Chapter 11
Ornithology

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Introduction

11.1 This chapter presents the findings of the assessment of likely significant construction and operational effects of the proposed Kendoon to Tongland 132kV (kilovolt) Reinforcement Project' ('the KTR Project') on ornithological, details of which are provided in **Chapter 4: Development Description** and **Chapter 5: Felling, Construction and Operational Maintenance**. It details the methods used to establish the bird interest within the KTR Project Study Area, together with the process used to determine the Nature Conservation Importance (NCI) of the bird populations present. It explains the ways in which birds may be affected by the KTR Project and reports the assessment of the likely effects of the KTR Project and their significance. Additionally, the chapter and appendices set out information to allow Scottish Ministers to undertake an appropriate assessment of the effects of the KTR Project on the Loch Ken and River Dee Marches (LKRDM) Special Protection Area (SPA) (and Ramsar site).Further comments relating to the appropriate assessment are set out in **Appendix 11.4: Ornithology Shadow Appropriate Assessment**.

11.2 The assessment reported in this chapter complements the assessment of Ecological effects in **Chapter 10: Ecology**. Planning policies of relevance to this assessment are provided in **Chapter 6: Planning Policy Context**.

11.3 The chapter is supported by:

- **Appendix 11.1: Ornithology Technical Report**;
- **Appendix 11.2: Ornithology Collision Risk**;
- **Appendix 11.3: Ornithology Confidential Report**; and
- **Appendix 11.4: Ornithology Shadow Appropriate Assessment**.

Scope of the Assessment

Potential Effects

11.4 The potential effects on ornithology associated with the construction and / or operation of an overhead line (OHL) (such as the KTR Project) are:

- a short-term reduction in breeding or wintering bird populations due to disturbance (during construction);
- a long-term/permanent reduction in breeding or wintering populations due to direct loss of critical habitats (during operation);
- a long-term/permanent reduction in breeding or wintering populations due to disturbance displacement resulting from maintenance activities or birds' perceived reductions in suitability of adjacent habitats (during construction and operation);
- a long-term/permanent reduction in breeding or wintering bird populations due to collision mortality (during operation);
- a long-term/ permanent reduction in breeding or wintering bird populations due to the loss of habitat critical for nesting or feeding (during construction and operation);
- long-term/permanent reduction in breeding or wintering bird populations due to electrocution mortality (during operation); and
- cumulative effects with other nearby development proposals that are constructed during the same period, and/or with other developments which pose a potential mortality risk (during operation).

11.5 As specified by Scottish Natural Heritage (SNH) Guidance (SNH, 2018[i]) the potential for significant effects is assessed for species which are considered to be of high and moderate NCI (see **Table 11.3**) and for which a population is known to be present, or is potentially present, in the vicinity of KTR Project, and thus could potentially be affected.

Loss of Habitat and Habitat Modification

11.6 There is a potential for destruction or damage of nests if site clearance and construction activities occur within the breeding season (typically March to August for most species).

11.7 Direct loss of critical habitats due to the land-take for infrastructure (towers/wood poles, access tracks, underground cables[1], wayleave corridors and ancillary structures); and habitat modification due to changes in land management (including windthrow areas) and hydrology may occur. This may be temporary during the construction phase and long-term during the operation phase.

11.8 The extent of the effect of direct loss of habitat will depend on the territory and range size of the species and the availability, and ability of, the species to make use of alternative habitat within that territory or range.

11.9 Birds will also be affected by the restructuring of forest habitats. Forest restructuring will favour species which prefer forest edges and open ground however this may affect some woodland specialist species.

Disturbance and Displacement

11.10 Disturbance of breeding attempts; disturbance of winter roosts; and, displacement of foraging birds from suitable habitats may occur. Temporary disturbance of breeding birds is most likely to result in indirect habitat loss due to displacement of birds through disturbance by activity associated with people and machines in the vicinity of the KTR Project during construction.

11.11 The extent to which disturbance and displacement may occur and the implications for birds are likely to vary depending on the behavioural sensitivity of the species to human disturbance, the nature of the construction activity and the intervening topography, which may influence the avoidance distance a species adopts. Birds that are disturbed at breeding sites are vulnerable to a variety of potential effects on breeding performance, including the chilling or predation of exposed eggs / chicks, damage to or loss of eggs / chicks caused by panicked adults and the premature fledging of the young. Birds disturbed when foraging, may also feed less efficiently and thereby breed or over-winter less successfully. These impacts may lead to a short-term reduction in the productivity of bird populations. Disturbance effects on birds will be confined to areas in the locality of the proposed towers/wood poles and associated ancillary infrastructure, with different species varying in their sensitivity. Larger bird species, those higher up the food chain e.g. most raptors, or those that feed in flocks in the open (e.g. geese) tend to be more susceptible to disturbance than small birds living in structurally complex or closed habitats (e.g. woodlands) (Hill *et al.*, 1997)[ii].

Collision and Electrocution Mortality

11.12 The potential risk of collision or electrocution is greatest in situations where particular factors exist or combine to create the risk such as: migratory flyways; situations where large numbers of birds fly in times of poor visibility or at night; and, areas where a food resource is exceptional (and hence bird activity levels are elevated).

11.13 There is a potential risk of collision with the conductors and towers/wood poles. The risk of collision is considered to be dependent on a number of factors including the amount of flight activity over the OHL connections and bird species behaviour. In addition, the risk is considered to vary between species depending on the ability of birds to detect and manoeuvre around the conductors and earth wires. Finally the position of the OHL in the landscape and habitats, and the configuration of the lines will also affect the risk of collision by birds. The methodology used to describe the risk of collision is detailed in **Appendix 11.2**. For the purposes of the assessment reported in this chapter, birds that collide are assumed to be killed or fatally injured. Collisions with the OHL may occur within a risk window which encompasses the heights of the conductors and earth wires of the OHL; this varies due to the different designs of the each of the connections forming part of the KTR Project. Within this risk window, the actual risk of collision is far smaller than the defined risk window due to the conductors and earth wire only physically occupying a very small proportion of the total area in the risk window. Birds can fly unharmed between the conductors within the risk window.

[1] Relevant to the short section of underground cable proposed for E-G and the undergrounding of the distribution lines as part of P-G via K works

11.14 A large amount of research on the risk of electrocution to birds has been undertaken and it has been understood within the industry for many years how to design poles / towers which minimise or remove the risk of electrocution (e.g. APLIC, 2006[iii]; Ferrer, 2012[iv]). In general, electrocution of birds can occur on structures with: phase conductors separated by less than the wrist-to-wrist or head-to-foot (flesh-to-flesh) distances of a bird; distance between earthed hardware and energised phase conductors that is less than the flesh-to-flesh distance of a bird. The recommended minimum horizontal distance is stated as 1.5m for the wrist-to-wrist measurement of a bird and 1m for head-to-foot measurement (APLIC, 2006)[iii].

11.15 Electrocution risk can be discounted for the majority of the KTR Project, due to the design of the steel lattice towers. The steel lattice towers have conductors which are at least 3.75m apart vertically and are separated by more than 2m vertically from any part of the tower itself. There is a theoretical electrocution risk associated with the wood pole connections (Carsfad to Kendoon (C-K) and Earsltoun to Glenlee (E-G)) which have all the conductors aligned on a horizontal plane attached to a cross-arm and a pole which may appeal to birds as a perch. These however are also designed to ensure reduced risk of electrocution due to the horizontal separation of the conductors by 2.5m and by their separation of 2m vertically from any part of the cross-arms.

11.16 Golden eagle is the largest bird of the current avifauna in the wider area surrounding the KTR Project which is known to be prone to electrocution in other countries, if poles are not appropriately designed and deployed. The dimensions of the wood poles to be used for connections forming part of the KTR Project are greater than the dimensions recommended by Avian Power Line Interaction Committee (APLIC) which take into account eagle species, thus are deemed to be avian-friendly. Furthermore, the design of the wood poles is such that the KTR Project will be safe for any ornithological interest which may expand into the area in the future (e.g. golden eagle; white-tailed eagle).

11.17 Whilst this does not mean that electrocution of birds perched on these structures is impossible, the risk of a significant number of mortality events of birds as a result of electrocution is considered to be negligible, therefore electrocution is not considered further in the assessment reported in this chapter.

Disturbance during operational maintenance

11.18 Maintenance activities associated with the OHLs and the wayleave corridor during operation of the KTR Project may disturb breeding birds. However such activities are infrequent and highly unlikely to be a notable source of disruption. All maintenance activities will be undertaken in line with SP Energy Networks' (SPEN) duties in terms of Schedule 9 of the Electricity Act 1989, and wider commitments to protect flora and fauna. For example, if planned maintenance works need to take place during breeding bird season or adjacent to known protected species, surveys will be undertaken prior to works commencing to determine appropriate mitigation to avoid disturbance. Thus, any potential for disturbance displacement resulting from maintenance activities associated with the operation of the KTR Project will be negligible, and this is not considered further in this assessment.

Effects Scoped Out

11.19 On the basis of the desk based and field survey work undertaken, the professional judgement of the EIA team, experience from other relevant projects and policy, guidance and standards, and feedback received from consultees, a number of potential effects have been 'scoped out' of the detailed assessment reported in this chapter, as detailed in **Table 11.1**.

Table 11.1: Effects Scoped in and Scoped Out

Connection	Potential Effects Scoped in to Detailed Assessment	Potential Effects Scoped out of Detailed Assessment
Polquhanity to Glenlee via Kendoon (P-G via K)	• Short-term/temporary reduction in breeding or wintering bird populations due to construction disturbance (greylag goose, osprey, peregrine, red kite, barn owl). • Long-term/permanent reduction in breeding or wintering bird populations due to collision mortality (greylag goose, osprey, peregrine red kite) • The effects of the removal of N route and R route (north) where they overlap with the P-G via K connection[2]. • Cumulative effects (construction or operational) of any potential effects which are assessed as minor significance or above in isolation for this connection and therefore may be increased cumulatively with other components of the KTR Project and other developments in the relevant Study Area.	• Long-term/permanent reduction in breeding or wintering bird populations due to direct loss of critical habitats for nesting or feeding through land-take for the towers and associated infrastructure. The areas of habitat potentially lost when considered with the size of the ranges of all these species, plus options to continue using the habitat mean effects unlikely to be significant. • Effects on all other bird populations of species of high and moderate NCI. Baseline field studies in 2016 to 2019 recorded very infrequent use of the connection and its survey 'buffers' by species of high and moderate NCI. Although these species were present in the KTR Project as a whole, their reliance on habitats and airspace in the vicinity of the P-G via K connection is so low that there is no potential for an adverse effect on regional or national populations as a result of construction or operational activities. • Effects on all species considered to be of low NCI.
C-K	• As for P-G via K for the following species: red kite).	• As for P-G via K with effects on greylag goose, osprey, peregrine and barn owl also scoped out.
E-G	• As for P-G via K for the following species populations only: red kite.	• As for P-G via K with effects on greylag goose, osprey peregrine and barn owl also scoped out.
BG route Deviation (BG Deviation)	• None (no activity or species of high or moderate NCI were recorded within the survey buffers during any surveys or from the desk studies and consultations which could be used in the assessment).	• All potential effects have been scoped out.
Glenlee to Tongland (G-T)	• Short-term/temporary reduction in breeding or wintering bird populations due to construction disturbance, (whooper swan, greylag goose, curlew, lapwing, osprey, peregrine, red kite, barn owl, golden eagle, hen harrier, goshawk, nightjar, honey-buzzard). • The effects of removal of R route (south)[3] (whooper swan, Greenland white-fronted goose, greylag goose). • Long-term/permanent reduction in breeding or wintering bird populations due to collision mortality (whooper swan, greylag goose, osprey, peregrine, red kite, golden eagle, hen harrier, goshawk, nightjar, honey-buzzard). • Cumulative effects with other nearby development proposals that are constructed during the same period, and/or with other developments which pose a potential mortality risk.	• Long-term/permanent reduction in breeding or wintering bird populations due to direct loss of critical habitats, for nesting or feeding (whooper swan, Greenland white-fronted goose, greylag goose, curlew, lapwing, osprey, peregrine, red kite, barn owl, golden eagle, hen harrier, goshawk, nightjar, honey-buzzard). The areas of habitat potentially lost when considered with the size of the ranges of all these species, plus options to continue using the habitat mean effects unlikely to be significant. • Effects on the all other bird populations of species of high and moderate NCI. Baseline field studies in 2016 to 2019 recorded very infrequent use of this connection and its buffers by these species of high and moderate NCI. Although these species were present in the KTR Project as a whole, their reliance on habitats and airspace in the vicinity of this connection is so low that there is no potential for an adverse effect on regional or national populations as a result of construction or operational activities. • Effects on all species considered to be of low NCI.
KTR Project as a	• Short-term reduction in breeding or wintering bird populations due to	• For appropriate assessment purposes Effects on internationally and nationally

[2] In this context N route and R route (north) are those sections of N and R routes which overlap with P-G via K connection and which are north of Glenlee substation.

[3] In this context R route (south) is that section of R route which overlaps with G-T and which is south of Glenlee substation.

Connection	Potential Effects Scoped in to Detailed Assessment	Potential Effects Scoped out of Detailed Assessment
Whole	construction disturbance; including the effects of the N and R routes removal (whooper swan, Greenland white-fronted goose, greylag goose, curlew, lapwing, osprey, peregrine, red kite, barn owl, golden eagle, hen harrier, goshawk, nightjar, honey-buzzard). • A long-term/permanent reduction in breeding or wintering bird populations due to collision mortality; including the effects of the N and R route removal (whooper swan, Greenland white-fronted goose, greylag goose, osprey, peregrine, red kite, golden eagle, hen harrier, goshawk, nightjar, honey-buzzard). • Cumulative effects with other nearby development proposals that are constructed and/or in operation during the same period, and/or with other developments which pose a potential mortality risk. • For the purposes of an Appropriate Assessment the Effects on the LKRDM SPA (and Ramsar site) (qualifying species greylag goose and Greenland white-fronted goose) including the effects of the R route removal.	designated sites: For all sites except the LKRDM SPA (and Ramsar site), this was agreed with SNH during the scoping stage as no significant effects are predicted. • A long-term/permanent reduction in breeding or wintering bird populations due to direct loss of critical habitats; for nesting or feeding (whooper swan, Greenland white-fronted goose, greylag goose, curlew, lapwing, osprey, peregrine, red kite, barn owl, golden eagle, hen harrier, goshawk, nightjar, honey-buzzard)

Assessment Methodology

Legislation and Guidance

Legislation

11.20 This assessment is carried out in accordance with the principles contained within the following legislation:

- The Wildlife and Countryside Act 1981 (as amended) (WCA);
- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended) (EIA Regulations);
- Environmental Impact Assessment Directive 2011/92/EU (as amended);
- The Conservation of Habitats and Species Regulations 2017[4] ('the Habitats Regulations');
- The Nature Conservation (Scotland) Act 2004 (as amended); and
- The Council Directive on the Conservation of Wild Birds 2009/147/EC (The EU 'Birds Directive').

Guidance

11.21 This assessment is carried out in accordance with the principles contained within the following documents:

- SNH Guidance: Assessment and Mitigation of Impacts of Power Lines and Guyed Meteorological Masts on Birds (SNH, 2016)[v];
- SNH Guidance: Assessing Connectivity with Special Protection Areas (SPAs) (SNH, 2016)[vi];
- SNH Guidance: Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms (SNH, 2014[vii])[5]; and
- SNH Guidance: Assessing Significance of Impacts from Onshore Windfarms on Birds outwith Designated Areas (SNH, 2018[i])[6].

Consultation

11.22 In undertaking the assessment, consideration has been given to the scoping responses and other consultation as detailed in **Table 11.2**.

Table 11.2: Consultation Responses

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action Taken
Scottish Ministers	Formal Scoping Opinion	Stated that "*the EIA should include a thorough investigation of appropriate mitigation measures to minimise any potential effects to Nightjar along the Glenlee to Tongland connection and any other area where nightjar is assessed as being at risk.*"	To ensure all practicable measures are taken to avoid adverse effects on the regional populations of nightjar and key raptor species, felling and construction operations will be avoided during the breeding period in certain areas as outlined in this Chapter Mitigation methods such as temporal avoidance of disturbance during construction are proposed and this is outlined in this Chapter. In addition, opportunities for habitat enhancement are proposed in and around the wayleave which will benefit species including nightjar (see **Appendix 5.1: Forest Design Concept)**
		Suggested "*mitigation measures should be considered to reduce the potential effects to red kite through consideration to micrositing and/or timing of works during the breeding season relating to active nest sites.*"	Current red kite nest locations and communal winter roosts have been identified and advice provided on buffers required during construction. Construction will be timed to avoid disturbance in areas where this is necessary. This will be supplemented by pre-construction surveys to identify any additional areas where construction timing will need to avoid disturbance during the breeding season. Where mitigation is deemed necessary measures have been proposed, as outlined in this Chapter.
		Drew attention to "*the requirement highlighted by the Royal Society for the Protection of Birds (RSPB) to ensure survey methodology is suitable to properly assess abundance and distribution of nightjar and black grouse onsite. This would include pre-dawn lek surveys for black grouse and survey for churring male nightjars at dusk*".	All survey work including surveys for abundance and distribution of all species have been undertaken in accordance with relevant SNH Guidance. This includes surveys for churring nightjar and pre-dawn surveys for black grouse. Survey methods were agreed with SNH, in consultation with RSPB. Additional data were provided by the RSPB on nightjar and black grouse distribution and by the Dumfries and Galloway Nightjar study group (DGNSG) for nightjar distribution. (see **Appendix 11.3**)
		Stated that "*RSPB should be consulted along with SNH to determine the need for additional survey work after the collation of the first year's survey*	Following completion of the first year of surveys, a first year report of survey effort and results was produced and issued to SNH and RSPB. Confirmation of the requirement for and scope of

[4] The 2017 regulations apply in Scotland in relation to certain specific activities including consents granted under section 37 of the Electricity Act 1989 and directions that planning permission is deemed to be granted in terms of section 57(2) of the Town and Country Planning (Scotland) Act 1997.

[5] SNH recommend that surveys to allow the assessment of effects of powerline developments on birds should follow this guidance.

[6] SNH recommend that determining the significance of effects on birds arising from powerline developments should follow this guidance.

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action Taken
		results."	additional surveys on certain species for a second year was agreed with SNH and RSPB. (See RSPB and SNH sections in this table for details).
		Adopted the RSPB's recommendation that baseline data is collated in relation to nightjar flight activity for the routes that pose the highest risk for this species. This could be achieved through assessing the frequency of flights at risk height from vantage point watches.	A proposal for additional flight activity surveys was submitted and approved by SNH and RSPB (see relevant section below in this table). Surveys were conducted to attempt to collect data in relation to nightjar flight activity in 2018 and 2019. These data are presented in this Chapter (and see **Appendix 11.3**).
SNH	Formal Scoping Consultation 26 May 2017	Stated "*the scope and methods are appropriate and we are content with the approach proposed regarding the review of an initial year's data*."	The surveys were carried out as per the methods in the Scoping Report and a first year report issued to SNH 25/08/2017 for review and discussion on the requirement for further surveys in 2018 see section below in this table.
		Advised that data should be provided to allow the competent authority to undertake an appropriate assessment as part of a Habitats Regulations Appraisal (HRA) in respect of the LKRDM SPA (and Ramsar site).	This chapter and associated Appendices provide the data to enable the competent authority to undertake the appropriate assessment and are summarised in relation to the HRA (and see **Appendix 11.4**).
		Advise that there is no need for a HRA with respect to any other SPAs.	Noted.
	Other Consultation Scope of works issued via email 25/10/2016 SNH response received via email 18/11/2016	Details of proposed surveys were provided to SNH for comment prior to commencement of survey work. SNH responded with their acceptance of the scope of work and requested clarification on the target species for vantage point (VP) watches, suggesting red kite should be included due to the proximity of the Laurieston feeding site.	Surveys were carried out as described in the **Appendix 11.1** to this EIA Report In relation to red kites, considerable data are available for the breeding and non-breeding seasons and the location of these sites were utilised to inform the route of the KTR Project. The feeding station is at its closest about 2.1km from the OHL. Thus it was not considered necessary to specifically target surveys on gathering flight activity/habitat use data on red kites. During all other VP work, information was gathered on the presence and flight height of red kites to inform the assessment of effects on this population.
	Other Consultation First Year survey report issued via email on 25/08/2017 SNH response received on 28 August 2017	Accepted the first year survey report and confirmed SNH were content with proposals for the second year of surveys.	Surveys were carried out in the second year as outlined in the report. The methods and results are reported on in this chapter and the appendices.
	Other Consultation SNH Replied on 11/01/2018 and 08/03/2018 to email from NRP on 11/01/2018 outlining proposed additional surveys of nightjar flight activity	Commented on the scope of works for the surveys in 2018 which included the proposed survey method for nightjar flight activity. Additionally confirmed that the proposed surveys for nightjar for 2018 were appropriate.	Proposed survey methods for nightjar were provided in January 2018. Surveys were carried out between May to July 2018 (and further surveys in May to August 2019). Results are provided in this chapter and the appendices.
	Other Consultation Response via email on 21/01/2019 to the confidential interim report on the results of all surveys	Confirmed that "*the report provides welcome reassurance regarding potential bird impacts*."	Further survey information included in this chapter and associated appendices.
	Other Consultation Meeting on 19/03/2019 and email received on 19/04/2019 re further nightjar survey work in 2019	Meeting held with SNH (and RSPB) to discuss the results of the 2018 surveys and the potential need for additional surveys for nightjar to gather more detail on flight height. SNH subsequently confirmed the proposed surveys for nightjar in 2019 were appropriate.	Meeting on 19/03/2019 re the report on the 2018 survey findings and discussion on proposed further surveys. Email sent on 17/04/2019 in response to the discussion at the meeting outlining further nightjar survey work proposed in 2019. Surveys for nightjar, including flight activity surveys were carried out in 2019, the findings are presented within this chapter.
RSPB	Formal Scoping Consultation 23 May 2017	Advised that "*the EIA includes a thorough investigation of appropriate mitigation measures to minimise any potential effects to nightjar along the G-T connection of the preferred route and any other area where nightjar is assessed as being at risk.*"	As above in the section relating to the comments raised by the Scottish Ministers
		Advised that "*mitigation measures are considered to reduce the potential effect to red kite through consideration to micrositing and/or timing of works during the breeding season relating to active nests*."	As above in the section relating to the comments raised by the Scottish Ministers.
		Highlighted "*the requirement to ensure the survey methodology is suitable to properly assess abundance and distribution of black grouse and nightjar onsite. This would include pre-dawn lek surveys for black grouse and surveys for churring male nightjars at dusk*."	As above in the section relating to the comments raised by the Scottish Ministers. All survey work has been undertaken in accordance with relevant SNH Guidance, including surveys for nightjar and black grouse.
		Requested that RSPB be included in the consultation after the collation of the first year's survey results.	RSPB were provided with the first year report on 25/08/2017 and consulted on the requirement for further surveys.
		Recommended that "*baseline data is collated in relation to nightjar flight activity for the routes that pose the highest risk for this species. This could be achieved through assessing the frequency of flights at risk height from vantage point watches*."	As above in the section relating to the comments raised by the Scottish Ministers. Flight activity in locations along the proposed route was observed and flight heights quantified in 2018. Further surveys were carried out in 2019.
		Suggested that removal of the existing 132kV lines during the non-breeding season would require programming of the works to consider the potential effects on Greenland white-fronted geese.	This has been completed in the EIA chapter. The decommissioning programme for removal of the existing line (R route (south)) through the SPA takes into account the non-breeding season.

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action Taken
	Other Consultation RSPB Replied on 15/01/2018 to email from NRP on 11/01/2018 outlining proposed additional surveys of nightjar flight activity	Commented on the proposed survey method which included the proposed survey method for nightjar flight. Requested collection of some basic data on nightjar flight height as well as frequency for the VP watches.	Data were collected on nightjar flight heights during 2018 and 2019 surveys, and are reported on in this chapter and its associated appendices.
	Other Consultation Response via email on 05/02/2019 to the confidential interim report on the results of all surveys for nightjar and golden eagle	One of RSPB's "*main concerns has been the potential for effects on nightjar where the route is proposed to pass directly through a core area in the park,"* and they "*have maintained that undergrounding in this section should be considered.*" RSPB remained "*concerned as to the risk of collision for nightjar particularly, in the section where it is proposed to intersect*" the core area of activity. RSPB acknowledged "*the results of the survey work"* and "*the challenges in assessing flight heights"* and asked that this is "*fully factored into any assessment relating to assessment of risk to nightjar through collision in the EIA. In terms of mitigation measures",* RSPB stated that "*the detail of this would need to be given full consideration*."	Concerns noted and further discussion on the possibility of nightjar flights and risk of collisions was undertaken at the meeting on 19/03/2019. Further survey work has been undertaken in 2019 to provide further context on nightjar use of the forest and supplement the data gathered in 2018 and further desk studies collated in 2019.The survey results and consideration of possible effects on nightjar are presented in this chapter and its associated appendices.
	Other Consultation Meeting on 19/03/2019 and emails received on 26/04/2019 & 02/05/2019 re further nightjar survey work in 2019	Meeting discussed the results of the 2018 surveys and the potential need for additional surveys on nightjar to gain more detail on flight height. Further information on survey methods were provided.	Meeting held on 19/03/2019 (with SNH) in relation to the report on the 2018 survey findings and discussion on proposed further surveys. Email sent on 17/04/2019 in response to the discussion at the meeting outlining further nightjar survey work proposed in 2019. Comments received from RSPB were taken on board during 2019 surveys to ensure data collected was appropriate to inform the assessment of effects on nightjar.
	Other Consultation Emails received on 16/03/2017 & 13/05/2019	Formally provided data on various scarce breeding birds within the area of the KTR Project.	Data provided are presented in the **Appendix 11.3** (Confidential Annex) of this chapter.
	Other Consultation Phone and email throughout survey period	Provided data on various scarce breeding birds within the area of the KTR Project.	As both RSPB and Dumfries and Galloway Raptor Study Group (DGRSG) monitor various species in the area, during the survey period surveyors maintained regular contact via phone and email prior to survey visits with RSPB and DGRSG to ensure no unnecessary disturbance occurred and to ensure data gathered is appropriate to inform the assessment.
Dumfries and Galloway Raptor Study Group (DGRSG)	Other Consultation Phone and email throughout survey period	Provided data on various scarce breeding birds within the area of the KTR Project.	As both RSPB and DGRSG monitor various species in the area, during the survey period surveyors maintained regular contact via phone and email prior to survey visits with RSPB and DGRSG to ensure no unnecessary disturbance occurred and to ensure data gathered is appropriate to inform the assessment.
	Other consultation Email on 10/05/2019 29/05/2019 & 30/05/2019	Provided data on various scarce breeding birds within the area of the KTR Project.	Data provided are presented in the **Appendix 11.3** (Confidential Annex) of this chapter.
Forestry & Land Scotland (FLS) (formerly Forest Enterprise Scotland)[7]	Other Consultation Email 11/03/2019	FLS provided maps and information on nightjar management areas and management plans for this species on the FLS estate.	This information was used for this chapter and its associated appendices and also for planning survey work for 2019.
	Other Consultation Meeting on 19/03/2019 and email received on 18/04/2019 re further nightjar survey work in 2019	Meeting held to discuss the results of the 2018 surveys and the potential need for additional surveys on nightjar to gain more detail on flight height. Subsequent response to proposals for 2019 nightjar surveys, advised that the proposals seem appropriate but defer to SNH and RSPB in relation to the detail.	Meeting on 19/03/2019 regarding the report on the 2018 survey findings and discussion on proposed further surveys. Email sent on 17/04/2019 in response to the discussion at the meeting outlining further nightjar survey work proposed in 2019.
Dumfries and Galloway Nightjar Study Group (DGNSG)	Other Consultation	Provided data on their monitoring survey results for 2017 and 2018	Surveys to inform the assessment were undertaken in consultation with the group. Data provided is presented in the **Appendix 11.3** (Confidential Annex) of this chapter.
Wildfowl & Wetlands Trust (WWT)	Other Consultation	Provided data from their monitoring of Greenland white-fronted goose feeding fields around the LKRDM SPA (and Ramsar site); GPS tag data from whooper swans and barnacle geese passing through the region on migration	Data were used to inform the route selection for the connections and for background to the assessment in this chapter.

Study Area

11.23 The Study Area was defined with reference to the location of the preferred route for each connection forming part of the KTR Project and encompasses a series of buffers of generally up to 2km radius; with buffer size as defined by SNH guidance (SNH, 2016[v]; SNH, 2014[vii]) and dependent on the sensitivity of key species to potential effects associated with developments (see **Figure 11.1** and **Appendix 11.1**). The survey areas which make up the Study Area are defined as follows:

- 'site' refers to the area enclosed by the infrastructure and wayleave corridor for the KTR Project (including the 100m infrastructure location allowance (ILA));
- 'breeding bird survey area', 'winter walkover survey area', ' core survey area' or 'flight activity survey area' refers to the site plus an additional 500m buffer around the site;
- 'black grouse survey area' refers to the site plus an additional 1.5km buffer;
- 'scarce bird survey area' refers to the site plus an additional 2km buffer depending on the focal species (1km for goshawk and barn owl, 6km for golden eagle) and the presence of contiguous suitable habitat outside of the core survey area.

11.24 The current land use of the site and survey area includes upland moorland, commercial forestry, agricultural land and waterbodies.

[7] FLS was consulted due to their ongoing habitat management programme for nightjar in the forest which the KTR Project is proposed.

Desk Based Research and Data Sources

11.25 A desk based study was undertaken to collate existing bird records/data. Distribution and abundance data were collected from published sources and consultees.

- SNH Sitelink (online information about designated sites);
- UK Biodiversity Action Plan (BAP);
- The Birds of Conservation Concern (BoCC) (Eaton *et al.*, 2015)[viii];
- International Union for the Conservation of Nature (IUCN, 2018)[ix] Red list of threatened species;
- Scottish Biodiversity List (Scottish Biodiversity Forum, 2013)[x];
- National Biodiversity Network (NBN) Gateway website (https://data.nbn.org.uk/);
- RSPB;
  - current and historical survey records on various scarce breeding birds 16/03/2017 & 13/05/2019.
- DGRSG;
  - information on scarce breeding raptors including current and historical survey records throughout survey period and formally on 10/05/2019.
- DGNSG;
  - data on their monitoring survey results for 2017 and 2018.
- FLS;
  - maps and information on nightjar management areas and management plans for nightjar on the FLS estate 11/03/2019.
- WWT;
  - Data on barnacle goose, Greenland white-fronted goose and whooper swan including data from GPS tracking devices received on 22/09/2015.

Field Survey

11.26 Baseline field surveys were carried out between October 2016 and August 2019. A detailed methodology for all surveys is provided in the **Appendices 11.1** and **11.3** and is summarised below.

11.27 Information on bird flight activity was collected in targeted watches from a number of VPs. Migration watch VPs (MWPs)[8] and focal VPs (FVPs) were located to provide views over the 500m buffer of the KTR Project in areas identified through the desk study and during consultation (including Laughenghie and Airie Hills Special Site of Scientific Interest (SSSI), Laurieston Forest, LKRDM SPA (and Ramsar site) and associated SSSIs), where species of High Nature Conservation Concern were considered likely to occur (see **Figure 11.1**).

11.28 In addition, a number of other surveys were conducted to identify breeding sites of scarce raptors and owls in appropriate buffers (1km, 2km and 6km dependent on species); to search for displaying male black grouse (in a 1.5km buffer); to provide an inventory of breeding waders (in a 500m buffer); and to locate singing ("churring") nightjar (in a 2km buffer) and quantify their flight activity (in a 500m buffer) (**Figure 11.1**).

11.29 With the exception of the point where the existing R route (south) lies within the LKRDM SPA (and Ramsar site) (**Figure 11.1** and **11.7**), no surveys were required or carried out along the existing N and R routes. These will be surveyed at a time closer to the removal of the OHL to ensure breeding, foraging and roosting species are protected from disturbance where necessary during the decommissioning works.

Wildfowl

Wildfowl Flight Activity

11.30 Due to the presence of wintering wildfowl, targeted flight activity surveys from a total of seven MWPs were undertaken during the two migration periods (spring (March and April) and autumn (October to November). The MWPs aimed to record movements by the LKRDM SPA (and Ramsar site)'s qualifying species (Greenland white-fronted goose and greylag goose) along with other species including whooper swan (a qualifying species for the River Dee (Parton to Crossmichael) SSSI and pink-footed goose near to the northern sections of the KTR Project, north of the River Dee SSSI the main designated part of the SPA (and Ramsar site) with relevance to birds. This method was agreed with SNH in November 2016 (**Table 11.2**). Five MWP locations (MWPs 1-5) were identified and used during the autumn (October and November 2016) and five (MWPs 1, 2, 5-7) for spring (March and April 2017) wildfowl migration periods (**Figure 11.1**). 36 hours of watches were completed during each of these periods from these MWPs. Flight lines were mapped and flight heights estimated.

11.31 P-G via K connection in part was covered by MWP1 and MWP2; C-K connection by MWP1; E-G, BG Deviation in part and part of G-T connections by MWP2; relevant parts of G-T connection were covered by MWPs 3-7.

Wildfowl Roost Activity

11.32 Weekly winter roost watches were completed from a focal VP (FVP5) for Greenland white-fronted goose at the historical roost area at Stroan Loch in the vicinity of G-T connection during the winters of 2016/2017 and 2017/2018 (**Figure 11.1**).These watches were carried out during dawn and dusk periods to attempt to observe any birds coming to or leaving the roost area. In total 48.75 hours of observation were completed between November 2016 and March 2017 and 46.50 hours between October 2017 and April 2018.

11.33 Watches were undertaken from a single FVP (FVP6) overlooking the route of the existing OHL (R route (south) to be removed) where it crosses the LKRDM SPA (and Ramsar site) with the purpose of recording flight lines of Greenland white-fronted geese and greylag geese between roosting and feeding areas **(Figure 11.1**). Approximately 16 hours per month were completed (based on two two hour watches per week) during two non-breeding periods (between October and April of 2017-2018 and 2018-2019).

11.34 In addition to the Greenland white-fronted geese and greylag geese flights, other wildfowl species' flights were also recorded including whooper swan, pink-footed goose and various duck species. Observers mapped flight lines and estimated flight heights, as well as noting whether the birds passed over, between or under the conductors of the existing OHL.

Wildfowl collision with existing line

11.35 Due to the possibility that wildfowl are potentially at risk from collision with OHLs, especially at the point where the existing OHL (R route (south)) crosses Loch Ken within the LKRDM SPA (and Ramsar site), searches for potential wildfowl victims of collision were carried out for two winters (between October and April of 2017- 2018 and 2018-2019). These searches occurred approximately weekly and the ground which was accessible under this section of the route (R route (south) to be removed) was checked for carcasses to approximately 25m either side for approximately 2km length of the existing OHL (**Figure 11.7**). If a carcass was found the location was noted, attempts to identify the species were made, and an assessment of whether it may have collided with the line was also made.

Raptors and Owls

Raptor and Owl Flight Activity

11.36 Targeted surveys to provide information to determine the flight activity and ranging behaviour of certain key raptor species was completed (including hen harrier and golden eagle). The field work included systematic year-round FVP watches totalling approximately 24 hours per month and a monthly check for roosting hen harriers during the non-breeding season (October to March of 2016-2017 and 2017-2018) (**Appendix 11.1, 11.3, Confidential Figure 1**).

11.37 No FVPs were set up specifically for any other raptor species individually, as their population size in the survey area in respect to the overall population within the region and risk of collision was judged to be too low as to necessitate the surveys. This approach was agreed with SNH in 2016 (**Table 11.2**).

11.38 However, sightings of flights by all species of scarce raptor or owl which occurred during the MWP or FVP watches were recorded and all flight durations and elevations were noted, except for red kite flights. Red kite flight activity was summarised as a count of birds present and flying within each five minute period of the survey hours.

11.39 As they were targeted on certain species known to be present based on the desk study findings, all FVPs for raptors and owls were along the G-T Connection.

[8] A MWP is a vantage point location where watches are carried during the bird main migration periods (March and April, and October to November only). A FVP can used during other periods e.g. all winter, all year.

Raptor and Owl breeding and roosting areas

11.40 Targeted surveys to provide information to determine the presence, distribution and nest locations of certain key raptor and owl species were undertaken during March to August of 2017 and 2018. This included 200 hours of surveys to determine raptor breeding status within the 2km buffer of the KTR Project and barn owl breeding status within the 1km buffer (**Figure 11.1**). To avoid unnecessary disturbance of these protected species this aspect of the work was undertaken by the licenced observers in close liaison with the DGRSG and RSPB.

11.41 Priority was given to the species considered most likely to breed in the area on the basis of the collated desk based data: goshawk, osprey, hen harrier, red kite, honey-buzzard, peregrine, merlin, barn owl, short-eared owl and golden eagle. Survey methods in Hardey *et al.* (2013)[xi] were followed, whereby habitats considered suitable for possible breeding and roosting were searched for signs and watched over for activity which might indicate use of the area.

11.42 Surveys covered all suitable habitats within all new connections forming part of the KTR Project.

Nightjar

11.43 Targeted surveys were undertaken for nightjar, taking account of the comment from the Scottish Ministers and RSPB in their Scoping Opinion responses on the survey methodology. These surveys included searches for singing ("churring") males in suitable habitat of the KTR Project within the 2km buffer during May and June 2017 and 2018 (**Figure 11.1**). Survey methods based on those described in Gilbert *et al*. (1998) [xii] were followed and comprised observers listening and watching from suitable locations near suitable habitat, for churring male nightjars. Locations were mapped and compared to allow a summary map to be compiled. Some surveys were undertaken in coordination with the DGNSG and information from the surveys was supplemented by data provided by the DGNSG.

11.44 In addition 82 hours of watches for flight activity in the vicinity of the KTR Project were undertaken during May to July 2018 and June to August 2019. These surveys were within the FLS management area for nightjar mainly within the 500m survey buffer of the KTR Project (**Appendix 11.3**, **Confidential Figures 2b & 2c**). Focal VPs were identified which allowed the observer to watch for flight activity in areas of known occupation and to gather basic data on flight heights. Flights were mapped and flight heights estimated. During the 2019 surveys a thermal imaging device was used to allow information on areas of activity and flight heights to be gathered over a wider area for this nocturnal species (methods were agreed in with SNH in consultation with RSPB and FLS).

11.45 As they were targeted on certain areas known to be suitable for nightjar based on the desk study findings and consultations, all surveys were undertaken within the G-T connection Study Area.

Black grouse

11.46 Targeted surveys (51.5 hours) were undertaken for displaying black grouse within the 1.5km survey buffer during 2017 and 2018, taking account of the comment from the Scottish Ministers and RSPB in their Scoping Opinion responses on the survey methodology. The methods employed were based on those described in Gilbert *et al.* (1998) [xii]. Surveys were undertaken during the early morning in calm, dry weather with good visibility. Observers walked quietly and listened and scanned the areas considered suitable for black grouse. In total 19.75 hours were spent searching for black grouse in 2017 and 31.75 hours in 2018.

11.47 Surveys covered all suitable habitats within all new connections forming part of the KTR Project.

Breeding waders

11.48 Breeding waders (including curlew, oystercatcher and lapwing) were surveyed using standard three visit methods (Brown & Shepherd, 1993)[xiii] during April to July 2017. In total around 63 hours of walkover surveys were undertaken to determine these species' presence and distribution adjacent to the connections forming part of the KTR Project.

11.49 The surveys aimed to cover the ground systematically with a constant search effort. All suitable ground within the 500m survey boundary was approached closely. Surveyors paused at regular intervals to scan and listen for calling and singing birds. Careful attention was given to recording behaviour indicative of breeding and care was taken to avoid counting the same individual more than once. Population estimates were derived by comparing the summary maps for the three visits.

11.50 Surveys covered all suitable habitats within all new connections forming part of the KTR Project.

Assessing Significance

11.51 The assessment follows the approach set out in EIA Regulations. The process of evaluating the effects of the KTR Project on birds seeks to ensure that the competent authority (Scottish Ministers) have sufficient information in relation to the likely significant effects of construction and operation of the new connections comprising the KTR Project and removal of the N and R routes on bird interests. In addition, a Shadow Appropriate Assessment to assist the competent authority's appropriate assessment of the implications of the KTR Project for the LKRDM SPA (and Ramsar site) in view of that site's conservation objectives has been provided in **Appendix 11.4**.

11.52 Effects are evaluated against the existing baseline conditions, i.e. without the new connections forming part of the KTR Project present, but including the existing N and R routes. The evaluation assumes that there are no existing (baseline) significant adverse effects on the population, range or distribution of a species (although collisions (especially by Greenland white-fronted goose and greylag goose) do occur where the existing R route (south) crosses the LKRDM SPA (and Ramsar site)[9]; and no significant interference with the flight paths of migratory birds. If any mitigation is required in relation to likely significant effects associated with the KTR Project this is then identified, and the residual effects re-assessed with this included.

11.53 In assessing the effects, emphasis is given to the national and regional populations of the species. Regional populations are those occurring within the host Natural Heritage Zone (NHZ) as defined by SNH (SNH, 2001)[xiv]. This approach is used unless a wider area ecologically pertinent to the KTR Project is required for specific species due to their distribution (e.g. nightjar and golden eagle is south Scotland).

11.54 The assessment reported in this chapter first identifies the potential effects of each connection comprising the KTR Project and considers the likelihood of their occurrence. For the purposes of this assessment, an effect is defined as a change in the assemblage of the bird species present, as a result of the construction or operation of the KTR Project. Effects can be adverse, neutral or beneficial. A judgement is then made as to whether or not they are significant in the context of the EIA Regulations. Subsequently, mitigation measures and the likely residual effects are considered.

11.55 In assessing whether an effect is significant, three factors are taken into account which determine the sensitivity of the species to each potential effect and the magnitude of the changes which could be brought about by the potential effects on the population of each species:

- The NCI of the species involved;
- The magnitude of likely effects (spatial and temporal); and
- The conservation status of the species.

11.56 Following the classification of each species' NCI and consideration of the magnitude of each effect and behavioural sensitivity, professional judgement is used to make a reasoned assessment of the likely effect on the conservation status of each potentially affected species.

Determining the Magnitude of Change and Sensitivity of Receptors

Methods Used to Evaluate Nature Conservation Importance

11.57 The NCI of each species potentially affected by the KTR Project is defined according to **Table 11.3**.

Table 11.3 Nature Conservation Importance

Importance	Definition
High	Species listed in Annex 1 of the EU Birds Directive. Breeding species listed on Schedule 1 of the WCA. Species listed on Schedule 1A and A1 of the WCA. Species cited in the qualifying features for international designated sites or notified features of national designated sites within 20km of the KTR Project.

[9] This assumption is made on the basis that SNH assessed the SPA condition as Favourable Maintained for both species (in 2007 for Greenland white-fronted goose, and in 2010 for greylag goose), indicating that during the lifetime of the presence of the current R route, effects of collision are not known to be significantly adverse on these wintering populations, however collisions do occur and there is no data available on the collision rates on current R route, and this would be difficult to ascertain as there is no approved collision risk model for OHLs or an agreed avoidance rate to use for these species.

Importance	Definition
Moderate	Species cited on the BoCC 'Red list' (Eaton *et al.,* 2015) or the IUCN 'Red list – Near Threatened' (IUCN, 2018). Regularly occurring migratory species, which are either rare or vulnerable, or warrant special consideration on account of the proximity of migration routes, or breeding, moulting, wintering or staging areas in relation to the KTR Project. Species present in regionally important numbers (>1% regional population).
Low	All other species not falling within the categories mentioned above.

Species listed in Local BAPs (LBAPs) will be considered moderately important only if the KTR Project supports at least 1% of the regional population.

Magnitude

11.58 The magnitude of change has been determined by consideration of the spatial and temporal nature of each effect. There are five levels of spatial magnitude (**Table 11.4**) and four levels of temporal magnitude (**Table 11.5**). For the majority of other species which are included in the assessment where the species considered is not connected to a designated site the spatial magnitude is assessed in respect of regional populations within the Western Southern Uplands and Inner Solway Natural Heritage Zone (NHZ 19) as defined by SNH (SNH, 2001)[xiv]. Due to their range and smaller population size for nightjar and for golden eagle the area is defined as South Scotland.

Table 11.4 Levels of Spatial Magnitude

Magnitude	Definition
Very High	Total/near loss of a bird population due to mortality or displacement. Total/near loss of productivity in a bird population due to disturbance. Guide: >80% of regional population affected.
High	Major reduction in the status or productivity of a bird population due to mortality, displacement or disturbance. Guide: 21-80% of regional population affected.
Moderate	Partial reduction in the status or productivity of a bird population due to mortality, displacement or disturbance. Guide: 6-20% of regional population affected.
Low	Small but discernible reduction in the status or productivity of a bird population due to mortality, displacement or disturbance. Guide: 1-5% of regional population affected.
Negligible	Very slight reduction in the status or productivity of a bird population due to mortality, displacement or disturbance. Reduction barely discernible, approximating to the 'no change' situation. Guide: <1% of regional population affected.

Table 11.5 Levels of Temporal Magnitude

Magnitude	Definition
Permanent	Effects continuing indefinitely beyond the span of one human generation (taken as approximately 25 years), except where there is likely to be substantial improvement after this period (e.g. the replacement of mature trees by young trees which need >25 years to reach maturity). Such exceptions can be termed very long effects.
Long-term	Approximately 15 to 25 years or longer (refer to above).
Medium-term	Approximately five to 15 years.
Short-term	Up to approximately five years.

11.59 The magnitude of an effect can be influenced by when it occurs. For example, operations undertaken in daylight hours may have little temporal overlap with the occupancy of birds' night-time roosts, and seasonality in a bird population's occupancy of a site may mean that effects are unlikely during certain periods of the year. Using professional judgement this is taken into account when defining the magnitude of the effects on the species.

11.60 A populations' behavioural sensitivity may also be considered when assessing the magnitude of effects and the species' overall sensitivity to them. Behavioural sensitivity may be judged as being high, moderate or low according to a species' ecological function and behaviour. Behavioural sensitivity can differ even between similar species and, for particular species, some populations and individuals may be more sensitive than others, and sensitivity may change over time e.g. species are often more sensitive during the breeding season. Using professional judgement this is also taken into account when defining the magnitude of the effects on the species.

Determining Conservation Status

11.61 Where the data allow, the conservation status of each potentially affected population is considered within the region. For these purposes conservation status is taken to mean the sum of the influences acting on a population which may affect its long-term distribution and abundance. Conservation status is considered to be favourable where:

- A species appears to be maintaining itself on a long-term basis as a viable component of its habitats;
- The natural range of the species is not being reduced, nor is likely to be reduced for the foreseeable future; and
- There is (and will probably continue to be) sufficient habitat to maintain the species' population on a long-term basis.

Significance

11.62 In accordance with EIA Regulations each effect is evaluated and classified as either significant (**major** or **moderate**) or not significant (**minor** or **none**). The significance levels of effects on bird populations are described in **Table 11.6**. Effects resulting in detectable changes in the conservation status of regional populations of NCI are automatically considered to be significant effects for the purposes of the EIA Regulations (i.e. no distinction between effects of '**majo**r' or '**moderate**' significance). Non-significant effects include all those which are likely to result in small to barely detectable (**minor**) or non-detectable (i.e. **none**) changes in conservation status of regional (and therefore national) populations.

11.63 If an effect is determined to be significant adverse, measures to mitigate the effect are proposed wherever possible, and the effect is then re-evaluated as a residual effect.

Table 11.6: Significance Criteria

Significance of Effect	Description
Major	Detectable changes in regional populations of NCI that would have a severe impact on conservation status.
Moderate	Detectable changes in regional populations of NCI that would have an impact on their conservation status.
Minor	Small or barely discernible changes in regional populations that would be unlikely to have an impact on the conservation status of regional populations of NCI.
None	No or non-detectable changes in the conservation status of regional populations of NCI.

Cumulative Assessment

11.64 Cumulative changes involve the same impacts and potential effects for individual site-based construction and operational changes, but on an accumulated basis across several projects i.e. the addition of the effects of the individual connections to those determined or assessed for other projects (including the other connections of the KTR Project). When considering the individual connections of the KTR Project cumulatively with the other individual connections in the KTR Project there is a likelihood of construction processes coinciding therefore the potential cumulative construction and operational effects are considered.

11.65 The assessment of cumulative effects is limited to species of High or Moderate NCI for which there is a likely effect as a result of the connection being assessed, that may be exacerbated cumulatively with other projects as regards influencing the species' conservation status, therefore only effects assessed as minor or above (for an individual connection) are included in the cumulative assessment. Reference should be made to the Cumulative Assessment section in relation to the connections below for greater detail.

Assessment Limitations

11.66 The available information on bird populations at the NHZ and regional level is limited, and available information on the results of monitoring, mitigation and enhancement work at other existing and proposed developments (which could be useful in informing the assessment of both the KTR Project in isolation and cumulatively with other developments), is sparse. Therefore, as is standard with these assessments, use is necessarily made of the available literature and professional judgement to inform the assessment.

11.67 Unlike for wind turbines there are no defined methods for modelling an estimation of collision risk for birds and OHLs. Bespoke methods are beset with issues and inevitably rely on the inclusion of an avoidance rate which is most often derived from non-empirical data. SNH in their Guidance (SNH, 2016)[v] state they "*do not therefore currently recommend a generic modelling approach.*" Therefore an assessment of bird collision risk with the KTR Project is limited in scope and will not use any predictive modelling. A method has been devised to describe the collision risk based on information on the relevant species' behaviour, biology and using the empirical baseline data gathered during the project. Details are provided in **Appendix 11.2**.

11.68 Surveys to record flight activity of nightjars were slightly limited by the viewing conditions due to their nocturnal habits. The survey work during 2018 and 2019 was carried out in locations which allowed the observer to see the birds for longer against the remaining light in the sky and to avoid midge attacks rendering surveys unproductive. However, these conditions and the low light conditions limited the area viewed by a surveyor at any one time. Thus whilst useful data on flight heights has been gathered to inform the assessment of potential collision risk, no detailed assessment of collision risk, utilising a collision risk model, could be derived from these data as the criteria for this cannot be fulfilled under these conditions. However, this information when combined with the additional information gathered during the desk studies and field surveys in 2019 (using the thermal imaging device) ensured there was sufficient information for an assessment, as agreed with SNH.

11.69 For red kite the calculation of duration in the risk window per hours of observation is an overestimation due to two factors: firstly the observation interval of five minute periods means that if a bird was present even for a few seconds in that period it was counted, therefore the calculation overestimates the amount of time each bird was in flight; secondly the presence of a red kite in flight was recorded in an area much larger than the buffer of each OHL connection as the visible area from each VP was larger than this.

11.70 The carcass searches completed in the area of the existing R route (south) within the LKRDM SPA (and Ramsar site) were limited by the flooded habitat conditions being unsafe for access in a number of locations, especially after heavy rain. However enough areas within the Study Area remained accessible to ensure that sufficient information was gathered to inform the assessment.

Future Baseline in the Absence of the Development

11.71 Provided the existing land-management of the area continues as at present, changes in the bird population during the medium to long term are likely to be typical of those associated with areas of commercial plantation forest, open moorland, waterbodies, open rough grazing and enclosed farmland.

Implications of Climate Change

11.72 The UK Climate Projections COP18[xv] for temperature and precipitation by 2080 (the perceived lifetime of the KTR Project) based on a precautionary intermediate representative pathway for greenhouse gases of 6.0, suggests that the Solway River Basin (which encompasses the Dumfries and Galloway (D&G) region) will become hotter and drier in the summer (June to August) and warmer and wetter in the winter (December to February). Some studies have suggested that rainfall in south-west Scotland may be increasing (Haworth & Fielding, 2014)[xvi].

11.73 If the overwinter and spring weather conditions are suitable for adults to reach breeding condition then for many species the main period of concern will be the months in spring and early summer when they nest and the chicks require feeding. Low cloud and rainfall can adversely affect the foraging activities of birds which forage in flight such as raptors and insectivorous birds and effects their ability to breed or feed chicks. Furthermore the availability of invertebrates as food for chicks of species such as nightjar, gamebirds and waders may be effected by the alteration in the rainfall. For ground nesting species (e.g. waders, gamebirds and nightjar) eggs and chicks could be subject to chilling due to rainfall. The nests of other species such as raptors, which often nest in exposed locations, could also be susceptible to chilling. Dry conditions in summer may benefit breeding success by improving conditions for the chicks, as long as the temperatures do not go too high. Warm and wet winters may well improve growing conditions for vegetation and hence provide better food for geese and swans.

11.74 After studying historical data for species such as black grouse and nightjar the conclusion is that they already appear to have been subject to reductions in their range.

11.75 If nightjar are able to counteract the potential effects of increased rainfall the presumption is that areas which are being managed for nightjar will continue to be maintained as a minimum and this species will therefore at least be likely to remain in these areas.

Other Causes of Change

11.76 The South of Scotland Golden Eagle Project is attempting to reinforce the very small isolated population of golden eagles which survives in the south Scotland region. The project released three juveniles into the area in 2018 and intends to continue for a five year period releasing a number of youngsters each year. The hope is that they will interact with and recruit into the current population and boost the population's chance of survival.

11.77 Haworth & Fielding (2014)[xvi] assessed the potential for golden eagle repopulating the South of Scotland and identified possible locations which might be used by the population in its expansion. In the survey buffer of the KTR Project a few small areas in the Galloway Hills were identified by their study where an active range might occur. One of these is the current active range, another fell within the radius of the current range and the others are small isolated areas. The Galloway Hills have been important to the south of Scotland golden eagle population with up to four separate ranges (reduced to two now). Haworth & Fielding postulated that sufficient habitats and potential breeding sites remain to support at least two pairs.

11.78 Therefore despite these possible changes in the future it can be concluded that the baseline and associated assessments within this chapter remain robust.

Infrastructure Location Allowance

11.79 The survey areas covered the 50m ILA. There are no ornithological constraints to applying the ILA as required during the pre-construction phase, subject to the findings of the pre-construction surveys.

Embedded Mitigation Measures

11.80 To conform with the WCA, surveys within a 500m buffer to locate nests of birds listed in Schedule 1 of the WCA and Annex 1 of the Birds Directive will be undertaken prior to forestry and construction operations during the breeding period as part of a Birds Protection Plan which will be overseen by an Ecological Clerk of Works (ECoW). To complement this, surveys of roosts of birds within a 500m buffer listed on Schedule 1A of the WCA will be undertaken during the non-breeding period. If it is judged that these activities are likely to disturb breeding attempts or roosting behaviour then appropriate exclusion zones (Ruddock & Whitfield 2007)[xvii] or other mitigation procedures will be agreed with SNH prior to recommencing works. Standard forestry guidance will be followed in the case of tree felling operations. This will also apply for decommissioning operations on the N and R routes to be removed.

11.81 As set out in **Chapter 5**, to avoid disturbances to geese (Greenland white-fronted goose and greylag goose) which are qualifying interests of the LKRDM SPA (and Ramsar site), any decommissioning activities within the SPA (and Ramsar site) and a 500m buffer will occur outside of the months when the qualifying species are present. There are 13 towers of the existing R route (south) located within 500m of the LKRDM (SPA and Ramsar), towers 46-48 and towers 95 to 103 (of which towers 99, 100 and 100A are within the SPA (and the component Parton to Crossmichael SSSI). These towers will be removed between 1st August and 15th October, commencing with towers 99, 100 and 100A. This will ensure that the main foraging areas are not disturbed during the period when the species are present.

11.82 As embedded mitigation to avoid disturbance to golden eagle, no construction activity (including forestry felling) will be undertaken within 1.5km of the active nesting site during January to September.

11.83 As part of the embedded mitigation for nightjar, to avoid disturbance to breeding attempts, all construction within the core nightjar management area, defined by FLS, will be avoided between May and September when nightjar are present.

Summary of Existing Conditions for the KTR Project

Designated Sites

11.84 The new OHL components forming part of the KTR Project do not intersect with any site that is designated at international or national levels for ornithological interests. The nearest internationally designated ornithological site is the LKRDM SPA (and Ramsar Site), which at its closest is situated around 2.2km east of the new components of the KTR Project.

11.85 The existing R route (south), which is being removed as part of the KTR Project, has a short section located within this internationally designated site. The notified features of this SPA (and Ramsar site) are non-breeding: Greenland white-fronted goose and greylag goose populations.

11.86 Otherwise, the next nearest site is the Upper Solway Flats and Marshes (SFM) SPA (and Ramsar Site) 20km to the east, the notified features for this SPA are non-breeding: bar-tailed godwit, cormorant, curlew, dunlin, golden plover, goldeneye, grey plover, knot, lapwing, oystercatcher, pink-footed goose, pintail, redshank, ringed plover, scaup, shelduck, Svalbard barnacle goose, whooper swan and waterfowl assemblage, and also passage ringed plover; and for this Ramsar are non-breeding: bar-tailed godwit, curlew, knot, oystercatcher, pink-footed goose, pintail, scaup and Svalbard barnacle goose. A proposed SPA (pSPA), the Solway Firth pSPA, lies approximately 11km to the south incorporating the SFM SPA, and therefore includes the features of that SPA plus the addition of non-breeding: black-headed gull, common gull, common scoter, goosander, herring gull, red-throated diver and sanderling.

11.87 The nearest nationally designated site to the new components of the KTR Project which cites ornithological features is the Laughenghie and Airie Hills SSSI which at is closest is around 0.1km from the proposed G-T connection. The notified features of this SSSI are: breeding bird assemblage and non-breeding hen harrier. In addition the River Dee (Parton to Crossmichael) SSSI (notified features: non-breeding: Greenland white-fronted goose, greylag goose and whooper swan) and the Threave and Carlingwark Loch SSSI (notified features non-breeding greylag goose and breeding bird assemblage), both of which form part of the LKRDM SPA (and Ramsar site), lie within 3km of the KTR Project.

11.88 The WCA (as amended) contains legislation for bird protected by special penalties during the breeding period (Schedule 1), and also contains legislation which protects some bird species from intentional or reckless harassment at any time (Schedule 1A).

Desk Study Results

11.89 The desk study highlighted that wildfowl (geese and swans) that winter in the region and at sites to the south of the KTR Project use airspace over the KTR Project mainly during their migration periods in the autumn and spring. The main species of NCI are whooper swan, Greenland white-fronted goose, pink-footed goose, greylag goose and barnacle goose. Although individuals from different migratory populations pass through the region over a broad area, populations using the adjacent designated sites (LKRDM SPA (and Ramsar site) (qualifying interests: non-breeding Greenland white-fronted goose and non-breeding greylag goose);and Ramsar site (non-breeding Greenland white-fronted goose and non-breeding greylag goose) , the Upper SFM SPA (non-breeding Svalbard barnacle goose, non-breeding whooper swan and non-breeding pink-footed goose) and Ramsar site (non-breeding Svalbard barnacle goose and non-breeding pink-footed goose), and the SSSIs associated with these sites (River Dee (Parton to Crossmichael) - non-breeding Greenland white-fronted goose, non-breeding greylag goose and non-breeding whooper swan; Threave and Carlingwark Loch - non-breeding greylag goose; Upper SFM – non-breeding Svalbard barnacle goose) may follow habitual flight lines close to the KTR Project.

11.90 The data provided by the WWT included records of regular Greenland white-front goose counts of flocks feeding in fields in the vicinity of the LKRDM SPA (and Ramsar site); data from GPS tracking devices on whooper swans through the region, as well as information on barnacle goose movements throughout the region.

11.91 A number of raptor species of NCI are known to use habitats in the vicinity of the KTR Project for nesting, roosting or foraging. These include osprey, red kite, hen harrier, golden eagle, goshawk and peregrine; all these species are protected under Schedule 1 of the WCA. Non-breeding hen harrier is a qualifying interest of the Laughenghie and Airie Hills SSSI.

11.92 A number of other species of NCI are known to use habitats in the vicinity of the KTR Project, including black grouse, breeding nightjar and breeding waders e.g. curlew and lapwing.

Field Survey Results

11.93 This section summarises the bird populations and flight activity within and surrounding the KTR Project's component connections, based on surveys undertaken in the period October 2016 to August 2019. The survey methods and detailed results are described in **Appendices 11.1, 11.2 & 11.3**.

Wildfowl

11.94 Whooper swan, Greenland white-fronted goose, pink-footed goose, greylag goose and barnacle goose were recorded during the field surveys. Whooper swan (listed on Annex 1 of the Birds Directive and on Schedule 1 of the WCA), Greenland white-fronted goose (Annex 1, Red listed BoCC, BAP), barnacle goose (Annex 1) along with greylag goose (due to being one of the qualifying species for the LKRDM SPA (and Ramsar site)) are of High NCI. Pink-footed goose is of Moderate NCI. All species are regular migratory species and as such are afforded protection under the Birds Directive. All species except barnacle goose are known to over-winter in the vicinity of the KTR Project. (**Figures 11.2.1, 11.2.2, 11.2.3** and **11.3**; **Appendices 11.1** and **11.2**).

11.95 Other species of wildfowl of Low NCI recorded included mute swan, Canada goose, goosander, cormorant, mallard, pintail, wigeon, and teal. These are not considered further in the assessment.

P-G via K Connection

11.96 Whooper swan, greylag goose, barnacle goose and pink-footed goose were recorded (**Appendices 11.1** and **11.2** and **Figure 11.2.1**). Flights which occurred at least partially within 500m of the P-G via K connection were: a single whooper swan flight of 26 birds (above 150m elevation); four barnacle goose flights were recorded totalling 128 birds, (flights were all above 150m elevation); eight greylag goose flights totalling 75 birds were recorded (68 birds flying at least partially within the 10-30m and 30-50m height bands (these bands contain the potential collision risk height for this connection).

11.97 Due to the very low numbers and levels of flight activity within the survey buffers there is no possibility that any potential effects will be significant under the EIA Regulations, therefore despite whooper swan and barnacle goose being considered species of High NCI and pink-footed goose as of Moderate NCI, these species are not considered further in the assessment of the P-G via K connection. Potential effects on greylag goose are considered in the assessment.

C-K Connection

11.98 Whooper swan, greylag goose and barnacle goose were recorded (**Appendices 11.1** and **11.2** and **Figure 11.2.1**). Flights which occurred at least partially within 500m of the C-K connection were: a single whooper swan flight of 26 birds above 150m elevation. Three barnacle goose flights totalling 99 birds were all above 150m elevation; two greylag goose flights totalling 64 birds, with only one flock of 53 flying from below 10m to greater than 50m above ground level (passing through the 10-30m height bands the potential collision risk window for this connection), whilst the other flock of 11 birds was between 30-50m and greater than 50m above ground level.

11.99 Due to the very low numbers and level of flight activity there is no possibility that any potential effects will be significant under the EIA Regulation therefore none of these species are considered further in the assessment for the C-K connection.

E-G Connection

11.100 Whooper swan, greylag goose and pink-footed goose were recorded (**Appendices 11.1** and **11.2** and **Figure 11.2.1**). Flights which occurred at least partially within 500m of the E-G connection were: a single whooper swan flight of seven birds flew north up the valley and was greater than 50m elevation; four greylag goose flights totalling eight birds with only one flock of three flying within the 10-30m height band (the potential collision risk window for this connection), whilst the other three were all greater than 50m above ground level.

11.101 Due to the very low numbers and level of flight activity there is no possibility that any potential effects will be significant under the EIA Regulation therefore none of these species are considered further in the assessment for the E-G connection.

BG Deviation

11.102 No flight activity was recorded within 500m of this connection by wildfowl therefore none of these species are considered further in the assessment for the BG Deviation connection (**Figure 11.2.1**).

G-T Connection

11.103 Greenland white-fronted goose, whooper swan, greylag goose, barnacle goose and pink-footed goose were recorded (**Appendices 11.1** and **11.2** and **Figures 11.2.1, 11.2.2, 11.2.3** & **11.3**). Flights which occurred at least partially within 500m of the G-T connection were: three whooper swan flights (19 birds) flew north along the Loch Ken valley, two were above 150m and the third was in 30-50m height band; one barnacle goose flight was recorded of 70 birds at greater than 50m; twelve greylag goose flights totalling 38 birds were seen, with only two flocks of two flying between the ground and 10-30m above ground level, whilst two flocks were in the 30-50m height band, one flock was between 30-50m and greater than 50m, and seven flocks were at greater than 50m; six pink-footed goose flights totalling 252 birds were seen, one flock of 35 in the 30-50m height band and above, the other five greater than 50m; one flight by an unidentified swan species of two birds was between 10-30m and 30-50m height bands. The 10-30m and 30-50m height bands contain the potential collision risk window for this connection.

11.104 A large number of flights by whooper swan (25 flights), Greenland white-fronted goose (68 flights), greylag goose (193 flights) and a few by pink-footed goose (17 flights) were recorded over the existing R route (south) which is to be removed (existing towers 094 to 102 approximately).

11.105 In addition, nine flights of greylag goose and one flight by whooper swan were recorded crossing over the existing R route (south) where it crosses the River Ken valley after it leaves the Glenlee power station[10] and heads east (existing towers 031 to 038 approximately).

11.106 Due to the very low level of flight activity of barnacle goose and low level of flight activity and Moderate NCI of pink-footed goose there is no possibility that any potential effects will be significant under the EIA Regulations therefore neither of these species are considered further in the assessment for the G-T connection. Potential effects on Greenland white-fronted goose are considered for the removal of R route (south) only as there was no evidence of this species in the vicinity of the proposed G-T connection and whooper swan and greylag goose are considered in the assessment for the G-T connection including the removal of R route (south).

KTR Project as a Whole

11.107 From the data present above and in the **Appendices 11.1** and **11.2**: Greenland white-fronted goose, whooper swan and greylag goose were recorded sufficiently to be considered further in the assessment for the KTR Project as a whole.

11.108 Flights which occurred at least partially within the flight activity survey area of the KTR Project comprised: five whooper swan flights totalling of 52 birds (one flight of five birds within the 10-30m or 30-50m height bands, these bands contain the potential collision risk window for the KTR Project as a whole); there were also one flight by an unidentified swan species of two birds which was between 10-30m and 30-50m height bands; twenty greylag goose flights totalling 113 birds were recorded (85 birds in nine flights flying at least partially within the 10-30m & 30-50m height bands).

11.109 A large number of flights by whooper swan (25 flights), Greenland white-fronted goose (68 flights), greylag goose (193 flights) and a few by pink-footed goose (17 flights) were recorded over the existing R route (south) which is to be removed (existing towers 094 to 102 approximately); and a further nine flights of greylag goose and one flight by whooper swan were recorded crossing over the existing R route (south) where it crosses the River Ken valley after it leaves the Glenlee power station and heads east (existing towers 031 to 038 approximately).

Scarce Raptors and Owls

11.110 Red kite, hen harrier, peregrine, goshawk, osprey, honey-buzzard, hobby, golden eagle and barn owl were recorded during the field surveys. All are species of High NCI. All species are listed on Annex 1 and Schedule 1 apart from goshawk, hobby and barn owl which are on Schedule 1 only, and hen harrier, red kite and golden eagle are also on Schedule 1A. The majority of these species are present all year whilst osprey and honey-buzzard are summer visitors only. Hobby is a passage vagrant. Results for all nest locations of all these species and other results for nightjar and golden eagle are provided in the **confidential Appendix 11.3**.)

11.111 Due to the very low numbers and level of flight activity within the survey buffers of hobby (**Figure 11.5**, **Appendices 11.1** and **11.3**), and they were not found to breed within the core Study Area, there is no possibility that any potential effects will be significant under the EIA Regulations therefore this species is not considered further in the assessment.

11.112 Buzzard, sparrowhawk and kestrel were also recorded and are present all year and breed in the area. As species of Low NCI these are not considered further in the assessment.

P-G via K Connection

11.113 Red kite, peregrine, goshawk, osprey, and barn owl were all recorded in the survey buffers (**Appendices 11.1** and **11.3** and **Figure 11.5.1**). Red kite, osprey and peregrine all bred within 500m of the P-G via K connection during the survey period; one barn owl nest and five suitable sites with signs of owls being present were found within 1km of the P-G via K connection. Two flights of duration 103 seconds by goshawk passed within 500m of the P-G via K connection with a total duration of 26 seconds within the 10-30m and 30-50m height bands (these bands contain the potential collision risk window for this connection). One peregrine flight of duration 68 seconds passed within 500m of the P-G via K connection, all of which was within the potential risk window. For red kites 11% of the five minute periods within the total watch duration of 145.25 hours contained flights by kites, however not all these flights will have occurred within 500m of the connection and only 34% of this flight activity was in the risk height bands of the P-G via K connection (**Appendix 11.1**).

11.114 Due to the very low numbers and level of flight activity and no breeding sites of goshawk there is no possibility that any potential effects will be significant under the EIA Regulations therefore this species is not considered further in the assessment for the P-G via K connection. Potential effects on red kite, peregrine, osprey and barn owl are considered in the assessment.

C-K Connection

11.115 Red kite, peregrine, goshawk, osprey, and barn owl were all recorded in the survey buffers (**Appendices 11.1** and **11.3** and **Figure 11.5.1**). One red kite territory was situated within 500m of the C-K connection; two suitable barn owl sites with signs of owls being present were found within 1km of the C-K connection. No flights by peregrine, goshawk and osprey occurred within 500m of the C-K connection. For red kites 7% of the five minute periods within the total watch duration of 72 hours contained flights by kites, however not all these flights will have occurred within 500m of the connection and only 22% of this flight activity was in the risk height band of the C-K connection (**Appendix 11.1**).

11.116 Due to the very low presence of peregrine, goshawk, osprey and barn owl, there is no possibility that any potential effects will be significant under the EIA Regulations therefore these species are not considered further in the assessment for the C-K Connection. Potential effects on red kite are considered.

E-G Connection

11.117 Red kite, peregrine, goshawk, osprey, and barn owl were all recorded in the survey buffers (**Appendices 11.1** and **11.3** and **Figure 11.5.1**). Red kite and peregrine bred within the survey buffers during the survey period and one peregrine territory was within 500m of the E-G connection; one suitable barn owl site with signs of owls being present was found within 1km of the E-G connection. For red kites 15% of the five minute periods within the total watch duration of 73.25 hours contained flights by kites, however not all these flights will have occurred within 500m of this connection and only 7% of this flight activity was in the risk height band of the E-G connection (**Appendix 11.1**).

11.118 Due to the very low presence of peregrine, goshawk, osprey and barn owl, there is no possibility that any potential effects will be significant under the EIA Regulations therefore these species are not considered further in the assessment for the E-G connection. Potential effects on red kite are considered.

BG Deviation

11.119 Very limited red kite flights were recorded in the survey buffers. One suitable barn owl site with signs of owls being present was found within 1km of the connection (**Appendices 11.1** and **11.3** and **Figure 11.5.1**).

11.120 Due to the very low presence of all scarce raptor and owl species, there is no possibility that any potential effects will be significant under the EIA Regulation therefore none of these species are considered further in the assessment for the BG Deviation connection.

[10] *These flights were over the R route east of Glenlee (see **Figure 11.2.1**), given its location this would fall into the buffers of P-G via K however as this is the part of R route after the line leaves Glenlee and goes south (after heading east), it is included for assessment purposes in the G-T connection, however the flights are not in the ornithology survey buffer of that connection as defined.*

G-T Connection

11.121 Red kite, peregrine, goshawk, osprey, hen harrier, hobby, honey-buzzard, golden eagle and barn owl were all recorded in the survey buffers (**Appendices 11.1** and **11.3** and **Figures 11.5.1** and **11.5.2**). Red kite, goshawk, osprey, honey-buzzard, golden eagle and barn owl bred within the survey areas during the survey period with two red kite and three goshawk territories found within 500m of the G-T connection. Hen harriers (one location) and red kites (two locations) were present during the winter months at communal roosts; none were within 500m of the G-T Connection although one kite roost was within 300m of an existing track which will be used temporarily for access during construction. One barn owl roost and three suitable sites with signs of birds being present were found within 1km of the G-T connection **Appendix 11.3**.

11.122 Eleven flights by peregrine of duration 956 seconds passed within 500m of the G-T connection with a total duration of 572 seconds within the 10-30m and 30-50m height bands (these bands contain the potential collision risk height window for this connection). Thirty two flights by goshawk of a total duration 6,016 seconds were within 500m of the G-T connection with a total duration of 1,976 seconds within the potential collision risk window for this connection. Fourteen flights by osprey of duration 1,067 seconds were within 500m of the G-T connection with a total duration of 550 seconds within the potential collision risk window. Four hen harrier flights were recorded within 500m of the G-T connection with duration of 544 seconds, and 121 seconds of these were within the potential collision risk height bands. One flight by honey-buzzard passed within 500m of the G-T connection for duration of 110 seconds, and all of the flight was above 50m above ground level **(Appendices 11.1, 11.2** and **11.3)**.

11.123 For red kites 5% of the five minute periods within the total watch duration of 942.50 hours contained flight activity by kites, however not all these flights will have occurred within 500m of this connection and only 53% of this flight activity was in the risk height band of the G-T connection. (**Appendices 11.1, 11.2** and **11.3**).

11.124 As noted above, due to the very low numbers and level of flight activity of hobby and they were not found to breed within the Study Area for G-T connection, there is no possibility that any potential effects will be significant under the EIA Regulation therefore this species is not considered further in the assessment for the G-T connection. Potential effects on red kite, peregrine, goshawk, osprey, hen harrier, honey-buzzard, golden eagle and barn owl are considered.

KTR Project as a whole

11.125 From the data presented above and in the **Appendices 11.1**, **11.2** and **11.3**: Red kite, peregrine, goshawk, osprey, hen harrier, honey-buzzard, golden eagle and barn owl were all recorded in the survey buffers and were recorded sufficiently to be considered further in the assessment for the KTR Project as a whole.

11.126 Red kite, goshawk, osprey, honey-buzzard, golden eagle and peregrine all bred within the survey buffers during the survey period; one barn owl nest, one roost and seven suitable sites with owls present were found within 1km of the KTR Project. Hen harriers (one location) and red kites (two locations) were present during the winter months at communal roosts. Within 500m of the KTR Project three red kite, three goshawk, one osprey and one peregrine nest territories were found, along with three of the suitable and occupied barn owl locations. Neither the hen harrier roost nor the kite roosts were within 500m of the KTR Project, although one roost was within 300m of an existing track which will be used temporarily for access during construction.

11.127 Twelve flights by peregrine of duration 1,024 seconds passed within 500m of the KTR Project with a total duration of 640 seconds within the 10-30m and 30-50m height bands (these bands contain the potential collision risk height for the KTR Project as a whole). Thirty four flights by goshawk of a total duration 6,119 seconds passed within 500m of the KTR Project with a total duration of 2,002 seconds within the potential collision risk height for the KTR Project. Fourteen flights by osprey of a duration of 1,067 seconds passed within 500m of the KTR Project with a total duration of 550 seconds within the potential collision risk height bands. Four hen harrier flights were recorded within 500m of the KTR Project with a total duration of 544 seconds, and 121 seconds of these were within the potential collision risk height bands. One flight by honey-buzzard passed within 500m of the KTR Project for a total duration of 110 seconds, and all of the flight was above 50m above ground level.

11.128 For red kites 5.5% (672) of five minute periods (12,174) within the total watch duration of 1014.50 hours (from all MWPs and FVP1-5) contained flights by kites. However not all these flights will have occurred within 500m of the KTR Project and only 51% of this flight activity was in the risk height bands.

Nightjar

11.129 Nightjar was confirmed at a number of locations along the G-T Connection and is a species of High NCI listed on Annex 1 of the Birds Directive and is also a BAP species. Results for nightjar are confidential and are provided in the **Appendix 11.3.** As this species was only found to be present in the G-T connection Study Area, there is no possibility that any potential effects will be significant under the EIA Regulation for any of the other connections and therefore this species is not considered further in the assessment for those connections.

11.130 Nightjar is also considered in the assessment for the KTR Project as a whole.

Black Grouse

11.131 Black grouse is a Red listed BoCC and BAP species of Moderate NCI.

11.132 No birds were identified as being present in the survey area (**Appendix 11.1** and **11.2, Figure 11.4**) there is no possibility that any potential effects will be significant under the EIA Regulation therefore this species is not considered further in the assessment for any connection or for the KTR Project as a whole.

Waders

11.133 Golden plover, curlew, greenshank, oystercatcher, snipe, jack snipe, lapwing and woodcock were recorded (**Appendix 11.1**).

11.134 Golden plover (Annex 1), greenshank (Schedule 1), curlew (IUCN Near Threatened, Red listed BoCC, BAP), lapwing (Red listed BoCC, BAP) and woodcock (Red listed BoCC) are species of High and Moderate NCI. Oystercatcher, snipe and jack snipe are of Low NCI and are not considered further in this assessment.

11.135 Due to the very low numbers and level of flight activity within the survey buffers of golden plover, greenshank and woodcock, and they were not found to breed within the Study Area, (**Appendix 11.1**) there is no possibility that any potential effects will be significant under the EIA Regulation therefore these species are not considered further in the assessment.

11.136 Due to Curlew and lapwing only being found to be breeding in the G-T connection (**Figures 11.6.1** and **11.6.2**), there is no possibility that any potential effects will be significant under the EIA Regulation for any of the other connections and therefore these species are not considered further in the assessment for the other connections.

11.137 Curlew and lapwing are also considered for the KTR Project as a whole.

Other Species

11.138 Great grey shrike and willow tit were noted. Both were recorded during the winter. Willow tit is resident in the area and is a red listed BoCC therefore of Moderate NCI, whilst small numbers of great grey shrikes overwinter in the UK. Other species of Moderate NCI noted as present and breeding in the area were: tree pipit, song thrush, mistle thrush, linnet, dunnock, reed bunting, lesser redpoll, stonechat, whinchat, skylark, starling, redstart, house sparrow, yellowhammer, rook, raven, grasshopper warbler, whitethroat, cuckoo, crossbill, sedge warbler and sand martin (**Appendix 11.1**).

11.139 As all nests will be protected during construction the level of possible effects likely in relation to these species will be so low that there is no possibility that any potential effects will be significant under the EIA Regulations, therefore these species are not considered further in the assessment for any connection or for the KTR Project as a whole.

Information on Species considered further in the Assessment

11.140 Each connection comprising the KTR Project is assessed individually and then the KTR Project as a whole. Based on the results of the desk based and field surveys, **Table 11.7** sets out the species included within the detailed assessment for each connection and the NCI (or 'sensitivity') of the species (in accordance with **Table 11.3**).

11.141 Information on the Conservation Status is then described for those species, which will then be utilised in the assessments of the individual connections and the KTR Project as a whole.

Table 11.7 Nature Conservation Importance of Potentially Affected Species and the relevant KTR Project Connections and Assessment Stages (C = construction, O = operation, E = Existing N and R Route decommissioning.

Nature Conservation Importance	Species	Connection									
		P-G (via K)			C-K		E-G		G-T		
Effects assessed during development stage		C	O	E	C	O	C	O	C	O	E
High	Whooper swan								✓	✓	✓
	Greenland white-fronted goose										✓
	Greylag goose	✓	✓	✓					✓	✓	✓
	Hen harrier								✓	✓	
	Goshawk								✓	✓	
	Osprey	✓	✓	✓					✓	✓	
	Peregrine	✓	✓	✓					✓	✓	
	Red kite	✓	✓	✓	✓	✓	✓		✓	✓	
	Honey-buzzard								✓		
	Barn owl	✓		✓					✓		
	Nightjar								✓	✓	
	Golden eagle								✓	✓	
Moderate	Curlew								✓		
	Lapwing								✓		

Whooper swan (Cygnus cygnus)

11.142 This species is of High NCI due to being listed on Annex 1 of the Birds Directive and on Schedule 1 of the WCA. The species is a notified feature of the River Dee (Parton to Crossmichael) SSSI during the non-breeding season. They overwinter in the area of, and have some flights within, the 500m buffer of the KTR Project.

11.143 This species is a common winter visitor, arriving during September and October and leaving by early April. They utilise a wide range of habitats including freshwater lochs and marshes, small lochans, ponds and intertidal marshes. They feed on aquatic vegetation, cereal stubbles, root crops, winter cereals, oil-seed rape and improved grasslands (Forrester *et al*., 2007)[xviii]. Their core foraging distances from night roost during the winter is estimated as less than 5km (SNH, 2016)[vi].

11.144 The whooper swan population estimate of the NHZ19 is 1,188 (Wilson *et al.,* 2015)[xix]. The population from the British Trust for Ornithology (BTO) Wetlands Birds Survey (WeBS) surveys for the regions of D&G East and West (including the Solway Estuary) is estimated as 1,106 (five years average) (763 east and 343 west). The Scottish population trend has been increasing since the winter of 1995/96 however the trend appears to have levelled off since 2010/11 (Frost *et al*., 2019)[xx]. The conservation status of whooper swan is favourable.

Greenland white-fronted goose (Anser albifrons flavirostris)

11.145 This species is a non-breeding qualifying species for the LKRDM SPA (and Ramsar site), and River Dee (Parton to Crossmichael) SSSI. It is also listed on Annex 1 of the Birds Directive, is a Red Listed BoCC, and a UK BAP species, and therefore is a species of High NCI.

11.146 SNH assessed the condition of the LKRDM SPA Greenland white-fronted goose population as Favourable Maintained in 2007. Connectivity with the LKRDM SPA (and Ramsar site) is likely to occur within a core range of 5-8km for Greenland white-fronted goose (SNH, 2016)[vi].

11.147 This species is a localised winter visitor (with just two flocks in D&G at Loch Ken and Stranraer), which arrive during early October and leave in early April. Historically they were associated with oceanic blanket bog, and some flocks remain closely associated with natural wetlands and low intensity farmland and they show lower reproductive success compared with others which exploit more intensive landscapes (Forrester *et al*., 2007)[xviii]. The Greenland white fronted goose (GWFG) study [xxi] states the Loch Ken population use stubble fields in autumn, but an array of grassland types are used throughout the winter, especially improved grassland and reseeds, with the wetlands and inundation marsh adjacent to Loch Ken also exploited. The core foraging range from their night roosts is estimated as 5km to 8km (SNH, 2016)[vi].

11.148 The LKRDM SPA (and Ramsar site) population of Greenland white-fronted goose was 360 birds when the site was classified in 1992. The population estimate of the NHZ19 is 550 (Wilson *et al.,* 2015)[xix]. The population from the BTO WeBS surveys for the regions of D&G East and West (including the Solway Estuary) is estimated as 414 (five years average) (zero east and 414 west). The Scottish population trend has been decreasing since the winter of 1998/99 however the trend may have levelled off since 2015/16 (Frost *et al.*, 2019)[xx]. Greenland white-fronted goose populations have been perceived as declining in recent years (Urquhart *et al.,* 2015)[xxii], and studies show there has been a decline in the LKRDM SPA (and Ramsar site) population since 1998 to around 200 birds (GWFG Study)[xxxi]. The conservation status of Greenland white-fronted goose is therefore currently unfavourable.

Greylag Goose (Anser anser)

11.149 This species is a non-breeding qualifying species for the LKRDM SPA (and Ramsar site) plus the River Dee (Parton to Crossmichael) and Threave and Carlingwark Loch SSSIs and therefore is a species of High NCI. They overwinter in the area of and have some flights within the 500m buffer of the KTR Project. They are listed on Schedule 2 part 1 of the WCA which means they may be killed outside the closed season (1 February to 31 August) and thus away from the LKRDM SPA (and Ramsar site) will potentially be a quarry species for shooters. They overwinter in the area of the KTR Project.

11.150 SNH assessed the condition of the LKRDM SPA (and Ramsar site) greylag goose population of as Favourable Maintained in 2010. Connectivity with the LKRDM SPA (and Ramsar site) is likely to occur within a core range of 15-20km for greylag goose (SNH, 2016)[vi].

11.151 This species is a common winter visitor mainly arriving during October and leaving in April. It is also a common resident with a native breeding population in the north and west and a naturalised breeding population in the south and east of Scotland (including D&G). During the winter they are relatively sedentary once they reach their wintering grounds, and the breeding birds are sedentary also making short local movements. During the winter they feed on stubble fields, winter cereals, and grass. (Forrester *et al*., 2007)[xviii]. The core foraging range from their night roosts is estimated as 15km to 20km (SNH, 2016)[vi].

11.152 The LKRDM SPA (and Ramsar site) population of greylag goose was 1,150 birds when the site was classified and the population of this SPA was assessed as declining in the years prior to 2012 (Mitchell, 2012)[xxiii] with the number of birds at 457 suggesting the SPA no longer held internationally important numbers of birds. The population from the BTO WeBS surveys for the regions of D&G East and West (including the Solway Estuary) is estimated as 4,794 (five years average) (2,180 east and 2,614 west). The Loch Ken five year average is 611. The Scottish population trend has increased since the winter of 2002/03 however the trend may have levelled off since 2012/13 (Frost *et al.,* 2019)[xx]. The conservation status of greylag goose is therefore favourable.

European Honey-buzzard (Pernis apivorous)

11.153 Honey-buzzard is listed on Annex 1 of the Birds Directive and on Schedule 1 of the WCA and thus is a species of High NCI. It breeds in the survey buffer of the KTR Project.

11.154 This species is a very rare breeding summer visitor to Scotland, returning during the second half of May and the young fledge in August. It prefers landscapes dominated by mature forest interspersed with mixed farmland, heath and scrub woodland, and nests in trees. Its diet is primarily the grubs and adults of social wasps and bumblebees, but frogs and nestlings of wood pigeon are also taken (Forrester *et al*., 2007)[xviii].

11.155 Scotland appears to have an abundance of suitable habitat and it is likely the Scottish population is under-recorded, thus 15-20 pairs in northern Scotland was extrapolated to around 50 pairs in Scotland by Etheridge in Forrester *et al.* (2007)[xviii]. The South Scotland population has three home ranges checked by the DGRSG. There are insufficient data available on this species' abundance and distribution to make an assessment of its conservation status, however as habitat for it can be improved by creating better structured and diverse woodlands and this management of woodland habitat is likely to be increasing throughout south Scotland it is probable that the species is in favourable status.

Red Kite (Milvus milvus)

11.156 Red kite is listed on Annex 1 of the Birds Directive and on Schedule 1 and Schedule 1A of the WCA and thus is a species of High NCI. It is an uncommon resident breeding bird in Scotland. It breeds and over-winters in the survey buffer of the KTR Project and flight activity was also recorded within the 500m buffer of the OHL.

11.157 Between 2001 and 2004, the D&G region was one of the areas where red kite was re-introduced to Scotland, and a kite feeding station exists near Laurieston (approximately 2.1km from the KTR Project). Open stands of coniferous and broadleaved woodland are used for nesting and for communal roosting in winter. Kites forage on open low ground, moorland areas and marginal agricultural habitats, taking carrion and small live prey. During the breeding season red kite foraging ranges from the nest site are recorded as 4km to 6km (SNH, 2016)[vi]. Communal roosts are used between September and March, mainly by non-breeding and juvenile birds, which may be joined by local breeding adults especially in periods of harsh weather (Forrester *et al.,* 2007)[xviii]. Adult and juvenile survival rates are 0.61 and 0.5 (in first year) respectively (Robinson, 2005)[xxiv].

11.158 The red kite population in D&G is expanding, and the NHZ19 population was estimated at 83 pairs in 2013 (Wilson *et al.,* 2015)[xix]. Red kite occupied 115 home ranges in 2017 in D&G and annual productivity for 2017 was 1.1 young fledged per home range monitored (67 pairs) (Challis *et al.*, 2018)[xxv]. Therefore the red kite population in this area is at a minimum maintaining itself, therefore the conservation status of red kite is favourable.

Hen harrier (Circus cyaneus)

11.159 Hen harrier is listed on Annex 1 of the Birds Directive and on Schedule 1 and Schedule 1A of the WCA, and is a Red listed BoCC, and is a non-breeding qualifying interest of the Laughenghie and Airie Hills SSSI and therefore is a species of High NCI. It is a widespread but scarce breeding species in Scotland. Hen harriers use a winter roost in the survey buffer of the KTR Project and flight activity was also recorded within the 500m buffer of the OHL.

11.160 This ground nesting species feeds on small to medium live prey and is closely associated to heather moorland and newly afforested uplands for breeding. In the milder parts (including the south-west of Scotland) the majority of adults are resident. During the breeding season hen harrier foraging ranges from the nest site are recorded as a core of 2km with maximum range of 10km (SNH, 2016)[vi]. In the autumn and winter a sizeable proportion of the population moves to lower altitudes hunting over open country such as rough grassland, cultivated farmland and marsh, and roost on the ground in long heather or wet rushy areas and may form communal roosts (Forrester *et al.*, 2007)[xxxii]. Adult and juvenile survival rates are 0.81 and 0.22 (to age two) respectively (Robinson, 2005)[xxiv].

11.161 The number of breeding pairs of hen harrier in NHZ19 was estimated at 18 in 2011 (Wilson *et al.,* 2015)[xix], although this is thought likely to be an underestimate, with far more birds visiting the NHZ during the winter months. The hen harrier population monitored in D&G in 2017 was 17 pairs with productivity of 2.8 per occupied home range monitored (Challis, 2018)[xxv]. Therefore the hen harrier population in this area is at a minimum maintaining itself, therefore the conservation status of hen harrier is favourable.

Goshawk (Accipiter gentilis)

11.162 Goshawk is listed on Schedule 1 of the WCA and therefore is a species of High NCI. It is a scarce resident breeding bird in Scotland. It breeds and over-winters in the survey buffer of the KTR Project and also flight activity was also recorded within the 500m buffer of the OHL.

11.163 Goshawk feed on a wide variety of small to medium live prey, and although predominately a forest species they also hunt open areas. They use a wide range of woodland habitats to breed although prefer larger forests (Forrester *et al.*, 2007). During the breeding season goshawk foraging ranges from the nest site are recorded as a core of 3km with maximum range generally less than 10km, and a maximum recorded distance of 18km (SNH, 2016)[vi]. Adult and juvenile survival rates are 0.83 and 0.4 (to age two) respectively (Robinson, 2005)[xxiv].

11.164 The NHZ19 goshawk population was estimated at 31 pairs in 2013 although this was probably an underestimate (Wilson *et al.,* 2015)[xix]. The goshawk population monitored in Dumfries & Galloway in 2017 was 26 pairs with productivity of 1.4 (Challis, 2018)[xxv]. The population is likely to be underestimated and is at a minimum maintaining itself so is in favourable conservation status.

Golden eagle (Aquila chrysaetos)

11.165 Golden eagle is listed on Annex 1 of the Birds Directive and on Schedule 1 of the WCA and thus is a species of High NCI. It is a scarce resident breeding species in Scotland. It is resident in the survey buffer of the KTR Project.

11.166 Golden eagles occupy a range of habitats from open montane areas, through woodland to sea cliffs. They are closely associated with mountainous areas and unenclosed and unimproved habitats such as deer forest and upland sheep-walk (Hardey *et al.,* 2013)[xi]. Golden eagles reach breeding age and maturity at four to five years and established pairs are largely sedentary, occupying a usually exclusive home range which contains their nesting territory and hunting range, which they defend against intruding eagles (Watson, 2010)[xxvi]. During the breeding season golden eagle foraging ranges from the nest site are recorded as a core of 6km with maximum range of up to 9km (SNH, 2016)[vi]. Food consists of medium sized prey such as grouse, hares, rabbits and carrion (Whitfield *et al.,* 2008)[xxvii]. Most sub-adult golden eagles are highly mobile and have a high exploratory potential. Satellite tracking of dispersing juveniles in Scotland has shown that most of their movements occur within 30-50 km of their natal site but longer distance movements commonly take individuals over 100 km from their natal site (Watson, 2010)[xxvi]. Adult and juvenile survival rates are 0.95 and 0.15 (to age four) respectively (Robinson, 2005)[xxiv].

11.167 The Scottish population of golden eagles was assessed in 2015 at 508 territorial pairs and is in favourable conservation status however the population in southern Scotland is extremely low, estimated at four breeding pairs (Hayhow et al., 2017)[xxviii]. This small population south of the central belt is isolated from the population north of it and potentially vulnerable to extinction, and any young birds which do fledge will be vital to its continuation. The South of Scotland Golden Eagle Project released three juvenile birds from the Moffat Hills during 2018 and further releases of young birds are planned as a way to help increase the number of golden eagles present in the region. Given the span of the golden eagle project, the unit of assessment for the golden eagle in this instance is taken to be the south of Scotland, which is in unfavourable conservation status.

Osprey (Pandion haliaetus)

11.168 Osprey is listed on Annex 1 of the Birds Directive and on Schedule 1 of the WCA and thus is a species of High NCI. It is an increasing summer breeding visitor in Scotland. It breeds in the survey buffer of the KTR Project and flight activity was also recorded within the 500m buffer of the OHL.

11.169 They are fish eating and very adaptable and able to exploit freshwater, brackish and saltwater habitats. They fish mainly in lochs and rivers. During the breeding season osprey foraging ranges from the nest site are recorded as a core of 10km with some regular 10km, and a maximum recorded distance of 18km (SNH, 2016)[vi]. Most ospreys arrive from late March and depart from mid-August. Most nests are in trees but they also nest on deserted buildings and electricity towers (Forrester *et al.*, 2007)[xviii]. Adult and juvenile survival rates are 0.85 and 0.6 (in first year) respectively (Robinson, 2005)[xxiv].

11.170 The osprey population is currently increasing and expanding its range in NHZ19 and the NHZ population was estimated at six pairs in 2013 (Wilson *et al.,* 2015)[xxxiv]. The D&G monitored population was 11 pairs in 2017 with a productivity of at least 1.1 (Challis, 2018)[xxv]. Therefore the osprey population in this area is at a minimum maintaining itself, thus the conservation status of osprey is favourable.

Peregrine (Falco peregrinus)

11.171 Peregrine is listed on Annex 1 of the Birds Directive and on Schedule 1 of the WCA and therefore is a species of High NCI. It is a scarce but widespread resident breeder in Scotland. It breeds in the survey buffer of the KTR Project and flight activity was recorded within the 500m buffer of the OHL.

11.172 Peregrine mainly nest on crags and buildings and they occur in open areas with secure nest sites and plentiful avian prey (Forrester *et al*. 2007)[xviii]. During the breeding season peregrine foraging ranges from the nest site are recorded as a core of 2km and a maximum recorded distance of 18km (SNH, 2016)[vi]. Adult and juvenile survival rates are 0.80 and 0.54 (in first year) respectively (Robinson, 2005)[xxiv].

11.173 The NHZ19 population was estimated at 34 in 2014 (Wilson *et al.,* 2015)[xxxiv]. The peregrine population monitored in D&G in 2017 was 58 pairs (of 63 occupied ranges) with productivity of 1.3 (Challis, 2018)[xxv]. The population is at a minimum maintaining itself so is in favourable conservation status.

Nightjar (Caprimulgus europaeus)

11.174 Nightjar is listed on Annex 1 of the Birds Directive and therefore is a species of High NCI. It is a scarce summer visitor to Scotland with regular breeding confined to the south-west, and western seaboard. It breeds in the survey buffer of the KTR Project.

11.175 Nightjars are nocturnal, ground-nesting, insectivorous birds, and they return to Scotland in May leaving again in August/September. The Scottish birds use clearings on conifer plantations, generally on well-drained sites. They favour restocks where the trees are more open and less than ten years old, with large amounts of open bare ground. They can forage over low-lying heaths and valley bogs and proximity to rich feeding sites may be important in selection of breeding areas (Forrester *et al*., 2007)[xviii]. Their foraging ranges can vary widely depending on the availability of suitable foraging habitats near to their breeding sites, and in the UK means have been recorded as between around 750m (Sharps *et al.,* 2015)[xxix] and 3.1km (Alexander & Cresswell, 1990)[xxx] which are similar to those found for Belgium (593m to 3.3km) (Evens *et al.,* 2018)[xxxi]. Adult survival rate is 0.70 (Robinson, 2005)[xxiv].

11.176 Historically nightjars were widespread in Scotland, but a range contraction has occurred concentrating them in D&G, Clyde and Forth areas (they are recovering in England and Wales) (Forrester *et al*. 2007)[xviii].

11.177 The nightjar population in D&G currently forms the majority of the Scottish population. Their range is showing signs of expansion in the region and the latest minimum count of 44 churring males from 2017 showed a continuing increase over the past five years. The 2017 total may also be an underestimation as counts were limited to key sites only. The permanent management for nightjar by FLS in areas is seen to be fundamental to the initial recovery of this species (Gallagher, 2017)[xxxii]. This management appears to be working and is encouraging individuals to spread into the wider area (as illustrated by the expansion in the region). Therefore the population is considered to be in favourable conservation status because the population dynamics of the species indicate that the population is maintaining itself on a long-term basis; the natural range of the species is not being reduced, nor is it likely to be; and, there is sufficient habitat to maintain the population in the long-term.

Barn owl (Tyto alba)

11.178 Barn owl is listed on Schedule 1 of the WCA and thus is a species of High NCI. It is a resident breeding bird in Scotland with highest numbers in the south and west. It breeds in the survey buffer of the KTR Project.

11.179 They are found mainly at lower altitudes up to 300m, and nest in large, dark cavities in trees, rock faces, and built structures hunting over areas of rough grassland including field margins, ditches, roadside verges, tracks and forest edges, with good numbers of small mammals. Their foraging range when breeding is up to 1km from the nest and up to 3km to 5km when not breeding (Hardey *et al.,* 2013)[xi]. They are nocturnal but can be active around dusk and dawn. Barn owls usually nest in Scotland between April and August (Forrester *et al*., 2007) [xviii]. Adult and juvenile survival rates are 0.72 and 0.37 (in first year) respectively (Robinson, 2005)[xxiv].

11.180 The barn owl population estimate for D&G in 2004 of 400 was based on 165 sites monitored (Forrester *et al*. 2007)[xviii]. The population monitored in 2017 was 110 (of 126 occupied nest sites). In 2017 productivity was 3.4 (Challis, 2018)[xxv]. The population is considered to be expanding and is in a favourable conservation status.

Curlew (Numenius arquata)

11.181 Curlew is a Red listed species BoCC and listed as Near-threatened by the IUCN 'Red list', therefore is a species of Moderate NCI. It is a widespread breeding resident in Scotland. It breeds in the survey buffer of the KTR Project.

11.182 Curlew is a wading bird which breeds inland preferring rush pastures with some enclosed heather moorland and unimproved grassland, moving to the coast in winter. They return inland from February and nest in April leave for the coast from July (Forrester *et al.*, 2007)[xviii]. Adult and juvenile survival rates are 0.73 and 0.47 (in first year) respectively (Robinson, 2005)[xxiv].

11.183 The most recent estimate of the NHZ19 population of curlew was 4,284 (Wilson *et al.,* 2015) [xix]. The curlew population in Scotland and the UK is in decline (BTO *et al.,* 2018)[xxxiii] with loss of habitat suggested as the main cause, and the species is now considered one of the most important bird conservation issues for the UK (Woodward *et al.*, 2018)[xxxiv]. Therefore the population conservation status is assumed to be unfavourable.

Lapwing (Vanellus vanellus)

11.184 Lapwing is a Red listed species BoCC therefore is a species of Moderate NCI. It is a common and widespread breeding resident in Scotland. It breeds in the survey buffer of the KTR Project.

11.185 Lapwing is a wading bird which breed1s on all types of short sward grassland from river valleys to uplands, ploughed fields and spring-sown crops, with chicks requiring short sward vegetation with wet areas. In winter they move to lower ground and estuaries returning inland in late February (Forrester *et al.*, 2007) [xviii]. Adult and juvenile survival rates are 0.70 and 0.59 (in first year) respectively (Robinson, 2005)[xxiv].

11.186 The lapwing population in the UK is in decline (BTO *et al.* 2018)[xxxiii] with habitat loss and changes in agricultural practice suggested as the main causes (Woodward *et al.*, 2018)[xxxiv]. Therefore the population conservation status is assumed to be unfavourable.

Polquhanity to Glenlee (via Kendoon)

11.187 The effects considered are construction disturbance of foraging for greylag goose, osprey, peregrine, red kite, barn owl; and, risk of collision during operation for greylag goose, peregrine, osprey and red kite with all other effects and species scoped out (**Table 11.1; Appendix 11.2**).

11.188 The effects of removal (decommissioning) of the existing N and R route (north) are also considered for greylag goose, osprey, peregrine, red kite and barn owl.

Existing Conditions

Wildfowl

11.189 Low levels of flight activity by greylag goose in the potential collision risk height for this connection were recorded (**Appendices 11.1** and **11.2**).

Scarce Raptors and Owls

11.190 Red kite, osprey and peregrine all bred within the survey area during the survey period. Only one osprey, one peregrine and two red kite nests were situated within the core survey area of the P-G via K connection. One peregrine nest was occupied in 2017 and 2018; one osprey territory was occupied in 2017 and 2018. Previously used red kite nests were found but only two were occupied in 2018. During the 2018 survey year, three suitable locations for barn owl were occupied (i.e. potential nests) (**Appendix 11.3**). Low levels of flight activity at potential risk height by peregrine and red kite was recorded. No osprey or barn owl flight activity was observed (**Appendix 11.1**).

Predicted Construction Effects

Wildfowl

11.191 Displacement of foraging birds from suitable habitats may occur for greylag goose. The extent to which displacement may occur and the implications of this will vary depending on the nature of the construction activity and the intervening topography, which may influence the avoidance distance this species adopts. However, this species has a large foraging range (SNH use the foraging range of 15km to 20km (SNH, 2016)[vi]), and suitable foraging habitats are widespread through the area surrounding the P-G via K connection. Therefore it is considered that sufficient habitat exists beyond any potential construction disturbance zone around construction activities to support this species.

Scarce Raptors and Owls

11.192 All nests of raptor and owl species listed on Schedule 1 and Annex 1 will be identified and protected from disturbance during the construction period (see **Embedded Mitigation Measures** section above).This includes the nests within the core survey area which were active during the survey period and which are likely to still be in use during the construction period.

11.193 Displacement of foraging birds from suitable habitats may occur for osprey, peregrine and red kite and the extent to which displacement may occur and the implications of this will vary depending on the nature of the construction activity and the intervening topography, which may influence the avoidance distance a species adopts. However, all these species have large foraging ranges: osprey 10km to 20km maximum recorded 28km; peregrine core range 2km up to maximum recorded 18km; red kite 4km to

6km (SNH, 2016)[vi], and suitable habitats are widespread through the area surrounding the P-G via K connection. Therefore it is considered that sufficient habitat exists beyond any potential construction disturbance zone around construction activities to support these species.

11.194 Barn owl foraging range when breeding is up to 1km, and up to 3km to 5km when not breeding. They forage mainly during the night although some activity may occur at dusk and dawn, so the overlap between their main daily foraging period and construction activities will be minimal. Furthermore, barn owl is also very tolerant of human activities and so potential for disturbance during construction is intrinsically low.

Assessment – Greylag goose

11.195 Nature Conservation Importance – greylag goose is classified as High NCI for the KTR Project (**Table 11.3**).

11.196 Spatial and Temporal Magnitude – based on the flock sizes observed in flight and the small number of observations, only small numbers appear to use the vicinity of the P-G via K connection; behaviourally, they are present only during part of the year (October to April) and also range over a very large area to forage and therefore construction disturbance will have a negligible spatial magnitude when behavioural sensitivity is taken into consideration. Construction disturbance will last 58 months at the most[11] (see **Chapter 5**) so is assessed as short term temporal magnitude.

11.197 Conservation Status – favourable.

Assessment - Scarce Raptors and Owls

11.198 Nature Conservation Importance – osprey, peregrine, red kite and barn owl are all classified as High NCI for the KTR Project (**Table 11.3**).

11.199 Spatial and Temporal Magnitude – osprey – initially assigned as moderate spatial magnitude for population (based on the NHZ population estimate in 2013 of six pairs (this estimate is liable to be lower than the current population as this is increasing) and the guide proportions for spatial magnitude in **Table 11.4**)) however as the nest will be protected from construction disturbance and behaviourally they have very large foraging area and are only present between March and August, the level of spatial magnitude can be reduced to negligible when this is taken into account. The temporal magnitude will be short-term for a construction period of 58 months (**Table 11.5**).

11.200 Spatial and Temporal Magnitude – red kite and peregrine – initially assigned as low spatial magnitude for population based on NHZ estimates of 83 pairs for red kite in 2013 (which will be lower than the current population as this is expanding) and 34 pairs in 2014 for peregrine, against the guide proportions in **Table 11.4**. As all nests will be protected from construction disturbance and both species utilise large foraging ranges the level of spatial magnitude can be reduced to negligible when this is taken into account. The temporal magnitude will be short-term for a construction period of 58 months (**Table 11.5**).

11.201 Spatial and Temporal Magnitude – barn owl – the D&G population estimate was 400 birds in 2004 and the population is considered to be expanding so although there is no NHZ estimate the spatial magnitude can be assigned as negligible (**Table 11.4**) for three potential nests, especially as all nests will be protected from construction disturbance. Barn owls forage during the night i.e. the period when construction is unlikely to occur, so their behaviour alone will ensure the spatial magnitude for construction disturbance is negligible, in addition to the short-term temporal construction period (58 months) (**Table 11.5**).

11.202 Conservation Status – osprey, peregrine, red kite and barn owl are all in favourable conservation status.

Summary of assessment of significance for construction effects of P-G via K connection

11.203 The short-term potential effects of construction on greylag goose, osprey, peregrine, red kite and barn owl along the P-G via K connection of direct and indirect displacement effects are predicted to be **none** and therefore **not significant** in terms of the EIA Regulations.

Proposed Mitigation

11.204 No additional mitigation is proposed for the construction of the P-G via K connection.

Residual Construction Effects Assessment of Significance

11.205 The residual short-term potential effects of construction on greylag goose, osprey, peregrine, red kite and barn owl along the P-G via K connection of direct and indirect displacement effects are predicted to be **none** and therefore **not significant** in terms of the EIA Regulations.

Predicted Operational Effects

Wildfowl

11.206 For greylag goose, flight collision risk is evaluated as low (**Appendix 11.2**).

Scarce Raptors and Owls

11.207 For peregrine, osprey and red kite, as these species were found nesting within close proximity of the connection, the collision risk evaluation was inferred from the evaluation for the G-T connection. As set out in the Field Survey section, the purpose of the MWPs was for gathering information on flights by migrating wildfowl. Data for the P-G via K connection was gathered from two VPs (MWP1 and MWP2) and was necessarily only collected during October, November, March and April of one winter migration season, therefore the flight activity during other months of the year was not recorded. Whereas, data collection for the G-T connection was undertaken over all months of the year for a full two year period from a number of VPs (MWPs and FVPs) and provides a better picture of general activity for raptor species. In addition the species were recorded as breeding within the survey buffer of the G-T connection (**Appendix 11.2**).

11.208 For these birds which nest within the core survey area of the P-G via K connection collision risk along the 10.1km of the connection was inferred from the collision risk evaluations for the G-T connection (32.3km). For the G-T connection, peregrine and osprey collision risk was evaluated as low and for red kite very low (**Appendix 11.2**), therefore, for the purpose of this assessment, collision risk attributed to the P-G via K connection has been evaluated as being low for peregrine and osprey and very low for red kite.

Assessment – Greylag goose

11.209 Nature Conservation Importance – greylag goose is classified as High NCI (**Table 11.3)**.

11.210 Spatial and Temporal Magnitude - For greylag goose the LKRDM SPA (and Ramsar site) population is taken as estimated as 457 and the D&G population around 4750. For a moderate spatial magnitude effect to occur on the local population (e.g. LKRDM SPA (and Ramsar site) population) over 27 birds would have to be killed by collision with the OHL each year. This is judged to be unlikely due to the low level of flight collision risk (**Appendix 11.2**) (i.e. they were observed in small numbers, mainly in small flocks, (flight activity of low numbers of flights per hour) and they did not appear to be passing regularly over the OHL of the P-G via K in any 'hotspots' of flight activity, but often were flying in parallel to the OHL route along the valleys (**Figure 11.2.1**), therefore the spatial magnitude is judged to be negligible. The temporal magnitude of the operational collision effect of the P-G via K connection will be long-term.

11.211 Conservation Status – favourable.

Assessment – Scarce Raptors and Owls

11.212 Nature Conservation Importance – osprey, peregrine and red kite are all classified as High NCI (**Table 11.3**.

11.213 Spatial and Temporal magnitude – Osprey. initially assigned as moderate spatial magnitude for population (based on the NHZ population estimate in 2013 of six pairs (this estimate is liable to be lower than the current population as this is increasing) and the guide proportions for spatial magnitude in **Table 11.4**)). However. due to the evaluation of low flight collision risk for this species, behaviourally they have very large foraging area as well as are only present between March and August, and the potential for collision will decline away from nest locations the level of spatial magnitude can be reduced to negligible when this is taken into account.

11.214 Spatial and Temporal magnitude –Peregrine. initially assigned as low spatial magnitude for population based on NHZ estimate of 34 pairs in 2014 for peregrine, against the guide proportions in **Table 11.4**. Due to the evaluation of low flight collision risk for this species, plus they utilise large foraging ranges and the potential for collision will decline away from nest locations, the level of spatial magnitude can be reduced to negligible when this is taken into account. The temporal magnitude is long-term.

[11] This duration is the total which includes removal of N and R route (north) and restoration.

11.215 Spatial and Temporal magnitude – red kite is initially assigned as low spatial magnitude in a regional increasing population of over 160 breeding birds. The collision risk for red kite is judged to be very low and this species utilises a large foraging range. The level of spatial magnitude can be reduced to negligible when this is taken into account, so spatial magnitude is negligible whilst the temporal magnitude is long-term.

11.216 Conservation Status – osprey, peregrine and red kite are all in favourable conservation status.

Summary of assessment of significance for operational effects of P-G via K connection

11.217 The long-term potential effects of operation on greylag goose osprey, peregrine and red kite along the P-G via K connection of collision are predicted to be **none** and therefore **not significant** in terms of the EIA Regulations.

Proposed Mitigation

11.218 No additional mitigation is proposed for the operation of the P-G via K connection.

Residual Operation Effects Assessment of Significance

11.219 The residual long-term potential effects of operation on greylag goose, peregrine, osprey and red kite along the P-G via K connection, due to collision are predicted to be **none** and therefore **not significant** in terms of the EIA Regulations.

Assessment for Removal of N and R (north) Routes

11.220 Construction activities on the new OHL will occur alongside the existing single circuit steel lattice 132kV OHL (N and R (north) routes) which will remain in situ prior to dismantling. The decommissioning activities for the N and R (north) routes will commence during the construction of the new OHL. The period of all decommissioning activities will last for of 51 months duration, so total duration of P-G via K construction and N and R (north) decommissioning is 58 months.

11.221 The decommissioning of N and R (north) routes is being undertaken in proximity to construction of the P-G via K connection (construction of P-G via K will take 38 months). The decommissioning activities will extend the temporal extent of potential disturbance/displacement for the same species – however as this is only temporary – the significance assessment of the effects would remain as **none** and **not significant** in terms of the EIA Regulations. Post-decommissioning there will not be any operational effects, as the N and R (north) routes will no longer exist therefore the significance assessment is **none** and **not significant**.

Proposed Mitigation

11.222 As there are no significant effects no additional mitigation is required or proposed for the decommissioning of the current N and R route (north) OHL along the P-G via K connection. In addition, no mitigation is proposed in terms of SPEN's Schedule 9 duties.

Residual Effects

11.223 The residual long-term potential effects of direct and indirect displacement due to decommissioning along the N and R (north) routes on greylag goose, osprey, peregrine, red kite and barn owl when combined with the P-G via K Connection and are predicted to be **none** and therefore **not significant** in terms of the EIA Regulations.

Summary of Effects

11.224 For the P-G via K connection, no adverse effects are predicted during construction and operation and decommissioning (of N and R (north) routes) on any bird species, therefore residual effects are judged to be **none** and **not significant** in the context of the EIA Regulations.

Cumulative Effects

11.225 **Chapter 3: Approach to the EIA** sets out the approach to cumulative assessment. The assessment of cumulative effects is limited to species of High NCI for which there is a likely effect as a result of the connection being assessed that may be exacerbated cumulatively with other projects. Only effects assessed as **minor** or above (for an individual connection) are included in the cumulative assessment.

11.226 Given there are no predicted adverse residual effects 'in isolation' for construction disturbance of foraging for greylag goose, osprey, peregrine, red kite, barn owl; and, operational collision for greylag goose i.e. all effects are assessed as **none**, it is considered highly unlikely that the P-G via K connection will contribute cumulatively to adverse effects on the conservation status of the regional population of these species. Consequently, there is no requirement for a cumulative assessment.

Carsfad to Kendoon

11.227 The effects considered as part of the assessment reported below are construction disturbance of foraging red kite and risk of collision during operation for red kite; with all other effects and species scoped out (**Table 11.1**).

Existing Conditions

Scarce Raptors and Owls

11.228 One red kite nest was found in the core survey area of the C-K connection (see **Appendix 11.3)** and low levels of flight activity by red kite were recorded. (**Appendix 11.1**). For red kite which was found to be nesting within close proximity of the C-K connection, the collision risk evaluation was inferred from the evaluation for the G-T connection.

Predicted Construction Effects

Scarce Raptors and Owls

11.229 All nests of species listed on Schedule 1 and Annex 1 will be identified and protected from disturbance during the construction period (see **Embedded Mitigation Measures** section above). This includes the nests within the core survey area which were active during the survey period and which are likely to still be in use during the construction period.

11.230 Displacement of foraging red kites from suitable habitats may occur and the extent to which displacement may occur and the implications will vary depending on the nature of the construction activity and the intervening topography, which may influence the avoidance distance. However, this species has a large foraging range (4km to 6km (SNH, 2016)[vi]) and suitable habitats are widespread through the area surrounding the C-K connection. Therefore, it is considered that sufficient habitat exists beyond any potential construction disturbance zone around construction activities to support this species.

Assessment - Scarce Raptors and Owls

11.231 Nature Conservation Importance – red kite is classified as High NCI (**Table 11.3**).

11.232 Spatial and Temporal Magnitude – red kite is initially assigned as low spatial magnitude for population based on NHZ estimates of 83 pairs in 2013 (which will be lower than the current population as this is expanding), against the guide proportions in **Table 11.4**. As all nests will be protected from construction disturbance and this species utilises a large foraging range the level of spatial magnitude can be reduced to negligible when this is taken into account. The temporal magnitude will be short-term for a construction period of 24 months [12] (see **Chapter 5**) (**Table 11.5**).

11.233 Conservation Status – red kite is in favourable conservation status.

Summary of Assessment of Significance for Construction Effects of C-K connection

11.234 The short-term potential effects of construction on red kite along the C-K connection of direct and indirect displacement are predicted to be **none** and therefore **not significant** in the terms of the EIA Regulations.

Proposed Mitigation

11.235 No additional mitigation is proposed for the construction of the C- K connection.

[12] This duration is the total which includes restoration.

Residual Construction Effects Assessment of Significance

11.236 The residual short-term potential effects of construction on red kite along the C-K connection of direct and indirect displacement are predicted to be **none** and therefore **not significant** in the terms of the EIA Regulations.

Predicted Operational Effects

Red kite

11.237 As explained in the Field Survey section, the purpose of the MWPs was for gathering information on migrating wildfowl. Data for the C-K connection was gathered from a single VP (MWP1) and was necessarily only collected during October, November, March and April of one winter migration season, therefore the flight activity during other months of the year was not recorded. Whereas data collection for the G-T connection was undertaken over all months of the year for a full two year period from a number of VPs (MWPs and FVPs). In addition red kite was recorded as breeding within the survey buffer of the G-T connection (**Appendix 11.2**).

11.238 For the red kite which nest within the core survey area of the C-K connection collision risk along the 2.6km of the connection was inferred from the collision risk evaluations for the G-T connection (32.3km). For the G-T connection collision risk was evaluated as very low for red kite (**Appendix 11.2**). Therefore, for the purpose of this assessment collision risk attributed to the C-K connection has been evaluated as being very low for red kite.

Assessment – Scarce Raptors and Owls

11.239 Nature Conservation Importance – red kite is classified as High NCI (**Table 11.3**).

11.240 Spatial and Temporal Magnitude – is initially assigned as low spatial magnitude in a regional increasing population of over 160 breeding birds. The collision risk for red kite is judged to be very low and this species utilises a large foraging range. The level of spatial magnitude can be reduced to negligible when this is taken into account, so spatial magnitude is negligible whilst the temporal magnitude is long-term.

11.241 Conservation Status - red kite is in favourable conservation status.

Summary of Assessment of Significance for Operational Effects of C-K connection

11.242 The long-term potential effects of operation on red kite along the C-K connection of collision risk are predicted to be **none** and therefore **not significant** in the terms of the EIA Regulations.

Proposed Mitigation

11.243 No additional mitigation is proposed for the operation of the C- K connection.

Residual Operational Effects Assessment of Significance

11.244 The residual long-term potential effects of operational collision on red kite along the C-K connection are predicted to be **none** and therefore **not significant** in the terms of the EIA Regulations.

Summary of Effects

11.245 For the C-K connection no adverse effects are predicted during construction and operation on any bird species, and therefore residual effects will be **none** and therefore **not significant** in terms of the EIA Regulations.

Cumulative Effects

11.246 **Chapter 3** sets out the approach to cumulative assessment. The assessment of cumulative effects is limited to species of High NCI for which there is a likely effect as a result of the connection being assessed that may be exacerbated cumulatively with other projects. Only effects assessed as **minor** or above (for an individual connection) are included in the cumulative assessment.

11.247 Given there are no predicted adverse residual effects 'in isolation' for construction disturbance of foraging red kite it is considered highly unlikely that the C-K connection will contribute cumulatively to adverse effects on the conservation status of the regional population of this species. Consequently, there is no requirement for a cumulative assessment.

Earlstoun to Glenlee

11.248 The effects considered as part of the assessment reported below are construction disturbance of foraging for red kite; with all other effects and species scoped out (**Table 11.1**).

Existing Conditions

Scarce Raptors and Owls

11.249 No nests of red kite were within the core area, and only low levels of flight activity by red kite were recorded. (**Appendix 11.1**).

Predicted Construction Effects

Scarce Raptors and Owls

11.250 All nests of species listed on Schedule 1 and Annex 1 will be identified and protected from disturbance during the construction period (see **Embedded Mitigation Measures** section above).

11.251 Displacement of foraging red kites from suitable habitats may occur and the extent to which displacement may occur and the implications will vary depending on the nature of the construction activity and the intervening topography, which may influence the avoidance distance. However, this species has a large foraging range (4km to 6km (SNH, 2016)[vi]) and suitable habitats are widespread through the area surrounding the E-G connection. Therefore, it is considered that sufficient habitat exists beyond any potential construction disturbance zone around construction activities to support this species.

Assessment – Scarce Raptors and Owls

11.252 Nature Conservation Importance – red kite is classified as High NCI for the KTR Project (**Table 11.3**).

11.253 Spatial and Temporal Magnitude - red kite is initially assigned as low spatial magnitude for population (based on NHZ estimates of 83 pairs in 2013 (which will be lower than the current population as this is expanding), against the guide proportions in **Table 11.4**. As all nests will be protected from construction disturbance and this species utilises a large foraging range the level of spatial magnitude can be reduced to negligible when this is taken into account. The temporal magnitude will be short-term for a construction period of 41 months at the most[13] (see **Chapter 5**) (**Table 11.5**).

11.254 Conservation Status - red kite is in favourable conservation status.

Summary of Significance Assessment for Construction Effects of E-G connection

11.255 The short-term potential effects of construction on red kite along the E-G connection of direct and indirect displacement are predicted to be **none** and therefore **not significant** in terms of the EIA Regulations.

Proposed Mitigation

11.256 No additional mitigation is proposed for the construction of the E- G connection

Residual Construction Effects

11.257 The residual short-term potential effects of construction on red kite along the E-G connection of direct and indirect displacement are predicted to be **none** and therefore **not significant** in the terms of the EIA Regulations.

Summary of Effects

11.258 For the E-G connection no adverse effects are predicted during construction and operation on any bird species, therefore residual effects are judged to be **none** and **not significant** in terms of the EIA Regulations.

[13] This duration is the total which includes restoration.

Cumulative Effects

11.259 **Chapter 3** sets out the approach to cumulative assessment. The assessment of cumulative effects is limited to species of High NCI for which there is a likely effect as a result of the connection being assessed that may be exacerbated cumulatively with other projects. Only effects assessed as **minor** or above (for an individual connection) are included in the cumulative assessment.

11.260 Given there are no predicted adverse residual effects 'in isolation' for construction disturbance of foraging for red kite it is considered highly unlikely that the E-G connection will contribute cumulatively to adverse effects on the conservation status of the regional population of this species. Consequently, there is no requirement for a cumulative assessment.

Glenlee to Tongland

11.261 The effects considered as part of the assessment reported below are construction disturbance of foraging for whooper swan, greylag goose, red kite, osprey, peregrine, goshawk, hen harrier, honey-buzzard, golden eagle, nightjar, curlew, lapwing and barn owl; construction disturbance of roosting red kite and hen harrier; and, risk of collision for whooper swan, greylag goose, red kite, osprey, peregrine, goshawk, hen harrier, nightjar and golden eagle; with all other effects and species scoped out (**Table 11.1; Appendix 11.2**).

11.262 The effects of removal (decommissioning) of the existing R route (south) are also considered for Greenland-white fronted goose, whooper swan and greylag goose.

Existing Conditions

Wildfowl

11.263 Low levels of flight activity by greylag goose and whooper swan was recorded in the potential collision risk height bands for the G-T connection (**Appendices 11.1** and **11.2, Figures 11.2.1** and **11.2.2**).

Scarce Raptors and Owls

11.264 Red kite, peregrine, goshawk, osprey, hen harrier, honey-buzzard, golden eagle and barn owl were all recorded in the scarce bird survey area. Red kite, goshawk, osprey, honey-buzzard, golden eagle and barn owl bred within the survey areas during the survey period. Hen harriers and red kites were present during the winter months at communal roost locations (one and two locations within the survey areas respectively) (**Appendix 11.3**).

11.265 Within the core survey area of the G-T connection: one red kite territory was occupied in both 2017 and 2018; and, three goshawk territories were located, two occupied in 2018, one in 2017 (**Appendix 11.3**). During the 2018 survey year, six potential barn owl nest and roost locations were checked, no nests were found but a roost and two locations suitable for nesting with signs of occupation were found within 1km of the G-T connection (**Appendix 11.3**).

11.266 Hen harriers utilised a winter roost location, however this was outwith the core survey area (at over 1km from the G-T connection). Red kites used two historical roost locations: one most recently held 141 birds, the other 25 birds. Both are at least 1km from the G-T connection (and hence out with the core Study Area) **(Appendix 11.3)**. The larger one is approximately 275m from a short section of existing access track, which will be used temporarily during construction for removal of 35 tonnes of timber and for construction of six steel towers (**Chapter 5** and **Chapter 13: Traffic and Transport**).

11.267 Flight activity for peregrine, goshawk, osprey, hen harrier, golden eagle, honey-buzzard and red kite was recorded (**Appendix 11.1**, **Figures 11.5.1** and **11.5.2**). Levels of activity within the potential risk height bands of the G-T connection were in general low, however sufficient data was gathered to allow collision risk to be evaluated for peregrine, osprey, goshawk, hen harrier, golden eagle and red kite (**Appendices 11.2** and **11.3**).

Nightjar

11.268 During surveys by the DGNSG in 2017 eight males were estimated to have territories which at least partly lay within the 500m buffer of the G-T connection, whilst in 2018 six territorial males were estimated from these surveys. The 2019 surveys estimated thirteen males within this 500m buffer (**Appendix 11.3**).

11.269 Specialised flight activity surveys conducted for the KTR Project during 2018 and 2019 showed the majority of flights occurred at heights below the main risk height level of the conductors, (the lowest conductor is attached to the arm on the tower at an elevation of approximately 13.5m, the middle conductor at 17.25m, the top at 21.0m and the earth wire will be at approximately 26.0m at the tower). The nightjar flight activity within the 10-50m flight height band (which covers the heights of the conductors and earth wire) during 2018 and 2019 was 17%. (**Appendices 11.2** and **11.3**).

Waders

11.270 Curlew and lapwing were recorded as breeding within 500m of the G-T connection. Seven curlew and four lapwing territories were found in the survey buffer in one small area of good breeding habitat at Bargatton and two lapwing territories further south (**Figure 11.6.2**).

Predicted Construction Effects

Wildfowl

11.271 Displacement of foraging birds from suitable habitats may occur for greylag goose and whooper swan. The extent to which displacement may occur and the implications of this will vary depending on the nature of the construction activity and the intervening topography, which may influence the avoidance distance the species adopt. However, both have large foraging ranges (whooper swan is estimated at 5-8km whilst greylag goose a range of 15km to 20km (SNH, 2016[vi])). Where the connection passes through plantation forest the existing habitats around the G-T connection are unsuitable for foraging by these species. Furthermore, suitable foraging habitats are widespread through the wider area surrounding the G-T connection. Therefore, it is considered that sufficient habitat exists beyond any potential construction disturbance zone around construction activities to support these species.

Scarce Raptors and Owls

11.272 All nests of species listed on Schedule 1 and Annex 1, and other bird species of NCI will be identified and protected from disturbance during the construction period (see **Embedded Mitigation Measures** section above). For golden eagle, no construction activity will be undertaken within 1.5km of the active nesting site during January to September. This is reflected in the assessment below. With this embedded mitigation in place, the direct disturbance of breeding birds will be avoided for red kite, osprey, peregrine, goshawk, hen harrier, honey-buzzard, golden eagle and barn owl, and is therefore not considered further in this assessment.

11.273 Displacement of foraging birds from suitable habitats may occur for peregrine, goshawk, osprey, hen harrier, golden eagle, honey-buzzard and red kite and the extent to which displacement may occur and the implications will vary depending on the nature of the construction activity and the intervening topography, which may influence the avoidance distance a species adopts. However, all these species have large foraging ranges (during the breeding season: peregrine core range 2km up to maximum recorded 18km; goshawk core range 3km maximum less than 10km maximum recorded distance 18km; osprey 10km to 20km maximum recorded 28km; hen harrier core range 2km maximum 10km; golden eagle core range 6km maximum up to 9km; honey-buzzard and red kite 4km to 6km (SNH, 2016)[vi]) and suitable habitats are widespread through the area surrounding the G-T connection. Therefore, it is considered that sufficient habitat exists beyond any potential construction disturbance zone around construction activities to support these species. Goshawk forage in forests as well as in the adjoining open land and so may lose a small proportion of their foraging range due to felling for wayleaves and windthrow protection. However, they will also utilise these open areas within the forest for foraging so may benefit, especially from the increase in available edges, due to this felling. Golden eagle, peregrine, hen harrier, osprey, red kite, honey-buzzard and barn owl are unlikely to use commercial plantation forest (especially mature forest) for much if any foraging, preferring open ground or mixed woodland and open stands of trees, so the inclusion of a large portion of the new G-T connection within forest plantation will therefore have little effect on these species, and will ensure there is separation between these species and the construction activities in these areas.

11.274 Roosts of species listed on Schedule 1A of the WCA (hen harrier and red kite) will be protected from disturbance during the construction and decommissioning period (see **Embedded Mitigation Measures** section).

11.275 From the data gathered during the field surveys, the hen harrier winter roost location is used between October and March by a small number of birds (around four to five individuals) thus there is potential for disturbance due to construction activities. Birds arrive at the roost at or after dusk and leave around dawn, so there is likely to be some overlap with the construction activities during the shorter days of

these months and the birds arriving and leaving. However, in addition to the protection due to the embedded mitigation measures as the roost is beyond 1km away from the construction areas, the likelihood of disturbance of roosting hen harriers is minimal.

11.276 From data provided by the DGRSG the red kite winter roost locations support around 141 and 25 birds. There is some potential for disturbance due to construction activities during the shorter days of the winter months. However, both roosts are at least 1km from the potential disturbance due to construction of the towers. The larger roost is approximately 275m from a short section of existing access track which will be used for extraction of 35 tonnes of timber for creation of the wayleave corridor and also during the construction of six steel towers. This roost is currently around 200m from an existing public 'B' road. Under the WCA, disturbance near roosts will be avoided where at all possible by timing of construction works outwith the roost period (see **Embedded Mitigation Measures** section). The roosts are all at a distance where disturbance will be unlikely to occur (300m is the recommended buffer (SNH, 2014)[xxxv]), however if these works overlap with the evening and night periods of the winter months, there could be the potential for some short-term magnitude disturbance of the birds using the roost due to the temporary increase in traffic for the small amount of timber extraction and tower construction. It should also be considered that this roost currently exists close to a public road therefore the birds using this roost are presumed to already be tolerant of activity by some traffic.

11.277 Barn owls foraging range when breeding is up to 1km, and up to 3km to 5km when not breeding. They forage mainly during the night although some activity may occur at dusk and dawn, so the overlap between their main daily foraging period and construction activities will be minimal. Furthermore, barn owl is also very tolerant of human activities and so potential for disturbance during construction is intrinsically low. It is considered unlikely that construction activity will affect barn owls.

Nightjar

11.278 Nightjars are only present between May and September. As part of the embedded mitigation for nightjar, all construction within the core nightjar management area, defined by FLS, will be avoided between May and September (**Appendix 11.3** and **Chapter 5**). Therefore with this embedded mitigation in place direct disturbance of breeding nightjars will be avoided and is therefore not considered further in this assessment.

11.279 Nightjar forage between dusk and dawn and thus it will be highly unlikely that any overlap with their daily foraging period and construction activities will occur. Therefore, any displacement of foraging birds during the construction period will be minimal. Their foraging ranges can vary widely depending on the availability of suitable foraging habitats near to their breeding sites, and mean distances have been recorded as between around 600m to 3.3km (Sharps *et al.,* 2015[xxix]; Alexander & Cresswell, 1990[xxx]; Evens *et al.,* 2018[xxxi]). Due to no construction occurring between May and September within the core nightjar area, this area will be available for undisturbed foraging. For any nightjar which also use areas beyond the core area to forage, the diurnal separation between construction activities and the foraging birds will allow them to continue to forage undisturbed. As such, disturbance to foraging nightjar is not considered further in this assessment.

Waders

11.280 All nests of species listed on Schedule 1 and Annex 1, and other bird species of NCI will be identified and protected from disturbance during the construction period (see **Embedded Mitigation Measures** section above).With this in place the direct disturbance of breeding birds will be avoided.

11.281 Foraging curlew and lapwing may be displaced but the extent to which this may occur and the implications of this will vary depending on the nature of the construction activity and the intervening topography, which may influence the avoidance distance the species adopt. Both species will only be present during the breeding season effectively March to July for these species, and any potential disturbance will be limited to those months only. Despite the surveys for the G-T connection illustrating these species mainly utilising a small area for nesting, both curlew and lapwing often feed outside the breeding territory (Cramp & Simmons 1983)[xxxvi] and use a wide variety of habitats which are available in the wider area. Construction activities in foraging areas (away from the breeding area) may displace foraging curlew and lapwing, however if displaced during the construction period from the small areas around construction activities they will find other local foraging areas to utilise.

Assessment – Wildfowl

11.282 Nature Conservation Importance – whooper swan and greylag goose are classified as High NCI (**Table 11.3**).

11.283 Spatial and Temporal Magnitude- based on the flock sizes observed during the surveys, only small numbers appear to use the vicinity of the G-T Connection; behaviourally they are only present during part of the year (October to April) and also range over large areas to forage; they will also not forage within the forested areas. Construction disturbance will last 58 months[14] so is assessed as short term magnitude and negligible spatial magnitude when behavioural sensitivity is taken into consideration.

11.284 Conservation Status – favourable for both species.

Assessment – Scarce Raptors and Owls

11.285 Nature Conservation Importance - red kite, osprey, peregrine, goshawk, hen harrier, honey-buzzard, golden eagle and barn owl are all classified as High NCI (**Table 11.3**).

11.286 Spatial and Temporal Magnitude – red kite – initially assigned as low spatial magnitude for the breeding population (based on NHZ estimates of 83 pairs in 2013 (as this is an expanding population the current population will be larger) against the guide proportions in **Table 11.4**. With any active nests and roosts protected from disturbance during construction; the winter roosts mainly occupied by non-breeding or juvenile birds (therefore additional birds to the estimate of the population of breeding birds) and protected from most potential sources of disturbance by distance or tolerance; the species utilising a large foraging range, and generally avoiding foraging with plantation forest, the level of spatial magnitude can be assessed as negligible. Temporal magnitude will be short term (construction period of 58 months).

11.287 Spatial and Temporal Magnitude – osprey – initially assigned as moderate spatial magnitude for a population based on an NHZ estimate of six pairs in 2013 (this will have increased for this expanding population) and the guide proportions for magnitude in **Table 11.4**. However, as the nest will be protected from disturbance; this species uses a very large foraging range, and does not utilise plantation forest for foraging; and they are only present during the breeding period (March to August), the level of spatial magnitude can be assessed as negligible. The temporal magnitude will be short-term (period of 58 months).

11.288 Spatial and temporal Magnitude – goshawk – initially assigned as low spatial magnitude (in line with the guide proportions in **Table 11.4**) for a population based on an NHZ estimate of 31 pairs in 2013 (which was likely an underestimate). Any nests will be protected from disturbance during construction; this species utilises a large foraging range and will probable benefit from the addition of forest openings and edges; so the level of spatial magnitude can be assessed as negligible. Temporal magnitude will be short-term for these effects within a 58 month construction period.

11.289 Spatial and Temporal Magnitude – golden eagle - any nest locations will be protected from disturbance with distance and temporal restrictions; foraging birds rarely approached the area of the G-T connection, are not likely to use the habitats around the new connection within the forest plantation and have a large foraging range. This separation between golden eagle and the new OHL in these areas ensures the construction activities will therefore have very little effect on the species, once these facts are accounted for this can be assessed as negligible.

11.290 Spatial and Temporal Magnitude – hen harrier – there were no nests; no foraging activity from hen harriers during the breeding season for the G-T connection, and they are unlikely to use many of the habitats through which the G-T connection passes for foraging, preferring instead the open upland areas. The winter roost site will be protected from disturbance by the embedded mitigation measures and due to its distance from any potential construction, as well as only being occupied during the winter months, therefore, potential construction effects on this species which has a large over-wintering population in the NHZ can be assessed as negligible for spatial magnitude. The temporal magnitude will be short-term for a construction period of 58 months.

11.291 Spatial and Temporal Magnitude – peregrine – there are no nests within the G-T connection, and a large foraging range, therefore enables an assessment of negligible for this species (which would initially be assigned as low) for spatial magnitude, for a population estimated as 34 pairs of peregrine in this NHZ in 2014 against the guide proportions in **Table 11.4.** The temporal magnitude is short-term for a construction period of 58 months (including restoration).

11.292 Spatial and Temporal Magnitude - honey-buzzard – any nests will be protected from disturbance, (although none were found within the core buffer (500m) of the G-T Connection); they utilise a large foraging range and diverse habitats; very little flight activity was observed in the vicinity of the new

[14] This duration is the total which includes removal of R route and restoration

OHL; and they are only present during the breeding period (May to September). Despite there being no definitive population estimate for the NHZ or south Scotland, when the likelihood that this species is under-recorded and the regional population is expanding is taken into account, an assessment of negligible for spatial magnitude of construction effects can be made. The temporal magnitude is short-term for a construction period of 58 months.

11.293 Spatial and Temporal magnitude - barn owl – any nests will be protected from disturbance during construction; (although none were found in the core buffer of the G-T connection), they use diverse foraging habitats and a large range; their population is expanding and is estimated as negligible spatial magnitude based on these details and the population estimate from 2004 against the guide proportions in **Table 11.4**. The temporal magnitude is short-term for a construction period of 58 months.

11.294 Conservation Status – favourable for red kite, osprey, goshawk, hen harrier, peregrine, honey-buzzard and barn owl; unfavourable for golden eagle.

Assessment - Waders

11.295 Nature Conservation Importance – curlew and lapwing are classified as Moderate NCI (**Table 11.3**).

11.296 Spatial and Temporal Magnitude - Nests of curlew and lapwing will be protected from disturbance within the construction period as required under the WCA (see **Embedded Mitigation Measures** above). Due to the very low numbers of curlew and lapwing present in the survey area relative to the regional populations of these species, the spatial magnitude of construction disturbance effects would be negligible. The temporal magnitude is short-term for a construction period of 58 months.

11.297 Conservation Status – both curlew and lapwing are considered to be in unfavourable conservation status.

Summary of assessment of significance for Construction Effects of G-T connection

11.298 The short-term potential direct and indirect displacement effects of construction on breeding, foraging and roosting whooper swan, greylag goose, red kite, osprey, peregrine, goshawk, hen harrier, honey-buzzard, golden eagle, barn owl, nightjar, curlew and lapwing along the G-T connection of the KTR Project of are negligible magnitude spatially thus are predicted to be **none** and therefore **not significant** in terms of the EIA Regulations.

Proposed Mitigation

11.299 No additional mitigation is proposed for the construction of the G-T connection.

Residual Construction Effects Assessment of Significance

11.300 The residual short-term potential effects of construction on whooper swan, greylag goose, red kite, osprey, peregrine, goshawk, hen harrier, honey-buzzard, golden eagle, barn owl, nightjar, curlew and lapwing along the G-T connection of direct and indirect displacement effects are predicted to be **none** and therefore **not significant** in terms of the EIA Regulations.

Predicted Operational Effects

11.301 In addition to behavioural and morphological characteristics, collision risk is related to the time a species spends flying in the risk window. The risk window is defined as the minimum and maximum flight height bands used in the surveys (in this case 10m to 50m) containing the conductors of the OHL but is more importantly reduced to the very small proportion of that airspace which contains the conductors i.e. seven wires (six conductors plus the earth wire) each of approximately 2.3cm diameter within the 40m risk window, therefore only 0.22% of that risk window constitutes an actual risk of collision for birds (**Appendix11.2**).

Wildfowl

11.302 Whooper swan and greylag goose which have high susceptibility to collision due to their morphology and behaviour but have minimal flight activity (and even less in the collision risk window), and no indication of regularly used flight routes within 500m of the G-T connection, are evaluated as low collision risk for the G-T connection (**Appendix 11.2**).

Scarce Raptors

11.303 The potential for collision will decline away from nest locations. Due to low levels of flight activity within 500m of the G-T connection and documented low susceptibility to collision due to their morphology and behaviour, hen harrier, red kite and goshawk collision risk is evaluated as very low for the G-T connection. For peregrine (low flight activity and medium susceptibility to collision due to morphology and flight behaviour), osprey (some regular pattern to their flight activity and low susceptibility to collision), and golden eagle (low flight activity but medium susceptibility due to morphology and flight behaviour) collision risk is evaluated as low (further details are provided in **Appendix 11.2** and **Appendix 11.3**).

Nightjar

11.304 Nightjars have potential susceptibility to collision especially where the G-T connection passes through the core nightjar management area.

11.305 For nightjar the majority of the flights observed were short low-level flights with relatively little proportion of time spent in the main risk window of 10-50m (17% for both survey years, 24% for 2018 and 11% for 2019).

11.306 Nightjar flight behaviour, physiology and foraging strategy indicates they will be able to avoid the conductors, as by their nature: they are highly manoeuvrable; almost exclusively fly during the hours of darkness, and are highly competent at foraging in and around areas of woodland, therefore are highly adapted to manoeuvring to catch prey and avoid obstacles in conditions of darkness. The susceptibility of collision by nightjars with OHLs was considered to be minimal by a researcher working on avoidance behaviour of the species nesting around wind farms across Europe (A. Traxler *pers. comm.*). Furthermore, nightjars were able to spot and avoid mist-nets used in the open and regenerating forested areas of Thetford forest in complete darkness (B. Urquhart *pers comm*.) (further discussion in **Appendix 11.2**). On this basis, the resulting collision risk for nightjar, given the likelihood of avoidance, is evaluated to be very low (**Appendix 11.3**).

Assessment – Wildfowl

11.307 Nature Conservation Importance - whooper swan and greylag goose are classified as High NCI (**Table 11.3**).

11.308 Spatial and Temporal Magnitude – for greylag goose, there is no available estimate for the NHZ population, however the local population (LKRDM SPA which is less than the NHZ population) is estimated as 457 and the D&G population around 4750. For a moderate spatial magnitude effect (**Table 11.4**) to occur on the local population (as a precautionary approach), over 27 birds would have to be killed by collision with the OHL each year. This is judged to very unlikely due to: low collision risk (**Appendix 11.2**); small numbers of individuals (flight activity of low numbers of flights per hour) and no regularly used routes identified crossing the G-T connection, instead there were flights in parallel to the OHL. Furthermore, the regional (NHZ) population will be greater than that attributed solely to the local population (LKRDM SPA (and Ramsar site)). Therefore, the spatial magnitude of operational effects is judged to be negligible. Temporal magnitude is long-term.

11.309 Spatial and Temporal Magnitude – for whooper swan with an NHZ population of 1188, for a moderate spatial effect to occur (**Table 11.4**) 71 birds would have to be killed annually through collision with the OHL. This is judged to very unlikely due to: low collision risk (**Appendix 11.2**); small numbers of individuals (flight activity of low numbers of flights per hour). Therefore, the spatial magnitude of operational effects is judged to be negligible. Temporal magnitude is long-term.

11.310 Conservation Status – both whooper swan and greylag goose are in favourable conservation status.

Assessment - Scarce Raptors

11.311 Nature Conservation Importance - red kite, osprey, peregrine, goshawk, hen harrier and golden eagle are all classified as High NCI (**Table 11.3**).

11.312 Spatial and Temporal Magnitude – red kite breeding population based on NHZ estimates was 83 pairs in 2013. This is an expanding population therefore the current population will be larger and an assessment based on this figure of 83 pairs is therefore precautionary. Against the guide proportions in **Table 11.4**, for a moderate spatial magnitude effect to occur 10 birds would have to be killed due to collision with the G-T connection each year. One red kite territory was active in the G-T connection; two winter roosts were over 1km from the G-T connection and the collision risk is evaluated as very low (red kites are generally slow and agile in flight and are considered to have low susceptibility to collision taken with a low level of locally recorded flight features **Appendix 11.2**) therefore the spatial magnitude of operational effects can be assessed as negligible. Temporal magnitude will be long-term.

11.313 Spatial and Temporal Magnitude – goshawk breeding population based on NHZ estimates was 31 pairs in 2013. This is an expanding population therefore the current population will be larger and an assessment based on this figure is therefore precautionary. There are two nesting territories within the G-T connection. Against the guide proportions in **Table 11.4**. for a moderate spatial magnitude effect to occur four birds would have to be killed due to collision with the G-T connection each year, which is unlikely due to this species being highly adapted to flight in forested areas and therefore very capable of avoiding the conductors (low susceptibility to collision), low level of locally recorded flight features (despite nesting in the area) hence the collision risk is evaluated as very low (**Appendix 11.2**) and the spatial magnitude of operational effects can be assessed as negligible. Temporal magnitude will be long-term.

11.314 Spatial and Temporal Magnitude – hen harrier breeding population based on NHZ estimates was 18 pairs in 2011 plus there is acknowledged to be a larger over-wintering population in the NHZ. There are no nests, and breeding birds do not utilise the G-T connection area; the winter roost is over 1km from the connection, and collision risk is evaluated as very low due to a low level of locally recorded flight features coupled with having a low susceptibility to collision (**Appendix 11.2**) therefore the spatial magnitude of operational effects can be assessed as negligible. The temporal magnitude will be long-term.

11.315 Spatial and Temporal Magnitude – peregrine breeding population based on NHZ estimates was 34 pairs in 2014. This is an expanding population therefore the current population will be larger and an assessment based on this figure is therefore precautionary. Against the guide proportions in **Table 11.4**. for a moderate spatial magnitude effect to occur four birds would have to be killed due to collision with the G-T connection each year. The collision risk is evaluated as low (low level of locally recorded flight features and medium susceptibility to collision **Appendix 11.2**); there are no nests in the buffer of G-T connection and very little flight activity, therefore the spatial magnitude of operational effects can be assessed as negligible. Temporal magnitude will be long-term.

11.316 Spatial and Temporal Magnitude – osprey breeding population based on NHZ estimates was six pairs in 2013. This is an expanding population therefore the current population will be larger and an assessment based on this figure is therefore precautionary. Against the guide proportions in **Table 11.4**. for a moderate spatial magnitude effect to occur one bird would have to be killed due to collision with the G-T connection each year. There are no nests within the G-T connection; the collision risk is evaluated as low (medium level of locally recorded flight features and low susceptibility to collision **Appendix 11.2**), therefore the spatial magnitude of operational effects can be assessed as low. Temporal magnitude will be long-term.

11.317 Spatial and Temporal Magnitude – golden eagle has a very small regional population, estimated as four pairs in 2015 for the South of Scotland. One bird every four years would have to be killed in collision for a moderate spatial effect to occur (**Table 11.4**). The risk of collision is evaluated as low as golden eagles seldom fly in the vicinity of the G-T connection and would be unlikely to use the habitat or terrain regularly (Medium susceptibility to collision and low level of locally recorded flight features (**Appendix 11.3**); therefore the spatial magnitude of operational effects can be assessed as low. Temporal magnitude will be long-term.

11.318 Conservation Status – red kite, goshawk, hen harrier, peregrine and osprey are all in favourable conservation status for the region, whilst golden eagle is considered to be in unfavourable conservation status for the South of Scotland region.

Assessment – Nightjar

11.319 Nature Conservation Importance – nightjar is classified as High NCI (**Table 11.3**).

11.320 Spatial and Temporal Magnitude - The 2019 DGNSG count data estimated approximately 13 territories within 500m of the G-T connection. A survey of key sites in D&G in 2017 produced a count of 44 territorial males (Gallagher, 2017)[xxxii]. However this regional result is stated as likely to be an underestimate as the survey was limited to key sites in the region rather than covering the full area. The 2017 count data for within 500m of the G-T connection estimated eight territories (18% of the minimum of 44 in the region), the 2019 count data equates to 30% of 44 territories. The risk of collision is evaluated as very low (low susceptibility to collision and low level of locally recorded flight features **Appendix 11.3**) and as discussed above and in **Appendices 11.2** and **11.3**, it is considered likely that avoidance of collision will be extremely high, and therefore it is unlikely that any breeding territories would be affected. Even using a highly pessimistic scenario that two territories were to be affected every year this would still be less than 5% of the minimum regional population and give an assessment of spatial magnitude which is low (**Table 11.4**). The Temporal magnitude will be long-term.

11.321 Conservation Status – nightjar is considered to be in favourable conservation status for the NHZ.

Summary of assessment of significance for Operational Effects of G-T Connection

11.322 The long-term potential effects of operation of the G-T connection on whooper swan, greylag goose, red kite, osprey, peregrine, goshawk, golden eagle and hen harrier is predicted to be **none** (No or non-detectable changes in the conservation status) and nightjar is predicted to be **minor** (Small or barely discernible changes in regional population that would be unlikely to have an impact on the conservation status of regional populations) and therefore **not significant** in the terms of the EIA Regulations.

Proposed Mitigation

11.323 No additional mitigation is proposed for the operation of the G-T connection. The Scoping Opinion asked for an investigation of measures to minimise potential effects on nightjar along the G-T connection and any other area where nightjar is assessed as being at risk. As the assessment above has shown there is very little risk to nightjar due to operational effects. A variety of possible measures have been discussed with consultees at meetings however none have been identified as required.

Residual Effects

11.324 The residual long-term potential effects of operation of the G-T connection on whooper swan, greylag goose, red kite, osprey, peregrine, goshawk, golden eagle and hen harrier is predicted to be **none** and nightjar is predicted to be **minor** and therefore **not significant** in the terms of the EIA Regulations.

Assessment for Removal of R Route (South)

11.325 Construction activities on the new G-T OHL will occur in proximity to the existing single circuit steel lattice 132kV OHL R route (south), at the southern extent, which will remain in situ prior to dismantling. The enabling works for decommissioning of the R route (south) will commence during the construction of the new OHL. The period of all activities (enabling, dismantling and reinstatement) will last for a duration of 51 months. The towers of the existing R route (south) and new G-T connection will be in situ together for approximately 25 months.

11.326 Greenland white-fronted goose and greylag goose are the qualifying species for the LKRDM SPA (and Ramsar site), and as such are included in a shadow appropriate assessment to assist the competent authority in its appropriate assessment of the implications of the KTR Project for the LKRDM SPA (and Ramsar site) in view of that site's conservation objectives which has been provided in **Appendix 11.4**

Existing Conditions

11.327 Greenland white-fronted geese, greylag geese and whooper swans roost and forage in the habitats around the R route (south).

11.328 The flight activity surveys were concentrated on the new G-T connection and thus did not cover the majority of the existing R route (south) where the G-T connection and R route diverged [15]. One focal VP covered the existing R route (south) where it crosses the River Dee and is located within the LKRDM SPA (and Ramsar site). Once the G-T connection is operational, the R route (south) will be decommissioned and removed from within the SPA/Ramsar as the route of the G-T connection avoids the LKRDM SPA (and Ramsar site) (**Figure 11.1**). Flight activity was also recorded over the area of the R route (south) east of Glenlee from MWP2. (**Figure 11.2.1)**.

11.329 Numerous flights of the two LKRDM SPA (and Ramsar site) qualifying species (Greenland white-fronted goose and greylag goose) were recorded along with whooper swans (a qualifying species for one of the component SSSIs) and pink-footed goose at the existing OHL crossing point of the River Dee (**Appendix 11.1, 11.2; Figures 11.2.3** and **11.3**).

11.330 Twenty-five flights (involving 167 individuals) of whooper swan were recorded from this FVP with 24 flocks crossing the R route (south) OHL. All flights passed above the OHL. (**Figure 11.2.3** and **Appendices 11.1** and **11.2**).

[15] With the exception of the point where the existing R route (south) lies within the LKRDM SPA (and Ramsar site) (**Figure 11.1 and 11.7**), no surveys were required or carried out along the existing R route (south). This will be surveyed at a time closer to the removal of the OHL to ensure breeding, foraging and roosting species are protected from disturbance where necessary during the decommissioning works.

11.331 Sixty-eight Greenland white-fronted goose flights totalling 2536 individuals were recorded, with 62 of them crossing over the R route (south) OHL. All flights crossing the R route (south) passed above the OHL. (**Figure 11.3** and **Appendices 11.1 & 11.2**).

11.332 For greylag goose 193 flights were recorded involving 2195 individuals. Of these 175 flights passed over the existing R route (south) OHL, two flights of two birds passed through between two sets of the conductors, ten flocks (75 birds) passed underneath the conductors, and six did not crossing the R route (south) (**Figure11.2.3** and **Appendices 11.1** and **11.2**).

11.333 Low levels of flight activity of greylag goose (nine flights, total 23 birds) was also recorded over the area of the R route (north) east of Glenlee from MWP2, most passing above the existing OHL and only two flights (total seven greylag geese) was recorded at potential risk height (**Figure 11.2.1** and **11.5.1, Appendix 11.1**).

11.334 During the 185 hours of watches from the FVP6 no individuals of any of these species were seen to strike the conductors. Outwith these surveys, an incidental sighting of a collision event was seen when a flock of 50 greylag goose flying at speed, passed between, under and over the OHL conductors. One bird collided with the top conductor and fell to the ground whilst another bird made contact with the wire but flew on.

11.335 One carcass of Greenland white-fronted goose was found during 48 weekly searches under the existing OHL over two seasons (23 weeks during 2017/2018 and 25 weeks during 2108/2019). Three carcasses of greylag goose and one carcass of a swan species were also found during these searches. In total 21 bird carcasses were found including geese, swans, ducks and other species (**Figure 11.7** and **Appendices 11.1** and **11.2**). These carcasses indicate that the existing R route (south) OHL poses an ongoing risk of collision to wildfowl.

11.336 All nests of species listed on Schedule 1 and Annex 1, and other bird species of NCI, and roosts of species listed on Schedule 1A, will be identified and protected from disturbance associated with enabling, dismantling and restoration activities during the decommissioning period (see **Embedded Mitigation Measures** section) and therefore these species are not required to be further assessed.

Predicted Effects

11.337 Prior to decommissioning – The species for which collision is currently of concern on the R route (south) are Greenland white-fronted goose, greylag goose and whooper swan with the risk of collision for the existing R route (south) evaluated as potentially High for the two goose species and Moderate for whooper swan (**Appendix 11.2**). While the existing R route (south) and the new G-T connection will be in situ for approximately 25 months (**Chapter 5**) there will be no additional risk of collision as a result for Greenland white-fronted goose as no flights occurred over the G-T connection. The collision risk was considered to be low for greylag goose and whooper swan for the G-T connection (**Appendix 11.2**), with only a few flights occurring along the G-T connection, there is little change to the risk of collision from the current baseline for these two species.

11.338 Decommissioning - effects during decommissioning of R route (south) have the potential be similar to that predicted for construction of G-T. If works were to take place between mid-October to mid-April, temporary disturbance of whooper swans, Greenland white-fronted geese and greylag geese would be possible during the decommissioning phase. This disturbance is likely to occur within the immediate footprint of, and in habitats adjacent to, the R route (south), which are used by whooper swans, Greenland white-fronted geese and greylag geese. The majority of these habitats are in the vicinity of the Parton to Crossmichael SSSI part of the LKRDM SPA (and Ramsar site) but these species may also potentially use fields in the wider area along the length of the R route (south). However, as no works will be undertaken within 500m of the Parton to Crossmichael SSSI part of the LKRDM SPA (and Ramsar site) between mid-October to mid-April (see **Embedded Mitigation Measures** section above and **Chapter 5**), this potential disturbance will be minimised.

11.339 Post-decommissioning – once the existing OHL is removed this will be a positive effect for Greenland white-fronted goose, greylag goose, whooper swan and other wildfowl using the areas within and around the LKRDM SPA (and Ramsar site) as any risk of collision will be removed.

Assessment

11.340 Nature Conservation Importance – Greenland white-fronted goose, greylag goose and whooper swan are all classified as High NCI (**Table 11.3**).

11.341 Spatial and Temporal Magnitude - Prior to decommissioning. The species for which collision is currently of concern are Greenland white-fronted goose, greylag goose and whooper swan. The risk of collision with the existing R route (south) was evaluated in **Appendix 11.2**. Whooper swan a species with a High susceptibility to collision and displaying a Medium level of locally recorded flight features were defined as having a Moderate risk of collision with the existing R route (south). Greenland white-fronted goose and greylag goose are species with a High susceptibility to collision and displaying a High level of locally recorded flight features were defined as having a High risk of collision with the existing R route (south). These qualitative evaluations are reinforced by the empirical evidence from the carcass searches under the existing OHL, whereby one Greenland white-fronted goose, three greylag goose and one swan carcasses were found during the weekly searches completed over two winters. Given the small regional population of Greenland white-fronted goose, locating one carcass during these searches under the OHL (which included an area over the water which would not retain any carcasses to be found should they land there), would suggest that there is indeed currently a High risk of collision for this species. Furthermore, for the larger regional population of greylag goose three carcasses were located in the same search period, and for whooper swan which showed less flight activity in this area, one carcass was located, in turn reinforcing the qualitative evaluations.

11.342 Any additional risk of collision with the new G-T connection will be additive to the existing collision risk for the short-term period while both the G-T connection and the R route (south) OHL exist prior to dismantling of the R route. In addition, the southern part of the G-T connection runs in parallel with the existing R route (south) and will minimise any 'novel' effects of the G-T connection along this section. Therefore the low level of flight activity over the proposed G-T connection by greylag goose and whooper swan and no flights over it by Greenland white-fronted goose suggests that the spatial magnitude of negligible for collision during operation can be applied during the period that the R route (south) remains in-situ during the construction of the G-T connection. The temporal magnitude of the period when both OHLs are in situ is short-term (25 months).

11.343 Spatial and Temporal Magnitude –decommissioning period. Displacement of foraging geese and swans will be limited, as they are only present during part of the year (October to April) and also range over large areas to forage. In addition there will be embedded mitigation measures in place (see above and **Chapter 5**) to avoid disturbances to the geese which are qualifying interests of the LKRDM SPA (and Ramsar site), through timing any decommissioning activities within the LKRDM SPA (and Ramsar site) and a 500m buffer to occur outside of the months when the qualifying species are present[16]. To avoid potential effects on the qualifying species of the LKRDM SPA (and Ramsar site) these towers will be removed between 1st August and 15th October. This will ensure that the main foraging areas are not disturbed during the period when the species are present, which will also benefit other wildfowl species including whooper swan and non-SPA geese. If wildfowl are foraging in the area beyond where the embedded mitigation is in place during the brief periods of decommissioning activities, areas will be available away from the disturbance (including the areas covered by the embedded mitigation). Decommissioning disturbance is assessed as negligible spatial magnitude when behavioural sensitivity is taken into consideration. The full decommissioning period will last 51 months so is short term in temporal magnitude.

11.344 Spatial and Temporal Magnitude –post-decommissioning.

11.345 Once the R route (south) is removed there will be beneficial effects especially where it currently crosses the River Dee, a location where the OHL crosses a waterbody perpendicular to the likely flightpaths of waterbirds using it and which surveys show causes a small number of collisions each season. Therefore there will be permanent beneficial effects on the regional populations of Greenland white-fronted goose, greylag goose and whooper swan once the R route (south) is removed.

11.346 Conservation Status – whooper swan and greylag goose are in favourable conservation status, Greenland white-fronted goose is unfavourable.

Summary of assessment of significance for pre-decommissioning, decommissioning and post-decommissioning of R route (south)

11.347 The short-term adverse effects of collision during the pre-decommissioning period due to the existence of both the existing R route (south) and the proposed G-T connection on Greenland white-fronted goose, greylag goose and whooper swan are predicted to be **none** and therefore **not significant** in the terms of the EIA Regulations.

[16] There are 13 towers of the existing R route (south) located within 500m of the LKRDM SPA (and Ramsar site), towers 46-48 and towers 95 to 103 (of which towers 099, 100 and 100A are within the LKRDM SPA (and Ramsar site))

11.348 The short-term adverse effects of decommissioning disturbance for the R route (south) on Greenland white-fronted goose, greylag goose and whooper swan are predicted to be **none** and therefore **not significant** in the terms of the EIA Regulations**.**

11.349 There will be permanent post-decommissioning beneficial effects of removal of the R route (south) on Greenland white-fronted goose, greylag goose and whooper swan.

Proposed Mitigation

11.350 No additional mitigation is proposed for the operation of the R route (south) temporarily alongside the G-T connection or the decommissioning of the R route (south).

Residual Effects

11.351 The residual short-term operational adverse effects of collision due to the existence of both the current R route (south) and the proposed G-T connection on Greenland white-fronted goose, greylag goose and whooper swan is predicted to be **none** and therefore **not significant** in the terms of the EIA Regulations.

11.352 The short-term adverse effects of decommissioning disturbance for the R route on Greenland white-fronted goose, greylag goose and whooper swan are predicted to be **none** and therefore **not significant** in the terms of the EIA Regulations.

11.353 There will be a permanent operational beneficial effects of the removal of the R route (south) on Greenland white-fronted goose, greylag goose and whooper swan.

Summary of Effects

11.354 For the G-T connection negligible and low effects are predicted during construction, operation and decommissioning (of R route (south)) on bird species, therefore residual effects are judged to be **none** or **minor** (for nightjar during operation only) and **not significant** in terms of the EIA Regulations.

Cumulative Effects

11.355 **Chapter 3** sets out the approach to cumulative assessment.

11.356 The assessment of cumulative effects is limited to species of High and Moderate NCI for which there is a likely effect as a result of the connection being assessed that may be exacerbated cumulatively with other projects. Only effects assessed as minor or above (for an individual connection) are included in the cumulative assessment.

11.357 For the G-T connection all residual effects 'in isolation' for construction disturbance were judged to be **none** for breeding or foraging: whooper swan, greylag goose, red kite, osprey, peregrine, goshawk, hen harrier, honey-buzzard, golden eagle, barn owl, nightjar, curlew and lapwing; and **none** for operational collision for: whooper swan, Greenland white-fronted goose, greylag goose, red kite, osprey, peregrine, goshawk, golden eagle and hen harrier. It is considered highly unlikely that the G-T connection will contribute cumulatively to adverse effects on the conservation status of the regional population of these species. Consequently, there is no requirement for a cumulative assessment.

11.358 Operational collision risk for nightjar was **minor** adverse for the G-T connection consequently this section focusses the cumulative effects assessment on nightjar.

11.359 The decommissioning of the R route (south) will have a permanent beneficial effect on Greenland white-front goose, greylag goose and whooper swan due to removal of the collision risk associated with the existing crossing of the River Dee. As the effect will be beneficial it will slightly reduce the cumulative effects of collision risk when other projects are included for these species in the region. As the effect is predicted to be **none,** the regional effect will be **not Significant**.

11.360 As described in **Chapter 3**, Stage 4 Interconnection cumulative effects. A search area based on the regional scope of the assessment was used i.e. D&G for nightjar, and available materials were consulted for the projects listed in **Table 11.8** (agreed with SNH, May 2020) (available hard-copy EIA Reports, web-posted EIA Reports and / or Non-Technical Summaries (NTSs) (used when no other information was found), web posted planning application documents and planning decisions, supplemented by SNH's most recent documentation of relevant projects and Google Earth habitat information). On this basis, **Table 11.8** lists the individual projects within D&G and the attributes of the projects (including status in the planning system, source of the information, and the significance of effects on ornithological interests ascribed to each project in isolation). The searches for information were completed as accurate as at 27th April 2020 (agreed with SNH May 2020).

Table 11.8 Developments considered in the Cumulative Assessment – G-T

Project	Type of development	Status	Source of information	Predicted or actual effects of project
Knockman Hill /Loch Hill	Wind farm	Consented for five / turbines, application for 11 which will supersede this	NTS	No surveys as no nightjar likely to be present
Little Sypland	Wind turbine	Consented	EIA	No surveys as no nightjar likely to be present
Mochrum Fell	Wind farm	Consented	EIA	Surveys completed, no nightjar present
Shepherds' Rig	Wind farm	Application	EIA	No surveys as no nightjar likely to be present
Troston Loch	Wind farm	Application	EIA	Surveys completed, no nightjar present
Blackcraig Hill	Wind farm	Operational	NTS	No surveys as no nightjar likely to be present
Cornharrow	Wind farm	Appeal/public inquiry (refused September 2019)	EIA	No surveys as no nightjar likely to be present
Glenshimmeroch	Wind farm	Appeal/public inquiry (approved September 2019)	EIA	No surveys as no nightjar likely to be present
Loch Urr	Wind farm	Application	EIA	No surveys as no nightjar likely to be present
Wether Hill	Wind farm	Operational	EIA	No surveys as no nightjar likely to be present
Lochburn	Wind farm	Application	Aerial Imagery	No suitable habitat
Benbrack	Wind farm	Consented	EIA	No surveys as no nightjar likely to be present
Windy rig	Wind Farm	Consented	EIA	No surveys as no nightjar likely to be present
Windy standard and extensions	Wind Farm	Operational & Application	EIA	No surveys as no nightjar likely to be present
South Kyle	Wind Farm	Consented	EIA	No surveys as no nightjar likely to be present
Kype Muir & Extension	Wind Farm	Consented & Application	EIA	No surveys as no nightjar likely to be present
Afton	Wind farm	Operational	Aerial imagery	Not suitable habitat
Pencloe	Wind farm	Consented	EIA	No surveys as no nightjar likely to be present
Ulzieside	Wind Farm	Application	Planning	No surveys as no

Project	Type of development	Status	Source of information	Predicted or actual effects of project
			documents	nightjar likely to be present
Sanquhar II	Wind Farm	Application	EIA	Surveys completed, no nightjar present
Hare Hill	Wind Farm	Operational	Aerial Imagery	Not suitable habitat
Hare Hill Ext	Wind Farm	Operational	Aerial Imagery	Not suitable habitat
Over Hilll	Wind farm	Application	EIA	No surveys as no nightjar likely to be present `
Kilgallioch	Wind Farm	Operational	EIA	No surveys as no nightjar likely to be present
Stranoch II	Wind Farm	Application to replace consented Stranoch turbines	EIA	No surveys as no nightjar likely to be present
Airies	Wind Farm	Operational	EIA	Surveys completed, no nightjar present
Balmurrie Fell (Artfield Fell Ext)	Wind Farm	Operational	Planning Documents	No surveys as no nightjar likely to be present
Artfield Fell	Wind Farm	Operational	Aerial Imagery	Not suitable habitat
Gass	Wind Farm	Consented	EIA	No surveys as no nightjar likely to be present
Glenchamber	Wind Farm	Operational	Planning Documents	No mention of nightjar
Carscreugh	Wind Farm	Operational	EIA	No surveys as no nightjar likely to be present `
Barlockhart Moor	Wind Farm	Application	EIA	No surveys as no nightjar likely to be present
Arecleoch	Wind farm	Operational	Monitoring Reports	No surveys as no nightjar likely to be present
Arecleoch Extension	Wind farm	Application	EIA	Surveys completed, no nightjar present
Chirmorie	Wind farm	Consented	EIA	No surveys as no nightjar likely to be present
Mark Hill	Wind farm	Operational	NTS	No surveys as no nightjar likely to be present
Harestanes/Forest of Ae	Wind farm	Operational	Monitoring reports	No surveys as no nightjar likely to be present
Auchencairn	Wind farm	Application	No information	No information
Dalswinton (Pennyland Moor)	Wind farm	Operational	No information	No information
Blackwood	Wind farm	Application	EIA	No surveys as no nightjar likely to be present
Glenmuckloch	Wind farm	Consented	Aerial imagery	No suitable habitat
North Lowther Energy Initiative	Renewable energy park	Application / Inquiry	Aerial imagery	No suitable habitat
Little Hartfell	Wind farm	Application (consented September 2019)	EIA	No surveys as no nightjar likely to be present
Lorg	Wind farm	Application	Planning Documents	No mention of nightjar
Fell	Wind farm	Application	EIA	No surveys as no nightjar likely to be present
Kennoxhead Extension	Wind farm	Application	EIA	No surveys as no nightjar likely to be present
Tralorg to Mark Hill	33kV OHL	Consented	Environmental Appraisal	No surveys as no nightjar likely to be present
P-G via K	OHL (part of KTR Project)	Application	EIA	Surveys completed, no nightjar present
C-K	OHL (part of KTR Project)	Application	EIA	Surveys completed, no nightjar present
E-G	OHL (part of KTR Project)	Application	EIA	No surveys, as no suitable habitat no nightjar likely to be present
B-G Deviation	OHL (part of KTR Project)	Application	EIA	No surveys as no suitable habitat, no nightjar likely to be present
BG Route	Existing OHL	Operational	Aerial imagery	No suitable habitat
Blackcraig and Margree Connection	Existing OHL	Operational	EIA	Surveys completed, One nightjar territory present. Not assessed for collision, minor and not significant for construction habitat loss and operational maintenance disturbance.
Polquhanity – Dalmellington (SWS) Connection	Existing OHL	Operational	EIA	No surveys as, no nightjar likely to be present
S Route	Existing OHL	Operational	Aerial imagery	No suitable habitat

11.361 Eight of these developments (including two other component connections of the KTR Project) completed survey work for the species so the habitat was considered potentially suitable for the species at these developments, whilst the majority were not in suitable habitat and therefore no surveys were required. No nightjars were found during the survey work which was completed at seven of these developments.

11.362 For the one development where one nightjar territory was located there was no assessment of collision risk made, and the only assessment for operational effects was disturbance during emergency maintenance. Therefore, there is no predicted cumulative effect of the G-T connection on operational collision for nightjar, which is assessed as None and Not significant.

11.363 Stage 4 Inter-connection cumulative effects. The developments listed in **Table 11.8** are unlikely to have any effects on nightjar therefore there will be no additional effects on nightjar as a result of construction and operation of the G-T connection and thus cumulative effects are **Not Significant.**

KTR Project as a Whole: Assessment of Effects

11.364 Potential effects on greylag goose, Greenland white-fronted goose, whooper swan, peregrine, goshawk, osprey, hen harrier, golden eagle, honey-buzzard, red kite, nightjar, barn owl, curlew and lapwing are considered within the individual connections of the KTR Project above. For all of these species the following sections describe the assessment of effects for the KTR Project as a Whole, bringing together the information from the individual connection assessments.

11.365 For the KTR Project as a Whole, there are a number of effects which are geographically concentrated and hence are limited to a specific connection; as such, the level of effect for the KTR Project as a whole therefore remains as per the relevant individual connection. For example, the effects on whooper swan, Greenland white-fronted goose, hen harrier, honey-buzzard, golden eagle, nightjar, lapwing and curlew are relevant to the G-T connection only. Therefore, the effects for the KTR Project as a Whole are the same as those of the G-T connection for these species.

11.366 The decommissioning of the existing N and R routes comprise part of the KTR Project as a Whole along with the five new OHL connections, and are therefore included in the assessment. The activities associated with decommissioning of N and R routes partially overlap with the construction period of the five new OHL connections (see **Chapter 5**), however the interaction of these activities and associated effects will only overlap in geographically localised areas (i.e. the length of P-G, C-K and E-G and the southern end of R route (south).

Predicted Construction Effects

Wildfowl

11.367 Greylag goose, Greenland white-fronted goose and whooper swan are considered to be of High NCI and the regional populations of these species are considered to be in favourable conservation status, with the exception of Greenland white-fronted goose which is unfavourable.

11.368 To avoid disturbance of foraging and roosting Greenland white-fronted goose and greylag goose during the decommissioning of the R route (south) within and around the LKRDM SPA (and Ramsar site) (including the component Parton to Crossmichael SSSI) all decommissioning activities will be completed between 1st August and 15th October (see **Embedded Mitigation Measures** section).

11.369 With these embedded mitigation measures in place, disturbance of all roosting and feeding Greenland white-fronted goose and greylag goose at their favoured areas will be negligible and therefore no adverse effects are anticipated during decommissioning on the regional populations.

11.370 For greylag goose, Greenland white-fronted goose and whooper swan, the embedded mitigation will be in place to prevent disturbance of foraging wildfowl species around the LKRDM SPA (and Ramsar site) (including the component Parton to Crossmichael SSSI), therefore this area will also be available as an undisturbed area to forage for wildfowl displaced from other areas along the route of the KTR Project during the short-term period of construction and/or decommissioning.

11.371 No adverse effects are anticipated on these regional populations as a result of the short-term construction of the new OHL connections and decommissioning of N and R routes. The short-term temporal potential direct and indirect displacement effects of construction and decommissioning of N and R routes on foraging and roosting whooper swan, greylag goose and Greenland white-fronted goose of the KTR Project as a Whole are of negligible magnitude spatially and the effect will be **none** and therefore **not significant** in terms of the EIA Regulations (see assessments for individual connections of the KTR Project above for more detail).

Scarce Raptors and Owls

11.372 Peregrine, goshawk, osprey, hen harrier, golden eagle, honey-buzzard, red kite and barn owl are all species of High NCI. Their regional populations are considered to be in favourable conservation status with the exception of golden eagle which is unfavourable.

11.373 All nests of species listed on Schedule 1 and Annex 1, and other bird species of High or Moderate NCI will be protected from disturbance during the construction period and decommissioning period of N and R Routes (see **Embedded Mitigation Measures** section). In addition, for golden eagle, no construction activity will be undertaken within 1.5km of the active nesting site during January to September. To complement this, winter roosts of hen harrier and red kite, both species listed on Schedule 1A of the WCA, will be protected from disturbance during the construction and decommissioning period (see **Embedded Mitigation Measures** section).

11.374 With these embedded mitigation measures in place, the disturbance at breeding and roosting sites resulting from construction of the new OHLs and decommissioning of N and R Routes of the KTR Project as a Whole will be negligible for all raptor and owl species and are not required to be assessed further.

11.375 Displacement of foraging birds from suitable habitats may occur for peregrine, goshawk, osprey, hen harrier, golden eagle, honey-buzzard, barn owl and red kite. The extent to which displacement may occur and the implications will vary depending on the nature of the construction or decommissioning activity, the intervening topography and temporal activity patterns of the species, which may influence the avoidance distance a species adopts. However, all these species have large foraging ranges, and habitats are widespread throughout the area surrounding the KTR Project. Therefore, it is considered that sufficient habitat exists beyond any potential disturbance zone around construction and decommissioning activities to support these species. Furthermore, as barn owls forage mainly during the night the overlap between their main daily foraging period and construction activities will be minimal.

11.376 Foraging golden eagles rarely approached the area of the KTR Project, are not likely to use the habitats around the new OHL within the forest plantation, and have a large foraging range. This separation between golden eagle and the new OHL in these areas ensures the construction activities will therefore have very little effect on the species.

11.377 The short-term potential direct and indirect displacement effects of construction and decommissioning on breeding, foraging and roosting red kite, osprey, peregrine, goshawk, hen harrier, honey-buzzard, golden eagle and barn owl, along the KTR Project as a Whole are of negligible magnitude spatially thus are predicted to be **none** and therefore **not significant** in terms of the EIA Regulations.

Nightjar

11.378 Nightjar is a species of High NCI and is considered to be in favourable conservation status.

11.379 Nightjar are only present in the Study Area for the KTR Project as a Whole during the breeding season (May to September) and during this period forage between dusk and dawn. Embedded mitigation for nightjar will ensure that all construction within the core nightjar management area, as defined by FLS, will be avoided between May and September. Therefore, with this embedded mitigation in place direct disturbance of breeding nightjars during construction of the KTR Project as a Whole will be avoided and is therefore not considered further in this assessment.

11.380 Nightjar foraging ranges can vary widely depending on the availability of suitable foraging habitats near to their breeding sites. The core management area for this species will be protected from disturbance by a construction exclusion area during the months they are present (May to September) (see **Embedded Mitigation Measures** section), and thus this area will be available for undisturbed foraging within these months. For any nightjar which also use areas beyond the core management area to forage, the diurnal separation between construction activities and the time when birds forage at night will allow them to continue to forage undisturbed. Therefore, displacement of foraging birds during the construction period will also be minimal as no construction activity will be undertaken during the months they are present in the core management area. As such, disturbance to foraging nightjar during construction of the KTR Project as a Whole is not considered further in this assessment.

Waders

11.381 Curlew and lapwing are species of Moderate NCI and both are considered to be in unfavourable conservation status.

11.382 The embedded mitigation measures will ensure that disturbance at breeding sites of curlew and lapwing resulting from construction of the KTR Project as a Whole, including decommissioning of N and R routes,

will be negligible. Due to the very low numbers of curlew and lapwing present in the survey area relative to the regional populations of these species, the spatial magnitude of construction disturbance effects on foraging curlew and lapwing would be negligible. Therefore, no adverse effects are anticipated during construction or decommissioning on the regional populations of curlew and lapwing.

11.383 The short-term potential direct and indirect displacement effects of construction on breeding and foraging curlew and lapwing along the KTR Project as a Whole of are negligible magnitude spatially thus are predicted to be **none** and therefore **not significant** in terms of the EIA Regulations.

Summary of assessment of significance for construction and decommissioning effects of KTR Project

11.384 The short-term potential direct and indirect displacement effects of construction and decommissioning on breeding, foraging and roosting whooper swan, greylag goose, red kite, osprey, peregrine, goshawk, hen harrier, honey-buzzard, golden eagle, barn owl, nightjar, curlew and lapwing along the KTR Project as a Whole are of negligible magnitude spatially thus are predicted to be **none** and therefore **not significant** in terms of the EIA Regulations.

Additional Mitigation

11.385 As there are no effects which are assessed as being significant in terms of the EIA Regulations, additional mitigation is not proposed. No additional mitigation is proposed in terms of SPEN's Schedule 9 duties.

Residual Construction Effects

11.386 No significant residual effects are predicted on any ornithological interests for the KTR Project as a Whole, and the residual effects predicted for construction (and decommissioning) disturbance and displacement will be **none** and therefore **not significant** in terms of the EIA Regulations.

Predicted Operational Effects

Wildfowl

11.387 Greylag goose and whooper swan are judged to have Low collision risk for the new OHL connections of the KTR Project, the collision risk for Greenland white-fronted goose is judged to be None (see **Appendix 11.2**).

11.388 The species for which collision is currently of concern on the existing N and R Routes are Greenland white-fronted goose, greylag goose and whooper swan. This risk of collision with the existing R route (south) was evaluated in **Appendix 11.2**. Whooper swan is classed as a species with a High susceptibility to collision and displaying a Medium level of locally recorded flight features[17] was evaluated as having a Moderate risk of collision with the existing R route (south). Greenland white-fronted goose and greylag goose are species with a High susceptibility to collision and displaying a High level of locally recorded flight features were evaluated as having a High risk of collision with the existing R route (south). These qualitative evaluations are reinforced by the empirical evidence from the carcass searches under the existing OHL (R route (south)), whereby one Greenland white-fronted goose, one swan and three greylag goose carcasses were found during the weekly searches completed over two winters (**Appendix 11.1**). Given the small regional population of Greenland white-fronted goose, the presence of one carcass during these searches under the OHL (which included an area over the water which would not retain any carcasses to be found should they land there), would suggest that there is a High risk of collision for this species. Furthermore, for the larger regional population of greylag goose three carcasses were located in the same search period, and for whooper swan which showed less flight activity in this area, one carcass was located, in turn reinforcing the qualitative evaluations.

11.389 There is no additional risk (to the existing risk associated with N and R routes) of collision as a result of the operation of the new connections of the KTR Project for Greenland white-fronted goose as this species had no flight activity over or in the vicinity of the new OHLs. The collision risk for greylag goose and whooper swan was evaluated as Low for the new OHL of the P-G via K connection and the G-T connection (**Appendix 11.2**) and hence also for the KTR Project as a Whole. The conclusion is that there will be no change to the collision risk from the current baseline for the short-term period that both the existing and new OHLs are present, reflecting the KTR Project as a Whole (see assessment sections for each connection above for more detail).

11.390 The short-term operational adverse effects of collision due to the presence of both the existing N and R routes and the new OHLs, collectively comprising the KTR Project as a Whole, on Greenland white-fronted goose, greylag goose and whooper swan is predicted to be **none** and therefore **not significant** in the terms of the EIA Regulations.

11.391 The subsequent removal of the N and R routes will remove the risk of collision for all species with these existing OHLs. This will result in a beneficial effect where the R route (south) crosses east of Glenlee (the Water of Ken) and the River Dee Marshes (see G-T Connection above). During operation of the new OHLs there will no longer be any collision risk for whooper swan, Greenland white-fronted goose and greylag goose or for other species, in these areas as the new OHLs avoid crossing these waterbodies.

11.392 Therefore, **permanent operational beneficial effects** are anticipated for the KTR Project as a Whole on Greenland white-fronted goose, greylag goose and whooper swan due to the removal of the N and R routes.

Scarce Raptors and owls

11.393 The collision risk is judged to be Low for peregrine, osprey and golden eagle, Very Low for hen harrier, goshawk, and red kite, and None for honey-buzzard (**Appendix 11.2** and **11.3**). The potential for collision will decline as distance increases away from nest locations. The result is predicted to lead to No or non-detectable changes in the conservation status of these species.

11.394 The long-term potential effects of operation of the KTR Project as a Whole on red kite, osprey, peregrine, goshawk, golden eagle, honey-buzzard and hen harrier is predicted to be **none** and therefore **not significant** in the terms of the EIA Regulations.

Nightjar

11.395 For nightjar, collision risk is judged to be Very Low (Low susceptibility to collision and Low level of locally recorded flight features **Appendix 11.3**). For nightjar, the majority of the flights observed were short low-level flights with relatively little proportion of time spent in the main risk window of 10-50m (17% for both survey years, 24% for 2018 and 11% for 2019).

11.396 Nightjar flight behaviour, physiology and foraging strategy indicates they will be able to avoid the conductors, as by their nature: they are highly manoeuvrable, almost exclusively fly during the hours of darkness, and are highly competent at foraging in and around areas of woodland, therefore are highly adapted to manoeuvring to catch prey and avoid obstacles in conditions of darkness. The susceptibility of collision by nightjars with OHLs was considered to be minimal by a researcher working on avoidance behaviour of the species nesting around wind farms across Europe (A. Traxler *pers. comm.*). Furthermore, nightjars were able to spot and avoid mist-nets used in the open and regenerating forested areas of Thetford forest in complete darkness (B. Urquhart *pers comm*.) (further discussion in **Appendix 11.2**). On this basis, the resulting collision risk for nightjar, given the likelihood of avoidance, is evaluated to be Very Low (**Appendix 11.3**).

11.397 There were approximately 13 nightjar territories identified within 500m of the KTR Project as a Whole during the most recent surveys in 2019, which equates to 30% of the wider area estimated minimum of 44 territorial males in D&G from the 2017 DGNSG surveys of key sites (Gallagher, 2017)[xxxii]. However this regional result is stated as likely to be an underestimate as the survey was limited to key sites in the region rather than covering the full area. (The 2017 count data for within 500m of the G-T connection estimated eight territories (18% of the minimum of 44 in the region)). As discussed above and in **Appendices 11.2** and **11.3**, it is considered likely that avoidance of collision will be extremely high, and therefore it is unlikely that any breeding territories would be affected. Even using a highly pessimistic scenario that two territories were to be affected every year this would still be less than 5% of the regional population and give an assessment of spatial magnitude which is low. The temporal magnitude would be long-term.

11.398 The result is therefore an assessment of small or barely discernible changes in regional population that would be unlikely to have an impact on the conservation status of the nightjar regional population.

11.399 The long-term potential effects of operation of the KTR Project as a Whole on nightjar are predicted to be **minor** and therefore **not significant** in the terms of the EIA Regulations.

[17] Appendix 11.2 describes the Importance of Local Flight Features for species as part of the evaluation of collision risk. These features include: number of flights per hour; number of birds; patterns in flight routes; proportion of flight activity in risk window.

Summary of Assessment of Significance for Operational Effects of KTR Project as a Whole

11.400 When the collision risk, regional population estimates and conservation status of each species is considered (see sections for operational effects of each connection above for more detail) the long-term potential effects of operation of the KTR Project as a Whole on the species of High NCI: whooper swan, greylag goose, red kite, osprey, peregrine, goshawk, golden eagle, honey buzzard and hen harrier can also be predicted to be **none** and nightjar is predicted to be **minor** and therefore **not significant** in the terms of the EIA Regulations.

Additional Mitigation

11.401 Additional mitigation is not proposed as no significant effects are predicted. No additional mitigation is proposed in terms of SPEN's Schedule 9 duties.

Residual Effects

11.402 No significant residual effects are predicted for operation on any ornithological interests for the KTR Project as a Whole, and the residual effects predicted for operational collision will be **none** and **minor** (for nightjar) and therefore **not significant** in terms of the EIA Regulations.

Summary of Significant Effects of KTR as a Whole

11.403 For the KTR Project as a Whole, no significant construction, decommissioning (associated with removal of N and R routes) or operational effects are predicted on bird species.

11.404 No additional mitigation is proposed as no effects are assessed as significant for the construction or operation of the KTR Project as a Whole including the decommissioning and removal of the N and R Routes.

11.405 For the KTR Project as a Whole residual effects are predicted for construction, operation and decommissioning which will be **minor** for nightjar (during operation only) or **none** for all other species and therefore **not significant** under the EIA Regulations.

Enhancement and Monitoring

11.406 There are potential opportunities for enhancement of the wayleave as outlined in **Appendix 5.1**, including habitat enhancement suitable for nightjar, which should increase their foraging habitat in an area beyond the current FLS core nightjar management area.

11.407 The DGNSG will continue to monitor nightjar populations in the core management area. SPEN will liaise with the DGNSG to discuss an approach where they can provide the results to SPEN.

11.408 A programme of monitoring will also be discussed with SNH, FLS and RSPB for the nightjar in the core management area post construction where their use of the area will be investigated.

Cumulative Effects for KTR Project as a Whole

11.409 The approach to cumulative assessment is described in **Chapter 3**, Stage 2 Combined Effects of KTR Project. The effects considered in the cumulative assessment are those arising from the new infrastructure captured by the whole of the KTR Project (i.e. P-G via K, C-K, E-G, BG Deviation and G-T connections) including decommissioning of N and R routes with other known developments in the Study Area.

11.410 The assessment of cumulative effects is focussed on species of High and Moderate NCI for which there is a likely effect as a result of the KTR Project as a Whole that may be exacerbated cumulatively with other projects. Only effects assessed as **minor** or above are included in the cumulative assessment.

11.411 For the KTR Project as a Whole, all residual effects 'in isolation' for construction disturbance were judged to be **none** for breeding or foraging whooper swan, greylag goose, red kite, osprey, peregrine, goshawk, hen harrier, honey-buzzard, golden eagle, barn owl, nightjar, curlew and lapwing; and **none** for operational collision for whooper swan, Greenland white-fronted goose, greylag goose, red kite, osprey, peregrine, goshawk, golden eagle and hen harrier. On this basis. it is considered highly unlikely that the KTR Project will contribute cumulatively to adverse effects on the conservation status of the regional population of these species. Consequently, there is no requirement for a cumulative assessment.

11.412 Operational collision risk for nightjar was predicted as **minor** adverse for the KTR Project as a Whole, consequently the cumulative effects assessment focusses on nightjar only. As shown in the G-T connection assessment there are no developments in the study area of D&G which have effects on nightjar, therefore the cumulative effects of the KTR Project as a Whole will be the same as for the G-T connection, **not significant.**

Interrelationship between Effects

11.413 There are interrelationships between potential effects assessed in this chapter and those discussed in **Chapter 10: Ecology**. Many of the effects identified in the ecology chapter, relating primarily to habitat loss and disturbance, are of importance to ornithological features, and have informed the assessment of effects on ornithology.

Summary of Significant Effects

11.414 The construction, operational and decommissioning (of N and R routes) effects for each of the individual connections, and for the KTR Project as a Whole, including cumulatively are **not significant** in the context of the EIA Regulations.

[i] SNH (2018). Guidance: Assessing significance of impacts from onshore wind farms outwith designated areas. SNH Battleby, UK
[ii] Hill, D.A., Hockin, D., Price D., Tucker G., Morris, R. & Treweek, J. (1997). Bird disturbance: improving the quality of disturbance research. *Journal of Applied Ecology* 34, pp 275-288et al 1997
[iii] Avian Power Line Interaction Committee (APLIC) (2006) Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006. Edison Electric Institute, APLIC, and the California Energy Commission. Washington, D.C and Sacramento, CA.
[iv] Ferrer, M. (2012) Birds and Powerlines. ENDESA S.A. and Fundacion MIGRES, Sevilla
[v] SNH (2016). Guidance: Assessment and mitigation of impacts of power lines and guyed meteorological masts on birds. SNH. Battleby, UK.
[vi] SNH (2016). Guidance: Assessing Connectivity with Special Protection Areas (SPAs). SNH Battleby, UK
[vii] SNH (2014). Guidance: Recommended bird survey methods to inform impact assessment of onshore wind farms. SNH Battleby, UK
[viii] Eaton, M.A., Aebischer, N.J., Brown, A.F., Hearn, R.D., Lock, L., Musgrove, A.J., Noble, D.G., Stroud, D.A. and Gregory, R.D. (2015). Birds of Conservation Concern 4: the population status of birds in the United Kingdom,, Channel Islands and Isle of Man. British Birds 108, 708-746
[ix] International Union for the Conservation of Nature (2018) The IUCN Red list of threatened species version 2018-2 www.iucnredlist.org
[x] Scottish Biodiversity Forum (2013). Scottish Biodiversity List. Available at www2.gov.scot/Topics/Environment/Wildlife-Habitats/16118/Biodiversitylist/SBL
[xi] Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. & Thompson, D. (2013). Raptors, a field guide to survey and monitoring. The Stationery Office, Edinburgh.
[xii] Gilbert, G., Gibbons, D.W. & Evans, J. (1998). Bird monitoring methods. RSPB Sandy, Bedfordshire.
[xiii] Brown, A.F. & Shepherd, K.B. (1993). A method for censusing upland breeding waders. Bird study 40: 3 pp189-195.
[xiv] SNH (2001). Natural Heritage Zones: a national assessment of Biodiversity (Habitats). SNH Battleby, UK
[xv] https://www.metoffice.gov.uk/research/collaboration/ukcp
[xvi] Fielding, A.H. & Haworth, P.F. 2014. Golden eagles in the south of Scotland: an overview. *Scottish Natural Heritage Commissioned Report No. 626.*
[xvii] Ruddock, M & Whitfield, D.P. (2007) A review of Disturbance Distances in Selected Bird Species. Report to SNH
[xviii] Forrester, R.W., Andrews, I.J., McInerny, C.J., Murray, R.D., McGowan, R.Y., Zonfrillo, B., Betts, M.W., Jardine, D.C. & Grundy, D>S. (eds) 2007. The Birds of Scotland. The Scottish Ornithologists Club, Aberlady.
[xix] Wilson, M. W., Austin, G. E., Gillings S. and Wernham, C. V. (2015). Natural Heritage Zone Bird Population Estimates. SWBSG Commissioned report number SWBSG_1504. pp72. Available from:www.swbsg.org
[xx] Frost, T.M., Austin, G.E., Calbrade, N.A., Mellan, H.J., Hearn, R.D., Robinson, A.E., Stroud, D.A., Wotton, S.R. and Balmer, D.E. 2019. Waterbirds in the UK 2017/18: The Wetland Bird Survey. BTO/RSPB/JNCC. Thetford. BTO wEBS reports available from https://app.bto.org/webs-reporting/
[xxi] Greenland white-fronted goose Study https://greenlandwhitefront.org/gb-site-inventory/south-west-scotland/74-loch-ken-dumfries-and-galloway-region/
[xxii] Urquhart C, Fox AD, Francis I, Griffin L, Mitchell C, Stroud DA. 2015. Greenland white-fronted goose. Version 1.0. In The Species Action Framework Handbook, Gaywood MJ, Boon PB, Thompson DBA, Strachan IM (eds). Scottish Natural Heritage, Battleby, Perth.
[xxiii] Mitchell, C. 2012. Mapping the distribution of feeding pink-footed and Icelandic greylag geese in Scotland. Wildfowl & Wetlands Trust / SNH Report, Slimbridge. 108pp.
[xxiv] Robinson, R.A. (2005) *BirdFacts: profiles of birds occurring in Britain & Ireland*. BTO, Thetford (http://www.bto.org/birdfacts, accessed on 21/06/2019
[xxv] Challis, A., Wilson, M.W., Holling, M., Roos, S., Stevenson, A. & Stirling-Aird, P. (2018). *Scottish Raptor Monitoring Scheme Report 2017.* BTO Scotland, Stirling.
[xxvi] Watson, J. (2010). The Golden Eagle. T & A D Poyser, London
[xxvii] Whitfield, D.P., Fielding, A.H., McLeod, D.R.A. & Haworth, P.F. (2008). A conservation framework for golden eagles: implications for their conservation and management in Scotland. Scottish Natural Heritage Commissioned Report No.193 (ROAME No. F05AC306).
[xxviii] Hayhow, D.B., Benn, S., Stevenson, A., Stirling-Aird, P.K. & Eaton, M.A. (2017): Status of Golden Eagle Aquila chrysaetos in Britain in 2015, Bird Study.

[xxix] Sharps, K., Henderson, I., Conway, G., Armour-Chelu, N. & Dolman, P.M. (2015) Home-range size and habitat use of European Nightjars *Caprimulgus europaeus* nesting in a complex plantation-forest landscape. Ibis 157, 260-272

[xxx] Alexander, I. & Cresswell, B. (1990) Foraging by nightjars *Caprimulgus europaeus* away from their nesting areas. Ibis 1332: 568-574

[xxxi] Evens, R., Beenaerts, N., Neyens, T. *et al.* Proximity of breeding and foraging areas affects foraging effort of a crepuscular, insectivorous bird. *Sci Rep* **8,** 3008 (2018). https://doi.org/10.1038/s41598-018-21321-0

[xxxii] Gallagher, J. Nightjars in Dumfries & Galloway, Survey Results Report 2017. RSPB.

[xxxiii] *BTO/JNCC/RSPB Breeding Bird Survey trends https://www.bto.org/our-science/projects/bbs/latest-results/population-trends*

[xxxiv] Woodward, I.D., Massimino, D., Hammond, M.J., Harris, S.J., Leech, D.I., Noble, D.G., Walker, R.H., Barimore, C., Dadam, D., Eglington, S.M., Marchant, J.H., Sullivan, M.J.P., Baillie, S.R. & Robinson, R.A. (2018) *BirdTrends 2018: trends in numbers, breeding success and survival for UK breeding birds*. Research Report 708. BTO, Thetford. www.bto.org/birdtrends

[xxxv] SNH (2014) Implications of Additional Protection for Hen Harrier, Red Kite and Golden Eagle under Schedules A1 & 1A of the Wildlife and Countryside Act (1981)

[xxxvi] Cramp, S. & Simmons, K.E.L, 1983. Handbook of the birds of Europe, the Middle East and North Africa: the birds of the Western Palearctic vol.3; waders to gulls. Oxford university Press, Oxford, UK.

Appendix 11.1: Ornithology Technical Report

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Appendix 11.1: Ornithology Technical Report

Introduction

11.1.1 This report details the ornithological survey work undertaken for the proposed Kendoon to Tongland 132kV (kilovolts) Reinforcement Project ('the KTR Project') by Natural Research (Projects) Ltd (NRP) from October 2016 to August 2019.

11.1.2 The objectives of the study were to:

- Map the distributions of breeding birds, including scarce species listed in Annex 1 of the EU Birds Directive (2009/147/EC) on the conservation of wild birds (the Birds Directive) or Schedule 1 of the Wildlife and Countryside Act 1981 (WCA) [1];
- Quantify the level of bird flight activity by breeding, wintering, foraging and migrating birds of potential conservation importance (primarily those listed on Annex 1 and Schedule 1), and;
- Record the presence and abundance of other birds of conservation importance (those listed in Biodiversity Action Plans (BAPs), on the Red List of Birds of Conservation Concern (BoCC) (Eaton *et al.,* 2015[i]), the IUCN Red list of Threatened Species (IUCN, 2017[ii]) throughout the year[2].

11.1.3 The survey design and methods were informed by consultation with and agreed by Scottish Natural Heritage (SNH) and Royal Society Protection of Birds (RSPB) and reference the appropriate SNH Guidance Notes (2016[iii] and 2014[iv]).

Desk Study and Consultation

11.1.4 The desk study provided information on designated areas and their qualifying species, which may be required to be included in survey planning and the assessment.

11.1.5 The nearest internationally designated ornithological site is the Loch Ken and River Dee Marshes (LKRDM) Special Protection Area (SPA) (and Ramsar Site). This is designated for its wintering Greenland white-fronted goose and greylag goose populations.

11.1.6 The new overhead line (OHL) components forming part of the KTR Project do not intersect with any site that is designated at international or national levels for ornithological interests. At its closest the LKRDM SPA is situated around 2.2km east of the new components of the KTR Project. The existing OHL R route which will be removed passes through an internationally and nationally designated site at one location and passes close by to two components of this internationally and nationally designated site.

11.1.7 Otherwise, the next nearest site is the Upper Solway Flats and Marshes(SFM) SPA[3] (and Ramsar[4] Site) 20km to the east. A proposed SPA, the Solway Firth pSPA[5], lies approximately 11km to the south.

11.1.8 The nearest nationally designated site which cites ornithological features is the Laughenghie and Airie Hills Site of Special Scientific Interest (SSSI) which at is closest is around 0.1km from the KTR Project. This is designated for its breeding bird assemblage and its non-breeding hen harrier population. In addition the River Dee (Parton to Crossmichael) SSSI[6] and the Threave and Carlingwark Loch SSSI[7], both of which form part of the Loch Ken and River Dee Marshes SPA, lie within 3km of the new components of the KTR Project. The existing R route to be removed crosses one component SSSI (River Dee (Parton to Crossmichael SSSI) and passes near to the two other component SSSIs (Kenmure Holms, approximately 340m; Threave and Carlingwark Loch 2.5km).

11.1.9 Consultations with SNH and the RSPB and the Scoping Opinion by the Scottish Ministers informed the survey design (**Table 1**).

11.1.10 Ornithological information for the area was requested from the Dumfries and Galloway Raptor Study Group (DGRSG), RSPB, the Dumfries and Galloway nightjar study group (DGNSG)[8], Wildfowl and Wetlands Trust (WWT) and Forestry and Land Scotland (FLS) (**Table 1**).

11.1.11 DGRSG shared desk based data on breeding and roosting locations of scarce raptors; RSPB replied with data on a number of breeding locations for scarce raptors, black grouse display locations; the DGNSG and FLS provided nightjar survey results and information, and the WWT supplied information on goose roost and feeding areas (**Table 1**).

Table 1: Consultations

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action Taken
Scottish Ministers	Formal Scoping Opinion	Drew attention to "*the requirement highlighted by the RSPB to ensure survey methodology is suitable to properly assess abundance and distribution of nightjar and black grouse onsite. This would include pre-dawn lek surveys for black grouse and survey for churring male nightjars at dusk*".	All survey work including surveys for abundance and distribution of all species have been undertaken in accordance with relevant SNH Guidance. This includes surveys for churring nightjar and pre-dawn surveys for black grouse. Survey methods were agreed with SNH, in consultation with RSPB. Additional data were provided by the RSPB on nightjar and black grouse distribution and by the DGNSG for nightjar distribution. (see **Appendix 11.3**)
		Stated that "*RSPB should be consulted along with SNH to determine the need for additional survey work after the collation of the first year's survey results*."	Following completion of the first year of surveys, a first year report of survey effort and results was produced and issued to SNH and RSPB. Confirmation of the requirement for and scope of additional surveys on certain species for a second year was agreed with SNH and RSPB. (See RSPB and SNH sections in this table for details).
		Adopted the RSPB's recommendation that baseline data is collated in relation to nightjar flight activity for the routes that pose the highest risk for this species. This could be achieved through assessing the frequency of flights at risk height from vantage point watches.	A proposal for additional flight activity surveys was submitted and approved by SNH and RSPB (see relevant section below in this table). Surveys were conducted to collect data in relation to nightjar flight activity in 2018 and 2019. These data are presented in (**Appendix 11.3**).
SNH	Formal Scoping Consultation 26 May 2017	Stated "*the scope and methods are appropriate and we are content with the approach proposed regarding the review of an initial year's data*."	The surveys were carried out as per the methods in the Scoping Report and a first year report issued to SNH 25/08/2017 for review and discussion on the requirement for further surveys in 2018 see section below in this table.
	Other Consultation Scope of works issued via email 25/10/2016	Details of proposed surveys were provided to SNH for comment prior to commencement of survey work. SNH responded with their acceptance of the scope of work and requested	Surveys were carried out as described in this appendix. In relation to red kites, considerable data are available for the breeding and non-breeding seasons and the location

[1] These equate to birds classed as of high Nature Conservation Importance for the assessment in Chapter 11

[2] These equate to birds classed as of moderate Nature Conservation Importance for the assessment in Chapter 11

[3] Qualifying interests: non-breeding waterfowl assemblage i.e. bar-tailed godwit, cormorant, curlew, dunlin, golden plover, goldeneye, grey plover, knot, lapwing, oystercatcher, pink-footed goose, pintail, redshank, ringed plover (and passage), scaup, shelduck, Svalbard barnacle goose, whooper swan.

[4] Qualifying interests: non-breeding waterfowl assemblage i.e. bar-tailed godwit, curlew, knot, oystercatcher, pink-footed goose, pintail, redshank scaup, Svalbard barnacle goose,

[5] Qualifying interests: non-breeding waterfowl assemblage i.e. bar-tailed godwit, black-headed gull, common gull, common scoter, cormorant, curlew, dunlin, golden plover, goldeneye, goosander, grey plover, herring gull, knot, lapwing, oystercatcher, pink-footed goose, pintail, red-throated diver, redshank, ringed plover, sanderling, scaup, shelduck, Svalbard barnacle goose, whooper swan.

[6] Qualifying interests: non-breeding Greenland white-fronted goose, greylag goose, whooper swan.

[7] Qualifying interests: breeding bird assemblage, non-breeding greylag goose.

[8] Organised and administered by RSPB

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action Taken
	SNH response received via email 18/11/2016	clarification on the target species for vantage point (VP) watches, suggesting red kite should be included due to the proximity of the Laurieston feeding site.	of these sites were utilised to inform the route of the KTR Project. The feeding station is at its closest about 2.1km from the OHL. Thus it was not considered necessary to specifically target surveys on gathering flight activity/habitat use data on red kites. During all other VP work, information was gathered on the presence and flight height of red kites to inform the assessment of effects on this population.
	Other Consultation First Year survey report issued via email on 25/08/2017 SNH response received on 28 August 2017	Accepted the first year survey report and confirmed SNH were content with proposals for the second year of surveys.	Surveys were carried out in the second year as outlined in the report. The methods and results are reported on in the chapter and the appendices.
	Other Consultation SNH Replied on 11/01/2018 and 08/03/2018 to email from NRP on 11/01/2018 outlining proposed additional surveys of nightjar flight activity	Commented on the scope of works for the surveys in 2018 which included the proposed survey method for nightjar flight activity. Additionally confirmed that the proposed surveys for nightjar for 2018 were appropriate.	Proposed survey methods for nightjar were provided in January 2018. Surveys were carried out between May to July 2018 (and further surveys in May to August 2019). Results are provided in the Chapter and the Appendices.
	Other Consultation Response via email on 21/01/2019 to the confidential interim report on the results of all surveys	Confirmed that "*the report provides welcome reassurance regarding potential bird impacts*."	Further survey information included in the chapter and associated appendices.
	Other Consultation Meeting on 19/03/2019 and email received on 19/04/2019 re further nightjar survey work in 2019	Meeting held with SNH (and RSPB) to discuss the results of the 2018 surveys and the potential need for additional surveys for nightjar to gather more detail on flight height. SNH subsequently confirmed the proposed surveys for nightjar in 2019 were appropriate.	Meeting on 19/03/2019 regarding the report on the 2018 survey findings and discussion on proposed further surveys. Email sent on 17/04/2019 in response to the discussion at the meeting outlining further nightjar survey work proposed in 2019. Surveys for nightjar, including flight activity surveys were carried out in 2019, the findings are presented within **Appendix 11.3**.
RSPB	Formal Scoping Consultation 23 May 2017	Highlighted "*the requirement to ensure the survey methodology is suitable to properly assess abundance and distribution of black grouse and nightjar onsite. This would include pre-dawn lek surveys for black grouse and surveys for churring male nightjars at dusk*."	As above in the section relating to the comments raised by the Scottish Ministers. All survey work has been undertaken in accordance with relevant SNH Guidance, including surveys for nightjar and black grouse.
		Requested that RSPB be included in the consultation after the collation of the first year's survey results.	RSPB were provided with the first year report on 25/08/2017 and consulted on the requirement for further surveys.
		Recommended that "*baseline data is collated in relation to nightjar flight activity for the routes that pose the highest risk for this species. This could be achieved through assessing the frequency of flights at risk height from vantage point watches*."	As above in the section relating to the comments raised by the Scottish Ministers. Flight activity in locations along the proposed route was observed and flight heights quantified in 2018. Further surveys were carried out in 2019.
	Other Consultation RSPB Replied on 15/01/2018 to email from NRP on 11/01/2018 outlining proposed additional surveys of nightjar flight activity	Commented on the proposed survey method which included the proposed survey method for nightjar flight. Requested collection of some basic data on nightjar flight height as well as frequency for the VP watches.	Data were collected on nightjar flight heights during 2018 and 2019 surveys, and are reported on in the chapter and its associated appendices.
	Other Consultation Response via email on 05/02/2019 to the confidential interim report on the results of all surveys for nightjar and golden eagle	acknowledged "*the results of the survey work*"	Further survey work has been undertaken in 2019 to provide further context on nightjar use of the forest and supplement the data gathered in 2018 and further desk studies collated in 2019.
	Other Consultation Meeting on 19/03/2019 and emails received on 26/04/2019 & 02/05/2019 re further nightjar survey work in 2019	Meeting discussed the results of the 2018 surveys and the potential need for additional surveys on nightjar to gain more detail on flight height. Further information on survey methods were provided.	Meeting held on 19/03/2019 (with SNH) in relation to the report on the 2018 survey findings and discussion on proposed further surveys. Email sent on 17/04/2019 in response to the discussion at the meeting outlining further nightjar survey work proposed in 2019. Comments received from RSPB were taken on board during 2019 surveys to ensure data collected was appropriate to inform the assessment of effects on nightjar.
	Other Consultation Emails received on 16/03/2017 & 13/05/2019	Formally provided data on various scarce breeding birds within the area of the KTR Project.	Data provided are presented in the **Appendix 11.3**
	Other Consultation Phone and email throughout survey period	Provided data on various scarce breeding birds within the area of the KTR Project.	As both RSPB and DGSRG monitor various species in the area, during the survey period surveyors maintained regular contact via phone and email prior to survey visits with RSPB and DGRSG to ensure no unnecessary disturbance occurred and to ensure data gathered is appropriate to inform the assessment.
DGSRG	Other Consultation Phone and email	Provided data on various scarce breeding birds within the area of the KTR Project.	As both RSPB and DGRSG monitor various species in the area, during the survey period surveyors maintained regular contact via phone and email

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action Taken
	throughout survey period		prior to survey visits with RSPB and DGRSG to ensure no unnecessary disturbance occurred and to ensure data gathered is appropriate to inform the assessment.
	Other consultation Email on 10/05/2019 29/05/2019 & 30/05/2019	Provided data on various scarce breeding birds within the area of the KTR Project.	Data provided are presented in the **Appendix 11.3**
FLS (formerly Forest Enterprise Scotland)[9]	Other Consultation Email 11/03/2019	FLS provided maps and information on nightjar management areas and management plans for this species on the FLS estate.	This information was used for the chapter and its associated appendices and also for planning survey work for 2019.
	Other Consultation Meeting on 19/03/2019 and email received on 18/04/2019 re further nightjar survey work in 2019	Meeting held to discuss the results of the 2018 surveys and the potential need for additional surveys on nightjar to gain more detail on flight height. Subsequent response to proposals for 2019 nightjar surveys, advised that the proposals seem appropriate but defer to SNH and RSPB in relation to the detail.	Meeting on 19/03/2019 re the report on the 2018 survey findings and discussion on proposed further surveys. Email sent on 17/04/2019 in response to the discussion at the meeting outlining further nightjar survey work proposed in 2019.
DGNSG	Other Consultation	Provided data on their monitoring survey results for 2017 and 2018	Surveys to inform the assessment were undertaken in consultation with the group. Data provided is presented in the **Appendix 11.3**.
WWT	Other Consultation	Provided data from their monitoring of Greenland white-fronted goose feeding fields around the LKRDM SPA (and Ramsar site); GPS tag data from whooper swans and barnacle geese passing through the region on migration	Data were used to inform the route selection for the connections and for background to the assessment.

Study Areas and Survey Periods

11.1.12 The Study Areas for ornithological surveys relevant to the KTR Project were agreed with SNH and in consultation with RSPB (**Table 1**).

11.1.13 The agreed Study Areas comprised a variety of habitats including: open moorland, commercial forestry plantations, rough grassland, managed grassland; wetlands and open water.

11.1.14 The various components of the KTR Project are illustrated on **Figure 1** and are referred to as follows:

- Polquhanity to Glenlee (via Kendoon) (P-G via K);
- Carsfad to Kendoon (C-K);
- Earlstoun to Glenlee (E-G);
- BG Route Deviation (BG Deviation);
- Glenlee to Tongland (G-T); and
- Removal of N and R Routes (N and R Removal).

11.1.15 SNH Guidance (2016)[iii] states one year of relevant survey work is deemed appropriate for proposed transmission power line developments so this was followed for the majority of the surveys, however some surveys on species considered to be those with most potential to be affected by the KTR Project were carried out in a second year. Field surveys were designed with reference to appropriate SNH Guidance Notes (2016[iii] & 2014[iv]) and agreed with SNH and RSPB (**Table 1**). A 12 month period of baseline survey work was completed between October 2016 and September 2017, and further surveys were completed between October 2017 and August 2019. Some bird species range over large areas and are therefore potentially vulnerable to the effects of developments located a considerable distance away. Hence the ornithological surveys were completed within a series of survey boundaries extending to 2km from the KTR Project. These boundaries defined the Study Area for surveys of certain species or for a particular survey method i.e. 500m for flight activity surveys, for breeding waders and for wintering birds; 1km for breeding barn owl and goshawk; 1.5km for black grouse; 2km for other breeding raptors and short-eared owl. In addition, a 6km boundary was used for golden eagle.

[9] FLS was consulted due to their ongoing habitat management programme for nightjar in the forest which the KTR Project is proposed.

Field Survey Methods

11.1.16 The field surveyors were R. Stakim (RAS), J. Halliday (JH), I. Mackenzie (IMK), M. Henderson (MH), D. Cameron (DJC), J. Clarke (JAC) and A. Ash (AA). All field surveyors were experienced ornithologists who were familiar with the species of bird likely to be encountered in the habitats of the KTR Project (many of them were local and thus already familiar with the area to surveyed). Surveyors have also been trained in the importance of carrying out surveys in a systematic and standardised way to enable direct comparison of data from different survey periods and locations. Training included the survey methods, techniques to minimise observer effects on bird detection, and the classification of bird behaviour.

Flight Activity

11.1.17 Information on bird flight activity was collected during timed watches from a number of vantage points. Migration Period watches (MWP) and Focal Vantage Point watches (FVP) were conducted from locations which allowed flight activity data to be gathered to inform the assessment on certain target species (Greenland white-fronted goose, greylag goose and golden eagle). During these watches flight activity of selected species of high conservation concern was also recorded if they were observed. These included hen harrier, goshawk, osprey and peregrine which breed in a few locations in the area. Red kite is an abundant breeding species in the area, habitual in its use of an area and highly visible. The decision was taken that if flight activity was to be recorded for this species this would significantly reduce the observation time for other more unobtrusive species and therefore detailed flight activity was not recorded. (Scope of Works and emails to SNH on 18th October 2016 and 21st November 2016 refer to **Table 1**).

Migration Period Watches

11.1.18 Five MWP locations were identified and used during the autumn (October and November 2016) and five for spring (March and April 2017) wildfowl migration periods (**Figure 1**).Three of these MWPs were used in both migration periods, whilst two, MWP3 and MWP4, were replaced for operational reasons in the spring by MWP6 and MWP7 respectively (these replacement MWPs covered similar areas of the KTR Project). One spring and one autumn migration survey period at these locations was agreed to be sufficient to provide data on wildfowl movements as per the SNH Guidelines.

11.1.19 Note that the MWPs were located to cover specific areas where there was considered to be a likelihood of wildfowl movements potentially crossing the KTR Project. They were chosen to allow observation of these areas and were not related in any way to the particular connections of the KTR Project. Coverage from these MWPs was therefore not evenly spread along the KTR Project and so when MWP coverage and survey effort was attributed per connection some connections had more coverage than others (**Tables 2** and **3, Figure 1**).

11.1.20 A minimum of 36 hours of watches were completed from each of the MWPs during each of these periods. Connection P-G via K was covered by MWP1 and MWP2; C-K by part of MWP1; connections E-G plus part of G-T by MWP2; the remaining parts of connection G-T were covered by MWPs 3-7 (**Tables 2** and **3**) (**Figure 1**).

Table 2: Migration Period Watch Survey Effort (hours) – Autumn 2016

Watch Point	Grid Reference	Parts of Connections Included	October	November	Total
MWP1	NGR 260048 589295	P-G via K; C-K	24.00	12.00	36.00

Watch Point	Grid Reference	Parts of Connections Included	October	November	Total
MWP2	NGR 262517 580410	E-G; G-T; BG Deviation	24.00	13.25	37.25
MWP3	NGR 261222 576968	G-T	21.00	15.00	36.00
MWP4	NGR 264719 569986	G-T	24.00	12.00	36.00
MWP5	NGR 263611 565160	G-T	24.00	12.00	36.00

Table 3: Migration Period Watch Survey Effort (hours)– Spring 2017

Watch Point	Grid Reference	Parts of Connections Included	March	April	Total
MWP1	NGR 260048 589295	P-G via K; C-K	27.00	9.00	36.00
MWP2	NGR 262517 580410	E-G; G-T; BG Deviation	27.00	9.00	36.00
MWP5	NGR 263611 565160	G-T	30.00	6.00	36.00
MWP6	NGR 260849 574425	G-T	27.00	9.00	36.00
MWP7	NGR 264497 571779	G-T	27.00	9.00	36.00

Focal Vantage Point Watches around the Laughenghie and Airlie Hills SSSI

11.1.21 Four FVP locations were used for watches around the Laughenghie and Airlie Hills SSSI (**Appendix 3)**, with approximately six hours from each FVP completed each month from October 2016 to September 2018 (**Tables 4** and **5**). Due to being focussed on the SSSI all FVPs were within the G-T connection. FVP locations are provided in the **Appendix 11.3**).

Table 4: Focal Vantage Point Watch Survey Effort 2016 to 2017 (hours)

Watch Point	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
FVP1	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	72.00
FVP2	2.50	6.50	6.00	6.00	6.00	6.00	6.00	6.00	6.00	5.75	6.00	6.00	68.75
FVP3	3.00	9.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	72.00
FVP4	3.00	9.00	6.00	6.00	6.00	7.00	6.00	6.00	6.00	6.00	6.00	6.00	73.00

Table 5: Focal Vantage Point Watch Survey Effort 2017 to 2018 (hours)

Watch Point	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
FVP1	6.00	3.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	69.00
FVP2	6.00	6.00	2.00	5.00	5.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	66.00
FVP3	6.00	4.00	7.50	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	71.50
FVP4	6.00	3.00	6.00	6.00	3.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	66.00

Greenland White-fronted Goose Roost Watches

11.1.22 Weekly winter roost watches were completed from a focal VP (FVP5) for Greenland white-fronted goose at the historical roost area at Stroan Loch in the vicinity of G-T connection (**Figure 11.1**) during the winters of 2016 to 2017 and 2017 to 2018.These watches were carried out during dawn and dusk periods in order to attempt to observe any birds coming to or leaving the roost area (**Table 11.6, Annex 4**). In total 48.75 hours of observation were completed between November 2016 and March 2017 and 46.50 hours between October 2017 and April 2018.

11.1.23 In addition one migration period watch point (MWP 4) overlooked Stroan Loch thus survey effort from watches from this location can also be included (**Tables 2 and 3**).

Table 6: Greenland White-fronted Goose Roost Watches 2016 to 2018 from FVP5 (hours)

	2016		2017					2017			2018				
	Nov	Dec	Jan	Feb	Mar	Total		Oct	Nov	Dec	Jan	Feb	Mar	Apr	Total
Dawn	6.00	2.00	4.00	4.00	6.00	22.00		2.00	4.00	4.00	4.00	6.00	4.00	2.00	26.00
Dusk	8.50	2.00	4.00	6.25	6.00	26.75		2.00	4.00	4.00	6.00	0.00	4.50	0.00	20.50
Total	14.50	4.00	8.00	10.25	12.00	48.75		4.00	8.00	8.00	10.00	6.00	8.50	2.00	46.50

Nightjar Surveys

11.1.24 Nightjar surveys were designed and reviewed in consultation with SNH, RSPB and FLS (Table 11.1).

Breeding Nightjar

11.1.25 The occurrence and distribution of breeding nightjars was determined by undertaking two visits to suitable habitats, at dusk in May and June 2017, surveys were undertaken in the vicinity of P-G via K, C-K and G-T connections. Combined counts by the DGNSG occurred during 2017, 2018 and 2019 within G-T connection (see **Appendix 11.3).**

11.1.26 During 2017, surveys in suitable habitat were carried out to attempt to locate singing male nightjars. Two visits were made at dusk in May and June 2017 (31st May, and 8th, 12th, 14th June). These surveys complimented the combined counts by the DGNSG which were carried out in 2017 (12th and 14th June), 2018 (11th and 18th June) and 2019 (10th and 12th June).

Flight Activity

11.1.27 A targeted programme of watches was designed to attempt to observe nightjar flight activity in the vicinity of the route. Between late May 2018 and July 2018, 29 hours of watches were completed see **Appendix 11.3** for more detail.

11.1.28 Flight activity surveys were designed to concentrate on the areas near to the G-T Connection where it passes through habitats known to be used by nightjars. Focal watches were carried out to obtain data on flight frequency by nightjars over the G-T Connection. Surveys commenced in late May 2018 and continued until the end of July 2018. They focussed on the area of overlap between the core range of the nightjars and part of the G-T Connection. In total 29 hours of observation were completed. Nightjars are active from dusk and throughout the night when foraging occurs and territorial and courtship behaviour take place, thus surveys were carried out between sunset and a few hours after sunset

11.1.29 A further series of targeted watches of nightjar flight activity totalling 53 hours, where a thermal imaging camera was utilised, were carried out between June and August 2019. (see **Appendix 11.3**).

Scarce Breeding Bird Surveys

Raptors and Owls

11.1.30 A number of raptor and owl species of conservation concern are known to breed or attempt to breed within 2km of the KTR Project. Data were received from the RSPB and DGRSG who monitor a number of sites and therefore searches during the survey periods were limited to those areas in other areas relevant to the KTR Project not already covered by RSPB and DGRSG. Close liaison was kept with both organisations to avoid unnecessary disturbance.

11.1.31 Priority was given to the species considered most likely to breed in the area: goshawk, osprey, hen harrier, red kite, peregrine, merlin, barn owl and short-eared owl.

11.1.32 Surveys covered all suitable habitats in all the new connections forming the KTR Project. In addition to the effort undertaken for other survey types, over 200 hours were spent searching for evidence of scarce breeding raptors and owls between 2017 and 2018. (**Table 7**).

11.1.33 Surveys were designed and agreed in consultation with SNH and RSPB (**Table 1**). Surveys for osprey, hen harrier, red kite, peregrine, merlin and short-eared owl were undertaken within a 2km survey boundary, whilst goshawk and barn owl were searched for within a 1km boundary.

11.1.34 Survey methods in Hardey *et al* (2013)[v] were followed, with emphasis given to appropriate habitat types and checking for signs of occupation (e.g. plucked prey, moulted feathers, pellets, faeces) as well as searching for birds displaying or showing breeding behaviour, including areas such as:

- any stands of tall heather (for hen harrier, merlin and short-eared owl);
- boulders, hummocks, trees with old crows nests (for merlin);
- crags and steep banks (for peregrine);
- tree nests for red kite, goshawk, osprey;
- potentially suitable buildings for barn owl.

Table 7: Survey Effort for Scarce Breeding Raptors and Owls 2017 and 2018 (hours)

	Mar	Apr	May	Jun	Jul	Aug	Total
2017	5.00	32.03	22.00	15.50	6.25	6.00	89.78
2018	6.00	45.50	28.50	16.25	14.75	0.00	111.00

Flight Activity

11.1.35 No VPs were set up specifically for any of these species individually, as their population size in the survey area in respect to the overall population within the region and risk of collision was assessed based on professional judgement be too low as to necessitate specific flight activity surveys. This approach was agreed with SNH.

11.1.36 However, sightings of flights by all species of scarce raptor or owl which occurred during the MWP or FVP watches were recorded and all flight durations and elevations were noted, except for red kite flights. The presence of red kites would have distracted from recording the species which the watches were predominantly set up to record. Red kite flight activity was summarised as a count of birds present and flying within each five minute period of the survey hours.

Black Grouse

11.1.37 Surveys followed SNH Guidance (SNH 2016[iii] and 2014[iv]) and were agreed in consultation with SNH and RSPB (**Table 1**). Searches for black grouse were undertaken within suitable habitat in the 1.5km survey boundary during the peak period for display activity (lekking) by males between April and May in 2017 and 2018. The methods employed were based on those described in Gilbert *et al.* (1998)[vi]. Surveys were undertaken during the early morning in calm, dry weather with good visibility. Observers walked quietly and listened and scanned the areas considered suitable for black grouse. In total 19.75 hours were spent searching for black grouse in 2017 and 31.75 hours in 2018. Surveys covered all suitable habitats in all the new connections forming the KTR Project (**Table 8**).

Table 8: Survey Effort for Displaying Black Grouse 2017 and 2018 (hours)

	Apr	May	Total
2017	11.00	8.75	19.75
2018	14.75	17.00	31.75

Breeding Birds of Open Ground

11.1.38 In line with SNH Guidance (SNH 2016[iii]) breeding bird territories were surveyed in one year, 2017, in open ground within the 500m survey boundary (the results illustrated no requirement for further surveys). Surveys covered all suitable habitats in all the new connections forming the KTR Project. The Brown and Shepherd (1993)[vii] survey method for upland waders was modified to also provide reliable estimates for some breeding moorland passerines by undertaking some surveys during the first few hours of daylight. All bird species listed in **Annex 1** to this Appendix, were recorded with the addition of skylark.

11.1.39 The surveys were conducted three times in the breeding season to allow for differences in detection rates between early and late breeding species. Surveys took place on: 27th April, 2nd, 3rd, 8th and 11th May (Visit one); 16th, 18th, 19th, 24th May and 2nd June (Visit two); 22nd, 30th June and 7th July (Visit three). Fieldwork was not undertaken in conditions considered likely to affect bird detection, for example strong winds (greater than Beaufort Scale Force 4), persistent heavy precipitation, poor visibility (less than 300m), or in unusually hot or cold temperatures (**Table 9**).

11.1.40 The surveys aimed to cover the ground systematically with a constant search effort. All suitable ground within the 500m survey boundary was approached closely, typically to within 100m. Waterbodies and isolated trees were examined, and ditches and streams followed. Surveyors paused at regular intervals to scan and listen for calling and singing birds.

11.1.41 Careful attention was given to recording behaviour indicative of breeding and care was taken to avoid counting the same individual more than once. Where necessary, surveyors retraced their steps in order to check the continued presence of previously recorded birds.

11.1.42 The location and activity of birds were mapped onto enlarged 1:25,000 scale OS maps using standard British Trust for Ornithology (BTO) codes (Marchant 1983[viii]). The position of each bird was mapped at the point it was first detected, and flight lines of birds seen flying over were recorded.

11.1.43 Where a number of breeding individuals were present and it was not possible to determine the exact number of breeding pairs, a method was devised to allow the number of discrete territories to be estimated. Registrations of individual birds were deemed to represent discrete breeding territories / pairs if the distance between them was more than 250m (500m for curlew, 200m for small passerines). This approach produces a standardised index of abundance based on the distance that members of a breeding pair are likely to move during a survey period.

11.1.44 Population estimates were derived by comparing the summary maps for the three visits. Again, a method to estimate discrete territories was used. Territories plotted during each visit were considered separate from one another if they were located more than 1000m apart (500m for snipe, common sandpiper and skylark, 300m for other small passerines). These distances were chosen to reflect the distances birds could plausibly move between survey dates. The locations of territories mapped in more than one survey period were plotted centrally.

Table 9: Surveys for Breeding Birds of Open Ground in 2017 (hours)

Visit	May	Jun	Jul	Total
1	22.50	0.00	0.00	22.50
2	15.50	4.00	0.00	19.50
3	0.00	16.25	5.00	21.25

Hen Harrier Winter Roost Watches

11.1.45 Surveys to determine the use of communal winter roost sites by hen harriers were undertaken. Known sites within 1km of the KTR Project were visited monthly to determine occupancy and count individuals. Red kite roosts were monitored by the RSPB and therefore data were obtained from them for this species. Watches for hen harrier were carried out between November 2016 and March 2017 and November 2017 and March 2018 and were in the G-T connection part of the KTR Project (**Table 10**).

Table 10: Hen Harrier Winter Roost Watches 2016/2017 and 2017/2018 (hours)

	2016		2017					2017		2018			
	Nov	Dec	Jan	Feb	Mar	Total		Nov	Dec	Jan	Feb	Mar	Total
Dawn	2.00	0.00	0.00	0.00	0.00	2.00		2.00	0.00	0.00	2.00	2.00	6.00
Dusk	2.00	0.00	2.00	2.25	2.00	8.25		2.00	4.00	4.00	0.00	0.00	10.00

N and R Route Removal

11.1.46 A programme of work to gather information on wildfowl (especially Greenland white-fronted goose and greylag goose) movements in the LKRDM SPA (and Ramsar site) (and associated SSSIs) area (R route (south)) commenced in October 2017 and continued until April 2018. Surveys then recommenced in October 2018 and were completed in April 2019. In addition some of the migration period watches completed between October 2016 and April 2017 covered parts of the N and R routes.

11.1.47 Surveys were undertaken to provide information for a Habitats Regulations Appraisal (HRA) and agreed in consultation with SNH (**Table 1**). No other surveys on the existing N and R routes[10] were considered necessary at this time.

Flight Activity

11.1.48 Watches were undertaken from a single FVP (FVP6) overlooking the route of the current R route OHL where it crosses the Loch Ken / River Dee (in the River Dee (Parton to Crossmichael) SSSI component of the LKRDM SPA (and Ramsar site) with the purpose of recording flight lines of Greenland white-fronted geese and greylag geese between roosting and feeding areas (**Figure 1**). Approximately 16 hours per month was completed (based on two two hour watches per week) between October and April 2017 to 2018 and 2018 to 2019. (**Table 11, Annex 5)**).

11.1.49 Watches during the autumn and spring migration periods from MWP1 overlooked sections of the N route, and MWP2 overlooked part of the R route (north and south sections) around Glenlee where it crosses the River Dee.

Collision Monitoring

11.1.50 The accessible ground below the existing R route (south) OHL approximately 1km either side of Loch Ken / River Dee was searched on a weekly basis over the same 2017 to 2018 and 2018 to 2019 period as the FVP watches to look for evidence of collisions by geese or other wildfowl. Each search lasted approximately three hours (**Table 12**, **Figure 7**).

Table 11: Watches for Wildfowl Movements in the vicinity of the existing R route (south) crossing of the Loch Ken / River Dee within the Loch Ken and River Dee Marshes SPA (hours)

	2017/2018							2018/2019						
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Dawn	2.0	4.0	2.2	6.0	1.0	4.0	0.0	2.0	6.0	4.0	0.0	2.0	4.0	0.0
Day	2.0	8.0	10.0	10.0	6.0	8.0	2.0	6.0	10.2	6.0	12.0	10.0	8.0	2.0
Dusk	2.0	3.5	4.0	4.0	4.0	4.0	2.0	4.0	0.0	2.2	8.0	4.0	4.0	2.0
Total	6.0	15.5	16.2	20.0	11.0	16.0	4.0	12.0	16.2	12.2	20.0	16.0	16.0	4.0

Table 12: Surveys for collision victims under the existing R route within the Loch Ken and River Dee Marshes SPA

Survey year	Survey number	Date	Duration	Observer	Result
2017/2018	1	19/10/2017	3.00	RAS	Carcass
	2	26/10/2017	3.50	RAS	Carcass
	3	02/11/2017	3.50	RAS	Nil Result
	4	10/11/2017	3.25	RAS	Nil Result
	5	16/11/2017	3.00	IMK	Feathers
	6	23/11/2017	3.00	RAS	Nil Result. Restricted access due to high water level
	7	01/12/2017	2.50	RAS	Nil Result
	8	08/12/2017	3.00	RAS	Nil Result
	9	11/12/2017	2.50	JH	Nil Result
	10	20/12/2017	3.00	RAS	Carcass
	11	05/01/2018	2.50	RAS	Feathers
	12	12/01/2018	3.00	RAS	Nil Result
	13	18/01/2018	3.00	RAS	Nil Result
	14	25/01/2018	2.00	RAS	Nil Result. Restricted access due to high water level
	15	30/01/2018	3.00	RAS	Nil Result. Restricted access due to high water level
	16	08/02/2018	3.00	RAS	Feathers
	17	16/02/2018	2.00	JH	Nil Result
	18	21/02/2018	3.00	RAS	Feathers
	19	08/03/2018	3.00	RAS	Carcass
	20	14/03/2018	2.00	JH	Nil Result
	21	22/03/2018	3.00	RAS	Nil Result
	22	26/03/2018	3.00	RAS	Nil Result
	23	05/04/2018	3.00	RAS	Nil Result
2018/2019	1	15/10/2018	3.00	RAS	two Carcasses likely raptor kills
	2	22/10/2018	3.00	RAS	carcass
	3	29/10/2018	3.00	RAS	carcass
	4	05/11/2018	2.50	RAS	Nil Result
	5	14/11/2018	2.75	RAS	carcass
	6	19/11/2018	3.00	RAS	Nil Result
	7	29/11/2018	2.00	JH	Nil Result
	8	07/12/2018	1.75	JH	carcass
	9	10/12/2018	2.00	JH	Nil Result
	10	19/12/2018	3.00	JH	Nil Result. Restricted access due to high water level
	11	04/01/2019	3.00	RAS	two carcasses
	12	10/01/2019	3.00	RAS	Nil Result
	13	17/01/2019	3.00	RAS	Nil Result
	14	24/01/2019	3.00	RAS	Nil Result
	15	31/01/2019	3.00	RAS	Nil Result
	15	05/02/2019	2.50	RAS	Nil Result
	17	11/02/2019	3.00	RAS	Nil Result
	18	18/02/2019	3.00	RAS	carcass
	19	25/02/2019	3.00	RAS	Nil Result
	20	04/03/2019	1.00	JH	Nil Result
	21	05/03/2019	1.00	JH	Nil Result
	22	12/03/2019	1.50	JH	Nil Result
	23	18/03/2019	3.00	RAS	Nil Result
	24	27/03/2019	2.00	JH	Nil Result
	25	10/04/2019	2.00	JH	carcass from peregrine kill

Desk Study Results

11.1.51 The desk study highlighted that wildfowl (geese and swans) that winter in the region and at sites (including some internationally and nationally designated sites) to the south of the KTR Project use airspace over the KTR Project mainly during their migration periods in the autumn and spring. The main species of interest are whooper swan, Greenland white-fronted goose, pink-footed goose, greylag goose and barnacle goose. Although individuals from different migratory populations pass through the region on a broad front, populations using the adjacent designated sites (SPA, Ramsar Site and SSSI) may follow habitual flight lines close to the existing N and R routes and the new connections forming the KTR Project.

[10] N route and R route (north) removal is being assessed as part of the P-G via K connection S37 application and R route (south) removal is being assessed as part of the G-T connection S37 application.

11.1.52 A number of raptor and owl species of conservation concern are known to use habitats in the vicinity of the KTR Project for nesting, roosting or foraging. These include osprey, red kite, hen harrier, golden eagle, goshawk, honey-buzzard, peregrine and barn owl; all these species are protected under Schedule 1 of the WCA.

11.1.53 A number of other species of conservation concern are known to use habitats in the vicinity of the KTR Project, including black grouse, nightjar and waders e.g. curlew and lapwing.

Field Survey Results

Wildfowl

11.1.54 Whooper swan, Greenland white-fronted goose, pink-footed goose, greylag goose and barnacle goose were recorded. Whooper swan (listed on Annex 1 of the Birds Directive and on Schedule 1 of the WCA), Greenland white-fronted goose (Annex 1, Red listed BoCC, BAP) and barnacle goose (Annex 1) are of high conservation concern. Pink-footed goose and greylag goose are of lesser conservation concern. All species are regular migratory species and as such are afforded protection under the Birds Directive. All species except barnacle goose are known to over-winter in the vicinity of the KTR Project.

11.1.55 Other species of waterbird of lesser conservation concern recorded included mute swan, Canada goose, goosander, cormorant, mallard, pintail, wigeon, and teal.

Scarce Raptors and Owls

11.1.56 Red kite, hen harrier, peregrine, goshawk, osprey, honey-buzzard, hobby, golden eagle and barn owl were recorded. All are species of conservation concern. All species are listed on Annex 1 and Schedule 1 apart from goshawk, hobby and barn owl which are on Schedule 1 only. The majority of these species are present all year whilst osprey, honey-buzzard and hobby are summer visitors only. Some results containing environmentally sensitive information on species which are listed on Schedule 1 of the WCA are provided in the **Appendix 11.3**.

11.1.57 Buzzard, sparrowhawk and kestrel were also recorded and are species of lesser conservation concern present all year and breed in the area.

Black Grouse

11.1.58 Black grouse was found at a number of locations in the vicinity of the KTR Project however all were outwith the Study Areas. It is a Red listed BoCC and BAP species of conservation concern.

Nightjar

11.1.59 Nightjar was confirmed at a number of locations and is a species of conservation concern listed on Annex 1 of the Birds Directive and is also a BAP species.

11.1.60 Results of surveys for nightjar are provided in the **Appendix 11.3**.

Waders

11.1.61 Golden plover, curlew, greenshank, oystercatcher, snipe, jack snipe, lapwing and woodcock were recorded.

11.1.62 Golden plover (Annex 1), greenshank (Schedule 1), curlew (IUCN Near Threatened, Red listed BoCC, BAP), lapwing (Red listed BoCC, BAP) and woodcock (Red listed BoCC) are species of conservation concern, whilst snipe and jack snipe are of lesser conservation concern.

Other Species

11.1.63 Great grey shrike and willow tit were noted as species of interest. Both were recorded during the winter. Willow tit is resident in the area and is a red listed BoCC, whilst small numbers of great grey shrikes overwinter in the UK.

11.1.64 Other species of lesser conservation concern noted as present and breeding in the area were: tree pipit, song thrush, mistle thrush, linnet, dunnock, reed bunting, lesser redpoll, stonechat, whinchat, skylark, starling, redstart, house sparrow, yellowhammer, rook, raven, grasshopper warbler, whitethroat, cuckoo, crossbill, sedge warbler, sand martin.

Polquhanity to Glenlee (via Kendoon)[11]

Wildfowl

Abundance and Distribution

11.1.65 Flight activity was recorded within 500m of this connection by whooper swan, barnacle goose, greylag goose and pink-footed goose (**Figure 2.1**). One flight by a whooper swan flock of 26 birds was seen in April 2017, flying north up the valley. The total of 128 barnacle geese comprised four flocks varying in size from four to 50 birds, and were all seen on one day in October 2016. These flocks were flying south down the valley likely to their winter sites on the Solway. Eight flocks of greylag geese were recorded on two days in November 2016 and three days in March 2017. The total of 75 birds was noted in flocks of between one and 53 birds. The majority of flights were of single individuals or small flocks of two or three birds making movements within the local area. The single flock of 30 pink-footed geese was recorded in March 2017.

Flight Activity

11.1.66 During VP watches from MWPs, one flight by a flock of whooper swans, four flights by flocks of barnacle goose, eight by greylag goose flocks and one by a pink-footed goose flock were recorded with at least part of the duration of flight recorded passing within 500m of the P-G via K connection (**Table 13** and **Figure 2.1**).

11.1.67 For the recorded flight the whooper swan flock was greater than 50m above ground level (a.g.l.) (it was a high elevation flight (>150m)) . (**Table 13** and **Figure 2.1**).

11.1.68 For the barnacle geese all the flights recorded were at over 50m elevation a.g.l. (also at high elevation (>150m)) (**Table 13** and **Figure 2.1**).

11.1.69 During the recorded flights the flock of 53 greylag geese flew from below 10m to above 50m a.g.l. One flight of three birds and a flight by a single individual flew between 10m and 30m a.g.l. Three other flights occurred at above 50m a.g.l., and one of 11 birds between 30m and above 50m (**Table 13** and **Figure 2.1**).

11.1.70 The pink-footed goose flight was at over 50m a.g.l. (also a high elevation flight >150m) (**Table 13** and **Figure 2**).

Table 13: Wildfowl Flight Activity Which Passed At Least Partly Within 500m of the P-G via K connection of the KTR Project

Species	VP	Date	No. Birds	<10m	10-30m	30-50m	>50m
Barnacle Goose	MWP1	06/10/16	45				✓ (>150m)
			4				✓ (>150m)
			29				✓ (>150m)
			50				✓ (>150m)
Greylag goose	MWP1	13/03/17	11			✓	✓
		16/03/17	53	✓	✓	✓	✓
		28/03/17	2				✓
			1		✓		
	MWP2	15/11/16	3		✓		
		18/11/16	3				✓
			1				✓
		28/03/17	1				✓
Pink-footed Goose	MWP2	23/03/17	30				✓ (>150m)
Whooper swan	MWP1	06/04/17	26				✓ (>150m)

[11] No specific surveys were carried out for the removal of N Route and R Route (north) however as the P-G via K route is effectively parallel to these existing routes the survey results from this connection also relate to these routes

Scarce Raptors and Owls

Abundance and Distribution

11.1.71 Red kite, peregrine, goshawk, osprey, and barn owl were all recorded in the survey buffers.

11.1.72 Red kite, osprey and peregrine all bred within the survey buffers during the survey period. Of the nest territories which were found, two red kite nest territories, one peregrine nest territory and one osprey nest territory, were situated within 500m of the P-G via K connection (**Appendix 11.3**).

11.1.73 During all the surveys undertaken for the P-G via K connection between October 2016 and September 2018 red kites were seen during the months of March, April, May, June, July, October, and November. Flight activity was observed in 197 five minute periods during a possible total of 1743 for the 145.25 hours of watches from MWP1 which was within the P-G via K connection and MWP2 which was at least partially within this connection.

11.1.74 During all the surveys undertaken for the P-G via K connection between October 2016 and September 2018 peregrines were seen during the months of (March, April, May, October and November). Six flights from MWPs 1 and 2 were recorded, but only one was within 500m of the P-G via K connection (**Figure 5.1**).

11.1.75 During the surveys undertaken for the P-G via K connection between October 2016 and September 2018 goshawks were seen during the months of March and April. Four flights were recorded from MWP 1 and 2, two of which passed within 500m of the connection **(Figure 5.1**).

11.1.76 During the surveys undertaken for the P-G via K connection between October 2016 and September 2018 ospreys were seen during the months of March, April, May and June. One flight was recorded from MWP 1, and it did not pass within 500m of the connection (**Figure 5.1**).

11.1.77 During the survey year 2018 twelve potential barn owl nest and roost locations were checked and one nest and five suitable sites with signs of birds being present were found within 1km of the P-G via K connection (**Appendix 11.3**).

Flight Activity

11.1.78 Flight activity for all raptor species except red kite was tailored to the final OHL route by using flight durations and elevations which took place within 500m of the P-G via K connection. Red kite flights were recorded within the full visible area of the watch points.

11.1.79 During the watches from MWPs, two flights of total duration 103 seconds by goshawk passed within 500m of the P-G via K connection with a total duration of 26 seconds within the 10-30m and 30-50m a.g.l. height bands (**Table 14** and **Figure 5.1).**

11.1.80 During the watches from MWPs, one peregrine flight of duration 68 seconds passed within 500m of the P-G via K connection with a total duration of 68 seconds within the 10-30m a.g.l. elevation (**Table 14** and **Figure 5.1**).

11.1.81 For red kites 11% of five minute periods, during the watches from MWPs, contained flights by kites. This involved 297 individual flights as some periods contained more than one flight. 220 of these flights had a height band attributed to them, two in <10m; 27 in the 10-30m height band; 47 in the 30-50m; and 144 in the >50m, thus approximately 34% (74 records) of flight activity was within the 10-30m and 30-50m height bands.

Table 14: Flight Activity of Scarce Raptors Which Passed at least Partly Within 500m of the P-K (via K) connection of the KTR Project[12] (seconds)

Species	VP	Date	No. Birds	Duration (s)	<10m	10-30m	30-50m	>50m
Goshawk	MWP1	07/03/17	1	77	0	0	0	77
		04/04/17	1	26	0	17	9	0
Peregrine	MWP2	18/11/16	1	68	0	68	0	0

[12] Due to the abundance of red kites in the vicinity of the KTR Project, flights by this species were not recorded in the same manner as less abundant raptor species, see section **11.16** Flight Activity in Field Survey Methods, above.

Nightjar

11.1.82 No nightjar territories were recorded within 2km of the P-G via K connection.

Black Grouse

11.1.83 Black grouse were observed in the vicinity of the P-G via K connection, however they were outwith 1.5km. A minimum of two males were present in 2017 (two males seen in April, and one in a similar location in May) and a minimum of one male in the same location in 2018 (one bird recorded in April and one in May) (**Figure 4**).

Waders

11.1.84 Two oystercatcher territories were identified within 500m of P-G via K connection, near Carsfad Loch. Both were over 390m from the P-G via K connection (**Figure 6.1**).

Carsfad to Kendoon

Wildfowl

Abundance and Distribution

11.1.85 Flight activity was recorded within 500m of this connection by whooper swan, barnacle goose and greylag goose (**Figure 2.1**). One flight by a whooper swan flock of 26 birds was seen in April 2017, they flew north up the valley (and is the same flock reported in the P-G via K connection). The total of 99 barnacle geese comprised three flocks of sizes from four, 45 and 50 birds which were all seen on one day in October 2016 (and are the same flocks reported in the P-G via K connection). These flocks were flying south down the valley likely to their winter sites on the Solway. Two flocks of greylag geese were recorded on two days in March 2017. The total of 64 birds was noted in flocks of 11 and 53 birds and included one of the flocks reported in the P-G via K connection (but is also relevant also to C-K as they partially share the same Study Area).

Flight Activity

11.1.86 During VP watches from MWPs, one flight by a flock of whooper swans, three flights by flocks of barnacle goose, and two by greylag goose flocks were recorded with at least part of the duration of flight recorded passing within 500m of the C-K connection (**Table 15** and **Figure 2.1**).

11.1.87 For the recorded flight the whooper swan flight was greater than 50m a.g.l. (it was a high elevation flight (>150m)). (**Table 15** and **Figure 2.1**).

11.1.88 The barnacle goose flights were all above 50m a.g.l (also at high elevation (>150m)) (**Table 15** and **Figure 2.1**).

11.1.89 During the recorded flights the flock of 53 greylag geese flew from below 10m up to >50m a.g.l whilst the other flock of 11 flew at between 30-50m and >50m a.g.l. (**Table 15** and **Figure 2.1**).

Table 15: Wildfowl Flight Activity Which Passed at least Partly Within 500m of the C-K connection of the KTR Project

Species	VP	Date	No. Birds	<10m	10-30m	30-50m	>50m
Barnacle Goose	MWP1	06/10/16	45				✓ (>150m)
			4				✓ (>150m)
			50				✓ (>150m)
Greylag goose	MWP1	13/03/17	11			✓	✓
		16/03/17	53	✓	✓	✓	✓
Whooper Swan	MWP1	06/04/17	26				✓ (>150m)

Scarce Raptors and Owls

Abundance and Distribution

11.1.90 Red kite, peregrine, goshawk, osprey, and barn owl were all recorded in the survey buffers of the C-K connection.

11.1.91 Red kite, osprey and peregrine all bred within the survey buffers during the survey period. Of the nest territories which were found, two red kite territories and one osprey nest territory, were situated within 500m of the C-K connection (**Appendix 11.3**) (and are also reported on for the P-G via K connection but is also relevant also to C-K as they partially share the same Study Area)).

11.1.92 During all the surveys undertaken for the C-K connection between October 2016 and September 2018 red kites were seen during the months of March, April, May, October, and November. Flight activity was observed in 61 five minute periods during a possible total of 864 for the 72.00 hours of watches from MWP1 the visible area from which was at least partially within this connection of the KTR Project.

11.1.93 During all the surveys undertaken for the C-K connection between October 2016 and September 2018 peregrines were seen during the months of March, April, May, October and November. Two flights were recorded from MWP1, but both were outwith 500m of the C-K connection (**Figure 5.1**).

11.1.94 During all the surveys undertaken for the C-K connection between October 2016 and September 2018 goshawks were seen during the months of March and April. Three flights were recorded from MWP1 but all were outwith 500m of this connection (**Figure 5.1**).

11.1.95 During all the surveys undertaken for the C-K connection between October 2016 and September 2018 ospreys were seen during the months of March, April, and May. One flight was recorded from MWP1 which did not pass within 500m of the C-K connection (**Figure 5.1**).

11.1.96 During the survey year 2018 five potential barn owl nest and roost locations were checked and two suitable sites with signs of birds being present were found within 1km of the C-K connection (see **Appendix 11.3**).

Flight Activity

11.1.97 Flight activity for all raptor species except red kite was tailored to the final OHL route by using flight durations and elevations which took place within 500m of the C-K connection. Red kite flights were recorded within the full visible area of the watch points.

11.1.98 During the watches from MWP1 7% of five minute periods contained flights by red kites. This involved 86 individual flights as some periods contained more than one flight. Seventy four of these flights had a height band attributed to them, two in <10m; 16 in the 10-30m height band; 11 in the 30-50m; 45 at >50m; thus approximately 22% of flight activity was within the 10-30m height band.

Nightjar

11.1.99 No nightjar territories were recorded within 2km of the C-K connection.

Black Grouse

11.1.100 No black grouse were found in either 2017 or 2018 in suitable habitat within 1.5km of the C-K connection.

Waders

11.1.101 Two oystercatcher territories were identified within 500m of the C-K connection (**Figure 6.1**).

Earlstoun to Glenlee

Wildfowl

Abundance and Distribution

11.1.102 Flight activity was recorded within 500m of this connection by whooper swan, greylag goose and pink-footed goose (**Figure 2.1**). One flight by a whooper swan flock of seven birds was seen in April 2017, as they flew north up the valley (this flight was different to those seen within 500m of the P-G via K connection). Four flocks of greylag geese were recorded on two days in November 2016 and one day in March 2017. The total of eight birds was noted in flocks between one and three birds (and all these flights were reported in the P-G via K connection but is also relevant also to E-G as they partially share the same Study Area) and were most probably birds moving within the local area. The single flock of 30 pink-footed goose was recorded in March 2017, and was reported in the P-G via K connection.

Flight Activity

11.1.103 During vantage point watches from MWPs, one flight by a flock of whooper swans, four flights by greylag goose and one by pink-footed goose flocks were recorded with at least part of the duration of flight recorded passing within 500m of the E-G connection (**Table 16** and **Figure 2.1**).

11.1.104 The whooper swan flock flew at elevations above 50m a.g.l. (**Table 16** and **Figure 2.1**).

11.1.105 During the recorded greylag goose flights one flock of three birds flew between 10 and 30m a.g.l. The three other flights occurred at above 50m a.g.l. (**Table 16** and **Figure 2.1**).

11.1.106 The pink-footed goose flight was at over 50m a.g.l. (it was a high elevation flight (>150m)). (**Table 16** and **Figure 2.1**)

Table 16: Wildfowl Flight Activity Which Passed at least Partly Within the 500m Buffer of the E-G connection of the KTR Project

Species	VP	Date	No. Birds	<10m	10-30m	30-50m	>50m
Greylag goose	MWP2	15/11/16	3		✓		
		18/11/16	3				✓
			1				✓
		28/03/17	1				✓
Pink-footed Goose	MWP2	23/03/17	30				✓ (>150m)
Whooper swan	MWP2	05/04/17	7				✓

Scarce Raptors and Owls

11.1.107 Red kite, peregrine, goshawk, osprey, and barn owl were all recorded in the survey buffers of the E-G connection.

11.1.108 Red kite and peregrine bred within the survey buffers during the survey period. Of the nest territories which were found one peregrine territory was situated within 500m of this connection of the KTR Project (**Appendix 11.3**).

11.1.109 During all the surveys undertaken for the E-G connection between October 2016 and September 2018 red kites were seen during the months of March, April, July, October and November. Flight activity was observed in 136 five minute periods during a possible total of 879 for the 73.25 hours of watches from MWP2 which was at least partially within this Section of the KTR Project, and also reported in the C-K and P-G via K connections but is also relevant also to E-G as they partially share the same Study Area.

11.1.110 During all the surveys undertaken for the E-G connection between October 2016 and September 2018 peregrines were seen during the months of March, April, May, October and November. Three flights were recorded from MWP2 one of which was within 500m of the E-G connection (**Figure 5.1**).

11.1.111 During all the surveys undertaken for the E-G connection between October 2016 and September 2018 a goshawk was seen during the month of March. One flight was recorded, from MWP2, but was outwith 500m of the E-G connection (**Figure 5.1**).

11.1.112 During all the surveys undertaken for the E-G connection between October 2016 and September 2018 ospreys were seen during the month of April. No flights were recorded from MWP2 (**Figure 5.1**).

11.1.113 During the survey year 2018 two potential barn owl nest and roost locations were checked and one suitable site with signs of birds being present was found within 1km of the E-G connection (**Appendix 11.3**).

Flight Activity

11.1.114 Flight activity for all raptor species except red kites was tailored to the final OHL route by using flight durations and elevations which took place within 500m of the E-G connection. Red kite flights were recorded within the full visible area of the watch points.

11.1.115 During the watches from MWP2 one peregrine flight of duration 68 seconds passed within 500m of the E-G connection with a total duration of 68 seconds within the 10-30m a.g.l. elevation (**Table 17** and **Figure 5.1**).

11.1.116 During the watches from MWP2 15% of five minute periods contained flights by red kites. This involved 211 individual flights as some periods contained more than one flight. 146 of these flights had a height band attributed to them, none in <10m; 11 in the 10-30m height band; 36 in the 30-50m; 99 above 50m thus approximately 7% of flight activity was within the 10-30m height band.

Table 17: Flight Activity of Scarce Raptors Which Passed at least Partly Within 500m of the E-G connection of the KTR Project[13]

Species	VP	Date	No. Birds	Duration (s)	<10m	10-30m	30-50m	>50m
Peregrine	MWP2	18/11/16	1	68	0	68	0	0

Black Grouse

11.1.117 No black grouse were found in either 2017 or 2018 in suitable habitat within 1.5km of the E-G connection of the KTR Project.

Waders

11.1.118 No wader territories were recorded within 500m of the E-G connection of the KTR Project.

BG Route Deviation

Wildfowl

11.1.119 No flight activity by wildfowl was recorded within 500m of the BG Deviation (**Figure 2.1**).

Scarce Raptors and Owls

11.1.120 Red kite and barn owl were recorded in the survey buffers of the BG Deviation.

11.1.121 Red kite bred within the survey buffers during the survey period. No red kite territories were situated within 500m of the BG Deviation (**Appendix 11.3**).

11.1.122 During all the surveys undertaken for the BG Deviation connection between October 2016 and September 2018 no flights by scarce raptors or owls were recorded for this connection except red kite flight activity from MWP2.

11.1.123 During the survey year 2018 one potential barn owl nest and roost locations were checked and one suitable site with signs of birds being present was found within 1km of the BG Deviation (**Appendix 11.3**).

Flight Activity

11.1.124 During the watches from MWP2 15% of five minute periods contained flights by red kites. This involved 211 individual flights as some periods contained more than one flight. 146 of these flights had a height band attributed to them, none in <10m; 11 in the 10-30m height band; 36 in the 30-50m; 99 above 50m thus approximately 7% of flight activity was within the 10-30m height band.

Black Grouse

11.1.125 No black grouse were found in either 2017 or 2018 in suitable habitat within 1.5km of the BG Deviation.

[13] Due to the abundance of red kites in the vicinity of the KTR Project, flights by this species were not recorded in the same manner as less abundant raptor species, see section **11.16** Flight Activity in Field Survey Methods, above.

Waders

11.1.126 No wader territories were recorded within 500m of BG Deviation.

Glenlee to Tongland

Wildfowl – New G-T OHL Connection

Abundance and Distribution

11.1.127 Flight activity was recorded within 500m of the G-T connection by whooper swan, barnacle goose, greylag goose and pink-footed goose and also by an unidentified swan species (**Figures 2.1 & 2.2**). Three flights by whooper swan flocks of one, five and 13 birds were seen in December 2016, October 2017 and March 2017 respectively. One flight by an unidentified swan species was recorded of two birds in October 2016. One flight of 70 barnacle geese was seen on the same day in October 2016 as the flocks reported in the P-G via K, C-K and E-G connections. Twelve flights of greylag geese were recorded on nine days: one flock of seven on 1st February 2017, one day with three flights (of two, two, and four birds) in March 2017, four days (with five flights of one, two, two, two and four birds) in April 2017, one flock of nine birds in June 2017, one individual in July 2017 and one flight of two birds in March 2018. As these flights are all by small groups or individual birds and include the breeding season it is likely there is a resident feral population of this species in the area. Six flocks of pink-footed goose totalling 252 birds were recorded. One flock of 50 in October 2016, one of eight in January 2017, two flocks in October 2017 (of 50 and nine birds) one of 35 birds in January 2018 and one of 100 birds in March 2018.

Flight Activity

11.1.128 There were 942.75 hours of watches from MWP2, MWP3, MWP4, MWP5, MWP6, MWP 7, FVP1, FVP2, FVP3, FVP4 and FVP5 which were at least partially within the G-T connection. MWP2 was also reported in the C-K, P-G via K and E-G connections.

11.1.129 During VP watches from MWPs, three flights by whooper swans, one flight by an unidentified swan species, one flight of barnacle geese, twelve flights by greylag goose and six by pink-footed goose flocks were recorded with at least part of the duration of flight recorded passing within 500m of the G-T connection (**Table 18** and **Figures 2.1** and **2.2**).

11.1.130 Two whooper swan flights were greater than 50m a.g.l. (at a high elevation of >150m) whilst the third flight of five birds was at 30-50m a.g.l. (**Table 18, Figures 2.1** and **2.2).**

11.1.131 The unidentified swan flight was between 10-30m and 30-50m a.g.l. (**Table 18, Figure 11.2.1** and **2.2).**

11.1.132 The barnacle goose flight was above 50m a.g.l. (**Table 18, Figures 2.1** and **2.2).**

11.1.133 Two flights of greylag goose each comprising just two birds were recorded in the height bands <10m and 10-30m a.g.l. Two flocks were in the 30-50m a.g.l. band, and one at 30-50m and >50m. Seven flocks flew above 50m a.g.l.. (**Table 18, Figures 2.1** and **2.2).**

11.1.134 One pink-footed goose flight was at 30-50m to over 50m a.g.l., the other five flights were over 50m a.g.l. with four at high elevation (>150m) (**Table 18** and **Figures 2.1** and **2.2**).

Table 18: Wildfowl Flight Activity Which Passed at least Partly Within the 500m Buffer of the G-T connection of the KTR Project

Species	VP	Date	No. Birds	<10m	10-30m	30-50m	>50m
Barnacle Goose	MWP4	06/10/16	70				✓
Greylag goose	MWP7	13/03/17	2				✓
			2				✓
			4				✓
		05/04/17	2				✓
	FVP1	01/02/17	7				✓
		07/04/17	2	✓	✓		

Species	VP	Date	No. Birds	<10m	10-30m	30-50m	>50m
		28/04/17	4			✓	
			1			✓	
		14/06/17	9			✓	✓
	FVP2	26/04/17	2				✓
	FVP3	19/07/17	1				✓
	FVP5	21/03/18	2	✓	✓		
Pink-footed goose	MWP4	06/10/16	50				✓ (>150m)
	FVP1	03/10/17	50				✓ (>150m)
		18/10/17	9				✓ (>150m)
		24/01/18	35			✓	✓
	FVP4	10/01/17	8				✓
	FVP5	09/03/18	100				✓ (>150m)
Whooper Swan	FVP1	23/03/17	13				✓ (>150m)
	FVP1	18/10/17	5			✓	
	FVP3	08/12/16	1				✓ (>150m)
Swan Species	MWP6	20/10/16	2		✓	✓	

Wildfowl - Removal of R Route (South)

Abundance and Distribution

11.1.135 Flight activity by wildfowl species was recorded within the route of the existing R route (south) OHL where it crosses the River Dee. The removal of this route is being assessed as part of the G-T connection. Whooper swan, Greenland white-fronted goose, greylag goose and pink-footed goose were among the species recorded.

11.1.136 Nine flights of greylag goose and one flight by whooper swan were recorded (from MWP2) in the vicinity of the existing R route where it crosses the River Ken valley after it leaves the Glenlee power station and heads east (existing towers 031 to 038 approximately) (**Figure 2.1**).

11.1.137 All other flights were recorded at the section where the R Route crosses the Loch Ken and River Dee SPA at the Crossmichael to Parton SSSI (**Figures 2.2** and **2.3**).

11.1.138 Twenty five flights by whooper swan flocks of between two and 24 birds, totalling 167 birds, were recorded in October 2017 to December 2017, in March 2018 and between October 2018 to March 2019 (**Figure 2.3**).

11.1.139 Sixty-eight flights by Greenland white-fronted goose were recorded totalling 2536 individuals in flocks of between one individual to 220 birds (**Figure 3**). Flights were recorded in every month between October 2017 and April 2018: two flights totalling 73 birds (flocks of two and 71 birds) on one day in October; four flights totalling 252 birds on two days in November (flocks of between 2 and 140 birds); 19 flights totalling 445 individuals (flocks of between one and 75 birds) on three days in December; 11 flights totalling 318 individuals (flocks of between three and 220 birds) on four days in January; two flights totalling 320 individuals (flocks of 120 and 200 birds) on two days in February; seven flights totalling 255 individuals (flocks of between one and 120 birds) on three days in March; one flight by five birds on one day in April. Flights were recorded in every month between October 2018 and March 2019: one flight totalling 100 birds on one day in October; two flights totalling 97 birds on two days in November (flocks of between two and 95 birds); one flight of 73 individuals on one day in December; 6th flights totalling 87 individuals (flocks of between one and 45 birds) on four days in January; nine flights totalling 438 individuals (flocks of between one and 115 birds) on three days in February; three flights totalling 73 individuals (flocks of between 23 and 26 birds) on one day in March.

11.1.140 One hundred and ninety three flights of greylag geese were recorded totalling 2195 individuals in flocks of between one and 200 birds (**Figure 2.2**). Flights were recorded in every month between October 2017 and April 2018: 23 flights totalling 282 birds (flocks between two and 60 birds) on two days in October; three flights totalling 24 birds (two flocks of six and one of 12) on three days in November; ten flights totalling 117 birds (flocks between three and 40 birds) on three days in December; 42 flights totalling 565 individuals (flocks of between two and 50 birds) on five days in January; 16 flights totalling 51 individuals (flocks between one and nine birds) on three days in February; thirteen flights by 35 individuals (flocks of between 1 and 7 birds) on four days in March; two flights by 10 birds (flocks of two and eight birds) on one day in April. Flights were recorded in every month between October 2018 and April 2019: 10 flights totalling 112 birds (flocks between two and 34 birds) on two days in October; 19 flights totalling 368 birds (flocks between one and 200) on four days in November; 18 flights totalling 198 birds (flocks between one and 57 birds) on two days in December; 17 flights totalling 339 individuals (flocks of between two and 130 birds) on five days in January; nine flights totalling 69 individuals (flocks between two and 21 birds) on four days in February; eleven flights by 25 individuals (flocks of between one and six birds) on three days in March.

11.1.141 Seventeen flights of pink-footed goose totalling 1865 birds were recorded in flocks of between one and 600 individuals (**Figure 2.2**). Flights were recorded in December 2017 and in January and March 2018. One flock of seven birds in December 2017; one flight by 16 birds in January 2018; eight flights by 1356 birds (in flocks of between one and 600 birds) on two days in March 2018. Flights were recorded in November 2018 and between January and April 2019. One flock of 60 birds in November 2018; one flight by 70 birds in January; one flight by one bird in February; one flight by 75 birds in March; three flights by 280 birds (two flocks of 80 and one of 120 birds) on one day in April.

Removal of R Route Flight Activity

11.1.142 Of the nine flights of greylag goose (seen from MWP2) which passed over the R route just east of the Glenlee Substation, one flock of five birds flew at <10m a.g.l., one flock of three birds at 10-30m, one flock of four at 30-50m and the six other flocks of one to three birds flew at >50m a.g.l. The whooper swan flock of seven birds flew above 50m a.g.l.. (**Table 19**).

11.1.143 In the Crossmichael to Parton SSSI component of the LKRDM SPA (and Ramsar site) 25 whooper swan flights were recorded with 24 passing over the existing R route OHLs, the other flight did not cross them. The elevations recorded varied, with 16 flights in the height band between 10m to 30m a.g.l., six flights in band 30 to 50m and two at >50m a.g.l. (**Table 20**).

11.1.144 In the Crossmichael to Parton SSSI component of the LKRDM SPA (and Ramsar site), 62 of the Greenland white-fronted goose flights were recorded as over the existing R route OHL and six did not cross the OHL (but were recorded in flight in areas nearby). The elevations recorded for the flights over the existing R route OHL were: one flight flew from below 10m to 30m a.g.l.; 17 flights were at 10 to 30m; 23 flights at between 30 and 50m; 21 flights at >50m a.g.l. Of the six flights which did not cross the existing R route OHL one was at >50m; one flew from <10m to land, one from 30-50m to land and one from >50m to land. Two others had no height recorded (**Table 21**).

11.1.145 In the Crossmichael to Parton SSSI component of the LKRDM SPA (and Ramsar site) 175 flights by greylag goose were recorded as passing over the existing R route OHL (2092 birds), two flights of two birds passed through between two sets of the conductors ten flights (75 birds) passed under conductors, and six flights (24 birds) did not cross the OHL. The elevations recorded for flights passing above the OHL 87 flights were between 10 and 30m; 74 flights at 30-50m; 14 at >50m. Six of the ten flights recorded as under the OHL were recorded in elevation band less than 10m, one flight between less than 10m and 10-30m elevation bands, two flights went between less than10m to 30-50 m elevation and one at 30-50m. The flights which passed between two sets of the existing R route conductors were in the 10-30m band. The six flights which did not cross the OHL comprised two at >50m, three at 30-50m and one at 10-30m. (**Table 22**).

11.1.146 In the Crossmichael to Parton SSSI component of the LKRDM SPA (and Ramsar site) all 17 pink-footed goose flights were recorded as passing over the existing R route OHL. The elevations recorded were: one flight at 10-30m; seven flights at 30-50m; and nine at above 50m. (**Table 23**).

Table 19: Wildfowl Flight Activity Which Passed Over the existing R Route (south) to be removed as part of the KTR Project East of Glenlee (G-T connection Section 37 application)

Species	VP	Date	No. Birds	<10m	10-30m	30-50m	>50m
Greylag goose	MWP2	16/10/16	1				✓
		15/11/16	3		✓		
		18/11/16	3				✓
			5	✓			

Species	VP	Date	No. Birds	<10m	10-30m	30-50m	>50m
			1				✓
		28/03/17	3				✓
			2				✓
			1				✓
		13/04/17	4			✓	
Whooper swan	MWP2	05/04/17	7				✓

Table 20: Whooper Swan Flight Activity Which Crossed the existing R Route (or close to) at the Loch Ken and River Dee Marshes SPA (and Ramsar site) to be removed as part of the KTR Project (G-T connection Section 37 application)

Date	No. Birds	Crossing of line	<10m	10-30m	30-50m	>50m
19/10/17	2	Over the lines		✓		
26/10/17	17	Over the lines				✓
02/11/17	9	Over the lines			✓	
10/11/17	9	Over the lines		✓		
	6	Over the lines		✓		
	7	Over the lines		✓		
08/12/17	8	Over the lines		✓		
14/03/18	14	Over the lines				✓
26/03/18	24	Over the lines		✓		
15/10/18	3	Did not cross	✓			
29/10/18	9	Over the lines		✓		
	2	Over the lines		✓		
	5	Over the lines		✓		
05/11/18	10	Over the lines		✓		
14/11/18	5	Over the lines		✓		
	5	Over the lines			✓	
19/11/18	2	Over the lines			✓	
	7	Over the lines			✓	
19/12/18	5	Under the lines		✓		
	4	Over the lines			✓	
04/01/19	1	Over the lines			✓	
10/01/19	3	Over the lines		✓		
18/02/19	4	Over the lines		✓		
18/03/19	3	Over the lines		✓		
	3	Over the lines		✓		

Table 21: Greenland White-fronted Goose Flight Activity Which Crossed the existing R Route (or close to) at the Loch Ken and River Dee Marshes SPA (and Ramsar Site) to be removed as part of the KTR Project (G-T connection Section 37 application)

Date	No. Birds	Crossing of line	<10m	10-30m	30-50m	>50m
26/10/17	71	Over the lines			✓	
	2	Over the lines			✓	
10/11/17	65	Over the lines			✓	
	45	Over the lines			✓	
	2	Over the lines			✓	
16/11/17	140	Over the lines				✓
08/12/17	9	Over the lines			✓	
	12	Over the lines			✓	
	47	Over the lines			✓	
	34	Over the lines			✓	
	20	Over the lines			✓	
	5	Over the lines			✓	
	5	Over the lines		✓		
	12	Over the lines		✓		
	12	Over the lines		✓		
11/12/17	5	Over the lines				✓
	40	Over the lines				✓
	1	Over the lines				✓
	25	Over the lines			✓	
	7	Over the lines				✓
	60	Over the lines				✓
	75	Over the lines				✓
	30	Over the lines				✓
	34	Over the lines				✓
20/12/17	12	Did not cross				✓
12/01/18	3	Over the lines			✓	
	4	Over the lines		✓		
18/01/18	6	Over the lines			✓	
	6	Over the lines twice			✓	✓
	6	Over the lines			✓	
25/01/18	14	Over the lines				✓
30/01/18	33	Over the lines				✓
	4	Over the lines				✓
	220	Over the lines				✓
	10	Did not cross - landed	✓	✓	✓	✓
	12	Over the lines			✓	
16/02/18	120	Over the lines				✓
21/02/18	200	Over the lines				✓
14/03/18	14	Over the lines				✓
	5	Over the lines				✓
	1	Over the lines				✓
	14	Over the lines				✓
22/03/18	1	Over the lines		✓		
26/03/18	100	Over the lines	✓	✓		

Date	No. Birds	Crossing of line	<10m	10-30m	30-50m	>50m
	120	Did not cross - landed	✓	✓	✓	
05/04/18	5	Over the lines		✓		
29/10/18	100	Over the lines		✓		
05/11/18	2	Over the lines				✓
19/11/18	95	Over the lines			✓	
10/12/18	73	Over the lines			✓	✓
04/01/19	45	Over the lines			✓	
10/01/19	16	Over the lines		✓		
	8	Over the lines		✓		
	3	Over the lines		✓		
17/01/19	1	Over the lines		✓		
31/01/19	14	Over the lines				✓
05/02/19	50	Over the lines		✓		
	115	Over the lines			✓	
11/02/19	32	Over the lines			✓	
	12	Over the lines		✓		
	43	Did not cross - landed	✓			
	115	Over the lines		✓		
18/02/19	18	Over the lines		✓		
	52	Over the lines		✓		
	1	Over the lines		✓		
04/03/19	24	Over the lines			✓	
	26	Did not cross				
	23	Did not cross				

Table 22: Greylag Goose Flight Activity Which Crossed the existing R Route (or close to) at the Loch Ken and River Dee Marshes SPA (and Ramsar site) to be removed as part of the KTR Project (G-T connection Section 37 application)

Date	No. Birds	Crossing of line	<10m	10-30m	30-50m	>50m
19/10/17	2	Over the lines				✓
	9	Over the lines				✓
	11	Over the lines				✓
	15	Over the lines			✓	
	8	Over the lines			✓	
	60	Over the lines			✓	
	6	Over the lines			✓	
	40	Over the lines			✓	
26/10/17	2	Over the lines		✓		
	16	Over the lines		✓		
	9	Did not cross		✓		
	8	Over the lines		✓		
	5	Over the lines			✓	
	10	Over the lines		✓		
	16	Over the lines			✓	
	4	Did not cross				✓
	4	Over the lines			✓	
	4	Did not cross				✓
	4	Did not cross			✓	
	11	Over the lines		✓		
	20	Over the lines		✓		
	7	Over the lines		✓		
	11	Over the lines			✓	
02/11/17	6	Over the lines			✓	
10/11/17	12	Over the lines			✓	
23/11/17	6	Over the lines		✓		
08/12/17	3	Over the lines		✓		
	40	Over the lines		✓		
11/12/17	14	Over the lines			✓	
	12	Over the lines			✓	
	5	Over the lines			✓	
	17	Over the lines				✓
	12	Over the lines				✓
20/12/17	7	Over the lines				✓
	3	Over the lines		✓		
	4	Over the lines			✓	
05/01/18	4	Over the lines				✓
12/01/18	10	Over the lines		✓		
	30	Over the lines		✓		
	23	Over the lines			✓	
	6	Over the lines		✓		
	17	Over the lines		✓		
	3	Over the lines			✓	
	36	Over the lines		✓		
	46	Over the lines		✓		
	48	Over the lines		✓		
	17	Over the lines		✓		
	12	Over the lines		✓		
	5	Over the lines				✓
	30	Over the lines			✓	
	50	Over the lines			✓	
18/01/18	11	Over the lines			✓	
	3	Over the lines			✓	
	13	Over the lines		✓		
	5	Over the lines		✓		
	8	Over the lines		✓		
	27	Over the lines				✓

Date	No. Birds	Crossing of line	<10m	10-30m	30-50m	>50m
	11	Over the lines		✓		
	10	Over the lines		✓		
	20	3 times over the lines		✓		
	14	Over the lines		✓		
	18	Over the lines			✓	
	8	Over the lines			✓	
	11	Over the lines			✓	
	2	Over the lines		✓		
25/01/18	2	Over the lines		✓		
	2	Over the lines			✓	
	2	Over the lines			✓	
	2	Over the lines			✓	
	4	Over the lines		✓		
	5	Over the lines		✓		
	4	Over the lines			✓	
	2	Over the lines		✓		
	13	Over the lines			✓	
30/01/18	22	Over the lines			✓	
	2	Over the lines and Through the lines		✓		
	5	Over the lines		✓		
	2	Over the lines		✓		
08/02/18	4	Over the lines				✓
16/02/18	1	Over the lines			✓	
	6	Under the lines	✓	✓		
	1	Over the lines				✓
	1	Over the lines				✓
	3	Over the lines			✓	
	4	Over the lines			✓	
	1	Under the lines	✓			
	1	Over the lines			✓	
	8	Over the lines			✓	
21/02/18	3	Over the lines			✓	
	2	Over the lines			✓	
	9	Over the lines		✓		
	2	Over the lines		✓		
	2	Over the lines		✓		
	3	Over the lines		✓		
08/03/18	2	Over the lines			✓	
	2	Over the lines		✓		
	2	Under the lines	✓			
	6	Over the lines			✓	
	2	Over the lines		✓		

Date	No. Birds	Crossing of line	<10m	10-30m	30-50m	>50m
14/03/18	2	Under the lines		✓		
	2	Over the lines			✓	
	2	Over the lines			✓	
	2	Over the lines			✓	
22/03/18	2	Over the lines		✓		
26/03/18	3	Over the lines		✓		
	1	Over the lines		✓		
	7	Over the lines		✓		
05/04/18	2	Under the lines	✓			
	8	Over the lines		✓		
22/10/18	9	Over the lines		✓		
	8	Over the lines		✓		
	9	Over the lines			✓	
	34	Over the lines			✓	
	12	Over the lines		✓	✓	
	14	Over the lines and under the lines	✓	✓	✓	
	16	Over the lines and under the lines	✓	✓	✓	
29/10/18	3	Over the lines		✓		
	5	Over the lines		✓		
	2	Over the lines		✓		
05/11/18	4	Over the lines		✓		
	7	Over the lines		✓		
	35	Over the lines		✓		
	4	Over the lines		✓		
	28	Over the lines		✓		
	6	Under the lines	✓			
	2	Over the lines and Through the lines		✓		
	200	Over the lines		✓		
14/11/18	6	Under the lines	✓			
19/11/18	5	Over the lines			✓	
	5	Over the lines			✓	
	3	Over the lines		✓		
	4	Over the lines		✓		
	7	Over the lines		✓		
	40	Over the lines		✓		
29/11/18	3	Over the lines			✓	
	1	Over the lines			✓	
	1	Over the lines			✓	
	7	Over the lines			✓	
07/12/18	7	Over the lines		✓		
	1	Over the lines			✓	

Date	No. Birds	Crossing of line	<10m	10-30m	30-50m	>50m
	4	Over the lines			✓	
	1	Over the lines			✓	
	5	Over the lines			✓	
	57	Over the lines			✓	
	2	Over the lines			✓	
	2	Over the lines			✓	
19/12/18	1	Over the lines			✓	
	7	Over the lines				✓
	33	Over the lines			✓	
	12	Over the lines			✓	
	3	Over the lines		✓		
	18	Over the lines		✓		
	28	Over the lines		✓		
	10	Over the lines		✓		
	1	Over the lines			✓	
	6	Over the lines			✓	
04/01/19	12	Over the lines			✓	
	55	Over the lines				✓
10/01/19	8	Over the lines		✓		
	12	Over the lines		✓		
	2	Over the lines		✓		
17/01/19	9	Over the lines		✓		
	130	Over the lines			✓	
	4	Over the lines		✓		
	16	Over the lines		✓		
	5	Over the lines		✓		
24/01/19	10	Over the lines		✓		
	3	Over the lines			✓	
	2	Over the lines		✓		
	14	Over the lines		✓		
	35	Over the lines		✓		
31/01/19	20	Under the lines, flushed by low flying aircraft	✓			
	2	Over the lines			✓	
05/02/19	8	Over the lines		✓		
	2	Over the lines		✓		
	21	Over the lines		✓		
11/02/19	2	Over the lines		✓		
18/02/19	2	Over the lines		✓		
	16	Over the lines		✓		
25/02/19	6	Over the lines		✓		
	6	Over the lines		✓		
	6	Over the lines		✓		
04/03/19	1	Did not cross			✓	
	2	Did not cross			✓	
12/03/19	2	Over the lines			✓	
	2	Over the lines			✓	
	2	Over the lines			✓	
	1	Over the lines			✓	
	1	Over the lines			✓	
	6	Over the lines			✓	
	4	Over the lines			✓	
	2	Over the lines			✓	
18/03/19	2	Over the lines		✓		

Table 23: Pink-footed Goose Flight Activity Which Crossed the existing R Route (or close to) of the at the Loch Ken and River Dee Marshes SPA (and Ramsar site) to be removed as part of the KTR Project (G-T connection Section 37 application)

Date	No. Birds	Crossing of line	<10m	10-30m	30-50m	>50m
20/12/17	7	Over the lines				✓
30/01/18	16	Over the lines		✓		
08/03/18	25	Over the lines			✓	
	300	Over the lines			✓	
	600	Over the lines			✓	
	150	Over the lines			✓	
	170	Over the lines				✓ (>150m)
	1	Over the lines			✓	
26/03/18	50	Over the lines				✓
	60	Over the lines				✓
19/11/18	60	Over the lines				✓ (>150m)
24/01/19	70	Over the lines				✓
25/02/19	1	Over the lines			✓	
27/03/19	75	Over the lines			✓	
10/04/19	80	Over the lines				✓
	80	Over the lines				✓ (>150m)
	120	Over the lines				✓ (>150m)

Scarce Raptors and Owls

Abundance and Distribution

11.1.147 Red kite, peregrine, goshawk, osprey, hen harrier, hobby, honey-buzzard, golden eagle and barn owl were all recorded in the relevant survey areas for the G-T connection.

11.1.148 Red kite, goshawk, honey-buzzard, golden eagle and osprey bred within the survey buffers during the survey period. Of the nest territories which were found two red kite territories and three goshawk territories were situated within 500m of the G-T connection (**Appendix 11.3**).

11.1.149 During all surveys undertaken for the G-T connection between October 2016 and September 2018 red kites were seen during all months. Flight activity was observed in 611 five minute periods during a possible total of 11,310 for the 942.50 hours of watches from MWPs and FVPs.

11.1.150 During all the surveys between October 2016 to September 2018 for the G-T connection peregrines were seen during the months of March, April, May, June, September, October and November. 18 flights were recorded, fourteen from a MWP and four from an FVP, eleven of which were within 500m of the G-T connection. (**Figure 5.2**).

11.1.151 During all the surveys conducted between October 2016 to September 2018 for the G-T connection goshawks were seen during the months of February, March, April, May, June, August, October, November and December. 39 flights were recorded, 37 from MWPs and FVPs, 32 of which were within 500m of the G-T connection (**Figure 5.2**).

11.1.152 During all the surveys conducted between October 2016 to September 2018 for the G-T connection ospreys were seen during the months of March, April, May, June, July and August. 33 flights were recorded, 15 from FVPs, 14 of which were within 500m of the G-T connection (**Figure 5.2**).

11.1.153 During all the surveys conducted between October 2016 to September 2018 for the G-T connection hen harriers were seen during the months of January, February, March, October, November and December. Fifty three flights were recorded, 47 from FVPs, four of which were within 500m of the G-T connection. The majority of these flights were related to birds flying around and to and from the winter roost (**Appendix 11.3**, **Figure 5.2**).

11.1.154 During all the surveys conducted between October 2016 to September 2018 for the G-T connection honey-buzzards were seen during the months of June, August and September. Five flights were recorded, all from FVPs, one flight was within 500m of the G-T connection (**Appendix 11.3**).

11.1.155 A hobby was seen once very briefly during September 2017 outwith 500m of the G-T connection. This bird will have been a migrant moving through the area (**Figure 5.2**).

11.1.156 During the survey year 2018 for the G-T connection six potential barn owl nest and roost locations were checked and one roost and three suitable sites with signs of birds being present were found within 1km of the G-T connection (**Appendix 11.3**).

Flight Activity

11.1.157 Flight activity for all raptor species except red kites was tailored to the final OHL route by using flight durations and elevations which took place within 500m of the G-T connection. Red kite flights were recorded within the full visible area of the watch points.

11.1.158 11 by peregrine of a duration 956 seconds passed within 500m of the G-T connection with a total duration of 572 seconds within the 10-30m and 30-50m a.g.l. elevations (**Table 24**).

11.1.159 32 flights by goshawk of a total duration 6016 seconds passed within 500m of the G-T connection with a total duration of 1976 seconds within the 10-30m and 30-50m a.g.l. elevations (**Table 24**).

11.1.160 14 flights by osprey of a duration 1067 seconds passed within 500m of the G-T connection with a total duration of 550 seconds within the 10-30m and 30-50m a.g.l. elevations (**Table 24**).

11.1.161 Four hen harrier flights were recorded within 500m of the G-T connection with a duration of 544 seconds, and 121 seconds of these were within the 10-30m and 30-50m a.g.l. flight activity band (**Table 24**).

11.1.162 One flight by honey-buzzard passed within 500m of the G-T connection for a duration of 110 seconds, and all of the flight was above 50m a.g.l. (**Table 24**).

11.1.163 For the G-T connection 5% of five minute periods contained flights by red kites. This involved 871 individual flights as some periods contained more than one flight. 683 of these flights had a height band attributed to them, 13 in the <10m; 152 in the 10-30m height band; 209 in the 30-50m; and 309 above 50m, thus approximately 53% of flight activity was within the 10-30m and 30-50m height bands.

Table 24: Flight Activity of Scarce Raptors Which Passed at least Partly Within 500m of the G-T connection of the KTR Project[14]

Species	VP	Date	No. Birds*	Duration (s)	<10m	10-30m	30-50m	>50m
Peregrine	MWP3	19/10/16	1	74		18	56	
			1	48			48	
			1	44			44	
		02/11/16	1	46			31	
	MWP4	12/10/16	1	24				24
			1	20			20	
		13/10/16	1	12		12		
		26/10/16	1	414	31	138	199	46
	MWP5	19/10/16	1	170				170
	MWP6	13/10/16	1	42				42
	FVP3	13/03/18	1	62			6	56
Goshawk	MWP3	13/10/16	1	15				15
	MWP4	06/10/16	1	31		15	16	
		13/10/16	1	26			26	
			2	960			336	624
		18/10/16	1	32		16		16
	MWP6	15/03/17	1	136		30	60	45
	MWP7	27/03/17	2	5	2	3		
		04/04/17	1	321			61	260
	FVP1	06/10/16	1	100				100
		26/10/16	1	64	16	16		32
		09/12/16	1	48	48			
		01/02/17	1	95		63	32	
		15/02/17	1	85	51	34		
		23/03/17	1	135		60	75	
		07/04/17	1	85	34	51		
			1	70	34	18	18	
			1	3		3		
			1	7		7		
		20/02/18	1	64		64		
		15/05/18	1	44				44
	FVP2	01/03/17	1	96				96
	FVP3	16/02/17	1	938		60	60	818
		22/02/17	1	564		106	15	444
		13/03/18	1	208			46	162
			2	149			95	54
		27/03/18	1	260		65	120	75
			1	538			60	478
			1	477				477

[14] Due to the abundance of red kites in the vicinity of the KTR Project, flights by this species were not recorded in the same manner as less abundant raptor species, see section **11.16** Flight Activity in Field Survey Methods, above.

Species	VP	Date	No. Birds*	Duration (s)	<10m	10-30m	30-50m	>50m
			1	115		99	16	
		11/04/18	1	56		37	19	
		09/08/18	1	159		36	122	
	FVP4	20/02/18	1	130			16	114
Osprey	FVP1	07/04/17	1	88		18	53	18
		20/07/17	1	307				307
		03/08/17	1	58			58	
			1	88				88
			1	19			19	
			1	49		49		
			1	44			44	
		23/08/17	1	20			20	
		26/04/18	1	16			16	
			1	212		166	46	
			1	60		60		
		15/05/18	1	54				54
			1	51				51
	FVP3	13/07/17	1	1			1	
Hen harrier	MWP3	11/10/16	1	124	124			
		19/10/16	1	225	110		2	113
	MWP4	17/11/16	1	73		42	31	
	FVP1	06/10/16	1	122	76	46		
Honey-buzzard	FVP3	15/08/18	1	110				110
*where more than one bird was involved in the flight, the durations have been multiplied to reflect this								

Nightjar

11.1.164 Nightjar breeding territories were located within 2km of the G-T connection and additional surveys to record flight activity were carried out (see **Appendix 11.3**).

Black Grouse

11.1.165 No black grouse were found in either 2017 or 2018 in suitable habitat within 1.5km of the G-T connection of the KTR Project.

Waders

11.1.166 Within 500m of the G-T connection seven curlew territory centres (plus one just outside), six snipe territory centres (plus one just outside) one oystercatcher territory centre (plus two just outside) and six lapwing territory centres (plus two just outside) were identified (**Figure 6.2**).

11.1.167 Golden plovers were seen flying on three occasions: once in October 2016, once in April 2017, and once in May 2017. A greenshank was seen once in flight during August 2017. No other records were obtained during searches for breeding waders. These observations are all consistent with birds passing through on the way to or on their return from breeding locations further north.

Removal of R Route (south)- Carcass Searches

11.1.168 21 carcasses have been found during the searches in the area under the existing R route (south) OHL. Those identified included wildfowl species: two mute swans; one unidentified swan species; one Greenland white-fronted goose; three greylag goose; one Canada goose; three mallard; three teal; one pintail; along with other bird species, lapwing (one), woodpigeon (three) and two unidentified bird species. (**Table 25, Figure 7**).

Table 25: Carcasses Found Under the existing R Route (or close to) at the crossing of the Loch Ken and River Dee Marshes SPA (and Ramsar site)

Date	Species	Notes
19/10/17	Greenland white-fronted goose	Carcass
26/10/17	Mallard	Fresh carcass
16/11/17	Mallard	Feathers only, and fresh fox scat adjacent
	unidentified	Old feathers possibly pheasant
	unidentified	Very old unidentified feathers
20/12/17	Teal	Carcass remains - Other predator
05/01/18	Pintail	No carcass found but enough feathers to suggest the duck is dead
08/02/18	unidentified swan	Swan species. Dead within last week
21/02/18	Teal	Carcass found Feathers only
08/03/18	Lapwing	Carcass
15/10/18	Teal	Likely raptor kill
15/10/18	Woodpigeon	Likely raptor kill
22/10/18	Greylag goose	Carcass, breast bone/ flight feathers two plus months old
29/10/18	Woodpigeon	Carcass
14/11/18	Greylag goose	Breast bone and feathers
07/12/18	Mute swan	Recent carcass, mostly eaten
04/01/19	Mute swan	Likely dead for two plus months Pulled from ditch as carrion
	Canada goose	Likely dead for two plus weeks
17/01/19	Greylag goose	Seen to hit the existing OHL and fell to ground An incidental observation of a flock of 50 flying at speed possibly flushed, flew over, through and under the line. One clipped top conductor and flew on, another collided with the top conductor and fell to the ground. No trace of remains of bird seen colliding with conductor found on visit on 24th January 2019
18/02/19	Woodpigeon	
10/04/19	Mallard	Killed and eaten by raptor (peregrine) by tower

Annex 1: Survey Species list and BTO Codes

List A		List C	
Species	**BTO Code**	**Species**	**BTO Code**
Diver sp.	RH/BV	Cormorant	CA
Common scoter	CX	Heron	H.
White tailed eagle	WE	Kestrel	K.
Golden eagle	EA	Buzzard	BZ
Hen harrier	HH	Sparrowhawk	SH
Goshawk	GI	Red grouse	RG
Red kite	KT	Grey partridge	P.
Osprey	OP	Lapwing	L.
Merlin	ML	Redshank	RK
Peregrine	PE	Common sandpiper	CS
Hobby	HY	Oystercatcher	OC
Barn owl	BO	Snipe	SN
Short-eared owl	SE	Woodcock	WK
Black grouse	BK	Herring gull	HG
Capercaillie	CP	Cuckoo	CK
Nightjar	NJ	Skylark	S.
Chough	CF	Tree pipit	TP
Whooper swan	WS	Dunnock	D.
Rare raptors	HZ/MR/RF/YF	Ring ouzel	RZ
List B		Song thrush	ST
Species	**BTO Code**	Grasshopper warbler	GH
Greylag goose	GJ	Wood warbler	WO
Barnacle goose	BY	Spotted flycatcher	SF
White-front. goose	EW(Euro)/NW(Grld)	Marsh/Willow tit	MT/WT
Pink-footed goose	PG	Crested tit	CI
Brent goose	DB(Dark)/PB(Pale)	Starling	SG
Bean goose	BE	House/Tree sparrow	HS/TS
Golden plover	GP	Linnet	LI
Dunlin	DN	Twite	TW
Greenshank	GK	Lesser redpoll	LR
Whimbrel	WM	Crossbill/ Scottish c'bill	CR/CY
Curlew	CU	Bullfinch	BF
Wood sandpiper	OD	Hawfinch	HF
Tern spp.	AE/CN	Yellowhammer	Y.
Skua spp.	AC/NX	Reed bunting	RB
Colonial spp. nests	H./Gull spp.	Corn bunting	CB
		Raven	RN
		Other wildfowl spp.	MS/MA/GD/T.

[i] Eaton, M.A., Aebischer, N.J., Brown, A.F., Hearn, R.D., Lock, L., Musgrove, A.J., Noble, D.G., Stroud, D.A. and Gregory, R.D. (2015). Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. British Birds 108, 708-746.

[ii] International Union for the Conservation of Nature (2018) The IUCN Red list of threatened species version 2018-2 www.iucnredlist.org

[iii] SNH (2016). Guidance: Assessment and mitigation of impacts of power lines and guyed meteorological masts on birds. SNH. Battleby, UK.

[iv] SNH (2014). Guidance: Recommended bird survey methods to inform impact assessment of onshore wind farms. SNH Battleby, UK

[v] Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. and Thompson, D. (2013). Raptors, a field guide to survey and monitoring. The Stationery Office, Edinburgh.

[vi] Gilbert, G., Gibbons, D.W. and Evans, J. (1998). Bird monitoring methods. RSPB Sandy, Bedfordshire.

[vii] Brown, A.F. and Shepherd, K.B. (1993). A method for censusing upland breeding waders. Bird study 40: 3 pp189-195.

[viii] Marchant, J.H. (1983). BTO Common Birds Census Instructions. British Trust for Ornithology, Thetford.

Appendix 11.2: Ornithology Collision Risk

Contents

Appendix 11.2: Ornithology Collision Risk

11.2.1 This report details the approach used to evaluate collision risk and presents the results of this work undertaken for the proposed Kendoon to Tongland 132kV (kilovolts) Reinforcement Project ('the KTR Project') by Natural Research (Projects) Ltd (NRP).

11.2.2 There is a potential risk to birds through collision with the conductors, earthwire and towers/wood poles of an overhead line (OHL). The risk of collision may be dependent on the amount of flight activity over the OHL but also will depend on a variety of other factors including flight behaviour. Furthermore, the risk is assumed to vary between species depending on the ability of birds to detect and manoeuvre around the conductors and/or other OHL components. Finally, the position of the OHL in the landscape, the surrounding habitats and the configuration of the conductors and earthwires will also affect the risk to birds. Birds that collide are assumed to be killed or fatally injured.

11.2.3 The Scottish Natural Heritage (SNH) Guidance for assessment of power lines (SNH, 2016)[i] states "*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.*" The guidance also states "*we recommend that emphasis is put on mitigation where surveys indicate potential conflicts. In cases where impacts are likely to be severe, and mitigation may not reduce this sufficiently, bespoke models may be useful if they are based on the best available information from the site and on the attributes and status of the species of concern. An example of this may be where there is a level of flight activity at the proposed line which is high enough to raise concerns about potential collision mortality impacts at a designated site or regional population scale*."

11.2.4 This appendix sets out the methodology used to describe the risk of collision with OHLs for species potentially affected as a result of the KTR Project. The assessment of the significance of the effects on the species as a result of the collision risk, and, where appropriate, suggested mitigation methods, are presented in **Chapter 11: Ornithology**.

Bird Collision Risk

11.2.5 The potential risk of collision is greatest in situations where particular biological, environmental and engineering factors exist or combine to create the risk. These factors can include: body size, weight, manoeuvrability, flight behaviour, time of day, season, habitat and habitat use, land uses, weather, and visibility, size of lines, line placement, line orientation, line configuration, and structure type (Aviation Power Line Interaction Committee (APLIC), 2012)[ii].

11.2.6 As highlighted in the SNH guidance, it is difficult to extrapolate collision risk from one power line study and apply or compare it with other studies because of site specific conditions and the lack of standard study methods which result in variability of reported mortality rates. Species of birds reported to be susceptible to collisions generally have a large body size, long wingspan, heavy body, and poor manoeuvrability. Examples include species of divers, storks, grebes, waterfowl, and some species of hawks and eagles(APLIC, 2012)[ii].

11.2.7 Bevanger's (1998)[iii] review used sixteen studies of power line mortalities, and defined groups of birds by their morphology and predicted relative sensitivity to collision of these groups. The report illustrated that birds which have low flight agility, so called 'poor fliers' (including gamebirds, rails and coots) and other water birds, are more susceptible to collision, and these have higher 'wing loading'. The birds with lower wing loads such as aerial predators and 'thermal soarers' (e.g. kites, harriers, falcons, hawks, eagles, nightjar) were less susceptible. The reverse was suggested for susceptibility to electrocution, with the species with larger body size and wing spans and tendencies to perch or hunt in manners which bring them into contact with the OHL (e.g. storks, herons, eagles). However with a number of these species it is not always simple to determine whether a death was due to electrocution or collision.

11.2.8 Empirical evidence from the 16 studies described in Bevanger (1998)[iii] showed that reports of wildfowl (*Anseriformes*) as collision victims were very high, along with snipe and sandpipers (*Scolopacidae*), rails, coots and cranes (*Rallidae/Gruidae*) and gulls (*Laridae*).

11.2.9 Madders (2000)[iv] reviewed the reported collision and electrocution incidents within the ScottishPower[1] electrical distribution network and found approximately 50% related to swans. Geese, ducks, wading birds and gulls together accounted for 36% of the remaining incidents. However due to difficulties of detection, collisions by smaller birds are very likely to be under-recorded. Biases can also exist due to the data being collated to provide information on power outages, as heavier birds are those most likely to be the cause of bird-related incidents.

11.2.10 A Spanish report showed there were few or even no fatalities caused by power lines in the case of resident individuals, as opposed to migrant birds visiting the same areas (Alonso & Alonso, 1999[v]). Migrant and over-wintering birds are probably less familiar with obstacles and are therefore more vulnerable. During migration, especially nocturnal migration, even small passerines can be exposed to collision. Diurnal migrants are apparently less sensitive, except when they have to fly low because of bad weather conditions (Scott *et al.*, 1972)[vi].

11.2.11 Local topography can be an important factor in determining collision events (Kabouche *et al.,* 2006[vii]). This study identified a number of effects of topography on collision risk including: ways a bird may come across an OHL crossing their flight path perpendicularly; OHLs in open areas where birds may be landing or taking-off; birds avoiding an obstacle can collide with the wires if they are hidden by the obstacle.

11.2.12 Power lines in forests can increase exposure to collision as they create open areas which may become attractive to birds (Kabouche *et al.*, 2006)[vii]; or forest fragmentation caused by the creation of wayleaves can force forest birds to cross the open stretches to reach other parts of their territory and by doing so they are also exposed to collision. However, if the line crosses a forest with a tree height equal to or exceeding power tower height, the collision risk is minimal for birds flying over the canopy (Jenkins *et al.*, 2010)[viii].

11.2.13 Collisions can occur with all types of power lines, but appear to occur more often with thinner cables (e.g. earth wires, medium and low (lower than 50 kV) voltage conductors etc. Derouaux *et al.* (2012)[xiv]).

11.2.14 The collision rate also depends on power-line design. In Norway, a study resulted in a significant reduction in the number of bird collisions (mainly ptarmigans – *Lagopus sp*.) after the removal of the earth wire (Bevanger & Brøseth, 2001)[ix]. However, in Spain, no significant difference in the bird collision rate was observed when comparing a transmission line of 380kV (with three cable levels and two overhead earth wires), a 132kV distribution line (one cable level and no earth wire) and a 13kV distribution line (one cable level and no earth wire) (Janss & Ferrer, 1998)[x]. It must be noted that this last study also concerned three different habitats.

11.2.15 Despite this research effort, the population consequences of collision mortality for birds (i.e. whether this mortality can contribute to or cause population declines or even extinction) remain largely unknown. In terms of Environmental Impact Assessment (EIA), the conservation status of the species is important in determining the degree of ecological significance of any mortality. In population terms, the life-history strategy of the species is important: whether a species is long-lived with a low reproductive rate (K selected, e.g. raptors) or short-lived with high reproductive rate, (r selected, e.g. small passerines) (see Reznick *et al.*, 2002)[xi] and also the age and status of the individual birds involved, with mortality of long-lived breeding adults likely to cause the greatest population level impacts.

11.2.16 Many reports (including Haas *et al*.,2005[xii]; Prinsen *et al*., 2011[xiii]; Derouaux *et al*., 2012[xiv]) cite a table which appears to have been first published in Haas *et al*. (2003)[xv], the report written by BirdLife International on behalf of the Bern Convention. The table categorises the severity of the impact on bird populations of the losses due to electrocution and / or collision with power lines for the different families of bird species and uses classifications :*0 - no casualties reported or likely; I - casualties reported, but no apparent threat to the bird population; II - regionally or*

[1] Scottish Power PLC, Power Systems Division, now known as SP Energy Networks (SPEN)

locally high casualties; but with no significant impact on the overall species population; III - casualties are a major mortality factor; threatening a species with extinction, regionally or on a larger scale. There are, however, no citations attached to the classifications for the species and families mentioned in the table therefore the justification for the classification categories used is not always obvious. This table has been revised and updated recently in a Guidance document from the European Commission (EU, 2018)[xvi]. Despite its provenance, putative 'authority' and repeated repetition, however, in the absence or shortage of supporting objective data, through cited references, at least some of these classifications must be taken more as undocumented opinion rather than objectively based classifications. This is unfortunate given some publishers' putative authority (including the Bern Convention and the EU) when there is no demonstrable objective basis.

Overhead Line Design

11.2.17 Information on the towers and wood pole designs including conductors are described in detail in **Chapter 4: Development Description**.

11.2.18 The proposed wood pole OHLs are designed with relatively large separation distances between the conductors, due to the high voltages that they carry. The arrangement of the conductors and the position and size of the insulators gives a horizontal separation of approximately 2.5m between the conductors and 2.0m vertically between the conductors and the cross-arms.

11.2.19 The proposed steel tower OHLs have much larger separation distances both horizontally and vertically, With the vertical distance of 3.75m between conductors which are also separated between 1.0m and 1.35m horizontally between the different conductor levels on the steel tower, so the distance between the conductors is greater than 3.75m.

11.2.20 The conductor wires are between approximately 19.5mm and 24.7mm diameter and their earth wires either 13.9mm or 20.6mm approximately. For each connection the figures for the diameters of the conductor and earth wires are: Polquhanity to Glenlee via Kendoon (P-G via K) Conductor 24.70mm, earthwire 20.58mm; Earlstoun to Glenlee (E-G) and Carsfad to Kendoon (E-G) conductor 20.09mm, no earthwire; BG route deviation (BG Deviation) Conductor 19.53mm, earthwire 13.95 mm; Glenlee to Tongland (G-T) conductor 22.61mm and earthwire 20.58mm.

11.2.21 During the construction of the new connections forming part of the KTR Project there will be a period when the new OHLs will exist alongside the existing steel lattice OHL of the N and R routes. The N and R routes will then be decommissioned, dismantled and removed. The timescales are described in **Chapter 5: Felling, Construction, Operational Maintenance and Decommissioning**, and dependent on which connection is concerned, decommissioning the existing OHL may commence whilst construction of the new OHL is still ongoing at a different location along the route, therefore it is not possible to identify a specific duration for how long the OHLs may exist together per connection.

Field Survey

11.2.22 For full details and descriptions of methods, locations effort and results see **Appendices 11.1: Ornithology Technical Report** and **11.3: Confidential Ornithology Report**.

Risk of Collision

11.2.23 As outlined above in relation to the SNH guidance, there are no defined methods for modelling an estimation of collision risk for birds and OHLs. Thus to inform the assessment reported in **Chapter 11**, a description of the risk of collision (as opposed to a modelled estimation of collision risk) of species potentially affected by the KTR Project is provided here[2].

11.2.24 This collision risk description is informed by information on the species' morphology (such as wing load) and flight behaviour (e.g. flight heights expected due to hunting patterns; agility) gathered from the published information and through professional experience, along with empirical data gathered through the field surveys of the Study Area: flight routes; total number of flights observed; flights per hour in the risk window. Professional judgement based on morphological, behavioural and empirical data is then used to incorporate this information into assigning a level for these factors (see **Table 1** and **Table 2**) which is then used to provide a risk of collision for each species at each OHL connection forming part of the KTR Project. These are presented as Very Low, Low, Moderate or High (**Table 3**).

11.2.25 The description of the risk of collision for each species at each OHL connection forming part of the KTR Project was used to inform the assessment of effects of the OHL connections where the conservation status of the species can be incorporated (as presented in **Chapter 11** of the EIA Report).

11.2.26 **Table 1** describes how susceptibility to collision was determined for each species, presented in three classes (High, Medium and Low). Susceptibility to collision is based on morphological and behavioural characteristics of the species.

Table 1: Susceptibility to collision

Susceptibility	Description of morphological and behavioural factors (Bevanger 1998) (not all factors apply to all species)
High	High wing load low manoeuvrability Fast flight Large amount of time spent in flight Water birds, diving birds and 'poor' flying species
Medium	Medium wing load and manoeuvrability
Low	Low wing load and high manoeuvrability Slow flying Aerial predators, thermal soarers and marine soarers

11.2.27 **Table 2** describes the three-way classification of locally-derived (by direct observation) flight characteristics of the species by way of activity, flight height and degree of concentration of flight traffic. Local empirical observations of the flight activity and other local features directly observed in or documented for the Study Area (including its constituent parts), recorded the volume of flight traffic and other characteristics (e.g. flight height, regularity of flight routes). These have been used to classify the importance of local flight features for each species affected by the individual connections forming part of the KTR Project.

Table 2: Importance of local flight features

Importance	Description of local flight features (not all factors fit all species)
High	High number of flights per hour High number of birds Regularly used flight routes High proportion of flight duration in risk window
Medium	Medium number of flights per hour Medium number of birds Some pattern to flight routes Medium proportion of flight duration in risk window
Low	Low number of flights per hour Low number of birds No regular flight routes

[2] SPEN, SNH, RSPB and FLS (formerly Forest Enterprise Scotland) agreed that a collision risk model would not be robust for nightjar or the type of development at a meeting 19/03/19

Importance	Description of local flight features (not all factors fit all species)
	Low proportion of flight duration in risk window

11.2.28 The classifications of species' susceptibility to collision in line with criteria in **Table 1** and the importance of local flight features of species' flight activity (empirically observed or documented) in line with criteria in **Table 2** were used to define the risk of collision based on the matrix presented in **Table 3**. Table 3 was used to derive a Risk of Collision outcome (Very Low, Low, Moderate or High).

11.2.29 For example, a species with a Low susceptibility to collision (**Table 1**) and displaying a Low level of locally recorded flight features (**Table 2**) would be defined as having a Very Low risk of collision with the particular connection forming part of the KTR Project, in line with **Table 3**. Conversely, a species with a High susceptibility to collision (**Table 1**) and a High level of importance of locally recorded flight features, (**Table 2**) would be defined as having a High risk of collision with the particular connection forming part of the KTR Project (**Table 3**).

Table 3: Risk of Collision

Importance	Susceptibility to collision		
	High	**Medium**	**Low**
High	High	Moderate	Low
Medium	Moderate	Moderate	Low
Low	Low	Low	Very low

11.2.30 Species included in the consideration of risk of collision were those listed in **Table 11.7** of **Chapter 11** as species which were considered further in the assessment, and for which flight activity data was collected during field surveys, namely: whooper swan, Greenland white-fronted goose, greylag goose, hen harrier, goshawk, honey-buzzard, osprey, peregrine, red kite, golden eagle and nightjar. Flight activity data for these species were then considered for each connection of the KTR Project. Where the level of flight activity was so low that an estimation of collision risk would be meaningless these species were not considered further in this appendix.

11.2.31 The MWP surveys were designed to focus on wildfowl migration periods and thus were only carried out during the months of October, November, March and April during the peaks of activity for these species, therefore the risk of collision was considered for wildfowl alone when using data gathered from these surveys. The FVP surveys gathered flight activity information on raptor species which are either potentially resident all year (hen harrier, peregrine, red kite, golden eagle and goshawk) or during the spring and summer months to breed (honey-buzzard and osprey) these species were recorded if seen during all other flight activity surveys. For the purposes of describing the collision risk the data gathered from the FVPs 1-4 which were utilised during all months of the year for two years were considered to be sufficient to provide information on risk of collision for these species. These FVPs were within the G-T connection only, therefore collision risk is described for this connection alone for these species. Flight activity by these species recorded from MWPs within the G-T connection was also included. As flight activity by the raptor species over the other connections was very low the derived risk of collision for G-T can be extrapolated for the other connections if necessary.

Information on Species' Flight Behaviour and Morphology

11.2.32 Most raptor species are present in the Study Area (as defined in **Chapter 11**) all year round, however osprey and honey buzzard are summer visitors and thereby risk is limited to the months they are present, March to September for osprey and May to September for honey buzzard. Hen harrier was only recorded in the winter months; however it is possible that birds could potentially be present in some habitats all year. Whooper swan, Greenland white-fronted goose and greylag goose are present in the Study Area during the non-breeding period of October to April only; thereby the collision risk is limited to these months. Whooper swan, Greenland white-fronted goose and greylag goose may either be wintering in the vicinity of the Loch Ken and River Dee Marshes (LKRDM) Special Protection Area (SPA) (and Ramsar site), or passing through the Study Area to wintering areas further south. Nightjar are present in the Study Area during summer and thereby risk is limited to the months they are present, May to September.

11.2.33 Bevanger (1998)[iii] used information on bird morphology with relation to size and wing proportions ('load' and 'aspect') (citing Rayner, 1988)[xvii] to consider aerodynamic performance of species and classify their flight efficiency. Wing loading is a measurement that relates the mass of the bird to the total wing area, whilst aspect is the ratio of its span to its mean chord. Thus, a bird with a low wing loading has a larger wing area relative to its mass, as compared to a bird with a high wing loading; and a long, narrow wing has a high aspect ratio, whereas a short, wide wing has a low aspect ratio.

11.2.34 Other characteristics are also related to manoeuvrability, such as tail length: a lot of forest species have long tails e.g. blackbirds and sparrowhawks as do species which fly slowly to hunt e.g. hen harrier, red kite.

11.2.35 Wildfowl species are considered in Bevanger (1998)[iii] to have high wind load, medium aspect wings and low manoeuvrability, and are classified as having higher susceptibility to collision with OHL. This group is widely recorded as collision victims of OHLs in the literature (Bevanger, 1998[iii]; Janss 2000[xviii]; Haas *et al*. 2003[xv], Jenkins, 2010[viii]; Ferrer, 2012[xviii]; APLIC, 2012[ii] ; EU, 2018[xvi] etc) (although as previously noted this group is also more likely to be recorded as victims due to their size and potential for damage to OHLs (Drewitt & Langston, 2008)[xix]). The table used by EU (2018)[xvi] is consistent with this wide body of literature and classifies geese and swan sensitivities to collision as II ("*regionally or locally high casualties but with no significant impact on the overall species population"*).

11.2.36 Birds flying in a flock are presumed to be more likely to be able to react together due to other birds in the flock being vigilant. Furthermore there is a likelihood of returning and resident geese being already aware of an OHL in a familiar location.

11.2.37 During the field surveys of the existing R route direct observations were made of collisions by duck and geese species, with three ducks (two mallard and a wigeon) clipping a conductor and flying on without losing feathers and apparently unharmed. A flock of greylag geese also flew between, over and under the existing conductors of the R route OHL with one bird clipping and flying on unharmed whilst another collided and fell to the ground. Not all collisions result in harm to the birds, although for the purposes of the assessment reported in **Chapter 11**, birds that collide are assumed to be killed or fatally injured.

11.2.38 Raptor species are generally considered to be at lower risk of collision with OHLs. Bevanger (1998) [iii] classifies hawks as having low wing load and low aspect, they also have long tails; these facts are consistent with their high manoeuvrability and low susceptibility to collision. In Bevanger (1998) [iii] kites and harriers have low wing-loading and medium aspect, they also have long tails and hence are classified with low susceptibility to collision; whilst species such as falcons and eagles have low to medium wing loads and low aspects, so are classified as slightly more susceptible. Raptor foraging flight behaviours illustrate they are in general highly manoeuvrable and agile in flight hence can more easily avoid the conductors (Bevanger, 1998 [iii]; Janss, 2000 [xviii]; Haas *et al*., 2003 [xv]; Ferrer, 2012[xxxviiii]; Luzenski *et al.,* 2016[xxi]). However, some species may be at risk of collision due to their foraging strategy, Bevanger (1998)[iii]. EU, 2018 [xvi] classifies raptors (*Accipiteriformes* and *Falconiformes*) as I-II (between "*casualties reported but no apparent threat for the bird population"* and "*regionally or locally high casualties but with no significant impact on the overall species population"*).

11.2.39 During the field surveys of the existing R route direct observations were made of raptor species (particularly peregrine and red kite) demonstrating awareness of the conductors whereby they flew between, under or over the conductors, and used the existing steel towers to perch.

11.2.40 Bevanger (1998)[iii] classified nightjar (*Caprimulgidae*) as low susceptibility to collision due to the species having low wing load and a medium wing aspect. However, for reasons that are unclear in the literature, nightjar have been grouped with swifts (*Apodidae*)) in Haas (2003) [xv] and thus in other documents, including EU (2018)[xvi] which reference the Haas 2003 document. This grouping is classified as I-II for collision ("*between "casualties reported but no apparent threat for the bird population" and "regionally or locally high casualties but with no significant impact on the overall species population"")* but in contrast to wildfowl and raptors there is no discussion as to why nightjar receive this classification in the review literature. Therefore further detail is provided below.

11.2.41 Nightjars are fundamentally different to swifts in their biology, and so their collective grouping in these documents is questioned, aside from a somewhat remote taxonomic connection. Apart

from the gross physical adaptations on flight activity timing (nocturnal versus diurnal), and associated eye size (for example), there is also the habitat in which nightjars seek their prey – close to ground, often in wooded habitats (with consequent obstacles that need to be avoided) and swifts which forage unimpeded in the air, much higher than even other morphologically similar diurnal hirundines (martins and swallows) (Cramp, 1985)[xxii].

11.2.42 Nightjar flight activity is described in Cramp (1985)[xxii], where it is stated that when their prey (mainly moths and beetles) are plentiful nightjar fly at low-levels in sustained pursuits (rarely above trees). They normally approach prey from below or otherwise from the sides and may exceptionally hover and swoop down. When hunting if fewer insects are flying and also after dark, they make short flights (10-15m) from low perches or the ground, returning after capture to the perch or one of two or three others. Prior to laying they may forage up to several kilometers from the nest territory but after laying foraging generally occurs in the nesting territory.

11.2.43 Nightjars are active at night, which is a critical behavioural factor in the consideration of whether nightjars are prone to collision. Unlike diurnal species which sometimes fly at night during migration, the nocturnal nightjars forage and fly at night in forest areas. Therefore they are adapted to night flight activity and have the vision and manoeuvrability to allow this and avoid collisions; especially when their nocturnal activity is often in habitats replete with possibilities for 'natural' collision. Their eyesight is sufficient at night to detect and capture relatively small prey. The susceptibility of collision with OHLs by nightjars was considered to be negligible by a researcher working on avoidance behaviour of the species nesting around wind farms across Europe (A. Traxler *pers. comm.*). Furthermore nightjars were able to spot and avoid mist-nets used in the open and regenerating forested areas of Thetford forest in complete darkness (B. Urquhart *pers comm*.) Taken together with consideration of this species' biology and consequent underlying adaptations, it is considered highly unlikely that nightjars would be vulnerable to collision with the OHL.

Overhead Line Risk Window Characteristics

11.2.44 The risk of collision is related to the time spent flying in the OHL risk window. In order to estimate collision risk, a risk window is defined for each connection forming part of the KTR Project. This risk window is defined by the flight height categories used during the field surveys which encompass the heights of the conductors relevant to the design of the OHL. Most importantly within this risk window the actual risk of collision is far smaller than the defined risk window due to the conductors and earthwire only physically occupying a very small proportion of the total area in the risk window (**Table 4**). Birds can fly unharmed between the conductors within the risk window, as each conductor only occupies a very small space within that window. There is a large air gap both vertically and horizontally between each conductor, through which a bird can pass safely. For the steel tower OHLs in connections P-G via K, BG Deviation and G-T: seven wires (six conductors plus the earthwire with vertical and horizontal placement) of approximately 2.3cm diameter are within the 10m – 50m risk window (i.e. a 40m gap), therefore only c.0.2% of that risk window contains a conductor/earthwire. For the wood pole OHL in connections C-K and E-G: three wires (three conductors placed horizontally) of approximately 2.0cm diameter are within the 10m to 30m risk window (i.e. a 20m gap) thus only 0.1% of that risk window contains a wire. Therefore when considering the risk it must be taken into account that the actual prospect of collision is very small in comparison to the defined risk window.

Table 4: Details of risk window and proportion of risk window occupied by wires for each connection

Connection	Risk window (m)	Proportion of risk window occupied by wires (%)
P - G via K	10 - 50	0.24
C - K	10 - 30	0.10
E - G	10 - 30	0.10
BG Deviation	10 - 50	0.18
G - T	10 - 50	0.22

Polquhanity to Glenlee (via Kendoon)

Overhead Line Information

11.2.45 The steel lattice tower heights for this connection range from 23m-39m, meaning that the risk window for collision with the conductors and earthwire is in the 10-50m flight height bands (**Table 4**). The 10.1km connection is routed on the west side of the valley for the entire length and crosses the valley and main watercourse once where it enters the Kendoon power station. In general, it follows closely the existing OHL line of the N and R routes north of Glenlee, only deviating slightly from this for approximately 2km at the northern end around Dundeugh by less than 400m to the west of the existing N route OHL. Therefore there will be very little alteration to the route of the OHL from the current situation for birds familiar with the area.

11.2.46 Following construction of the P to G via K connection there will be a period when the new OHL exists alongside the currently existing steel lattice OHL constituting the N and R routes prior to their removal.

11.2.47 Vertically there will be three arms carrying phase conductors and an earth wire above this, with arms carrying conductors being located on both sides of the towers. The conductor and earth wire diameters are: Conductor 24.70mm, earthwire 20.58mm, the vertical spacing between the conductors is 3.75m. Therefore, the proportion of the 10m to 50m risk window occupied by wires is 0.24% (**Table 4**).

Bird Flight Information

11.2.48 The empirical data is based on the flight activity data from surveys from MWPs 1 and 2, consisting of 145.25 hours of survey time.

Wildfowl

11.2.49 Whooper swan and greylag goose are present between October and April only. There is little habitat for feeding or roosting for these species along the length of the P-G via K connection, hence the majority of flights in the Study Area will likely be migrating birds. This is corroborated by the flight lines presented in **Figure 11.2.1**.

11.2.50 During vantage point (VP) watches one flight by a flock of whooper swans (which flew north up the valley) and eight flights by greylag goose flocks (the majority of flights were of single individuals or small flocks of two or three birds making movements within the local area) were recorded with at least part of the duration of flight recorded passing within 500m of the P-G via K connection (**Appendix 11.1, Figure 11.2.1**).

11.2.51 The whooper swan flock was over 50m above ground level. Therefore all flight activity was not at risk of collision and a detailed description of the collision risk for the P-G via K connection is not required.

11.2.52 There is a low level of flight activity by greylag goose within the risk window of the OHL. A total of 75 greylag geese were recorded flying at heights from below 10m to greater than 50m above ground level. One flight of three birds and a flight by a single individual occurred between 10-30m above ground level. One flight of 53 birds occurred between less than 10m and greater than 50m above ground level. One flight of eleven birds occurred between 30-50m and greater than 50m above ground level. Four other flights, involving seven individuals occurred at heights greater than 50m above ground level.

11.2.53 Greylag geese were observed in small numbers, mainly in small flocks, (flight activity of low numbers of flights per hour) and they did not appear to be passing regularly over the OHL of the P-G via K connection in any 'hotspots' of flight activity, but rather flying along the valley (in general effectively in parallel to the OHL route).

Collision Risk for P-G via K

11.2.54 Based on their biology and behaviour, greylag geese as wildfowl are considered to have potentially high collision susceptibility (High susceptibility to collision as per the criteria in **Table 1**). They were seen in a low number of flights in small flocks presumed to be on local excursions, and they do not appear to be passing regularly over the OHL route. Birds flying in a flock are presumed to be more likely to be able to react together due to other birds in the flock being

vigilant. Furthermore there is a likelihood of returning and resident geese being already aware of an OHL in this location. In light of this information this species was classed as displaying low level of locally recorded flight features according to the criteria set out in **Table 2**. Therefore especially when avoidance of the transmission line wires is also taken into consideration, based on these classifications, greylag goose is determined as having a low risk of collision with the P-G via K connection (in line with the approach set out in **Table 3**).

Carsfad to Kendoon

Overhead Line Information

11.2.55 The wood pole heights range from 10-17m, meaning that the risk window for collision with the conductors is in the 10-30m flight height band (**Table 4**). The 2.6km connection is routed on the west side of the valley for the entire length starting at Kendoon power station where it crosses the valley and main watercourse. It follows closely the existing R Route OHL and is adjacent to the new P-G via K connection, and terminates at the Carsfad hydropower station. Therefore, there will be very little alteration to the route of the OHL from the current situation for birds familiar with the area.

11.2.56 There will be one level of conductors only. The conductor diameter is 20.09mm and no earth wire is used, the horizontal spacing between the conductors is 2.5m. Therefore, the proportion of the 10-30m risk window occupied by wires is 0.1% (**Table 4**).

Bird Flight Information

11.2.57 The C-K connection was at least partially within the viewshed of MWP 1 and therefore the empirical data is based on the flight activity data collected during 72.00 hours of survey time.

Wildfowl

11.2.58 Whooper swan and greylag goose are present between October and April only. There is little habitat for feeding or roosting of these species along the length of the C-K connection, hence the majority of flights in the Study Area will likely be migrating birds. This is corroborated by the flight lines presented in **Figure 11.2.1**.

11.2.59 During VP watches, one flight by a flock of whooper swans and two greylag goose flocks were recorded with at least part of the duration of flight recorded passing within 500m of the C-K connection and are the same flights reported on in respect of the P-G via K connection. (**Appendix 11.1**, **Figure 11.2.1**).

11.2.60 For the recorded flights, the whooper swan flock was greater than 50m above ground level. One flight of 53 greylag geese were recorded flying at heights from less than 10m to greater than 50m above ground level (therefore was the only flight in the risk window of the C-K connection) and one flock of 11 birds flew at between 30-50m and greater than 50m above ground level. Therefore on the basis of minimal flight activity for both species (i.e. lower than the "low" classification in terms of **Table 2**), a detailed description of collision risk for the C-K connection is not required despite the species' susceptibility to collision being classified as high (as per **Table 1**).

Earlstoun to Glenlee

Overhead Line Information

11.2.61 The wood pole heights range from approximately 10m to 16m, meaning that the risk window for collision with the conductors is in the 10-30m flight height band. The 1.6km E-G connection is routed on the west side of the valley for the entire length starting at Earlstoun hydropower station, it follows closely the existing R Route OHL from E-G and is adjacent to the southern end of the new P-G via K connection. Therefore there will be very little alteration to the route of the OHL from the current situation for birds familiar with the area.

11.2.62 There will be one level of conductors only. The conductor diameter is 20.09mm and there is no earth wire used, the spacing between the conductors is 2.5m. Therefore, the proportion of the 10-30m risk window occupied by wires is 0.1% (**Table 4**).

Bird Flight Information

11.2.63 The E-G connection was at least partially within the viewshed of MWP2 therefore the empirical data is based on the flight activity data collected during 73.25 hours of survey time.

Wildfowl

11.2.64 Whooper swan and greylag goose are present between October and April only. There is little habitat for feeding or roosting of these species along the length of the E-G connection, hence the majority of flights in the Study Area will likely be migrating birds.

11.2.65 Flight activity was recorded within 500m of the E-G connection by whooper swan and greylag goose (**Appendix 11.1**, **Figure 11.2**). One flight by a whooper swan flock of seven birds flew at elevations greater than 50m above ground level as they flew north up the valley. Four flocks of greylag geese were recorded with a total of eight birds noted in flocks between one and three birds. All these greylag goose flights were reported in respect of the P-G via K connection, and were most probably birds moving within the local area. One flock of three birds flew between 10-30m above ground level and the three other flights occurred at heights greater than 50m above ground level. Therefore, despite the species being classed as High in susceptibility to collision (**Table 1**), on the basis of minimal flight activity for both these species (i.e. lower than the "low" classification in terms of **Table 2**) a detailed description of the risk of collision for the E-G connection is not required.

BG Deviation

Overhead Line Information

11.2.66 The steel lattice tower heights range from approximately 25-32m, meaning that the risk window for collision with the conductors is in the 10-30m and 30-50m flight height bands. This short (1.2km) connection reflects the existing 'BG' OHL Route heading west from the Glenlee power station. Therefore, there will be very little alteration to the route of the OHL from the current situation for birds familiar with the area.

11.2.67 There will be three levels vertically of phase conductors plus an earth wire above these and arms carrying conductors on both sides of the tower. The conductor and earth wire diameters are: Conductor 19.53mm; earth 13.95mm, and the vertical spacing between the conductors is 3.75m. Therefore, the proportion of the 10m to 50m risk window occupied by wires is 0.18% (**Table 4**).

Bird Flight Information

11.2.68 The BG Deviation was partially within the viewshed of MWP2 and therefore the empirical data is based on the flight activity data collected during 73.25 hours of survey time.

11.2.69 No flights by swans or geese were recorded passing within 500m of the BG Deviation; therefore no further consideration on collision risk is required for this connection (**Appendix 11.1**).

Glenlee to Tongland

Overhead Line Information

11.2.70 The steel lattice tower heights of the G-T connection range from 25-35m, meaning that the risk window for collision with the conductors is in the 10-30m and 30-50m flight height bands. The 32.3km long G-T connection runs south from Glenlee hydropower station to Tongland, and is essentially routed on the west side of the valley for the entire length. It follows a new route avoiding the LKRDM SPA (and Ramsar site) where the existing OHL of R (south) route is located (on the east side of the valley) until it re-joins to parallel the existing OHL R route 6.5km north of Tongland. The G-T connection crosses the River Dee (Black Water of Dee) near Stroan Loch.

11.2.71 The removal of the existing R route (south) will remove two crossings of the Water of Ken / Loch Ken which currently exist in the valley and therefore at present pose an ongoing collision risk to the birds (especially the wildfowl) using this area. One of the existing R route (south) crossings is within the LKRDM SPA (and Ramsar site).

11.2.72 For the G-T connection, vertically there will be three levels of conductors on arms plus an earth wire above these, and arms on both sides of the steel tower. The conductor and earth wire diameters are: Conductor 22.61mm and earth 20.58mm, the vertical spacing between the conductors is 3.75m. Therefore, the proportion of the 10m to 50m risk window occupied by wires is 0.22% (**Table 4**).

Bird Flight Information

11.2.73 The G-T connection lies within the visible area of MWPs 2, 3, 4, 5, 6, 7 and FVPs 1, 2, 3 and 4 therefore the empirical data is based on the flight activity data collected during 847.50 hours of survey effort. Data collected at the MWP2 was also reported in relation to the P-G via K and E-G connections. FVP5 was an additional location used to observe flight activity to and from a potential goose roost at dawn and dusk and an additional 95.25 hours of survey data was collected from that location, making the total survey effort for flight activity for the G-T connection 942.75 hours. For geese and swans, the FVP 1-4 survey effort was reduced to 318.50 for the months of October to April only (when these species are potentially present), therefore the total survey effort for geese and swans was 703 hours. Ospreys are summer visitors and are present from April to August only, therefore the total survey time for osprey was 272.75 hours.

11.2.74 FVP6 was a watch location at the existing R route (south) OHL within the LKRDM SPA (and Ramsar site), where the OHL crosses the Loch Ken / River Dee. This location was selected to record flight lines of Greenland white-fronted geese and greylag geese (SPA qualifying species) between roosting and feeding areas where they might cross the existing R route (south) OHL. The survey effort from this FVP totalled 185.1 hours.

Wildfowl

11.2.75 Whooper swan, Greenland white-fronted goose and greylag goose are present between October and April only. Information gathered during the desk study and supported by the extensive field surveys illustrated existing habitat for feeding and roosting of these species along the length of the G-T connection and the existing R Route; as well as the possibility of birds migrating to and from areas further south.

G-T Overhead Line connection

11.2.76 Flight activity was recorded within 500m of the G-T connection by whooper swan, greylag goose and also by an unidentified swan species (**Appendix 11.1**, **Figure 11.2.1** and **11.2.2**). Three flights by whooper swan were recorded; two flights, by one and 15 birds respectively were greater than 50m above ground level whilst the third flight of five birds was at 30-50m above ground level. One flight by unidentified swan species (involving two birds) was recorded between 10-30m and 30-50m above ground level. Twelve flights of greylag geese were recorded involving single individual or small flocks (of two to nine birds) and include observations made during the breeding season; it is likely there is a resident feral population of this species in the area. Two flights each comprising just two birds were recorded between less than 10m and 10-30m height bands above ground level. Two flocks were between 30-50m above ground level and one at 30-50m and >50m. Seven flocks of greylag geese flew at heights greater than 50m above ground level.

Existing R Route

11.2.77 Flight activity by wildfowl species was recorded from FVP6 with the majority crossing the route of the existing R route (south) OHL where it crosses the LKRDM SPA (and Ramsar site). Whooper swan, Greenland white-fronted goose and greylag goose were among the species for which this information was recorded (**Appendix 11.1, Figures 11.2.3** and **11.3**).

11.2.78 25 flights by whooper swan flocks of between two and 24 birds, totalling 167 birds, were recorded. 23 flights (92%) were recorded as passing over the OHL, one under the OHL and the other flight did not cross the existing OHL route. The elevations recorded varied, with 16 flights in the height band between 10 to 30m above ground level (including 15 (100 birds) passing over the OHL and one passing under the OHL), six flights (28 birds) in band 30 to 50m and two (31 birds) at greater than 50m above ground level.

11.2.79 Sixty-eight flights by Greenland white-fronted goose were recorded totalling 2,536 individuals in flocks of between one individual to 220 birds were recorded. Sixty-two (91%) of the Greenland white-fronted goose flights were recorded as passing over the OHL and six did not cross the OHL route (but were recorded in flight in areas nearby). The elevations recorded for the flights over the lines were: one flight (100 birds) from below 10m to 10-30m above ground level; 17 flights (415 birds) at 10-30m; 23 flights (754 birds) at 30-50m minimum (two of these going up to greater than 50m above ground level); 21 flights (1,033 birds) greater than 50mabove ground level. The six flights which did not cross the lines were greater than 50m above ground level or descending from greater than 50m and 30-50m to land on the ground.

11.2.80 192 flights of greylag geese were recorded totalling 2,168 individuals in flocks of between one and 200 birds. Eight flocks (45 birds) (4%) passed under the OHL with six flocks (37 birds) passing at less than 10m above ground level, one flock (six birds) passed from below 10m to 10-30m and one flock (two birds) passing from 10-30m to 30-50m. Two flocks (30 birds) split with birds flying under the OHL and over the OHL (in the 10-30m and 30-50m height bands). Two flights by two birds had one bird each passing between the conductors of the OHL and one over the OHL. For 174 flights (91%) passed over the OHL, 87 flocks (1117 birds) were in the 10-30m height band; 74 flights (813 birds) at 30-50m; 13 flocks (135 birds) at greater than 50m above ground level. The six flights which did not cross the line comprised two at greater than 50m, three at 30-50m and one at 10-30m.

11.2.81 21 carcasses were found during the searches in the area under the existing R route OHL. Those identified included the following wildfowl species: two mute swans; one unidentified swan species; one Greenland white-fronted goose; three greylag goose; one Canada goose; three mallard; three teal; one pintail. Additional carcasses included one lapwing, three woodpigeons and two unidentified bird species.

11.2.82 No observations were made during any of the watches of any individuals of these species colliding with the existing OHL. As an incidental observation, the observer saw a greylag goose collide with the OHL and fall to ground. It was part of a flock flying at speed which flew over, through and under the line. One bird clipped line and flew on, whilst another collided with the line and fell to the ground. No trace of the remains of this goose was found during the next carcass search visit seven days later.

Scarce Raptors and Owls

11.2.83 Red kite, goshawk, honey-buzzard, golden eagle and osprey bred within the survey buffers during the survey period (further detail is contained in **Appendix 11.3**). Of these, two red kite territories and three goshawk territories were within 500m of the G-T Connection. Hen harrier and peregrine were present throughout the survey period but no breeding sites were located in the G-T connection survey buffer (**Appendix 11.3**).

11.2.84 Flight activity was recorded within 500m of the G-T connection by red kite, peregrine, osprey, goshawk, hen harrier, golden eagle and also by honey-buzzard (**Appendices 11.1** and **11.3**, **Figure 11.5.2**).

11.2.85 A single flight by honey buzzard was recorded at a height greater than 50m above ground level. Due to very low flight activity within 500m of the G-T Connection which was also above 50m, a detailed description of the risk of collision for honey-buzzard is not required for the G-T connection.

11.2.86 11 peregrine flights were recorded, with a total duration of 956 seconds within 500m of the G-T Connection. Of this, 572 seconds were recorded within the 10-50m risk window (60%). This equates to 0.0002 hours of flight in the risk window per hour of observation (**Table 5**).

11.2.87 32 goshawk flights (35 birds) were recorded, with a total duration of 6,016 seconds within 500m of the G-T Connection. Of this, 1,976 seconds were recorded within the 10-50m risk window (33%). This equates to 0.0006 hours of flight in the risk window per hour of observation (**Table 5**).

11.2.88 14 osprey flights were recorded, with a total duration of 1,067 seconds within 500m of the G-T Connection. Of this, 550 seconds were recorded within the 10-50m risk window (52%). This equates to 0.0006 hours of flight in the risk window per hour of observation (**Table 5**).

11.2.89 Four hen harrier flights were recorded, with a total duration of 544 seconds within 500m of the G-T Connection. Of this, 121 seconds were recorded within the 10-50m risk window (22%). This equates to 0.0004 hours of flight in the risk window per hour of observation (**Table 5**).

Table 5: Flight activity recorded for scarce raptors in the 500m buffer for the new OHL G-T Connection

Species	Total flights (count of birds)	Flights passing through 10-50m risk window per hour of observation	Hours in the 10-50m risk window per hour of observation
Peregrine	11 (11)	8 = 0.0082	0.0002
Goshawk	32 (35)	26 = 0.0269	0.0006
Osprey	14 (14)	10 = 0.0367	0.0006
Hen harrier	4 (4)	3 = 0.0031	0.0004
Golden eagle	11 (11)	5 = 0.0064	0.0001

11.2.90 Red kite flight activity was observed in 611 (5%) of five minute periods during a possible total of 11,310 for the 942.75 hours of survey effort from MWPs and FVPs. As some five minute periods contained flight activity by more than one bird, this amounted to a total of 871 five minute periods. Height of the flight was recorded for 683 of these observations, 13 in <10m; 152 in the 10-30m height band; 209 in the 30-50m; and 309 in the greater than 50m above ground level. Thus 53% of flight activity was within the risk window, which can be extrapolated to 460.4 five minute periods of flight activity in the risk window.

11.2.91 Flight activity in the risk window is calculated as 460.4 periods by five minutes to give 2301.84 minutes in the risk window (38.36 hours) which translates to 0.040 hours of flight activity spent in the risk window per hour of observation.

Collision Risk for G-T Connection

Existing R Route (south)

11.2.92 Whooper swan, Greenland white-fronted goose and greylag goose are classed as having High susceptibility to collision (**Table 1**). The importance of local fight features of these species' flight activity are assessed as Medium for whooper swan and High for Greenland white-fronted goose and greylag goose (**Table 2**).

11.2.93 Whooper swan, a species with a High susceptibility to collision (**Table 1**) and displaying a Medium level of locally recorded flight features (**Table 2**) would be defined as having a Moderate risk of collision with the existing R route (south), in line with **Table 3**. Greenland white-fronted goose and greylag goose species with a High susceptibility to collision (**Table 1**) and displaying a High level of locally recorded flight features (**Table 2**) would be defined as having a High risk of collision with the existing R Route (south) (**Table 3**).

11.2.94 However, the process of describing the risk of collision (in terms of **Tables 1, 2** and **3**) is not relevant in this context, as the existing R route (south) OHL will be removed as part of the KTR Project.

11.2.95 All the observed Greenland white-fronted goose flights passed over and above the conductors and earth wire of the OHL. One carcass of this species was found during the weekly searches (48 weekly searches over two seasons (23 during 2017/2018 and 25 during 2108/2019)). The majority of the greylag goose flights passed over and above the conductors and earth wire of the OHL, although a small proportion passed under them. Three carcasses of greylag goose were found during the weekly searches, and a collision event was seen when a flock of greylag goose passed through, under and over the OHL, and one bird collided (with the top conductor wire) and fell to the ground whilst another bird made contact with the wire but flew on. One swan carcass was found during the weekly searches.

11.2.96 Given the small regional population of Greenland white-fronted goose, locating one carcass during these searches under the OHL (which included an area over the water which would not retain any carcasses to be found should they land there), would suggest that there is a High risk of collision for this species. Furthermore, for the larger regional population of greylag goose three carcasses were located in the same search period, and for whooper swan which showed less flight activity in this area, one carcass was located, in turn reinforcing the qualitative evaluations described in this appendix.

11.2.97 The carcasses collected during the searches demonstrate that the existing R route (south) OHL creates a risk of collision for Greenland white-fronted goose and greylag goose, but that the majority of the geese (which are demonstrated in the literature to be susceptible to collision, e.g. Bevanger, (1998) [iii]) can negotiate the OHL safely, due in part to the very small proportion of the risk window containing the conductors.

11.2.98 During the field surveys of the existing R route (south) for wildfowl flight activity, incidental observations of raptor species (particularly peregrine and red kite) showed these species demonstrating awareness of the conductors (flying between, under or over them) and using the existing steel towers to perch.

11.2.99 The existing R route (south) OHL which crosses the Loch Ken / River Dee waterbody within the SPA (and Ramsar site) will be removed, therefore the existing risk of collision will also be removed and therefore a positive effect on the populations of all species of birds including raptors is predicted (see **Chapter 11**).

G-T Connection Overhead Line

11.2.100 The risk of collision with the conductors and earthwire is contained to 0.22% of the full extent of the 10-50m risk window for the new OHL (**Table 4**).

11.2.101 Despite whooper swan, Greenland white-fronted goose and greylag goose being classed as having High susceptibility to collision (**Table 1**), on the basis of the minimal flight activity for these species (lower than the "low" classification in terms of **Table 2**), they are evaluated as experiencing low risk of collision as a result of the new OHL of the G-T Connection (**Table 3**).

11.2.102 For peregrine, the proportion of flights in the collision risk window was 60%. The duration of flight spent in the 10-50m risk window per hour of observation was very low (0.0002 hours), which results in a low level of locally recorded flight features (Low: **Table 2**).

11.2.103 Goshawk nested in the area and the flights can be attributed to foraging flights moving from nest territories to foraging areas, or territorial behaviour but there were no hotspots of routes. The proportion of flights in the risk window was 33%, and the duration of flight spent in the risk window per hour of observation was very low (0.0006 hours), which results in a low level of locally recorded flight features (Low: **Table 2**).

11.2.104 Ospreys appeared to fly to and from Loch Stroan with flight lines indicating some pattern of regular use (**Figure 11.5.2**). The proportion of their flights in the risk window was 52%. The duration of flight spent in the risk window per hour of observation was very low (0.0006 hours). The possibility of some regular use of the area gives osprey a classification of medium level of locally recorded flight features (Medium: **Table 2)**.

11.2.105 During the winter months, hen harrier used an area over 1km from the proposed G-T route as a roost. The majority of flight activity occurred away from the route of the G-T connection, and there was no hotspot of activity for this species affecting the route of the OHL. The proportion of the hen harrier flights in the risk window was 22%, and the duration of flight spent in the risk window per hour of observation was very low (0.0004 hours), which results in a low level of locally recorded flight features (Low: **Table 2**).

11.2.106 Goshawk, osprey and hen harrier are considered unlikely to collide with OHL due to their morphology and behaviour, and are evaluated as having low susceptibility to collision (Low: **Table 1**). Due to morphological and behavioural factors peregrine are classed as having medium susceptibility to collision (Medium: **Table 1**).

11.2.107 Therefore when these factors are combined, and avoidance of the transmission tower wires are considered, the risk of collision is evaluated as very low (**Table 3**) for goshawk and hen harrier and low for osprey and peregrine (**Table 3**) in relation to the G-T connection.

11.2.108 Red kites are generally slow and agile in flight (they have very low wing load and medium aspect), although they may spend time looking at the ground when foraging, they are considered based on their morphology and behaviour to have low susceptibility to collision (Low: **Table 1**). The flight activity data show a low duration of flight time spent in the risk window (0.040 hours per hour of observation), which results in a low level of locally recorded flight features (Low: **Table 2**). When all these factors are taken into consideration, the risk of collision

with the conductors is judged to be very low for red kite in respect of the G-T connection (Very low: **Table 3**).

Golden eagle

11.2.109 Further information is contained in the Confidential Appendix (**Appendix 11.3**).

Nightjar

11.2.110 Further information is contained in the Confidential Appendix (**Appendix 11.3**).

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[i] SNH (2016). Guidance: Assessment and mitigation of impacts of power lines and guyed meteorological masts on birds. SNH. Battleby, UK.

[ii] Avian Power Line Interaction Committee (APLIC). (2012). *Reducing Avian Collisions with Power Lines: The State of the Art in 2012.* Edison Electric Institute and APLIC. Washington, D.C.

[iii] Bevanger, K. (1998) Biological and conservation aspects of bird mortality caused by electricity power lines: a review. Biol. Cons. 86, 67-76

[iv] Madders, M. (2000) Bird Interactions with power lines: The scale and distribution of bird collisions and electrocutions. Report to ScottishPower PLC, Power Systems Division, May 2000.

[v] Alonso, J.A. & Alonso, J.C. (1999) Mitigation of bird collisions with transmission lines through groundwire marking Chapter 5 in M Ferrer and G.F. E. Janss (eds) Birds and Power Lines. Quercus, Madrid.

[vi] Scott, R.E., Roberts, L.J., Cadbury, C.J., 1972. Bird deaths from power lines at Dungeness. British Birds 65, 273-286.

[vii] Kabouche, B., Bayeul, J., Zimmermann, L. & Bayle, P. (2006): La mortalité des oiseaux sur le réseau électrique aérien : enjeux et perspectives en Provence-Alpes-Côte d'Azur, Rapport DIREN PACA - LPO PACA.

[viii] Jenkins, A.R., Smaillie, J.J. & Diamond, M. (2010): Avian collisions with power lines: a global review of causes and mitigation with a South African perspective. Bird Conservation International, 20: 263-278.

[ix] Bevanger, K. & Brøseth, H. (2001) Bird collisions with power lines - an experiment with ptarmigan (Lagopus spp.). Biological Conservation, 99, 341-346.

[x] Janss, G.F.E. & Ferrer, M. (1998). Rate of bird collision with powerlines: effects of conductor-marking and static wire-marking. Journal of Field Ornithology 69, 8-17.

[xi] Reznick, D., Bryant, M.J., and Bashey, F. (2002). r- and K- selection revisited: the role of population regulation in life-history evolution. Ecology 83: 1509-1520.

[xii] Haas, D., M. Nipkow, G. Fiedler, Schneider, R., Haas, W. & Schürenberg, B. (2005). Protecting birds from powerlines. Nature and environment 140. Report by NABU – German Society for Nature Conservation, BirdLife in Germany for the Convention on the Conservation of European Wildlife and Habitats (Bern convention). Council of Europe Publishing.

[xiii] Prinsen, H.A.M., Boere, G.C., Píres N. & Smallie, J.J. (2011): Review of the conflict between migratory birds and electricity power grids in the African-Eurasian region. CMS Technical Series No. XX, AEWA Technical Series NO. XX, Bonn, Germany

[xiv] Derouaux, A., Everaert, J., Brackx, N., Driessens, G., Martin Gil, A. & Paquet, J-Y. (2012) Reducing bird mortality caused by high- and very-high voltage power lines in Belgium. final report, Elia and Aves-Natagora, 56 pp

[xv] Haas, D., Nipkow. M., Fiedler, G., Schneider, R., Haas, W. & Schürenberg, B. (2003) Protecting birds on powerlines: a practical guide on the risks to birds from electricity transmission facilities and how to minimise any such adverse effects. Report on behalf of NABU – German Society for Nature Conservation, BirdLife in Germany.

[xvi] EU (2018) Guidance on Energy Transmission Infrastructure and EU nature legislation EU, Luxembourg PDF ISBN 978-92-79-92943-4 doi:10.2779/827210

[xvii] Rayner, J.M.V., (1988). Form and function in avian flight. In: Johnston, R.F. (Ed.), Current Ornithology, Vol. 5. Plenum, New York, pp. 1-66.

[xviii] Janss, G.F.E (2000) Avian mortality from power lines: a morphologic approach of a species-specific mortality. Biological Conservation 95, 353-359.

[xix] Drewitt, A.L. & Langston, R. H. W. (2008) Collision Effects of Wind-power Generators and Other Obstacles on Birds. Ann. N.Y. Acad. Sci. 1134, 233–266.

[xx] Ferrer, M. (2012) Birds and powerlines. From conflict to solution. ENDESA, S.A. and Fundación MIGRES, Sevilla.

[xxi] Luzenski, J., Claudia E. Rocca, C.E., Harness, R.E., Cummings, J.L., Austin, D.D., Landon, M.A., and Dwyer, J.F. (2016) Collision avoidance by migrating raptors encountering a new electric power transmission line. The Condor, 118(2):402-410.

[xxii] Cramp, S., (ed) (1985) The Birds of the Western Palearctic, Vol. IV.

Appendix 11.3: Confidential Ornithology Report

Provided to SNH, RSPB and Scottish Ministers

Appendix 11.4: Ornithology Shadow Appropriate Assessment

Contents

Appendix 11.4: Ornithology Shadow Appropriate Assessment

Introduction

11.4.1 SP Energy Networks (SPEN)[1] is seeking consent for the replacement and reinforcement of the 132kV electricity transmission network between Polquhanity (north of Kendoon) and Tongland in Dumfries and Galloway, as well as the decommissioning and removal of the existing electric lines known as the N and R routes. This project is called the Kendoon to Tongland 132kV (Kilovolts) Reinforcement Project (hereafter referred to as 'the KTR Project').

11.4.2 The KTR Project consists of proposals for the replacement of the existing 132kV overhead transmission line (OHL) which is supported on steel towers between Polquhanity in the north, through Glenlee substation, and south to the Tongland substation. The five OHL connections comprising the KTR Project are illustrated on **Figure 11.1**. The OHL to be replaced currently connects five hydro-electric power stations in Galloway that serve the populations of Galloway, Dumfries and Ayrshire with electricity. Built in the 1930s and running at full capacity, the OHL is at the end of its operational life and is therefore in need of replacement.

11.4.3 This Shadow Appropriate Assessment (SAA) has been provided in support of: 1) five applications submitted to Scottish Ministers seeking consent under section 37 of the Electricity Act 1989 for the OHLs comprised in the KTR Project; as well as 2) five applications seeking directions that planning permission be deemed to be granted under section 57 (2) of the Town and Country Planning (Scotland) Act 1997 (deemed planning permission) for the OHLs and associated works as well as the removal of the existing OHLs comprising N and R routes.

Legal and Policy Background

Legal requirements

11.4.4 Special Protection Areas are selected to protect certain bird species in line with the European Union Council Directive 2009/147/EC on the Conservation of Wild Birds ('Birds Directive'). Together with Special Areas of Conservation (protecting certain habitats and / or species in line with the European Union Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora, ('Habitats Directive'), Special Protection Areas are known as 'European sites[2]'. For the purposes of this SAA, proposed European sites (i.e. sites approved by Scottish Ministers for formal consultation but where a final decision relating to their designation has not been reached) are treated as if they were designated as European sites[3].

11.4.5 European site designations are distinct from other designations, such as Ramsar sites and Sites of Special Scientific Interest (SSSI). The various types of designations are subject to different legal and policy protections.

11.4.6 The integrity of European sites is protected through legislation transposing provisions of the Birds and Habitats Directives into domestic law. In the UK, the Birds and Habitats Directives have been implemented through (amongst others) the Conservation of Habitats and Species Regulations 2017 ('Habitats Regulations'). Certain provisions of the Habitats Regulations extend to Scotland by virtue of Regulation 2. The provisions relevant to the applications for the KTR Project are Regulations 70 and 89.

11.4.7 The Habitats Regulations prescribe certain requirements which apply where a competent authority is deciding whether to give consent or permission for a project which (i) is likely to have a significant effect on a European site (either alone or in combination with other plans or projects); and (ii) is not directly connected with or necessary to the management of that site. Where this is the case, the competent authority must make an 'appropriate assessment' of the implications of the project for the relevant European site in view of that site's conservation objectives. In the context of the KTR Project, the Scottish Ministers are the competent authority and it is the Ministers who must make the appropriate assessment.

11.4.8 In light of the conclusions of the appropriate assessment (and subject to limited exceptions), the competent authority may agree to the proposed project only after having ascertained that it will not adversely affect the integrity of the European site. In considering whether a project will adversely affect the integrity of the site, the competent authority must have regard to the manner in which it is proposed the project will be carried out or to any conditions or restrictions subject to which the authority proposes that the consent should be given. Where the competent authority considers that any adverse effect on the integrity of a European site would be avoided if the consent were subject to conditions, the authority may grant the consent subject to those conditions.

11.4.9 The appropriate assessment required in terms of the Habitats Regulations has to be made by the competent authority as the decision maker. A person applying for the relevant consent must provide the competent authority with such information as it may reasonably require for the purposes of the appropriate assessment.

11.4.10 The appropriate assessment process should be informed by a consultation with the appropriate nature conservation body. The consultation must be undertaken by the competent authority. In reaching its decision regarding the relevant consent, the competent authority must have regard to any representations of the consulted nature conservation body. Scottish Natural Heritage (SNH) is the appropriate nature conservation body in the context of the requirements of the Habitats Regulations applicable to the KTR Project.

Case law relating to appropriate assessment requirements

11.4.11 In line with the judgement of the European Court of Justice in the case known as *Waddenzee* (C-127/02[4]), any plan or project (other than those directly concerned with the management of a European site) should be subject to appropriate assessment if "*it cannot be excluded, on the basis of objective information, that it will have a significant effect on that site, either individually or in combination with other plans or projects*". Further, if a plan or project "*is likely to undermine the site's conservation objectives, it must be considered likely to have a significant effect on that site. The assessment of that risk must be made in the light inter alia of the characteristics and specific environmental conditions of the site concerned by such a plan or project*".

11.4.12 The requirements associated with the appropriate assessment process have been recently clarified in the judgement of the European Court of Justice in case known as *People Over Wind* (C-323/17[5]). This judgement provided an explanation regarding the correct approach to avoidance or reduction measures (i.e. mitigation measures) in the context of the Habitats Regulations. Additionally, the European Court of Justice in the case known as *Holohan* (C-461/17[6]) further clarified (amongst others) the correct approach to consideration of habitats and species associated with a European site for the purposes of assessment of effects on conservation objectives of that site.

National policy and guidance relating to appropriate assessment requirements

11.4.13 The current policy applicable to developments affecting European sites in Scotland is set out in the Scottish Planning Policy. Paragraphs 207 – 210 comment on the policy approach to developments likely to have a significant effect on these sites. The principles set out in the Scottish Planning Policy inform local planning policies.

11.4.14 Guidance relating to the implementation of protection of the European sites in Scotland is provided in the Scottish Office Circular No. 6/1995 (revised by the Scottish Executive in June 2000) ('Circular'). The Circular advises that to determine the impact on the interest protected within a European site, the need

[1] SPEN, the trading name for Scottish Power Energy Network Holdings Limited which owns and operates the electricity transmission and distribution networks in central and southern Scotland through its wholly-owned subsidiaries SP Transmission plc (SPT) and SP Distribution plc (SPD). SP Transmission plc is the holder of a transmission licence. The references within this document to SPEN in the context of statutory and licence duties should be read as applying to SP Transmission plc.
[2] The network of protected sites includes marine sites. It is unlikely that the KTR Project would have a significant effect on any Marine European site, and so marine sites have not been considered further in this SAA.
[3] This approach reflects the definition of "European sites" in line with Regulation 8 of the Conservation of Habitats and Species Regulations 2017.
[4] Landelijke Vereniging tot Behoud van de Waddenzee and Nederlandse Vereniging tot Bescherming van Vogels v Staatssecretaris van Landbouw, Natuurbeheer en Visserij
[5] People Over Wind and Peter Sweetman v Coillte Teoranta
[6] Brian Holohan and Others v An Bord Pleanála

for considering the appropriate assessment extends to projects located outside the boundary of that site. It is the potential effect of the proposal on a European site which is relevant, rather than the project's location in respect to the site boundary.

Ramsar sites and Sites of Special Scientific Interest

11.4.15 Protections afforded to European sites are relevant in the context of Ramsar sites. In January 2019, the Scottish Government published guidance clarifying how the protections applicable to Ramsar sites should be implemented in Scotland[7]. The guidance notes that protection of Ramsar sites is achieved through co-designation or Ramsar sites with European sites and / or SSSIs, which are protected under the relevant statutory regime. Where the Ramsar interests coincide with Natura qualifying interests protected under a European site, the interests are given the same level of legal protection.

11.4.16 Protection of SSSI is dealt with under a separate legislative regime and is not further discussed in this SAA.

The Need for an appropriate assessment in relation to the KTR Project

11.4.17 The Loch Ken and River Dee Marshes (LKRDM) Special Protection Area (SPA) (and Ramsar site) is located to the east of the route of the proposed new OHL connections forming part of the KTR Project. The SPA is located approximately 2.1km at its nearest point from Glenlee to Tongland (G-T) connection tower 13 to the northern component of the SPA; 2.7km from G-T connection tower 94 to the southern component, and 2.8km from G-T connection tower 47 to the central component. Furthermore, sections of the existing R route (south of Glenlee) proposed to be removed as part of the KTR Project lie within and in the vicinity of the SPA. The boundaries of the SPA are illustrated on **Figure 11.1**.

11.4.18 The need for appropriate assessment in respect of the effects of the KTR Project (including the proposed new connections, and the removal of certain existing OHLs) on the SPA was recognised at an early stage. The Scoping Report submitted by SPEN to the Scottish Ministers in the context of the environmental impact assessment for the KTR Project notes that "[t]*he nearest internationally designated ornithological site is the Loch Ken and River Dee Marshes Special Protection Area (SPA) and Ramsar Site, which at its closest is situated around 2.2km east of the proposed route. This is designated for its wintering Greenland white-fronted goose and greylag goose populations. Owing to its proximity to the new overhead line components of the KTR Project, it is anticipated that the competent authority will be required to undertake an Appropriate Assessment as part of a Habitats Regulations Appraisal (HRA) in respect of this SPA*." In response to the scoping consultation relating to the environmental impact assessment for the KTR Project, SNH noted that an appropriate assessment would require to be made by the competent authority in respect of the SPA. Dumfries and Galloway Council (D&GC) also recognised the need for an appropriate assessment in respect of the SPA.

11.4.19 As noted above, the appropriate assessment requires to be made by the Scottish Ministers, and should be informed by the materials provided by SPEN as applicant. This SAA together with the information provided in the Environmental Impact Assessment (EIA) Report submitted in support of the applications seeking consent are provided to allow the Scottish Ministers to make the appropriate assessment in respect of each of the applications for the KTR Project.

The KTR Project Proposals and Manner in which the Works will be Carried Out

11.4.20 It is acknowledged that an appropriate assessment should be made for the KTR Project. As such, the Scottish Ministers should ascertain whether the KTR Project (alone or in combination with other projects) will adversely affect the integrity of the SPA. The assessment should be made having regard to the manner in which it is proposed that the Project will be carried out / any conditions or restrictions subject to which the Scottish Ministers propose that the KTR Project should be granted.

11.4.21 As noted above, the KTR Project consists of construction of five new OHL connections replacing existing infrastructure, the removal of sections of the existing N route and R route (north and south of Glenlee) and associated works. For the purposes of the appropriate assessment to be made by the Scottish Ministers in the context of the applications for the KTR Project, the proposals can be summarised as follows[8]:

- Construction of replacement OHL connections;
- Operation of the replacement OHL connections;
- Decommissioning operations associated with removal of the N and R routes[9]; and
- Forestry operations[10].

11.4.22 Surveys within a 500m buffer to locate nests of birds listed in Schedule 1 of the Wildlife and Countryside Act 1981 (WCA) and Annex 1 of the Birds Directive will be undertaken prior to forestry and construction operations during the breeding period as part of a Birds Protection Plan which will be overseen by an Ecological Clerk of Works (ECoW). To complement this, surveys of roosts of birds within a 500m buffer listed on Schedule 1A of the WCA will be undertaken during the non-breeding period. If it is judged that these activities are likely to disturb breeding attempts or roosting behaviour, then appropriate exclusion zones (Ruddock & Whitfield 2007) or other mitigation procedures will be agreed with SNH prior to recommencing works. Standard forestry guidance will be followed in the case of tree felling operations. This will also apply for decommissioning operations on the N and R routes to be removed.

11.4.23 In addition to the above, it is proposed that any construction / decommissioning activities within the boundaries of the SPA and a 500m buffer will occur outside of the months when the qualifying SPA species are present.

11.4.24 It is envisaged that specific conditions to be attached to the KTR Project would be applied during the construction period, specifying protection measures for two species for which breeding is already known to occur in the vicinity of the KTR Project (golden eagle and nightjar). These measures would be in place to avoid any possibility of disturbance of breeding attempts by these protected species.

11.4.25 Forest management proposals would also be implemented as part of the Construction and Decommissioning Environmental Management Plan (CDEMP) to improve the habitat for a number of species of mammals and birds.

11.4.26 The KTR Project and the manner in which it is proposed to be carried out, and SPEN's suggestions for conditions to be attached to the Consent, are described in detail in the EIA Report.

Qualifying Species of the SPA and other information

11.4.27 This and the subsequent sections of this SAA place the potential effects of the KTR Project on the integrity of the SPA under detailed scientific scrutiny. The provided information utilises the evidence gathered as part of the assessment reported in the EIA Report, having regard to the manner in which it is proposed the KTR Project is carried out, and to conditions / restrictions which it is suggested could be attached to the consent. Specific reference is made to the relevant conservation objectives of the SPA to assist the Scottish Ministers with making the appropriate assessment in respect of the applications for consent.

The qualifying species of the SPA

11.4.28 The qualifying species of the SPA are the greylag goose and Greenland white-fronted goose. The first conservation objective for the SPA is to avoid deterioration of the habitats of the qualifying species, or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained. The second conservation objective is to ensure for the qualifying species that the following are maintained in the long term:

1. Population of the species as a viable component of the site;

[7] Published on 22 January 2019, available at https://www.gov.scot/publications/implementation-of-scottish-government-policy-on-protecting-ramsar-sites/

[8] In this SAA, the assessments of construction / decommissioning / operation take account of the relevant ancillary works proposed as part of the KTR Project.

[9] The removal of N and R (north) is part of the P-G via K application, the effects are assessed separately but presented under the main heading of that connection. The effects of removal of R (south) is part of the G-T connection Section 37 application, findings are presented under that heading. Refer to the EIA Report **Chapter 4: Development Description**.

[10]. Any forestry operations which will occur during the construction of the replacement OHLs / decommissioning will be carried out after surveys for breeding birds have been completed. In this SAA, the forestry operations forming part of the KTR Project have been considered as part of the construction of replacement OHL connections / decommissioning operations (as appropriate).

2. Distribution of the species within [the] site;
3. Distribution and extent of habitats supporting the species;
4. Structure, function and supporting processes of habitats supporting the species; and
5. No significant disturbance of the species.

11.4.29 The species designated as the qualifying species of the SPA are also the qualifying species of the LKRDM Ramsar site. In this context, the species of the Ramsar site enjoy the same level of protection as the qualifying species of the SPA.

11.4.30 The nature of the qualifying species of the SPA determines the scope of the assessment. The SPA qualifies under Article 4 (1) of the Birds Directive as it regularly supports, in winter, internationally important numbers of Greenland white-fronted geese. The site also qualifies under Article 4 (2) by supporting an internationally important wintering population of greylag geese. The LKRDM also support important assemblages of breeding and wintering birds typical of open water and associated wetlands, although these are not designated as qualifying species of the SPA.

11.4.31 It is apparent from available desk-study records of the qualifying species that the numbers using the SPA have declined since it was classified as an SPA in 1992. The most recent site condition monitoring (2007 for Greenland white-fronted goose, 2010 for greylag goose) suggests that the SPA populations are considered Favourable Maintained, however more recent studies suggested that the SPA no longer held internationally important numbers of greylag goose (Mitchell, 2012[i]), and that the Greenland white-fronted goose numbers are also lower (GWFG Study[ii]).

11.4.32 Both qualifying species are only present in the winter months as they migrate away to breed, with Greenland white-fronted geese present between early October and early April and greylag geese also present between October and April (Forrester *et al.* 2007[iii]).

11.4.33 Core foraging ranges from SPAs have been identified as 5-8km for Greenland white-fronted goose and 15-20km for greylag goose (SNH, 2016[iv]) therefore both species may forage within the vicinity of the KTR Project.

11.4.34 Although it is possible that some birds recorded during the winter in and around the KTR Project were not part of the SPA qualifying species, to ensure a robust assessment and provide a thorough exposition of all information to the competent authority, it has been assumed that all non-breeding season records involved the SPA qualifying species.

Other Proposals within 20km of the SPA

11.4.35 To allow for assessments of in-combination effects on the integrity of the SPA in view of that site's conservation objectives, a list of other relevant plans and projects which are located within a 20km radius of the SPA has been collated (**Table 1**) taking account of the potential for effects on the SPA.

11.4.36 A 20km radius has been used as this is the furthest distance which SNH define as the core foraging range for greylag goose (SNH, 2016 [iv]).

Table 1: Plans and projects (application, consented or operational) within 20km of the SPA

Project	Type of development	Status	Appropriate assessment required in respect of the SPA?
BG Route	Grid connection	Operational	None (pre-dates the SPA)
Blackcraig and Margree Connection	Grid connection	Operational	None
Polquhanity – Dalmellington (SWS) Connection	Grid connection	Operational	None
S Route	Grid connection	Operational	None (pre-dates the SPA)
Knockman Hill /Loch Hill	Wind farm	Consented for 5 / turbines, application for 11 which will supersede this	None
Little Sypland	Wind turbine	Consented	None
Mochrum Fell	Wind farm	Consented	None
Shepherds' Rig	Wind farm	Application	None
Troston Loch	Wind farm	Application	None
Blackcraig Hill	Wind farm	Operational	None
Fell	Wind Farm	Application	None
Cornharrow	Wind farm	Appeal/public inquiry (refused Sept 2019)	None
Glenshimmeroch	Wind farm	Appeal/public inquiry (approved Sept 2019)	HRA screening, no Likely Significant Effects
Loch Urr	Wind farm	Application	None
Wether Hill	Wind farm	Operational	None
Windy rig	Wind Farm	Consented	None
Plascow	Wind turbines	Consented	None

Information to assist with the appropriate assessment relating to the SPA

Polquhanity to Glenlee (via Kendoon) Connection

Conservation Objective 1

11.4.37 As noted above, the first conservation objective for the SPA is "*to avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained*". Given the distance between elements of the Polquhanity to Glenlee (via Kendoon) (P-G via K) connection and the SPA (over 4km from the nearest point at the south of the connection to the northern most component of the SPA (Kenmure Holms SSSI); over 12km to the middle component (River Dee (Parton to Crossmichael) SSSI), and 22km to the southern component (Threave and Carlingwark Loch)) there is no possibility that the habitats of the qualifying species of the SPA will deteriorate as a result of construction or operation of the P-G via K connection, or decommissioning of the N and R route (north). Furthermore, these distances and the negligible use of the area around for the P-G via K connection for foraging mean that foraging or roosting Greenland white-fronted geese or greylag geese, constituting the SPA qualifying species, would not be disturbed or displaced by the operation of the new OHL component of the P-G via K connection.

11.4.38 Disturbance to foraging and roosting birds of the qualifying species within the boundaries of the SPA during the short-term period of decommissioning of the existing N and R route (north) as part of the P-G via K connection works is not possible due to the distance between the decommissioning activities taking place and the SPA. This is true even if the decommissioning activities were to occur during the winter months when the qualifying species are present (October to April).

11.4.39 In addition, disturbance of qualifying SPA bird species foraging outwith the boundaries of the SPA is highly unlikely during the short-term periods of construction of the new OHL forming the P-G via K connection and the decommissioning of the existing N and R routes. A study of the foraging areas utilised by greylag geese around the SPA (Mitchell, 2012[i]) found few locations outwith the Ken Dee valley area, and this finding was supported by the small number of greylag goose flights recorded in survey work for the P-G via K connection (**Appendix 11.1: Technical Ornithology Report**). Greenland white-fronted geese are similarly limited in their foraging ranges. The GWFG Study[ii] lists a number of locations which lie on both sides of the Loch Ken valley from Parton south as favoured for foraging, this is supported by data on the fields utilised by this species provided by the Wildfowl and Wetlands Trust (WWT) during the desk study for the KTR Project and the surveys undertaken for the KTR Project recorded no flights away from the SPA.

11.4.40 If any disturbance of foraging geese during construction of the OHL forming the P-G via K connection and decommissioning of the N and R route (north) was to occur, it would be short-term and localised and the birds would be able to move to other suitable areas to feed. For example, the GWFG Study[ii] states the Loch Ken population uses stubble fields in autumn, but an array of grassland types are used throughout the winter, especially improved grassland and reseeds, with the wetlands and inundation marsh adjacent Loch Ken also exploited. The Greenland white-fronted geese therefore use a wide range of habitats for foraging. Greylag geese will be similar in their wide use of foraging opportunities.

11.4.41 Potential disturbance of roosting geese during construction of the OHL forming the P-G via K connection and decommissioning of the N and R route (north) would be limited to the period between dusk and dawn during the months of October to April. The surveys conducted for KTR Project reinforced the findings of the GWFG Study[ii] that Loch Stroan was no longer used as a roost and the flock uses Loch Ken as the regular roost site. Due to the distance between the SPA and the P-G via K connection, no disturbance of roosting SPA species would occur.

11.4.42 A relatively small area of habitat suitable for the SPA species would be disturbed during construction of the P-G via K connection, and decommissioning of the N and R route (north). However, the limited scale of this disturbance is not considered to amount to deterioration of the habitat of the qualifying SPA species, in the context of the comments above. Once the construction and decommissioning works associated with the P-G via K connection are completed, any disturbed habitats would be restored to as close to their original form as possible. This would ensure that the relatively small area in which any suitable habitats are disturbed continues to be available to the qualifying species in the long term.

11.4.43 In conclusion, there will be no significant disturbance to the qualifying SPA species due to construction of the P-G via K connection, and decommissioning of the N and R route (north). There will be no deterioration of the habitat of the qualifying SPA species as a result of construction of the P-G via K connection, and decommissioning of the N and R route (north). As noted above, there will also be no deterioration of the habitat of the qualifying species of the SPA and no significant disturbance of the qualifying SPA species due to operation of the P-G via K connection. As such, construction and operation of the P-G via K connection and decommissioning of the N and R route (north) will not adversely affect the integrity of the SPA in view of the first conservation objective.

Conservation Objective 2

11.4.44 The second conservation objective for the SPA consists of five parts, as referred to above. Part 5 of the second conservation objective is the long-term maintenance of "*no significant disturbance of the species*". Disturbance to the SPA qualifying species as a result of construction of the OHL forming the P-G via K connection and decommissioning of the N and R route (north) is not likely, as has been outlined above in relation to the first conservation objective. Once construction and decommissioning activities have ceased there will be no further disturbance potential to the SPA qualifying species, due to the distances between the new operational OHL forming the P-G via K connection and the SPA. As such, construction and operation of the P-G via K connection and decommissioning of the N and R route (north) will not adversely affect the integrity of the SPA in view of part 5 of the second conservation objective.

11.4.45 Parts 3 and 4 of the second conservation objective concerned with maintenance of habitats for the SPA qualifying species (namely the objective to ensure that the *"structure, function and supporting processes of habitats supporting the species"* and the *"distribution and extent of habitats supporting the species"* are maintained in the long term) would be affected during construction of the OHL forming the P-G (via K) connection and decommissioning of the N and R route (north). These effects would be short-term, as the habitats would be disturbed by construction vehicle traffic and activities. Once the construction and decommissioning works associated with the P-G via K connection are completed, any disturbed habitats would be restored to as close to their original form as possible. This would ensure that the relatively small area in which any suitable habitats are disturbed continues to be available to the qualifying species in the long term. The existence of the new OHL constituting the P-G via K connection, which lies over 4km from the SPA (at its closest point), will not have any significant effects on the habitats outside the boundaries of the SPA which are potentially used by the qualifying species. As previously stated, the qualifying SPA species mainly use the area around the Loch Ken valley and so the operation of the P-G via K connection is unlikely to result in any habitat disturbance which might affect them. The new OHL forming the P-G via K connection will be very closely aligned to the existing N and R route (north) and so will have no additional effect on the habitat available to the SPA qualifying species once these routes are decommissioned and the habitat restored. As such, construction and operation of the P-G via K connection and decommissioning of the N and R route (north) will not adversely affect the integrity of the SPA in view of parts 3 and 4 of the second conservation objective.

11.4.46 Given the location of the P-G via K connection with respect to the SPA, part 2 of the second conservation objective (namely the objective to ensure that the *"distribution of the species within [the] site"* is maintained in the long term) will not be compromised. The new OHL component of the P-G via K connection and the N and R route (north) to be removed are not within the SPA and are at least 4km away from the boundary of the SPA. As such, construction and operation of the P-G via K connection and decommissioning of the N and R route (north) will not adversely affect the integrity of the SPA in view of part 2 of the second conservation objective.

11.4.47 For part 1 of the second conservation objective (namely the objective to ensure that the *"population of the species [is maintained] as a viable component of the site"* in the long term) only the primary influential effect of collision strikes on the maintenance of species viability through an increase in mortality is considered. This is because the other potential effects (such as disturbance to birds and adverse effects on habitats) will have no significant effect on the maintenance of the qualifying species' populations as a viable component of the SPA.

11.4.48 As noted from baseline surveys (described in **Chapter 11: Ornithology** of the EIA Report and associated **Appendices 11.1, 11.2: Ornithology Collison Risk** and **11.3: Confidential Ornithology Report**), no flights of Greenland white-fronted geese occurred and the flight collision risk for greylag goose was predicted as low (**Appendix 11.2**) for this connection. Therefore, the prospect of any discernible increase in mortality of Greenland white-fronted geese or greylag geese through collision with the new OHL component of the P-G via K connection is remote and will have no effect on the overall maintenance of the populations of the qualifying species. As such, operation of the P-G via K connection and decommissioning of the N and R route (north) will not adversely affect the integrity of the SPA in view of part 1 of the second conservation objective.

11.4.49 In conclusion, the construction and operation of the P-G via K connection and decommissioning of the N and R route (north) will have no long-term effects on maintenance for the qualifying species of elements specified in parts 1 – 5 of the second conservation objective for the SPA. As such, construction and operation of the P-G via K connection and decommissioning of the N and R route (north) will not adversely affect the integrity of the SPA in view of the second conservation objective.

Summary – Conservation Objectives 1 and 2

11.4.50 It is reasonable to conclude that construction and operation of the P-G via K connection and decommissioning of the N and R route (north) will not have an adverse effect on the integrity of the SPA in view of that site's conservation objectives.

In-combination effects

11.4.51 The construction and operation of the P-G via K connection and decommissioning of the N and R route (north) will have no adverse effect on integrity of the SPA in view of that site's conservation objectives, when considered in combination with the other connections of the KTR Project.

11.4.52 Likely combined effects on the SPA resulting from construction and operation of the P-G via K connection and decommissioning of the N and R route (north) considered together with the plans and projects noted in **Table 1** are indistinguishable to those resulting from construction and operation of the P-G via K connection and decommissioning of the N and R route (north) considered alone. This is in large part because of the likely negligible effects of construction and operation of the P-G via K connection and decommissioning of the N and R route (north) on the SPA which have been assessed to have no adverse effect on integrity of the SPA in view of that site's conservation objectives.

Conclusion

11.4.53 It can be concluded that the construction and operation of the P-G via K connection and decommissioning of the N and R route (north) alone or in-combination with other plans and projects will have no adverse effect on the integrity of the SPA in view of that site's conservation objectives.

Carsfad to Kendoon Connection

Conservation Objective 1

11.4.54 As noted above, the first conservation objective for the SPA is "*to avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained*". Given the distance between elements of the Carsfad to Kendoon (C-K) connection and the SPA (over 8km from the nearest point at the south of the connection to the northern most component of the SPA (Kenmure Holms SSSI); over 16km to the middle component (River Dee (Parton to Crossmichael) SSSI), and 26km to the southern component (Threave and Carlingwark Loch)), there is no possibility that the habitats of the qualifying species of the SPA will deteriorate as a result of construction or operation of the C-K connection. These distances and the negligible use of the area

around for the C-K connection for foraging also mean that foraging or roosting Greenland white-fronted geese or greylag geese constituting the SPA qualifying species would not be disturbed or displaced by the operation of the new OHL component of the C-K connection.

11.4.55 In addition, disturbance to qualifying SPA bird species foraging outwith the boundaries of the SPA is highly unlikely during the short-term periods of construction of the new OHL forming the C-K connection. A study of the foraging areas utilised by greylag geese around the SPA (Mitchell 2012[i]) found few locations outwith the Ken Dee valley area, and this finding was supported by the very small number of greylag goose flights recorded in survey work for the C-K connection. Greenland white-fronted geese are similarly limited in their foraging ranges. The GWFG Study[ii] lists a number of locations which lie on both sides of the Loch Ken valley from Parton south as favoured for foraging, this is supported by data on the fields utilised by this species provided by the WWT during the desk study for the KTR Project and the surveys undertaken for the KTR Project recorded no flights away from the SPA.

11.4.56 In conclusion, there will be no deterioration of the habitat of the qualifying species of the SPA and no significant disturbance to the qualifying SPA species due to construction of the C-K connection. There will also be no deterioration of the habitat of the qualifying species of the SPA and no significant disturbance of the qualifying species due to operation of the C-K connection. As such, construction and operation of the C-K connection will not adversely affect the integrity of the SPA in view of the first conservation objective.

Conservation Objective 2

11.4.57 The second conservation objective for the SPA consists of five parts, as referred to above. Part 5 of the second conservation objective is the long term maintenance of "*no significant disturbance of the species*". The disturbance to the SPA qualifying species as a result of construction of the OHL forming the C-K connection is highly unlikely, as has been outlined above in relation to the first conservation objective. Once construction activities have ceased there will be no disturbance potential to the SPA qualifying species, due to the distances between the new operational OHL forming the C-K connection and the SPA. As such, construction and operation of the C-K connection will not adversely affect the integrity of the SPA in view of part 5 of the second conservation objective.

11.4.58 Parts 3 and 4 of the second conservation objective concerned with maintenance of habitats for the SPA qualifying species (namely the objective to ensure that the "*structure, function and supporting processes of habitats supporting the species*" and the "*distribution and extent of habitats supporting the species*" are maintained in the long term) would not be affected during construction of the C-K connection. The habitats affected by these works have not been shown to be utilised by the SPA qualifying species. The existence of the new OHL constituting the C-K connection which lies over 8km from the SPA, will not have any significant effect on the habitats outside the SPA which are potentially used by the qualifying species. As previously stated, the qualifying SPA species mainly use the area around the Loch Ken valley and so the operation of the C-K connection is unlikely to result in any habitat disturbance which might affect them. The new OHL forming the C-K connection will be very closely aligned to the existing R route (north) and so will have no additional effect on the habitat available to the SPA qualifying species once the route is decommissioned and the habitat restored. As such, construction and operation of the C-K connection will not adversely affect the integrity of the SPA in view of parts 3 and 4 of the second conservation objective.

11.4.59 Given the location of the C-K connection with respect to the SPA, part 2 of the second conservation objective (namely the objective to ensure that the" *distribution of the species within [the] site*" is maintained in the long term) will not be compromised. The new OHL component of the C-K connection is not within the SPA and is at least 8km away from the boundary of the SPA. As such, construction and operation of the C-K connection will not adversely affect the integrity of the SPA in view of part 2 of the second conservation objective.

11.4.60 For part 1 of the second conservation objective (namely the objective to ensure that the "*population of the species [is maintained] as a viable component of the site*" in the long term) only the primary influential effect of collision strikes on the maintenance of species viability through an increase in mortality is considered. This is because the other potential effects (such as disturbance to birds and adverse effects on habitats) will have no significant effect on the maintenance of the qualifying species' populations as a viable component of the SPA.

11.4.61 As noted from baseline surveys (described in the EIA Report **Chapter 11** and associated **Appendices 11.1** to **11.3**), any discernible increase in mortality of Greenland white-fronted geese or greylag geese through collision with the new OHL component of the C-K connection is not possible and so will have no effect on the overall maintenance of the populations of the qualifying species. As such, operation of the C-K connection will not adversely affect the integrity of the SPA in view of part 1 of the second conservation objective.

11.4.62 In conclusion, construction and operation of the C-K connection will have no long-term effects on maintenance for the qualifying species of elements specified in parts 1 – 5 of the second conservation objective for the SPA. As such, construction and operation of the C-K connection will not adversely affect the integrity of the SPA in view of the second conservation objective.

Summary – Conservation Objectives 1 and 2

11.4.63 It is reasonable to conclude that construction and operation of the C-K connection will not have an adverse effect on the integrity of the SPA in view of that site's conservation objectives.

In-combination Effects

11.4.64 The construction and operation of the C-K connection will have no adverse effect on integrity of the SPA in view of that site's conservation objectives, when considered in combination with the other connections of the KTR Project.

11.4.65 Likely combined effects on the SPA resulting from construction and operation of the C-K connection considered together with the plans and projects noted in **Table 1** are indistinguishable to those resulting from construction and operation of the C-K connection alone. This is in large part because of the likely negligible effects of construction and operation of the C-K connection on the SPA which have been assessed to have no adverse effect on integrity of the SPA in view of that site's conservation objectives.

Conclusion

11.4.66 It can be concluded that the construction and operation of the C-K connection alone or in-combination with other plans and projects will have no adverse effect on the integrity of the SPA in view of that site's conservation objectives.

Earlstoun to Glenlee Connection

Conservation Objective 1

11.4.67 As noted above, the first conservation objective of the SPA is "*to avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained*". The distance between elements of the Earlstoun to Glenlee (E-G) connection and the SPA (over 4km from the nearest point at the south of the connection to the northern most component of the SPA (Kenmure Holms SSSI); over 12km to the middle component (River Dee (Parton to Crossmichael) SSSI), and 22km to the southern component (Threave and Carlingwark Loch)) are such that there is no possibility that the habitats of the qualifying species of the SPA will deteriorate as a result of construction or operation of the E-G connection. These distances and the negligible use of the area around the E-G connection for foraging or roosting further ensure that Greenland white-fronted geese or greylag geese (which constitute the SPA qualifying species) would not be disturbed or displaced by the operation of the new OHL component of the E-G connection.

11.4.68 In addition, disturbance to qualifying SPA bird species foraging outwith the boundaries of the SPA is very unlikely during the short-term periods of construction of the new OHL forming the E-G connection as part of the E-G connection works. A study of the foraging areas utilised by greylag geese around the SPA (Mitchell 2012[i]) found few locations outwith the Ken Dee valley area, and this finding was supported by the very small number of greylag goose flights recorded in survey work for the E-G connection. Greenland white-fronted geese are similarly limited in their foraging ranges. The GWFG Study[ii] lists a number of locations which lie on both sides of the Loch Ken valley from Parton south as favoured for foraging, this is supported by data on the fields utilised by this species provided by the WWT during the desk study for the KTR Project and the surveys undertaken for the KTR Project recorded no flights away from the SPA.

11.4.69 Any disturbance of roosting geese would be limited to the period between dusk and dawn during the months of October to April.

11.4.70 In conclusion there will be no deterioration of the habitat of the qualifying species of the SPA and no significant disturbance of the qualifying SPA species due to construction of the E-G connection. There will also be no deterioration of the habitat of the qualifying species of the SPA and no significant disturbance

of the qualifying species due to operation of the E-G connection. As such, construction and operation of the E-G connection will not adversely affect the integrity of the SPA in view of the first conservation objective.

Conservation Objective 2

11.4.71 The second conservation objective for the SPA consists of five parts, as referred to above. Part 5 of the second conservation objective is the long term maintenance of "*no significant disturbance of the species*". The disturbance to the SPA qualifying species as a result of construction of the OHL forming the E-G connection is highly unlikely, as has been outlined above in relation to the first conservation objective. Once construction and decommissioning activities have ceased there will be no disturbance potential to the SPA qualifying species, due to the distances between the new operational OHL forming the E-G connection and the SPA. As such, construction and operation of the E-G connection will not adversely affect the integrity of the SPA in view of part 5 of the second conservation objective.

11.4.72 Parts 3 and 4 of the second conservation objective concerned with the maintenance of habitats for the SPA qualifying species (namely the objective to ensure that the "*structure, function and supporting processes of habitats supporting the species*" and the "*distribution and extent of habitats supporting the species*" are maintained in the long term) would not be affected during construction of the E-G connection, as the affected habitats have not been shown to be utilised by the SPA qualifying species. The existence of the new OHL constituting the E-G connection which lies over 4km from the SPA (at its closest point) will not have any significant effect on the habitats outside the SPA which are potentially used by the qualifying species. As previously stated, the qualifying SPA species mainly use the area around the Loch Ken valley and so the operation of the E-G connection is unlikely to result in any habitat disturbance which might affect them. The new OHL forming the E-G connection will be very closely aligned to the existing R route and so will have no additional effect on the habitat available to the SPA qualifying species once this route is decommissioned and the habitat restored. As such, construction and operation of the E-G connection will not adversely affect the integrity of the SPA in view of parts 3 and 4 of the second conservation objective.

11.4.73 Given the location of the E-G connection with respect to the SPA, part 2 of the second conservation objective (namely the objective to ensure that the" *distribution of the species within site*" is maintained in the long term) will not be compromised. The new OHL component of the E-G connection and is not within the SPA and is at least 4km away from the boundary of the SPA. As such, construction and operation of the E-G connection will not adversely affect the integrity of the SPA in view of part 2 of the second conservation objective.

11.4.74 For part 1 of the second conservation objective (namely the objective to ensure that the "*population of the species [is maintained] as a viable component of the site*") only the primary influential effect of collision strikes on the maintenance of species viability through an increase in mortality is considered. This is because the other potential effects (such as disturbance to birds and adverse effects on habitats) will have no significant effect on the maintenance of the qualifying species' populations as a viable component of the SPA.

11.4.75 As noted from baseline surveys (described in the EIA Report **Chapter 11** and **Appendices 11.1** to **11.3**), any discernible increase in mortality of Greenland white-fronted geese or greylag geese through collision with the new OHL component of the E-G connection is not possible and so will have no effect on the overall maintenance of the populations of the qualifying species. As such, construction and operation of the E-G connection will not adversely affect the integrity of the SPA in view of part 1 of the second conservation objective.

11.4.76 In conclusion, construction and operation of the E-G connection will have no long-term effects on maintenance for the qualifying species of elements specified in parts 1 – 5 of the second conservation objective for the SPA. As such, construction and operation of the E-G connection will not adversely affect the integrity of the SPA in view of the second conservation objective.

Summary – Conservation Objectives 1 and 2

11.4.77 It is reasonable to conclude that construction and operation of the E-G connection will not have an adverse effect on the integrity of the SPA in view of that site's conservation objectives.

In-combination Effects

11.4.78 The construction and operation of the E-G connection will have no adverse effect on integrity of the SPA in view of that site's conservation objectives, when considered in combination with the other connections of the KTR Project.

11.4.79 Likely combined effects on the SPA resulting from construction and operation of the E-G connection considered together with the plans and projects noted in **Table 1** are indistinguishable to those resulting from construction and operation of the construction and operation of the E-G connection alone. This is in large part because of the likely negligible effects of the E-G connection on the SPA which have been assessed to have no adverse effect on integrity of the SPA in view of that site's conservation objectives.

Conclusion

11.4.80 It can be concluded that the construction and operation of the E-G connection alone or in-combination with other plans and projects will have no adverse effect on the integrity of the SPA in view of that site's conservation objectives.

BG Route Deviation

11.4.81 The qualifying SPA species have not been recorded during the baseline surveys for the BG Route Deviation (BG Deviation) (described in the EIA Report **Chapter 11** and associated **Appendices 11.1** to **11.3**). The BG Deviation is located over 4km from the northern most component of the SPA (Kenmure Holms SSSI); over 12km to the middle component (River Dee (Parton to Crossmichael) SSSI), and 22km to the southern component (Threave & Carlingwark Loch).

11.4.82 Given the lack of presence of the qualifying SPA species in the areas affected by construction and operation of the BG Deviation, there will be no deterioration of the habitat of the qualifying species of the SPA and no significant disturbance of the qualifying SPA species due to its construction and operation. As such, construction and operation of the BG Deviation will not adversely affect the integrity of the SPA in view of the first conservation objective. For the same reason, construction and operation of the BG Deviation will have no long-term effects on maintenance for the qualifying species of elements specified in parts 1 – 5 of the second conservation objective for the SPA. As such, construction and operation of the BG Deviation will not adversely affect the integrity of the SPA in view of the second conservation objective.

Summary – Conservation Objectives 1 and 2

11.4.83 It can be concluded that the construction and operation of the BG Deviation will not have an adverse effect on the integrity of the SPA and in view of that site's conservation objectives.

In-combination Effects

11.4.84 The construction and operation of the BG Deviation will have no adverse effect on integrity of the SPA in view of that site's conservation objectives, when considered in combination with the other connections of the KTR Project.

11.4.85 Likely combined effects on the SPA resulting from construction and operation of the BG Deviation considered together with the plans and projects noted in **Table 1** are indistinguishable to those resulting from construction and operation of the BG Deviation alone. This is in large part because of the likely negligible effects of the construction and operation of the BG Deviation on the SPA which have been assessed to have no adverse effect on integrity of the SPA in view of that site's conservation objectives.

Conclusion

11.4.86 It can be concluded that the construction and operation of the BG Deviation alone or in-combination with other plans and projects will have no adverse effect on the integrity of the SPA in view of that site's conservation objectives.

Glenlee to Tongland Connection

Conservation Objective 1

11.4.87 As noted above, the first conservation objective of the SPA is "*to avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity*

of the site is maintained". Given the distances between elements of the new OHL component of the Glenlee to Tongland (G-T) connection and the SPA (over 2km from the nearest point at the north of the connection to the northern most component of the SPA (Kenmure Holms SSSI); at least 2.7km to the middle component (River Dee (Parton to Crossmichael) SSSI), and at least 2.7km to the southern component (Threave & Carlingwark Loch)) there is no possibility that the habitats of the qualifying species of the SPA will deteriorate as a result of construction or operation of the G-T connection.

11.4.88 Three towers of the existing R route (south) lie within the SPA, therefore minimum activities will take place within its boundaries during decommissioning of the R route (south). The relatively small area of habitat affected by decommissioning of the R route (south) will in general be no more disturbed than through normal farming or land management practises such as ploughing.

11.4.89 The distances involved and the negligible use of the area around the G-T connection for foraging or roosting further ensure that Greenland white-fronted geese or greylag geese (which constitute the SPA qualifying species) would not be disturbed or displaced by the operation of the new OHL component of the G-T connection.

11.4.90 If the decommissioning of the existing R route (south) occurs during the winter months when the qualifying SPA species are present (October to April), then disturbance to foraging and roosting birds of the qualifying species within the boundaries of the SPA would be possible (during the short-term period of decommissioning). In addition, some disturbance of qualifying SPA bird species foraging outwith the boundaries of the SPA would be possible during the short-term periods of construction of the new OHL forming the G-T connection and the decommissioning of the existing R Route (south). However, any such disturbance of foraging geese during construction and decommissioning periods will be short-term and localised, and the birds would be able to move to other suitable areas to feed. For example, the GWFG Study[ii] states the Loch Ken population uses stubble fields in autumn, but an array of grassland types are used throughout the winter, especially improved grassland and reseeds, with the wetlands and inundation marsh adjacent to Loch Ken also exploited. They therefore use a wide range of habitats for foraging. Greylag geese will be similar in their wide use of foraging opportunities.

11.4.91 A study of the foraging areas utilised by greylag geese around the SPA (Mitchell 2012[i]) found few locations outwith the Ken Dee valley area, and this finding was supported by the small number of greylag goose flights recorded in survey work for the G-T connection. Therefore, it can be ascertained that the limited scope of their foraging range will also limit any potential for disturbance as a result of construction of parts of G-T Connection. Greenland white-fronted geese are similarly limited in their foraging ranges. The GWFG Study[ii] lists a number of locations which lie on both sides of the Loch Ken valley from Parton south as favoured for foraging, this is supported by data on the fields utilised by this species provided by the WWT during the desk study for the KTR Project and the surveys undertaken for the KTR Project recorded no flights away from the SPA.

11.4.92 Disturbance of roosting geese would be limited to the period between dusk and dawn during the months of October to April. Disturbance of roosting would also be limited to the vicinity of Loch Ken. The surveys conducted for the G-T connection reinforced the findings of the GWFG Study[ii] that Loch Stroan was no longer used as a roost and the flock uses Loch Ken as the regular roost site.

11.4.93 To ensure disturbances of the qualifying interests of the SPA is avoided, it is proposed that any construction / decommissioning activities within the SPA and a 500m buffer will occur outside of the months when the qualifying species are present.

11.4.94 Furthermore, any limited disturbance to small areas of habitat) outwith the SPA (which may be used by the qualifying species) as a result of the decommissioning of R route (south) would in general be no more than one would expect through normal farming or land management practices. It would not constitute a deterioration of habitat of the qualifying SPA species. Any small areas which were disturbed would be restored to as close to their original form as possible.

11.4.95 In conclusion, the likelihood of disturbance to the qualifying species due to construction of the G-T connection and decommissioning of the R route (south) is low. Taking account of the temporal restriction on decommissioning activities for R route (south) referred to above, there will be no significant disturbance of the qualifying species as a result of construction of the G-T connection and decommissioning of the R route (south). There will be no deterioration of the habitat of the qualifying SPA species as a result of construction of the G-T connection and decommissioning of the R route (south). There will be no deterioration of the habitat of the qualifying species of the SPA and no significant disturbance of the qualifying SPA species due to operation of the G-T connection. As such, construction and operation of the G-T connection and decommissioning of the R route (south) will not adversely affect the integrity of the SPA in view of the first conservation objective.

Conservation Objective 2

11.4.96 The second conservation objective for the SPA consists of five parts, as referred to above. Part 5 of the second conservation objective is the long-term maintenance of "*no significant disturbance of the species*". The potential for disturbance has already been outlined above in relation to the first conservation objective 1. Once construction and decommissioning activities have ceased there will be no further disturbance potential to the SPA qualifying species, due to the distances between the new operational OHL forming the G-T connection and the SPA. As such, construction and operation of the G-T connection and decommissioning of the R route (south) will not adversely affect the integrity of the SPA in view of part 5 of the second conservation objective.

11.4.97 Parts 3 and 4 of the second conservation objective concerned with the maintenance of habitats for the SPA qualifying species (namely the objective to ensure that the *"structure, function and supporting processes of habitats supporting the species"* and the *"distribution and extent of habitats supporting the species"* are maintained in the long term) would be affected during construction of the G-T connection and decommissioning of the R route (south), due to the habitats being physically disturbed by construction vehicle movements and activities. There will be no new OHL construction activities within the boundaries of the SPA, and minimal activities will take place within its boundaries during decommissioning of the R route (south) (with three towers (of the total number of towers to be removed) lying within the SPA (towers 99, 100 and 100A)). In addition, ten towers of the R route (south) to be removed lie within the 500m buffer of the SPA (three in the vicinity of the northern component (towers 46-48) plus another two located less than 50m outside this buffer (towers 49 and 50); and seven in the vicinity of the middle component (towers 95-98 and 101-103), plus another three located less than 50m outside this buffer (towers 93, 94 and 104); noting that there are no towers within the 500m buffer of the southern component). The relatively small area of habitat affected by decommissioning of the R route (south) will in general be no more disturbed than through normal farming or land management practises such as ploughing.

11.4.98 Once the construction works associated with the G-T connection and decommissioning of R route (south) are completed, any disturbed habitats would be restored to as close to their original form as possible. This would ensure that the relatively small area in which the habitats are disturbed continue to be available to the qualifying species in the long term. As such, parts 3 and 4 of the second conservation objective for the SPA will not be compromised in the long term as a result of construction of the G-T connection and decommissioning of the R route (south) when considered in the context of these proposed mitigation measures.

11.4.99 The existence of the new OHL constituting the G-T connection (which lies over 2km from the SPA) will not have a significant effect on the habitats outside the SPA which are potentially used by the qualifying SPA species. The qualifying SPA species mainly use the area around the Loch Ken valley and so any habitat disturbance which might affect them is effectively limited to this area, and not the full length of the G-T Connection. Additionally, only approximately one third of the new length of OHL which constitutes the G-T connection would be located in open ground, whilst two thirds would be located in forested land which would not be utilised by the SPA qualifying species. As such, the area of possible temporary habitat disturbance is reduced further. This contrasts with the existing R Route (south), which is located entirely in open ground areas that could be utilised by the SPA qualifying species. Decommissioning of the existing R route (south) will lead to an improvement in the habitat both within and outwith the SPA, by removing the OHL and its steel lattice towers from open ground. The southern part of the new OHL constituting the G-T connection will be very closely aligned to the existing R route (south) and so will have no additional effect on the habitat available to the SPA qualifying species once this route is decommissioned and the habitat restored. Construction and operation of the G-T connection and decommissioning of the R route (south) will not adversely affect the integrity of the SPA in view of parts 3 and 4 of the second conservation objective.

11.4.100 Given the location of the G-T connection with respect to the SPA, part 2 of the second conservation objective (namely the objective to ensure for the qualifying species that the*" distribution of the species within the site"* is maintained in the long term) will not be compromised. The new OHL component of the G-T connection will not be located within the SPA and is at least 2km from the boundary of the SPA. The short section of the existing R route (south) which lies within the SPA would be removed, which is likely to enhance the long term distribution of the qualifying species within the site. As

such, construction and operation of the G-T connection and decommissioning of the R route (south) will not adversely affect the integrity of the SPA in view of part 2 of the second conservation objective.

11.4.101 For part 1 of the second conservation objective (namely the objective to ensure for the qualifying species that the "*population of the species [is maintained] as a viable component of the site*") only the primary influential effect of collision strikes on the maintenance of species viability through an increase in mortality is considered. This is because the other potential effects of (such as disturbance of birds and adverse effects on habitats) will have no significant effect on the maintenance of the qualifying species' populations as a viable component of the SPA.

11.4.102 As noted from the baseline surveys (described in the EIA Report **Chapter 11** and associated **Appendices 11.1** to **11.3**) no flights by Greenland white-fronted geese were observed over the new OHL component of the G-T connection, and the collision risk for greylag goose was deemed to be low. Therefore the prospect of any discernible increase in mortality of Greenland white-fronted geese or greylag geese through collision with the new OHL component of the G-T connection is remote and will have no effect on the overall maintenance of the populations of the qualifying species. More importantly there will be a decrease in collision risk due to the removal of the existing R route (south) OHL both from within the boundaries of, and the vicinity of the SPA. As noted during baseline surveys, both qualifying species show regular flights crossing the existing R route (south) OHL within the SPA where it crosses Loch Ken. The baseline surveys recorded a small number of collision victims. As such, construction and operation of the G-T connection and decommissioning of the R route (south) will not adversely affect the integrity of the SPA in view of part 1 of the second conservation objective.

11.4.103 In conclusion, construction and operation of the G-T connection and decommissioning of the R (south) route will have no long-term adverse effects on maintenance for the qualifying species of elements specified in parts 1 – 5 of the second conservation objective for the SPA. As such, construction and operation of the G-T connection decommissioning of the R (south) will not adversely affect the integrity of the SPA in view of the second conservation objective.

Summary – Conservation Objectives 1 and 2

11.4.104 It is reasonable to conclude, that the construction and operation of the G-T connection and decommissioning of the R route (south) will not have an adverse effect on the integrity of the SPA in view of that site's conservation objectives.

In-combination Effects

11.4.105 The construction and operation of the G-T connection and decommissioning of the R route (south) will have no adverse effect on integrity of the SPA in view of that site's conservation objectives, when considered in combination with the other connections of the KTR Project.

11.4.106 Likely combined effects on the SPA resulting from construction and operation of the G-T connection and decommissioning of the R route (south) considered together with the plans and projects noted in **Table 1** are indistinguishable to those resulting from construction and operation of the G-T connection and decommissioning of the R route (south) alone. This is in large part because of the likely negligible effects of the construction and operation of the G-T connection and decommissioning of the R route (south) on the SPA which have been assessed to have no adverse effect on integrity of the SPA in view of that site's conservation objectives. Indeed, in the long term, the operation of the G-T Connection and decommissioning of the R route (south) is likely to have beneficial effects on integrity of the SPA.

Conclusion

11.4.107 It can be concluded that the construction and operation of the G-T connection and decommissioning of the R route (south) alone or in-combination with other plans and projects will have no adverse effect on the integrity of the SPA in view of that site's conservation objectives.

KTR Project as a whole

11.4.108 For the KTR Project as a whole, the effects on the SPA described above for the individual connections will be combined over the full length of the Project.

Conservation Objective 1

11.4.109 Given the distances between the elements of the KTR Project and the SPA, there is no possibility that the habitats of the qualifying species will deteriorate, or that foraging or roosting Greenland white-fronted geese or greylag geese constituting the SPA qualifying species would be disturbed or displaced by the construction and operation of the new OHL components of the KTR Project.

11.4.110 Disturbance to foraging and roosting qualifying SPA bird species within the boundaries of the SPA is possible during the short-term period of decommissioning of the existing R route, if the decommissioning activities occur during the winter months when the qualifying species are present (October to April)

11.4.111 In addition, some disturbance of qualifying SPA bird species foraging outwith the boundaries of the SPA is possible during the short-term periods of construction of the new OHL forming part of the KTR Project and decommissioning of the existing R Route.

11.4.112 However, any such disturbance of foraging geese during construction and decommissioning periods would be short-term and localised, and the birds would be able to move to other suitable areas to feed. Furthermore, any disturbed habitats outside the SPA where geese potentially feed would be restored to as close to their original form as possible.

11.4.113 The limited scope of the foraging range of the qualifying SPA species will also result in limiting most of the disturbance resulting from construction and decommissioning activities constituting the KTR Project to those parts which are within the Ken Dee valley area (i.e. G-T Connection).

11.4.114 In addition, disturbance of roosting geese would be limited to the period between dusk and dawn during the months of October to April. Disturbance of roosting would be limited to the vicinity of Loch Ken.

11.4.115 To avoid disturbance to the qualifying interests of the SPA, it is proposed that any construction / decommissioning activities within the SPA and a 500m buffer to occur outside of the months when the qualifying species are present and any disturbed habitats would be restored to as close to their original form as possible.

11.4.116 The likelihood of disturbance to the qualifying SPA species as a result of construction and decommissioning activities constituting the KTR Project is low. Taking account of the proposed temporal restriction on construction and decommissioning activities referred to above, there will be no significant disturbance of the qualifying species as a result of construction of the KTR Project and decommissioning of the N and R routes. There will be no deterioration of the habitat of the qualifying SPA species as a result of construction and decommissioning activities constituting the KTR Project. There will be no deterioration of the habitat of the qualifying species of the SPA and no significant disturbance of the qualifying SPA species due to operation of the KTR Project. As such, construction and operation of the KTR Project (including decommissioning of the N and R routes) will not adversely affect the integrity of the SPA in view of the first conservation objective.

Conservation Objective 2

11.4.117 The second conservation objective for the SPA consists of five parts, as referred to above. Part 5 of the second conservation objective is the long-term maintenance of "*no significant disturbance of the species*". The potential for disturbance has already been outlined above in relation to the first conservation objective 1. Once construction and decommissioning activities have ceased there will be no further disturbance potential to the SPA qualifying species, due to the distances between the new operational OHL forming the KTR Project and the SPA. As such, construction and operation of the KTR Project (including decommissioning of the N and R routes) will not adversely affect the integrity of the SPA in view of part 5 of the second conservation objective.

11.4.118 There will be no new OHL construction activities within the boundaries of the SPA. Decommissioning vehicle traffic and activities associated with R route removal will have the potential to physically disturb a relatively small area of habitat within the boundaries of the SPA (three towers lying within the SPA). In addition ten towers of the R route to be removed lie within the 500m buffer of the SPA (three in the vicinity of the northern component (plus another two located less than 30m outside this buffer); seven in the vicinity of the middle component (plus two located less than 30m outside this buffer); noting that there are no towers with in the 500m buffer of the southern component) so habitat within the 500m buffer will also be disturbed. However, this relatively small area of habitat affected by decommissioning of the R route will be no more disturbed than through normal farming or land management practises such as ploughing.

11.4.119 Once the construction and decommissioning works associated with the KTR Project are completed, any disturbed habitats would be restored to as close to their original form as possible. This

would ensure that the relatively small area in which the habitats are disturbed will continue to be available to the qualifying interests in the long term. As such, parts 3 and 4 of the second conservation objective for the SPA will not be compromised in the long term as a result of the KTR Project when considered in the context of these proposed mitigation measures.

11.4.120 The existence of the new OHLs constituting the new connections of the KTR Project, which at its closest point lies over 2km from the SPA, will not have a significant effect on the habitats outside the boundaries of the SPA which are potentially used by the SPA qualifying species. As any habitat disturbance which might affect qualifying species is effectively limited to the area around the Loch Ken valley and parts of the new length of the OHL constituting the KTR Project are in forested land (which would not be utilised by the qualifying species), the area of disturbance is small. The existing R Route is located entirely in open ground areas that could be utilised by the qualifying species. As such, decommissioning of the existing R route will lead to an improvement in the amount of habitat available to the qualifying species, both within and outwith the boundaries of the SPA, by removing the OHL from open ground. The remaining lengths of KTR Project are very closely aligned to the existing N and R routes and so will have no additional effect on the species once these routes are decommissioned, and once the habitats are restored. Construction and operation of the KTR Project (including decommissioning of the N and R routes) will not adversely affect the integrity of the SPA in view of parts 3 and 4 of the second conservation objective.

11.4.121 The short section of the existing R route OHL which lies within the boundaries of the SPA will be removed and is likely to enhance the long-term distribution of the qualifying species within the site due to no longer being present. As such, construction and operation of the KTR Project (including decommissioning of the N and R routes) will not adversely affect the integrity of the SPA in view of part 2 of the second conservation objective.

11.4.122 From the baseline surveys (described in the EIA Report **Chapter 11** and associated **Appendices 11.1** to **11.3**) no flights by Greenland white-fronted geese were observed over the new OHL component of the KTR Project, and the collision risk for greylag goose was deemed to be low for the small number of flights over the length of the KTR Project. Therefore, the prospect of any discernible increase in mortality of Greenland white-fronted geese or greylag geese through collision with the new OHL component of the KTR Project is remote and will have no effect on the overall maintenance of the populations of the qualifying species. Importantly there will be a decrease in collision risk due to the removal of the existing R route OHL both from the SPA and from close to it. As noted during baseline surveys both qualifying SPA species show regular flights crossing the existing R route OHL within the SPA where it crosses Loch Ken. The baseline surveys recorded a small number of collision victims. As such, construction and operation of the KTR Project (including decommissioning of the N and R routes) will not adversely affect the integrity of the SPA in view of part 1 of the second conservation objective.

11.4.123 In conclusion, construction and operation of the KTR Project (including decommissioning of the N and R routes) will have no long-term adverse effects on maintenance for the qualifying species of elements specified in parts 1 – 5 of the second conservation objective for the SPA. As such, construction and operation of the KTR Project will not adversely affect the integrity of the SPA in view of the second conservation objective.

Summary – Conservation Objectives 1 and 2

11.4.124 It is reasonable to conclude that the construction and operation of the KTR Project (including decommissioning of the N and R routes) will not have an adverse effect on the integrity of the SPA in view of that site's conservation objectives.

Combination Effects

11.4.125 Likely combined effects on the SPA resulting from construction and operation of the KTR Project (including decommissioning of the N and R routes) considered together with the plans and projects noted in **Table 1** are indistinguishable to those resulting from the construction and operation of the KTR Project (including decommissioning of the N and R routes) alone. This is in large part because of the likely negligible effects of construction and operation of the KTR Project (including decommissioning of the N and R routes) on the SPA which have been assessed to have no adverse effect on integrity of the SPA in view of that site's conservation objectives. Indeed, in the long term, the operation of the KTR Project is likely to have beneficial effects on integrity of the SPA.

Conclusion

11.4.126 In conclusion, construction and operation of the KTR Project (including decommissioning of the N and R routes) will not have an adverse effect on the integrity of the SPA in view of that site's conservation objectives, either alone or in combination with other plans and projects.

Comments regarding other European sites in the vicinity of the KTR Project

11.4.127 Scottish Natural Heritage in their response to the Scoping consultation advised there was no requirement for an HRA with respect to any other European sites.

11.4.128 The Scoping consultation and the Scoping Opinion issued by the Scottish Ministers pre-date the judgements of the European Court of Justice in *People Over Wind* and *Holohan*, referred in the introduction to this SAA. Taking account of these judgements, it is concluded that the KTR Project (either alone or in combination with other developments) is not likely to have a significant effect on the Upper Solway Flats and Marshes (SFM) SPA (and Ramsar Site), and the Solway Firth proposed Special Protection Area (pSPA). As such, appropriate assessment does not require to be made in respect of effect of the KTR Project on the integrity of the Upper SFM SPA (and Ramsar Site), the Solway Firth pSPA or any other European site (as defined in the Habitats Regulations).

Conclusion

11.4.129 Overall, the KTR Project (either alone or in combination with other developments) will not have an adverse effect on the integrity of the SPA in view of that site's conservation objectives. The KTR Project (either alone or in combination with other developments) is also not likely to have a significant effect on any other European site.

[i] Mitchell, C. 2012. Mapping the distribution of feeding pink-footed and Icelandic greylag geese in Scotland. Wildfowl & Wetlands Trust / SNH Report, Slimbridge. 108pp

[ii] Greenland white-fronted goose Study https://greenlandwhitefront.org/gb-site-inventory/south-west-scotland/74-loch-ken-dumfries-and-galloway-region/

[iii] Forrester, R.W., Andrews, I.J., McInerny, C.J., Murray, R.D., McGowan, R.Y., Zonfrillo, B., Betts, M.W., Jardine, D.C. & Grundy, D>S. (eds) 2007. The Birds of Scotland. The Scottish Ornithologists Club, Aberlady

[iv] SNH (2016). Guidance: Assessing Connectivity with Special Protection Areas (SPAs). SNH Battleby, UK