The Great Grid Upgrade

North Humber to High Marnham

NHHM-AEC-CNS-REP-0059

# North Humber to High Marnham

## Volume 6: Environmental Statement

**Document 6.9.A3 Environmental Statement Appendix 9.3 - Flight Activity Assessment**

**Final Issue A**

**October 2026**

**Planning Inspectorate Reference: EN020034**

**Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 Regulation 5(2)(a)**

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# 1. Introduction

1.1.1 This appendix to **Application Document 6.9 Chapter 9 Ornithology** presents flight activity data and assessment for several priority species targeted by Vantage Point (VP) surveys across the Project. The locations of VPs and survey methods are set out in **Application Document 6.9.2 Appendix 9.2 Ornithology Baseline Report and Document 6.9.2 Appendix 9.2 Figures 6.9.A2.5 and 6.9.A2.6**. Vantage Points were strategically located to target areas of potentially elevated flight activity as described in **Application Document 6.9.2 Appendix 9.2 Ornithology Baseline Report** and in agreement with key stakeholders including Natural England, Royal Society for the Protection of Birds (RSPB), East Riding of Yorkshire Council, North Lincolnshire Council and Nottinghamshire County Council.

1.1.2 Currently there is no recognised, standardised methodology or guidance for undertaking bird flight collision risk analysis for overhead lines, although extensive documentation is available for onshore wind farms and this is often used as a proxy on overhead lines.

1.1.3 The risk of avian collisions with overhead lines is dependent on a number of factors, of which the following are most important:

- Species-specific morphology and biology (e.g., flight characteristics and wing loading, degree of visual acuity);
- Landscape and topography (e.g., overhead lines near important habitats or flight corridors);
- Adverse weather affecting flight capability or visibility; and
- Technical aspects of the overhead lines (e.g., spacing of conductors, visibility of earth wire, creation of perching or nesting areas).

1.1.4 As avian collision is a key potential risk of the proposed overhead lines, representative surveys were undertaken to quantify flight activity in key sensitive locations. Surveys focussed on representative areas along the route of the proposed overhead line where there may be 'hotspots' of activity, e.g. potential flyways (along main river crossings as an example), areas of expected activity (such as wetlands) and where the proposed overhead line is in proximity to designated sites that support qualifying features of ornithological importance.

1.1.5 As outlined in NatureScot guidance (NatureScot, 2025), VP surveys are primarily aimed at wind farms; however, the methodology is also suitable for overhead lines in order to understand the flight activity and flight height of birds over or across a survey area.

1.1.6 Within England there is a lack of standardisation within overhead line collision risk assessment and Natural England have considered both qualitative (describing risk in relation to flight activity) and quantitative (using avoidance and traffic rates to calculate potential collision rates) proposals with justifications that are put forward by EIA consultants dependent on type of overhead line project.

1.1.7 A generally agreed quantitative starting point is estimating the number of flights through the overhead line and the collision risk area, extrapolating records to

represent seasonal and annual traffic rates and looking at a range of avoidance rates in the first instance. However, there is no accepted or robustly proven model to account for these various quantitative approaches. Avoidance rates are theoretical and untested, mainly they are applicable to wind turbines and there is no direct evidence that they are relevant for overhead lines.

1.1.8 Natural England's position in recent DCO projects is that "*There is no defined threshold that triggers the need for further assessment – i.e. Population Viability Assessment (PVA) or otherwise… An increase of more than 1% in Baseline Mortality found through [Collision Risk Modelling] CRM or other impact assessment has been used historically as the trigger for further investigation/consideration/assessment. A review of all the relevant factors should be undertaken to determine whether the collision risk identified is likely to have an adverse effect on the integrity of the qualifying species. This could include; population size, population trends, baseline mortality, specific conservation objectives (e.g. presence of restore or maintain objectives for certain species) and the effect of mitigation measures (i.e. diverters).*

1.1.9 It is generally Natural England's advice that a precautionary approach should be taken and mitigation, such as bird diverters and enhancement of habitats to support the designated site populations, should be used where there is any uncertainty regarding the likelihood of an adverse effect to any species that is a qualifying feature of a designated site without it.

1.1.10 This flight activity assessment follows the rationale outlined by NatureScot (NatureScot, 2025) in relation to collision risk modelling, which is '*There is currently very little empirical evidence on bird interactions with power lines in Scotland or elsewhere in the UK. Whilst the collation of data on recorded impacts can help to develop our understanding of this, there is currently no statistical model available which we are confident would provide a robust assessment of potential mortality. Collisions are usually site, season and species specific, and a generic collision risk model is unlikely to accurately predict levels of mortality. We do not, therefore, currently recommend a generic modelling approach*'.

1.1.11 In the current NatureScot guidance (NatureScot, 2025), it is also recognised that their qualitative/non-modelling approach can potentially present difficulties in terms of assessment, and they therefore recommend that '*emphasis is put on mitigation where surveys indicate potential conflict*'. However, in instances where anticipated potential impacts are severe site/species specific modelling could be investigated. Such instances would by their nature be rare in occurrence especially as the effectiveness of bird diverters is widely acknowledged (see paragraph 4.1.1).

1.1.12 Consequently, this flight activity assessment does not provide a modelled prediction of the number of bird collisions with the proposed overhead line. Instead, the data derived from surveys are used to determine a predicted annual number of bird passes through the airspace occupied by the conductor and earth wires and within the airspace viewed from each VP to provide a comparative level of collision risk across the proposed overhead line route.

1.1.13 Given that the conductor and earth wires occupy a very small proportion of the broad vertical "risk window" of airspace containing overhead wires, the numbers of bird passes through this broad risk window are then used to determine the most likely collision risk scenarios prior to any mitigation (i.e. without bird diverters in place), including comparative risk at different locations across the Project; and approximate collision rates at each VP at a range of theoretical avoidance rates. Any potential requirement for bird diverters to reduce avian collision mortality can be identified from the relative and semi-quantitative levels of risk and mortality identified for different parts of the proposed overhead lines.

# 2. Determining Relative Levels of Bird Activity

2.1.1 The narrative and tables below describe the level of flight activity recorded at each VP. Survey effort was not equal across all VPs, therefore flight activity is expressed as the flight rate per hour of observation.

2.1.2 In addition to general flight activity, a second key metric is the proportion of the observed flights that were recorded at risk of collision with the proposed overhead line. This risk is attributed only to flights recorded during VP surveys that exhibit both of the following properties:

- The flight entered the Order Limits; and
- Any part of the recorded flight was at a height above ground occupied by one or more of the wires (conductors or earth wire) that collectively make up the proposed overhead line. This is represented by a risk height "window" spanning the air space between the lowest cable sag height and the highest point of the earth wire (the top of the pylons). Over land this is taken as 7 m – 60 m above ground, and at the River Ouse Crossing, the equivalent airspace is between 60 m and 130 m above ground.

2.1.3 Prior to the development of the defined proposal at statutory consultation and the draft Order Limits, surveyors recorded birds in flight across a broader consultation corridor. The flight direction, flight duration and behaviours of birds recorded in flight were subsequently reviewed and consultation corridor flights were assigned to one of two subsets (flights that entered the Order Limits; and flights that did not enter the Order Limits). From the development of the defined proposal, this metric was recorded in the field. Changes to the draft Order Limits presented at statutory consultation and as described in **Application Document 5.9 Design Development Report** do not make a material difference to how flight data were recorded.

2.1.4 Multiplying "flight rate per hour" by "proportion at risk" yields the flight rate as passes per hour at risk of collision ($p$). It is possible for locations with high overall flight rates to yield a lower risk of collision than locations with lower overall flight rates and vice versa due to altitudinal differences in flight activity.

2.1.5 The predicted annual number of passes at risk ($P$) for each species can be derived from the passes per hour at risk ($p$) and factoring in the number of hours per year during which the species is active within the survey area as follows:

- The number of hours per year during which the species is active is derived from the months in which the species is present. For migrant species this may be for part of the year (such as pink-footed goose *Anser brachyrhynchus*, which is absent from early spring to early autumn), whereas resident species are typically present all year, unless they breed in different locations from their wintering

grounds. Examples of this would include hen harrier and golden plover, which breed in upland habitats and return to the lowlands in winter[1];

- The number of hours (*h*) that the species is active in the Survey Area is calculated by summing the daylight hours in each month that the species is present and adding this to the nocturnal hours (*n*) that approximates the additional night-time hours during which the species is expected to be active, which is expressed as a proportion of the daylight hours available[2];
- This yields the number of hours per year during which the species is active and likely to engage in flight activity (*a*), which is calculated as follows;

$$a = h + n$$

- The predicted annual passes at risk (*P*) is calculated by multiplying the passes per hour at risk (*p*) by hours of flight activity (*a*) as follows:

$$P = p \times a$$

2.1.6 The results of these calculations are presented for individual species but not for the all-species data, which do not take account of seasonal variations in the activity of different species.

[1] Humber Estuary qualifying species that are otherwise common and widespread and that are present all year are assessed only for the season/period in which they qualify as a feature of the designated site, e.g. mallard qualifies as an overwintering species and is assessed only for that period.

[2] NatureScot's wind farm CRM automatically calculates these parameters using the latitude of the Project's location and a species-specific expected proportion of time active at night, both of which are entered by the model user. The latitude entered was set as the central point of the proposed overhead line alignment, which is at 49 degrees north. The assessments for geese and waders have assumed they are active for 25% of night-time hours. Raptors have been assumed to be active only during daylight hours.

# 3. Relative Risk and Estimation of Collisions

3.1.1 The value of *P* does not represent the number of birds that would collide with a wire, it merely states the number of birds predicted to pass through a potential collision risk window within which a bird could theoretically come into contact with a conductor or earth wire, based on their numbers and spatial distribution in flight. The actual number of birds that could collide with the proposed overhead line would be significantly smaller than the number represented by *P*, for the reasons set out in paragraphs 3.1.2 – 3.1.8.

3.1.2 The air space within which birds were recorded as at potential risk of collision is a broad height band covering 53 vertical metres (between 7 m and 60 m above ground) over land and 70 m (60 m – 130 m) over the River Ouse (pylons 4AF77 and 4AF78), of which the conductors and earth wire themselves occupy only a very small proportion.

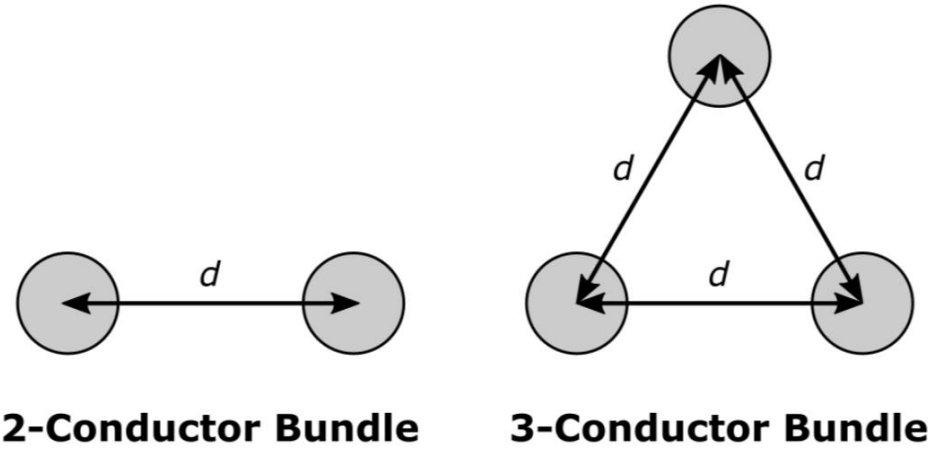
3.1.3 Details of the conductor and earth wire cable dimensions and arrangements are provided in Annex A. The majority of the Project involves the installation of cables in a triple Araucaria design on the 4AF line and replacement sections of 4ZQ line. This design is characterised by:

- Three arms on each side of each pylon;
- Bundles of 3 conductor cables suspended from each arm in a triangular arrangement (see Image 3.1), each wire being of 37.26 mm diameter and an assumed distance of 600 mm from adjacent wires within the same bundle; and
- An earth wire of 19.5 mm diameter suspended at the top of each pylon.

3.1.4 While the design used at the River Ouse crossing may be different, all assessment herein has been based on the same Triple Araucaria design since the River Ouse crossing is a single cable span and any differences in the cable arrangement and thicknesses here will not make a significant difference to the assessment outcome.

3.1.5 The proposed modification to the existing ZDA overhead line in Route Section C uses, for the majority of the ZDA pylons, a Twin Rubus design identical to the existing overhead line at that location, with 3 arms on each side of each pylon, from which conductors are suspended in bundles of 2 wires in horizontal alignment (Image 1), each wire being of 31.5 mm diameter. Exceptions to this are at four lowered ZDA pylons that use a gantry-type structure with a different cable arrangement from the Twin Rubus design described above. However, this part of the Project will not result in new infrastructure that is materially different from the existing overhead line, so this part of the modification to the existing ZDA is not considered further in this report.

Image 3.1 Typical cable bundles for a 2-conductor and 3-conductor design (*d* is assumed to be 600 mm[3])




3.1.6 The proportion of the height of the risk window occupied by conductor and earth wires is derived from the combined diameter of the conductor and earth wires in one circuit (i.e. on one side of the pylon), plus the earth wire[4]. While the triple Araucaria design includes three conductor wires per bundle (nine conductors on each side of the pylon), two of the conductors in each bundle are horizontally aligned (as illustrated in Image 3.1); thus, the number of barriers (wires) facing an oncoming bird is effectively six conductor wires on one side of the pylon plus the earth wire. A precautionary approach has been adopted to account for the overall bundle diameter and an allowance for variations in bird size and corresponding wingspan, and for the earth wire, the diameter of the wire plus a wingspan buffer. This approach regards each bundle of conductors as a singular obstacle with no airspace between each wire plus a precautionary buffer. Therefore, the flight barrier and potential for collision presented by the wires collectively would be 1 m (the thickness of the earth wire plus buffer) plus the "thickness" of each of the three conductor bundles that faces an oncoming bird and associated 1 m buffer equalling 2 m.

3.1.7 The effective barrier is therefore 7 m, which is 13.21% of the overall risk window:

$$(3 \times 2\ m) + 1\ m = 7\ m.$$

$$(7/53) \times 100 = 13.21\%$$

3.1.8 A worst-case scenario is that the number of collisions per year will be equal to 13.21% of the annual number of passes at risk (*P*). This is both a crude and highly precautionary estimate for the following reasons:

- It assumes that birds take no avoiding action to prevent a collision from happening, which is highly unlikely to be the case;
- It assumes that all of the wires present an equal risk to birds passing through the proposed overhead line, when in fact each bird will pass through only a small

[3] Whilst 600 mm is assumed for the theoretical calculations presented herein, the actual distance implemented for operation may differ by c.100 mm

[4] The conductor bundles on each side of the pylon are vertically aligned; therefore, both circuits present a single barrier to an oncoming bird

portion of the 53 m risk window and is therefore unlikely to encounter more than two (conductor) wires at any time. How important this is will depend on the size and wing diameter of the species in question, with larger birds (such as geese and swans) more likely to make contact with one or more wires than smaller birds (such as small waders);

- The earth wire is spatially separated from the conductors and sits at the top of the pylons. Birds passing close to the top of the proposed overhead line would encounter only this wire, while birds passing close to conductor bundles would not encounter it; and
- The contribution of the conductor wires to bird mortality is likely to be proportionately much lower than that of the earth wire. Treating the conductor bundles and the earth wire as equal contributors to collision risk greatly overestimates collision mortality. If the earth wire alone were to be regarded as the only contributor to collision risk, the proportion of the height risk window containing a collision hazard would be amended to 1.89%, which would reduce the collision estimates by more than an order of magnitude.

# 4. Collision Avoidance

4.1.1 The relative risk levels and estimation of collision mortalities for the Project are presented below for an overhead line without line markers (also referred to as bird diverters) installed. Installation of line markers has been shown in many instances to be highly effective at reducing avian collisions with overhead power lines. Reductions in avian collision with overhead power lines of between 54% and 100% have commonly been reported (e.g. (Barrientos, 2012 ), (J. Bernardino, 2018 ), (Ferrer, 2020), (Verbelen, 2024), (Frost, 2008), (Galis, 2020)) when fitted to the earth wire. The earth wire has been shown to be responsible for the majority of collisions in studies that have attempted to quantify bird collisions with overhead lines, with some studies finding that earth wires account for up to 84% of avian collisions ( (Avian Power Line Interaction Committee (APLIC)., 2012), (Jenkins, 2010), (J. Bernardino, 2018). One possible explanation for this is that the earth wire, which is set apart from the conductors and at the pylon tip, is less visible to birds in flight than the conductors which are typically bundled in groups of between two and four wires per pylon arm, within conductor bundles ( (Savareno, 1996) and each conductor wire in a bundle separated by spacers set at intervals along the overhead line. Thus, birds gaining height to avoid the conductors may instead encounter the earth wire.

4.1.2 Determining the proportion of flights through/past overhead lines that result in collision would require a meta-analysis of a statistically robust number of studies that record both the numbers of birds passing above/through/below overhead lines and the proportion of those passes that result in a collision. To date, no such study has been carried out and therefore widely applicable avoidance rates have not been published for overhead lines as they have for onshore wind farms (NatureScot, 2025). Nevertheless, it stands to reason that avoidance of collisions must occur either through evasive action, gradual alterations to flight paths or behavioural changes (such as alteration of commuting and migratory routes).

4.1.3 Vantage Point surveys across the Project amounted to 2,380.25 hours of survey effort, during which 103,910 bird passes were recorded through the viewsheds. The surveys carried out at (in geographical order from north to south) VPs 1, 19, 20, 2-8, 10, 12 and 17 included observations of bird interactions with existing overhead lines of similar proportions to the proposed overhead line, which at these locations would be in close parallel with the existing overhead line. There were 89,410 bird passes recorded at these VPs, of which 27,661 (30.1%) were “at risk”.

4.1.4 No collisions were recorded from the 89,410 bird passes, with only a single contact between a flying bird and an earth wire. A single Bewick’s swan (*Cygnus bewickii*) was recorded as a near miss, “grazing” the earth wire as it gained height to cross the existing overhead line adjacent to Broomfleet Tileworks in Route Section A. As the only occurrence of a collision event, this represents a development-specific collision rate of 0.004% and subsequent avoidance rate of 99.996%.

4.1.5 While this does not account for species-specific differences in collision avoidance rates, given the large number of flights by large birds with high wing loading (geese,

swans)[5] that contribute to the overall data set, it does indicate that avoidance of the proposed overhead line is likely to be high by most species, as recorded for the existing overhead line.

4.1.6 The species-specific tables (Table 6.2 to Table 6.15) are presented with a range of avoidance rates spanning the recommended wind farm avoidance rates in NatureScot (NatureScot, 2025) and the development-specific avoidance rate derived above, rounded down to 99.99% avoidance. The avoidance rates are applied to the values derived for *P*, adjusted for the proportion of the risk window occupied by wires (13.21%).

4.1.7 It is important to note that these are estimated avoidance and collision rates. They are used here only to approximate what might be considered a more realistic estimate of collision mortality than simply using the number of annual passes, which would result in a gross over-estimation of collisions. It takes no account of:

- How collision rates might differ in different weather conditions;
- How avoidance rates might differ between species;
- The differences between different parts of the Project due to habituation of birds to the existing overhead line (this being absent from approximately half of the Project);
- How different wires (earth wire, conductor bundles) might contribute different levels of risk to oncoming birds;
- The fact that birds will usually encounter only one or two wires, or at worst one or two conductor wire bundles when flying through the proposed overhead line, depending on their vertical position as they fly through the risk window; and
- The adoption of a 1 m risk buffer around the conductor bundles and earth wire that allows provision for larger bird wingspan but overestimates risk for smaller birds.

[5] Large wildfowl are typically less able to avoid obstacles in flight than are smaller more manoeuvrable birds such as small waders, due to their large size and high wing loading.

# 5. Assessment of Potential Collision Risk and Mitigation

5.1.1 Potential collision risk has been considered in this report and within **Application Document 6.9 Chapter 9 Ornithology** only for the following species, all other species contributing zero or negligible flight activity to the flight data and/or (in the case of breeding mallard *Anas platyrhynchos* and breeding greylag goose *Anser anser*) being of insufficient conservation priority to warrant further consideration:

- Non-breeding pink-footed goose;
- Non-breeding golden plover (*Pluvialis apricaria*);
- Non-breeding lapwing (*Vanellus vanellus*);
- Non-breeding curlew (*Numenius arquata*);
- Non-breeding greylag goose;
- Non-breeding mallard;
- Non-breeding shelduck (*Tadorna tadorna*);
- Non-breeding marsh harrier (*Circus aeruginosus*);
- Non-breeding Bewick's swan (*Cygnus columbianus bewickii*);
- Non-breeding whooper swan (*Cygnus cygnus*);
- Non-breeding little egret (*Egretta garzetta*);
- Breeding hobby (*Falco subbuteo*);
- Breeding peregrine falcon (*Falco peregrinus*); and
- Breeding marsh harrier.

5.1.2 The relative level of collision risk for these species across the length of the Project is described within the individual species accounts sections below. The assessments of the effects of bird collisions are presented in **Application Document 6.9 Chapter 9 Ornithology**, supported by the content of this report. Any requirements for mitigation have been determined primarily by considering:

- The relative levels of bird activity at risk and the approximate estimates of potential collision rates attributable to each VP[6];
- The presence of an existing overhead line and observations of how birds interacted with it; and
- The design of the Project, taking into account a close parallel design with existing overhead lines across approximately 41.5 km (46%) of the proposed overhead

[6] Table 6.1-Table 6.15 present values for each VP in geographical order from north to south along the length of the Project.

line, which is intended to minimise the potential for collisions in expected high-risk areas by placing new infrastructure close to existing infrastructure.

5.1.3 The estimates of collision mortality are considered as a further guide to the strategic use of mitigation measures and to guide the assessment of effects from the Project on individual species, rather than as a definitive part of the assessment. Further narrative regarding potential collision rates and relative risk levels is provided with each species-specific table in the sections that follow.

5.1.4 The following species were recorded but are not included in this report because they contributed negligible or zero flight activity to the baseline:

- Pochard (*Aythya ferina*);
- Shoveler (*Spatula clypeata*);
- Teal (*Anas crecca*);
- Wigeon (*Mareca penelope*);
- Gadwall (*Mareca strepera*);
- Goldeneye (*Bucephala clangula*);
- Bittern (*Botaurus stellaris*): and
- Snipe (*Gallinago gallinago*).

# 6. Bird Flight Rates and Risk Assessment

## 6.1 All species

6.1.1 The flight data for all species at all times of year can be used as a comparative barometer of potential collision risk at different locations across the Project. However, unlike the species-specific data, the all-species data cannot be used to approximate the numbers of birds likely to collide annually with the proposed overhead line, since there is no distinction between the temporal patterns of presence/absence for different species.

6.1.2 Table 6.1 presents the all-species flight data for each VP as number of recorded bird passes, the number of recorded bird passes at risk of collision and the passes per hour of observation at risk of collision. For comparison with the species–specific data presented thereafter, a risk rating is provided for each VP, with the highest potential at-risk passage rate represented by a value of 1 and all other passage rates expressed as a proportion of 1.

6.1.3 The highest potential risk is anticipated to occur at the following locations (from north to south):

- Broomfleet (Selby railway line) to Staddlethorpe Broad Lane (pylons 4AF58-4AF70) in Route Section A;
- Ousefleet to Luddington (Pylons 4AF82-4AF94) in Route Section B; and
- Misterton/Gringley Carrs (River Idle-Chesterfield Canal; pylons 4AF169-4AF184) in Route Sections D and E.

6.1.4 Moderate potential risk occurs at the following locations (from north to south):

- Much of the Humberhead Levels between Ellerker and the Selby Railway Line (pylons 4AF49-4AF57) in Route Section A;
- Staddlethorpe Broad Lane to Ousefleet (pylons 4AF70-4AF81) in Route Sections A and B; and
- Warping Drain (pylons 4AF156-4AF162) in Route Section D.

6.1.5 Low potential risk occurs everywhere else, particularly across the Yorkshire Wolds in Route Section A and south of the Chesterfield Canal in Route Sections E and F.

6.1.6 The moderate potential risk level at VPs 18a/b is relatively insignificant since most of the airspace watched from these VPs is not intersected by the proposed overhead line.

Table 6.1 – Bird passage rate and relative collision risk recorded for all species at all VPs

| VP | Hours of observation | Number of passes through viewshed | Passes per hour through viewshed | % at risk (crossing OL at risk height) | Passes at risk per hour of observation | Relative risk |
|---|---|---|---|---|---|---|
| 1 | 86 | 752 | 8.74 | 41.3 | 3.61 | 0.05 |
| 19 | 42 | 1,226 | 29.19 | 16.7 | 4.87 | 0.07 |
| 20 | 42 | 39 | 0.93 | 51.7 | 0.48 | 0.007 |
| 2 | 87.5 | 517 | 5.91 | 31.9 | 1.88 | 0.03 |
| 3 | 124.5 | 4,644 | 37.30 | 34.3 | 12.79 | 0.18 |
| 4a | 100 | 5,326 | 53.26 | 41.7 | 22.21 | 0.31 |
| 4b | 102 | 17,904 | 175.53 | 41.4 | 72.67 | 1 |
| 18a | 105 | 5,440 | 51.81 | 14.8 | 7.67 | 0.11 |
| 18b | 105 | 5,277 | 50.26 | 15.6 | 7.84 | 0.11 |
| 5 | 143 | 11,927 | 83.41 | 25 | 20.85 | 0.29 |
| 6 | 137 | 4,406 | 32.16 | 42.7 | 13.73 | 0.19 |
| Ouse | 199.75 | 13,757 | 68.87 | 13.8 | 9.50 | 0.13 |
| 7 | 138.5 | 8,620 | 62.24 | 39 | 24.27 | 0.33 |
| 8 | 108.5 | 3,964 | 36.53 | 41.7 | 15.23 | 0.21 |
| 9 | 108 | 1,980 | 18.33 | 34.7 | 6.36 | 0.09 |
| 10 | 109.5 | 2,137 | 19.52 | 42.9 | 8.37 | 0.12 |
| 11 | 84 | 779 | 9.27 | 51.7 | 4.79 | 0.07 |
| 12 | 99 | 2,855 | 28.84 | 45.8 | 13.21 | 0.18 |
| 13 | 90 | 6,791 | 75.46 | 27.9 | 21.05 | 0.29 |
| 21 | 36 | 798 | 22.17 | 54.3 | 12.04 | 0.17 |
| 14 | 109 | 3635 | 33.35 | 45 | 15.01 | 0.21 |
| 15 | 75 | 375 | 5.00 | 36.8 | 1.84 | 0.03 |
| 16 | 75 | 142 | 1.89 | 46.2 | 0.87 | 0.01 |
| 17 | 74 | 619 | 8.36 | 17.1 | 1.43 | 0.02 |
| **Total** | **2,380.25** | **103,910** | | | | |

## 6.2 Species-specific collision estimates

6.2.1 The approach to assessing collision risk described above results in annual collision rates that are very low for all species. Using the recorded 99.99% avoidance rate, annual collision rates are between 5.92 (for non-breeding Pink-footed goose) and 0.001 (for non-breeding Bewick's swan).

6.2.2 Only the collision rates presented for non-breeding pink-footed goose, non-breeding golden plover (1 potential collision every two years), non-breeding greylag goose (1 potential collision every 2.3 years) and non-breeding lapwing (2 potential collisions every year) indicate any potential for measurable levels of mortality. Nevertheless, the relative risk values can be used to determine the broad areas within which potential risk is greatest, by assigning the following risk categories to the species-specific data:

- 0-0.15 = low risk;
- 0.16-0.39 = moderate risk; and
- 0.40 and above = high risk.

6.2.3 On average the actual risk level is likely to be low for pink-footed goose, greylag goose, golden plover and lapwing and extremely low (mostly below detectable values) for all other species. However, on the basis of the relative and actual amounts of flight activity recorded at each VP, in certain environmental conditions (such as poor weather), the following parts of the Project could theoretically contribute elevated levels of bird mortality (with levels of flight elsewhere too low for this to be considered likely):

- Between the Market Weighton Canal and Staddlethorpe Broad Lane (pylons 4AF62-4AF70) in Route Section A; and
- The River Ouse to Luddington (pylons 4AF77-4AF102) in Route Section B.

6.2.4 Potentially higher levels of relative risk also occur at outliers to these areas, as follows:

- West of Ellerker as far as the Selby railway line in Route Section A for golden plover;
- Between the A164 and Cottingham in Route Section A for greylag goose;
- Warping Drain in Route Section D and the River Idle in Route Section E for greylag goose, mallard and lapwing;
- Between Three Rivers in Route Section C and the M180 in Route Section D for mallard; and
- Misterton Carrs in Route Section E for whooper swan.

6.2.5 However, the actual collision risk for these species is predicted to be negligible at these locations.

6.2.6 Given stakeholder comments (see Section 9.3 in **Application Document 6.9 Chapter 9 Ornithology**) regarding the potential risks to wintering wild swans, which are qualifying features of the River Idle Washlands SSSI, across Misterton and Gringley Carrs and the moderate to high relative risk levels identified for certain

species, this area is regarded as high risk between the River Idle (Pylon 4AF171) in Route Section D and Pylon 4AF180 in Route Section E.

6.2.7 For breeding hobby, peregrine and marsh harrier, as predatory birds with a high degree of visual acuity and excellent manoeuvrability in flight, the actual collision risk to these species would be extremely low. Hobby are known to nest on pylons (Rare Breeding Birds Panel , 2026) (although that has not been recorded during surveys for this Project), and peregrine falcon was recorded breeding on several existing pylons, therefore it is reasonable to assume negligible collision risk for these species regardless of other factors.

6.2.8 Estimated collision rates for pink-footed goose were higher than for any other species, which is a reflection of the abundance and frequency of occurrence of this species in flight across a broad area between the Market Weighton Canal and Luddington. Relative levels of collision risk for pink-footed goose were a good proxy for those observed for greylag goose, although the estimated collision rates were much lower for this species.

6.2.9 The following sections provide tables of relative risk and approximate estimations of collision mortality for key species.

### Non-breeding pink-footed goose

6.2.10 Table 6.2 presents the flight data for pink-footed goose. An estimate of, on average, 5.92 collisions per year can be predicted for this species. Almost all of the collision risk for this species occurs where the proposed overhead line crosses the Market Weighton Canal (pylon 4AF62) southwest towards Staddlethorpe Broad Lane (pylon 4AF70) in Route Section A, and between the River Ouse (pylon 4AF77) and Luddington (pylon 4AF96) in Route Section B.

Table 6.2 – Annual passage rates, relative collision risk and estimate of collision mortality for non-breeding pink-footed goose

| VP | Hours of observation | Number of passes through viewshed | Passes per hour through viewshed | % at risk (crossing OL at risk height) | Passes at risk per hour of observation | Relative risk | Predicted annual passes at risk (no avoidance) | Predicted collisions 98% avoidance | Predicted collisions 99% avoidance | Predicted collisions 99.9% avoidance | Predicted collisions 99.99% avoidance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 62 | 443 | 7.15 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 19 | 36 | 1,118 | 31.06 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 20 | 36 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2 | 53 | 464 | 8.75 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3 | 87 | 2,906 | 33.40 | 24.2 | 8.08 | 0.22 | 23,448.3 | 61.95 | 30.98 | 3.10 | 0.310 |
| 4a | 64 | 2,479 | 38.73 | 8.3 | 3.21 | 0.09 | 9,326.0 | 24.64 | 12.32 | 1.23 | 0.123 |
| 4b | 66 | 10,555 | 159.92 | 11.8 | 18.87 | 0.52 | 54,741.4 | 144.63 | 72.31 | 7.23 | 0.723 |
| 18a | 72 | 4,152 | 57.67 | 10.3 | 5.94 | 0.16 | 17,229.8 | 45.52 | 22.76 | 2.28 | 0.228 |
| 18b | 72 | 3,972 | 55.17 | 17.4 | 9.60 | 0.26 | 27,844.9 | 73.57 | 36.78 | 3.68 | 0.368 |
| 5 | 87 | 8,781 | 100.93 | 35.9 | 36.23 | 1.00 | 105,108.7 | 277.70 | 138.85 | 13.88 | 1.388 |
| 6 | 80 | 3,660 | 45.75 | 17.9 | 8.19 | 0.23 | 23,755.5 | 62.76 | 31.38 | 3.14 | 0.314 |
| Ouse | 103.75 | 4,492 | 43.30 | 33.3 | 14.42 | 0.40 | 41,823.0 | 110.50 | 55.25 | 5.52 | 0.552 |
| 7 | 88.5 | 6,172 | 69.74 | 25 | 17.44 | 0.48 | 50,575.7 | 133.62 | 66.81 | 6.68 | 0.668 |
| 8 | 69 | 3,360 | 48.70 | 34.4 | 16.75 | 0.46 | 48,592.4 | 128.38 | 64.19 | 6.42 | 0.642 |
| 9 | 72 | 321 | 4.46 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 10 | 72 | 1,895 | 26.32 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 11 | 45 | 389 | 8.64 | 12.5 | 1.08 | 0.03 | 3,134.5 | 8.28 | 4.14 | 0.41 | 0.041 |

| VP | Hours of observation | Number of passes through viewshed | Passes per hour through viewshed | % at risk (crossing OL at risk height) | Passes at risk per hour of observation | Relative risk | Predicted annual passes at risk (no avoidance) | Predicted collisions 98% avoidance | Predicted collisions 99% avoidance | Predicted collisions 99.9% avoidance | Predicted collisions 99.99% avoidance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 66 | 1,244 | 18.85 | 6.3 | 1.19 | 0.03 | 3,444.6 | 9.10 | 4.55 | 0.46 | 0.046 |
| 13 | 66 | 6,029 | 91.35 | 2.9 | 2.65 | 0.07 | 7,684.6 | 20.30 | 10.15 | 1.02 | 0.102 |
| 21 | 36 | 495 | 13.75 | 20 | 2.75 | 0.08 | 7,977.2 | 21.08 | 10.54 | 1.05 | 0.105 |
| 14 | 81 | 4977 | 61.44 | 13.2 | 8.11 | 0.22 | 23,527.5 | 62.16 | 31.08 | 3.11 | 0.311 |
| 15 | 48 | 262 | 5.46 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 16 | 45 | 115 | 2.56 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 17 | 45 | 303 | 6.73 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| **Total** | **1,552.25** | **68,584** | | | | | **448,213.86** | **1184.18** | **592.09** | **59.21** | **5.92** |

### Non-breeding golden plover

6.2.11 Table 6.3 presents the flight data for golden plover. An estimate of, on average, 1 collision every two years is predicted for the Project for this species. Almost half of the predicted collisions are predicted to occur near Ellerker (pylons 4AF50-4AF55, Route Section A), with the majority of the remaining predicted collisions between Staddlethorpe Broad Lane and the River Ouse (Pylons 4AF70-4AF79, Route Section A).

Table 6.3 – Annual passage rates, relative collision risk and approximate estimate of collision mortality for non-breeding golden plover

| VP | Hours of observation | Number of passes through viewshed | Passes per hour through viewshed | % at risk (crossing OL at risk height) | Passes at risk per hour of observation | Relative risk | Predicted annual passes at risk (no avoidance) | Predicted collisions 98% avoidance | Predicted collisions 99% avoidance | Predicted collisions 99.9% avoidance | Predicted collisions 99.99% avoidance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 62 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 19 | 36 | 88 | 2.44 | 33.3 | 0.81 | 0.14 | 2,361.3 | 6.24 | 3.12 | 0.31 | 0.031 |
| 20 | 36 | 10 | 0.28 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2 | 53 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3 | 87 | 706 | 8.11 | 71.4 | 5.79 | 1.00 | 16,807.5 | 44.41 | 22.20 | 2.22 | 0.222 |
| 4a | 64 | 2,372 | 37.06 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4b | 66 | 4,800 | 72.73 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 18a | 72 | 123 | 1.71 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 18b | 72 | 66 | 0.92 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5 | 87 | 916 | 10.53 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6 | 80 | 280 | 3.50 | 50 | 1.75 | 0.30 | 5,076.4 | 13.41 | 6.71 | 0.67 | 0.067 |
| Ouse | 103.75 | 259 | 2.50 | 66.7 | 1.67 | 0.29 | 4,830.1 | 12.76 | 6.38 | 0.64 | 0.064 |
| 7 | 88.5 | 40 | 0.45 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8 | 69 | 53 | 0.77 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 9 | 72 | 205 | 2.85 | 33.3 | 0.95 | 0.16 | 2,750.3 | 7.27 | 3.63 | 0.36 | 0.036 |
| 10 | 72 | 17 | 0.24 | 100 | 0.24 | 0.04 | 684.9 | 1.81 | 0.90 | 0.09 | 0.009 |
| 11 | 45 | 175 | 3.89 | 50 | 1.94 | 0.34 | 5,640.5 | 14.90 | 7.45 | 0.75 | 0.075 |

| VP | Hours of observation | Number of passes through viewshed | Passes per hour through viewshed | % at risk (crossing OL at risk height) | Passes at risk per hour of observation | Relative risk | Predicted annual passes at risk (no avoidance) | Predicted collisions 98% avoidance | Predicted collisions 99% avoidance | Predicted collisions 99.9% avoidance | Predicted collisions 99.99% avoidance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 66 | 59 | 0.89 | 100 | 0.89 | 0.15 | 2,593.1 | 6.85 | 3.43 | 0.34 | 0.034 |
| 13 | 66 | 75 | 1.14 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 21 | 36 | 12 | 0.33 | 50 | 0.17 | 0.03 | 483.5 | 1.28 | 0.64 | 0.06 | 0.006 |
| 14 | 81 | 116 | 1.43 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 15 | 48 | 28 | 0.58 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 16 | 45 | 6 | 0.13 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 17 | 45 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| **Total** | **1,552.25** | **10,406** | | | | | **41,227.60** | **108.92** | **54.46** | **5.45** | **0.55** |

### Non-breeding lapwing

6.2.12 Table 6.4 presents the flight data for lapwing. An estimate of 2 collisions per year can be attributed to the Project for this species.

6.2.13 The key locations of highest collision risk for this species are:

- The River Ouse (pylons 4AF77-4AF78, Route Section B);
- Luddington (pylons 4AF97-4AF112 (Route Section B)); and
- Warping Drain (pylons 4AF159-AF165 (Route Section D).

6.2.14 Higher relative collision risk south of Luddington is likely to be due to birds visiting a favoured foraging area within mixed bean and cereal crop fields south, east and west of Luddington, as recorded by RSPB in the winter of 2024-25 (see section 1.4 of **Application Document 6.9 Appendix 9.2 Ornithology Baseline Report).** However, the actual collision risk at this location is predicted to be negligible.

Table 6.4 – Annual passage rates, relative collision risk and approximate estimate of collision mortality for non-breeding lapwing

| VP | Hours of observation | Number of passes through viewshed | Passes per hour through viewshed | % at risk (crossing OL at risk height) | Passes at risk per hour of observation | Relative risk | Predicted annual passes at risk (no avoidance) | Predicted collisions 98% avoidance | Predicted collisions 99% avoidance | Predicted collisions 99.9% avoidance | Predicted collisions 99.99% avoidance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 47 | 26 | 0.55 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 19 | 30 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 20 | 27 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2 | 38 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3 | 66 | 690 | 10.45 | 37.5 | 3.92 | 0.24 | 7,740.9 | 20.45 | 10.23 | 1.02 | 0.102 |
| 4a | 46 | 235 | 5.11 | 25 | 1.28 | 0.08 | 2,521.8 | 6.66 | 3.33 | 0.33 | 0.033 |
| 4b | 48 | 1,381 | 28.77 | 22.2 | 6.39 | 0.38 | 12,611.4 | 33.32 | 16.66 | 1.67 | 0.167 |
| 18a | 54 | 384 | 7.11 | 40 | 2.84 | 0.17 | 5,616.4 | 14.84 | 7.42 | 0.74 | 0.074 |
| 18b | 54 | 291 | 5.39 | 28.6 | 1.54 | 0.09 | 3,043.1 | 8.04 | 4.02 | 0.40 | 0.040 |
| 5 | 63 | 101 | 1.60 | 50 | 0.80 | 0.05 | 1,582.7 | 4.18 | 2.09 | 0.21 | 0.021 |
| 6 | 54 | 147 | 2.72 | 33.3 | 0.91 | 0.05 | 1,789.9 | 4.73 | 2.36 | 0.24 | 0.024 |
| Ouse | 67.75 | 2,327 | 34.35 | 48.4 | 16.62 | 1.00 | 32,823.8 | 86.72 | 43.36 | 4.34 | 0.434 |
| 7 | 65.5 | 1,071 | 16.35 | 12.5 | 2.04 | 0.12 | 4,035.7 | 10.66 | 5.33 | 0.53 | 0.053 |
| 8 | 54 | 445 | 8.24 | 22.2 | 1.83 | 0.11 | 3,612.2 | 9.54 | 4.77 | 0.48 | 0.048 |
| 9 | 54 | 1,102 | 20.41 | 75 | 15.31 | 0.92 | 30,220.8 | 79.84 | 39.92 | 3.99 | 0.399 |
| 10 | 54 | 143 | 2.65 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 11 | 30 | 34 | 1.13 | 100 | 1.13 | 0.07 | 2,237.8 | 5.91 | 2.96 | 0.30 | 0.030 |

| VP | Hours of observation | Number of passes through viewshed | Passes per hour through viewshed | % at risk (crossing OL at risk height) | Passes at risk per hour of observation | Relative risk | Predicted annual passes at risk (no avoidance) | Predicted collisions 98% avoidance | Predicted collisions 99% avoidance | Predicted collisions 99.9% avoidance | Predicted collisions 99.99% avoidance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 51 | 1,098 | 21.53 | 43.8 | 9.43 | 0.57 | 18,619.3 | 49.19 | 24.60 | 2.46 | 0.246 |
| 13 | 51 | 456 | 8.94 | 71.4 | 6.38 | 0.38 | 12,605.2 | 33.30 | 16.65 | 1.67 | 0.167 |
| 21 | 30 | 100 | 3.33 | 100 | 3.33 | 0.20 | 6,581.7 | 17.39 | 8.69 | 0.87 | 0.087 |
| 14 | 66 | 323 | 4.89 | 40 | 1.96 | 0.12 | 3,865.2 | 10.21 | 5.11 | 0.51 | 0.051 |
| 15 | 36 | 72 | 2.00 | 100 | 2.00 | 0.12 | 3,949.0 | 10.43 | 5.22 | 0.52 | 0.052 |
| 16 | 33 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 17 | 33 | 267 | 8.09 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| **Total** | **1,152.25** | **10,693** | | | | | **15,3456.88** | **405.43** | **202.72** | **20.27** | **2.03** |

### Non-breeding curlew

6.2.15 Table 6.5 presents the flight data for curlew. An estimate of, on average, 1 collision every 14.3 years is predicted the Project for this species. The area with highest predicted collision is the River Ouse (pylons 4AF77-4AF79, Route Section B), with 0.045 predicted collisions per year (approximately 1 collision every 22 years).

Table 6.5 – Annual passage rates, relative collision risk and approximate estimate of collision mortality for non-breeding curlew

| VP | Hours of observation | Number of passes through viewshed | Passes per hour through viewshed | % at risk (crossing OL at risk height) | Passes at risk per hour of observation | Relative risk | Predicted annual passes at risk (no avoidance) | Predicted collisions 98% avoidance | Predicted collisions 99% avoidance | Predicted collisions 99.9% avoidance | Predicted collisions 99.99% avoidance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 56 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 19 | 36 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 20 | 36 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2 | 47 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3 | 81 | 11 | 0.14 | 33.3 | 0.05 | 0.03 | 110.2 | 0.29 | 0.15 | 0.01 | 0.001 |
| 4a | 58 | 21 | 0.36 | 40 | 0.14 | 0.10 | 352.8 | 0.93 | 0.47 | 0.05 | 0.005 |
| 4b | 60 | 10 | 0.17 | 50 | 0.08 | 0.06 | 203.0 | 0.54 | 0.27 | 0.03 | 0.003 |
| 18a | 60 | 52 | 0.87 | 14.3 | 0.12 | 0.09 | 301.9 | 0.80 | 0.40 | 0.04 | 0.004 |
| 18b | 60 | 122 | 2.03 | 17.6 | 0.36 | 0.26 | 871.8 | 2.30 | 1.15 | 0.12 | 0.012 |
| 5 | 78 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6 | 69 | 21 | 0.30 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| Ouse | 79.75 | 923 | 11.57 | 12.1 | 1.40 | 1.00 | 3,411.6 | 9.01 | 4.51 | 0.45 | 0.045 |
| 7 | 77.5 | 2 | 0.03 | 100 | 0.03 | 0.02 | 62.9 | 0.17 | 0.08 | 0.01 | 0.001 |
| 8 | 63 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 9 | 66 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 10 | 66 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 11 | 39 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |

| VP | Hours of observation | Number of passes through viewshed | Passes per hour through viewshed | % at risk (crossing OL at risk height) | Passes at risk per hour of observation | Relative risk | Predicted annual passes at risk (no avoidance) | Predicted collisions 98% avoidance | Predicted collisions 99% avoidance | Predicted collisions 99.9% avoidance | Predicted collisions 99.99% avoidance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 60 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 13 | 60 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 21 | 36 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 14 | 75 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 15 | 42 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 16 | 39 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 17 | 39 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| **Total** | **1,383.25** | **1,162** | | | | | **5,314.14** | **14.04** | **7.02** | **0.70** | **0.07** |

### Non-breeding greylag goose

6.2.16 Table 6.6 presents the flight data for greylag goose. On average, approximately 1 collision every 2.3 years is predicted for the Project for this species. The majority of this risk occurs at:

- Cottingham golf course (pylons 4AF4-4AF8, Route Section A);
- The Market Weighton Canal westwards as far as Staddlethorpe Broad lane (pylons 4AF63-4AF70, Route Section A);
- The river Ouse (4AF77-4AF79, Route Section B); and
- Warping Drain to the River Idle (4AF157-4AF172, Route Section D)

6.2.17 Irrespective of relative risk levels, the actual risk of collision is likely to be at worst, very low for all locations.

Table 6.6 – Annual passage rates, relative collision risk and approximate estimate of collision mortality for non-breeding greylag goose

| VP | Hours of observation | Number of passes through viewshed | Passes per hour through viewshed | % at risk (crossing OL at risk height) | Passes at risk per hour of observation | Relative risk | Predicted annual passes at risk (no avoidance) | Predicted collisions 98% avoidance | Predicted collisions 99% avoidance | Predicted collisions 99.9% avoidance | Predicted collisions 99.99% avoidance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 53 | 139 | 2.62 | 61.1 | 1.60 | 0.56 | 3,908.7 | 10.33 | 5.16 | 0.52 | 0.052 |
| 19 | 30 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 20 | 27 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2 | 44 | 5 | 0.11 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3 | 72 | 35 | 0.49 | 28.6 | 0.14 | 0.05 | 339.1 | 0.90 | 0.45 | 0.04 | 0.004 |
| 4a | 52 | 41 | 0.79 | 50 | 0.39 | 0.14 | 961.6 | 2.54 | 1.27 | 0.13 | 0.013 |
| 4b | 54 | 293 | 5.43 | 52.4 | 2.84 | 1.00 | 6,935.1 | 18.32 | 9.16 | 0.92 | 0.092 |
| 18a | 66 | 213 | 3.23 | 7.1 | 0.23 | 0.08 | 558.9 | 1.48 | 0.74 | 0.07 | 0.007 |
| 18b | 66 | 171 | 2.59 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5 | 72 | 1,882 | 26.14 | 7.1 | 1.86 | 0.65 | 4,526.8 | 11.96 | 5.98 | 0.60 | 0.060 |
| 6 | 65 | 31 | 0.48 | 66.7 | 0.32 | 0.11 | 775.9 | 2.05 | 1.03 | 0.10 | 0.010 |
| Ouse | 91.75 | 2,427 | 26.45 | 9.9 | 2.62 | 0.92 | 6,387.7 | 16.88 | 8.44 | 0.84 | 0.084 |
| 7 | 76.5 | 13 | 0.17 | 50 | 0.08 | 0.03 | 207.3 | 0.55 | 0.27 | 0.03 | 0.003 |
| 8 | 60 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 9 | 60 | 23 | 0.38 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 10 | 60 | 41 | 0.68 | 25 | 0.17 | 0.06 | 416.7 | 1.10 | 0.55 | 0.06 | 0.006 |
| 11 | 36 | 6 | 0.17 | 100 | 0.17 | 0.06 | 406.5 | 1.07 | 0.54 | 0.05 | 0.005 |

| VP | Hours of observation | Number of passes through viewshed | Passes per hour through viewshed | % at risk (crossing OL at risk height) | Passes at risk per hour of observation | Relative risk | Predicted annual passes at risk (no avoidance) | Predicted collisions 98% avoidance | Predicted collisions 99% avoidance | Predicted collisions 99.9% avoidance | Predicted collisions 99.99% avoidance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 57 | 233 | 4.09 | 50 | 2.04 | 0.72 | 4,985.4 | 13.17 | 6.59 | 0.66 | 0.066 |
| 13 | 57 | 133 | 2.33 | 50 | 1.17 | 0.41 | 2,845.7 | 7.52 | 3.76 | 0.38 | 0.038 |
| 21 | 30 | 2 | 0.07 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 14 | 72 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 15 | 42 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 16 | 39 | 3 | 0.08 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 17 | 39 | 1 | 0.03 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| **Total** | **1,321.25** | **5,692** | | | | | **33,255.45** | **87.86** | **43.93** | **4.39** | **0.44** |

### Non-breeding mallard

6.2.18 Table 6.7 presents the flight data for mallard. An approximate estimate of, on average, 1 collision every 10 years can be attributed to the Project for this species.

6.2.19 The River Ouse (pylons 4AF77-4AF78 (Route Section B); the area between North Soak Drain and Three Rivers (pylons 4AF123-4AF127, Route Section C); and Warping Drain (pylons 4AF161-4AF162, Route Section D) contribute most of the estimated collisions, however estimated collision is very low at all locations.

Table 6.7 – Annual passage rates, relative collision risk and approximate estimate of collision mortality for non-breeding mallard

| VP | Hours of observation | Number of passes through viewshed | Passes per hour through viewshed | % at risk (crossing OL at risk height) | Passes at risk per hour of observation | Relative risk | Predicted annual passes at risk (no avoidance) | Predicted collisions 98% avoidance | Predicted collisions 99% avoidance | Predicted collisions 99.9% avoidance | Predicted collisions 99.99% avoidance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 47 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 19 | 30 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 20 | 27 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2 | 38 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3 | 66 | 41 | 0.62 | 50 | 0.31 | 0.24 | 613.3 | 1.62 | 0.81 | 0.08 | 0.008 |
| 4a | 46 | 9 | 0.20 | 40 | 0.08 | 0.06 | 154.5 | 0.41 | 0.20 | 0.02 | 0.002 |
| 4b | 48 | 18 | 0.38 | 28.6 | 0.11 | 0.08 | 211.8 | 0.56 | 0.28 | 0.03 | 0.003 |
| 18a | 54 | 102 | 1.89 | 5.6 | 0.11 | 0.08 | 208.9 | 0.55 | 0.28 | 0.03 | 0.003 |
| 18b | 54 | 77 | 1.43 | 15 | 0.21 | 0.17 | 422.3 | 1.12 | 0.56 | 0.06 | 0.006 |
| 5 | 63 | 5 | 0.08 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6 | 54 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| Ouse | 67.75 | 175 | 2.58 | 22.6 | 0.58 | 0.45 | 1,152.6 | 3.05 | 1.52 | 0.15 | 0.015 |
| 7 | 65.5 | 2 | 0.03 | 100 | 0.03 | 0.02 | 60.3 | 0.16 | 0.08 | 0.01 | 0.001 |
| 8 | 54 | 35 | 0.65 | 50 | 0.32 | 0.25 | 639.9 | 1.69 | 0.85 | 0.08 | 0.008 |
| 9 | 54 | 35 | 0.65 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 10 | 54 | 1 | 0.02 | 100 | 0.02 | 0.01 | 36.6 | 0.10 | 0.05 | 0.00 | 0.000 |
| 11 | 30 | 16 | 0.53 | 100 | 0.53 | 0.41 | 1,053.1 | 2.78 | 1.39 | 0.14 | 0.014 |

| VP | Hours of observation | Number of passes through viewshed | Passes per hour through viewshed | % at risk (crossing OL at risk height) | Passes at risk per hour of observation | Relative risk | Predicted annual passes at risk (no avoidance) | Predicted collisions 98% avoidance | Predicted collisions 99% avoidance | Predicted collisions 99.9% avoidance | Predicted collisions 99.99% avoidance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 51 | 89 | 1.75 | 73.9 | 1.29 | 1.00 | 2,546.4 | 6.73 | 3.36 | 0.34 | 0.034 |
| 13 | 51 | 9 | 0.18 | 66.7 | 0.12 | 0.09 | 232.4 | 0.61 | 0.31 | 0.03 | 0.003 |
| 21 | 30 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 14 | 66 | 15 | 0.23 | 85.7 | 0.19 | 0.15 | 384.6 | 1.02 | 0.51 | 0.05 | 0.005 |
| 15 | 36 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 16 | 33 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 17 | 33 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| **Total** | **1,152.25** | **629** | | | | | **7,716.57** | **20.39** | **10.19** | **1.02** | **0.10** |

### Non-breeding shelduck

6.2.20 Table 6.8 presents the flight data for shelduck. Approximately 1 collision every 167 years, on average, is predicted for this species across the whole Project. The River Ouse (pylons 4AF77-4AF78, Route Section B) is identified as contributing the highest level of risk, with moderate risk occurring west of Broomfleet Tileworks (estimated to be between 4AF66 and 4AF70, Route Section A), however the risk at all locations (both individually and combined) is virtually zero.

Table 6.8 – Annual passage rates, relative collision risk and approximate estimate of collision mortality for non-breeding shelduck

| VP | Hours of observation | Number of passes through viewshed | Passes per hour through viewshed | % at risk (crossing OL at risk height) | Passes at risk per hour of observation | Relative risk | Predicted annual passes at risk (no avoidance) | Predicted collisions 98% avoidance | Predicted collisions 99% avoidance | Predicted collisions 99.9% avoidance | Predicted collisions 99.99% avoidance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 56 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 19 | 36 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 20 | 36 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2 | 47 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3 | 81 | 3 | 0.04 | 33.3 | 0.01 | 0.09 | 30.0 | 0.08 | 0.04 | 0.00 | 0.000 |
| 4a | 58 | 6 | 0.10 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4b | 60 | 6 | 0.10 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 18a | 60 | 6 | 0.10 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 18b | 60 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5 | 78 | 3 | 0.04 | 100 | 0.04 | 0.27 | 93.7 | 0.25 | 0.12 | 0.01 | 0.001 |
| 6 | 69 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| Ouse | 79.75 | 65 | 0.82 | 17.6 | 0.14 | 1.00 | 349.5 | 0.92 | 0.46 | 0.05 | 0.005 |
| 7 | 77.5 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8 | 63 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 9 | 66 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 10 | 66 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 11 | 39 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |

| VP | Hours of observation | Number of passes through viewshed | Passes per hour through viewshed | % at risk (crossing OL at risk height) | Passes at risk per hour of observation | Relative risk | Predicted annual passes at risk (no avoidance) | Predicted collisions 98% avoidance | Predicted collisions 99% avoidance | Predicted collisions 99.9% avoidance | Predicted collisions 99.99% avoidance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 60 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 13 | 60 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 21 | 36 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 14 | 75 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 15 | 42 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 16 | 39 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 17 | 39 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| **Total** | **1,383.25** | **89** | | | | | **473.20** | **1.25** | **0.63** | **0.06** | **0.006** |

### Non-breeding marsh harrier

6.2.21 Table 6.9 presents the flight data for marsh harrier. On average, 1 collision every 11.13 years is predicted for the Project, almost all of which would be expected to occur near the Market Weighton Canal and Broomfleet Tileworks (pylons 4AF63-4AF66, Route Section A), which has been identified as the area of highest risk for non-breeding marsh harrier.

Table 6.9 – Annual passage rates, relative collision risk and approximate estimate of collision mortality for non-breeding marsh harrier

| VP | Hours of observation | Number of passes through viewshed | Passes per hour through viewshed | % at risk (crossing OL at risk height) | Passes at risk per hour of observation | Relative risk | Predicted annual passes at risk (no avoidance) | Predicted collisions 98% avoidance | Predicted collisions 99% avoidance | Predicted collisions 99.9% avoidance | Predicted collisions 99.99% avoidance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 62 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 19 | 36 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 20 | 36 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2 | 53 | 1 | 0.02 | 100 | 0.02 | 0.01 | 41.0 | 0.11 | 0.05 | 0.01 | 0.001 |
| 3 | 87 | 23 | 0.26 | 38.1 | 0.10 | 0.04 | 218.7 | 0.58 | 0.29 | 0.03 | 0.003 |
| 4a | 64 | 6 | 0.09 | 66.7 | 0.06 | 0.03 | 135.8 | 0.36 | 0.18 | 0.02 | 0.002 |
| 4b | 66 | 287 | 4.35 | 51.9 | 2.26 | 1.00 | 4,901.3 | 12.95 | 6.47 | 0.65 | 0.065 |
| 18a | 72 | 80 | 1.11 | 8.2 | 0.09 | 0.04 | 197.9 | 0.52 | 0.26 | 0.03 | 0.003 |
| 18b | 72 | 65 | 0.90 | 11.1 | 0.10 | 0.04 | 217.6 | 0.57 | 0.29 | 0.03 | 0.003 |
| 5 | 87 | 17 | 0.20 | 23.5 | 0.05 | 0.02 | 99.7 | 0.26 | 0.13 | 0.01 | 0.001 |
| 6 | 80 | 1 | 0.01 | 100 | 0.01 | 0.01 | 27.1 | 0.07 | 0.04 | 0.00 | 0.000 |
| Ouse | 103.75 | 36 | 0.35 | 2.9 | 0.01 | 0.00 | 21.9 | 0.06 | 0.03 | 0.00 | 0.000 |
| 7 | 88.5 | 9 | 0.10 | 66.7 | 0.07 | 0.03 | 147.3 | 0.39 | 0.19 | 0.02 | 0.002 |
| 8 | 69 | 5 | 0.07 | 60 | 0.04 | 0.02 | 94.4 | 0.25 | 0.12 | 0.01 | 0.001 |
| 9 | 72 | 119 | 1.65 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 10 | 72 | 4 | 0.06 | 75 | 0.04 | 0.02 | 90.5 | 0.24 | 0.12 | 0.01 | 0.001 |
| 11 | 45 | 4 | 0.09 | 100 | 0.09 | 0.04 | 193.0 | 0.51 | 0.26 | 0.03 | 0.003 |

| VP | Hours of observation | Number of passes through viewshed | Passes per hour through viewshed | % at risk (crossing OL at risk height) | Passes at risk per hour of observation | Relative risk | Predicted annual passes at risk (no avoidance) | Predicted collisions 98% avoidance | Predicted collisions 99% avoidance | Predicted collisions 99.9% avoidance | Predicted collisions 99.99% avoidance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 66 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 13 | 66 | 1 | 0.02 | 100 | 0.02 | 0.01 | 32.9 | 0.09 | 0.04 | 0.00 | 0.000 |
| 21 | 36 | 1 | 0.03 | 100 | 0.03 | 0.01 | 60.3 | 0.16 | 0.08 | 0.01 | 0.001 |
| 14 | 81 | 1 | 0.01 | 100 | 0.01 | 0.01 | 26.8 | 0.07 | 0.04 | 0.00 | 0.000 |
| 15 | 48 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 16 | 45 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 17 | 45 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| **Total** | **1,552.25** | **660** | | | | | **6,506.40** | **17.19** | **8.59** | **0.86** | **0.09** |

### Non-breeding Bewick's swan

6.2.22 Table 6.10 presents the flight data for Bewick's swan. The predicted average collision rate is below detectable levels at an assumed avoidance rate of 99.99% or 99.9%. Using an avoidance rate of 99% yields an approximate estimate of, on average, 1 collision every 7.7 years attributable to the Project for this species. West of Broomfleet Tileworks (pylons 4AF66-4AF70, Route Section A) has been identified as the area of highest risk for Bewick's swan.

Table 6.10 – Annual passage rates, relative collision risk and approximate estimate of collision mortality for non-breeding Bewick's swan

| VP | Hours of observation | Number of passes through viewshed | Passes per hour through viewshed | % at risk (crossing OL at risk height) | Passes at risk per hour of observation | Relative risk | Predicted annual passes at risk (no avoidance) | Predicted collisions 98% avoidance | Predicted collisions 99% avoidance | Predicted collisions 99.9% avoidance | Predicted collisions 99.99% avoidance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 56 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 19 | 36 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 20 | 36 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2 | 47 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3 | 81 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4a | 58 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4b | 60 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 18a | 60 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 18b | 60 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5 | 78 | 12 | 0.15 | 25 | 0.04 | 1.00 | 93.7 | 0.25 | 0.12 | 0.01 | 0.001 |
| 6 | 69 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| Ouse | 79.75 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7 | 77.5 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8 | 63 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 9 | 66 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 10 | 66 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 11 | 39 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |

| VP | Hours of observation | Number of passes through viewshed | Passes per hour through viewshed | % at risk (crossing OL at risk height) | Passes at risk per hour of observation | Relative risk | Predicted annual passes at risk (no avoidance) | Predicted collisions 98% avoidance | Predicted collisions 99% avoidance | Predicted collisions 99.9% avoidance | Predicted collisions 99.99% avoidance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 60 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 13 | 60 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 21 | 36 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 14 | 75 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 15 | 42 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 16 | 39 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 17 | 39 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| **Total** | **1,383.25** | **12** | | | | | **93.70** | **0.25** | **0.13** | **0.01** | **0.001** |

### Non-breeding Whooper swan

6.2.23 Table 6.11 presents the flight data for whooper swan. An estimate of 1 collision every 8.62 years can be attributed to the Project for this species. Misterton Carrs (pylons 4AF171-4AF180, Route Section E) has been identified as the highest risk area for whooper swan.

Table 6.11 – Annual passage rates, relative collision risk and approximate estimate of collision mortality for non-breeding whooper swan

| VP | Hours of observation | Number of passes through viewshed | Passes per hour through viewshed | % at risk (crossing OL at risk height) | Passes at risk per hour of observation | Relative risk | Predicted annual passes at risk (no avoidance) | Predicted collisions 98% avoidance | Predicted collisions 99% avoidance | Predicted collisions 99.9% avoidance | Predicted collisions 99.99% avoidance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 56 | 10 | 0.18 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 19 | 36 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 20 | 36 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2 | 47 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3 | 81 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4a | 58 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4b | 60 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 18a | 60 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 18b | 60 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5 | 78 | 18 | 0.23 | 33.3 | 0.08 | 0.03 | 187.2 | 0.49 | 0.25 | 0.02 | 0.002 |
| 6 | 69 | 26 | 0.38 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| Ouse | 79.75 | 10 | 0.13 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7 | 77.5 | 1 | 0.01 | 100 | 0.01 | 0.00 | 31.4 | 0.08 | 0.04 | 0.00 | 0.000 |
| 8 | 63 | 23 | 0.37 | 100 | 0.37 | 0.13 | 889.4 | 2.35 | 1.17 | 0.12 | 0.012 |
| 9 | 66 | 11 | 0.17 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 10 | 66 | 4 | 0.06 | 100 | 0.06 | 0.02 | 147.6 | 0.39 | 0.20 | 0.02 | 0.002 |
| 11 | 39 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |

| VP | Hours of observation | Number of passes through viewshed | Passes per hour through viewshed | % at risk (crossing OL at risk height) | Passes at risk per hour of observation | Relative risk | Predicted annual passes at risk (no avoidance) | Predicted collisions 98% avoidance | Predicted collisions 99% avoidance | Predicted collisions 99.9% avoidance | Predicted collisions 99.99% avoidance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 60 | 4 | 0.07 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 13 | 60 | 15 | 0.25 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 21 | 36 | 170 | 4.72 | 61.5 | 2.90 | 1.00 | 7,074.9 | 18.69 | 9.35 | 0.93 | 0.093 |
| 14 | 75 | 131 | 1.75 | 10 | 0.17 | 0.06 | 425.5 | 1.12 | 0.56 | 0.06 | 0.006 |
| 15 | 42 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 16 | 39 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 17 | 39 | 5 | 0.13 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| Total | **1,383.25** | **428** | | | | | **8,756.03** | **23.13** | **11.57** | **1.16** | **0.116** |

### Non-breeding Little Egret

6.2.24 Table 6.12 presents the flight data for little egret. An estimate of 1 collision every 100 years can be attributed to the Project for this species.

6.2.25 There is no obvious pattern to the areas of risk for little egret, with the relative risk being consistently higher between Ellerker (pylon 4AF50) and Adlingfleet (4AF86) in Route Sections A-B, and intermittently high south of Adlingfleet. However, the actual risk level is negligible across all parts of the Project.

Table 6.12 – Annual passage rates, relative collision risk and approximate estimate of collision mortality for non-breeding little egret

| VP | Hours of observation | Number of passes through viewshed | Passes per hour through viewshed | % at risk (crossing OL at risk height) | Passes at risk per hour of observation | Relative risk | Predicted annual passes at risk (no avoidance) | Predicted collisions 98% avoidance | Predicted collisions 99% avoidance | Predicted collisions 99.9% avoidance | Predicted collisions 99.99% avoidance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 62 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 19 | 36 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 20 | 36 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2 | 53 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3 | 87 | 30 | 0.34 | 15.4 | 0.05 | 0.96 | 154.0 | 0.41 | 0.20 | 0.02 | 0.002 |
| 4a | 66 | 3 | 0.05 | 66.7 | 0.03 | 0.55 | 87.9 | 0.23 | 0.12 | 0.01 | 0.001 |
| 4b | 66 | 3 | 0.05 | 66.7 | 0.03 | 0.55 | 87.9 | 0.23 | 0.12 | 0.01 | 0.001 |
| 18a | 72 | 8 | 0.11 | 12.5 | 0.01 | 0.25 | 40.3 | 0.11 | 0.05 | 0.01 | 0.001 |
| 18b | 72 | 2 | 0.03 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5 | 87 | 8 | 0.09 | 28.6 | 0.03 | 0.47 | 76.3 | 0.20 | 0.10 | 0.01 | 0.001 |
| 6 | 80 | 7 | 0.09 | 16.7 | 0.01 | 0.26 | 42.4 | 0.11 | 0.06 | 0.01 | 0.001 |
| Ouse | 103.75 | 44 | 0.42 | 2.9 | 0.01 | 0.22 | 35.7 | 0.09 | 0.05 | 0.00 | 0.000 |
| 7 | 88.5 | 4 | 0.05 | 25 | 0.01 | 0.20 | 32.8 | 0.09 | 0.04 | 0.00 | 0.000 |
| 8 | 69 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 9 | 74 | 1 | 0.01 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 10 | 72 | 3 | 0.04 | 66.7 | 0.03 | 0.50 | 80.6 | 0.21 | 0.11 | 0.01 | 0.001 |
| 11 | 42 | 2 | 0.05 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |

| VP | Hours of observation | Number of passes through viewshed | Passes per hour through viewshed | % at risk (crossing OL at risk height) | Passes at risk per hour of observation | Relative risk | Predicted annual passes at risk (no avoidance) | Predicted collisions 98% avoidance | Predicted collisions 99% avoidance | Predicted collisions 99.9% avoidance | Predicted collisions 99.99% avoidance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 66 | 11 | 0.17 | 33.3 | 0.06 | 1.00 | 161.0 | 0.43 | 0.21 | 0.02 | 0.002 |
| 13 | 66 | 4 | 0.06 | 66.7 | 0.04 | 0.73 | 117.3 | 0.31 | 0.15 | 0.02 | 0.002 |
| 21 | 36 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 14 | 81 | 2 | 0.02 | 100 | 0.02 | 0.44 | 71.6 | 0.19 | 0.09 | 0.01 | 0.001 |
| 15 | 48 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 16 | 45 | 1 | 0.02 | 100 | 0.02 | 0.40 | 64.5 | 0.17 | 0.09 | 0.01 | 0.001 |
| 17 | 45 | 3 | 0.07 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| Total | **1,553.25** | **136** | | | | | **1,052.32** | **2.78** | **1.39** | **0.14** | **0.01** |

### Breeding Hobby

6.2.26 Table 6.13 presents the flight data for hobby. An approximate estimate of, on average, 1 collision every 100 years can be attributed to the Project for this species.

6.2.27 Highest relative risk has been identified between Ellerker and the Market Weighton Canal (Route Section A), near the Chesterfield Canal (Route Section E) and near South Leverton (Route Section E). However, for the reasons stated in paragraph 6.2.7 it is reasonable to expect zero collisions for this species.

Table 6.13 – Annual passage rates, relative collision risk and approximate estimate of collision mortality for breeding hobby

| VP | Hours of observation | Number of passes through viewshed | Passes per hour through viewshed | % at risk (crossing OL at risk height) | Passes at risk per hour of observation | Relative risk | Predicted annual passes at risk (no avoidance) | Predicted collisions 98% avoidance | Predicted collisions 99% avoidance | Predicted collisions 99.9% avoidance | Predicted collisions 99.99% avoidance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 30 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 19 | 6 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 20 | 6 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2 | 40.5 | 1 | 0.02 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3 | 43.5 | 4 | 0.09 | 50 | 0.05 | 0.52 | 123.3 | 0.33 | 0.16 | 0.02 | 0.002 |
| 4a | 42 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4b | 42 | 3 | 0.07 | 33.3 | 0.02 | 0.27 | 63.8 | 0.17 | 0.08 | 0.01 | 0.001 |
| 18a | 45 | 8 | 0.18 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 18b | 45 | 7 | 0.16 | 20 | 0.03 | 0.35 | 83.4 | 0.22 | 0.11 | 0.01 | 0.001 |
| 5 | 65 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6 | 68 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| Ouse | 120 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7 | 61 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8 | 45.5 | 2 | 0.04 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 9 | 42 | 1 | 0.02 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 10 | 43.5 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 11 | 45 | 1 | 0.02 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |

| VP | Hours of observation | Number of passes through viewshed | Passes per hour through viewshed | % at risk (crossing OL at risk height) | Passes at risk per hour of observation | Relative risk | Predicted annual passes at risk (no avoidance) | Predicted collisions 98% avoidance | Predicted collisions 99% avoidance | Predicted collisions 99.9% avoidance | Predicted collisions 99.99% avoidance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 39 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 13 | 30 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 21 | 0 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 14 | 34 | 5 | 0.15 | 60 | 0.09 | 1.00 | 236.6 | 0.63 | 0.31 | 0.03 | 0.003 |
| 15 | 33 | 1 | 0.03 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 16 | 36 | 6 | 0.17 | 50 | 0.08 | 0.94 | 223.4 | 0.59 | 0.30 | 0.03 | 0.003 |
| 17 | 35 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| **Total** | **997** | **39** | | | | | **730.45** | **1.93** | **0.96** | **0.10** | **0.01** |

### Breeding Peregrine falcon

6.2.28 Table 6.14 presents the flight data for peregrine falcon. An estimate of 1 collision every 100 years is predicted for the Project.

6.2.29 Highest relative risk is predicted for location on the Yorkshire Wolds, near Broomfleet Tileworks and the River Ouse, all of which are within Route Section A. However, for the reasons stated in paragraph 6.2.7 it is reasonable to expect zero collisions for this species.

Table 6.14 – Annual passage rates, relative collision risk and approximate estimate of collision mortality for breeding peregrine falcon

| VP | Hours of observation | Number of passes through viewshed | Passes per hour through viewshed | % at risk (crossing OL at risk height) | Passes at risk per hour of observation | Relative risk | Predicted annual passes at risk (no avoidance) | Predicted collisions 98% avoidance | Predicted collisions 99% avoidance | Predicted collisions 99.9% avoidance | Predicted collisions 99.99% avoidance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 33 | 6 | 0.18 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 19 | 12 | 2 | 0.17 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 20 | 15 | 7 | 0.47 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2 | 43.5 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3 | 52.5 | 2 | 0.04 | 50 | 0.02 | 0.08 | 50.8 | 0.13 | 0.07 | 0.01 | 0.001 |
| 4a | 48 | 35 | 0.73 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4b | 48 | 36 | 0.75 | 33.3 | 0.25 | 1.00 | 666.6 | 1.76 | 0.88 | 0.09 | 0.009 |
| 18a | 39 | 1 | 0.03 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 18b | 39 | 0 | 0.00 | 20 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5 | 71 | 10 | 0.14 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6 | 72 | 50 | 0.69 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| Ouse | 108 | 8 | 0.07 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7 | 62 | 3 | 0.05 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8 | 48.5 | 2 | 0.04 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 9 | 48 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 10 | 49.5 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 11 | 48 | 1 | 0.02 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |

| VP | Hours of observation | Number of passes through viewshed | Passes per hour through viewshed | % at risk (crossing OL at risk height) | Passes at risk per hour of observation | Relative risk | Predicted annual passes at risk (no avoidance) | Predicted collisions 98% avoidance | Predicted collisions 99% avoidance | Predicted collisions 99.9% avoidance | Predicted collisions 99.99% avoidance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 42 | 1 | 0.02 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 13 | 33 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 21 | 6 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 14 | 37 | 0 | 0.00 | 60 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 15 | 33 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 16 | 36 | 2 | 0.06 | 50 | 0.03 | 0.11 | 74.1 | 0.20 | 0.10 | 0.01 | 0.001 |
| 17 | 35 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| **Total** | **1,059** | **166** | | | | | **791.56** | **2.09** | **1.05** | **0.10** | **0.01** |

### Breeding Marsh harrier

6.2.30 Table 6.15 presents the flight data for marsh harrier. An estimate of 1 collision every 20 years is predicted for the Project.

6.2.31 The highest relative risk levels are predicted from the Market Weighton Canal (Route Section A) west/southwards as far as Garthorpe (Route Section B). However, the actual predicted risk is negligible and, for the reasons stated in paragraph 6.2.7, it is reasonable to expect zero collisions for this species.

Table 6.15 – Annual passage rates, relative collision risk and approximate estimate of collision mortality for breeding marsh harrier

| VP | Hours of observation | Number of passes through viewshed | Passes per hour through viewshed | % at risk (crossing OL at risk height) | Passes at risk per hour of observation | Relative risk | Predicted annual passes at risk (no avoidance) | Predicted collisions 98% avoidance | Predicted collisions 99% avoidance | Predicted collisions 99.9% avoidance | Predicted collisions 99.99% avoidance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 24 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 19 | 6 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 20 | 6 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2 | 34.5 | 3 | 0.09 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3 | 37.5 | 10 | 0.27 | 20 | 0.05 | 0.14 | 122.7 | 0.32 | 0.16 | 0.02 | 0.002 |
| 4a | 36 | 1 | 0.03 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4b | 36 | 11 | 0.31 | 37.5 | 0.11 | 0.30 | 263.7 | 0.70 | 0.35 | 0.03 | 0.003 |
| 18a | 33 | 54 | 1.64 | 9.8 | 0.16 | 0.42 | 369.1 | 0.98 | 0.49 | 0.05 | 0.005 |
| 18b | 33 | 32 | 0.97 | 33 | 0.32 | 0.84 | 736.5 | 1.95 | 0.97 | 0.10 | 0.010 |
| 5 | 56 | 33 | 0.59 | 15.2 | 0.09 | 0.24 | 206.2 | 0.54 | 0.27 | 0.03 | 0.003 |
| 6 | 57 | 13 | 0.23 | 53.8 | 0.12 | 0.32 | 282.4 | 0.75 | 0.37 | 0.04 | 0.004 |
| Ouse | 96 | 14 | 0.15 | 7.1 | 0.01 | 0.03 | 23.8 | 0.06 | 0.03 | 0.00 | 0.000 |
| 7 | 50 | 35 | 0.70 | 54.3 | 0.38 | 1.00 | 874.8 | 2.31 | 1.16 | 0.12 | 0.012 |
| 8 | 39.5 | 11 | 0.28 | 45.5 | 0.13 | 0.33 | 291.6 | 0.77 | 0.39 | 0.04 | 0.004 |
| 9 | 36 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 10 | 37.5 | 2 | 0.05 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 11 | 39 | 11 | 0.28 | 45.5 | 0.13 | 0.34 | 295.4 | 0.78 | 0.39 | 0.04 | 0.004 |

| VP | Hours of observation | Number of passes through viewshed | Passes per hour through viewshed | % at risk (crossing OL at risk height) | Passes at risk per hour of observation | Relative risk | Predicted annual passes at risk (no avoidance) | Predicted collisions 98% avoidance | Predicted collisions 99% avoidance | Predicted collisions 99.9% avoidance | Predicted collisions 99.99% avoidance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 33 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 13 | 24 | 1 | 0.04 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 21 | 0 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 14 | 28 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 15 | 27 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 16 | 30 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| 17 | 29 | 0 | 0.00 | 0 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 | 0.00 | 0.000 |
| **Total** | **828** | **231** | | | | | **3,466.20** | **9.16** | **4.58** | **0.46** | **0.05** |

# 7. Case for adoption of collision reduction bird diverters

7.1.1 Taking the previously detailed observations into account, requirements for mitigation of potential collision mortality are driven by the collision risk for pink-footed goose and whooper swan, and location-specific mitigation is recommended on this basis.

7.1.2 A key point to note is that collision events are very infrequent, of a random nature and difficult to model. The assessment presented herein highlights areas of relatively high levels of flight activity that present the greatest risk of collision events should adverse conditions occur (such as inclement weather at a time when mass movements of birds are likely). Location-specific mitigation, guided by this risk assessment, is presented as a precautionary provision to minimise risk during such events, to levels that are below any significance threshold relevant to SPAs/Ramsar sites (i.e., in HRA and EcIA terms) and other designated sites, in particular SSSIs (i.e., in EcIA terms).

7.1.3 To summarise, since bird collision was identified as a key potential operational risk of the proposed overhead lines, surveys were undertaken to quantify flight activity in key sensitive locations. Surveys focussed on representative areas along the route of the proposed overhead line where there may be 'hotspots' of activity, e.g. potential flyways (along main river crossings as an example), areas of expected activity (such as wetlands) and where the proposed overhead line would be in proximity to designated sites and land outside the designated site(s) that supports qualifying features (so-called "Functionally Linked Land", or FLL) that support qualifying features of ornithological importance.

7.1.4 Bird diverters are recommended as a precautionary mitigation measure to offset the rare but potentially significant implications of unpredictable collision events and the resultant adverse effects on the integrity of European and National Designated Sites (SPAs, Ramsar sites and SSSIs). As it is not possible to predict accurately when collision events may occur and their magnitude, bird flight activity assessment and assessment of collision risk was used to determine the most likely cable spans where risk is highest. It is only these high-risk areas where bird diverters are recommended for installation. These areas are:

- Area 1. Pylons 4AF62 to 4AF70 – (within areas of Humber Estuary SPA/Ramsar site FLL across the Humberhead Levels north of the River Ouse, in Route Section A);
- Area 2. Pylons 4AF77 to 4AF96 – (in FLL south of the River Ouse and proximity to the Ouse crossing point and Humber Estuary SPA/Ramsar site, in Route Sections A and B); and
- Area 3. Pylons 4AF171 to Pylon 4AF180 (in relation to River Idle Washlands SSSI, across Misterton and Gringley Carrs, in Route Section E).

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# Annex A Conductor and Earth Wire Dimensions

nationalgrid

# Annex A
# Conductor and Earth Wire Dimensions

Details of the conductors and earth wires were provided by National Grid and are set out below for different designs. The Zebra design is being removed from existing infrastructure, so it is not considered further in this report.

The Araucaria and Rubus designs will be used on the Project. However, the twin Rubus design will be used only to replace a section of existing overhead line like for like, except for four lowered ZDA pylons that use a gantry-type structure with a different cable arrangement from the Twin Rubus design described above. This section will not result in new infrastructure that is materially different from the existing overhead line and is therefore not considered further with respect to the assessment of bird flight activity and collision risk.

### Araucaria Conductor

Proposed for majority the of the 4AF overhead line other than the river crossing section. Also proposed for replacement of a section on the 4Z line. Total diameter of the conductor is 37.26 mm with a nominal aluminium area of 700 $mm^2$. The conductors would be a triple bundle, with three of the 37.26 mm diameter conductors bundled for each phase. There are three phases per circuit and two circuits, making a total of 18 conductors.

### Rubus Conductor

Replacement proposed for ZDA section and also existing for ZDA. Total conductor diameter is 31.5 mm with a nominal aluminium area of 500 $mm^2$. The conductors would be a twin bundle, with two of the 31.5 mm diameter conductors bundled. There are three phases per circuit and two circuits, making a total of 12 conductors.

### Zebra Conductor

Existing on the 4ZQ overhead line, so removal only for this Project. Total conductor diameter is 28.62 mm with a nominal aluminium area of 400 $mm^2$. The conductors would be a quad bundle, with four of the 31.5 mm diameter conductors bundled. There are three phases per circuit and two circuits, making a total of 24 conductors.

### Keziah conductor

Earth wire proposed on 4AF, ZDA and 4ZQ overhead lines. Total conductor diameter is 19.5 mm with a nominal aluminium area of 160 $mm^2$. The earth wire will be a single conductor, not bundled.

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