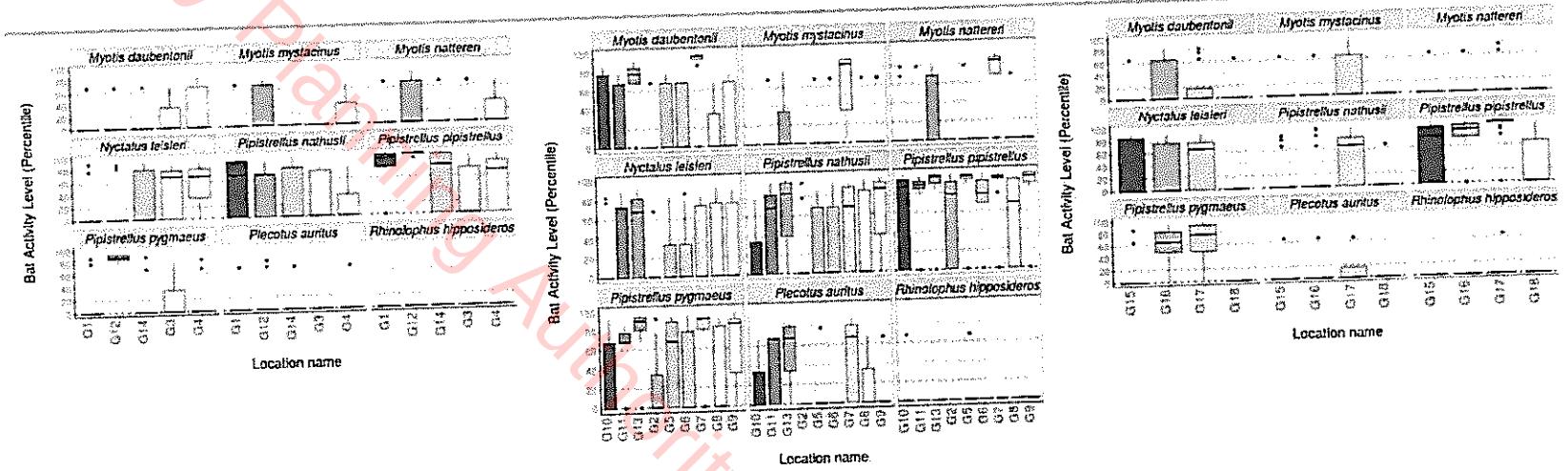


Figure 3-9: Differences in activity between Static Detector Locations, split by Species and Location during Survey Period 2 at Gortyrahilly

3.4.2.2 *Inchamore*

A summary table showing the number of nights recorded bat activity fell into each activity band for each species is presented below. Recordings were analysed in one single group as all detectors were deployed simultaneously.

The maximum of recordings for a single night across all detectors combined on 03/07/2019 was 2,077 recordings where eight species were recorded.

Seven of the ten static locations had at least one night of High Activity during the survey period.

The following Turbine locations are deemed to have a High Bat Activity (for specific bat species) level based on the Percentile Median value: T1 (Daubenton's bat and common pipistrelle), T2 (common pipistrelle), T4 (common pipistrelle and soprano pipistrelle), T6 (common pipistrelle), T7 (common pipistrelle), T9 (Nathusius' bat, common pipistrelle and soprano pipistrelle) and T10 (common pipistrelle and soprano pipistrelle).

Table 3-13: Summary of Ecobat Analysis Tool for Static Detectors deployed at Inchamore during survey period 2. I = Inchamore and number = turbine location, so I1 = turbine 1 at Inchamore.

Location	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity	Median Percentile	Bat Activity
I1	*Myotis daubentonii*	8	2	0	0	1	88	High
I1	*Myotis mystacinus*	1	5	0	0	5	68	Moderate to High
I1	*Myotis nattereri*	2	6	0	0	3	78	Moderate to High
I1	*Nyctalus leisleri*	2	5	0	0	4	68	Moderate to High
I1	*Pipistrellus nathusii*	1	2	0	0	8	0	Low
I1	*Pipistrellus pipistrellus*	11	0	0	0	0	96	High
I1	*Pipistrellus pygmaeus*	2	4	0	0	5	68	Moderate to High
I1	*Plecotus auritus*	0	1	0	0	10	0	Low
I1	*Rhinolophus hipposideros*	0	0	0	0	11	0	Low
I2	*Myotis daubentonii*	2	6	0	0	3	68	Moderate to High
I2	*Myotis mystacinus*	1	1	0	0	9	0	Low
I2	*Myotis nattereri*	1	3	0	0	7	0	Low
I2	*Nyctalus leisleri*	0	1	0	0	10	0	Low
I2	*Pipistrellus nathusii*	0	0	0	0	11	0	Low

Location	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity	Median Percentile	Bat Activity
I2	*Pipistrellus pipistrellus*	6	3	0	0	2	83	High
I2	*Pipistrellus pygmaeus*	2	1	0	0	8	0	Low
I2	*Plecotus auritus*	0	1	0	0	10	0	Low
I2	*Rhinolophus hipposideros*	0	0	0	0	11	0	Low
I3	*Myotis daubentonii*	0	5	0	0	6	0	Low
I3	*Myotis mystacinus*	0	0	0	0	11	0	Low
I3	*Myotis nattereri*	0	0	0	0	11	0	Low
I3	*Nyctalus leisleri*	0	4	0	0	7	0	Low
I3	*Pipistrellus nathusii*	0	0	0	0	11	0	Low
I3	*Pipistrellus pipistrellus*	1	2	0	0	8	0	Low
I3	*Pipistrellus pygmaeus*	0	0	0	0	11	0	Low
I3	*Plecotus auritus*	0	0	0	0	11	0	Low
I3	*Rhinolophus hipposideros*	0	0	0	0	11	0	Low
I4	*Myotis daubentonii*	3	5	0	0	3	68	Moderate to High
I4	*Myotis mystacinus*	0	4	0	0	7	0	Low
I4	*Myotis nattereri*	0	6	0	0	5	68	Moderate to High
I4	*Nyctalus leisleri*	2	3	0	0	6	0	Low
I4	*Pipistrellus nathusii*	3	0	0	0	8	0	Low
I4	*Pipistrellus pipistrellus*	11	0	0	0	0	95	High
I4	*Pipistrellus pygmaeus*	8	3	0	0	0	89	High
I4	*Plecotus auritus*	0	3	0	0	8	0	Low
I4	*Rhinolophus hipposideros*	0	0	0	0	11	0	Low

Location	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity	Median Percentile	Bat Activity
I5	*Myotis daubentonii*	0	1	0	0	10	0	Low
I5	*Myotis mystacinus*	0	0	0	0	11	0	Low
I5	*Myotis nattereri*	0	1	0	0	10	0	Low
I5	*Nyctalus leisleri*	0	0	0	0	11	0	Low
I5	*Pipistrellus nathusii*	0	0	0	0	11	0	Low
I5	*Pipistrellus pipistrellus*	0	3	0	0	8	0	Low
I5	*Pipistrellus pygmaeus*	0	1	0	0	10	0	Low
I5	*Plecotus auritus*	0	0	0	0	11	0	Low
I5	*Rhinolophus hipposideros*	0	0	0	0	11	0	Low
I6	*Myotis daubentonii*	1	3	0	0	7	0	Low
I6	*Myotis mystacinus*	0	3	0	0	8	0	Low
I6	*Myotis nattereri*	0	0	0	0	11	0	Low
I6	*Nyctalus leisleri*	0	1	0	0	10	0	Low
I6	*Pipistrellus nathusii*	1	0	0	0	10	0	Low
I6	*Pipistrellus pipistrellus*	8	1	0	0	2	86	High
I6	*Pipistrellus pygmaeus*	4	4	0	0	3	68	Moderate to High
I6	*Plecotus auritus*	0	0	0	0	11	0	Low
I6	*Rhinolophus hipposideros*	0	0	0	0	11	0	Low
I7	*Myotis daubentonii*	0	1	0	0	10	0	Low
I7	*Myotis mystacinus*	0	2	0	0	9	0	Low
I7	*Myotis nattereri*	0	0	0	0	11	0	Low
I7	*Nyctalus leisleri*	0	1	0	0	10	0	Low
I7	*Pipistrellus nathusii*	1	2	0	0	8	0	Low

Location	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity	Median Percentile	Bat Activity
I7	*Pipistrellus pipistrellus*	7	3	0	0	1	86	High
I7	*Pipistrellus pygmaeus*	4	3	0	0	4	68	Moderate to High
I7	*Plecotus auritus*	0	0	0	0	11	0	Low
I7	*Rhinolophus hipposideros*	0	0	0	0	11	0	Low
I8	*Myotis daubentonii*	0	0	0	0	11	0	Low
I8	*Myotis mystacinus*	0	0	0	0	11	0	Low
I8	*Myotis nattereri*	0	0	0	0	11	0	Low
I8	*Nyctalus leisleri*	0	0	0	0	11	0	Low
I8	*Pipistrellus nathusii*	0	0	0	0	11	0	Low
I8	*Pipistrellus pipistrellus*	0	0	0	0	11	0	Low
I8	*Pipistrellus pygmaeus*	0	0	0	0	11	0	Low
I8	*Plecotus auritus*	0	0	0	0	11	0	Low
I8	*Rhinolophus hipposideros*	0	0	0	0	11	0	Low
I9	*Myotis daubentonii*	0	4	0	0	7	0	Low
I9	*Myotis mystacinus*	0	1	0	0	10	0	Low
I9	*Myotis nattereri*	0	0	0	0	11	0	Low
I9	*Nyctalus leisleri*	2	4	0	0	5	68	Moderate to High
I9	*Pipistrellus nathusii*	7	4	0	0	0	90	High
I9	*Pipistrellus pipistrellus*	11	0	0	0	0	98	High
I9	*Pipistrellus pygmaeus*	10	0	0	0	1	93	High
I9	*Plecotus auritus*	0	1	0	0	10	0	Low
I9	*Rhinolophus hipposideros*	0	0	0	0	11	0	Low

Location	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity	Median Percentile	Bat Activity
I10	*Myotis daubentonii*	0	2	0	0	9	0	Low
I10	*Myotis mystacinus*	2	2	0	0	7	0	Low
I10	*Myotis nattereri*	3	5	0	0	3	68	Moderate to High
I10	*Nyctalus leisleri*	3	3	0	0	5	68	Moderate to High
I10	*Pipistrellus nathusii*	3	4	0	0	4	68	Moderate to High
I10	*Pipistrellus pipistrellus*	11	0	0	0	0	98	High
I10	*Pipistrellus pygmaeus*	11	0	0	0	0	93	High
I10	*Plecotus auritus*	0	4	0	0	7	0	Low
I10	*Rhinolophus hipposideros*	0	1	0	0	10	0	Low

Differences in activity between static detector locations split by species and location is presented in the figure below. The centre line indicates the median activity level whereas the box represents the interquartile range (therefore the spread of the middle 50% of nights of activity). The plot for common pipistrelle shows that the activity level for both T1, T4, T6, T9 and T10 was consistently high. Similarly, the plot for soprano pipistrelle shows that the activity level for both T4, T9 and T10 was consistently high.

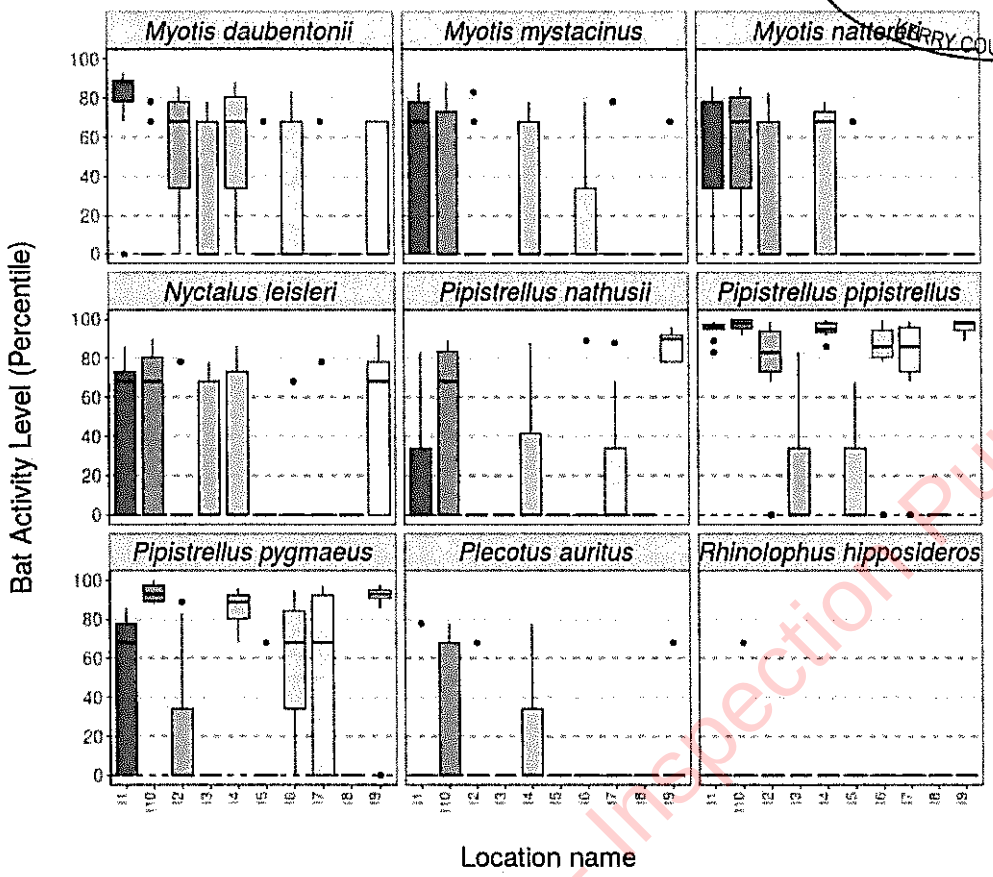


Figure 3-9: Difference in activity between static detector locations, split by species and location during survey period 2 at Inchamore

The centre line indicates the median activity level whereas the box represents the interquartile range (the spread of the middle 50% of nights of activity). The dots indicate outlier values. Note: *Myotis daubentonii* = Daubenton's bat, *Myotis mystacinus* = whiskered bat, *Myotis nattereri* = Natterer's bat, *Nyctalus leisleri* = Leisler's bat, *Pipistrellus nathusii* = Nathusius' bat, *Pipistrellus pipistrellus* = common pipistrelle, *Pipistrellus pygmaeus* = soprano pipistrelle, *Plecotus auritus* = brown long-eared bat and *Rhinolophus hipposideros* = lesser horseshoe bat. I = Inchamore and number = turbine location, so I1 = turbine 1 at Inchamore.

3.4.3 Survey Period 3

3.4.3.1 Gortyrahilly

A summary table showing the number of nights recorded bat activity fell into each activity band for each species is presented below. Recordings were split into three groups depending on the dates deployed: group 1 (turbines 1, 2, 6, 7, 9, 10, 11, 12, 13, 14, 15, 17 and 18), group 2 (turbines 3, 4 and 5) and group 3 (turbine 19). Each group was analysed in Ecobat separately but is presented collectively in this report.

The maximum of recordings for a single night across all detectors combined on 21/09/2019 was 1,643 recordings where six species were recorded.

Five of the eleven static locations had at least one night of High Activity during the survey period.

The following Turbine locations are deemed to have a High Bat Activity (for specific bat species) level based on the Percentile Median value: T1 (common pipistrelle), T2 (common pipistrelle), T9 (common pipistrelle), T10 (common pipistrelle, soprano pipistrelle and brown long-eared bat) and T11 (common pipistrelle and soprano pipistrelle).

Table 3-13: Summary of Ecobat Analysis Tool for static detectors deployed at Gorthrahilly during survey period 3. G = gortyrahilly and number = turbine location, so G1 = turbine 1 at Gortyrahilly.

Location	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity	Median Percentile	Bat Activity
G1	*Myotis daubentonii*	0	3	0	0	11	0	Low
G1	*Myotis mystacinus*	0	1	0	0	13	0	Low
G1	*Myotis nattereri*	0	1	0	0	13	0	Low
G1	*Nyctalus leisleri*	2	1	0	0	11	0	Low
G1	*Pipistrellus nathusii*	4	1	0	0	9	0	Low
G1	*Pipistrellus pipistrellus*	8	0	0	0	6	88	High
G1	*Pipistrellus pygmaeus*	3	5	0	0	6	63	Moderate to High
G1	*Plecotus auritus*	2	3	0	0	9	0	Low
G1	*Rhinolophus hipposideros*	0	0	0	0	14	0	Low
G2	*Myotis daubentonii*	0	6	0	0	8	0	Low
G2	*Myotis mystacinus*	0	4	0	0	10	0	Low
G2	*Myotis nattereri*	0	6	0	0	8	0	Low
G2	*Nyctalus leisleri*	4	2	0	0	8	0	Low
G2	*Pipistrellus nathusii*	3	3	0	0	8	0	Low
G2	*Pipistrellus pipistrellus*	10	1	0	0	3	94	High
G2	*Pipistrellus pygmaeus*	8	2	0	0	4	90	High
G2	*Plecotus auritus*	0	2	0	0	12	0	Low

Location	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity	Median Percentile	Bat Activity
G2	*Rhinolophus hipposideros*	0	4	0	0	10	0	Low
G3	*Myotis daubentonii*	4	6	0	0	17	0	Low
G3	*Myotis mystacinus*	0	4	0	0	23	0	Low
G3	*Myotis nattereri*	0	6	0	0	21	0	Low
G3	*Nyctalus leisleri*	13	5	0	0	9	63	Moderate to High
G3	*Pipistrellus nathusii*	3	5	0	0	19	0	Low
G3	*Pipistrellus pipistrellus*	11	10	0	0	6	75	Moderate to High
G3	*Pipistrellus pygmaeus*	6	10	0	0	11	63	Moderate to High
G3	*Plecotus auritus*	1	12	0	0	14	0	Low
G3	*Rhinolophus hipposideros*	0	0	0	0	27	0	Low
G4	*Myotis daubentonii*	0	0	0	0	27	0	Low
G4	*Myotis mystacinus*	0	0	0	0	27	0	Low
G4	*Myotis nattereri*	0	0	0	0	27	0	Low
G4	*Nyctalus leisleri*	0	0	0	0	27	0	Low
G4	*Pipistrellus nathusii*	0	0	0	0	27	0	Low
G4	*Pipistrellus pipistrellus*	0	4	0	0	23	0	Low
G4	*Pipistrellus pygmaeus*	0	1	0	0	26	0	Low
G4	*Plecotus auritus*	0	0	0	0	27	0	Low
G4	*Rhinolophus hipposideros*	0	0	0	0	27	0	Low
G5	*Myotis daubentonii*	0	8	0	0	19	0	Low
G5	*Myotis mystacinus*	0	10	0	0	17	0	Low
G5	*Myotis nattereri*	0	1	0	0	26	0	Low

Location	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity	Median Percentile	Bat Activity
G5	*Nyctalus leisleri*	4	9	0	0	14	0	Low
G5	*Pipistrellus nathusii*	1	5	0	0	21	0	Low
G5	*Pipistrellus pipistrellus*	26	1	0	0	0	96	High
G5	*Pipistrellus pygmaeus*	19	6	0	0	2	85	High
G5	*Plecotus auritus*	1	9	0	0	17	0	Low
G5	*Rhinolophus hipposideros*	0	0	0	0	27	0	Low
G7	*Myotis daubentonii*	1	3	0	0	10	0	Low
G7	*Myotis mystacinus*	1	0	0	0	13	0	Low
G7	*Myotis nattereri*	0	2	0	0	12	0	Low
G7	*Nyctalus leisleri*	2	6	0	0	6	63	Moderate to High
G7	*Pipistrellus nathusii*	0	0	0	0	14	0	Low
G7	*Pipistrellus pipistrellus*	9	1	0	0	4	97	High
G7	*Pipistrellus pygmaeus*	9	1	0	0	4	89	High
G7	*Plecotus auritus*	1	4	0	0	9	0	Low
G7	*Rhinolophus hipposideros*	0	0	0	0	14	0	Low
G9	*Myotis daubentonii*	1	6	0	0	7	32	Low to Moderate
G9	*Myotis mystacinus*	0	1	0	0	13	0	Low
G9	*Myotis nattereri*	1	4	0	0	9	0	Low
G9	*Nyctalus leisleri*	1	1	0	0	12	0	Low
G9	*Pipistrellus nathusii*	3	1	0	0	10	0	Low
G9	*Pipistrellus pipistrellus*	6	1	0	0	7	32	Low to Moderate
G9	*Pipistrellus pygmaeus*	9	0	0	0	5	85	High
G9	*Plecotus auritus*	1	3	0	0	10	0	Low

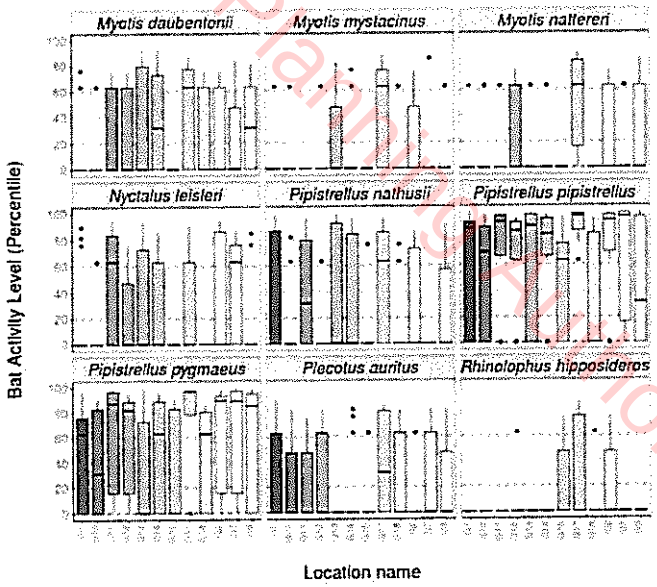
Location	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity	Median Percentile	Bat Activity
G9	*Rhinolophus hipposideros*	0	0	0	0	14	0	Low
G10	*Myotis daubentonii*	0	2	0	0	12	0	Low
G10	*Myotis mystacinus*	0	1	0	0	13	0	Low
G10	*Myotis nattereri*	0	3	0	0	11	0	Low
G10	*Nyctalus leisleri*	0	2	0	0	12	0	Low
G10	*Pipistrellus nathusii*	1	1	0	0	12	0	Low
G10	*Pipistrellus pipistrellus*	6	3	0	0	5	70	Moderate to High
G10	*Pipistrellus pygmaeus*	4	3	0	0	7	32	Low to Moderate
G10	*Plecotus auritus*	1	3	0	0	10	0	Low
G10	*Rhinolophus hipposideros*	0	0	0	0	14	0	Low
G11	*Myotis daubentonii*	0	5	0	0	9	0	Low
G11	*Myotis mystacinus*	0	0	0	0	14	0	Low
G11	*Myotis nattereri*	0	1	0	0	13	0	Low
G11	*Nyctalus leisleri*	5	3	0	0	6	63	Moderate to High
G11	*Pipistrellus nathusii*	4	3	0	0	7	32	Low to Moderate
G11	*Pipistrellus pipistrellus*	9	2	0	0	3	93	High
G11	*Pipistrellus pygmaeus*	9	1	0	0	4	87	High
G11	*Plecotus auritus*	0	4	0	0	10	0	Low
G11	*Rhinolophus hipposideros*	0	0	0	0	14	0	Low
G12	*Myotis daubentonii*	0	5	0	0	9	0	Low
G12	*Myotis mystacinus*	0	1	0	0	13	0	Low
G12	*Myotis nattereri*	0	6	0	0	8	0	Low

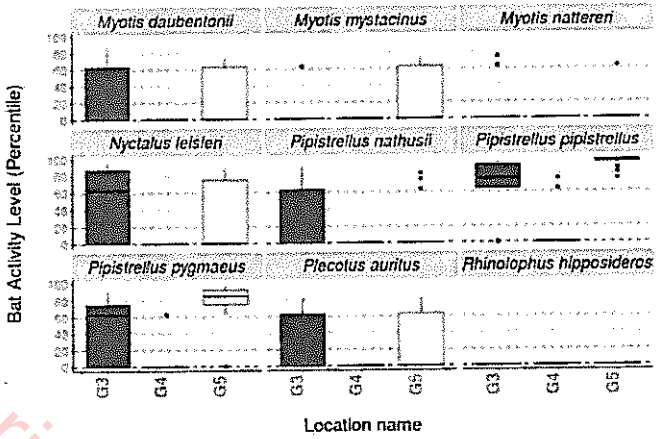
Location	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity	Median Percentile	Bat Activity
G12	*Nyctalus leisleri*	0	4	0	0	10	0	Low
G12	*Pipistrellus nathusii*	0	2	0	0	12	0	Low
G12	*Pipistrellus pipistrellus*	8	3	0	0	3	86	High
G12	*Pipistrellus pygmaeus*	8	2	0	0	4	82	High
G12	*Plecotus auritus*	1	4	0	0	9	0	Low
G12	*Rhinolophus hipposideros*	0	1	0	0	13	0	Low
G13	*Myotis daubentonii*	4	2	0	0	8	0	Low
G13	*Myotis mystacinus*	1	3	0	0	10	0	Low
G13	*Myotis nattereri*	0	2	0	0	12	0	Low
G13	*Nyctalus leisleri*	3	2	0	0	9	0	Low
G13	*Pipistrellus nathusii*	5	1	0	0	8	0	Low
G13	*Pipistrellus pipistrellus*	9	0	0	0	5	90	High
G13	*Pipistrellus pygmaeus*	3	2	0	0	9	0	Low
G13	*Plecotus auritus*	0	0	0	0	14	0	Low
G13	*Rhinolophus hipposideros*	0	0	0	0	14	0	Low
G14	*Myotis daubentonii*	3	4	0	0	7	32	Low to Moderate
G14	*Myotis mystacinus*	0	2	0	0	12	0	Low
G14	*Myotis nattereri*	0	2	0	0	12	0	Low
G14	*Nyctalus leisleri*	2	4	0	0	8	0	Low
G14	*Pipistrellus nathusii*	5	1	0	0	8	0	Low
G14	*Pipistrellus pipistrellus*	8	3	0	0	3	84	High
G14	*Pipistrellus pygmaeus*	5	3	0	0	6	63	Moderate to High
G14	*Plecotus auritus*	1	2	0	0	11	0	Low

Location	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity	Median Percentile	Bat Activity
G14	*Rhinolophus hipposideros*	0	0	0	0	14	0	Low
G15	*Myotis daubentonii*	0	0	0	0	14	0	Low
G15	*Myotis mystacinus*	0	0	0	0	14	0	Low
G15	*Myotis nattereri*	0	0	0	0	14	0	Low
G15	*Nyctalus leisleri*	0	0	0	0	14	0	Low
G15	*Pipistrellus nathusii*	0	1	0	0	13	0	Low
G15	*Pipistrellus pipistrellus*	3	5	0	0	6	63	Moderate to High
G15	*Pipistrellus pygmaeus*	4	1	0	0	9	0	Low
G15	*Plecotus auritus*	0	3	0	0	11	0	Low
G15	*Rhinolophus hipposideros*	0	4	0	0	10	0	Low
G17	*Myotis daubentonii*	4	4	0	0	6	63	Moderate to High
G17	*Myotis mystacinus*	3	5	0	0	6	63	Moderate to High
G17	*Myotis nattereri*	4	6	0	0	4	63	Moderate to High
G17	*Nyctalus leisleri*	2	4	0	0	8	0	Low
G17	*Pipistrellus nathusii*	5	4	0	0	5	63	Moderate to High
G17	*Pipistrellus pipistrellus*	12	2	0	0	0	97	High
G17	*Pipistrellus pygmaeus*	10	3	0	0	1	97	High
G17	*Plecotus auritus*	4	3	0	0	7	32	Low to Moderate
G17	*Rhinolophus hipposideros*	3	3	0	0	8	0	Low
G18	*Myotis daubentonii*	0	5	0	0	9	0	Low
G18	*Myotis mystacinus*	0	2	0	0	12	0	Low
G18	*Myotis nattereri*	0	0	0	0	14	0	Low

Location	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity	Median Percentile	Bat Activity
G18	*Nyctalus leisleri*	0	0	0	0	14	0	Low
G18	*Pipistrellus nathusii*	0	2	0	0	12	0	Low
G18	*Pipistrellus pipistrellus*	5	1	0	0	8	0	Low
G18	*Pipistrellus pygmaeus*	4	4	0	0	6	63	Moderate to High
G18	*Plecotus auritus*	2	3	0	0	9	0	Low
G18	*Rhinolophus hipposideros*	0	1	0	0	13	0	Low
G19	*Myotis daubentonii*	4	7	0	0	20	0	Low
G19	*Myotis mystacinus*	5	9	0	0	17	0	Low
G19	*Myotis nattereri*	3	8	0	0	20	0	Low
G19	*Nyctalus leisleri*	5	9	0	0	17	0	Low
G19	*Pipistrellus nathusii*	2	9	0	0	20	0	Low
G19	*Pipistrellus pipistrellus*	21	0	0	0	10	94	High
G19	*Pipistrellus pygmaeus*	10	6	0	0	15	64	Moderate to High
G19	*Plecotus auritus*	5	5	0	0	21	0	Low
G19	*Rhinolophus hipposideros*	0	2	0	0	29	0	Low

Differences in activity between static detector locations split by species and location is presented in the figure below. The centre line indicates the median activity level whereas the box represents the interquartile range (therefore the spread of the middle 50% of nights of activity). The plot for common pipistrelle shows that the activity level for T17 was consistently high.





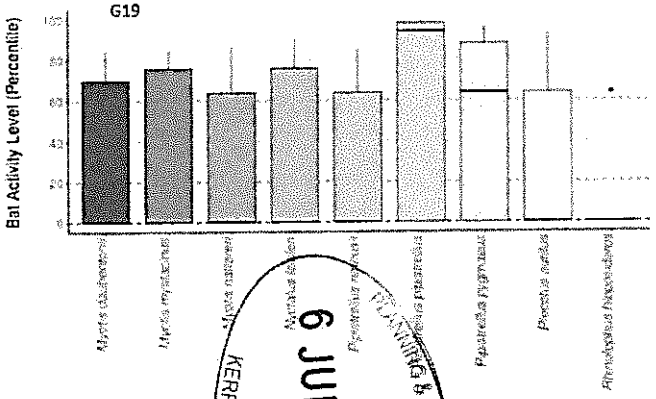


Figure 3-10: Differences in activity between static detector locations, split by species and location during survey period 3 at Gortyrahilly.

The centre line indicates the median activity level whereas the box represents the interquartile range (the spread of the middle 50% of nights of activity). The dots indicate outlier values. Note: *Myotis daubentonii* = Daubenton's bat, *Myotis mystacinus* = whiskered bat, *Myotis nattereri* = Natterer's bat, *Nyctalus leisleri* = Leisler's bat, *Pipistrellus nathusii* = Nathusius' bat, *Pipistrellus pipistrellus* = common pipistrelle, *Pipistrellus pygmaeus* = soprano pipistrelle, *Plecotus auritus* = brown long-eared bat and *Rhinolophus hipposideros* = lesser horseshoe bat. G = gortyrahilly and number = turbine location, so G1 = turbine 1 at Gortyrahilly.

3.4.3.2 *Inchamore*

A summary table showing the number of nights recorded bat activity fell into each activity band for each species is presented below. Recordings were split into two groups depending on the dates deployed: group 1 (turbines 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10) and group 2 (turbine 11). Each group was analysed in Ecobat separately but is presented collectively in this report.

The maximum of recordings for a single night across all detectors combined on 13/09/2019 was 1,578 recordings where eight species were recorded.

Twelve of the thirteen static locations had at least one night of High Activity during the survey period. No bats were recorded at T8 during this survey period and so information for this table is not included in the results below.

The following Turbine locations are deemed to have a High Bat Activity (for specific bat species) level based on the Percentile Median value: T2 (Leisler's bat), T3 (Leisler's bat), T5 (Leisler's bat), T6, (common pipistrelle), T7, (Daubenton's bat, Leisler's bat and common pipistrelle), T12 (Leisler's bat and common pipistrelle) and T13 (Leisler's bat, Nathusius' bat, common pipistrelle and soprano pipistrelle).

Table 3-18: Summary of Ecobat Analysis Tool for static detectors deployed at Inchamore during survey period 3. I = Inchamore and number = turbine location, so I1 = turbine 1 at Inchamore.

Location	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity	Median Percentile	Bat Activity
I1	*Myotis daubentonii*	10	8	0	0	9	63	Moderate to High
I1	*Myotis mystacinus*	2	13	0	0	12	63	Moderate to High
I1	*Myotis nattereri*	3	9	0	0	15	0	Low
I1	*Nyctalus leisleri*	4	9	0	0	14	0	Low
I1	*Pipistrellus nathusii*	0	2	0	0	25	0	Low
I1	*Pipistrellus pipistrellus*	15	4	0	0	8	85	High
I1	*Pipistrellus pygmaeus*	5	10	0	0	12	63	Moderate to High
I1	*Plecotus auritus*	7	10	0	0	10	63	Moderate to High
I1	*Rhinolophus hipposideros*	0	0	0	0	27	0	Low
I2	*Myotis daubentonii*	4	13	0	0	10	63	Moderate to High
I2	*Myotis mystacinus*	7	14	0	0	6	63	Moderate to High
I2	*Myotis nattereri*	3	9	0	0	15	0	Low

Location	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity	Median Percentile	Bat Activity
I2	*Nyctalus leisleri*	5	6	0	0	16	0	Low
I2	*Pipistrellus nathusii*	1	7	0	0	19	0	Low
I2	*Pipistrellus pipistrellus*	22	3	0	0	2	96	High
I2	*Pipistrellus pygmaeus*	13	9	0	0	5	75	Moderate to High
I2	*Plecotus auritus*	11	10	0	0	6	75	Moderate to High
I2	*Rhinolophus hipposideros*	0	0	0	0	27	0	Low
I3	*Myotis daubentonii*	0	6	0	0	21	0	Low
I3	*Myotis mystacinus*	0	3	0	0	24	0	Low
I3	*Myotis nattereri*	0	3	0	0	24	0	Low
I3	*Nyctalus leisleri*	2	6	0	0	19	0	Low
I3	*Pipistrellus nathusii*	2	3	0	0	22	0	Low
I3	*Pipistrellus pipistrellus*	6	3	0	0	18	0	Low
I3	*Pipistrellus pygmaeus*	3	3	0	0	21	0	Low
I3	*Plecotus auritus*	0	3	0	0	24	0	Low
I3	*Rhinolophus hipposideros*	1	1	0	0	25	0	Low
I4	*Myotis daubentonii*	6	12	0	0	9	63	Moderate to High
I4	*Myotis mystacinus*	0	13	0	0	14	0	Low
I4	*Myotis nattereri*	4	11	0	0	12	63	Moderate to High
I4	*Nyctalus leisleri*	6	5	0	0	16	0	Low
I4	*Pipistrellus nathusii*	1	3	0	0	23	0	Low
I4	*Pipistrellus pipistrellus*	11	6	0	0	10	63	Moderate to High
I4	*Pipistrellus pygmaeus*	13	5	0	0	9	75	Moderate to High
I4	*Plecotus auritus*	4	11	0	0	12	63	Moderate to High

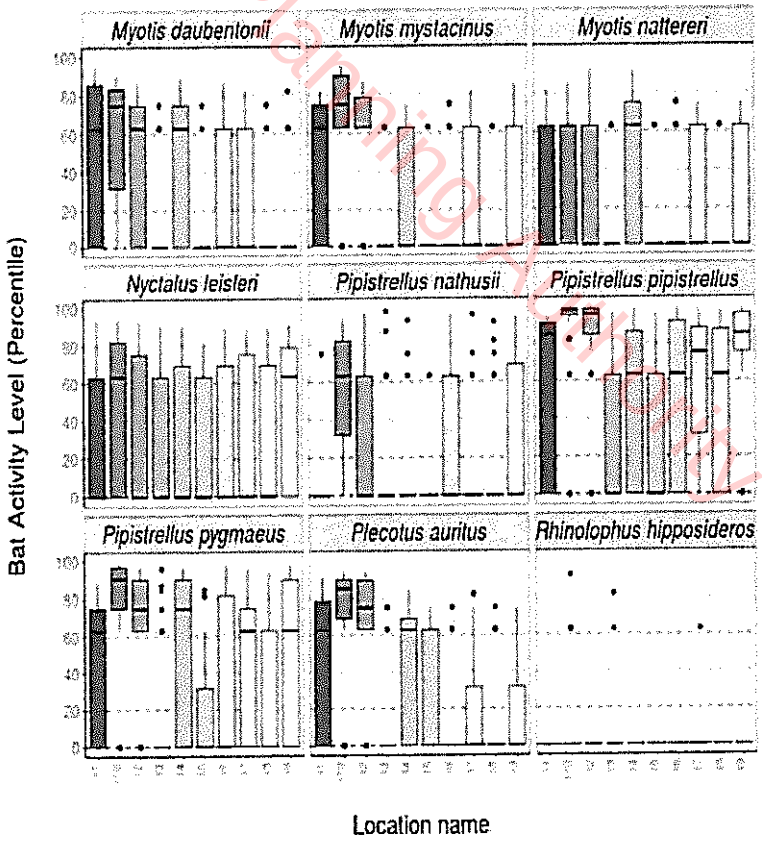
Location	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity	Median Percentile	Bat Activity
I4	*Rhinolophus hipposideros*	0	0	0	0	27	0	Low
I5	*Myotis daubentonii*	0	2	0	0	25	0	Low
I5	*Myotis mystacinus*	0	1	0	0	26	0	Low
I5	*Myotis nattereri*	0	2	0	0	25	0	Low
I5	*Nyctalus leisleri*	2	9	0	0	16	0	Low
I5	*Pipistrellus nathusii*	0	1	0	0	26	0	Low
I5	*Pipistrellus pipistrellus*	5	5	0	0	17	0	Low
I5	*Pipistrellus pygmaeus*	3	4	0	0	20	0	Low
I5	*Plecotus auritus*	0	9	0	0	18	0	Low
I5	*Rhinolophus hipposideros*	0	0	0	0	27	0	Low
I6	*Myotis daubentonii*	1	10	0	0	16	0	Low
I6	*Myotis mystacinus*	0	6	0	0	21	0	Low
I6	*Myotis nattereri*	0	6	0	0	21	0	Low
I6	*Nyctalus leisleri*	6	4	0	0	17	0	Low
I6	*Pipistrellus nathusii*	4	4	0	0	19	0	Low
I6	*Pipistrellus pipistrellus*	10	5	0	0	12	63	Moderate to High
I6	*Pipistrellus pygmaeus*	9	4	0	0	14	0	Low
I6	*Plecotus auritus*	0	6	0	0	21	0	Low
I6	*Rhinolophus hipposideros*	0	0	0	0	27	0	Low
I7	*Myotis daubentonii*	2	8	0	0	17	0	Low
I7	*Myotis mystacinus*	1	11	0	0	15	0	Low
I7	*Myotis nattereri*	0	10	0	0	17	0	Low

Location	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity	Median Percentile	Bat Activity
I7	*Nyctalus leisleri*	6	7	0	0	14	0	Low
I7	*Pipistrellus nathusii*	1	5	0	0	21	0	Low
I7	*Pipistrellus pipistrellus*	12	8	0	0	7	75	Moderate to High
I7	*Pipistrellus pygmaeus*	6	10	0	0	11	63	Moderate to High
I7	*Plecotus auritus*	2	5	0	0	20	0	Low
I7	*Rhinolophus hipposideros*	0	1	0	0	26	0	Low
I8	*Myotis daubentonii*	0	3	0	0	24	0	Low
I8	*Myotis mystacinus*	0	4	0	0	23	0	Low
I8	*Myotis nattereri*	0	3	0	0	24	0	Low
I8	*Nyctalus leisleri*	3	7	0	0	17	0	Low
I8	*Pipistrellus nathusii*	2	3	0	0	22	0	Low
I8	*Pipistrellus pipistrellus*	11	7	0	0	9	63	Moderate to High
I8	*Pipistrellus pygmaeus*	3	8	0	0	16	0	Low
I8	*Plecotus auritus*	0	6	0	0	21	0	Low
I8	*Rhinolophus hipposideros*	0	0	0	0	27	0	Low
I9	*Myotis daubentonii*	1	5	0	0	21	0	Low
I9	*Myotis mystacinus*	1	7	0	0	19	0	Low
I9	*Myotis nattereri*	0	10	0	0	17	0	Low
I9	*Nyctalus leisleri*	7	9	0	0	11	63	Moderate to High
I9	*Pipistrellus nathusii*	6	3	0	0	18	0	Low
I9	*Pipistrellus pipistrellus*	18	6	0	0	3	85	High
I9	*Pipistrellus pygmaeus*	10	6	0	0	11	63	Moderate to High
I9	*Plecotus auritus*	0	7	0	0	20	0	Low

Location	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity	Median Percentile	Bat Activity
I9	*Rhinolophus hipposideros*	0	0	0	0	27	0	Low
I10	*Myotis daubentonii*	13	7	0	0	7	75	Moderate to High
I10	*Myotis mystacinus*	13	10	0	0	4	75	Moderate to High
I10	*Myotis nattereri*	1	13	0	0	13	63	Moderate to High
I10	*Nyctalus leisleri*	9	8	0	0	10	63	Moderate to High
I10	*Pipistrellus nathusii*	8	12	0	0	7	63	Moderate to High
I10	*Pipistrellus pipistrellus*	25	1	0	0	1	98	High
I10	*Pipistrellus pygmaeus*	19	4	0	0	4	91	High
I10	*Plecotus auritus*	17	4	0	0	6	85	High
I10	*Rhinolophus hipposideros*	1	5	0	0	21	0	Low
I11	*Myotis daubentonii*	10	9	0	0	6	75	Moderate to High
I11	*Myotis mystacinus*	8	11	0	0	6	75	Moderate to High
I11	*Myotis nattereri*	0	3	0	0	22	0	Low
I11	*Nyctalus leisleri*	12	9	0	0	4	75	Moderate to High
I11	*Pipistrellus nathusii*	0	9	0	0	16	0	Low
I11	*Pipistrellus pipistrellus*	22	0	0	0	3	97	High
I11	*Pipistrellus pygmaeus*	13	6	0	0	6	81	High
I11	*Plecotus auritus*	3	9	0	0	13	0	Low
I11	*Rhinolophus hipposideros*	0	2	0	0	23	0	Low

Differences in activity between static detector locations split by species and location is presented in the figure below. The centre line indicates the median activity level whereas the box represents the interquartile range (therefore the spread of the middle 50% of nights of activity). The plot for common pipistrelle shows that the activity level for both T2, T10 and T11 was consistently high.

The centre line indicates the median activity level whereas the box represents the interquartile range (the spread of the middle 50% of nights of activity). The dots indicate outlier values. Note: *Myotis daubentonii* = Daubenton's bat, *Myotis mystacinus* = whiskered bat, *Myotis nattereri* = Natterer's bat, *Nyctalus leisleri* = Leisler's bat, *Pipistrellus nathusii* = Nathusius' bat, *Pipistrellus pipistrellus* = common pipistrelle, *Pipistrellus pygmaeus* = soprano pipistrelle, *Plecotus auritus* = brown long-eared bat and *Rhinolophus hipposideros* = lesser horseshoe bat. I = Inchamore and number = turbine location, so I1 = turbine 1 at Inchamore.



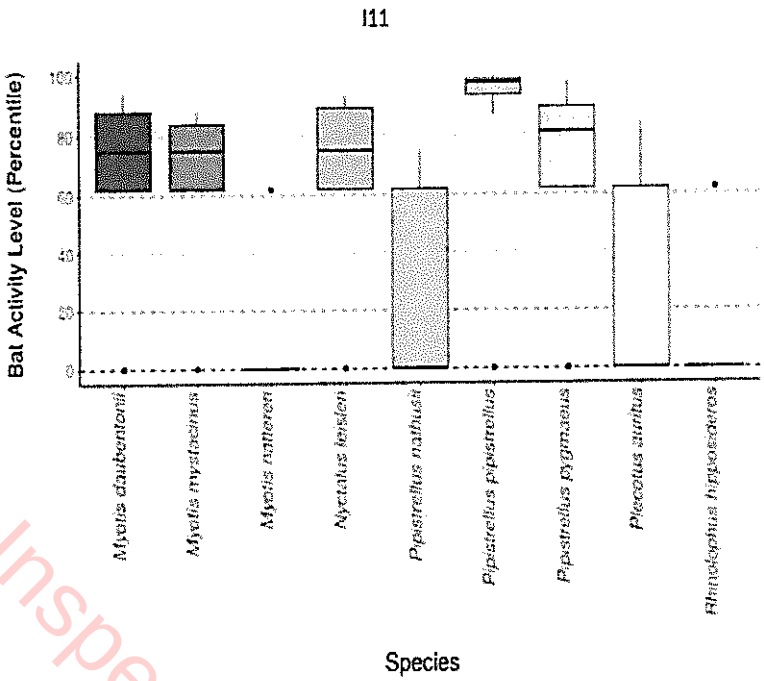


Figure 3.4 Differences in activity between static detector locations, split by species and location during survey period 3 at Inchamore.

3.5 Bat Roost Surveys

3.5.1 Preliminary Ecological Appraisal

Review of aerial photography for the proposed wind farm sites at Inchamore and Gortyrahilly indicates that both sites are predominantly comprised of conifer plantation and open upland vegetation, with small parcels of pasture in lower lying areas of the sites. Watercourses are limited to small 1st order streams that are generally open or run adjacent to forest blocks. These watercourses and hedgerows/ treelines bounding pasture do provide some connectivity to the wider landscape, but overall the sites support relatively poor connectivity. In accordance with the criteria outlined in Table 2-4, the commuting and foraging habitats over most of the sites are of low suitability for bats, with the low lying, more sheltered areas of pasture supporting moderate suitability. A summary of foraging and roosting habitats for Irish bats is included in Appendix B.

3.5.2 Bat Roost Inspection Survey

3.5.2.1 Trees

Inchamore

The cover of broadleaved trees at the proposed site at Inchamore is low, with very few mature trees present. No trees of suitability as roosting or resting places for bats were recorded at this site.

Gortyrahilly

The cover of broadleaved trees at the proposed site at Gortyrahilly is limited to lower lying areas of pasture at the northern and southern extremes of the site. Two trees supporting suitability as roosting habitat for bats were recorded at Gortyrahilly: one Ash (*Fraxinus excelsior*) tree of moderate suitability due to features including broken limbs, a cracked limb and wounds caused by a limb drop; and one Oak (*Quercus robur*) of low suitability for bats in heavy ivy growth were both recorded at the northern-most tip of the site. The location of these trees is indicated in Figure 3-13.

3.5.2.2 Structures

Inchamore

Four structures were identified within the proposed site at Inchamore during the preliminary ecological appraisal. Three of these structures were completely derelict, with no roof, windows or doors (as per example in Plate 3-1). These buildings were of negligible suitability for bats and as such, are not assessed further in this report.

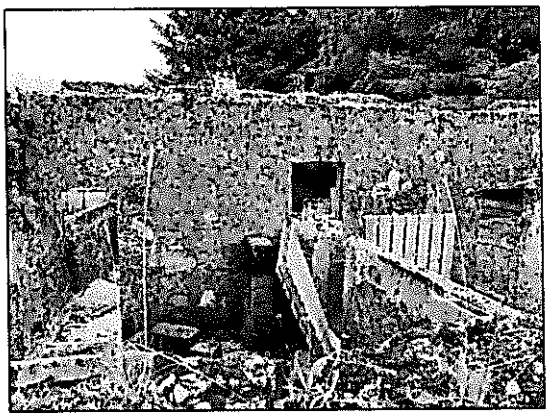


Plate 3-1: Example of derelict buildings present at Inchamore

A structure located on the eastern boundary of the site (Figure 3-12) was a single storey outbuilding constructed of stone with cement rendering to the walls and a corrugated roof. The door to the building was missing. Internally, the building supported limited potential for individual bats in joints of roof beams. No evidence of bats was observed during the external or internal inspection of the structure. This structure does not provide appropriate conditions to be used by bats on a regular basis or by larger numbers of bats and is considered to be of low suitability as a roosting habitat.

Plate 3-2: Outbuilding located at the eastern boundary of the site at Inchamore

No bridges with potential to support bats were identified within the proposed wind farm boundary at Inchamore.

Gortyrahilly

Two clusters of buildings were identified within the proposed site at Gortyrahilly during the preliminary ecological appraisal; one in the townland of Gortyrahilly at the north of the site and one in the townland of Cahernacaha at the south of the site.

The buildings at Gortyrahilly to the north of the site comprised two disused dwellings and two farm outbuildings.

Disused dwelling (Dwelling G1)

This building is a two-storey house with rendered walls and a slate roof. Two stone outbuildings with a corrugated roof are attached to the house (see Photos 1 and 2, Plate 3-3). Potential access points for bats include slipped roof tiles, raised flashing to the chimney and an open downstairs window. There are also gaps in the soffit and ridge tiles at the rear of the house. The attached outbuildings contain gaps around the window shutter and door and there are also small gaps between the stonework of the walls. Neither the dwelling nor outbuildings were accessible for internal inspection. No evidence of bats was observed during the external inspection. This building is considered to be of high suitability as a roosting habitat due to the size, shelter and conditions provided by the structure. The surrounding habitat provides suitable foraging and commuting areas at a treelined local road to the south and pasture bounded by hedgerows/treelines and scrub to the north.

Derelict Dwelling (Dwelling G2)

A derelict two-storey stone cottage with slate roof (Photo 3 and 4, Plate 3-3). There are potential entry points for bats via broken and open windows, gaps in the roof tiles and soffits. There are also gaps between exposed stonework at the southern end of the building (Photo 5, Plate 3-3). This building was not accessible for internal inspection. No evidence of bats was observed during the external inspection. This building is considered to be of moderate suitability for bats due to the size, shelter and conditions provided by the structure. The building is falling into disrepair, which makes it more subject to draughts and as such less likely to provide conditions required by a roost of high conservation status.

Outbuilding 1

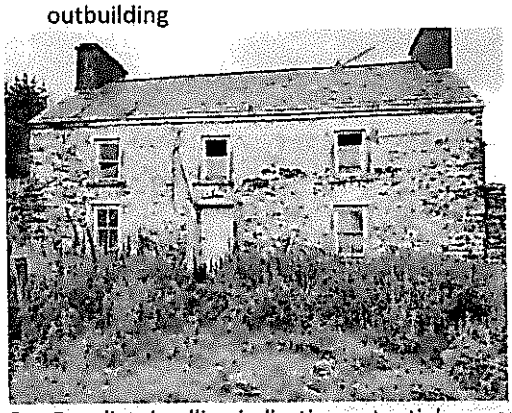
A single storey rendered outbuilding with a corrugated roof (Photo 5, Plate 3-3). There were potential access points via gaps around the door and under the roof. This building was not accessible for internal inspection. No evidence of bats was observed during the external inspection. This building is considered to be of moderate suitability for bats due to the size, shelter and conditions provided by the structure.

Outbuilding 2

A single storey outbuilding constructed of stone with a corrugated roof (Photo 6, Plate 3-3). There are potential access points for bats via gaps between the stonework and around the doors. Internally, there are potential roosting features within the joints of timber beams. No evidence of bats was recorded during the internal or external inspections. This building is considered to be of moderate suitability for bats due to the size, shelter and conditions provided by the structure.

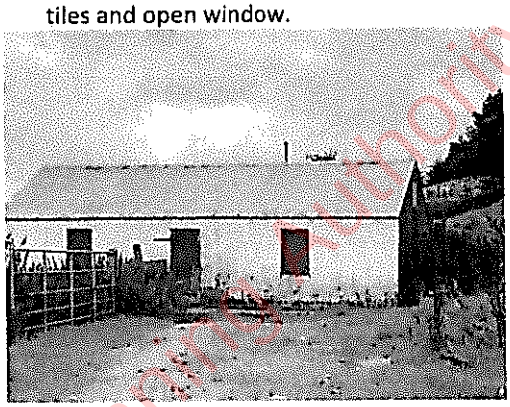
1. Disused dwelling and attached stone outbuilding

2. Rear view of dwelling indicating potential access points in raised ridge tiles and soffit

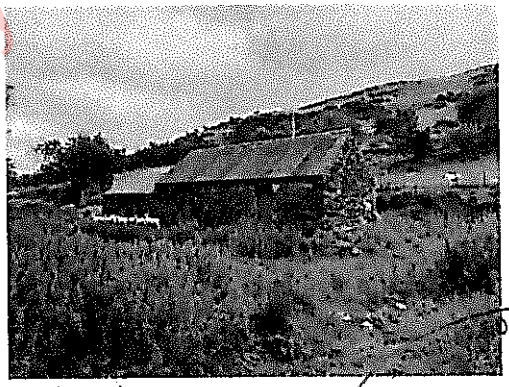


3. Derelict dwelling indicating potential access points via soffit, ridge tiles and gaps in roof tiles and open window.

4. Rear and side view of disused dwelling showing exposed stonework



5. Single storey outbuilding



6. Stone barn

Plate 3-3: Photographs of disused farmhouses and associated outbuildings at the north of the proposed site at Gortyrahilly

There were two dwellings at Cahernacaha, at the south of the proposed Gortyrahilly Wind Farm. Dwelling C1 was a modern two-storey building with a slate roof. A single storey outbuilding was also present to the west of the house (Plate 3-4). These buildings were not accessed for an internal inspection. The house and outbuilding were in good repair and no obvious entry points for bats were recorded.

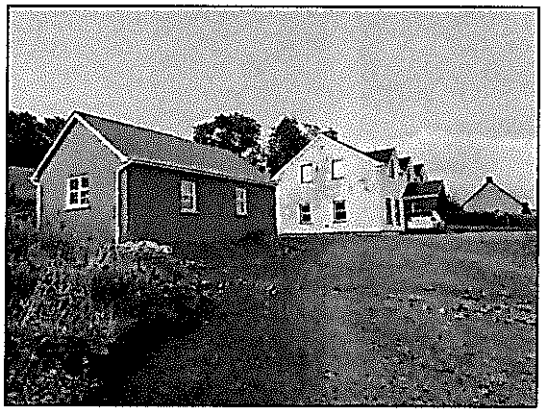


Plate 3-4: Dwelling C1 at Cahernacaha

Dwelling C2 was a two-storey dwelling with a slate roof (Plate 3-5). There was a potential access point for bats via a raised ridge tile. This building is considered to be of high suitability as a roosting habitat due to the size, shelter and conditions provided by the structure. The surrounding habitat provides suitable foraging and commuting areas within pasture bounded by hedgerows/treelines and scrub located around the house.

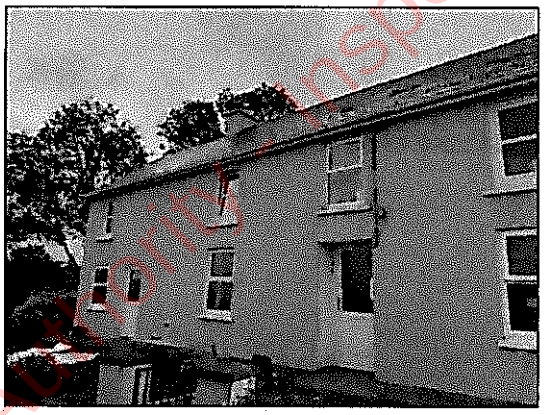


Plate 3-5: Dwelling C2 at Cahernacaha

Bridges

A double arched stone culvert under a local road at Gortnabinna to the south of the proposed site (W 15638 71322) (Plate 3-6) supports moderate suitability for roosting bats in several deep crevices present between the stone slabs forming the arches. No evidence of roosting bats was recorded at the bridge during the inspection surveys undertaken on 17th August 2019 and 27th February 2020; this culvert is classified as Grade 2[13].

[13] *0 = no potential (no suitable crevices); 1 = crevices present may be of use to bats; 2 = crevices ideal for bats but no evidence of usage; and 3 = evidence of bats (e.g. bats present, droppings, grease marks, urine staining, claw marks or the presence of bat fly pupae) (Billington and Norman, 1997).

The watercourse below the culvert is not the type favoured for foraging by Daubenton's bat, but according to Roche *et al.* (2014), maternity colonies show a preference for being situated in the vicinity of bog, marsh and heath. This is reinforced by the results of the static detector survey, which suggests the general wind farm area is still used by this species even if no roosts are present.

Plate 3-6: Double arch stone culvert with moderate suitability for roosting bats

3.5.3 Emergence Roost Survey

3.5.3.1 Inchamore

The outbuilding at Inchamore was sufficiently accessible to enable a thorough and complete internal inspection of the building. Sufficient information was obtained during the inspection to establish the absence of bats at this structure at the time of survey. As such a further emergence survey was not considered necessary.

3.5.3.2 Gortyrahilly

Gortyrahilly Townland

An emergence survey of the buildings in the townland of Gortyrahilly was undertaken by two surveyors on 16th August 2019. One Natterer's bat and seven pipistrelle bats, comprising both common and soprano pipistrelle bats were recorded emerging from the soffit at the rear of the disused house (Dwelling G1; location illustrated in Figure 3-13). The bats foraged around the building and also along the treeline to the south of the building. The passive monitor recording adjacent to this building recorded common and soprano pipistrelle, Leisler's bat, Natterer's bat and one brown long-eared bat. Summary data from the passive monitor is included in Appendix A.

Four pipistrelle bats, comprising both common and soprano pipistrelle bats were recorded emerging from the derelict house (Dwelling G2; location illustrated in Figure 3-13). Three bats emerged from the soffit at the front of the house and one bat emerged from the roof at the rear of the house (exact exit point not observed). The bats foraged around the house for the duration of the survey.

Leisler's bat was also recorded commuting overhead at 21:34 (35 minutes after sunset). No emergent bats or bat roosts were identified at the outbuildings present at the site.

Cahernacaha Townland

An emergence survey of the buildings at Cahernacaha was undertaken by two surveyors on 17th August 2019. Approximately 40 common pipistrelle and ten soprano pipistrelle bats emerged from the roof of Dwelling C2 (location illustrated in Figure 3-13). No other species were recorded during the course of the emergence survey.

No bats were recorded emerging from Dwelling C1 at Cahernacaha (Plate 3-4).

3.5.4 Interpretation and Evaluation of Roost Survey Results

3.5.4.1 Inchamore

Presence/ absence: There was no evidence of bats within the outbuilding at Inchamore during the external/ internal inspection.

Population size class assessment: N/A

Site status assessment: The outbuilding is of low suitability for roosting bats due to the lack of suitable roosting features to support larger numbers of bats. No evidence of bats was recorded during the internal inspection of the building.

No potential or actual tree roosts were recorded at the proposed site at Inchamore.

No caves or other underground features are known to exist at the proposed site and its environs.

The location of the potential bat roost at Inchamore is illustrated in Figure 3-12.

3.5.4.2 Gortyrahilly

Gortyrahilly and Gortnabinna Townland

Presence/ absence: Seven pipistrelle (soprano and common pipistrelle) and one natterer's bat were observed emerging from the disused house Dwelling G1 at Gortyrahilly (W 16685 73416).

Four pipistrelles (soprano and common pipistrelle) were observed emerging from the derelict house Dwelling G2 at Gortyrahilly (W 16715 73463).

No evidence of bats was observed within the outbuildings at Gortyrahilly during the external/internal inspections or emergence survey.

Population size class assessment: The disused house and derelict house at Goryrahilly both support minor summer roosts, likely a small group of males.

Site status assessment: The disused house Dwelling G1 at Gortyrahilly was considered to be of high suitability for bats due to the size, shelter and conditions provided by the structure. The surrounding habitat provides suitable foraging and commuting areas at a treelined local road to the south and pasture bounded by hedgerows/treelines and scrub to the north. The emergence survey confirmed that the disused house supports a minor summer roost for pipistrelle and natterer's bat that is likely to be a small group of male bats.

The derelict house Dwelling G2 at Gortyrahilly was considered to be of moderate suitability for bats; although the building was in a bad state of repair it did contain features that were suitable to provide shelter and protection for bats. The emergence survey confirmed that the abandoned house supports a minor common and soprano pipistrelle roost that is likely to be a small group of male bats.

The outbuildings on site were of moderate suitability for bats. However, no evidence of roosting bats was observed during the inspection or emergence survey.

The bridge located to the south of the site at Gortnabinna was of moderate suitability for bats. However, no evidence of roosting bats was observed during the inspection survey.

In winter bats may roost in parts of buildings such as cavity walls or around window frames in cooler areas with stable temperatures. The potential for bats to hibernate in the buildings to the north of the site at Gortyrahilly or deep within cavities in the bridge at Gortnabinna cannot be excluded. No caves or other underground features are known to exist at the proposed site and its environs.

Two potential tree roosts were recorded at Gortyrahilly.

The location of the actual and potential roosts at Gortyrahilly is illustrated in Figure 3-13.

Cahernacaha Townland

Approximately 50 pipistrelles (40 common pipistrelle and ten soprano pipistrelle) were observed emerging from Dwelling C2 at Cahernacaha (W 14770 70582).

No bats were recorded emerging from Dwelling C1 at Cahernacaha (W 14821 70509).

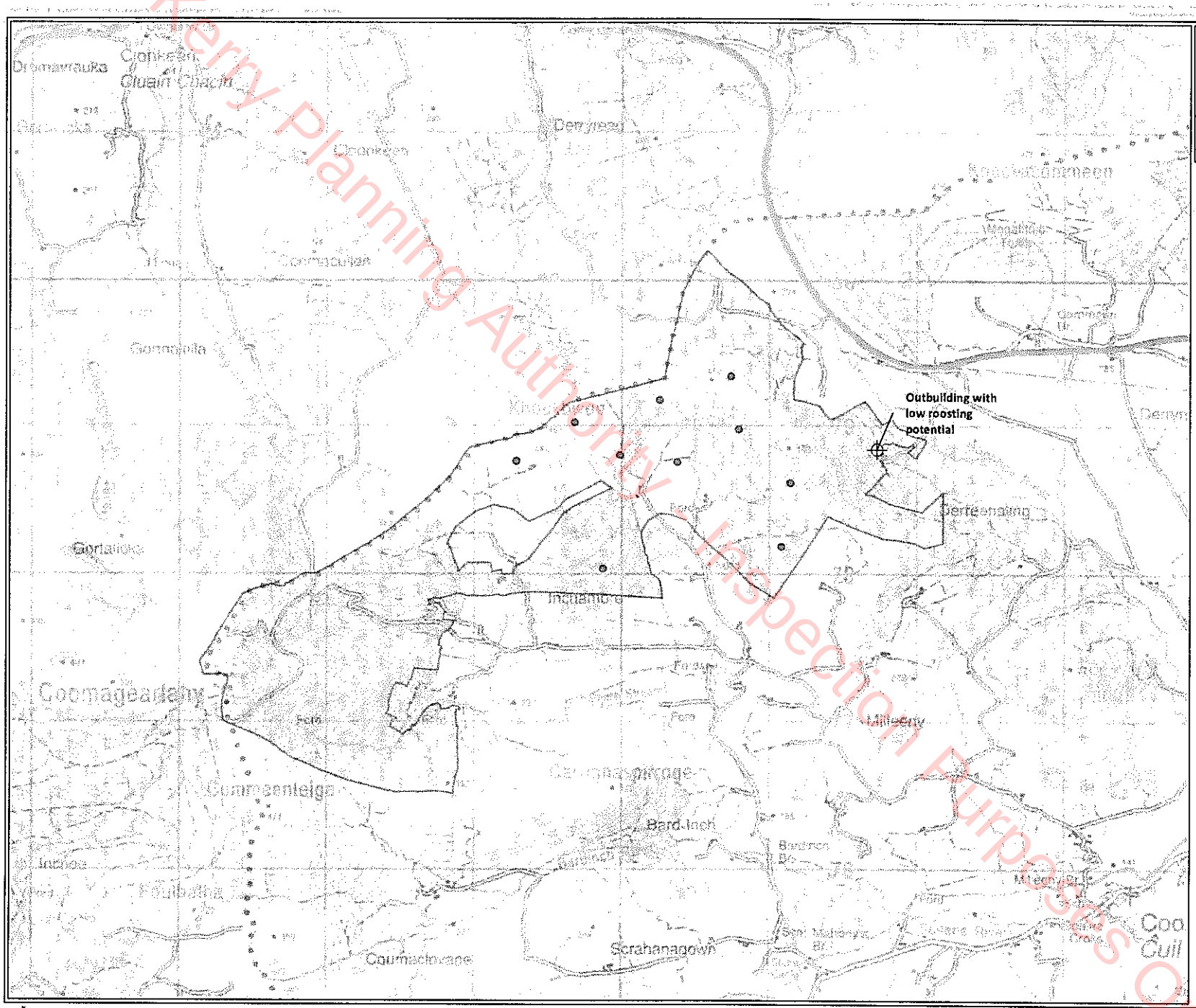
Population size class assessment: Dwelling C2 at Cahernacaha supports a common and soprano pipistrelle maternity roost.

Site status assessment: Dwelling C1 at Cahernacaha did not support any obvious entry and exit points for bats and no bats were recorded during the emergence survey.

Dwelling C2 at Cahernacaha was considered to be of high suitability as a roosting habitat due to the size, shelter and conditions provided by the structure. The surrounding habitat provides suitable foraging and commuting areas within pasture bounded by hedgerows/treelines and scrub located around the house. The emergence survey confirmed that the dwelling supports a common and soprano pipistrelle maternity roost.

The potential for bats to hibernate in the buildings at Cahernacaha cannot be excluded. No caves or other underground features are known to exist at Cahernacaha and its environs.

The location of the roost at Cahernacaha is illustrated in Figure 3-13.



TITLE:	Location of Potential Bat Roosts at the Proposed Wind Farm Site at Inchamore
PROJECT:	Gortyrahilly and Inchamore Wind Farms Bat Survey 2019/2020
FIGURE NO:	3.6
CLIENT:	SSE Renewables
SCALE:	1:25000
REVISION:	0
DATE:	31/03/2020
PAGE SIZE:	A3

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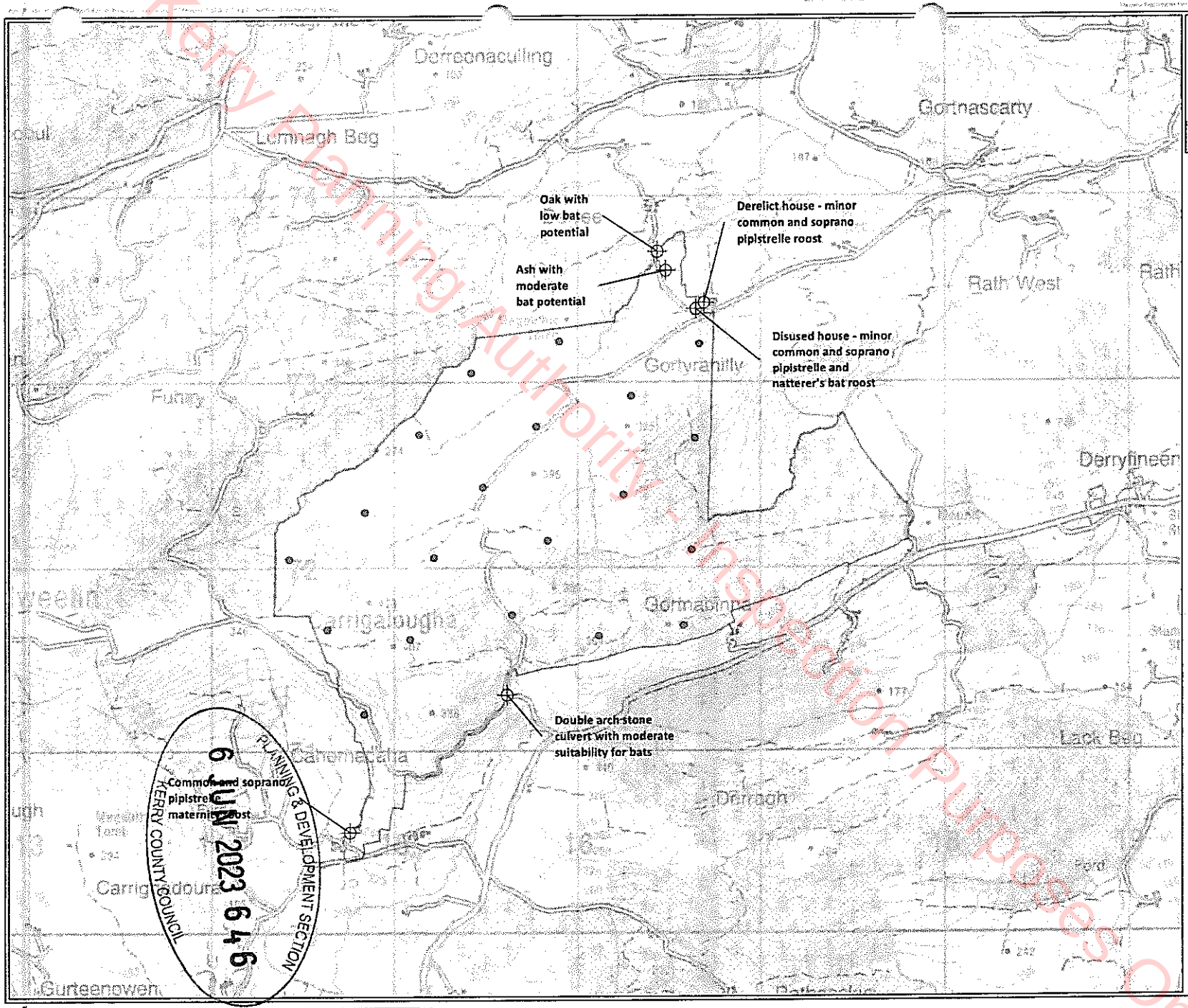

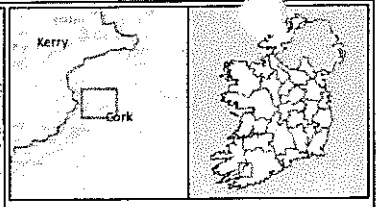

Potential Bat Roost

Indicative Turbine Locations

Site Boundary

TITLE:	Location of Bat Roosts at the Proposed Wind Farm Site at Gortyrahilly		
PROJECT:	Gortyrahilly and Inchamore Wind Farms Bat Survey 2019/2020		
FIGURE NO:	3.7		
CLIENT:	SSE Renewables		
SCALE:	1:20000	REVISION:	0
DATE:	31/03/2020	PAGE SIZE:	A3

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3.6 Summary of the results of 2019/2020 bat surveys

Table 3-15 provides a summary of the bat assessment. It outlines whether a bat species identified for the desktop study was subsequently recorded within the proposed wind farm during the bat surveys that took place in 2019 and 2020.

Table 3-15: Bat Survey Summary Results

Bat Species	Desktop Study (NBDC & NPWS)	2019 Activity Surveys	2019 Static Detector Surveys	2019/20 Roost Surveys
Brown long-eared bat	✓	X	✓	X
Common pipistrelle	✓	✓	✓	✓
Daubenton's bat	✓	X	✓	X
Leisler's bat	✓	✓	✓	X
Lesser horseshoe bat	✓	X	✓	X
Nathusius' bat	✓	X	✓	X
Natterer's bat	X	✓	✓	✓
Soprano pipistrelle	✓	✓	✓	✓
Whiskered bat	X	X	✓	X

4. DISCUSSION

The methodology for the 2019 and 2020 bat surveys at Gortyrahilly and Inchamore wind farms adhered to SNH (2019) guidance for assessing the impact of proposed wind farm developments on local bat species. Monthly activity surveys were undertaken between May to October 2019. Three rounds of static detectors were also deployed during this time period, for a minimum of 10 nights per round per detector. Roost surveys were also conducted including preliminary ecological appraisal, bat roost inspection and emergence surveys. The latter were conducted in August 2019 and February 2020.

During activity surveys during the summer of 2019, a total of four species of bats were recorded: common pipistrelle, soprano pipistrelle, Leisler's bat and Natterer's bat. Common pipistrelle was recorded most frequently across both sites and Natterer's bat the least.

During static detector surveys, a total of nine species of bat were recorded. In addition to the four species already recorded during activity surveys, Nathusius' bat, Daubenton's bat, whiskered bat, brown long-eared bat and lesser horseshoe bat were also recorded.

The Ecobat analysis showed six out of 14 detectors recorded at least one night of high bat activity in round one (spring), ten out of 18 detectors recorded at least one night of high bat activity in round two (summer) and eleven out of 17 detectors recorded at least one night of high bat activity in round three (autumn) at Gortyrahilly. Similarly, for Inchamore, it showed five out of 10 detectors recorded at least one night of high bat activity in round one (spring), seven out of 10 detectors recorded at least one night of high bat activity in round two (summer) and five out of 11 detectors recorded at least one night of high bat activity in round three (autumn).

All bats recorded are classified as 'Least Concern' on the Irish Red List and protected under the EU Habitats Directive Annex IV and Wildlife Acts. Only one species was also listed as Annex II under the EU Habitats Directive: lesser horseshoe bat.

During August roost surveys, a total of seven potential roosts were identified. Of these, there were only three confirmed roosts. Three species were recorded during emergence surveys (common pipistrelle, soprano pipistrelle and Natterer's bat).

No actual bat roosts were identified at the Inchamore site following inspection of trees and buildings (only one low potential outbuilding was present in the south east of the site).

At Gortyrahilly, of the six potential roosts, three were confirmed via emergence surveys. These included a disused house Dwelling G1 and derelict house Dwelling G2 were present in the north east of the site. The disused house Dwelling G1 was classified as high suitability for bats and was confirmed as a minor summer roost site for male common pipistrelle, soprano pipistrelle and Natterer's bat. The derelict house Dwelling G2 was classified as moderate suitability for bats and was confirmed as a minor summer roost site for male common and soprano pipistrelle bats. The final confirmed summer roost was in the south west of the Gortyrahilly site and was a high suitability dwelling (Dwelling C2) that acted as a maternity roost for common and soprano pipistrelles. A low potential oak tree, moderate potential ash tree and moderate potential double-arched stone culvert were discounted as roosts at Gortyrahilly.

During winter roost surveys, no evidence of winter roosting bats was recorded either at Gortyrahilly or Inchamore. While the buildings recorded during the summer roost surveys (disused house and derelict house) at Gortyrahilly are unlikely to provide the consistent cool conditions required by hibernating bats, the presence of low numbers of bats within these structures cannot be excluded.

No trees or structures of potential use as winter roosts were recorded at Inchamore.

There is potential for low-level cumulative impacts to a minor roost of common pipistrelle located 0.7 km south of the Gortyrahilly recorded during surveys for Derragh wind farm.

4.1 Constraints

As detailed earlier, all Irish bats are protected under the Wildlife Act (Revised). Destruction, alteration or evacuation of a known bat roost is a notifiable action under current legislation and a derogation licence must be obtained from the National Parks and Wildlife Service (NPWS) before works can commence.

In addition, it should be noted that any works interfering with bats and especially their roosts, may only be carried out under a licence to derogate from Regulation 23 of the Habitats Regulations 1997, (which transposed the EU Habitats Directive into Irish law) issued by the NPWS.

4.2 Potential Impacts

As outlined by Scottish Natural Heritage (2019), wind farms can affect bats in the following ways:

- Collision mortality, barotrauma and other injuries
- Loss or damage to commuting and foraging habitat
- Loss of, or damage to roosts
- Displacement of individuals or populations

4.3 Recommendations

No demolition or construction works are proposed to the structures that are the subject of this report. As such, loss of, or damage to roosts will be avoided.

Disturbance of occupied roosts should be prevented by restricting construction activities in their vicinity.

There should be no direct illumination of known bat roosts as identified in this report. Lighting shall be directed away from the roosts by the use of directional lighting (i.e. lighting which only shines on the proposed works and not nearby countryside) to prevent overspill. This shall be achieved by the design of the luminaire and by using accessories such as hoods, cowls, louvres and shields to direct the light to the intended area only.

Should the stone culvert (at W 15638 71322) require any strengthening works, this should be done under the supervision of a licensed bat specialist who will identify any deep crevices which will be retained for use by bats or alternative roosts provided.

If, for unforeseen reasons, works to a structure identified as bat roost become unavoidable it will be necessary to apply for a derogation licence from NPWS wildlife licencing section before works are allowed. The destruction of known roosts cannot proceed without a derogation licence (Section 23 & 34 licence prescribed under the Wildlife Act 1976 (as amended); and Section 54 of the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended) being in place and specific mitigation measures being approved in advance with NPWS.

A 50 m buffer distance from turbine blade tip to any key habitat feature (e.g. woodland, wetlands) should be applied. This is especially relevant for turbines located within or near to forestry towards the east of the Gortyrahilly site and for much of the Inchamore site. This should be achieved either by turbine micro-siting or trimming of key habitat features both during construction and operation of the proposed wind farm.

5. CONCLUSION

In general, the landscape in which the proposed wind farm sites are situated is of low to moderate suitability for common pipistrelle, soprano pipistrelle, brown long-eared bat, Leisler's bat, Daubenton's bat, whiskered bat, Natterer's bat and lesser horseshoe. It is classed as of low suitability for Nathusius' pipistrelle. Nine species of bats have been recorded as present at the proposed Gortyrahilly and Inchamore wind farm sites during 2019 bat surveys. All are listed as 'Least Concern' on the Irish Red List and one is listed as 'Annex II' under the EU Habitats Directive: lesser horseshoe bat. No confirmed roosts were present at Inchamore site and three confirmed summer roosts (two minor and one maternity roost for common pipistrelle, soprano pipistrelle and Natterer's bat) were present at Gortyrahilly site. Although no confirmed winter roosts were present, it cannot be discounted that the summer roosts at Gortyrahilly do not provide suitable hibernation roosts for low numbers of bats. Damage and disturbance to these roosts should be avoided. Mitigation measures such as providing a 50 m buffering distance from turbine blade to key habitat features should be implemented during construction and operation of the proposed wind farm sites.

6. REFERENCES

Altringham, J. (2003) British Bats The New Naturalist Series 93. Harper Collins.

Aughney, T., Kelleher, C., & Mullen, D. (2008): Bat Survey Guidelines, Traditional Farm Buildings Scheme. Heritage Council, Kilkenny.

Aughney, T., Roche, N. & Langton, S. (2018). *The Irish Bat Monitoring Programme 2015-2017. Irish Wildlife Manuals*, No. 103. National Parks and Wildlife Service, Department of Culture Heritage and the Gaeltacht, Ireland

Bat Conservation Ireland, (2010). Guidance notes for Planners, Engineers, Architects, and Developers.

Bristol University. (2019,). *The Bats of Britain*. Retrieved from Bristol University: http://www.bio.bris.ac.uk/research/bats/britishbats/

BTHK. 2018. Bat Roosts in Trees – A Guide to Identification and Assessment for Tree-Care and Ecology Professionals. Pelagic Publishing, Exeter UK.

CIEEM (2016) Guidelines for Ecological Impact Assessment. The Institute for Ecology and Environmental Management.

Collins (2016). *Bat Surveys: Good Practice Guidelines* publication [3RD Edition], Bat Conservation Trust, UK.

Council of the European Communities (1992). Council Directive (92/43/EEC) of 21 May 1992 on the Conservation of natural habitats and of wild fauna and flora. *Official Journal of the European Communities* L215, 85-90 [Habitats Directive]

EPA, 2017. Guidelines on the Information to be contained in Environmental Impact Assessment Reports - Draft 2017. Environmental Protection Agency, Ireland.

Hundt, L. (2012). *Bat Surveys: Good Practice Guidelines*, 2nd Edition, Bat Conservation Trust

Kelleher, C. & Marnell, F. (2006). *Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals,* No. 25. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland

Lundy MG, Aughney T, Montgomery WI, Roche N (2011). *Landscape conservation for Irish bats & species specific roosting characteristics*. Bat Conservation Ireland.

Marnell, F., Looney, D. & Lawton, C. (2019) Ireland Red List No. 12: Terrestrial Mammals. National Parks and Wildlife Service, Department of the Culture, Heritage and the Gaeltacht, Dublin, Ireland.

Mitchell-Jones, A.J. & McLeish, A.P. (2004). *Bat Workers Manual*. 3rd edition. Joint Nature Conservation Committee.

National Roads Authority (2006): Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes. National Roads Authority, Dublin.

National Roads Authority (2006) - *Guidelines for the Treatment of Bats During the Construction of National Road Schemes*

NRA (2009) Guidelines for the Assessment of Ecological Impacts of National Road Schemes Rev. 2. National Roads Authority.

NRA (2008) NRA Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna on National Road Schemes). National Roads Authority.

NPWS (2008). *Conservation Status in Ireland of Habitats and Species listed in the European Council Directive on the Conservation of Habitats, Flora and Fauna 92/43/EEC*. Brunswick Press Ltd.

Roche, N., Aughney, T., Marnelle, F. and Lundy, M. (2014). Irish Bats in the 21st Century. Bat Conservation Ireland.

Rodrigues, L. *et al* (2015): Guidelines for consideration of bats in wind farm projects - Revision 2014. EUROBATS Publication Series No. 6 (English Version). UNEP/ EUROBATS Secretariat, Bonn, Germany, 133 pp.

Russ (2012) British Bat Calls: A Guide to Species Identification. Pelagic Publishing.

Scottish Natural Heritage (2019). Bats and onshore wind turbines: survey, assessment and mitigation.

Whilde, A. (1993). *Threatened mammals, birds, amphibians and fish in Ireland. Irish Red Data Book 2: Vertebrates*. Belfast: HMSO.

Wildlife Act (1976) pp 1-209. Dublin: Government Publications.

Wildlife Amendment Act (2000). Dublin: Government Publications.

FEHILY TIMONEY
30 YEARS

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APPENDIX A

Summary of Bat Calls
Recorded on Passive Monitor
During Roost Surveys

Summary table of bat calls recorded on the passive monitor at Gortyrahilly on 17th August, 2019

Common Pipistrelle	Soprano Pipistrelle	Leisler's Bat	Natterer's Bat	*Myotis* Species	Brown Long-eared Bat
1185	228	25	9	6	1

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APPENDIX B

Description of Irish Bat Species

Ireland has ten known bat species from two distinct families. Each is briefly described below. For a more comprehensive overview see Roche *et al* (2014). The conservation status of each species is derived from NPWS (2013).

Vespertilionidae:

Common pipistrelle (*Pipistrellus pipistrellus*)
This species was only recently separated from its sibling, the soprano or brown pipistrelle *P. pygmaeus*, which is detailed below (Barratt et al, 1997). The common pipistrelle's echolocation calls peak at 45 kHz. The species forages along linear landscape features such as hedgerows and treelines as well as within woodland. The conservation status of this species is Favourable.

Soprano pipistrelle (*Pipistrellus pygmaeus*)
The soprano pipistrelle's echolocation calls peak at 55 kHz, which distinguishes it readily from the common pipistrelle on detector. The pipistrelles are the smallest and most often seen of our bats, flying at head height and taking small prey such as midges and small moths. Summer roost sites are usually in buildings but tree holes and heavy ivy are also used. Roost numbers can exceed 1,500 animals in mid-summer. The conservation status of this species is Favourable.

Nathusius' pipistrelle (*Pipistrellus nathusii*)
Nathusius' pipistrelle is a recent addition to the Irish fauna and has mainly been recorded from the north-east of the island in Counties Antrim and Down (Richardson, 2000) and also in Fermanagh, Longford and Cavan. It has also been recorded in Counties Cork and Kerry (Kelleher, 2005). However, the known resident population is enhanced in the autumn months by an influx of animals from Scandinavian countries. The conservation status of this species is Favourable.

Leisler's bat (*Nyctalus leisleri*)
This species is Ireland's largest bat, with a wingspan of up to 320mm; it is also the third most common bat, preferring to roost in buildings, although it is sometimes found in trees and bat boxes. It is the earliest bat to emerge in the evening, flying fast and high with occasional steep dives to ground level, feeding on moths, caddis-flies and beetles. The echolocation calls are sometimes audible to the human ear being around 15 kHz at their lowest. The audible chatter from their roost on hot summer days is sometimes an aid to location. The conservation status of this species is Favourable.

Brown long-eared bat (*Plecotus auritus*)
This species of bat is a 'gleaner', hunting amongst the foliage of trees and shrubs, and hovering briefly to pick a moth or spider off a leaf, which it then takes to a sheltered perch to consume. They often land on the ground to capture their prey. Using its nose to emit its echolocation, the long-eared bat 'whispers' its calls so that the insects, upon which it preys, cannot hear its approach (and hence, it needs oversize ears to hear the returning echoes). As this is a whispering species, it is extremely difficult to monitor in the field as it is seldom heard on a bat detector. Furthermore, keeping within the foliage, as it does, it is easily overlooked. It prefers to roost in old buildings. The conservation status of this species is Favourable.

Natterer's bat (*Myotis nattereri*)
This species has a slow to medium flight, usually over trees but sometimes over water. It usually follows hedges and treelines to its feeding sites, consuming flies, moths, caddis-flies and spiders. Known roosts are usually in old stone buildings but they have been found in trees and bat boxes. The Natterer's bat is one of our least studied species and further work is required to establish its status in Ireland. The conservation status of this species is Favourable.

Daubenton's bat (*Myotis daubentonii*)
This bat species prefers feeding close to the surface of smooth water, either over rivers, canals, ponds, lakes or reservoirs but it can also be found foraging in woodlands. Flying at 15 kilometres per hour, it gaffs insects with its over-sized feet as they emerge from the surface of the water - feeding on caddis flies, moths, mosquitoes, midges etc. It is often found roosting beneath bridges or in tunnels and also makes use of hollows in trees. The conservation status of this species is Favourable.

Whiskered bat (*Myotis mystacinus*)
This species, although widely distributed, has been rarely recorded in Ireland. It is often found in woodland, frequently near water. Flying high, near the canopy, it maintains a steady beat and sometimes glides as it hunts. It also gleans spiders from the foliage of trees. Whiskered bats prefer to roost in buildings, under slates, lead flashing or exposed beneath the ridge beam within attics. However, they also use cracks and holes in trees and sometimes bat boxes. The whiskered bat is one of our least studied species and further work is required to establish its status in Ireland.

Brandt's bat (*Myotis brandtii*)
According to NPWS (2013), whiskered and Brandt's bats are cryptic species and can only be told apart using DNA techniques. Brand't bat has been confirmed only once from Ireland; a single specimen found in 2003 in Wicklow (Mullen, 2006). Following this discovery, an intensive re-survey, involving DNA testing, was undertaken of all known whiskered bat roosts in Ireland, by the Centre for Irish Bat Research. Woodland mist-netting was also conducted for the species. Despite the extensive survey-work, no further Brandt's bats were identified. The most recent Red Data List for Irish Mammals (Marnell *et al.* 2009) lists Brandt's bat as data deficient. There is no evidence of any roosts for this species in the country and at present the single record for the species is considered an anomaly. Boston et al (2010) concluded that "*M. brandtii* .... cannot currently be considered a resident species. This species is now considered a vagrant to the country and consequently, a detailed assessment has not been carried out.

<u>Rhinolophidae:</u>
Lesser horseshoe bat (*Rhinolophus hipposideros*)
This species is the only representative of the Rhinolophidae or horseshoe bat family in Ireland. It differs from our other species in both habits and looks, having a unique nose leaf with which it projects its echolocation calls. It is also quite small and, at rest, wraps its wings around its body. Lesser horseshoe bats feed close to the ground, gleaning their prey from branches and stones. It often carries its prey to a perch to consume, leaving the remains beneath as an indication of its presence. The echolocation call of this species is of constant frequency and, on a heterodyne bat detector, sounds like a melodious warble. The species is confined to six counties along the Atlantic seaboard: Mayo, Galway, Clare, Limerick, Kerry and Cork. The current Irish national population is estimated at 12,500 animals. This species is listed on Annex II of the EC Habitats Directive and 41 Special Areas of Conservation have been designated in Ireland for its protection. Where it occurs, it is often found roosting within farm buildings. The conservation status of this species is Favourable.

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APPENDIX C

Raw Data used for Ecobat Tool

Table 1: Raw data Curtyrahilly round 2

TURBINE_NO	Date	*Myotis daubentonii*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Myotis mystacinus*	*Myotis nattereri*	*Rhinolophus hipposideros*
G1	09/05/2019	0	0	0	0	0	0	0	0	0
G1	10/05/2019	0	0	0	0	0	0	0	0	0
G1	11/05/2019	1	2	1	0	0	0	0	0	0
G1	12/05/2019	0	1	0	2	0	0	0	0	0
G1	13/05/2019	0	7	0	1	0	0	0	0	0
G1	14/05/2019	0	0	0	1	0	0	0	0	0
G1	15/05/2019	0	6	0	26	2	0	0	0	0
G1	16/05/2019	0	4	0	3	0	1	0	0	0
G1	17/05/2019	0	2	0	6	0	0	0	0	0
G1	18/05/2019	0	1	0	0	0	0	0	0	0
G1	19/05/2019	0	0	0	0	0	0	0	0	0
G1	20/05/2019	0	0	0	0	0	0	0	0	0
G2	09/05/2019	0	0	0	0	0	0	0	0	0
G2	10/05/2019	0	1	0	1	0	0	0	0	0
G2	11/05/2019	0	5	0	1	0	0	0	1	0
G2	12/05/2019	0	8	0	0	1	0	0	0	0
G2	13/05/2019	0	7	0	1	0	0	0	0	0
G2	14/05/2019	0	1	0	0	1	0	0	0	0
G2	15/05/2019	0	11	0	7	2	1	1	0	0
G2	16/05/2019	0	14	0	2	0	0	0	0	0
G2	17/05/2019	1	4	0	14	11	0	2	0	0
G2	18/05/2019	0	1	1	1	0	1	0	0	0
G2	19/05/2019	0	0	0	0	0	0	0	0	0
G2	20/05/2019	0	0	0	0	0	0	0	0	0
G3	09/05/2019	0	1	0	0	0	0	0	0	0
G3	10/05/2019	0	2	0	0	0	0	1	0	0
G3	11/05/2019	0	2	0	1	0	0	0	0	0
G3	12/05/2019	0	5	0	2	0	0	0	0	0
G3	13/05/2019	0	4	0	2	0	0	0	0	0

TURBINE_NO	Date	*Myotis daubentonii*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Myotis mystacinus*	*Myotis nattereri*	*Rhinolophus hipposideros*
G3	14/05/2019	0	3	0	0	0	0	0	0	0
G3	15/05/2019	0	11	0	8	4	0	0	0	0
G3	16/05/2019	0	11	3	23	6	0	0	0	0
G3	17/05/2019	0	2	12	9	2	0	0	0	0
G3	18/05/2019	0	5	0	5	0	0	0	0	0
G3	19/05/2019	0	1	0	0	0	0	0	0	0
G3	20/05/2019	0	1	1	0	0	0	0	0	0
G3	21/05/2019	1	0	0	3	20	0	0	0	0
G4	09/05/2019	0	0	0	0	0	0	0	0	0
G4	10/05/2019	1	0	0	0	0	0	0	0	0
G4	11/05/2019	0	7	0	2	1	0	0	0	0
G4	12/05/2019	0	3	0	1	0	0	0	0	0
G4	13/05/2019	0	0	0	0	0	0	0	0	0
G4	14/05/2019	0	11	0	1	1	0	0	0	0
G4	15/05/2019	0	12	0	29	8	0	0	0	0
G4	16/05/2019	0	0	0	0	0	0	0	0	0
G4	17/05/2019	0	0	0	0	0	0	0	0	0
G4	18/05/2019	0	0	0	0	0	0	0	0	0
G4	19/05/2019	0	0	0	0	0	0	0	0	0
G4	20/05/2019	0	0	1	1	0	0	0	0	0
G4	21/05/2019	0	0	0	0	0	0	0	0	0
G5	09/05/2019	0	0	0	0	0	0	0	0	0
G5	10/05/2019	0	1	0	1	0	0	0	0	0
G5	11/05/2019	0	29	0	1	0	0	0	0	0
G5	12/05/2019	0	42	0	0	0	0	0	0	0
G5	13/05/2019	0	11	0	0	0	0	0	0	0
G5	14/05/2019	0	7	0	4	0	0	0	0	0
G5	15/05/2019	0	27	0	16	0	0	0	0	0
G5	16/05/2019	0	32	0	2	1	0	0	0	0
G5	17/05/2019	0	7	0	5	1	0	0	0	0
G5	18/05/2019	0	1	0	5	0	0	0	0	0

TURBINE_NO	Date	*Myotis daubentonii*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Myotis mystacinus*	*Myotis nattereri*	*Rhinolophus hipposideros*
G5	19/05/2019	0	0	0	0	0	0	0	0	0
G5	20/05/2019	0	3	0	4	0	0	0	0	0
G5	21/05/2019	0	12	0	9	0	0	0	0	0
G6	21/05/2019	0	2	0	1	0	0	0	0	0
G6	22/05/2019	0	0	2	11	0	0	0	0	1
G6	23/05/2019	0	8	5	70	2	0	0	0	0
G6	24/05/2019	1	3	0	7	3	0	0	0	0
G6	25/05/2019	0	0	2	23	0	0	0	0	1
G6	26/05/2019	0	0	0	14	0	0	0	0	0
G6	27/05/2019	0	1	1	1	0	0	0	0	0
G6	28/05/2019	0	0	0	2	0	0	0	0	0
G6	29/05/2019	0	0	0	2	0	0	0	0	0
G6	30/05/2019	0	0	0	0	0	0	0	0	0
G6	31/05/2019	0	2	2	15	0	0	0	0	0
G6	01/06/2019	0	0	53	372	2	0	0	0	0
G6	02/06/2019	0	0	0	0	0	0	0	0	2
G6	03/06/2019	0	1	8	84	1	0	0	0	0
G6	04/06/2019	0	2	0	1	0	0	0	0	1
G7	21/05/2019	12	2	0	4	0	0	0	0	0
G7	22/05/2019	12	2	0	12	7	0	0	0	0
G7	23/05/2019	15	12	20	68	21	0	0	0	0
G7	24/05/2019	6	8	15	47	9	0	0	0	0
G7	25/05/2019	5	12	11	86	11	1	1	0	0
G7	26/05/2019	6	0	2	5	1	0	0	0	0
G7	27/05/2019	4	0	1	0	0	0	0	0	0
G7	28/05/2019	0	0	0	7	0	0	0	0	0
G7	29/05/2019	0	5	2	17	0	0	0	0	0
G7	30/05/2019	0	0	0	0	0	0	0	0	0
G7	31/05/2019	6	6	1	2	1	1	0	0	0
G7	01/06/2019	2	3	2	23	2	1	0	0	0
G7	02/06/2019	2	0	0	4	0	0	0	0	0

TURBINE_NO	Date	*Myotis daubentonii*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Myotis mystacinus*	*Myotis nattereri*	*Rhinolophus hipposideros*
G7	03/06/2019	0	3	11	24	9	0	0	1	0
G7	04/06/2019	0	0	0	0	1	0	0	0	0
G8	21/05/2019	0	4	0	4	1	0	0	0	0
G8	22/05/2019	0	1	22	29	2	0	0	0	0
G8	23/05/2019	0	12	199	414	55	0	0	0	0
G8	24/05/2019	0	2	21	127	40	0	0	0	0
G8	25/05/2019	0	8	31	181	20	0	0	0	0
G8	26/05/2019	0	0	7	16	8	1	0	0	0
G8	27/05/2019	1	0	4	7	0	1	0	0	0
G8	28/05/2019	0	0	0	0	0	0	0	0	0
G8	29/05/2019	0	1	7	24	2	0	0	0	0
G8	30/05/2019	0	0	0	0	0	0	0	0	0
G8	31/05/2019	0	14	2	7	0	0	0	0	0
G8	01/06/2019	0	46	88	214	11	0	0	0	0
G8	02/06/2019	0	0	0	0	0	0	0	0	0
G8	03/06/2019	0	3	24	200	98	1	0	0	0
G8	04/06/2019	0	0	0	0	0	0	0	0	0
G9	21/05/2019	0	2	0	1	0	0	0	0	0
G9	22/05/2019	0	1	0	4	0	0	0	0	0
G9	23/05/2019	1	20	2	13	0	0	0	0	0
G9	24/05/2019	0	0	1	7	0	0	0	0	0
G9	25/05/2019	0	2	0	6	0	0	0	0	0
G9	26/05/2019	0	0	0	0	0	0	0	0	0
G9	27/05/2019	0	0	0	1	0	0	0	0	0
G9	28/05/2019	0	3	0	0	0	0	0	0	0
G9	29/05/2019	0	0	0	0	0	0	0	0	0
G9	30/05/2019	0	0	0	1	0	0	0	0	0
G9	31/05/2019	0	3	0	1	0	0	0	0	0
G9	01/06/2019	0	3	2	9	2	0	0	0	0
G9	02/06/2019	0	0	0	0	0	0	0	0	0
G9	03/06/2019	0	2	0	2	0	0	0	0	0

TURBINE_NO	Date	*Myotis daubentonii*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Myotis mystacinus*	*Myotis nattereri*	*Rhinolophus hipposideros*
G9	04/06/2019	0	0	0	0	0	0	0	0	0
G10	21/05/2019	0	3	0	1	0	0	0	0	0
G10	22/05/2019	0	1	0	4	0	0	0	0	0
G10	23/05/2019	1	20	2	13	0	0	0	0	0
G10	24/05/2019	0	0	1	7	0	0	0	0	0
G10	25/05/2019	0	2	0	6	0	0	0	0	0
G10	26/05/2019	0	0	0	0	0	0	0	0	0
G10	27/05/2019	0	0	0	1	0	0	0	0	0
G10	28/05/2019	0	3	0	0	0	0	0	0	0
G10	29/05/2019	0	0	0	0	0	0	0	0	0
G10	30/05/2019	0	0	0	1	0	0	0	0	0
G10	31/05/2019	0	3	0	1	0	0	0	0	0
G10	01/06/2019	0	3	2	9	2	0	0	0	0
G10	02/06/2019	0	0	0	0	0	0	0	0	0
G10	03/06/2019	0	2	0	2	0	0	0	0	0
G10	04/06/2019	0	0	0	0	0	0	0	0	0
G11	05/06/2019	0	0	0	0	0	2	0	0	0
G11	06/06/2019	4	4	6	8	1	1	0	0	0
G11	07/06/2019	0	0	0	0	0	0	0	0	0
G11	08/06/2019	0	0	0	1	0	1	0	0	0
G11	09/06/2019	0	0	0	0	0	0	0	0	0
G11	10/06/2019	0	0	0	0	0	0	0	0	0
G11	11/06/2019	0	0	0	0	0	0	0	0	0
G11	12/06/2019	0	0	0	0	0	0	0	0	0
G11	13/06/2019	0	0	0	0	0	0	0	0	0
G11	14/06/2019	0	0	0	0	0	0	0	0	0
G11	15/06/2019	0	0	0	0	0	0	0	0	0
G11	16/06/2019	0	0	0	0	0	0	0	0	0
G11	17/06/2019	0	0	0	0	0	0	0	0	0
G12	20/05/2019	0	2	2	12	0	0	1	0	0
G12	21/05/2019	2	1	1	92	1	0	0	0	2

TURBINE_NO	Date	*Myotis daubentonii*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Myotis mystacinus*	*Myotis nattereri*	*Rhinolophus hipposideros*
G12	22/05/2019	0	9	3	21	0	0	0	0	0
G12	23/05/2019	0	41	1	228	1	6	0	0	0
G12	24/05/2019	0	14	0	136	4	6	0	0	0
G12	25/05/2019	2	16	1	210	10	7	0	0	1
G12	26/05/2019	0	2	0	43	0	3	1	0	0
G12	27/05/2019	0	2	0	36	11	2	0	0	0
G12	28/05/2019	0	0	0	153	30	1	0	0	0
G12	29/05/2019	2	1	0	14	1	0	0	0	0
G12	30/05/2019	0	0	0	4	0	0	0	0	0
G12	31/05/2019	1	0	6	44	8	1	0	0	0
G12	01/06/2019	0	11	3	35	4	2	0	1	1
G12	02/06/2019	0	0	0	11	2	0	0	0	0
G12	03/06/2019	0	7	3	55	1	2	0	0	1
G12	04/06/2019	0	1	0	0	0	0	0	0	0
G13	20/05/2019	0	4	20	68	23	0	0	0	0
G13	21/05/2019	3	5	24	93	18	0	0	0	3
G13	22/05/2019	2	15	1	39	5	0	1	0	1
G13	23/05/2019	2	58	48	94	4	0	5	0	1
G13	24/05/2019	0	3	23	69	10	0	1	0	0
G13	25/05/2019	0	13	36	63	2	0	0	0	0
G13	26/05/2019	0	0	6	9	0	0	0	0	0
G13	27/05/2019	0	2	9	35	1	0	0	0	0
G13	28/05/2019	0	0	2	3	0	0	0	0	0
G13	29/05/2019	0	3	4	0	0	0	0	0	0
G13	30/05/2019	0	0	0	0	0	0	0	0	0
G13	31/05/2019	1	26	15	58	13	0	0	0	0
G13	01/06/2019	0	117	21	38	2	0	0	0	1
G13	02/06/2019	0	0	1	5	0	0	0	0	0
G13	03/06/2019	0	36	6	29	5	1	0	0	0
G13	04/06/2019	0	2	0	0	0	0	0	0	0
G14	21/05/2019	0	0	0	0	0	0	0	0	0

TURBINE_NO	Date	*Myotis daubentonii*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Myotis mystacinus*	*Myotis nattereri*	*Rhinolophus hipposideros*
G14	22/05/2019	0	4	0	0	0	0	0	0	0
G14	23/05/2019	0	5	0	3	0	0	0	0	0
G14	24/05/2019	0	0	13	16	0	0	0	0	0
G14	25/05/2019	0	0	1	8	0	1	0	0	0
G14	26/05/2019	0	0	0	0	0	0	0	0	0
G14	27/05/2019	0	0	1	0	0	0	0	0	0
G14	28/05/2019	0	0	0	0	0	0	0	0	0
G14	29/05/2019	0	0	0	0	0	0	0	0	0
G14	30/05/2019	0	0	0	0	0	0	0	0	0
G14	31/05/2019	0	5	0	0	0	0	0	0	0
G14	01/06/2019	0	27	0	4	0	0	0	0	0
G14	02/06/2019	0	0	0	0	0	0	0	0	0
G14	03/06/2019	0	0	0	0	0	0	0	0	0
G14	04/06/2019	0	0	0	0	0	0	0	0	0

Table 2: Raw data Inchamore sound 1

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*	*Myotis mystacinus*
I1	09/05/2019	0	0	1	0	0	0	0	0	0
I1	10/05/2019	1	0	0	0	0	0	0	0	0
I1	11/05/2019	0	0	2	0	0	0	0	0	0
I1	12/05/2019	1	0	3	1	1	1	1	0	0
I1	13/05/2019	7	0	5	0	0	6	0	0	0
I1	14/05/2019	0	0	2	0	1	4	0	0	0
I1	15/05/2019	3	1	10	0	9	22	0	0	0
I1	16/05/2019	2	0	4	1	24	2	1	0	0
I1	17/05/2019	0	0	0	0	3	1	0	0	0
I1	18/05/2019	1	0	0	0	3	1	0	0	0
I1	19/05/2019	0	0	0	0	0	0	1	0	0
I1	20/05/2019	0	0	1	0	0	0	0	0	0
I2	09/05/2019	0	0	3	0	0	0	0	0	0
I2	10/05/2019	0	0	1	0	0	0	0	0	0
I2	11/05/2019	0	0	3	0	0	0	0	0	0
I2	12/05/2019	0	0	4	0	50	1	0	0	0
I2	13/05/2019	0	0	27	0	1	0	0	0	0
I2	14/05/2019	0	0	3	0	5	0	0	0	0
I2	15/05/2019	0	0	10	1	5	0	0	0	0
I2	16/05/2019	0	0	17	8	105	0	0	0	0
I2	17/05/2019	0	0	2	3	133	0	0	0	0
I2	18/05/2019	0	0	1	0	12	0	0	0	0
I2	19/05/2019	0	0	0	0	0	0	0	0	0
I2	20/05/2019	0	0	0	0	0	0	0	0	0
I3	09/05/2019	0	0	0	0	0	0	0	0	0
I3	10/05/2019	0	0	0	0	0	0	0	0	0
I3	11/05/2019	0	1	7	0	0	1	0	0	0
I3	12/05/2019	0	0	7	0	0	0	0	0	0
I3	13/05/2019	0	0	0	0	0	0	0	0	0

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*	*Myotis mystacinus*
I3	14/05/2019	0	0	0	0	0	0	0	0	0
I3	15/05/2019	0	0	4	0	0	0	0	0	0
I3	16/05/2019	0	0	7	0	2	0	0	0	0
I3	17/05/2019	0	0	0	0	0	0	0	0	0
I3	18/05/2019	0	0	0	0	0	0	0	0	0
I3	19/05/2019	0	0	0	0	0	0	0	0	0
I3	20/05/2019	0	0	0	0	0	0	0	0	0
I4	09/05/2019	0	0	5	0	0	0	3	0	0
I4	10/05/2019	1	0	1	0	0	0	4	0	0
I4	11/05/2019	0	0	6	0	0	0	0	0	0
I4	12/05/2019	0	0	7	1	3	2	2	0	0
I4	13/05/2019	0	0	17	4	5	0	1	0	1
I4	14/05/2019	1	0	7	7	0	0	1	0	0
I4	15/05/2019	5	0	10	0	19	16	0	0	0
I4	16/05/2019	2	0	32	1	69	10	0	0	0
I4	17/05/2019	0	0	9	2	51	1	3	0	0
I4	18/05/2019	1	0	1	0	16	0	1	0	0
I4	19/05/2019	0	0	0	0	1	0	1	0	0
I4	20/05/2019	1	0	0	0	0	0	1	0	0
I5	09/05/2019	0	0	0	0	0	0	0	0	0
I5	10/05/2019	0	0	1	0	0	0	0	0	0
I5	11/05/2019	0	0	0	0	0	0	0	0	0
I5	12/05/2019	0	0	3	0	0	0	0	0	0
I5	13/05/2019	0	0	0	0	0	0	0	0	0
I5	14/05/2019	0	0	0	0	0	0	0	0	0
I5	15/05/2019	0	0	1	0	1	0	0	0	0
I5	16/05/2019	0	0	2	0	1	0	0	0	0
I5	17/05/2019	0	0	0	0	2	0	0	0	0
I5	18/05/2019	0	0	1	0	1	0	0	0	0
I5	19/05/2019	0	0	0	0	0	0	0	0	0
I5	20/05/2019	0	0	0	0	0	0	0	0	0

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*	*Myotis mystacinus*
I6	05/06/2019	0	0	0	0	0	0	0	0	0
I6	06/06/2019	0	0	0	0	1	1	2	0	0
I6	07/06/2019	1	0	0	0	0	0	0	0	0
I6	08/06/2019	0	0	0	0	0	0	0	0	0
I6	09/06/2019	1	0	1	0	1	1	0	0	0
I6	10/06/2019	0	0	1	0	3	0	0	0	0
I6	11/06/2019	0	0	1	0	0	0	0	0	0
I6	12/06/2019	0	0	0	0	0	0	0	0	0
I6	13/06/2019	0	0	0	0	0	0	0	0	0
I6	14/06/2019	0	0	0	0	0	0	0	0	0
I6	15/06/2019	0	0	0	1	3	0	0	0	0
I6	16/06/2019	1	0	10	1	23	1	0	0	0
I6	17/06/2019	2	0	5	7	87	7	0	0	0
I7	20/05/2019	1	0	0	0	3	0	0	0	0
I7	21/05/2019	0	0	0	1	31	3	0	0	0
I7	22/05/2019	0	0	0	3	23	1	0	0	0
I7	23/05/2019	0	0	0	0	4	0	0	0	0
I7	24/05/2019	0	0	1	1	4	1	0	0	0
I7	25/05/2019	0	0	0	0	1	1	0	0	0
I7	26/05/2019	1	0	0	0	60	60	0	0	0
I7	27/05/2019	0	0	0	0	39	0	0	0	0
I7	28/05/2019	0	0	0	0	0	0	0	0	0
I7	29/05/2019	0	0	0	0	0	0	0	0	0
I7	30/05/2019	0	0	0	0	1	0	0	0	0
I7	31/05/2019	0	0	0	0	0	0	0	0	0
I7	01/06/2019	0	0	0	0	0	0	0	0	0
I7	02/06/2019	0	0	0	0	0	0	0	0	0
I7	03/06/2019	0	0	0	0	0	0	0	0	0
I7	04/06/2019	0	0	0	0	0	0	0	0	0
I8	20/05/2019	0	0	1	1	43	2	0	0	4
I8	21/05/2019	0	0	0	2	131	17	0	0	5

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*	*Myotis mystacinus*
18	22/05/2019	0	0	6	2	101	6	2	0	4
18	23/05/2019	0	0	18	4	4	0	1	1	1
18	24/05/2019	2	0	2	2	12	0	2	0	0
18	25/05/2019	0	0	9	0	17	5	0	0	0
18	26/05/2019	0	0	1	0	7	0	0	0	0
18	27/05/2019	0	0	19	0	12	7	1	0	0
18	28/05/2019	0	0	3	2	2	0	0	0	0
18	29/05/2019	0	0	0	1	2	1	0	0	0
18	30/05/2019	0	0	0	1	2	0	0	0	0
18	31/05/2019	0	0	0	3	13	4	2	0	1
18	01/06/2019	1	0	3	5	18	4	1	0	2
18	02/06/2019	0	0	0	1	8	1	0	0	0
18	03/06/2019	0	0	6	2	20	1	1	0	1
18	04/06/2019	0	0	0	0	0	0	1	0	0
19	20/05/2019	0	0	0	1	24	4	0	1	0
19	21/05/2019	0	0	0	15	75	12	0	2	1
19	22/05/2019	0	0	4	11	206	18	0	0	0
19	23/05/2019	1	0	2	24	239	22	0	1	0
19	24/05/2019	0	0	1	14	133	14	1	0	0
19	25/05/2019	0	0	11	48	158	9	0	1	0
19	26/05/2019	0	0	2	9	40	13	0	0	0
19	27/05/2019	1	0	4	2	18	8	1	0	0
19	28/05/2019	0	0	1	26	87	2	0	0	0
19	29/05/2019	0	0	3	18	16	0	0	0	0
19	30/05/2019	0	0	3	4	14	9	0	0	0
19	31/05/2019	0	0	2	36	78	10	0	0	0
19	01/06/2019	0	0	0	80	300	24	0	1	0
19	02/06/2019	0	0	0	6	20	3	0	0	0
19	03/06/2019	3	0	0	54	178	16	1	0	1
19	04/06/2019	0	0	0	3	0	0	0	0	0
20	20/05/2019	2	0	0	1	62	8	0	0	0

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*	*Myotis mystacinus*
I10	21/05/2019	4	0	1	17	245	41	1	2	0
I10	22/05/2019	2	0	2	5	55	19	0	0	0
I10	23/05/2019	1	0	2	6	31	1	0	2	0
I10	24/05/2019	0	0	1	1	25	6	0	1	0
I10	25/05/2019	1	0	0	1	13	4	0	1	0
I10	26/05/2019	0	0	1	0	17	4	0	0	0
I10	27/05/2019	2	0	0	1	28	3	0	0	0
I10	28/05/2019	1	0	0	0	12	0	0	0	0
I10	29/05/2019	0	0	0	0	6	0	0	0	0
I10	30/05/2019	0	0	1	0	8	0	0	0	0
I10	31/05/2019	0	0	1	1	27	3	0	1	0
I10	01/06/2019	1	0	0	0	87	20	0	2	0
I10	02/06/2019	0	0	0	0	9	1	0	0	0
I10	03/06/2019	0	0	0	2	28	1	0	0	0
I10	04/06/2019	0	0	0	0	0	0	0	0	0

Table 3: Raw data for Corryvahilly round 2

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
G1	28/06/2019	1	1	0	0	34	117	5	0	0
G1	29/06/2019	1	0	0	7	56	160	0	0	0
G1	30/06/2019	0	1	1	2	19	122	0	0	0
G1	01/07/2019	0	0	0	0	0	1	0	0	0
G1	02/07/2019	0	0	0	0	4	1	0	1	0
G1	03/07/2019	0	0	0	0	1	12	0	0	0
G1	04/07/2019	0	0	0	0	0	6	2	0	0
G1	05/07/2019	0	0	0	0	2	0	0	0	0
G1	06/07/2019	0	0	1	0	1	3	0	0	0
G1	07/07/2019	0	0	0	0	0	7	0	0	0
G1	08/07/2019	0	0	0	0	0	13	0	0	0
G2	01/07/2019	0	0	0	0	0	0	0	0	0
G2	02/07/2019	0	0	0	0	0	12	0	0	0
G2	03/07/2019	0	0	0	0	2	14	2	0	0
G2	04/07/2019	0	0	0	0	0	0	0	0	0
G2	05/07/2019	0	0	0	0	0	2	0	0	0
G2	06/07/2019	0	0	0	0	0	2	0	0	0
G2	07/07/2019	0	0	0	0	0	0	0	0	0
G2	08/07/2019	0	0	0	0	0	5	0	0	0
G2	09/07/2019	1	0	0	1	13	110	10	0	0
G2	10/07/2019	0	0	0	0	0	0	1	0	0
G2	11/07/2019	0	0	0	0	0	0	0	0	0
G3	28/06/2019	0	0	0	1	0	1	0	0	0
G3	29/06/2019	0	0	0	2	2	2	1	0	0
G3	30/06/2019	0	0	0	0	0	0	0	0	0
G3	01/07/2019	0	0	0	4	0	0	0	0	0
G3	02/07/2019	1	0	0	1	0	1	0	0	0
G3	03/07/2019	0	0	0	4	2	16	2	0	0
G3	04/07/2019	1	0	1	2	0	5	0	0	0

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
G3	05/07/2019	0	0	1	0	0	0	1	0	0
G3	06/07/2019	1	0	0	1	2	0	0	0	0
G3	07/07/2019	0	0	0	0	1	0	0	0	0
G3	08/07/2019	0	0	0	0	0	0	0	0	0
G4	28/06/2019	0	0	0	0	2	5	0	0	0
G4	29/06/2019	1	0	0	1	1	3	1	0	0
G4	30/06/2019	0	0	0	2	0	0	0	0	0
G4	01/07/2019	0	0	0	7	0	0	0	0	0
G4	02/07/2019	0	0	0	0	0	1	0	1	0
G4	03/07/2019	1	1	1	3	0	14	3	0	0
G4	04/07/2019	3	1	1	3	1	3	0	1	0
G4	05/07/2019	1	0	1	1	0	3	0	0	0
G4	06/07/2019	0	1	0	1	0	1	0	0	0
G4	07/07/2019	0	0	0	1	0	0	0	0	0
G4	08/07/2019	0	0	0	0	0	0	0	0	0
G5	01/07/2019	0	0	0	0	0	12	0	0	0
G5	02/07/2019	1	0	0	0	1	64	1	0	0
G5	03/07/2019	0	0	0	0	4	145	20	0	1
G5	04/07/2019	0	1	2	3	1	101	16	0	0
G5	05/07/2019	1	0	0	0	0	43	1	0	0
G5	06/07/2019	0	0	0	0	0	28	4	2	0
G5	07/07/2019	1	0	0	0	0	13	0	0	1
G5	08/07/2019	0	0	0	0	0	5	0	0	0
G5	09/07/2019	2	0	0	2	2	46	6	0	0
G5	10/07/2019	0	0	0	1	1	90	5	0	0
G5	11/07/2019	0	0	0	0	0	0	0	0	0
G6	01/07/2019	0	0	0	0	0	0	0	0	0
G6	02/07/2019	0	0	0	0	0	2	0	0	0
G6	03/07/2019	0	0	0	4	1	37	5	0	0
G6	04/07/2019	1	1	0	0	1	2	0	0	0
G6	05/07/2019	1	0	0	0	0	1	0	0	0

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
G6	06/07/2019	0	0	0	0	0	1	0	0	0
G6	07/07/2019	0	0	0	1	0	1	0	0	0
G6	08/07/2019	0	0	0	0	0	4	2	0	0
G6	09/07/2019	1	0	0	0	10	168	26	0	0
G6	10/07/2019	1	0	0	2	5	108	2	0	0
G6	11/07/2019	0	0	0	0	0	0	0	0	0
G7	01/07/2019	13	0	3	0	0	2	0	0	0
G7	02/07/2019	47	6	4	0	0	16	11	1	0
G7	03/07/2019	44	5	4	1	0	13	2	1	0
G7	04/07/2019	39	5	1	0	1	17	9	5	0
G7	05/07/2019	38	6	6	2	0	9	3	6	0
G7	06/07/2019	71	5	6	1	5	36	10	3	0
G7	07/07/2019	21	0	3	2	2	45	27	2	0
G7	08/07/2019	4	1	0	0	5	27	8	0	0
G7	09/07/2019	50	3	3	3	6	32	9	1	0
G7	10/07/2019	12	2	1	0	12	72	11	0	0
G7	11/07/2019	0	0	0	0	0	0	0	0	0
G8	01/07/2019	0	0	0	3	0	1	0	0	0
G8	02/07/2019	0	0	0	10	2	18	3	1	0
G8	03/07/2019	1	0	0	4	30	17	8	1	0
G8	04/07/2019	1	1	1	1	0	10	3	1	0
G8	05/07/2019	1	0	0	0	16	10	0	0	0
G8	06/07/2019	0	0	0	1	8	4	3	0	0
G8	07/07/2019	0	0	0	0	0	0	0	0	0
G8	08/07/2019	0	0	0	0	0	0	0	0	0
G8	09/07/2019	0	0	0	0	0	0	0	0	0
G8	10/07/2019	0	0	0	0	0	0	0	0	0
G8	11/07/2019	0	0	0	0	0	0	0	0	0
G9	01/07/2019	0	0	0	0	0	3	0	0	0
G9	02/07/2019	2	1	0	0	2	44	2	0	0
G9	03/07/2019	1	0	0	3	21	619	63	0	0

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
G9	04/07/2019	0	0	0	0	8	271	11	1	0
G9	05/07/2019	0	0	0	1	4	14	5	1	0
G9	06/07/2019	1	0	0	0	4	16	0	0	0
G9	07/07/2019	0	0	0	1	0	0	1	0	0
G9	08/07/2019	0	0	0	5	23	29	5	0	0
G9	09/07/2019	1	1	0	5	45	317	9	0	0
G9	10/07/2019	0	0	0	0	5	29	4	0	0
G9	11/07/2019	0	0	0	0	0	0	0	0	0
G10	01/07/2019	0	0	0	0	0	0	0	0	0
G10	02/07/2019	2	0	1	0	0	4	0	0	0
G10	03/07/2019	2	0	2	2	1	16	1	0	1
G10	04/07/2019	2	0	0	0	0	4	1	1	0
G10	05/07/2019	0	0	0	0	0	0	0	1	0
G10	06/07/2019	0	0	0	0	0	2	1	1	0
G10	07/07/2019	0	0	0	0	0	0	0	0	0
G10	08/07/2019	0	0	0	0	0	19	0	0	0
G10	09/07/2019	4	0	0	3	2	135	21	0	0
G10	10/07/2019	0	0	0	0	1	30	1	0	0
G10	11/07/2019	0	0	0	0	0	0	0	0	0
G11	01/07/2019	0	0	0	0	0	2	0	0	0
G11	02/07/2019	0	0	0	0	0	7	1	1	0
G11	03/07/2019	1	0	0	6	7	32	4	0	0
G11	04/07/2019	2	1	0	2	0	11	2	1	0
G11	05/07/2019	0	0	0	0	1	4	1	1	0
G11	06/07/2019	1	0	0	1	2	4	1	1	0
G11	07/07/2019	0	0	0	0	1	3	1	0	0
G11	08/07/2019	0	0	0	0	4	5	1	0	0
G11	09/07/2019	1	1	0	7	18	28	3	1	0
G11	10/07/2019	0	0	2	0	0	8	2	1	0
G11	11/07/2019	0	0	0	0	0	0	0	0	0
G12	28/06/2019	0	0	0	0	3	28	5	0	0

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
G12	29/06/2019	0	0	0	0	6	202	6	1	0
G12	30/06/2019	0	0	0	0	0	7	2	0	0
G12	01/07/2019	0	0	0	0	0	30	3	0	0
G12	02/07/2019	0	0	0	0	0	84	18	0	0
G12	03/07/2019	1	1	1	5	1	194	26	2	0
G12	04/07/2019	0	2	1	0	1	144	11	0	0
G12	05/07/2019	0	1	1	0	1	49	4	0	0
G12	06/07/2019	0	1	4	0	0	79	14	0	0
G12	07/07/2019	0	0	0	0	0	61	4	0	0
G12	08/07/2019	0	0	0	3	1	25	3	0	0
G13	01/07/2019	5	0	0	0	0	3	4	1	0
G13	02/07/2019	14	0	1	0	3	44	28	3	0
G13	03/07/2019	4	0	0	4	49	388	81	3	0
G13	04/07/2019	2	2	2	6	24	107	17	3	0
G13	05/07/2019	1	2	0	1	19	79	15	1	0
G13	06/07/2019	3	0	1	1	5	27	7	2	0
G13	07/07/2019	0	0	2	0	0	4	2	0	0
G13	08/07/2019	1	0	0	1	2	70	3	0	0
G13	09/07/2019	2	1	1	8	17	87	20	2	0
G13	10/07/2019	1	0	1	2	2	11	1	1	0
G13	11/07/2019	0	0	0	0	0	0	0	0	0
G14	28/06/2019	0	0	0	0	1	13	0	0	0
G14	29/06/2019	0	0	0	10	7	108	5	0	0
G14	30/06/2019	0	0	1	3	40	477	1	0	0
G14	01/07/2019	0	0	0	0	6	363	0	0	0
G14	02/07/2019	0	0	0	0	0	0	0	0	0
G14	03/07/2019	1	0	0	8	0	6	0	1	0
G14	04/07/2019	0	0	0	1	0	2	0	0	0
G14	05/07/2019	0	0	0	0	0	0	0	0	0
G14	06/07/2019	0	0	0	2	0	1	0	0	0
G14	07/07/2019	0	0	0	0	0	0	0	1	0

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
G14	08/07/2019	0	0	0	0	0	0	0	0	0
G15	11/07/2019	0	0	0	0	0	1	0	0	0
G15	12/07/2019	0	0	0	0	0	15	0	0	0
G15	13/07/2019	0	0	0	0	0	6	1	0	0
G15	14/07/2019	0	1	0	7	1	24	1	0	0
G15	15/07/2019	0	0	0	8	3	79	4	1	0
G15	16/07/2019	0	0	0	8	1	20	0	0	0
G15	17/07/2019	0	0	0	4	0	5	1	0	0
G15	18/07/2019	0	0	0	0	0	4	0	0	0
G15	19/07/2019	0	0	0	0	0	0	0	0	0
G15	20/07/2019	0	0	0	2	2	5	0	0	0
G15	21/07/2019	0	0	1	1	0	9	0	0	0
G15	22/07/2019	0	0	0	0	0	0	0	0	0
G15	23/07/2019	0	0	0	0	0	0	0	0	0
G15	24/07/2019	1	0	0	7	0	1	0	0	0
G15	25/07/2019	0	0	0	0	0	0	0	0	0
G15	26/07/2019	0	0	0	0	0	0	0	0	0
G15	27/07/2019	1	0	0	4	0	8	0	0	0
G15	28/07/2019	0	0	0	0	0	0	0	0	0
G15	29/07/2019	0	0	0	0	0	0	0	0	0
G15	30/07/2019	0	0	0	0	0	0	0	0	0
G16	11/07/2019	0	0	0	0	0	16	3	0	0
G16	12/07/2019	0	0	1	1	0	12	5	0	0
G16	13/07/2019	1	1	0	0	0	7	1	0	0
G16	14/07/2019	2	0	0	7	0	15	3	0	0
G16	15/07/2019	2	1	0	2	3	87	20	1	0
G16	16/07/2019	0	0	0	1	10	106	14	1	0
G16	17/07/2019	3	0	0	2	0	5	1	0	0
G16	18/07/2019	1	0	0	0	0	4	1	0	0
G16	19/07/2019	0	0	0	0	0	10	0	0	0
G16	20/07/2019	2	0	0	3	9	32	2	1	0

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
G16	21/07/2019	0	0	1	2	1	2	2	0	0
G16	22/07/2019	0	0	0	0	0	0	0	0	0
G16	23/07/2019	0	0	0	0	0	0	0	0	0
G16	24/07/2019	0	0	1	0	0	1	1	0	0
G16	25/07/2019	0	0	0	0	0	0	0	0	0
G16	26/07/2019	0	0	0	0	0	4	1	0	0
G16	27/07/2019	0	0	1	0	0	3	0	0	0
G16	28/07/2019	0	0	0	0	0	2	4	0	0
G16	29/07/2019	1	0	0	2	0	5	1	1	0
G16	30/07/2019	0	0	0	0	0	0	1	0	0
G17	11/07/2019	0	0	1	0	3	24	2	0	0
G17	12/07/2019	0	0	0	0	1	45	0	0	0
G17	13/07/2019	0	1	0	1	1	64	5	0	0
G17	14/07/2019	2	1	0	1	3	75	14	0	0
G17	15/07/2019	1	2	1	7	23	233	48	1	1
G17	16/07/2019	0	0	2	4	17	203	58	1	0
G17	17/07/2019	3	12	2	2	11	215	14	0	0
G17	18/07/2019	1	1	0	2	2	38	1	0	0
G17	19/07/2019	0	0	0	0	0	2	0	0	0
G17	20/07/2019	0	1	0	1	1	85	8	0	0
G17	21/07/2019	1	0	0	1	0	116	38	1	0
G17	22/07/2019	0	0	0	0	0	21	1	0	0
G17	23/07/2019	0	0	0	0	0	4	0	0	0
G17	24/07/2019	0	0	0	0	0	12	3	0	0
G17	25/07/2019	0	0	0	0	0	6	0	0	0
G17	26/07/2019	0	1	0	1	0	27	1	0	0
G17	27/07/2019	0	3	0	5	2	48	2	1	0
G17	28/07/2019	0	0	0	2	1	49	3	1	0
G17	29/07/2019	0	0	0	1	0	49	2	0	0
G17	30/07/2019	0	0	0	0	0	0	0	0	0
G18	11/07/2019	0	0	0	0	0	0	0	0	0

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
G18	12/07/2019	0	0	0	0	0	0	0	0	0
G18	13/07/2019	0	0	0	0	0	0	0	0	0
G18	14/07/2019	1	0	0	0	0	15	0	0	0
G18	15/07/2019	1	0	0	0	1	23	0	0	0
G18	16/07/2019	0	0	0	0	0	8	0	0	0
G18	17/07/2019	1	0	0	0	0	0	0	0	0
G18	18/07/2019	0	0	0	0	0	1	0	0	0
G18	19/07/2019	0	0	0	0	0	0	0	0	0
G18	20/07/2019	0	0	0	0	1	2	0	0	0
G18	21/07/2019	0	0	0	0	0	1	0	0	0
G18	22/07/2019	0	0	0	0	0	0	0	0	0
G18	23/07/2019	0	0	0	0	0	0	0	0	0
G18	24/07/2019	0	0	0	0	0	0	0	0	0
G18	25/07/2019	0	0	0	0	0	0	0	0	0
G18	26/07/2019	0	0	0	0	0	0	0	0	0
G18	27/07/2019	0	0	0	0	0	0	0	0	0
G18	28/07/2019	0	0	0	0	0	0	0	0	0
G18	29/07/2019	0	0	0	0	0	0	0	0	0
G18	30/07/2019	0	0	0	0	0	0	0	0	0

Table 3 Raw data for Inchamore round 2

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
I1	28/06/2019	0	0	0	1	3	94	1	0	0
I1	29/06/2019	5	2	4	1	2	149	4	2	0
I1	30/06/2019	5	0	2	4	0	34	4	0	0
I1	01/07/2019	14	0	1	0	0	32	2	0	0
I1	02/07/2019	5	2	2	0	0	69	1	0	0
I1	03/07/2019	6	2	0	2	0	45	0	0	0
I1	04/07/2019	6	5	2	0	0	6	0	0	0
I1	05/07/2019	6	1	2	0	0	26	0	0	0
I1	06/07/2019	9	2	3	3	0	43	0	0	0
I1	07/07/2019	1	0	1	1	1	25	2	0	0
I1	08/07/2019	1	0	0	1	0	3	0	0	0
I2	28/06/2019	1	0	0	2	0	30	0	0	0
I2	29/06/2019	1	3	0	0	0	29	3	0	0
I2	30/06/2019	0	1	0	0	0	9	1	0	0
I2	01/07/2019	4	0	0	0	0	3	0	0	0
I2	02/07/2019	2	0	1	0	0	2	0	0	0
I2	03/07/2019	2	0	3	0	0	150	6	0	0
I2	04/07/2019	1	0	1	0	0	3	0	0	0
I2	05/07/2019	0	0	0	0	0	2	0	0	0
I2	06/07/2019	3	0	0	0	0	1	0	0	0
I2	07/07/2019	1	0	1	0	0	0	0	1	0
I2	08/07/2019	0	0	0	0	0	0	0	0	0
I3	28/06/2019	0	0	0	0	0	0	0	0	0
I3	29/06/2019	1	0	0	2	0	1	0	0	0
I3	30/06/2019	1	0	0	0	0	0	0	0	0
I3	01/07/2019	1	0	0	0	0	0	0	0	0
I3	02/07/2019	0	0	0	0	0	1	0	0	0
I3	03/07/2019	1	0	0	1	0	3	0	0	0
I3	04/07/2019	0	0	0	0	0	0	0	0	0

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
I3	05/07/2019	0	0	0	1	0	0	0	0	0
I3	06/07/2019	2	0	0	2	0	0	0	0	0
I3	07/07/2019	0	0	0	0	0	0	0	0	0
I3	08/07/2019	0	0	0	0	0	0	0	0	0
I4	28/06/2019	1	0	0	4	0	25	6	1	0
I4	29/06/2019	0	1	1	3	3	180	43	0	0
I4	30/06/2019	1	0	0	0	0	15	6	0	0
I4	01/07/2019	1	0	1	1	0	153	8	0	0
I4	02/07/2019	4	1	2	1	3	46	16	0	0
I4	03/07/2019	2	0	2	0	5	410	22	1	0
I4	04/07/2019	5	2	2	0	0	41	1	2	0
I4	05/07/2019	3	1	1	0	0	9	4	0	0
I4	06/07/2019	1	0	0	2	0	22	2	0	0
I4	07/07/2019	0	0	0	0	0	20	1	0	0
I4	08/07/2019	0	0	0	0	0	4	3	0	0
I5	28/06/2019	0	0	0	0	0	1	0	0	0
I5	29/06/2019	1	0	1	0	0	0	0	0	0
I5	30/06/2019	0	0	0	0	0	0	0	0	0
I5	01/07/2019	0	0	0	0	0	0	0	0	0
I5	02/07/2019	0	0	0	0	0	1	0	0	0
I5	03/07/2019	0	0	0	0	0	0	0	0	0
I5	04/07/2019	0	0	0	0	0	1	1	0	0
I5	05/07/2019	0	0	0	0	0	0	0	0	0
I5	06/07/2019	0	0	0	0	0	0	0	0	0
I5	07/07/2019	0	0	0	0	0	0	0	0	0
I5	08/07/2019	0	0	0	0	0	0	0	0	0
I6	28/06/2019	0	0	0	0	0	11	1	0	0
I6	29/06/2019	0	1	0	1	0	29	1	0	0
I6	30/06/2019	0	0	0	0	0	2	1	0	0
I6	01/07/2019	1	0	0	0	0	63	22	0	0
I6	02/07/2019	1	0	0	0	0	3	1	0	0

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
I6	03/07/2019	3	2	0	0	6	265	11	0	0
I6	04/07/2019	0	0	0	0	0	14	4	0	0
I6	05/07/2019	1	0	0	0	0	4	3	0	0
I6	06/07/2019	0	1	0	0	0	3	0	0	0
I6	07/07/2019	0	0	0	0	0	0	0	0	0
I6	08/07/2019	0	0	0	0	0	0	0	0	0
I7	28/06/2019	0	0	0	0	0	4	2	0	0
I7	29/06/2019	0	0	0	0	0	26	13	0	0
I7	30/06/2019	0	0	0	0	1	140	60	0	0
I7	01/07/2019	1	2	0	0	0	65	38	0	0
I7	02/07/2019	0	0	0	0	0	3	0	0	0
I7	03/07/2019	0	2	0	2	5	44	9	0	0
I7	04/07/2019	0	0	0	0	1	18	0	0	0
I7	05/07/2019	0	0	0	0	0	2	1	0	0
I7	06/07/2019	0	0	0	0	0	1	1	0	0
I7	07/07/2019	0	0	0	0	0	0	0	0	0
I7	08/07/2019	0	0	0	0	0	1	0	0	0
I8	28/06/2019	0	0	0	0	0	0	0	0	0
I8	29/06/2019	0	0	0	0	0	0	0	0	0
I8	30/06/2019	0	0	0	0	0	0	0	0	0
I8	01/07/2019	0	0	0	0	0	0	0	0	0
I8	02/07/2019	0	0	0	0	0	0	0	0	0
I8	03/07/2019	0	0	0	0	0	0	0	0	0
I8	04/07/2019	0	0	0	0	0	0	0	0	0
I8	05/07/2019	0	0	0	0	0	0	0	0	0
I8	06/07/2019	0	0	0	0	0	0	0	0	0
I8	07/07/2019	0	0	0	0	0	0	0	0	0
I8	08/07/2019	0	0	0	0	0	0	0	0	0
I9	28/06/2019	0	0	0	0	29	195	11	0	0
I9	29/06/2019	1	0	0	6	14	169	15	0	0
I9	30/06/2019	0	0	0	0	2	61	13	0	0

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
I9	01/07/2019	1	0	0	2	2	25	9	0	0
I9	02/07/2019	1	0	0	1	9	17	4	0	0
I9	03/07/2019	0	1	0	2	9	148	36	0	0
I9	04/07/2019	0	0	0	1	7	73	17	0	0
I9	05/07/2019	1	0	0	9	8	192	62	0	0
I9	06/07/2019	0	0	0	0	2	227	102	1	0
I9	07/07/2019	0	0	0	0	6	19	7	0	0
I9	08/07/2019	0	0	0	0	2	6	0	0	0
I10	28/06/2019	0	0	0	3	0	11	5	0	0
I10	29/06/2019	2	0	1	2	0	83	26	0	0
I10	30/06/2019	0	0	1	0	0	64	11	0	0
I10	01/07/2019	0	0	1	0	6	106	12	1	1
I10	02/07/2019	1	0	3	1	2	536	8	0	0
I10	03/07/2019	0	5	1	7	6	566	282	2	0
I10	04/07/2019	0	2	2	3	6	432	169	1	0
I10	05/07/2019	0	1	3	0	1	287	44	1	0
I10	06/07/2019	0	4	4	1	1	181	102	0	0
I10	07/07/2019	0	0	0	0	2	17	5	0	0
I10	08/07/2019	0	0	0	0	0	17	5	0	0

Table 5: Raw data for Carryability round 3

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
G1	17/09/2019	0	0	0	7	0	10	2	2	0
G1	18/09/2019	2	1	1	2	0	13	1	7	0
G1	19/09/2019	0	0	0	0	1	4	1	0	0
G1	20/09/2019	0	0	0	0	0	0	1	3	0
G1	21/09/2019	0	0	0	0	23	12	4	0	0
G1	22/09/2019	0	0	0	3	135	425	5	1	0
G1	23/09/2019	1	0	0	0	44	11	2	1	0
G1	24/09/2019	0	0	0	0	19	90	35	0	0
G1	25/09/2019	1	0	0	0	0	8	0	0	0
G1	26/09/2019	0	0	0	0	0	0	0	0	0
G1	27/09/2019	0	0	0	0	0	0	0	0	0
G1	28/09/2019	0	0	0	0	0	0	0	0	0
G1	29/09/2019	0	0	0	0	0	0	0	0	0
G1	30/09/2019	0	0	0	0	0	0	0	0	0
G2	17/09/2019	1	0	2	20	0	45	11	0	2
G2	18/09/2019	0	0	1	19	1	57	16	1	1
G2	19/09/2019	1	1	1	7	2	37	12	0	0
G2	20/09/2019	1	1	0	2	0	11	7	1	1
G2	21/09/2019	0	0	0	1	5	30	6	0	0
G2	22/09/2019	2	2	2	9	5	159	46	0	0
G2	23/09/2019	0	1	1	0	0	7	12	0	0
G2	24/09/2019	0	0	0	0	1	18	2	0	0
G2	25/09/2019	0	0	0	0	0	11	0	0	0
G2	26/09/2019	1	0	0	0	0	1	1	0	0
G2	27/09/2019	0	0	0	0	0	0	0	0	0
G2	28/09/2019	0	0	0	0	0	0	0	0	0
G2	29/09/2019	2	0	1	0	3	42	9	0	2
G2	30/09/2019	0	0	0	0	0	0	0	0	0
G2	NA	0	0	0	0	0	0	0	0	0

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
G3	21/08/2019	0	0	0	0	0	0	0	0	0
G3	22/08/2019	0	0	0	0	1	1	0	0	0
G3	23/08/2019	0	0	0	4	0	8	2	0	0
G3	24/08/2019	1	1	0	1	1	2	0	1	0
G3	25/08/2019	6	0	0	19	7	13	1	3	0
G3	26/08/2019	0	1	2	3	0	2	6	2	0
G3	27/08/2019	0	0	0	0	0	0	0	0	0
G3	28/08/2019	0	0	0	0	0	5	0	0	0
G3	29/08/2019	0	0	0	1	0	0	0	2	0
G3	30/08/2019	0	0	0	0	0	0	0	0	0
G3	31/08/2019	2	1	1	11	0	9	1	0	0
G3	01/09/2019	1	0	0	5	0	2	1	1	0
G3	02/09/2019	1	0	1	3	0	1	1	1	0
G3	03/09/2019	0	0	0	1	0	0	0	1	0
G3	04/09/2019	0	0	0	11	0	1	0	0	0
G3	05/09/2019	0	0	0	9	0	0	0	1	0
G3	06/09/2019	0	0	0	0	0	2	7	0	0
G3	07/09/2019	7	0	2	6	0	19	6	1	0
G3	08/09/2019	3	1	0	3	1	19	6	1	0
G3	09/09/2019	0	0	0	10	0	1	1	0	0
G3	10/09/2019	4	0	1	0	0	1	2	0	0
G3	11/09/2019	0	0	0	0	1	3	1	0	0
G3	12/09/2019	1	0	1	3	0	9	5	1	0
G3	13/09/2019	0	0	0	5	3	8	12	1	0
G3	14/09/2019	1	0	0	1	4	5	2	2	0
G3	15/09/2019	0	0	0	1	2	18	2	0	0
G3	16/09/2019	0	0	0	0	0	1	0	0	0
G4	21/08/2019	0	0	0	0	0	0	0	0	0
G4	22/08/2019	0	0	0	0	0	0	0	0	0
G4	23/08/2019	0	0	0	0	0	1	0	0	0
G4	24/08/2019	0	0	0	0	0	0	0	0	0

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
G4	25/08/2019	0	0	0	0	0	2	1	0	0
G4	26/08/2019	0	0	0	0	0	1	0	0	0
G4	27/08/2019	0	0	0	0	0	0	0	0	0
G4	28/08/2019	0	0	0	0	0	1	0	0	0
G4	29/08/2019	0	0	0	0	0	0	0	0	0
G4	30/08/2019	0	0	0	0	0	0	0	0	0
G4	31/08/2019	0	0	0	0	0	0	0	0	0
G4	01/09/2019	0	0	0	0	0	0	0	0	0
G4	02/09/2019	0	0	0	0	0	0	0	0	0
G4	03/09/2019	0	0	0	0	0	0	0	0	0
G4	04/09/2019	0	0	0	0	0	0	0	0	0
G4	05/09/2019	0	0	0	0	0	0	0	0	0
G4	06/09/2019	0	0	0	0	0	0	0	0	0
G4	07/09/2019	0	0	0	0	0	0	0	0	0
G4	08/09/2019	0	0	0	0	0	0	0	0	0
G4	09/09/2019	0	0	0	0	0	0	0	0	0
G4	10/09/2019	0	0	0	0	0	0	0	0	0
G4	11/09/2019	0	0	0	0	0	0	0	0	0
G4	12/09/2019	0	0	0	0	0	0	0	0	0
G4	13/09/2019	0	0	0	0	0	0	0	0	0
G4	14/09/2019	0	0	0	0	0	0	0	0	0
G4	15/09/2019	0	0	0	0	0	0	0	0	0
G4	16/09/2019	0	0	0	0	0	0	0	0	0
G5	21/08/2019	0	0	0	0	0	13	0	0	0
G5	22/08/2019	0	0	0	2	2	23	3	0	0
G5	23/08/2019	1	2	0	6	3	18	6	2	0
G5	24/08/2019	2	2	0	0	0	5	8	1	0
G5	25/08/2019	0	1	1	2	0	12	25	3	0
G5	26/08/2019	0	1	0	1	0	52	13	0	0
G5	27/08/2019	0	1	0	0	0	2	2	0	0
G5	28/08/2019	0	0	0	1	0	70	3	0	0

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
G5	29/08/2019	2	0	0	1	0	30	3	1	0
G5	30/08/2019	0	0	0	0	0	12	1	0	0
G5	31/08/2019	0	0	0	2	0	34	5	1	0
G5	01/09/2019	1	0	0	0	0	21	4	1	0
G5	02/09/2019	0	1	0	4	0	44	4	1	0
G5	03/09/2019	0	0	0	0	0	26	1	1	0
G5	04/09/2019	0	0	0	0	0	3	2	0	0
G5	05/09/2019	1	1	0	3	1	20	3	0	0
G5	06/09/2019	1	0	0	0	0	9	12	0	0
G5	07/09/2019	1	0	0	1	0	18	11	1	0
G5	08/09/2019	0	0	0	0	2	68	8	0	0
G5	09/09/2019	0	0	0	0	0	5	1	1	0
G5	10/09/2019	0	0	0	0	0	24	0	0	0
G5	11/09/2019	0	1	0	2	1	40	11	0	0
G5	12/09/2019	0	1	0	0	0	20	5	0	0
G5	13/09/2019	0	0	0	1	1	36	15	0	0
G5	14/09/2019	1	1	0	0	0	28	5	0	0
G5	15/09/2019	0	0	0	3	0	31	16	0	0
G5	16/09/2019	0	0	0	0	0	16	1	0	0
G7	17/09/2019	0	0	0	2	0	140	26	2	0
G7	18/09/2019	4	4	0	1	0	90	33	3	0
G7	19/09/2019	0	0	0	2	0	76	84	2	0
G7	20/09/2019	2	0	0	2	0	310	5	1	0
G7	21/09/2019	0	0	0	0	0	65	28	0	0
G7	22/09/2019	1	0	0	5	0	132	45	0	0
G7	23/09/2019	0	0	0	0	0	9	11	0	0
G7	24/09/2019	0	0	0	0	0	1	0	0	0
G7	25/09/2019	0	0	0	1	0	0	0	0	0
G7	26/09/2019	0	0	0	0	0	0	1	0	0
G7	27/09/2019	0	0	0	0	0	0	0	0	0
G7	28/09/2019	0	0	0	0	0	0	0	0	0

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
G7	29/09/2019	0	0	1	3	0	36	8	0	0
G7	30/09/2019	1	0	1	1	0	21	4	1	0
G9	17/09/2019	2	0	2	0	7	44	17	1	0
G9	18/09/2019	1	0	1	2	5	31	11	0	0
G9	19/09/2019	1	0	4	0	0	14	18	1	0
G9	20/09/2019	0	0	1	0	0	0	3	1	0
G9	21/09/2019	2	0	0	0	0	10	13	0	0
G9	22/09/2019	1	1	0	4	2	143	25	0	0
G9	23/09/2019	3	0	0	0	0	1	4	0	0
G9	24/09/2019	0	0	0	0	0	0	0	0	0
G9	25/09/2019	0	0	0	0	0	0	0	0	0
G9	26/09/2019	0	0	0	0	0	0	0	0	0
G9	27/09/2019	0	0	0	0	0	0	0	0	0
G9	28/09/2019	0	0	0	0	0	0	0	0	0
G9	29/09/2019	1	0	0	0	10	235	64	3	0
G9	30/09/2019	0	0	1	0	0	0	4	0	0
G10	17/09/2019	0	0	0	1	0	14	4	2	0
G10	18/09/2019	1	0	1	0	3	9	5	3	0
G10	19/09/2019	0	0	0	0	0	4	2	1	0
G10	20/09/2019	1	0	1	0	0	0	1	0	0
G10	21/09/2019	0	0	0	0	0	3	0	0	0
G10	22/09/2019	0	0	0	1	0	13	7	2	0
G10	23/09/2019	0	0	0	0	0	2	2	0	0
G10	24/09/2019	0	0	0	0	0	0	0	0	0
G10	25/09/2019	0	0	0	0	0	0	0	0	0
G10	26/09/2019	0	0	0	0	0	0	0	0	0
G10	27/09/2019	0	0	0	0	0	0	0	0	0
G10	28/09/2019	0	0	0	0	0	1	0	0	0
G10	29/09/2019	0	1	1	0	1	47	9	0	0
G10	30/09/2019	0	0	0	0	0	1	0	0	0
G11	17/09/2019	2	0	0	4	1	11	12	0	0

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
G11	18/09/2019	2	0	0	9	1	10	5	2	0
G11	19/09/2019	1	0	0	3	4	442	23	1	0
G11	20/09/2019	0	0	0	10	7	221	40	0	0
G11	21/09/2019	0	0	1	19	22	208	28	0	0
G11	22/09/2019	0	0	0	1	0	13	5	0	0
G11	23/09/2019	2	0	0	0	0	72	31	1	0
G11	24/09/2019	0	0	0	0	0	0	0	0	0
G11	25/09/2019	0	0	0	0	0	0	0	0	0
G11	26/09/2019	0	0	0	0	0	1	1	0	0
G11	27/09/2019	0	0	0	0	1	2	0	0	0
G11	28/09/2019	0	0	0	0	0	0	0	0	0
G11	29/09/2019	0	0	0	1	10	18	29	0	0
G11	30/09/2019	1	0	0	1	0	12	4	2	0
G12	17/09/2019	2	0	0	2	0	13	9	3	0
G12	18/09/2019	1	0	2	1	0	7	16	2	0
G12	19/09/2019	0	0	0	1	1	10	3	0	1
G12	20/09/2019	0	0	0	0	0	3	3	1	0
G12	21/09/2019	0	0	0	0	0	9	7	0	0
G12	22/09/2019	0	1	2	0	1	21	4	0	0
G12	23/09/2019	1	0	0	0	0	11	4	0	0
G12	24/09/2019	1	0	1	0	0	1	1	1	0
G12	25/09/2019	0	0	0	0	0	1	0	0	0
G12	26/09/2019	0	0	0	0	0	0	0	0	0
G12	27/09/2019	0	0	1	0	0	0	1	0	0
G12	28/09/2019	0	0	0	0	0	0	0	0	0
G12	29/09/2019	2	0	1	1	0	11	13	1	0
G12	30/09/2019	0	0	1	0	0	2	0	0	0
G13	17/09/2019	6	3	0	1	16	50	0	0	0
G13	18/09/2019	11	1	0	2	4	65	1	0	0
G13	19/09/2019	9	2	1	14	25	213	4	0	0
G13	20/09/2019	1	0	1	25	35	420	100	0	0

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
G13	21/09/2019	0	0	0	11	109	758	195	0	0
G13	22/09/2019	1	1	0	0	0	19	0	0	0
G13	23/09/2019	4	0	0	0	1	24	2	0	0
G13	24/09/2019	0	0	0	0	0	3	0	0	0
G13	25/09/2019	0	0	0	0	0	0	0	0	0
G13	26/09/2019	0	0	0	0	0	0	0	0	0
G13	27/09/2019	0	0	0	0	0	0	0	0	0
G13	28/09/2019	0	0	0	0	0	0	0	0	0
G13	29/09/2019	0	0	0	0	0	4	0	0	0
G13	30/09/2019	0	0	0	0	0	0	0	0	0
G14	17/09/2019	1	0	0	5	4	16	8	0	0
G14	18/09/2019	4	2	0	0	5	19	1	3	0
G14	19/09/2019	0	0	0	1	5	39	20	1	0
G14	20/09/2019	1	0	1	0	2	6	1	0	0
G14	21/09/2019	0	0	0	0	0	2	1	0	0
G14	22/09/2019	2	0	0	4	22	52	9	0	0
G14	23/09/2019	1	0	0	0	0	2	3	2	0
G14	24/09/2019	0	0	0	0	0	1	0	0	0
G14	25/09/2019	0	0	0	0	0	0	0	0	0
G14	26/09/2019	0	0	0	0	0	0	0	0	0
G14	27/09/2019	0	0	0	1	0	4	0	0	0
G14	28/09/2019	0	0	0	0	0	0	0	0	0
G14	29/09/2019	9	1	1	2	3	110	10	0	0
G14	30/09/2019	12	0	0	1	0	3	0	0	0
G15	17/09/2019	0	0	0	0	2	26	6	0	0
G15	18/09/2019	0	0	0	0	0	20	2	1	1
G15	19/09/2019	0	0	0	0	0	14	9	1	1
G15	20/09/2019	0	0	0	0	0	2	0	1	0
G15	21/09/2019	0	0	0	0	0	2	0	0	0
G15	22/09/2019	0	0	0	0	0	2	8	0	0
G15	23/09/2019	0	0	0	0	0	1	4	0	2

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
G15	24/09/2019	0	0	0	0	0	0	0	0	0
G15	25/09/2019	0	0	0	0	0	1	0	0	0
G15	26/09/2019	0	0	0	0	0	0	0	0	1
G15	27/09/2019	0	0	0	0	0	0	0	0	0
G15	28/09/2019	0	0	0	0	0	0	0	0	0
G15	29/09/2019	0	0	0	0	0	0	0	0	0
G15	30/09/2019	0	0	0	0	0	0	0	0	0
G17	17/09/2019	1	2	1	1	28	117	38	3	2
G17	18/09/2019	5	2	6	8	5	110	62	3	5
G17	19/09/2019	0	5	7	1	3	66	37	4	0
G17	20/09/2019	1	1	1	1	1	27	47	2	0
G17	21/09/2019	1	0	1	0	1	37	28	0	0
G17	22/09/2019	0	4	4	5	6	104	34	1	3
G17	23/09/2019	3	6	4	0	0	29	32	3	1
G17	24/09/2019	0	1	1	0	1	2	4	0	0
G17	25/09/2019	0	0	0	0	0	4	2	0	0
G17	26/09/2019	0	0	0	0	0	3	2	0	0
G17	27/09/2019	1	0	0	0	1	7	2	0	0
G17	28/09/2019	0	0	0	0	0	1	0	0	0
G17	29/09/2019	5	0	2	2	10	118	29	0	3
G17	30/09/2019	3	1	1	0	0	7	18	1	2
G18	17/09/2019	1	1	0	0	2	22	5	3	0
G18	18/09/2019	1	0	0	0	0	14	5	2	0
G18	19/09/2019	2	0	0	0	1	11	3	3	0
G18	20/09/2019	1	0	0	0	0	0	1	0	1
G18	21/09/2019	0	0	0	0	0	0	1	0	0
G18	22/09/2019	1	0	0	0	0	3	4	0	0
G18	23/09/2019	0	0	0	0	0	1	1	0	0
G18	24/09/2019	0	0	0	0	0	0	0	0	0
G18	25/09/2019	0	0	0	0	0	0	0	0	0
G18	26/09/2019	0	0	0	0	0	0	0	0	0

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
G18	27/09/2019	0	0	0	0	0	0	0	0	0
G18	28/09/2019	0	0	0	0	0	0	0	0	0
G18	29/09/2019	0	1	0	0	0	4	2	1	0
G18	30/09/2019	0	0	0	0	0	0	0	1	0
G19	30/07/2019	0	0	0	1	2	70	0	0	0
G19	31/07/2019	1	2	5	0	0	123	11	3	0
G19	01/08/2019	3	0	5	4	0	56	5	2	1
G19	02/08/2019	2	2	0	3	2	68	15	0	0
G19	03/08/2019	0	0	0	2	2	196	17	1	0
G19	04/08/2019	1	4	2	1	0	240	1	0	0
G19	05/08/2019	1	0	0	0	0	5	0	0	0
G19	06/08/2019	0	2	0	0	2	54	2	0	0
G19	07/08/2019	0	3	0	5	0	25	7	4	0
G19	08/08/2019	2	4	1	1	0	57	2	0	0
G19	09/08/2019	0	1	0	0	0	0	0	0	0
G19	10/08/2019	0	0	0	0	0	0	0	0	0
G19	11/08/2019	0	1	1	0	1	21	0	0	0
G19	12/08/2019	4	4	4	1	4	61	6	3	0
G19	13/08/2019	2	3	2	2	0	15	1	2	0
G19	14/08/2019	0	0	0	0	0	3	0	0	0
G19	15/08/2019	0	0	1	2	0	17	3	1	0
G19	16/08/2019	0	0	0	0	1	6	0	0	0
G19	17/08/2019	0	0	0	2	1	13	1	0	0
G19	18/08/2019	0	1	0	0	0	6	2	0	0
G19	19/08/2019	2	1	1	1	1	17	7	1	0
G19	20/08/2019	3	2	2	4	3	122	24	11	1
G19	21/08/2019	3	2	2	8	1	37	8	7	0
G19	22/08/2019	0	0	0	0	0	0	0	0	0
G19	23/08/2019	0	0	0	0	0	0	0	0	0
G19	24/08/2019	0	0	0	0	0	0	0	0	0
G19	25/08/2019	0	0	0	0	0	0	0	0	0

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
G19	26/08/2019	0	0	0	0	0	0	0	0	0
G19	27/08/2019	0	0	0	0	0	0	0	0	0
G19	28/08/2019	0	0	0	0	0	0	0	0	0
G19	29/08/2019	0	0	0	0	0	0	0	0	0

Table 6: Raw data for Inchamore round 3.

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
I1	21/08/2019	0	0	0	0	0	0	0	0	0
I1	22/08/2019	0	0	0	4	2	13	3	0	0
I1	23/08/2019	6	1	0	4	0	6	1	1	0
I1	24/08/2019	1	2	0	2	0	2	0	0	0
I1	25/08/2019	0	1	0	7	0	4	6	1	0
I1	26/08/2019	1	2	0	15	0	6	5	8	0
I1	27/08/2019	0	0	0	0	0	4	0	0	0
I1	28/08/2019	0	0	0	0	0	0	0	0	0
I1	29/08/2019	0	0	1	1	0	8	2	4	0
I1	30/08/2019	0	0	0	0	0	0	1	1	0
I1	31/08/2019	0	1	0	0	0	0	1	0	0
I1	01/09/2019	1	2	0	0	0	16	1	1	0
I1	02/09/2019	1	0	1	0	0	2	0	1	0
I1	03/09/2019	0	0	0	1	0	0	0	0	0
I1	04/09/2019	1	2	1	1	0	11	2	3	0
I1	05/09/2019	1	0	3	0	0	9	0	3	0
I1	06/09/2019	4	0	0	0	0	4	0	0	0
I1	07/09/2019	9	3	0	2	0	10	1	2	0
I1	08/09/2019	2	0	1	1	0	1	0	5	0
I1	09/09/2019	4	0	3	0	0	9	0	0	0
I1	10/09/2019	15	3	1	1	0	0	0	0	0
I1	11/09/2019	5	1	0	0	0	14	3	2	0
I1	12/09/2019	4	2	3	0	0	8	3	1	0
I1	13/09/2019	19	2	2	1	0	8	2	1	0
I1	14/09/2019	13	2	2	0	2	2	2	6	0
I1	15/09/2019	8	1	1	0	0	0	1	4	0
I1	16/09/2019	1	1	1	1	0	0	0	1	0
I1	21/08/2019	0	0	0	0	0	2	0	0	0
I1	22/08/2019	1	0	0	5	1	121	8	1	0

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
I2	23/08/2019	4	5	1	10	38	93	12	8	0
I2	24/08/2019	0	1	0	1	0	3	1	5	0
I2	25/08/2019	1	3	1	2	1	19	12	1	0
I2	26/08/2019	2	2	2	2	2	39	7	7	0
I2	27/08/2019	0	0	0	0	0	17	1	0	0
I2	28/08/2019	0	0	0	0	0	26	2	0	0
I2	29/08/2019	1	1	0	11	0	85	16	1	0
I2	30/08/2019	0	0	0	0	0	1	0	1	0
I2	31/08/2019	0	1	0	3	0	15	0	0	0
I2	01/09/2019	2	1	0	0	0	30	2	2	0
I2	02/09/2019	2	1	2	0	0	1	4	6	0
I2	03/09/2019	0	3	0	0	0	5	1	2	0
I2	04/09/2019	0	2	0	0	1	40	1	2	0
I2	05/09/2019	2	3	0	0	0	60	2	9	0
I2	06/09/2019	1	2	0	0	0	10	3	0	0
I2	07/09/2019	3	5	0	2	0	39	3	5	0
I2	08/09/2019	2	2	3	0	0	95	3	9	0
I2	09/09/2019	0	0	1	0	0	21	0	0	0
I2	10/09/2019	1	3	1	0	0	0	1	11	0
I2	11/09/2019	1	2	0	1	2	294	27	1	0
I2	12/09/2019	1	3	2	0	0	37	7	2	0
I2	13/09/2019	5	1	3	3	1	172	25	13	0
I2	14/09/2019	4	1	12	2	1	86	30	10	0
I2	15/09/2019	0	1	1	0	0	3	1	4	0
I2	16/09/2019	1	1	1	0	0	0	0	1	0
I3	21/08/2019	0	0	0	0	0	0	0	0	0
I3	22/08/2019	0	1	0	0	0	1	0	0	0
I3	23/08/2019	0	0	0	9	0	28	0	0	0
I3	24/08/2019	0	0	0	0	0	0	0	0	0
I3	25/08/2019	0	0	0	2	0	7	2	0	0
I3	26/08/2019	2	0	0	3	1	5	1	2	0

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
I3	27/08/2019	0	0	0	0	0	0	0	0	0
I3	28/08/2019	0	0	0	0	0	0	0	0	0
I3	29/08/2019	0	0	0	0	0	0	0	0	3
I3	30/08/2019	0	0	0	0	0	0	0	0	0
I3	31/08/2019	0	0	0	1	0	0	0	0	0
I3	01/09/2019	1	0	0	1	0	1	0	0	0
I3	02/09/2019	0	0	0	0	0	0	0	0	0
I3	03/09/2019	0	0	0	0	0	0	0	0	0
I3	04/09/2019	0	0	0	0	0	0	0	0	0
I3	05/09/2019	1	1	0	1	0	0	0	0	0
I3	06/09/2019	0	0	0	0	0	0	0	0	0
I3	07/09/2019	0	1	1	1	1	0	4	2	0
I3	08/09/2019	0	0	0	1	1	4	1	0	0
I3	09/09/2019	0	0	1	0	0	0	0	0	0
I3	10/09/2019	1	0	0	0	0	0	0	0	0
I3	11/09/2019	0	0	0	0	46	29	23	0	0
I3	12/09/2019	0	0	0	0	0	0	0	0	0
I3	13/09/2019	1	0	1	0	5	10	5	1	0
I3	14/09/2019	1	0	0	0	0	1	0	0	0
I3	15/09/2019	0	0	0	0	0	0	0	0	1
I3	16/09/2019	0	0	0	0	0	0	0	0	0
I4	21/08/2019	0	0	0	0	0	0	0	0	0
I4	22/08/2019	1	1	1	1	2	5	5	0	0
I4	23/08/2019	0	0	0	5	0	8	9	1	0
I4	24/08/2019	0	0	2	1	0	0	3	0	0
I4	25/08/2019	1	0	0	8	0	9	12	1	0
I4	26/08/2019	4	0	3	3	0	4	4	3	0
I4	27/08/2019	0	0	0	0	0	0	0	0	0
I4	28/08/2019	1	0	0	0	0	3	1	1	0
I4	29/08/2019	3	1	1	0	0	3	3	3	0
I4	30/08/2019	0	0	0	0	0	0	0	0	0

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
I4	31/08/2019	0	0	0	0	0	0	0	0	0
I4	01/09/2019	1	0	0	1	0	1	0	2	0
I4	02/09/2019	1	1	2	1	0	0	1	0	0
I4	03/09/2019	0	0	0	0	0	0	0	0	0
I4	04/09/2019	2	2	1	0	0	1	0	2	0
I4	05/09/2019	0	1	2	0	0	0	2	0	0
I4	06/09/2019	3	0	1	0	0	1	2	1	0
I4	07/09/2019	2	2	5	2	1	29	8	2	0
I4	08/09/2019	6	1	0	3	0	0	0	4	0
I4	09/09/2019	1	0	1	0	0	1	2	0	0
I4	10/09/2019	2	0	1	0	0	0	7	1	0
I4	11/09/2019	3	1	0	3	0	27	13	0	0
I4	12/09/2019	2	2	9	0	0	3	10	1	0
I4	13/09/2019	3	1	2	6	11	164	18	4	0
I4	14/09/2019	1	1	3	0	2	43	38	1	0
I4	15/09/2019	2	1	0	0	0	2	5	1	0
I4	16/09/2019	0	1	2	0	0	1	0	0	0
I5	21/08/2019	0	0	0	0	0	0	0	0	0
I5	22/08/2019	0	0	0	1	0	1	0	0	0
I5	23/08/2019	0	0	0	1	0	23	0	1	0
I5	24/08/2019	0	0	0	2	0	0	0	0	0
I5	25/08/2019	0	0	0	3	0	0	0	1	0
I5	26/08/2019	0	0	0	0	0	6	0	1	0
I5	27/08/2019	0	0	0	0	0	0	0	0	0
I5	28/08/2019	0	0	0	3	0	0	0	0	0
I5	29/08/2019	0	1	0	2	0	2	1	0	0
I5	30/08/2019	0	0	0	0	0	0	0	0	0
I5	31/08/2019	0	0	0	1	0	1	1	0	0
I5	01/09/2019	0	0	0	1	0	1	0	1	0
I5	02/09/2019	0	0	0	0	0	0	0	0	0
I5	03/09/2019	0	0	0	0	0	0	0	0	0

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
I5	04/09/2019	0	0	0	0	0	0	1	0	0
I5	05/09/2019	0	0	0	0	0	0	0	0	0
I5	06/09/2019	0	0	0	0	0	0	0	0	0
I5	07/09/2019	0	0	1	0	0	0	0	2	0
I5	08/09/2019	2	0	1	2	0	0	0	0	0
I5	09/09/2019	0	0	0	0	0	0	0	0	0
I5	10/09/2019	0	0	0	0	0	0	0	1	0
I5	11/09/2019	0	0	0	1	0	6	3	1	0
I5	12/09/2019	1	0	0	0	0	1	1	0	0
I5	13/09/2019	0	0	0	0	1	6	3	1	0
I5	14/09/2019	0	0	0	1	0	3	4	0	0
I5	15/09/2019	0	0	0	0	0	0	0	1	0
I5	16/09/2019	0	0	0	0	0	0	0	0	0
I6	21/08/2019	0	0	0	0	0	0	0	0	0
I6	22/08/2019	0	0	0	3	3	19	5	0	0
I6	23/08/2019	0	1	0	3	0	2	3	1	0
I6	24/08/2019	2	0	0	0	2	0	0	0	0
I6	25/08/2019	0	0	1	7	0	18	3	0	0
I6	26/08/2019	0	1	0	3	0	2	2	1	0
I6	27/08/2019	0	0	0	0	0	0	0	0	0
I6	28/08/2019	0	0	0	1	0	0	0	0	0
I6	29/08/2019	0	0	0	2	0	9	4	0	0
I6	30/08/2019	0	0	0	0	0	0	0	0	0
I6	31/08/2019	0	0	0	0	0	0	0	0	0
I6	01/09/2019	1	0	2	1	0	9	2	0	0
I6	02/09/2019	2	0	0	0	0	1	0	0	0
I6	03/09/2019	0	0	0	0	0	0	0	0	0
I6	04/09/2019	0	0	0	0	0	0	0	0	0
I6	05/09/2019	1	0	0	0	0	0	0	0	0
I6	06/09/2019	1	2	1	0	0	0	2	0	0
I6	07/09/2019	5	0	2	1	1	14	3	0	0

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
I6	08/09/2019	0	2	0	3	1	10	0	0	0
I6	09/09/2019	0	0	0	0	0	1	0	0	0
I6	10/09/2019	2	1	1	0	0	0	0	0	0
I6	11/09/2019	0	0	0	0	10	108	43	1	0
I6	12/09/2019	1	0	0	0	1	9	6	2	0
I6	13/09/2019	1	0	1	4	32	159	29	1	0
I6	14/09/2019	1	1	0	0	9	17	5	1	0
I6	15/09/2019	0	0	0	0	0	1	1	0	0
I6	16/09/2019	1	0	0	0	0	0	0	0	0
I7	21/08/2019	0	0	0	0	0	0	0	0	0
I7	22/08/2019	0	1	0	1	1	2	2	0	0
I7	23/08/2019	1	0	0	4	0	3	2	0	0
I7	24/08/2019	0	1	0	2	0	0	0	0	0
I7	25/08/2019	0	0	1	4	0	8	10	0	0
I7	26/08/2019	1	1	1	6	0	3	8	3	0
I7	27/08/2019	0	0	0	0	0	0	0	0	0
I7	28/08/2019	0	0	0	2	0	1	0	0	0
I7	29/08/2019	0	1	0	3	0	7	0	0	0
I7	30/08/2019	0	1	0	0	0	0	0	0	0
I7	31/08/2019	0	0	0	0	0	0	0	0	0
I7	01/09/2019	2	2	0	0	1	5	1	0	0
I7	02/09/2019	3	2	1	0	0	3	0	0	0
I7	03/09/2019	0	0	1	0	0	0	0	0	0
I7	04/09/2019	0	0	0	1	0	0	0	0	0
I7	05/09/2019	1	0	1	0	0	2	2	1	0
I7	06/09/2019	0	1	0	0	0	1	2	0	0
I7	07/09/2019	3	1	1	6	2	13	4	1	0
I7	08/09/2019	0	1	0	1	2	6	2	2	0
I7	09/09/2019	0	0	0	0	0	2	1	0	0
I7	10/09/2019	2	0	0	0	0	1	0	1	0
I7	11/09/2019	0	3	2	1	1	17	13	0	1

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
I7	12/09/2019	0	0	0	0	0	5	8	0	0
I7	13/09/2019	1	0	1	6	23	121	27	3	0
I7	14/09/2019	2	0	2	1	0	8	2	2	0
I7	15/09/2019	1	0	0	0	0	2	2	0	0
I7	16/09/2019	0	2	1	0	0	1	1	0	0
I8	21/08/2019	0	0	0	0	0	0	0	0	0
I8	22/08/2019	0	0	0	2	0	1	1	0	0
I8	23/08/2019	0	0	0	6	0	9	1	0	0
I8	24/08/2019	0	1	0	0	0	0	0	0	0
I8	25/08/2019	0	1	0	0	0	8	1	0	0
I8	26/08/2019	0	0	0	3	1	1	0	1	0
I8	27/08/2019	0	0	0	0	0	0	0	0	0
I8	28/08/2019	0	0	0	0	1	0	0	0	0
I8	29/08/2019	0	0	0	2	0	2	0	0	0
I8	30/08/2019	0	0	0	0	0	0	0	0	0
I8	31/08/2019	0	0	0	0	0	0	0	0	0
I8	01/09/2019	0	0	0	2	0	1	2	1	0
I8	02/09/2019	0	0	0	0	0	2	0	0	0
I8	03/09/2019	0	0	0	0	0	0	0	0	0
I8	04/09/2019	0	0	0	0	0	1	1	0	0
I8	05/09/2019	0	0	0	0	0	5	0	0	0
I8	06/09/2019	1	1	0	0	0	4	1	0	0
I8	07/09/2019	0	0	1	1	2	12	8	1	0
I8	08/09/2019	0	0	1	2	0	0	0	0	0
I8	09/09/2019	0	0	0	0	0	4	0	0	0
I8	10/09/2019	2	0	0	0	0	0	0	0	0
I8	11/09/2019	0	0	0	1	0	8	2	2	0
I8	12/09/2019	0	0	0	1	3	5	3	1	0
I8	13/09/2019	0	1	1	4	10	69	14	1	0
I8	14/09/2019	1	0	0	0	0	4	0	0	0
I8	15/09/2019	0	0	0	0	0	6	2	0	0

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
I8	16/09/2019	0	0	0	0	0	1	0	0	0
I9	21/08/2019	0	0	0	0	0	0	0	0	0
I9	22/08/2019	1	0	0	3	3	11	1	0	0
I9	23/08/2019	1	1	0	9	2	17	6	1	0
I9	24/08/2019	0	0	0	1	0	2	0	0	0
I9	25/08/2019	0	0	0	4	0	4	3	0	0
I9	26/08/2019	0	1	1	7	1	19	14	2	0
I9	27/08/2019	0	0	0	0	0	1	0	0	0
I9	28/08/2019	0	0	0	1	0	4	0	0	0
I9	29/08/2019	0	1	1	0	0	35	1	0	0
I9	30/08/2019	0	0	0	0	0	0	0	0	0
I9	31/08/2019	0	0	0	0	0	5	0	0	0
I9	01/09/2019	0	0	2	1	0	14	1	0	0
I9	02/09/2019	1	4	0	1	0	3	0	1	0
I9	03/09/2019	0	0	0	0	0	3	0	0	0
I9	04/09/2019	0	0	0	1	0	2	0	0	0
I9	05/09/2019	0	0	2	0	0	3	1	0	0
I9	06/09/2019	0	0	0	0	0	2	0	0	0
I9	07/09/2019	0	0	1	3	1	8	4	2	0
I9	08/09/2019	3	2	1	3	0	31	10	1	0
I9	09/09/2019	0	1	0	0	0	2	1	0	0
I9	10/09/2019	1	0	2	0	0	1	0	0	0
I9	11/09/2019	0	0	0	1	14	173	48	0	0
I9	12/09/2019	0	1	2	1	19	167	13	0	0
I9	13/09/2019	1	0	1	1	20	123	17	2	0
I9	14/09/2019	0	0	0	2	10	48	8	0	0
I9	15/09/2019	0	1	1	4	12	62	10	1	0
I9	16/09/2019	0	0	0	0	0	0	1	0	0
I10	21/08/2019	0	0	0	0	0	3	1	0	0
I10	22/08/2019	0	2	0	1	0	147	74	2	1
I10	23/08/2019	3	7	2	15	1	68	32	11	0

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
I10	24/08/2019	0	3	1	5	1	17	0	3	0
I10	25/08/2019	1	2	0	4	5	266	11	3	0
I10	26/08/2019	8	13	1	11	2	160	31	10	1
I10	27/08/2019	0	0	0	0	0	35	0	0	0
I10	28/08/2019	1	0	0	3	14	93	9	0	0
I10	29/08/2019	3	6	1	1	9	143	20	8	0
I10	30/08/2019	0	0	0	0	0	3	0	0	0
I10	31/08/2019	1	5	0	1	10	89	7	4	0
I10	01/09/2019	3	7	0	2	3	76	9	4	0
I10	02/09/2019	5	5	2	0	2	20	8	7	0
I10	03/09/2019	0	1	1	0	1	0	2	0	0
I10	04/09/2019	1	2	1	1	1	162	7	3	0
I10	05/09/2019	3	2	1	0	1	80	2	5	0
I10	06/09/2019	4	2	4	1	2	225	15	0	0
I10	07/09/2019	4	19	2	3	8	157	47	13	0
I10	08/09/2019	3	9	0	1	2	71	24	5	10
I10	09/09/2019	3	1	0	6	2	67	6	2	0
I10	10/09/2019	0	1	0	0	0	8	2	7	1
I10	11/09/2019	2	1	0	0	3	73	30	1	0
I10	12/09/2019	5	7	1	3	1	105	29	4	1
I10	13/09/2019	6	20	1	1	10	232	120	13	0
I10	14/09/2019	7	13	0	0	0	39	66	10	1
I10	15/09/2019	2	3	1	5	1	12	17	2	0
I10	16/09/2019	2	1	2	0	0	1	0	5	0
I11	30/07/2019	0	2	0	1	1	34	7	0	0
I11	31/07/2019	1	4	0	1	1	29	6	0	0
I11	01/08/2019	2	3	0	2	2	143	39	0	0
I11	02/08/2019	3	5	0	9	2	189	44	0	0
I11	03/08/2019	1	1	0	3	2	57	4	1	0
I11	04/08/2019	10	2	0	0	1	38	11	1	0
I11	05/08/2019	1	1	0	0	0	28	0	1	0

TURBINE_NO	Date	*Myotis daubentonii*	*Myotis mystacinus*	*Myotis nattereri*	*Nyctalus leisleri*	*Pipistrellus nathusii*	*Pipistrellus pipistrellus*	*Pipistrellus pygmaeus*	*Plecotus auritus*	*Rhinolophus hipposideros*
I11	06/08/2019	0	2	0	3	0	14	2	0	0
I11	07/08/2019	2	5	0	11	0	87	3	2	0
I11	08/08/2019	6	5	0	8	1	12	4	3	0
I11	09/08/2019	2	1	1	3	0	11	1	0	0
I11	10/08/2019	0	0	0	0	0	0	0	1	0
I11	11/08/2019	1	0	0	1	0	5	4	0	0
I11	12/08/2019	6	1	0	3	0	37	2	2	0
I11	13/08/2019	11	4	0	2	0	82	0	0	0
I11	14/08/2019	1	0	0	2	0	136	1	0	0
I11	15/08/2019	3	1	1	8	2	59	8	0	0
I11	16/08/2019	0	0	0	2	0	41	0	1	0
I11	17/08/2019	2	6	0	3	0	29	2	4	1
I11	18/08/2019	15	5	0	2	1	39	1	3	0
I11	19/08/2019	8	1	0	7	0	65	5	0	0
I11	20/08/2019	18	2	1	8	0	46	16	1	1
I11	21/08/2019	10	2	0	12	0	26	7	1	0
I11	22/08/2019	0	0	0	1	0	0	0	0	0
I11	23/08/2019	0	0	0	0	0	0	0	0	0

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Appendices

Chapter 7 – Ornithology

May 2023

APPENDIX 7.1:

VP SUMMER 2017 - SURVEY DETAILS

Date	VP no.	Start Time	Duration (Hrs)	Precipitation	Cloud (okta)	Wind	Visibility
25/04/2017	1	10.15	3	Dry	4/8	F 5-6 NW	Excellent-Good (some heat shimmer)
25/04/2017	1	13.45	3	some snow & hail showers	7/8	NW F6-7	V. good-good-excellent (some heat shimmer)
18/05/2017	1	10.4	3	Light rain at start, mainly dry & clear	5/8-7/8	F4-5 W	Moderate - excellent
26/05/2017	1	15.08	0.5	Dry	8/8	F6-7 SE	Moderate
29/05/2017	1	15.12	2	Dry	8/8	F3-4 SSW	V. good
03/07/2017	1	10.26	3	Misty drizzle	7/8	F3-4 SW	Excellent-poor
03/07/2017	1	13.36	3	Misty drizzle	8/8	F3-5 SW	Moderate
31/07/2017	1	10.35	3	Occasional showers; mainly dry	7/8-6/8	F6-7 WSW	Good-excellent
31/07/2017	1	13.35	3	Occasional showers	6/8-8/8	F6-7 WSW	Excellent-moderate
29/08/2017	1	10.3	3	dry	8/8	F2-3 W	Good-moderate
29/08/2017	1	13.3	3	Occasional short showers	7/8-5/8	F3-4 W	Excellent
08/09/2017	1	10.35	3	Occasional short showers	7/8-5/8-8/8	F3-5 W	V.good- moderate
08/09/2017	1	13.45	3	Occ. Brief heavy showers	7/8-6/8	F3-5 W	V.good- poor
21/04/2017	2	10	3	Dry	1/8-5/8	F4-5 NW	Ex. -V.good; some heat shimmer
21/04/2017	2	13.3	3	Dry	3/8-5/8	F3-5 NW	V.good; some heat shimmer
18/05/2017	2	13.5	3	Intermittent showers + dry spells	6/8	F3 -4 NW	Ex./mod/poor
26/05/2017	2	11.57	3	Dry	8/8-7/8	F6-7 ESE	Mod-Good; slight haze
28/06/2017	2	9.45	3	Dry	5/8	F2-3 NW	Excellent
28/06/2017	2	13.05	3	Dry	7/8-5/8	F2-5 SW	Excellent
31/07/2017	2	10.35	3	Showers	7/8	F5 SW	Good
30/08/2017	2	9.5	3	Light drizzle at end of watch	7/8-5/8	F1-4 (variable) NW	V.good
30/08/2017	2	12.5	3	Intermittent misty showers	8/8-5/8	F2-4 WNW	Mod-V.good
11/09/2017	2	11.4	3	Frequent showers	6/8-8/8	F6 W	Good-poor
11/09/2017	2	14.4	3	Frequent showers	6/8	F4-5 W	Mod-poor
20/04/2017	3	11.3	3	Dry	5/8-6/8	F2-3 Var.	Excellent

Date	VP no.	Start Time	Duration (Hrs)	Precipitation	Cloud (okta)	Wind	Visibility
20/04/2017	3	15	3	Dry	7/8	F3-4 NW	Excellent
15/05/2017	3	10.04	3	Regular misty drizzle/ light showers & dry spells	8/8	F4-5 ENE	Moderate/poor
15/05/2017	3	13.34	3	Occasional showers, misty drizzle & dry clear spells	8/8	F4-5 ENE	Moderate/poor
16/06/2017	3	11.51	3	Dry	3/8	F5 NW	Excellent
16/06/2017	3	15.15	3	Dry	3/8-5/8	Var; F0-F5 NW	Excellent
04/08/2017	3	10.15	3	Medium 20 min shower in last hr of survey	7/8	F1-3 NW/N	V.good
04/08/2017	3	13.45	3	Light spitting on & off for 1st 30 min	8/8-7/8	F1-2 N/NW	V.good
18/08/2017	3	9.25	3	Occ. Showers	7/8-5/8	F4-5 WSW	Good-V.good
18/08/2017	3	12.55	3	showers & dry clear spells	8/8	F3-5 (var./gusty) W	V-good-mod
05/09/2017	3	9.3	3	Dry	6/8-2/8	F3-4 W	V.good
05/09/2017	3	12.3	3	Dry	3/8	F4-5W	Excellent

APPENDIX 7.2:

VP WINTER 2017/2018 - SURVEY DETAILS

VP Winter 2017/2018 - Survey Details

Date	VP	Time	Duration (hours)	Precipitation	Cloud (okta)	Wind	Visibility
22/12/2017	1	10:15	3	Some misty drizzle	8/8-7/8	F2-4 SW	V.good-Mod
22/12/2017	1	13:15	3	Dry	8/8	F3-4 SW	V.good
31/12/2017	2	13:40	3	Frequent Showers	8/8	F3-4 SW	Fair-Good
25/10/2017	3	10:00	3	Light spitting for 15 min	8/8	F0	V.Good
25/10/2017	3	13:30	3	Dry	8/8	F0	V.Good
27/10/2017	2	09:30	6		8/8	F1 SW	Poor-Good
15/11/2017	2	11:4	3	Occ. Misty showers; 90% dry	8/8-7/8	F3 WSW	Mod-V.good
15/11/2017	2	14:4	2	Some misty showers	8/8	F3-4 WSW	V.good-poor
15/11/2017	3	11:00	3	Drizzle	8/8	F2 ENE	-
15/11/2017	3	14:30	3	None	7/8	F3 S	Excellent
23/11/2017	1	10:30	3	Dry	4/8	F4-5 NW	V.good
23/11/2017	1	13:30	3	Dry	8/8	F3-4 NW	V.good
23/11/2017	2	09:35	1	Dry	4/8	F5-6 NW	Good
30/11/2017	1	10:30	6	N/A	6/8	F4 NNW-S	Good
01/12/2017	3	9:45	3	Dry	1/8-3/8	F0-1 NW	V.good
01/12/2017	3	12:45	3	Dry	2/8	F0-1 NW	V.good
15/12/2017	1	10:00	3	Dry	1/8-4/8	F5-6 NW	Good-Ex
15/12/2017	1	13:00	3	Dry	4/8	F5-6 NW	Excellent
31/12/2017	2	13:40	3	frequent squalls	8/8	SW F3-4	Fair-Good
31/12/2017	4	09:30	4	Frequent Heavy	8/8	SW F3-4	Poor to Good
01/01/2018	2	09:30	3	Heavy showers at first	8/8	W-NW F5-6	Good
04/01/2018	3	10:30	3	Occ. Light showers	7/8	F4-5 W	Good
04/01/2018	3	13:30	3.5	Occ. Light showers	7/8	F3-4 W	Good
19/01/2018	2	12:30	3	Heavy snow showers	7/8	F4 W	Moderate
26/01/2018	2	09:00	3	Occ. showers	6/8	F3	Good
08/02/2018	3	08:30	3	Drizzle	8/8	F1	Poor-mod
08/02/2018	3	12:00	3	Dry	7/8	F2	Mod-good
09/02/2018	2	11:05	3	1 brief snow shower	5/8	F2 NW	V.good-poor-v.good
09/02/2018	2	14:05	3	Dry	8/8	F3 NW	V.Good
23/03/2018	2	12:20	3	Light showers	8/8	F3 SE	Moderate/Occ. Poor
23/03/2018	2	15:30	3	Steady light rain	8/8	F3 ESE	Moderate

Date	VP	Time	Duration (hours)	Precipitation	Cloud (okta)	Wind	Visibility
08/04/2018	1	12:15	6	N/A	Fog 4/8	F3	Good/ Fog
09/04/2018	3	09:50	3	Dry	6/8-8/8	F2 SE	Excellent
09/04/2018	3	12:50	3	Dry	8/8	F2/3 SE	Excellent
29/04/2018	1	07:45	6	N/A	3/8	F4	Good

APPENDIX 7.3:

BIRD SURVEY VP FLIGHT LINE DATA, 2017-2018

Inchamore Summer 2017 Vantage Point Observations

VP no.	Date	Start Time	End Time	Species	Flight line no.	Species quantity	Start Time	Inside / outside Buffer	Total Duration (s)	0-20 (s)	20-40 (s)	40-80 (s)	80-150 (s)	>150 (s)	Bird Notes
3	18/08/2017	9.25	12.25	Cormorant_CA	-	3		IN						Flying E-W through viewshed	3
2	31/07/2017	10.35	16.35	Kestrel_K.	9	1	13.02	OUT	1800	1800					Moving along short intervals surveying field while hovering
2	31/07/2017	10.35	16.35	Kestrel_K.	9	1	13.32	IN	300	300					Crossed into viewshed & out of viewshed
2	31/07/2017	10.35	16.35	Kestrel_K.	8	2	13.44	IN	30		30				Pair travelling across viewshed, not hovering
2	31/07/2017	10.35	16.35	Kestrel_K.	7	1	14.26	IN	45	45					Travelling & stopped twice to hover briefly
2	31/07/2017	10.35	16.35	Kestrel_K.	7	1	14.26	OUT	50	50					
2	31/07/2017	10.35	16.35	Kestrel_K.	6	1	14.41	OUT	70	70					Travelling, no hovering

VP no.	Date	Start Time	End Time	Species	Flight line no.	Species quantity	Start Time	Inside / outside Buffer	Total Duration (s)	0-20 (s)	20-40 (s)	40-80 (s)	80-150 (s)	>150 (s)	Bird Notes
2	31/07/2017	10.35	16.35	Kestrel_K.	5	1	14.53	OUT	1500	1500					Circled, then hovered, then moving small distances to hover
3	04/08/2017	10.15	13.15	Kestrel_K.	1	1	11.48	IN	55	37	18				Flying, hunting, hovering
3	04/08/2017	10.15	13.15	Kestrel_K.	1	1	11.48	OUT	55	38	17				In/Outside site boundary rather than buffer recorded.
3	05/09/2017	9.3	12.3	Kestrel_K.	4	1	11.24	IN	8	8					Hovering, hunting, flying
3	05/09/2017	12.3	15.3	Kestrel_K.	3	1	13.34	IN	22	16	6				
3	05/09/2017	12.3	15.3	Kestrel_K.	2	1	13.51	IN	11	11					
3	15/05/2017	13.34	16.34	Mallard_MA	-										Male

VP no.	Date	Start Time	End Time	Species	Flight line no.	Species quantity	Start Time	Inside / outside Buffer	Total Duration (s)	0-20 (s)	20-40 (s)	40-80 (s)	80-150 (s)	>150 (s)	Bird Notes
2	11/09/2017	11.4	14.4	Peregrine Falcon_PE	1	1	13:36	IN	10	10					
3	15/05/2017	13.34	16.34	Sparrowhawk_SH	1	1	14.28	IN	19	19					Female or juvenile; flying c.1m altitude, hunting along road & field boundaries. Lost sight behind spur.
3	15/05/2017	13.34	16.34	Sparrowhawk_SH	1	1	14.28	OUT	2	2					
1	29/08/2017	10.3	13.3	Sparrowhawk_SH	3	1	10.3	IN	5	5					A, B & C = same bird. Flushed on approach to VP, flew downhill behind ridge
1	29/08/2017	10.3	13.3	Sparrowhawk_SH	4	1	10.3	IN	3	3					Approached ridge, flushed again, flew behind 2nd ridge
1	29/08/2017	10.3	13.3	Sparrowhawk_SH	5	1	10.3	IN	10	10					Approached 2nd ridge, flushed, flew across heath into conifer plantation

VP no.	Date	Start Time	End Time	Species	Flight line no.	Species quantity	Start Time	Inside / outside Buffer	Total Duration (s)	0-20 (s)	20-40 (s)	40-80 (s)	80-150 (s)	>150 (s)	Bird Notes
3	05/09/2017	9.3	12.3	Sparrowhawk_SH	2	1	10.3	IN	7	7					Male; took small passerine from low branch of spruce tree
3	05/09/2017	9.3	12.3	Sparrowhawk_SH	2	1	10.3	OUT	3	3					

Inchamore Winter 2017 / 18 Vantage Point Observations

VP no.	Date	Start Time	End Time	Species	Flight line no.	Species quantity	Start Time	Inside / outside Buffer	Total Duration (s)	0-20 (s)	20-40 (s)	40-80 (s)	80-150 (s)	>150 (s)	Bird Notes
2	15/11/2017	14.4	16.55	Golden Plover_GP	11		14.4								Heard calling overhead; obscured by cloud; could tell general location & direction of flight from calls
1	23/11/2017	10.3	13.3	Golden Plover_GP	1	11	10.55	IN	15	15					Lost sight behind rise to west of VP1
1	23/11/2017	10.3	13.3	Golden Plover_GP	2	12	12.35	IN	11	11					Lost sight behind rise; appeared to be landing
1	23/11/2017	10.3	13.3	Golden Plover_GP	3	c. 35	12.56	IN	105	73	32				c. 25 followed closely by 10. Appeared to land behind rise, same area as above
1	23/11/2017	10.3	13.3	Golden Plover_GP	4	15	13.27	IN	18	18					Probably arrived earlier, + disturbed. Other GO flightpaths (1,4, & 5) considered influx from N + E

VP no.	Date	Start Time	End Time	Species	Flight line no.	Species quantity	Start Time	Inside / outside Buffer	Total Duration (s)	0-20 (s)	20-40 (s)	40-80 (s)	80-150 (s)	>150 (s)	Bird Notes
1	23/11/2017	10.3	13.3	Golden Plover_GP	5	c.40	13.15-13.25	IN							4 flocks of c.10 flushed& flew along FP A when area approached to confirm landing
1	23/11/2017	13.3	16.3	Golden Plover_GP	6	c.30	13.5	IN	18	18					
1	23/11/2017	13.3	16.3	Golden Plover_GP	7	16	13.54	IN	15	15					
1	23/11/2017	13.3	16.3	Golden Plover_GP	8	10	14	IN	4	4					
2	23/11/2017	9.35	10.2	Golden Plover_GP	9	4	9.48	IN	10	10					
2	23/11/2017	9.35	10.2	Golden Plover_GP	10	4	9.54	IN	18	18					

VP no.	Date	Start Time	End Time	Species	Flight line no.	Species quantity	Start Time	Inside / outside Buffer	Total Duration (s)	0-20 (s)	20-40 (s)	40-80 (s)	80-150 (s)	>150 (s)	Bird Notes
1	15/12/2017	13	16	Golden Plover_GP	13	10	14.52	IN	15	15					
1	15/12/2017	13	16	Golden Plover_GP	14	12	15.54	IN	13	13					
1	15/12/2017	13	16	Golden Plover_GP	15	12	15.55	IN	45	10	35				Assume same flock as (2) above; appeared to land behind rise west of VP
2	19/01/2018	12.3	15.3	Golden Plover_GP	23	1	14.21	IN					200		Calling & travelling
2	19/01/2018	12.3	15.3	Golden Plover_GP	23	1	14.21	OUT					129		

VP no.	Date	Start Time	End Time	Species	Flight line no.	Species quantity	Start Time	Inside / outside Buffer	Total Duration (s)	0-20 (s)	20-40 (s)	40-80 (s)	80-150 (s)	>150 (s)	Bird Notes
1	22/01/2018	10.15	13.15	Golden Plover_GP	17	1	10.12	IN	9	9					Flushed on route to VP, flew off low calling
1	22/01/2018	10.15	13.15	Golden Plover_GP	18	c.40	10.3	IN	335	140	160	35			
1	22/01/2018	10.15	13.15	Golden Plover_GP	18	c.40	10.3	OUT	15		15				
1	22/01/2018	10.15	13.15	Golden Plover_GP	19	c.35	10.36	IN	42	32	10				Presume landed on bog
1	22/01/2018	10.15	13.15	Golden Plover_GP	20	12	10.5	IN	169	17	101	51			
1	22/01/2018	10.15	13.15	Golden Plover_GP	21	c.70	11.55	IN	627		43	478	106		Lost in clouds
1	22/01/2018	10.15	13.15	Golden Plover_GP	21	c.70	11.55	OUT	228			120	108		
1	22/01/2018	13.15	16.15	Golden Plover_GP	22	3	15.43	IN	15		15				

VP no.	Date	Start Time	End Time	Species	Flight line no.	Species quantity	Start Time	Inside / outside Buffer	Total Duration (s)	0-20 (s)	20-40 (s)	40-80 (s)	80-150 (s)	>150 (s)	Bird Notes
2	26/01/2018	9	12	Golden Plover_GP	24	3	9.4	IN	132				132		Calling & travelling
2	26/01/2018	9	12	Golden Plover_GP	25	1	11.18	IN	160					160	Calling & travelling
2	26/01/2018	9	12	Golden Plover_GP	25	1	11.18	OUT	20					20	Calling & travelling
2	26/01/2018	9	12	Golden Plover_GP	26	1	11.5	IN	50					50	Calling & travelling
2	23/03/2018	12:20	15:20	Golden Plover_GP	35	18	12:40	IN	270	54	216				
1	08/04/2018	12:15	18:15	Golden Plover_GP	44	16	12:12	IN	7	7					Fog <150m visibility

VP no.	Date	Start Time	End Time	Species	Flight line no.	Species quantity	Start Time	Inside / outside Buffer	Total Duration (s)	0-20 (s)	20-40 (s)	40-80 (s)	80-150 (s)	>150 (s)	Bird Notes
1	08/04/2018	12:15	18:15	Golden Plover_GP	45	7	12:21	IN	8	8					Fog <150m visibility
1	08/04/2018	12:15	18:15	Golden Plover_GP	46	43	16:24	IN / OUT	29		29				
1	22/01/2018	13.15	16.15	Hen Harrier_HH	4	1	15.46	IN	13	13					Male colouring on upper parts, but juvenile underneath & around face
1	22/01/2018	13.15	16.15	Hen Harrier_HH	5	1	15.47	IN	45	45					Same individual as (2) above
2	09/02/2018	11.05	14.05	Hen Harrier_HH	7	1	11.53	IN	55	49	6				Ringtail; mobbed by RN

VP no.	Date	Start Time	End Time	Species	Flight line no.	Species quantity	Start Time	Inside / outside Buffer	Total Duration (s)	0-20 (s)	20-40 (s)	40-80 (s)	80-150 (s)	>150 (s)	Bird Notes
2	09/02/2018	14.05	17.05	Hen Harrier_HH	8	1	14.4	IN	7	7					Male
2	09/02/2018	14.05	17.05	Hen Harrier_HH	8	1	14.40	OUT	8	8					
3	04/01/2018	10.3	13	Kestrel_K.	1	1	11.58	IN	7	7					Seen briefly- lost below hill/WD4
3	15/11/2017	11	14	Merlin_ML	1	1	11.59	IN	20				20		Flew straight through, flushing approx. 60 SG
3	15/11/2017	11	14	Merlin_ML	1	1	11.59	OUT	17				17		

VP no.	Date	Start Time	End Time	Species	Flight line no.	Species quantity	Start Time	Inside / outside Buffer	Total Duration (s)	0-20 (s)	20-40 (s)	40-80 (s)	80-150 (s)	>150 (s)	Bird Notes
2	09/02/2018	11.05	14.05	Red Grouse_RG	-	Dropping		IN							One dropping at VP
2	27/10/2017	09:30	15:30	Snipe_SN	-	2									
1	03/11/2017	10:30	16:30	Snipe_SN	8	1	10:30	IN	2	2					Snipe flushed arriving at VP flew low passing VP2 and over brow of hill
3	15/11/2017	14.3	17.3	Snipe_SN	3	2	17.18	IN	20	20					Seen flying past through GA1/GS4 close
1	23/11/2017	10.3	13.3	Snipe_SN	1	1	11.24	IN	11	11					Flushed from behind (west) of VP1
1	23/11/2017	10.3	13.3	Snipe_SN	2	1	11.53	IN	9	9					Flushed

VP no.	Date	Start Time	End Time	Species	Flight line no.	Species quantity	Start Time	Inside / outside Buffer	Total Duration (s)	0-20 (s)	20-40 (s)	40-80 (s)	80-150 (s)	>150 (s)	Bird Notes
1	22/01/2018	10.15	13.15	Snipe_SN	5	1	10.15	IN							Flushed on arrival at VP
1	22/01/2018	10.15	13.15	Snipe_SN	6	1	11.49	IN	2	2					Flushed from behind VP
3	08/02/2018	8.3	11.3	Snipe_SN	7	1	11.19	IN	24	24					Travelling, landed in HH3
3	01/12/2017	12.45	15.45	Sparrowhawk_SH	-	1	15.31	IN	4	4					
3	01/12/2017	12.45	15.45	Sparrowhawk_SH	-			OUT	16	16					
1	22/01/2018	10.15	13.15	White-tailed Eagle_WE	1	1	10.53	OUT	26	6	20				Silhouette only observed, so age not determined

VP no.	Date	Start Time	End Time	Species	Flight line no.	Species quantity	Start Time	Inside / outside Buffer	Total Duration (s)	0-20 (s)	20-40 (s)	40-80 (s)	80-150 (s)	>150 (s)	Bird Notes
1	22/01/2018	10.15	13.15	White-tailed Eagle_WE	1	1	10.53	IN	8	2	4				Ground beneath flightpath not visible (hidden behind ridge) so mapping accuracy reduced
3	15/11/2017	14.3	17.3	Woodcock_WK	1	1	17.04	IN	2						Seen flying low coming from a small coniferous belt with a stream running through

APPENDIX 7.4:

VP SUMMER 2018 - SURVEY DETAILS

VP Summer 2018 - Survey Details

Date	VP	Time	Duration (hours)	Cloud (okta)	Precipitation	Wind	Visibility
09/04/2018	3	09:50	03:00	6/8-8/8	Dry	F2 SE	Excellent
09/04/2018	3	12:50	03:00	8/8	Dry	F2/3 SE	Excellent
19/04/2018	2	10:35	03:00	8/8-4/8	Dry	F2-3 SW	Excellent
19/04/2018	2	13:35	03:00	4/8	Dry	F2 SW	Excellent
29/04/2018	1	07:45	07:00	3/8	N/A	4	Good
11/05/2018	1	09:30	06:00	8/8-3/8	N/A	SW	Moderate/ low cloud at first - cleared at 13:00
22/05/2018	3	10:55	03:00	2/8	Dry	F1 NW	Excellent
22/05/2018	3	13:55	03:00	1/8	Dry	F1 NW	Excellent
25/05/2018	2	10:30	03:00	3/8	Dry	F2-4N	Excellent
05/06/2018	3	12:05	03:00	5/8	Dry	F2 SE	Excellent
05/06/2018	3	15:05	03:00	4/8	Dry	F2 SE	V. good (slight haze)
19/06/2018	1	13:00	06:00	8/8	N/A	SW 3	Moderate, low cloud
03/07/2018	1	11:00	06:00	2/8	N/A	E 2	Good
08/07/2018	2	10:00	06:00	4/8	Nil	WNW	Good
17/07/2018	2	13:00	06:00	-	Nil	SSW1	Good
18/07/2018	1	14:00	06:00	7/8	N/A	SSW 1	Good
20/07/2018	3	09:55	03:00	8/8	Occ. Light misty drizzle	F0-1 W	V. Good
20/07/2018	3	12:55	03:00	7/8	Dry	F2 WNW	Excellent
23/07/2018	2	12:45	03:00	8/8	light	F2-3 W	Ok-Poor-Fair
23/07/2018	2	09:15	03:00	8/8	V. light	F2-3 W/SW	Good-Poor-OK, very misty at times
31/07/2018	3	08:11	03:19	8/8-7/8	Light-medium-clear with showers at times	F2-3 W at times	Ok-Good with poor-ok during intermittent showers
31/07/2018	3	12:00	03:00	8/8-7/8	Light-medium-clear with showers at times	F2-3 W at times	Ok-Good with poor-ok during intermittent showers
07/08/2018	1	11:00	06:00	6/8	N/A	WSW 2	Good
16/08/2018	2	14:00	06:00	5/8	Nil	W2-3	Good
16/08/2018	3	09:10	03:00	6/8-7/8	Changeable, bright to light showers	F0-1 NW - 3-4NW	Good-Ok
16/08/2018	3	12:40	03:00	6/8-7/8	Changeable, bright to light showers	F0-1 NW - 3-4NW	Good-Ok
17/08/2018	2	09:00	03:00	8/8	Light showers	F3-4W 5 at times	OK-light mist at times

Date	VP	Time	Duration (hours)	Cloud (okta)	Precipitation	Wind	Visibility
26/09/2018	1	12:30	06:00	8/8 at 12:30, 2/8 at 15:00	Nil	SW 1-2	Good
27/09/2018	2	11:00	04:30	1/8	Nil	WNW 2-3	Mod-good
27/09/2018	2	11:00	04:30	1/8	Nil	WNW 2-3	Mod-good

APPENDIX 7.5:

VP WINTER 2018/2019 - SURVEY DETAILS

VP Winter 2018/2019 - Survey Details

Date	VP	Time	Duration (hours)	Cloud (okta)	Precipitation	Wind	Visibility
26/09/2018	1	12:30	06:00	8/8 at 12:30, 2/8 at 15:00	Nil	SW 1-2	Good
11/10/2018	3	10:30	03:00	6/8-8/8-4/8	Mainly dry, 1 light misty shower	F1	Excellent-v. good
11/10/2018	3	13:30	03:00	3/8	Dry	F1-2	Excellent
17/10/2018	2	10:20	03:00	4/8-8/8	Misty rain - none	F3-4W	OK, low lying mis, cleared at start of VP
17/10/2018	2	13:50	03:00	4/8-8/8	Misty rain - none	F3-4W	OK, low lying mis, cleared at start of VP
18/10/2018	1	08:50	03:00	1/8	Dry	F0, building to F1	V. good
15/11/2018	3	09:30	03:00	8/8	Light at start	F0-4 S-SE-SE-W	Ok-Fair
15/11/2018	3	13:00	03:00	8/8	Light at start	F0-4 S-SE-SE-W	Ok-Fair
16/11/2018	2	09:10	03:00	8/8 low lying fog in areas	Light rain throughout	F2-4	Fair to OK to Poor at times
21/11/2018	2	11:30	03:00	8/8	Dry	F0-1	Mod-v. good
30/11/2018	1	10:00	06:15	6/8 -8/8	Showers	F5-6 Strong	Full - poor
10/12/2018	3	08:25	06:20	8/8-7/8	Light from 09:00 onwards	F0-F1 calm	OK. Some morning haze light, poor vis 10:30-11:45 with changeable, then good thereafter
18/12/2018	2	10:10	06:00	8/8-6/8-2/8 (at times)	Light rain showers passing over	F3S	Excellent to OK at times
20/12/2018	1	09:30	03:00	8/8-6/8	Intermediate misty showers	F3-4	V. good
20/12/2018	1	12:30	03:00	8/8	Dry	F3-4	V. good
08/01/2019	3	09:30	03:00	7/8	None	F2 NW	Good
08/01/2019	3	13:00	03:00	8/8-7/8	None	F2 NW	Good- v. good
16/01/2019	2	09:30	03:00	2/8-4/8	Some brief showers	F2-3W	V. good
16/01/2019	2	12:30	03:00	5/8-7/8	Some brief heavy showers	F3W	V. good-good
17/01/2019	1	09:30	03:00	3/8	None	F1-2 NE	Good-v. good
17/01/2019	1	12:30	03:00	3/8-7/8	None	F1 NE	V. good
12/02/2019	2	10:00	03:00	8/8	Misty drizzle clearing	F2-3	Moderate-good

Date	VP	Time	Duration (hours)	Cloud (okta)	Precipitation	Wind	Visibility
12/02/2019	3	09:30	03:00	8/8	Some light drizzle	F1-3 SW	Good
12/02/2019	3	12:30	03:00	7/8	None-some drizzle	F2-3SW	V. good
14/02/2019	2	10:15	02:30	8/8	N/A	F4S	Good-poor
15/02/2019	1	10:10	01:00	8/8	Light throughout	F3-4 S	OK
04/03/2019	1	11:50	02:30	8/8	N/A	F3-4W	Good
04/03/2019	1	14:50	02:30	8/8	Heavy sleet with snow	F2-3 W	OK-Good
04/03/2019	2	14:20	00:30	8/8	Light	F0-2 W	Good
05/03/2019	3	07:25	03:00	8/8-5/8	Light showers constantly	F0-2 at times	Excellent
05/03/2019	3	10:55	03:00	8/8	Light showers constantly	F0-2 at times	Excellent
25/03/2019	2	09:25	06:30	1/8	N/A	F1	Excellent
29/03/2019	1	09:25	06:00	6/8-1/8	N/A	F2	Excellent

APPENDIX 7.6:

BIRD SURVEY VP FLIGHT LINE DATA, 2018-2019

Summer Survey 2018 Bird Flightline Data

VP	Date	Observation No.	Species	Quanity	Start	In/Out	Duration	0-20 (s)	20-40 (s)	40-80 (s)	80-150 (s)	>150 (s)	Flightline Map	Flightline No.
2	27/09/2018	1	Buzzard_BZ	1	11:26	In	93		93				2-8-A-1	1
2	27/09/2018	1	Buzzard_BZ	1	11:26	Out	10		10				2-8-A-1	1
2	27/09/2018	4	Hen harrier_HH	1	15:06	In	214	58	156				2-8-A-2	2
2	27/09/2018	4	Hen harrier_HH	1	15:06	Out	5		5				2-8-A-2	2
2	23/07/2018	1	Kestrel_K.	2	13:16	Out	15		5	10			-	-
2	23/07/2018	1	Kestrel_K.	2	13:16	In	600	50	500	50			-	-
2	08/07/2018	1	Kestrel_K.	1	13:42	In	791	312	479				2-8-A-3	1
2	08/07/2018	2	Kestrel_K.	1	15:45	In	296	98	198				2-8-A-3	2
2	16/08/2018	1	Kestrel_K.	1	18:15	In	293			293			2-8-A-3	4
2	17/07/2018	1	Kestrel_K.	1	15:33	In	429	184	245				2-8-A-3	3
3	22/05/2018	1	Kestrel_K.	1	13:21	In	160	16	144				2-8-A-3	7
3	22/05/2018	2	Kestrel_K.	1	13:59	In	94	14	80				2-8-A-3	8
3	22/05/2018	3	Kestrel_K.	1	14:22	In	52	47	5				2-8-A-3	9
2	27/09/2018	2	Kestrel_K.	1	12:01	In	7	7					2-8-A-3	5
2	27/09/2018	3	Kestrel_K.	1	12:05	In	207	162	45				2-8-A-3	6
1	26/09/2018	1	Kestrel_K.	1	13:46	In	7	7					2-8-A-3	10
1	26/09/2018	2	Kestrel_K.	1	14:28	In	11	11					2-8-A-3	11
1	26/09/2018	3	Kestrel_K.	1	14:29	In	12	12					2-8-A-3	12
3	20/07/2018	1	Merlin_ML	1	10:18	Out	20		20				2-8-A-5	1
2	19/04/2018	1	Peregrine_PE	1	16:31	In	590	60	90	150	290		2-8-A-6	1
2	19/04/2018	1	Peregrine_PE	1	16:31	Out	10				10		2-8-A-6	1

Winter Survey 2018/19 Bird Flightline Data

VP	Date	Observation No.	Species	Quantity	Start	In/Out	Duration	0-20 (s)	20-40 (s)	40-80 (s)	80-150 (s)	>150 (s)	Flightline Map	Flightline No.
3	08/01/2019	3	Common Gull_CM	2	11:27	In	9		9				2-8-B-1	1
3	08/01/2019	3	Common Gull_CM	2	11:27	Out	10		10				2-8-B-1	1
2	18/12/2018	1	Golden Plover_GP	35	10:40	In	25			15	10		2-8-B-2	10
2	18/12/2018	2	Golden Plover_GP	10	11:21	In	120				120		2-8-B-2	11
1	29/03/2019	-	Golden Plover_GP	-	09:26	In	Heard only						-	-
1	20/12/2018	2	Golden Plover_GP	30	15:33	In	25	18	7				2-8-B-2	1
1	15/02/2019	1	Golden Plover_GP	12	10:05	In	25	5	5	10	5		2-8-B-2	2
1	04/03/2019	1	Golden Plover_GP	28	12:03	In	300	100	50	50			2-8-B-2	3
1	04/03/2019	1	Golden Plover_GP	28	12:08	In	240	240					2-8-B-2	3
1	04/03/2019	2	Golden Plover_GP	20	12:12	In	10	10					2-8-B-2	4
1	04/03/2019	2	Golden Plover_GP	20	12:12	In	1,680	1,680					2-8-B-2	4
1	04/03/2019	1	Golden Plover_GP	28	12:12	In	1,680	1680					2-8-B-2	5
1	04/03/2019	3	Golden Plover_GP	20	12:40	In	5	5					2-8-B-2	6
1	04/03/2019	3	Golden Plover_GP	48	12:40	In	5	5					2-8-B-2	6
1	04/03/2019	4	Golden Plover_GP	48	13:12	In	25	20	5				2-8-B-2	7
1	04/03/2019	5	Golden Plover_GP	48	13:13	In	35	5	5	5	15	5	2-8-B-2	8
1	04/03/2019	5	Golden Plover_GP	48	13:13	Out	5	5					2-8-B-2	8
1	04/03/2019	6	Golden Plover_GP	48	13:29	In	20	5	5	10			2-8-B-2	9
1	04/03/2019	6	Golden Plover_GP	48	13:29	Out	40			5	5	25	2-8-B-2	9
2	14/02/2019	-	Golden Plover_GP	-	12:00	In	Heard only						-	-
2	16/01/2019	1	Grey Plover_GV	30	09:59	In	28	2		16	10		2-8-B-3	1
2	16/01/2019	1	Grey Plover_GV	30	09:59	Out	2		2				2-8-B-3	1
2	17/10/2018	1	Hen Harrier_HH	1	13:59	In	5		20					1
3	11/10/2018	1	Hen Harrier_HH	1	14:15	In	20		5					2
2	16/01/2019	2	Hen Harrier_HH	1	10:07	In	5		5					3
1	26/09/2018	1	Kestrel_K.	1	13:46	In	7	7					2-8-A-3	10
1	26/09/2018	2	Kestrel_K.	1	14:28	In	11	11					2-8-A-3	11

VP	Date	Observation No.	Species	Quantity	Start	In/Out	Duration	0-20 (s)	20-40 (s)	40-80 (s)	80-150 (s)	>150 (s)	Flightline Map	Flightline No.
1	26/09/2018	3	Kestrel_K.	1	14:29	In	12	12					2-8-A-3	12
1	18/10/2018	1	Kestrel_K.	1	14:02	In	150	50	120				2-8-B-5	1
1	18/10/2018	2	Kestrel_K.	1	14:14	In	480	96	384				2-8-B-5	2
3	11/10/2018	2	Kestrel_K.	1	15:58	In	289		5				2-8-B-5	3
3	15/11/2018	1	Kestrel_K.	1	12:24	Out	5			25			2-8-B-5	4
3	12/02/2019	2	Kestrel_K.	1	13:13	In	25	25					2-8-B-5	5
3	05/03/2019	1	Kestrel_K.	1	09:49	In	5	5					2-8-B-5	6
2	16/11/2018	1	Snipe_SN	1	09:05	In	5	5					2-8-B-8	4
1	20/12/2018	1	Snipe_SN	1	10:18	In	2	2					2-8-B-8	1
1	17/01/2019	1	Snipe_SN	1	13:20	In	3	3					2-8-B-8	2
2	18/12/2018	3	White-tailed Eagle_WE	1	13:32	In	45	5	35	5			2-8-B-9	1
2	18/12/2018	3	White-tailed Eagle_WE	1	13:32	Out	15	10	5				2-8-B-9	1

APPENDIX 7.7:

ADDITIONAL BIRD SURVEY DATA, 2018 - 2019

Hinterland Survey Data 2018/19

Site	Location	Date	Observer	Start Time	Cloud	Visibility	Rain	Wind	Species	Species Quantity
Inchamore	Inchigeelagh	04/02/2019	LM	09:40	1/8	Excellent	None	F0-1 SW	Mute Swan	2
Inchamore	Inchigeelagh	04/02/2019	LM	09:40	1/8	Excellent	None	F0-1 SW	Little Egret	1
Inchamore	Inchigeelagh	04/02/2019	LM	09:40	1/8	Excellent	None	F0-1 SW	Moor Hen	1
Inchamore	Inchigeelagh	04/02/2019	LM	09:40	1/8	Excellent	None	F0-1 SW	Mallard	1
Inchamore	Lee Valley	04/02/2019	LM	09:40	1/8	Excellent	None	F0-1 SW	Mute Swan	11
Inchamore	Lee Valley	04/02/2019	LM	09:40	1/8	Excellent	None	F0-1 SW	Whooper Swan	69
Inchamore	Lee Valley	04/02/2019	LM	09:40	1/8	Excellent	None	F0-1 SW	Greylag Goose	46
Inchamore	Lough Allua	04/02/2019	LM	09:40	1/8	Excellent	None	F0-1 SW	Mute Swan	2
Inchamore	Lough Allua	04/02/2019	LM	09:40	1/8	Excellent	None	F0-1 SW	Whooper Swan	10
Inchamore	Lough Allua	04/02/2019	LM	09:40	1/8	Excellent	None	F0-1 SW	Cormorant	5
Inchamore	Lough Allua	04/02/2019	LM	09:40	1/8	Excellent	None	F0-1 SW	Mallard	5
Inchamore	Gearagh	01/02/2019	LM + JD	14:30	4/8	Good	Light rain	F2	Teal	24
Inchamore	Gearagh	01/02/2019	LM + JD	14:30	4/8	Good	Light rain	F2	Long-tailed tit	1
Inchamore	Gearagh	01/02/2019	LM + JD	14:30	4/8	Good	Light rain	F2	Wigeon	12
Inchamore	Gearagh	01/02/2019	LM + JD	14:30	4/8	Good	Light rain	F2	Greylag Goose	1
Inchamore	Gearagh	01/02/2019	LM + JD	14:30	4/8	Good	Light rain	F2	Mute Swan	1
Inchamore	Gearagh	01/02/2019	LM + JD	14:30	4/8	Good	Light rain	F2	Gull sp.	1
Inchamore	Gearagh	01/02/2019	LM + JD	14:30	4/8	Good	Light rain	F2	Mallard	2
Inchamore	Gearagh	01/02/2019	LM + JD	14:30	4/8	Good	Light rain	F2	Snipe	1
Inchamore	Gearagh	01/02/2019	LM + JD	14:30	4/8	Good	Light rain	F2	Grey Herron	1
Inchamore	Gearagh	01/02/2019	LM + JD	14:30	4/8	Good	Light rain	F2	Cormorant	1

Site	Location	Date	Observer	Start Time	Cloud	Visibility	Rain	Wind	Species	Species Quantity
Inchamore	Sillahtane WFE	04/02/2019	LM	10:40	1/8	Excellent	None	F0-1 SW	N/A	-
Inchamore	Lough Nabuddoga	04/02/2019	LM	10:40	1/8	Excellent	None	F0-1 SW	N/A	-
Inchamore	Sillahtane WFE	15/02/2019	LM	11:35	8/8	Excellent	None	F3 S	Snipe	1
Inchamore	Lough Allua	15/02/2019	LM	11:35	8/8	Excellent	None	F3 S	Cormorant	1
Inchamore	Lough Allua	15/02/2019	LM	11:35	8/8	Excellent	None	F3 S	Mute Swan	2
Inchamore	Lough Allua	15/02/2019	LM	11:35	8/8	Excellent	None	F3 S	Mallard	4
Inchamore	Lough Allua	15/02/2019	LM	11:35	8/8	Excellent	None	F3 S	Whooper Swan	10
Inchamore	Inchigeelagh	15/02/2019	LM	11:35	8/8	Excellent	None	F3 S	Mallard	1
Inchamore	Inchigeelagh	15/02/2019	LM	11:35	8/8	Excellent	None	F3 S	Moor Hen	1
Inchamore	Lee Valley	15/02/2019	LM	11:35	8/8	Excellent	None	F3 S	Mute Swan	25
Inchamore	Lee Valley	15/02/2019	LM	11:35	8/8	Excellent	None	F3 S	Whooper Swan	55
Inchamore	Lee Valley	15/02/2019	LM	11:35	8/8	Excellent	None	F3 S	Greylag Goose	22
Inchamore	Gearagh	15/02/2019	LM	11:35	8/8	Excellent	None	F3 S	Whooper Swan	2
Inchamore	Gearagh	15/02/2019	LM	11:35	8/8	Excellent	None	F3 S	Mallard	11
Inchamore	Gearagh	15/02/2019	LM	11:35	8/8	Excellent	None	F3 S	Mute Swan	3
Inchamore	Gearagh	15/02/2019	LM	11:35	8/8	Excellent	None	F3 S	Cormorant	2
Inchamore	Gearagh	15/02/2019	LM	11:35	8/8	Excellent	None	F3 S	Black-headed Gull	6
Inchamore	Gearagh	06/03/2019	LM	10:44	8/8	OK	Light rain	F3	Cormorant	5
Inchamore	Gearagh	06/03/2019	LM	10:44	8/8	OK	Light rain	F3	Mallard	17
Inchamore	Gearagh	06/03/2019	LM	10:44	8/8	OK	Light rain	F3	Great Black-backed Gull	2
Inchamore	Gearagh	06/03/2019	LM	10:44	8/8	OK	Light rain	F3	Teal	37
Inchamore	Gearagh	06/03/2019	LM	10:44	8/8	OK	Light rain	F3	Golden Plover	1
Inchamore	Gearagh	06/03/2019	LM	10:44	8/8	OK	Light rain	F3	Swan Sp. (too far)	1
Inchamore	Gearagh	06/03/2019	LM	10:44	8/8	OK	Light rain	F3	Grey Herron	5
Inchamore	Gearagh	06/03/2019	LM	10:44	8/8	OK	Light rain	F3	Grey wagtail	2
Inchamore	Gearagh	06/03/2019	LM	10:44	8/8	OK	Light rain	F3	Sparrowhawk	1
Inchamore	Gearagh	06/03/2019	LM	10:44	8/8	OK	Light rain	F3	Starling	30
Inchamore	Gearagh	06/03/2019	LM	10:44	8/8	OK	Light rain	F3	Whooper Swan	18

Site	Location	Date	Observer	Start Time	Cloud	Visibility	Rain	Wind	Species	Species Quantity
Inchamore	Gearagh	06/03/2019	LM	10:44	8/8	OK	Light rain	F3	Greylag Goose	19
Inchamore	Lee Valley	06/03/2019	LM	10:44	8/8	OK	Light rain	F3	Mute Swan	2
Inchamore	Lee Valley	06/03/2019	LM	10:44	8/8	OK	Light rain	F3	Black-headed Gull	50
Inchamore	Lee Valley	06/03/2019	LM	10:44	8/8	OK	Light rain	F3	Whooper Swan	64
Inchamore	Lee Valley	06/03/2019	LM	10:44	8/8	OK	Light rain	F3	Grey Herron	1
Inchamore	Lough Allua	06/03/2019	LM	10:44	8/8	OK	Light rain	F3	Mallard	12
Inchamore	Lough Allua	06/03/2019	LM	10:44	8/8	OK	Light rain	F3	Whooper Swan	5
Inchamore	Lough Allua	06/03/2019	LM	10:44	8/8	OK	Light rain	F3	Teal	3
Inchamore	Lough Allua	06/03/2019	LM	10:44	8/8	OK	Light rain	F3	Cormorant	3
Inchamore	Lough Allua	06/03/2019	LM	10:44	8/8	OK	Light rain	F3	Grey Herron	2
Inchamore	Sillahtane WFE	06/03/2019	LM	10:44	8/8	OK	Light rain	F3	N/A	-
Inchamore	Sillahtane WFE	26/04/2018	JA	-	0/8	Good	None	F2	N/A	-
Inchamore	Lough Nabuddoga	26/04/2018	JA	-	0/8	Good	None	F2	N/A	-
Inchamore	Grousmont	26/04/2018	JA	-	0/8	Good	None	F2	N/A	-
Inchamore	Sillahtane WFE	24th May 2018	JA	-	0/8	Good	None	F1	WE	1
Inchamore	Lough Nabuddoga	24th May 2018	JA	-	0/8	Good	None	F3	N/A	-
Inchamore	Grousmont	24th May 2018	JA	-	0/8	Good	None	F3	N/A	-
Inchamore	Lough Allua	24th May 2018	JA	-	0/8	Good	None	F3	N/A	-
Inchamore	Inchigeelagh	24th May 2018	JA	-	0/8	Good	None	F3	N/A	-
Inchamore	Gearagh	24th May 2018	JA	-	0/8	Good	None	F3	N/A	-
Inchamore	Sillahtane WFE	10/05/2018	JA	-	0/8	Good	None	F3	WE	1
Inchamore	Sillahtane WFE	10/05/2018	JA	-	0/8	Good	None	F3	WE	1
Inchamore	Lough Nabuddoga	10/05/2018	JA	-	0/8	Good	None	F3	N/A	-
Inchamore	Grousmont	10/05/2018	JA	-	0/8	Good	None	F3	N/A	-
Inchamore	Lough Allua	10/05/2018	JA	-	0/8	Good	None	F3	N/A	-
Inchamore	Inchigeelagh	10/05/2018	JA	-	0/8	Good	None	F3	N/A	-
Inchamore	Gearagh	10/05/2018	JA	-	0/8	Good	None	F3	N/A	-
Inchamore	Sillahtane WFE	22/08/2018	JA	-	5/8	OK	Light	F3	WE	1

Site	Location	Date	Observer	Start Time	Cloud	Visibility	Rain	Wind	Species	Species Quantity
Inchamore	Lough Nabuddoga	22/08/2018	JA	-	5/8-	OK	Slight	F3	N/A	-
Inchamore	Grousmont	22/08/2018	JA	-	5/8-	OK	Slight	F3	N/A	-
Inchamore	Lough Allua	22/08/2018	JA	-	5/8-	OK	Slight	F3	N/A	-
Inchamore	Inchigeelagh	22/08/2018	JA	-	5/8-	OK	Slight	F3	N/A	-
Inchamore	Gearagh	22/08/2018	JA	-	5/8-	OK	Slight	F3	N/A	-
Inchamore	Sillahtane WFE	13/09/2018	JA	-	0/8	Good	None	F2	WE	1
Inchamore	Lough Nabuddoga	13/09/2018	JA	-	0/8	Good	None	F2	N/A	-
Inchamore	Grousmont	13/09/2018	JA	-	0/8	Good	None	F2	N/A	-
Inchamore	Lough Allua	13/09/2018	JA	-	0/8	Good	None	F2	N/A	-
Inchamore	Inchigeelagh	13/09/2018	JA	-	0/8	Good	None	F2	N/A	-
Inchamore	Gearagh	13/09/2018	JA	-	0/8	Good	None	F2	N/A	-
Inchamore	Sillahtane WFE	11/07/2018	JA	-	1/8	Good	None	F2	WE	1
Inchamore	Lough Nabuddoga	11/07/2018	JA	-	1/8	Good	None	F2	N/A	-
Inchamore	Grousmont	11/07/2018	JA	-	1/8	Good	None	F2	N/A	-
Inchamore	Lough Allua	11/07/2018	JA	-	1/8	Good	None	F2	N/A	-
Inchamore	Inchigeelagh	11/07/2018	JA	-	1/8	Good	None	F2	N/A	-
Inchamore	Gearagh	11/07/2018	JA	-	1/8	Good	None	F2	N/A	
Inchamore	Gearagh	26/11/2018	JA	-	8/8	Good-excellent	Occasional shower	F4-5 SE	Teal	8
Inchamore	Lee Valley	26/11/2018	JA	-	8/8	Good-excellent	Occasional shower	F4-5 SE	Whooper Swan	21
Inchamore	Coolea town	26/11/2018	JA	-	8/8	Good-excellent	Occasional shower	F4-5 SE	mallard	7
Inchamore	Gearagh	18/10/2018	JA	-	8/8	Excellent	None	F1-2 SW	Little Egret	3
Inchamore	Gearagh	18/10/2018	JA	-	8/8	Excellent	None	F1-2 SW	Lapwing	188
Inchamore	Gearagh	18/10/2018	JA	-	8/8	Excellent	None	F1-2 SW	Grey Heron	4
Inchamore	Gearagh	18/10/2018	JA	-	8/8	Excellent	None	F1-2 SW	Mute swan	4

Site	Location	Date	Observer	Start Time	Cloud	Visibility	Rain	Wind	Species	Species Quantity
Inchamore	Gearagh	18/10/2018	JA	-	8/8	Excellent	None	F1-2 SW	Cormorant	4
Inchamore	Gearagh	18/10/2018	JA	-	8/8	Excellent	None	F1-2 SW	Teal	87
Inchamore	Gearagh	18/10/2018	JA	-	8/8	Excellent	None	F1-2 SW	Coot	1
Inchamore	Gearagh	18/10/2018	JA	-	8/8	Excellent	None	F1-2 SW	Kingfisher	2
Inchamore	Gearagh	18/10/2018	JA	-	8/8	Excellent	None	F1-2 SW	Lesser black-backed Gull	9
Inchamore	Gearagh	18/10/2018	JA	-	8/8	Excellent	None	F1-2 SW	Curlew	1
Inchamore	Gearagh	18/10/2018	JA	-	8/8	Excellent	None	F1-2 SW	Black-headed gull	13
Inchamore	Gearagh	18/10/2018	JA	-	8/8	Excellent	None	F1-2 SW	Snipe	1
Inchamore	Gearagh	18/10/2018	JA	-	8/8	Excellent	None	F1-2 SW	mallard	4
Inchamore	Ballyvorney	18/10/2018	JA	-	8/8	Excellent	None	F1-2 SW	N/A Chough	-
Inchamore	Ballyvorney	26/11/2018	JA	-	8/8	Good-excellent	occasional shower	F4-5 SE	N/A Chough	-
Inchamore	Ballyvorney	26/04/2018	JA	-	8/8	Good-excellent	occasional shower	F4-5 SE	N/A Chough	-

Merlin Survey Data 2018

Site	Location Transect/ Square No.	Date	Observer	Start Time	Cloud	Visibility	Rain	Wind	Merlin	General Notes
Inchamore	13047/ 78511	28/04/2018	KW	06:30	0/8	Good	Dry	F2	No	Tree felling in progress
Inchamore	13176/ 78927	28/04/2018	KW	06:30	0/8	Good	Dry	F2	No	
Inchamore	13488/ 78865	28/04/2018	KW	06:30	0/8	Good	Dry	F2	No	
Inchamore	13505/ 788345	28/04/2018	KW	06:30	0/8	Good	Dry	F2	No	
Inchamore	13047/ 78511	11/05/2018	KW	06:30	0/8	Good	N/A	F3	No	
Inchamore	13176/ 78927	11/05/2018	KW	06:30	0/8	Good	N/A	F3	No	
Inchamore	13488/ 78865	11/05/2018	KW	06:30	0/8	Good	N/A	F3	No	
Inchamore	13505/ 788345	11/05/2018	KW	06:30	0/8	Good	N/A	F3	No	
Inchamore	13047/ 78511	21/06/2018	KW	08:15	0/8	Good	Dry	F2	No	
Inchamore	13176/ 78927	21/06/2018	KW	08:15	0/8	Good	Dry	F2	No	
Inchamore	13488/ 78865	21/06/2018	KW	08:15	0/8	Good	Dry	F2	No	
Inchamore	13505/ 788345	21/06/2018	KW	08:15	0/8	Good	Dry	F2	No	
Inchamore	13047/ 78511	07/08/2018	KW	08:15	3/8	Good	Dry	F3	No	
Inchamore	13176/ 78927	07/08/2018	KW	08:15	3/8	Good	Dry	F3	No	
Inchamore	13488/ 78865	07/08/2018	KW	08:15	3/8	Good	Dry	F3	No	
Inchamore	13505/ 788345	07/08/2018	KW	08:15	3/8	Good	Dry	F3	No	

Red Grouse Survey Data 2019

Transect No.	Grid Coordinates	Date	Start Time	Record number	Record Type	Transect # of record	Record details (Sex, ad/juv, behav, colour, pellet, old?)	Habitat (H%, hab, landuse, grid, damp, alt)	Non-grouse records
W1278	T1a, T1b, T2a, T2b	25/02/2019	12:00	1	Feathers	T1b	Feather blew away before collected	70%, raised bog, Stones around, wet, 410m ASL	S. flying and singing, Rn present
W1278	T1a, T1b, T2a, T2b	25/02/2019	12:00	2	Sighting	T1b	Unsexed adult, flying not calling, medium darkness	70%, raised bog, Stones around, wet, 440m ASL	S. flying and singing, Rn present
W1278	T1a, T1b, T2a, T2b	25/02/2019	12:00	3	Sighting	T1a	Male adult, flying not calling, medium darkness	70%, raised bog, Stones around, wet, 450m ASL	S. flying and singing, Rn present
W1278	T1a, T1b, T2a, T2b	25/02/2019	12:00	4	Sighting	T1b	Unsexed adult, flying not calling	70%, raised bog, Stones around, wet, 440m ASL	S. flying and singing, Rn present
W1278	T1a, T1b, T2a, T2b	25/02/2019	12:00	5	Call	T1a	-	70%, raised bog, Stones around, wet, 410m ASL	S. flying and singing, Rn present

APPENDIX 7.8:

VP SUMMER 2020 - SURVEY DETAILS

VP Summer 2020/21 - Survey Details

VP no.	Date	Start Time	End Time	Cloud	Visibility	Rain	Wind
1	06/06/2020	09:15	15:15	7\8	Good	Showers	F3
2	07/06/2020	11:20	17:20	6\8	Very Good	Dry	F3-4
2	29/08/2020	09:30	15:30	6\8	Very Good	Dry	F2
1	30/08/2020	11:10	17:10	7\8	Very Good	Dry	F 1-2
3	07/08/2020	11:00	17:00	5\8	Good	Dry	F2 W
3	28/05/2020	12:30	18:30	2\8	Very Good	Dry	F4 SE

APPENDIX 7.9:

VP WINTER 2020/21 - SURVEY DETAILS

VP Winter 2020/21 - Survey Details

VP no.	Date	Start Time	End Time	Cloud	Visibility	Rain	Wind
1	30/10/2020	10:15	16:15	8/8	good	dry	f2 SW
2	27/10/2020	10:30	16:30	5/8-8/8	good	showers	f4 W
3	09/10/2020	10:25	16:25	8/8	good	showers	f4 W
3	09/12/2020	08:42	12:42	8/8	3-5KM	Shower	F2-3 S
2	11/12/2020	09:04	15:04	7/8	Excellent	Dry - rain last hour	F4 SW
1	07/12/2020	09:32	15:32	3/8	low cloud cleared	None	F3 N
1	26/02/2021	10:24	16:24	8/8	Excellent	None	F4 SW
2	28/02/2021	11:11	17:11	3/8	Excellent	None	F2-4E
3	04/02/2021	10:15	16:15	8/8	frequent showers	good	f2 SW

APPENDIX 7.10:

BIRD SURVEY VP FLIGHT LINE DATA, SUMMER 2020 & WINTER 20/21

2020/21 Bird Flightline Data

VP no.	Date	Mapnote / Flightline No.	Common Name	Species Quantity	Sex	Time of Obs.	SNH Buffer (In/Out)	Total Duration (s)	0-10 m (s)	10-20 m (s)	20-30 m (s)	30-50 m (s)	50-100 m (s)	100-185 m (s)	>185 m (s)	Bird Notes
1	30/08/2020	1	Lesser Black-backed Gull	3		12:12	In	350					250	100		
1	30/08/2020	2	Lesser Black-backed Gull	6		13:42	Out	300					100	200		
1	26/02/2021	3	Golden Plover	1		10:58	In	12			12					Flying over heath bog
1	26/02/2021	4	Golden Plover	25		12:50	In	20	20							Flying over heath bog
1	26/02/2021	5	Buzzard	1		15:55	In	43	3	20	20					Flying over bog
2	29/08/2020	6	Kestrel	1		11:22	In	7 min	120	300						Flew out of view below brow of hill
2	28/02/2021	7	Buzzard	1		11:54	Out	46			20	26				Flying over heath bog
2	28/02/2021	8	Kestrel	1	Female/ imm	12:03	In	12	12							Hunting over heath bog
2	28/02/2021	9	Kestrel	1	Male	15:25	In	55		10	20	25				Hunting bog
2	28/02/2021	10	Peregrine	2	Pair	15:33	In	88					70	18		Pair interacting over site
2	28/02/2021	11	Buzzard	1		15:36	In	25					25			Flying over bog
3	28/05/2020	12	Sparrowhawk	1		13:40	Out	5	5							Flew out of view below brow of hill
3	28/05/2020	13	Kestrel	1		17:19	In	42			36	6				

VP no.	Date	Mapnote / Flightline No.	Common Name	Species Quantity	Sex	Time of Obs.	SNH Buffer (In/Out)	Total Duration (s)	0-10 m (s)	10-20 m (s)	20-30 m (s)	30-50 m (s)	50-100 m (s)	100-185 m (s)	>185 m (s)	Bird Notes
3	07/08/2020	14	Kestrel	1		13:03	Out	165				165				hunting
3	07/08/2020	15	Kestrel	2		13:50	Out	248				248				Interacting
3	07/08/2020	16	Kestrel	1		14:08	In	5	1	2	2					Stooping for prey
3	09/10/220	17	Kestrel	1		11:43	Out	56	56							hunting and perched
3	09/10/2020	18	Kestrel	1		14:28	Out	64				14	50			hunting
3	09/10/2020	19	Kestrel	1		16:15	Out	48					48			hunting
3	09/12/2020	22	Kestrel	1		09:09	Out	13			13					Commuting
3	04/02/2021	24	Sparrowhawk	1	Female	10:56	Out	5	5							hunting flight

APPENDIX 7.11:

HINTERLAND SURVEY DATA, 2020/2021

Hinterland Survey Data Summer 2020

Date	Site	Common Name	Quantity
28/05/2020	Gearagh	Great Crested Grebe	28
28/05/2020	Gearagh	Greylag Goose	6
28/05/2020	Lee Valley	NA	
28/05/2020	Inchigeelagh	Grey wagtail	4
28/05/2020	Inchigeelagh	Swift	1
28/05/2020	Inchigeelagh	Sand Martin	1
28/05/2020	Inchigeelagh	House Martin	1
28/05/2020	Lough Allua	Mute Swan	1
28/05/2020	Lough Allua	Jay	1
28/05/2020	Lough Allua	Lesser Black-backed Gul	1
28/05/2020	Gougane Barra	Cormorant	1
28/05/2020	Sillahertane	Lesser Black-backed Gul	28
28/05/2020	Grousemount	NA	
28/05/2020	Lough Nabuddoga	Lesser Black-backed Gul	1
28/05/2020	North Kilgarvan	NA	
28/05/2020	Ballyvourney North	Peregrine	1
09/06/2020	Gearagh	Great Crested Grebe	11
09/06/2020	Gearagh	Mallard	26
09/06/2020	Gearagh	Mute Swan	7
09/06/2020	Gearagh	Stonechat	1
09/06/2020	Gearagh	Grey wagtail	2
09/06/2020	Lee Valley	Sand Martin	20
09/06/2020	Lee Valley	Spotted Flycatcher	2
09/06/2020	Lough Allua	Mute Swan	2
09/06/2020	Lough Allua	Cormorant	3
09/06/2020	Lough Allua	Mallard	1
09/06/2020	Lough Allua	Grey Heron	1
09/06/2020	Lough Allua	Lesser Black-backed Gul	1
09/06/2020	Lough Allua	Moorhen	1
09/06/2020	Gougane Barra	Cuckoo	1
09/06/2020	Gougane Barra	Kestrel	1
09/06/2020	Sillahertane	NA	
09/06/2020	Grousemount	Kestrel	1
09/06/2020	Lough Nabuddoga	NA	
09/06/2020	Kilgarvan North	NA	
09/06/2020	Ballyvourney North	NA	
30/06/2020	Gearagh	Great Crested Grebe	13

Date	Site	Common Name	Quantity
30/06/2020	Gearagh	Coot	2
30/06/2020	Gearagh	Moorhen	6
30/06/2020	Gearagh	Mute Swan	52
30/06/2020	Gearagh	Whooper Swan	1
30/06/2020	Gearagh	Snipe	1
30/06/2020	Gearagh	Mallard	6
30/06/2020	Lee Valley	Mallard	5
30/06/2020	Lee Valley	Grey wagtail	2
30/06/2020	Inchigeelagh	House Martin	
30/06/2020	Inchigeelagh	SM	10
30/06/2020	Inchigeelagh	Heron	1
30/06/2020	Lough Allua	Heron	5
30/06/2020	Lough Allua	Lesser Black-backed Gul	1
30/06/2020	Lough Allua	Stonechat	1
30/06/2020	Lough Allua	Mallard	3
30/06/2020	Lough Allua	Cormorant	3
30/06/2020	Gougane Barra	Sandpiper	2
30/06/2020	Gougane Barra	Greater Black-backed Gull	
30/06/2020	Gougane Barra	Lesser Black-backed Gul	
30/06/2020	Gougane Barra	Jay	4
30/06/2020	Sillahertane	NA	
30/06/2020	Grousemount	NA	
30/06/2020	Roughty River	Common Sandpiper	
30/06/2020	Roughty River	Sandmartin	
30/06/2020	Lough Nabuddoga	Mallard	2
30/06/2020	Ballyvourney North	NA	
22/07/2020	Gearagh	Great Crested Grebe	12
22/07/2020	Lee Valley	Mallard	6
22/07/2020	Lee Valley	Grey Heron	1
22/07/2020	Inchigeelagh	Common Sandpiper	2
22/07/2020	Inchigeelagh	Greywagtail	1
22/07/2020	Inchigeelagh	Spotted Flycatcher	3
22/07/2020	Inchigeelagh	Dipper	1
22/07/2020	Inchigeelagh	Moorhen	1
22/07/2020	Lough Allua	Sparrowhawk	1
22/07/2020	Lough Allua	Cormorant	2
22/07/2020	Lough Allua	Lesser Black-backed Gul	1
22/07/2020	Gougane Barra	Kestrel	1

Date	Site	Common Name	Quantity
22/07/2020	Gougane Barra	Moorhen	1
22/07/2020	Gougane Barra	Stonechat	1
22/07/2020	Gougane Barra	Grey Heron	1
22/07/2020	Sillahertane	Sparrowhawk	1
22/07/2020	Sillahertane	Kestrel	1
22/07/2020	Grousemount	NA	
22/07/2020	Lough Nabuddoga	Sparrowhawk	2
22/07/2020	Ballyvourney North	Kestrel	1
22/07/2020	Ballyvourney North	Swifts	2
26/08/2020	Gearagh	Shag	1
26/08/2020	Gearagh	Ruff	1
26/08/2020	Gearagh	Dunlin	2
26/08/2020	Gearagh	Ringed Plover	4
26/08/2020	Gearagh	Greylag Goose	17
26/08/2020	Gearagh	Teal	27
26/08/2020	Gearagh	Mallard	43
26/08/2020	Gearagh	Little egret	6
26/08/2020	Gearagh	Great Crested Grebe	21
26/08/2020	Gearagh	Heron	2
26/08/2020	Ballyvourney North	NA	
26/08/2020	Lough Nabuddoga	NA	
26/08/2020	Grousemount	NA	
26/08/2020	Sillahertane	NA	
26/08/2020	Gougane Barra	Cormorant	1
26/08/2020	Lough Allua	Mute Swan	2
26/08/2020	Lough Allua	Great Black-backed Gull	1
26/08/2020	Inchigeelagh	NA	
26/08/2020	Lee Valley	NA	

Hinterland Survey Data Winter 2020/21

Date	Site	Common Name	Quantity
20/10/2020	Gearagh	Great White Egret	1
20/10/2020	Gearagh	Wigeon	39
20/10/2020	Gearagh	Teal	268
20/10/2020	Gearagh	Long-eared Owl	26
20/10/2020	Gearagh	Cormorant	6
20/10/2020	Gearagh	Grey Heron	2
20/10/2020	Gearagh	Lesser Black-backed Gull	132
20/10/2020	Gearagh	Black-headed Gull	69
20/10/2020	Gearagh	Great Crested Grebe	2
20/10/2020	Gearagh	Mallard	4
20/10/2020	Gearagh	Curlew	44
20/10/2020	Gearagh	Lapwing	61
20/10/2020	Gearagh	Dunlin	1
20/10/2020	Toon valley/Killeens	White-fronted Goose (Greenland)	1
20/10/2020	Toon valley/Killeens	Pink-footed Goose	1
20/10/2020	Toon valley/Killeens	Barnacle Goose	1
20/10/2020	Toon valley/Killeens	Greylag Goose	112
20/10/2020	Toon valley/Killeens	Whooper Swan	21
20/10/2020	Toon valley/Killeens	Mallard	21
20/10/2020	Toon valley/Killeens	Black-headed Gull	88
20/10/2020	Toon valley/Killeens	Grey Heron	1
20/10/2020	Toon valley/Killeens	Teal	66
20/10/2020	Toon valley/Killeens	Lesser Black-backed Gull	120
20/10/2020	Toon valley/Killeens	Mute Swan	19
20/10/2020	Lee Valley	Kestrel	1
20/10/2020	Inchigeelagh	Mallard	2
20/10/2020	Lough Allua	Great Black-backed Gull	1
20/10/2020	Lough Allua	Mallard	8
20/10/2020	Lough Allua	Grey Wagtail	1
20/10/2020	Lough Allua	Mute Swan	2
20/10/2020	Lough Allua	Meadow Pipit	2
20/10/2020	Lough Allua	Pied/White Wagtail	1
20/10/2010	Lough Allua	Chaffinch	1
20/10/2020	Gougane Barra	Cormorant	1
20/10/2020	Gougane Barra	Grey Heron	1

Date	Site	Common Name	Quantity
20/10/2020	Grousemount	#N/A	1
20/10/2020	Sillahertane	Raven	1
20/10/2020	Sillahertane	Wren	1
20/10/2020	Lough Nabuddoga	Snipe	1
20/10/2020	Ballyvourney North	Woodpigeon	2
20/10/2020	Ballyvourney North	Hooded Crow	1
13/11/2020	Gearagh	Great White Egret	4
13/11/2020	Gearagh	Little Egret	12
13/11/2020	Gearagh	Wigeon	56
13/11/2020	Gearagh	Mallard	13
13/11/2020	Gearagh	Whooper swan	5
13/11/2020	Gearagh	Black headed gull	54
13/11/2020	Gearagh	Teal	8
13/11/2020	Gearagh	Curlew	3
13/11/2020	Gearagh	Grey Heron	6
13/11/2020	Gearagh	Greenland white-fronted goose	1
13/11/2020	Gearagh	Cormorant	1
13/11/2020	Gearagh	Mute swan	1
13/11/2020	Gearagh	Greylag geese	24
13/11/2020	Gearagh	Stonechat	1
13/11/2020	Gearagh	Redpoll	1
13/11/2020	Gearagh	Wren	1
13/11/2020	Gearagh	Reed Bunting	1
13/11/2020	Gearagh	Grey wagtail	1
13/11/2020	Gearagh	Magpie	1
13/11/2020	Gearagh	Hooded Crow	2
13/11/2020	Gearagh	Great crested grebe	1
13/11/2020	Gearagh	Rook	1
13/11/2020	Gearagh	Robin	1
13/11/2020	Toon valley/Killeens	Barnacle goose	1
13/11/2020	Toon valley/Killeens	White fronted goose	1
13/11/2020	Toon valley/Killeens	Pink footed goose	1
13/11/2020	Toon valley/Killeens	Whooper swan	37
13/11/2020	Toon valley/Killeens	Mute swan	1
13/11/2020	Toon valley/Killeens	Greylag geese	21
13/11/2020	Toon valley/Killeens	Lapwing	68
13/11/2020	Toon valley/Killeens	Little Egret	4

Date	Site	Common Name	Quantity
13/11/2020	Toon valley/Killeens	Fieldfare	11
13/11/2020	Toon valley/Killeens	Redwing	9
13/11/2020	Lee Valley	Long tailed tit	1
13/11/2020	Lee Valley	Great tit	1
13/11/2020	Lee Valley	Coal tit	1
13/11/2020	Lee Valley	Dunnock	1
13/11/2020	Lee Valley	Magpie	1
13/11/2020	Lee Valley	Grey Heron	1
13/11/2020	Lee Valley	Pied wagtail	1
13/11/2020	Inchigeelagh	jay	2
13/11/2020	Inchigeelagh	Blue tit	1
13/11/2020	Inchigeelagh	Chaffinch	1
13/11/2020	Inchigeelagh	Goldcrest	2
13/11/2020	Inchigeelagh	Jackdaw	2
13/11/2020	Inchigeelagh	Grey Heron	1
13/11/2020	Inchigeelagh	Pied wagtail	1
13/11/2020	Lough Allua	Whooper swan	5
13/11/2020	Lough Allua	Mute swan	2
13/11/2020	Lough Allua	Mallard	7
13/11/2020	Lough Allua	Teal	2
13/11/2020	Lough Allua	Little Egret	1
13/11/2020	Gougane Barra	Cormorant	1
13/11/2020	Sillahertane	Raven	3
13/11/2020	Sillahertane	Starling	1
13/11/2020	Grousemount	Raven	1
13/11/2020	Lough Nabuddoga	Merlin	1
13/11/2020	Lough Nabuddoga	Pheasant	1
13/11/2020	Ballyvourney North	Goldfinch	2
13/11/2020	Gortyrahilly		
05/12/2020	Gearagh	Curlew	26
05/12/2020	Gearagh	Buzzard	1
05/12/2020	Gearagh	Little Egret	2
05/12/2020	Gearagh	Black headed gull	2
05/12/2020	Gearagh	Teal	78
05/12/2020	Gearagh	Mallard	3
05/12/2020	Gearagh	Dunlin	119
05/12/2020	Gearagh	Lapwing	96

Date	Site	Common Name	Quantity
05/12/2020	Gearagh	Wigeon	56
05/12/2020	Gearagh	Grey Heron	1
05/12/2020	Gearagh	Hooded Crow	2
05/12/2020	Gearagh	Wood pigeon	3
05/12/2020	Gearagh	Rook	2
05/12/2020	Gearagh	Blackbird	6
05/12/2020	Gearagh	Robin	1
05/12/2020	Gearagh	Redwing	26
05/12/2020	Toon valley/Killeens	Whooper swan	59
05/12/2020	Toon valley/Killeens	White fronted goose	1
05/12/2020	Toon valley/Killeens	Pink footed goose	1
05/12/2020	Toon valley/Killeens	Barnacle goose	1
05/12/2020	Toon valley/Killeens	Mute swan	24
05/12/2020	Toon valley/Killeens	Greylag geese	111
05/12/2020	Toon valley/Killeens	Grey Heron	1
05/12/2020	Lee Valley	Mute swan	2
05/12/2020	Lee Valley	Fieldfare	3
05/12/2020	Lee Valley	Coal tit	1
05/12/2020	Lee Valley	Jackdaw	2
05/12/2020	Lee Valley	Blue tit	1
05/12/2020	Lough Allua	Mute swan	2
05/12/2020	Lough Allua	Chaffinch	10
05/12/2020	Gougane Barra	jay	1
05/12/2020	Gougane Barra	Goldfinch	2
05/12/2020	Gougane Barra	Sparrowhawk	1
05/12/2020	Sillahertane	Coal tit	1
05/12/2020	Sillahertane	Chaffinch	1
05/12/2020	Sillahertane	Wren	1
05/12/2020	Grousemount	Raven	1
05/12/2020	Lough Nabuddoga	Song Thrush	1
05/12/2020	Lough Nabuddoga	Raven	1
05/12/2020	Ballyvourney North	Magpie	1
05/12/2020	Ballyvourney North	Song Thrush	1
05/12/2020	Gortyrahilly	Hen Harrier	1
08/01/2021	Gearagh	Goosander	1
08/01/2021	Gearagh	Golden Plover	4
08/01/2021	Gearagh	Cormorant	8

Date	Site	Common Name	Quantity
08/01/2020	Gearagh	Lesser black backed gull	1
08/01/2021	Gearagh	Wigeon	72
08/01/2021	Gearagh	Curlew	18
08/01/2021	Gearagh	Lapwing	89
08/01/2021	Gearagh	Great crested grebe	1
08/01/2021	Gearagh	Black headed gull	40
08/01/2021	Gearagh	Little Egret	3
08/01/2021	Gearagh	Great White Egret	3
08/01/2021	Gearagh	Dunlin	118
08/01/2021	Gearagh	Teal	88
08/01/2021	Gearagh	Grey Heron	10
08/01/2021	Gearagh	Mallard	9
08/01/2021	Gearagh	Grey wagtail	1
08/01/2021	Toon valley/Killeens	Whooper swan	91
08/01/2021	Toon valley/Killeens	Mute swan	36
08/01/2021	Toon valley/Killeens	Greylag geese	78
08/01/2021	Toon valley/Killeens	Barnacle goose	1
08/01/2021	Toon valley/Killeens	White fronted goose	1
08/01/2021	Toon valley/Killeens	Pink footed goose	1
08/01/2021	Lee Valley	Goldcrest	1
08/01/2021	Lee Valley	Blue tit	1
08/01/2021	Lee Valley	Jackdaw	2
08/01/2021	Inchigeelagh	Mute swan	2
08/01/2021	Inchigeelagh	Mallard	2
08/01/2021	Inchigeelagh	Dipper	1
08/01/2021	Inchigeelagh	Magpie	1
08/01/2021	Inchigeelagh	Robin	1
08/01/2021	Lough Allua	Grey Heron	2
08/01/2021	Lough Allua	Redwing	26
08/01/2021	Lough Allua	Fieldfare	1
08/01/2021	Lough Allua	Blackbird	1
08/01/2021	Lough Allua	Dunnock	1
08/01/2021	Lough Allua	Goldcrest	1
08/01/2021	Lough Allua	Teal	8
08/01/2021	Lough Allua	Mallard	2
08/01/2021	Lough Allua	Mute swan	2
08/01/2021	Lough Allua	Grey wagtail	1

Date	Site	Common Name	Quantity
08/01/2021	Lough Allua	Cormorant	
08/01/2021	Lough Allua	Rook	1
08/01/2021	Gougane Barra	Sparrowhawk	1
08/01/2021	Gougane Barra	Great tit	1
08/01/2021	Gougane Barra	Little Grebe	1
08/01/2021	Gougane Barra	Mistle Thrush	1
08/01/2021	Sillahertane	Meadow Pipit	1
08/01/2021	Sillahertane	Chaffinch	1
08/01/2021	Grousemount	Raven	9
08/01/2021	Lough Nabuddoga	Raven	2
08/01/2021	Ballyvourney North	Meadow Pipit	1
08/01/2021	Ballyvourney North	Hooded Crow	1
08/01/2021	Ballyvourney North	Wood pigeon	1
08/01/2021	Gortyrahilly	Peregrine	1
08/01/2021	Gortyrahilly		
02/02/2021	Gearagh	Great crested grebe	3
02/02/2021	Gearagh	Black headed gull	45
02/02/2021	Gearagh	Dunlin	119
02/02/2021	Gearagh	Lapwing	66
02/02/2021	Gearagh	Curlew	61
02/02/2021	Gearagh	Wigeon	75
02/02/2021	Gearagh	Teal	52
02/02/2021	Gearagh	Mallard	2
02/02/2021	Gearagh	Goosander	1
02/02/2021	Gearagh	Snipe	1
02/02/2021	Gearagh	Lesser black backed gull	1
02/02/2021	Gearagh	Great White Egret	1
02/02/2021	Gearagh	Little Egret	3
02/02/2021	Toon valley/Killeens	Cormorant	2
02/02/2021	Toon valley/Killeens	Mute swan	24
02/02/2021	Toon valley/Killeens	Whooper swan	68
02/02/2021	Toon valley/Killeens	Mallard	16
02/02/2021	Toon valley/Killeens	Greylag geese	14
02/02/2021	Toon valley/Killeens	Lapwing	28
02/02/2021	Toon valley/Killeens	Little Egret	2
02/02/2021	Lee Valley	Dunnock	1
02/02/2021	Lee Valley	Jackdaw	2

Date	Site	Common Name	Quantity
02/02/2021	Lee Valley	Magpie	1
02/02/2021	Inchigeelagh	Mistle Thrush	1
02/02/2021	Inchigeelagh	Mistle Thrush	1
02/02/2021	Inchigeelagh	Robin	1
02/02/2021	Lough Allua	Mute swan	4
02/02/2021	Lough Allua	jay	2
02/02/2021	Lough Allua	Whooper swan	8
02/02/2021	Lough Allua	Curlew	1
02/02/2021	Lough Allua	Mallard	16
02/02/2021	Lough Allua	Great black backed gull	3
02/02/2021	Lough Allua	Rook	4
02/02/2021	Lough Allua	Raven	1
02/02/2021	Lough Allua	Cormorant	4
02/02/2021	Gougane Barra	Mistle Thrush	1
02/02/2021	Gougane Barra	Wood pigeon	1
02/02/2021	Gougane Barra	Wren	1
02/02/2021	Sillahertane	Meadow Pipit	1
02/02/2021	Sillahertane	Chaffinch	12
02/02/2021	Grousemount	Raven	1
02/02/2021	Grousemount	Dunnock	1
02/02/2021	Lough Nabuddoga	Reed Bunting	1
02/02/2021	Lough Nabuddoga	Starling	1
02/02/2021	Lough Nabuddoga	Raven	2
02/02/2021	Lough Nabuddoga	Hooded Crow	1
02/02/2021	Ballyvourney North	Coal tit	1
02/02/2021	Ballyvourney North	Blue tit	1
02/02/2021	Ballyvourney North	Kestrel	1
02/02/2021	Ballyvourney North	Raven	1
02/02/2021	Ballyvourney North	Meadow Pipit	1
02/02/2021	Ballyvourney North	Robin	1
02/02/2021	Gortyrahilly		
02/02/2021	Gortyrahilly	Woodcock	1
11/03/2021	Gearagh	Golden Plover	86
11/03/2021	Gearagh	Curlew	6
11/03/2021	Gearagh	Dunlin	19
11/03/2021	Gearagh	Teal	51
11/03/2021	Gearagh	Great black backed gull	3

Date	Site	Common Name	Quantity
11/03/2021	Gearagh	Mallard	4
11/03/2021	Gearagh	Black headed gull	18
11/03/2021	Gearagh	Wigeon	5
11/03/2021	Gearagh	Lesser black backed gull	8
11/03/2021	Gearagh	Great crested grebe	4
11/03/2021	Gearagh	Cormorant	3
11/03/2021	Gearagh	Buzzard	1
11/03/2021	Toon valley/Killeens	White fronted goose	1
11/03/2021	Toon valley/Killeens	Barnacle goose	1
11/03/2021	Toon valley/Killeens	Pink footed goose	1
11/03/2021	Toon valley/Killeens	Whooper swan	115
11/03/2021	Toon valley/Killeens	Mute swan	12
11/03/2021	Toon valley/Killeens	Little Egret	1
11/03/2021	Toon valley/Killeens	Grey Heron	1
11/03/2021	Toon valley/Killeens	Fieldfare	30
11/03/2021	Lee Valley	Buzzard	1
11/03/2021	Lee Valley	Wood pigeon	1
11/03/2021	Lee Valley	Mistle Thrush	1
11/03/2021	Lee Valley	Wren	1
11/03/2021	Lee Valley	Jackdaw	1
11/03/2021	Lee Valley	Great tit	1
11/03/2021	Inchigeelagh	Blue tit	1
11/03/2021	Inchigeelagh	Chiffchaff	1
11/03/2021	Inchigeelagh	Treecreeper	1
11/03/2021	Inchigeelagh	Magpie	1
11/03/2021	Inchigeelagh	Goldcrest	1
11/03/2021	Lough Allua	Mute swan	1
11/03/2021	Lee Valley	Whooper swan	6
11/03/2021	Lee Valley	Cormorant	4
11/03/2021	Lee Valley	Teal	2
11/03/2021	Lee Valley	Lesser black backed gull	1
11/03/2021	Lee Valley	Mallard	5
11/03/2021	Lee Valley	Great black backed gull	2
11/03/2021	Gougane Barra	Cormorant	1
11/03/2021	Gougane Barra	Mallard	4
11/03/2021	Sillahertane	Stonechat	1
11/03/2021	Sillahertane	Raven	4

Date	Site	Common Name	Quantity
11/03/2021	Sillahertane	Kestrel	1
11/03/2021	Grousemount	Raven	2
11/03/2021	Lough Nabuddoga	Raven	7
11/03/2021	Lough Nabuddoga	Coal tit	1
11/03/2021	Ballyvourney North	Redwing	7
11/03/2021	Gortyrahilly	Woodcock	1

APPENDIX 7.12:

VP SUMMER 2021 - SURVEY DETAILS

VP Summer 2021 - Survey Details

VP	Date	Observer	Start	End	Cloud (okta)	Visibility	Rain	Wind
1	16/04/2021	JA	12:30	15:30	8\8	Excellent	Dry	F4-5 S
2	16/04/2021	JA	15.40	18:40	8/8	Excellent	Dry	F4 S
2	17/04/2021	JA	12.40	15.40	8\8	Excellent	Dry	F3-4 S
1	17/04/2021	JA	15:50	18:50	8\8	Excellent	Dry	F3-4 S
3	18/04/2021	JA	12:30	15:30	8\8	Excellent	Dry	F3-4 S
3	19/04/2021	JA	13:30	16:30	8\8	Good	Rain, light	F1-2 SE

VP	Date	Observer	Start	End	Cloud (okta)	Visibility	Rain	Wind
2	28/05/2021	JA	09:40	12:45	8\8	Excellent	Dry	F2-3 S
1	28/05/2021	JA	13:10	16:10	8\8	Excellent	Dry	F2-3 S
3	29/05/2021	JA	13:05	16:05	8\8	Excellent	Dry	F1-2 SE
2	30/05/2021	JA	09:25	12:25	6\8	Excellent	Dry	F1-2 SE
1	30/05/2021	JA	12:40	15:40	4\8	Excellent	Dry	F1-2 SE
3	31/05/2021	JA	13:45	16:45	5\8	Excellent	Dry	F2 SE

APPENDIX 7.13:

BIRD SURVEY VP FLIGHT LINE DATA, SUMMER 2021

Year 2021, Summer - Bird Flightline Data

VP no.	Date	Mapnote / Flightline No.	Common Name	Latin Name	Species Quantity	Time of Obs.	Inside / Outside Buffer	Total Duration (s)	0-25 m (s)	25-100 m (s)	100-150 m (s)	>150 m (s)	Comment
1	16/04/2021	1	Kestrel	*Falco tinnunculus*	1	13:36	In / Out	90	30	60			Male hunting
3	19/04/2021	2	Kestrel	*Falco tinnunculus*	1	14:14	Out	120	50	70			Hunting
2	28/05/2021	3	Kestrel	*Falco tinnunculus*	1	10:15	In / Out	120	0	120			Flying
1	17/04/2021	1	Sparrowhawk	*Accipiter nisus*	2	10:22	In / Out	280	0	80	100	100	Pair in display rising
1	17/04/2021	2	Sparrowhawk	*Accipiter nisus*	1	11:19	IN	20	20	0			Male hunting
3	29/05/2021	3	Sparrowhawk	*Accipiter nisus*	1	15.42	Out	30	30	0			Female type hunting

APPENDIX 7.14:

HINTERLAND SURVEY DATA, SUMMER 2021

Hinterland Survey Data Summer 2021

Date	Site	Common Name	Quantity
19/04/2021	Gearagh	Moorhen	3
19/04/2021	Gearagh	Mute Swan	18
19/04/2021	Gearagh	Whooper Swan	2
19/04/2021	Gearagh	Great Crested Grebe	17
19/04/2021	Gearagh	Teal	1
19/04/2021	Gearagh	Mallard	3
19/04/2021	Gearagh	Lesser Black-backed Gull	47
19/04/2021	Gearagh	Whimbrel	36
19/04/2021	Gearagh	Cormorant	4
19/04/2021	Gearagh	Yellow Legged Gull	1
19/04/2021	Gearagh	Sand Martin	100
19/04/2021	Lee Valley	Dipper with nest	
19/04/2021	Lee Valley	Mallard	10
19/04/2021	Lee Valley	Grey Wagtail	2
19/04/2021	Inchigeelagh	Grey wagtail	1
19/04/2021	Inchigeelagh	Mallard	2
19/04/2021	Lough Allua	Mute Swan	2
19/04/2021	Lough Allua	Grey Heron	1
19/04/2021	Lough Allua	Lesser Black-backed Gul	2
19/04/2021	Lough Allua	Cormorant	6
17/04/2021	Ballyvourney North	Raven	5
17/04/2021	Ballyvourney North	Hooded Crow	7
18/04/2021	Sillahertane	Meadow Pipit	5
18/04/2021	Sillahertane	Stonechat	1
18/04/2021	Sillahertane	Hooded Crow	6
18/04/2021	Lough Nabuddoga	Willow Warbler	6
18/04/2021	Lough Nabuddoga	Raven	3
18/04/2021	Lough Nabuddoga	Siskin	4
18/04/2021	Lough Nabuddoga	Chaffinch	6
18/04/2021	Lough Nabuddoga	Blackcap	4
18/04/2021	Lough Nabuddoga	Meadow Pipit	4
18/04/2021	Lough Nabuddoga	Skylark	3
18/04/2021	Lough Nabuddoga	Swallow	3
18/04/2021	Lough Nabuddoga	Sand Martin	2
18/04/2021	Grousemount hinterland	Willow Warbler	4
18/04/2021	Grousemount hinterland	Blackbird	2
18/04/2021	Grousemount hinterland	Blackcap	3

Date	Site	Common Name	Quantity
18/04/2021	Grousemount hinterland	Song Thrush	2
18/04/2021	Grousemount hinterland	Chiffchaff	1
18/04/2021	Grousemount hinterland	Pied Wagtail	2
18/04/2021	Grousemount hinterland	Dunnock	2
18/04/2021	Grousemount hinterland	Wren	3
18/04/2021	Grousemount hinterland	Robin	3
22/05/2021	Gearagh	Great Crested Grebe	23
22/05/2021	Gearagh	Mallard	7
22/05/2021	Gearagh	Mute Swan	21
22/05/2021	Gearagh	Whooper Swan	2
22/05/2021	Gearagh	Lesser Black-backed Gull	1
22/05/2021	Gearagh	Grey wagtail	1
22/05/2021	Lee Valley	Mallard	2
22/05/2021	Lee Valley	Willow Warbler	2
22/05/2021	Lough Allua	Mute Swan	2
22/05/2021	Lough Allua	Cormorant	3
22/05/2021	Lough Allua	Mallard	2
22/05/2021	Lough Allua	Grey Heron	1
22/05/2021	Lough Allua	Lesser Black-backed Gul	1
22/05/2021	Lough Allua	Moorhen	3
22/05/2021	Inchigeelagh	Dipper	2
22/05/2021	Inchigeelagh	Willow Warbler	2
22/05/2021	Inchigeelagh	House Sparrow	3
29/05/2021	Ballyvourney North	Raven	2
29/05/2021	Ballyvourney North	Hooded Crow	3
29/05/2021	Ballyvourney North	Magpie	2
29/05/2021	Ballyvourney North	Pied Wagtail	2
30/05/2021	Grousemount hinterland	Woodpigeon	4
30/05/2021	Grousemount hinterland	Blackcap	2
30/05/2021	Grousemount hinterland	Swallow	4
30/05/2021	Grousemount hinterland	Wren	2
30/05/2021	Grousemount hinterland	Blackbird	3
30/05/2021	Grousemount hinterland	Willow Warbler	4
30/05/2021	Sillahertane hinterland	Chaffinch	4
30/05/2021	Sillahertane hinterland	Pheasant	2
30/05/2021	Sillahertane hinterland	Hooded Crow	8
30/05/2021	Sillahertane hinterland	Robin	2
30/05/2021	Sillahertane hinterland	Meadow Pipit	4

Date	Site	Common Name	Quantity
30/05/2021	Sillahertane hinterland	Reed Bunting	1
30/05/2021	Sillahertane hinterland	Siskin	4
30/05/2021	Sillahertane hinterland	Raven	2
30/05/2021	Lough Nabuddoga	Wren	6
30/05/2021	Lough Nabuddoga	Willow Warbler	8
30/05/2021	Lough Nabuddoga	Hooded Crow	3
30/05/2021	Lough Nabuddoga	Chaffinch	4
30/05/2021	Lough Nabuddoga	Goldcrest	2
30/05/2021	Lough Nabuddoga	Siskin	4
30/05/2021	Lough Nabuddoga	Woodpigeon	2
30/05/2021	Lough Nabuddoga	Skylark	3
30/05/2021	Lough Nabuddoga	Meadow Pipit	4
30/05/2021	Lough Nabuddoga	Redpoll	2
30/05/2021	Lough Nabuddoga	Mistle Thrush	1

APPENDIX 7.15:

LIST OF BIRDS RECORDED WITHIN INCHAMORE SITE DURING SURVEYS 2017-2021

Common name (BTO code)	Scientific name	*BoCCI status	**Annex I status
Blackbird (B.)	*Turdus merula*	Green	No
Blackcap (BC)	*Sylvia atricapilla*	Green	No
Blue tit (BT)	*Cyanistes caeruleus*	Green	No
Bluethroat (BU)	*Luscinia svecica*	Green	No
Buzzard (BZ)	*Buteo buteo*	Green	No
Chaffinch (CH)	*Fringilla coelebs*	Green	No
Chiffchaff (CC)	*Phylloscopus collybita*	Green	No
Coal tit (CT)	*Periparus ater*	Green	No
Dunnock (D.)	*Prunella modularis*	Green	No
Fieldfare (FF)	*Turdus pilaris*	Green	No
Goldcrest (GC)	*Regulus regulus*	Amber	No
Goldfinch (GO)	*Carduelis carduelis*	Green	No
Great Black Backed Gull (GB)	*Larus marinus*	Amber	No
Great tit (GT)	*Parus major*	Green	No
Grey heron (H.)	*Ardea cinerea*	Green	No
Grey wagtail (GW)	*Motacilla cinerea*	Red	No
Golden Plover (GP)	***Pluvialis apricaria***	**Red**	**Yes**
Hen harrier (HH)	***Circus cyanaeus***	**Amber**	**Yes**
Hooded crow (HC)	*Corvus cornix*	Green	No
House martin (HM)	*Delichon urbicum*	Amber	No
Jackdaw (JD)	*Coloeus monedula*	Green	No
Jay (J.)	*Garrulus glandarius*	Green	No
Kestrel (K.)	*Falco tinnunculus*	Red	No
Lesser black-backed gull (LB)	*Larus fuscus*	Amber	No
Linnet (LI)	*Linaria cannabina*	Amber	No
Long-tailed tit (LT)	*Aegithalos caudatus*	Green	No
Magpie (MG)	*Pica pica*	Green	No
Meadow pipit (MP)	*Anthus pratensis*	Red	No
Merlin (ML)	***Falco columbarius***	**Amber**	**Yes**
Mistle thrush (M.)	*Turdus viscivorus*	Green	No
Pheasant (PH)	*Phasianus colchicus*	Green	No
Peregrine (PE)	***Falco peregrinus***	**Green**	**Yes**

Common name (BTO code)	Scientific name	*BoCCI status	**Annex I status
Pied wagtail (PW)	*Motacilla alba*	Green	No
Raven (RN)	*Corvus corax*	Green	No
Redpoll (LR)	*Acanthis flammea*	Green	No
Redwing (RE)	*Turdus iliacus*	Red	No
Red Grouse (RG)	*Lagopus lagopus*	Red	No
Reed Warbler (RW)	*Acrocephalus scirpaceus*	Amber	No
Robin (R.)	*Erithacus rubecula*	Green	No
Rook (RO)	*Corvus frugilegus*	Green	No
Siskin (SK)	*Spinus spinus*	Green	No
Skylark (S.)	*Alauda arvensis*	Amber	No
Snipe (SN)	*Gallinago gallinago*	Red	No
Song thrush (ST)	*Turdus philomelos*	Green	No
Sparrowhawk (SH)	*Accipiter nisus*	Green	No
Starling (SG)	*Sturnus vulgaris*	Amber	No
Stonechat (SC)	*Saxicola rubicola*	Green	No
Swallow (SL)	*Hirundo rustica*	Amber	No
Wheatear (W.)	*Oenanthe oenanthe*	Amber	No
White-tailed Eagle (WE)	***Haliaeetus albicilla***	**Red**	**Yes**
Willow warbler (WW)	*Phylloscopus trochilus*	Amber	No
Woodpigeon (WP)	*Columba palumbus*	Green	No
Wren (WR)	*Troglodytes troglodytes*	Green	No

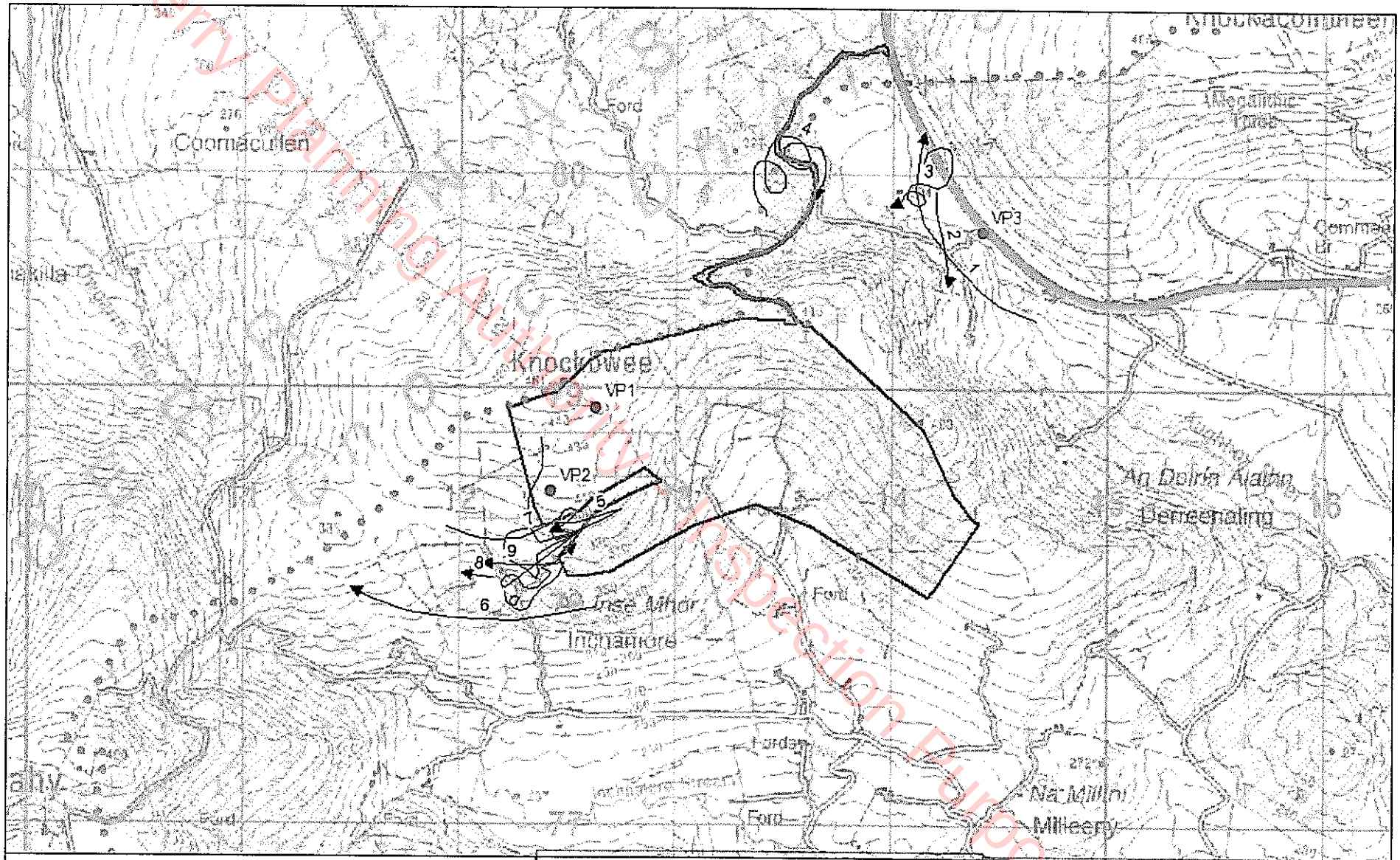
* refers to the conservation status of the species according to Birds of Conservation Concern in Ireland.

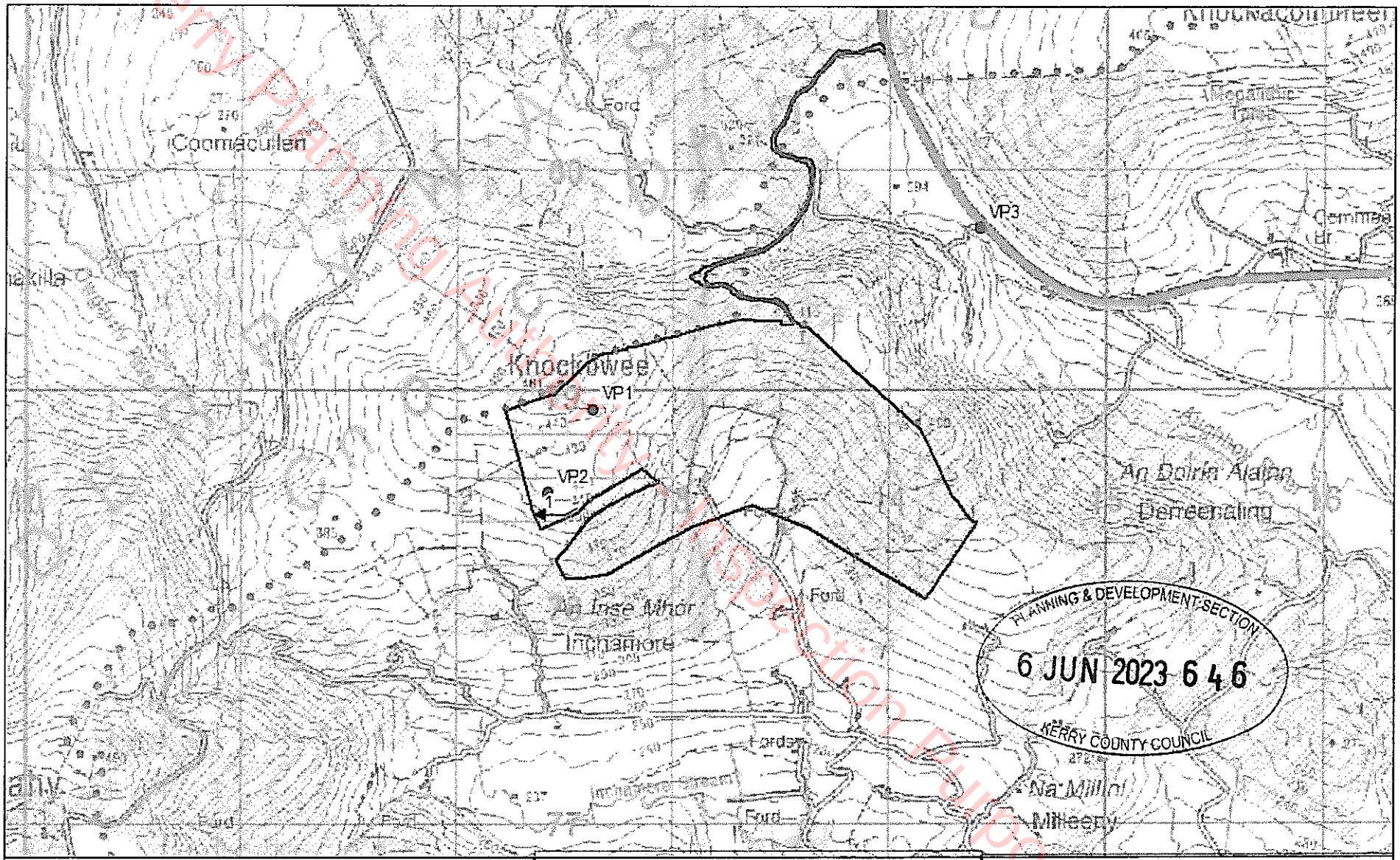
**refers to species listed on Annex I of the EU Birds Directive; shown in bold.

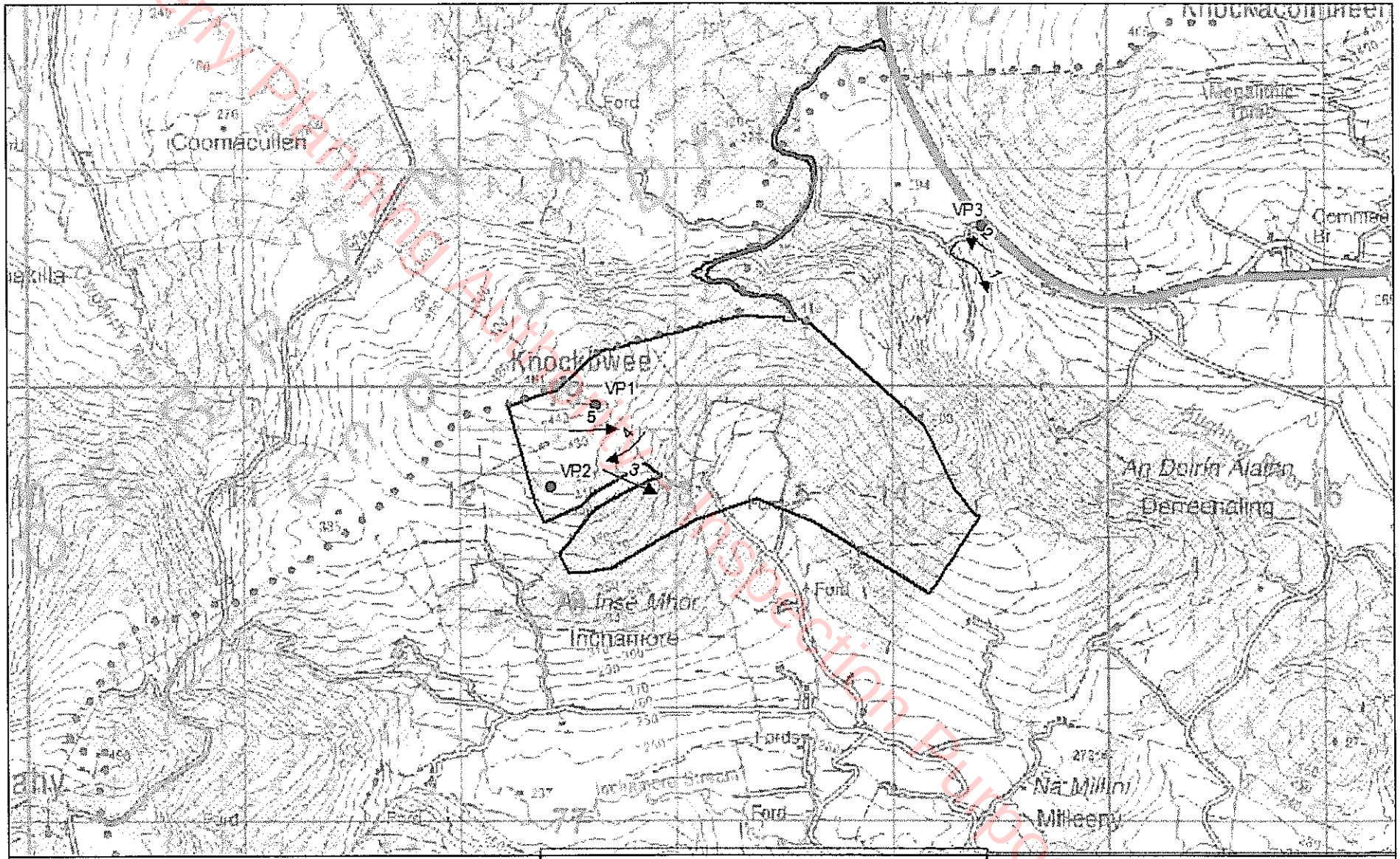
APPENDIX 7.16:

VANTAGE POINT FLIGHT LINES FOR SURVEYS 2017 - 2021

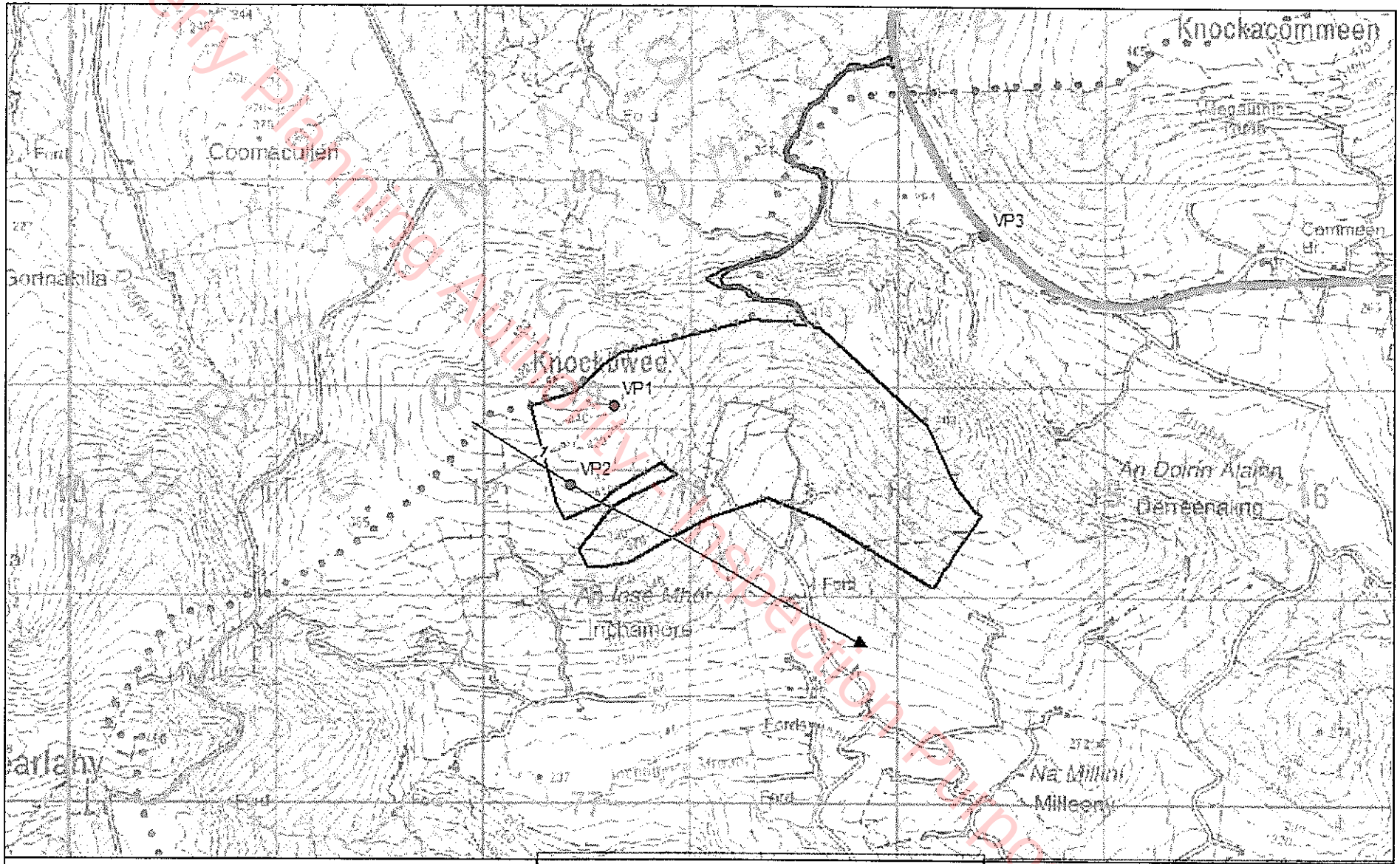
Summer 2017

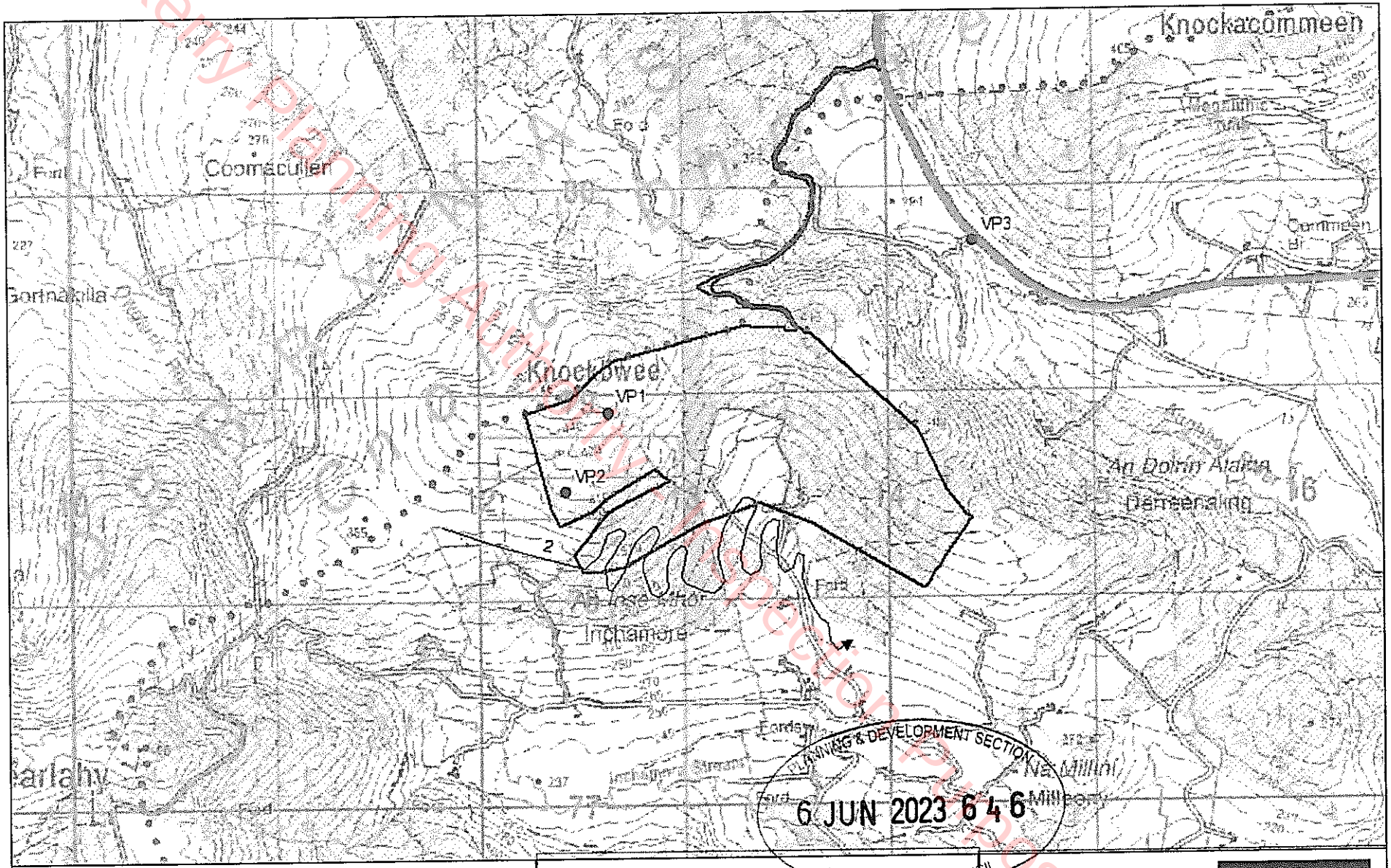


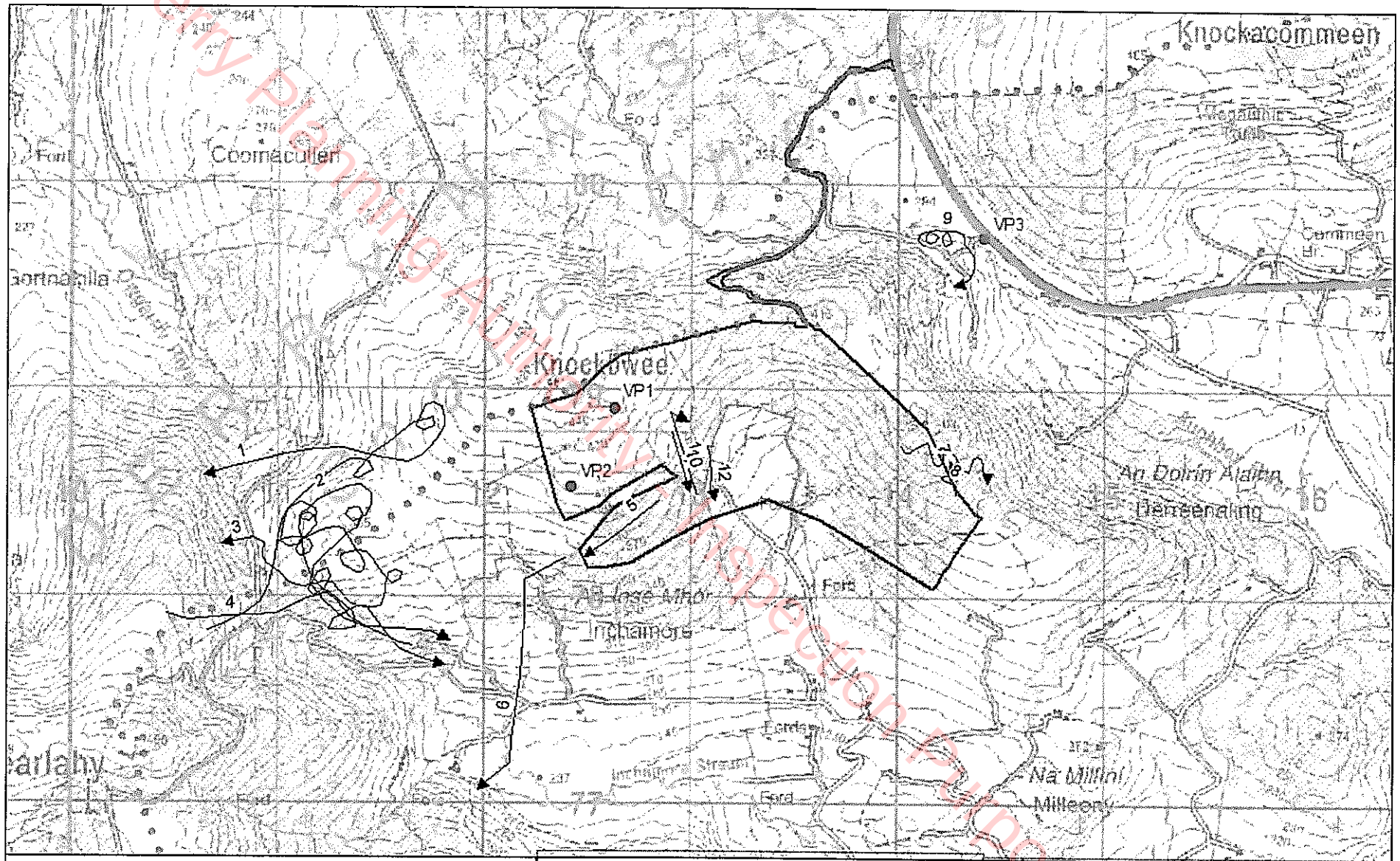


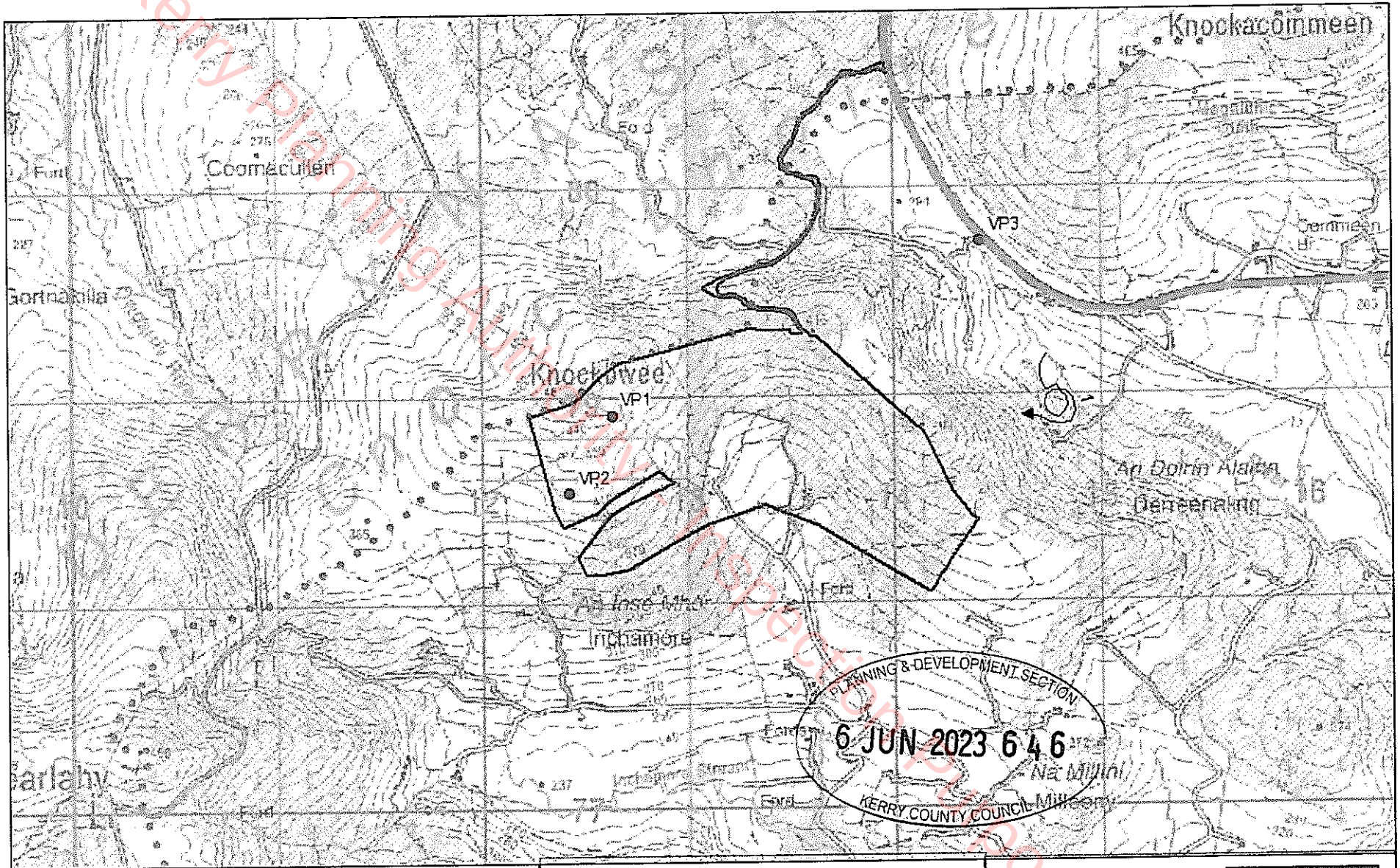


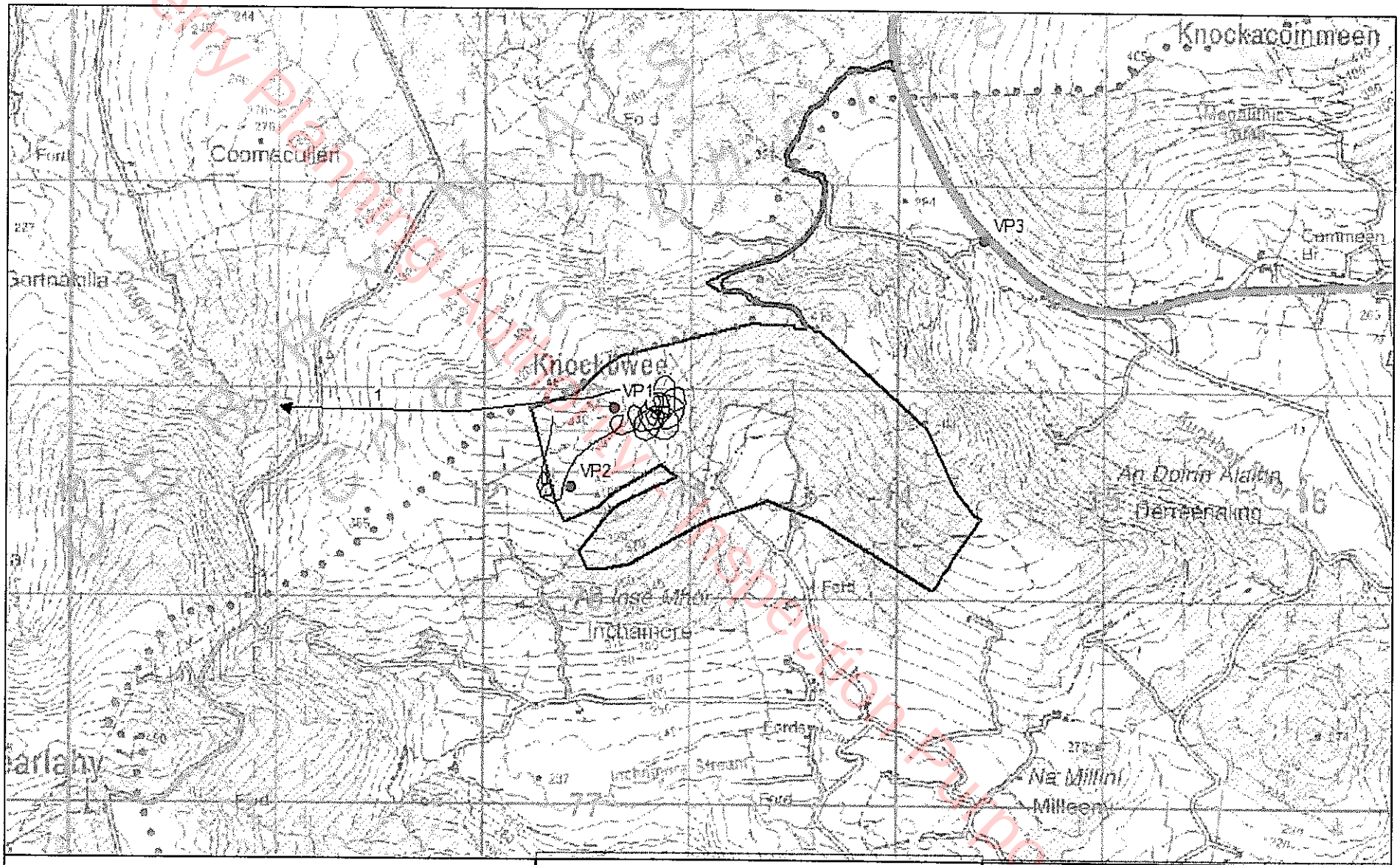
Summer 2018



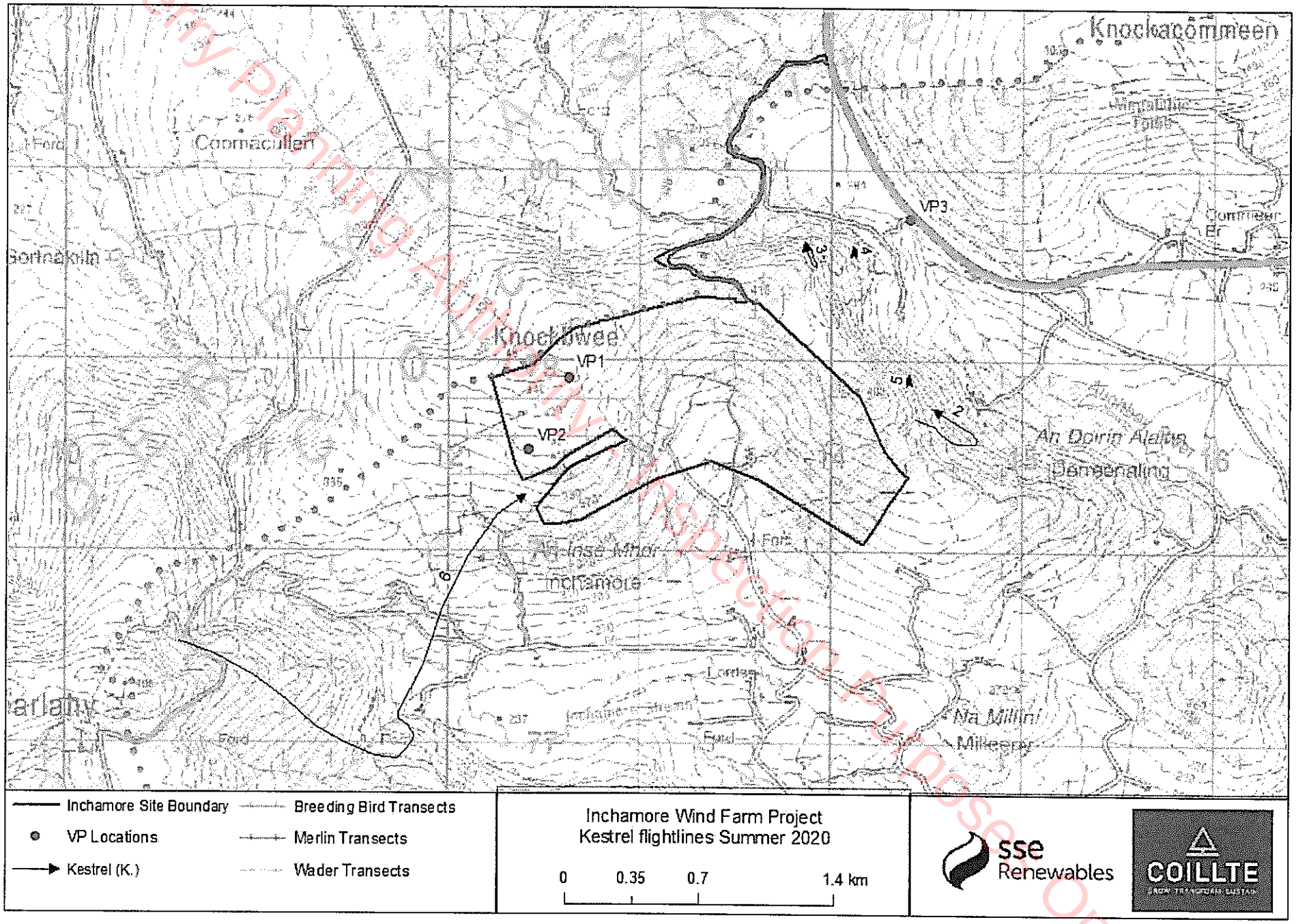


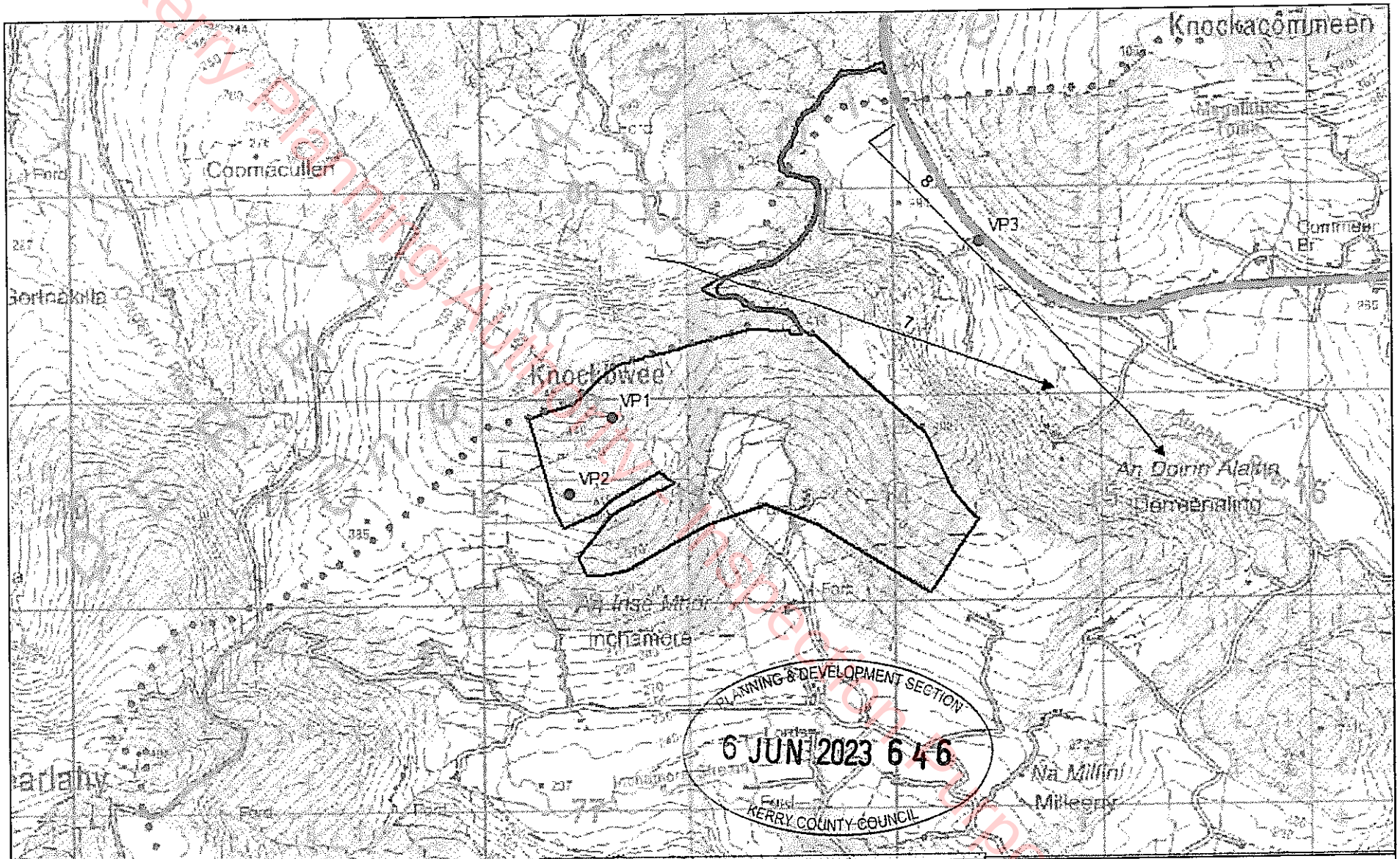


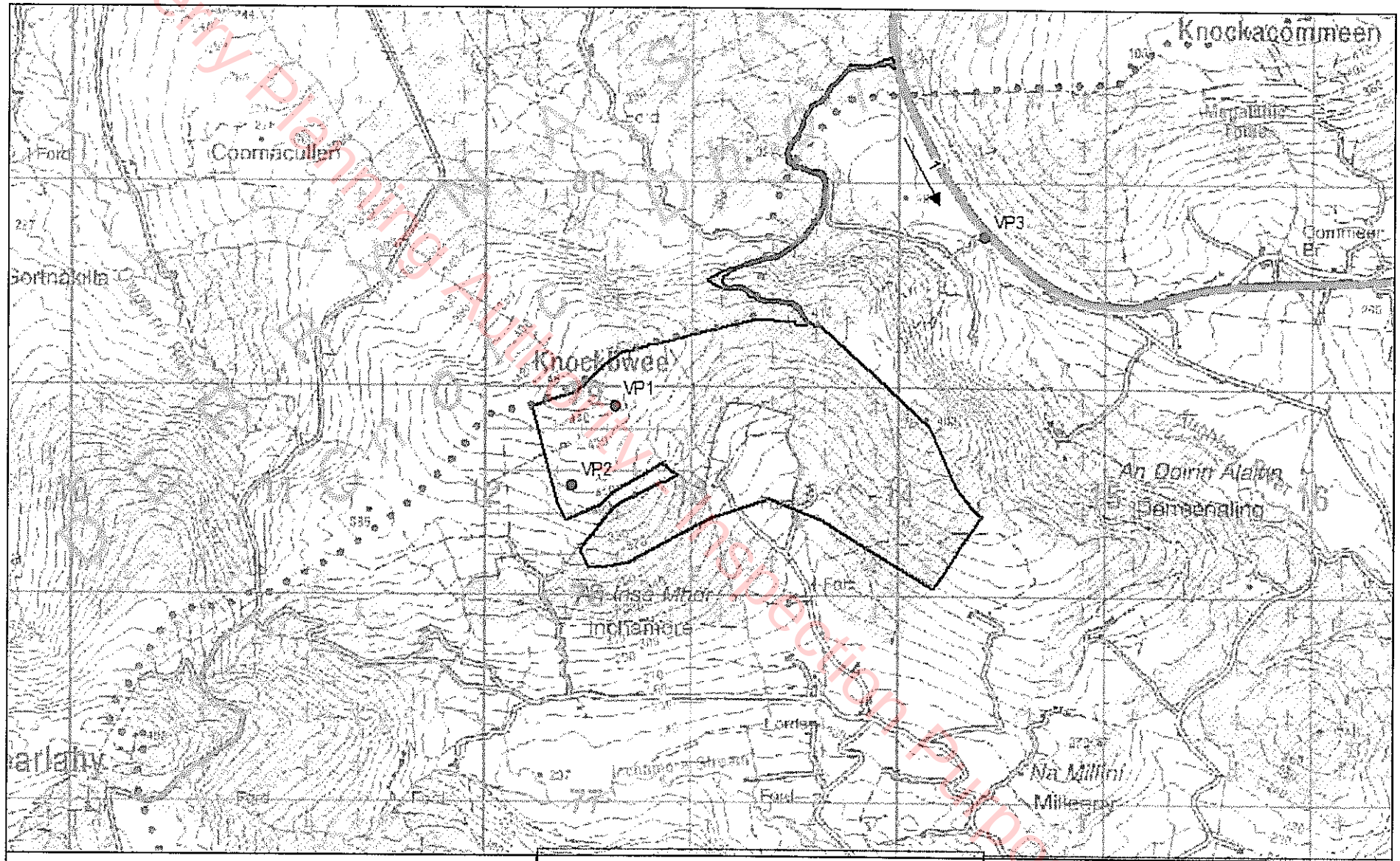




Summer 2020







FID	id	VP	O_co	Date	Time	Flightline
0	0	2	K.	2020-08-29	11:22	6
1	0	1	LB	2020-08-30	12:12	7
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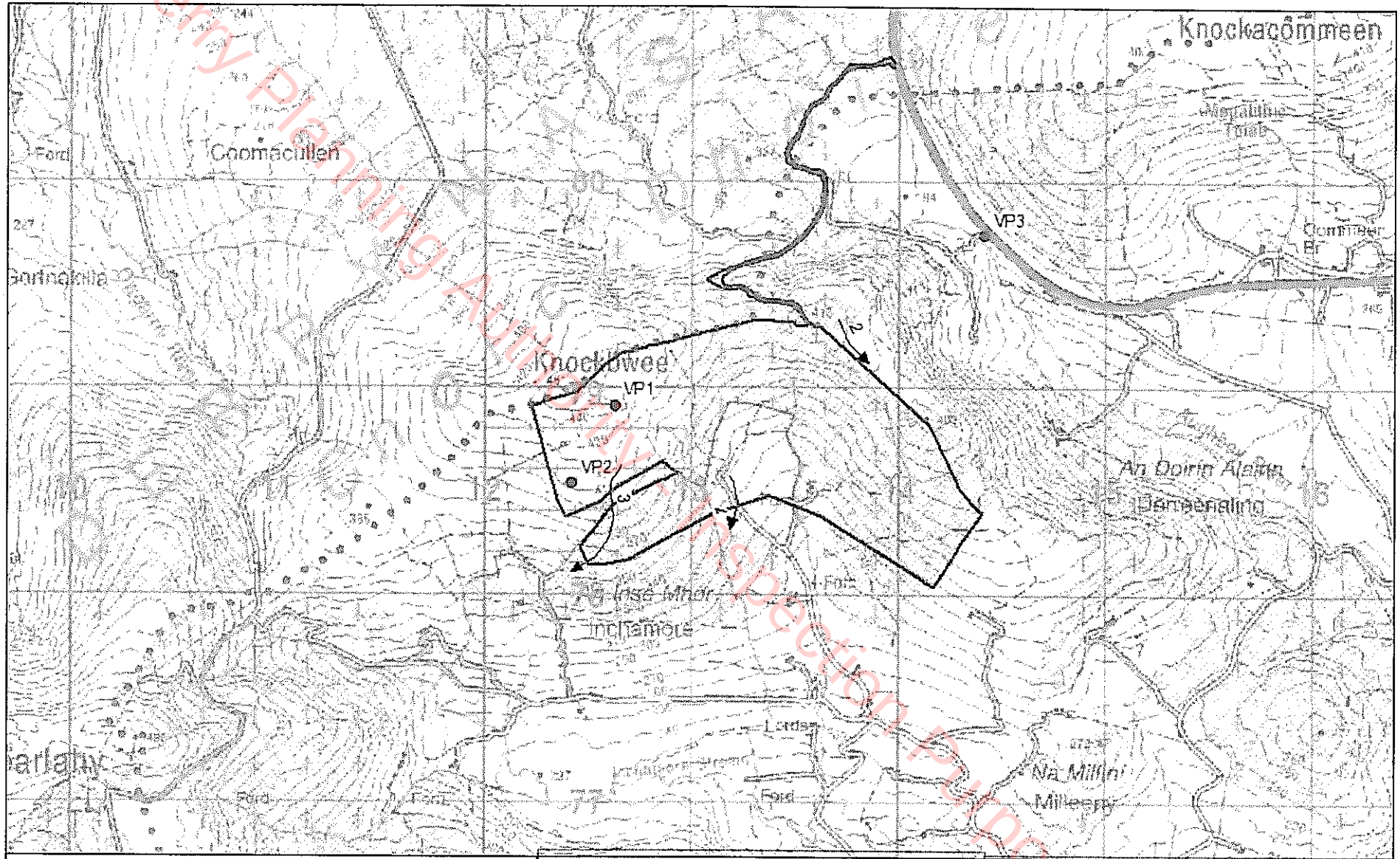
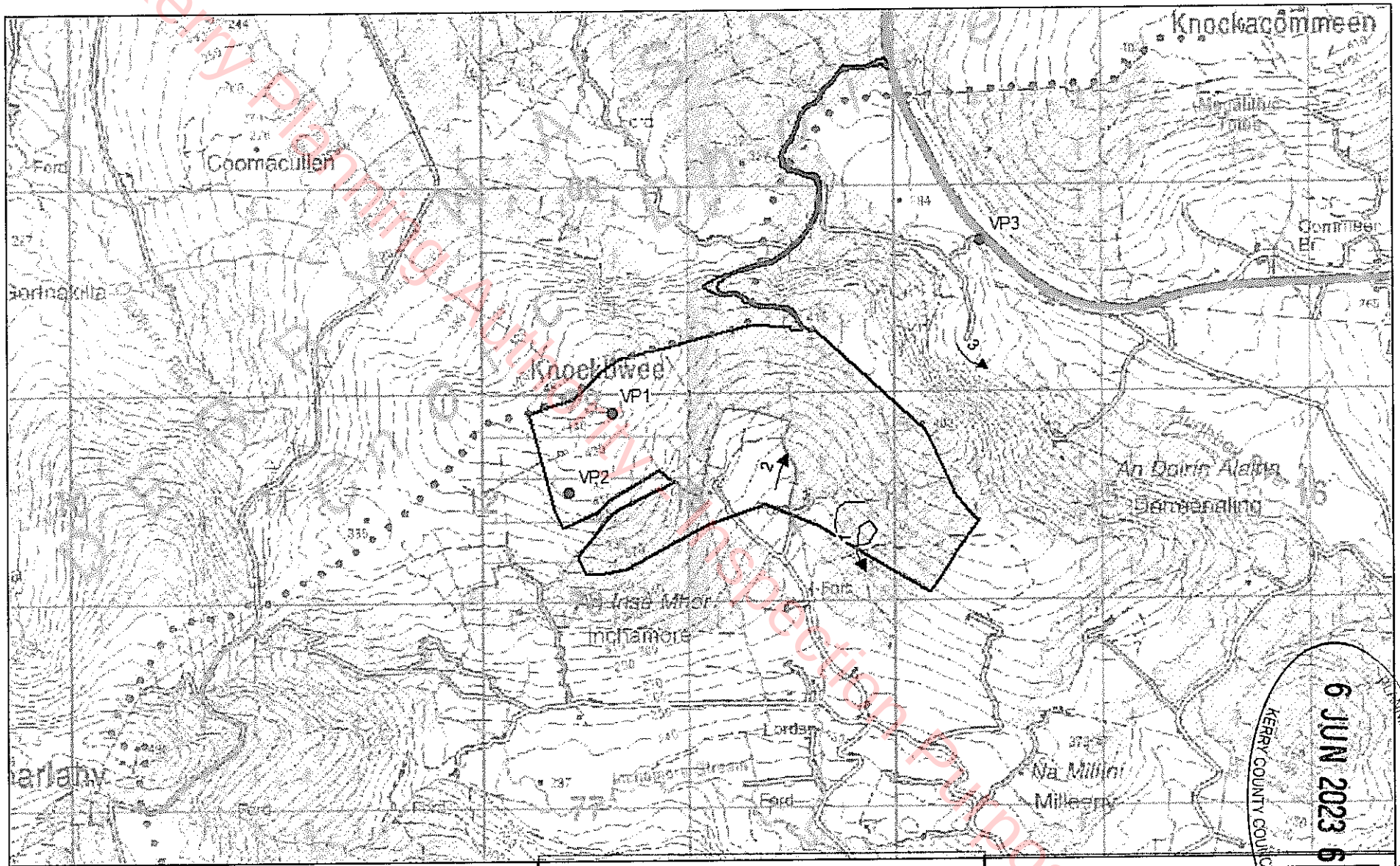
7	0	3	K.	2020-05-28	17:19	2

BTO_name
Kestrel
Lesser Black-backed Gull
Lesser Black-backed Gull
Kestrel
Kestrel
Kestrel
Sparrowhawk
Kestrel

Summer 2022





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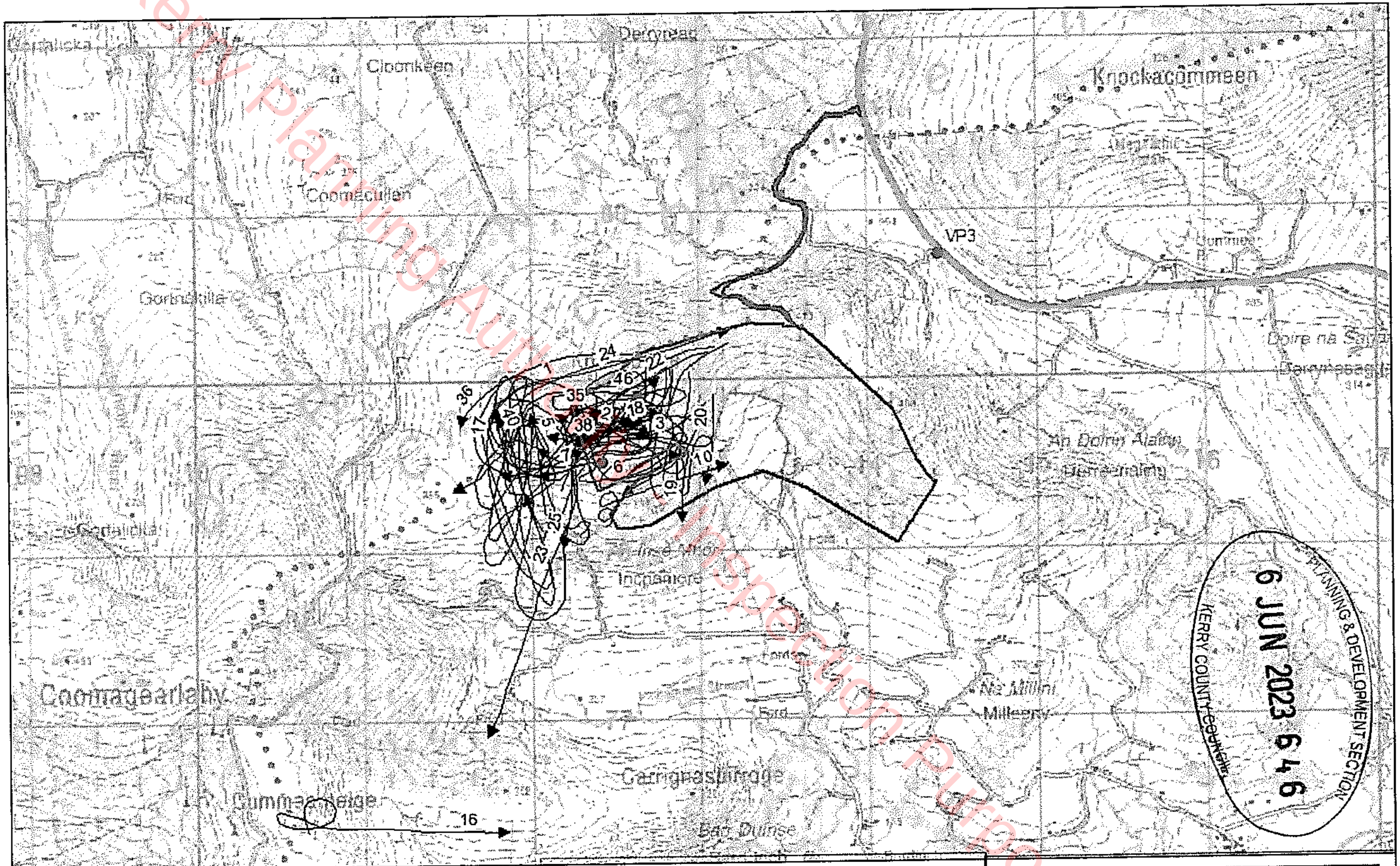


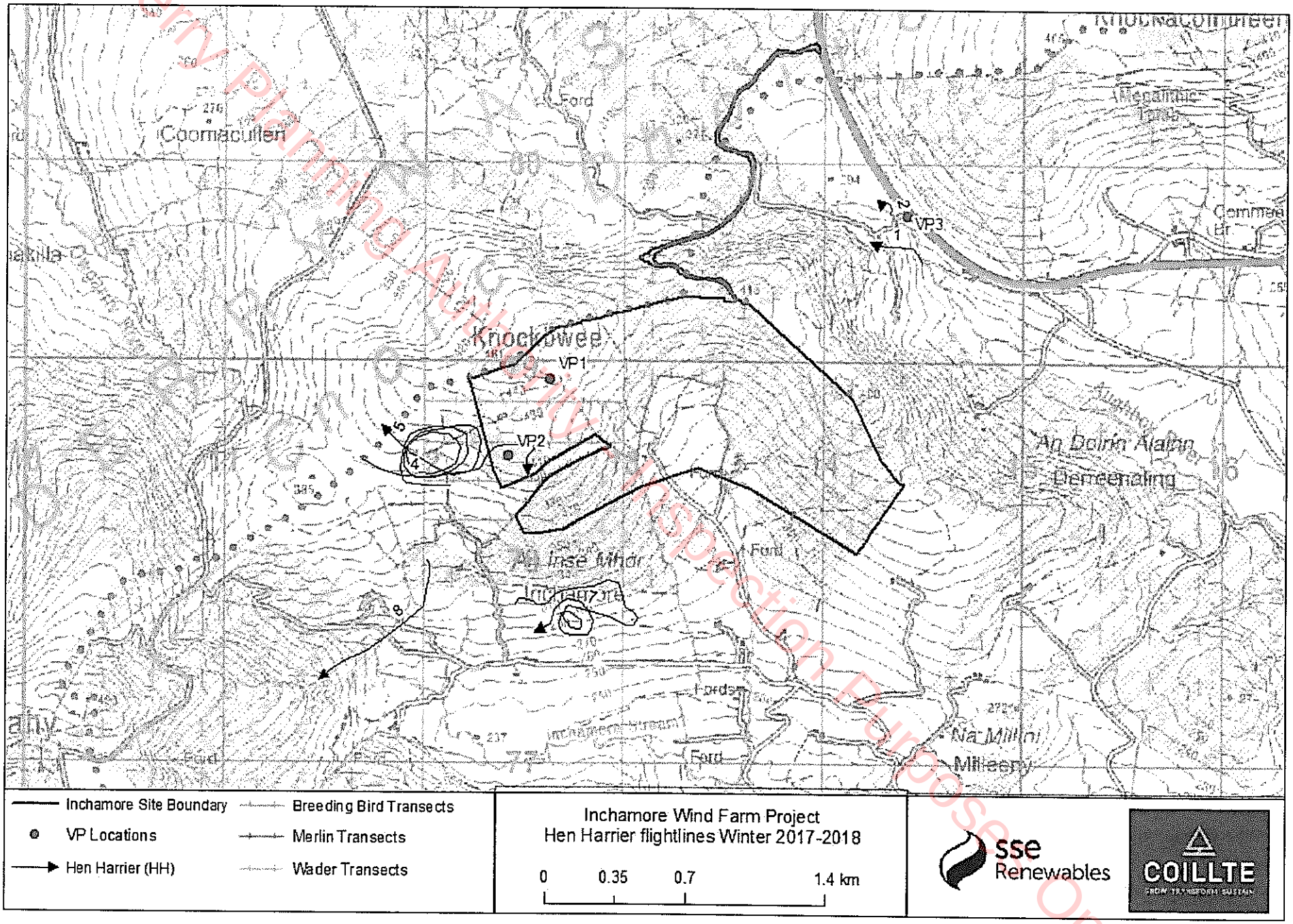
Inchamore Site Boundary
VP Locations
Golden Plover (GP)
Breeding Bird Transects
Merlin Transects
Wader Transects

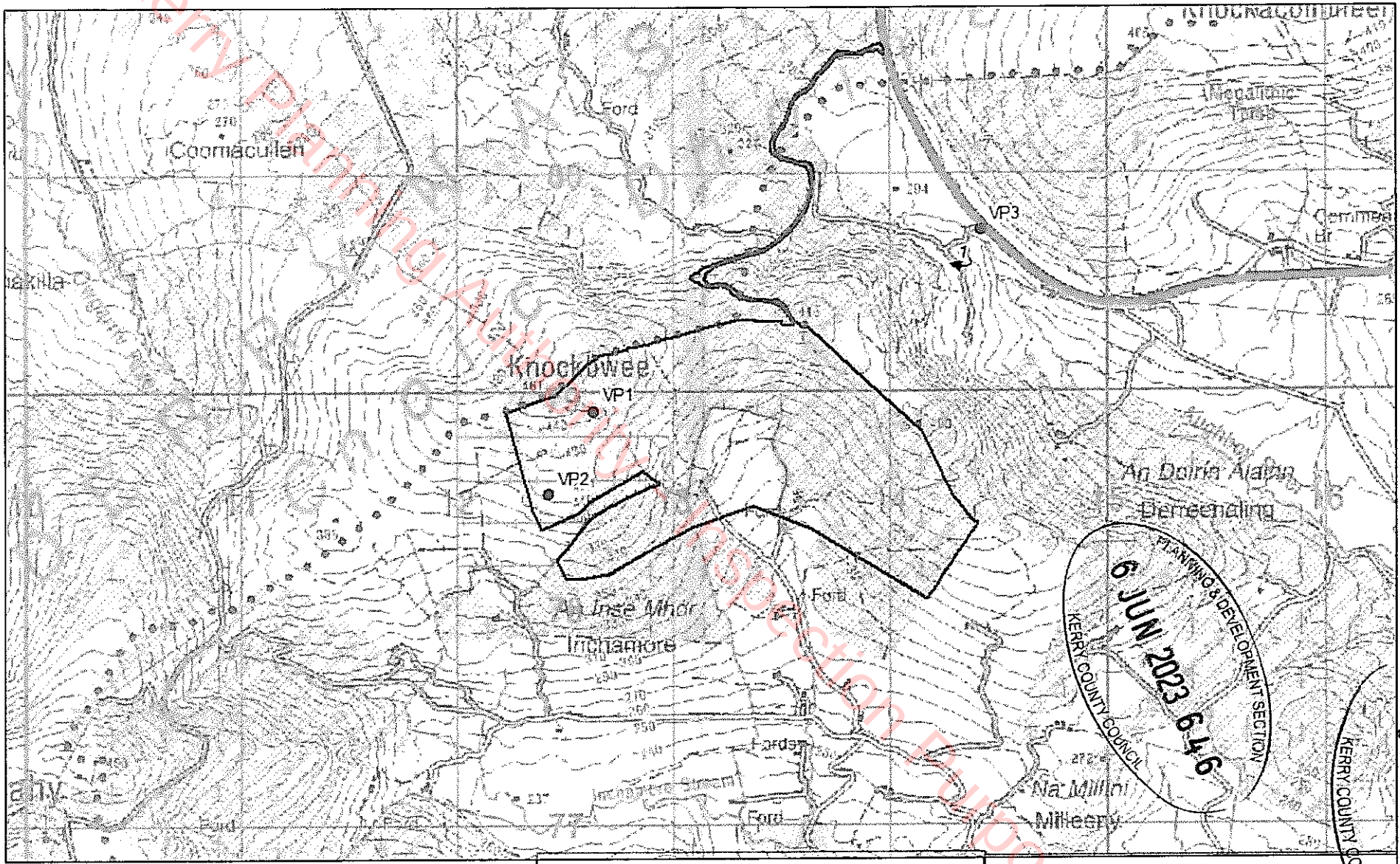
Inchamore Wind Farm Project
Golden Plover flightlines Winter 2017-2018

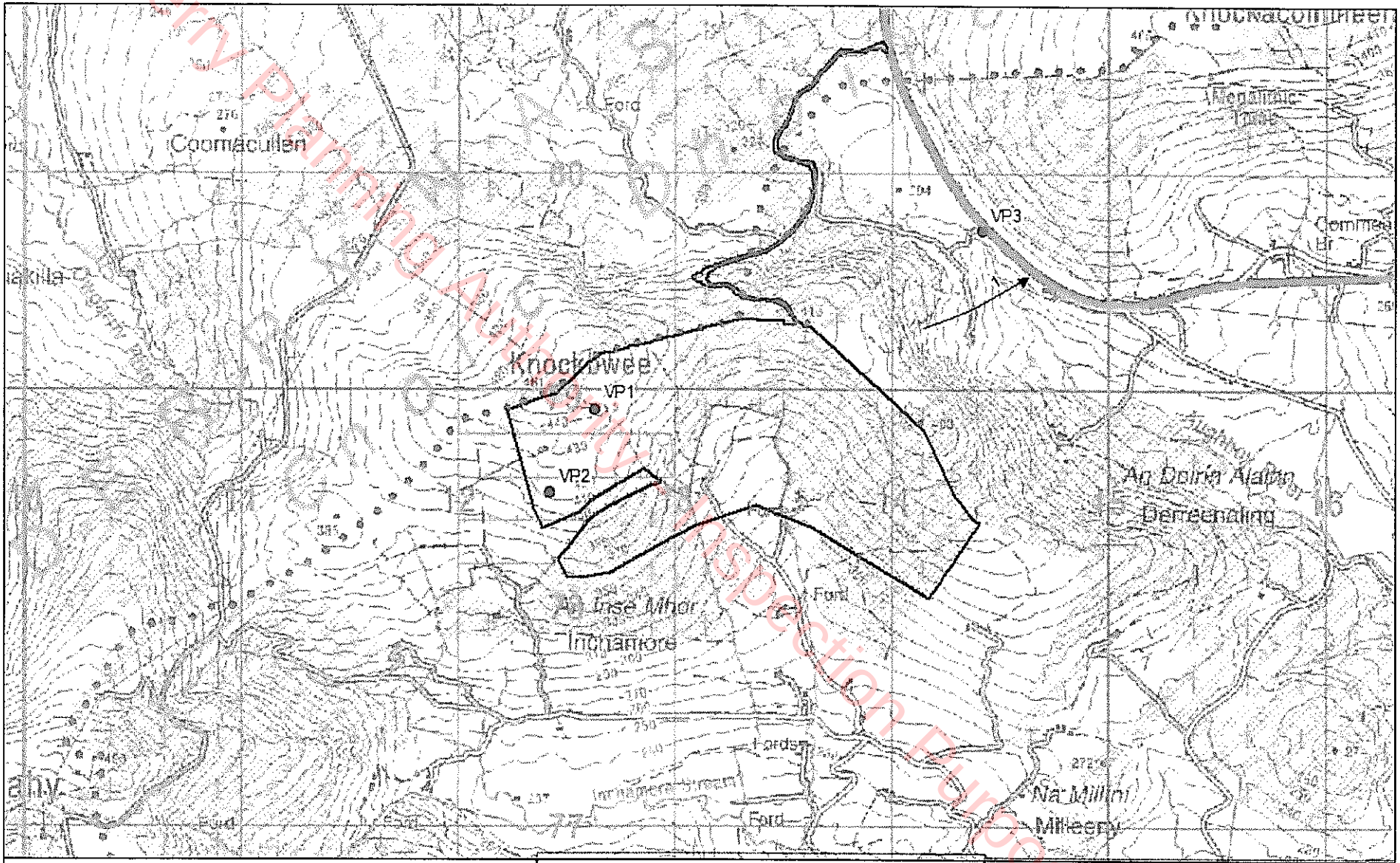
0 0.45 0.9 1.8 km

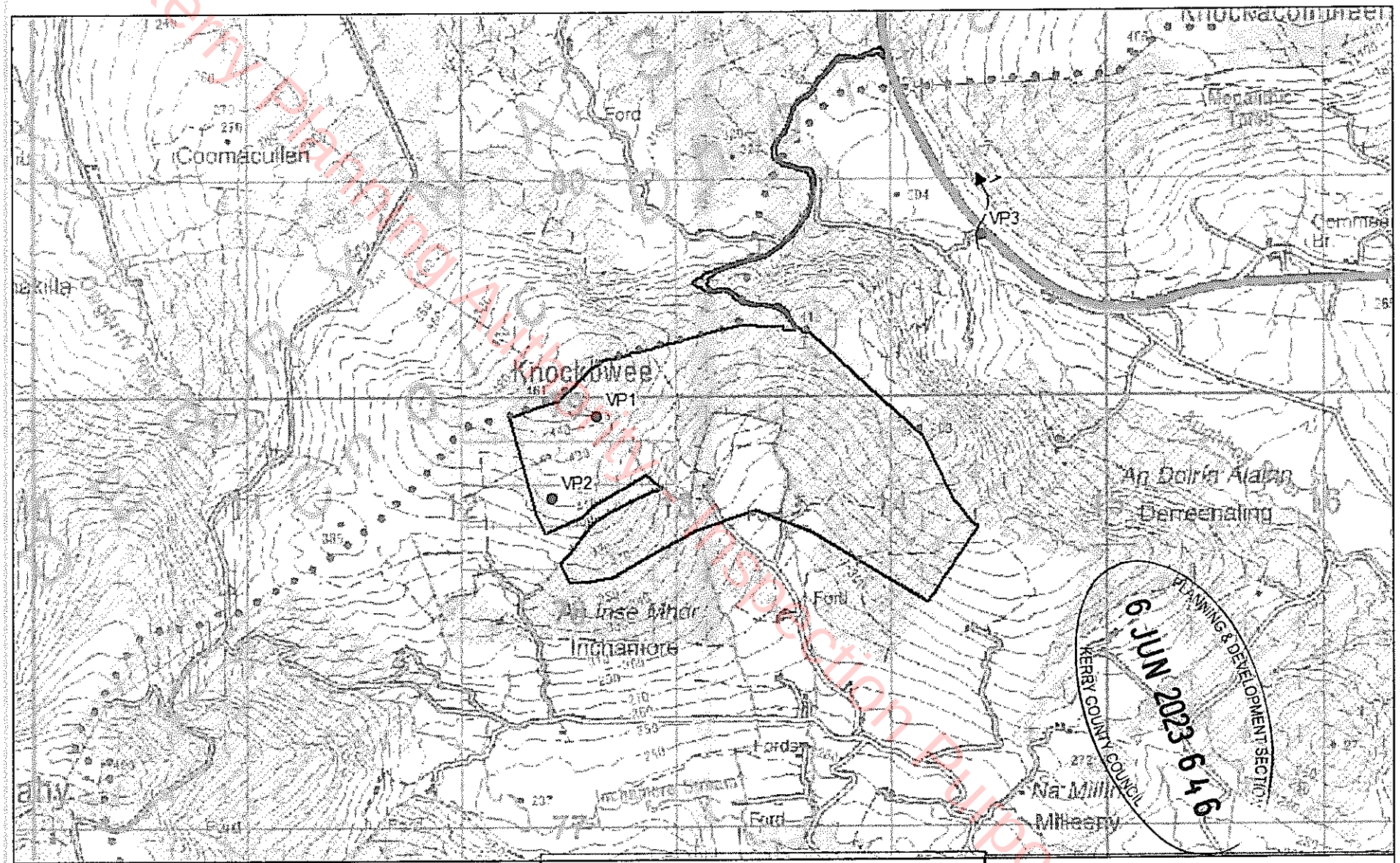
sse Renewables

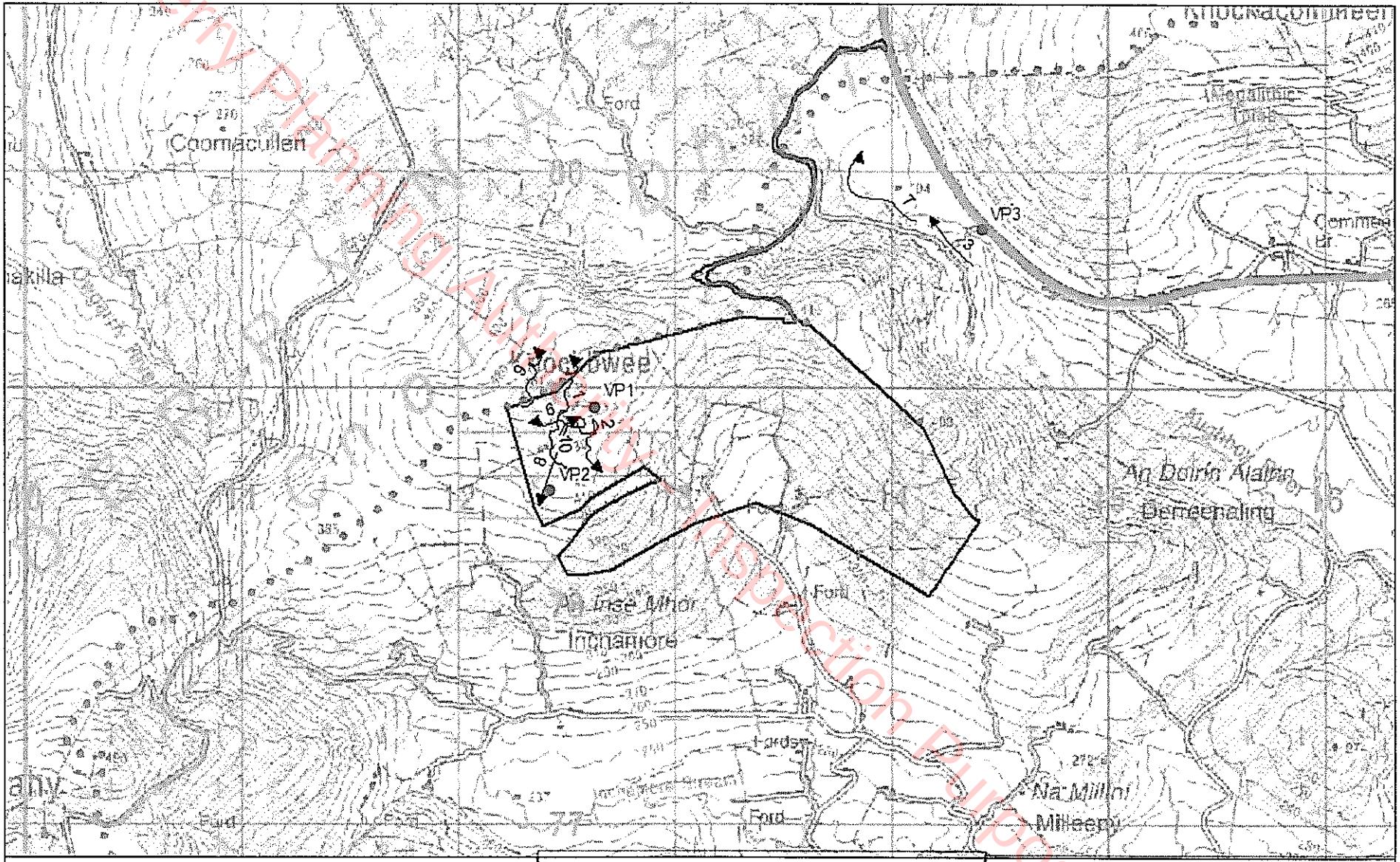
COILLTE

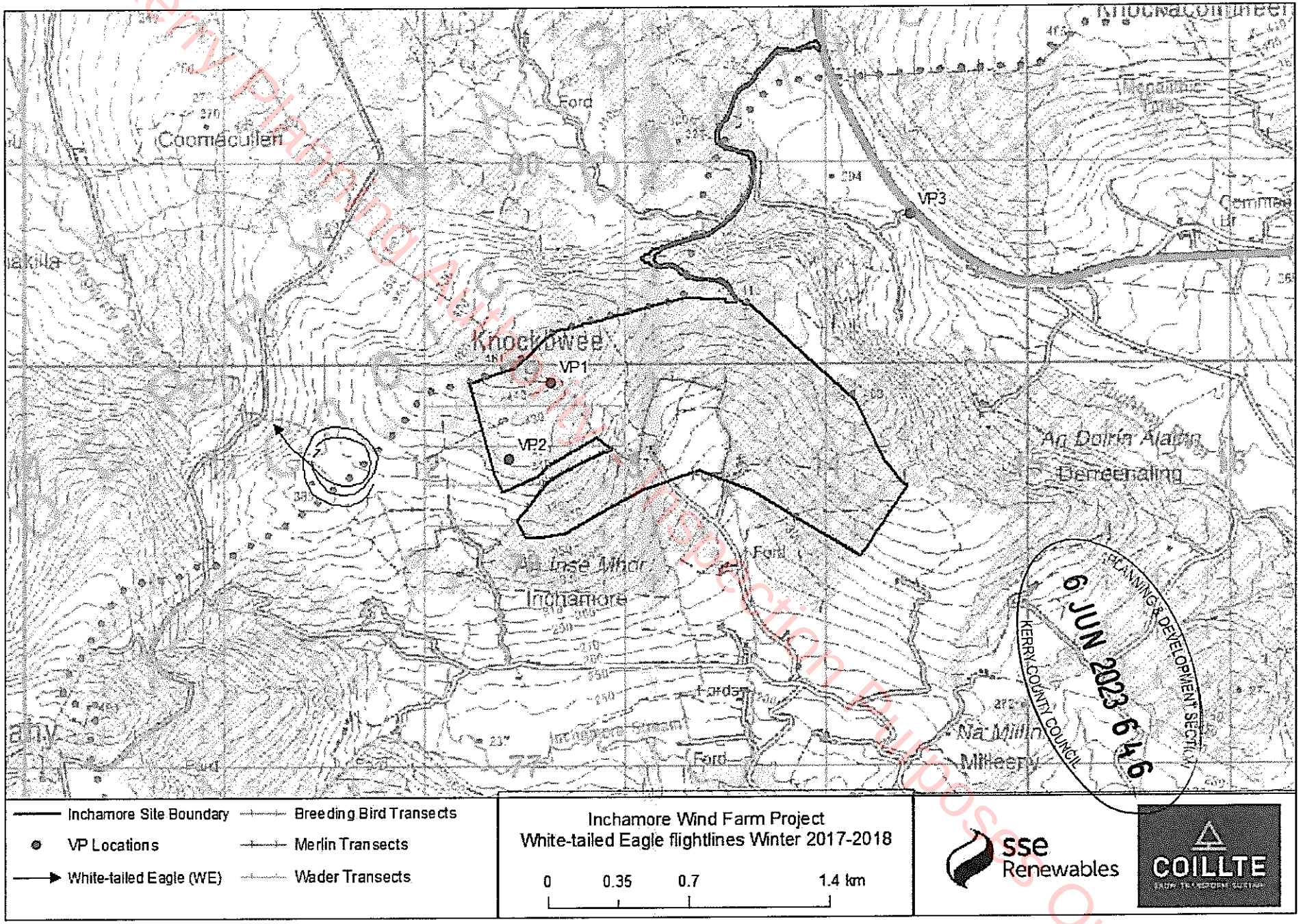


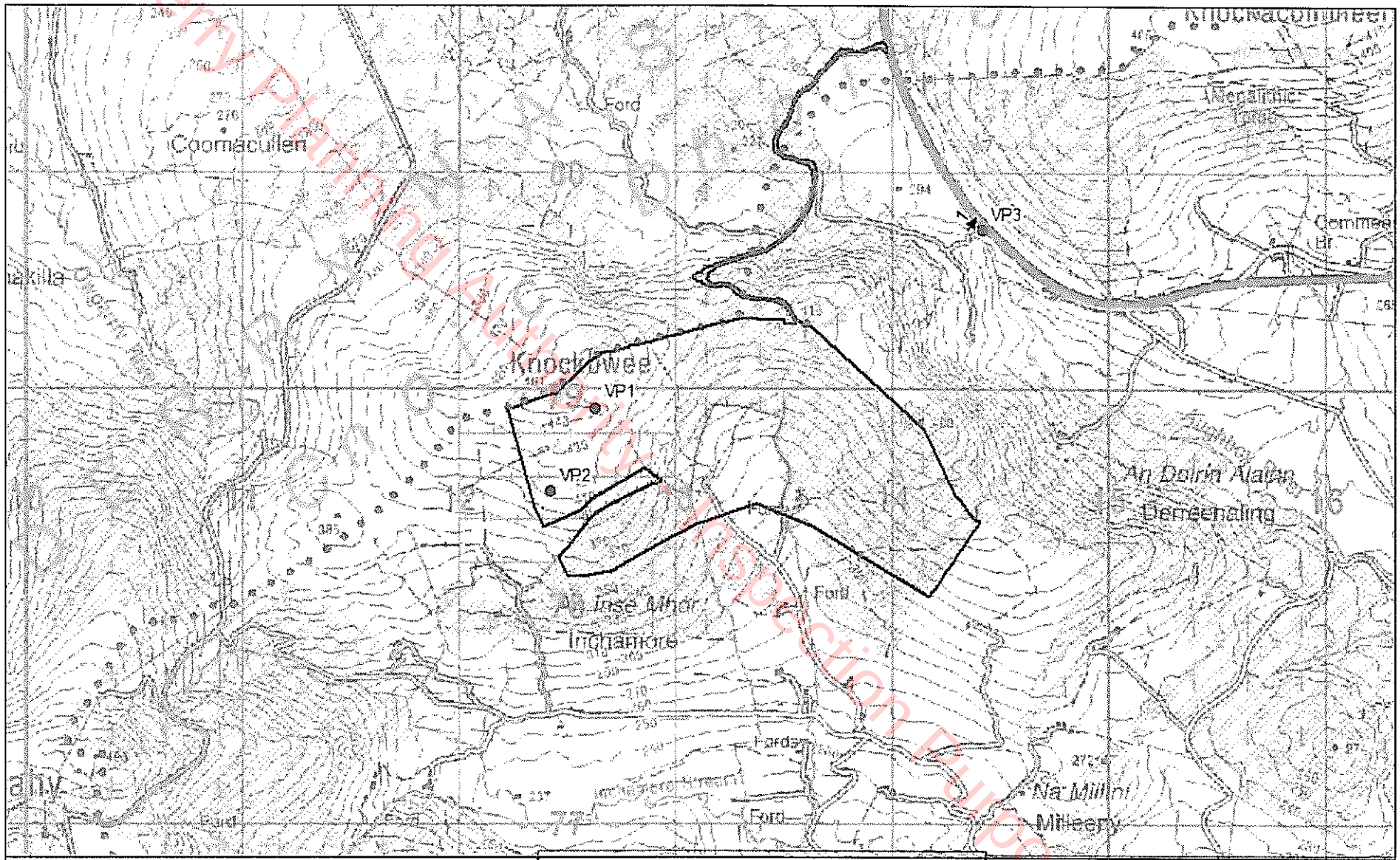




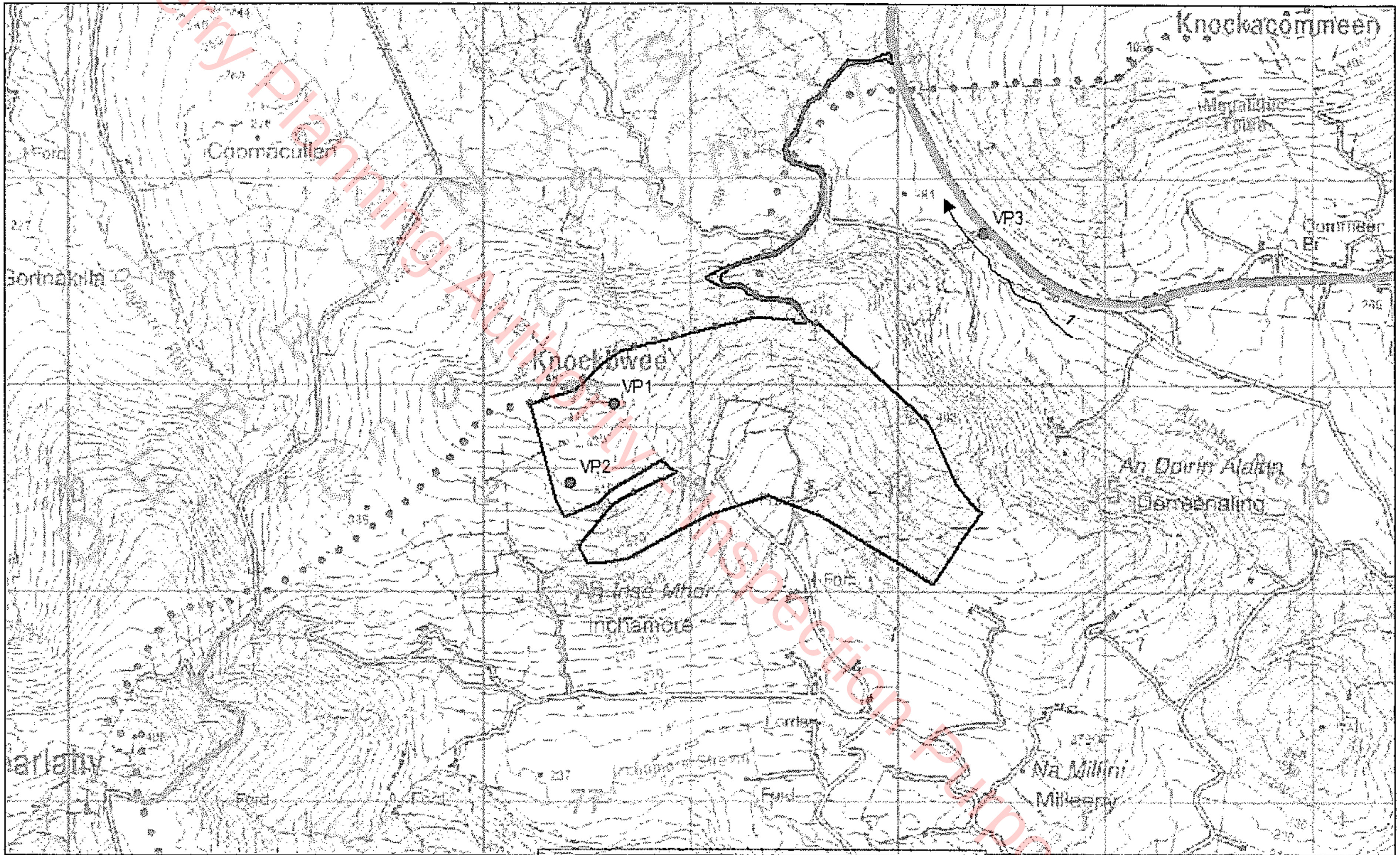








Winter 2018 - 2019



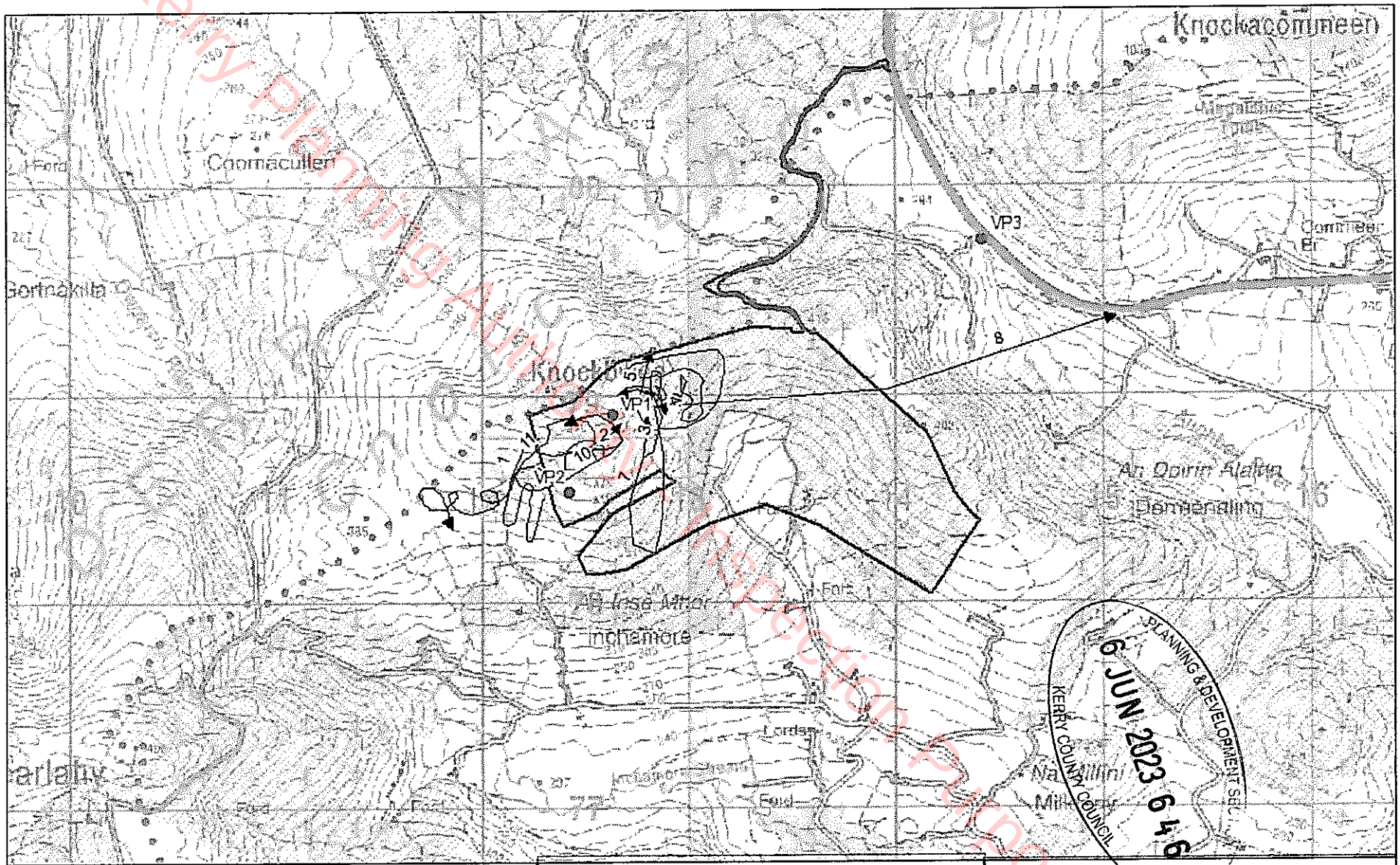
Inchamore Site Boundary
VP Locations
Common Gull (CM)
Breeding Bird Transects
Merlin Transects
Wader Transects

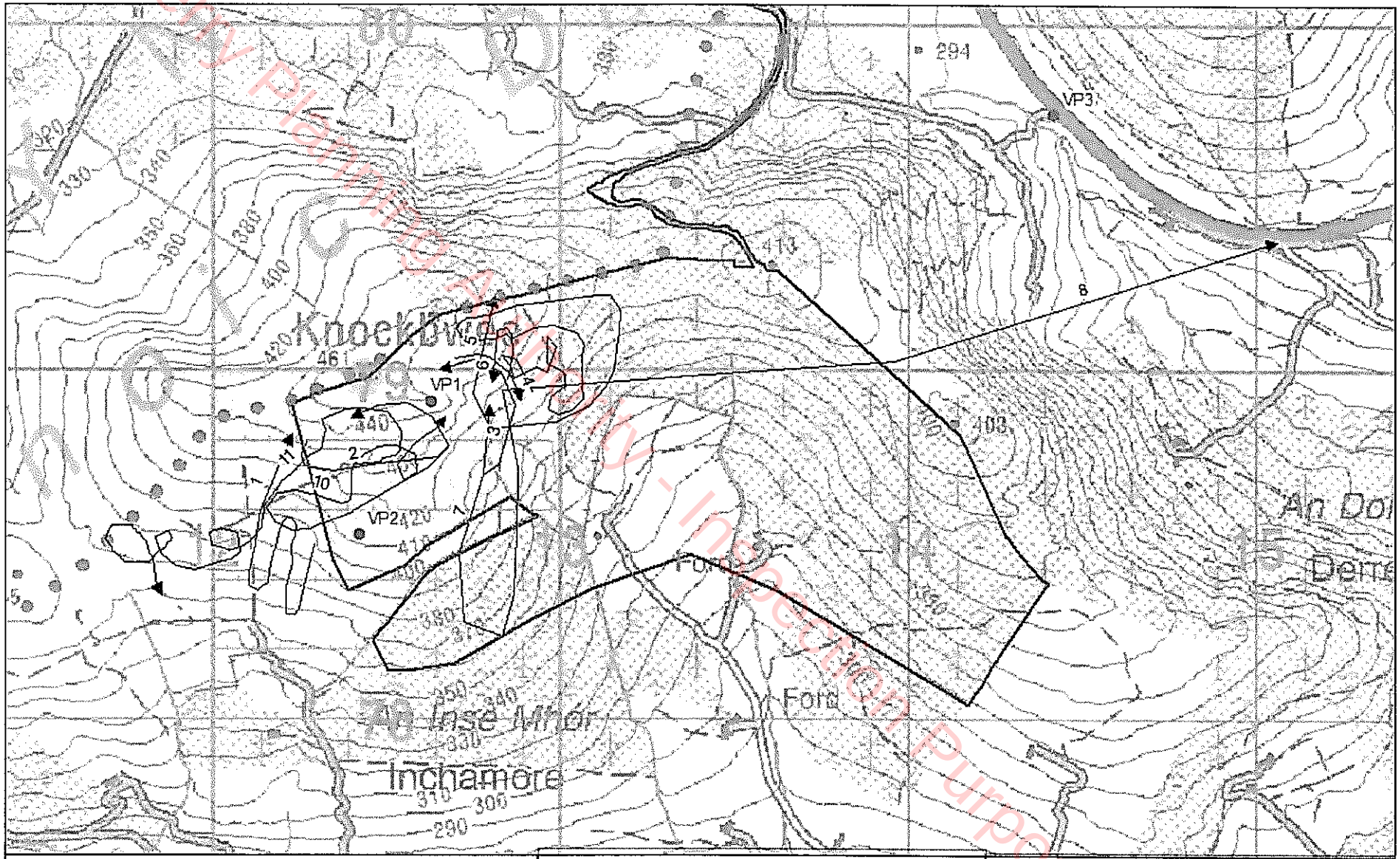
Inchamore Wind Farm Project
Common Gull flightlines Winter 2018-2019

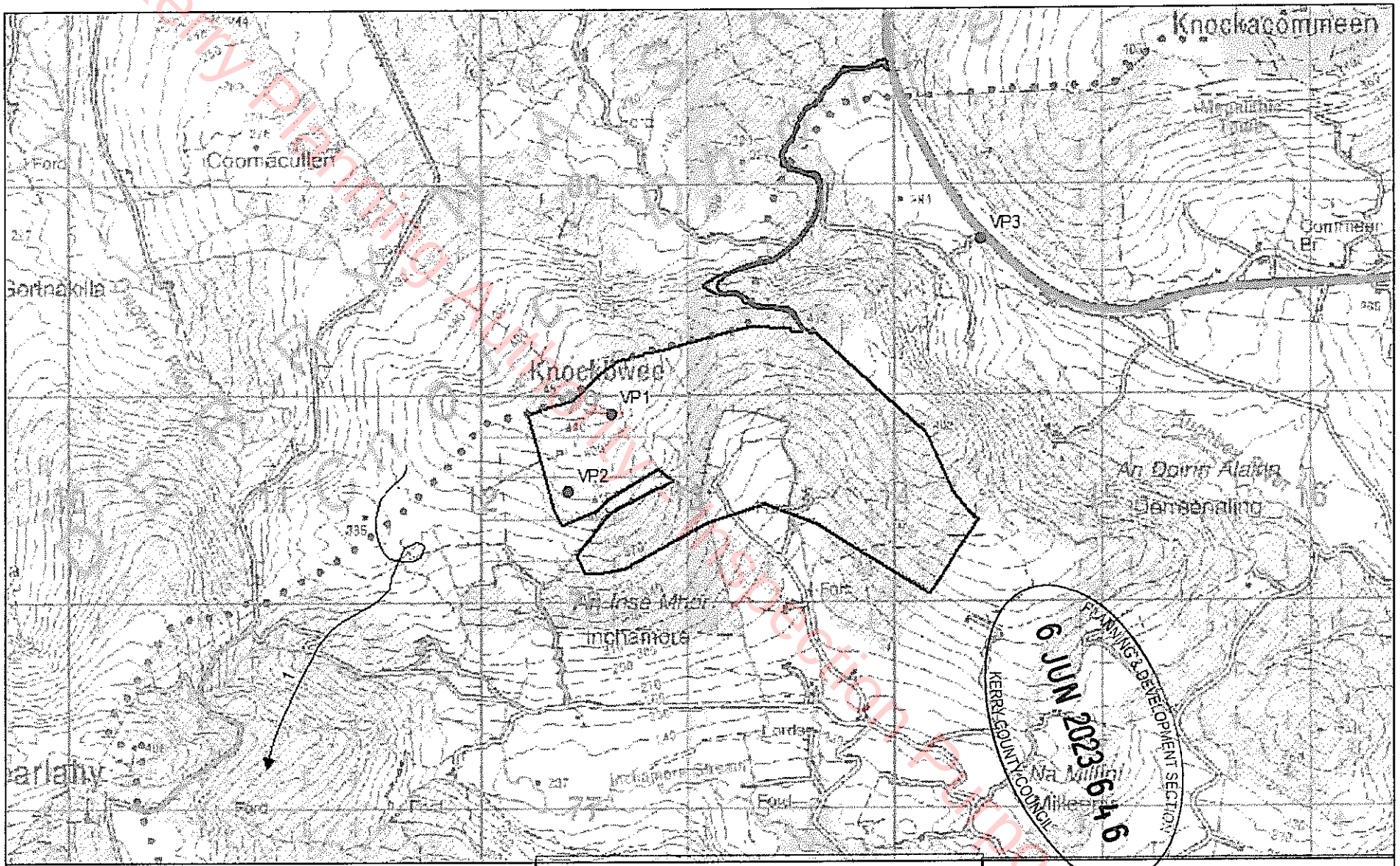
0 0.35 0.7 1.4 km

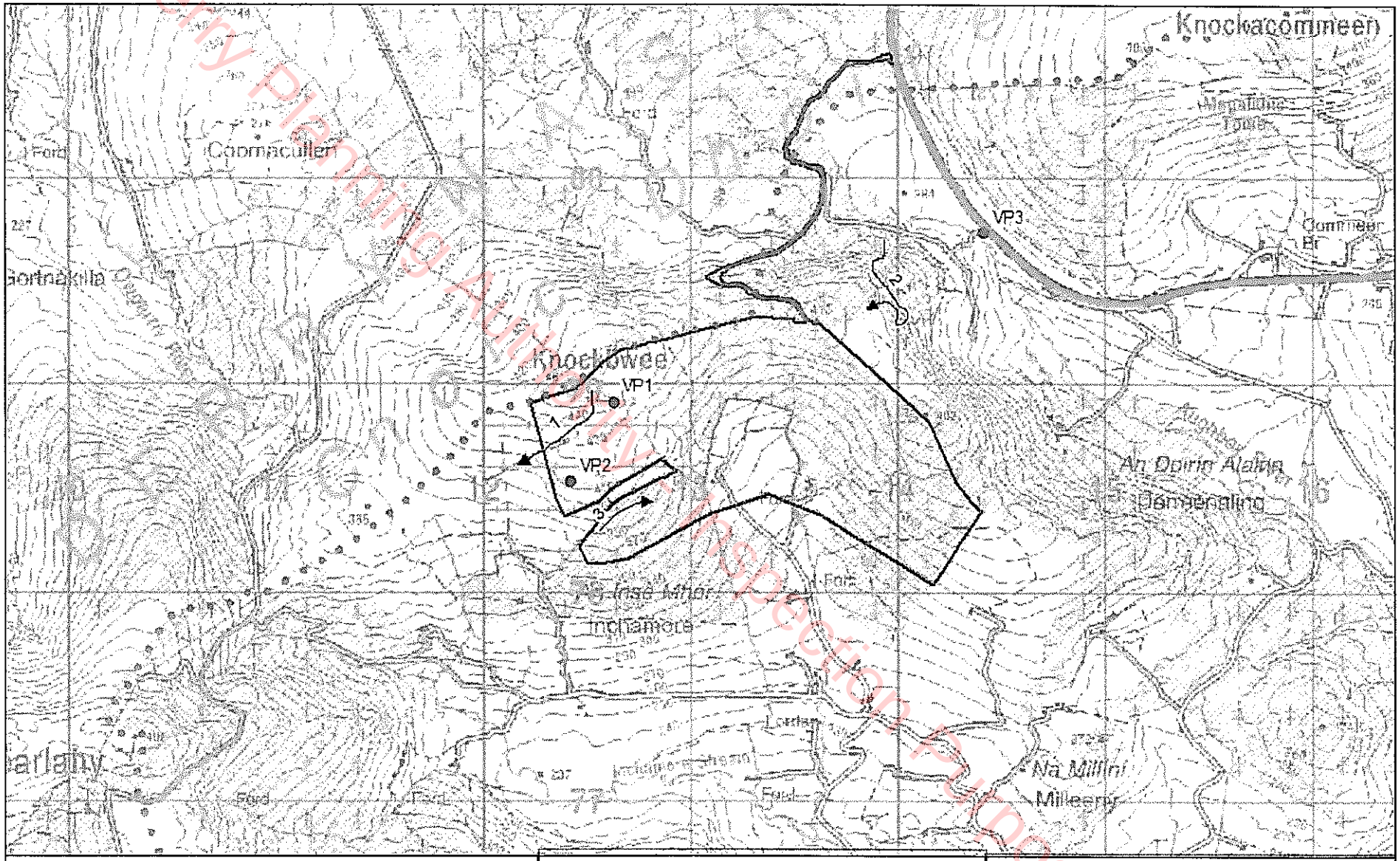
sse Renewables

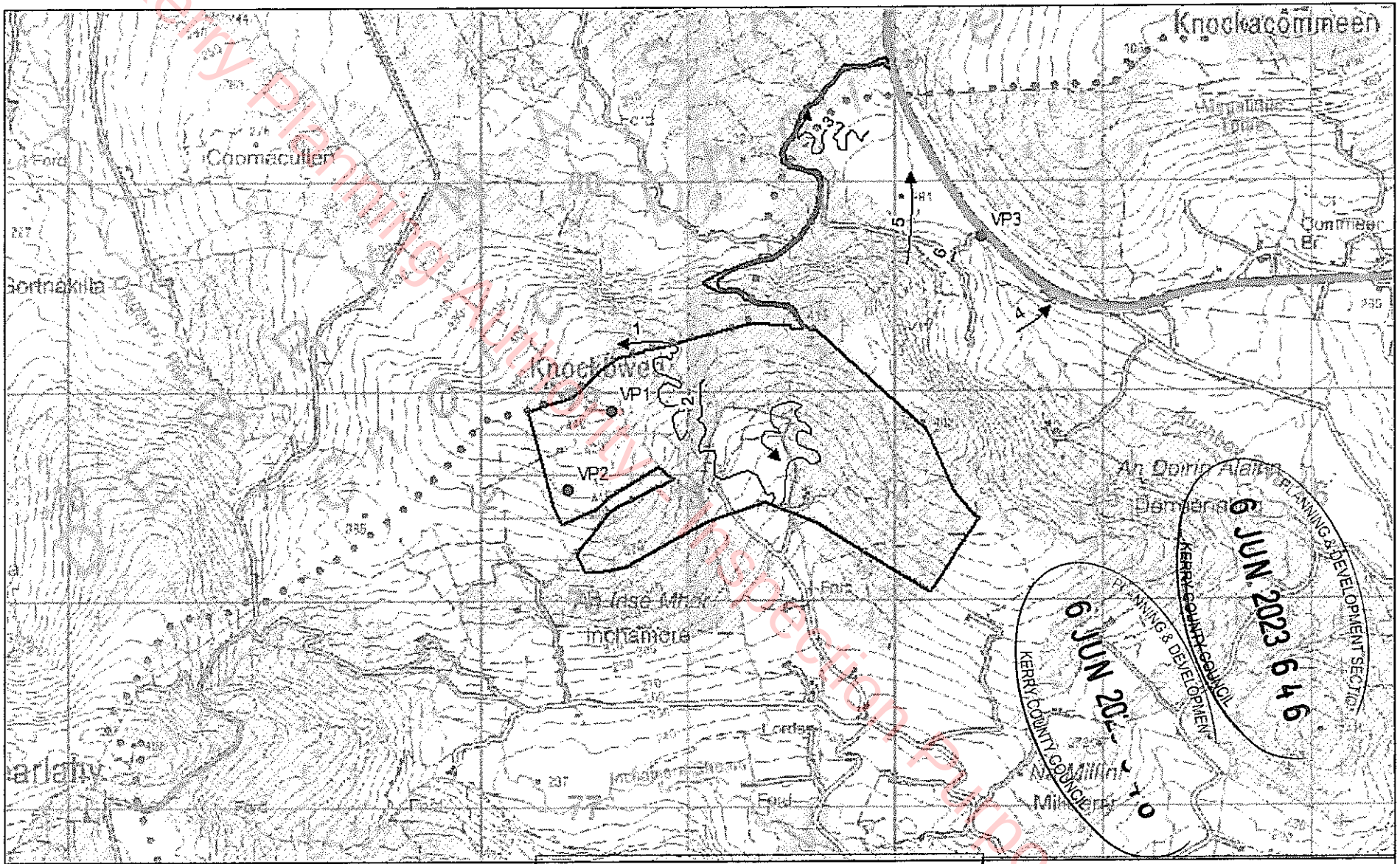
COILLTE

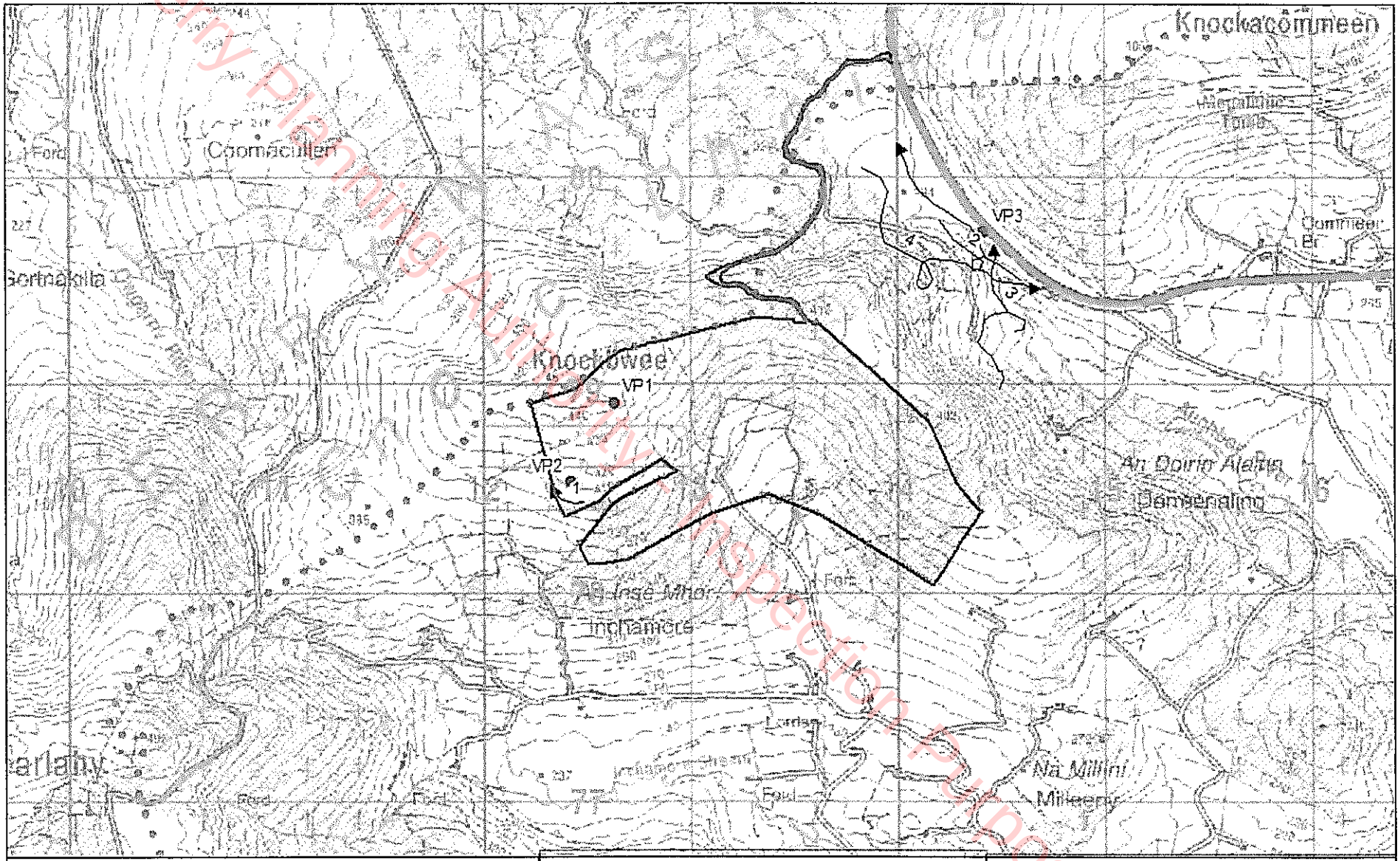


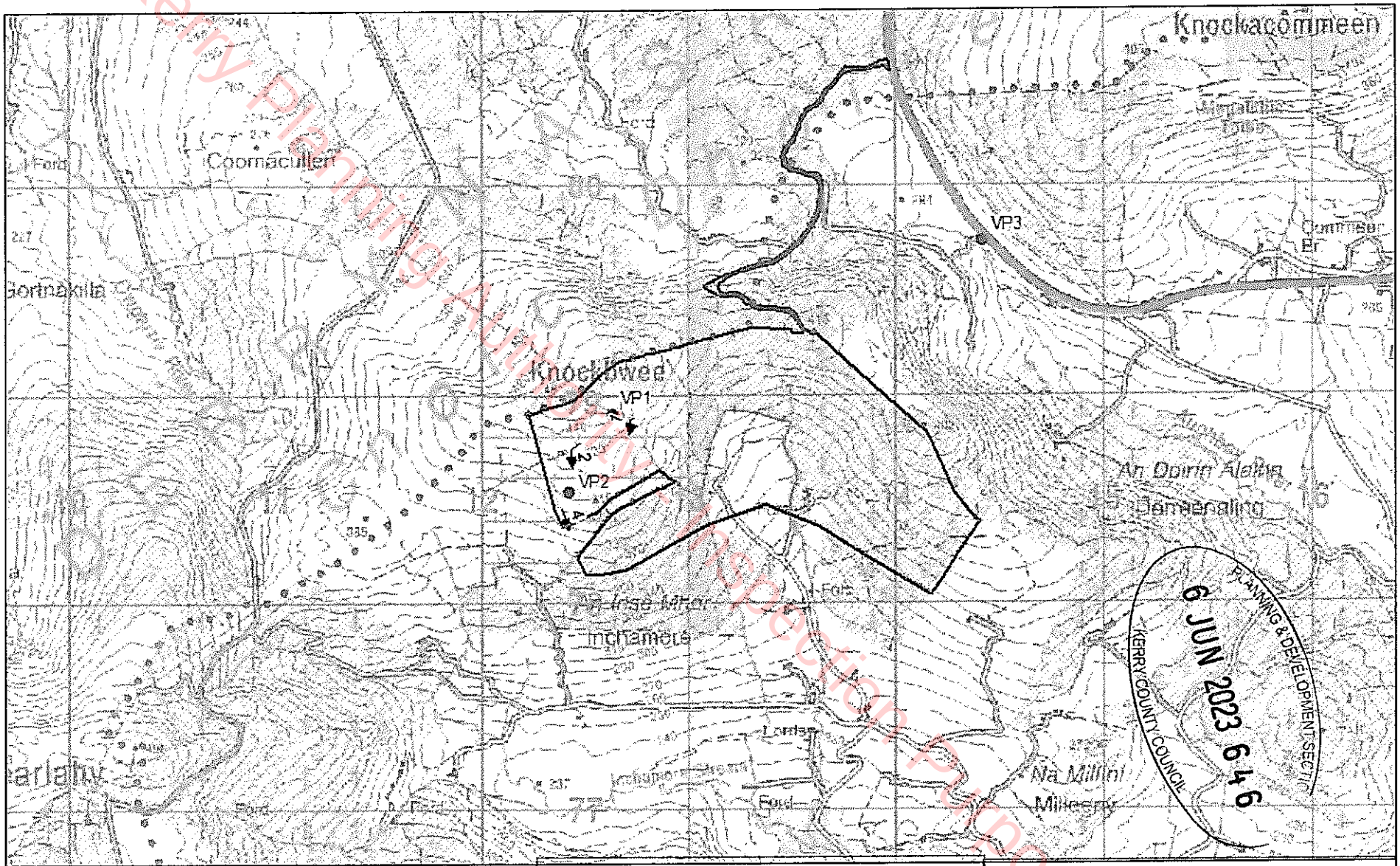


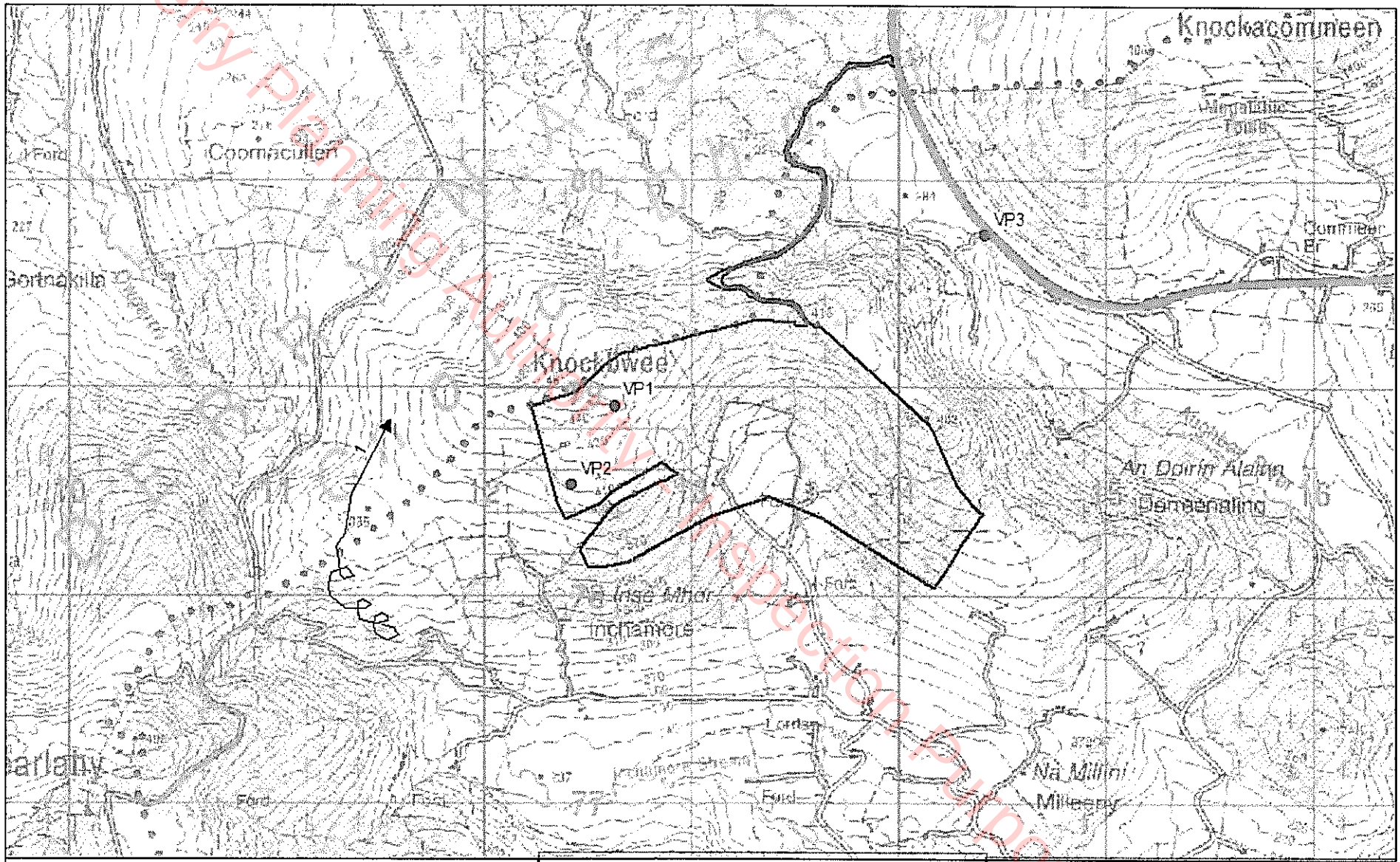












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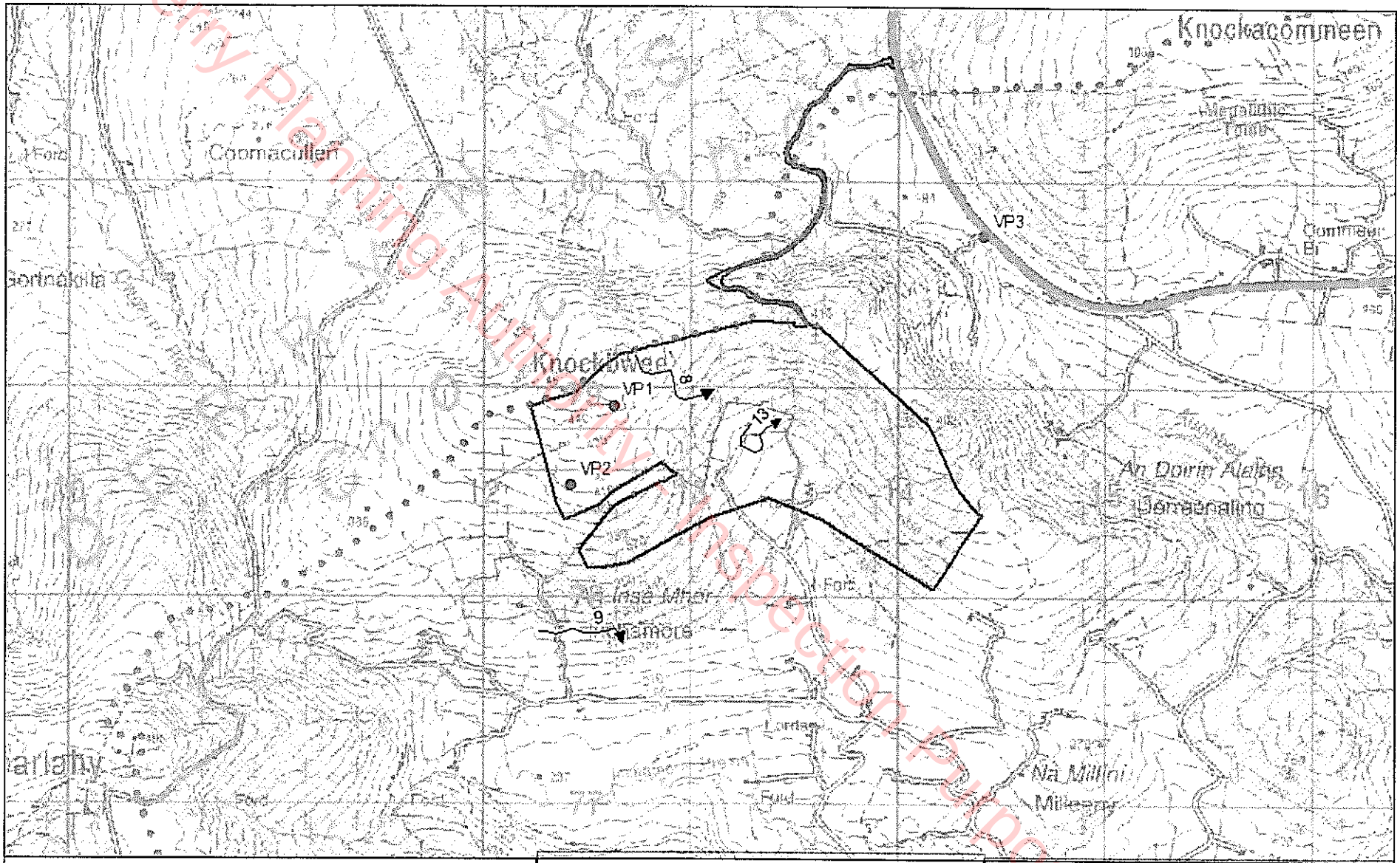

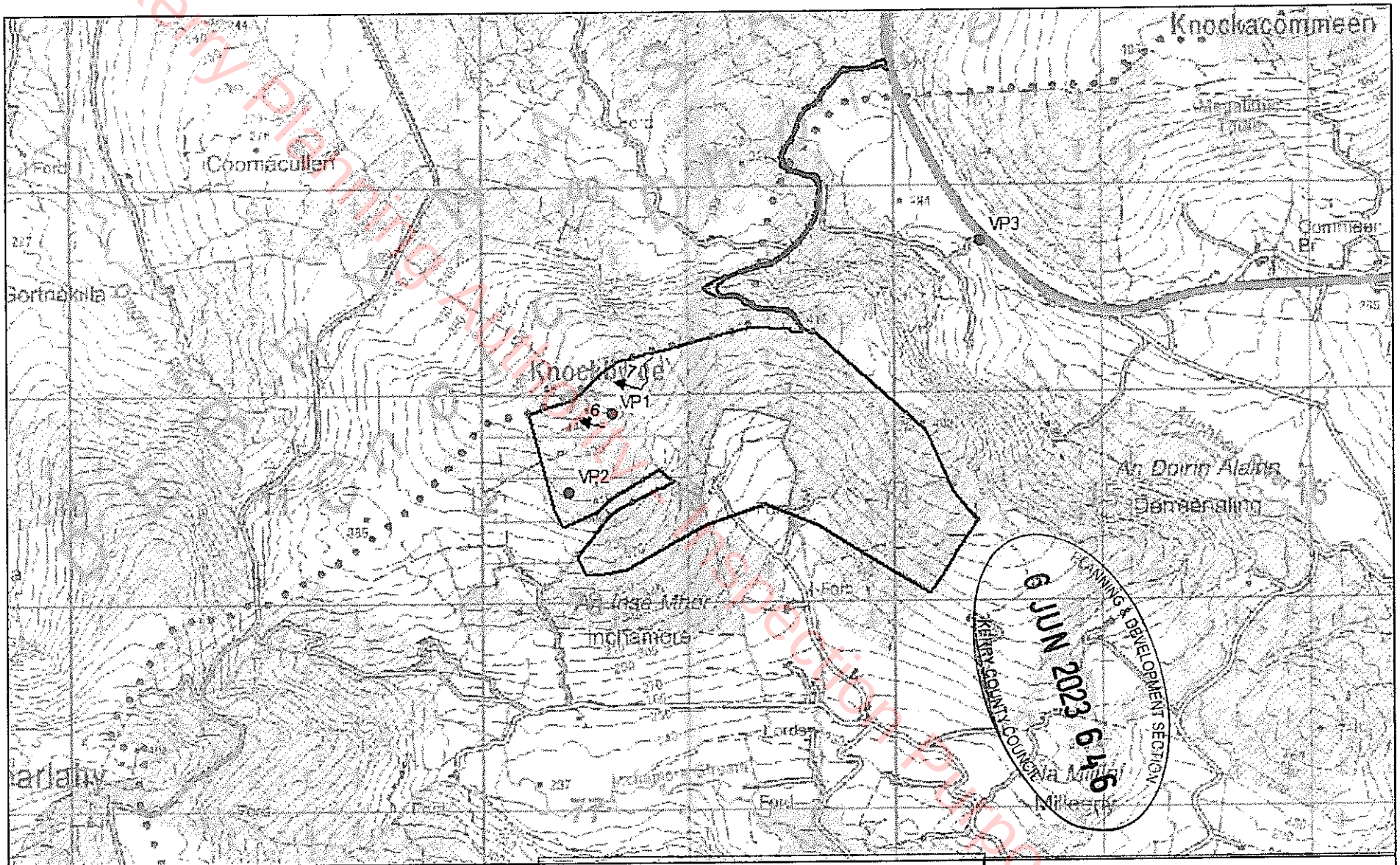

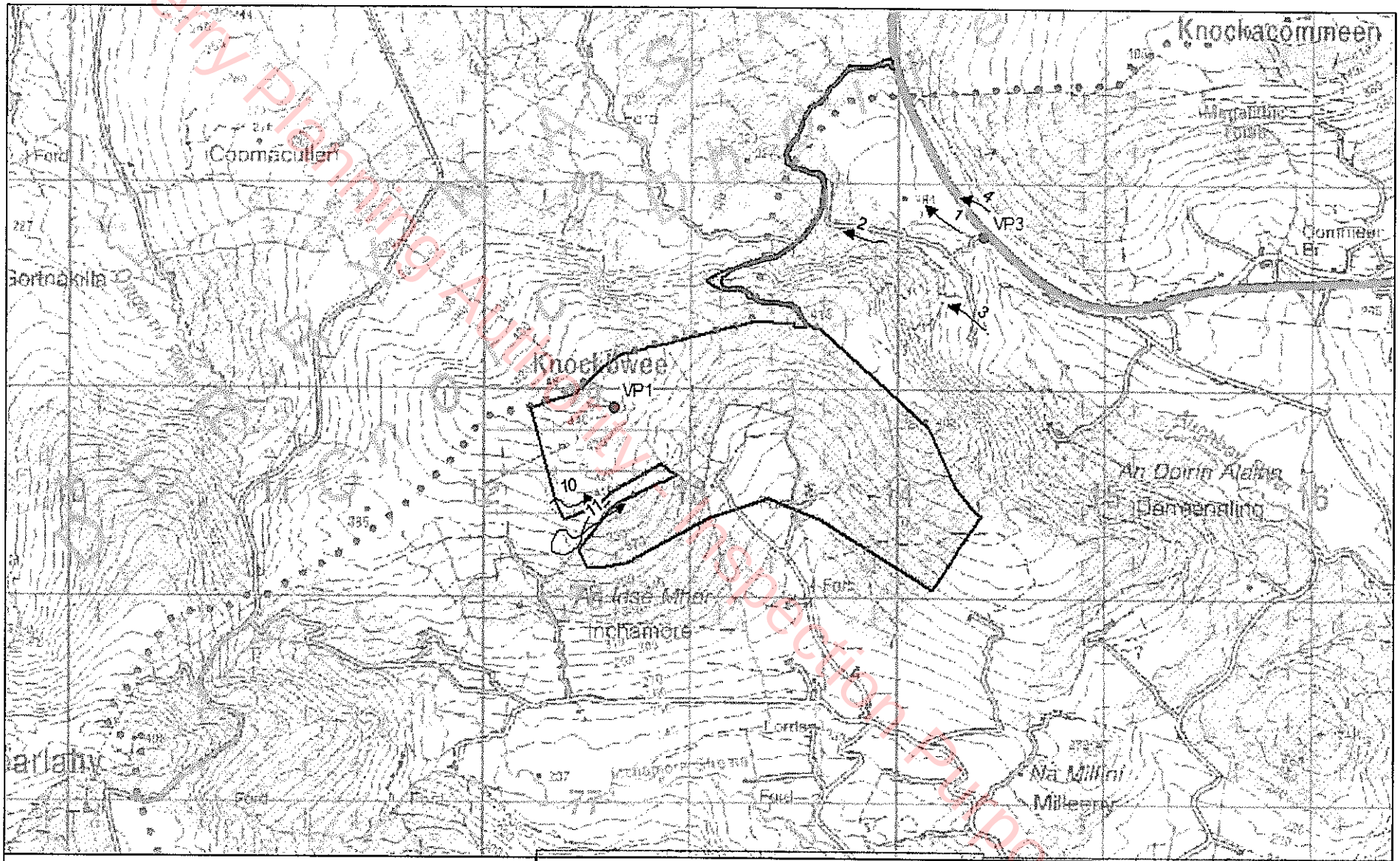

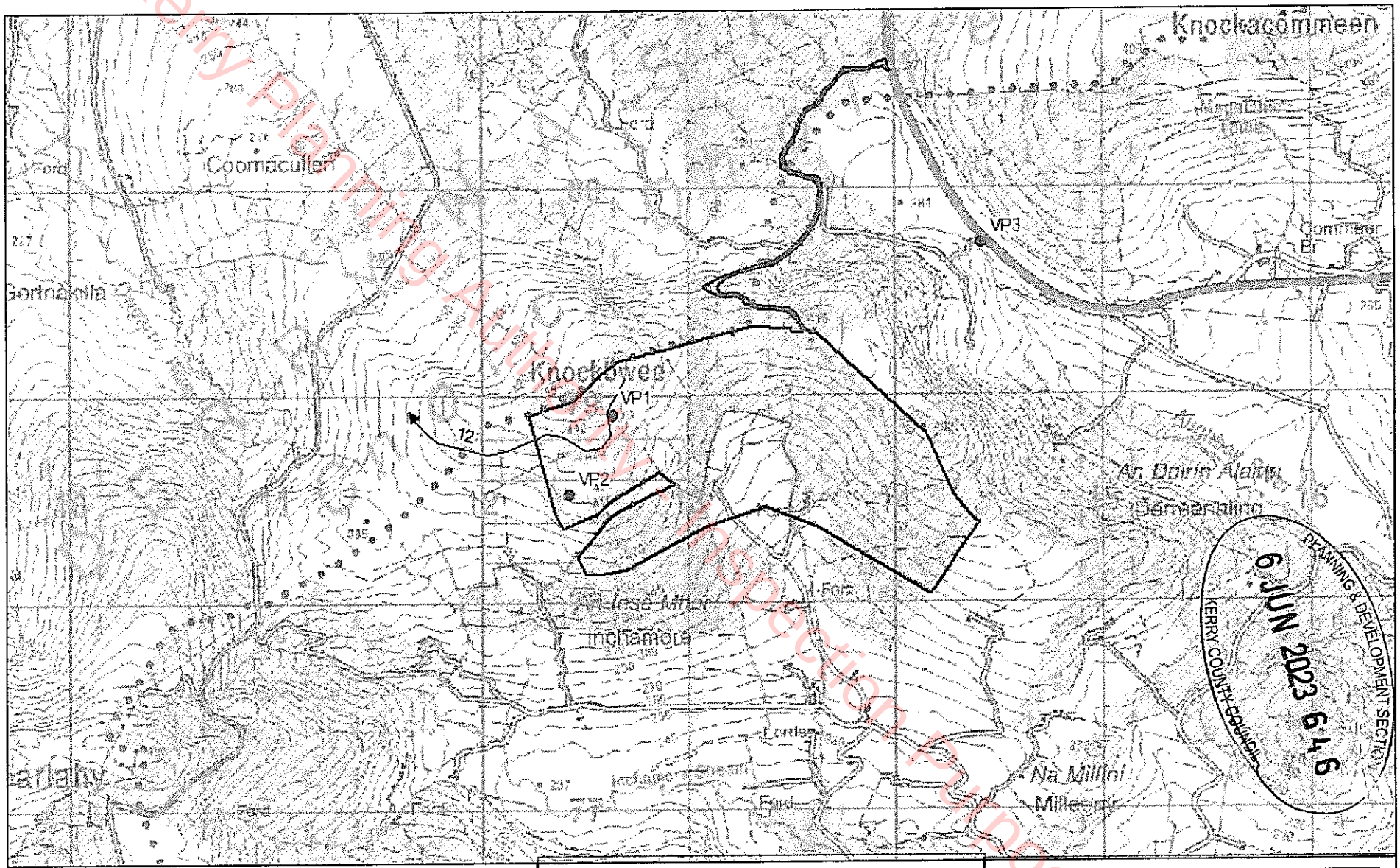

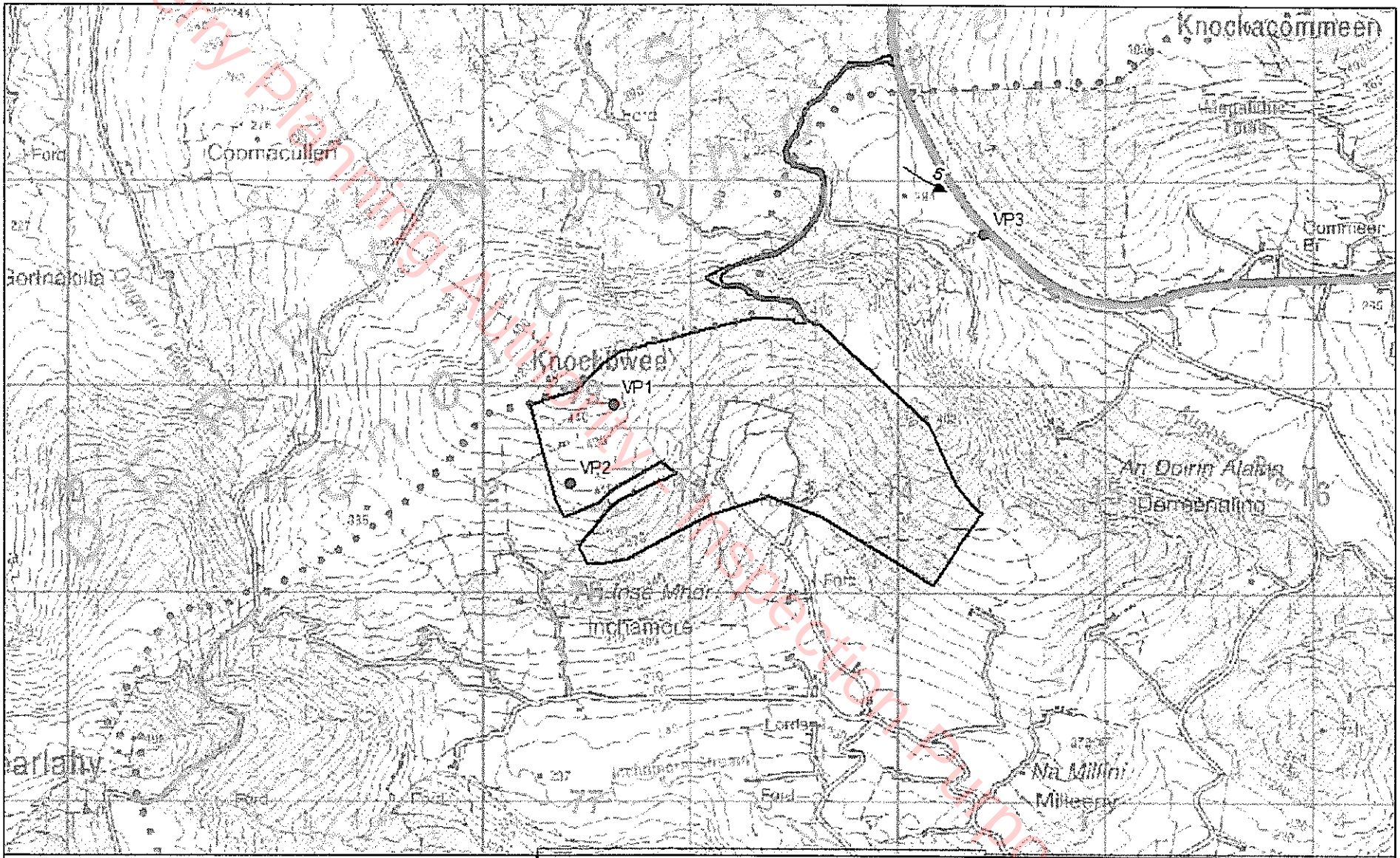

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2	0	3	K.	2020-10-09	14:28	3
3	0	3	K.	2020-12-09	09:09	4
4	0	1	GP	2021-02-26	10:58	6
5	0	1	GP	2021-02-26	12:50	7
6	0	1	BZ	2021-02-26	15:55	8
7	0	2	BZ	2021-02-28	11:54	9
8	0	2	K.	2021-02-28	12:03	10
9	0	2	K.	2021-02-28	15:25	11
10	0	2	PE	2021-02-28	15:33	12
11	0	2	BZ	2021-02-28	15:36	13
12	0	3	SH	2021-02-04	10:56	5

BTO_name
Kestrel
Kestrel
Kestrel
Kestrel
Golden Plover
Golden Plover
Buzzard
Buzzard
Kestrel
Kestrel
Peregrine
Buzzard
Sparrowhawk

APPENDIX 7.17:

COLLISION RISK MODELLING REPORT

VEON Forestry, Ecology & Environment

Collision Risk Modelling

Inchamore Wind Farm Development

Inchamore, Coolea, Co. Cork

Compiled by: Veon Ecology,
David M. McGillycuddy B.Sc. (Hons) in Wildlife Biology.

Prepared for: BioSphere Environmental Services.

Completion Date: 2nd March 2023

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Details of relevant qualifications/ affiliations/years of experience	David M. McGillycuddy B.Sc. (Hons) in Wildlife Biology at MTU, QCIEEM Munster Technological University (MTU) Over 6 years' experience working as an ecologist & wildlife education officer at TBW Eco Centre. Completed several key projects and produced reports regarding Biodiversity Action Plans (BAP), Climate Action Plans (CAP), Natura Impact Statement (NIS), Ecological Impact Assessment (EcIA) & habitat mapping etc.
Describe scope of contribution in preparing this report	Desktop Survey, Collision Risk Modelling, Collision Risk Assessment, Finalising report.

Veon Ltd. Veon Ecology							
Revision	**Description**	**Author:**	**Date**	**Reviewed By:**	**Date**	**Authorised by:**	**Date**
1	Draft Report	DM	31/04/2023	DP	02/05/2023	-	-
2	Final Report	DM	-	-	-	-	-

Executive Summary

This report presents the outcome of a Collision Risk Assessment for target species at the proposed Inchamore Wind Farm Development (Summer 2017 to Winter 2018/2019) located in Inchamore, Coolea, Co. Cork. The contents of this report, prepared by Veon Ecology are true and have been prepared with due regard to the Chartered Institute of Ecology and Environmental Management's (CIEEM) Code of Professional Conduct.

Section 1: INTRODUCTION

1.1 Background

Veon Ltd. (Veon Ecology) has been appointed by BioSphere Environmental Services, to carry out a Collision Risk Assessment for target bird species at the proposed Inchamore Wind Farm Development in Inchamore, Coolea, Co. Cork. This Assessment uses standardised Collision Risk Modelling (CRM) methods.

This document has been prepared by David M. McGillycuddy of (Veon Ecology) Veon Ltd. to assess the collision risk for birds (i.e. target species) at the proposed Inchamore Wind Farm Site. The collision risk assessment, prepared by David M. McGillycuddy B.Sc. (Hons) in Wildlife Biology at MTU, QCIEEM, is based on vantage point surveys undertaken at the development site from the breeding and wintering seasons of 2017 - 2019 inclusive. The data represents a 24-month survey period, consisting of two breeding seasons and two non-breeding (wintering) seasons, in full compliance with the Scottish Natural Heritage guidelines SNH (2017).

Surveys were undertaken from April 2017 to March 2019, from three fixed Vantage Point (VP) locations, (i.e. VP1 – VP3) **(See Appendix 1)**. The locations of these VPs were strategically positioned to provide the maximum viewshed of the survey area from the minimum number of locations. Bird data gathered from VP3 was not included in the Collision Risk Modelling (CRM) calculations as this VP did not contribute any coverage to the proposed locations of the Inchamore turbines.

Collision risk is calculated using a mathematical model to predict the numbers of individual birds, of a particular species (i.e. target species), that may be collide with moving wind turbine rotor blades. The modelling method and calculations used in this collision risk assessment follows Scottish Natural Heritage (SNH) guidance often referred to as the Band Model (Band et al. 2007). The calculations and results attained from the Band model must be interpreted with a degree of caution. The bird occupancy method (SNH, 2000) was used to calculate the number of bird transits through the rotors, and the spreadsheet accompanying the SNH report was used to calculate collision probabilities for birds transiting the rotors occupied space.

This collision risk modelling used data from vantage point (VP) surveys carried out in the summers of 2017 and 2018, and winters of 2017/2018 and 2018/2019. VP surveys were SNH (Scottish Natural Heritage) compliant (SNH, 2017). Eight target species were recorded in flight within the study area during survey work. These include the following species Common Kestrel, Eurasian Sparrowhawk, White-tailed Eagle, European Golden Plover, Hen Harrier, Merlin, Peregrine Falcon and Common Buzzard. Two of the target species (White-tailed Eagle and European Golden Plover) recorded were present during the winter surveys only and two (Peregrine Falcon and Common Buzzard) were present during the summer surveys only, while the remaining four (Common Kestrel, Eurasian Sparrowhawk, Hen Harrier and Merlin) were present throughout the year.

Two stages are involved in the model:

- **Stage 1:** This includes the estimation of the number of birds or flights passing through the wind turbines rotor blades swept air space. Two forms of collision risk modelling are considered when referencing the Band Model. These are referred to as the "Regular Flight Model" and the "Random Flight Model". Transits are calculated in this assessment using the "Random Flight" model, due to the bird flight distribution and behaviour recorded.

- **Stage 2:** This includes the calculation of the probability of a bird strike occurring with rotor blades. The probability is calculated using a statistical spreadsheet which considers the turbine parameters and avian biometrics. This spreadsheet is publicly available on the SNH website (https://www.nature.scot/wind-farmimpacts-birds-calculating-probability-collision).

The results of Stage 1 and Stage 2 modelling gives a theoretical annual collision mortality rate and is based on the assumption that birds (i.e. target species) make no attempt to avoid colliding with the proposed turbines. Thus, an informal third stage is applied to the Stage 1 and Stage 2 results.

The final stage of the assessment provides for a "real life" scenario, i.e. to account for the avoidance measures taken by each bird species, worked out as a percentage applied to the stage 1 and 2 results. Birds usually demonstrate high rates of avoidance (i.e. 95-99%) according to SNH (2018). This final stage as a result is typically the most important feature of collision risk modelling.

The Band Model values are solely speculative and representative of worst-case scenario estimates, only drawing conclusions by assuming likely levels of active avoidance by specific species. As such, results obtained are dependent on the quality of field observation data and accuracy of the avoidance rates used and must therefore be interpreted with a certain degree of caution.

1.2 Proposed Development and Site Description

The proposed Inchamore wind farm development is located at Inchamore, Coolea, Co. Cork, approximately 5km west of Ballyvourney. The proposed development site comprises of c. 167 hectares and lies in close proximity to the Cork-Kerry county border. The receiving environment for the proposed wind turbine locations is representative of upland habitats and includes lands under active management for forestry and agriculture. The proposed development site is located in close proximity to other constructed windfarm developments (Grousemount, Midas & Foilgreana Wind Farm).

The proposed wind farm design on which this CRM is based, is comprised of five WTG turbines (Candidate Models: Siemens Gamesa SG 6.6 – 155, Nordex N149/5.X and Vestas V150). The Collision Risk Assessment (CRA) makes assumptions on the turbine specifications, such as rotor diameter and rotational speed. Because the final choice of turbine is not known at this stage, the worst-case scenario is assumed. The worst-case scenario is a combination of the maximum collision risk area (affected by hub height and rotor blade length), maximum number of turbines proposed and minimum turbine downtime (i.e. non-operational time) using the specifications of the candidate WTG turbines. Turbine specifications for the proposed Inchamore Wind Farm development site used as per this CRM are shown below in **Table 1.1**.

Table 1.1: Wind turbine specification and Wind farm Parameters for Inchamore Wind farm development

Wind Farm Components/Turbine Parameters	
Technical Information and Wind Farm Component	**Data used/Scenario Modelled**
Turbine model	Siemens Gamesa SG 6.6 – 155
Number of turbines	5
Number of blades per turbine rotor	3
Rotor blade maximum chord (m) (i.e., depth of blade)	4.5m
Blade Length (m)	76m
Rotor radius (m)	77.5m
Rotor diameter (m)	155m
Circumference of blade tip (m) (Pi x Rotor Diameter)	486.7m
Swept area (m^2)	18,859.6
Turbine height (m)	180m
Hub height (m)	102.5m
Swept height (m)	25-180m
Maximum height to blade tip (m)	180m
Minimum height to blade tip (m)	25m
Max Tip Speed (m/s)	0.724256m/s
Rotation speed (rpm)	11.2rpm
Rotation period (s) (i.e., seconds per rotation)	5.3571s
Turbine operation time*	85%
Mean pitch angle of the blade during normal operation (degrees)**	13°

* The European Wind Energy Association (2016) provides an average operation time of a turbine of between 70% and 85%. In following the precautionary principal approach this CRM uses the 85% figure.

** The pitch angle of the turbine blade is determined by wind speed, which is variable depending on several factors including, location, local topographic, landscape etc. To maintain a constant operating speed the pitch angle of the blade is altered. The pitch angle of the turbine blade is greater in higher wind speeds to "feather" the wind in order to control rotation speed. The figure of 13° used in this assessment is derived from specifications provided by the client which advocates an average pitch of between 6 – 13 degrees along the length of the turbine blade. In following the precautionary principal approach, the greater 13° figure has been adopted as part of this model.

1.3 Statement of Authority

David M. McGillycuddy B.Sc. (Hons) in Wildlife Biology at MTU, QCIEEM is a qualified ecologist with over 6 years of experience working in the field of ecological research, teaching, and assessment. David is proficient in experimental design and data analysis and has managed a range of large-scale, multi-disciplinary ecological projects. These have included research and targeted management work for species of conservation concern, the design and delivery of practical conservation actions with stakeholders, education and interpretation on the interface between people and the environment and the development of co-ordinated, strategic plans for biodiversity.

David is an ecologist with Veon Ltd. and Veon Ecology and is experienced in several key environmental projects and the production of ecological reports regarding Biodiversity Action Plans (BAP), Climate Action Plans (CAP), Natura Impact Statement (NIS), Ecological Impact Assessments (EcIA), etc.

1.4 Data Sources

The following data and information were provided for this collision risk assessment:

- Data outlining all observations of flight activity recorded during the VP surveys.
- Mapping of the proposed turbine locations.
- Technical specifications for the proposed candidate WTG turbines.
- GIS mapping of flight lines recorded during the summers of 2017 and 2018 and winters of 2017/2018 and 2018/2019 VP surveys.
- Clarification about survey methodology.
- Mapping of the VP locations.

All of the survey data used in this assessment was provided externally by Wetlands Surveys Ireland. Additional information, including technical details (e.g. turbine specifications) were provided by the client.

1.5 Target Species

The key target species were selected in line with SNH (2017) guidance, thereby enabling VP surveys to focus on the species of greatest importance. In general target species are those species that are afforded a higher level of legislation protection and also includes species which are more likely to be subject to impact from wind farms, e.g., breeding and non-breeding species forming qualifying features for nearby SPAs or species listed on Annex I of the Birds Directive.

The following species recorded flights within the rotor swept height and inside the 2km arc of the selected vantage points during the VP surveys across 2017, 2018 and 2019:

- Common Buzzard (*Buteo buteo*)
- Common Kestrel (*Falco tinnunculus*)
- European Golden Plover (*Pluvialis apricaria*)
- Hen Harrier (*Circus cyaneus*)
- Peregrine Falcon (*Falco peregrinus*)

Other species of conservation concern were recorded in the vantage point surveys but were excluded from consideration in the collision risk analysis due to the following reasons:

Eurasian Sparrowhawk (*Accipiter nisus*) were not recorded flying within the collision risk height band. Thus, for this species, the collision risk can be assumed to be effectively zero excluding them from further consideration in the analysis.

Merlin (*Falco columbarius*) were only recorded flying within the collision risk height band from VP 3. VP 3 has been excluded from the analysis, as the viewshed does not include any of the proposed turbine locations. Since there are no turbines located within this viewshed, the predicted number of collisions is zero.

White-tailed Eagle (*Haliaeetus albicilla*) were recorded within the potential collision risk height bands from VPs 1 and 2. Although White-tailed Eagle was recorded within the collision risk height bands, the total flight time of these recordings does not exceed 70 seconds (No. 2 observations). Therefore, this species has been excluded from the analyses due to the low level of flight activity recorded.

1.6 Seasonal Definitions

For the species modelled (i.e. Common Buzzard, Common Kestrel, European Golden Plover, Hen Harrier and Peregrine Falcon), the CRM was constructed using data from the relevant breeding and non-breeding season periods, as defined by NatureScot in relation to Scotland and British Trust of Ornithology (BTO) which is also broadly applicable to Ireland.

The data used in this CRM was collected over a period of 24 months from April 2017 to March 2019 inclusive, thereby providing data for two breeding season cycles and two winter cycles for the target species. For each target species included in the CRM, collision risk predictions were calculated for both relevant seasonal periods within each 12-month cycle (see **Table 1.2** for the seasonal divisions for each species). The sum of these separate summer and winter CRM results was taken as the predicted annual collision risk rather than using results from a single all-year CRM. This method minimised any potential biases that may arise from seasonal variation in daylength and the number of hours of activity available to each species in each month. This was to increase precision of the CRM and to ensure that any potential underestimation or overestimation for a species risk of collision was minimised as much as possible.

Table 1.2: Seasonal divisions of relevant target species.

Species Name	Breeding season start	Breeding season end	Non-breeding season start	Non-breeding season end
Common Buzzard	April	August	September	March
Common Kestrel	April	August	September	March
Golden Plover	April	August	September	March
Hen Harrier	March	August	September	February
Peregrine Falcon	March	August	September	February

The number of hours that birds are potentially active during the day for the breeding and non-breeding season forms part of the CRM model. This is calculated as 15 hours per day for the summer survey period (i.e. the breeding season) and 10 hours per day for the winter survey period (i.e. the non-breeding season). These figures of activity are based on the average calculation of daylight minutes within the season of analysis and are likely to be over-estimated. These figures would be difficult to quantify in simple terms otherwise, although, the use of an over-estimation of species activity time increases the likelihood of a collision as birds are considered to be more active (i.e. increased flights) than if activity hours were reduced. This approach therefore offers an additional precaution in determining collision risk, and therefore a more robust estimation for collision risk assessment.

The hours that a species may potentially be active was calculated to include daylight, one hour before sunrise, and one hour after sunset (dusk) for all species with the exception of golden plover. For this species it was calculated as daylight, one hour before sunrise, one hour after sunset (dusk), and 25% of the night (SHN, 2017). These flight activity hours were calculated from timeanddate.com.

1.7 Limitations and Constraints

There are a number of limitations and constraints associated with pre-planning ecological assessments for potential development sites, as well as constraints and limitations inherent to the collection and analysis of field-based ecological data. The field survey data evaluated as part of this Collision Risk Assessment was received from Wetland Surveys Ireland. The data comprised of the following:

- Bird flight data from timed Vantage Point surveys. This data consisted of flights within the rotor-swept height bands. The vantage point surveys recorded flight heights in five bands: 0-20 m; 20-40 m; 40-80 m; 80-150 m and > 150 m. The 20-40 m; 40-80 m; 80-150 m and > 150 m height bands have been taken to represent the flight activity within the potential collision risk height zone. Flight duration (in seconds) for all bird observations along with data relevant to each flight record (date, weather conditions, timing, VP number (location), etc.) were provided.

- Vantage Point survey effort data (i.e. hours of observations) on a monthly basis during the summer and winter seasons of 2017 - 2019 (April 2017 to March 2019 inclusive) for all VP survey work undertaken.

- Description and metrics for the wind farm as a whole as well as for individual turbine parameters.

- Area viewed from each vantage point.

This CRM relates specifically to the provided vantage point survey data which has not been independently validated by the author of this report. Any variation in the coverage of the vantage points surveyed during fieldwork, flight data, layout of the wind farm/turbine locations as well as the individual turbine specifications would require the outputs from this CRM to be amended.

For field-based surveys, the availability of suitable weather conditions is important with good visibility and little wind or rain. The flight data used as part of this CRM was collected during optimal weather conditions, as determined by Best Practice guidance. As a result, this required the re-arrangement of monthly schedules in some circumstances, with certain VPs being additionally surveyed in one month to compensate for months when no survey work took place. These alterations in survey schedules are indicated within the data provided. It should be noted that these scheduling re-arrangements are still in line with Best Practice guidelines which requires a minimum coverage or two years of data. The requirement in the SNH (2017) guidance is for 36 hours of VP survey effort per season. For a single species, this is equivalent to 72 hours of VP survey effort per year.

There were a small number of flights for which the number of birds, or duration of flight, were not recorded. Where the number of birds was not recorded, it is assumed that the flight referred to a single bird. Where the duration was not recorded, the mean flight duration for that species was used (in the relevant season, if there was sufficient data, or across the entire dataset).

Section 2: ASSESSMENT AND METHODOLOGY

In regard to the Band Model, two forms of collision risk modelling are typically considered. These are generally referred to as the "Regular Flight Model" and the "Random Flight Model". The "Regular Flight Model" is generally applied to flightlines which comprise of a more regular pattern such as a commuting corridor between feeding grounds, migratory routes and roosting sites. As a result, the "Regular Flight Model" is typically more relevant for aquatic bird species, particularly swans and geese. The alternative "Random Flight Model" is more relevant for species and scenarios whereby no apparent flight routes or patterns can be associated with a species within the survey area. Thus, Random flights is most prevalent when investigating hunting or foraging flight behaviour.

Collision Risk Modelling (CRM) adopts a mathematical approach to determining the probability of a bird species colliding with wind turbine rotors at a pre-defined site and is described in detail by Band *et al.* (2007) and Scottish Natural Heritage (SNH, 2000), with additional supporting information provided by Scottish Natural Heritage (SNH, 2018).

This report is based upon field data collected at the Inchamore wind farm development, located at Inchamore, Coolea, Co. Cork, approximately 5km west of Ballyvourney. The proposed development site comprises of c. 167 hectares and lies in close proximity to the County Cork/Kerry border. The receiving environment for proposed wind turbine locations is representative of upland habitats and includes lands under active management for forestry and agriculture. The resulting output from the model indicates the number of birds likely to collide with rotors of all 5 turbines within the proposed wind farm development per year of operation of the overall wind farm as a whole. The inverse of this (i.e. the number of years over which a single fatality would be likely) is additionally calculated.

The "**Random Flight Model**" examines the predicted number of transits through the windfarm site with regard to all flights recorded within the viewshed (i.e. a 2km arc of the vantage point) as randomly occurring. The random flight model therefore assumes that any observed flight could occur both within and outside of the wind farm site with equal likelihood. The viewshed of a given VP should extend to a distance no greater than 2km and include an arc of no greater than 180 degrees, as per the SNH (2017) guidelines. Any flights recorded within the rotor swept height and inside the 2km arc of the vantage point are included in the model.

The Random Flight Model has a number of limitations and assumptions.

- Both habitat and bird activity will remain the same over time and be unchanged during the operational stage of the proposed windfarm development.
- Bird activity is not spatially explicit, i.e. bird activity is equal throughout the viewshed area and this is equal to activity in the proposed windfarm development area.
- All flight activity used in the model occurred within the viewshed area calculated at the lowest swept rotor height. (e.g. if the lowest swept height of the turbine blade is 20m, the viewshed coverage displaying the visibility of the area within the 2km arc at a height of 20m above ground level is used). All flights are assumed to have occurred within this visible area, although many are likely to have been above this. The calculation for survey area visible (AVP) from each VP in the model is therefore highly precautionary as it is likely to have been a larger area of coverage for much of the flight activity.

The "**Regular Flight Model**" examines the predicted number of transits through a cross-sectional area of the windfarm which represents the width of the commuting corridor. A "risk window" comprises of a 2-dimesional line which represents the width of the windfarm in addition to a 500m buffer for each of the turbines, multiplied by the rotor diameter. All flights which pass through the identified risk window, within the swept height of the turbines, are included in the collision risk modelling. Any regular flights more than 500m from the turbine layout can be excluded from analysis.

The Regular Flight Model has a number of limitations and assumptions.

- Firstly, that the turbine rotor swept area is 2-dimensional, i.e. there is a single row of turbines in the windfarm. This represents all turbines within the commuting corridor accounted for by a single straight-line.
- It is assumed that bird activity is spatially explicit.
- Birds in an observed flight only cross the turbine area once and do not pass through the cross-section a second time (or multiple times).

Further details regarding both the Random and Regular Flight Model calculations are available on the SNH website. https://www.nature.scot/wind-farm-impacts-birds-calculating-theoreticalcollision-risk-assuming-no-avoiding-action.

The data used as part of the model, such as the number, size, dimensions and likely functioning of the proposed turbines for the Inchamore Wind Farm Development Site (See **Table 1.1**) forms part of the calculations, along with the available bird biometric data (See **Table 1.2**). These values are modelled with the standardised field data collected using Best Practice methods on surveying birds flight activity within the proposed Inchamore Wind Farm Development Site.

The data is collectively modelled to predict the number of bird flights through the rotors of all turbines within the site on an annual basis (CRM Stage 1) as well as the probability that a bird flying through the turbine will collide with the rotors (CRM Stage 2). The product of the numerical output from these two stages of assessment then predicts the number of birds likely to collide with the rotors of the turbines if no avoiding action is taken. This value is then corrected using the available avoidance rates (CRM Stage 3), to give a final indication of collision risk (number of bird colliding with the turbine rotors per annum).

The steps used to derive the collision risk for birds observed at the proposed development according to the Band Model are summarised below:

- Stage 1 (Band model): this model uses observations of birds flying through the study area during vantage point surveys to calculate the number of birds estimated to fly through the proposed turbines blade swept areas.
- Stage 2 (Band model): this model calculates the collision risk for an individual bird flying through a rotating turbine blade. The collision risk depends on the flight behaviour and biometrics.
- The result of the number of birds calculated to fly through the turbines annually is then multiplied by the collision risk probability. This calculation gives the worst-case scenario and assumes that birds flying through the site make no attempt to avoid turbines.
- Stage 3: An avoidance factor is applied to the result of the collision risk model to account for avoidance of the turbine rotors by bird species. Avoidance rates are available from SNH online bird collision risk guidance (SNH 2018). This avoidance rate corrects for the ability of the birds to detect and move around the turbines. This final output after all steps of modelling is a real-world estimation of the number of collisions that may occur at the proposed wind farm based on observed bird activity during the survey periods.

Several assumptions were made in the calculation of collision risk for the proposed Inchamore Wind Farm Development. These assumptions are tailored specifically to Inchamore Wind Farm Development and are as follows:

- Birds in flight within the study area at heights greater than 20m above ground level are assumed to be in danger of collision with the rotating turbine blades.

- No preference was taken for birds using gliding or flapping flight through the study area for target species as they exhibit both behaviours. In the calculation of the percentage risk of collision for a bird flying through a rotating turbine, the mean of the worst-case scenario (i.e. a bird flying upwind through a turbine using flapping flight whilst the turbine is at its fastest rotation speed) and the best-case scenario (i.e. a bird flying downwind through a rotating turbine using a gliding flight whilst the turbine at its slowest rotation speed) has been used for birds which exhibit both flapping and gliding flight. However, for Golden Plover (*Pluvialis apricaria*) only the mean calculations for flapping flights were used.

The Collision Risk Assessment (CRA) also makes assumptions on the turbine specifications, such as rotor diameter and rotational speed. Because the final choice of turbine will not be known until a later stage in the planning process, the worst-case scenario is assumed. The worst-case scenario is a combination of the maximum collision risk area (i.e. swept area determined by hub height and rotor blade length), maximum number of turbines proposed and turbine operational time. The turbine and wind farm characteristics for the purposes of this assessment at the proposed Inchamore Wind Farm Development Site are presented in **Table 1.1**.

2.1 Determination of Bird Flights Through the Rotor Swept Area

Stage 1 of the CRM determines the number of transits through the rotors for a given period or season. For the calculations below, this is expressed as the number of birds flying through the rotors per season (Breeding and Non-breeding).

Flight data was recorded at fixed vantage point locations from April 2017 to March 2019 inclusive and the data was provided to Veon Ecology to undertake the Collision Risk modelling for the relevant target species. A potential collision risk height (PCH) of between 20m and 180m above ground was established based on the proposed turbines having a maximum blade tip height of 180m, and a rotor diameter of 155m. This ensured that the PCH was within the rotor sweep of the turbine but also, slightly overestimates the risk of collision as it greater than the actual turbine swept area. The flight height of species was classified into height bands (HB) as follows: HB1 = 0-20m, HB2 = 20-40m, HB3 = 40-80m, HB4 = 80-150m, HB5 = 150m+. Behavioural observations were also recorded with the minimum requirement of 36 hours per VP per season (breeding and non-breeding) and 72 hours of VP survey effort per year achieved.

The VP Arc for each VP is a 180° arc with a radius of 2km from the vantage point location, which represents the theoretical maximum coverage area. The viewshed represents the actual area visible to the surveyor at a specified height above ground level from the vantage point location within each VP Arc. GIS computer software was used to generate the viewsheds for each VP. Flight data from the viewshed mapping for each VP was used to inform this CRM.

In the case of birds observed during surveys for the proposed Inchamore Wind Farm Development, flights recorded from surveys were classified for the purpose of the analysis as "randomly" distributed flights which could occur anywhere within the given viewsheds. The "Random Flight Model" is used in cases of irregular flight activity such as that displayed by raptors occupying a recognized territory, or by waders. This model requires calculation of the proportion of time birds were observed flying per unit of survey area. Therefore the "Random Flight Model" was applied for each target species to calculate the predicted number of transits through the proposed wind farm site.

The proportion of flight time between 20 and 180m for a bird species for each of the VPs was calculated. If multiple birds were observed in one flight, the seconds spent at PCH were calculated by multiplying the number of birds observed per flight by the duration of the flight at PCH (in line with SNH, 2000).

The hours that a species may potentially be active in either a breeding or non-breeding season was calculated to include daylight, one hour before sunrise, and one hour after sunset (dusk) for all species with the exception of Golden Plover. For this species it was calculated as daylight, one hour before sunrise, one hour after sunset (dusk), and 25% of the night (SHN, 2017). These flight activity hours were calculated from timeanddate.com.

Flight activity was used to calculate the number of bird passes through the rotor for each VP in turn and per turbine within each viewshed before being calculated for the entire wind farm. The Stage 1 calculation was carried out for each season (i.e. breeding and wintering) for each species.

2.2 Probability of Collision of Birds Passing Through the Rotor Swept Area

The probability of a birds flying through the rotors and colliding with the turbine blades is determined in Stage 2 of the CRM. The probability of a collision depends on the species biometrics including size (both length and wingspan) and average flight speed. In order to simplify the calculations for this CRM, all birds are assumed to be of simple cruciform shape, with the wings half-way down the length of the body. Characteristics of the turbine and rotor blades are also required as part of the calculations, including the pitch and width of the turbine rotor blades and the rotation speed of the proposed turbines. For Stage 2 of the CRM, the turbine rotor blades are assumed to have no thickness, although the blade depth is considered in Stage 1 of the model.

The risk of a bird colliding with the turbine rotor blades changes depending upon whether the bird passes through the rotor swept area towards the tip of the blade (where the blades are only present for a small proportion of the time, having a short chord width and a faster rotational time) or next to the turbine hub (where the blades have a wider chord width, occupy a larger volume of airspace and are travelling at slower speeds). Towards the blade tips, it is the length of the bird that offers greater contribution to the determination of the risk of collision. Closer to the turbine hub, the wingspan of the bird compared to the physical distance between the blades is the controlling factor. The bird is assumed to enter the rotor swept area at random anywhere along the disc.

The calculations determine the collision risk at several locations along the length of the rotor blade (in intervals of 0.05R, where R is the radius of the rotor swept area) using numerical integration of various elements in relation to the rotors (notably angular velocity of the blade and chord width) and the bird (such as the point at which the bird enters the rotor along the radius and the flight speed of the bird). These are calculated for both downwind and up-wind flights and averaged to give a probability of collision per season, assuming no avoiding action is taken.

The calculations are performed in the SNH collision risk model, where the relevant data on the turbines and bird biometrics are entered into the model, and the model estimates the probability of a collision when a bird flies through the rotor area. This calculation is based solely upon the behaviour and biometrics of the bird and the specifications of the turbines proposed at the Inchamore site.

For the Inchamore Wind Farm development site, the average probability of each species passing through the wind farm and colliding with the rotors if it takes no avoiding action is presented in **Table 3.4**.

Section 3: RESULTS

The Collison risks were calculated using flight data recorded during vantage point watches at three fixed vantage point locations (VP1-VP3) within the study area between April 2017 and March 2019. The target species recorded within the potential collision risk zone included Common Buzzard (*Buteo buteo*), Common Kestrel (*Falco tinnunculus*), European Golden Plover (*Pluvialis apricaria*), Hen Harrier (*Circus cyaneus*) and Peregrine Falcon (*Falco peregrinus*).

The calculation parameters are outlined in **Tables 3.1, 3.2** and **Table 3.3**. A worked example of the calculation of collision risk for Hen Harrier is available in Appendix 4. **Table 3.1** below presents the details on the viewshed area for each VP.

Table 3.1: Summary of CRM parameters for VPS at Inchamore Wind Farm

Vantage Point	VP Arc (ha)	Viewshed area within VP Arc (ha)	Viewshed Coverage (%)	Turbine Buffer Area Within Viewshed (ha)	No. of Turbines Within Viewshed	Total Survey Effort (hrs)
VP 1	628	400	63.69	274.18	4	147.75
VP 2	628	376	59.87	128.98	2	153.5
VP 3	628	306	48.73	58.5	0	139.13

Species-specific morphometric measurements, flight speeds and avoidance rates are shown in **Table 3.2.** The amount of time a species was observed flying at heights of between 20 - 180 metres, i.e. within the Potential Collision Height (PCH), is presented in **Table 3.3** below. Birds in flight within the study area at heights between 20m and 180m are assumed to be in danger of collision with the rotating turbine blades. This is a precautionary approach as the lower extent of the swept area of the turbine blades will be greater than 20m.

Table 3.2: Avian Biometric Data and Avoidance Rates

Avian Biometric Data and Avoidance Rates				
Species Name	Length (m)	Wingspan (m)	Mean flight speed (m/s)	Avoidance rates (%)
Common Buzzard (*Buteo buteo*)	0.54	1.2	13.3	98
Common Kestrel (*Falco tinnunculus*)	0.34	0.76	10.1	95
European Golden Plover (*Pluvialis apricaria*)	0.275	0.715	17.9	98
Hen Harrier (*Circus cyaneus*)	0.48	1.1	12	99
Peregrine Falcon (*Falco peregrinus*)	0.42	1.02	12.1	98

Table 3.3: Bird biometrics and bird seconds spent by species at Potential Collision Height (20-180m)

Seconds spent at PCH (2017-2019)							
Species Name (BTO Code)	Seconds in flight at PCH (20-180m)						Total secs at PCH over 24 Months
	2017/2018			2018/2019			
	Summer	Winter	Total	Summer	Winter	Total	
Buzzard (BZ)	0	0	0	93	0	93	93
Kestrel (K.)	60	0	60	2,360	504	2,864	2,924
Golden Plover (GP)	0	61,363	61,363	0	7,725	7,725	69,088
Hen Harrier (HH)	0	6	6	156	25	181	187
Peregrine (PE)	0	0	0	530	0	530	530

Table 3.4: Number of collisions predicted for target species without the application of avoidance rates

Species	Year	Predicted collisions per season without avoidance rates applied		
		Breeding	Winter	Total
Common Buzzard	2017/18	0.000	0.000	0.000
	2018/19	1.24	0.000	1.24
Common Kestrel	2017/18	0.82	0.000	0.82
	2018/19	23.67	17.22	40.89
European Golden Plover	2017/18	0.000	4164.86	4164.86
	2018/19	0.000	423.49	423.49
Hen Harrier	2017/18	0.000	0.06	0.06
	2018/19	0.000	0.25	0.25
Peregrine	2017/18	0.000	0.000	0.000
	2018/19	6.15	0.000	6.15

Table 3.5: Number of collisions predicted for target species with the application of avoidance rates

Species	Year	Predicted collisions per season with avoidance rates applied			Predicted collisions over 30 year lifetime of the windfarm		
		Breeding	Winter	Total	Breeding	Winter	Total
Common Buzzard	2017/18	0.000	0.000	0.000	0.000	0.000	0.000
	2018/19	0.012	0.000	0.012	0.372	0.000	0.372
Common Kestrel	2017/18	0.008	0.000	0.008	0.247	0.000	0.247
	2018/19	0.237	0.172	0.409	7.100	5.166	12.266
European Golden Plover	2017/18	0.000	41.649	41.649	0.000	1249.459	1249.459
	2018/19	0.000	4.235	4.235	0.000	127.046	127.046
Hen Harrier	2017/18	0.000	0.001	0.001	0.000	0.017	0.017
	2018/19	0.000	0.002	0.002	0.000	0.075	0.075
Peregrine	2017/18	0.000	0.000	0.000	0.000	0.000	0.000
	2018/19	0.062	0.000	0.062	1.846	0.000	1.846

Table 3.6: Mean number of collisions predicted for target species with avoidance rates

Target Species Biometrics			
Species Name	Mean no. of predicted collisions per year	Mean no. of predicted collisions per 30 years	Equivalent to 1 bird every x (years)
Buzzard (BZ)	0.006	0.019	166.6
Kestrel (K.)	0.209	6.257	4.8
Golden Plover (GP)	22.942	688.253	0.04
Hen Harrier (HH)	0.002	0.046	500
Peregrine (PE)	0.031	0.923	32.6

Section 4: CONCLUSION

This CRM has been completed for the proposed Inchamore Wind Farm development. The VP survey data used for this CRM was collected over two summer surveys (breeding seasons) and two winter surveys (non-breeding seasons), which meets the requirements of current SNH guidelines.

There are a number of potential sources of uncertainty/error that apply to all CRM analyses. The main potential source of error is the accuracy of the surveys and flight activity data, which will affect the accuracy of the predicted transit rate, and the simplification involved in the calculations of collision probabilities.

The Band method used for this collision risk model is developed using several assumptions, particularly regarding bird characteristics and behaviour, and relies on the accuracy of the available information regarding species avoidance rates, turbine specifications, and survey data. As a result of these limitations and assumptions in relation to the CRM, the predicted collision risk should be considered only an indication of the potential collision risk significance for each target species.

The output of the first two stages of the model presents the number of predicted bird collisions with the proposed wind turbines per annum. This is the result of the number of bird transits through the rotor occupied space per season and the probability of a bird passing through the rotor swept area colliding with the turbine blades.

In the present assessment, the predicted collision risks are very low for all the target species, with only Golden Plover and Kestrel, being predicted to have any collisions within the nominal 30 year. Thus, the only species that are likely to have significant levels of collisions are Common Kestrel (*Falco tinnunculus*) and European Golden Plover (*Pluvialis apricaria*). It is clear from the VP surveys that there is a considerable amount of Golden Plover activity in the area during the non-breeding seasons with much of it seemingly at the Potential Collision Height (i.e. 20-180m). However, as discussed above, collision risk modelling is dependent on many assumptions and can be prone to biases.

The Kestrel, a year-round resident of the area, has a prediction of over six collisions every 30 years. However, this value is also liable to be rather tenuous as a large percentage of recorded kestrel flight activity likely involved hovering birds which suggests that the mean kestrel flight speed used in this CRM (i.e. 10.1 m/s) will not be a true indication of the mean flight speed of the kestrels observed during the surveys. Kestrels fly relatively quickly between hovering spots which may lead to an underestimation of their speed resulting in a greater predicted risk of collision than would likely occur in "real-life" scenarios.

It is most notably the flocking species of Golden Plover which are at the greatest potential risk of impact. With more than 688 collisions predicted every 30 years, Golden Plover is by far the species with the highest predicted collision risk output (See **Table 3.6**). Further assessment of the potential collision risk of Golden Plover at Inchamore is advised due to the potential high level of collisions indicated by this CRM. However, as the Golden Plover recorded are part of a wintering population, a single all-year CRM is likely to overestimate the collision risk of the species. The main activity area for Golden Plover lies within the viewsheds for VP 1 and 2, however, the entire turbine envelope does not occur within these viewsheds. The mean flock size recorded across the 2017/18 and 2018/19 winter seasons was of c. 25 individuals (a total of 21 observations comprising 533 individuals in total, with the peak flock size of 70 birds recorded in January 2018). It should be noted that the amount of time at collision risk height has been derived as a product of flight duration and the number of individuals in the flock. Furthermore, given the apparent random nature of golden plover flights, all of those observed within each viewshed (1 and 2) at collision risk height have been included in the CRM, including flights "out" of the collision-risk area. As such, the results of the CRM are likely to over-estimate the theoretical collision risk for Golden Plover.

In conclusion and with regard to the limitations and assumptions presented by collision risk modelling, the resulting predicted collisions should only be considered an indication and not a definitive result. Thus, the outputs of the collision risk modelling should be used solely as a comparative tool rather than an accurate indicator of bird mortality risk. Therefore, it is advised to interpret the results of CRM analyses as indicating only the order of magnitude of the predicted collision risk for given target species.

Section 5: REFERENCES

Alerstam, T., Rosén, M., Bäckman, J., Ericson, P.G. & Hellgren, O. (2007). Flight speeds among bird species: allometric and phylogenetic effects.

Band, W., Madders, M. and Whitfield, D.P. (2007). Developing field and analytical methods to assess avian collision risk at wind farms. In: Birds and wind power: risk assessment and mitigation. M. DeLucas, G.F.E. Janss and M. Ferrer, Eds.: 259-275.

Chamberlain, D.E., Rehfisch, M.R., Fox, A.D., Desholm, M., Anthony, S.J. 2006. The effect of avoidance rates on bird mortality predictions made by wind turbine collision risk models.

Cramp, S. (1993) Handbook of the Birds of the Western Palaearctic. Oxford University Press, Oxford.

Drewitt, A. & Langston, R. (2006). Assessing the impacts of wind farms on birds.

European Wind Energy Association. 2020. Wind energy's frequently asked questions (FAQ). EWEA, Brussels.

IWEA (Irish Wind Energy Association). 2012. Best Practice Guidelines for the Irish Wind Energy Industry. IWEA, Co. Kildare.

Madders, M. & Whitfield, P.D. (2006). Upland Raptors and the Assessment of Wind Farm Impacts.

Robinson, R.A. 2005. BirdFacts: profiles of birds occurring in Britain & Ireland. BTO, Thetford (Available at http://www.bto.org/birdfacts).

Ruddock, M., Mee, A., Lusby, J., Nagle, A., O'Neill, S. & O'Toole, L. (2016). The 2015 National Survey of Breeding Hen Harrier in Ireland. Irish Wildlife Manuals 93. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Ireland.

Scottish Natural Heritage (2000). Windfarms and Birds - Calculating a theoretical collision risk assuming no avoiding action. SNH Guidance Note. Available at http://www.snh.gov.uk/docs/C205425.pdf

Scottish Natural Heritage (2017). Recommended Bird Survey Methods to Inform Impact Assessment on Onshore Wind Farms. Version 2.

Scottish Natural Heritage (2018). Use of avoidance rates in the SNH wind farm Collision Risk Model. Available at: https://www.nature.scot/wind-farm-impacts-birds-use-avoidance-rates-snh-wind-farmcollision-risk-model.

timeanddate.com Sunrise, Sunset, and Daylength. Available at: https://www.timeanddate.com

Wilson, M. W., Irwin, S., Norriss, D. W., Newton, S. F., Collins, K., Kelly, T. C. & O'Halloran, J. 2009. The importance of pre-thicket conifer plantations for nesting Hen Harriers Circus cyaneus in Ireland.

Wilson, M. W., Irwin, S., O'Donoghue, B., Kelly, T. C. & O'Halloran, J. 2010. The use of forested landscapes by Hen Harriers in Ireland. COFORD Connects. Environment No. 10.

Appendix 1. FIGURES AND MAPS

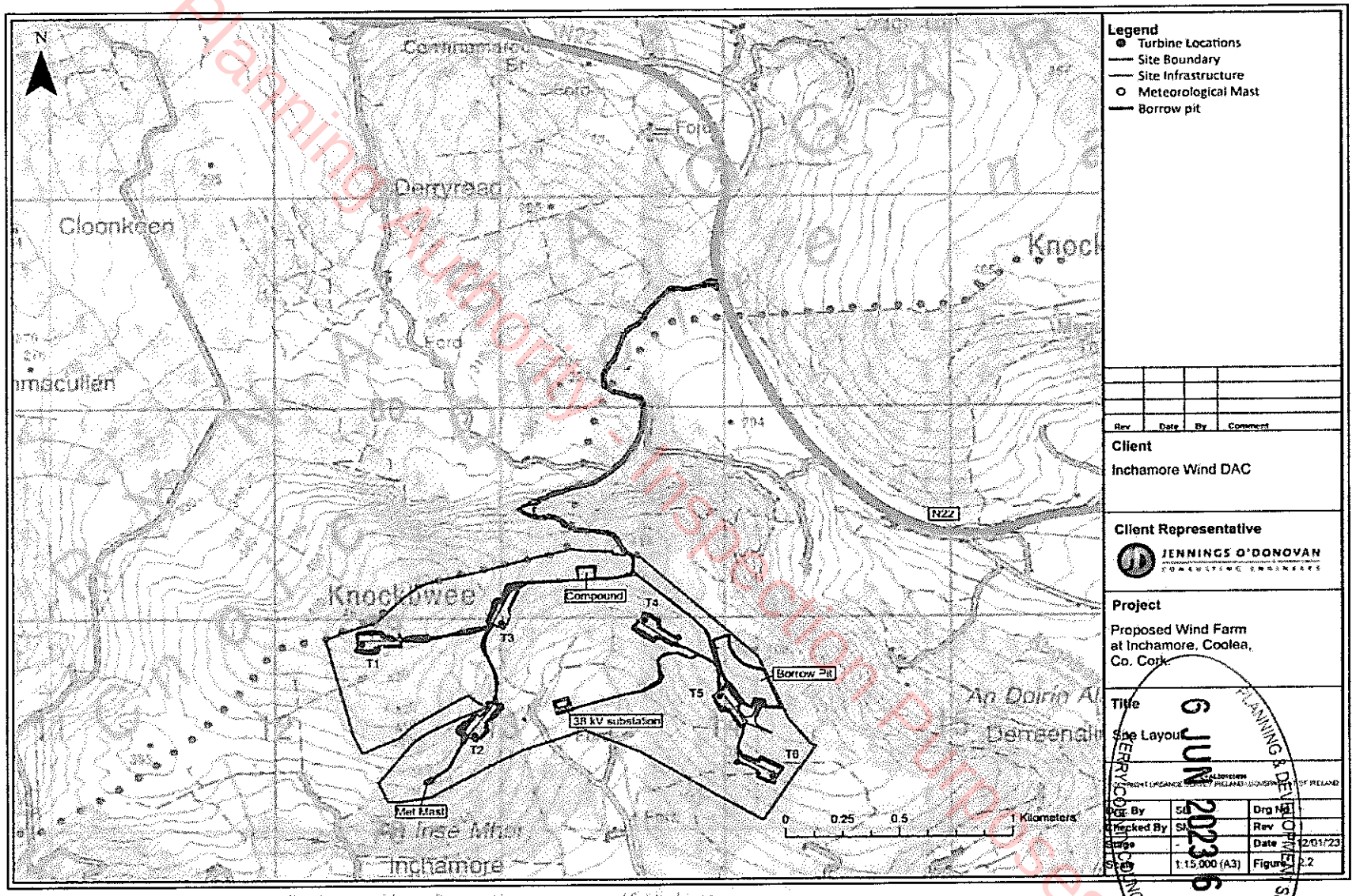

Figure 6-1: Site location and boundary with the outlined area in blue indicating the area proposed for turbines.

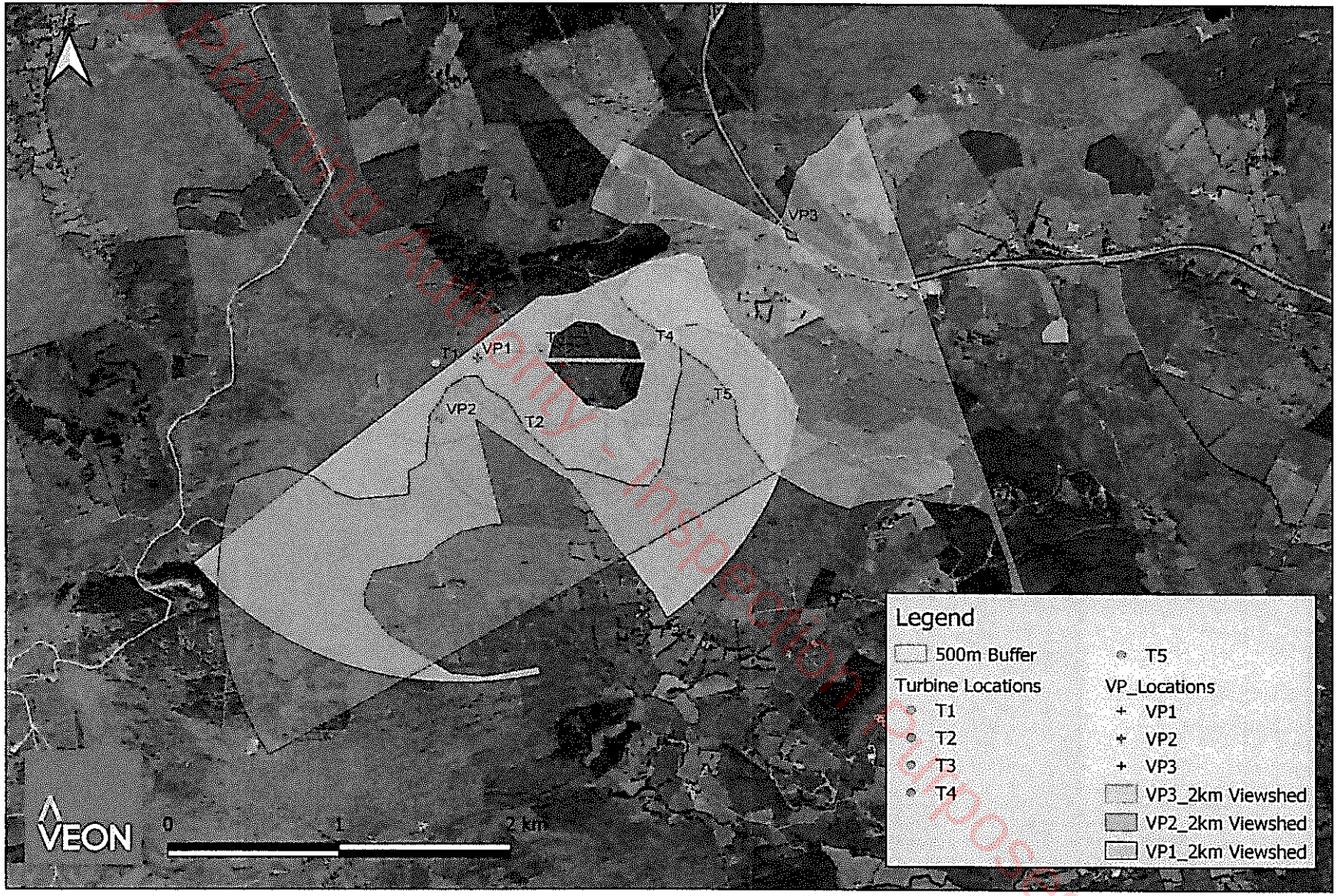

Figure 6.2 Vantage Point locations and viewshed map.

Appendix 2. VANTAGE POINT DATA

VANTAGE POINT SURVEY EFFORT (HOURS) FOR SUMMER 2017

Table 6.1: Inchamore VP data (VP1-3) survey effort Summer 2017

Survey Effort Data (Summer 2017 April-September)							
Vantage Point	April	May	June	July	August	September	Total Hours
VP 1	6	5.5	0	12	6	6	35.5
VP 2	6	6	6	3	6	6	33
VP 3	6	6	6	0	12	6	36
Total	18	17.5	12	15	24	18	104.5

VANTAGE POINT SURVEY EFFORT (HOURS) FOR WINTER 2017-2018

Table 6.2: Inchamore VP data (VP1-3) survey effort Winter 2017-2018.

Survey Effort Data (Winter 2017-2018 October-March)							
Vantage Point	October	November	December	January	February	March	Total Hours
VP 1	0	12	12	0	0	12	36
VP 2	6	6	6	9	6	6	39
VP 3	6	6	6	6.5	6	0	30.5
Total	12	24	24	15.5	12	6	93.5

VANTAGE POINT SURVEY EFFORT (HOURS) FOR SUMMER 2018

Table 6.3: Inchamore VP data (VP1-3) survey effort Summer 2018.

Survey Effort Data (Summer 2018 April-September)							
Vantage Point	April	May	June	July	August	September	Total Hours
VP 1	7	6	6	12	6	6	43
VP 2	6	3	0	18	9	9	45
VP 3	6	6	6	12.3	6	0	36.3
Total	19	15	12	42.3	21	15	124.3

VANTAGE POINT SURVEY EFFORT (HOURS) FOR WINTER 2018-2019

Table 6.4: Inchamore VP data (VP1-3) survey effort Winter 2018-2019

Survey Effort Data (Winter 2018-2019 October-March)							
Vantage Point	October	November	December	January	February	March	Total Hours
VP 1	3	6.25	6	6	1	11	33.25
VP 2	6	6	6	6	5.5	7	36.5
VP 3	6	6	6.33	6	6	6	36.33
Total	15	18.25	18.33	18	12.5	24	106.08

Table 6.5: Inchamore VP data (VP1-3) survey effort overview.

Vantage point survey effort (VP 1-3)			
Survey Dataset	Months	Effort/Month	Total hours per VP
Summer 2017	April-September	Variable	33-36 (Mean 34.83)
Winter 2017 - 2018	October-March	Variable	30.5-39 (Mean 34.75)
Summer 2018	April-September	Variable	36.3-45 (Mean 41.43)
Winter 2018 - 2019	October-March	Variable	33.25-36.5 (Mean 34.875)

Table 6.6: All species seconds spent at Potential Collision Height (20-180m) (VP 1-3)

Seconds spent at PCH (2017-2019)							
Species Name	Seconds in flight at PCH (20-180m)						Total secs at PCH over 24 Months
	2017/2018			2018/2019			
	Summer	Winter	Total	Summer	Winter	Total	
Common Buzzard (*Buteo buteo*)	0	0	0	103	0	103	103
Common Kestrel (*Falco tinnunculus*)	84	0	84	2,589	509	3,098	3,182
Eurasian Sparrowhawk (*Accipiter nisus*)	0	0	0	0	0	0	0
European Golden Plover (*Pluvialis apricaria*)	0	61,363	61,363	0	7,725	7,725	69,088
White-tailed Eagle (*Haliaeetus albicilla*)	20	4	24	0	45	45	69
Hen Harrier (*Circus cyaneus*)	0	6	6	156	30	186	192
Merlin (*Falco columbarius*)	0	37	37	20	0	20	57
Peregrine Falcon (*Falco peregrinus*)	0	0	0	530	0	530	530

Table 6.7: VP data (VP1-3) Survey Effort and Viewshed Coverage

Vantage Point	VP Arc (ha)	Viewshed area within VP Arc (ha)	Viewshed Coverage (%)	Turbine Buffer Area Within Viewshed (ha)	No. of Turbines Within Viewshed	Total Survey Effort (hrs)
VP 1	628	400	63.69	274.18	4	147.75
VP 2	628	376	59.87	128.98	2	153.5
VP 3	628	306	48.73	58.5	0	139.13

Table 6.B: VP Summer 2017 - Survey Details

Date	VP no.	Start Time	Duration (Hrs)	Precipitation	Cloud (okta)	Wind	Visibility
25/04/2017	1	10.15	3	Dry	4/8	F 5-6 NW	Excellent-Good (some heat shimmer)
25/04/2017	1	13.45	3	some snow & hail showers	7/8	NW F6-7	V. good-good-excellent (some heat shimmer)
18/05/2017	1	10.4	3	Light rain at start, mainly dry & clear	5/8-7/8	F4-5 W	Moderate - excellent
26/05/2017	1	15.08	0.5	Dry	8/8	F6-7 SE	Moderate
29/05/2017	1	15.12	2	Dry	8/8	F3-4 SSW	V. good
03/07/2017	1	10.26	3	Misty drizzle	7/8	F3-4 SW	Excellent-poor
03/07/2017	1	13.36	3	Misty drizzle	8/8	F3-5 SW	Moderate
31/07/2017	1	10.35	3	Occasional showers; mainly dry	7/8-6/8	F6-7 WSW	Good-excellent
31/07/2017	1	13.35	3	Occasional showers	6/8-8/8	F6-7 WSW	Excellent- moderate
29/08/2017	1	10.3	3	dry	8/8	F2-3 W	Good-moderate
29/08/2017	1	13.3	3	Occasional short showers	7/8-5/8	F3-4 W	Excellent
08/09/2017	1	10.35	3	Occasional short showers	7/8-5/8-8/8	F3-5 W	V.good- moderate
08/09/2017	1	13.45	3	Occ. Brief heavy showers	7/8-6/8	F3-5 W	V.good- poor
21/04/2017	2	10	3	Dry	1/8-5/8	F4-5 NW	Ex. -V.good; some heat shimmer
21/04/2017	2	13.3	3	Dry	3/8-5/8	F3-5 NW	V.good; some heat shimmer
18/05/2017	2	13.5	3	Intermittent showers + dry spells	6/8	F3 -4 NW	Ex./mod/poor
26/05/2017	2	11.57	3	Dry	8/8-7/8	F6-7 ESE	Mod-Good; slight haze
28/06/2017	2	9.45	3	Dry	5/8	F2-3 NW	Excellent
28/06/2017	2	13.05	3	Dry	7/8-5/8	F2-5 SW	Excellent
31/07/2017	2	10.35	3	Showers	7/8	F5 SW	Good
30/08/2017	2	9.5	3	Light drizzle at end of watch	7/8-5/8	F1-4 (variable) NW	V.good
30/08/2017	2	12.5	3	Intermittent misty showers	8/8-5/8	F2-4 WNW	Mod-V.good
11/09/2017	2	11.4	3	Frequent showers	6/8-8/8	F6 W	Good-poor
11/09/2017	2	14.4	3	Frequent showers	6/8	F4-5 W	Mod-poor
20/04/2017	3	11.3	3	Dry	5/8-6/8	F2-3 Var.	Excellent
20/04/2017	3	15	3	Dry	7/8	F3-4 NW	Excellent
15/05/2017	3	10.04	3	Regular misty drizzle/ light showers & dry spells	8/8	F4-5 ENE	Moderate/poor
15/05/2017	3	13.34	3	Occasional showers, misty drizzle & dry clear spells	8/8	F4-5 ENE	Moderate/poor
16/06/2017	3	11.51	3	Dry	3/8	F5 NW	Excellent
16/06/2017	3	15.15	3	Dry	3/8-5/8	Var; F0-F5 NW	Excellent
04/08/2017	3	10.15	3	Medium 20 min shower in last hr of survey	7/8	F1-3 NW/N	V.good
04/08/2017	3	13.45	3	Light spitting on & off for 1st 30 min	8/8-7/8	F1-2 N/NW	V.good
18/08/2017	3	9.25	3	Occ. Showers	7/8-5/8	F4-5 WSW	Good-V.good
18/08/2017	3	12.55	3	showers & dry clear spells	8/8	F3-5 (var./gusty) W	V-good-mod
05/09/2017	3	9.3	3	Dry	6/8-2/8	F3-4 W	V.good
05/09/2017	3	12.3	3	Dry	3/8	F4-5W	Excellent

Table 6-9: VP Winter 2017/2018 Survey Details.

Date	VP	Time	Duration (hours)	Precipitation	Cloud (okta)	Wind	Visibility
22/12/2017	1	10:15	3	Some misty drizzle	8/8-7/8	F2-4 SW	V.good-Mod
22/12/2017	1	13:15	3	Dry	8/8	F3-4 SW	V.good
23/11/2017	1	10:30	3	Dry	4/8	F4-5 NW	V.good
23/11/2017	1	13:30	3	Dry	8/8	F3-4 NW	V.good
30/11/2017	1	10:30	6	N/A	6/8	F4 NNW-S	Good
15/12/2017	1	10:00	3	Dry	1/8-4/8	F5-6 NW	Good-Ex
15/12/2017	1	13:00	3	Dry	4/8	F5-6 NW	Excellent
08/04/2018	1	12:15	6	N/A	Fog 4/8	F3	Good/ Fog
29/04/2018	1	07:45	6	N/A	3/8	F4	Good
31/12/2017	2	13:40	3	Frequent Showers	8/8	F3-4 SW	Fair-Good
27/10/2017	2	09:30	6		8/8	F1 SW	Poor-Good
15/11/2017	2	11:4	3	Occ. Misty showers; 90% dry	8/8-7/8	F3 WSW	Mod-V.good
15/11/2017	2	14:4	2	Some misty showers	8/8	F3-4 WSW	V.good-poor
23/11/2017	2	09:35	1	Dry	4/8	F5-6 NW	Good
31/12/2017	2	13:40	3	frequent squalls	8/8	SW F3-4	Fair-Good
01/01/2018	2	09:30	3	Heavy showers at first	8/8	W-NW F5-6	Good
19/01/2018	2	12:30	3	Heavy snow showers	7/8	F4 W	Moderate
26/01/2018	2	09:00	3	Occ. showers	6/8	F3	Good
09/02/2018	2	11:05	3	1 brief snow shower	5/8	F2 NW	V.good-poor-v.good
09/02/2018	2	14:05	3	Dry	8/8	F3 NW	V.Good
23/03/2018	2	12:20	3	Light showers	8/8	F3 SE	Moderate/Occ. Poor
23/03/2018	2	15:30	3	Steady light rain	8/8	F3 ESE	Mod
25/10/2017	3	10:00	3	Light spitting for 15 min	8/8	F0	V.Good
25/10/2017	3	13:30	3	Dry	8/8	F0	V.Good
15/11/2017	3	11:00	3	Drizzle	8/8	F2 ENE	-
15/11/2017	3	14:30	3	None	7/8	F3 S	Excellent
01/12/2017	3	9:45	3	Dry	1/8-3/8	F0-1 NW	V.good
01/12/2017	3	12:45	3	Dry	2/8	F0-1 NW	V.good
04/01/2018	3	10:30	3	Occ. Light showers	7/8	F4-5 W	Good
04/01/2018	3	13:30	3.5	Occ. Light showers	7/8	F3-4 W	Good
08/02/2018	3	08:30	3	Drizzle	8/8	F1	Poor-mod
08/02/2018	3	12:00	3	Dry	7/8	F2	Mod-good
09/04/2018	3	09:50	3	Dry	6/8-8/8	F2 SE	Excellent
09/04/2018	3	12:50	3	Dry	8/8	F2/3 SE	Excellent
31/12/2017	4	09:30	4	Frequent Heavy	8/8	SW F3-4	Poor to Good

Table 6.10: VP Summer 2018 Survey Details

Date	VP	Time	Duration (hours)	Cloud (okta)	Precipitation	Wind	Visibility
29/04/2018	1	07:45	07:00	3/8	N/A	4	Good
11/05/2018	1	09:30	06:00	8/8-3/8	N/A	SW	Moderate/ low cloud at first - cleared at 13:00
19/06/2018	1	13:00	06:00	8/8	N/A	SW 3	Moderate, low cloud
03/07/2018	1	11:00	06:00	2/8	N/A	E 2	Good
18/07/2018	1	14:00	06:00	7/8	N/A	SSW 1	Good
07/08/2018	1	11:00	06:00	6/8	N/A	WSW 2	Good
26/09/2018	1	12:30	06:00	8/8 at 12:30, 2/8 at 15:00	Nil	SW 1-2	Good
19/04/2018	2	10:35	03:00	8/8-4/8	Dry	F2-3 SW	Excellent
19/04/2018	2	13:35	03:00	4/8	Dry	F2 SW	Excellent
25/05/2018	2	10:30	03:00	3/8	Dry	F2-4N	Excellent
08/07/2018	2	10:00	06:00	4/8	Nil	WNW	Good
17/07/2018	2	13:00	06:00	-	Nil	SSW1	Good
23/07/2018	2	12:45	03:00	8/8	light	F2-3 W	Ok-Poor-Fair
23/07/2018	2	09:15	03:00	8/8	V. light	F2-3 W/SW	Good-Poor-OK, very misty at times
16/08/2018	2	14:00	06:00	5/8	Nil	W2-3	Good
17/08/2018	2	09:00	03:00	8/8	Light showers	F3-4W 5 at times	OK-light mist at times
27/09/2018	2	11:00	04:30	1/8	Nil	WNW 2-3	Mod-good
27/09/2018	2	11:00	04:30	1/8	Nil	WNW 2-3	Mod-good
09/04/2018	3	09:50	03:00	6/8-8/8	Dry	F2 SE	Excellent
09/04/2018	3	12:50	03:00	8/8	Dry	F2/3 SE	Excellent
22/05/2018	3	10:55	03:00	2/8	Dry	F1 NW	Excellent
22/05/2018	3	13:55	03:00	1/8	Dry	F1 NW	Excellent
05/06/2018	3	12:05	03:00	5/8	Dry	F2 SE	Excellent
05/06/2018	3	15:05	03:00	4/8	Dry	F2 SE	V. good (slight haze)
20/07/2018	3	09:55	03:00	8/8	Occ. Light misty drizzle	F0-1 W	V. Good
20/07/2018	3	12:55	03:00	7/8	Dry	F2 WNW	Excellent
31/07/2018	3	08:11	03:19	8/8-7/8	Light-medium-clear with showers at times	F2-3 W at times	Ok-Good with poor-ok during intermittent showers
31/07/2018	3	12:00	03:00	8/8-7/8	Light-medium-clear with showers at times	F2-3 W at times	Ok-Good with poor-ok during intermittent showers
16/08/2018	3	09:10	03:00	6/8-7/8	Changeable, bright to light showers	F0-1 NW - 3-4NW	Good-Ok
16/08/2018	3	12:40	03:00	6/8-7/8	Changeable, bright to light showers	F0-1 NW - 3-4NW	Good-Ok

Table 6.11 : VP Winter 2018/2019 - Survey Details

Date	VP	Time	Duration (hours)	Cloud (okta)	Precipitation	Wind	Visibility
26/09/2018	1	12:30	06:00	8/8 at 12:30, 2/8 at 15:00	Nil	SW 1-2	Good
18/10/2018	1	08:50	03:00	1/8	Dry	F0, building to F1	V. good
30/11/2018	1	10:00	06:15	6/8 -8/8	Showers	F5-6 Strong	Full - poor
20/12/2018	1	09:30	03:00	8/8-6/8	Intermediate misty showers	F3-4	V. good
20/12/2018	1	12:30	03:00	8/8	Dry	F3-4	V. good
17/01/2019	1	09:30	03:00	3/8	None	F1-2 NE	Good-v. good
17/01/2019	1	12:30	03:00	3/8-7/8	None	F1 NE	V. good
15/02/2019	1	10:10	01:00	8/8	Light throughout	F3-4 S	OK
04/03/2019	1	11:50	02:30	8/8	N/A	F3-4W	Good
04/03/2019	1	14:50	02:30	8/8	Heavy sleet with snow	F2-3 W	OK-Good
29/03/2019	1	09:25	06:00	6/8-1/8	N/A	F2	Excellent
17/10/2018	2	10:20	03:00	4/8-8/8	Misty rain - none	F3-4W	OK, low lying mis, cleared at start of VP
17/10/2018	2	13:50	03:00	4/8-8/8	Misty rain - none	F3-4W	OK, low lying mis, cleared at start of VP
16/11/2018	2	09:10	03:00	8/8 low lying fog in areas	Light rain throughout	F2-4	Fair to OK to Poor at times
21/11/2018	2	11:30	03:00	8/8	Dry	F0-1	Mod-v. good
18/12/2018	2	10:10	06:00	8/8-6/8-2/8 (at times)	Light rain showers passing over	F3S	Excellent to OK at times
16/01/2019	2	09:30	03:00	2/8-4/8	Some brief showers	F2-3W	V. good
16/01/2019	2	12:30	03:00	5/8-7/8	Some brief heavy showers	F3W	V. good-good
12/02/2019	2	10:00	03:00	8/8	Misty drizzle clearing	F2-3	Moderate-good
14/02/2019	2	10:15	02:30	8/8	N/A	F4S	Good-poor
04/03/2019	2	14:20	00:30	8/8	Light	F0-2 W	Good
25/03/2019	2	09:25	06:30	1/8	N/A	F1	Excellent
11/10/2018	3	10:30	03:00	6/8-8/8-4/8	Mainly dry, 1 light misty shower	F1	Excellent-v. good
11/10/2018	3	13:30	03:00	3/8	Dry	F1-2	Excellent
15/11/2018	3	09:30	03:00	8/8	Light at start	F0-4 S-SE-SE-W	Ok-Fair
15/11/2018	3	13:00	03:00	8/8	Light at start	F0-4 S-SE-SE-W	Ok-Fair
10/12/2018	3	08:25	06:20	8/8-7/8	Light from 09:00 onwards	F0-F1 calm	OK. Some morning haze light, poor vis 10:30-11:45 with changeable, then good thereafter
08/01/2019	3	09:30	03:00	7/8	None	F2 NW	Good
08/01/2019	3	13:00	03:00	8/8-7/8	None	F2 NW	Good- v. good
12/02/2019	3	09:30	03:00	8/8	Some light drizzle	F1-3 SW	Good
12/02/2019	3	12:30	03:00	7/8	None-some drizzle	F2-3SW	V. good
05/03/2019	3	07:25	03:00	8/8-5/8	Light showers constantly	F0-2 at times	Excellent
05/03/2019	3	10:55	03:00	8/8	Light showers constantly	F0-2 at times	Excellent

Appendix 3. VANTAGE POINT BIRD FLIGHTLINE DATA

Table 6.12: Summer 2017 Bird Flightline Data

VP	Date	Start Time	End Time	Species	Flight line no.	Species quantity	Start Time	Inside / outside Buffer	Total Duration (s)	0-20 (s)	20-40 (s)	40-80 (s)	80-150 (s)	>150 (s)	Bird Notes
2	31/07/2017	10.35	16.35	Kestrel_K.	9	1	13.02	OUT	1800	1800					Moving along short intervals surveying field while hovering
2	31/07/2017	10.35	16.35	Kestrel_K.	9	1	13.32	IN	300	300					Crossed into viewshed & out of viewshed
2	31/07/2017	10.35	16.35	Kestrel_K.	8	2	13.44	IN	30		30				Pair travelling across viewshed, not hovering
2	31/07/2017	10.35	16.35	Kestrel_K.	7	1	14.26	IN	45	45					Travelling & stopped twice to hover briefly
2	31/07/2017	10.35	16.35	Kestrel_K.	7	1	14.26	OUT	50	50					
2	31/07/2017	10.35	16.35	Kestrel_K.	6	1	14.41	OUT	70	70					Travelling, no hovering
2	31/07/2017	10.35	16.35	Kestrel_K.	5	1	14.53	OUT	1500	1500					Circled, then hovered, then moving small distances to hover
3	04/08/2017	10.15	13.15	Kestrel_K.	1	1	11.48	IN	55	37	18				Flying, hunting, hovering
3	04/08/2017	10.15	13.15	Kestrel_K.	1	1	11.48	OUT	55	38	17				In/Outside site boundary rather than buffer recorded.
3	05/09/2017	9.3	12.3	Kestrel_K.	4	1	11.24	IN	8	8					Hovering, hunting, flying
3	05/09/2017	12.3	15.3	Kestrel_K.	3	1	13.34	IN	22	16	6				
3	05/09/2017	12.3	15.3	Kestrel_K.	2	1	13.51	IN	11	11					
2	11/09/2017	11.4	14.4	Peregrine Falcon_PE	1	1	13:36	IN	10	10					
3	15/05/2017	13.34	16.34	Sparrowhawk_SH	1	1	14.28	IN	19	19					Female or juvenile; flying c.1m altitude, hunting along road & field boundaries. Lost sight behind spur.

VP	Date	Start Time	End Time	Species	Flight line no.	Species quantity	Start Time	Inside / outside Buffer	Total Duration (s)	0-20 (s)	20-40 (s)	40-80 (s)	80-150 (s)	>150 (s)	Bird Notes
3	15/05/2017	13.34	16.34	Sparrowhawk_SH	1	1	14.28	OUT	2	2					
1	29/08/2017	10.3	13.3	Sparrowhawk_SH	3	1	10.3	IN	5	5					A, B & C = same bird. Flushed on approach to VP, flew downhill behind ridge
1	29/08/2017	10.3	13.3	Sparrowhawk_SH	4	1	10.3	IN	3	3					Approached ridge, flushed again, flew behind 2nd ridge
1	29/08/2017	10.3	13.3	Sparrowhawk_SH	5	1	10.3	IN	10	10					Approached 2nd ridge, flushed, flew across heath into conifer plantation
3	05/09/2017	9.3	12.3	Sparrowhawk_SH	2	1	10.3	IN	7	7					Male; took small passerine from low branch of spruce tree
3	05/09/2017	9.3	12.3	Sparrowhawk_SH	2	1	10.3	OUT	3	3					

Table 6.3.3. Winter 2017/2018 Bird Flightline Data.

VP	Date	Start Time	End Time	Species	Flight line no.	Species quantity	Start Time	Inside / outside Buffer	Total Duration (s)	0-20 (s)	20-40 (s)	40-80 (s)	80-150 (s)	>150 (s)	Bird Notes
2	15/11/2017	14.4	16.55	Golden Plover_GP	11		14.4								Heard calling overhead; obscured by cloud; could tell general location & direction of flight from calls
1	22/01/2018	10.15	13.15	Golden Plover_GP	20	12	10.5	IN	169	17	101	51			
1	23/11/2017	10.3	13.3	Golden Plover_GP	1	11	10.55	IN	15	15					Lost sight behind rise to west of VP1
1	23/11/2017	10.3	13.3	Golden Plover_GP	2	12	12.35	IN	11	11					Lost sight behind rise; appeared to be landing
1	23/11/2017	10.3	13.3	Golden Plover_GP	3	c. 35	12.56	IN	105	73	32				c. 25 followed closely by 10. Appeared to land behind rise, same area as above
1	23/11/2017	10.3	13.3	Golden Plover_GP	4	15	13.27	IN	18	18					Probably arrived earlier, + disturbed. Other GO flightpaths (1,4, & 5) considered influx from N + E
1	23/11/2017	10.3	13.3	Golden Plover_GP	5	c.40	13.15-13.25	IN							4 flocks of c.10 flushed& flew along FP A when area approached to confirm landing
1	23/11/2017	13.3	16.3	Golden Plover_GP	6	c.30	13.5	IN	18	18					
1	23/11/2017	13.3	16.3	Golden Plover_GP	7	16	13.54	IN	15	15					
1	23/11/2017	13.3	16.3	Golden Plover_GP	8	10	14	IN	4	4					
2	23/11/2017	9.35	10.2	Golden Plover_GP	9	4	9.48	IN	10	10					
2	23/11/2017	9.35	10.2	Golden Plover_GP	10	4	9.54	IN	18	18					
1	15/12/2017	13	16	Golden Plover_GP	13	10	14.52	IN	15	15					
1	15/12/2017	13	16	Golden Plover_GP	14	12	15.54	IN	13	13					

VP	Date	Start Time	End Time	Species	Flight line no.	Species quantity	Start Time	Inside / outside Buffer	Total Duration (s)	0-20 (s)	20-40 (s)	40-80 (s)	80-150 (s)	>150 (s)	Bird Notes
1	15/12/2017	13	16	Golden Plover_GP	15	12	15.55	IN	45	10	35				Assume same flock as (2) above; appeared to land behind rise west of VP
2	19/01/2018	12.3	15.3	Golden Plover_GP	23	1	14.21	IN					200		Calling & travelling
2	19/01/2018	12.3	15.3	Golden Plover_GP	23	1	14.21	OUT					129		
1	22/01/2018	10.15	13.15	Golden Plover_GP	17	1	10.12	IN	9	9					Flushed on route to VP, flew off low calling
1	22/01/2018	10.15	13.15	Golden Plover_GP	18	c.40	10.3	IN	335	140	160	35			
1	22/01/2018	10.15	13.15	Golden Plover_GP	18	c.40	10.3	OUT	15		15				
1	22/01/2018	10.15	13.15	Golden Plover_GP	19	c.35	10.36	IN	42	32	10				Presume landed on bog
1	22/01/2018	10.15	13.15	Golden Plover_GP	21	c.70	11.55	IN	627		43	478	106		Lost in clouds
1	22/01/2018	10.15	13.15	Golden Plover_GP	21	c.70	11.55	OUT	228			120	108		
1	22/01/2018	13.15	16.15	Golden Plover_GP	22	3	15.43	IN	15		15				
2	26/01/2018	9	12	Golden Plover_GP	24	3	9.4	IN	132				132		Calling & travelling
2	26/01/2018	9	12	Golden Plover_GP	25	1	11.18	IN	160					160	Calling & travelling
2	26/01/2018	9	12	Golden Plover_GP	25	1	11.18	OUT	20					20	Calling & travelling
2	26/01/2018	9	12	Golden Plover_GP	26	1	11.5	IN	50					50	Calling & travelling
2	23/03/2018	12:20	15:20	Golden Plover_GP	35	18	12:40	IN	270	54	216				
1	08/04/2018	12:15	18:15	Golden Plover_GP	44	16	12:12	IN	7	7					Fog <150m visibility
1	08/04/2018	12:15	18:15	Golden Plover_GP	45	7	12:21	IN	8	8					Fog <150m visibility
1	08/04/2018	12:15	18:15	Golden Plover_GP	46	43	16:24	IN / OUT	29		29				
1	22/01/2018	13.15	16.15	Hen Harrier_HH	4	1	15.46	IN	13	13					Male colouring on upper parts, but juvenile underneath & around face
1	22/01/2018	13.15	16.15	Hen Harrier_HH	5	1	15.47	IN	45	45					Same individual as (2) above
2	09/02/2018	11.05	14.05	Hen Harrier_HH	7	1	11.53	IN	55	49	6				Ringtail; mobbed by RN

VP	Date	Start Time	End Time	Species	Flight line no.	Species quantity	Start Time	Inside / outside Buffer	Total Duration (s)	0-20 (s)	20-40 (s)	40-80 (s)	80-150 (s)	>150 (s)	Bird Notes
2	09/02/2018	14.05	17.05	Hen Harrier_HH	8	1	14.4	IN	7	7					Male
2	09/02/2018	14.05	17.05	Hen Harrier_HH	8	1	14.40	OUT	8	8					
3	04/01/2018	10.3	13	Kestrel_K.	1	1	11.58	IN	7	7					Seen briefly- lost below hill/WD4
3	15/11/2017	11	14	Merlin_ML	1	1	11.59	IN	20				20		Flew straight through, flushing approx. 60 SG
3	15/11/2017	11	14	Merlin_ML	1	1	11.59	OUT	17				17		
3	01/12/2017	12.45	15.45	Sparrowhawk_SH	-	1	15.31	IN	4	4					
3	01/12/2017	12.45	15.45	Sparrowhawk_SH	-			OUT	16	16					
1	22/01/2018	10.15	13.15	White-tailed Eagle_WE	1	1	10.53	OUT	26	6	20				Silhouette only observed, so age not determined
1	22/01/2018	10.15	13.15	White-tailed Eagle_WE	1	1	10.53	IN	8	2	4				Ground beneath flightpath not visible (hidden behind ridge) so mapping accuracy reduced

Table 6.14 Summer 2018 Bird Flightline Data

VP	Date	Observation No.	Species	Quanity	Start	In/Out	Duration	0-20 (s)	20-40 (s)	40-80 (s)	80-150 (s)	>150 (s)	Flightline Map	Flightline No.
2	27/09/2018	1	Buzzard_BZ	1	11:26	In	93		93				2-8-A-1	1
2	27/09/2018	1	Buzzard_BZ	1	11:26	Out	10		10				2-8-A-1	1
2	27/09/2018	4	Hen harrier_HH	1	15:06	In	214	58	156				2-8-A-2	2
2	27/09/2018	4	Hen harrier_HH	1	15:06	Out	5		5				2-8-A-2	2
2	23/07/2018	1	Kestrel_K.	2	13:16	Out	15		5	10			-	-
2	23/07/2018	1	Kestrel_K.	2	13:16	In	600	50	500	50			-	-
2	08/07/2018	1	Kestrel_K.	1	13:42	In	791	312	479				2-8-A-3	1
2	08/07/2018	2	Kestrel_K.	1	15:45	In	296	98	198				2-8-A-3	2
2	16/08/2018	1	Kestrel_K.	1	18:15	In	293			293			2-8-A-3	4
2	17/07/2018	1	Kestrel_K.	1	15:33	In	429	184	245				2-8-A-3	3
3	22/05/2018	1	Kestrel_K.	1	13:21	In	160	16	144				2-8-A-3	7
3	22/05/2018	2	Kestrel_K.	1	13:59	In	94	14	80				2-8-A-3	8
3	22/05/2018	3	Kestrel_K.	1	14:22	In	52	47	5				2-8-A-3	9
2	27/09/2018	2	Kestrel_K.	1	12:01	In	7	7					2-8-A-3	5
2	27/09/2018	3	Kestrel_K.	1	12:05	In	207	162	45				2-8-A-3	6
1	26/09/2018	1	Kestrel_K.	1	13:46	In	7	7					2-8-A-3	10
1	26/09/2018	2	Kestrel_K.	1	14:28	In	11	11					2-8-A-3	11
1	26/09/2018	3	Kestrel_K.	1	14:29	In	12	12					2-8-A-3	12
3	20/07/2018	1	Merlin_ML	1	10:18	Out	20		20				2-8-A-5	1
2	19/04/2018	1	Peregrine_PE	1	16:31	In	590	60	90	150	290		2-8-A-6	1
2	19/04/2018	1	Peregrine_PE	1	16:31	Out	10				10		2-8-A-6	1

Table 6.15: Winter 2018/2019 Bird Flightline Data

VP	Date	Observation No.	Species	Quantity	Start	In/Out	Duration	0-20 (s)	20-40 (s)	40-80 (s)	80-150 (s)	>150 (s)	Flightline Map	Flightline No.
2	18/12/2018	1	Golden Plover_GP	35	10:40	In	25			15	10		2-8-B-2	10
2	18/12/2018	2	Golden Plover_GP	10	11:21	In	120				120		2-8-B-2	11
1	29/03/2019	-	Golden Plover_GP	-	09:26	In	Heard only						-	-
1	20/12/2018	2	Golden Plover_GP	30	15:33	In	25	18	7				2-8-B-2	1
1	15/02/2019	1	Golden Plover_GP	12	10:05	In	25	5	5	10	5		2-8-B-2	2
1	04/03/2019	1	Golden Plover_GP	28	12:03	In	300	100	50	50			2-8-B-2	3
1	04/03/2019	1	Golden Plover_GP	28	12:08	In	240	240					2-8-B-2	3
1	04/03/2019	2	Golden Plover_GP	20	12:12	In	10	10					2-8-B-2	4
1	04/03/2019	2	Golden Plover_GP	20	12:12	In	1,680	1,680					2-8-B-2	4
1	04/03/2019	1	Golden Plover_GP	28	12:12	In	1,680	1680					2-8-B-2	5
1	04/03/2019	3	Golden Plover_GP	20	12:40	In	5	5					2-8-B-2	6
1	04/03/2019	3	Golden Plover_GP	48	12:40	In	5	5					2-8-B-2	6
1	04/03/2019	4	Golden Plover_GP	48	13:12	In	25	20	5				2-8-B-2	7
1	04/03/2019	5	Golden Plover_GP	48	13:13	In	35	5	5	5	15	5	2-8-B-2	8
1	04/03/2019	5	Golden Plover_GP	48	13:13	Out	5	5					2-8-B-2	8
1	04/03/2019	6	Golden Plover_GP	48	13:29	In	20	5	5	10			2-8-B-2	9
1	04/03/2019	6	Golden Plover_GP	48	13:29	Out	40			5	5	25	2-8-B-2	9
2	14/02/2019	-	Golden Plover_GP	-	12:00	In	Heard only						-	-
2	17/10/2018	1	Hen Harrier_HH	1	13:59	In	5		20					1
3	11/10/2018	1	Hen Harrier_HH	1	14:15	In	20		5					2
2	16/01/2019	2	Hen Harrier_HH	1	10:07	In	5		5					3
1	26/09/2018	1	Kestrel_K.	1	13:46	In	7	7					2-8-A-3	10
1	26/09/2018	2	Kestrel_K.	1	14:28	In	11	11					2-8-A-3	11
1	26/09/2018	3	Kestrel_K.	1	14:29	In	12	12					2-8-A-3	12
1	18/10/2018	1	Kestrel_K.	1	14:02	In	150	50	120				2-8-B-5	
1	18/10/2018	2	Kestrel_K.	1	14:14	In	480	96	384				2-8-B-5	
3	11/10/2018	2	Kestrel_K.	1	15:58	In	289		5				2-8-B-5	
3	15/11/2018	1	Kestrel_K.	1	12:24	Out	5			25			2-8-B-5	
3	12/02/2019	2	Kestrel_K.	1	13:13	In	25	25					2-8-B-5	
3	05/03/2019	1	Kestrel_K.	1	09:49	In	5	5					2-8-B-5	6

VP	Date	Observation No.	Species	Quantity	Start	In/Out	Duration	0-20 (s)	20-40 (s)	40-80 (s)	80-150 (s)	>150 (s)	Flightline Map	Flightline No.
2	18/12/2018	3	White-tailed Eagle_WE	1	13:32	In	45	5	35	5			2-8-B-9	1
2	18/12/2018	3	White-tailed Eagle_WE	1	13:32	Out	15	10	5				2-8-B-9	1

Appendix 4. COLLISION RISK ASSESSMENT CALCULATIONS

Table 6.16: Bird-seconds spent by species at Potential Collision Height (20-180m) for each VP

Species (BTO Code)	Year	VP 1 Seconds spent at PCH		VP 2 Seconds spent at PCH	
		Summer	Winter	Summer	Winter
Buzzard (BZ)	2017/18	0	0	0	0
	2018/19	0	0	93	0
Kestrel (K.)	2017/18	0	0	60	0
	2018/19	0	509	2,360	0
Golden Plover (GP)	2017/18	0	56,696	0	4,694
	2018/19	0	4,930	0	2,075
Hen Harrier (HH)	2017/18	0	0	0	6
	2018/19	0	0	0	25
Peregrine (PE)	2017/18	0	0	0	0
	2018/19	0	0	530	0

Table 6.17: Bird biometrics and bird-seconds spent by species at Potential Collision Height (20-180m)

Species Name (BTO Code)	Length (m)	Wingspan (m)	Mean flight speed (m/s)	Seconds spent at PCH (2017-2019)						
				Seconds in flight at PCH (25-180m)						Total secs at PCH over 24 Months
				2017/2018			2018/2019			
				Summer	Winter	Total	Summer	Winter	Total	
Buzzard (BZ)	0.54	1.2	13.3	0	0	0	93	0	93	93
Kestrel (K.)	0.34	0.76	10.1	60	0	60	2,360	504	2,864	2,924
Golden Plover (GP)	0.275	0.715	17.9	0	61,363	61,363	0	7,725	7,725	69,088
Hen Harrier (HH)	0.48	1.1	12	0	6	6	156	25	181	187
Peregrine (PE)	0.42	1.02	12.1	0	0	0	530	0	530	530

Table 6 15: Probability of collision – Stage 2 Calculations.

key Target Species Stage 2 Calculations							
Species Name (BTO Code)	Flapping bird			Gliding bird			Mean probability of Collision Risk (Flapping + Gliding)/2
	Upwind	Downwind	Average	Upwind	Downwind	Average	
Buzzard (BZ)	8.3%	3.9%	6.1%	8.1%	3.7%	5.9%	6%
Kestrel (K.)	8.5%	3.5%	6.0%	8.4%	3.4%	5.9%	5.95%
Golden Plover (GP)	6.2%	2.7%	4.5%	N/A	N/A	N/A	4.5%
Hen Harrier (HH)	8.5%	3.9%	6.2%	8.3%	3.7%	6.0%	6.1%
Peregrine (PE)	8.1%	3.6%	5.8%	8.0%	3.4%	5.7%	5.75%

No preference was taken for birds using flapping or gliding flight through the study area for species which exhibit both behaviours. In the calculation of the percentage risk of collision for a bird flying through a rotating turbine, the mean of the worst-case scenario (i.e. a bird flying upwind through a turbine using flapping flight whilst the turbine is at its fastest rotation speed) and the best-case scenario (i.e. a bird flying downwind through a rotating turbine using a gliding flight whilst the turbine at its slowest rotation speed) has been used for species which exhibit both flapping and gliding flight. For Golden plover only the mean calculations for flapping flights were used.

Table 6 19: Avian Biometric Data and Avoidance Rates.

Avian Biometric Data and Avoidance Rates				
Species Name	Length (m)	Wingspan (m)	Mean flight speed (m/s)	Avoidance rates (%)
Common Buzzard (*Buteo buteo*)	0.54	1.2	13.3	98
Common Kestrel (*Falco tinnunculus*)	0.34	0.76	10.1	95
European Golden Plover (*Pluvialis apricaria*)	0.275	0.715	17.9	98
Hen Harrier (*Circus cyaneus*)	0.48	1.1	12	99
Peregrine Falcon (*Falco peregrinus*)	0.42	1.02	12.1	98

Appendix 5. WORKED CALCULATIONS

Table 6.20 Target species breeding and non-breeding season periods.

Key target species breeding and non-breeding season periods				
Species Name	Breeding season start	Breeding season end	Non-breeding season start	Non-breeding season end
Common Buzzard (*Buteo buteo*)	April	August	September	March
Common Kestrel (*Falco tinnunculus*)	April	August	September	March
Eurasian Sparrowhawk (*Accipiter nisus*)	April	August	September	March
European Golden Plover (*Pluvialis apricaria*)	April	August	September	March

Table 6.21 Avian Biometric Data and Avoidance Rates

Avian Biometric Data and Avoidance Rates				
Species Name	Length (m)	Wingspan (m)	Mean flight speed (m/s)	Avoidance rates (%)
Hen Harrier (*Circus cyaneus*)	0.48	1.1	12	99

Table 6.22 Probability of collision – Stage 2 Calculations.

Key Target Species Stage 2 Calculations							
Species Name (BTO Code)	Flapping bird			Gliding bird			Mean probability of Collision Risk (Flapping + Gliding)/2
	Upwind	Downwind	Average	Upwind	Downwind	Average	
Hen Harrier (HH)	8.5%	3.9%	6.2%	8.3%	3.7%	6.0%	6.1%

Table 6.13: Calculation of collision risk for Hen Harrier passing (Gliding) through rotor area.

K: [1D or [3D] (0 or 1)	1		Calculation of alpha and p(collision) as a function of radius								
NoBlades	3					Upwind:			Downwind:		
MaxChord	4.5	m	r/R	c/C	α	collide		contribution	collide		contribution
Pitch (degrees)	13		radius	chord	alpha	length	p(collision)	from radius r	length	p(collision)	from radius r
BirdLength	0.48	m	0.025	0.575	5.28	17.60	0.82	0.00103	16.44	0.77	0.00096
Wingspan	1.1	m	0.075	0.575	1.76	6.26	0.29	0.00219	5.09	0.24	0.00178
F: Flapping (0) or gliding (+1)	1		0.125	0.702	1.06	4.70	0.22	0.00274	3.28	0.15	0.00191
			0.175	0.860	0.75	4.25	0.20	0.00347	2.50	0.12	0.00204
Bird speed	12	m/sec	0.225	0.994	0.59	3.98	0.19	0.00417	1.96	0.09	0.00206
RotorDiam	155	m	0.275	0.947	0.48	3.29	0.15	0.00422	1.37	0.06	0.00176
RotationPeriod	5.36	sec	0.325	0.899	0.41	2.99	0.14	0.00454	1.17	0.05	0.00178
			0.375	0.851	0.35	2.66	0.12	0.00465	0.93	0.04	0.00163
			0.425	0.804	0.31	2.39	0.11	0.00473	0.76	0.04	0.00151
			0.475	0.756	0.28	2.17	0.10	0.00480	0.64	0.03	0.00141
Bird aspect ratioo: β	0.44		0.525	0.708	0.25	1.98	0.09	0.00484	0.54	0.03	0.00133
			0.575	0.660	0.23	1.81	0.08	0.00486	0.48	0.02	0.00130
			0.625	0.613	0.21	1.67	0.08	0.00486	0.53	0.02	0.00155
			0.675	0.565	0.20	1.54	0.07	0.00484	0.57	0.03	0.00179
			0.725	0.517	0.18	1.42	0.07	0.00479	0.59	0.03	0.00200
			0.775	0.470	0.17	1.31	0.06	0.00472	0.60	0.03	0.00218
			0.825	0.422	0.16	1.20	0.06	0.00463	0.61	0.03	0.00235
			0.875	0.374	0.15	1.11	0.05	0.00452	0.61	0.03	0.00249
			0.925	0.327	0.14	1.02	0.05	0.00438	0.61	0.03	0.00261
			0.975	0.279	0.14	0.93	0.04	0.00422	0.60	0.03	0.00271
				Overall p(collision) =			**Upwind**	**8.3%**		**Downwind**	**3.7%**
								Average	**6.0%**		

Table 6.24 Calculation of collision risk for Hen Harrier passing (Flapping) through rotor area

K: [1D or [3D] (0 or 1)	1		Calculation of alpha and p(collision) as a function of radius								
NoBlades	3					Upwind:			Downwind:		
MaxChord	4.5	m	r/R	c/C	α	collide		contribution	collide		contribution
Pitch (degrees)	13		radius	chord	alpha	length	p(collision)	from radius r	length	p(collision)	from radius r
BirdLength	0.48	m	0.025	0.575	5.28	19.71	0.92	0.00115	18.55	0.87	0.00108
Wingspan	1.1	m	0.075	0.575	1.76	6.96	0.32	0.00243	5.80	0.27	0.00203
F: Flapping (0) or gliding (+1)	0		0.125	0.702	1.06	5.12	0.24	0.00299	3.70	0.17	0.00216
			0.175	0.860	0.75	4.55	0.21	0.00371	2.81	0.13	0.00229
Bird speed	12	m/sec	0.225	0.994	0.59	4.21	0.20	0.00442	2.20	0.10	0.00231
RotorDiam	155	m	0.275	0.947	0.48	3.48	0.16	0.00446	1.56	0.07	0.00201
RotationPeriod	5.36	sec	0.325	0.899	0.41	2.99	0.14	0.00454	1.17	0.05	0.00178
			0.375	0.851	0.35	2.66	0.12	0.00465	0.93	0.04	0.00163
			0.425	0.804	0.31	2.39	0.11	0.00473	0.76	0.04	0.00151
			0.475	0.756	0.28	2.17	0.10	0.00480	0.64	0.03	0.00141
Bird aspect ratioo: β	0.44		0.525	0.708	0.25	1.98	0.09	0.00484	0.54	0.03	0.00133
			0.575	0.660	0.23	1.81	0.08	0.00486	0.48	0.02	0.00130
			0.625	0.613	0.21	1.67	0.08	0.00486	0.53	0.02	0.00155
			0.675	0.565	0.20	1.54	0.07	0.00484	0.57	0.03	0.00179
			0.725	0.517	0.18	1.42	0.07	0.00479	0.59	0.03	0.00200
			0.775	0.470	0.17	1.31	0.06	0.00472	0.60	0.03	0.00218
			0.825	0.422	0.16	1.20	0.06	0.00463	0.61	0.03	0.00235
			0.875	0.374	0.15	1.11	0.05	0.00452	0.61	0.03	0.00249
			0.925	0.327	0.14	1.02	0.05	0.00438	0.61	0.03	0.00261
			0.975	0.279	0.14	0.93	0.04	0.00422	0.60	0.03	0.00271
				Overall p(collision) =			Upwind	8.5%		Downwind	3.9%
								Average 6.2%			

Table 6.25 Calculation of Collision risk for Hen Harrier Non-Breeding Season 2018/2019.

Measurements	Code	Value
Rotor radius (metres)	R	77.5
Rotor diameter (metres)	RD	155
Max chord width of turbine blades (metres)	d	4.5
Bird length (metres)	l	0.48
Average flight speed (m/s)	s	12
Daily Duration of Activity (hrs)	Tod	10
Length of Season (days)	Tss	181
Wingspan (m)		1.1
Mean pitch of blade (degrees)		13
Rotors per turbine		3
Rotational period (seconds)		5.36
Turbine operational time (%)		85

			VP 1	VP 2
Total Survey time over 6 months (secs)	T		119700	131400
Total flight at Rotor Height 20 - 180m (bird-secs)	sPCH		0	25
No. of turbines in viewshed	x		4	2
Survey area visible from VP (hectares)	Avp		400	376
Flight Risk Area, i.e. 500m buffer of turbines within viewshed (hectares)	Afr		274.18	128.98
Availability of species activity during survey period (hrs)	Sa		1810	1810
Measurements	Code	Calculation		
Proportion of Bird flight-time between 20 - 180m	t	sPCH/T	0	0.000190259
Flight activity in visible area per hectare	F	t/Avp	0	5.06007E-07
Proportion of Bird flight time in Risk Area	Trisk	F*Afr	0	6.52648E-05
Bird occupancy of Risk Area (hrs/season)	n	Trisk*Sa	0	0.118129331
Flight Risk volume (m3)	Vw	(Afr*RD)*10000	424979000	199919000
Actual volume of air swept by rotors (m3)	o	x*(πr2(d+l))	375683.73	187841.865
Bird occupancy of rotor swept area (bird-secs)	b	3600*(n*(o/Vw))	0	0.399575239
Time taken for Bird to pass through rotors (secs)	v	(d+l)/s	0.415	0.415
Number of Bird passes through the rotor during survey period	N	b/v	0	0.9628319
Total transits adjusted for maximum operation of turbines (85%)	Tn	N*0.85	0	0.818407115
Number of transits per turbine within viewshed	TnT	Tn/x	0	1.636814231
Average TnT of all VP's (VP 1-2)	ATnT	(TnT1+TnT2+TnT3+.....)/2	0.818407115	
Number of transits across windfarm	NT	ATnT*(Total no. turbines)	4.092035576	

Share / Calculation	Calculation	Result
Collision Probability (%)	(Model)	6.10%
Collisions during study period	NT*Collision Probabi	0.25
Collisions during study period with 99% Avoidance Rate	*0.01	0.002496142
Over 30-year duration of windfarm	*30	0.074884251

Table 6.26 Number of collisions predicted for Hen Harrier with the application of avoidance rates

Species	Year	Predicted collisions per season with avoidance rates applied			Predicted collisions over 30-year lifetime of the windfarm		
		Breeding	Winter	Total	Breeding	Winter	Total
Hen Harrier	2017/18	0.000	0.001	0.001	0.000	0.017	0.017
	2018/19	0.000	0.002	0.002	0.000	0.075	0.075

Table 6.27 Mean number of collisions predicted for Hen Harrier with avoidance rates

Target Species Biometrics			
Species Name	Mean no. of predicted collisions per year	Mean no. of predicted collisions per 30 years	Equivalent to 1 bird every x (years)
Hen Harrier (HH)	0.002	0.046	500

APPENDIX 7.18:

FIRST YEAR ORNITHOLOGICAL SURVEYS – INCHAMORE/ GORTYRAHILLY WIND FARM SUMMER 2017 AND WINTER 2017 / 18

PREPARED BY FEHILY TIMONEY & COMPANY

Please note that this report was prepared based on surveys carried out for an extended Inchamore wind farm site boundary (Inchamore - turbines 1-25) and also to include an additional proposed site to the southeast (Gortyrahilly - turbines 26-58). However, in the intervening period, the site boundary for the proposed Inchamore wind farm has been reduced which now only accommodates 5 no. turbines while Gortyrahilly is now a standalone site and is at the planning stage. The relevant data for the current Inchamore site boundary has been extracted from this baseline report and used to inform the assessments.

ENVIRONMENTAL BALANCE IN DESIGN AND CONSTRUCTION

FIRST YEAR ORNITHOLOGICAL SURVEYS - INCHAMORE/GORTYRAHILLY WIND FARM SUMMER 2017 AND WINTER 2017 / 18

SSE RENEWABLES

NOVEMBER 2018

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Abstract: This report presents the results of the first year of ornithological surveys at the Inchamore/ Gortyrahilly Wind Farm site, from April 2017 to March 2018.

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EXECUTIVE SUMMARY

The methodology for the 2017/2018 ornithological survey at Inchamore Gortyrahilly Wind Farm adhered to Scottish Natural Heritage guidance (SNH, 2014) for assessing the impact of proposed wind farm developments on the local target species breeding and wintering populations. Two timed watches of three hours duration were carried out from each VP every month from April to September 2017 and October to March 2017/ 2018 inclusive, totalling 72 hours of observation time at each VP over the survey period. Breeding & Winter Bird Transect Survey, Hinterland Survey, and Merlin surveys were also assessed during this period.

During vantage point surveys, across the surveyed summer and winter periods of 2017/18, a total of 65 species of bird were noted. Of these species 6 are of Red status under the BoCCI, these include; Meadow Pipit, White-Tailed Eagle, Red Grouse, Grey Wagtail, Eurasian Curlew, and European Golden Plover, 23 are of Amber status and the remaining 36 are of Green status. An additional 5 of these species are protected under Annex I of the EU Birds Directive, these species include; Merlin, Peregrine Falcon, White-Tailed Eagle, Chough, and European Golden Plover.

No breeding wader target species were observed during surveys in 2017. Birds species observed within this survey include; Raven, Rook, Hooded Crow, Kestrel, Skylark, Meadow Pipit, Chaffinch, Goldcrest, Blackbird, Reed Bunting, Grasshopper Warbler, Willow Warbler, Lesser Redpoll, Mistle Thrush, Sparrowhawk, and Pheasant. These observations, during breeding wader surveys 2017, include one red listed species (Meadow Pipit) and five Amber-listed species (Kestrel, Skylark, Goldcrest, Mistle Thrush and Sparrowhawk).

During hinterland surveys on the site, four red listed species were identified as being present these include; White-Tailed Eagle, Lapwing, Black-headed Gull and Wigeon. Eight Amber-listed bird species were identified, these include; Chough, Coot, Cormorant, Goosander, Lesser-Black-backed Gull, Mute Swan, Snipe and Teal. Two green listed bird species were identified as being present during hinterland surveys. These include; Grey Heron and Mallard.

Indicator signs of Merlin, such as Pellets, droppings and feathers were identified during Merlin surveys. Merlin were observed only very occasionally during vantage point surveys throughout the site. Two Merlin observations, during winter surveys in March 2018 and November 2017, noted a female hunting/ commuting at vantage point 9 for 25s at a height of 0-20m and within the turbine buffer envelope. The remaining Merlin observation, noted at vantage point number 3, displays an individual flying both within and outside the rotor envelope for 37s at a height of 80-150m. A possible Merlin observation, during summer surveys, was recorded in July 2017 noted a possible individual calling from a conifer plantation at vantage point 1. Twenty bird species were recorded during Merlin surveys across the site. These species include; one Red listed species, five Amber, and fourteen Green listed species.

1. INTRODUCTION

Fehily Timoney & Company (FT) was appointed by SSE Generation to undertake ornithological surveys at the proposed Inchamore - Gortyrahilly Wind Farm from 2017-2018. This report presents the results of the first year of ornithological surveys and summarises the activity of specific target bird species during survey periods in 2017 and 2018. The study area of Inchamore - Gortyrahilly Wind Farm forms two separate site locations near Ballyvourney, Co. Cork. The site encompasses parts of the townlands of Derreenaling, Milleeny, Inchamore, Bardinch, Coumaclovane, Gortyrahilly, Rath West, Rath West, Derryfineen, Gortnabinna and Cahernacaha. This study area is located to the west of the town of Ballyvourney and adjacent to the N22 roadway.

This Avian assessment, for surveys completed over the first year in summer 2017 and winter 2017/18, includes the assessment of target bird species potentially occurring within the proposed site boundary, surveys of surrounding potentially bird-rich habitats and the assessment of individual specific species of interest. Surveys adhered to Scottish Natural Heritage guidance (SNH, 2014). The following surveys were carried out:

- Vantage Point Surveys (Breeding and Non-Breeding Season);
- Breeding Moorland Survey;
- Breeding & Winter Bird Transect Survey;
- Hinterland Survey;
- Merlin survey.

The monthly assessment of bird species, during the breeding and winter season, within the site was completed using vantage point survey watches. Surveys took place within 9 vantage point (VP) locations from April to August 2017 (inclusive) and October to March 2018 (Inclusive). Each VP was subject to two watches per month, each consisting of 3 hours in length (6 hours surveyed per VP per month).

Hinterland surveys were completed in potential favourable bird habitats within 10 km radius of the proposed wind farm development. This survey method was used to assess species populations surrounding the proposed development site. Breeding Bird Surveys were completed along transects within both sites. This survey technique was used in order to assess the presence of breeding waders within the area.

Merlin surveys, specifically for this bird of prey (*Falco columbarius*), were used in order to assess presence of the species within the proposed development site. Specific survey transects were used in order to accurately assess for the species. This report details the methodology used as well as findings for the period of April 2017 to March 2018.

1.1 Study Area

The proposed Inchamore – Gortyrahilly Wind Farm is within and surrounding the townlands of Inchamore and Gortyrahilly. This development is proposed to be located in two sections, one (Inchamore) along Cork-Kerry boarder, an estimated 18km south-east of the town of Killarney and 5km west of the town of Ballyvourney, and the other further to the south (Gortyrahilly) located approximately 3.2 km north of Ballingeary. Surrounding habitats and land uses are described by Corine 2012 as 'Forest' and 'semi-natural areas with transitional woodland scrub and Conifer Plantation' (324 & 314), 'Wetlands' (412) and 'Agricultural Areas' (243).

During site survey, habitats such as heath (HH), peatlands (PB), conifer plantation (WD4) and agricultural lands (GA/ GS) were noted (Fossitt, 2000). Areas of dry siliceous heath (HH1), dominant in Heather (Ling *Calluna vulgaris* and Bell Heather *Erica cinerea*) were identified throughout the site, particularly around turbine number 1. Areas of degraded heath were also present. Such heather dominant habitats have the potential to provide suitable habitat species such as Red Grouse (*Lagopus lagopus scoticus*) and for the prey species of birds of prey, such as Kestrels (*Falco tinnunculus*).

Areas of conifer plantation (WD4) are widespread throughout the site, with crops largely consisting non-native pine species (Pinus sp.). This habitat appears to be largely planted upon areas of degraded bog (PB) and

heath (HH). The edges of such habitats have to potential to provide nesting and feeding opportunities for Merlin (*Falco columbarius*).

Upland blanket bog (PB2) along with degraded areas of cutover bog (PB4) habitat was also present throughout the site. Areas of bog and flush (PB/PF) habitat were also present to the west of at turbine number 4. These habitats have potential to provide roosting and foraging for wader species.

Cultivated (BC) and built land (BL3) is present throughout the site dwellings and agricultural sheds being most prominent. Areas of agricultural grassland (GA1) are particularly dominant throughout the lowland areas within and surrounding the site. Wet grassland areas (GS4) were also identified at the edges of such agricultural areas.

Protected European and national sites within the area include; Sillahertane Bog NHA (Site Code: 001882), St. Gobnet'S Wood NHA & SAC (Site Code: 000106), Killarney National Park, Macgillycuddy'S Reeks and Caragh River Catchment NHA & SAC (Site Code: 000365), Roughty River NHA (Site Code: 001376), Mullaghanish to Musheramore Mountains SPA (Site Code: 004162) and Mullaghanish Bog SAC (Site Code: 001890).

Musheramore Mountains SPA (Site Code: 004162) located approximately 2.95km north east of Inchamore is designated for Hen Harrier (*Circus cyaneus*). During the latest national survey conducted in 2015, it was noted that there has been an 80% decline recorded in the Mullaghanish to Musheramore Mountains SPA since 2005. Five confirmed Hen Harrier territories were noted within the SPA during the 2005 national survey (Barton *et al*, 2006), two confirmed and one possible territory during the third national survey in 2010 (Ruddock *et al*, 2012) and only one confirmed Hen Harrier territory in 2015 (Ruddock *et al*, 2016). The site also supports a breeding population of Merlin. The site synopsis[1] states that '*the population size is not well known but is likely to be one or two pairs.*'

[1] NPWS (2012). *Site Synopsis for the Mullaghanish to Musheramore Mountains SPA (Site Code: 004162).* published 25/01/2012

2. SURVEY METHODOLOGY

The avian surveys carried out at the proposed wind farm adhered to Scottish Natural Heritage guidance (SNH, 2014) methodologies of the following survey types:

- Vantage Point Surveys (Breeding and Non-Breeding Season);
- Breeding Moorland Survey;
- Breeding & Winter Bird Transect Survey;
- Hinterland Survey;
- Merlin Survey.

2.1 Vantage Point Surveys

Vantage Point (VP) surveys were carried out at the proposed Inchamore-Gortyrahilly Wind Farm site from April 2017 to March 2018 during the non-breeding and breeding seasons, in accordance with the Scottish Natural Heritage Methodology for onshore wind farms (SNH, 2014). These surveys were divided into summer (April - September) 2017 and Winter (October - March) 2017/ 2018 seasons. Nine fixed VP locations (VP1 to VP9) overlooking the study area were used during the VP surveys. VPs 1, 2, 3 and 4 covered the northern Inchamore section of the study area whereas, VPs 5, 6, 7, 8 and 9 covered the southern Gortyrahilly section. Table 2-2 gives the VP locations. Vantage points were chosen to cover a specific viewshed of the proposed development site. Each was chosen specifically to encompass the view of all the proposed turbines.

The main purposes of vantage point survey watches are to:

1. Collect data on *target species* that will enable estimates to be made of:
    a. The time spent flying over the defined survey area;
    b. The relative use of different parts of the defined survey area; and
    c. The proportion of flying time spent within the upper and lower height limits as determined by the rotor diameter and rotor hub height.

The specific vantage points and turbines within their viewsheds can be seen in the table, below.

Table 2-1: Vantage point viewshed and turbines encompassed

Vantage Point	Turbine number(s) covered in viewshed
VP1	1, 5, 6, 4, 10, 8, 7, 12, 11, 16, 15, 21 and 13
VP2	14, 17 and 18
VP3	9, 2 and 3
VP4	19, 22, 24, 25, 23, 21 and 20
VP5	31, 32, 33 and 34
VP6	58, 57 and 53
VP7	46, 47, 44, 43, 41, 40, 38, 37, 35, 26 and 27
VP8	30, 29, 28 and 36
VP9	48, 50, 49, 45, 51, 54, 55, 52, 42, 53, 56, 39, 57 and 58

Vantage point locations were based on observations from walkover/reconnaissance surveys, viewshed analysis (using GIS) and collated information on known feeding and roosting sites from both desktop review and consultation. The number and location of vantage points was selected in order to achieve visibility of the entire study area and important features for birds in close proximity to the site (e.g. lakes, wetlands).

In line with recommended best practice (SNH, 2014 and Band *et al.* 2007), viewshed analysis was undertaken using ARCMAP 10.3, to calculate a theoretical zone of visibility from each vantage point. Visibility is calculated from each vantage point along an invisible layer suspended at the predicted lowermost height passed through by the rotor blade tips, using an observer height of 1.5m. We note the following from SNH guidance in respect of priority areas for viewshed analysis (emphasis added):

"Where the key purpose is to estimate the risk of collision with turbines, ***it is the visibility of the airspace to be occupied by the turbine rotors (the collision risk volume) that is of prime importance****. Therefore it is recommended that visibility be calculated using the least visible part of this airspace, i.e. an imaginary layer suspended at the lowermost height passed through by the rotor blade tips (typically about 20-30m above ground level). Predicting visibility at this level is a simple task using GIS. Being able to view all or most of the site to ground level can be helpful in gauging overall bird activity and usage of the site, but is not as important as being able to view the collision risk volume."*

Following SNH guidance (2014) and subsequent to consultation, watches were conducted to sampling diurnal, crepuscular and nocturnal activity of target species, and *exceeding* the required effort from SNH.

Data recorded included flight activity of target species (flight height, duration, directionality) in addition to metrics such as flock size (per recorded transit) and time of observation relative. Detailed notes of each observation of a target bird species was recorded including behaviour, gender (where possible), numbers, flight height, associated habitat and the period of time spent within the study area. Successful foraging events were also noted if they arose. Other bird species seen or heard during the VP surveys were also recorded on a casual basis and were considered separately in the analysis as additional species. Flight activity was annotated onto field maps. Total numbers of birds present both on arrival at the vantage point (when relative) and on departure (when relative) is noted. Details of each flight-path observation are provided in Section 3. Binoculars are used to scan for target species. Dictaphones are utilised to dictate bird heights whilst tracking flight events.

Flight heights are estimated visually as allowed for in SNH (2014) guidance. Flight height estimation using a clinometer or rangefinder is accepted as an *alternative* means of determining flight height however this is often not practicable (equipment may be clumsy and birds may be lost from view whilst trying to focus additional equipment on a target species rapidly moving out of sight); it should be noted that in practice many flocks of swans do not fly close enough to a surveyor for a rangefinder to be used, resulting in most flights heights being estimated in any case. As is often the case an experienced observer will be able to record accurate observations at a higher frequency resulting in a larger dataset for analysis.

As previously mentioned VP surveys were carried out at the site from April 2017 to March 2018 inclusive (see Table 2-1 for details) and involved carrying out 2 x 3 hour VPs at each VP every month. As per SNH guidance (2014) thirty-six hours of vantage point effort was carried out at each vantage point during the wintering period and breeding period. The proportion of survey time that activity was recorded inside and outside the wind farm site boundary was used as part of the overall analysis and assessment of target species usage of the study area. Vantage point locations can be found in Table 2-2, below. All surveys were conducted during suitable weather conditions.

Table 2-2: Grid References for VP locations at Inchamore/Gortyrahilly Wind Farm

Vantage Point	Location (ITM)
VP1	512600 578973
VP2	512393 578592
VP3	514385 579799
VP4	510657 576557
VP5	511897 572251
VP6	518270 572901
VP7	515686 572534
VP8	515184 574573
VP9	516014 570969

2.2 Hinterland Surveys

Hinterland surveys were undertaken following methodology (Bibby *et al*, 2000). The surveys were carried out in suitable wetland habitats and lakes in the area surrounding the proposed wind farm site. To determine the numbers and species of wetland birds in the area, a hinterland survey was undertaken over an area of 10 km from the proposed wind farm site and was comprised of six lake/wetland sites. Surveys were carried out October (24th), November (17th, 20th and 21st) and December (9th and 29th) of 2017 and January (28th and 29th), February (1st) and March (15th and 24th) 2018. The following site were checked monthly Grousemount, the Gearagh, Inchigeelagh, Lough Allua (Ballingeary), Lough Nabuddoga, Sillahtane Wind Farm. The species and abundance of the wetland birds were monitored using short Vantage Point watches (of between 1 hr and 3 hr 50 mins duration). Table 2-3 indicates where within the 10 km area around the proposed Wind Farm hinterland surveys were carried out.

Table 2-3: Hinterland Survey Locations

Location	Grid reference	Dates visited
Lough Nabuddoga	506728 573791	15/03/2018, 29/01/2018, 21/11/2017 & 24/10/2017
Inchigeelagh	522331 566141	24/03/2018 & 29/12/2017
Grousemont	509274 569529	28/01/2018
Gearagh	531400 570836	02/02/2018, 17/11/2017, 20/11/2017 & 29/12/2017.
Lough Allua	518735 565624	20/11/2017 & 29/12/2017
Sillahtane Windfarm entrance	510719 573143	09/12/2017

2.3 Breeding Moorland Surveys

Survey transects to assess the presence of breeding moorland populations were completed in May, June and July 2017. Breeding birds were surveyed using methodology of the breeding wader survey and breeding moorland survey, following Bibby *et al*, (2000) and Gilbert *et al*, (1998). Four transects, of approximately, was used within the site.

As recommended by Scottish National Heritage (2014), upland breeding moorland surveys should be completed using transects with 4 visits during mid-April early July. Two years' survey is required unless shorter survey period has been justified. All species encountered (seen or heard) on the transect were recorded and their abundance noted. Any species occurring more than 100 m from the observer, or flying over the site and not using it, were recorded as 'additional' species to further inform the baseline survey.

Table 2-4 Breeding Bird Transect - Survey Details

Date	Site	Cloud (Okta)	Precipitation	Wind
08/05/2017	Ballyvourney and Inchamore	1/8-0/8	Dry	F1-2-3
13/06/2017	Inchamore	6/8-8/8	Dry	F0-5
14/06/2017	Gortyrahilly	6/8-8/8	Dry	F2-4
07/07/2017	Inchamore and Gortyrahilly	6/8-2/8	Dry	F0-1
17/07/2017	Inchamore and Gortyrahilly	1/8-2/8	Dry	F3-4

2.4 Merlin Surveys

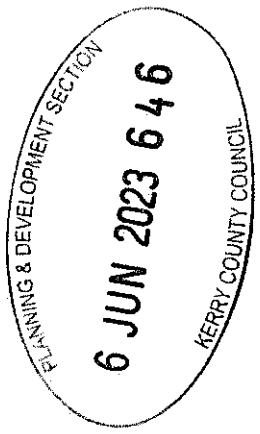
Merlin surveys, specifically for the bird of prey (*Falco columbarius*), in order to assess the presence of the species within the proposed development site. Specific Merlin survey transects were used in order to accurately assess for the species (Gilbert, G. *et al*., 1998).

Four visits, of potential Merlin habitat, were completed between May and July 2017. Such habitat types included areas of heather, moorland, forestry plantation edges and young plantations and open woodland below, 600m in altitude (Gilbert, G. *et al*., 1998). Within all Merlin suitable areas, merlin observations, nests and evidence were recorded.

Weather conditions, including, precipitation, cloud cover and wind were measured at the start of all surveys. Table 2-5 displays the survey details of Merlin surveys within the site.

Table 2-5: Merlin Transect - Survey Details

Date	Cloud (Okta)	Precipitation	Wind
08/05/2017	1/8	Dry	F 2-3
08/05/2017	1/8-0/8	Dry	F 2-3
25/05/2017	8/8	Mist – No rain	F 2-3W
03/06/2017	6/8	Showers	F 3
01/07/2017	8/8	Dry	F5-6W



2.5 Breeding Bird Surveys

For general breeding birds the method utilised was based on the existing British Trust for Ornithology (BTO) Breeding Bird Survey (BBS or CBS) (Biddy *et al*, 2000). The study area for this survey comprised a total of 8 no. c. 1 kilometre transects which were selected and centred on different habitats present within the subject sites (See Figure 2-1 for the location of transects.). Four transects were located in both the Inchamore and Gortyrahilly Wind Farm sites. For each site birds were counted over two visits, each timed to coincide with the early part of the breeding season (April to mid-May 2017 and 2018) and later part of the season (mid-May to late June 2017 and 2018) with visits at least four weeks apart. Surveyors recorded all birds seen or heard as they walked methodically along the transect routes. Birds were noted in four distance categories, measured at right angles to the transect line (within 25m, between 25m-100m and over 100m from the transect line) and those seen in flight only. Recording birds in distance bands gives a measure of bird detectability and allows relative population densities to be estimated if required (BTO, 2018).

SNH guidance on recommended bird survey methods to inform impact assessment of onshore wind farms states:

> *"Surveys of farmland passerines especially on more intensive arable habitat are generally not required"* (SNH 2014).

The breeding bird transect schedule is available in Table 2.6. The results are presented in Table 3.6 and 3.7.

Table 2-6: Breeding Bird Transect Survey Details

Date	Transect	Time	Weather Conditions
16.05.2017	1N	11.33	Cloud: 3/8 oktas, Rain: Dry, Wind: Beaufort 3, Visibility: Very Good
16.05.2017	2N	09.30	Cloud: 5/8 oktas, Rain: Dry, Wind: Beaufort 3, Visibility: Very Good
16.05.2017	3N	10.01	Cloud: 7/8 oktas, Rain: Dry, Wind: Beaufort 3, Visibility: Very Good
16.05.2017	4N	12.45	Cloud: 5/8 oktas, Rain: Dry, Wind: Beaufort 3, Visibility: Very Good
16.05.2017	1S	17.16	Cloud: 3/8 oktas, Rain: Dry, Wind: Beaufort 3-4, Visibility: Very Good
16.05.2017	2S	13.39	Cloud: 3/8 oktas, Rain: Dry, Wind: Beaufort 2-3, Visibility: Very Good
16.05.2017	3S	14.36	Cloud: 1/8 oktas, Rain: Dry, Wind: Beaufort 3, Visibility: Very Good
16.05.2017	4S	16.08	Cloud: 1/8 - 5/8 oktas, Rain: Dry, Wind: Beaufort 2-5, Visibility: Very Good
19.06.2017	1N	17.55	Cloud: 6/8 oktas, Rain: Dry, Wind: Beaufort 0-1, Visibility: Very Good
13.06.2017	2N	14.55	Cloud: 8/8 oktas, Rain: Dry, Wind: Beaufort 3-4, Visibility: Very Good
13.06.2017	3N	15.42	Cloud: 8/8 oktas, Rain: Dry, Wind: Beaufort 3-4, Visibility: Very Good
13.06.2017	4N	17.35	Cloud: 7/8 oktas, Rain: Dry, Wind: Beaufort 3, Visibility: Very Good
01.07.2017	1S	11.21	Cloud: 8/8 oktas, Rain: Dry, Wind: Beaufort 3, Visibility: Very Good
14.06.2017	2S	13.44	Cloud: 0/8 oktas, Rain: Dry, Wind: Beaufort 2-3, Visibility: Very Good
14.06.2017	3S	14.47	Cloud: 8/8 oktas, Rain: Dry, Wind: Beaufort 3, Visibility: Very Good
14.06.2017	4S	12.05	Cloud: 6/8 oktas, Rain: Dry, Wind: Beaufort 3, Visibility: Very Good