

Appendix 8.3
Ornithology

Appendix 8.3 Ornithology

Scope

1.1 This Appendix relates to the ornithological surveys undertaken to inform the Ecological Impact Assessment (EclA) of the EDM Project. The appendix includes an account of the scope of the surveys, the methods adopted, baseline findings and an interpretation of results. The appendix should be read in conjunction with **Chapter 8: Ecology and Ornithology** of the Environmental Impact Assessment Report (EIA REPORT).

1.2 For the purposes of this appendix, the EDM Project encompasses the construction of the New 132kV OHL and the removal of the Existing 132kV OHL. The project is described in detail in **Chapter 4: Project Description** of the EIA Report.

Supporting Documents

1.3 The Appendix is supported by a series of figures, in **Appendix A**. Figures include:

- **Figure 8.3.1: Study Area**
- **Figure 8.3.2: Ornithology Observation Points**
- **Figure 8.3.3: Viewshed Coverage**
- **Figure 8.3.4: Breeding Bird Territories**
- **Figure 8.3.5: Bird Flights Overview**
- **Figure 8.3.6 – 8.3.18 – Ornithology Observation Points – Detailed Findings**
- **Figure 8.3.17: Redshank Flights**
- **Figure 8.3.18: Geese and Swan Flights**
- **Figure 8.3.19: Curlew Flights**

Competency

1.4 All ornithology surveys were undertaken within appropriate seasonal windows in 2018 and 2019, by academically and professionally qualified JK Ecology ornithologists. The data has been assessed by ornithologists with extensive experience in interpreting ornithological data sets.

Methods Overview

1.5 The methods adopted in the survey, are outlined in detail below, comprising a desk study and:

- Breeding bird surveys.
- Flight activity surveys.

1.6 The range of survey methods adopted accord with best practice guidance produced by the Chartered Institute of Ecology and Environmental Managementⁱ and the British Standards Instituteⁱⁱ.

Desk Study

1.7 To provide additional background information, a study of available online resources, including SNH Site Linkⁱⁱⁱ and Renfrewshire SINC^{iv} websites, was undertaken to identify sites designated for their ornithological interest. A search was undertaken, within a 5km radius from the New 132kV OHL, for statutory designated sites, and within 2km of the New 132kV OHL for non-statutory designated sites. Inverclyde Council was approached for records of non-statutory sites within their jurisdiction, but a response was not forthcoming. The findings of this comprehensive Desk Study are detailed in **Technical Appendix 8.1 Habitats and Vegetation**.

Field Studies

Guidance

1.8 Scottish Natural Heritage (SNH) introduced new guidance covering power line projects in 2016^v. This guidance states that a minimum of one year of survey work is required for both new and replacement power lines. Replacement power line survey requirements are the same as that for new power lines due to replacement towers having a different structure from those they replace, and therefore presenting different risks to birds. There are also potential effects from the replacement works themselves on bird populations in the area.

1.9 Species which have the potential to be affected by OHLs in this area include raptors, waders and waterfowl. SNH's guidance states that survey work should span all times of the year when target species are present. Given the range of species potentially affected and the proximity of the EDM Project to several designated sites, it was concluded that all seasons would require thorough investigation; breeding season, autumn migration, winter, and spring migration.

1.10 The guidance also states that the principles and methods for designing a suite of bird surveys are similar to those recommended for wind farms^{vi}. Usually when surveying a potential onshore wind farm site this entails at least breeding bird surveys, raptor surveys and flight activity surveys. The following suite of surveys was therefore designed to allow for assessment EDM Project, following consultation and agreement with SNH.

Study Area

1.11 The New 132kV OHL is approximately 16km in length. SNH guidance^v states that, where the New 132kV OHL crosses or has connectivity with a protected area with bird qualifying features, then at least a 500m survey buffer should be applied to either side of the proposed route. Since the New 132kV OHL has possible connectivity to designated sites to the north and south, a 500m survey buffer along the entire 132kV OHL route was deemed appropriate.

1.12 The Ornithology Study Area is presented in **Figure 8.3.1** in **Appendix A**.

Breeding Bird Survey

1.13 A breeding bird survey was undertaken with the aim of identifying any areas of relatively high ornithological sensitivity.

1.14 Methods deployed were based on a combination of Brown and Shepherd upland bird surveys^{vii} and Common Bird Census (CBC)^{viii} for enclosed farmland and woodland areas.

1.15 The New 132kV OHL, plus a 500m buffer, was surveyed in each April, May, June and July, covering the whole breeding season. The Study Area took approximately five days to survey in its totality. Fieldwork was undertaken between 0830 and 1800 hours, i.e. dawn and dusk, thus avoiding the main periods of rapidly changing bird activity.

1.16 Standard BTO activity codes were used to note species, sex and age where possible, and to record activity such as singing or nest-building. Fieldwork was not undertaken in conditions considered likely to affect bird detection rates, for example in winds greater than Beaufort Scale Force 4, persistent precipitation, or poor visibility.

1.17 Surveys were undertaken from 23rd April to 13th July 2018 inclusive, encompassing one breeding season. Access to Drums Estate was not granted until late May, which meant that this section of ground was not surveyed during April. It was, however, surveyed in late-May, June and July.

1.18 **Table 2.1** summarises the survey dates and times for the breeding bird surveys undertaken.

Table 1.1: Breeding Bird Surveys

Date	Month	Section	Start Time	End Time	Duration
23/04/18	April	Devol Moor to Bardrainney	09:30	16:35	7.05
24/04/18	April	Bardrainney to Knockmountain	09:05	16:00	6.55
25/04/18	April	Knockmountain to Haddockston House	09:10	16:15	7.05
28/04/18	April	High Hatton to Drumcross	08:50	15:40	6.50

Date	Month	Section	Start Time	End Time	Duration
15/05/18	May	Drumcross to High Hatton	09:20	16:15	6.55
16/05/18	May	Haddockston House to Knockmountain	09:20	16:50	7.30
18/05/18	May	Knockmountain to Bardrainey	09:45	16:35	6.50
21/05/18	May	Bardrainey to Devol Moor	10:30	17:10	6.40
29/05/18	May	Drums Estate	08:05	15:15	7.10
11/06/18	June	Devol Moor to Bardrainey	09:20	16:50	7.30
13/06/18	June	Bardrainey to Knockmountain	09:00	15:20	6.20
18/06/18	June	Knockmountain to Haddockston House	10:20	17:00	6.40
20/06/18	June	Drums Estate	08:50	15:15	6.25
22/06/18	June	High Hatton to Drumcross	09:20	15:15	5.55
03/07/18	July	Drumcross to High Hatton	09:20	15:45	6.25
06/07/18	July	Drums Estate	08:40	14:15	5.35
11/07/18	July	Haddockston House to Knockmountain	08:35	15:30	6.55
12/07/18	July	Knockmountain to Bardrainey	09:15	16:40	4.25
13/07/18	July	Bardrainey to Devol Moor	09:20	16:00	6.40
Total					125 hrs 50 mins

Flight Activity Survey

1.19 Where designated sites, particularly SPAs, are located within close proximity to a development site, there is a requirement to assess any impacts on their qualifying interests^{vi}. It was agreed with SNH during consultation that a minimum of 72 hours of flight activity surveys should be carried out from a number of vantage point (VP) locations along the New 132kV OHL, spread throughout the year (six hours per VP per month) to help to inform this process.

1.20 A GIS viewshed analysis was carried out to identify VP locations which would give the best visual coverage of the New 132kV OHL plus the 500m buffer, as far as practically possible. Originally 12 VP locations were identified, but following discussions with SNH, it was agreed the VP viewsheds need only cover those sections of the survey corridor within 5km of a Wetland Bird Survey (WeBS) whooper or goose record because those are the species at greatest risk of collision with the New 132kV OHL. SNH also discounted any impacts on Renfrewshire Heights SPA, designated for its hen harrier population, and therefore proposed VPs 1-3, at the western end of the route, were never used. Using the most recent survey data available^{ix} these sections were identified as:

- Clyde Estuary 1 - Carts Mouth to Erskine Bridge (mute swan, Canada goose and greylag goose recorded).
- Clyde Estuary 2 - Erskine Bridge to West Ferry (mute swan, whooper swan, pink-footed goose, greylag goose, Canada goose recorded).
- Clyde Estuary 6 - Dunglass Castle to Dumbarton Rock (mute swan, Canada goose recorded).
- Clyde Estuary 8 - Cardross to Craigendoran Pier (mute swan, Canada goose, barnacle goose recorded).

1.21 This resulted in VP1, VP2 and VP3 being omitted, with VP4 to VP12 being taken forward, covering the majority of the New 132kV OHL. These locations were then ground-truthed to check their suitability, with some locations being modified or microsited to give the best view possible. Final VP locations are shown in **Figure 8.3.2** in **Appendix A**.

1.22 In some areas it proved difficult to find VP locations which were suitable due to the topography of the surroundings or the presence of mature woodland. As a result, some VPs were located in closer proximity to the New 132kV OHL than optimal, but overall the combination of VPs selected was considered to give the most complete visual coverage given the topography.

1.23 In April VP6, VP7 and VP8 were not surveyed due to access to Drums Estate being denied, but from May onwards, surveys from all nine VPs were carried out after access was granted.

1.24 In October 2018, the route of the New 132kV OHL was modified further west, therefore two new VPs were required to cover the additional section known as the 'High Hatton deviation'. VP7's bearing was altered to face in the opposite direction (north-west) to cover part of the deviation. This was renamed VP7b. An additional VP was required to cover the remainder of the deviation around 2km west of VP9. This was named VP9b.

1.25 The final VP locations are presented in **Table 2.2** and presented in **Figure 8.3.2** in **Appendix A**. Viewsheds are shown in **Figure 8.3.3** in **Appendix A**.

Table 1.2: Final Vantage Point Locations for Flight Activity Surveys

VP	National Grid Reference	Bearing (degrees)	Notes
4	235812 671752	220	Located within forestry block overlooking two reservoirs.
5	237231 670904	12	Overlooks farmland and new forestry/native woodland.
6	238941 671219	180	Located within Drums Estate. Surveyed from May onwards.
7	240744 671958	135	Located within Drums Estate. Surveyed from May to October inclusive but not required after High Hatton deviation finalised.
7b	240744 671958	315	Same location as VP7 but with opposite bearing. Undertaken from October onwards to cover High Hatton deviation. Part of viewshed overlaps Clyde Estuary.
8	241413 672167	315	Located within Drums Estate. Surveyed from May onwards. Part of viewshed overlaps Clyde Estuary.
9	241744 672828	180	Limited view due to topography and woodland.
9b	240386 672769	80	Undertaken from October onwards to cover High Hatton deviation. Part of viewshed overlaps Clyde Estuary.
10	242529 672205	30	Part of viewshed overlaps Clyde Estuary.
11	243867 672065	200	Overlooks farmland and urban conurbation of Bishopton.
12	244746 671295	210	View to the west restricted due to woodland.

1.26 Watches were undertaken during daylight hours, in conditions of good ground visibility. Visits were limited to three-hour maximum duration to avoid surveyor fatigue, with a minimum of 30 minutes between any two consecutive surveys. During watches, the viewing arc (not exceeding 180 degrees) was scanned constantly until a target bird or flock was detected in flight and, once detected, this was followed until it ceased flying or was lost from view. The time the bird or flock was initially detected and the time it spent within the survey area (to the nearest second) was recorded. The route followed by the bird or flock was plotted in the field on to a 1:25,000 scale map, with direction of flight indicated.

1.27 Following discussions with SNH, it was decided to limit target species to non-passerine species which are afforded a higher level of legislative protection, i.e. those from Annex 1 of the EC Birds Directive, Schedule 1 of the Wildlife and Countryside Act 1981, and/or Red-listed Birds of Conservation Concern (BOCC). Redshank were also included on the list of target species because the wintering population on the Inner Clyde is the qualifying feature of the SPA.

1.28 In addition, all goose and swan species were treated as target species as they are known to occasionally fly into OHLs due to their relatively large size and the fact that they tend to be less manoeuvrable in the air than some other species^v. As many are migratory species, their numbers can increase significantly during the autumn and winter months, when large numbers overwinter in the UK.

1.29 Four defined height bands were used when recording flights during flight activity surveys. These are presented in **Table 2.3**.

Table 1.3: Height Bands used for Flight Activity Surveys

Height Band No.	Height Band Range (metres above ground)	Description	Potential Collision Risk
1	0 to 10	Below risk height: from ground level to the height of the lowest hanging wire between two of the new OHL wood poles.	No
2	10 to 20	At risk height: the height above ground level of the lowest hanging cables between two new OHL wood poles to the top of one of the new OHL cables. Height band defined following discussion with SPEN over wood pole specification.	Yes
3	20 to 100	Above risk height: from the highest point of the OHL wood poles to 100m.	No
4	100+	High flying birds: All flights above 100m, e.g. high flying / soaring birds, migratory flocks, etc.	No

1.30 **Table 2.4** summarises the survey dates and times for the flight activity surveys undertaken.

Table 1.4: Summary of Flight Activity Survey Timings

Date	Month	VP	Start Time	End Time	Duration (hours)
18/04/2018	April	12	10:00	16:30	6
21/04/2018	April	4	09:30	16:00	6
26/04/2018	April	5	08:55	15:25	6
26/04/2018	April	11	12:15	19:00	6
29/04/2018	April	10	13:00	16:00	6
02/05/2018	April	9	09:45	16:15	6
11/05/2018	May	5	09:50	16:20	6
13/05/2018	May	4	10:40	17:10	6
22/05/2018	May	11	09:40	12:40	3
22/05/2018	May	12	13:15	16:15	3
23/05/2018	May	10	09:50	16:20	6
26/05/2018	May	9	07:55	14:25	6
27/05/2018	May	11	09:25	12:25	3
30/05/2018	May	12	09:10	12:10	3
30/05/2018	May	7	12:40	19:10	6
31/05/2018	May	6	09:30	16:00	6
31/05/2018	May	8	09:20	15:50	6
04/06/2018	June	4	09:10	15:40	6
05/06/2018	June	5	11:20	17:50	6

Date	Month	VP	Start Time	End Time	Duration (hours)
06/06/2018	June	10	09:20	15:50	6
07/06/2018	June	9	10:00	16:30	6
15/06/2018	June	12	09:45	16:15	6
25/06/2018	June	6	09:40	16:10	6
26/06/2018	June	11	09:50	12:50	3
26/06/2018	June	8	13:20	16:20	3
28/06/2018	June	8	10:25	13:25	3
29/06/2018	June	7	09:30	16:00	6
30/06/2018	June	11	11:00	14:00	3
02/07/2018	July	10	09:45	16:15	6
08/07/2018	July	12	10:45	17:15	6
14/07/2018	July	11	10:00	16:30	6
16/07/2018	July	5	09:45	16:15	6
21/07/2018	July	9	10:00	16:30	6
24/07/2018	July	8	09:50	16:20	6
30/07/2018	July	7	09:45	16:15	6
31/07/2018	July	4	10:00	16:30	6
01/08/2018	July	6	09:25	15:55	6
08/08/2018	August	9	09:00	15:30	6
09/08/2018	August	10	08:30	15:00	6
14/08/2018	August	5	09:45	16:15	6
16/08/2018	August	7	10:20	16:50	6
17/08/2018	August	4	10:00	16:30	6
22/08/2018	August	11	10:15	16:45	6
24/08/2018	August	12	09:40	16:10	6
27/08/2018	August	8	09:35	16:05	6
29/08/2018	August	6	10:00	16:30	6
04/09/2018	September	4	07:45	14:15	6
04/09/2018	September	10	14:45	17:45	3
05/09/2018	September	11	07:35	10:35	3
05/09/2018	September	7	11:05	17:35	6
07/09/2018	September	5	09:40	16:10	6

Date	Month	VP	Start Time	End Time	Duration (hours)
12/09/2018	September	9	09:45	16:15	6
17/09/2018	September	8	09:35	16:05	6
21/09/2018	September	11	12:50	15:50	3
24/09/2018	September	6	10:00	16:30	6
25/09/2018	September	12	09:25	16:05	6
30/09/2018	September	10	09:55	12:55	3
02/10/2018	October	4	13:00	16:00	3
04/10/2018	October	5	10:40	17:10	6
05/10/2018	October	9	10:00	16:30	6
18/10/2018	October	8	09:50	16:20	6
20/10/2018	October	11	09:55	16:25	6
23/10/2018	October	7	09:35	16:05	6
26/10/2018	October	4	08:30	10:30	2
26/10/2018	October	6	11:05	17:35	6
26/10/2018	October	12	10:25	17:15	6
27/10/2018	October	4	08:05	09:05	1
27/10/2018	October	10	10:00	16:35	6
30/10/2018	October	7B	09:30	16:00	6
31/10/2018	October	9B	10:00	16:30	6
07/11/2018	November	12	09:45	16:15	6
09/11/2018	November	5	09:30	16:00	6
12/11/2018	November	11	09:00	15:30	6
15/11/2018	November	4	13:00	16:00	3
16/11/2018	November	7B	09:15	15:45	6
19/11/2018	November	10	09:10	15:40	6
20/11/2018	November	9	09:15	15:45	6
21/11/2018	November	8	09:20	15:50	6
23/11/2018	November	6	09:15	15:45	6
26/11/2018	November	4	12:45	15:45	3
30/11/2018	November	9B	09:00	15:30	6
11/12/2018	December	12	09:50	12:50	3
12/12/2018	December	9B	09:05	15:35	6

Date	Month	VP	Start Time	End Time	Duration (hours)
14/12/2018	December	12	08:45	11:45	3
21/12/2018	December	9	09:00	15:30	6
22/12/2018	December	8	09:05	15:35	6
22/12/2018	December	5	08:15	14:45	6
24/12/2018	December	6	08:45	15:15	6
24/12/2018	December	11	09:05	15:35	6
27/12/2018	December	10	09:15	15:50	6
30/12/2018	December	4	09:15	15:45	6
31/12/2018	December	7B	09:10	15:40	6
02/01/2019	January	6	09:15	15:45	6
09/01/2019	January	5	09:20	15:50	6
13/01/2019	January	12	09:10	15:40	6
15/01/2019	January	10	09:40	16:10	6
17/01/2019	January	4	09:30	16:00	6
19/01/2019	January	11	11:30	17:00	6
23/01/2019	January	8	09:30	16:00	6
26/01/2019	January	11	13:00	14:00	1
27/01/2019	January	9	10:20	16:50	6
31/01/2019	January	9B	10:15	16:45	6
05/02/2019	February	7B	09:30	16:00	6
06/02/2019	February	10	09:40	16:10	6
10/02/2019	February	4	10:30	17:00	6
14/02/2019	February	9B	09:00	15:30	6
15/02/2019	February	6	09:35	16:05	6
17/02/2019	February	5	11:30	18:00	6
21/02/2019	February	11	07:20	10:20	3
21/02/2019	February	8	10:50	17:20	6
24/02/2019	February	9	10:30	17:00	6
26/02/2019	February	7B	07:35	14:05	6
26/02/2019	February	12	14:40	17:40	3
01/03/2019	March	12	10:05	13:05	3
01/03/2019	March	11	13:35	15:35	3

Date	Month	VP	Start Time	End Time	Duration (hours)
04/03/2019	March	5	10:15	16:45	6
07/03/2019	March	9	10:25	16:55	6
11/03/2019	March	10	09:45	16:15	6
12/03/2019	March	12	10:05	13:05	3
14/03/2019	March	4	09:45	16:15	6
15/03/2019	March	9B	10:00	13:00	3
20/03/2019	March	11	10:30	17:00	6
21/03/2019	March	12	10:00	13:00	3
21/03/2019	March	9B	13:40	16:40	3
25/03/2019	March	8	06:50	09:50	3
25/03/2019	March	7b	10:25	16:55	6
28/03/2019	March	8	08:00	11:00	3
28/03/2019	March	6	11:30	18:00	6

1.31 A total of 672 hours of survey effort was undertaken for the flight activity surveys from 18th April 2018 to 28th March 2019 inclusive. The spring / summer breeding season is generally defined as April to August inclusive and the autumn / winter non-breeding season as September to March inclusive. The total effort in each seasonal period was 252 hours in summer and 420 hours in winter.

Survey Limitations

General Constraints

1.32 All ornithological surveys represent a snapshot in time. Target species populations are dynamic and change over time in response to a range of variables. Data presented in this report should not be considered a long-term interpretation of ornithological data and should not be relied upon as such.

1.33 Of all the flight activity surveys, 12 were carried out simultaneously: two each on 26th April, 31st May, 26th October, 27th October, 22nd December and 24th December. In April and October, the flight activity surveys undertaken simultaneously were due to time restrictions resulting from poor weather conditions that month. All simultaneous flight activity surveys were more than 5km apart, at opposite ends of the New 132kV OHL route, with no overlap of viewshed. On 31st May however, surveys from VP6 and VP8 had to be undertaken simultaneously due to access to Drums Estate only being granted in the last few days of the month, creating a time constraint. There was a slight overlap of viewsheds (less than 10% at heights 3 and 4 only) but observers were more than 2km apart and not visible to each other. Observers were also in direct communication with each other should any flights pass through the area of overlap. In December, flight activity surveys were undertaken simultaneously due to poor weather earlier that month and the Christmas holidays making the time available for surveying shorter. There was no overlap of viewsheds while undertaking these surveys in December.

1.34 Due to poor weather conditions, there were occasions when flight activity survey hours had to be carried over into the following month. One each occasion hours carried over were undertaken as soon as possible in the first week of the following month, preferably within the first couple of days. This happened on the following times: in April, six hours at VP9 were carried over and completed on 2nd May; in July six hours at VP6 were carried over, being completed on the 1st August; six hours at VPb7 from January were carried over and undertaken on 5th February; and in March three hours each from VPs 11 and 12 were carried over from February and a total of six hours were completed on the 1st March.

High Hatton Deviation

1.35 A deviation to the New 132kV OHL near High Hatton was proposed by SPEN in September 2019. The new alignment sits closer to M8 motorway than the original route proposed. This deviation was proposed several months after the breeding bird season had finished. As a result, only the area which falls within the original Study Area near High Hatton has been surveyed for breeding birds. An assessment of the un-surveyed habitat was made and was found to be very similar to that within the original route. It was therefore concluded that the species likely to be present would be very similar or the same within the original Study Area and the deviation and, as such, this is unlikely to have a significant effect on the breeding survey results.

1.36 In terms of flight activity, the deviation may have little effect on the risk of collision with the New 132kV OHL because birds already gain height to avoid the motorway when flying from the Clyde Estuary to and from the neighbouring fields.

2018 Summer Weather

1.37 The summer of 2018 was one of the hottest summers since records began in the UK. Bird activity generally, even during the breeding season, tends to reduce during the middle of the day and then pick up again during mid-afternoon. This is why the order in which breeding bird survey routes are walked is reversed on each visit; as a way of 'evening out' bird sightings over the four survey visits. Similarly, flight activity surveys collect data from a spread of hours throughout the day.

1.38 It is not possible to say conclusively whether the hot summer weather in June and July 2018 lead to a higher-than-usual reduction in bird activity in the middle of the day, but at times it did feel quieter than 'usual'. It is assumed that any difference would not be significant. Indeed, on some days when temperatures were regularly reaching 28 degrees Celsius, a handful of surveys were stopped and completed later in the month as it became physically too demanding to continue with the survey.

1.39 The approach to data collection has provided a sufficiently robust data set, despite the limitation described above.

Desk Study

1.40 As detailed in **Technical Appendix 8.1: Habitats and Vegetation** an extensive desk study was undertaken to inform the EclA. The following sites designated for their ornithological interest were identified:

- Inner Clyde SPA/Ramsar/SSSI – designated for non-breeding redshank population – approx. 50m north (at closest point).
- Renfrewshire Heights SPA/SSSI – designated for breeding hen harrier – approx. 1.5km south.
- Black Cart SPA/SSSI – designated for non-breeding whopper swan population – approx. 3km east.

Breeding Bird Survey

1.41 The majority of the New 132kV OHL passes through agricultural pasture land, used either for silage production or livestock grazing, as well as some smaller areas of arable. The species associated with these areas tended to be corvids, wood pigeon (and occasionally stock dove), gulls, and common farmland passerines such as starling, chaffinch, goldfinch, skylark and occasional house sparrow. Less common farmland passerines recorded were reed bunting, yellowhammer and tree sparrow.

1.42 In the west of the Study Area are several areas of open moorland and heath, where several snipe and curlew territories were identified. Other typical species associated with these habitats included, meadow pipit, skylark and stonechat.

1.43 There are numerous areas of mature woodland, scrub and hedgerows within the Study Area. Typical species in these habitats included thrushes, tits, finches, great spotted woodpecker, treecreeper, buzzard, sparrowhawk, and kestrel. Summer migrants associated with these habitats included willow warbler, chiffchaff, blackcap, and whitethroat. Tree pipit was recorded within Knockmountain FCS forestry block.

1.44 The Study Area is less than 3km north of Renfrewshire Heights SPA; however, no hen harriers were observed during the breeding bird surveys.

1.45 Overall the species assemblages recorded were typical of those expected in the habitats present. The species recorded are presented in **Table 3.1**. Territories identified during the surveys are presented in **Figure 8.3.4** in **Appendix A**.

Table 1.5: Birds Recorded in the Breeding Season (including Conservation Status)

Species	Annex 1	Schedule 1	Birds of Conservation Concern (Red)	Birds of Conservation Concern Amber)
Peregrine	X	X	-	-
Osprey	X	X	-	X
Crossbill	-	X	-	-
Cuckoo	-	-	X	-
Curlew	-	-	X	-
Grasshopper warbler	-	-	X	-
Grey wagtail	-	-	X	-
Herring gull	-	-	X	-
House sparrow	-	-	X	-
Lapwing	-	-	X	-
Lesser redpoll	-	-	X	-
Linnet	-	-	X	-
Mistle thrush	-	-	X	-
Skylark	-	-	X	-
Song thrush	-	-	X	-
Starling	-	-	X	-
Tree pipit	-	-	X	-
Tree sparrow	-	-	X	-
Whinchat	-	-	X	-
Yellowhammer	-	-	X	-
Bullfinch	-	-	-	X
Common gull	-	-	-	X
Common redstart	-	-	-	X
Dunnock	-	-	-	X
Greylag goose	-	-	-	X
House martin	-	-	-	X
Kestrel	-	-	-	X
Lesser black-backed gull	-	-	-	X
Mallard	-	-	-	X
Meadow pipit	-	-	-	X

Species	Annex 1	Schedule 1	Birds of Conservation Concern (Red)	Birds of Conservation Concern Amber)
Mute swan	-	-	-	X
Reed bunting	-	-	-	X
Shelduck	-	-	-	X
Snipe	-	-	-	X
Stock dove	-	-	-	X
Swallow	-	-	-	X
Swift	-	-	-	X
Tawny owl	-	-	-	X
Wheatear	-	-	-	X
Whitethroat	-	-	-	X
Willow warbler	-	-	-	X
Black bird	-	-	-	-
Blackcap	-	-	-	-
Blue tit	-	-	-	-
Buzzard	-	-	-	-
Canada goose	-	-	-	-
Carrion crow	-	-	-	-
Chaffinch	-	-	-	-
Chiffchaff	-	-	-	-
Coal tit	-	-	-	-
Collared dove	-	-	-	-
Coot	-	-	-	-
Dunnock	-	-	-	-
Feral pigeon	-	-	-	-
Goldcrest	-	-	-	-
Goldfinch	-	-	-	-
Grasshopper warbler	-	-	-	-
Great crested grebe	-	-	-	-
Great spotted woodpecker	-	-	-	-
Great tit	-	-	-	-
Greenfinch	-	-	-	-

Species	Annex 1	Schedule 1	Birds of Conservation Concern (Red)	Birds of Conservation Concern Amber)
Grey heron	-	-	-	-
Jackdaw	-	-	-	-
Jay	-	-	-	-
Little grebe	-	-	-	-
Long-tailed tit	-	-	-	-
Magpie	-	-	-	-
Moorhen	-	-	-	-
Pheasant	-	-	-	-
Pied wagtail	-	-	-	-
Raven	-	-	-	-
Red-legged partridge	-	-	-	-
Robin	-	-	-	-
Rook	-	-	-	-
Sand martin	-	-	-	-
Sedge warbler	-	-	-	-
Siskin	-	-	-	-
Sparrowhawk	-	-	-	-
Stonechat	-	-	-	-
Treecreeper	-	-	-	-
Tufted duck	-	-	-	-
Wood pigeon	-	-	-	-
Wren	-	-	-	-

Flight Activity Surveys

1.46 Figure 8.3.5 in Appendix A provides an overview of recorded flight activity. Figures 8.3.6 – 8.3.16 in Appendix A present detailed findings from each observation point.

1.47 Eighteen target species were recorded during flight activity surveys. Herring gull was the species for which the greatest number of flights were recorded. Pink-footed goose was the species for which the highest number of individual birds were recorded (cumulative). Curlew was the species with the greatest number of individual birds at potential collision height and within 100m of the New 132kV OHL (802 individuals), termed 'at risk' flights. This is summarised in Table 3.2.

¹ 100m distance chosen to allow for micro-siting of the new 132kV OHL poles and takes into account the margin of error when plotting flight lines on maps in the field. This represents an increase to the usually 50m deviation zone usually applied on SPEN projects.

Table 1.6: Summary of Flight Activity (by Species)

Species	Total no. Flights	Total no. Constituent Birds Recorded	-of Which Were at Potential Collision Height	-of Which Came Within 100m of the New 132kV OHL ¹
Curlew	220	2,092	1,348	802
Greylag goose	70	1,390	671	457
Lapwing	40	1,095	782	257
Herring gull	865	1,538	424	195
Pink-footed goose	36	3,106	1,079	98
Peregrine	22	22	6	5
Osprey	21	24	8	3
Redshank	20	77	2	1
Red kite	4	4	1	1
Mute swan	11	19	1	1
Merlin	1	1	1	1
Common tern	57	168	32	0
Little egret	9	11	8	0
Woodcock	3	3	2	0
Whooper swan	9	56	0	N/A
Golden plover	1	1	0	N/A
Hobby	1	1	0	N/A
Canada goose	1	2	0	N/A

Species of Conservation Importance

1.48 Flight activity and breeding bird surveys between April 2018 and March 2019 identified 50 bird species that are either Annex 1, Schedule 1, or Red/Amber Birds of Conservation Concern (BOCC) within the Study Area and surrounding area. Table 3.3 presents the key species recorded in order of conservation significance and then by alphabetical order.

Table 1.7: Species of Conservation Importance Recorded During All Surveys

Species	Annex 1	Schedule 1	Birds of Conservation Concern (Red)	Birds of Conservation Concern (Amber)
Merlin	X	X	X	-
Whooper swan	X	X	-	X
Peregrine	X	X	-	-
Red kite	X	X	-	-
Common tern	X	-	-	X

Species	Annex 1	Schedule 1	Birds of Conservation Concern (Red)	Birds of Conservation Concern (Amber)
Golden plover	X	-	-	-
Little egret	X	-	-	-
Osprey	-	X	-	X
Crossbill	-	X	-	-
Hobby	-	X	-	-
Cuckoo	-	-	X	-
Curlew	-	-	X	-
Grasshopper warbler	-	-	X	-
Grey wagtail	-	-	X	-
Herring gull	-	-	X	-
House sparrow	-	-	X	-
Lapwing	-	-	X	-
Lesser redpoll	-	-	X	-
Linnet	-	-	X	-
Mistle thrush	-	-	X	-
Skylark	-	-	X	-
Song thrush	-	-	X	-
Starling	-	-	X	-
Tree pipit	-	-	X	-
Tree sparrow	-	-	X	-
Whinchat	-	-	X	-
Yellowhammer	-	-	X	-
Common gull	-	-	-	X
Common redstart	-	-	-	X
Duncock	-	-	-	X
Greylag goose	-	-	-	X
House martin	-	-	-	X
Kestrel	-	-	-	X
Lesser black-backed gull	-	-	-	X
Mallard	-	-	-	X
Meadow pipit	-	-	-	X

Species	Annex 1	Schedule 1	Birds of Conservation Concern (Red)	Birds of Conservation Concern (Amber)
Mute swan	-	-	-	X
Pink-footed goose	-	-	-	X
Redshank	-	-	-	X
Reed bunting	-	-	-	X
Shelduck	-	-	-	X
Snipe	-	-	-	X
Stock dove	-	-	-	X
Swallow	-	-	-	X
Swift	-	-	-	X
Tawny owl	-	-	-	X
Wheatear	-	-	-	X
Whitethroat	-	-	-	X
Willow warbler	-	-	-	X
Whitethroat	-	-	-	X

Species Accounts

1.49 The following sections present summary information for the 33 species observed during the breeding bird and flight activity surveys that are either listed on Annex 1 of the EC Birds Directive, Schedule 1 of the Wildlife and Countryside Act 1981, or are Red-listed Birds of Conservation Concern (BOCC) ('target species'. Amber-listed birds are not specifically included unless they are at risk of collision. Redshank is also included due to this species being a qualifying feature for the adjacent Inner Clyde SPA. Mute swan, greylag goose, pink-footed goose and Canada goose are also included in this section despite being neither Annex 1, Schedule 1 nor Red-listed BOCC. All goose and swan species were, however, treated as target species as they are known to occasionally fly into overhead lines, are large birds which tend to be less manoeuvrable than other species, and their numbers can increase significantly during the autumn and winter months, when large numbers overwinter in the UK'.

1.50 The species accounts below are listed in order of number of 'at risk' flights in descending order, then BOCC Red and Amber species in alphabetical order. Species with no additional conservation designation are not discussed in the species accounts.

1.51 Species data and background information was drawn from a number of published resources^{ix,x,xii}.

Curlew

1.52 This resident species was seen regularly from flight activity surveys, especially from those VPs which are situated close to the Clyde Estuary. A total of 220 flights were observed, comprised of 2,092 individual birds, 1,348 of which were at potential collision height. Of those individuals at potential collision height 802 were within 100m of the New 132kV OHL.

1.53 Only 21 of the 220 flights recorded occurred during the breeding season (March to August inclusive) the rest being recorded during the autumn / winter season. One hundred and twelve flights were observed from VP9b, which represents just over half of all the curlew flights across the Study Area. Of the 112 curlew flights recorded from VP9B, 53 were 'at risk', i.e. both at potential collision height and within 100m of the New 132kV OHL. This amounts to 460 individuals with collision potential at this location.

1.54 Along with VP9B, VPs 7B, 8 and 9 also have viewsheds which overlook the High Hatton area. When considering data from only VPs 7B, 8, 9 and 9B, 796 were 'at risk', i.e. both within 100m of the New 132kV OHL and at potential collision height. This total number of individuals were from 63 flights recorded between October and March inclusive. Only five 'at risk' flights were observed from the remaining six VPs which overlooked other sections of the Study Area, totalling six individuals.

1.55 Two curlew territories were identified during the breeding bird surveys, both situated in the western end of the Study Area. One territory was within 500m of Devol Moor Substation and the other in an area of moorland south of Port Glasgow Golf Club.

1.56 There was a greater area of viewshed at the High Hatton deviation due to the close relative locations of VP8, VP9, and VP9B. Whilst there is a possibility of some overcounting of use in this area of the corridor, it is unlikely to skew the interpretation of the data as this habitat is suitable for curlew. Combined with the close proximity of the Inner Clyde, it is to be expected that curlew would be present in this area in higher numbers than many other locations along the route.

Information Relevant to Assessment of 'Ecological Importance'

1.57 Curlew is currently Red-listed on the UK Birds of Conservation Concern list, due to a long-term breeding population decline. The UK curlew breeding population is approximately 66,000 pairs. WeBS data for the Clyde Estuary during the autumn/winter of 2015 to 2016 showed a total of 5,862 curlew present within 5km of the EDM Project during the non-breeding season. The largest single flock size observed during EDM Project flight activity surveys was 91 birds, which represents 1.55% of the latest available non-breeding data.

Information Relevant to Impact Assessment

1.58 Two curlew breeding territories were identified within the Study Area in 2018 and only 7.7% of curlew flights were recorded during the breeding season. The Study Area is therefore not considered to be of high importance to breeding curlew, and indeed alternative breeding habitat is present in the surrounding area should these pairs become displaced. The extent of any disturbance on the local breeding population due to construction activities associated with the New 132kV OHL is likely to extend no further than the immediate area around a disturbance source along the route. Even with a 'worst case scenario' of total displacement along the New 132kV OHL, the impact on breeding curlew is predicted to be of local spatial extent and of short-term duration.

1.59 The latest estimate of the UK wintering curlew population is 120,000 individuals. The majority of curlew flights recorded occurred outside the breeding season (92.3%). Many of these were of birds flying between the Clyde Estuary and nearby agricultural fields through which the Study Area passes, particularly around High Hatton. It is likely that disturbance related to construction activities associated with the New 132kV OHL will displace curlew feeding in fields near the route. While there are numerous agricultural fields in the immediate and wider area, it is possible that wintering curlew prefer the fields around High Hatton because of their close proximity to the estuary, to which birds can make a short flight to continue feeding once tidal conditions have reduced their ability to forage foraging on the mudflats. It is possible that the quality of the feeding opportunities on offer in the High Hatton fields may also be of particular importance to curlew locally. This is a ground nesting wader and could therefore be at risk of being disturbed or destroyed during construction of the New 132KV OHL should it be undertaken in the breeding season. It is possible therefore that disturbance here by construction activities could have an impact on the local wintering population by reducing the area of foraging habitat available to them. This will however be short-term while the construction activities are ongoing. The area around High Hatton was heavily used by curlew between October and March. Birds flew from the estuary (usually at high tide) to feed in adjacent agricultural fields, often making short flights between fields when disturbed by farming activities or flushed by raptors. Birds would then start to make return flights back onto mudflats once tidal conditions began to change. The New 132KV OHL which will pass through some of the fields preferred by feeding curlew may therefore present a collision risk to birds undertaking these regular flights between these fields and to/from the estuary. Curlew are relatively large waders but are also fairly manoeuvrable in flight, but they were found to congregate in medium sized flocks when feeding in fields close to the estuary. When flushed, they tended to rise up and fly away in one group, before circling round and landing again. It is this kind of behaviour which can lead to collisions with overhead lines, rather than birds flying singly or in low numbers. It is therefore recommended that earth wires are marked along the section of new line and in this general area, in order to increase its visibility and reduce the risk of collision.

Greylag Goose

1.60 A total of 70 greylag goose flights comprising 1,390 individual birds were recorded during the flight activity surveys. Of those 70 flights, 20 were at potential collision height, comprising 671 individuals, 457 of those individuals being within 100m of the New 132kV OHL. Greylag goose therefore represents the second highest number of 'at risk' flights.

1.61 A mixed flock of greylag geese and pink-footed geese was recorded on the 22nd December 2018 from VP8. The individuals of both species have been included in this account and in the pink-footed goose account.

1.62 While greylag goose breeds in the UK, the resident population increases by approximately 88,000 birds from Iceland which over-winter in the UK. This species was only recorded in the autumn and winter during flight activity surveys with no spring or summer flights observed. It was, however, recorded on several occasions during breeding bird walkover surveys.

Information Relevant to Assessment of 'Ecological Importance'

1.63 WeBS data for the Clyde Estuary during the autumn/winter of 2015 to 2016 shows a total count of 866 birds present within 5km of the Study Area. The largest single flock size observed during flight activity surveys was 180 birds, feeding in fields, which represents 20.8% of the latest available non-breeding data.

1.64 Greylag goose is currently Amber-listed on the UK Birds of Conservation Concern list. The UK greylag goose breeding population is approximately 46,000 pairs.

Information Relevant to Impact Assessment

1.65 No greylag goose breeding territories were identified within the Study Area and no flights were recorded during breeding season. It is therefore considered highly unlikely that the EDM project would have any impact on breeding greylag goose.

1.66 The latest estimate of the UK wintering population is 231,000 individuals. All of the 70 greylag flights recorded occurred during the winter months. Of the total number of individuals that make up these 70 flights (1,390), 32.9% were at both collision height and within 100m of the New 132kV OHL and therefore deemed 'at risk'. It is possible that collision with the New 132kV OHL may occur as geese are well known to be at increased risk of collision with powerlines as they are large, heavy birds with high wing loading and low manoeuvrability. With their habit of flying in flocks, greylag geese, like other goose species, have an increased chance of colliding with conductors, or more commonly, earth wires. This is due to the earth wires' reduced diameter and therefore visibility, compared to conductors which tend to be more visible to birds in flight. Flock sizes of greylags deemed 'at risk' along the New 132kV OHL have been relatively small to medium in size, no greater than 130 birds with most flocks numbering approximately 30 to 50 individuals. The fields and flight paths used by greylag geese along the New 132kV OHL are therefore considered to be of medium use and as such represent a low risk of collision. Disturbance caused by construction activities along the New 132kV OHL route is likely to be short-term even if undertaken during the winter months when birds are present. It is also considered that any disturbance to greylag geese caused during the installation of the New 132kV OHL is likely to be relatively low in relation to that regularly caused by farming activities or hunting / stalking within the local area. Even with a 'worst-case scenario' of total displacement along the EDM Project route, the impact on greylags is predicted to be of local spatial extent and of short-term duration.

Lapwing

1.67 During flight activity surveys, 40 flights by lapwing were recorded, 34 of which were between September and February inclusive. The 40 flights were comprised of 1,095 individual birds, with 257 individuals being recorded both at potential collision height and within 100m of the New 132kV OHL. Of the 40 flights recorded, 34 were from VPs which either overlook or are in close proximity to the Clyde Estuary. Of these 34 flights, the majority involved birds making low flights over the estuary itself or flying to / from the estuary to feed in neighbouring fields. This was particularly the case around the High Hatton area. The largest flock size recorded was of 170 birds on 27th October, observed from VP10, flying down to fields around 400m north of the New 132kV OHL. Another large flock (120 birds) was also recorded from VP10 on the 27th December flying to the same flooded fields on the edge of the estuary to the north of the vantage point.

1.68 The only record of lapwing during the breeding bird surveys was of a single pair displaying over ploughed fields south of Bardrainney during the April visit.

Information Relevant to Assessment of 'Ecological Importance'

1.69 WeBS data for the Clyde Estuary during the autumn/winter of 2015 to 2016 shows a total count of 2,751 birds present within 5km of the New 132kV OHL. The largest single flock of lapwing observed during flight activity surveys was 170 birds, which represents 6.18% of the latest available non-breeding data.

1.70 Lapwing is currently Red-listed on the UK Birds of Conservation Concern list, due to a severe decline in UK breeding population size (>50%) over 25 years as well as a long-term breeding population decline. The UK lapwing breeding population is approximately 130,000 pairs. Lapwing is also a priority species in the Renfrewshire Local Biodiversity Action Plan. However, it is acknowledged that only low numbers of birds were recorded within the Study Area during the spring/summer season.

Information Relevant to Impact Assessment

1.71 The Study Area is not considered to be of high importance to breeding lapwing, and indeed there is alternative breeding habitat present in the surrounding area should the single pair become displaced. It is considered that the extent of any disturbance on the

local breeding population due to construction activities associated with the EDM Project will extend no further than the immediate area around a disturbance source along the route.

1.72 Even with a 'worst case scenario' of total displacement along the New 132kV OHL during construction, the impact on breeding lapwing is predicted to be of local spatial extent and of short-term duration on one pair.

1.73 The latest estimate of the UK wintering population of lapwing is 620,000 individuals. 85% of all lapwing flights were recorded during the non-breeding season. The average flock size was approximately 30 birds but on two occasions large flocks numbering 120 and 170 birds were observed. All except three flights recorded during the non-breeding season were observed from VPs which have viewsheds either overlooking the Clyde Estuary or agricultural land adjacent to it, indicating the attractiveness of this area to lapwing. This area which is made up of intertidal mudflats, permanent pasture and silage fields stretches from the fields and estuary immediately east and north-east of VP9B, to the east towards Longhaugh Point which lies to the north-east of VP10. This is a ground nesting species and therefore could be at risk of being disturbed or nests destroyed during construction of the New 132kV, should it take place in the breeding season. The Study Area passes through this area and there is therefore a likelihood of disturbance to wintering lapwing should construction be undertaken in the non-breeding season. However, any disturbance is likely to be short-term and displaced lapwing will have ample alternate foraging areas, especially the large, seasonally flooded fields around Longhaugh Point which are on the northern side of the M8 motorway and therefore free from disturbance from any works undertaken during the construction of the New 132kV OHL.

1.74 It is considered unlikely that collision with New 132kV OHL by lapwing presents a risk. Lapwing are well known for their aerial agility and should be able to take avoiding action to prevent collisions. Marking of earth wires along this section is strongly recommended to increase the visibility of the New 132kV OHL, and will not just benefit lapwing, but other bird species as well.

Herring Gull

1.75 This resident, large gull species was the most regularly recorded during flight activity surveys. Flights were recorded every month across the Study Area, with VP9, VP10 and VP12 having the greatest number of flights, and VPs 5, 6 and 7 having the least. Regarding temporal variation, flight activity surveys between September to February recorded the greatest number of flights, making up 68.9% of the total. This is most likely due to the annual increase in herring gull numbers outside of the breeding season as birds migrate to the UK from more northerly populations.

1.76 A total of 865 flights were observed, comprising 1,538 individual birds, 424 of which were at potential collision height. Of those individuals at potential collision height 195 were within 100m of the New 132kV OHL.

1.77 Herring gull was recorded regularly during breeding bird surveys, usually flying over the survey area. No herring gulls were found to be breeding within the survey area.

Information Relevant to Assessment of 'Ecological Importance'

1.78 WeBS data for the Clyde Estuary during the autumn/winter of 2015 to 2016 shows a total count of 2,455 birds present within 5km of the Study Area. The largest single flock of herring gull observed during flight activity surveys was 25 birds, which represents 1.02% of the latest available non-breeding data. The majority of herring gulls observed during the non-breeding season tended to be individual birds moving up and down the Clyde estuary and therefore at some distance from the majority of the New 132kV OHL. Although herring gull is currently Red-listed on the UK Birds of Conservation Concern list, due to a large long-term decline in breeding and wintering numbers, no herring gulls bred within the breeding bird Study Area as there were no suitable nesting sites, with the habitats mainly being comprised of agricultural land, scrub, woodland and forestry.

Information Relevant to Impact Assessment

1.79 During flight activity surveys in the breeding season, a total of 194 herring gull flights were recorded, which represents 22.4% of total herring gull flights. Less than a third of these were 'at risk', the majority taking place along the Clyde Estuary and therefore well away from the New 132kV OHL. It is therefore considered highly unlikely that the EDM project would have any impact on breeding herring gull.

1.80 The latest estimate of the UK wintering herring gull population is 730,000 individuals. As mentioned above, the majority of all herring gull flights were observed during the non-breeding season (77.6%), but of the 671 non-breeding season flights only 87 were 'at risk'. As per the breeding season flights, many of the herring gull flights involved birds flying along the Clyde Estuary a distance away from the New 132kV OHL. There were few instances where herring gulls flew down to or from fields along the New 132kV OHL, with most birds flying over the area either towards the estuary or moved away inland, most likely to other large waterbodies. It is

therefore considered unlikely that herring gulls will be adversely affected or displaced by disturbance associated with the construction of the New 142kV OHL. Even with a 'worst-case scenario' of total displacement along the New 132kV OHL, the impact on wintering herring gull is predicted to be negligible. While collision is always a possibility, especially for a relatively large bird such as herring gull, the risk to the local non-breeding population is considered to be low given the small number of flights deemed at risk during the autumn and winter months.

Pink-footed Goose

1.81 A total of 36 flights comprised the highest total of individual birds for any species during flight activity surveys, totalling 3,106 individuals. Of this individual total 1,079 were recorded at potential collision height. Of those individuals at potential collision height, 98 were within 100m of the New 132kV OHL.

1.82 Pink-footed geese are an over-wintering species in the UK and were only recorded between November and February.

Information Relevant to Assessment of 'Ecological Importance'

1.83 Pink-footed goose is currently Amber-listed on the UK Birds of Conservation Concern list. The UK wintering population is approximately 510,000 individuals. WeBS surveys undertaken during the autumn/winter of 2015 to 2016 did not record any pink-footed geese. Though Pink-footed geese are a regular winter visitor to Scotland, there is no local reference population to compare against it. As such, the precautionary principle will be applied. It is recommended ecological importance is assigned at 'Local Level' for non-breeding birds.

Information Relevant to Impact Assessment

1.84 As an overwintering species, pink-footed goose was only recorded between November and February. Despite its short, four-month visit to the area, this species had the highest total number of individual birds recorded, 3,106, from the 36 flights observed. Only two flights were found to be 'at risk'. Pink-footed goose flights did on a number of occasions contain a large number of birds, 750 being the largest, and were often flocks visible on the edge of the viewshed, a kilometre or more away from the New 132kV OHL, or flying at an altitude of more than 100m. Two areas in particular were regular feeding areas for this species; the seasonally flooded fields south of Longhaugh Point close to the Clyde Estuary and fields approximately 1km south of Erskine substation. It is therefore considered that pink-footed geese represent a low risk of collision given that there were only a small proportion of individuals found to be 'at risk' and feeding tended to occur well away from the New 132kV OHL. Given the above, it is also unlikely that pink-footed geese will be affected by disturbance during construction activities and if any birds were to be displaced there is ample feeding opportunities for them in the wider area.

Peregrine

1.85 A total of 22 flights were recorded for this resident species during flight activity surveys, always of a single bird hunting. Apart from three 'inland' sightings from VP4, VP5 and VP6 the majority of the flights were from VPs overlooking or close to the Clyde Estuary. Six flights were at potential collision height, five of those being within 100m of the New 132kV OHL.

1.86 A single peregrine was observed hunting during the breeding bird surveys, to the west of Devol Moor Substation on 3rd July. Only two of the peregrines observed during flight activity surveys were recorded during the breeding season, in April and June respectively, with the remainder of sightings from August to March. There are two large quarries located to the north of the Study Area which have the potential to provide suitable nesting habitat for this species. There is also a series of crags in the Kilpatrick Hills, to the north of the Clyde Estuary, which could also provide suitable nesting habitat. There was no evidence of peregrine breeding anywhere near the Study Area itself.

1.87 The estuary is likely to be a prime hunting ground for peregrine due to the number of waders, ducks, gulls and terns present at different times of the year. Seven of the 22 flights were recorded from the VPs whose viewsheds overlook the Clyde Estuary (VPs 7B, 8, 9B and 10). This included a sighting on 31st October from VP9B when a single individual was observed flushing waders and ducks off the mudflats and then continuing to hunt across farmland inland.

Information Relevant to Assessment of 'Ecological Importance'

1.88 Peregrine is listed in Annex 1 of the Birds Directive and under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). However, given the low number of birds recorded, the ecological importance is likely to be reduced.

Information Relevant to Impact Assessment

1.89 The UK breeding population is approximately 1,769 pairs. There are no suitable breeding sites for peregrine within the Study Area and during flight activity surveys 22 flights were recorded, all by single birds, of which five were 'at risk'. Peregrine are fast, highly agile flyers, well known for their dashing, stooping flights in chase of prey. Raptors, in general, tend to be infrequent casualties of overhead powerlines due to their low wing loading and high manoeuvrability. The raptor casualties that do occur are often larger, longer winged species such as eagles, or higher wing loading / less manoeuvrable species such as vultures and condors. It is therefore considered highly unlikely that peregrine will collide with the New 132kV OHL and disturbance/displacement is thought to be negligible given the lack of breeding sites close to the route.

Osprey

1.90 This summer migrant was recorded 21 times from seven different VPs from June to September inclusive. The 21 flights were comprised of a total of 24 individuals, only three of which being at potential collision height and within 100m of the New 132kV OHL. Four of the total number of osprey flights were observed from the 'inland' VPs; VP4, VP5 and VP6. The remaining 17 flights were from VPs overlooking the estuary or situated close to it.

1.91 There was a noticeable increase in flight activity by osprey from August onwards, most likely due to an increased demand for food by nestlings within the wider area (ospreys will regularly hunt within a 20-mile radius of breeding sites). Birds were regularly seen carrying fish to the north of the Clyde, but also to the west and south-west. It is estimated that two or three pairs used the estuary and other waterbodies near the Study Area to forage.

1.92 On two occasions ospreys were observed perching on navigation towers and buoys within the central channel of the Clyde waiting for the incoming tide before commencing fishing. A single osprey was recorded perching on a navigation tower on 27th August and three ospreys were perched on the same navigation tower on 4th September, before being flushed by a passing cargo ship.

1.93 Several individual sightings of birds were made during the breeding bird surveys, but there was no evidence of this species breeding within or close to the Study Area.

Information Relevant to Assessment of 'Ecological Importance'

1.94 Osprey is listed under Annex 1 of the Birds Directive and Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). However, ecological importance is considered to be limited for this summer migrant due to the low numbers of birds recorded within the Study Area.

Information Relevant to Impact Assessment

1.95 The UK breeding population is approximately 200 pairs. No osprey territories were recorded during breeding bird surveys but flight activity surveys did show that more than one pair of osprey used the River Clyde for foraging. While several flights were deemed 'at risk', ospreys, and other raptor species, tend to have low wing loading, are highly manoeuvrable and collisions with overhead lines is not considered to be a significant mortality factor. It is therefore considered highly unlikely that the New 142kV OHL will have any impact on the local osprey breeding population and disturbance/displacement caused by construction activities is considered to be negligible.

Redshank

1.96 The Inner Clyde SPA, for which the species is a qualifying feature, is home to 1,918 wintering redshank, representing at least 1.3% of the wintering Eastern Atlantic population (winter peak mean). Monitoring carried out in 2007/08 recorded a low tide maximum of 1,864 individuals.

1.97 A total of 20 flights were recorded from flight activity surveys between April 2018 and March 2019, all occurring between October and February. Only one redshank flight was recorded at both potential collision height and within 100m of the New 132kV OHL, occurring on 30th November from VP9B. The flight was of a single bird flying with a small flock of lapwing, landing within 100m of the New 132kV OHL. The majority of redshank observed during flight activity surveys were feeding, with occasional low flights, on the mudflats to the north of VP9B.

1.98 No redshank were recorded during the breeding bird survey.

Information Relevant to Assessment of 'Ecological Importance'

1.99 Redshank is currently Amber-listed on the UK Birds of Conservation Concern list, due to a moderate decline in UK breeding and wintering population.

1.100 Part of the Study Area overlaps the edge of the Inner Clyde SPA which is designated for its internationally important non-breeding population of redshank. WeBS data for the Clyde Estuary during the autumn/winter of 2015 to 2016 shows a total count of 4,521 birds present within 5km of the Study Area. The largest single flock of redshank observed during flight activity surveys was 12 birds, which represents 0.27% of the latest available non-breeding data.

1.101 The UK breeding population is approximately 24,000 pairs. However, no redshank breeding territories were identified within the EDM Project survey area and no flights were recorded during breeding season.

Information Relevant to Impact Assessment

1.102 The latest estimate of the UK wintering population is 94,000 individuals. Redshank is listed as a qualifying feature on the Inner Clyde SPA due to its wintering population. The Inner Clyde SPA is home to 1,918 wintering redshank, representing at least 1.3% of the wintering Eastern Atlantic population (winter peak mean). Monitoring carried out in 2007/08 recorded a low tide maximum of 1,864 individuals. A total of 20 redshank flights were observed, all occurring during the autumn and winter. One flight, made up by a single individual, was 'at risk'. Despite the importance of the Inner Clyde SPA to wintering redshank very few were recorded from vantage points which overlooked the estuary. Of those that were recorded making flights, most were short, brief and located over mudflats, well away from the New 132kV OHL. Therefore, the likelihood of disturbance from construction activities is very low to negligible, especially for birds feeding on the estuary, as only a couple of birds were ever seen flying to / from farmland adjacent to the New 132kV OHL. It is also considered that the risk of collision is low due to the infrequency of redshank flights at collision height and in close proximity to the route. Even with a 'worst-case scenario' of total displacement along the New 132kV OHL, the impact on wintering redshank is predicted to be of local spatial extent and of short-term duration.

1.103 Given the lack of any breeding birds recorded, it is considered highly unlikely that the New 132kV OHL would have any impact on breeding redshank. However, as a ground-nesting bird known to be in large numbers in the wider vicinity, any works undertaken during the breeding season could result in disturbance or destruction.

Red Kite

1.104 Four red kite flights were recorded crossing the Study Area, all by single birds foraging over farmland. One of these flights, observed on 29th August from VP6, was both at potential collision height and within 100m of the New 132kV OHL.

1.105 No red kites were observed during the breeding bird surveys.

Information Relevant to Assessment of 'Ecological Importance'

1.106 Red kite is listed in Annex 1 of the Birds Directive and under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). However, the low number of birds recorded suggests the Study Area is of limited importance.

Information Relevant to Impact Assessment

1.107 The UK breeding population is approximately 1,600 pairs. As no red kite territories were recorded during breeding bird surveys, and as only two out of a total of four flights observed during flight activity surveys were recorded during the breeding season, it is considered highly unlikely that the New 132kV OHL would have any impact on breeding red kites.

1.108 The same can be said of the impact on red kite during the non-breeding season, since the nearest known resident population is located approximately 40km north east in Stirlingshire.

Mute Swan

1.109 There was a total of 11 flights, comprising 24 individuals were recorded for this species. Only one of the total number of flights was at potential collision height and also within 100m of the New 132kV OHL. All but one of the 11 flights were observed from 'coastal' VPs (i.e. VP7b, VP8, VP9, VP9b and VP10), the single 'inland' flight being recorded from VP4 on 30th December.

1.110 This species was recorded during breeding bird surveys with a pair recorded breeding successfully on both Leperstone and Auchendores reservoirs which VP4 overlooks.

Information Relevant to Assessment of 'Ecological Importance'

1.111 Mute swan is currently Amber-listed on the UK Birds of Conservation Concern list, due to the UK wintering population being of international importance. WeBS data for the Clyde Estuary during the autumn/winter of 2015 to 2016 showed a total of 241 mute swan present within 5km of the EDM Project during the non-breeding season. The largest single flock size observed during flight activity surveys was three birds, which represents 1.24% of the latest available non-breeding data.

1.112 The UK breeding population is approximately 6,000 pairs. Two mute swan breeding territories were identified within the Study Area, both on large waterbodies west of VP4. However, no flights by mute swan were observed during the breeding season.

Information Relevant to Impact Assessment

1.113 It is recognised that the most common cause of mute swan death in the UK is collision with powerlines. Swans, like geese, are large bodied, heavy birds with high wing loading and are therefore less manoeuvrable in the air and susceptible to colliding with overhead lines. The Existing 132kv OHL runs between the two waterbodies (Leperstone and Auchendores reservoirs) where mute swan bred in 2018. Mute swans are likely to be accustomed to the Existing 132kv OHL but the height of the conductors will be slightly lower than those on the existing steel towers (14-16m on New 132kv OHL, 20m on Existing 132kv OHL). It would be recommended to mark earth wires around Leperstone and Auchendores reservoirs, helping to reduce the risk of collision here.

1.114 The latest estimate of the UK wintering population is 50,000 individuals. All of the 11 flights observed during flight activity surveys occurred during the autumn and winter, with a single flight 'at risk'. Only one flight by mute swan was observed between the two reservoirs during the breeding season but this was not 'at risk'. All other mute swan flights observed were associated with the Clyde Estuary, either birds flying along the estuary or making flights towards or away from it. Mute swan is therefore considered at low risk of collision with the New 132kV OHL, but it is recommended that earth wires are marked to reduce the risk of collision on sections of EDM Project route adjacent to the Clyde Estuary.

1.115 It is possible that disturbance may be an issue at Leperstone and Auchendores reservoirs, if works take place during the breeding season. Tolerance to disturbance varies from pair to pair and will depend on a range of factors such as distance from nest to disturbance source, visibility of disturbance as well as extent and duration of any noise. It is likely, therefore, that any disturbance to mute swan will be limited to two pairs, both of which have ample habitat in which to nest should construction of the New 132kV OHL take place during the breeding season.

Merlin

1.116 A single flight was recorded of a male on 4th March from VP5, hunting over farmland and forestry at potential collision height within 100m of the New 132kV OHL. There is no suitable breeding habitat present within the Study Area and merlin were not recorded during the breeding bird survey. This was likely a bird returning to breeding grounds, the closest being within the Renfrewshire Heights SPA, which is approximately 3km from the New 132kV OHL at its closest point.

Information Relevant to Assessment of 'Ecological Importance'

1.117 Merlin is listed in Annex 1 of the Birds Directive and under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). Merlin is currently Red-listed on the UK Birds of Conservation Concern list, due to a historical decline in the breeding population. Given the single record for merlin, the ecological importance for this species is limited.

Information Relevant to Impact Assessment

1.118 The UK breeding population is approximately 1,100 pairs. No merlin were recorded during breeding bird surveys and the habitat within the Study Area is unsuitable. During flight activity surveys one flight by a single merlin was recorded in early March 2019, and this was 'at risk'. However, due to their small size and highly agile flight, it is considered highly unlikely that the New 132kV OHL would have any impact on merlin, either in the breeding season or non-breeding season.

Common Tern

1.119 A total of 56 flights were recorded of this summer breeding migrant, comprised of 149 individuals. While there were several flights observed at potential collision height, all flights were observed over the Clyde Estuary from May to August and were associated with breeding birds nesting along the Clyde. None of these flights were within 100m of the New 142kV OHL.

1.120 An old concrete pier support around 1km west of Dunglass Castle on the northern side of the river was used by around 20 to 30 pairs of common terns as a nesting platform and was visible from VP10.

1.121 No common tern were observed during the breeding bird surveys.

Information Relevant to Assessment of 'Ecological Importance'

1.122 Common tern is listed in Annex 1 of the Birds Directive and is Amber-listed in the UK Birds of Conservation Concern list due to the concentration of breeding localities within the UK. The species is a summer visitor to the UK, breeding in colonies at coastal sites and also inland. Only one breeding colony was observed at the edge of the Study Area.

Information Relevant to Impact Assessment

1.123 The UK breeding population is approximately 200 pairs. No common tern territories were recorded during breeding bird surveys, although a breeding colony numbering 20 to 30 pairs was situated approximately 1km north of the New 132kV OHL within the VP10 viewshed. None of the individual birds recorded during flight activity surveys were 'at risk' and all flights took place along the Clyde Estuary where birds would forage exclusively, with no birds observed flying inland. Due to their feeding and breeding habits it is therefore considered highly unlikely that the New 132kV OHL would have any impact on common tern during the breeding season. They are also extremely unlikely to be affected by disturbance during the construction of the New 132kV OHL if this took place during the breeding season when common tern is present.

Little Egret

1.124 There was a total of nine little egret flights observed. This species remains a scarce but increasingly recorded species in Scotland, mainly in the winter. All but two flights were of single birds, the others being comprised of two individuals, and all flights were associated with the Clyde Estuary. Eight flights were at potential collision height, but none were within 100m of the New 132kV OHL.

1.125 Little egret was not observed during the breeding bird surveys.

Information Relevant to Assessment of 'Ecological Importance'

1.126 Little egret is listed in Annex 1 of the Birds Directive. A recent colonist of the UK, little egret is gradually increasing its range northwards. As so few little egrets were observed during the surveys, the Study Area is unlikely to be of particular ecological importance for the species.

Information Relevant to Impact Assessment

1.127 Little egret was not recorded during breeding bird surveys within the Study Area. The UK breeding population is approximately 700 pairs and they are not currently known to breed in Scotland. It is therefore considered extremely unlikely that the New 132kV OHL would have any impact on breeding little egret.

1.128 The latest estimate of the UK wintering population is 11,000 individuals. All 11 little egret flights observed during flight activity surveys occurred during the autumn and winter, although none were 'at risk'. This species tends to be associated with coastal, intertidal and wetland habitats during the non-breeding season and so the likelihood of risk posed to little egret by the New 132kV OHL is considered to be negligible. Disturbance from construction activities is also likely to be negligible.

Woodcock

1.129 Three flights were recorded for this species, in December and January only, with each flight consisting of a single bird. None of these flights were at potential collision height. There is an annual influx of woodcock into the UK in the autumn of birds from the continent.

1.130 This species was not recorded during breeding bird surveys; although there appeared to be suitable breeding habitat present within the BBS survey buffer, mainly in woodland within Drums estate.

Information Relevant to Assessment of 'Ecological Importance'

1.131 Woodcock is currently Red-listed on the UK Birds of Conservation Concern list, due to a severe decline in UK breeding range. As only three birds were recorded, the ecological importance of the Study Area is likely to be much reduced.

Information Relevant to Impact Assessment

1.132 The UK breeding population is approximately 78,000 pairs. Woodcock nest in a range of woodland habitats and the New 132kV OHL has been designed to avoid woodland areas. Woodcock undertake display flights over woodland during the breeding season thus there is a risk of collision, particularly as display flights are mainly undertaken at dusk when poor light conditions may reduce conductor and earth wire visibility. However, as no woodcock breeding territories were identified within the Study Area, and no flights were recorded during breeding season, it is therefore considered that the New 132kV OHL presents a negligible risk to breeding woodcock at worst.

1.133 The latest estimate of the UK wintering population is 1,400,000 individuals. The three woodcock flights observed during flight activity surveys occurred during the autumn and winter, and none were 'at risk'. Since the woodcock population is greatly increased during the non-breeding season, and birds are the target of rough shooting on many farms and estates throughout the country, it is highly unlikely that the New 132kV OHL will affect the non-breeding woodcock population in the local or wider area.

Whooper Swan

1.134 A wintering migrant in the UK, nine whooper swan flights were observed during flight activity surveys in October, November and March only, totalling 56 individuals. Eight of the nine flights were recorded from VPs situated close to or overlooking the Clyde Estuary. One flight was recorded from VP4 where part of the viewshed overlooks Leperstone Reservoir and part of the larger Auchendores Reservoir, both of which attract small numbers of wildfowl and gulls. No flights were at potential collision height.

Information Relevant to Assessment of 'Ecological Importance'

1.135 Whooper swan is listed in Annex 1 of the Birds Directive and under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). It is also currently Amber-listed on the UK Birds of Conservation Concern list. This species (non-breeding) is also the notified feature for the Black Cart SPA, approximately 4 km south east of the Erskine Substation and is a priority species in the Renfrewshire Biodiversity Action Plan.

1.136 WeBS surveys undertaken during the autumn/winter of 2015 to 2016 did not record any whooper swans. Though Whooper Swan are known to be in the area, there is no local reference population to compare against. The precautionary principle should be applied and it is recommended that the Study Area has 'Local' ecological importance.

Information Relevant to Impact Assessment

1.137 The UK wintering population is approximately 19,632 individuals. Only recorded during the winter months, a total of nine flights were observed by this species, with none 'at risk'. The majority of whooper swan flights were birds flying over the Study Area, and several were seen migrating north in March 2019. Two birds were seen flying along the Clyde Estuary after loafing on the water and one flight was observed of a single bird which flew low onto a small pond north of VP7B and close to the New 132kV OHL. As with other swan species overhead lines are of particular concern and do result in fatal collisions. However, given the relatively few whooper swan flights recorded and the tendency for the majority of birds to be overflying the area, as opposed to actively feeding in nearby fields, it is unlikely that the EDM Project will impact on wintering whooper swans in the local area, whether through collisions, disturbance or displacement.

Golden Plover

1.138 One flight was recorded in October from VP8, comprised of a single individual flying inland, but not at potential collision height. Golden plover is an upland breeding wader in the UK, and during the winter tends to be associated with lowland farmland and coastal habitats and where they form large flocks.

1.139 No golden plover were observed during the breeding bird surveys.

Information Relevant to Assessment of 'Ecological Importance'

1.140 Golden plover is listed in Annex 1 of the Birds Directive. Only a single bird was observed during winter surveys and this bird is not expected to be present in the area during summer months.

Information Relevant to Impact Assessment

1.141 The UK breeding population is approximately 49,000 pairs. Golden plover was not recorded during breeding bird surveys, the habitat within the Study Area being completely unsuitable, and no flights by golden plover were observed during the breeding season. Therefore, the New 132kV OHL is highly unlikely to have any effect on breeding golden plover.

1.142 The latest estimate of the UK wintering population is 400,000 individuals. During flight activity surveys one flight by a single golden plover was recorded in September 2018, but was not 'at risk'. Given that only one flight was observed, and that no golden plover were seen feeding along the Clyde Estuary, it is considered highly unlikely that the New 132kV OHL will affect non-breeding golden plover.

Hobby

1.143 A single flight by a late migrating juvenile bird from VP4 was observed on 2nd October. Hobby remains a very rare summer visitor to Scotland with only a few pairs known to breed. This species was not recorded during the breeding bird surveys.

Information Relevant to Assessment of 'Ecological Importance'

1.144 Hobby is listed under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). Given the single record of a migrating bird, the ecological importance for this species is likely to be reduced.

Information Relevant to Impact Assessment

1.145 The UK breeding population is approximately 2,800 pairs. Hobby is a very rare breeding bird in Scotland, only regularly being known to breed in the northern Scotland. Hobby was not recorded during breeding bird surveys, but a single, late migrating juvenile was recorded during flight activity surveys in early October 2018, but not 'at risk'. Hobby are therefore considered that the risk to hobby from the New 132kV is extremely low.

Canada Goose

1.146 A single flight by two individuals was recorded on 20th March from VP11. This introduced species is common throughout many parts of the UK particularly around waterbodies and wetlands. Several pairs were recorded during breeding bird surveys on wet heath and bog between Devol Moor Substation and Harelaw Reservoir and although no breeding was confirmed, it was suspected in this area.

Information Relevant to Assessment of 'Ecological Importance'

1.147 Canada goose is an introduced non-native species which is of least concern globally. The UK breeding population is approximately 62,000 pairs. Only two birds were observed during surveys.

Information Relevant to Impact Assessment

1.148 Two probable breeding territories were identified within the Study Area, in an area of bog north of Devol Moor substation. However, no flights were observed during the breeding season. As with other goose species, Canada geese are large birds that tend to be less manoeuvrable and at increased risk of collision with powerlines. The risk of collision during the breeding season is considered to be low along the New 132kV OHL, due to their almost total absence apart from the probable breeding pairs at the western end of the Study Area. As no flight activity surveys were undertaken in this area (the furthest west vantage point being VP4, approximately 6km away) the authors are unable to determine the likelihood of collision in this locality. The results of the surveys do not suggest that there will be more than a negligible impact on breeding Canada goose arising from the New 132kV OHL.

1.149 The latest estimate of the UK wintering population is 160,000 individuals. During the non-breeding season, a single Canada goose was recorded during flight activity surveys in late March 2019 but was not 'at risk'. As Canada goose have very little presence within the Study Area, it is considered that the risk to this species from the EDM Project is extremely low.

Crossbill

1.150 A locally uncommon resident was recorded during the breeding bird survey within mature forestry / mixed woodland, mainly within Drums Estate.

Information Relevant to Assessment of 'Ecological Importance'

1.151 Crossbill is listed under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). However, as only one was recorded and it was outwith its typical locale, the ecological value of the Study Area for this species is limited.

Information Relevant to Impact Assessment

1.152 The UK breeding population is approximately 39,000 pairs. A resident breeder within the Study Area, it is generally associated with larger blocks of coniferous forestry, particularly within Drums Estate. As a woodland passerine it is highly unlikely that crossbill will be affected by the New 132kV OHL.

Cuckoo

1.153 This is a locally uncommon summer migrant species. Several calling males were recorded during the breeding bird surveys, mostly within FCS Knockmountain woodland and on Drums Estate.

Information Relevant to Assessment of 'Ecological Importance'

1.154 Cuckoo is currently Red-listed on the UK Birds of Conservation Concern list, due to a severe decline in UK breeding population size. However, the Study Area is unlikely to have significant ecological importance for the species.

Information Relevant to Impact Assessment

1.155 The UK breeding population is approximately 15,000 pairs for this locally uncommon summer migrant species. Several calling males were recorded during breeding bird surveys, mostly within FCS Knockmountain woodland and on Drums Estate. Due to its habit of parasitising the nests of species such as meadow pipit, which nest in tussocky grassland, it is possible that disturbance from the New 132kV OHL construction in the breeding season could affect locally breeding cuckoos in these habitats. However, given that this species is a brood parasite it would be very difficult to quantify this effect. It is therefore likely that the risk posed to cuckoo from the New 132kV OHL is low and at most may affect one or two pairs.

Grasshopper Warbler

1.156 This uncommon summer migrant was recorded on only two occasions during the breeding bird surveys. On one occasion a singing male was heard in rush pasture close to VP9 (directly within the New 132kV OHL route), and another in a patch of nettles on the edge of arable fields north of Bishopton.

Information Relevant to Assessment of 'Ecological Importance'

1.157 Grasshopper warbler is currently Red-listed on the UK Birds of Conservation Concern list, due to a severe decline in UK breeding population size. Though present within the Study Area, the low number of observations means that the Study Area is unlikely to have significant ecological importance for the species.

Information Relevant to Impact Assessment

1.158 The UK breeding population is approximately 13,000 territories. An uncommon summer migrant species, two singing males were recorded during the breeding bird surveys. Both singing birds occupied small areas of dense vegetation of which there is an abundance of along parts of the Study Area. Assuming appropriate pre-start checks are undertaken if works take place during the breeding season, it is highly unlikely that grasshopper warbler will be affected by the New 132kV OHL.

Grey Wagtail

1.159 This uncommon resident was recorded occasionally along watercourses and the edges of waterbodies during the breeding bird surveys.

Information Relevant to Assessment of 'Ecological Importance'

1.160 The UK breeding population is approximately 35,000 pairs and it is a priority species in the Renfrewshire Biodiversity Action Plan. This was an uncommon resident breeder within the Study Area, occurring occasionally along watercourses and the edges of waterbodies.

Information Relevant to Impact Assessment

1.161 It is unlikely that grey wagtail will be adversely affected by the New 132kV OHL as they tend to nest close to waterbodies and so less likely to be encountered / in close proximity to construction activity.

House Sparrow

1.162 A reasonably common resident species, it was recorded at a number of locations spread across the Study Area, particularly around farm buildings. House sparrow is a Red-listed Bird of Conservation Concern (BOCC) having seen their population decrease by over 70% in the last 40 years.

Information Relevant to Assessment of 'Ecological Importance'

1.163 House sparrow is currently Red-listed on the UK Birds of Conservation Concern list, due to a severe decline in UK breeding population size. It is also a priority species in the Inverclyde Biodiversity Action Plan. Given its commonality around farm buildings, of which there are many in the wider area, the Study Area is likely to be of limited importance for the species.

Information Relevant to Impact Assessment

1.164 The UK breeding population is approximately 35,000 pairs. A reasonably common resident species, it was recorded at a number of locations spread across the breeding bird survey area, particularly around farm buildings. As this species is known to be commensal with humans, it is highly tolerant of disturbance and mainly nests in buildings. Therefore, it is highly unlikely that house sparrow will be affected by the New 132kV OHL.

Lesser Redpoll

1.165 This resident species was found to be common in mixed woodland and forestry blocks during the breeding bird survey, typically recorded in flight, calling noisily.

Information Relevant to Assessment of 'Ecological Importance'

1.166 Lesser redpoll is currently Red-listed on the UK Birds of Conservation Concern list, due to a severe decline in UK breeding population size. This species was found to be common in suitable habitat within the Study Area, with many areas of available habitat in the wider area.

Information Relevant to Impact Assessment

1.167 The UK breeding population is approximately 190,000 pairs. A common resident species regularly encountered in mixed woodland and forestry blocks during the breeding bird survey. The New 132kV OHL has been designed to minimise areas of woodland / forestry impacted by works. As a woodland passerine it is highly unlikely that lesser redpoll will be affected by the New 132kV OHL.

Linnet

1.168 A locally common species, it was recorded among areas of gorse and scrub, particularly inland and within Drums Estate. A flock of 60 birds was recorded in fields south of Bardrainey during the April breeding bird survey visit.

Information Relevant to Assessment of 'Ecological Importance'

1.169 Linnet is currently Red-listed on the UK Birds of Conservation Concern list, due to a severe decline in UK breeding population size. This species is also a priority species in the Renfrewshire Biodiversity Action Plan. However, linnet is a common species in the wider landscape.

Information Relevant to Impact Assessment

1.170 The UK breeding population is approximately 410,000 pairs. Locally common species recorded among areas of gorse and scrub, particularly inland and within Drums Estate. The potential removal of gorse and scrub during construction activities related with the New 132kV is the main risk posed to this species. As a small, seed eating passerine it is highly unlikely that linnet will be affected by the New 132kV OHL.

Mistle Thrush

1.171 This species was fairly common in broadleaf/ mixed woodland and forestry plantations and was often encountered feeding in adjacent fields and grassy areas.

Information Relevant to Assessment of 'Ecological Importance'

1.172 Mistle thrush is currently Red-listed on the UK Birds of Conservation Concern list, due to a severe decline in UK breeding population size. This species is also a priority species in the Renfrewshire Biodiversity Action Plan. Given the extensive mix of suitable habitat and how common this species is, the Study Area is unlikely to be of significant ecological importance.

Information Relevant to Impact Assessment

1.173 The UK breeding population is approximately 160,000 pairs. This species was fairly common in broadleaved / mixed woodland and forestry plantations and adjacent fields and grassy areas. As a woodland passerine it is highly unlikely that mistle thrush will be affected by the New 132kV OHL. Any disturbance relating to construction activities in open grassy areas where mistle thrush tend to forage for invertebrates, is likely to be short-term with ample alternative feeding areas available to the birds.

Skylark

1.174 This resident was regularly encountered throughout the New 132kV OHL Study Area in spring, but not common. It was mainly recorded in areas of rough grassland and grazing, the edges of silage and arable fields, and in small areas of wet and dry heath / moorland at the western end of the Study Area.

Information Relevant to Assessment of 'Ecological Importance'

1.175 Skylark is currently Red-listed on the UK Birds of Conservation Concern list, due to a severe decline in UK breeding population size. It is a priority species in the Renfrewshire Local Biodiversity Action Plan. Though it was not common in the Study Area, the majority of the habitats beyond the project is highly suitable for this species.

Information Relevant to Impact Assessment

1.176 The UK breeding population is approximately 1,400,000 territories. This uncommon resident was regularly encountered within the Study Area in areas of rough grassland, edges of arable fields and in areas of heath at western end of the Study Area. As they are a ground-nesting species, skylark is susceptible to works taking place within these habitats during the breeding season

Song Thrush

1.177 This is a fairly common resident species, which was recorded in areas of farmland with hedgerows and broadleaved / mixed woodland and forestry.

Information Relevant to Assessment of 'Ecological Importance'

1.178 Song thrush is currently Red-listed on the UK Birds of Conservation Concern list, due to a severe decline in UK breeding population size. It is also a priority species in the Renfrewshire Local Biodiversity Action Plan. This species was found to be fairly common in suitable habitat within the Study Area, with many areas of available habitat in the wider area.

Information Relevant to Impact Assessment

1.179 The UK breeding population is approximately 1,100,000 territories. This fairly common resident was recorded in areas of farmland with hedgerows and in broadleaved / mixed woodland and forestry. As a woodland passerine it is highly unlikely that song thrush will be affected by the New 132kV OHL.

Starling

1.180 A fairly common resident species, starlings were observed across a range of farmland habitats. The farmland around High Auchenleck around 2km east of Devol Moor Substation was particularly busy with foraging adults and flocks of fledged juveniles during the breeding bird surveys in June and July.

Information Relevant to Assessment of 'Ecological Importance'

1.181 Starling is currently Red-listed on the UK Birds of Conservation Concern list, due to a severe decline in UK breeding population size. Starling is a priority species in the Renfrewshire Local Biodiversity Action Plan. This species was found to be fairly common in a range of predominately farmland habitats within the Study Area, with many similar areas available in the wider area.

Information Relevant to Impact Assessment

1.182 The UK breeding population is approximately 1,800,000 territories. This fairly common resident was observed across a range of farmland habitats. As the New 132kV OHL has been designed to avoid typical starling nest sites, such as buildings and holes in mature trees. Starling is also highly tolerant of disturbance and mainly nests in buildings and holes in old trees. Therefore, it is highly unlikely that house sparrow will be affected by the New 132kV OHL.

Tree Pipit

1.183 An uncommon summer migrant, tree pipits were mostly recorded on the edges of open woodland/ rough grazing and within FCS Knockmountain woodland/ forestry.

Information Relevant to Assessment of 'Ecological Importance'

1.184 Tree pipit is currently Red-listed on the UK Birds of Conservation Concern list, due to a severe decline in UK breeding population size. Tree pipit is also a priority species in the Renfrewshire Local Biodiversity Action Plan. Only a few individuals were recorded.

Information Relevant to Impact Assessment

1.185 The UK breeding population is approximately 88,000 pairs. This uncommon summer migrant was mostly recorded on the edges of open woodland and rough grazing and within FCS Knockmountain woodland. Tree pipit nest on the ground but prefer open woodland and scrub; the New 132kV OHL has been designed to avoid such areas as far as possible. Assuming appropriate pre-start checks are undertaken if works take place during the breeding season, it is highly unlikely that this species will be affected by the EDM Project.

Tree Sparrow

1.186 This is an uncommon resident only found on farmland around Drumcross/ North Porton farms at the eastern end of the Study Area and on Drums Estate. This is a declining species nationally having undergone a 93% reduction in the UK population between 1970 and 2008 and as such is a red-listed BOCC (RSPB, 2019).

Information Relevant to Assessment of 'Ecological Importance'

1.187 Tree sparrow is currently Red-listed on the UK Birds of Conservation Concern list, due to a severe decline in UK breeding population size. Tree sparrow is also a priority species in the Renfrewshire Biodiversity Action Plan. The presence of a small, possibly, viable, population within the study area could be important for the maintenance of the local meta-population.

Information Relevant to Impact Assessment

1.188 The UK breeding population is approximately 180,000 territories. This uncommon resident was only found on farmland around Drumcross /North Porton farms at the eastern end of the Study Area and on Drums Estate. The removal of suitable nest sites or disturbance during the breeding season around potential nest sites such as large trees along field boundaries in these areas could have a negative effect on the local breeding population. However, it should be possible to avoid known or potential nest sites. If any trees which could support tree sparrow were required to be felled to enable the construction of the New 132kV OHL, nest boxes could be installed as a form of mitigation, as tree sparrows are known to use them. Assuming appropriate pre-start checks are undertaken if

works take place during the breeding season, and mitigation measures are in place to avoid known tree sparrow areas, it is highly unlikely that this species will be affected by the New 132kV OHL.

Whinchat

1.189 A single observation was made of a singing male within FCS Knockmountain in an area of long grass and scrub.

Information Relevant to Assessment of 'Ecological Importance'

1.190 Whinchat is currently Red-listed on the UK Birds of Conservation Concern list, due to a severe decline in UK breeding population size. Whinchat is also a priority species in the Renfrewshire Biodiversity Action Plan. The Study Area supported low numbers.

Information Relevant to Impact Assessment

1.191 The UK breeding population is approximately 47,000 pairs. An uncommon summer migrant, a single male was observed singing within FCS Knockmountain in an area of long grass and scrub. Whinchat are a ground nesting species, so assuming appropriate pre-start checks are undertaken if works take place during the breeding season, it is highly unlikely that whinchat will be affected by the New 132kV OHL.

Yellowhammer

1.192 An uncommon species, yellowhammer was recorded in areas of mixed farmland with hedgerows and gorse scrub. The area of Drums Estate around VP7 and VP8 held good numbers of singing males as did Drumcross Farm at the eastern end of the Study Area.

Information Relevant to Assessment of 'Ecological Importance'

1.193 Yellowhammer is currently Red-listed on the UK Birds of Conservation Concern list, due to a severe decline in UK breeding population size. Additionally, Yellowhammer is a priority species in the Renfrewshire Local Biodiversity Action Plan. Given its rarity and its selectiveness for habitat, its ecological importance of 'Local' level is recommended.

Information Relevant to Impact Assessment

1.194 The UK breeding population is approximately 700,000 territories. This uncommon resident was recorded in areas of mixed farmland with hedgerows and gorse scrub, particularly within Drums Estate and on Drumcross Farm at the eastern end of the Study Area. The potential removal of gorse and scrub during construction activities related to the New 132kV OHL is the main risk posed to this species.

Interpretation

1.195 The species recorded during the suite of bird surveys were typical of this type of mixed habitat, comprised of a mosaic of agricultural land, woodland, scrub, and coastal habitats. There were one or two more unusual species recorded, such as hobby, little egret and red kite, but these were sporadic observations.

Breeding Birds

1.196 The species breeding throughout the BBS survey area were typical of the mosaic of agricultural land, woodland and scrub through which the New 132kV OHL passes. No Schedule 1 or Annex 1 species were breeding; however, several territories of red and amber listed BOCC species were recorded.

1.197 In the UK all active nests are protected through the Wildlife and Countryside Act 1981. If the New 132kV OHL construction works are carried out within the bird breeding season (March to August inclusive) then it is recommended that an ornithologist carries out walkover surveys to identify active nests and advise the contractor on avoidance buffers.

1.198 One breeding bird of interest was tree sparrow, with one breeding territory identified within Drumcross Farm in the far east of the Study Area (see **Figure 8.3.4** in **Appendix A**). Tree sparrow numbers have experienced a severe decline in the UK, with 93% reduction in numbers between 1970 and 2008* and this territory should therefore be avoided as far as practically possible to limit disturbance.

1.199 Several breeding wader territories were identified during the breeding bird surveys, all located in the west of the Study Area (see **Figure 8.3.4** in **Appendix A**). Small numbers of curlew and snipe as well as a single lapwing territory were recorded. It is recommended that, if possible, construction activities within potential breeding wader habitat are avoided during the breeding season or, if unavoidable, an ornithologist be instructed to identify active nests and advise on avoidance buffers for these ground-nesting species.

Collision Risk

1.200 Overhead wires associated with power lines present a hazard to birds, with three main risks:

- Mortality through collision with power lines or guy wires. On power lines, bird collisions are often concentrated along relatively short sections where several factors interact to create a 'hotspot'.
- Mortality through electrocution from power lines or supporting structures.
- Displacement, where birds are excluded from previously suitable areas. This can be caused by a number of factors, including direct loss of habitat to accommodate the infrastructure (such as felling woodland), indirect loss of habitat if birds avoid the structure and the surrounding area, an increased predation risk if pylons are used as perches by predators and/or disturbance through construction and maintenance activities. Displacement can also include barrier effects in which birds are deterred from using their normal routes to feeding or roosting grounds.

1.201 A range of factors influence the risk of bird mortality:

- Species-specific morphology and biology such as those with larger body sizes and high wing loadings and those which fly in flocks. Swans and other large waterfowl are particularly at risk of collisions in the UK.
- Landscape and topography factors such as power lines being located near or crossing important areas or flyways.
- Weather conditions such as strong winds, fog, or heavy rain may force birds to lower their normal flight heights, affect flight control and reduce visibility, thereby reducing their ability to take avoiding action.

1.202 Technical aspects such as the spacing of conductors and the availability of perches affect electrocution risk. Earth wires are thought to be responsible for a much higher rate of collisions than the thicker, often bundled conductor wires, because they are harder for birds to see and are typically positioned at the top of the wire array, putting them in the flight path of birds which have taken avoiding action to fly over the conductors.

1.203 During the flight activity surveys, five species were recorded in relatively high numbers at potential collision height in close proximity the New 132kV OHL; curlew, greylag goose, lapwing, herring gull and pink-footed goose. These were the species where more than five individuals were recorded at potential collision height within 100m of the New 132kV OHL.

Curlew

1.204 In terms of number of individuals recorded, curlew was the most numerous species recorded during flight activity surveys (2,092 individuals). It was also the species with the greatest number of flights both at potential collision height (1,348 individuals) and within 100m of the New 132kV OHL (802 individuals).

1.205 Fifty-seven percent of the curlew recorded were during flight activity surveys from VP9B which overlooks the High Hatton deviation. Several of the curlew flights observed from VP9B were of flocks of relatively large numbers of individuals (up to 63 birds). This was similar from VP8 and VP9 which also have viewsheds which overlook the High Hatton area, where groups of over 60 birds were recorded on five occasions, the highest being 91 individuals. These large flocks were formed as groups of birds congregating on fields west of Lower Hatton Farm when the tide was high, and the mudflats were not exposed. These large flocks of curlew were only observed from October to March which is typically when wader species tend to form large flocks outside of the breeding season.

1.206 It should be noted that VP9B was only established in late October 2018 with watches undertaken there until March 2019. Data collected from VP8 and VP9 however, shows that large groups of curlew were not recorded in this area from April to September (although the VP9B viewshed has full coverage of the High Hatton deviation).

1.207 As discussed above, the deviation may have little effect on the risk of collision with the New 132kV OHL because curlew already gain height to avoid the motorway. Although because the deviation is a new section of OHL, it could represent an increased collision risk to curlew which already fly through this area.

1.208 Many of the curlew flights from VP9B were of birds flying between fields to feed, from the estuary to fields and vice versa. More regular movements were observed in line with tidal changes on the estuary. At high tide birds were pushed closer to the shoreline and flew inland to continue feeding. As the tide receded birds began moving back onto exposed mud to feed or roost

Lapwing

1.209 Lapwing was the third highest 'at risk' species, with 257 individuals recorded at potential collision height, within 100m of the New 132kV OHL. On two occasions relatively large flocks of 120 or more birds were observed, but most flocks had an average of around 25 to 30 individuals. Lapwing are manoeuvrable in flight and should therefore be at lesser risk of collision with overhead lines in comparison with other species.

Herring Gull

1.210 Herring gull had the highest number of flights recorded for any species (865), but a relatively low number of individual birds within 100m of the New 132kV OHL and at potential collision height (195). The vast majority of herring gull flights were of one or two birds with occasional flights observed of groups numbering 15 to 25 birds. There was no pattern of movement by large flocks between specific areas which could be affected by the New 132kV OHL and any collision would be likely to be of one or two individuals. Gulls are, however, reasonably manoeuvrable species given their large size, and should therefore be at lower risk of collision compared to other species groups.

Geese and Swans

1.211 Greylag and pink-footed goose were both recorded in fairly large numbers at both potential collision height and within 100m of the New 132kV OHL. Greylag goose in fact had the second highest number of individuals within 100m of the New 132kV OHL and at potential collision height (457) despite a total of only 70 flights recorded over the course of the flight activity surveys, all occurring between November and March. Pink-footed goose were also only recorded during this timeframe during flight activity surveys but showed fewer individuals at potential collision height and within 100m of the New 132kV OHL (98) but from a total of 36 flights.

1.212 Whooper swan, an Annex 1 species, was recorded during flight activity surveys on nine occasions during the winter season, totalling 56 individuals, but none of these flights were observed at potential collision height. Eight of the nine flights observed were seen from VPs situated close to or overlooking the Clyde Estuary.

1.213 A single mute swan flight was recorded at potential collision height and within 100m of the New 132kV OHL.

1.214 The total number of flights of both swan species were both low and, while large species, such as swans, are known to collide with OHLs due to their reduced manoeuvrability compared to other species, the likelihood of collision with the New 132kV OHL appears to be low.

Effect on SPAs

1.215 Given the absence of redshank during the breeding bird survey and the low numbers seen within the survey area during winter, it seems unlikely that there will be an effect on the Inner Clyde SPA, which is designated for its wintering population.

1.216 Black Cart SPA, which sits 4km south-east of Erskine Substation, is designated for wintering whooper swan. Given the lack of birds recorded near the New 132kV OHL at potential collision height, it seems unlikely that the New 132kV OHL would have any effect on the Black Cart SPA.

Conclusions

1.217 Given the absence of redshank during the breeding bird survey and the low numbers seen within the survey area during winter, it is unlikely that there will be an effect on the Inner Clyde SPA, which is designated for its wintering population. Similarly, given the

lack of birds recorded near the New 132kV OHL at potential collision height, it seems unlikely that the New 132kV OHL would have any effect on the Black Cart SPA designated for wintering whooper swan.

1.218 Taking into account all 33 species observed during breeding bird and flight activity surveys, and described in Chapter 4 above, it is reasonable to assume from the data gathered that the chances of collision with the New 132kV OHL are low for all species. Marking the conductors along the New 132kV OHL is, however, advised to increase their visibility to birds in flight.

1.219 Line marking remains the most common and practical form of wire collision mitigation worldwide, and research shows that it can reduce bird collisions for some species by 50 to 94%^{xi}. In the UK, there is evidence that marking is effective in reducing wildfowl mortality, particularly for swans^{xii}. SNH recommends that wires are marked with devices that are as large as possible and installed from pylon to pylon. Markers should be installed as close together as possible (at least every 5 to 10m on power lines), and in contrasting colours e.g. black and white for maximum visibility in different weather and light conditions. Line markers will also need maintenance and replacement to ensure that they remain in position and functional throughout the lifetime of the power line.

1.220 Of the five most 'at risk' species discussed above (i.e. those which had more than five individuals recorded at potential collision height within 100m of the New 132kV OHL), curlew accounted for 79%. All except six of these individual curlews were recorded within the High Hatton area.

1.221 Curlew is the largest wader species in the UK but are relatively manoeuvrable in flight. Because curlew make up such a high percentage of 'at risk' individuals, it is possible that the new section of the EDM Project route through the High Hatton area may result in mortality for this species. The High Hatton area is a relatively small section of the overall EDM Project route and here it will be located in close proximity to a busy motorway. Curlew and other species were observed making a more pronounced upward movement than might be expected when flying from the edge of the estuary to the fields in the High Hatton area over the motorway, particularly at high tide. It is possible that the addition of a new overhead line may in effect create a 'double barrier' to birds flying between the estuary and fields. It will be especially important to mark the conductors in this area to increase their visibility to birds in flight.

1.222 In terms of breeding birds, is it recommended that construction is avoided during the breeding season in areas of habitat which are suitable for ground-nesting breeding waders. Disturbance should also be minimised at Drumcross Farm where breeding tree sparrows are present. It is recommended that an ornithologist is employed if works are being carried out in the bird breeding season, to locate any active nests and advise the contractor on disturbance buffers.

Appendix A
Figures

ⁱ Survey guidance is available at www.cieem.net/sources-of-survey-methods-sosm/ and appraisal guidance is available at www.cieem.net/guidance-on-preliminary-ecological-appraisal-gpea/

ⁱⁱ British Standards Institute (2013). BS42020: 2013 Biodiversity – Code of Practice for Planning and Development.

ⁱⁱⁱ Available at www.gateway.snh.gov.uk/sitelink/ (accessed April 2018).

^{iv} Available at www.biodiversityinc.uws.ac.uk (accessed April 2018).

^v SNH (2016). Assessment and mitigation of impacts of power lines and guyed meteorological masts on birds.

^{vi} SNH (2017). Recommended bird survey methods to inform impact assessment of onshore wind farms.

^{vii} Brown, A. F. & Shepherd, K. B. (1993) A method for censusing upland breeding waders. *Bird Study*, 40.

^{viii} Marchant, J.H. (1983). Common Birds Census instructions. BTO, Tring.

^{ix} BTO (2015). British Trust for Ornithology Wetland Bird Count data.

^x RSPB, 2019. www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/

^{xi} Prinsen, H.A.M., Smallie, J.J., Boere, G.C. & Pires, N. (Eds.) 2011. Guidelines on how to avoid or mitigate impact of electricity power grids on migratory birds in the African-Eurasian region. Bonn: AEWA Conservation Guidelines No. 14, CMS Technical Series No. 29, AEWA Technical Series No. 50, CMS Raptors MOU Technical Series No. 3.

^{xii} Frost, D. 2008. The use of 'flight diverters' reduces mute swan *Cygnus olor* collision with power lines at Abberton Reservoir, Essex, England. *Conservation Evidence*, 5, 83-91.