Technical Note

To	Project name	PINS Project number	The Applicant
Natural England	East Yorkshire Solar Farm	EN010143	East Yorkshire Solar Farm Limited

Subject	Date	Reason for issue
Habitats Regulations Assessment	15 August 2024	Further information to support response to NE1

Further information to support response to NE1

Clarification on Pink-footed Goose peak counts

All observations of Pink-footed Goose are provided in Table 29 of the HRA [REP2-012]. It should be noted that the peak counts presented in Table 28 represent all individuals recorded during surveys, irrespective of how they are interacting with the Order limits, i.e., many observations were of bird flying high over the site. For clarity, the peak counts per month of Pink-footed Goose using the Order limits i.e., not flying over, are presented in Table 1 below. These peak counts are based on the summed total count of all individuals recorded within the survey area, including the mitigation area, on a particular visit.

Table 1. Monthly peak counts of Pink-footed Goose within the survey area

	October	November	December	January	February	March
2022/23	0	0	80	0	0	0
2023/24	706	0	800	0	0	0

Calculation of Bird-days

Natural England has requested a 'bird days' approach to further describe bird-use of the Order limits and demonstrate that the mitigation land being provided by the Applicant is sufficient to support the bird-use. Following the calculation of 'bird days' using non-breeding bird data for 2022/23 and 2023/24, the area required to support this number of bird-days has been calculated

In order to describe bird-use of the site, and therefore the average use of the Order limits during the non-breeding season, the 'inter-annual mean of the intra-annual mean of the peak monthly counts' derived from the survey data across the two non-breeding bird survey periods was calculated for Pink-footed Goose, Golden Plover and Lapwing. This is hereafter called the 'peak-mean'[1].

The peak-mean counts for each species were calculated on the following basis.

- The intra-annual or yearly peak mean = total number of individuals per survey (peak monthly count), then sum peak monthly counts and divide by number of months per year.
- The inter-annual or peak mean = sum annual peak means and divide by number of survey years.

Metrics were calculated on the October to December period for all Pink-footed Goose and Golden Plover because neither species was recorded using the site outside this period in either of the survey years. Metrics for Lapwing were based on the October to March period, because non-breeding Lapwing were recorded in the arable fields throughout those months only.

These metrics represent an average number of birds per day foraging within the arable fields of the Order limits. Note that the data used is for the area of land which includes both the Solar PV Areas and the Ecology Mitigation Area. in the period, calculated in a precautionary manner by using only the highest (peak) counts of birds in that area each month.

[1] This method was applied by Cleve Hill Solar Farm and accepted as appropriate by Natural England. See https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010085/EN010085-001705-5.2%20RIAA_Rev%20B.pdf for further details. [APP-026].

Seasonal bird-days were calculated by multiplying the peak-mean number of foraging birds by the number of days in the season/period recorded

- Pink-footed Goose and Golden Plover: (Oct-Dec) 92 days
- Lapwing: (Oct-Mar) 183 days

This provides a measure of the utilisation of the Scheme and a basis on which to establish an appropriate area within the Order limits to manage for the benefit of Pink-footed Goose, Golden Plover and Lapwing.

Pink-footed Goose

Intra-annual or yearly peak mean

Oct-Dec 2022/23 = 0, 0, 80 = (80 / 3) = 26.67 individuals

Oct-Dec 2023/24 = 706, 0, 800 = (1,506 / 3) = 502 individuals

Inter-annual or peak mean

26.67 + 502 (summed yearly peak means) = 528.67 / 2 (no. of survey years) = 264.34 individuals

Bird-days

92 days x 264.34 individuals = 24,318.28 bird-days.

Golden Plover

Intra-annual or yearly peak mean

Oct-Dec 2022/23 = 0, 0, 36 = (36 / 3) = 12 individuals.

Oct-Dec 2023/24 = 475, 0, 800 = (1,275 / 3) = 425 individuals.

Inter-annual or peak mean

12 + 425 (summed yearly peak means) = 437 / 2 (no. of survey years) = 218.5 individuals

Bird-days

92 days x 218.5 individuals = 20,102 bird-days.

Lapwing

Intra-annual or yearly peak mean

Oct-Dec 2022/23 = 3, 0, 0,46, 51, 33, 29 = (162 / 6) = 27 individuals.

Oct-Dec 2023/24 = 125, 274, 60, 0, 2, 8 = (469 / 6) = 78.17 individuals.

Inter-annual or peak mean

27 + 78.17 (summed yearly peak means) = 105.17 / 2 (no. of survey years) = 52.59 individuals

Bird-days

183 days x 52.59 individuals = 9,623.1 bird-days.

Mitigation Areas

Gillings et al. (2007)[2] reported Golden Plover densities of 1,560 bird-days per hectare (ha) and 1,000 Lapwing bird-days per ha from mixed arable farmland. In line with the approach agreed with NE on the Cleve Hill Solar Farm Development

[2] Gillings, S., Fuller, R.J. and Sutherland, W. (2007). Winter field use and habitat selection by Eurasian Golden Plovers *Pluvialis apricaria* and Northern Lapwings *Vanellus vanellus* on arable farmland. Ibis 149: 509-520.

Consent Order[3], these figures are presented in the calculations below as a worst-case, acknowledging that permanent grassland will support a higher biomass of soil invertebrate prey.

Observations by Gill (1996)[4] showed that individual sugar beet fields have been recorded supporting over 2000 goose days per hectare. A review by Vickery & Gill (1999)[5] suggested that fertilised grass swards could support 2,750 goose-days per ha. Ernst (1991)[6] found that grey geese feeding on grass swards could occur 3,000-6,000 goose days per hectare, but that this did deplete resources and reduce yields. As worst-case scenario the lowest reported figure of 2,000 bird-days per ha has been used in the calculations below.

Pink-footed Goose

24,318.28 bird-days / 2,000 = 12.16 ha

Golden Plover

20,102 bird-days / 1,560 = 12.89 ha

Lapwing

9,623.1 bird-days / 1,000 = 9.62 ha

The above calculations demonstrate that the areas proposed for mitigation for Pink-footed Goose, Golden Plover and Lapwing are sufficient to support the birds recorded during the surveys, including combined use of the Golden Plover Mitigation Area by Golden Plover and Lapwing.

Golden Plover Mitigation Area 1h (28.75 ha)

NE commented that as Lapwing have the same habitat requirements as Golden Plover, there will be competition for the same invertebrate food and therefore, further justification is required to demonstrate that the 28.75ha of wet grassland will produce enough invertebrate prey to provide for the combined peaks of both Lapwing and Golden Plover. As set out in the calculations of bird-days the seasonal area required by both species; 12.89 ha and 9.62 ha (combined area of 22.51 ha), can be accommodated within the Golden Plover Mitigation Area.

In addition, NE have requested that a 150m buffer from solar PV panels be considered, when calculating the 'usable area' of the Golden Plover Mitigation Area. The Applicant has applied a buffer of 150m within the Golden Plover Mitigation Area from solar PV areas (taken from the security fencing) and this accounts for 2.45 ha of the total area. As such, the 'usable area' of the Golden Plover Mitigation Area is 26.3 ha. This is still sufficient to support the seasonal area required by both Golden Plover and Lapwing, combined, set out above.

Pink-footed Goose Mitigation Area 1g and 1h (15 ha)

The calculations set out above confirm that that the 15 ha of specifically managed arable farmland currently provided in the mitigation area for Pink-footed Goose is sufficient to support the birds recorded during surveys using the Order limits.

Table 1 of this document sets out the seasonal occurrence of Pink-footed Goose within the Order limits. Usage of the Order limits, including the mitigation areas, has only been recorded between October and December (with no recorded usage in November). Beyond this period, it is assumed that the Order limits do not currently support suitable foraging opportunities for the species and therefore, the birds move elsewhere in the second part of the winter. The mitigation to be delivered through the 15 ha is targeted at ensuring that Pink-footed Goose currently using the Order limits, in the first part of the winter (October to December), have a consistent annual foraging provision, in the form of stubble and associated split grain. To maximise the value of this provision, the landowners will harvest in a 'messy' manner, to ensure that adequate supplies of grain are spilt. In addition, the sowing of the next crop will be delayed until later in January, ensuring that the availability of the provision is extended further into the winter period. This will mean that Pink-footed Goose will not only have a larger quantity of food, but that this will also be available for a longer period of time.

[3] See https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010085/EN010085-001705-5.2%20RIAA_Rev%20B.pdf for further details. [APP-026].
[4] Gill, J. A. (1996) Habitat Choice in Pink-Footed Geese: Quantifying the Constraints Determining Winter Site Use. Journal of Applied Ecology 33: 884-892.
[5] Vickery, J. A. & Gill, J. A. (1999) Managing grassland for wild geese in Britain: a review. Biological Conservation 89: 93-106.

[6] Ernst, P. (1991). The influence of winter goose grazing on dry matter yields of grassland in North-Rhine-Westphalia. Ardea 79(2):187–190.

The existing crop types have been described in Table 13 of the HRA **[REP2-012]**. The crops presented in this table are representative of the crops suitable for growing in the region, e.g., this is driven by climate and soil type, based on current and historical information. Therefore, there is no reason to assume that the crop type in future years will differ significantly to that reported in Table 13. Should there be a shift in regional cropping patterns in future years due to changing environmental conditions, the cropping regime in the mitigation area would remain consistent. Irrespective of this, the Applicant has committed to providing a full cropping schedule for the entirety of the rotational Pink-footed Goose mitigation area (79 ha) as part of the detailed LEMP which will be prepared post consent pursuant to requirement 6 Schedule 2 of the draft DCO [REP3-004] and future monitoring will determine whether a changing environment changes crop types. Should there be a need for any changes in the proposed cropping regime in future years this would be discussed and agreed with the relevant stakeholders, including NE and East Riding of Yorkshire Council.

Pre- and post-construction monitoring

The objective of the mitigation areas are to ensure that there is no net loss in foraging opportunities for the non-breeding populations of Pink-footed Goose, Golden Plover and Lapwing recorded using the Order limits. The success of this will be measured by monitoring the Ecological Mitigation Area as follows:

- The five-year peak mean (Years 1 to 5 of operation) of each species using the relevant mitigation area, will reflect that recorded during the surveys. This equates to a five-peak mean of 264.34 Pink-footed Goose, 218.5 Golden Plover and 52.59 Lapwing. This measure will also be repeated in years 6 to 10 of operation.

After year 10 of operation, monitoring will be carried out on every fifth year, up to decommissioning which will commence following 40 years afterfinal commissioning. Operational monitoring will be detailed and secured in the detailed LEMP and OEMP. Monitoring will include both the occupancy of the mitigation areas by the target species and the condition of these habitats, in the context of providing optimal foraging habitat. Annual monitoring reports will be submitted for review and consultation with NE and the East Riding of Yorkshire Council as the host authority, to allow any remedial actions to be identified and agreed. Any remedial actions agreed with the stakeholders will be implemented as a commitment by the Scheme. The above monitoring proposals will be incorporated into updates of the Framework LEMP and OEMP and submitted into examination. .