E, and BESS. Adult badgers have been recorded present within the red-line boundaries of Green Hill C and D, and with confirmed badger setts across the entire Site, with the exception of Green Hill BESS.

*Bats*

Over 200 bat records were returned by Northamptonshire Bat Group. Records were returned for the following species (since 2000): barbastelle *Barbastella barbastellus*, brown long-eared *Plecotus auritus*, common pipistrelle *Pipistrellus pipistrellus*, Daubenton's *Myotis daubentonii,* Leisler's *Nyctalus leislieri,* Nathusius's pipistrelle *Pipistrellus nathusii,* noctule *Nyctalus noctula*, soprano pipistrelle *Pipistrellus pygmaeus* and whiskered bat *Myotis mystacinus*. Each record was returned with only a 4-figure OS grid reference, and therefore these records could only be related to a 1km square within which the record was obtained. Six barbastelle records were returned, including two roost records, which related to OS Grid Reference SP8370 (north of Green Hill C) and SP8158 respectively.

Two EPS licences relating to bats were identified during the desk study. Firstly, EPSM2013-5557, which relates to the destruction of a breeding site and resting place of common pipistrelle, soprano pipistrelle and brown long-eared bat, approx. 1.8km west of Green Hill B. Secondly, 2016-21753-EPS-MIT, relating to damage and destruction of resting place of common pipistrelle, within 2km of Green Hill C – E.

*Otter*

Six records of otter were returned by NBRC within 2km of the Site. The closest record pertained to a location 300m south-west of Green Hill D.

*Water Vole*

11 records of water vole were returned by NBRC within 2km of Site. The closest record pertained to a location 800m east of Parcel E. Additional however historical records (pre-2000) were also gathered pertaining to locations within the redline of Green Hill E.

*Hazel Dormouse*

No records of dormouse were returned by NBRC within 2km of the Site.

*Amphibians*

27 records of amphibians were returned from NBRC within 2km of Site since 2000, including common frog *Rana temporaria*, common toad *Bufo bufo*, great crested newt *Triturus cristatus* and smooth newt *Lissotriton vulgaris*.

Great crested newt records have been returned within 500m of Green Hill D, E and F; the closest common toad record was at 1.2km east of Green Hill E; with common frog recorded slightly closer at 1km east of Green Hill E.

The Site lies entirely within NatureSpace's GCN Impact Risk Zones. This includes overlap with red (high) risk zones at all land parcels, with the exception of Green Hill BESS (however this parcel is adjacent to a red risk zone). At Green Hill F, red zone areas correspond with a confirmed breeding site.

A total of 8 (up until 2017) EPS mitigation licences relating to GCN have been identified through a search using the MAGIC Map application, as follows:

- EPSM2009-1485, 1.8km northeast of Green Hill A, relating to destruction of a resting place;
- 2015-18472-EPS-MIT, 1.8km southwest of Green Hill B, which was amended on three occasions, relating to damage and destruction of a resting place;

- EPSM2013-5464 and 2014-1974-EPS-MIT, 1.5km east of Green Hill C, 0.9km east of Green Hill D and 0.8km north of Green Hill E, relating to the damage and destruction of a resting place
- 2014-1338-EPS-MIT and 2017-27647-EPS-MIT, 2km northeast of Green Hill C and D, and 1.9km north of Green Hill E, relating to the damage and destruction of a resting place.
- 2018-36758-EPS-MIT, 1.9km northwest of Green Hill BESS, relating to the damage and destruction of a resting place;
- At Parcel F, a single EPS GCN licence was returned approx. 200m from the redline boundary (2015-10360-EPS-MIT RESTING PLACE), which was amended on four occasions. This related to the destruction of both resting and breeding places.

*Reptiles*

Reptile records returned by NBRC included adder *Vipera berus* and grass snake *Natrix helvetica.* The closest record of adder was 500m west of Green Hill E and grass snake within 300m of both Green Hill E and Green Hill BESS.

*Birds*

Over 50,000 bird records were returned from NBRC within 2km of Site, the majority of which relate to records associated with the designated sites within lose proximity to Site, namely Upper Nene Valley Gravel Pits SPA, Pitsford Reservoir and Sywell Reservoir. Protected species/ species of conservation concern are detailed in Table 5, below.

**Table 5: NBRC Bird Records within 2km of Green Hill**

| Common Name | Latin Name | Date of Most Recent Record | Distance from Site |
|---|---|---|---|
| Barn owl | *Tyto alba* | 10/01/2020 | 37m E Green Hill E |
| Bittern | *Botaurus stellaris* | 05/09/2018 | 155m NE Green Hill BESS |
| Black redstart | *Phoenicurus ochruros* | 31/10/2013 | 1.5km NW of Green Hill B |
| Corn bunting | *Emberiza calandra* | 12/02/2012 | 1.5km NE Green Hill BESS |
| Coot | *Fulica atra* | 14/01/2020 | 155m NE Green Hill BESS |
| Cormorant | *Phalacrocorax carbo* | 14/01/2020 | 155m NE Green Hill BESS |
| Gadwall | *Anas strepera* | 14/01/2020 | 155m NE Green Hill BESS |
| Golden plover | *Pluvialis apricaria* | 04/01/2020 | 155m NE Green Hill BESS |
| Greenfinch | *Chloris chloris* | 14/01/2020 | 155m NE Green Hill BESS |
| Great crested grebe | *Podiceps cristatus* | 14/01/2020 | 155m NE Green Hill BESS |
| Herring gull | *Larus argentatus* | 14/01/2020 | 155m NE Green Hill BESS |
| Hobby | *Falco subbuteo* | 01/10/2019 | 155m NE Green Hill BESS |
| House martin | *Delichon urbicum* | 14/10/2019 | 155m NE Green Hill BESS |
| House sparrow | *Passer domesticus* | 13/01/2020 | Green Hill A |
| Lapwing | *Vanellus vanellus* | 14/01/2020 | 155m NE Green Hill BESS |
| Little egret | *Egretta garzetta* | 14/01/2020 | 155m NE Green Hill BESS |
| Mallard | *Anas platyrhynchos* | 14/01/2020 | 155m NE Green Hill BESS |
| Marsh tit | *Poecile palustris* | 11/01/2020 | 665m W Green Hill E |
| Pochard | *Aythya farina* | 14/01/2020 | 155m NE Green Hill BESS |
| Reed bunting | *Emberiza schoeniclus* | 14/01/2020 | 155m NE Green Hill BESS |
| Skylark | *Aluada arvensis* | 18/10/2018 | Green Hill F |
| Snipe | *Gallinago gallinago* | 13/01/2020 | 155m NE Green Hill BESS |
| Swift | *Apus apus* | 24/07/2019 | 155m NE Green Hill BESS |
| Wigeon | *Mareca penelope* | 14/01/2020 | 155m NE Green Hill BESS |
| Woodcock | *Scolopax rusticola* | 18/12/2019 | 155m NE Green Hill BESS |
| Yellow wagtail | *Motacilla flava* | 13/09/2019 | 155m NE Green Hill BESS |

*Invertebrates*

Large numbers of invertebrate records were returned for the Site, and of these 20 notable species were recorded within approx. 1km of the Site. This included: eleven priority moth species; medium-priority grizzled skipper butterfly *Pyrgus malvae;* and high-priority small heath *Coenonympha pamphilus* and wood white *Leptidea sinapis* butterflies. In addition, the red-listed large black slug was recorded 400m west of Green Hill E (at Sywell Reservoir).

*Notable Plants*

Several records of notable plants were returned within 2km. In terms of species recorded closest to the Site, these included:

Red listed field scabious *Knautia arvensis* and hoary plantain *Plantago media* were recorded adjacent to Green Hill F at Grendon Verge LWS.

The near scarce arable weed, corn spurrey *Spergula arvensis,* has been recorded within 500m of Green Hill A, in farmland near to Walgrave.

Records of several other rare and threatened woodland species were also returned from adjacent ancient woodlands at Green Hill C.

*Other Species of Conservation Concern (SoCC)*

Other Species of Conservation Concern (SoCC) recorded by the data search within 2km of the Site included: brown hare *Lepus europaeus*, hedgehog *Erinaceus europaeus* and polecat *Mustela putorius*.

The closest record for brown hare was within 20m of Green Hill A.

The closest record for hedgehog was 800m east of Green Hill E. Historical (pre-2000) records for hedgehog include within the redline boundary of Green Hill E.

Polecat have been recorded within 2km of Green Hill B and E, with the closest record 200m southeast of Site.

*Invasive Species*

No invasive non-native species records were returned within the NBRC data search.

# Potential Constraints and Opportunities Related to Development of the Site

**Table 6: Potential Constraints and Opportunities**

| Ecological Feature | Description | Constraints and Likely Impacts During Construction & Operation | Recommended Further Surveys, Mitigation and Enhancement Opportunities |
|---|---|---|---|
| **Designated Sites** | | | |
| Upper Nene Valley Gravel Pits SPA and Upper Nene Valley Gravel Pits SSSI | Upper Nene Valley Gravel Pits SPA (UNVGP SPA) is situated immediately adjacent to Green Hill BESS, whereas all other land parcels are situated between 2.5km and 12km of this internationally designated site. The farmland within the surrounding landscape provides important foraging habitat for overwintering bird species associated with these sites, namely golden plover and lapwing.<br><br>The footprint of the Upper Nene Valley Gravel Pits SSSI largely mirrors the UNVGP SPA, however this SSSI receives its protection due to the breeding bird assemblages. | Development of Site has the potential to result in habitat loss and fragmentation resulting from change of land-use. This impact could extend across the entire Site where farmland is confirmed to be used by significant numbers of target overwintering species associated with the UNVGP SPA (golden plover and lapwing) for foraging and loafing, and subsequently classified as Functionally Linked Land (with the UNVGP SPA). Functionally Linked Land is the term used to describe land occurring outside a designated Site which is considered critical for the maintenance of its ecological or behavioural functions.<br><br>Habitat damage may also occur from the installation of solar arrays and supporting infrastructure, including pollution from construction activities (e.g. dust and chemical spillages).<br><br>Pollution risks extends to the operational phase of the scheme, especially at Green Hill BESS where watercourses and groundwater may be at risk of pollution in the unfortunate event of a fire outbreak and control.<br><br>There is also risk of species disturbance during the construction phase, potentially into the operational phase where installed infrastructure significantly increases noise levels near to the SPA/SSSI. | **Further Surveys:**<br>Overwintering diurnal and nocturnal bird surveys of Site will inform the value of surrounding arable farmland to foraging plovers associated with UNVGP SPA, and whether such habitats form Functionally Linked Land and are therefore critical to the ecological functioning of the UNVGP SPA.<br><br>Breeding bird surveys of Site will determine assemblages present across Site and at risk of impact, informing the mitigation measures required – refer to Birds of Open Farmland and Birds sections, below.<br><br>**Mitigation Measures:**<br><u>Exclude BESS 3 from development</u><br>Due to the international significance of the extensive wetland habitats within the UNVGP SPA, it would be preferable to exclude BESS 3 from the development area given its proximity (immediately adjacent) to the SPA. The apparent high-water table, noted during ecological surveys within this field, also highlights the field as a suitable potential mitigation and/or enhancement area, as summarised within Table 2 above.<br><br>Where this cannot be achieved, appropriate undeveloped buffers should be maintained between the designated site and development area within Green Hill BESS. The specific distance would be informed by ecological survey results and consultation with Natural England; however, a minimum suggested buffer is provided in Table 1.<br><br><u>Pollution Prevention</u><br>Pollution prevention is especially important at Green Hill BESS given the high connectivity across the floodplain, therefore to prevent pollution of retained designated sites during construction, an Outline Ecological Protection and Mitigation Plan (OEPMP) will be prepared for the Site, detailing pollution control measures and other appropriate working methodologies.<br><br>The recommended Outline Landscape and Ecological Management Plan (OLEMP) will also be prepared to ensure appropriate long-term habitat management. Further consideration will be given to the impacts of increased noise levels at Green Hill BESS at the design stage.<br><br>Further consideration will also be given to pollution prevention at Green Hill BESS during the operational phase, as battery infrastructure presents a water pollution risk in the unfortunate instance of a fire. It is understood that prevention measures to prevent contamination of watercourses or groundwater will be incorporated into the design plans alongside fire risk prevention strategies. Consultation with the ecology team however may be required to ensure that design and mitigation measures are fit for purpose.<br><br><u>Avoid/compensate for UNVGP SPA Functionally Linked Land</u><br>Where further bird survey identifies Functionally Linked Land (FLL) within the Site, appropriate measures would need to be taken to mitigate for the loss of suitable plover foraging habitats. This may include avoiding development within some land |

| Ecological Feature | Description | Constraints and Likely Impacts During Construction & Operation | Recommended Further Surveys, Mitigation and Enhancement Opportunities |
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| | | | parcels, should extensive swathes of habitat be confirmed as FLL. If FLL is lesser in extent, the provision of replacement, compensatory habitat within the surrounding farmed landscape will be required. There may be opportunity to combine this land with mitigation measures targeted at other species associated with farmland – refer also to Birds of Open Farmland. Impacts on FLL may also be compensated by appropriate financial contributions to LPA- and Natural England-backed conservation measures, and/or the provision of alternative recreation facilities to divert local recreation pressures from the SPA.<br><br>The amount of mitigation habitat required would be informed by the results of the overwintering surveys.<br><br>**Enhancement Opportunities:**<br><u>Habitat Creation</u><br>The provision of additional wetland features within Green Hill BESS presents an opportunity to enhance land surrounding the UNVGP SPA. Features could include management as floodplain species-rich conservation grazed meadow, rather than arable farmland, and the provision of wetland features, such as ponds and wetland scrapes creation and associated marginal habitats to increase habitat diversity and associated wildlife.<br><br>The creation of wet grassland, and potentially traditionally farmed arable fields, elsewhere within the consultation zone of the SPA would enhance the wider landscape for overwintering foraging plover and other farmland birds.<br><br>Management prescriptions will be described within an Outline Landscape and Ecological Management Plan (OLEMP) for the Sites.<br><br><u>Community Contributions</u><br>Community contributions towards improving recreation access, and provision of seasonal rangers at nearby wildlife sites (such as Sywell Reservoir and Pitsford Reservoir) has potential to reduce anthropogenic impacts affecting overwintering birds at UNVGP SPA. |
| Four designated sites were identified within, immediately adjacent or in close proximity (<100m) to Site:<br>Grendon Lakes LWS, Horn Wood LWS, Bozeat Meadows SSSI, Bozeat Verge LWS | Grendon Lakes LWS (falls within redline boundary of Green Hill BESS) is a mosaic of wetland habitats due to the variety of aquatic plants, notably stonewort and other wetland vegetation.<br><br>Horn Wood LWS (located immediately adjacent to Green Hill F) is a diverse ancient woodland with numerous woodland indicator species.<br><br>Bozeat Meadows SSSI (located within 75m of Parcel F) comprises a field of unimproved grassland with mature hedgerows and ridge and furrow systems.<br><br>Bozeat Verge LWS (located within 50m of Parcel F) is a narrow length of species-rich grassland located on the A509. | There is potential for damage to adjacent designated sites during construction, either via direct damage from construction machinery (i.e. to damage to tree limbs, compaction of soils and roots), or through run-off, pollution or dust deposition.<br><br>The location of Bozeat Meadows SSSI, beyond an A-road, is considered likely to minimise the risk of these impacts upon the SSSI.<br><br>Given the nature of the proposed development, there is negligible risk of degradation to adjacent SSSIs during the operational phase.<br><br>It is possible that arable reversion and diverse grassland creation or woodland and scrub planting could extend available habitat for species associated with nearby designated sites. | **Mitigation Measures:**<br><u>Protection of nearby designated sites through buffers</u><br>An appropriate undeveloped buffer will be included within Scheme design between designated sites and the development area, during construction and operational phases, to prevent physical damage to the adjacent habitat. Suitable buffers are given in Table 1.<br><br>No specific mitigation is recommended for Bozeat Meadows SSSI, as the separation of Site from this designated area by 75m and a busy A-road makes any impacts unlikely.<br><br><u>Mitigation of construction phase impacts</u><br>Consideration will be given in the OEPMP to ensure that Bozeat Verge LWS is not impacted by construction traffic.<br><br>Appropriate pollution prevention measures will be implemented during construction, to be outlined within OEPMP.<br><br>**Enhancement Opportunities:** |

| Ecological Feature | Description | Constraints and Likely Impacts During Construction & Operation | Recommended Further Surveys, Mitigation and Enhancement Opportunities |
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| | The locations of these designated sites are included within Appendix A. | | Should soil tests confirm that calcareous seed mixes would be appropriate at Green Hill F, it is possible that arable reversion at this location could extend available habitat for a range of species.<br><br>Cessation of agricultural practices resulting from the development, including application of fertiliser and frequent movement of heavy machinery within RPZs, has potential to benefit adjacent trees and woodland habitats.<br><br>Natural England's National Habitat Mapping should be consulted to ensure that consideration is given to, and proposed enhancements correspond with, nationally identified habitat enhancement opportunities. |
| Wilby Meadow Streams LWS | Wilby Brook or Meadows Stream LWS is designated for its water vole colony and is an extension of the watercourse bounding the southern boundary of Green Hill E. It is approx. 1km east from Green Hill E, along the watercourse. | Pollutants resulting from construction works may enter watercourses within the Sites and contaminate the wider river system, including the Wilby Meadow Streams LWS. | **Mitigation Measures:**<br>Pollution prevention<br>The OEPMP to be prepared for the Sites will outline appropriate pollution prevention and control measures.<br><br>Watercourse protection measures are detailed in the relevant sections below. Recent guidance[3] highlight the importance of undeveloped buffers to reduce sediment and nutrient run-off into the watercourse. Suitable buffers are indicated in Table 1.<br><br>**Enhancement Opportunities:**<br>General<br>Cessation of intensive agricultural practices, e.g. fertiliser application, as a result of the development will reduce the run-off of chemical pollutants into the local network of watercourses from within the Sites. Over time, this has some potential to improve water quality within the wider river system. |
| Nine further SSSIs were identified within 5km of the Sites, alongside five LNRs.<br>A further 35 LWSs were also identified within 2km of the Sites. | Details of the remaining designated sites identified during the desk study are provided in Table 3 and Table 4 above and illustrated in Figures A1 – A5. | Given the nature of the development and the distance from the remaining designated sites identified, it is not anticipated that there will be any direct or indirect ecological impacts resulting from the construction and operation of the scheme. | **Mitigation Measures:**<br>N/A<br><br>**Enhancement Opportunities:**<br>Strategic habitat creation/enhancement<br>Habitat enhancements proposed within the Sites, detailed in the relevant sections below, will act to strengthen the habitat network within the local landscape and benefit associated protected species, where consideration is given to design to ensure habitat connectivity between on-site habitats and similar habitats within the wider landscape. |
| Off-Site Priority Habitats | Several priority habitats were identified immediately adjacent to the red line boundary of various parcels during the desk study, including ancient woodland, broadleaved woodland, and reed beds. Other Habitats of Principal Importance within 2km include lowland meadows, calcareous grassland, good quality semi-improved grassland, lowland fen, coastal and floodplain gracing marsh and traditional orchard.<br><br>The location of Habitats of Principal Importance within 2km of the Sites are shown in Figures A6-A7. | There is potential for damage to adjacent priority habitats during construction via direct damage from construction machinery or through run-off, pollution or dust deposition.<br><br>Given the nature of the proposed development, there is negligible risk of degradation to adjacent priority habitats during the operational phase. | **Mitigation Measures:**<br>Protection of nearby priority habitat through buffers<br>Appropriate undeveloped buffers (including no fencing) will be maintained between the off-site priority habitats and the development area during construction and operational phases to prevent physical damage to adjacent habitats.<br><br>Buffer distances will be determined principally by the habitat type. Suitable buffers are indicated in Table 1.<br><br>Pollution prevention<br>Appropriate pollution prevention measures will be implemented during construction, to be outlined within an OEPMP for the Sites.<br><br>**Enhancement Opportunities:**<br>Habitat creation within Site |

[3] Royal Haskoning DHV (2023) Norfolk Nutrient Guidance: Nutrient Mitigation Solutions [online] Available at: https://www.southnorfolkandbroadland.gov.uk/downloads/file/6673/royal-haskoning-norfolk-nutrient-strategy-nutrient-mitigation-solutions-report-oct-2023 {Accessed 10/04/2024]

| Ecological Feature | Description | Constraints and Likely Impacts During Construction & Operation | Recommended Further Surveys, Mitigation and Enhancement Opportunities |
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| | | | There may be potential to increase the extent of off-site priority habitats within the Sites, in areas immediately adjacent priority habitats, through appropriate management. This would primarily target woodland habitats, although the creation of wetland features in close proximity to Green Hill BESS has some potential to expand reedbed areas.<br><br><u>General</u><br>Cessation of agricultural practices resulting from the development, including application of fertiliser and frequent movement of heavy machinery within RPZs has potential to benefit adjacent trees and woodland habitats. |
| **Habitats** | | | |
| Arable<br>(Cereal and Non-Cereal Crops, Temporary Grass and Clover Leys, Winter Stubble) | The majority of habitats across Site comprised arable farmland, largely managed as monoculture crops. Fields appeared to be conventionally managed overall; however, the specifics around farming practices and fertiliser, herbicide and pesticide use is not known. Additionally, some agri-environmental measures were noted, such as retention of overwintering stubble, cover crops and conservation areas (e.g. pollinator or seed-rich arable margins – Arable Field Margins, below, refers) increasing habitat heterogeneity and value at a farm-scale.<br><br>Overall, the botanical diversity within arable fields was limited, nevertheless some rare arable weed indicator species were noted – Arable Field Margins below refers.<br><br>Despite the limited botanical diversity, arable farmland also has high value for other species, notably farmland bird species and brown hare (see 'Birds of Open Farmland' and 'Other Protected Species and SoCC' below), especially where agri-environmental measures form part of farming practices. | The majority, if not all, of the arable habitats will likely be lost to facilitate the construction of the solar array with associated infrastructure/landscaping.<br><br>Change of land-use and subsequent loss of arable habitats has the potential to displace, disturb or result in the accidental injury/killing of protected species associated with the habitats, in particular ground-nesting birds and brown hare (see relevant species sections below).<br><br>Where farming practices change, rare or threatened arable weeds are also at risk of loss. | **Further Survey:**<br><u>Arable weed surveys</u><br>Further surveys may be required to determine the presence, abundance and frequency of rare arable weeds across Site. These surveys would focus on a subsample of fields within the Site, prioritising land parcels where potential arable weed indicators have been recorded or land parcels which have uncropped field margins and field corners.<br><br>Surveys would ideally take place late May/June, before crops are harvested. Margins and field corners would be the focus of these surveys, but with the surveyor also accessing in-field areas (via crop tramlines). Transects would be determined on-site with at least five 1mx1m quadrats (or 0.5m x 2m along tramlines/narrow margins) completed per field. Arable weed presence will be recorded, including percentage cover and frequency as per the DOMIN scale.<br><br>**Mitigation Measures:**<br><u>Retention and ongoing management of some arable habitats</u><br>For rare or threatened arable weeds to be able to remain, cultivation needs to continue, which can be achieved by retaining a proportion of the Site as arable farmland, cultivated annually to ensure suitable conditions for the growth and establishment of uncommon arable weeds.<br><br>Managing such areas as arable also has the potential to mitigate for the loss of habitats affecting particular bird species. For example, winter stubble for foraging overwintering species – refer to 'Birds of Open Farmland and Birds' below).<br><br>**Enhancement Opportunities:**<br><u>Habitat creation</u><br>Within a landscape dominated by arable farmland, the creation of species-rich grassland via seeding of diverse and locally appropriate seed mixes offers a significant opportunity to increase the diversity of habitats on Site. This enhancement also presents an opportunity for significant biodiversity net gain overall.<br><br>Enhancement and management of arable field margins will be detailed within an OLEMP for the Sites. |
| Arable Field Margins | Arable field margins is listed as a priority habitat within the Northamptonshire BAP, and also recognised as a Habitats of Principal Importance (HPIs) under the NERC Act (2006). These areas were more botanically and structurally diverse than other arable habitats and offer suitable | Arable field margin habitats may be lost where cultivation ceases: where arable farmland is replaced with new habitat and/or cropped fields are replaced with solar infrastructure.<br><br>Where arable margins are retained, there is also the potential for damage during construction, e.g. via | **Further Survey:**<br>Refer to this section within 'Arable' immediately above.<br><br>**Mitigation Measures:**<br><u>Retention and ongoing management of arable field margins</u><br>It is recommended that existing arable field margins are retained within the design, to ensure that the farmland habitats of the greatest ecological value remain. |

| Ecological Feature | Description | Constraints and Likely Impacts During Construction & Operation | Recommended Further Surveys, Mitigation and Enhancement Opportunities |
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| | habitats for a range of species including invertebrates, birds reptiles, amphibians and small mammals.<br><br>Arable field margins recorded within the Site were generally between 2-12m wide. Additionally, wider areas at field corners or edges which had a similar character to the margins were present, although these do not qualify as 'arable field margins' by the strict UKHab definition.<br><br>The field margin habitats were diverse, including game-bird seed or pollen and nectar mixes, as well as tussocky grassland. Arable weed indicator species were recorded within some field margins, such as broad-leaved spurge *Euphorbia platyphyllos* at Green Hill F. | physical damage by site machinery or through pollution incidents.<br><br>Any removal of arable field margin habitats has the potential to result in disturbance or accidental injury/killing of protected species associated with these habitats (see relevant species sections below). | Retention of these habitat areas would be facilitated through the implementation of appropriate buffers at field boundaries (please refer to relevant sections within Hedgerow, Ditches, Rivers and Streams below).<br><br>The value of arable field margins may decline over time without appropriate long-term management or where cultivation ceases. As described above (**Arable – mitigation measures**), it would be possible to integrate some areas of continued cultivation into the scheme to maintain opportunities for the establishment and presence of arable weeds.<br><br>Retained arable field margins will be protected from damage during construction through the implementation of suitable Biodiversity Protection Zones (BPZs), to be detailed within an OEPMP.<br><br>**Enhancement Opportunities:**<br><u>Habitat management</u><br>The diversity of species, including arable weeds, within retained arable field margins can be increased through appropriate management measures to ensure an open sward with bare ground and/or supplementation with suitable seed mixes. This includes cultivation (e.g. chain harrowing) of arable field margins on rotation to ensure areas of open ground support the establishment of annual weeds reliant upon disturbance and open ground.<br><br><u>Habitat creation</u><br>New or extended field margins could be created within the scheme, through seeding with appropriate seed mixes (e.g. tussocky grassland, game bird mix etc.). As such, it will be a priority to maintain these areas at sufficient width for agricultural machinery access.<br><br>Increased extent of field margins would further enhance the habitat network within the Sites for protected species, as well their prey, and the foraging value of marginal habitats for invertebrates (including pollinators).<br><br>Enhancement and management of arable field margins will be detailed within an OLEMP. |
| Modified Grassland | With the exception of Green Hill D and Green Hill BESS, modified grassland habitat was recorded across all of the Sites. Areas of modified grassland were either livestock (cattle or sheep)-grazed pasture or permanent grassland (presumed to be managed for silage or hay cuts). These areas featured relatively low botanical diversity; **however it should be noted that, at the time of writing, some of the areas currently classified as Modified Grassland may in fact be Other Neutral Grassland.** As the baseline habitat surveys were conducted at a suboptimal time of year, additional grassland habitat condition assessments are necessary to confirm the actual extent of modified grassland – refer to **Further Surveys** section. | A loss of existing modified grassland habitat is likely to occur to facilitate construction of the array. Potential damage to areas of retained modified grassland habitat may continue during construction, e.g. via physical damage by site machinery or through pollution.<br><br>Removal of modified grassland habitat may result in the accidental injury/killing of protected species that may be present therein. Loss of grassland across the site would also result in reduced commuting and foraging opportunities for a range of species.<br><br>During operation, shading from the panels may degrade the condition of retained grassland beneath. Monitoring of a large number of solar arrays has shown a reduced level of grassland diversity beneath panels. | **Further Surveys:**<br>Grassland condition assessments and botanical quadrat surveys are required across all grassland areas within Green Hill F, as well in select fields at all other parcels. These surveys will confirm the grassland types present, and, by extension, the ecological value of these grasslands. Surveys should be completed within the optimal season (May – July/August inclusive).<br><br>**Mitigation Measures:**<br>It is recommended that any retained areas of modified grassland habitat outside the footprint of the array are protected from damage during construction through the implementation of suitable BPZs, to be detailed within an OEPMP.<br><br>**Enhancement Opportunities:**<br><u>Enhancement of Modified Grassland to Other Neutral Grassland</u><br>Where modified grassland habitat is retained, it is recommended that these areas are enhanced to target Other Neutral Grassland habitat, which can be achieved through sympathetic management and/or over sowing with locally appropriate species-rich grassland seed mixes. These enhancements will aim to increase species and structural diversity within the sward, benefitting a range of wildlife. |

| Ecological Feature | Description | Constraints and Likely Impacts During Construction & Operation | Recommended Further Surveys, Mitigation and Enhancement Opportunities |
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| | Modified grassland provides suitable habitat and foraging opportunities for protected species such as bats, badger, reptiles, amphibians, hedgehog and invertebrates, particularly in areas with greater structural diversity within the sward. | | Establishment of grazing across grassland habitats will help to maintain structurally diverse habitats, and will also introduce dung for invertebrates, enhancing prey resources for other species (such as bats).<br><br>Enhancement measures will be detailed within an OLEMP for the Sites. |
| Other Neutral Grassland (ONG) | Several fields of ONG habitat were recorded at Green Hill A, E and F which were either managed as grazed pasture (horses, livestock) or comprised fallow fields, presumably as part of agri-environmental agreements. ONG habitats also included wide grassland field margins (beyond 12m, in addition to entire fields out of cultivation and set-aside as grassland.<br><br>As mentioned above, some fields included above as modified grassland (and indeed those currently characterised as ONG) require further survey to confirm that habitat allocation remains correct. This affects Green Hill A, B, C, E and F.<br><br>A broad range of grassland types fall within the Other Neutral Grassland category, but all are of relatively high ecological value. It should also be borne in mind that some irreplaceable characteristics of non-priority grassland habitats are also not captured by UKHabs categorisation, such as FF20 containing ONG with stands of rush across undulating topography with frequent ant hills. FF12 featured similar characteristics, but to a much lesser extent. | A loss of existing ONG habitat is likely to occur to facilitate construction of the array. There is also potential for damage to any retained other neutral grassland habitat during construction, e.g. via physical damage by site machinery or through pollution.<br><br>Removal of other neutral grassland habitat may result in the accidental injury/killing of protected species that may be present therein. Loss of grassland would also result in reduced commuting and foraging opportunities for a range of species.<br><br>During operation, shading from the panels may degrade the condition of retained grassland beneath. Monitoring of a large number of solar arrays has shown a reduced level of grassland diversity beneath panels. | **Mitigation Measures:**<br><u>Retention of ONG</u><br>Where possible, it is recommended that all areas of existing ONG should be retained outside of the developable area, particularly those considered to be of high ecological value (e.g. FF20). Any retained areas of ONG habitat within Site should be protected from damage during construction through the implementation of suitable BPZs, to be detailed within an OEPMP.<br><br>**Enhancement Opportunities:**<br><u>Habitat creation</u><br>New areas of diverse grassland can also be created across the Scheme, seeded with appropriate local and diverse seed mixes, with an aim of strengthening the local grassland network.<br><br><u>Habitat enhancement</u><br>Where ONG habitat is retained, it is recommended that these areas are enhanced in their condition and structural/species diversity, which can be achieved through sympathetic management and/or over sowing with locally appropriate species-rich grassland seed mixes. These enhancements will benefit a range of wildlife, and also generate Biodiversity Net Gain habitat units.<br><br>Establishment of grazing across grassland habitats will help to maintain structurally diverse habitats, and will also introduce dung for invertebrates, enhancing prey resources for other species (such as bats).<br><br>Habitat creation and enhancement measures will be detailed within an OLEMP for the Sites. |
| Scrub (Bramble and Mixed Scrub)<br>and<br>Tall Ruderal Vegetation | Small pockets of scrub were recorded across Site. Generally, these areas formed isolated patches at field edges or surrounding ponds, but in some places were encroaching into some smaller grassland fields. At Green Hill E, frequent scrub adjacent to tall, species-rich hedgerows served to enhance the habitats present on Site by strengthening habitat connectivity between boundary features.<br><br>Patches of ruderal vegetation were also recorded across Site, which were generally located in field corners and margins, around farmsteads/buildings or where agricultural vehicle access is restricted.<br><br>Scrub and ruderal habitats enhance the mosaic of habitats present on Site, providing suitable foraging and sheltering opportunities for a range of species, | The loss of some scrub habitat and ruderal vegetation is likely to occur within the development proposals, but will likely be restricted by the implementation of appropriate buffers on other habitats, such as hedgerows and arable field margins, as the majority of these habitats were situated on field peripheries.<br><br>There is the potential for physical damage to any retained habitats during construction resulting from movement of site machinery, including root compaction, and/or pollution.<br><br>Removal of scrub habitat and ruderal vegetation may result in the accidental injury/killing of protected species that may be present therein.<br><br>Loss of these habitat areas would also reduce the extent of suitable habitat and foraging opportunities for a range of species, although these habitat types typically rapidly establish naturally following soil disturbance (e.g. through the construction phase), and so areas of these habitats | **Mitigation Measures:**<br><u>Retention of scrub</u><br>Areas of scrub habitat (particularly Mixed Scrub) should be retained within the development proposals where possible, particularly where scrub forms or contributes to habitat corridors within the Sites.<br><br>Protection of retained scrub habitat will be outlined within the OEPMP for the Sites. BPZs and scheme design should take into account the RPZs of any trees associated with scrub habitats in line with 'BS 5873: Trees in relation to design and construction'.<br><br>**Enhancement Opportunities:**<br><u>Habitat creation and enhancement</u><br>Inclusion of additional scrub planting using native woody species, selected to provide a range of successional resources throughout the year, will ensure continued and enhanced provision of suitable habitat for a range of species. New planting should be targeted in locations to connect to existing woodland parcels and to provide wildlife corridors within the Sites.<br><br>Any retained or newly planted scrub habitat should be managed to enhance biodiversity value and maximise contribution to biodiversity net gain. Appropriate management will be detailed within an OLEMP for the Sites. |

| Ecological Feature | Description | Constraints and Likely Impacts During Construction & Operation | Recommended Further Surveys, Mitigation and Enhancement Opportunities |
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| | including overwintering and nesting birds, badger, widespread reptiles and amphibians, hedgehog and invertebrates (see relevant sections below). | are likely to establish across parts of the site post-construction. | |
| Woodland (including broadleaved woodland, mixed woodland and wet woodland) | Lowland mixed deciduous woodland, as well as wet woodland, is a priority habitat in the Northamptonshire BAP and a recognised Habitat of Principal Importance. No significant stands of woodland fall within the red line boundary. Woodland areas within Site include those around ponds and/or in field corners and occasional long copses at field edges at both Green Hill A and E. A more substantial belt of broadleaved woodland surrounded the watercourse running north to south at Green Hill A.<br><br>Woodland habitats were generally situated at the fringes of Site, including ancient woodland immediately adjacent to Green Hill C (Sywell Woods) and Green Hill F (Horn Wood LWS). Part of the western boundary of Green Hill E is also bounded by an area of mixed (broadleaved and coniferous) plantation woodland used for game.<br><br>These woodland habitats have high ecological value for a range of species, including badgers, bats, breeding birds, amphibians (where ponds present) and dormice. This is further elevated where the woodlands comprise trees of varying age, increasing the likelihood of additional habitat features, such as suitable roosting habitats for rare barbastelle bats. | There is potential for damage to woodland habitats within the Sites during construction via direct damage from construction machinery or through run-off, pollution or dust deposition.<br><br>Construction activities may result in low levels of noise and possibly light disturbance to protected species residing within on and off-site woodland parcels. These impacts would only be temporary and are considered likely to be similar to disturbance resulting from current agricultural practices.<br><br>Operationally, the cessation of agricultural practices, including application of fertiliser and frequent movement of heavy machinery within RPZs, has potential to benefit trees within on-site and adjacent woodland parcels. | **Mitigation Measures:**<br><u>Retention of woodland</u><br>It is strongly recommended that all on-site woodland habitat should be retained within the development proposals. Suitable undeveloped buffers are indicated in Table 1. These must be maintained between the woodland edge and the development area during the construction and operational phases to prevent physical damage to woodland habitats.<br><br>Appropriate pollution prevention measures will be implemented during construction, including measures to address noise and light disturbance, to be outlined within an OEPMP for the Sites.<br><br>**Enhancement Opportunities:**<br><u>Habitat creation</u><br>Planting of additional woodland parcels at strategic locations would increase the extent of high-value habitat and enhance ecological corridors for wildlife dispersal within the Sites.<br><br>This inclusion of enhanced green infrastructure corridors at Green Hill C and Green Hill BESS will also contribute towards green infrastructure policies (Policy 19) set out within North Northamptonshire's Joint Strategy[4].<br><br><u>Habitat enhancement</u><br>Retained woodland habitat should be managed to maximise biodiversity value, ensuring the longevity of trees, maintaining structural diversity, retention and provision of deadwood and establishment of woodland ground flora species in small glades/clearings.<br><br>Small-leaved lime should be included within woodland and hedgerow planting schemes to create future provisions for the lime-bark beetle.<br><br>Appropriate management recommendations will be provided within an OLEMP for the Sites, including removal and appropriate disposal of tree guards once woodland trees are established. |
| Ponds | Ponds are a priority habitat in the Northamptonshire BAP and also recognised as a Habitat of Principal Importance.<br><br>A total of 18 ponds were recorded within Site, three of which are located within fields (Green Hill B, E and F) but with the majority at field edges and frequently connected to adjacent agricultural ditches. A defunct, recently infilled pond was also recorded at Green Hill BESS.<br><br>A further 100 ponds were identified within 250m of the Sites during the desk-based assessment. This includes a high density of | There is potential for damage and subsequent loss to pond habitats within the Sites through physical damage (compaction of soil, damage to banks), run-off or accidental pollution events during construction.<br><br>Damage to pond habitats resulting from construction may result in the accidental injury/killing of protected species that may be present therein.<br><br>Isolation of ponds at field margins outside the security fencing may pose a risk of these features being undermanaged and their condition being degraded. | **Further Surveys:**<br>Further surveys will likely be required to confirm the presence/likely absence of GCN within on-site ponds and all ponds within 250m of the Sites and cable route search area. Refer to 'Amphibians (Including GCN)' for further details relevant to this species.<br><br>**Mitigation Measures:**<br><u>Great Crested Newt District Level Licensing (DLL)</u><br>The use of DLL across the entire scheme is currently being explored as a potential mitigation option for the scheme. The district level licence would be administered by NatureSpace,<br><br><u>Retention of ponds</u><br>It is recommended that all on-site ponds are retained within the development proposals and protected from impacts during construction. |

[4] [4] West Northamptonshire Joint Core Strategy 2011-2031 (adopted July 2016). Available at: https://www.westnorthants.gov.uk/west-northamptonshire-joint-core-strategy/west-northamptonshire-joint-core-strategy-local-plan-part [Accessed 28th Feb 2024]

| Ecological Feature | Description | Constraints and Likely Impacts During Construction & Operation | Recommended Further Surveys, Mitigation and Enhancement Opportunities |
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| | larger waterbodies (formerly gravel pits) situated adjacent to Green Hill BESS, within the Upper Nene Valley Gravel Pits SPA, and a diverse network of waterbodies at the disused quarry site adjacent to Green Hill F.<br><br>Ponds can provide highly valuable habitat, but ponds situated in arable landscapes are often undermanaged and as a result, their ecological value is often restricted. Pond presence increases habitat heterogeneity and provides a valuable resource for a range of species, especially where they frequently occur within the local landscape. | | Suitable undeveloped buffers to retained ponds are indicated in Table 1.<br><br>Pollution control and appropriate working methodologies to be outlined within the OEPMP to be prepared for the Sites.<br><br>**Enhancement Opportunities:**<br><u>Habitat creation</u><br>Additional standing water features, including new wildlife ponds and wetland features to extend lateral connectivity, may be created within the Sites to increase the extent of the pond network within the local area. This will benefit a range of protected species and contribute towards the delivery of Biodiversity Net Gain. Any new waterbodies should be constructed and managed to increase ecological value by creating natural, sloping banks, planting a range of native aquatic plant species and ensuring the features are not stocked with fish.<br><br>There is potential to recover ghost ponds and restore retained ponds within the Sites where a lack of management has resulted in over shading, sedimentation or active infill. In the first instance, surrounding scrub vegetation should be removed to reduce shading and fencing to present livestock access, such as cattle, from the Sites will also reduce poaching pressure on the banks of retained ponds. Some sediment removal and modification of bank profiles to increase marginal waters may be appropriate. It would be anticipated that seedbanks would support recovery of aquatic plants, however this should be monitored and supplementary (biosecure) native marginal plug planting should be a future consideration, if required.<br><br>Cessation of intensive agricultural practices has potential to reduce chemical pollutants into on-site ponds and may result in increased water quality over the lifetime of the Scheme. |
| Urban – Developed Land; Sealed Surface<br><br>Artificial Unvegetated; Unsealed Surface,<br><br>Sparsely Vegetated Land | 'Urban' habitats identified within Site included farm access tracks, agricultural storage and working areas, buildings, and areas of hardstanding.<br><br>Urban habitats were recorded at Green Hill A, E and F and offer little intrinsic value for biodiversity and wildlife at this Site, with the exception of buildings used or with potential for use by roosting bats and nesting birds. Where present, buildings are generally old and derelict or falling into disrepair, creating numerous opportunities for roosting bats. Some are also confirmed to have been used by roosting barn owl.<br><br>Refer to the relevant sections below for further detail - 'Bats', 'Birds' and 'Birds of Open Farmland' below). | No constraints are anticipated in relation to urban habitat types (e.g. hardstanding, access tracks and bare ground), aside from those where hardcore is penetrable for amphibians, such as great crested newts.<br><br>The removal of existing buildings within the Sites also has the potential to result in disturbance or displacement of protected species residing therein, including roosting bats and nesting birds (see relevant sections below). | **Mitigation Measures:**<br>Refer to 'Bats' and 'Other Birds' for mitigation measures relating to protected species that may be associated with existing buildings.<br><br>**Enhancement Opportunities:**<br><u>Habitat creation</u><br>Removal of developed areas within the Sites provide opportunities for enhancement within the Sites; seeding these areas with a diverse, locally appropriate grassland mix or reverting them to any other semi-natural habitat type would achieve a biodiversity net gain. |
| Hedgerows and Lines of Trees | Hedgerows, regardless of their composition, are listed as a priority habitat in the Northamptonshire BAP and also recognised as HPIs (NERC, 2006).<br>Across Site, an extensive network of hedgerows, largely native in composition, | The creation of access tracks within the Sites may result in the loss of small lengths of hedgerow habitat.<br><br>Removal of hedgerows within the Sites has the potential to result in disturbance or the accidental injury/killing of protected species residing therein. Loss of hedgerows | **Mitigation Measures:**<br><u>Retention of existing hedgerows</u><br>It is recommended that hedgerow loss is minimised through the retention of as many existing hedgerows as possible. Access tracks within the Sites should seek to utilise existing hedgerow gaps and avoid lengths including mature or veteran trees. |

| Ecological Feature | Description | Constraints and Likely Impacts During Construction & Operation | Recommended Further Surveys, Mitigation and Enhancement Opportunities |
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| | with mature, standard trees frequently noted, was recorded. Additional lines of trees were also recorded, most of which were likely former hedgerows without regular management to maintain as stock-proof hedgerows.<br><br>Of the hedgerows and lines of trees, a large number were associated with ditch features, both wet and dry.<br><br>Hedgerows were generally largely intact with the majority in good or moderate condition, although the connectivity of the hedgerow network varied across each land parcel. In places, gaps were present between hedgerows and most commonly adjacent to ditches, in particular at Green Hill A.<br><br>Hedgerows and lines of trees provide foraging and sheltering habitat for a range of species year-round, including badger, breeding and overwintering birds, reptiles, amphibians, hedgehog and invertebrates. Standard trees within these features may provide further nesting opportunities, and suitable bat roosting features. These networks of valuable habitat also provide important commuting routes for species, such as bats. | and/or trees would also reduce the extent of suitable nesting/roosting habitat and foraging opportunities for a range of species.<br><br>Any retained hedgerows and trees may be damaged during construction in the absence of mitigation, including via direct damage from construction machinery or through run-off, pollution or dust deposition.<br><br>During operation, there is potential for features to be mismanaged, especially if maintenance is made difficult due to access restrictions. | Suitable undeveloped buffers are indicated in Table 1, which should be maintained between retained hedgerows and the development area within scheme design and during construction.<br><br>BPZs, and pollution prevention measures, to be maintained throughout construction will be detailed within an OEPMP for the Sites.<br><br><u>Hedgerow removal</u><br>A precautionary approach to any hedgerow removal should be taken, if required, in order to avoid potential impacts to protected species residing therein (refer to Species sections below).<br><br>Sensitive hedgerow removal methodologies will be prepared as part of the OEPMP.<br><br>**Enhancement Opportunities:**<br><u>Habitat enhancement</u><br>Where hedgerow gaps have been noted within any retained hedgerows, these should be infilled with native species of local provenance to improve hedgerow connectivity and integrity.<br><br>Retained hedgerows recorded as species-poor could also be infill planted to increase species richness, where possible or managed through hedge-laying if more appropriate.<br><br><u>Habitat creation</u><br>Where appropriate, new hedgerow planting within the proposals can be included to improve wildlife corridors and deliver a net gain in Hedgerow Units. This can also contribute towards local policy aims ('Woodland' above refers). New planting should be strategically located to enhance connectivity within the Sites, particularly between existing isolated features and connected to adjacent priority woodland habitats.<br><br>Hedgerows should be managed during the operational phase to maximise their value for biodiversity, with management prescriptions to be provided within an OLEMP. |
| Individual (Rural) Trees | A limited number of individual, standard trees (located at least 3m from boundaries or within fields) were recorded at Site. Tree species were primarily mature ash and oak, including veteran trees at least 150yrs old.<br><br>Several of these trees were assessed as having moderate to high suitability for roosting bats (see 'Bats'), as well as ecological niches for other species. | There is potential for damage to retained individual trees during construction via direct contact with from construction machinery, as well as root compaction, or through run-off, pollution or dust deposition.<br><br>Removal of individual trees within the Sites has the potential to result in disturbance or displacement of protected species residing therein, including roosting bats and nesting birds (see relevant sections below).<br><br>Isolated trees within arable fields can be vulnerable to damage from agricultural activities, including contact with machinery, the application of fertiliser as well as ploughing and frequent movement of heavy machinery within RPZs. Cessation of such practices following construction of the development will benefit retained trees. | **Mitigation Measures:**<br><u>Retention of trees</u><br>It is recommended that all individual trees are retained, particularly any ancient/veteran trees, within the development proposals, and protected with appropriately sized buffers. Ancient/veteran trees are irreplaceable habitats within BNG assessments.<br><br>Suitable undeveloped buffers are indicated in Table 1. The buffers will take into account RPZs in accordance with 'BS 5837: Trees in relation to design and construction'. Buffer distances will likely be determined by the suitability of the tree for roosting bats, or the RPZ, whichever is greater.<br><br>Design proposals should allow for shading from trees, ensuring that sufficient distance has been allowed for trees to reach their maximum canopies during the lifetime of the Scheme without constraint.<br><br><u>Tree removal</u><br>Any works affecting individual trees (such as removal or de-limbing) should be identified as early as possible, so that appropriate measures can be taken to prevent potential impacts to protected species such as roosting bats and nesting |

| Ecological Feature | Description | Constraints and Likely Impacts During Construction & Operation | Recommended Further Surveys, Mitigation and Enhancement Opportunities |
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| | | | birds (see relevant species sections). **Trees proposed for removal may require further survey work, such as tree climbing inspections or ground-based bat emergence surveys.**<br><br>**Enhancement Opportunities:**<br><u>Habitat creation</u><br>Planting additional trees within the Sites would provide an enhancement for biodiversity, including standard trees within fields to create ecological stepping stones between suitable habitats present across the Site.<br><br>See 'Bats' for further information around the rationale and measures required to ensure long-term protection and maintenance of created and retained individual trees.<br><br>Full details of the measures required would be detailed within the OLEMP to be prepared for the Site. |
| Ditches | Over 100 ditches were present across the entire Site, with the majority comprising agricultural drains of varying size associated with hedgerows. The majority were found to be dry and encroached by hedgerows, however some open stretches were recorded, such as at Green Hill A where open, steep-sided ditches were frequent.<br><br>Many of these ditches were wet at the time of survey or considered likely to hold water for at least 4 months of the year. Although not always apparent, these ditches would inevitably have connectivity with local waterbodies and watercourses - see 'Rivers and Streams' below).<br><br>Similarly to ponds, where ditches are wet year-round and accessible by wildlife, these habitats increase the heterogeneity of the Site; providing suitable habitat for a range of species, including amphibians, otter, water vole and reptiles. | Creation of access tracks within the Sites may result in the loss of lengths of open, wet ditch habitat.<br><br>There is potential for damage to retained ditch features through run-off and pollution, as well as inadvertent damage during construction.<br><br>Damage to ditches resulting from construction may result in disturbance or the accidental injury/killing of protected species that may be present therein.<br><br>During operation, there is potential for features to be mismanaged, especially if maintenance is made difficult due to access restrictions. | **Mitigation Measures:**<br><u>Retention of ditches</u><br>It is recommended that all wet ditch features are retained within the development proposals, as far as possible. Access tracks should seek to utilise existing crossings to prevent culverting of additional ditch length.<br><br>Suitable undeveloped buffers are indicated in Table 1, which will be maintained from the top of the ditch banks to the development area to prevent physical damage, riparian encroachment and impacts to protected species therein. Where possible, this should be increased to 15m to reduce runoff of contaminated water used for maintaining solar panels within the array. These buffers should be included within scheme design and maintained during construction through the implementation of BPZs.<br><br>Pollution control habitat protection measures will be detailed within the OEPMP to be prepared for the Sites. At Green Hill BESS, pollution measures should be incorporated into the Scheme design to ensure prevention of contamination of watercourses or groundwater in the unfortunate event of a fire outbreak and associated control.<br><br>**Enhancement Opportunities:**<br><u>Habitat enhancement</u><br>Retained ditches could be enhanced through targeted scrub removal where marginal plants are likely to recover, as well as rotational management of scrub encroachment across all channels. More ambitious measures would include reprofiling of ditch banks and hydrological measures necessary to ensure they retain water for longer periods, rather than rapid run-off at times of peak flow.<br><br><u>Habitat creation</u><br>The enhancement measures described above could also extend to include the wider network of dry ditches, associated with hedgerows, recorded within the Sites. Increasing the water-retention capacity of ditches, bank modification, and ensuring connectivity with existing watercourses, would increase the extent of wet ditch habitat within the Sites, benefitting a range of species. |
| Rivers and Streams | Rivers (as well as streams and associated habitats) are listed as priority habitats in the Northamptonshire BAP, in addition to rivers identified as HPIs under the NERC Act (2006). | Any development within 10m of the watercourses has the potential to impact the condition of the watercourse, including impacts to the wider network of watercourses in the local landscape. | **Mitigation Measures:**<br><u>Retention of watercourses</u><br>It is recommended that all watercourses are retained within the development proposals. |

| Ecological Feature | Description | Constraints and Likely Impacts During Construction & Operation | Recommended Further Surveys, Mitigation and Enhancement Opportunities |
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| | Significant watercourses occur at Green Hill A, E, F and BESS. The river present at Green Hill BESS is a short distance from the Upper Nene Valley Gravel Pits SPA, whereas the river bounding the southern edge of Green Hill E connects with Wilby Meadows Stream LWS (important for water vole populations) to the east.<br><br>Similar to ditches and ponds, watercourses increase the habitat heterogeneity of Site and have the potential to support protected species, including otter, water vole and aquatic invertebrate species. | Impacts to watercourses, including to associated riparian habitats, may result from inadvertent physical damage, or through run-off and pollution.<br><br>Damage or degradation of watercourses resulting from construction may result in disturbance or the accidental injury/killing of protected species that may be present therein. | Suitable undeveloped buffers are indicated in Table 1, which will be maintained from the bank top to the development area (to exclude any fencing). These buffers will prevent physical damage, riparian encroachment and impacts to protected species therein. The buffers should be included within scheme design and maintained during construction through the implementation of BPZs. Providing larger buffers will allow for the natural succession of river channels over time, especially within flood zone aeras such as the southern boundary of Green Hill E.<br><br>Pollution control habitat protection measures will be detailed within the OEPMP to be prepared for the Sites, including design measures to avoid potential contamination of watercourses at the BESS site – refer to 'Ditches and Internationally Designated Sites, above'.<br><br>**Enhancement Opportunities:**<br><u>Habitat Enhancement</u><br>Sympathetic management of riparian habitats would aim to increase the botanical diversity of bankside vegetation and maximise the value of these habitat for protected species associated with the watercourses.<br><br>More ambitious measures may include (where appropriate) reprofiling of banks and modification of hydrological measures necessary to reduce rapid run-off at times of peak flow, recover flood pulses and have increased lateral connectivity to wetland features.<br><br>Management for these habitats will be detailed within an OLEMP for the Sites. |
| Biodiversity Net Gain (BNG) | The development will seek to deliver BNG in accordance with the NPPF and local planning policy. A net gain of at least 10% will be delivered to comply with the Environment Act (2021); although not yet mandatory for NSIP-scale projects at the time of writing, this will become a legal requirement in 2025.<br><br>Local strategies also make reference to the national targets, with the potential for North Northamptonshire Council to be striving for an ambitious 20% biodiversity net gain[5].<br><br>This process will include habitat assessments using the Natural England Statutory Biodiversity Metric (the latest available version) to quantify habitat areas/units lost, enhanced or created across the scheme. The BNG calculations for the scheme will include habitats within the boundary of the Sites, as well as habitats along any associated cabling routes. This includes rivers and streams within 10m of the redline boundary, which will need to be subject to MoRPh (river condition assessment) surveys. | There is potential for damage to retained adjacent 'irreplaceable habitats' as defined by Natural England[6], during construction via direct damage from construction machinery, root compaction, or through run-off, pollution or dust deposition.<br><br>Irreplaceable habitats present on Site include ancient or veteran trees, in addition to ancient woodland which bounds Green Hill C and Green Hill F. | **Mitigation Measures:**<br>All irreplaceable habitats within and adjacent the Sites (i.e. ancient/veteran trees and ancient woodland) will be retained within the development proposals and protected during construction and assigned appropriate buffers. The details of these will be set out within the OEPMP to be prepared for the Site.<br><br>Other habitats of high ecological value should also be retained as far as possible within the proposals, including arable field margins, diverse grasslands, woodland, hedgerows, trees, ponds, ditches and streams.<br><br>It is recommended to maintain regular consultation with the appointed ecologist throughout the design process to allow for integration of opportunities for biodiversity net gain where possible.<br><br>**Enhancement Opportunities:**<br>The Sites present opportunities to deliver significant net gains for biodiversity, primarily resulting from the conversion of arable habitats to diverse grasslands. There is also scope to create further areas of ecologically valuable habitat such as woodland belts, scrub planting and wildlife ponds.<br><br>Retained habitats should be enhanced wherever possible, with the enhancement of grasslands into species-rich grasslands being a priority. Where grassland is within the flood zone, modifying these areas to allow water retention after periods of high flow would further enhance grassland habitats present on Site.<br><br>Any retained or newly created habitats within the Sites will be managed to maximise biodiversity value, to be detailed within an OLEMP. |

[5] North Northamptonshire Council (2022) North Northamptonshire Strategic Plan: Scope and Issues Consultation [online] Available at: [redacted] [Accessed: 10/04/2024]
[6] Gov.UK (2003) *Irreplaceable habitats and BNG: what you need to know.* [online] Available at: https://defralanduse.blog.gov.uk/2023/10/05/irreplaceable-habitats-and-bng-what-you-need-to-know/ [Accessed: 10/04/2024)

| Ecological Feature | Description | Constraints and Likely Impacts During Construction & Operation | Recommended Further Surveys, Mitigation and Enhancement Opportunities |
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| | No BNG baseline calculations have been prepared at the time of writing. | | |
| **Protected and Other Important Species** | | | |
| Badgers | Over 50 badger setts have been recorded across Site, as well as badgers recorded in the field during nocturnal surveys. This includes mains setts, in addition to additional subsidiary, outlying or annexe setts.<br><br>Badger activity was recorded across all parcels, but most notably at Green Hill E where setts were frequently recorded in-field and not restricted to field boundaries. Latrines, mammal paths and other signs of badger activity were also noted within the Site.<br><br>The arable fields, grassland, woodland and scrub habitats comprise suitable foraging grounds for numerous social groups of badgers. | Badgers are protected under the Protection of Badgers Act 1991, and under Schedule 6 of the Wildlife and Countryside Act (WCA) 1981. There is a risk of offences being committed during construction works resulting from damage/destruction of setts and/or disturbing badgers therein.<br><br>Incidental mortality or injury to badgers may also occur during construction, for instance through badgers becoming trapped in deep excavations.<br><br>A temporary reduction in the availability of foraging habitat may also occur during construction.<br><br>Perimeter fencing of the array is not considered to pose a limitation to badger dispersal unless it is deeply buried and of a tight mesh size, which is not typical of solar development.<br><br>Operationally, the cessation of arable farming and expected reversion of land to permanent grassland is likely to improve the value of the Site for badgers. In particular, the lack of disturbance (from ploughing/harvesting etc.) and provision of year-round grassland foraging opportunities would represent better quality habitat than currently exists within the arable fields, which have restricted foraging opportunities at some times of year. | **Further Surveys:**<br>A pre-construction update badger survey is recommended given the likely timescales between an application being submitted and the commencement of construction. This will ensure that any newly excavated setts/sett entrances can be identified. A suitable course of action can then be decided, depending on the location/extent of these setts.<br><br>Further badger sett surveys may also be required where design proposals encroach on the buffers (see below) required to protect badgers.<br><br>**Mitigation Measures:**<br><u>Retention of badger setts</u><br>All setts will be protected with suitable undeveloped buffers, as detailed in Table 1. These buffers are a requirement during construction to prevent damage and to ensure that no offences are committed, however these will also remain for the operational lifetime of the proposed scheme to ensure that no future damage or disturbance occurs.<br><br><u>Exclusion of badger setts</u><br>If it is not possible to retain an active sett within the proposals, or maintain adequate buffer zones, it will be necessary to close (either temporarily or permanently) the setts under a licence from Natural England. Where a Main badger sett requires closing under a licence, this may need an alternative artificial sett being constructed in good time (at least 6 months) prior to its closure.<br><br><u>General</u><br>Buried perimeter fencing should be avoided, to ensure badgers (and other mammals) are able to continue to freely use the land during construction and operation. Badgers will exploit natural undulations in the ground to push under fencing. Badger 'gates' in security fencing have been found to be ineffective and very rarely used, and therefore are not promoted.<br><br>Good practice measures should be implemented during construction to limit the risk of entrapment/injury/mortality of individual badgers that may utilise the Sites. Measures will be outlined within an OEPMP.<br><br>**Enhancement Opportunities:**<br>The diversification of currently arable habitat to permanent grassland is expected to provide enhanced foraging opportunities for badgers, especially where these grasslands are species-rich.<br><br>The incorporation of fruiting trees and shrubs, particularly in any landscape mitigation planting, as well as the creation of traditional orchards, would enhance the Site through the provision of additional foraging resources for badgers in the autumn. Other species could also benefit from this enhancement. |
| Bats | Bats are identified as UK Species of Principle Importance under the NERC Act (2006). | Bats are European Protected Species (EPS) and legally protected under the Wildlife and Countryside Act (1981, as amended), in addition to bats and their roosts | **Further Surveys:**<br>Static activity surveys will be carried out between April and October inclusive to ensure data is collected from across the key bat activity period, in accordance with |

| Ecological Feature | Description | Constraints and Likely Impacts During Construction & Operation | Recommended Further Surveys, Mitigation and Enhancement Opportunities |
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| | Bat activity surveys completed to-date (August to October 2023) have identified a diverse assemblage of bats across Site, including rarer species for the local area. This includes: barbastelle, long-eared species, *Myotis* species (a combination of various species), pipistrelles (common, soprano and Nathusius'), *Nyctalus* species (likely two separate species) and probable serotine.<br><br>High levels of barbastelle activity were recorded at Green Hill C and Green Hill E, notably at locations with good quality hedgerows and/or connectivity to woodland. Desk study records indicate nearby roosts of barbastelle in woodland connected to Sywell Woods. The low numbers of probable serotines were recorded at Green Hill A, C and E.<br><br>Mature trees are frequently present within the hedgerow network, as well as occasionally in-field and associated with woodland parcels adjacent to or within the Site. A large number of these trees are suitable to support roosting bats, as identified during a preliminary ground-based assessment. Some agricultural buildings were present within Site with likely suitability for roosting bats. | protected under the Conservation of Habitats and Species Regulations (2017).<br><br>Any removal, damage or pruning works to trees or buildings identified as having suitability for roosting bats may affect individual bats and/or their roosts, should they be present.<br><br>Change of land use and the removal or modification of habitats may result in habitat loss or fragmentation, e.g. through the construction of new access tracks through hedgerows, solar array construction around confirmed roosts and loss of in-field foraging habitats. Although research evidence on the impacts of solar arrays on roosting, foraging and dispersing bats is sparse, a recently published paper[7] has concluded that bat activity was substantially reduced within solar arrays when compared to nearby farmland. However, other research studies[8] conclude that bats continue to use these landscapes. It is important to note that some species may be affected more than others (e.g. barbastelle). Although the causal reasons for the apparent avoidance of solar arrays by bats was not confirmed, it is assumed that foraging and dispersing bats may be negatively impacted by change of land-use and potential associated habitat loss or fragmentation and the presence of solar panels and associated infrastructure.<br><br>For a development of this scale, this could have a considerable effect on the ability of local bat colonies to commute and forage/disperse effectively and ultimately sustain populations, which will need to be carefully assessed.<br><br>Lighting can act as a significant barrier to the movement of bats, potentially also causing unlawful obstruction of roost accesses within trees or adjacent buildings. | industry good practice guidance. Some of these surveys commenced in August 2023, but will need to continue throughout 2024.<br><br>Ground-level tree inspections determined the suitability of trees for roosting bats across Site, however further survey will be required if any design proposals would result in impacts upon these features or habitats within their roost protection areas. Such surveys would be necessary to determine the presence or likely absence of bat roosts that could be impacted.<br><br>On-site buildings require building inspection surveys to determine suitability for roosting bat and evidence of roosting bats, in order to assess potential impacts where solar infrastructure would isolate roosts in buildings from suitable surrounding habitats.<br><br>**Mitigation Measures:**<br><u>Retention of boundary features and trees</u><br>Field boundaries such as hedgerows, woodland edges and watercourses are likely to be of elevated importance for bats in comparison to arable fields and agricultural grassland. To retain these boundary habitats as functional commuting and foraging habitat for bats, and in light of emerging research which indicates bats may avoid developed areas of solar arrays, it is recommended that wide swathes of land are maintained from all field boundary habitats to maintain and reinforce these 'core' habitats for bats. This need is further supported by the confirmed presence of rare and threatened species on Site, notably at locations with connectivity to woodland. This includes hedgerows linked with ancient woodland Sywell Woods at Green Hill C and diverse and tall hedgerows across Green Hill E.<br><br>Suitable buffers (see Table 1) should be maintained from all hedgerows, woodlands and watercourses on Site to maintain sufficient opportunities for foraging and dispersal.<br><br>In addition to the above, suitable buffers are recommended from in-field trees with suitability for roosting bats. These buffers should be implemented into the design of the scheme. This will minimise possible disturbance impacts to potential roosts, and ensure bats are able to access the trees. The above buffers will also be assigned to buildings with varying levels of suitability for roosting bats, once building inspection surveys have been completed.<br><br><u>Artificial lighting</u><br>Any construction phase lighting should be carefully considered and positioned. The need for construction phase lighting, and any associated details, should be reviewed by Clarkson and Woods as early as possible, and appropriate restrictions on lighting can be prescribed within an OEPMP. Solar development does not typically require permanent lighting installation, however, should this be deemed necessary, e.g. for substations, deign proposals should be reviewed and discussed with Clarkson and Woods ecologists.<br><br><u>Licensable works</u><br>Should impacts to any confirmed bat roosts be unavoidable, a licence may be required from Natural England before works can proceed. Any licence would need |

[7] Tinsley, E., Froidevaux, J.S.P., Zsebők, S., Szabadi, K.L. and Jones, G. (2023) Renewable energies and biodiversity: Impact of ground-mounted solar photovoltaic sites on bat activity *Journal of Applied Ecology*. 60., pp. 1752 - 1762
[8] Szabadi, K.L., Kurali, A.A., Rahman, N.A.A., Froidevaux, J.S.P., Tinsley, E., Jones, G. , Gorfol, T., Estok, P. and Zsebok, S. (2023) The use of solar farms by bats in mosaic landscapes: Implications for conservation. *Global Ecology and Conservation*. 44

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| | | | to be informed by detailed survey work, and a mitigation strategy would be prepared to offset any impacts which are likely to occur.<br><br>**Enhancement Opportunities:**<br><u>Habitat creation/enhancement</u><br>Enhanced habitat can be provided within buffer zones maintained from boundary habitats; this would primarily revolve around the creation and management of diverse grassland, scrub and woodland edge habitat which is managed to maximise their productivity for invertebrates/bat prey.<br><br>Strengthening boundary habitats with connectivity to Green Hill C will also contribute towards strategic local policies (Policy 19 of North Northamptonshire Council Joint Core Strategy[9]), as a local green infrastructure corridor has been identified at this location.<br><br>Additionally, infill planting of hedgerow gaps and planting new hedgerow features where they are absent will increase connectivity throughout Site.<br><br>It is recommended that all individual trees within fields identified as being suitable to support roosting bats are connected to wooded boundaries through planting of additional hedgerows. This will provide connectivity between roosts, if present, to foraging and commuting habitat within/adjacent the Sites.<br><br>Any habitat creation should have consideration for maximising habitat connectivity, e.g. either reinstating old hedgerows identified from historic maps or at locations that will connect hedgerows, isolated trees, river corridors or woodlands.<br><br><u>Enhancement features</u><br>The provision of additional roosting opportunities can be incorporated into the scheme through the installation of tree and building-mounted bat roost boxes, as well as bespoke roost buildings/structure (e.g. 'wildlife towers') provided in strategic locations. A rate of approximately 1-2 new roosting features per 10ha of development land would be appropriate. |
| Otter | Otter is a UK Species of Principal Importance.<br><br>Otter surveys have confirmed their presence at Green Hill E and Green Hill BESS. An adult otter was also seen during nocturnal bird surveys travelling over fields to visit the large in-field pond at Green Hill B (within Field BF5).<br><br>Following population recoveries, this species is ubiquitous across England and is likely to use the watercourse and ditch network across the Site, including moving over land between river catchments.<br><br>Watercourses surrounding Green Hill BESS and those traversing Green Hill A, E and F also offer suitable opportunities for couch | Otter is a European Protected Species, with its holts/resting places legally protected.<br><br>Habitat clearance, excavation or engineering works in close proximity to the watercourses could result in the damage or destruction of a holt or resting place, as well as disturbance to otters, all of which would contravene the legislation.<br><br>Riparian habitat quality is at risk of degradation through pollution resulting from run-off, sediment/dust deposition and fuel/oil spills during the construction phase, which would impact resource availability for otters. | **Further Surveys:**<br>Where new or modified access crossings are proposed over ditches or watercourses, or where construction works occur within 10m of a watercourse, a targeted survey to search for otter holts and resting places within the affected area should be undertaken.<br><br>**Mitigation Measures:**<br><u>Retention of watercourses</u><br>Any required crossings over ditches and watercourses should utilise existing crossings wherever possible.<br><br>Suitable undeveloped buffers should be maintained from the top of watercourse bank tops; Table 1 refers.<br><br><u>Licensable works</u><br>In the event that evidence of any otter shelter is discovered (either in advance through a specific otter survey or during supervised works), works may require a licence from Natural England to proceed. In the absence of evidence of a holt or other shelter, the potential for disturbance or damage to habitat should be |

[9] West Northamptonshire Joint Core Strategy 2011-2031 (adopted July 2016). Available at: https://www.westnorthants.gov.uk/west-northamptonshire-joint-core-strategy/west-northamptonshire-joint-core-strategy-local-plan-part [Accessed 28th Feb 2024]

| Ecological Feature | Description | Constraints and Likely Impacts During Construction & Operation | Recommended Further Surveys, Mitigation and Enhancement Opportunities |
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| | sites, and potentially also holts. The ditch network is largely suboptimal for otters, but may well be used by this species when dispersing or hunting at inland waterbodies. | | mitigated for by carrying works out under an Ecological Watching Brief attended by an experienced ecologist.<br><br>Pollution prevention measures will be required as part of an OEPMP to ensure the ditches and watercourses are not impacted by runoff or accidental pollution events.<br><br>**Enhancement Opportunities:**<br>Habitat enhancement<br>Habitat enhancements for otter are mostly limited to the favourable management of watercourse bank tops to provide structurally diverse vegetative cover. Tussocky grassland, scrub and shrubs should be allowed to develop within undeveloped buffers alongside watercourses.<br><br>There is opportunity to provide additional habitat links and improve habitat quality by targeted river improvement measures. These will be bespoke to individual watercourses but could include channel re-meandering, instream habitat features and reconnecting the main channel with backwaters. Any new waterbodies may also contribute positively to otter conservation. |
| Water Vole | Water vole is a UK Species of Principal Importance.<br><br>Initial water vole surveys have confirmed their presence within watercourses at Green Hill BESS, plus a dead adult was found at Green Hill E: a land parcel with connectivity to a confirmed water vole colony.<br><br>Although a considerable length of ditches is present across Site, many were suboptimal or unsuitable for this species, primarily due to a lack of persistent water retention and and/or lack of connectivity to more suitable habitat.<br><br>A probable American mink was also sighted at Green Hill E during nocturnal bird surveys. This is a voracious predator of water voles, which may have a significant impact on water vole distribution and abundance across Site. | Water voles are legally protected under the WCA (1981) from harm as well as disturbance while within burrows.<br><br>Habitat clearance, excavation or engineering works in close proximity to watercourses or ditches could result in the killing, injury or disturbance of water voles which would contravene the legislation.<br><br>The introduction of new culverts within the ditch network could have a barrier effect on water vole dispersal, resulting in permanent habitat fragmentation and a risk of isolating populations.<br><br>Riparian habitat quality is at risk of degradation through pollution resulting from run-off, sediment/dust deposition and fuel/oil spills during the construction phase. | **Further Surveys:**<br>Two water vole surveys will take place, one in spring (between April and mid-June) and another in autumn (between mid-June and end-September). These surveys are undertaken in accordance with good practice guidance and to ensure the likelihood of recording water vole activity is optimal during their breeding seasons.<br><br>Some autumn surveys have already taken place (2023) with a repeat second survey to be undertaken between April and mid-June 2024. A total of two surveys will be required regardless of when the first survey was completed to be in accordance with good practice industry guidance.<br><br>**Mitigation Measures:**<br><br>Retention of existing watercourses<br>Any required crossings over ditches and watercourses should utilise existing crossings wherever possible.<br><br>Suitable undeveloped buffers should be maintained from the top of watercourse bank tops; Table 1 refers.<br><br>Licensable works<br>Where any new crossings over ditches or watercourses are required, or where construction works occur within 15m of a ditch within confirmed water vole presence, works may require a licence from Natural England to proceed dependent on the amount of habitat that will be lost. The potential for disturbance or damage to habitat should be mitigated for by carrying out works under an Ecological Watching Brief attended by an experienced ecologist.<br><br>Pollution prevention measures will be required as part of an OEMEP to ensure the ditches and watercourses are not impacted by runoff or accidental pollution events.<br><br>**Enhancement Opportunities:**<br>Habitat creation/enhancement<br>Enhancements for water voles would include increasing and enhancing the existing network of suitable habitat. The apparent lack of water for at least part of the year |

| Ecological Feature | Description | Constraints and Likely Impacts During Construction & Operation | Recommended Further Surveys, Mitigation and Enhancement Opportunities |
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| | | | in many ditches is likely to be a limiting factor upon existing water vole populations. Expanding wetland features with connectivity to watercourses and/or known water vole locations can be used to increase the amount of available habitat present. For example, improving ditch networks to increase water retention, woody vegetation management to increase light ingress to allow growth of marginal vegetation/foraging habitats, and the creation of ponds with islands to provide a safe refuge for water voles.<br><br>The retention and undeveloped buffers adjacent to watercourses could contribute towards the enhancement of foraging opportunities for water voles, however appropriate management would be required to ensure scrub and overshading do not compromise habitat value over time. |
| Hazel Dormouse | Hazel dormouse (referred to as dormouse/dormice hereafter) is a UK Species of Principal Importance.<br><br>No records of dormice were returned within the 2km search area around Site.<br><br>Habitats across the Scheme were considered sub-optimal overall, as they were generally restricted to managed simple hedgerow networks infrequently connected to woodland. The likelihood of dormice being present on Site is also reduced due to the fact that Northamptonshire represents the northern extent of their range within the UK.<br><br>Dormice are present within the county, however the only known population is a reintroduced population within extensive woodlands in the north of the county at Rockingham Forest. These woodlands have poor connectivity to the Site and it is therefore considered highly unlikely that the Site would be functionally linked to any known populations of dormice.<br><br>No detailed surveys for this species have been undertaken given the unlikely presence of dormice on Site. This is further supported by the relatively low scale of likely impacts to hedgerow and woodland habitats. | Dormouse is a legally protected European Protected Species.<br><br>The clearance of hedgerows, woodland or scrub across Site has the potential to reduce habitat connectivity, inhibiting the ability for small mammals to forage and disperse. This impact is considered to only be of relevance once the Site becomes operational, should dormouse populations within Northamptonshire or adjacent counties expand their ranges in the future. The likelihood of this is considered low, however habitat integrity is important for biodiversity overall as climate change has the potential to accelerate shifts in species distribution over time. | **Further Surveys:**<br>No further surveys are recommended given the unlikely presence of hazel dormouse.<br><br>**Mitigation Measures:**<br>The recommended buffer protection afforded to hedgerows and other boundary features will retain suitable habitat for small mammals that are likely present on Site. Similarly, efforts to ensure that access tracks utilise existing hedgerow gaps where possible and/or limiting new access routes to single track width will minimise the extent of hedgerow losses.<br><br>In the unlikely event that a hazel dormouse is encountered within the Sites, removal of suitable habitat will likely require a licence from Natural England which will set out specific appropriate mitigation and sensitive working methods to be adhered to. Works affecting suitable habitat would need to cease in the interim to prevent an environmental offence from being committed.<br><br>**Enhancement Opportunities:**<br>The addition of woodland belts, hedgerow creation and infill hedgerows targeted for other species will also benefit small mammals such as dormice. Infill planting of hedgerow gaps and planting new hedgerows where they are absent will increase the extent of suitable habitat and strengthen connective links across Site and into the wider landscape.<br><br>Provision of dormouse boxes in suitably mature hedgerows and woodland would increase nesting opportunities for this species. A suggested rate would be 1 box/10ha of suitable habitat. |
| Amphibians (including GCN) | Only palmate newt is recognised as a priority species within Northamptonshire BAP, but with common toad and great crested newt recognised as UK Species of Principal Importance.<br><br>The Site covers a variety of great created newt impact risk zones (white, green, amber | GCN is a European Protected Species.<br><br>If present, construction works have the potential to result in disturbance and injury/killing of GCN or other amphibians.<br><br>Although the majority of habitats present across Site are suboptimal for amphibians, impacts such as the temporary loss of habitat within the core range of | **Further Surveys:**<br>The need for surveys will be determined by if a traditional approach or district-level licencing (DLL) approach is taken.<br><br><u>Traditional approach</u><br>Undertake further eDNA surveys of the remaining on-site ponds and all off-site ponds within 250m of the optioned land to understand the range and distribution of the local GCN population. These surveys can be undertaken between 15th April and 30th June only. |

| Ecological Feature | Description | Constraints and Likely Impacts During Construction & Operation | Recommended Further Surveys, Mitigation and Enhancement Opportunities |
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| | and red), modelled and shared by Naturespace.<br><br>Species records returned from Northamptonshire Biodiversity Records Centre included common frog, common toad, palmate newt and great crested newt.<br><br>Three adult great crested newts (two female and one male) were recorded migrating over land in February 2024 at Green Hill F, which corresponds with the location of the nearby permitted EPS licence relating to great crested newts (refer to Data Search above).<br><br>A single incidental sighting of common toad was recorded during the nocturnal bird surveys at Green Hill E.<br><br>Terrestrial habitats for great crested newts across Site are limited, as regularly cropped or intensively grazed fields offer little shelter for amphibians. Suitable terrestrial habitat is generally restricted to marginal habitats of ponds, hedgerow bases, ditches, tussocky field margins, river corridors and woodland edges. Ponds and potentially other waterbodies across the Site may be used for breeding. | breeding ponds can be expected to occur during the construction phase.<br><br>Timing constraints have potential to impact the development, e.g. hibernation features (such as arable field margins, hedgerows, scrub and log/stone piles) should only be removed during the active season for GCN (Feb/March-October).<br><br>On completion of construction, it is anticipated that grassland established beneath the arrays has the potential to expand the quantity and quality of suitable terrestrial habitat for great crested newt than is currently available, especially where suitable sheltering features also establish (e.g. patches of tussocky grassland). | <u>District Level Licensing</u><br>This approach would be coordinated by Naturespace. Surveys are not essential under this option, but may be used to inform mitigation measures at a later stage. Where undertaken, surveys would be restricted to the same time period as detailed above.<br><br>**Mitigation Measures:**<br><u>Traditional approach</u><br>Suitable buffers (see Table 1) should be maintained around all ponds with confirmed GCN presence to protect core terrestrial habitat. These buffers should be connected with field margins wherever possible to ensure suitable grassland corridors are provided to facilitate movement of GCN within the Sites. Restoration of nearby ponds would also help to expand this network.<br><br>As a precaution, GCN presence should be assumed (with corresponding pond buffers provided) at the preliminary scheme design until surveys are completed.<br><br>If a great crested newt is encountered during the construction phase, then it may be necessary to cease work in the affected area until a mitigation licence can be acquired from Natural England. The mitigation licence application may need to be informed by further survey work, and specific mitigation measures are also likely to be required, which will depend on the specific impacts which are anticipated within the working area. This may include a translocation exercise, and/or the presence of a licenced ecological clerk of works (ECoW) to oversee any remaining work in the area.<br><br><u>District Level Licensing</u><br>It would be possible to register the Sites under the Naturespace DLL scheme. Under this scheme, a financial contribution will be made to Naturespace for the creation of suitable habitat off-site, which would adequately compensate for any anticipated impacts arising through the proposed development.<br><br>Mitigation measures would also be required during construction to avoid impacts and risk of mortality to GCN. The DLL approach does not negate this need, however in this case mitigation measures (such as toolbox talk, construction requirements and trapping) would only be required within high-risk areas.<br><br>If a great crested newt is encountered during the construction phase, but a district level licence is in place, then works could proceed immediately after the newt is relocated from the working area by a suitably qualified ecologist.<br><br>Any future pond management work should be restricted to suitable periods, when amphibians are not breeding within these waterbodies, i.e. autumn into winter. The above measures will also protect common toads and other amphibians from impacts.<br><br>**Enhancement Opportunities:**<br><u>Habitat creation/enhancement</u><br>Increasing the extent and suitability of terrestrial habitat (such as tussocky grassland, scrub edge & hedgerows) through new planting, extending the width of existing field margins in buffer zones, and through favourable management of new and retained field boundary habitats, would result in considerable enhancements across the optioned area and strengthen connectivity between breeding ponds. |

| Ecological Feature | Description | Constraints and Likely Impacts During Construction & Operation | Recommended Further Surveys, Mitigation and Enhancement Opportunities |
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| | | | <u>Enhancement features</u><br>The creation of hibernacula/wood piles in appropriate locations would provide additional sheltering features for amphibians. To have a meaningful beneficial impact, at least one feature should be created per 20ha.<br><br><u>Pond creation/enhancement</u><br>A number of existing ponds and ditches across Site appear to regularly dry out or through lack of management have become unsuitable for numerous species, including breeding amphibians.<br><br>Seasonally dry ponds and potentially connected ditches can be enhanced through the reduction of shading to allow the growth of marginal vegetation and, where appropriate, sediment removal. Continued management throughout the lifetime of the scheme would also be required to ensure the ponds do not fall into poor condition and lose their value longer-term.<br><br>The creation of new ponds (see 'Ponds' section above) would provide additional breeding features which would represent a significant benefit for great crested newts and amphibian. |
| Reptiles | Adder, common lizard, grass snake and slow worm are listed as UK Species of Principal Importance.<br><br>No targeted surveys for reptiles have been undertaken, on the assumed basis that solar development will largely avoid suitable habitat for this species group.<br><br>Few records were returned for reptiles within 2km of Site, including adder and grass snake.<br><br>Suitable areas of reptile habitats are generally restricted in area across Site, largely comprising arable field margins, woodland edge and some grassland habitats. This includes small fields such as FF20 at Green Hill F, which has variable topography and sward type. Other suitable fields include (but are not limited to) FF12 and CF3. The presence of widespread reptile species (grass snake, slow worm and common lizard) within these habitats and field boundaries has been assumed.<br><br>The open arable fields comprising the majority of Site generally represents unsuitable habitat. Intensively managed grasslands, such as clover or silage leys are also largely unsuitable, however some sympathetically managed pasture fields may offer suitable habitat. | Reptiles are legally protected from injury/killing (under the WCA, 1981).<br><br>Reptiles are assumed present on Site, but largely restricted to within the boundary habitats or small, sympathetically managed fields. Should any clearance of suitable habitats be required (particularly around field boundary habitats and hedgerows), potential impacts on these species could include direct harm and mortality, as well as habitat loss, degradation and fragmentation.<br><br>On completion of construction, land-use change and grassland creation will likely have a significant beneficial impact on these species, through considerable increases in suitable habitat extent and connectivity across the Site. | **Further Surveys:**<br>No further specific reptile surveys are advised; the presence of widespread species inhabiting field boundary habitat (and other suitable infield habitats, as described opposite) has been assumed. Therefore, reptile surveys would be considered disproportionate to the level of anticipated impacts.<br><br>**Mitigation Measures:**<br><u>Retention of boundary habitats and grasslands</u><br>All field boundary habitats should be retained where possible, in addition to fields with suitable reptile habitat, to avoid potential impacts on reptiles, and access tracks should utilise existing hedgerow gaps.<br><br>If necessary, hedgerow breaches for access/infrastructure should be limited to single track width to minimise the extent of habitat loss for reptiles.<br><br>Suitable field boundary habitats should be protected from impacts by maintaining undeveloped buffers around these features (please refer to relevant habitat sections above).<br><br><u>Construction phase measures</u><br>Where relatively small losses of field boundary habitat or other suitable habitats are required, best practice approaches to habitat clearance should be adopted to reasonably avoid impacts on reptiles, such as phased vegetation removal under an Ecological Watching Brief attended by an experienced ecologist.<br><br>**Enhancement Opportunities:**<br><u>Habitat creation and enhancement</u><br>Increasing the extent and suitability of habitat (such as tussocky grassland, scrub edge and hedgerows) through new planting, extending the width of existing field margins in buffer zones, and through favourable management of new and retained field boundary habitats, would result in considerable enhancements across the optioned area. Creation of species-rich grassland would aid increasing invertebrate prey availability.<br><br><u>Enhancement features</u> |

| Ecological Feature | Description | Constraints and Likely Impacts During Construction & Operation | Recommended Further Surveys, Mitigation and Enhancement Opportunities |
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| | | | The creation of hibernacula and/or wood piles at appropriate locations would provide additional shelter/basking features. To have a meaningful beneficial impact, at least one feature should be created per 20ha. |
| Birds of Open Farmland | Birds of open farmland are those that forage (year-round) and/or breed within open farmland and fields, including where open field habitats are only used for part of their breeding season only (e.g. quail).<br><br>Barn owl is recognised as a priority species in the Northamptonshire BAP, with a number of other species being Species of Principal Importance under the NERC Act. This includes curlew, grey partridge, lapwing, skylark and yellow wagtail.<br><br>Another species of significance at this site is the golden plover - listed as an Annex I species (under the EU Birds Directive, 2009). Golden plover feed across farmland during winter and are the qualifying species of the Upper Nene Valley Gravel Pits SPA situated between immediately adjacent and 12km from Site.<br><br>At the time of writing, golden plover and lapwing have been recorded (albeit relatively infrequently) during diurnal bird surveys. These were recorded as individuals or in small numbers, often flying overhead or in adjacent fields outside of the Site boundary. An exception to this however was a record of 18 golden plover foraging at Green Hill F (FF11), with an additional 6 golden plover at FF15. A flock of 70 birds were also recorded (late November) immediately adjacent to the west of Green Hill D. Lapwing have been recorded foraging on Site, with 71 lapwing (maximum flock size 45 birds) foraging in FF13 (early January) moving between adjacent fields (including FF15).<br><br>Nocturnal surveys also confirmed plover activity, in addition to other frequent ground foragers such as jack snipe, snipe and woodcock. Nocturnal surveys completed to date have recorded four golden plover overall, with only a single foraging golden plover recorded within the Site boundary (Green Hill EF31, early March alongside two birds heard calling nearby). The other golden plover were heard calling from the UNVGP SPA adjacent to Green Hill BESS (late February). | Farmland waders and ground-nesting bird species, such as skylark and lapwing, require long, unbroken sightlines when foraging or nesting for predator avoidance.<br><br>Change in land-use will result in the loss of suitable foraging and breeding habitat. For overwintering lapwing and golden plover, the loss of open field habitats will reduce the area of suitable foraging habitat within the surrounding landscape. The scale of impact will be determined by the foraging value of the land, including whether it is confirmed to be functionally linked habitat of the Upper Nene Valley Gravel Pits SPA. Where significant numbers of plovers (more than 1% of local populations) are found to frequently forage across Site, this has potential to undermine golden plover (and lapwing) populations associated with the Upper Neve Valley SPA.<br><br>Foraging requirements of other farmland waders (e.g. woodcock, snipe etc) are likely to be less restricted by the change of land use, as the need for wide, open sightlines is less critical for these species.<br><br>It can be reasonably assumed that the majority of confirmed skylark and lapwing nesting territories will be displaced from the solar arrays, since fields with solar panels are likely to be incompatible with their ecological nesting requirements. This could have a considerable impact on the local population considering that the Site likely supports a significant number of territories (primarily skylark).<br><br>Nesting habitat requirements of other ground-nesting species (e.g. yellow wagtail) recorded on Site to-date are less particular, with potential for them to nest within developed arrays or at the margins of the Site. However, the impacts of solar development on these species are largely unknown, and potential displacement is possible.<br><br>All active bird nests, eggs and young are legally protected and at risk of impact during the construction phase.<br><br>Breeding Schedule 1 species (such as barn owl) are afforded additional protection from disturbance during the nesting season, with appropriate buffer zones established where nesting activity has been concerned. | **Further Surveys:**<br>The proximity of Site to the Upper Nene Valley Gravel Pits SPA enforces the need for a comprehensive suite of overwintering bird surveys. Given the foraging ecology of golden plover, the diurnal wintering bird surveys need to be complemented with nocturnal wintering bird surveys.<br><br>Six diurnal surveys will be carried out between October and February, inclusive. Preferably, six nocturnal winter bird surveys would be undertaken to complement these survey results, including the mid-winter (Nov – Jan) when plover flock sizes tend to be at their largest.<br><br>There may be a need to undertake two years of surveys where significant numbers of plovers are recorded, or where the LPA, Natural England or other stakeholders require two years of data to be submitted.<br><br>Breeding bird surveys commenced in March 2024, with a suite of six breeding bird surveys to be completed between late March and June/early July. These surveys will ensure data is collected from across the breeding season to account for seasonal variances, in accordance with industry guidance, and capture passage species.<br><br>An additional visit should also be scheduled for a dusk survey, to pick up species more active during dusk and the night, such as common quail, nightingale and owls.<br><br>**Mitigation Measures:**<br>Mitigation measures will need to be two-fold to mitigate for the loss of suitable nesting habitat and the loss of foraging habitats.<br><br><u>Golden plovers</u><br>For overwintering plovers and waders, it may be necessary to retain fields (and exclude them from development) identified as Functionally Linked Land, dependent on the proximity to the UNVGP SPA, levels of use and habitat suitability for plovers. Other mitigation may include habitat creation of open pasture, including wetland habitat features, and sympathetically farmed arable fields with overwintering stubble, all of which would also enhance the wider landscape for overwintering foraging plover and other farmland birds.<br><br><u>Ground-nesting birds</u><br>For ground-nesting birds of open farmland, habitat loss can be mitigated either through the provision of new (i.e. not already suitable) compensatory nesting habitat, or the enhancement of existing habitat to increase its carrying capacity by the improvement of nesting suitability or increased foraging opportunities. Given the scale of likely impacts on these species, mitigation should be achieved through a blend of different mitigation techniques and land management approaches within Site and, potentially locally off-site. As has been described, solar arrays are not considered suitable nesting habitat for ground-nesting species which require long sightlines for predator monitoring, therefore mitigation for these species will need to comprise contiguous blocks of land free of solar panels and associated infrastructure. |

| Ecological Feature | Description | Constraints and Likely Impacts During Construction & Operation | Recommended Further Surveys, Mitigation and Enhancement Opportunities |
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| | A total of 13 lapwing were recorded during the nocturnal surveys, with a maximum of 2 individuals at any one time.<br><br>Breeding bird survey visits have commenced, with ground-nesting birds recorded at the time of writing, including frequent skylark and grey partridge; occasional lapwing and yellow wagtail. Recorded behaviour for these species has been indicative of establishing breeding territories, but with densities to be confirmed. | | Any fields within the optioned area which are unviable for solar panels installation (for instance due to landscaping/heritage constraints) should be explored for selection as mitigation land, although some of these fields may not fulfil all compensation requirements where field size is small or adjacent habitats are constricting (e.g. woodland). The definitive area of land required to achieve acceptable mitigation for birds of open farmland can only be calculated once all bird survey data has been collected and analysed.<br><br>**Enhancement Opportunities:**<br>Enhancement measures in proximity to any on or off-site land secured for ground-nesting and overwintering foraging bird mitigation should be considered. Such measures would expand on those described above.<br><br><u>Habitat enhancement</u><br>For example, the success of skylark nesting can be improved by better access to productive foraging grounds. As young skylarks are almost exclusively fed on invertebrates, areas within or outside of the array can be enhanced to support a greater abundance and diversity of invertebrate prey items, with low-input grassland likely to be particularly productive. Such measures have the potential to sustain skylarks breeding nearby. |
| Other Birds – associated with boundaries and general farmland habitats | The Site comprises habitat suitable for several bird species listed as UK Species of Principal Importance, including: corn bunting, linnet, house sparrow, reed bunting, tree sparrow, turtle dove and reed bunting.<br><br>Cropped land and associated foraging resources (spilt grain, invertebrates etc), plus field boundary habitats (arable margins etc) as well as woodland, hedgerows, scrub and trees, offer suitable foraging opportunities for a range of overwintering and breeding bird species.<br><br>A diverse assemblage of wintering birds has been recorded within Site, with over 50 species recorded. Some of these species have also been recorded on initial breeding bird surveys, including specialist farmland indicator species such as common whitethroat, goldfinch, stock dove linnet, starling and yellowhammer, alongside more generalist species, such as woodpigeon.<br><br>Schedule 1 species, which are afforded additional protection from disturbance during the breeding season, have also been recorded, notably (at the time of writing) an osprey (likely male) visiting the bird nesting platform in April 2024 at Green Hill B; and bittern adjacent to Green Hill BESS. Red kite have also been frequently seen during surveys. Both hobby and quail were also recorded in the data search, with hobby | All active bird nests, eggs and young are legally protected. Breeding Schedule 1 species are afforded additional protection from disturbance during the nesting season, with appropriate buffer zones established where nesting activity has been concerned. These may be substantial in size for species such as osprey, which require at least a 300m buffer from development-based disturbance around nest sites. Schedule 1 constraints will apply during construction, but may also be relevant during operational maintenance works, dependent on frequency, noise generation and level of activity.<br><br>There is the potential for accidental mortality to these birds during site clearance or ground preparation works if the clearance of woody vegetation is required.<br><br>In the absence of mitigation, disturbance from noise and vibration may deter species from nesting close to the construction area or, as a worst case, cause abandonment of nests, although birds will likely be habituated to some level of disturbance from agricultural machinery.<br><br>Land-use change may reduce the provision of foraging resources for species adapted to farming practices, notably grainivores such as house sparrow, tree sparrow and yellowhammer. | **Further Surveys:**<br>Six breeding bird survey visits will be completed between March/April and June/July 2024. At the time of writing, two of these have been completed. Data collected from across the breeding season will account for seasonal variances, in accordance with industry guidance. An additional dusk survey should also be carried out (in accordance with good practice) to record crepuscular associated with farmland (common quail, owls, nightingale).<br><br>Where osprey are found to pair and nest at Green Hill B, it may be necessary to secure a protected species licence from Natural England to enable the continuation of breeding bird surveys, to account for disturbance to this Schedule 1 species during nest building or when rearing young.<br><br>A suite of six diurnal wintering bird surveys is required between October and Feb/March to ensure data is collected year-round. This will confirm how the Site is used by winter migrant and resident species.<br><br>**Mitigation Measures:**<br><br><u>Schedule 1 bird species</u><br>Where Schedule 1 species are at risk of disturbance during nest building or when rearing young, it will be necessary to apply for a protected species licence from Natural England.<br><br>It may be prudent to remove the nesting platform at Green Hill B to avoid potential conflicts with construction and disturbance of ospreys, as well as the need for an undeveloped exclusion of several hundred metres' radius. If this option is pursued, the platform must be removed outside the breeding season and compensated for at a minimum 2:1 rate. The location of compensatory platforms should be agreed with input from key interest groups, such as the RSPB.<br><br><u>Retention of field boundary habitats</u><br>All field boundary habitats should be retained where possible to avoid potential impacts on associated bird species, and access tracks should utilise existing hedgerow gaps. |

| Ecological Feature | Description | Constraints and Likely Impacts During Construction & Operation | Recommended Further Surveys, Mitigation and Enhancement Opportunities |
|---|---|---|---|
| | being recorded adjacent to Green Hill BESS, and quail records being returned approximately 1.7km to the south-west of Green Hill C.<br><br>Refer above for species associated with open farmland – 'Birds of Open Farmland'. | | Suitable field boundary habitat should be protected from impacts by maintaining suitably protective undeveloped buffers (please refer to relevant habitat sections above for buffer sizes).<br><br><u>Construction phase measures</u><br>Any potential nesting habitat clearance should be sensitively timed to avoid the key nesting bird season (March – August inclusive). Coordination with timings to avoid impacts on other protected species (e.g. GCN) will need to be considered, and any requirement to remove woody vegetation within the nesting bird season would need to be preceded by an inspection for signs of nesting birds.<br><br>Any required loss of woody vegetation should be replaced by at least an equivalent extent of habitat to ensure no net losses in available habitat for birds. Such habitat should be species-rich, with consideration of ensuring successional foraging resources throughout the year.<br><br><u>Habitat creation</u><br>The provision of cultivated areas on mitigation land or carefully managed wild bird seed areas will also contribute towards the loss of cropped areas and associated foraging (grain and seed) resources.<br><br>**Enhancement Opportunities:**<br><u>Habitat creation/enhancement</u><br>New nesting and foraging habitat can be created through the planting of new hedgerows, lines of trees and scrub, as well as the favourable management of buffer zones and other easements for invertebrate- and seed-eating species. As recommended above, ensuring that new or retained habitats provide for different bird groups (e.g. insectivores, grainivores etc) is important to ensure that the Site will support farmland bird populations year-round. This can include annual wild bird seed areas alongside grassland creation to enhance foraging provisions throughout the year.<br><br><u>Enhancement features</u><br>Additional nesting opportunities should be incorporated into the scheme through the installation of tree and building-mounted bird boxes. Including a diverse range of boxes, informed by the winter and breeding bird survey results, will inform appropriate box type and location across Site. Specialist boxes for particular species of conservation concern and/or raptors and owls can be installed in appropriate key locations within the scheme. A rate of approximately 1-2 boxes per 10ha of developed land would be appropriate. |
| Invertebrates | Invertebrates listed as priority species in the Northamptonshire BAP include black hairstreak and lime bark beetle. Numerous moth species are also listed as UK Species of Principal Importance.<br><br>Records for two rare, high conservation status and UK SPI butterflies were returned within the data search: small heath and wood white (Green Hill C and close proximity to Green Hill A respectively), in addition to numerous moth species associated with nearby Sywell Countryside Park and Upper Nene Valley Gravel Pits | Although the suitability of the majority of habitat across the Site is low for invertebrates, where non-arable vegetation requires removal (either permanently or temporarily) during construction, this could have an adverse impact on associated invertebrate assemblages.<br><br>Invertebrate assemblages using retained field boundary habitats could also be indirectly impacted through run-off, pollution or dust deposition.<br><br>Operationally, the cessation of arable farming reversion to diverse grasslands combined with sympathetic management of hedgerows, woodland edge and scrub | **Further survey:**<br>N/A<br><br>**Mitigation Measures:**<br><u>Retention and creation of Other Neutral Grassland</u><br>Development within diverse areas of other neutral grassland should be avoided to retain suitable habitats on Site, connecting with areas of species-rich grassland creation to expand the availability of suitable habitat.<br><br>Elsewhere, likely important field boundary habitat should be protected from impacts by maintaining a suitably protective undeveloped buffer (please refer to relevant habitat sections above for buffer sizes). |

| Ecological Feature | Description | Constraints and Likely Impacts During Construction & Operation | Recommended Further Surveys, Mitigation and Enhancement Opportunities |
|---|---|---|---|
| | SPA/SSSI habitats. Unconfirmed invertebrate records also include historic records of rare butterflies such as purple hairstreak and purple emperor (Green Hill C).<br><br>Habitat requirements for the butterflies vary between species, but include thickets of blackthorn around woodlands, notably on heavy clay soils within the Northamptonshire area (black hairstreak); well-wooded landscapes, with willow species for caterpillars (purple emperor) and sheltered woodland glades or scrub, rearing caterpillars on legumes such as vetch and trefoil species (wood white). The small heath utilises a broad range of habitats, but with caterpillar foods including fine grass species (fescues, meadow grasses and bents). The lime bark beetle *Emoporus tiliae* is a native beetle with restricted range nationally, and is known to feed on recently dead or fallen twigs of lime trees, preferably small-leaved lime.<br><br>Suitable habitat for invertebrates across Site is restricted to uncultivated areas, field margins, hedgerows, woodland edges, ditches and watercourses. Diverse grassland areas, particularly margins or occasional small fields across Site will also be of value to a range of the invertebrates mentioned above. In contrast, cultivated arable areas offer little suitable habitat due to the intensive management and potential use of pesticides. | creation can be expected to increase habitat availability for a range of invertebrates. | Appropriate pollution control measures will be provided within an OEPMP for the Sites.<br><br>**Enhancement Opportunities:**<br><u>Habitat creation/enhancement</u><br>Boundary and buffer habitats, but also grassland within fields, should be sown with appropriate diverse grassland seed mixes to enhance habitat availability on Site. Recommended seed mixes should have consideration for the caterpillar food plants of species mentioned opposite, although general meadow mixes are likely to have a combination of the grassland species required.<br><br>The creation and sensitive management of diverse hedgerows, scrub and woodland edge habitats should be considered, to maximise productivity for invertebrates.<br><br>Enhancement/ restoration of ditches and ponds, plus creation of any new ponds and swales, would have beneficial impacts on aquatic invertebrates. Furthermore, a range of invertebrates would inevitably use marginal habitats associated with these features.<br><br>The creation of wood piles in appropriate locations would provide additional sheltering features for invertebrates and foraging resources for saproxylic (wood-eating) invertebrate species. To have a meaningful beneficial impact, at least one feature should be created per 20ha. |
| Other Protected Species and SoCC | Brown hare, harvest mouse, hedgehog and polecat are all listed as UK Species of Principal Importance.<br><br><u>Brown hare</u><br>Brown hare have been recorded frequently during field surveys conducted to-date. The mosaic of open arable fields, narrow rough grassland margins and woodland edges all provide suitable habitat for brown hare, and this species is likely to be ubiquitous across the optioned land.<br><br><u>Harvest mouse</u><br>Harvest mice can be found in arable farmland margins and will nest and forage within sympathetically managed cereal crops. However, this species favours rough grassland where there is less disturbance, which, although present across the | It is unlikely that significant effects on any of the terrestrial species would arise from the development of a solar array, and the cessation of intensive farming and expected reversion of the land to low-input grassland would likely benefit all to some extent. It has been observed that brown hare in particular may benefit from solar array installations and favour the shelter and lack of disturbance solar arrays afford.<br><br>Security fencing is not considered likely to impede movement by these species within the Sites, providing that mesh size is large enough (e.g. standard sheep-netting fencing) – see also 'Badgers' above.<br><br>In the absence of mitigation, direct mortality and harm to individuals could occur during site clearance activities, for instance when clearing hedgerows and field margins where hedgehogs and polecat may be present. | **Further Surveys:**<br>No further specific surveys for these species are recommended.<br><br>**Mitigation Measures:**<br>Suitable habitat for brown hare, harvest mouse, hedgehog and polecat, namely field margins, hedgerows, scrub and woodland edges, should be retained where possible and protected during construction via the installation and maintenance of appropriate BPZs (see relevant habitat sections above).<br><br>Suitable buffers adjacent to watercourses will be implemented alongside watercourses, reducing run-off into watercourses throughout the lifetime of the Scheme. These buffers will also be in place during construction to ensure that contamination related impacts are avoided.<br><br>Where electrical cables traverse watercourses, the proposed armouring of these cables to be buried at appropriate depths will minimise impacts that may arise from the generation of anthropogenic electromagnetic field.<br><br>Good practice measures should be taken during vegetation clearance works and construction, which should be detailed within an OEPMP for the Sites, to minimise |

| Ecological Feature | Description | Constraints and Likely Impacts During Construction & Operation | Recommended Further Surveys, Mitigation and Enhancement Opportunities |
|---|---|---|---|
| | optioned area, is generally restricted to narrow field margins, hedgerow bases and alongside ditches. Harvest mice are nevertheless likely to be present across the optioned land; this species is generally under-recorded.<br><br>Western European hedgehog<br>The majority of intensively farmed arable fields are suboptimal for hedgehogs. However, the mosaic of habitats present across farmland (especially where there is good habitat connectivity between rough grassland margins, hedgerows and woodland/scrub edges at field boundaries) provides suitable foraging, nesting and sheltering opportunities for this species. Hedgerows can be expected to be present within these habitats across the optioned land.<br><br>Polecat<br>Following recent population recoveries, this species is expanding in range and is increasingly prevalent in lowland farmland in England. It favours farmland with mature hedgerows and extensive pockets of woodland, and requires good sources of its favoured prey, particularly rabbits, but will also take amphibians, birds and rats. Typical polecat habitat and foraging requirements are well represented across Site, and as such this species can be assumed to be present.<br><br>Fish<br>Three records of spined loach, a SPI, were returned from Pitsford Reservoir and waterbodies associated with the River Nene. Watercourses present on Site have wider connectivity with the River Nene valley and may also be used by migratory species, such as European eel and brown trout.<br><br>Invasive Non-native Species (INNS)<br>No INNS were returned within the data search, however American mink (Green Hill E), frequent Chinese water deer (across Site) and American signal crayfish (Green Hill F) have been recorded at the aforementioned land parcels. | The cessation of farming practices and low-input activities is considered to have likely benefit upon the water quality of watercourses across Site where nutrient (sediment and synthetic) decline, however the introduction of electrical infrastructure may present anthropogenic impacts for species that use natural electromagnetic fields for navigation and migration, such as the European eel and brown trout.<br><br>With regards to INNS, no direct impacts are likely to occur from the change of land-use. However, where populations continue to establish (especially American mink and signal crayfish), this can have detrimental impacts upon other species. | the risk of accidental entrapment, injury or killing of individuals. Particular care should be taken during clearance of any areas of tussocky grassland and hedgerows.<br><br>**Enhancement Opportunities:**<br>Enhancement of retained grassland habitats, and the creation of additional diverse, tussocky grassland within the Sites would benefit all 'Other Protected Species and SoCC' identified. Long grass in the field margins would be particularly suitable for harvest mice.<br><br>Creation of unmanaged buffers throughout the Site and planting of addition hedgerow habitat would enhance connectivity between habitats for species such as hedgehog and polecat.<br><br>Creation of log/brash piles would provide additional sheltering opportunities for hedgehog.<br><br>Targeted INNS programmes have the potential to contribute towards controlling the presence of American mink and American signal crayfish, which would present further expansion of their populations, supporting recovery of water vole populations and fish assemblages assumed present within watercourses. Where pursued, these efforts could be coordinated with nearby conservation groups, such as Sywell Reservoir or Pitsford Reservoir. |

## Further Ecological Survey Work

The timeline below details suitable timings for the further ecological survey work, as discussed in Table 6 above. The following surveys have been recommended based on the legal or protected status of any given habitat or species, and are considered necessary to inform the DCO application. Many of these surveys are seasonally constrained, and communication with relevant external consultees is advised as soon as possible to clarify any specific requirements.

Please note that the below survey programme does not include survey work recommended for Green Hill G, which has recently been added to the scheme (at the time of writing). This PEA report will be updated in due course with recommendations for Green Hill G.

**Table 7: Recommended Further Survey Work**

| TASK | 2024 | | | | | | | | | 2025 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec | Jan | Feb | Mar | April |
| Additional Diurnal Wintering Bird Surveys (2x surveys – Green Hill F) | | | | | | | | | | | | | |
| Additional Nocturnal Wintering Bird Surveys, if required (3x surveys – Site) | | | | | | | | | | | | | |
| Bat Activity Surveys (3x surveys – Green Hill A – E, BESS) 6x surveys – Green Hill F) | | | | | | | | | | | | | |
| Diurnal Breeding Bird Surveys (4 x surveys – Site and 2x surveys of cable route) | | | | | | | | | | | | | |
| Crepuscular Breeding Bird Survey (1 x survey – Site) | | | | | | | | | | | | | |
| GCN eDNA Survey of On-Site Ponds and All Ponds within 250m of Sites (including cable route search area) | | | | | | | | | | | | | |
| Otter and Water Vole Surveys (1x survey – Green Hill F) | | | | | | | | | | | | | |

| TASK | 2024 | | | | | | | | | 2025 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec | Jan | Feb | Mar | April |
| Rare arable plant surveys (if required) | | | | | | | | | | | | | |
| Grassland BNG Condition Assessments | | | | | | | | | | | | | |
| MoRPh River Condition Assessments | | | | | | | | | | | | | |
| Building Inspections and/or Tree Climbing Survey (if required) | | | | | | | | | | | | | |
| Bat Emergence Survey (if required) | | | | | | | | | | | | | |

## Reporting Requirements

Table 8 below sets out the anticipated reporting requirements, their relevance to the wider project and likely timescales (in line with the project programme and against timing constraints of specific surveys). Therefore, all dates should be considered indicative and will require revision against project timescales once confirmed.

**Table 8: Overview of Reporting Requirements**

| Report | Purpose/Relevance | Timescales |
|---|---|---|
| Environmental Impact Assessment (EIA) Scoping Chapter - Ecology | To establish which ecological features identified during the initial surveys and desk study should be included or excluded from further assessment. | May 2024 |
| Preliminary Ecological Appraisal (PEA) | To enable scoping of the proposed design ahead of the DCO pre-application stage and consultation process, in addition to informing ecological mitigation requirements early. | May 2024 |
| Preliminary Environmental Information Report (PIER) Chapter – Ecology | Informed by the outcome of scoping and all ecological surveys completed to-date. Results of species-specific surveys to be included as appendices. To provide LPA, consultees and PINS Wales with preliminary, pre-application information on the nature and scale of potential ecological impacts, outline mitigation strategies and inform the consultation process. | August 2024 |
| Environmental Statement (ES) Chapter – Ecology | Revised PIER chapter in response to refinement of scheme design and consultation, and completion of any further surveys. To collate all habitat and species survey data and assess the impacts of the scheme on each feature. | TBC – based on inclusion/exclusion of Green Hill G |
| Outline Landscape and Ecological Management Plan (OLEMP) | To be informed by ecological reports/surveys and mitigation requirements to ensure appropriate long-term management and maintenance of habitat and other ecological features. | Within 2 months of confirmation of final layout |
| Outline Ecological Protection and Mitigation Plan (OEPMP) | To be informed by ecological reports/surveys and mitigation requirements to ensure their protection during construction and lawful development. | Within 2 months of confirmation of final layout |
| Biodiversity Net Gain (BNG) Assessment | To demonstrate how the scheme, including cable route, will deliver BNG. To be informed by landscape design and proposed biodiversity enhancements. | Within 2 months of confirmation of final layout |

# Conclusion

Results of the desk-based assessment and initial ecological surveys of the Sites have identified a number of sensitivities and ecological considerations. Careful design, and implementation of appropriate working methods following the guidance set out in Table 6 above, will ensure that potential adverse impacts to important ecological features are avoided as far as possible, or suitably mitigated.

Whilst the majority of the Sites comprised arable fields of relatively low value for biodiversity, a range of habitats of higher ecological value were recorded, including some patches of relatively diverse grassland, broadleaved woodland, ponds, arable field margins, mature trees, and a well-established network of species-rich hedgerows and occasional watercourses. Also of relevance to Site design and ecological mitigation are the off-site habitats and designated sites identified during the desk study which are located immediately adjacent the red line boundary. Most notably, these include Upper Nene Valley Gravel Pits SPA/Ramsar, as well as numerous parcels of woodland (including ancient woodland habitat). The proximity to the SPA highlights the importance of habitats within the Sites in providing connectivity within the wider landscape.

The habitats within the Sites are likely to support a range of protected species, of which several have already been confirmed as present through ecological surveys completed to-date. Relevant species that are likely to be impacted by the Scheme include badger, bats, birds (including golden plover, lapwing and skylark), otter, water vole, amphibians (including GCN), reptiles, invertebrates, brown hare, harvest mouse, hedgehog and polecat. Particular consideration during the design process should be given to the presence of badger setts, positive records of GCN (if not using GCN District Level Licensing), maintenance of suitable buffers from key habitats for a number of protected species (namely bats, GCN and water vole), and provision of mitigation habitat for birds associated with the SPA (such as golden plover), and ground-nesting bird species such as skylark.

A range of further species-specific surveys are required to inform the DCO application, detailed in Table 7 above. Further surveys will provide a more detailed understanding of the use of the Sites by protected species, and the results can be used to inform any refinement of the buffers proposed within this report as scheme design progresses.

Recommendations within the report have been made with relatively limited input from external parties (principally only comprising discussions with Natural England through their Discretionary Advice Service), and therefore consultation with other relevant external body(ies), such as the local planning authority ecologists, is recommended as soon as possible to clarify ecological requirements relating to further survey and mitigation measures.

Detailed results of all surveys completed to-date and a full impact assessment, including habitats and species associated with proposed cable routes for the scheme, will be provided in subsequent ecological reports (Table 8).

The Statutory Biodiversity Metric will be used to calculate the net unit change associated with the development (within the Sites and cable route) once proposals have been prepared. No preliminary calculations have been completed to date. The proposals will seek to deliver at least a 10% net gain in biodiversity units, for each of the three unit types (habitats, hedgerows and watercourses).

**Contact:**
Surveys: Completed by Clarkson & Woods Ltd.

PEA Report: Prepared by H. Parris ACIEEM, C. Poole ACIEEM, M. Hockey MCIEEM.

Report: Reviewed by H Fox MCIEEM

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## APPENDIX A: DESK STUDY FIGURES

- Figure A1: International Statutory Designated Sites within 10km of the Site Boundary
- Figure A2: National and Local Statutory Designated Sites within 5km of the Site Boundary (Green Hill A-E)
- Figure A3: National and Local Statutory Designated Sites within 5km of the Site Boundary (Green Hill BESS, F and G)
- Figure A4: Non-Statutory Designated Sites within 2km of the Site Boundary (Green Hill A - E)
- Figure A5: Non-Statutory Designated Sites within 2km of the Site Boundary (Green Hill BESS, F and G)
- Figure A6: Priority Habitats within 2km of the Site Boundary (Green Hill A - E)
- Figure A7: Priority Habitats within 2km of the Site Boundary (Green Hill BESS, F and G)

## APPENDIX B: UKHAB FIGURES

- Figure B1: UKHab Habitat Survey Map – Green Hill A
- Figure B2: UKHab Habitat Survey Map – Green Hill B
- Figure B3: UKHab Habitat Survey Map – Green Hill C
- Figure B4: UKHab Habitat Survey Map – Green Hill D
- Figure B5: UKHab Habitat Survey Map – Green Hill E (1 of 2)
- Figure B6: UKHab Habitat Survey Map – Green Hill E (2 of 2)
- Figure B7: UKHab Habitat Survey Map – Green Hill F (1 of 3)
- Figure B8: UKHab Habitat Survey Map – Green Hill F (2 of 3)
- Figure B9: UKHab Habitat Survey Map – Green Hill F (3 of 3)
- Figure B10: UKHab Habitat Survey Map – Green Hill BESS

## APPENDIX C: ECOLOGICAL CONSTRAINTS PLANS

- Figure C1: Ecological Constraints Plan – Green Hill A
- Figure C2: Ecological Constraints Plan – Green Hill B
- Figure C3: Ecological Constraints Plan – Green Hill C
- Figure C4: Ecological Constraints Plan – Green Hill D
- Figure C5: Ecological Constraints Plan – Green Hill E (1 of 2)
- Figure C6: Ecological Constraints Plan – Green Hill E (2 of 2)
- Figure C7: Ecological Constraints Plan – Green Hill F (1 of 4)
- Figure C8: Ecological Constraints Plan – Green Hill F (2 of 4)
- Figure C9: Ecological Constraints Plan – Green Hill F (3 of 4)
- Figure C10: Ecological Constraints Plan – Green Hill F (4 of 4)
- Figure C11: Ecological Constraints Plan – Green Hill BESS