APPENDIX 7.4

SURVEY DATA

Table of Contents

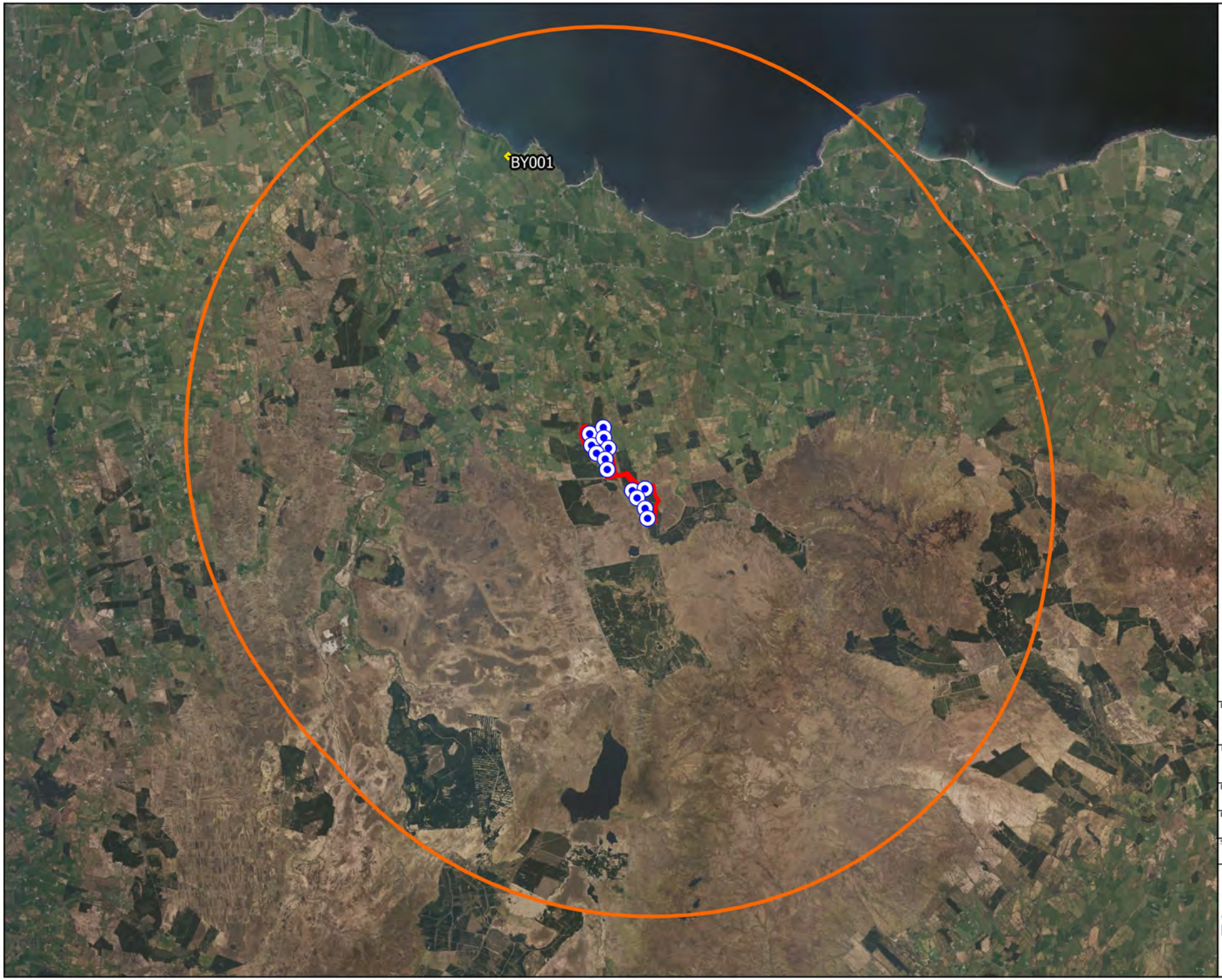
Table of Tables

Table of Figures

1. BARNACLE GOOSE

Table 7 - 4 - 1 Barnacle goose waterbird distribution survey data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
BY001	Pollbrean	29/11/2021	13:33	Barnacle Goose	23	improved agricultural grassland; grazing on coastal farmland	NM



Map Legend

- Turbine Locations
- Study Area Boundary
- 8km Radius of Study Area
- Barnacle Goose Record

N

Drawing Title

Barnacle Goose
Waterbird Distribution Survey

Project Title

Dunneill Wind Farm

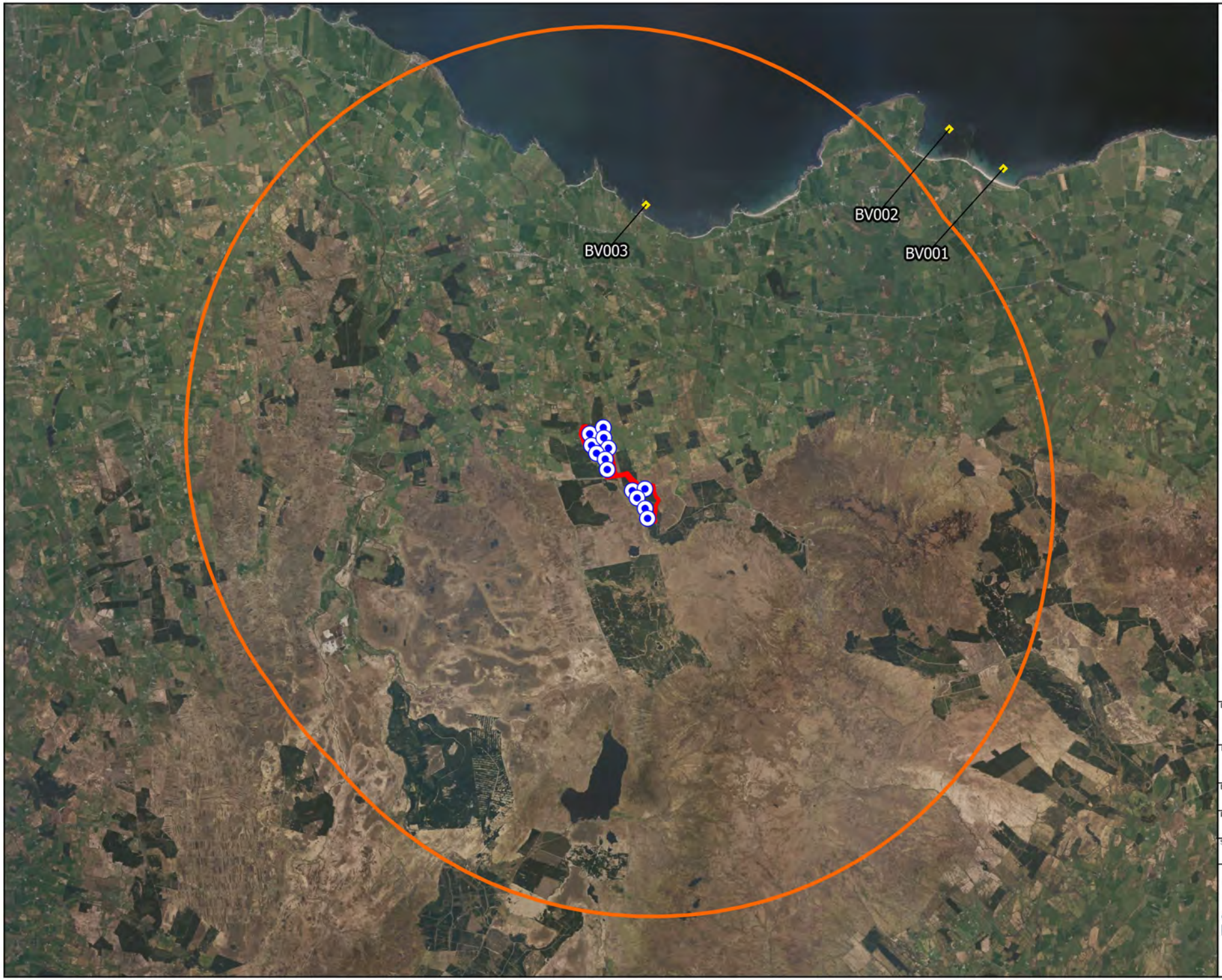
Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.1
Scale	Date
1:100000	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

2. BLACK-THROATED DIVER

Table 7 - 4 - 2 Black-throated diver waterbird distribution survey data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
BV001	Dunmoran Strand	27/10/2021	12:30	Black-throated Diver	1	marine water body; foraging	AOD
KI011	Pollachurry Pier	29/11/2021	08:47	Black-throated Diver	3	sea inlets and bays; swimming and diving just offshore	NM
	pollnadivva pier	29/11/2021	11:28	Black-throated Diver	2	sea inlets and bays; swimming and diving just offshore	NM



Map Legend

- Turbine Locations
- Study Area Boundary
- 8km Radius of Study Area
- Black-throated Diver Record

N

Drawing Title
Black-throated Diver Waterbird Distribution Survey

Project Title
Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.2
Scale	Date
1:100000	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

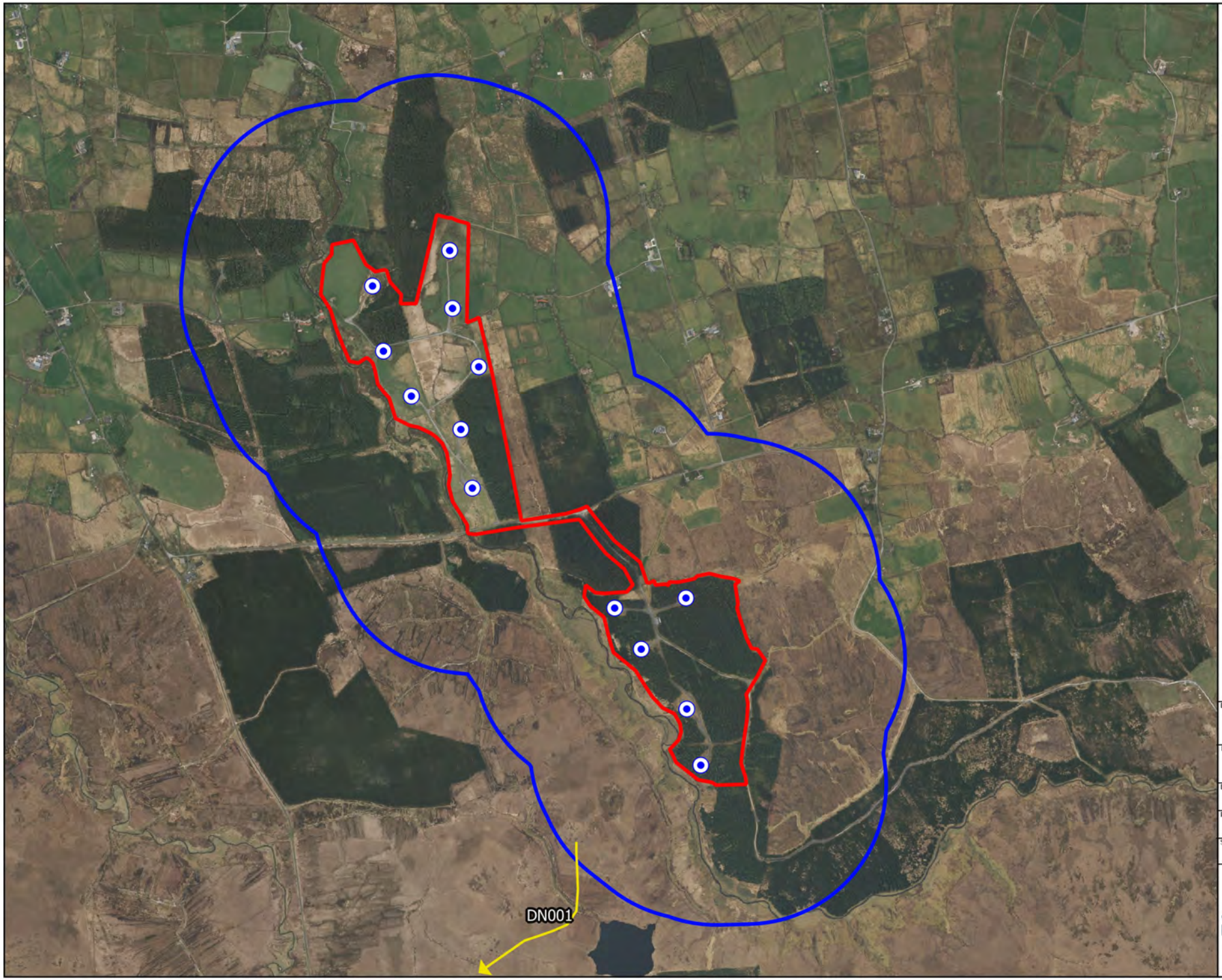
3. DUNLIN

Table 7 - 4 - 3 Dunlin walkover survey data

Ref.	Date	Time	Species	Number	Habitat and activity	Surveyor
DN001	21/07/2021	06:16	Dunlin	1	upland blanket bog and dry-humid acid grassland; flushed from heather and bog, breeding plumage clearly visibly, did not return, nor was any evidence of breeding found or observed (suitable nesting habitat; possible breeder)	NM

Table 7 - 4 - 4 Dunlin waterbird distribution survey data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
DN001	Crowagh	13/08/2021	15:07	Dunlin	1	bogs and heath; perched on heather in south-west open bog area, faded breeding pluamge visible	NM
DN002	Carrickphatrick	22/09/2021	18:19	Dunlin	7	littoral rock; foraging on rocky shore	NM
DN003	Dunmoran strand	06/10/2021	14:14	Dunlin	8	exposed rocky shroes; foraging	AOD
DN004	Aughris Head	06/10/2021	14:31	Dunlin	4	sand shores; foraging	AOD
DN005	Dunmoran strand	27/10/2021	13:02	Dunlin	7	exposed rocky shroes; roosting	AOD
DN006	Corkagh Beg	06/01/2022	11:46	Dunlin	16	mixed substrata shores; foraging	CH
DN007	Corkagh Beg	09/02/2022	16:46	Dunlin	14	moderately exposed rocky shores; roosting	CH
DN008	Dunmoran Strand	25/02/2022	16:44	Dunlin	150	littoral rock; flying and landing	CH
DN009	Dunmoran Strand	08/03/2022	16:18	Dunlin	250	sea inlets and bays; flying, flew east	CH



Map Legend

Site Boundary

Turbine Locations

Study Area Boundary

500m Radius

Breeding Season Observation

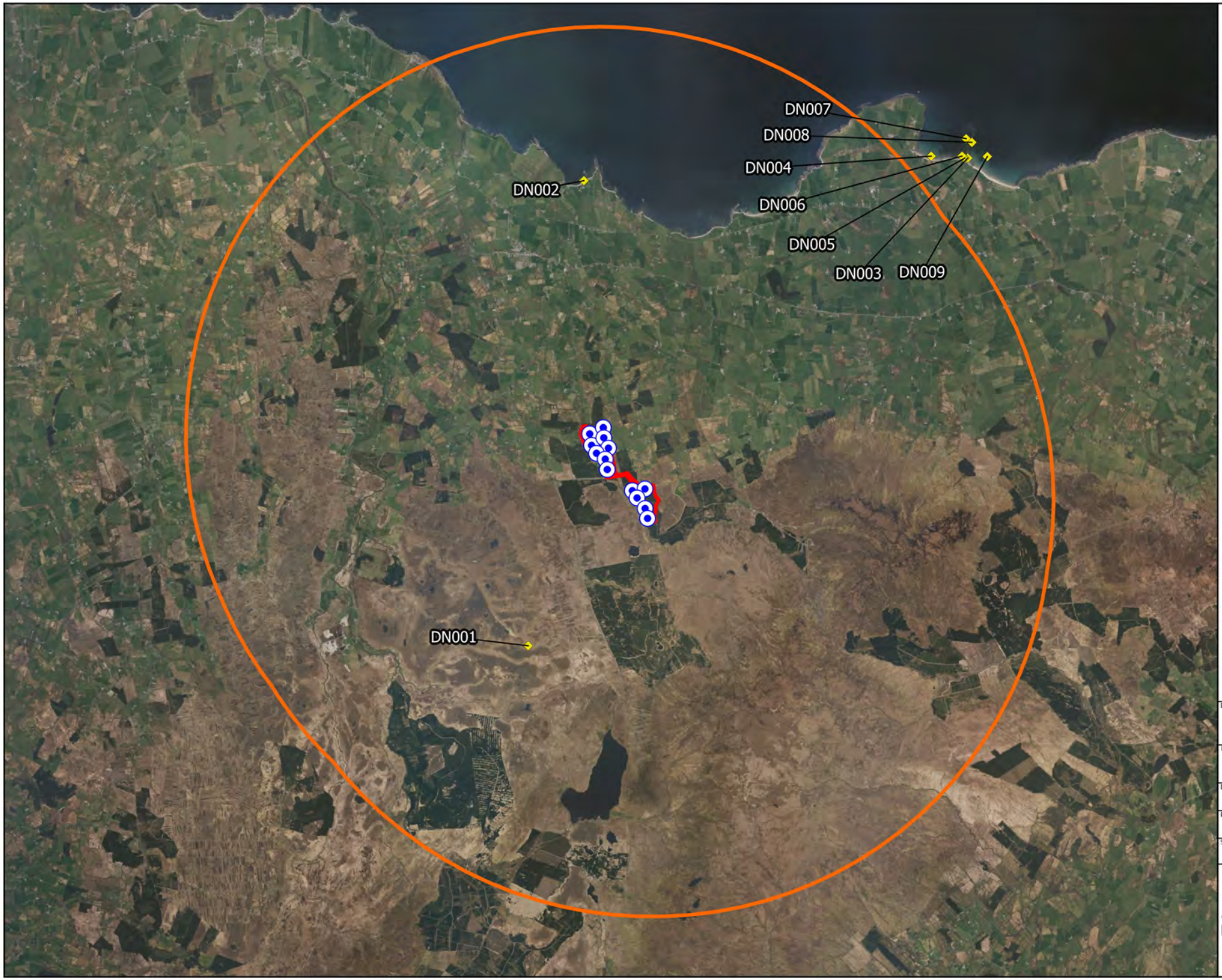
N

Drawing Title: Dunlin Walkover

Project Title: Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.3
Scale	Date
1:17640	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie



Map Legend

- Turbine Locations
- Study Area Boundary
- 8km Radius of Study Area
- Dunlin Record

N

Drawing Title

Dunlin
Waterbird Distribution Survey

Project Title

Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.4
Scale	Date
1:100000	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

4. GOLDEN PLOVER

Table 7 - 4 - 5 Golden plover waterbird distribution survey data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
GP001	Easky Lough	21/09/2021	13:09	Golden Plover	1	upland blanket bog; foraging on wet rushy grassland, flushed	NM
GP002	Crowagh	22/09/2021	08:14	Golden Plover	16	upland blanket bog and cutover bog; roosting/foraging on bog	NM
GP003	Lough Minna	27/10/2021	17:21	Golden Plover	50	raised bog; flying	AOD
GP004	Kilcummin	30/11/2021	12:03	Golden Plover	250	bogs and heath; large flock swirling over mountain	NM
GP005	Belcloghy Loughs	09/02/2022	19:04	Golden Plover	3	upland blanket bog; flying and calling, flushed	CH
GP006	Easkey Bog	09/02/2022	19:07	Golden Plover	9	upland blanket bog; flying, flushed and formed flock flying at 100m for 2mins	CH
GP007	Easkey Bog	09/02/2022	19:09	Golden Plover	6	upland blanket bog; flying and calling, flushed	CH
GP008	Easkey Bog	30/03/2022	12:20	Golden Plover	3	upland blanket bog; calling, heard, not seen	CH
GP009	Corkagh Beg	31/03/2022	15:48	Golden Plover	120	exposed rocky shroes; roosting	CH

Table 7 - 4 - 6 Golden plover incidental records data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
GP001	Hen Harrier Roost Survey; HHVP1	20/10/2021	17:50	Golden Plover	3	upland blanket bog; flying	CH

Map Legend

- Turbine Locations
- Study Area Boundary
- 8km Radius of Study Area
- Golden Plover Record

N

Drawing Title	Golden Plover Waterbird Distribution Survey
Project Title	Dunneill Wind Farm
Drawn By: SD	Checked By: PC
Project No.: 210207	Drawing No.: Fig 7.4.5
Scale: 1:100000	Date: 03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

Map Legend

- Study Area Boundary
- Golden Plover Observation

N

Drawing Title
Golden Plover
Incidental Record

Project Title
Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.6
Scale	Date
1:39000	03.08.22

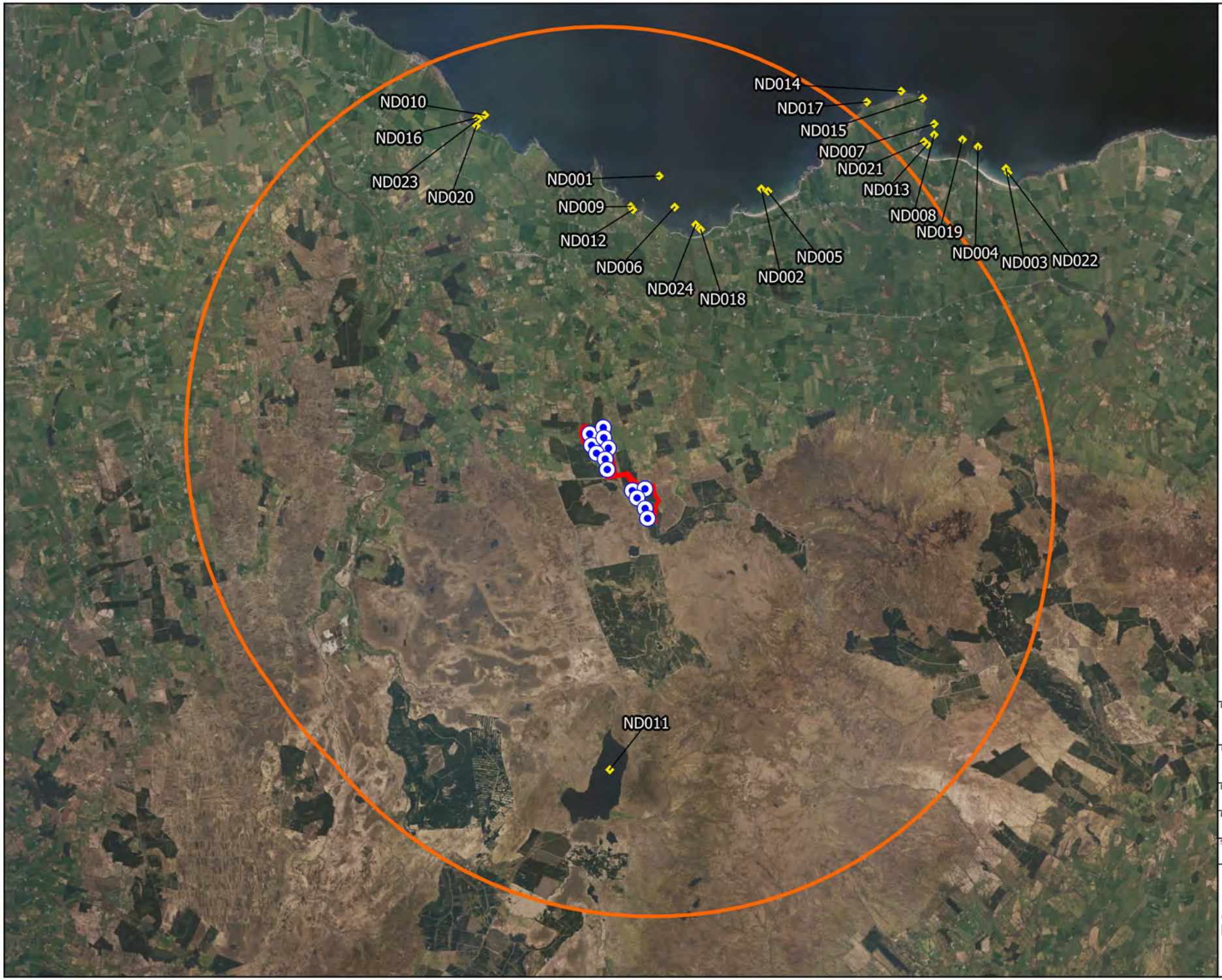
MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

5. GREAT NORTHERN DIVER

Table 7 - 4 - 7 Great northern diver waterbird distribution survey data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
ND001	Carricknambronty	08/09/2021	10:36	Great Northern Diver	2	marine water body; swimming and diving	NM
ND002	Trawwee	06/10/2021	15:32	Great Northern Diver	1	marine water body; foraging	AOD
ND003	Dunmoran Strand	27/10/2021	12:30	Great Northern Diver	1	marine water body; foraging	AOD
ND004	Dunmoran Strand	27/10/2021	12:59	Great Northern Diver	2	marine water body; foraging	AOD
ND005	Trawwee	27/10/2021	13:59	Great Northern Diver	1	marine water body; foraging	AOD
ND006	Doonycoy	27/10/2021	14:21	Great Northern Diver	2	marine water body; foraging	AOD
ND007	Pollachurry Pier	16/11/2021	14:43	Great Northern Diver	2	sea inlets and bays; swimming and diving	NM
ND008	Pollachurry Pier	29/11/2021	08:50	Great Northern Diver	1	sea inlets and bays; swimming and diving just offshore	NM
ND009	Pollnadivva Pier	29/11/2021	11:29	Great Northern Diver	2	sea inlets and bays; swimming and diving on water	NM
ND010	Pollbrean	29/11/2021	13:55	Great Northern Diver	2	sea inlets and bays; swimming and diving just offshore	NM
ND011	Lough Easky	30/11/2021	12:37	Great Northern Diver	1	lakes and ponds; swimming and diving on lake	NM
ND012	Pollnadivva Pier	06/12/2021	15:12	Great Northern Diver	1	sea inlets and bays; foraging	CH
ND013	Aughris Beach	06/01/2022	12:10	Great Northern Diver	1	sea inlets and bays; foraging	CH
ND014	Aughris Head	06/01/2022	12:57	Great Northern Diver	1	open marine water; foraging	CH
ND015	Aughris Head	06/01/2022	12:58	Great Northern Diver	1	open marine water; foraging	CH
ND016	Carrownabinny	25/01/2022	15:41	Great Northern Diver	1	sea inlets and bays; foraging	CH
ND017	Aughris Head	26/01/2022	15:18	Great Northern Diver	1	open marine water; foraging	CH
ND018	Carricknagrauv	09/02/2022	15:35	Great Northern Diver	6	sea inlets and bays; roosting, bathing and preening	CH
ND019	Corkagh Beg	09/02/2022	16:49	Great Northern Diver	4	sea inlets and bays; roosting and foraging	CH

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
ND020	Pollbrean	25/02/2022	14:31	Great Northern Diver	1	sea inlets and bays; foraging	CH
ND021	Aughris Beach	25/02/2022	16:01	Great Northern Diver	1	sea inlets and bays; foraging	CH
ND022	Dunmoran Strand	25/02/2022	16:40	Great Northern Diver	1	sea inlets and bays; foraging	CH
ND023	Pollbrean	08/03/2022	14:03	Great Northern Diver	1	sea inlets and bays; foraging	CH
ND024	Carricknagrauv	08/03/2022	14:53	Great Northern Diver	1	sea inlets and bays; foraging	CH



Map Legend

- Turbine Locations
- Study Area Boundary
- 8km Radius of Study Area
- Great Northern Diver Record

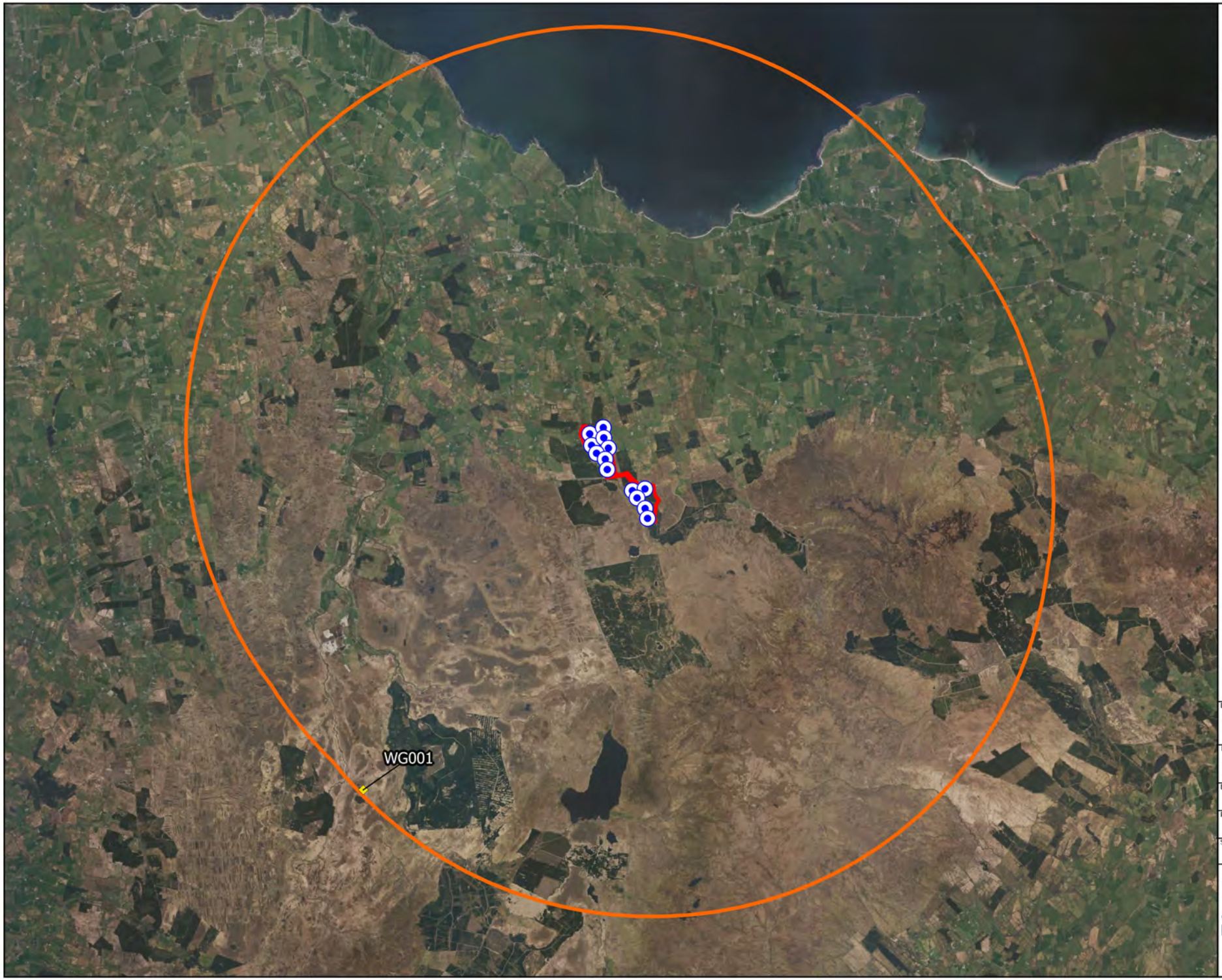
Drawing Title	Great Northern Diver Waterbird Distribution Survey
Project Title	Dunneill Wind Farm
Drawn By: SD	Checked By: PC
Project No.: 210207	Drawing No.: Fig 7.4.7
Scale: 1:100000	Date: 03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

6. GREENLAND WHITE-FRONTED GOOSE

Table 7 - 4 - 8 Greenland white-fronted goose waterbird distribution survey data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
WG001	Fiddandarry	15/11/2021	12:15	Greenland White-fronted Goose	14	bogs, dystrophic lakes and conifer plantation; flying high and s over upland	NM



Map Legend

- Turbine Locations
- Study Area Boundary
- 8km Radius of Study Area
- Greenland White-fronted Goose Record

N

Drawing Title
Greenland White-fronted Goose Waterbird Distribution Survey

Project Title
Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.8
Scale	Date
1:100000	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

7. HEN HARRIER

Table 7 - 4 - 9 Hen harrier vantage point survey data - flights

Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1	Band 2	Band 3 (PCH)	Band 4	Band 5	Habitat and activity	Surveyor
HH001	VP2	04/11/2021	15:40	Hen Harrier	1	480	440	20	20	0	0	upland blanket bog and conifer plantation; flying and hunting, adult male, low hunting flight, failed attack on snipe	CH
HH002	VP2	20/01/2022	15:25	Hen Harrier	1	30	30	0	0	0	0	upland blanket bog; hunting, adult male, caught avian prey	CH
HH003	VP2	20/01/2022	16:00	Hen Harrier	1	220	10	10	10	190	0	upland blanket bog; flying, adult male, took off after eating flying high and purposefully towards west	CH

Table 7 - 4 - 10 Hen harrier vantage point survey data - non-flights

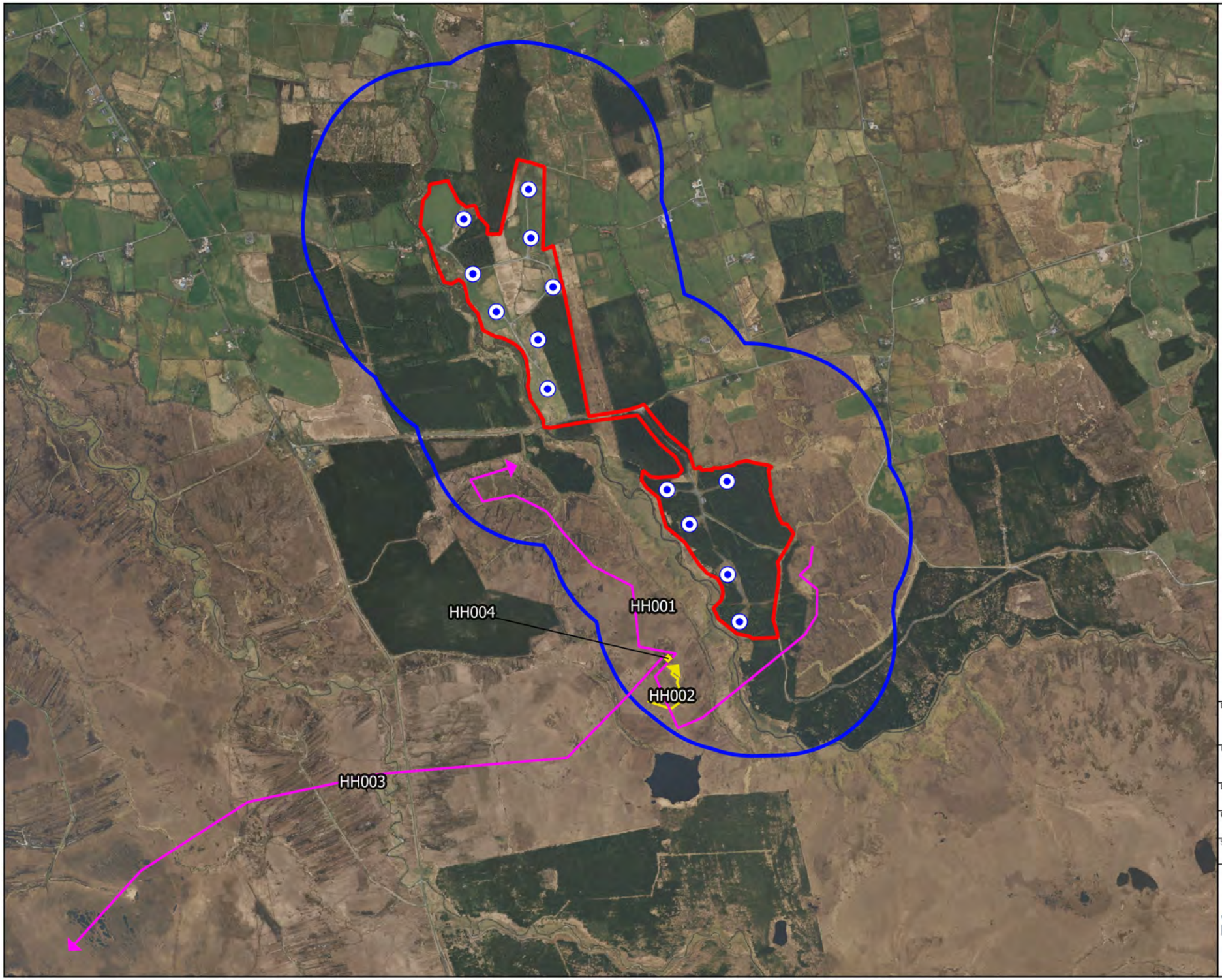
Ref.	VP	Date	Time	Species	Number	Habitat and activity	Surveyor
HH004	VP2	20/01/2022	15:30	Hen Harrier	1	upland blanket bog; foraging, adult male plucking and eating avian prey for 25 minutes	CH

Table 7 - 4 - 11 Hen harrier breeding raptor survey data

Ref.	BR	Date	Time	Species	Number	Habitat and activity	Breeding status	Surveyor
HH001	BR2	28/05/2021	09:02	Hen Harrier	1	conifer plantation, upland blanket bog and wet heath, perched briefly at edge of young conifers before flying low and purposely to west and north over open bog, area of heather scrub and rim of river gully. male - no breeding behaviour observed, appeared to be hunting	suitable nesting habitat; possible breeder	NM

Table 7 - 4 - 12 Hen harrier incidental records data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
HH001	Waterbird Distribution Survey; Lough Minna	22/09/2021	15:08	Hen Harrier	1	upland blanket bog, improved agricultural grassland and mixed conifer woodland; flying low across bog and field, disturbed from perch within bog	NM
HH002	Waterbird Distribution Survey; Portaghbradagh	29/11/2021	15:32	Hen Harrier	1	mixed conifer woodland, scrub and semi-natural grassland; flew out of perch at edge of forestry and flew low over scrubby grassland	NM



Map Legend

- Turbine Locations
- Study Area Boundary
- 500m Radius
- Non-flight Record
- Flight Record
- Flight Record at Potential Collision Height

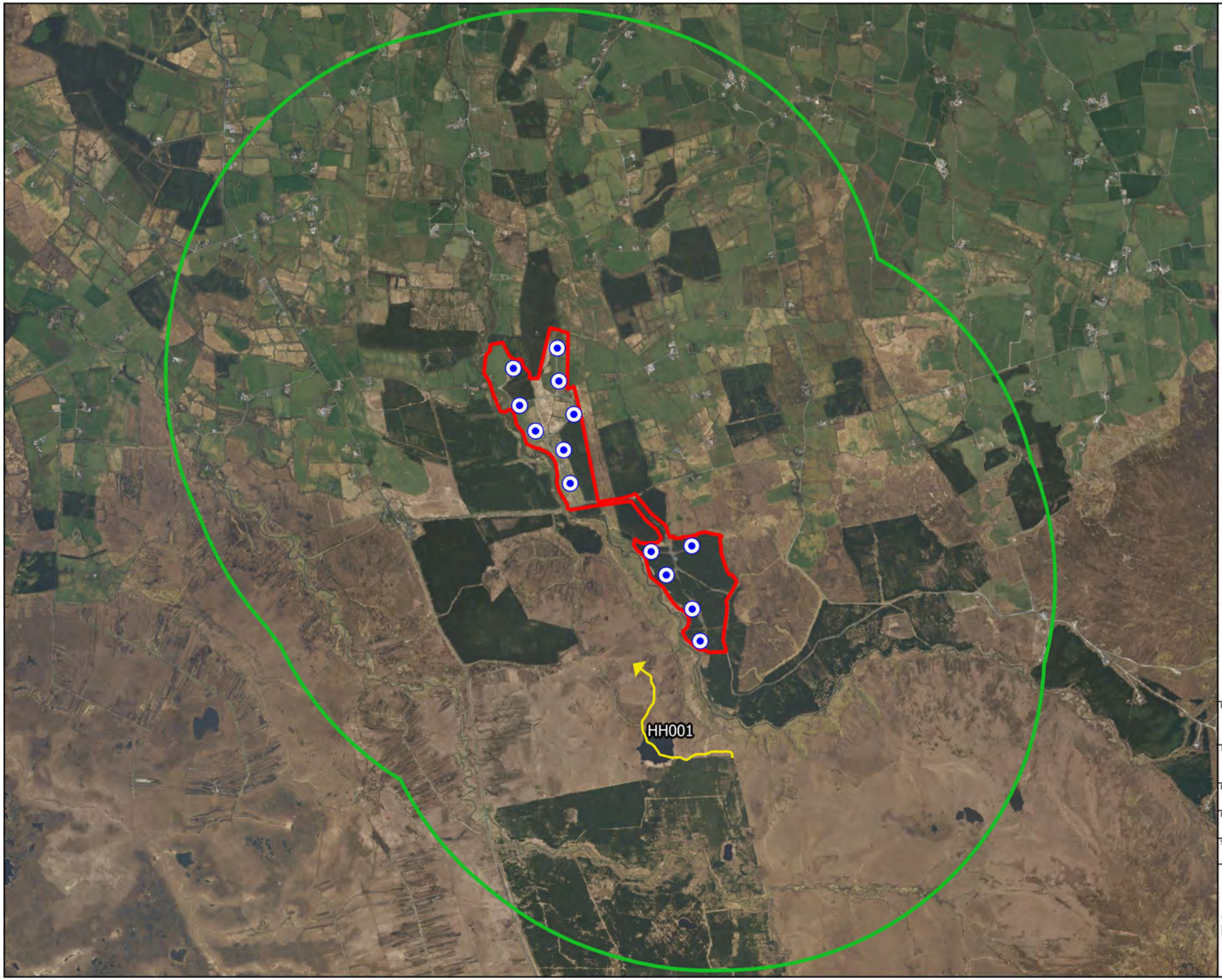
N

Drawing Title
Hen Harrier Vantage Point

Project Title
Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.9
Scale	Date
1:21000	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie



Map Legend

Site Boundary

Turbine Locations

Study Area Boundary

2km Radius

Hen Harrier Observation

N

Drawing Title

Hen Harrier
Breeding Raptor

Project Title

Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.10
Scale	Date
1:31000	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

Map Legend

Study Area Boundary

Hen Harrier Observation

N

Drawing Title

Hen Harrier
Incidental Record

Project Title

Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.11
Scale	Date
1:65000	03.08.22

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Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

8. KINGFISHER

Table 7 - 4 - 13 Kingfisher incidental records data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
KF001	Waterbird Distribution Survey; Easky River at Gleneasky	15/11/2021	10:39	Kingfisher	1	depositing/lowland rivers; flying and perching along river	NM

Map Legend

- Study Area Boundary
- Kingfisher Observation

N

Drawing Title
Kingfisher
Incidental Record

Project Title
Dunneill Wind Farm

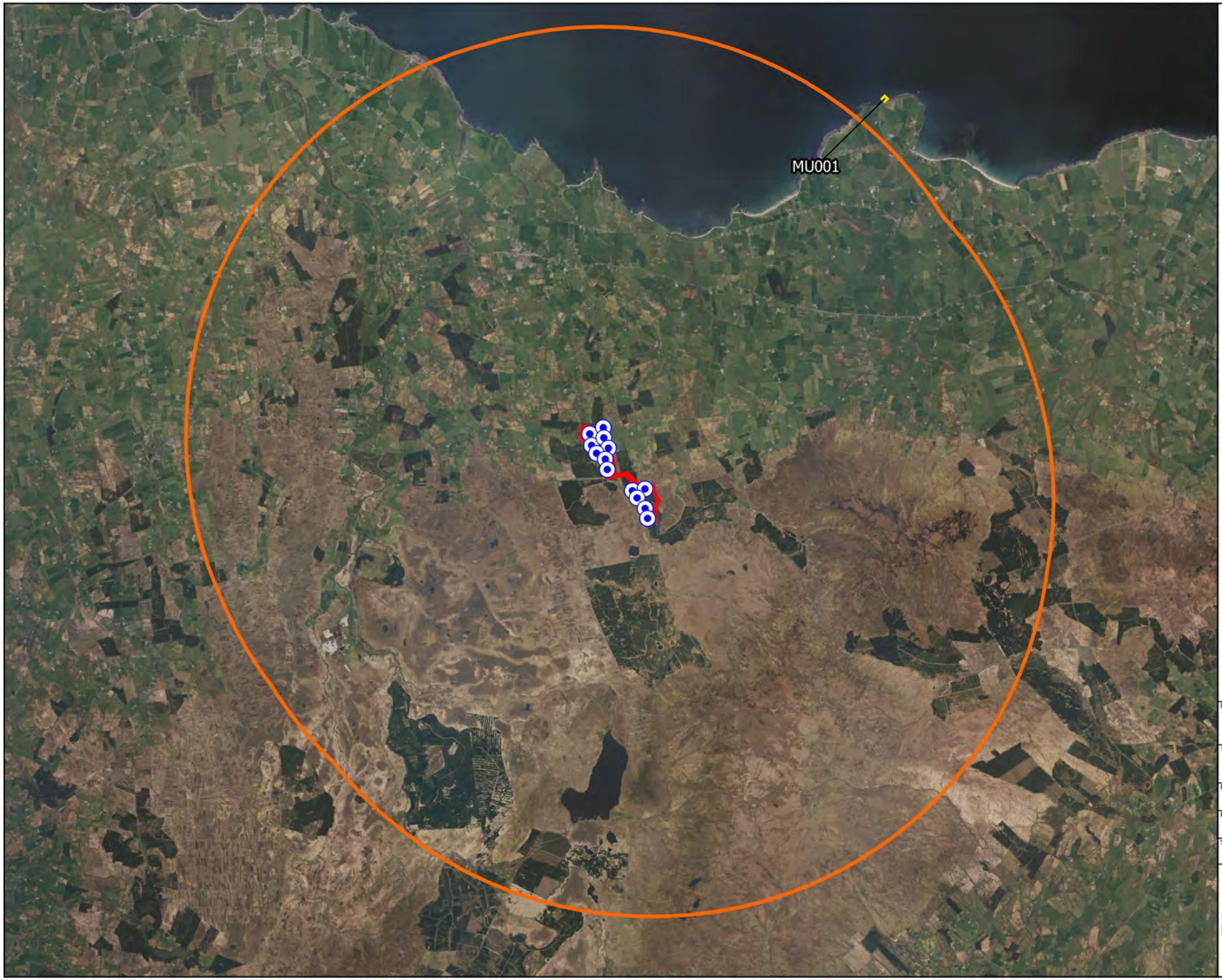
Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.12
Scale	Date
1:50000	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

9. MEDITERRANEAN GULL

Table 7 - 4 - 14 Mediterranean gull waterbird distribution survey data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
MU001	Aughris Head	16/11/2021	15:16	Mediterranean Gull	6	rocky sea cliffs and exposed rocky shroes; flying along exposed coast	NM



Map Legend

- Turbine Locations
- Study Area Boundary
- 8km Radius of Study Area
- Mediterranean Gull Record

N

Drawing Title

Mediterranean Gull Waterbird Distribution Survey

Project Title

Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.13
Scale	Date
1:100000	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

10. MERLIN

Table 7 - 4 - 15 Merlin vantage point survey data – flights

Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1	Band 2	Band 3 (PCH)	Band 4	Band 5	Habitat and activity	Surveyor
ML001	VP1	17/12/2021	12:43	Merlin	1	20	20	0	0	0	-	cutover bog; flying	CH

Table 7 - 4 - 16 Merlin vantage point survey data - non-flights

Ref.	VP	Date	Time	Species	Number	Habitat and activity	Surveyor
ML002	VP1	07/09/2021	19:23	Merlin	1	bogs and semi-natural grassland; perched on fence post at corner of forestry for a long time - departure was missed	NM

Table 7 - 4 - 17 Merlin breeding raptor survey data

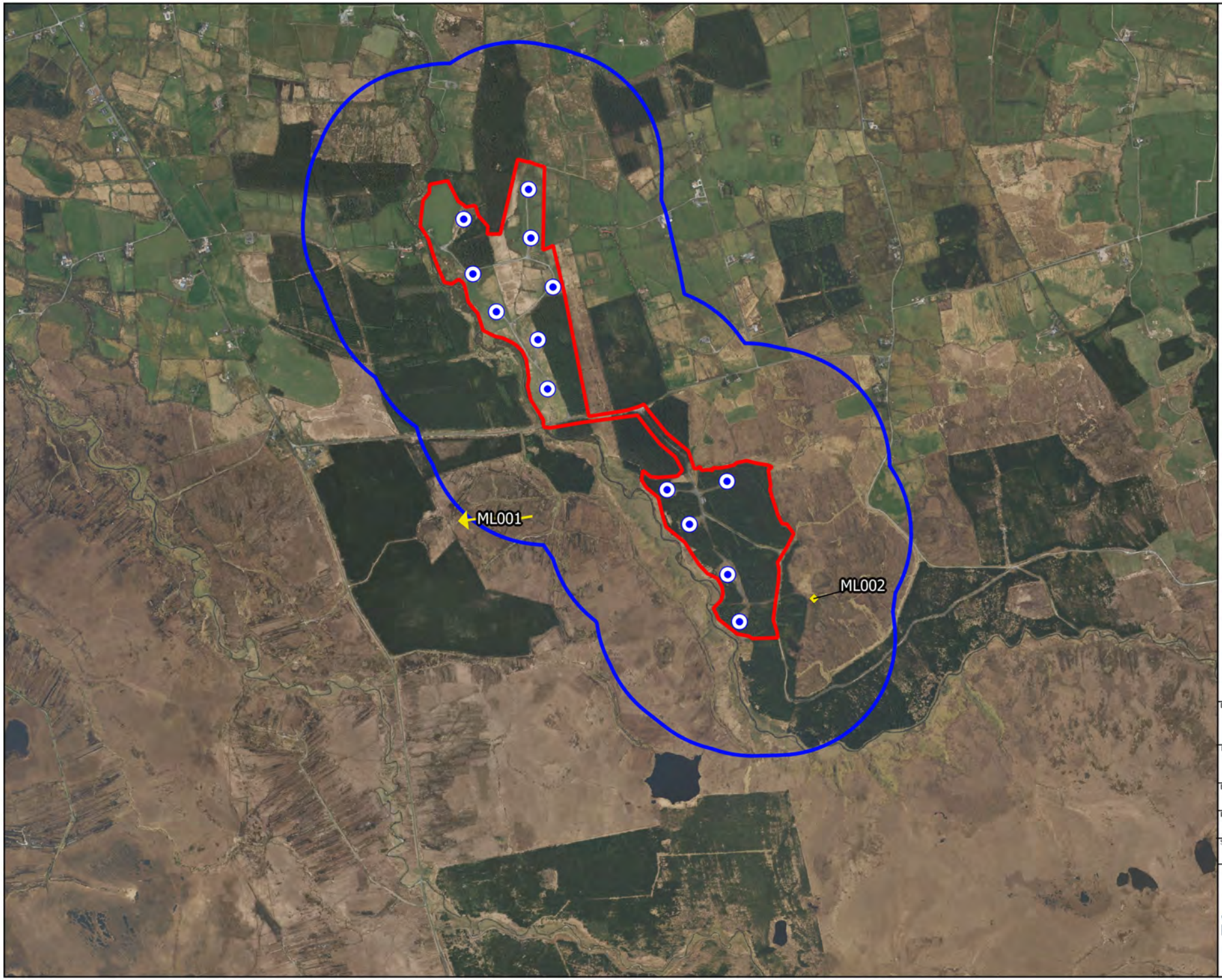
Ref.	BR	Date	Time	Species	Number	Habitat and activity	Breeding status	Surveyor
ML001	BR2	29/04/2021	10:45	Merlin	1	wet heath and upland blanket bog, flying low, rapidly and frantically across moorland, perched in high heather thicket briefly	suitable nesting habitat; possible breeder	NM
ML002	BRT1	25/05/2021	10:37	Merlin	1	conifer plantation and improved agricultural grassland, flying over mid-young age conifer plantation	flyover; non-breeding	NM

Ref.	BR	Date	Time	Species	Number	Habitat and activity	Breeding status	Surveyor
ML003	BR8	28/05/2021	06:26	Merlin	1	conifer plantation and upland blanket bog, perched on tree at edge of young forestry, flew away and weaving roughly north-east, no breeding behaviour witnessed	suitable nesting habitat; possible breeder	NM
ML004	BR1	20/07/2021	15:02	Merlin	1	upland blanket bog, cutover bog and conifer plantation, emerging from scrub along stream. flying low across open moor, road and along forest fringe, perched for a time in forestry before continuing flying along fringe in west direction uphill	suitable nesting habitat; possible breeder	NM
ML005	BR3	22/07/2021	07:47	Merlin	1	mixed conifer woodland and upland blanket bog, flying low along forestry fringes and along river, disappearing into forestry but location unclear	suitable nesting habitat; possible breeder	NM

Table 7 - 4 - 18 Merlin incidental records data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
ML001	Breeding Woodcock Survey; in south-western young forestry	09/06/2021	22:02	Merlin	1	conifer plantation, upland blanket bog and cutover bog; flying low along edge and over young forestry, commuting, no breeding behaviour observed	NM
ML002	Breeding Walkover Survey ; Lough Easkey	24/06/2021	19:17	Merlin	1	conifer plantation and upland blanket bog; took flight from tree, flushed mps, lost from view, female type	CD
ML003	Waterbird Distribution Survey; Crowagh bog	12/08/2021	12:34	Merlin	1	cutover bog; perched on turf pile, then flying away low and rapidly across bog	NM
ML004	Waterbird Distribution Survey; Crowagh River	26/08/2021	13:54	Merlin	1	bogs and mixed conifer woodland; flying low and rapidly along forestry track/river	NM
ML005	Waterbird Distribution Survey; Easky River	22/09/2021	08:33	Merlin	1	upland blanket bog, cutover bog and mixed conifer woodland; flying low across bog, battling with wind	NM

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
ML006	Waterbird Distribution Survey; Lough Minna	27/10/2021	17:28	Merlin	1	raised bog; flying	AOD
ML007	Hen Harrier Roost Survey; HHVP2	16/11/2021	16:03	Merlin	1	upland blanket bog; flying, flying directly towards known easky roost site at dusk	CH
ML008	Hen Harrier Roost Survey; HHVP4	01/12/2021	15:34	Merlin	1	lowland blanket bog and eroding/upland rivers; flying and foraging, hunting/chasing a meadow pipit	CH
ML009	Hen Harrier Roost Survey; HHVP3	02/12/2021	15:47	Merlin	1	cutover bog; flying, dropped low before disappearing in area of gorse bushes	CH
ML010	Waterbird Distribution Survey; Easky Bog	07/01/2022	11:44	Merlin	1	cutover bog; flying and landing, female travelling between turf stacks	CH
ML011	Hen Harrier Roost Survey; HHVP4	11/01/2022	17:07	Merlin	1	upland blanket bog and eroding/upland rivers; flying, possibly went to ground, lost sight of it in fading light against heather	CH
ML012	Waterbird Distribution Survey; HHVP2	25/01/2022	12:00	Merlin	1	upland blanket bog; flying	CH
ML013	Waterbird Distribution Survey; Fiddangarrode	09/02/2022	13:40	Merlin	1	cutover bog; foraging, chasing small passerine	CH
ML014	Breeding Red Grouse Survey; north of Lough Nafullow	11/03/2022	16:43	Merlin	1	upland blanket bog and heath; foraging, preening, perched, flying, landed on fence post for c.3 mins	CH
ML015	Hen Harrier Roost Survey; HHVP4	29/03/2022	18:25	Merlin	1	lowland blanket bog; flying, seen	NS
ML016	Hen Harrier Roost Survey; HHVP4	29/03/2022	18:56	Merlin	1	lowland blanket bog; flying, seen	NS



Map Legend

- Turbine Locations
- Study Area Boundary
- 500m Radius
- Non-flight Record
- Flight Record

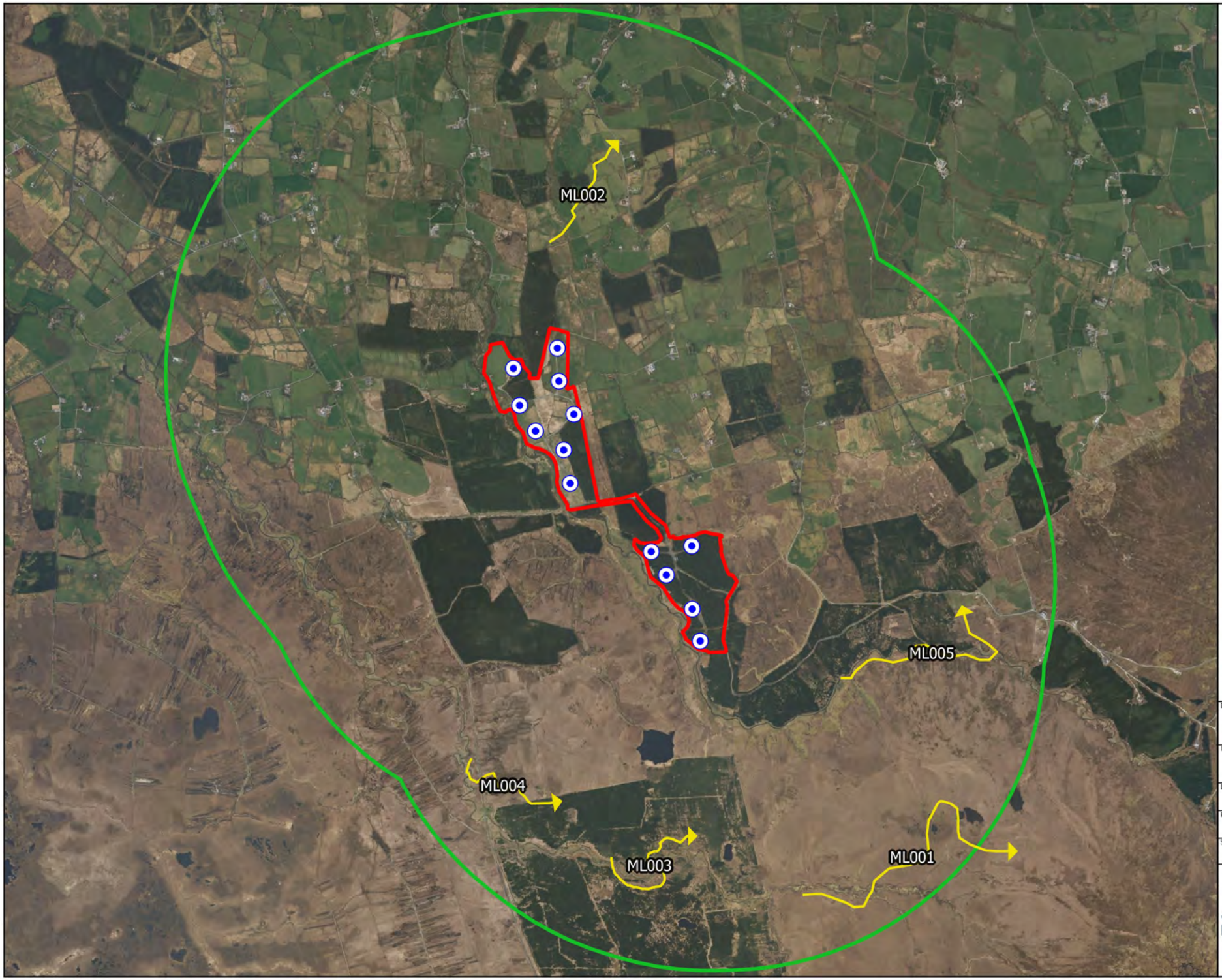
N

Drawing Title
Merlin
Vantage Point

Project Title
Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.14
Scale	Date
1:21000	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie



Map Legend

Site Boundary

Turbine Locations

Study Area Boundary

2km Radius

Merlin Observation

N

Drawing Title

Merlin
Breeding Raptor

Project Title

Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.15
Scale	Date
1:31000	03.08.22

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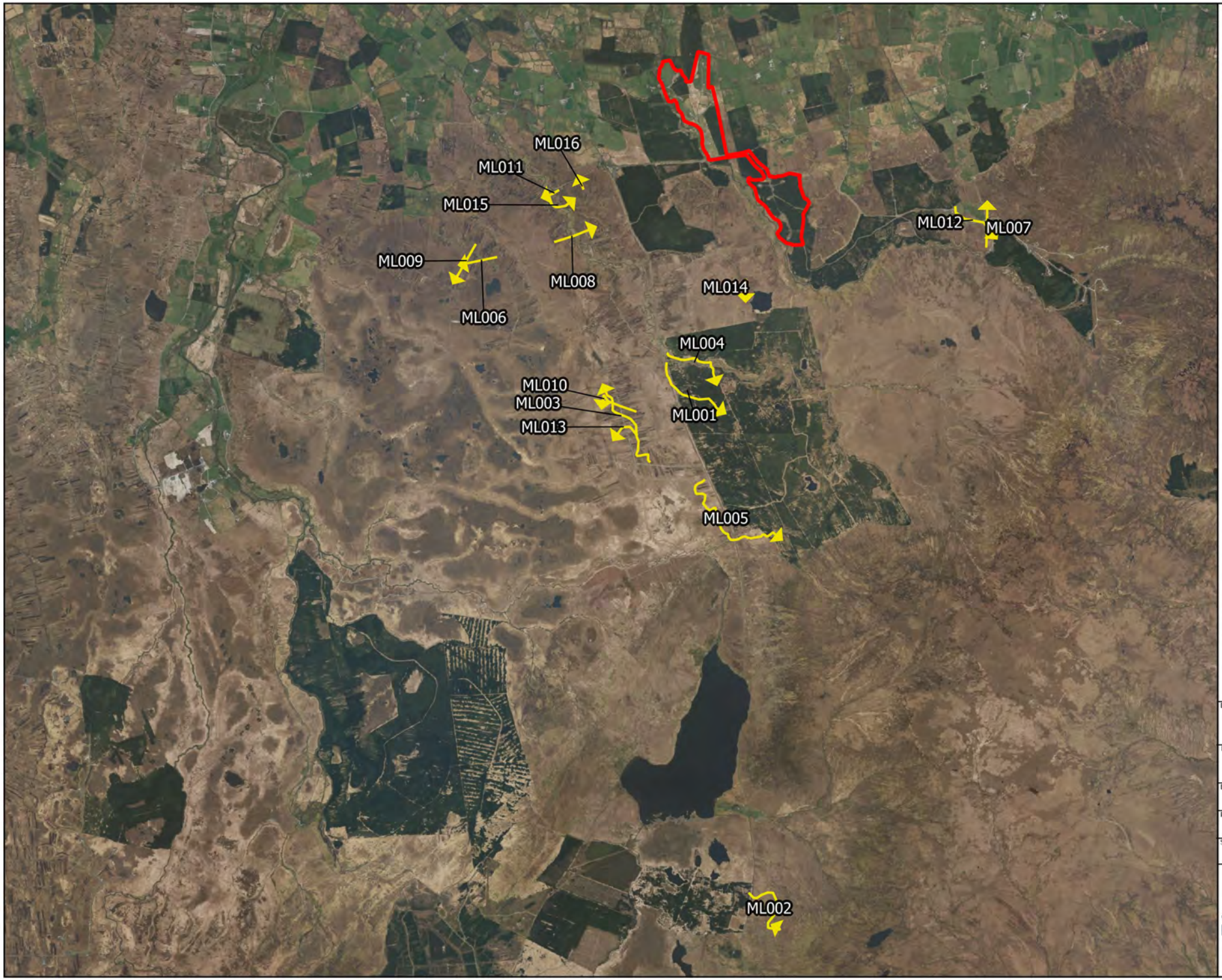
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie



Map Legend

Study Area Boundary

Merlin Observation

N

Drawing Title
Merlin
Incidental Record

Project Title
Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.16
Scale	Date
1:52000	03.08.22

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Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

11. PEREGRINE

Table 7 - 4 - 19 Peregrine incidental records data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
PE001	Waterbird Distribution Survey; Lough Aghree	07/10/2021	15:07	Peregrine	2	raised bog and lakes and ponds; flying, male and female (likely breeding pair)	AOD
PE002	Waterbird Distribution Survey; Ballynahowna bog	15/11/2021	09:53	Peregrine	1	bogs; commuting east across bog	NM

Map Legend

- Study Area Boundary
- Peregrine Observation

N

Drawing Title	Peregrine Incidental Record
Project Title	Dunneill Wind Farm
Drawn By: SD	Checked By: PC
Project No.: 210207	Drawing No.: Fig 7.4.17
Scale: 1:61000	Date: 03.08.22

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Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

12. RED KITE

Table 7 - 4 - 20 Red kite incidental records data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
KT001	Waterbird Distribution Survey; Cooper's Lodge	30/11/2021	11:57	Red Kite	1	improved agricultural grassland, bogs and scrub; soaring over upland farmland	NM

Map Legend

Study Area Boundary

Red Kite Observation

N

Drawing Title
Red Kite
Incidental Record

Project Title
Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.18
Scale	Date
1:120000	03.08.22

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Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

13. RED-THROATED DIVER

Table 7 - 4 - 21 Red-throated diver waterbird distribution survey data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
RH001	Lough Easky	13/08/2021	18:13	Red-throated Diver	1	dystrophic lakes; swimming and diving on lake	NM
RH002	Trawwee	21/12/2021	13:54	Red-throated Diver	2	open marine water; bathing and preening	CH
RH003	Carricknagrauv	21/12/2021	14:31	Red-throated Diver	2	sea inlets and bays; interacting	CH
RH004	Dunmoran Strand	06/01/2022	11:02	Red-throated Diver	1	sea inlets and bays; preening	CH
RH005	Pollbrean	25/01/2022	15:58	Red-throated Diver	1	sea inlets and bays; foraging	CH
RH006	Carricknagrauv	26/01/2022	14:01	Red-throated Diver	1	sea inlets and bays; foraging	CH
RH007	Corkagh Beg	09/02/2022	16:52	Red-throated Diver	1	sea inlets and bays; foraging	CH
RH008	Pollnadivva Pier	25/02/2022	15:55	Red-throated Diver	1	sea inlets and bays; foraging	CH
RH009	Carricknagrauv	31/03/2022	14:23	Red-throated Diver	1	sea inlets and bays; foraging	CH

Map Legend

- Turbine Locations
- Study Area Boundary
- 8km Radius of Study Area
- Red-throated Diver Record

Drawing Title
Red-throated Diver Waterbird Distribution Survey

Project Title
Dunneill Wind Farm

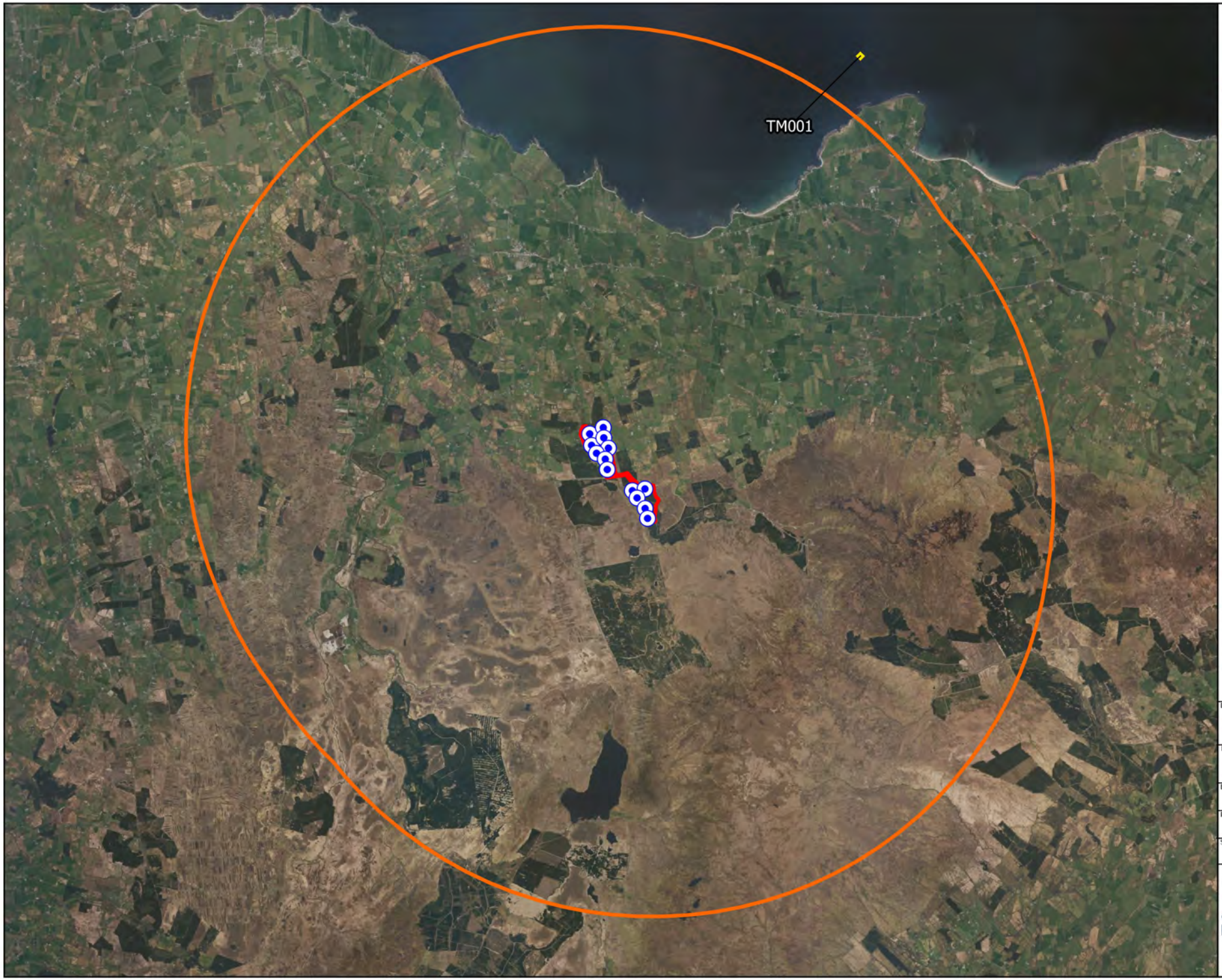
Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.19
Scale	Date
1:100000	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

14. STORM PETREL

Table 7 - 4 - 22 Storm petrel waterbird distribution survey data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
TM001	Aughris Head	21/09/2021	18:49	Storm Petrel	19	open marine water; flying low across water offshore heading north-west	NM



Map Legend

- Turbine Locations
- Study Area Boundary
- 8km Radius of Study Area
- Storm Petrel Record

N

Drawing Title

Storm Petrel
Waterbird Distribution Survey

Project Title

Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.20
Scale	Date
1:100000	03.08.22

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Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

15. WHOOPER SWAN

Table 7 - 4 - 23 Whooper swan vantage point survey data – flights

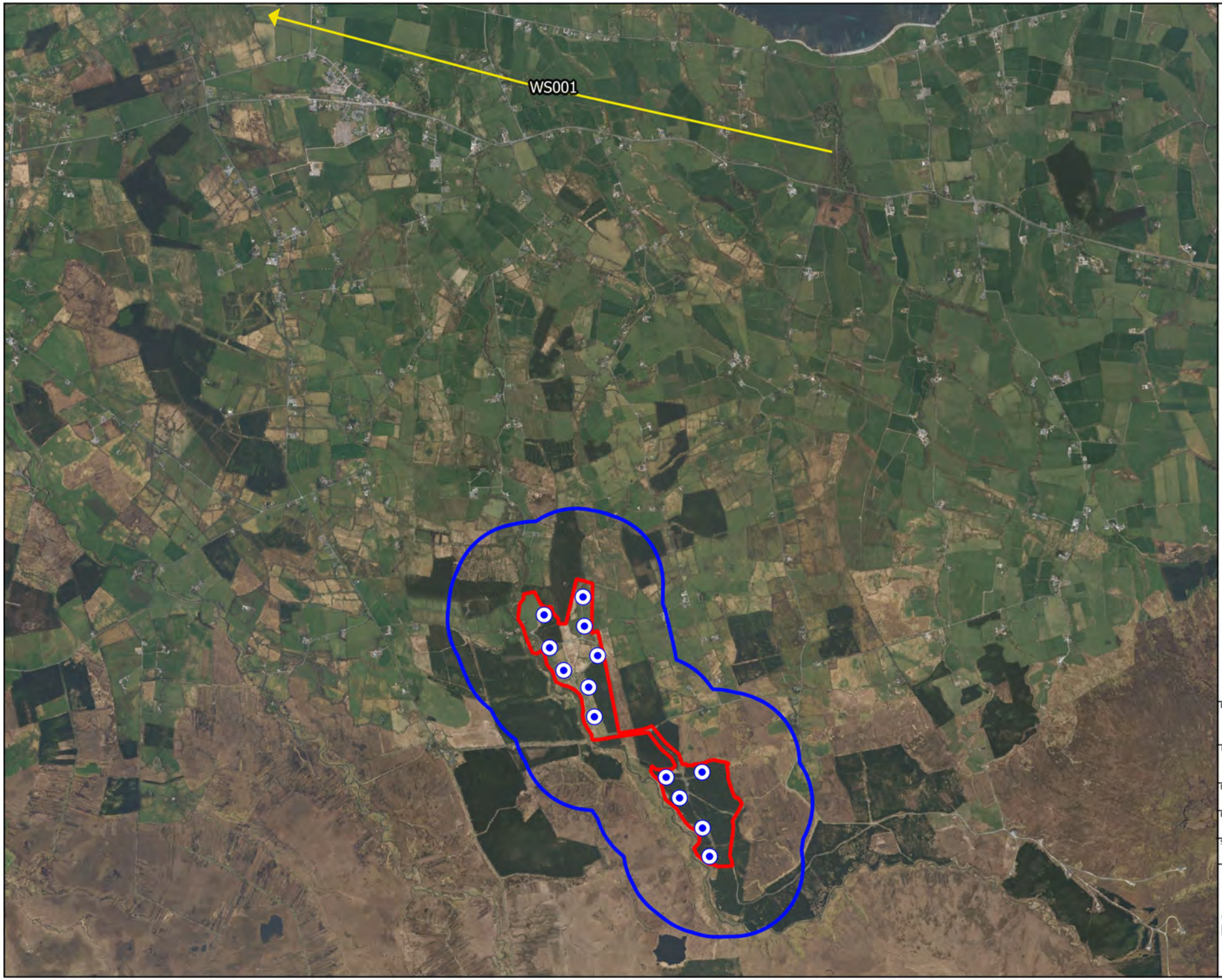
Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1	Band 2	Band 3 (PCH)	Band 4	Band 5	Habitat and activity	Surveyor
WS001	VP1	17/12/2021	13:37	Whooper Swan	4	200	0	0	0	200	-	improved agricultural grassland; flying	CH

Table 7 - 4 - 24 Whooper swan waterbird distribution survey data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
WS001	Dunmoran Strand	06/10/2021	14:10	Whooper Swan	2	marine water body; flying, migrants	AOD
WS002	Lough Achree	15/11/2021	15:25	Whooper Swan	10	lakes and ponds; swimming and feeding on lake	NM
WS003	Lough Achree	30/11/2021	09:45	Whooper Swan	15	lakes and ponds; swimming on lake	NM
WS004	Ballyfaris	06/12/2021	16:11	Whooper Swan	13	improved agricultural grassland; foraging and roosting	CH
WS005	Lough Aghree	21/12/2021	09:46	Whooper Swan	2	lakes and ponds; foraging	CH
WS006	Ballyfaris	21/12/2021	15:57	Whooper Swan	2	improved agricultural grassland; foraging	CH
WS007	Carrownabanny Lough	06/01/2022	10:16	Whooper Swan	1	lakes and ponds; foraging and preening	CH
WS008	Lough Ioe	07/01/2022	15:03	Whooper Swan	4	lakes and ponds; foraging, 3 adults, 1 juvenile	CH
WS009	Carrownabanny Lough	25/01/2022	10:32	Whooper Swan	1	lakes and ponds; foraging	CH
WS010	Easky Lough	25/01/2022	14:32	Whooper Swan	2	lakes and ponds; foraging	CH
WS011	Lough Ioe	26/01/2022	10:45	Whooper Swan	4	lakes and ponds; foraging, 3 adults, 1 juvenile	CH
WS012	Easky Lough	09/02/2022	13:14	Whooper Swan	2	lakes and ponds; foraging	CH
WS013	Carrownabanny Lough	30/03/2022	08:44	Whooper Swan	1	lakes and ponds; foraging	CH

Table 7 - 4 - 25 Whooper swan incidental records data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
WS001	Dunmoran Strand	06/10/2021	14:10	Whooper Swan	2	marine water body; flying, migrants	AOD
WS002	Lough Achree	15/11/2021	15:25	Whooper Swan	10	lakes and ponds; swimming and feeding on lake	NM
WS003	Lough Achree	30/11/2021	09:45	Whooper Swan	15	lakes and ponds; swimming on lake	NM
WS004	Ballyfaris	06/12/2021	16:11	Whooper Swan	13	improved agricultural grassland; foraging and roosting	CH
WS005	Lough Aghree	21/12/2021	09:46	Whooper Swan	2	lakes and ponds; foraging	CH
WS006	Ballyfaris	21/12/2021	15:57	Whooper Swan	2	improved agricultural grassland; foraging	CH
WS007	Carrownabanny Lough	06/01/2022	10:16	Whooper Swan	1	lakes and ponds; foraging and preening	CH
WS008	Lough Ioe	07/01/2022	15:03	Whooper Swan	4	lakes and ponds; foraging, 3 adults, 1 juvenile	CH
WS009	Carrownabanny Lough	25/01/2022	10:32	Whooper Swan	1	lakes and ponds; foraging	CH
WS010	Easky Lough	25/01/2022	14:32	Whooper Swan	2	lakes and ponds; foraging	CH
WS011	Lough Ioe	26/01/2022	10:45	Whooper Swan	4	lakes and ponds; foraging, 3 adults, 1 juvenile	CH
WS012	Easky Lough	09/02/2022	13:14	Whooper Swan	2	lakes and ponds; foraging	CH
WS013	Carrownabanny Lough	30/03/2022	08:44	Whooper Swan	1	lakes and ponds; foraging	CH



Map Legend

Site Boundary

Turbine Locations

Study Area Boundary

500m Radius

Flight Record

N

Drawing Title

Whooper Swan
Vantage Point

Project Title

Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.21
Scale	Date
1:35000	03.08.22

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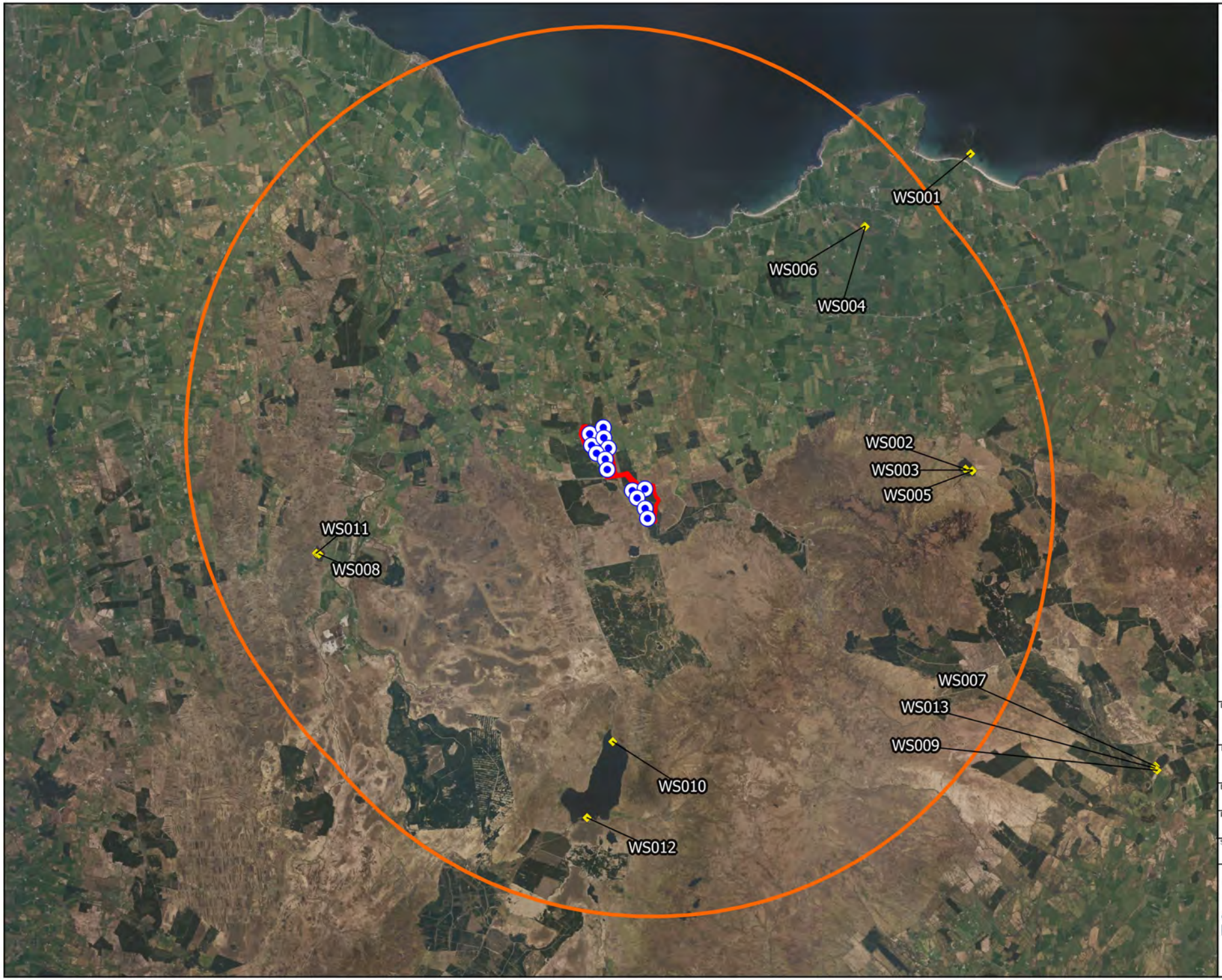
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie



Map Legend

- Turbine Locations
- Study Area Boundary
- 8km Radius of Study Area
- Whooper Swan Record

N

Drawing Title

Whooper Swan
Waterbird Distribution Survey

Project Title

Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.21
Scale	Date
1:100000	03.08.22

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Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

Map Legend

Study Area Boundary

Whooper Swan Observation

N

Drawing Title	Whooper Swan Incidental Record
Project Title	Dunneill Wind Farm
Drawn By: SD	Checked By: PC
Project No.: 210207	Drawing No.: Fig 7.4.23
Scale: 1:60000	Date: 03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

16. BRENT GOOSE

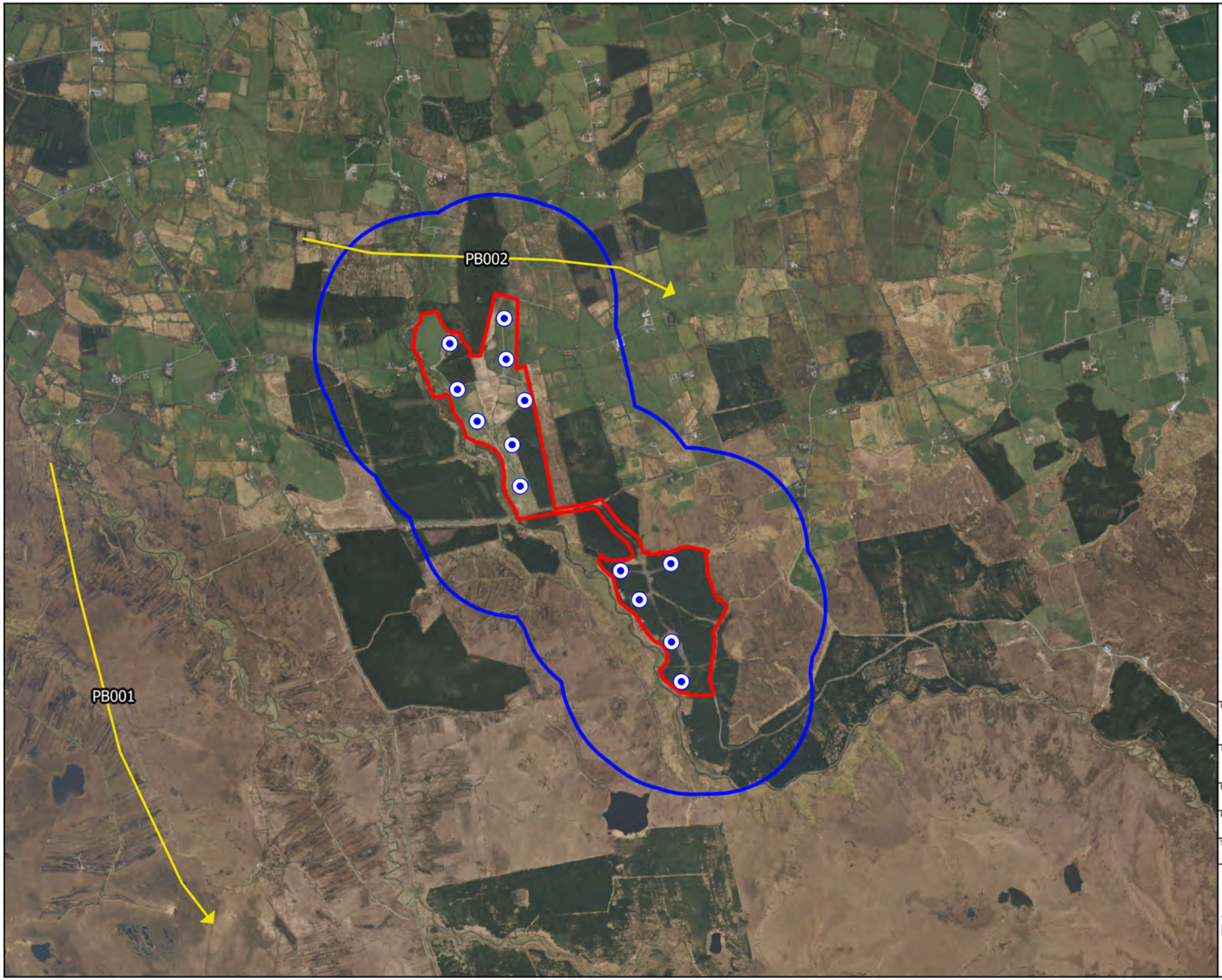
Table 7 - 4 - 26 Brent goose vantage point survey data – flights

Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1	Band 2	Band 3 (PCH)	Band 4	Band 5	Habitat and activity	Surveyor
PB001	VP2	04/11/2021	13:45	Brent Goose	1	90	0	0	90	0	0	upland blanket bog and cutover bog; flying	CH
PB002	VP1	18/11/2021	14:59	Brent Goose	1	60	0	0	0	60	0	improved agricultural grassland and conifer plantation; flying	CH

Table 7 - 4 - 27 Brent goose waterbird distribution survey data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
PB001	Carrickphatrick	06/12/2021	14:24	Brent Goose	9	moderately exposed rocky shores; foraging	CH
PB002	Pollnadivva Pier	06/12/2021	15:08	Brent Goose	3	moderately exposed rocky shores; foraging	CH
PB003	Corkagh Beg	21/12/2021	11:03	Brent Goose	15	mixed sediment shores; foraging	CH
PB004	Aughris Head	21/12/2021	13:12	Brent Goose	3	open marine water; flying, heading west	CH
PB005	Aughris Beach	21/12/2021	13:22	Brent Goose	9	sheltered rocky shores; foraging	CH
PB006	Aughris Beach	21/12/2021	13:24	Brent Goose	31	sheltered rocky shores; foraging	CH
PB007	Pollnadivva Pier	21/12/2021	14:43	Brent Goose	2	sea inlets and bays; flying	CH
PB008	Carrickphatrick	21/12/2021	14:54	Brent Goose	6	sheltered rocky shores; foraging	CH
PB009	Carrickphatrick	21/12/2021	14:56	Brent Goose	3	sheltered rocky shores; foraging	CH
PB010	Carrickphatrick	21/12/2021	14:59	Brent Goose	13	sheltered rocky shores; foraging	CH
PB011	Pollbrean	21/12/2021	15:33	Brent Goose	11	moderately exposed rocky shores; foraging	CH

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
PB012	Corkagh Beg	06/01/2022	11:42	Brent Goose	2	mixed substrata shores; foraging	CH
PB013	Aughris Beach	06/01/2022	12:09	Brent Goose	2	sea inlets and bays; flying	CH
PB014	Pollnadivva Pier	06/01/2022	13:53	Brent Goose	13	sheltered rocky shores; foraging	CH
PB015	Carrickphatrick	25/01/2022	16:13	Brent Goose	6	mixed sediment shores; foraging	CH
PB016	Pollnadivva Pier	25/01/2022	16:56	Brent Goose	10	sheltered rocky shores; foraging	CH
PB017	Aughris Beach	08/02/2022	16:23	Brent Goose	9	moderately exposed rocky shores; foraging	CH
PB018	Carricknagrauv	09/02/2022	15:38	Brent Goose	23	sheltered rocky shores; roosting	CH
PB019	Corkagh Beg	09/02/2022	16:40	Brent Goose	3	mixed sediment shores; foraging	CH
PB020	Aughris Beach	25/02/2022	15:59	Brent Goose	15	littoral rock; foraging	CH
PB021	Pollbrean	08/03/2022	14:02	Brent Goose	10	sheltered rocky shores; foraging	CH
PB022	Carrickphatrick	08/03/2022	14:26	Brent Goose	2	moderately exposed rocky shores; foraging	CH
PB023	Dunmoran Strand	08/03/2022	15:35	Brent Goose	2	sand shores; bathing	CH
PB024	Corkagh Beg	08/03/2022	15:58	Brent Goose	6	exposed rocky shroes; foraging	CH
PB025	Pollbrean	31/03/2022	13:30	Brent Goose	11	sheltered rocky shores; foraging	CH
PB026	Carrickphatrick	31/03/2022	13:58	Brent Goose	38	moderately exposed rocky shores; foraging	CH
PB027	Carricknagrauv	31/03/2022	14:21	Brent Goose	42	moderately exposed rocky shores; foraging	CH
PB028	Aughris Beach	31/03/2022	15:11	Brent Goose	43	moderately exposed rocky shores; foraging	CH
PB029	Dunmoran Strand	31/03/2022	15:49	Brent Goose	39	exposed rocky shroes; foraging	CH



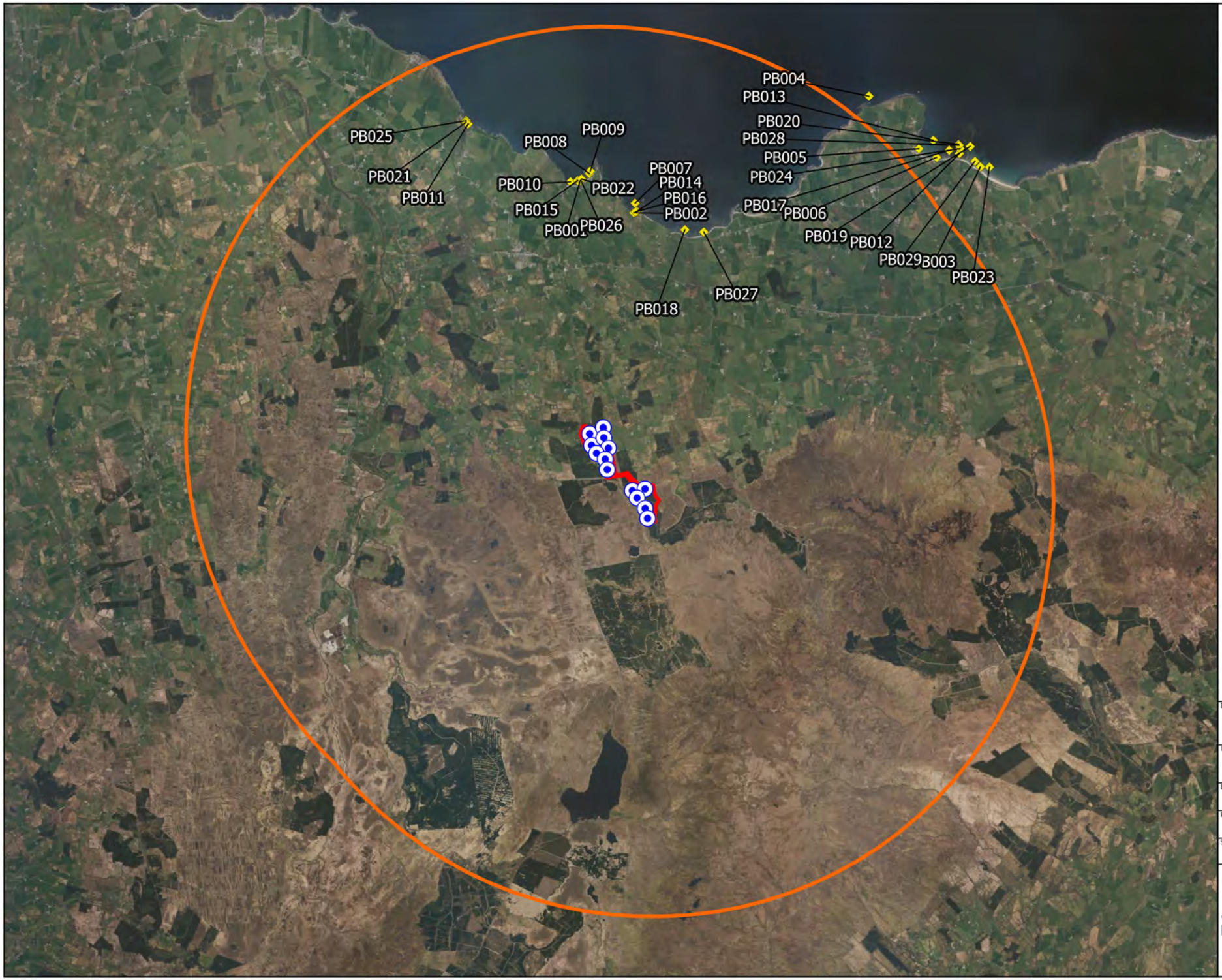
Map Legend

- Turbine Locations
- Study Area Boundary
- 500m Radius
- Flight Record

N

Drawing Title	Brent Goose Vantage Point
Project Title	Dunneill Wind Farm
Drawn By: SD	Checked By: PC
Project No.: 210207	Drawing No.: Fig 7.4.24
Scale: 1:25000	Date: 03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie



Map Legend

- Turbine Locations
- Study Area Boundary
- 8km Radius of Study Area
- Brent Goose Record

N

Drawing Title

Brent Goose
Waterbird Distribution Survey

Project Title

Dunneill Wind Farm

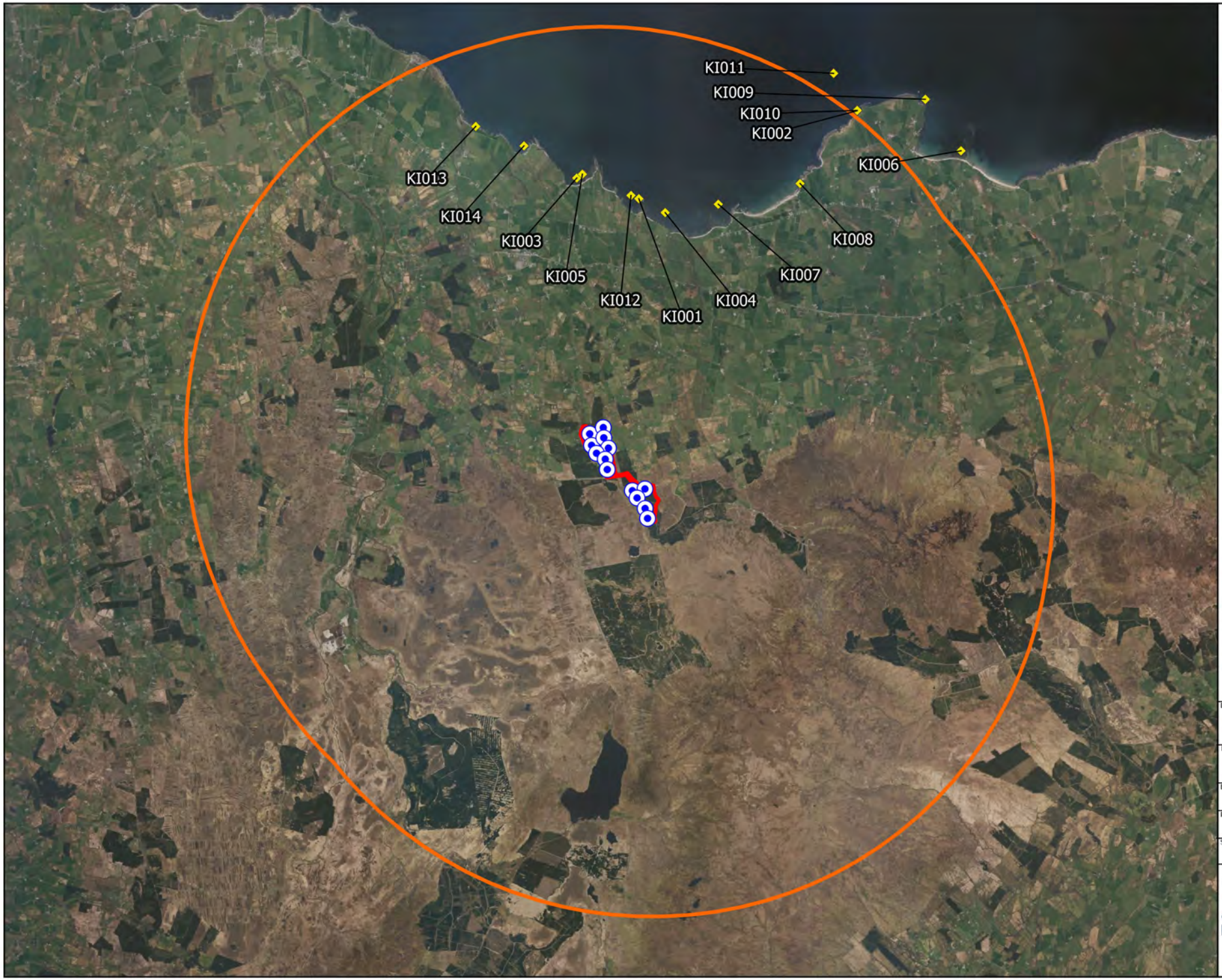
Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.25
Scale	Date
1:100000	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

17. KITTIWAKE

Table 7 - 4 - 28 Kittiwake waterbird distribution survey data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
KI001	Pollnadivva Pier	13/08/2021	11:05	Kittiwake	35	sea inlets and bays; swimming on water	NM
KI002	Aughris Head	21/09/2021	18:40	Kittiwake	18	rocky sea cliffs and marine water body; soaring in and around cliffs and just offshore	NM
KI003	Carrickphatrick	22/09/2021	18:40	Kittiwake	15	sea inlets and bays and littoral rock; circling and swooping over surf and rocky shore	NM
KI004	Pollnadivva Pier	06/10/2021	15:54	Kittiwake	3	marine water body; flying	AOD
KI005	Doonagh	06/10/2021	16:28	Kittiwake	9	marine water body; flying	AOD
KI006	Dunmoran strand	27/10/2021	13:01	Kittiwake	3	marine water body; flying	AOD
KI007	Trawwee Strand	27/10/2021	14:06	Kittiwake	2	marine water body; flying	AOD
KI008	Pollanimma	16/11/2021	12:36	Kittiwake	16	moderately exposed rocky shores; swirling over shore	NM
KI009	Pollaree	16/11/2021	14:55	Kittiwake	46	marine water body; swirling and flying just offshore	NM
KI010	Aughris Head	16/11/2021	15:36	Kittiwake	65	rocky sea cliffs and littoral rock; soaring along coast, not in one big group but as individuals along stretch of exposed coastline	NM
KI011	Aughris Head	16/11/2021	15:46	Kittiwake	16	marine water body; swimming and swirling near group of auks	NM
KI012	Pollnadivva Pier	29/11/2021	11:29	Kittiwake	16	sea inlets and bays; flying and foraging just offshore	NM
KI013	Pollbrean	06/12/2021	13:19	Kittiwake	4	moderately exposed rocky shores; roosting	CH
KI013	Lackavarna	06/12/2021	13:49	Kittiwake	6	moderately exposed rocky shores; roosting	CH



Map Legend

- Turbine Locations
- Study Area Boundary
- 8km Radius of Study Area
- Kittiwake Record

N

Drawing Title

Kittiwake
Waterbird Distribution Survey

Project Title

Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.26
Scale	Date
1:100000	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

18. REDSHANK

Table 7 - 4 - 29 Redshank waterbird distribution survey data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
RK001	Tonaloughan Lough	13/08/2021	17:04	Redshank	2	bogs and dystrophic lakes; flushed from edge of bog lake, flew away low and rapidly across bog to north-west	NM
RK002	Donagh	26/08/2021	19:56	Redshank	6	littoral rock; roosting on rocky shore	NM
RK003	Pollnadivva Pier	08/09/2021	10:23	Redshank	29	marine water body; flying low across water immediately offshore	NM
RK004	Carrickphatrick	22/09/2021	18:20	Redshank	34	littoral rock; perched on rocky shore	NM
RK005	Doonycoy	27/10/2021	14:20	Redshank	1	exposed rocky shroes; foraging	AOD
RK006	Donagh	27/10/2021	14:47	Redshank	2	exposed rocky shroes; foraging	AOD
RK007	Aughris Head	16/11/2021	15:10	Redshank	7	exposed rocky shroes; foraging on rocky shore	NM
RK008	Carricknagrauv	29/11/2021	10:55	Redshank	6	littoral rock; on shore	NM
RK009	Donagh	29/11/2021	11:55	Redshank	3	littoral rock; flitting on rocky shore	NM
RK010	Carrickphatrick	29/11/2021	11:55	Redshank	25	littoral rock; roosting on rocky shore	NM
RK011	Carrickphatrick	29/11/2021	12:11	Redshank	3	littoral rock; flitting on rocky shore	NM
RK012	Carrownabinny	29/11/2021	14:03	Redshank	17	marine water body and littoral rock; flying low across water	NM
RK013	lackavarna	06/12/2021	13:45	Redshank	1	sand shores; foraging	CH
RK014	Carrickphatrick	06/12/2021	14:25	Redshank	1	moderately exposed rocky shores; foraging, with oystercatchers	CH
RK015	Pollnadivva Pier	06/12/2021	14:45	Redshank	1	moderately exposed rocky shores; foraging	CH

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
RK016	Corkagh Beg	21/12/2021	10:59	Redshank	5	moderately exposed rocky shores; foraging	CH
RK017	Aughris Head	21/12/2021	13:06	Redshank	5	moderately exposed rocky shores; foraging	CH
RK018	Carricknagrauv	21/12/2021	14:30	Redshank	4	moderately exposed rocky shores; foraging	CH
RK019	Pollnadivva Pier	21/12/2021	14:42	Redshank	2	sheltered rocky shores; flying and calling	CH
RK020	Corkagh Beg	06/01/2022	11:40	Redshank	1	mixed substrata shores; foraging	CH
RK021	Aughris Beach	06/01/2022	12:08	Redshank	2	sand shores; foraging	CH
RK022	Aughris Head	06/01/2022	12:57	Redshank	1	moderately exposed rocky shores; foraging	CH
RK023	Pollnadivva Pier	06/01/2022	13:54	Redshank	2	moderately exposed rocky shores; flying and calling	CH
RK024	Pollbrean	06/01/2022	15:09	Redshank	1	moderately exposed rocky shores; calling, heard, not seen	CH
RK025	Lackavarna	06/01/2022	15:17	Redshank	1	mixed substrata shores; foraging	CH
RK026	Carrickphatrick	25/01/2022	16:15	Redshank	1	mixed sediment shores; foraging	CH
RK027	Pollbrean	09/02/2022	14:46	Redshank	2	moderately exposed rocky shores; foraging	CH
RK028	Carrickphatrick	09/02/2022	15:07	Redshank	3	mixed sediment shores; foraging	CH
RK029	Carricknagrauv	09/02/2022	15:40	Redshank	3	moderately exposed rocky shores; foraging	CH
RK030	Corkagh Beg	09/02/2022	16:40	Redshank	4	mixed sediment shores; foraging	CH
RK031	Corkagh Beg	09/02/2022	16:47	Redshank	3	moderately exposed rocky shores; foraging	CH
RK032	Carricknagrauv	08/03/2022	14:49	Redshank	6	moderately exposed rocky shores; foraging	CH
RK033	Carricknagrauv	31/03/2022	14:23	Redshank	12	moderately exposed rocky shores; foraging	CH

Map Legend

- Turbine Locations
- Study Area Boundary
- 8km Radius of Study Area
- Redshank Record

N

Drawing Title
Redshank
Waterbird Distribution Survey

Project Title
Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.27
Scale	Date
1:100000	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

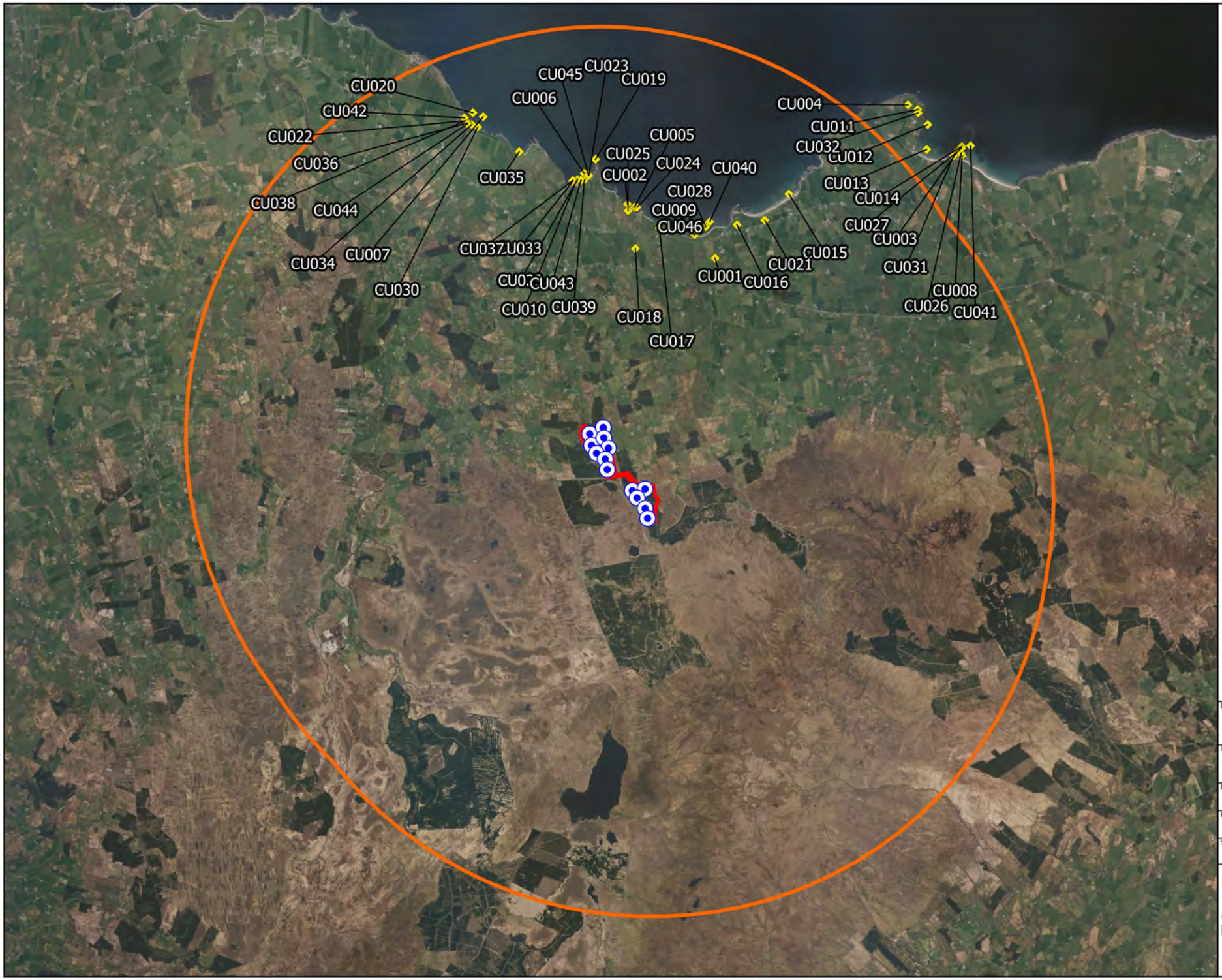
19. CURLEW

Table 7 - 4 - 30 Curlew waterbird distribution survey

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
CU001	Carrowmacrory	13/08/2021	12:45	Curlew	7	improved agricultural grassland and scrub; flying and calling high across coastal fields	NM
CU002	pollnadivva pier	08/09/2021	10:05	Curlew	6	littoral rock; foraging on rocky shore	NM
CU003	Dunmoran strand	06/10/2021	14:15	Curlew	10	exposed rocky shroes; foraging	AOD
CU004	Aughris Head	06/10/2021	15:16	Curlew	1	improved agricultural grassland; flying	AOD
CU005	pollnadivva pier	06/10/2021	16:11	Curlew	2	exposed rocky shroes; roosting	AOD
CU006	Doonagh	06/10/2021	16:29	Curlew	4	exposed rocky shroes; roosting	AOD
CU007	Carrownabinny	06/10/2021	17:11	Curlew	1	marine water body; flying	AOD
CU008	Dunmoran strand	27/10/2021	13:03	Curlew	1	exposed rocky shroes; roosting	AOD
CU009	Doonycoy	27/10/2021	14:20	Curlew	9	exposed rocky shroes; roosting	AOD
CU010	Donagh	27/10/2021	14:47	Curlew	6	exposed rocky shroes; foraging	AOD
CU011	Carrickphatrick	16/11/2021	16:25	Curlew	23	improved agricultural grassland; grazing on coastal grassland	NM
CU012	Pollachurry Pier	16/11/2021	16:32	Curlew	7	sea inlets and bays; flying just offshore, heading towards strand after dusk	NM
CU013	Dunmoran Strand	29/11/2021	08:52	Curlew	3	sea inlets and bays and sand shores; flying just offshore	NM
CU014	Dunmoran Strand	29/11/2021	08:57	Curlew	9	moderately exposed rocky shores; roosting on intertidal rocks	NM
CU015	Tra Buí	29/11/2021	09:16	Curlew	17	sand shores; on beach	NM
CU016	Doonmadden	29/11/2021	10:45	Curlew	16	improved agricultural grassland; grazing on wet coastal farmland	NM

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
CU017	Carrowmoran	29/11/2021	11:10	Curlew	5	improved agricultural grassland; grazing on coastal farmland	NM
CU018	Carrowmoran	29/11/2021	11:15	Curlew	6	improved agricultural grassland; flying over farmland, heading north-west	NM
CU019	Donagh	29/11/2021	11:56	Curlew	5	littoral rock; on rocky shore calling	NM
CU020	Carrownabinny	29/11/2021	13:53	Curlew	3	littoral rock and sea inlets and bays; flying along coast	NM
CU021	Tra Buí	29/11/2021	16:12	Curlew	17	improved agricultural grassland; grazing on coastal farmland	NM
CU022	Pollbrean	06/12/2021	13:17	Curlew	1	moderately exposed rocky shores; foraging	CH
CU023	Carrickphatrick	06/12/2021	14:26	Curlew	1	moderately exposed rocky shores; foraging	CH
CU024	Pollnadivva pier	06/12/2021	14:43	Curlew	1	moderately exposed rocky shores; foraging	CH
CU025	Pollnadivva pier	06/12/2021	15:10	Curlew	1	moderately exposed rocky shores; foraging	CH
CU026	Corkagh Beg	09/12/2021	15:24	Curlew	2	moderately exposed rocky shores; foraging	CH
CU027	Corkagh Beg	21/12/2021	11:02	Curlew	1	moderately exposed rocky shores; foraging	CH
CU028	Carricknagrauv	21/12/2021	14:29	Curlew	3	moderately exposed rocky shores; foraging	CH
CU029	Carrickphatrick	21/12/2021	15:00	Curlew	1	sheltered rocky shores; foraging	CH
CU030	Pollbrean	21/12/2021	15:34	Curlew	1	moderately exposed rocky shores; foraging	CH
CU031	Corkagh Beg	06/01/2022	11:43	Curlew	1	moderately exposed rocky shores; roosting	CH
CU032	Aughris Head	06/01/2022	12:56	Curlew	17	improved agricultural grassland; foraging	CH

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
CU033	Carrickphatrick	06/01/2022	14:23	Curlew	1	moderately exposed rocky shores; foraging	CH
CU034	Pollbrean	06/01/2022	15:09	Curlew	1	moderately exposed rocky shores; foraging	CH
CU035	Lackavarna	06/01/2022	15:17	Curlew	1	mixed substrata shores; foraging	CH
CU036	Carrownabinny	25/01/2022	15:39	Curlew	5	moderately exposed rocky shores; foraging	CH
CU037	Carrickphatrick	25/01/2022	16:14	Curlew	3	mixed sediment shores; foraging	CH
CU038	Pollbrean	09/02/2022	14:46	Curlew	1	moderately exposed rocky shores; foraging	CH
CU039	Carrickphatrick	09/02/2022	15:08	Curlew	4	mixed sediment shores; foraging	CH
CU040	Carricknagrauv	09/02/2022	15:42	Curlew	2	moderately exposed rocky shores; foraging	CH
CU041	Corkagh Beg	09/02/2022	16:39	Curlew	1	mixed sediment shores; foraging	CH
CU042	Pollbrean	25/02/2022	14:31	Curlew	1	moderately exposed rocky shores; flying	CH
CU043	Carrickphatrick	25/02/2022	15:51	Curlew	1	littoral sediment; foraging	CH
CU044	Pollbrean	08/03/2022	14:03	Curlew	1	sheltered rocky shores; bathing	CH
CU045	Carrickphatrick	08/03/2022	14:25	Curlew	1	moderately exposed rocky shores; foraging	CH
CU046	Carricknagrauv	08/03/2022	14:54	Curlew	1	moderately exposed rocky shores; flying	CH



Map Legend

- Turbine Locations
- Study Area Boundary
- 8km Radius of Study Area
- Curlew Record

N

Drawing Title

Curlew
Waterbird Distribution Survey

Project Title

Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.28
Scale	Date
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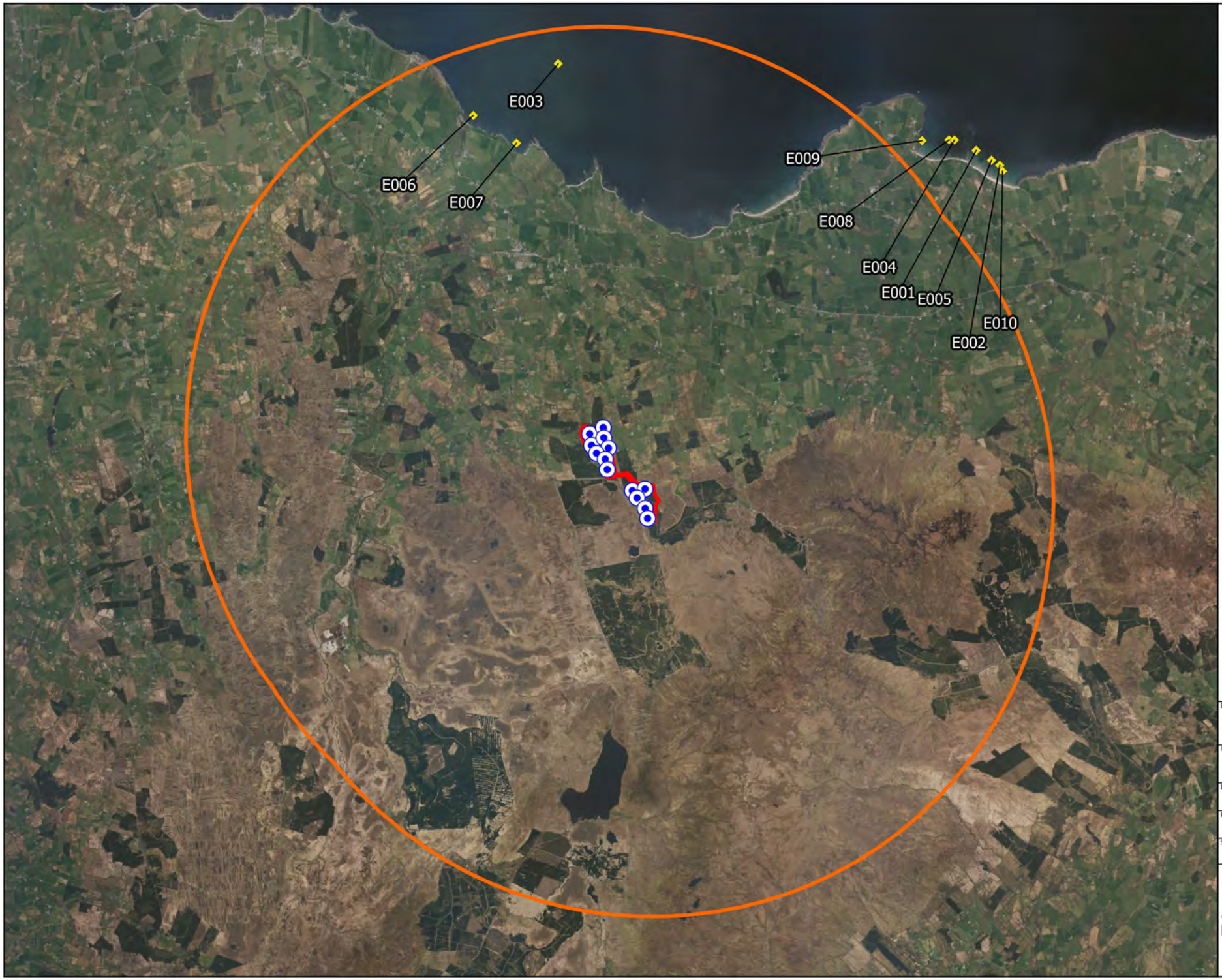
MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

20. EIDER

Table 7 - 4 - 31 Eider waterbird distribution survey data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
E001	Dunmoran strand	06/10/2021	14:14	Eider	20	marine water body; foraging	AOD
E002	Dunmoran strand	27/10/2021	12:31	Eider	6	marine water body; foraging	AOD
E003	Lackavarna	29/11/2021	13:21	Eider	17	open marine water; flying in tight group offshore heading west	NM
E004	Aughris Beach	08/02/2022	16:19	Eider	18	sea inlets and bays; foraging	CH
E005	Dunmoran Strand	09/02/2022	16:48	Eider	4	sea inlets and bays; foraging	CH
E006	Pollbrean	25/02/2022	14:32	Eider	2	sea inlets and bays; preening	CH
E007	Lackavarna	25/02/2022	14:35	Eider	1	sea inlets and bays; roosting, male	CH
E008	Aughris Beach	25/02/2022	15:59	Eider	4	sea inlets and bays; roosting, 1 male, 3 female	CH
E009	Aughris Beach	25/02/2022	16:00	Eider	1	sea inlets and bays; roosting	CH
E010	Dunmoran Strand	25/02/2022	16:39	Eider	3	sea inlets and bays; foraging	CH



Map Legend

- Turbine Locations
- Study Area Boundary
- 8km Radius of Study Area
- Eider Record

N

Drawing Title

Eider
Waterbird Distribution Survey

Project Title

Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.29
Scale	Date
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MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

21. GREY WAGTAIL

Table 7 - 4 - 32 Grey wagtail walkover survey data

Date	Time	Species	Number	Habitat and activity	Surveyor
23/06/2021	12:45	Grey Wagtail	2	watercourses; on stream (pair; probable breeding)	CD

Table 7 - 4 - 33 Grey wagtail incidental records data

Location	Date	Time	Species	Number	Habitat and activity	Surveyor
Breeding Raptor Survey; Crowagh River	28/05/2021	06:23	Grey Wagtail	2	eroding/upland rivers; calling and flitting among rocks on stream	NM
Breeding Woodcock Survey; T12	09/06/2021	20:52	Grey Wagtail	2	spoil and bare ground and conifer plantation; foraging on gravel and sharp stones around t12	NM
Waterbird Distribution Survey; Dunneill River	12/08/2021	10:36	Grey Wagtail	2	watercourses; flitting along river	NM
Waterbird Distribution Survey; Dunmoran Strand	29/11/2021	08:46	Grey Wagtail	2	buildings and artificial surfaces and hedgerows; flitting and foraging on road	NM
Waterbird Distribution Survey; Pollbrean	29/11/2021	13:54	Grey Wagtail	2	shingle and gravel shores; flitting on cobbles near river / sea junction	NM

22. KESTREL

Table 7 - 4 - 34 Kestrel vantage point survey data – flights

Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1	Band 2	Band 3 (PCH)	Band 4	Band 5	Habitat and activity	Surveyor
K001	VP1	27/05/2021	10:21	Kestrel	1	360	0	0	360	0	0	conifer plantation and improved agricultural grassland; adult hunting at potential collision height across site, lost behind forestry	CD
K002	VP2	11/06/2021	14:26	Kestrel	1	220	0	0	50	160	10	upland blanket bog, scrub and conifer plantation; hunting and hovering over ravine, bog and scrub - wheeling and moving north	NM
K003	VP1	16/07/2021	10:42	Kestrel	1	120	0	90	30	0	0	scrub and mixed conifer woodland; hunting and hovering over scrub and grassland just outside north boundary of site	NM
K004	VP2	17/07/2021	08:02	Kestrel	1	340	0	0	80	260	0	upland blanket bog, scrub and dry-humid acid grassland; hunting and hovering over bog and grassland and along forestry edges to north-east of vantage point	NM
K005	VP1	21/07/2021	21:11	Kestrel	1	175	0	0	150	25	0	scrub and dry-humid acid grassland; hunting and hovering over scrub and grassland along river	NM
K006	VP2	27/08/2021	10:43	Kestrel	1	200	0	120	80	0	0	bogs, heath and improved agricultural grassland; hunting and hovering over open moorland and sheep pasture	NM
K007	VP2	10/09/2021	19:34	Kestrel	1	150	30	70	50	0	0	dry-humid acid grassland, eroding/upland rivers and scrub; hunting and hovering over boggy grass;amd and along river - west edge of lower site (moving north-east)	NM

Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1	Band 2	Band 3 (PCH)	Band 4	Band 5	Habitat and activity	Surveyor
K008	VP1	26/10/2021	08:38	Kestrel	1	10	0	0	0	10	-	conifer plantation; flying	CH
K009	VP1	26/10/2021	10:16	Kestrel	1	20	0	10	0	10	-	cutover bog; flying and hunting, stooped to ground (hunting behaviour)	CH
K010	VP1	10/01/2022	15:18	Kestrel	1	10	10	0	0	0	-	conifer plantation and upland blanket bog; flying	CH
K011	VP1	10/01/2022	16:22	Kestrel	1	10	0	10	0	0	-	conifer plantation; flying, lost sight of it in trees	CH
K012	VP1	11/01/2022	14:23	Kestrel	1	180	0	0	0	180	-	improved agricultural grassland and conifer plantation; flying and foraging, hovering and soaring	CH
K013	VP2	23/03/2022	15:44	Kestrel	1	26	0	0	0	26	0	upland blanket bog; flying	NS
K014	VP2	23/03/2022	15:47	Kestrel	1	8	0	8	0	0	0	upland blanket bog; flying	NS
K015	VP2	23/03/2022	15:58	Kestrel	1	197	0	0	197	0	0	upland blanket bog; flying	NS

Table 7 - 4 - 35 Kestrel vantage point survey data - non-flights

Ref.	VP	Date	Time	Species	Number	Habitat and activity	Surveyor
K016	VP2	28/07/2021	18:09	Kestrel	1	mixed conifer woodland and upland blanket bog; perched at edge of forestry area, april survey	NM
K017	VP3	09/03/2022	17:00	Kestrel	1	upland blanket bog; perched, perched on pile of turf at the end of the road	NS

Table 7 - 4 - 36 Kestrel breeding raptor survey data

Ref.	BR	Date	Time	Species	Number	Habitat and activity	Breeding status	Surveyor
K001	BR1	27/04/2021	14:25	Kestrel	1	upland blanket bog and conifer plantation, hunting and hovering over bog and forestry boundary	suitable nesting habitat; possible breeder	NM
K002	BR3	29/04/2021	11:12	Kestrel	2	conifer plantation and upland blanket bog, chasing one another over open moorland and along fringes of conifer forestry	courtship and display; probable breeding	NM
K003	BR12	25/05/2021	11:44	Kestrel	1	scattered tress and parkland, hedgerows and improved agricultural grassland, hunting and hovering over young conifer plantation, decending from time to time	suitable nesting habitat; possible breeder	NM
K004	BR1	22/06/2021	12:29	Kestrel	1	upland blanket bog, hunting male	suitable nesting habitat; possible breeder	CD
K005	BR11	20/07/2021	08:54	Kestrel	1	cutover bog, conifer plantation and upland blanket bog, soaring and hovering over bog and forestry area, appeared to be hunting	suitable nesting habitat; possible breeder	NM
K006	BRT2	20/07/2021	17:13	Kestrel	1	dry-humid acid grassland, improved agricultural grassland and hedgerows, hovering and hunting low over grassland and scrubby hedgerows for a time, perching then in low elder	suitable nesting habitat; possible breeder	NM

Ref.	BR	Date	Time	Species	Number	Habitat and activity	Breeding status	Surveyor
K007	BR3	22/07/2021	13:18	Kestrel	1	lowland blanket bog, improved agricultural grassland and scrub, hunting and hovering over bog and farmland boundary	flyover; non-breeding	NM
K008	BR9	26/07/2021	07:36	Kestrel	1	mixed conifer woodland, improved agricultural grassland and dry-humid acid grassland, hunting and hovering over young forestry and grassland	suitable nesting habitat; possible breeder	NM

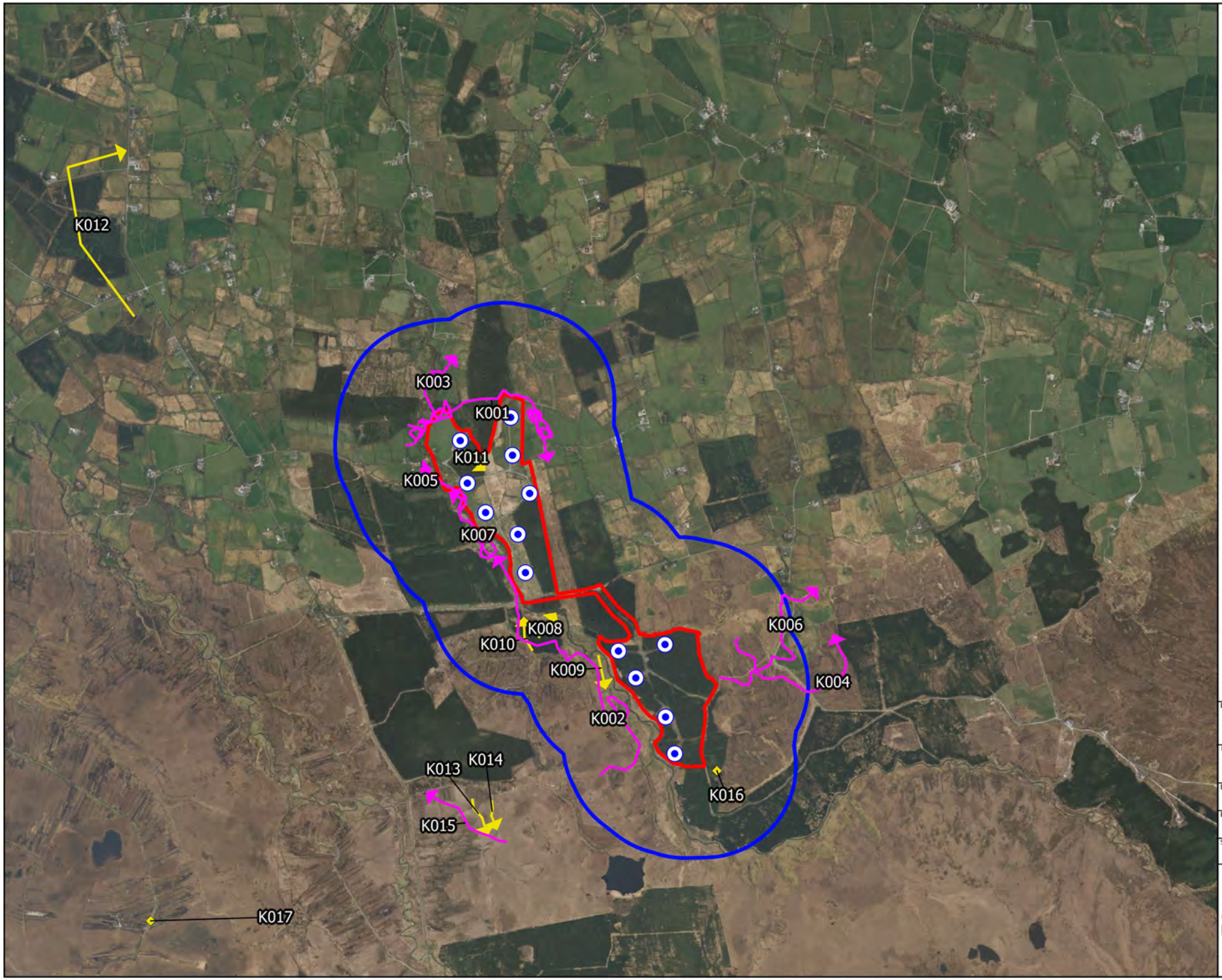
Table 7 - 4 - 37 Kestrel walkover survey data

Ref.	Date	Time	Species	Number	Habitat and activity	Surveyor
K001	26/05/2021	14:48	Kestrel	1	conifer plantation, scrub and improved agricultural grassland; commuting north (downhill) with something in talons (adult carrying food/faecal sac; confirmed breeding)	NM
K002	12/01/2022	12:02	Kestrel	1	upland blanket bog and cutover bog; foraging and flying, hovering and soaring >200m for 10mins (wintering)	CH
K003	03/03/2022	13:29	Kestrel	1	bogs; foraging, on site at dunneill wind farm south hovering and stooped out of sight (wintering)	CH

Table 7 - 4 - 38 Kestrel incidental records data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
K001	Waterbird Distribution Survey; Cloghabracka	12/08/2021	09:53	Kestrel	1	semi-natural grassland and mixed conifer woodland; hunting and hovering over grassland and forestry fringes	NM
K002	Waterbird Distribution Survey; Crowagh mountain	26/08/2021	11:32	Kestrel	1	bogs, heath and eroding/upland rivers; hunting and hovering along stream valley winding through bog	NM
K003	Waterbird Distribution Survey; Tawnamore bog	09/09/2021	09:15	Kestrel	2	bogs, scrub/transitional woodland and cutover bog; two individuals chasing one another across bog and scrub	NM

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
K004	Waterbird Distribution Survey; Cloghabracka	21/09/2021	11:05	Kestrel	1	scrub and dry-humid acid grassland; hunting and hovering over scrub and grassland	NM
K005	Waterbird Distribution Survey; Crowagh mountain	21/09/2021	16:05	Kestrel	1	upland blanket bog and cutover bog; hunting and hovering low over bog	NM
K006	Waterbird Distribution Survey; Crowagh River	22/09/2021	08:47	Kestrel	1	upland blanket bog and cutover bog; flying over bog stream	NM
K007	Waterbird Distribution Survey; Ford	22/09/2021	13:00	Kestrel	1	wet grassland, upland blanket bog and improved agricultural grassland; hunting and hovering, hanging in the wind and diving to the ground	NM
K008	Hen Harrier Roost Survey; HHVP1	20/10/2021	17:15	Kestrel	1	upland blanket bog and conifer plantation; flying and hovering	CH
K009	Waterbird Distribution Survey; Glen Easky	15/11/2021	10:35	Kestrel	1	depositing/lowland rivers, mixed broadleaved woodland and bogs; hunting and hovering	NM
K010	Waterbird Distribution Survey; Rathglass	29/11/2021	10:33	Kestrel	1	hedgerows, scrub and improved agricultural grassland; flying low along low scrubby hedgerows	NM
K011	Waterbird Distribution Survey; Carrowmoran	29/11/2021	16:00	Kestrel	1	improved agricultural grassland and scrub; commuting across coastal farmland	NM
K012	Hen Harrier Roost Survey; HHVP4	01/12/2021	15:37	Kestrel	1	lowland blanket bog; flying and foraging, hovering and stooping	CH
K013	Hen Harrier Roost Survey; HHVP4	01/12/2021	15:48	Kestrel	1	lowland blanket bog; flying and foraging, hovering	CH
K014	Hen Harrier Roost Survey; HHVP2	31/03/2022	19:20	Kestrel	1	upland blanket bog; flying, seen	NS



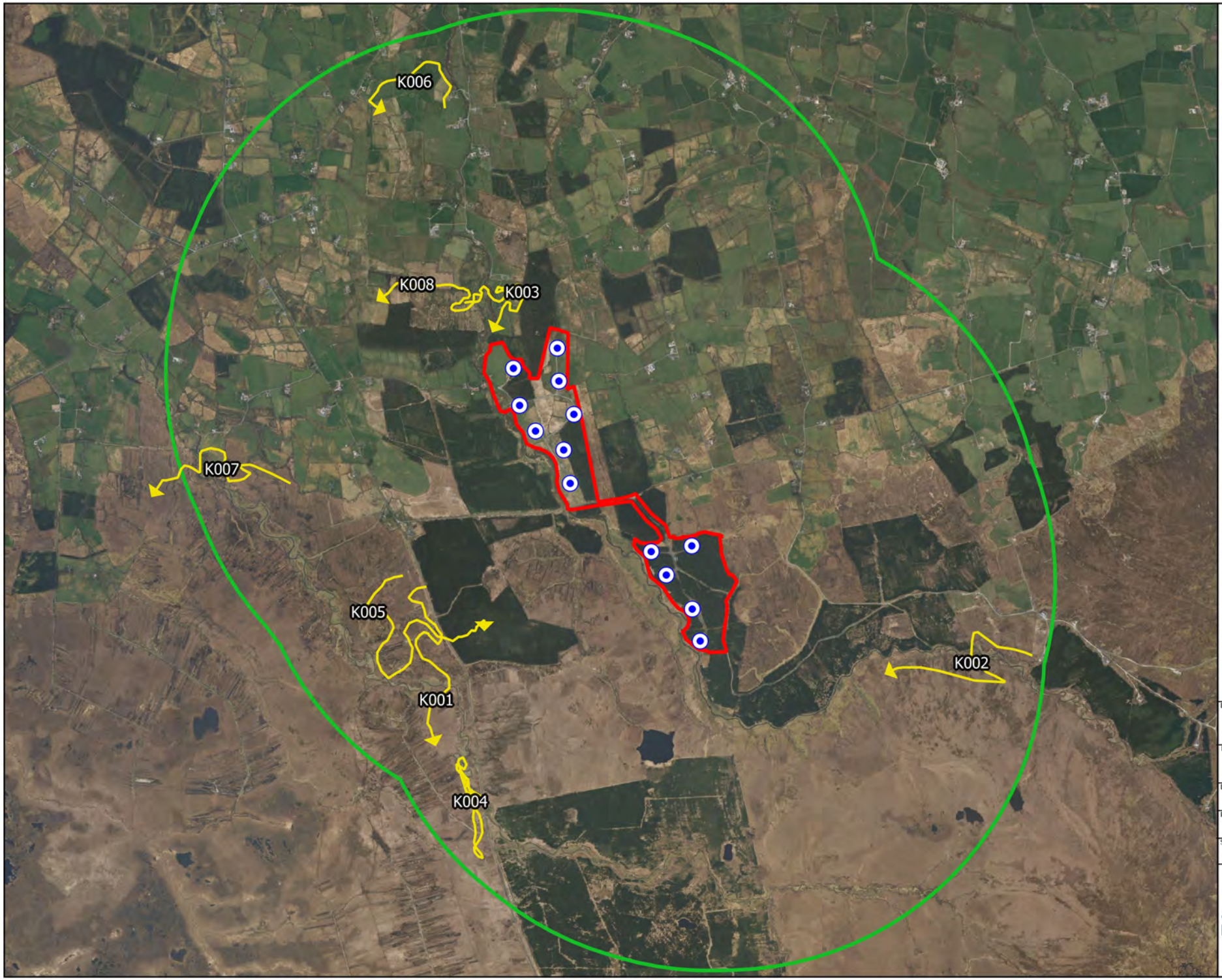
Map Legend

- Turbine Locations
- Study Area Boundary
- 500m Radius
- Non-flight Record
- Flight Record
- Flight Record at Potential Collision Height

N

Drawing Title	Kestrel Vantage Point
Project Title	Dunneill Wind Farm
Drawn By: SD	Checked By: PC
Project No.: 210207	Drawing No.: Fig 7.4.30
Scale: 1:27000	Date: 03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie



Map Legend

- Turbine Locations
- Study Area Boundary
- 2km Radius
- Kestrel Observation

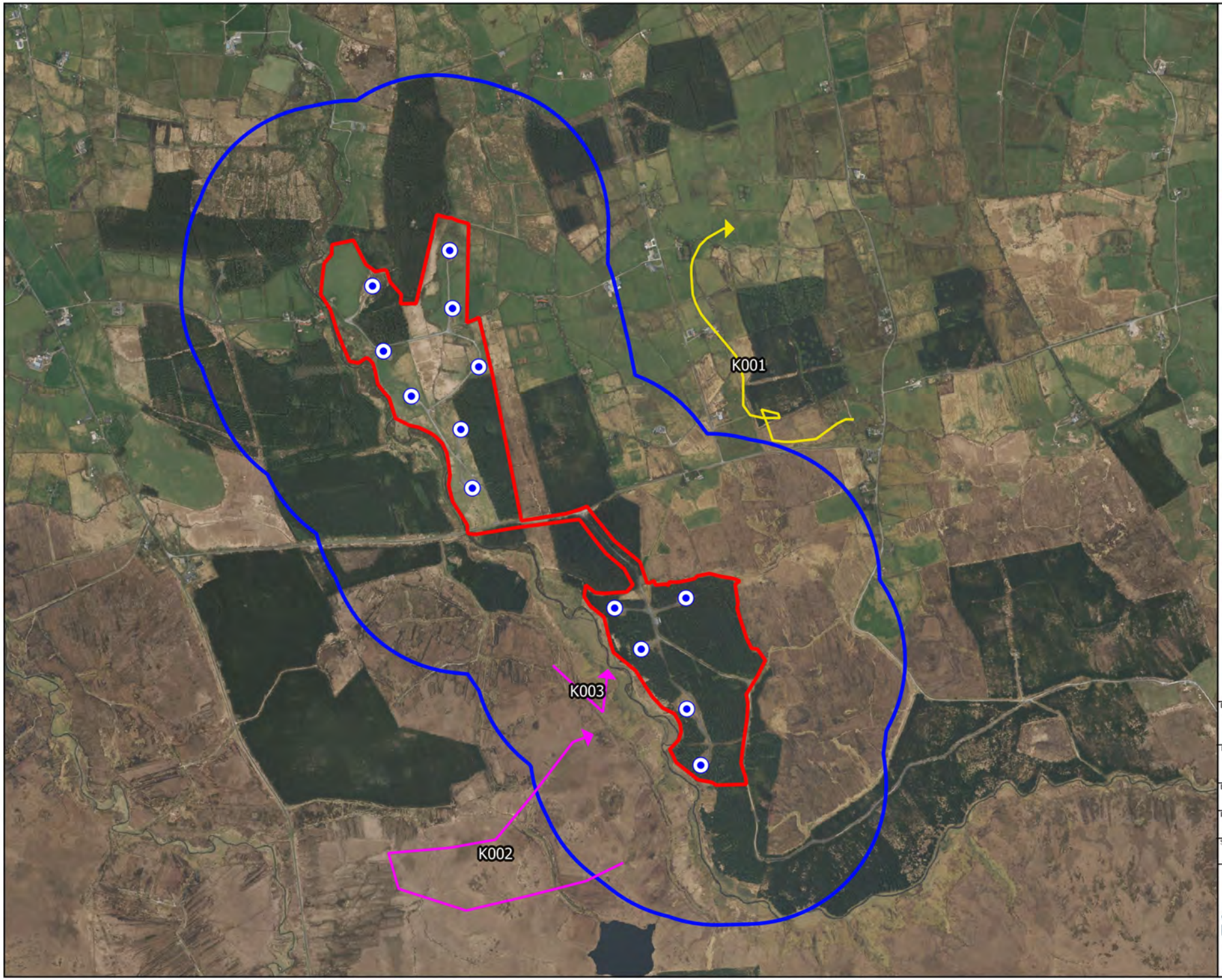
N

Drawing Title
Kestrel
Breeding Raptor

Project Title
Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.31
Scale	Date
1:31000	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie



Map Legend

- Turbine Locations
- Study Area Boundary
- 500m Radius
- Breeding Season Observation
- Winter Season Observation

N

Drawing Title	Kestrel Walkover
Project Title	Dunneill Wind Farm
Drawn By: SD	Checked By: PC
Project No.: 210207	Drawing No.: Fig 7.4.32
Scale: 1:17640	Date: 03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

Map Legend

Study Area Boundary

Kestrel Observation

N

Drawing Title

Kestrel
Incidental Record

Project Title

Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.33
Scale	Date
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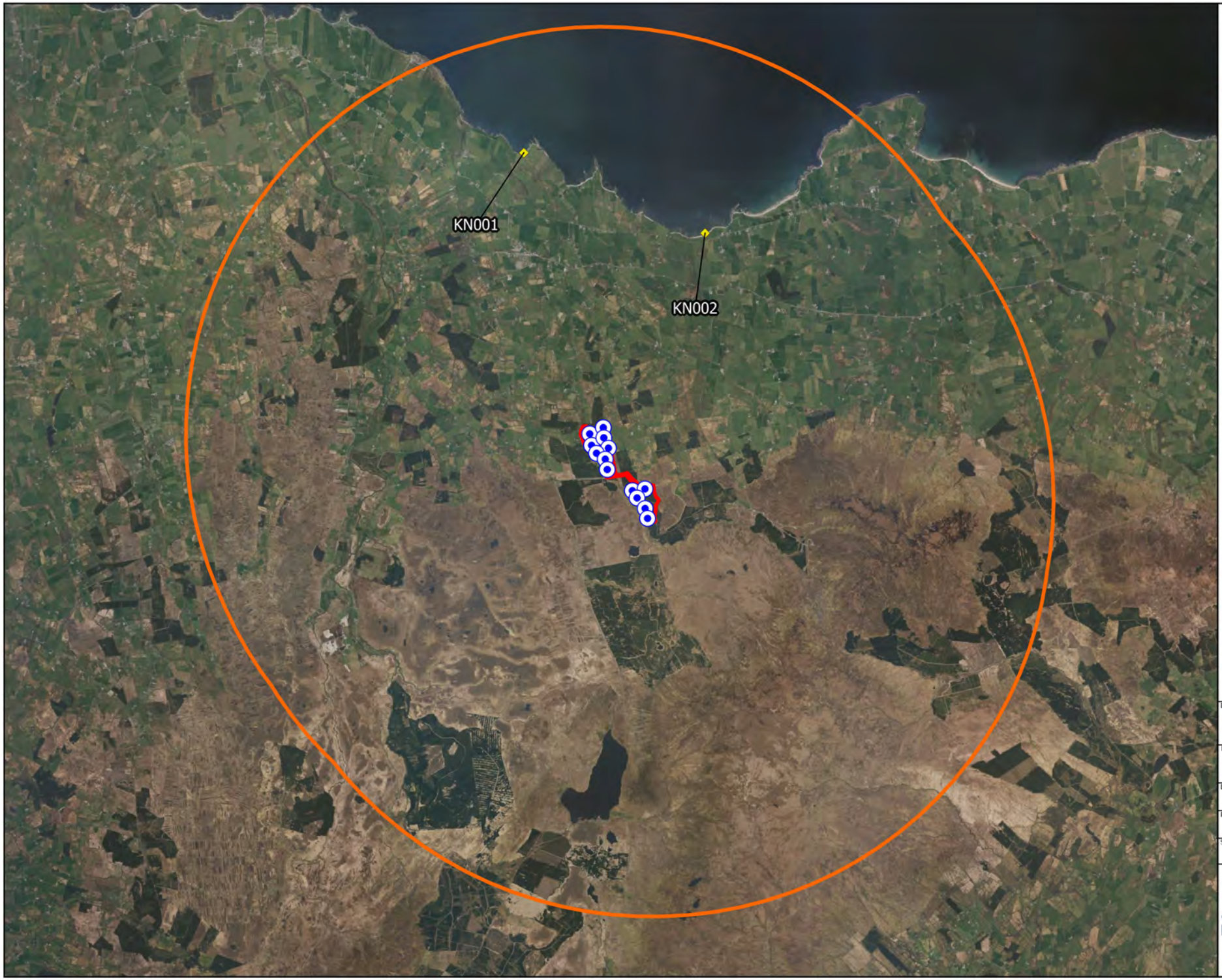
MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

23. KNOT

Table 7 - 4 - 39 Knot waterbird distribution survey data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
KN001	Lackavarna	06/01/2022	15:19	Red Knot	2	mixed substrata shores; foraging	CH
KN002	Carricknagrauv	26/01/2022	13:59	Red Knot	1	mixed sediment shores; foraging	CH



Map Legend

- Turbine Locations
- Study Area Boundary
- 8km Radius of Study Area
- Knot Record

N

Drawing Title

Knot
Waterbird Distribution Survey

Project Title

Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.34
Scale	Date
1:100000	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

24. LAPWING

Table 7 - 4 - 40 Lapwing vantage point survey data - flights

Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1	Band 2	Band 3 (PCH)	Band 4	Band 5	Habitat and activity	Surveyor
L001	VP2	27/08/2021	06:37	Lapwing	3	160	0	0	30	130	0	semi-natural grassland and upland blanket bog; flying west across vantage point	NM

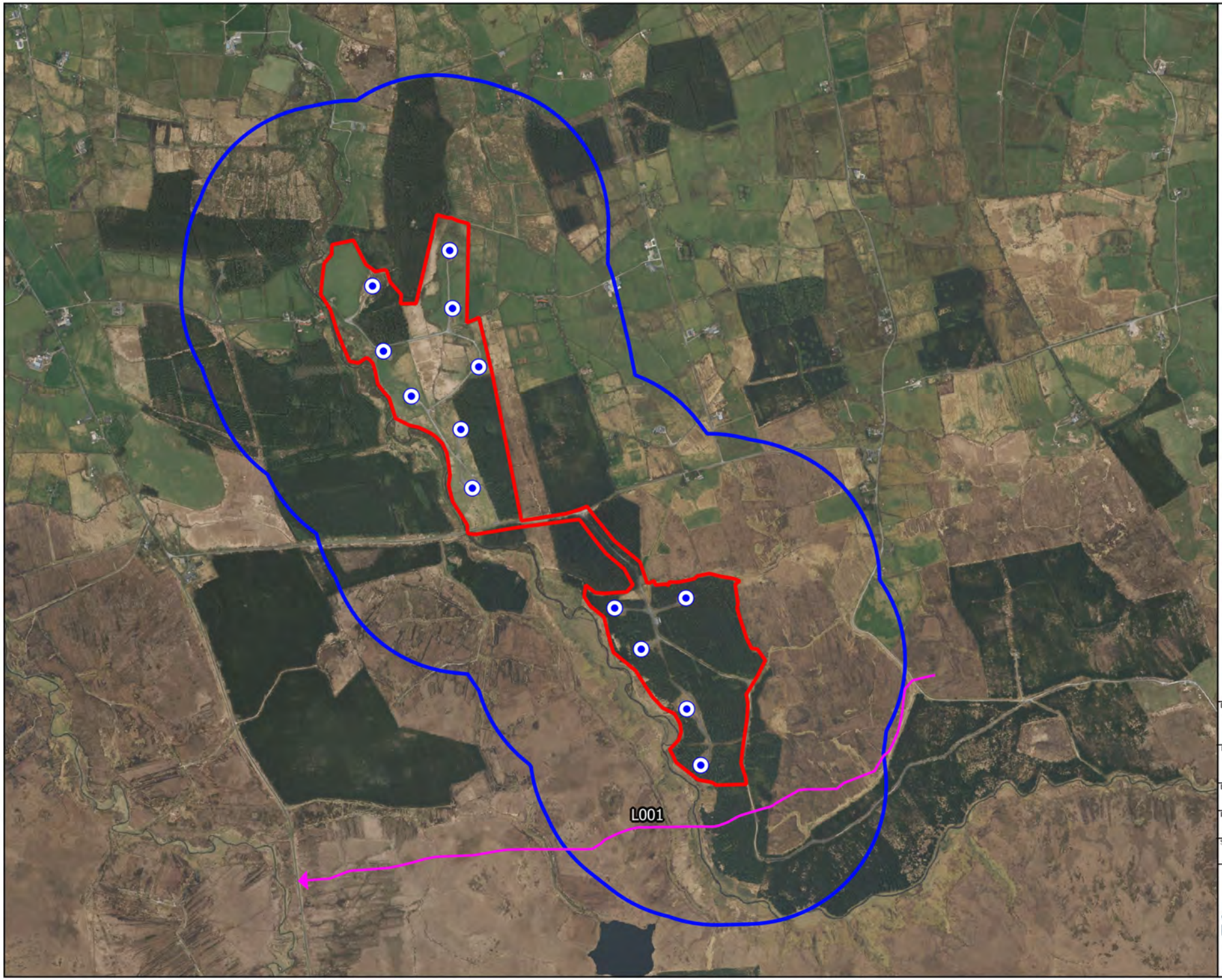
Table 7 - 4 - 41 Lapwing waterbird distribution survey data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
L001	Crowagh	13/08/2021	14:13	Lapwing	2	bogs; flying low across bog plateau to west of site, calling, flying north with purpose	NM
L002	Crowagh	26/08/2021	09:18	Lapwing	5	upland blanket bog and dystrophic lakes; roosting and foraging on bog wetland	NM
L003	Belcloghy Loughs	08/09/2021	13:54	Lapwing	16	dystrophic lakes and bogs; grazing on wet and puddles adjacent to lake	NM
L004	Crowagh	09/09/2021	10:35	Lapwing	3	bogs and dystrophic lakes; flying low across bog wetland plateu	NM
L005	Ballynahowna bog	15/11/2021	09:52	Lapwing	19	bogs and mixed conifer woodland; soaring and swooping over bog, gradually moving north-east	NM
L006	Templeboy	16/11/2021	12:15	Lapwing	12	improved agricultural grassland; foraging on grassland	NM
L007	Donaghintraine	29/11/2021	15:54	Lapwing	9	improved agricultural grassland; grazing on muddy and wet patches of field	NM

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
L008	Lough Minna	30/11/2021	14:57	Lapwing	19	improved agricultural grassland and spoil and bare ground; grazing on wet and disturbed field	NM
L009	Owenykeevan	30/11/2021	15:49	Lapwing	25	bogs and scrub; flying across bog, heading west	NM
L010	Corkagh Beg	09/12/2021	15:31	Lapwing	45	exposed rocky shroes and improved agricultural grassland; flying, flew from farmland to shore	CH
L011	Corkagh Beg	21/12/2021	10:58	Lapwing	28	moderately exposed rocky shores; flying and foraging	CH

Table 7 - 4 - 42 Lapwing incidental records data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
L001	Breeding Raptor Survey; Crowagh bog	26/07/2021	16:23	Lapwing	2	cutover bog and upland blanket bog; flying north across bog/scrub area, adjacent to river	NM



Map Legend

- Turbine Locations
- Study Area Boundary
- 500m Radius
- Flight Record at Potential Collision Height

N

Drawing Title
Lapwing
Vantage Point

Project Title
Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.35
Scale	Date
1:17640	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

Map Legend

- Turbine Locations
- Study Area Boundary
- 8km Radius of Study Area
- Lapwing Record

N

Drawing Title

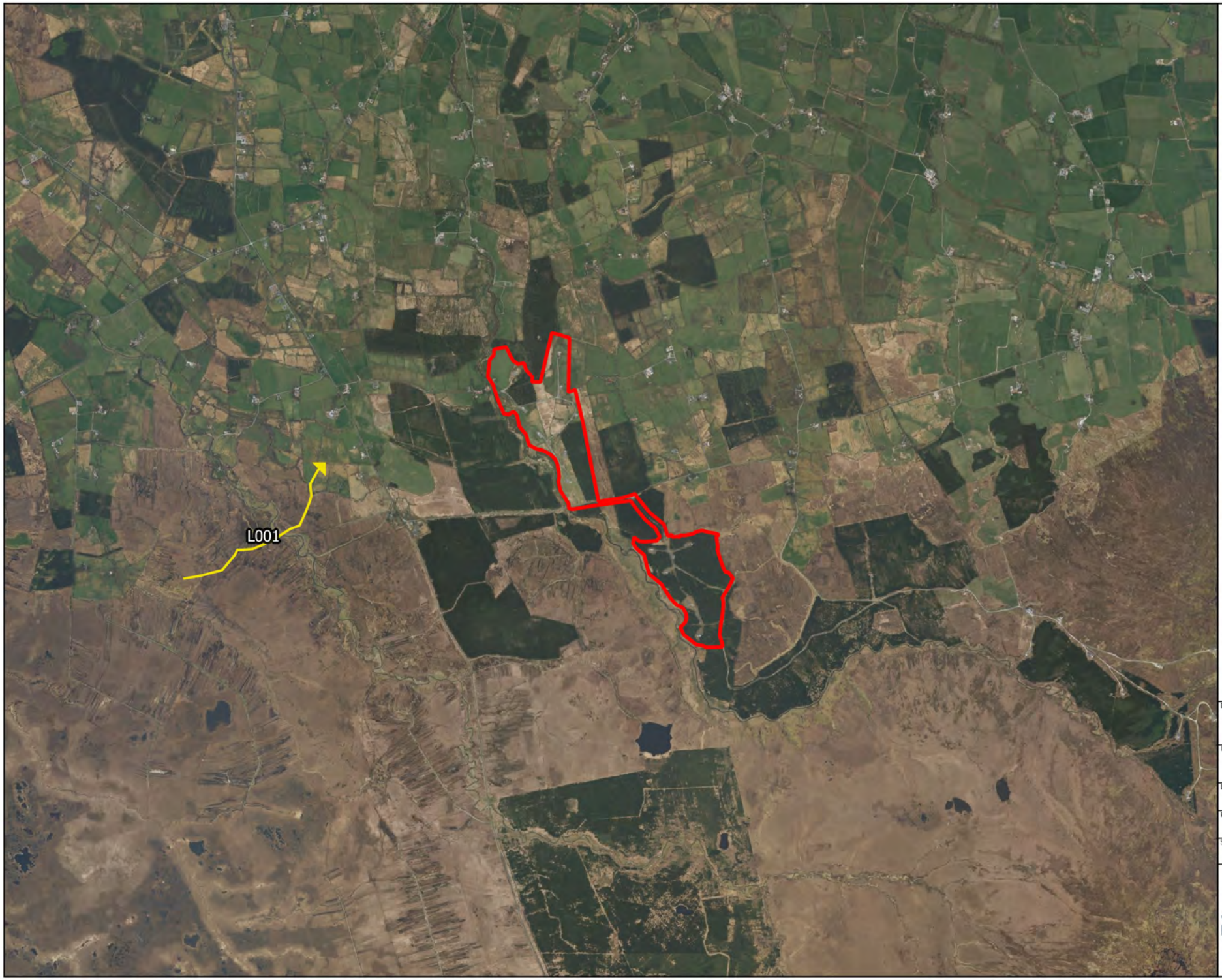
Lapwing
Waterbird Distribution Survey

Project Title

Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.36
Scale	Date
1:100000	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie



Map Legend

Study Area Boundary

Lapwing Observation

N

Drawing Title

Lapwing
Incidental Record

Project Title

Dunneill Wind Farm

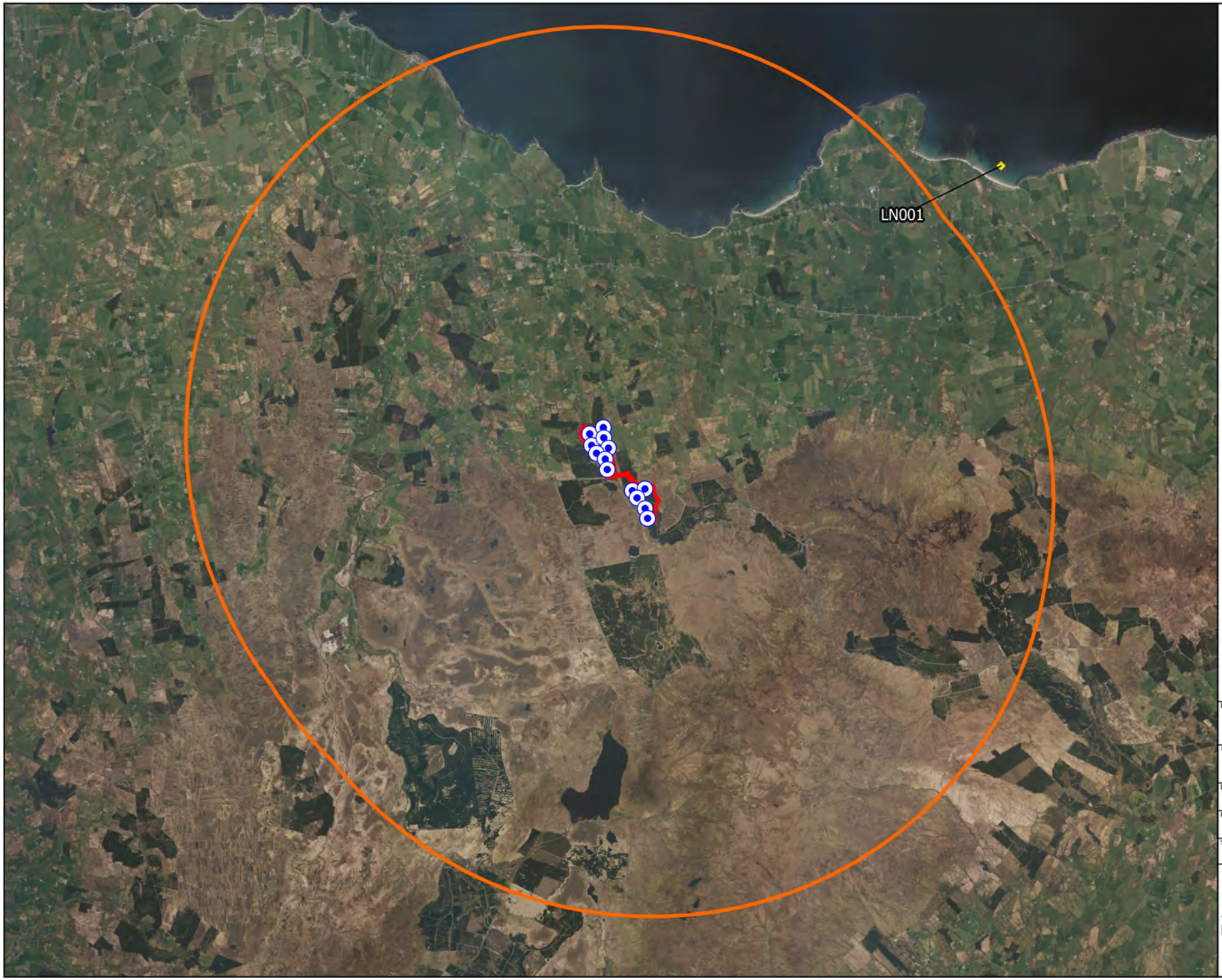
Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.37
Scale	Date
1:32000	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

25. LONG-TAILED DUCK

Table 7 - 4 - 43 Long-tailed duck waterbird distribution survey data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
LN001	Dunmoran Strand	27/10/2021	12:31	Long-tailed Duck	1	marine water body; foraging, female	AOD



Map Legend

- Turbine Locations
- Study Area Boundary
- 8km Radius of Study Area
- Long-tailed Duck Record

N

Drawing Title

Long-tailed Duck
Waterbird Distribution Survey

Project Title

Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.38
Scale	Date
1:100000	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

26. MEADOW PIPIT

Table 7 - 4 - 44 Meadow pipit vantage point survey data – lights

VP	Date	Time	Species	Number	Duration of flight (s)	Band 1	Band 2	Band 3 (PCH)	Band 4	Band 5	Habitat and activity	Surveyor
VP2	28/05/2021	07:21	Meadow Pipit	1	10	5	5	0	0	0	bogs; displaying	CD
VP2	28/05/2021	12:30	Meadow Pipit	1	30	20	10	0	0	0	bogs; displaying and flying around	CD
VP2	28/05/2021	14:13	Meadow Pipit	1	15	15	0	0	0	0	bogs; displaying	CD
VP2	10/09/2021	17:00	Meadow Pipit	25	2000	2000	0	0	0	0	semi-natural grassland, improved agricultural grassland and scrub; flitting and calling in open area north of vantage point, species exhibited consistent activity throughout vp	NM
VP1	26/10/2021	08:12	Meadow Pipit	2	10	10	0	0	0	-	cutover bog; flying	CH
VP1	26/10/2021	08:32	Meadow Pipit	2	15	15	0	0	0	-	cutover bog; flying	CH
VP1	26/10/2021	09:33	Meadow Pipit	1	10	0	10	0	0	-	cutover bog; flying	CH
VP1	26/10/2021	12:03	Meadow Pipit	1	20	20	0	0	0	-	upland blanket bog; flying	CH

VP	Date	Time	Species	Number	Duration of flight (s)	Band 1	Band 2	Band 3 (PCH)	Band 4	Band 5	Habitat and activity	Surveyor
VP1	18/11/2021	12:21	Meadow Pipit	2	20	20	0	0	0	0	upland blanket bog; flying and calling	CH
VP1	18/11/2021	15:05	Meadow Pipit	1	20	0	20	0	0	0	upland blanket bog; flying	CH
VP2	05/12/2021	09:09	Meadow Pipit	1	30	15	15	0	0	0	upland blanket bog and improved agricultural grassland; flying	CH
VP2	15/12/2021	10:16	Meadow Pipit	6	60	60	0	0	0	0	improved agricultural grassland; flying and calling	CH
VP2	15/12/2021	10:25	Meadow Pipit	2	20	20	0	0	0	0	improved agricultural grassland; flying and calling	CH
VP2	15/12/2021	11:13	Meadow Pipit	5	40	40	0	0	0	0	improved agricultural grassland and upland blanket bog; flying and calling	CH
VP2	15/12/2021	12:58	Meadow Pipit	4	20	0	20	0	0	0	improved agricultural grassland and upland blanket bog; flying	CH
VP1	17/12/2021	08:38	Meadow Pipit	1	30	0	0	30	0	-	cutover bog; flying and calling	CH
VP1	17/12/2021	08:41	Meadow Pipit	2	40	0	0	40	0	-	cutover bog; flying	CH
VP1	17/12/2021	10:36	Meadow Pipit	2	20	50	0	0	0	-	cutover bog; flying and landing	CH

VP	Date	Time	Species	Number	Duration of flight (s)	Band 1	Band 2	Band 3 (PCH)	Band 4	Band 5	Habitat and activity	Surveyor
VP1	10/01/2022	16:13	Meadow Pipit	2	20	0	0	20	0	-	upland blanket bog; flying	CH
VP1	11/01/2022	12:53	Meadow Pipit	2	30	0	30	0	0	-	cutover bog; flying	CH
VP2	20/01/2022	17:05	Meadow Pipit	1	30	0	30	0	0	0	upland blanket bog; flying	CH
VP2	02/02/2022	09:27	Meadow Pipit	2	20	0	20	0	0	0	upland blanket bog; flying	CH

Table 7 - 4 - 45 Meadow pipit vantage point survey data - non-flights

VP	Date	Time	Species	Number	Habitat and activity	Surveyor
VP1	27/05/2021	10:00	Meadow Pipit	1	improved agricultural grassland; calling throughout	CD
VP2	11/06/2021	10:40	Meadow Pipit	32	dry-humid acid grassland, upland blanket bog and mixed conifer woodland; calling and flitting across boggy grassland and adjacent forestry, occuring in abundance throughout entire length of survey - size of max flock	NM
VP1	16/07/2021	08:17	Meadow Pipit	27	improved agricultural grassland, scrub and upland blanket bog; calling and feeding in heather and grassland in area surrounding vp	NM
VP2	17/07/2021	09:16	Meadow Pipit	34	upland blanket bog and dry-humid acid grassland; calling, flying and flitting among grass and heather scrub in area surrounding vp	NM
VP1	21/07/2021	17:04	Meadow Pipit	17	upland blanket bog and mixed conifer woodland; calling and flitting close to ground and within heather / scrub / forestry edge, april survey	NM
VP2	28/07/2021	16:34	Meadow Pipit	13	upland blanket bog and dry-humid acid grassland; calling in bog, april survey	NM

VP	Date	Time	Species	Number	Habitat and activity	Surveyor
VP2	27/08/2021	09:18	Meadow Pipit	35	bogs, semi-natural grassland and mixed conifer woodland; flitting and calling over grassland in vp area, max numbers seen at any one time, consistent activity of mp throughout	NM

Table 7 - 4 - 46 Meadow pipit walkover survey data

Date	Time	Species	Number	Habitat and activity	Surveyor
26/05/2021	06:07	Meadow Pipit	28	upland blanket bog and dry-humid acid grassland; flitting and calling across bog (suitable nesting habitat; possible breeder)	NM
26/05/2021	08:02	Meadow Pipit	16	upland blanket bog; flitting and calling across bog (suitable nesting habitat; possible breeder)	NM
26/05/2021	11:23	Meadow Pipit	5	scrub; calling within gorse scrub along river (suitable nesting habitat; possible breeder)	NM
23/06/2021	11:45	Meadow Pipit	4	upland blanket bog; displaying and flying (courtship and display; probable breeding)	CD
23/06/2021	14:49	Meadow Pipit	20	upland blanket bog; mix of displaying, flying and flushed birds (courtship and display; probable breeding)	CD
24/06/2021	18:05	Meadow Pipit	5	improved agricultural grassland; flying in rain (suitable nesting habitat; possible breeder)	CD
24/06/2021	18:06	Meadow Pipit	1	improved agricultural grassland; flying (suitable nesting habitat; possible breeder)	CD
24/06/2021	18:06	Meadow Pipit	4	improved agricultural grassland; flying (suitable nesting habitat; possible breeder)	CD
21/07/2021	05:07	Meadow Pipit	19	upland blanket bog and dry-humid acid grassland; flitting and calling around - on ground and on heather in general area (suitable nesting habitat; possible breeder)	NM
21/07/2021	09:57	Meadow Pipit	9	upland blanket bog and dry-humid acid grassland; calling and flying around blanket bog / grassland area (suitable nesting habitat; possible breeder)	NM
29/10/2021	11:58	Meadow Pipit	1	conifer plantation; flying (wintering)	CH

Date	Time	Species	Number	Habitat and activity	Surveyor
29/10/2021	12:14	Meadow Pipit	3	upland blanket bog; flying & calling (wintering)	CH
29/10/2021	12:25	Meadow Pipit	2	upland blanket bog; flying & calling (wintering)	CH
29/10/2021	12:37	Meadow Pipit	2	upland blanket bog; flying (wintering)	CH
29/10/2021	13:24	Meadow Pipit	4	upland blanket bog; flying & calling (wintering)	CH
29/10/2021	13:30	Meadow Pipit	1	improved agricultural grassland; flying (wintering)	CH
29/10/2021	13:35	Meadow Pipit	2	improved agricultural grassland; flying (wintering)	CH
29/10/2021	15:09	Meadow Pipit	1	upland blanket bog; flying (wintering)	CH
29/10/2021	15:15	Meadow Pipit	1	upland blanket bog; flying (wintering)	CH
29/10/2021	15:17	Meadow Pipit	1	raised bog; flying (wintering)	CH
29/10/2021	15:20	Meadow Pipit	1	upland blanket bog; flying & calling (wintering)	CH
29/10/2021	15:36	Meadow Pipit	1	upland blanket bog; flying (wintering)	CH
23/11/2021	11:01	Meadow Pipit	1	upland blanket bog; flying (wintering)	CH
23/11/2021	11:03	Meadow Pipit	2	upland blanket bog; flying (wintering)	CH
23/11/2021	11:08	Meadow Pipit	1	upland blanket bog; flying (wintering)	CH
23/11/2021	12:17	Meadow Pipit	1	improved agricultural grassland; flying (wintering)	CH

Date	Time	Species	Number	Habitat and activity	Surveyor
24/11/2021	11:03	Meadow Pipit	1	improved agricultural grassland; flying and calling (wintering)	CH
12/01/2022	11:16	Meadow Pipit	1	cutover bog; flying and calling (wintering)	CH
12/01/2022	11:32	Meadow Pipit	1	cutover bog; flying and calling (wintering)	CH
12/01/2022	12:08	Meadow Pipit	2	cutover bog and upland blanket bog; flying and calling (wintering)	CH
12/01/2022	12:16	Meadow Pipit	1	cutover bog; flying and calling (wintering)	CH
12/01/2022	13:16	Meadow Pipit	1	upland blanket bog; flying and calling (wintering)	CH
12/01/2022	13:21	Meadow Pipit	1	upland blanket bog; flying (wintering)	CH
12/01/2022	13:43	Meadow Pipit	1	upland blanket bog; flying (wintering)	CH
14/01/2022	11:47	Meadow Pipit	6	improved agricultural grassland; flying (wintering)	CH
03/03/2022	10:38	Meadow Pipit	1	cutover bog; flying and calling (wintering)	CH
03/03/2022	10:51	Meadow Pipit	1	cutover bog; flying and singing (wintering)	CH
03/03/2022	10:52	Meadow Pipit	2	cutover bog; flying (wintering)	CH
03/03/2022	11:01	Meadow Pipit	1	cutover bog; flying (wintering)	CH
03/03/2022	11:02	Meadow Pipit	1	cutover bog; flying and singing (singing male; possible breeder)	CH
03/03/2022	11:18	Meadow Pipit	3	cutover bog; flying (wintering)	CH

Date	Time	Species	Number	Habitat and activity	Surveyor
03/03/2022	11:23	Meadow Pipit	1	cutover bog; flying and calling (wintering)	CH
03/03/2022	11:40	Meadow Pipit	3	cutover bog; flying and calling (wintering)	CH
03/03/2022	12:15	Meadow Pipit	1	improved agricultural grassland and bogs; flying (wintering)	CH
03/03/2022	12:58	Meadow Pipit	2	bogs; flying and calling (wintering)	CH
03/03/2022	13:03	Meadow Pipit	4	bogs; flying (wintering)	CH
03/03/2022	13:13	Meadow Pipit	2	bogs; flying and calling (wintering)	CH
03/03/2022	13:30	Meadow Pipit	2	bogs; flying and calling (wintering)	CH
03/03/2022	13:38	Meadow Pipit	1	bogs; flying (wintering)	CH
03/03/2022	13:45	Meadow Pipit	1	bogs; flying (wintering)	CH
03/03/2022	14:31	Meadow Pipit	1	improved agricultural grassland; flying (wintering)	CH
03/03/2022	14:38	Meadow Pipit	1	improved agricultural grassland; flying (wintering)	CH
03/03/2022	14:55	Meadow Pipit	1	improved agricultural grassland; flying and calling (wintering)	CH
03/03/2022	15:18	Meadow Pipit	1	improved agricultural grassland; flying (wintering)	CH
03/03/2022	15:25	Meadow Pipit	2	improved agricultural grassland; flying (wintering)	CH

Table 7 - 4 - 47 Meadow pipit incidental records data

Location	Date	Time	Species	Number	Habitat and activity	Surveyor
Breeding Raptor Survey; BR6	27/04/2021	not given	Meadow Pipit	1+	grassland and marsh; present	NM
Breeding Raptor Survey; BR1	27/04/2021	not given	Meadow Pipit	1+	grassland and marsh; present	NM
Breeding Raptor Survey; BR2	29/04/2021	not given	Meadow Pipit	1+	grassland and marsh; present	NM
Breeding Raptor Survey; BR3	29/04/2021	not given	Meadow Pipit	1+	grassland and marsh; present	NM
Breeding Raptor Survey; BR10	29/04/2021	not given	Meadow Pipit	1+	grassland and marsh; present	NM
Breeding Woodcock Survey; T1	24/05/2021	20:47	Meadow Pipit	23	dry-humid acid grassland; calling within river gully	NM
Breeding Woodcock Survey; T1	24/05/2021	21:06	Meadow Pipit	7	dry-humid acid grassland; calling within grassland around turbine and beyond on river gully	NM
Breeding Woodcock Survey; T1	24/05/2021	21:35	Meadow Pipit	20	upland blanket bog and wet heath; calling and socialising over bog / heath, spread over large area, complex flights	NM
Breeding Woodcock Survey; T1	24/05/2021	21:36	Meadow Pipit	30	upland blanket bog; calling on bog	NM
Breeding Woodcock Survey; T1	24/05/2021	21:42	Meadow Pipit	6	upland blanket bog and dry-humid acid grassland; calling on bog and grassland	NM
Breeding Raptor Survey; BR8	28/05/2021	06:01	Meadow Pipit	16	cutover bog; calling and parachuting within open bog, size of maximum flock	NM
Breeding Raptor Survey; BR2	28/05/2021	08:54	Meadow Pipit	37	upland blanket bog; calling and flitting across bog	NM
Breeding Raptor Survey; BR2	28/05/2021	10:36	Meadow Pipit	18	upland blanket bog and cutover bog; flitting and calling on bog	NM
Breeding Woodcock Survey; T1	09/06/2021	21:45	Meadow Pipit	16	upland blanket bog; calling and perching over open bog and wet upland, size of maximum flock	NM

Location	Date	Time	Species	Number	Habitat and activity	Surveyor
Breeding Woodcock Survey; T2	10/06/2021	21:35	Meadow Pipit	20	upland blanket bog and wet heath; calling and socialising over bog/heath, spread over large area, complex flights	NM
Breeding Raptor Survey; BR1	22/07/2021	07:03	Meadow Pipit	36	cutover bog; high activity over cutover blanket bog	NM
Breeding Raptor Survey; BR1	22/07/2021	07:14	Meadow Pipit	5	mixed conifer woodland and improved agricultural grassland; flitting and calling in edge conifers along river corridor of forestry	NM
Waterbird Distribution Survey; Crowagh	12/08/2021	13:14	Meadow Pipit	16	bogs; flitting and calling over bog area	NM
Waterbird Distribution Survey; near Finnandoo River	12/08/2021	16:02	Meadow Pipit	39	bogs and scrub; flitting and calling across bog, approximate number of individuals in nearby area	NM
Waterbird Distribution Survey; Dunneill	13/08/2021	not given	Meadow Pipit	1+	grassland and marsh; present	NM
Waterbird Distribution Survey; near turbine 6	25/08/2021	12:11	Meadow Pipit	30	improved agricultural grassland, semi-natural grassland and scrub; high numbers flitting and flying across grassland along river	NM
Waterbird Distribution Survey; Dunneill	26/08/2021	not given	Meadow Pipit	1+	grassland and marsh; present	NM
Waterbird Distribution Survey; Dunneill	09/09/2021	not given	Meadow Pipit	1+	grassland and marsh; present	NM
Waterbird Distribution Survey; Dunneill	21/09/2021	not given	Meadow Pipit	1+	grassland and marsh; present	NM
Waterbird Distribution Survey; Dunneill	22/09/2021	not given	Meadow Pipit	1+	grassland and marsh; present	NM
Hen Harrier Roost Survey; HHVP1	20/10/2021	17:44	Meadow Pipit	1	cutover bog; flying	CH
Hen Harrier Roost Survey; HHVP2	29/10/2021	17:07	Meadow Pipit	4	upland blanket bog; flying	CH

Location	Date	Time	Species	Number	Habitat and activity	Surveyor
Waterbird Distribution Survey; Dunneill	15/11/2021	not given	Meadow Pipit	1+	grassland and marsh; present	NM
Waterbird Distribution Survey; Dunneill	16/11/2021	not given	Meadow Pipit	1+	grassland and marsh; present	NM
Hen Harrier Roost Survey; HHVP4	19/11/2021	08:16	Meadow Pipit	1	upland blanket bog and eroding/upland rivers; flying and calling	CH
Waterbird Distribution Survey; Dunneill	29/11/2021	not given	Meadow Pipit	1+	grassland and marsh; present	NM
Waterbird Distribution Survey; Tawnamore	09/12/2021	12:33	Meadow Pipit	4	lowland blanket bog; flying	CH
Waterbird Distribution Survey; Easkey Bog	22/02/2022	11:30	Meadow Pipit	4	upland blanket bog; flying and calling, chasing each other	CH
Waterbird Distribution Survey; Crowagh	07/03/2022	16:20	Meadow Pipit	2	cutover bog; flying	CH
Waterbird Distribution Survey; Letterunshin	08/03/2022	12:50	Meadow Pipit	2	bogs; flying	CH
Waterbird Distribution Survey; Coopers Lodge	30/03/2022	09:50	Meadow Pipit	4	heath and cutover bog; flying and calling	CH
Waterbird Distribution Survey; Lough Nafullow	30/03/2022	10:10	Meadow Pipit	1	heath and bogs; singing, flying, displaying	CH
Waterbird Distribution Survey; Easkey Bog	30/03/2022	10:40	Meadow Pipit	1	heath and upland blanket bog; displaying	CH
Waterbird Distribution Survey; Lough Brickeagh	30/03/2022	11:00	Meadow Pipit	4	lakes and ponds and conifer plantation; flying	CH
Waterbird Distribution Survey; Easkey Bog	30/03/2022	11:30	Meadow Pipit	4	heath and upland blanket bog; displaying	CH
Waterbird Distribution Survey; Easkey Bog	30/03/2022	11:45	Meadow Pipit	6	heath and upland blanket bog; displaying	CH
Waterbird Distribution Survey; Easkey Bog	30/03/2022	12:35	Meadow Pipit	2	upland blanket bog; flying	CH

Location	Date	Time	Species	Number	Habitat and activity	Surveyor
Waterbird Distribution Survey; Easkey Bog	30/03/2022	12:40	Meadow Pipit	4	upland blanket bog; flying	CH
Waterbird Distribution Survey; Tawnamore	31/03/2022	11:20	Meadow Pipit	3	cutover bog and heath; flying and calling	CH

27. OYSTERCATCHER

Table 7 - 4 - 48 Oystercatcher waterbird distribution survey data

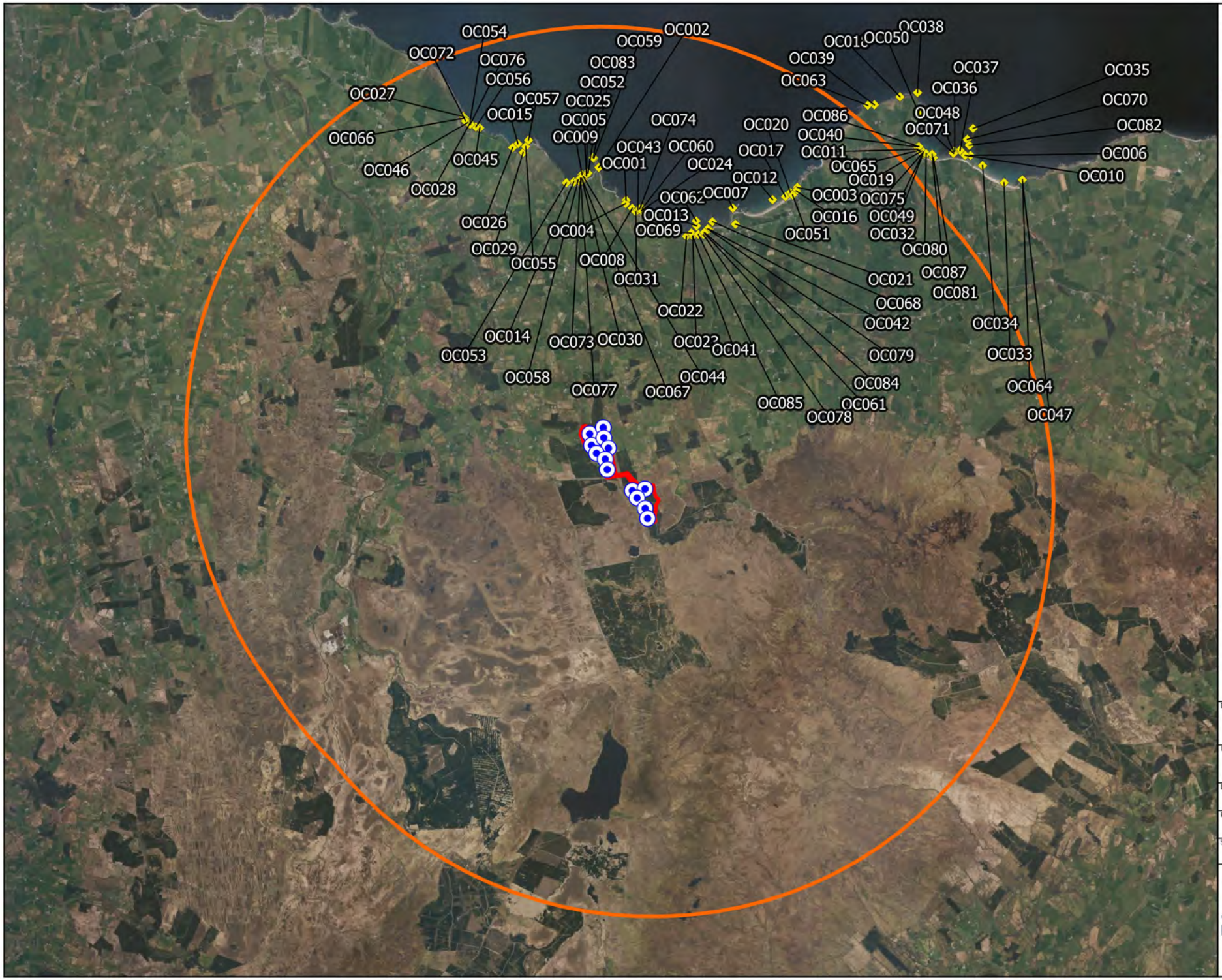
Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
OC001	Pollnadivva Pier	13/08/2021	11:54	Oystercatcher	9	littoral rock; roosting on rocky shore	NM
OC002	Donagh	26/08/2021	20:02	Oystercatcher	13	littoral rock; roosting and calling on rocky shore	NM
OC003	Tra Bui	08/09/2021	08:16	Oystercatcher	12	littoral rock; foraging and roosting on rocky shore	NM
OC004	Pollnadivva Pier	08/09/2021	10:17	Oystercatcher	17	littoral rock; foraging and roosting on rocky shore	NM
OC005	Carrickphatrick	22/09/2021	18:23	Oystercatcher	13	littoral rock; perched on rocky shore	NM
OC006	Dunmoran Strand	06/10/2021	14:13	Oystercatcher	12	exposed rocky shroes; foraging	AOD
OC007	Trawwee	06/10/2021	15:40	Oystercatcher	16	exposed rocky shroes; roosting	AOD
OC008	Pollnadivva Pier	06/10/2021	16:11	Oystercatcher	4	exposed rocky shroes; roosting	AOD
OC009	Doonagh	06/10/2021	16:32	Oystercatcher	10	exposed rocky shroes; roosting	AOD
OC010	Dunmoran Strand	27/10/2021	13:02	Oystercatcher	5	exposed rocky shroes; roosting	AOD
OC011	Dunmoran Strand	27/10/2021	13:16	Oystercatcher	3	sand shores; foraging	AOD
OC012	Trawwee	27/10/2021	13:59	Oystercatcher	5	marine water body; flying	AOD
OC013	Doonycoy	27/10/2021	14:21	Oystercatcher	5	exposed rocky shroes; roosting	AOD
OC014	Donagh	27/10/2021	14:46	Oystercatcher	12	exposed rocky shroes; foraging	AOD
OC015	Pollbrean	27/10/2021	15:00	Oystercatcher	7	exposed rocky shroes; foraging	AOD
OC016	Pollanimma	16/11/2021	12:35	Oystercatcher	9	moderately exposed rocky shores and sand shores; foraging on rocky shore	NM
OC017	Pollanimma	16/11/2021	12:39	Oystercatcher	3	sand shores; flying west along beach	NM

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
OC018	Aughris Head	16/11/2021	15:07	Oystercatcher	16	exposed rocky shroes; foraging on rocky shore	NM
OC019	Dunmoran Strand	29/11/2021	08:48	Oystercatcher	16	sand shores; on beach	NM
OC020	Tra Bui	29/11/2021	09:29	Oystercatcher	12	sand shores; on beach	NM
OC021	Carricknacranny	29/11/2021	10:40	Oystercatcher	7	improved agricultural grassland; grazing on wet coastal farmland	NM
OC022	Carricknagrauv	29/11/2021	10:56	Oystercatcher	9	littoral rock; foraging on shore	NM
OC023	Carricknagrauv	29/11/2021	10:58	Oystercatcher	3	sea inlets and bays; flying low along coast	NM
OC024	Pollnadivva Pier	29/11/2021	11:30	Oystercatcher	4	littoral rock; foraging on rocky shore	NM
OC025	Carrickphatrick	29/11/2021	11:55	Oystercatcher	7	littoral rock; roosting on rocky shore	NM
OC026	Pollbrean	29/11/2021	13:17	Oystercatcher	6	littoral rock; foraging on rocky shore	NM
OC027	Carrownabinny	29/11/2021	13:58	Oystercatcher	6	littoral rock; roosting on rocky shore	NM
OC028	Pollbrean	06/12/2021	13:17	Oystercatcher	3	moderately exposed rocky shores; foraging	CH
OC029	Lackavarna	06/12/2021	13:44	Oystercatcher	9	moderately exposed rocky shores; foraging	CH
OC030	Carrickphatrick	06/12/2021	14:25	Oystercatcher	4	mixed substrata shores; foraging	CH
OC031	Pollnadivva Pier	06/12/2021	14:44	Oystercatcher	4	moderately exposed rocky shores; foraging	CH
OC032	Aughris Beach	06/12/2021	16:08	Oystercatcher	8	sand shores; roosting	CH
OC033	Dunmoran Strand	09/12/2021	09:28	Oystercatcher	3	mixed sediment shores; foraging	CH
OC034	Corkagh Beg	09/12/2021	15:27	Oystercatcher	5	sand shores; foraging	CH
OC035	Corkagh Beg	21/12/2021	10:57	Oystercatcher	1	moderately exposed rocky shores; foraging	CH

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
OC036	Corkagh Beg	21/12/2021	11:00	Oystercatcher	3	moderately exposed rocky shores; foraging	CH
OC037	Corkagh Beg	21/12/2021	11:02	Oystercatcher	1	moderately exposed rocky shores; foraging	CH
OC038	Aughris Head	21/12/2021	13:01	Oystercatcher	4	moderately exposed rocky shores; foraging	CH
OC039	Aughris Head	21/12/2021	13:02	Oystercatcher	5	moderately exposed rocky shores; foraging	CH
OC040	Aughris Beach	21/12/2021	13:23	Oystercatcher	6	mixed sediment shores; foraging	CH
OC041	Carricknagrauv	21/12/2021	14:28	Oystercatcher	12	moderately exposed rocky shores; foraging	CH
OC042	Carricknagrauv	21/12/2021	14:29	Oystercatcher	3	moderately exposed rocky shores; foraging	CH
OC043	Pollnadivva Pier	21/12/2021	14:44	Oystercatcher	1	sheltered rocky shores; foraging	CH
OC044	Carrickphatrick	21/12/2021	14:55	Oystercatcher	5	sheltered rocky shores; foraging	CH
OC045	Pollbrean	21/12/2021	15:34	Oystercatcher	2	moderately exposed rocky shores; foraging	CH
OC046	Pollbrean	21/12/2021	15:34	Oystercatcher	5	moderately exposed rocky shores; foraging	CH
OC047	Dunmoran Strand	06/01/2022	11:00	Oystercatcher	4	moderately exposed rocky shores; roosting	CH
OC048	Corkagh Beg	06/01/2022	11:42	Oystercatcher	41	moderately exposed rocky shores; roosting and foraging	CH
OC049	Aughris Beach	06/01/2022	12:07	Oystercatcher	11	sand shores; foraging	CH
OC050	Aughris Head	06/01/2022	12:56	Oystercatcher	6	improved agricultural grassland; foraging	CH
OC051	Trawwee	06/01/2022	13:24	Oystercatcher	2	sand shores; bathing	CH
OC052	Carrickphatrick	06/01/2022	14:09	Oystercatcher	1	exposed rocky shroes; foraging	CH
OC053	Carrickphatrick	06/01/2022	14:23	Oystercatcher	2	sheltered rocky shores; foraging	CH

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
OC054	Pollbrean	06/01/2022	15:08	Oystercatcher	1	moderately exposed rocky shores; foraging	CH
OC055	Lackavarna	06/01/2022	15:14	Oystercatcher	7	mixed substrata shores; foraging	CH
OC056	Carrownabinny	25/01/2022	15:40	Oystercatcher	7	moderately exposed rocky shores; foraging	CH
OC057	Lackavarna	25/01/2022	15:59	Oystercatcher	1	moderately exposed rocky shores; foraging	CH
OC058	Carrickphatrick	25/01/2022	16:15	Oystercatcher	3	mixed sediment shores; foraging	CH
OC059	Donagh	25/01/2022	16:30	Oystercatcher	2	moderately exposed rocky shores; foraging	CH
OC060	Pollnadivva Pier	25/01/2022	16:57	Oystercatcher	2	sheltered rocky shores; foraging	CH
OC061	Carricknagrauv	26/01/2022	13:59	Oystercatcher	5	mixed sediment shores; foraging	CH
OC062	Carricknagrauv	26/01/2022	14:01	Oystercatcher	23	sea inlets and bays; flying	CH
OC063	Aughris Head	26/01/2022	15:16	Oystercatcher	7	exposed rocky shroes; foraging	CH
OC064	Dunmoran Strand	26/01/2022	15:46	Oystercatcher	3	moderately exposed rocky shores; foraging	CH
OC065	Aughris Beach	26/01/2022	15:26	Oystercatcher	1	sand shores; foraging	CH
OC066	Pollbrean	09/02/2022	14:45	Oystercatcher	14	moderately exposed rocky shores; foraging	CH
OC067	Carrickphatrick	09/02/2022	15:06	Oystercatcher	17	mixed sediment shores; foraging	CH
OC068	Carricknagrauv	09/02/2022	15:37	Oystercatcher	5	moderately exposed rocky shores; foraging	CH
OC069	Carricknagrauv	09/02/2022	15:39	Oystercatcher	4	moderately exposed rocky shores; foraging	CH
OC070	Corkagh Beg	09/02/2022	16:41	Oystercatcher	8	mixed sediment shores; present	CH
OC071	Corkagh Beg	09/02/2022	16:48	Oystercatcher	2	moderately exposed rocky shores; foraging	CH
OC072	Pollbrean	25/02/2022	14:13	Oystercatcher	10	moderately exposed rocky shores; bathing and preening	CH

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
OC073	Carrickphatrick	25/02/2022	15:50	Oystercatcher	13	littoral sediment; foraging	CH
OC074	Pollnadivva Pier	25/02/2022	15:55	Oystercatcher	7	sheltered rocky shores; foraging	CH
OC075	Aughris Beach	25/02/2022	15:57	Oystercatcher	2	littoral sediment; foraging	CH
OC076	Pollbrean	08/03/2022	14:03	Oystercatcher	1	sheltered rocky shores; foraging	CH
OC077	Carrickphatrick	08/03/2022	14:26	Oystercatcher	1	moderately exposed rocky shores; foraging	CH
OC078	Carricknagrauv	08/03/2022	14:51	Oystercatcher	1	moderately exposed rocky shores; foraging	CH
OC079	Carricknagrauv	08/03/2022	14:54	Oystercatcher	1	moderately exposed rocky shores; foraging	CH
OC080	Aughris Beach	08/03/2022	15:20	Oystercatcher	9	sand shores; roosting	CH
OC081	Aughris Beach	08/03/2022	15:20	Oystercatcher	2	sand shores; foraging	CH
OC082	Corkagh Beg	08/03/2022	15:58	Oystercatcher	2	exposed rocky shroes; foraging	CH
OC083	Carrickphatrick	31/03/2022	13:59	Oystercatcher	6	moderately exposed rocky shores; foraging	CH
OC084	Carricknagrauv	31/03/2022	14:23	Oystercatcher	5	moderately exposed rocky shores; foraging	CH
OC085	Carricknagrauv	31/03/2022	14:26	Oystercatcher	1	moderately exposed rocky shores; foraging	CH
OC086	Aughris Beach	31/03/2022	15:13	Oystercatcher	2	sand shores; foraging	CH
OC087	Aughris Beach	31/03/2022	15:14	Oystercatcher	2	sand shores; foraging	CH



Map Legend

- Turbine Locations
- Study Area Boundary
- 8km Radius of Study Area
- Oystercatcher Record

N

Drawing Title

Oystercatcher
Waterbird Distribution Survey

Project Title

Dunneill Wind Farm

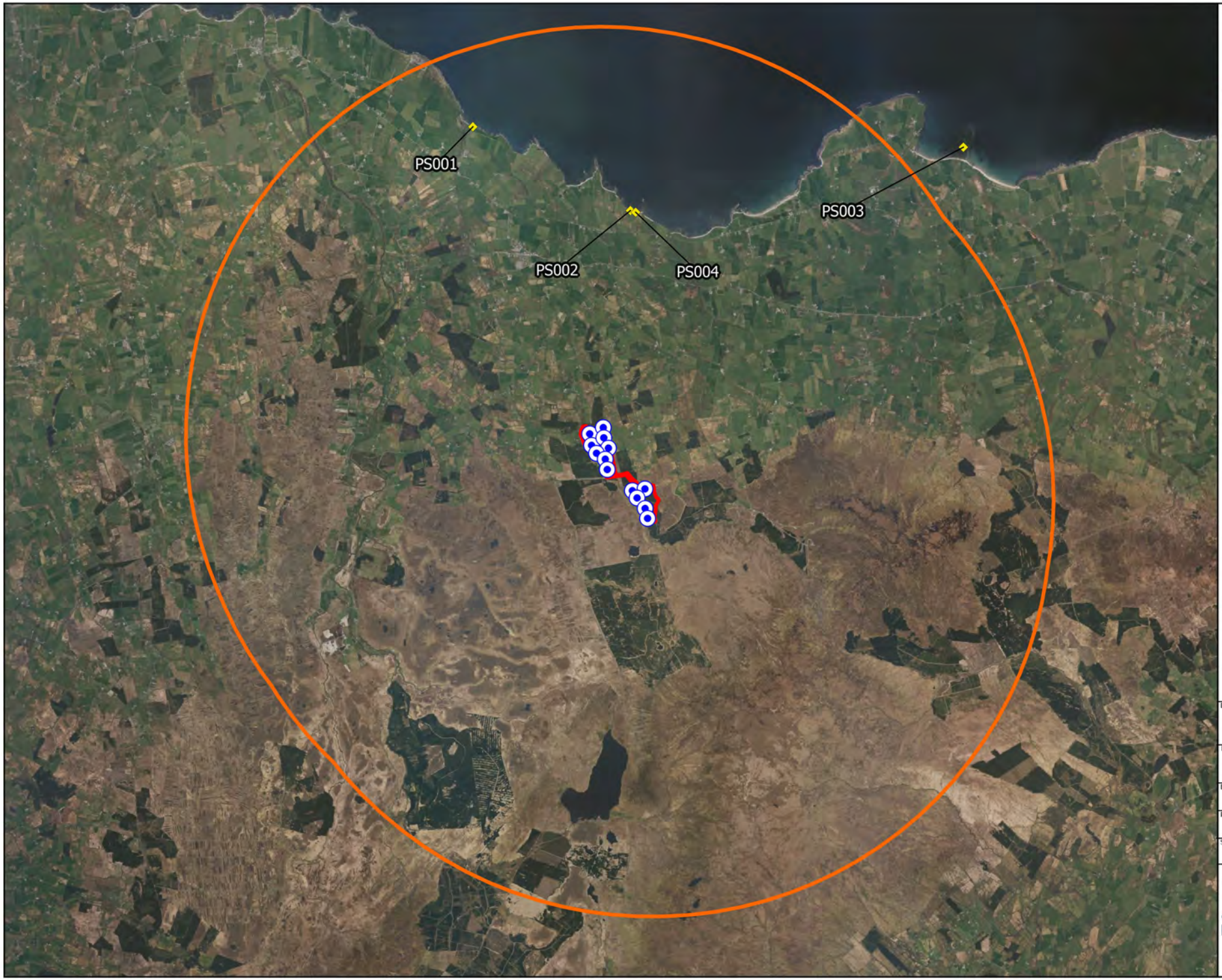
Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.39
Scale	Date
1:100000	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

28. PURPLE SANDPIPER

Table 7 - 4 - 49 Purple sandpiper waterbird distribution survey data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
PS001	Pollbrean	06/12/2021	12:03	Purple Sandpiper	37	moderately exposed rocky shores; foraging, with turnstone	CH
PS002	Pollnadivva Pier	25/01/2022	16:55	Purple Sandpiper	1	sheltered rocky shores; foraging	CH
PS003	Corkagh Beg	09/02/2022	16:44	Purple Sandpiper	6	moderately exposed rocky shores; foraging	CH
PS004	Pollnadivva Pier	25/02/2022	15:54	Purple Sandpiper	43	sheltered rocky shores; foraging	CH



Map Legend

- Turbine Locations
- Study Area Boundary
- 8km Radius of Study Area
- Purple Sandpiper Record

N

Drawing Title
Purple Sandpiper
Waterbird Distribution Survey

Project Title
Dunneill Wind Farm

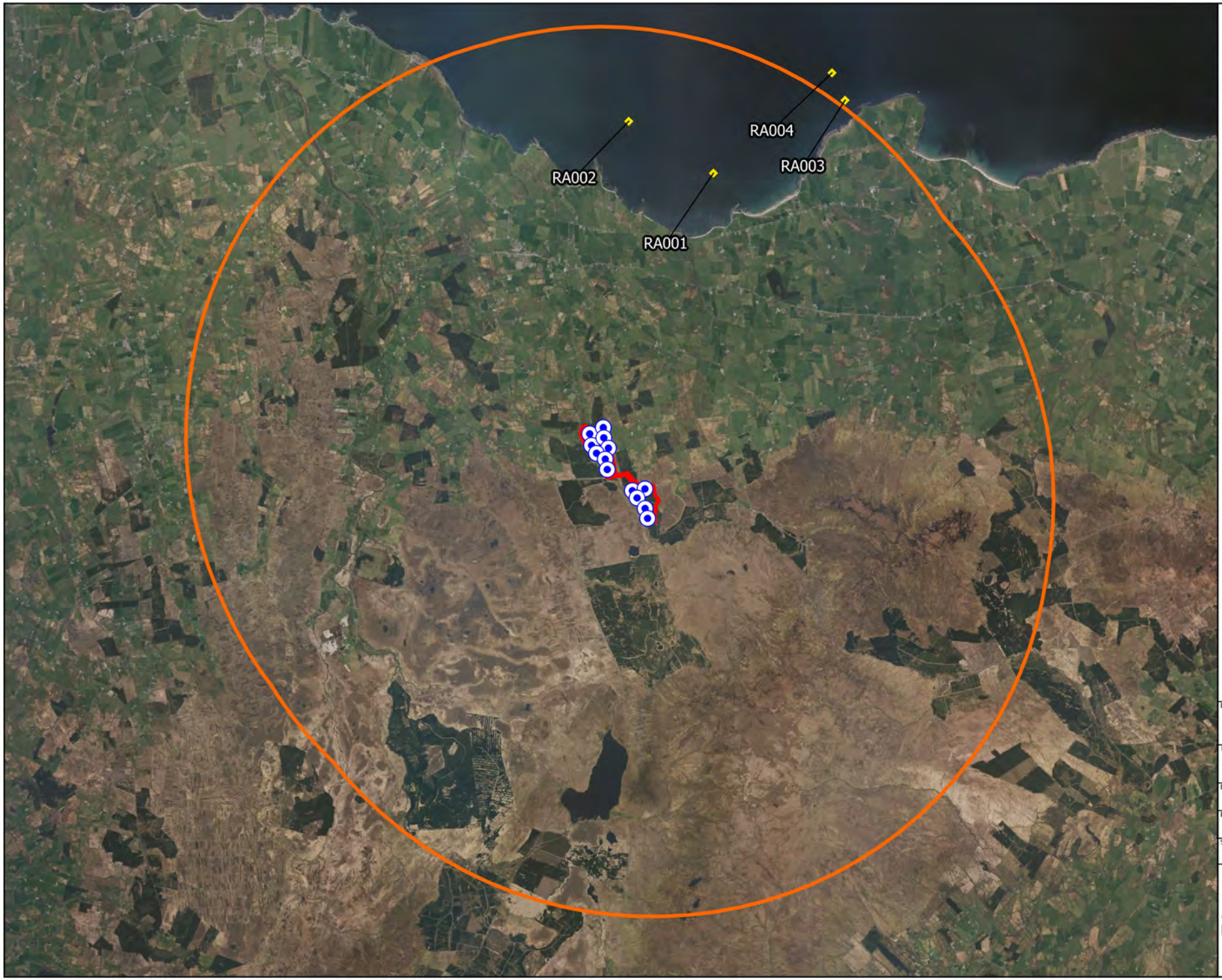
Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.40
Scale	Date
1:100000	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

29. RAZORBILL

Table 7 - 4 - 50 Razorbill waterbird distribution survey data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
RA001	Carricknacranny	13/08/2021	09:46	Razorbill	16	sea inlets and bays; flying low across water	NM
RA002	Donagh	13/08/2021	10:12	Razorbill	34	sea inlets and bays; swimming and diving on water	NM
RA003	Aughris Head	16/11/2021	15:01	Razorbill	16	marine water body; swimming and diving just offshore	NM
RA004	Aughris Head	16/11/2021	15:46	Razorbill	29	marine water body; large group of auks swimming offshore	NM



Map Legend

- Turbine Locations
- Study Area Boundary
- 8km Radius of Study Area
- Razorbill Record

N

Drawing Title

Razorbill
Waterbird Distribution Survey

Project Title

Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.41
Scale	Date
1:100000	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

30. RED GROUSE

Table 7 - 4 - 51 Red grouse vantage point survey data – flights

Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1	Band 2	Band 3 (PCH)	Band 4	Band 5	Habitat and activity	Surveyor
RG001	VP1	26/10/2021	07:41	Red Grouse	2	10	10	0	0	0	-	upland blanket bog and cutover bog; flying, took off from left, low rapid flying to land 100m to right	CH

Table 7 - 4 - 52 Red grouse vantage point survey data - non-flights

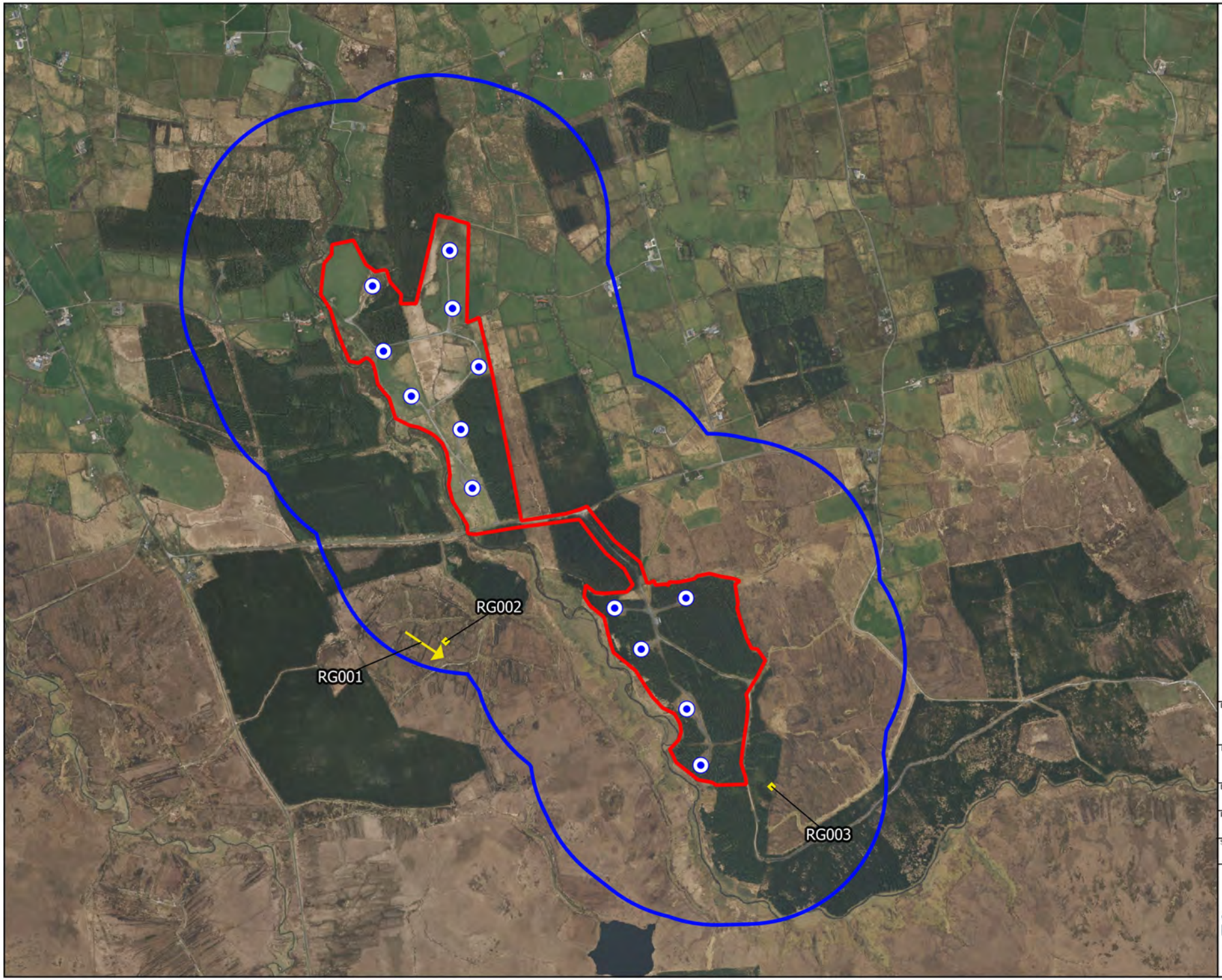
Ref.	VP	Date	Time	Species	Number	Habitat and activity	Surveyor
RG002	VP1	17/12/2021	07:57	Red Grouse	1	upland blanket bog; calling	CH
RG003	VP2	23/03/2022	19:16	Red Grouse	1	upland blanket bog; calling	NS

Table 7 - 4 - 53 Breeding red grouse survey data

Ref.	Transect	Date	Time	Species	Number	Habitat and activity	Surveyor
RG001	T4	14/03/2022	10:29	Red Grouse	1	heath and cutover bog, call back	CH
RG002	T4	14/03/2022	10:36	Red Grouse	1	heath and cutover bog, fly towards me and call back	CH
RG003	T4	14/03/2022	10:46	Red Grouse	1	heath and cutover bog, call back	CH
RG004	T5	14/03/2022	10:56	Red Grouse	1	heath and cutover bog, fly towards me and call	CH
RG005	T5	14/03/2022	11:09	Red Grouse	1	heath and upland blanket bog, flying towards	CH

Table 7 - 4 - 54 Red grouse incidental records data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
RG001	Hen Harrier Roost Survey; HHVP1	16/11/2021	07:35	Red Grouse	1	cutover bog; calling, heard, not seen	CH
RG002	Hen Harrier Roost Survey; HHVP1	16/11/2021	07:45	Red Grouse	1	cutover bog; calling, heard, not seen	CH
RG003	Hen Harrier Roost Survey; HHVP1	30/11/2021	15:25	Red Grouse	1	cutover bog; flying	CH
RG004	Hen Harrier Roost Survey; HHVP3	02/12/2021	14:48	Red Grouse	1	cutover bog; calling	CH
RG005	Hen Harrier Roost Survey; access road to HHVP4	03/02/2022	18:01	Red Grouse	1	lowland blanket bog; flying, flew low across track when returning to car	CH
RG006	Waterbird Distribution Survey; Easkey Bog	09/02/2022	18:58	Red Grouse	2	upland blanket bog; flying and calling, flushed	CH
RG007	Hen Harrier Roost Survey; HHVP3	28/03/2022	20:33	Red Grouse	1	lowland blanket bog; calling, calling from ground	NS
RG008	Hen Harrier Roost Survey; HHVP3	28/03/2022	20:52	Red Grouse	1	upland blanket bog; calling, calling from cover, not seen, 9 times between 20:33 and 20:52 in 8ha area	NS
RG009	Waterbird Distribution Survey; Easkey Bog	30/03/2022	11:20	Red Grouse	1	heath and upland blanket bog; fresh droppings	CH
RG010	Waterbird Distribution Survey; Easkey Bog	30/03/2022	12:15	Red Grouse	1	upland blanket bog and heath; droppings	CH
RG011	Waterbird Distribution Survey; Easkey Bog	30/03/2022	12:25	Red Grouse	1	upland blanket bog and heath; droppings, 4 patches of droppings here (not fresh)	CH



Map Legend

- Turbine Locations
- Study Area Boundary
- 500m Radius
- Flight Record
- Non-flight Record

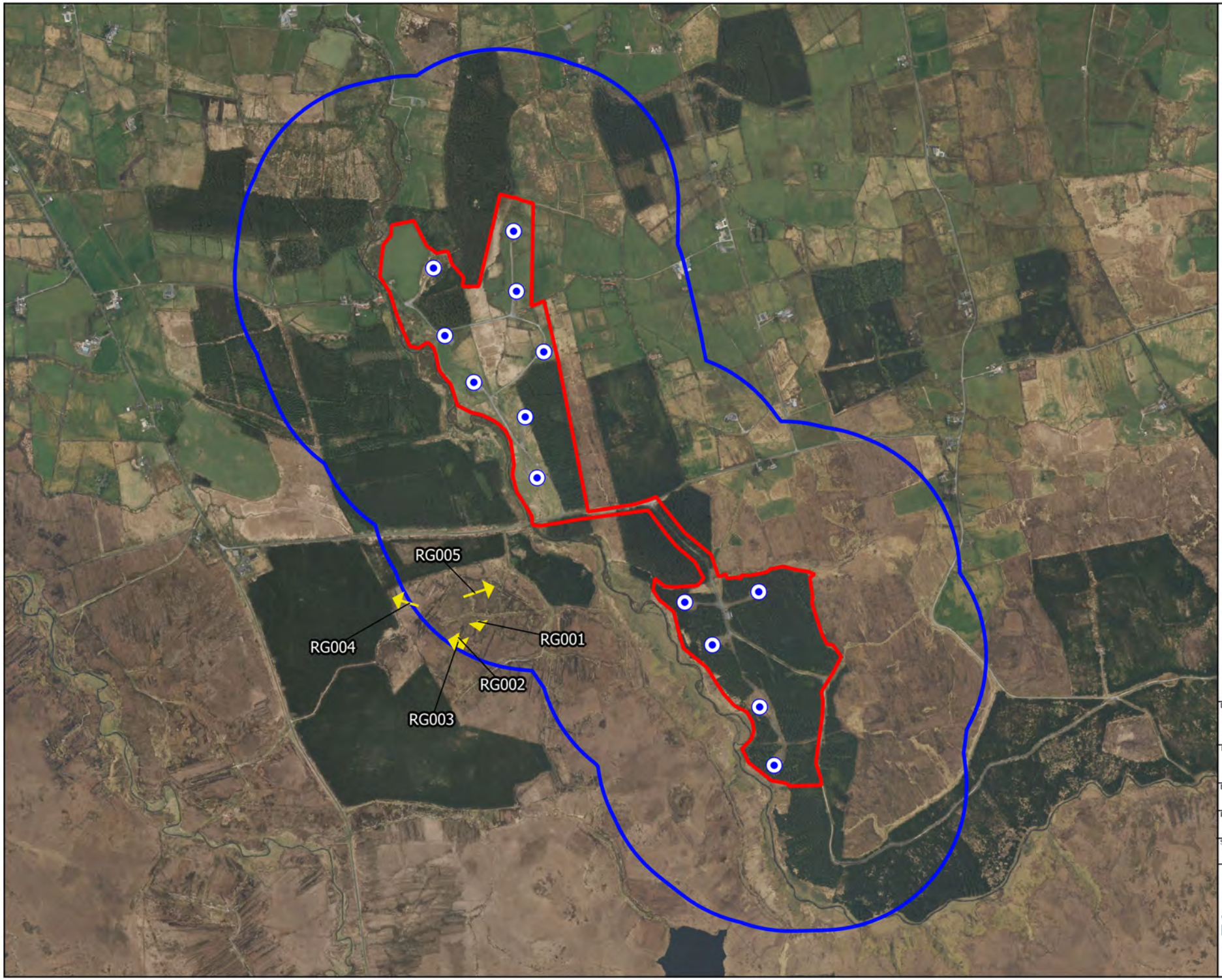
N

Drawing Title
Red Grouse
Vantage Point

Project Title
Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.42
Scale	Date
1:17640	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie



Map Legend

- Turbine Locations
- Study Area Boundary
- 500m Radius
- Red Grouse Observation

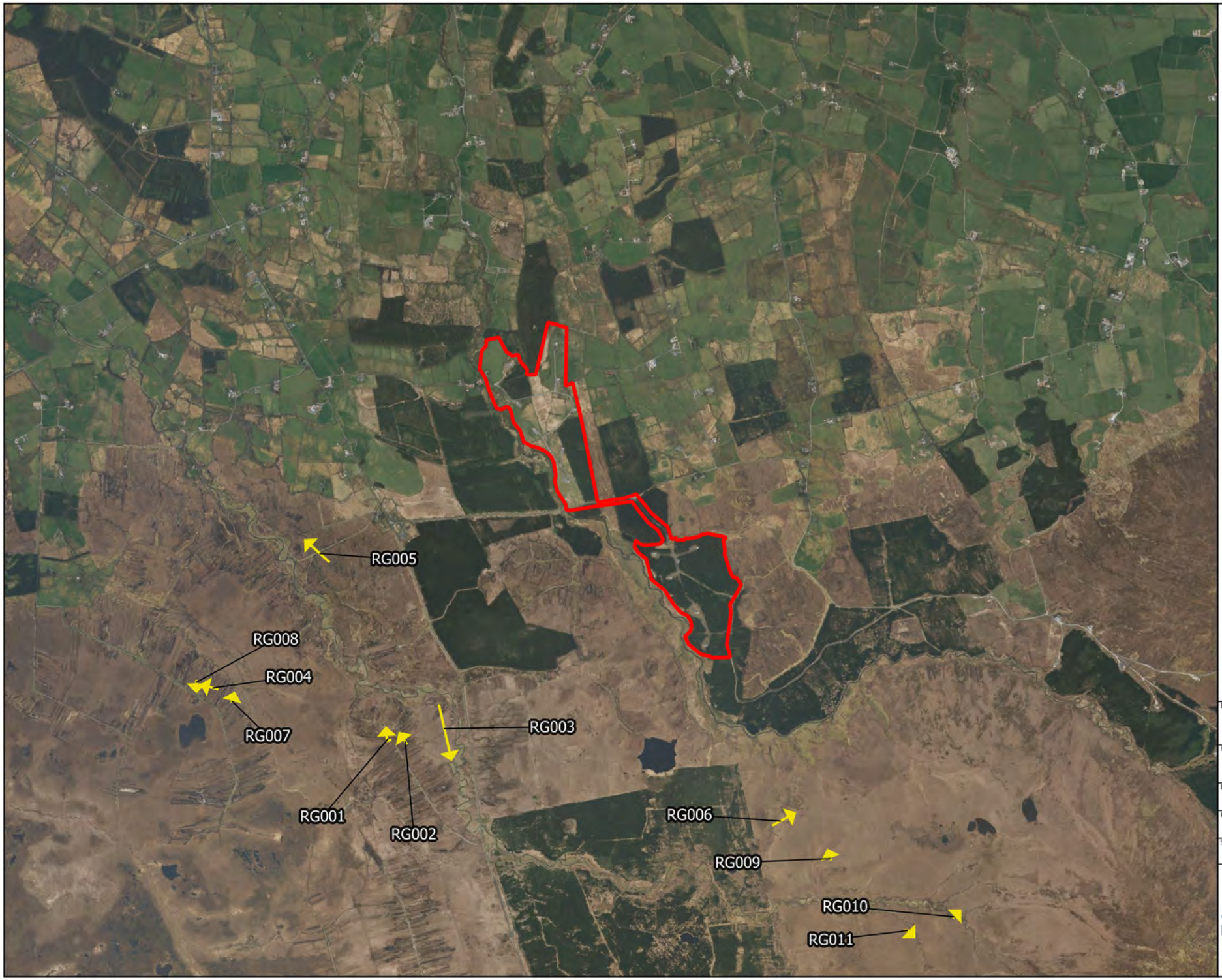
N

Drawing Title
Red Grouse
Breeding Red Grouse Survey

Project Title
Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.43
Scale	Date
1:17000	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie



Map Legend

Study Area Boundary

Red Grouse Observation

N

Drawing Title
Red Grouse
Incidental Record

Project Title
Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.44
Scale	Date
1:30000	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

31. REDWING

Table 7 - 4 - 55 Redwing vantage point survey data - flights

VP	Date	Time	Species	Number	Duration of flight (s)	Band 1	Band 2	Band 3 (PCH)	Band 4	Band 5	Habitat and activity	Surveyor
VP1	26/10/2021	09:01	Redwing	14	30	0	0	0	30	-	cutover bog and conifer plantation; flying	CH
VP1	26/10/2021	13:29	Redwing	7	60	0	0	0	30	-	conifer plantation and upland blanket bog; flying	CH
VP2	04/11/2021	14:08	Redwing	15	60	0	0	0	0	60	improved agricultural grassland; flying	CH
VP1	17/12/2021	08:28	Redwing	5	20	0	20	0	0	-	cutover bog; flying	CH

Table 7 - 4 - 56 Redwing walkover survey data

Date	Time	Species	Number	Habitat and activity	Surveyor
24/11/2021	11:23	Redwing	1	treelines and improved agricultural grassland; calling, flying and perching (wintering)	CH

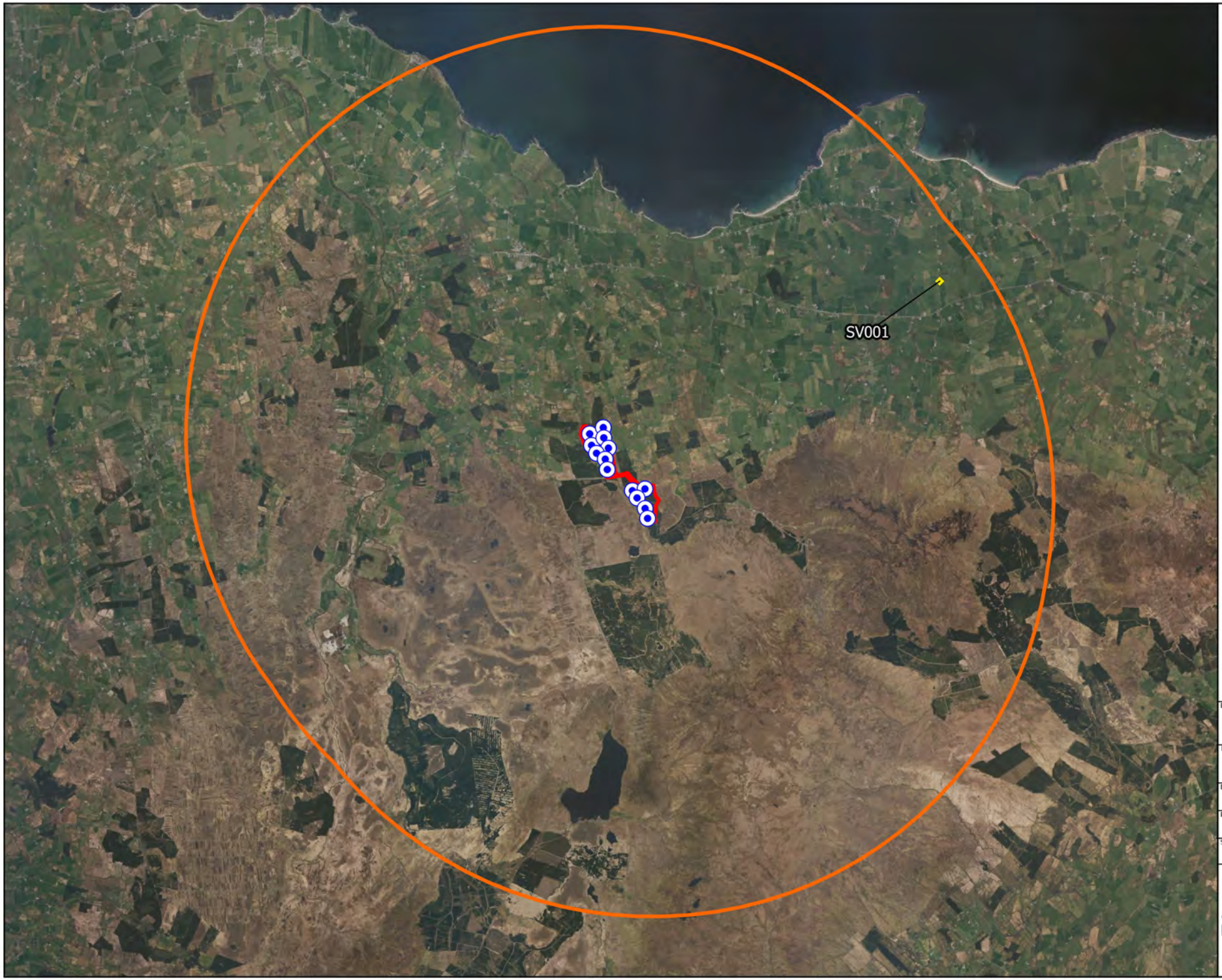
Table 7 - 4 - 57 Redwing incidental records data

Location	Date	Time	Species	Number	Habitat and activity	Surveyor
Hen Harrier Roost Survey; HHVP4	03/11/2021	16:40	Redwing	10	upland blanket bog; flying	CH
Waterbird Distribution Survey; Dunneill	16/11/2021	not given	Redwing	1+	grassland and marsh; present, 1+	NM

32. SHOVELER

Table 7 - 4 - 58 Shoveler waterbird distribution survey data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
SV001	Screen Beg	06/01/2022	15:50	Shoveler	9	lakes and ponds; foraging	CH



Map Legend

- Turbine Locations
- Study Area Boundary
- 8km Radius of Study Area
- Shoveler Record

Drawing Title

Shoveler
Waterbird Distribution Survey

Project Title

Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.45
Scale	Date
1:100000	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

33. SNIPE

Table 7 - 4 - 59 Snipe vantage point survey data – flights

Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1	Band 2	Band 3 (PCH)	Band 4	Band 5	Habitat and activity	Surveyor
SN001	VP2	28/07/2021	17:43	Snipe	1	25	0	25	0	0	0	upland blanket bog; wide swooping flight over bog with alarm calls	NM
SN002	VP1	07/09/2021	15:23	Snipe	1	80	80	0	0	0	0	semi-natural grassland, improved agricultural grassland and bogs; flushed from upland grassland - flew low and rapidly downhill to sout-east	NM
SN003	VP2	10/09/2021	20:30	Snipe	2	45	0	45	0	0	0	upland blanket bog, mixed conifer woodland and scrub; flying and calling over bog and forestry	NM
SN004	VP1	26/10/2021	08:09	Snipe	4	15	10	5	0	0	-	cutover bog; flying	CH
SN005	VP1	26/10/2021	08:58	Snipe	1	10	10	0	0	0	-	cutover bog; flying	CH
SN006	VP2	04/11/2021	15:45	Snipe	1	20	20	0	0	0	0	upland blanket bog; flushed by hen harrier	CH
SN007	VP1	18/11/2021	17:07	Snipe	2	20	20	0	0	0	0	upland blanket bog; flying and calling	CH
SN008	VP1	10/01/2022	17:28	Snipe	1	10	10	0	0	0	-	upland blanket bog; calling and flying, heard, not seen	CH

Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1	Band 2	Band 3 (PCH)	Band 4	Band 5	Habitat and activity	Surveyor
SN009	VP1	10/01/2022	17:30	Snipe	1	5	5	0	0	0	-	upland blanket bog; calling and flying, heard, not seen	CH
SN010	VP2	20/01/2022	17:34	Snipe	1	20	20	0	0	0	0	upland blanket bog; flying	CH
SN011	VP2	20/01/2022	17:40	Snipe	1	20	0	20	0	0	0	upland blanket bog; flying and calling	CH
SN012	VP2	20/01/2022	17:42	Snipe	1	15	0	15	0	0	0	upland blanket bog; flying and calling	CH
SN013	VP2	20/01/2022	17:45	Snipe	2	10	10	0	0	0	0	upland blanket bog; flying and calling	CH
SN014	VP1	04/02/2022	07:35	Snipe	1	30	0	30	0	0	-	upland blanket bog; flying and calling	CH
SN015	VP1	02/03/2022	13:47	Snipe	1	9	9	0	0	0	-	upland blanket bog; flying	NS
SN016	VP2	23/03/2022	19:23	Snipe	1	8	8	0	0	0	-	upland blanket bog; flying	NS

Table 7 - 4 - 60 Snipe vantage point survey data - non-flights

Ref.	VP	Date	Time	Species	Number	Habitat and activity	Surveyor
SN017	VP2	04/11/2021	17:40	Snipe	1	upland blanket bog; calling, heard, not seen	CH
SN018	VP1	18/11/2021	17:12	Snipe	2	upland blanket bog; flying and calling, heard, not seen	CH
SN019	VP1	18/11/2021	17:19	Snipe	1	upland blanket bog; flying and calling, heard, not seen	CH
SN020	VP1	18/11/2021	17:20	Snipe	1	upland blanket bog; flying and calling, heard, not seen	CH
SN021	VP1	18/11/2021	17:22	Snipe	2	upland blanket bog; flying and calling, heard, not seen	CH
SN022	VP2	23/03/2022	19:25	Snipe	1	upland blanket bog; calling	NS

Table 7 - 4 - 61 Snipe walkover survey data

Ref.	Date	Time	Species	Number	Habitat and activity	Surveyor
SN001	23/11/2021	11:00	Snipe	1	upland blanket bog; flying, flushed (wintering)	CH

Table 7 - 4 - 62 Snipe waterbird distribution survey data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
SN001	Easky Lough	21/09/2021	13:40	Snipe	1	upland blanket bog and improved agricultural grassland; flushed from boggy grassland	NM

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
SN002	Crowagh	22/09/2021	08:49	Snipe	1	upland blanket bog and cutover bog; flushed from wet boggy fringes of bog track	NM
SN003	Ford	22/09/2021	13:19	Snipe	1	upland blanket bog; flushed from bog	NM
SN004	Lough Aghree	07/10/2021	15:08	Snipe	8	upland blanket bog; flying	AOD
SN005	Belcloghy Loughs	07/10/2021	17:28	Snipe	1	lowland blanket bog; flying	AOD
SN006	West Lough	07/10/2021	17:29	Snipe	2	lowland blanket bog; flying	AOD
SN007	Lough Aghree	26/10/2021	13:09	Snipe	5	wet grassland; flying	AOD
SN008	Lough Minna	27/10/2021	17:22	Snipe	1	raised bog; flying	AOD
SN009	Owenykeevan	15/11/2021	08:57	Snipe	2	bogs; flushed from bog pool	NM
SN010	Tawnatruffaun	15/11/2021	10:52	Snipe	2	bogs; flushed from wet bog	NM
SN011	Donaghintraine	29/11/2021	12:25	Snipe	2	improved agricultural grassland; flying low across coastal wet farmland	NM
SN012	Ballynahowna	30/11/2021	14:24	Snipe	2	bogs; flushed from bog	NM
SN013	Letterunshin Bog	09/12/2021	11:44	Snipe	1	upland blanket bog; flying	CH
SN014	Letterunshin	22/12/2021	10:59	Snipe	3	upland blanket bog; flying	CH
SN015	Easkey Bog	09/02/2022	18:59	Snipe	2	upland blanket bog; flying and calling, flushed	CH
SN016	Easkey Bog	09/02/2022	19:00	Snipe	51	upland blanket bog; flying and calling, flushed these singly and in small groups of 2/3 birds in the space of 100m of wetland area (51 birds in total)	CH
SN017	Belcloghy Loughs	09/02/2022	19:04	Snipe	3	upland blanket bog; flying and calling, flushed	CH
SN018	Belcloghy Loughs	09/02/2022	19:05	Snipe	18	upland blanket bog; flying and calling, flushed in the area between the lakes	CH
SN019	Easkey Bog	09/02/2022	19:06	Snipe	8	upland blanket bog; flying and calling, flushed in this area	CH
SN020	Easkey Bog	22/02/2022	17:06	Snipe	1	upland blanket bog; flying, flushed, flew towards forestry	CH
SN021	Easkey Bog	22/02/2022	17:07	Snipe	1	upland blanket bog; flying, flushed, flew towards north	CH
SN022	Easkey Bog	22/02/2022	17:08	Snipe	1	upland blanket bog; flying towards west, flushed	CH

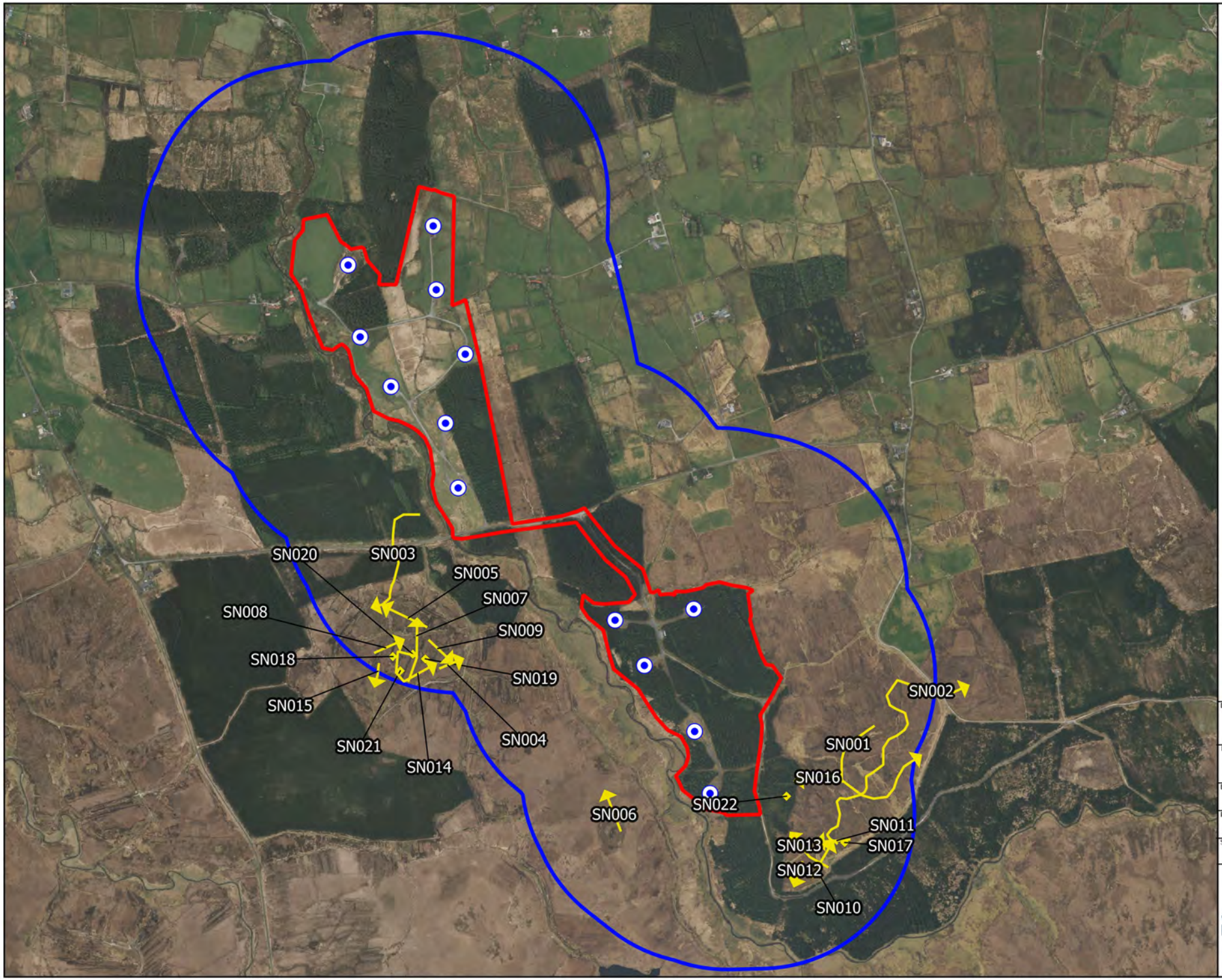
Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
SN023	Easkey Bog	22/02/2022	17:09	Snipe	4	upland blanket bog; flying towards north, flushed	CH
SN024	Easkey Bog	22/02/2022	17:10	Snipe	7	upland blanket bog; flying towards north, flushed	CH
SN025	Easkey Bog	22/02/2022	17:11	Snipe	3	upland blanket bog; flying towards west, flushed	CH
SN026	Easkey Bog	22/02/2022	17:12	Snipe	3	upland blanket bog; flying towards west, flushed	CH
SN027	Easkey Bog	22/02/2022	17:13	Snipe	8	upland blanket bog; flying, flushed	CH
SN028	Easkey Bog	22/02/2022	17:14	Snipe	4	upland blanket bog; flying, flushed	CH
SN029	Easkey Bog	22/02/2022	17:15	Snipe	1	upland blanket bog; flying, flushed	CH
SN030	Crowagh	07/03/2022	15:25	Snipe	2	cutover bog; flying, flushed	CH
SN031	Easkey Bog	30/03/2022	11:13	Snipe	1	upland blanket bog; flushed	CH

Table 7 - 4 - 63 Snipe incidental records data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
SN001	Breeding Raptor Survey; Crowagh	28/05/2021	06:09	Snipe	3	cutover bog; display flights over bog along with individuals calling from within it	NM
SN002	Breeding Raptor Survey; Dunneill bog	26/07/2021	09:03	Snipe	2	wet grassland; chirping within long rough grassland	NM
SN003	Vantage Point Survey; VP1	26/10/2021	07:51	Snipe	2	cutover bog; flying, flushed on way to vp	CH
SN004	Hen Harrier Roost Survey; HHVP2	29/10/2021	18:20	Snipe	1	upland blanket bog; calling, heard, not seen	CH
SN005	Hen Harrier Roost Survey; HHVP3	01/11/2021	15:20	Snipe	1	upland blanket bog; flying, flushed while walking to hhvp3	CH
SN006	Hen Harrier Roost Survey; HHVP4	03/11/2021	17:34	Snipe	1	upland blanket bog; flying, flushed when walking back to car	CH
SN007	Vantage Point Survey; VP1	18/11/2021	10:48	Snipe	1	upland blanket bog; flying, flushed by walking	CH

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
SN008	Vantage Point Survey; VP1	18/11/2021	10:55	Snipe	4	upland blanket bog; flying, flushed by walking	CH
SN009	Vantage Point Survey; VP1	18/11/2021	10:57	Snipe	5	upland blanket bog; flying and calling, flushed by walking	CH
SN010	Hen Harrier Roost Survey; access road to HHVP1	30/11/2021	17:05	Snipe	1	cutover bog; flying, flushed by car	CH
SN011	Hen Harrier Roost Survey; Access track to HHVP4	01/12/2021	17:02	Snipe	1	lowland blanket bog; flying, flushed by car	CH
SN012	Hen Harrier Roost Survey; HHVP3	02/12/2021	15:00	Snipe	1	cutover bog; flying, flushed by quad	CH
SN013	Hen Harrier Roost Survey; HHVP3	02/12/2021	15:01	Snipe	1	cutover bog; flying, flushed by quad	CH
SN014	Hen Harrier Roost Survey; access road to HHVP3	02/12/2021	17:00	Snipe	6	cutover bog; flying, each flushed separately along access road by car	CH
SN015	Vantage Point Survey; VP1	11/01/2022	11:15	Snipe	1	cutover bog; flying, flushed while walking to vp	CH
SN016	Breeding Red Grouse Survey; east of wind farm	11/03/2022	13:55	Snipe	2	heath and upland blanket bog; flushed	CH
SN017	Breeding Red Grouse Survey; East of Dunneill WF	11/03/2022	13:56	Snipe	2	upland blanket bog and heath; flushed	CH
SN018	Breeding Red Grouse Survey; East of Dunneill WF	11/03/2022	14:03	Snipe	2	upland blanket bog and heath; flushed	CH
SN019	Breeding Red Grouse Survey; East of Dunneill WF	11/03/2022	14:13	Snipe	1	heath and upland blanket bog; flushee	CH
SN020	Breeding Red Grouse Survey; East of Dunneill WF	11/03/2022	14:18	Snipe	1	upland blanket bog and heath; flushed	CH
SN021	Breeding Red Grouse Survey; East of Dunneill WF	11/03/2022	14:38	Snipe	2	heath and upland blanket bog; flushee	CH
SN022	Breeding Red Grouse Survey; East of Dunneill WF	11/03/2022	14:57	Snipe	1	upland blanket bog and heath; flushed	CH

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
SN023	Breeding Red Grouse Survey; East of Dunneill WF	11/03/2022	14:57	Snipe	1	upland blanket bog and heath; flushed	CH
SN024	Breeding Red Grouse Survey; north of Lough Nafullow	11/03/2022	16:42	Snipe	2	upland blanket bog and heath; flying and calling, flushed by merlin	CH
SN025	Breeding Red Grouse Survey; north of Lough Nafullow	11/03/2022	17:13	Snipe	1	heath and upland blanket bog; flying, flushed	CH
SN026	Breeding Red Grouse Survey; West of Dunneill wind farm	11/03/2022	17:42	Snipe	2	cutover bog; flying	CH
SN027	Breeding Red Grouse Survey; West of Dunneill wind farm	11/03/2022	17:43	Snipe	1	cutover bog; flying	CH
SN028	Hen Harrier Roost Survey; HHVP3	28/03/2022	20:52	Snipe	1	upland blanket bog; calling, heard calling 8 times in 1ha area between 20:40 and 20:52	NS
SN029	Hen Harrier Roost Survey; HHVP3	28/03/2022	20:55	Snipe	1	upland blanket bog; drumming, heard drumming	NS
SN030	Hen Harrier Roost Survey; HHVP2	31/03/2022	20:48	Snipe	1	upland blanket bog; flying, heard not seen	NS
SN031	Hen Harrier Roost Survey; HHVP2	31/03/2022	20:50	Snipe	1	upland blanket bog; flying, seen flying, not calling	NS
SN032	Hen Harrier Roost Survey; HHVP2	31/03/2022	21:01	Snipe	1	upland blanket bog; flying, calling	NS



Map Legend

- Turbine Locations
- Study Area Boundary
- 500m Radius
- Flight Record
- Non-flight Record

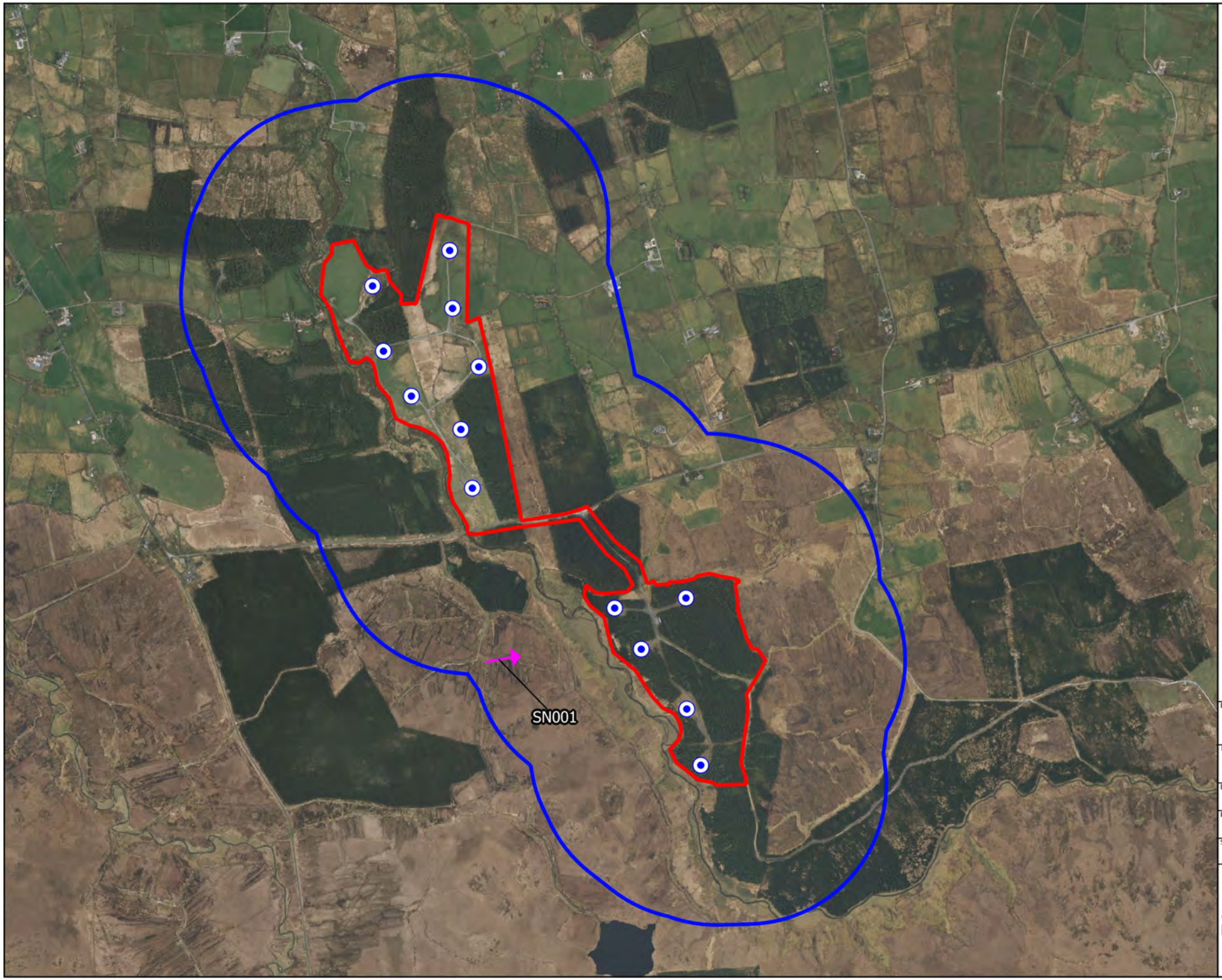
N

Drawing Title: Snipe Vantage Point

Project Title: Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.46
Scale	Date
1:16000	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie



Map Legend

- Turbine Locations
- Study Area Boundary
- 500m Radius
- Winter Season Observation

N

Drawing Title	Snipe Walkover
Project Title	Dunneill Wind Farm
Drawn By: SD	Checked By: PC
Project No.: 210207	Drawing No.: Fig 7.4.47
Scale: 1:17640	Date: 03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

Map Legend

- Turbine Locations
- Study Area Boundary
- 8km Radius of Study Area
- Snipe Record

N

Drawing Title

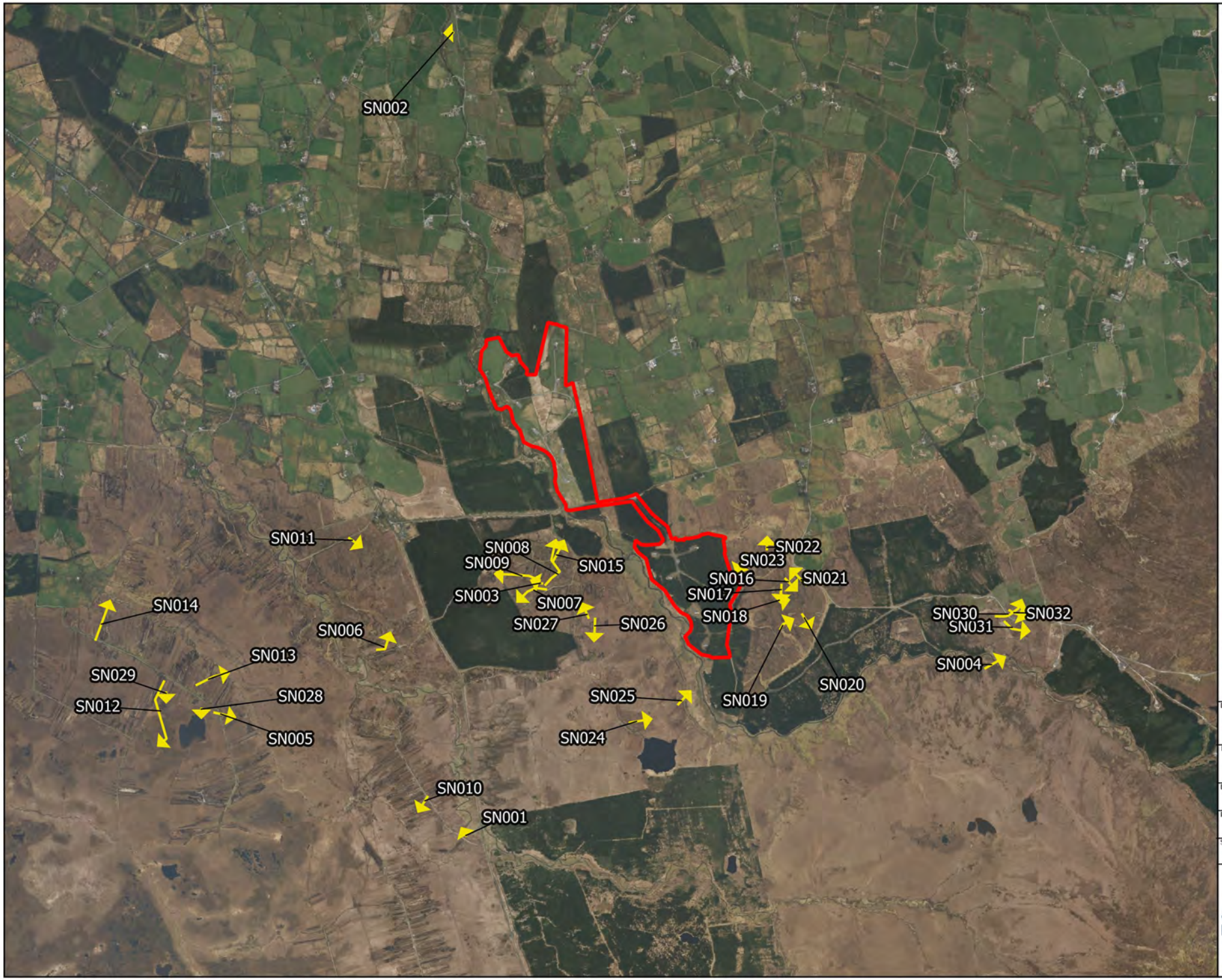
Snipe
Waterbird Distribution Survey

Project Title

Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.48
Scale	Date
1:100000	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie



Map Legend

- Study Area Boundary
- Snipe Observation

N

Drawing Title
Snipe
Incidental Record

Project Title
Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.49
Scale	Date
1:30000	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

34. SWIFT

Table 7 - 4 - 64 Swift vantage point survey data - flights

VP	Date	Time	Species	Number	Duration of flight (s)	Band 1	Band 2	Band 3 (PCH)	Band 4	Band 5	Habitat and activity	Surveyor
VP2	11/06/2021	15:58	Swift	2	55	55	0	0	0	0	upland blanket bog; flying low and rapidly over bog surface	NM
VP1	16/07/2021	07:32	Swift	16	90	70	20	0	0	0	scrub and improved agricultural grassland; swooping and foraging over agricultural grassland, scrub and over river on site	NM

35. WHINCHAT

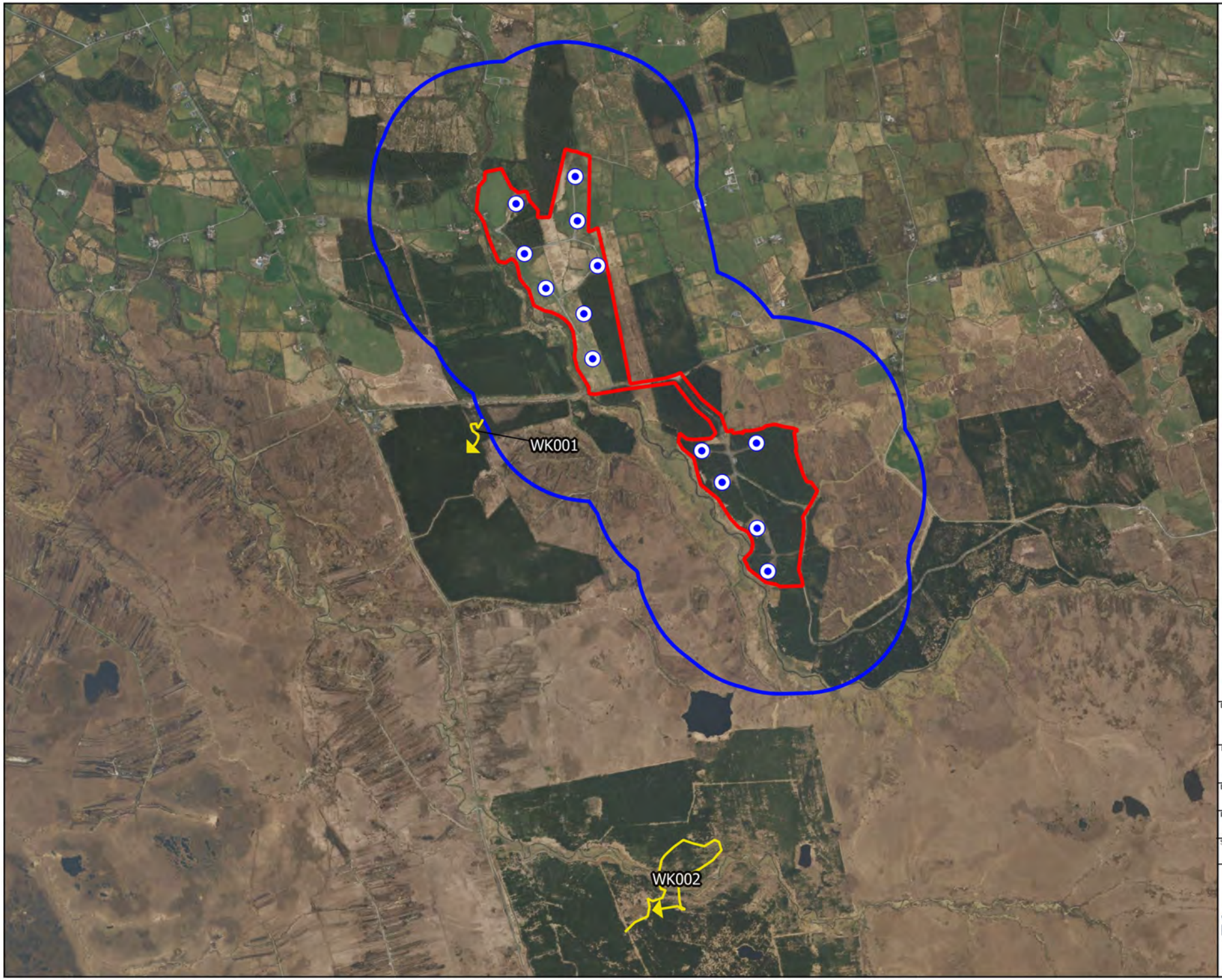
Table 7 - 4 - 65 Whinchat incidental records data

Location	Date	Time	Species	Number	Habitat and activity	Surveyor
Breeding Raptor Survey; Cloghabracka	26/07/2021	not given	Whinchat	1	grassland and marsh; present	NM

36. WOODCOCK

Table 7 - 4 - 66 Breeding woodcock survey data

Ref.	Transect	Date	Time	Species	Number	Habitat and activity	Surveyor
WK001	T2	25/05/2021	22:03	Woodcock	1	conifer plantation, roding male - display flight and call, dim shadow over narrow open corridor within forestry	NM
WK002	T1-2	09/06/2021	22:19	Woodcock	1	conifer plantation, male heard and observed displaying over young forestry, river and grazed bog 'corridor' running through forestry area	NM



Map Legend

- Turbine Locations
- Study Area Boundary
- 500m Radius
- Woodcock Observation

N

Drawing Title
Woodcock
Breeding Woodcock Survey

Project Title
Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.50
Scale	Date
1:23000	03.08.22

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

37. YELLOWHAMMER

Table 7 - 4 - 67 Yellowhammer vantage point survey data – non-flights

VP	Date	Time	Species	Number	Habitat and activity	Surveyor
VP1	16/07/2021	13:54	Yellowhammer	1	scrub; calling in scrub along river	NM

38. BUZZARD

Table 7 - 4 - 68 Buzzard vantage point survey data – flights

Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1	Band 2	Band 3 (PCH)	Band 4	Band 5	Habitat and activity	Surveyor
BZ001	VP1	27/05/2021	05:53	Buzzard	1	20	20	0	0	0	0	improved agricultural grassland and eroding/upland rivers; individual flying along river, landing on fence post	CD
BZ002	VP1	27/05/2021	07:09	Buzzard	1	10	10	0	0	0	0	improved agricultural grassland, eroding/upland rivers and conifer plantation; same individual took flight from post	CD
BZ003	VP1	27/05/2021	10:13	Buzzard	1	300	0	15	200	40	45	conifer plantation, improved agricultural grassland and watercourses; adult soaring across site to above potential collision height	CD
BZ004	VP2	28/05/2021	13:53	Buzzard	1	360	0	0	0	0	360	conifer plantation, improved agricultural grassland and bogs; individual seen above potential collision height on site soaring	CD
BZ005	VP2	11/06/2021	11:29	Buzzard	1	65	0	0	0	65	0	conifer plantation, wet grassland and scrub; soaring and circling over forestry and open / scrub areas in between	NM
BZ006	VP2	11/06/2021	12:54	Buzzard	1	65	10	10	15	30	0	conifer plantation, upland blanket bog and scrub; circling over edge of forestry before slowly descending	NM
BZ007	VP1	16/07/2021	10:06	Buzzard	1	150	0	0	150	0	0	conifer plantation and lowland blanket bog; soaring and gliding above site - forestry and blanket bog patches	NM
BZ008	VP1	16/07/2021	10:45	Buzzard	1	45	0	45	0	0	0	eroding/upland rivers, mixed conifer woodland and dry-humid acid grassland; flying along river gully	NM

Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1	Band 2	Band 3 (PCH)	Band 4	Band 5	Habitat and activity	Surveyor
BZ009	VP1	16/07/2021	11:09	Buzzard	2	260	0	0	0	230	0	mixed conifer woodland; soaring and and circling as pair high over forestry	NM
BZ010	VP2	28/07/2021	19:02	Buzzard	1	175	0	0	0	175	0	mixed conifer woodland, improved agricultural grassland and upland blanket bog; soaring over boggy farmland and forestry to ne of vp	NM
BZ011	VP1	24/08/2021	17:04	Buzzard	1	150	0	0	0	150	0	mixed conifer woodland; soaring over forestry	NM
BZ012	VP1	07/09/2021	20:17	Buzzard	1	175	0	30	25	120	0	mixed conifer woodland; soaring over forestry before descending into woodland to e of site	NM
BZ013	VP2	10/09/2021	16:14	Buzzard	2	250	0	0	0	250	0	mixed conifer woodland; soaring high over forestry on site	NM
BZ014	VP1	26/10/2021	11:35	Buzzard	1	60	10	10	0	47	-	conifer plantation and upland blanket bog; flying	CH
BZ015	VP2	04/11/2021	13:10	Buzzard	1	60	0	0	60	7	0	conifer plantation; flying	CH
BZ016	VP1	18/11/2021	12:01	Buzzard	1	240	0	0	0	220	20	conifer plantation and eroding/upland rivers; flying and foraging, soaring over river and conifers before stooping out of sight	CH
BZ017	VP1	18/11/2021	13:02	Buzzard	1	25	0	0	0	25	0	conifer plantation and eroding/upland rivers; flying	CH
BZ018	VP1	10/01/2022	16:04	Buzzard	1	5	5	0	0	0	-	improved agricultural grassland and scrub; foraging, flew from fence post to ground	CH

Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1	Band 2	Band 3 (PCH)	Band 4	Band 5	Habitat and activity	Surveyor
BZ019	VP1	10/01/2022	16:14	Buzzard	1	5	5	0	0	0	-	improved agricultural grassland; flying, flying one fence post to another	CH
BZ020	VP1	11/01/2022	12:29	Buzzard	2	135	0	15	120	0	-	improved agricultural grassland and conifer plantation; flying and calling, soaring between turbines at blade height and calling to each other	CH
BZ021	VP2	02/02/2022	11:50	Buzzard	1	180	0	5	20	60	95	conifer plantation, eroding/upland rivers and bogs; foraging, soaring and hovering several times before stooping to ground behind trees	CH
BZ022	VP2	23/03/2022	14:45	Buzzard	1	70	0	0	70	0	-	upland blanket bog and conifer plantation; flying	NS

Table 7 - 4 - 69 Buzzard vantage point survey data - non-flights

Ref.	VP	Date	Time	Species	Number	Habitat and activity	Surveyor
BZ023	VP2	17/07/2021	11:55	Buzzard	1	mixed conifer woodland; perched in bare limbs of conifer at edge of forestry	NM
BZ024	VP1	24/08/2021	18:53	Buzzard	1	scrub and semi-natural grassland; perched in gorse along river	NM
BZ025	VP1	10/01/2022	15:15	Buzzard	1	improved agricultural grassland; preening and foraging, on fence post drying off after heavy shower and watching for prey for c. 50mins	CH
BZ026	VP1	10/01/2022	16:09	Buzzard	1	improved agricultural grassland; preening and foraging, on fence post watching for prey	CH
BZ027	VP1	10/01/2022	16:37	Buzzard	1	improved agricultural grassland; foraging on ground	CH
BZ028	VP1	04/02/2022	10:06	Buzzard	1	improved agricultural grassland; foraging, foraging on ground	CH

Table 7 - 4 - 70 Buzzard breeding raptor survey data

Ref.	BR	Date	Time	Species	Number	Habitat and activity	Breeding status	Surveyor
BZ001	BR10	29/04/2021	15:56	Buzzard	2	improved agricultural grassland, wet grassland and treelines, soaring and and hunting over east of site	suitable nesting habitat; possible breeder	NM
BZ002	BR1	29/04/2021	11:12	Buzzard	1	wet grassland, scrub and conifer plantation, hunting, hunting arond the edge of farmland moor	flyover; non-breeding	LD
BZ003	BR1	29/04/2021	12:19	Buzzard	1	wet grassland, scrub and conifer plantation, hunting, seen hunting again away to the east	flyover; non-breeding	LD
BZ004	BR2	29/04/2021	13:24	Buzzard	1	wet grassland and conifer plantation, hunting, another buzzard seen hunting	flyover; non-breeding	LD
BZ005	BR2	29/04/2021	14:40	Buzzard	3	wet grassland and conifer plantation, travelling, travelling again.	flyover; non-breeding	LD
BZ006	BR2	29/04/2021	14:46	Buzzard	3	wet grassland and conifer plantation, travelling, hunting again, further away to the east	flyover; non-breeding	LD
BZ007	BR10	25/05/2021	10:46	Buzzard	2	improved agricultural grassland, conifer plantation and hedgerows, pair soaring over farmland and forestry	pair; probable breeding	NM
BZ008	BRT3	25/05/2021	14:24	Buzzard	1	improved agricultural grassland, dry calcareous and neutral grassland and hedgerows, soaring and circling over farmland	suitable nesting habitat; possible breeder	NM
BZ009	BR3	28/05/2021	07:42	Buzzard	2	conifer plantation, pair circling over forestry, slowly descending and disappearing out of view	pair; probable breeding	NM
BZ010	BR5	22/06/2021	16:41	Buzzard	1	conifer plantation and semi-natural grassland, hunting beside turbines, dunowla	suitable nesting habitat; possible breeder	CD
BZ011	BRT5	20/07/2021	12:29	Buzzard	2	improved agricultural grassland, hedgerows and mixed conifer woodland, soaring as pair over farmland	flyover; non-breeding	NM
BZ012	BR9	26/07/2021	08:19	Buzzard	1	treelines and improved agricultural grassland, perched in tree along road on approach before flying away south-east	flyover; non-breeding	NM
BZ013	BR7	26/07/2021	13:21	Buzzard	2	improved agricultural grassland, mixed conifer woodland and hedgerows, soaring over farmland and forestry areas	suitable nesting habitat; possible breeder	NM

Table 7 - 4 - 71 Buzzard walkover survey data

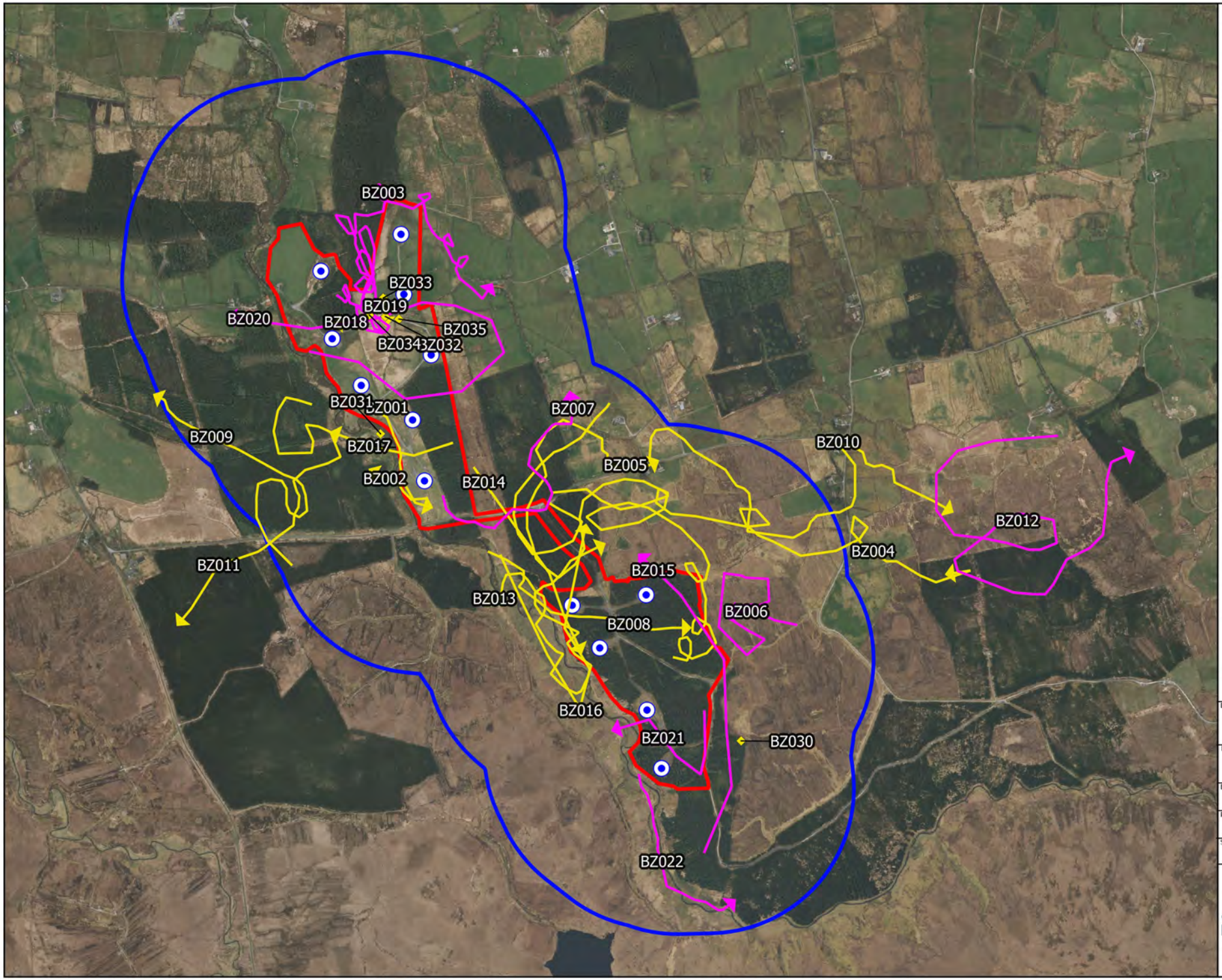
Ref.	Date	Time	Species	Number	Habitat and activity	Surveyor
BZ001	28/04/2021	12:16	Buzzard	2	wet grassland, dry siliceous heath and conifer plantation; hunting, hunting over the edge of upland moor, in flight together (pair; probable breeding)	LD
BZ002	26/05/2021	10:43	Buzzard	1	conifer plantation and upland blanket bog; soaring and circling over forestry, and open heather moorland in between (suitable nesting habitat; possible breeder)	NM
BZ003	23/06/2021	12:42	Buzzard	1	watercourses; flying (suitable nesting habitat; possible breeder)	CD
BZ004	21/07/2021	05:59	Buzzard	1	mixed conifer woodland, dry-humid acid grassland and scrub; soaring and gliding over forestry and along river gully (suitable nesting habitat; possible breeder)	NM
BZ005	21/07/2021	11:37	Buzzard	1	dry-humid acid grassland and mixed conifer woodland; soaring and circling high above bog/grassland and over fringes of forestry (suitable nesting habitat; possible breeder)	NM
BZ006	21/07/2021	12:35	Buzzard	1	mixed conifer woodland and improved agricultural grassland; soaring over forestry and farmland in far north of 500m buffer (suitable nesting habitat; possible breeder)	NM
BZ007	24/11/2021	11:25	Buzzard	1	improved agricultural grassland and conifer plantation; flying (wintering)	CH
BZ008	14/01/2022	11:33	Buzzard	1	improved agricultural grassland and conifer plantation; flying, soaring at blade height (100m) (wintering)	CH
BZ009	14/01/2022	12:12	Buzzard	1	improved agricultural grassland and conifer plantation; foraging and flying, foraging on ground in sheep field and spooked by me (wintering)	CH
BZ010	14/01/2022	12:33	Buzzard	2	improved agricultural grassland, conifer plantation and hedgerows; soaring and landing, landed in field by turbines (wintering)	CH
BZ011	03/03/2022	11:08	Buzzard	2	conifer plantation and eroding/upland rivers; flying and landing, onsite at dunneill wind farm south. one landed in conifer, other continued upstream out of sight (wintering)	CH
BZ012	03/03/2022	11:31	Buzzard	2	conifer plantation; soaring, soaring onsite at dunneill wind farm south higher and higher until out of sight due to height (wintering)	CH

Ref.	Date	Time	Species	Number	Habitat and activity	Surveyor
BZ013	03/03/2022	12:55	Buzzard	1	improved agricultural grassland; preening, perched on fence post near river finnandoo (offsite, within 500m) (wintering)	CH

Table 7 - 4 - 72 Buzzard incidental records data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
BZ001	Breeding Woodcock Survey; Finnandoo River	24/05/2021	20:42	Buzzard	1	scattered tress and parkland, improved agricultural grassland and scrub; flying north and east across wind farm site, hunting and scanning	NM
BZ002	Breeding Woodcock Survey; Finnandoo River	24/05/2021	20:58	Buzzard	1	conifer plantation; soaring and circling over conifer forestry	NM
BZ003	Breeding Woodcock Survey; Doonoeakin River	24/05/2021	22:26	Buzzard	2	conifer plantation; soaring and circling over area of forestry, nesting or roosting	NM
BZ004	Waterbird Distribution Survey; Finnandoo River	12/08/2021	16:17	Buzzard	2	mixed conifer woodland, bogs and heath; soaring high over site - turbines and forestry	NM
BZ005	Waterbird Distribution Survey; Fiddanduff River	13/08/2021	15:32	Buzzard	1	mixed conifer woodland, semi-natural grassland and scrub; soaring and circling over forestry and east edge of gleneasky	NM
BZ006	Waterbird Distribution Survey; Ballynahowna bog	08/09/2021	12:29	Buzzard	1	bogs, mixed conifer woodland and scrub; soaring over bog and forestry fringes	NM
BZ007	Waterbird Distribution Survey; Buncrowey	09/09/2021	15:49	Buzzard	1	improved agricultural grassland and hedgerows; soaring across farmland	NM
BZ008	Waterbird Distribution Survey; Fiddanduff River	22/09/2021	10:12	Buzzard	2	mixed conifer woodland and upland blanket bog; soaring over forestry and bog fringes	NM
BZ009	Waterbird Distribution Survey; Culleens	15/11/2021	09:25	Buzzard	1	improved agricultural grassland and treelines; swooping low over farmland and perching within treeline	NM
BZ010	Waterbird Distribution Survey; Owenbeg	15/11/2021	10:04	Buzzard	1	bogs and scrub; soaring over bog and scrub	NM

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
BZ011	Waterbird Distribution Survey; Buncrowey	15/11/2021	10:21	Buzzard	1	improved agricultural grassland; flying low across farmland	NM
BZ012	Waterbird Distribution Survey; Fiddanduff River	15/11/2021	12:47	Buzzard	1	improved agricultural grassland and scrub; flying low across rushy grassland, chased by raven	NM
BZ013	Waterbird Distribution Survey; Finnandoo River	30/11/2021	12:57	Buzzard	1	conifer plantation, bogs and semi-natural grassland; soaring over site	NM
BZ014	Waterbird Distribution Survey; Bellafarney	26/01/2022	11:28	Buzzard	2	lowland blanket bog and conifer plantation; foraging and flying	CH
BZ015	Waterbird Distribution Survey; Lough Aghree	08/02/2022	16:58	Buzzard	3	improved agricultural grassland, bogs and conifer plantation; soaring and calling	CH
BZ016	Waterbird Distribution Survey; Skreen	07/03/2022	13:51	Buzzard	1	improved agricultural grassland; flying	CH



Map Legend

- Turbine Locations
- Study Area Boundary
- 500m Radius
- Non-flight Record
- Flight Record
- Flight Record at Potential Collision Height

N

Drawing Title	Buzzard Vantage Point
Project Title	Dunneill Wind Farm
Drawn By: SD	Checked By: PC
Project No.: 210207	Drawing No.: Fig 7.4.51
Scale: 1:17000	Date: 03.08.22

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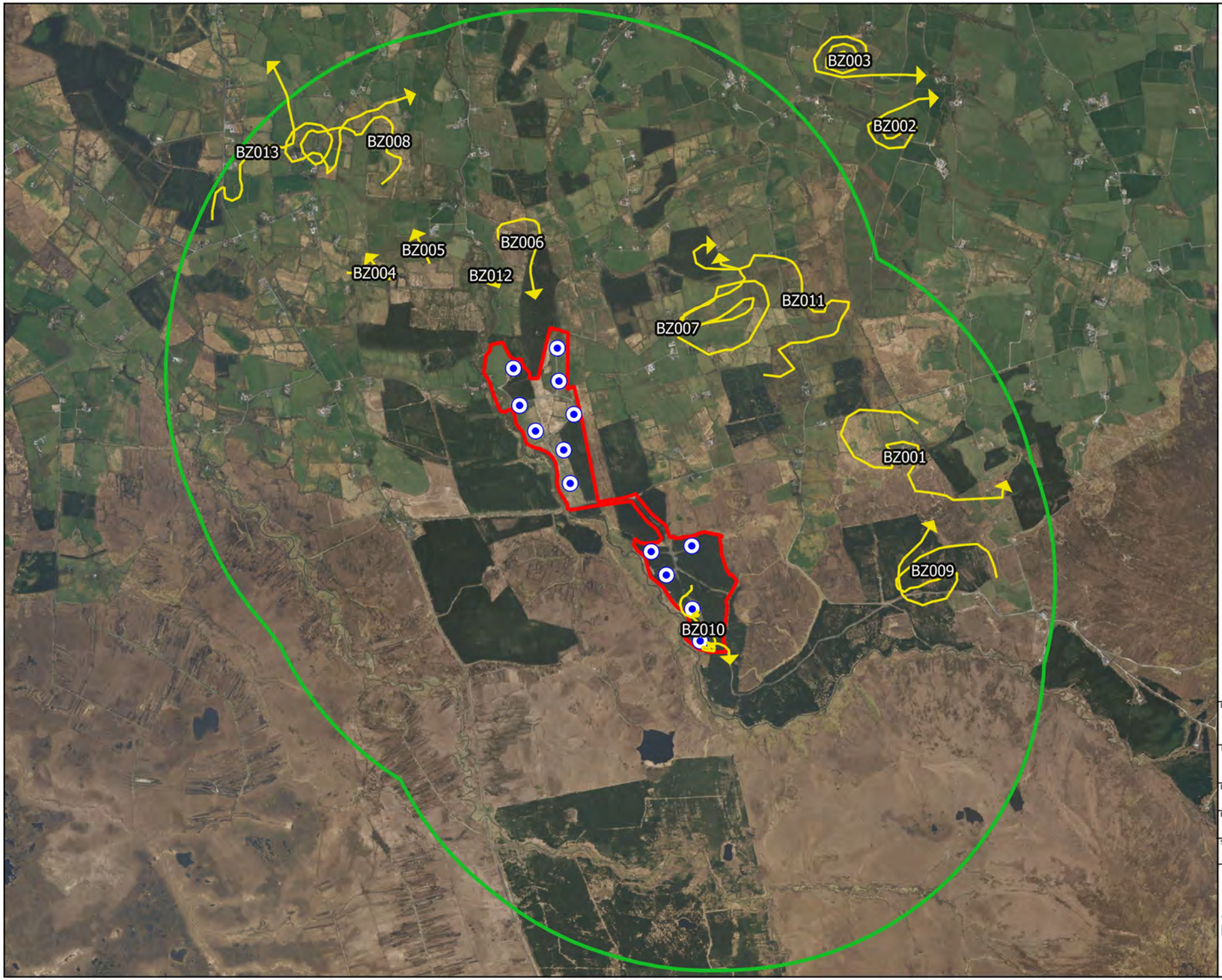
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie



Map Legend

- Turbine Locations
- Study Area Boundary
- 2km Radius
- Buzzard Observation

N

Drawing Title	Buzzard Breeding Raptor
Project Title	Dunneill Wind Farm
Drawn By: SD	Checked By: PC
Project No.: 210207	Drawing No.: Fig 7.4.52
Scale: 1:31000	Date: 03.08.22

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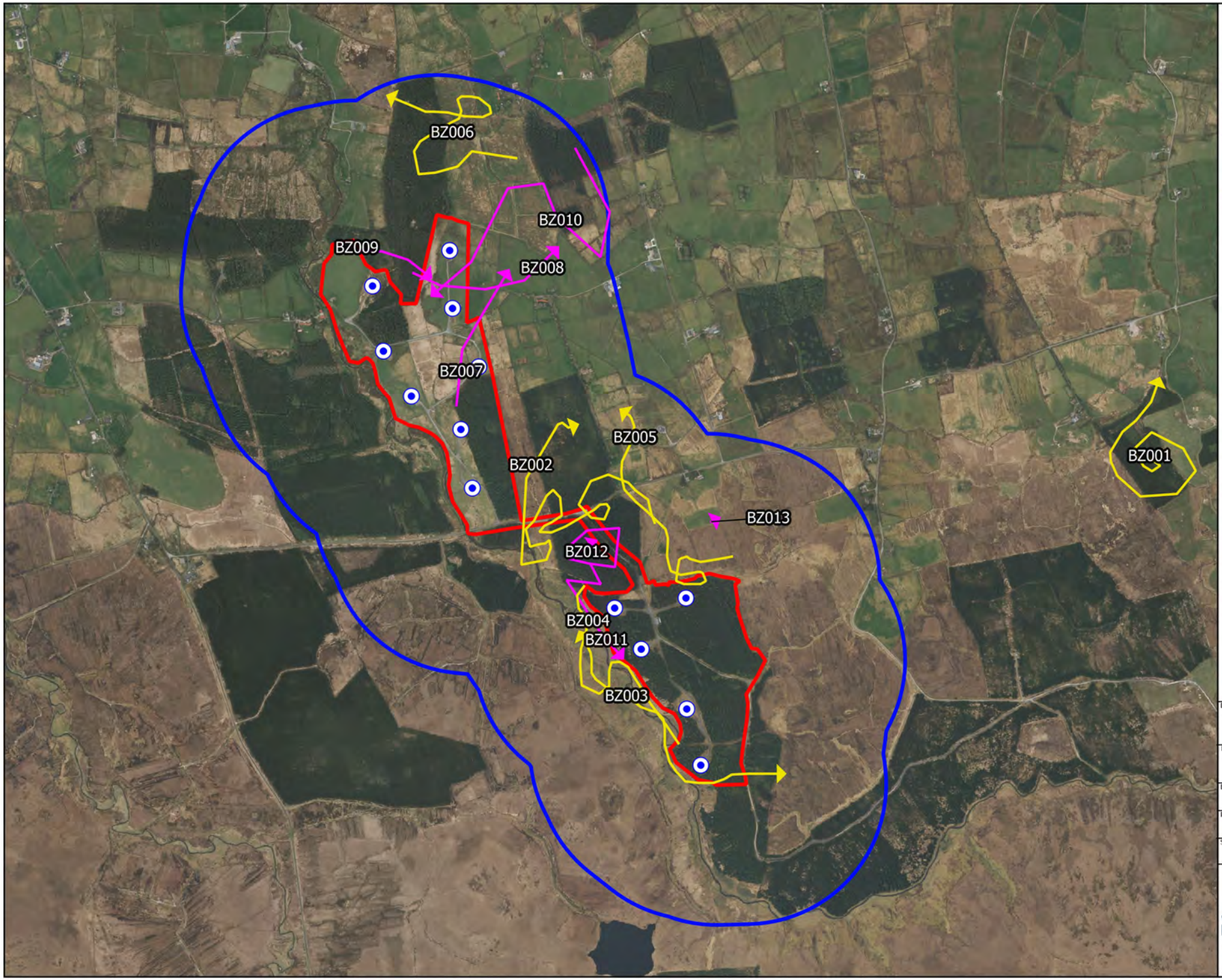
Website: ww.mkoireland.ie



Map Legend

- Turbine Locations
- Study Area Boundary
- 500m Radius
- Breeding Season Observation
- Winter Season Observation

N

Drawing Title	Buzzard Walkover
Project Title	Dunneill Wind Farm
Drawn By: SD	Checked By: PC
Project No.: 210207	Drawing No.: Fig 7.4.53
Scale: 1:17640	Date: 03.08.22

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Planning and Environmental Consultants
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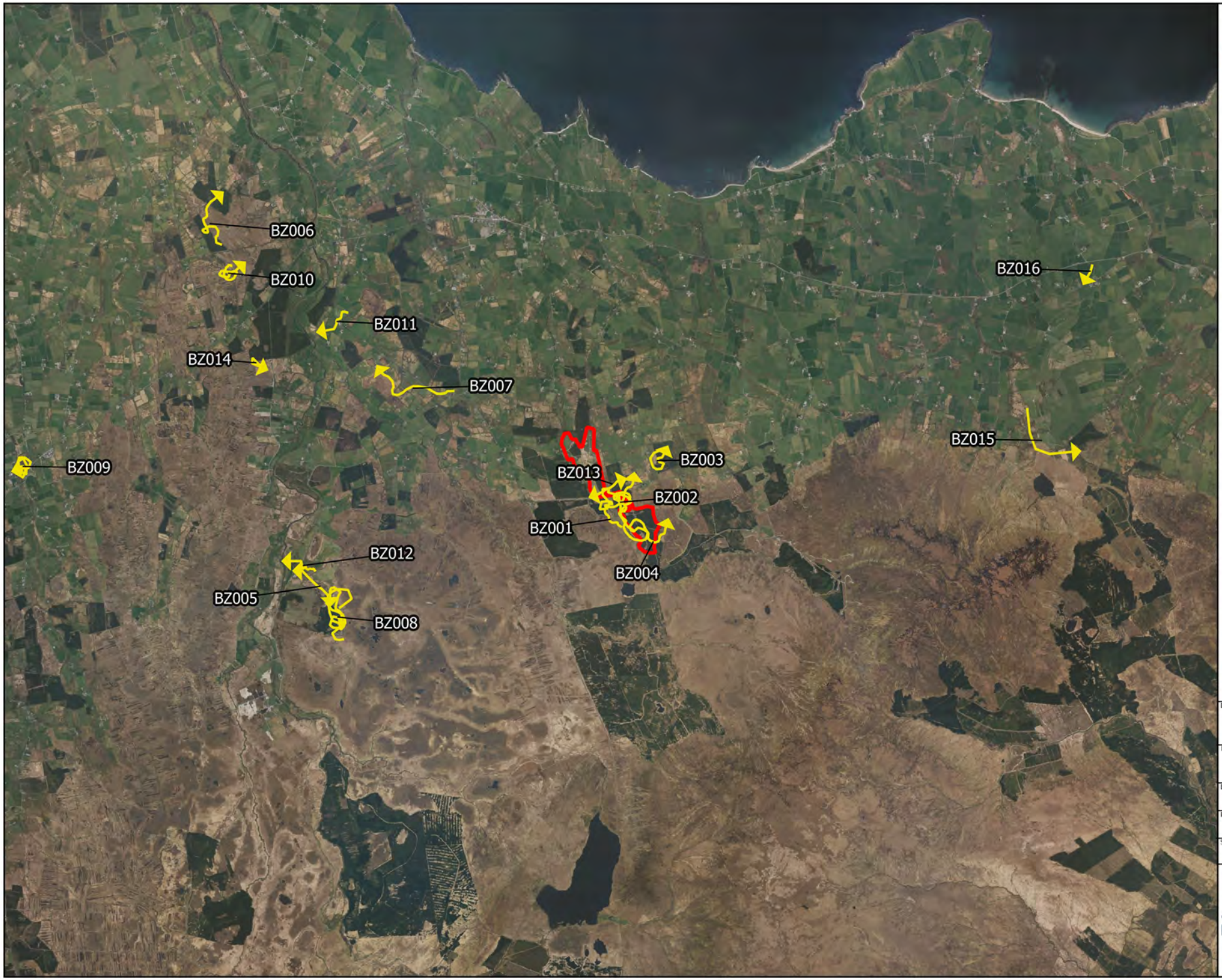
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie



Map Legend

- Study Area Boundary
- Buzzard Observation

N

Drawing Title

Buzzard
Incidental Record

Project Title

Dunneill Wind Farm

Drawn By	Checked By
SD	PC
Project No.	Drawing No.
210207	Fig 7.4.54
Scale	Date
1:80000	03.08.22

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Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

39. SPARROWHAWK

Table 7 - 4 - 73 Sparrowhawk vantage point survey data – flights

Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1	Band 2	Band 3 (PCH)	Band 4	Band 5	Habitat and activity	Surveyor
SH001	VP1	17/06/2021	12:22	Sparrowhawk	1	25	25	0	0	0	0	improved agricultural grassland, watercourses and conifer plantation; flying by, mobbed by mistle thrush	CD
SH002	VP1	17/06/2021	12:34	Sparrowhawk	1	100	20	15	65	0	0	improved agricultural grassland and conifer plantation; soaring, carrying prey, dropping it and catching it twice over forestry	CD
SH003	VP2	20/01/2022	11:55	Sparrowhawk	1	20	18	2	0	0	0	upland blanket bog and conifer plantation; flying, landed briefly on conifer at edge of plantation (<20secs)	CH
SH004	VP2	20/01/2022	12:34	Sparrowhawk	1	25	0	0	25	0	0	upland blanket bog and conifer plantation; flying	CH
SH005	VP2	02/02/2022	10:20	Sparrowhawk	1	220	0	10	20	70	120	improved agricultural grassland and conifer plantation; foraging, soaring; pulled out of a stoop three times before stooping to ground behind trees and not reappearing	CH
SH006	VP2	02/02/2022	12:35	Sparrowhawk	1	35	0	35	0	0	0	conifer plantation and bogs; flying	CH

Table 7 - 4 - 74 Sparrowhawk breeding raptor survey data

Ref.	BR	Date	Time	Species	Number	Habitat and activity	Breeding status	Surveyor
SH001	BR6	27/04/2021	10:32	Sparrowhawk	1	improved agricultural grassland, scrub and mixed conifer woodland, flying low between two areas of woodland	suitable nesting habitat; possible breeder	NM
SH002	BR2	29/04/2021	13:26	Sparrowhawk	1	wet grassland and conifer plantation, travelling, the buzzard put a sparrowhawk up from nearby trees	flyover; non-breeding	LD
SH003	BR7	26/07/2021	06:33	Sparrowhawk	1	improved agricultural grassland and mixed broadleaved woodland, flying low over farmland between areas of woodland, disappeared into area of broadleaved woodland along river	suitable nesting habitat; possible breeder	NM

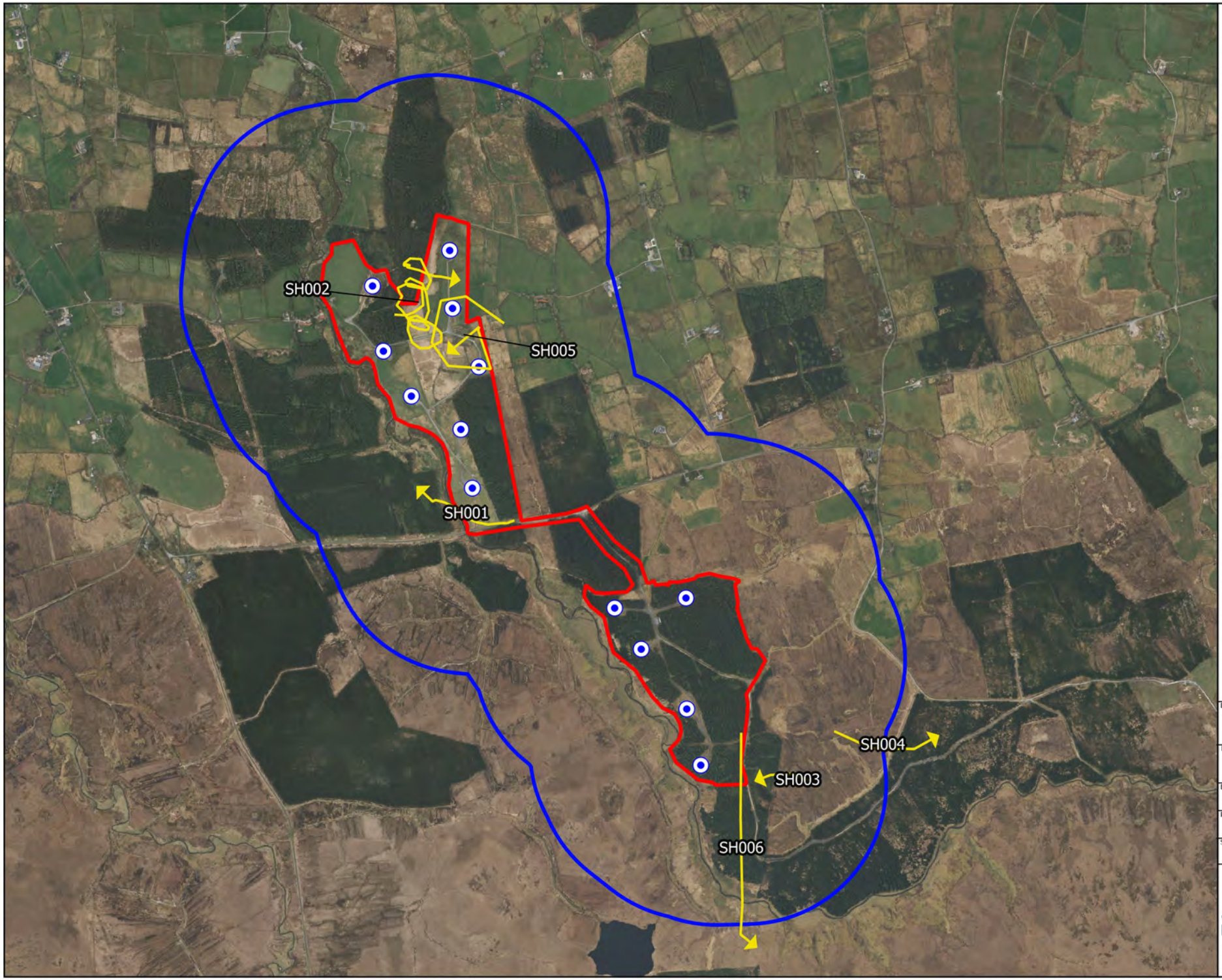
Table 7 - 4 - 75 Sparrowhawk walkover survey data

Ref.	Date	Time	Species	Number	Habitat and activity	Surveyor
SH001	03/03/2022	14:49	Sparrowhawk	1	conifer plantation and improved agricultural grassland; flying, onsite at dunneill north wind farm (wintering)	CH

Table 7 - 4 - 76 Sparrowhawk incidental records data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
SH001	Waterbird Distribution Survey; Finnandoo River	25/08/2021	12:20	Sparrowhawk	1	heath, semi-natural grassland and scrub; flying low within dunneill river gully, then disappearing within scrub and forestry	NM
SH002	Waterbird Distribution Survey; Cuskernagh	25/08/2021	15:12	Sparrowhawk	1	improved agricultural grassland; flying low across farmland	NM

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
SH003	Waterbird Distribution Survey; Belville	21/09/2021	10:21	Sparrowhawk	1	scrub and improved agricultural grassland; flying low across farmland and scrub	NM
SH004	Waterbird Distribution Survey; Owenykeevan bog	15/11/2021	08:41	Sparrowhawk	1	bogs; flying low along bog road and adjacent bog	NM
SH005	Waterbird Distribution Survey; Donaghintraine	08/03/2022	14:48	Sparrowhawk	1	improved agricultural grassland; flying	CH



Map Legend

- Turbine Locations
- Study Area Boundary
- 500m Radius
- Flight Record

Drawing Title	Sparrowhawk Vantage Point
Project Title	Dunneill Wind Farm
Drawn By: SD	Checked By: PC
Project No.: 210207	Drawing No.: Fig 7.4.55
Scale: 1:17640	Date: 03.08.22

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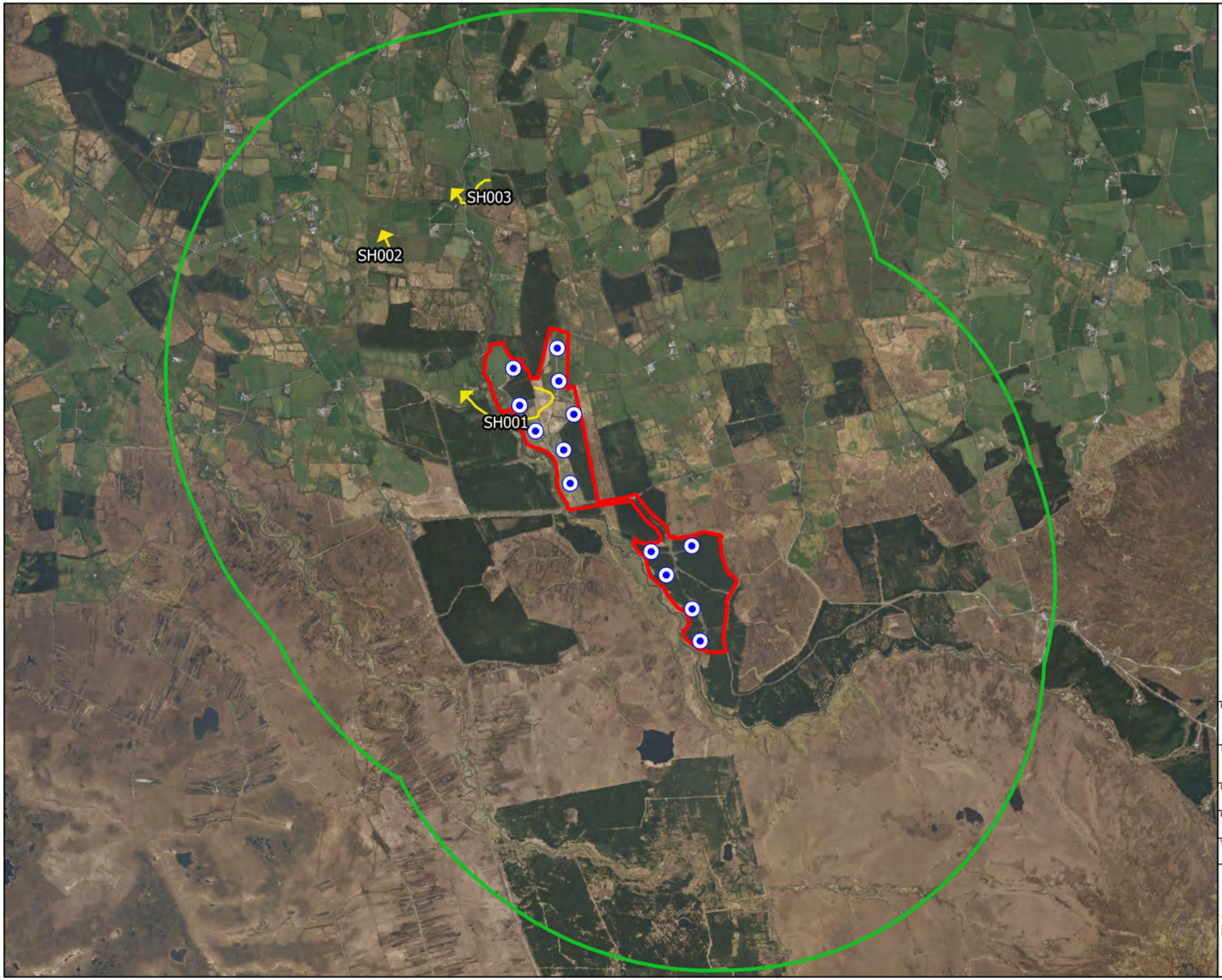
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie



Map Legend

- Turbine Locations
- Study Area Boundary
- 2km Radius
- Sparrowhawk Observation

N

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Drawing Title	Sparrowhawk Breeding Raptor
Project Title	Dunneill Wind Farm
Drawn By: SD	Checked By: PC
Project No.: 210207	Drawing No.: Fig 7.4.56
Scale: 1:31000	Date: 03.08.22

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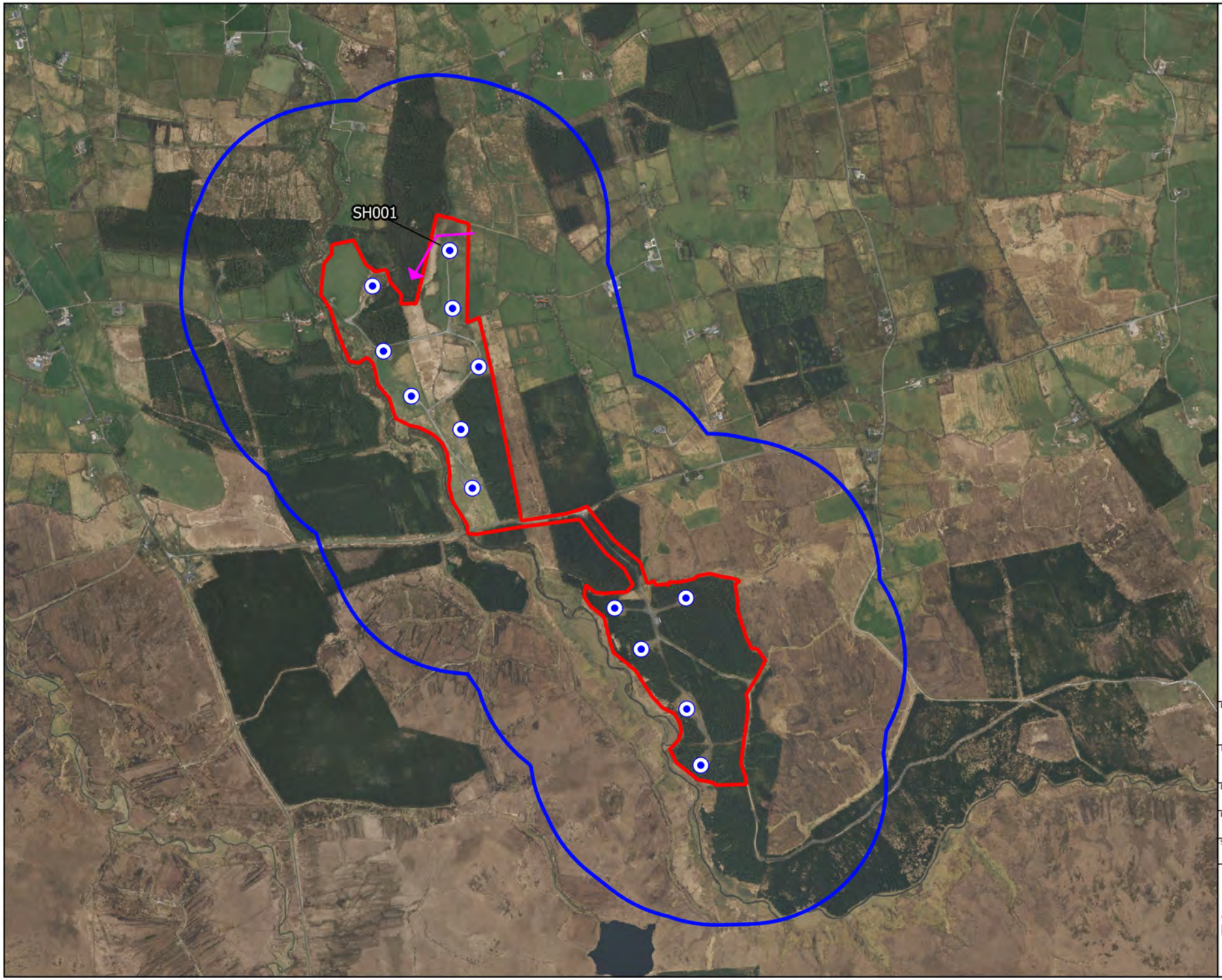
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie



Map Legend

- Turbine Locations
- Study Area Boundary
- 500m Radius
- Winter Season Observation

N

Drawing Title	Sparrowhawk Walkover
Project Title	Dunneill Wind Farm
Drawn By: SD	Checked By: PC
Project No.: 210207	Drawing No.: Fig 7.4.57
Scale: 1:17640	Date: 03.08.22

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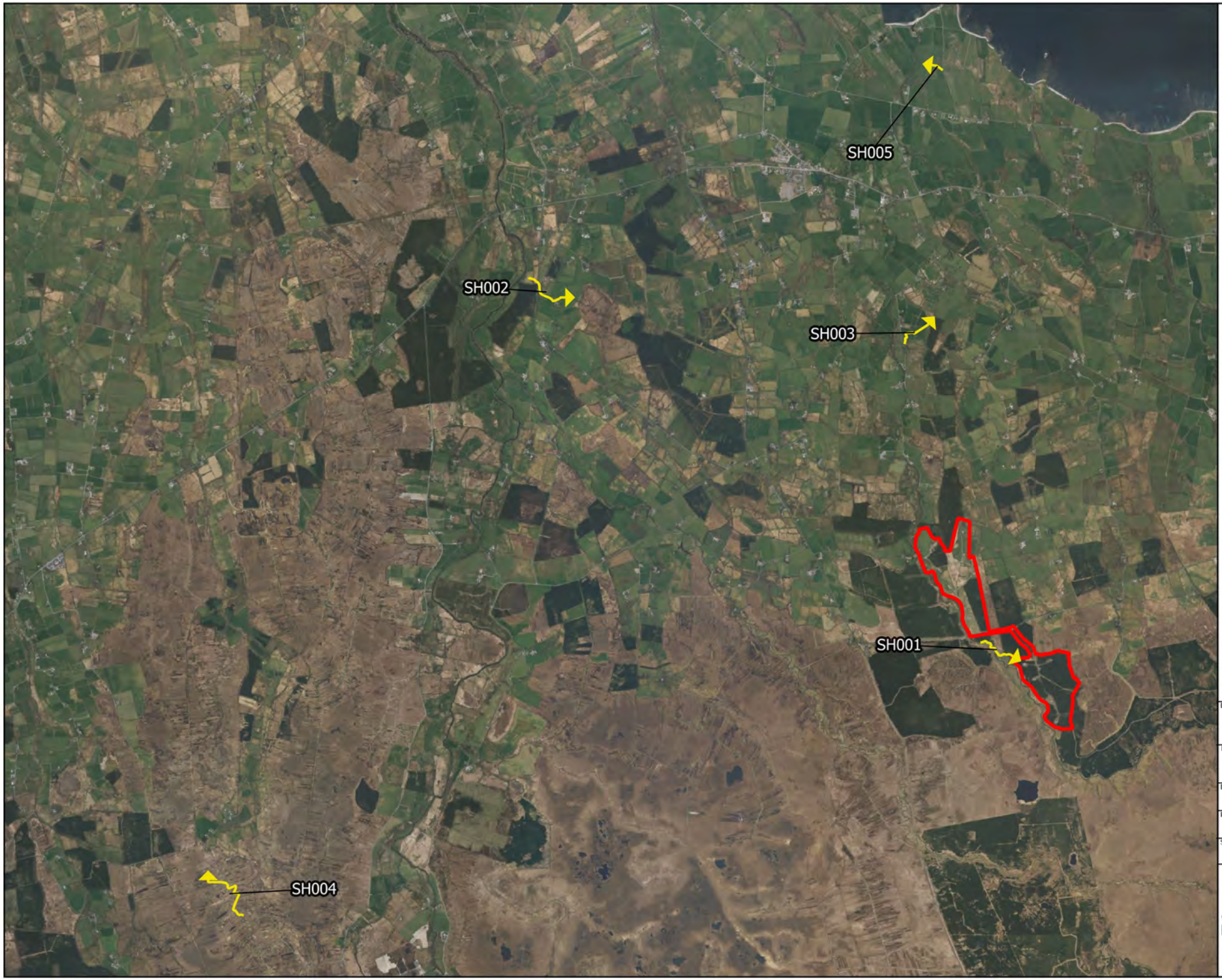
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie



Map Legend

- Study Area Boundary
- Sparrowhawk Observation

N

Drawing Title	Sparrowhawk Incidental Record
Project Title	Dunneill Wind Farm
Drawn By: SD	Checked By: PC
Project No.: 210207	Drawing No.: Fig 7.4.58
Scale: 1:47690	Date: 03.08.22

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Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

APPENDIX 7.5

COLLISION MONITORING

Eire Ecology

Environmental Consultants

Bird & Bat Collision Monitoring

Dunneill Windfarm

2021 - 2022

DOCUMENT DETAILS

Client:	MKO.
Project Title:	Windfarm collision monitoring
Document Title:	Bird and Bat Collision Monitoring Report April 2021 – March 2022 (Year 1)
Prepared By:	John Curtin – Consultant Ecologist
Date:	21/03/2022

EXECUTIVE SUMMARY

This document reports on the findings of 12 months of bird and bat collision monitoring conducted at Dunneill Windfarm.

Over the course of one year two birds and two bats were discovered. Predation on the site is high. Results predict a 90 (0.9–$\alpha\alpha$) % credibility that there were no more than 46 bird and 46 bat fatalities over the course of the 2021 to 2022 monitoring period (1 year) at Dunneill windfarm.

Contents

1 INTRODUCTION

This report details the results of surveys undertaken at Dunneill windfarm, Co. Sligo. Bird and bat mortality searches surrounding a portion of the 13 turbine bases have been completed from April 2021 to March 2022 inclusive.

1.1 Corpse Searches

Bird and bat strike searches are used to detect any possible turbine related bird / bat collision incidents at the site and to monitor collision rates and species involved.

Surveys comprised of fatality monitoring using standardised carcass searches. Searches of a 100 metre by 100 metre square centred on the turbine were conducted.

Searches were conducted by dog handler Gavin O' Dowd with the addition of Lara, a German wire-haired pointers, trained specifically to find bird and bat corpses. All works were overseen by John Curtin B.Sc. John has been conducting and overseeing collision monitoring at windfarms since 2014.

1.2 Statement of Authority

John Curtin collected survey data and deployed bat carcasses for the searcher efficiency trials. John holds a first class honours degree in Environmental Science from NUI Galway. Having worked as a consultant ecologist since 2010, John has experience in botanical & habitat identification, ornithological surveys & monitoring and mammal surveys. John has also acted as lead bat ecologist for several largescale wind farm projects and is a member of Bat conservation Ireland. John has overseen wind farm collision monitoring since 2014.

Gavin O'Dowd was the dog handler and completed fatality searches on site. Gavin is a dog trainer working from kennels located in Woodford, Co. Galway.

2 SITE DESCRIPTION

Dunneill windfarm is situated off the Ballina Road, Dromorewest, Co. Sligo. Third and second class roadways dissect the site, providing access to the turbines. Conifer plantation and pasture constitutes the main onsite habitats, alongside scrub, bare ground, and artificial surfaces.

2.1 Habitats within the search zones

Turbines on site are situated primarily within conifer plantation and pasture. As the result of extensive interference during the construction phase areas of gravel and spoil are also present.

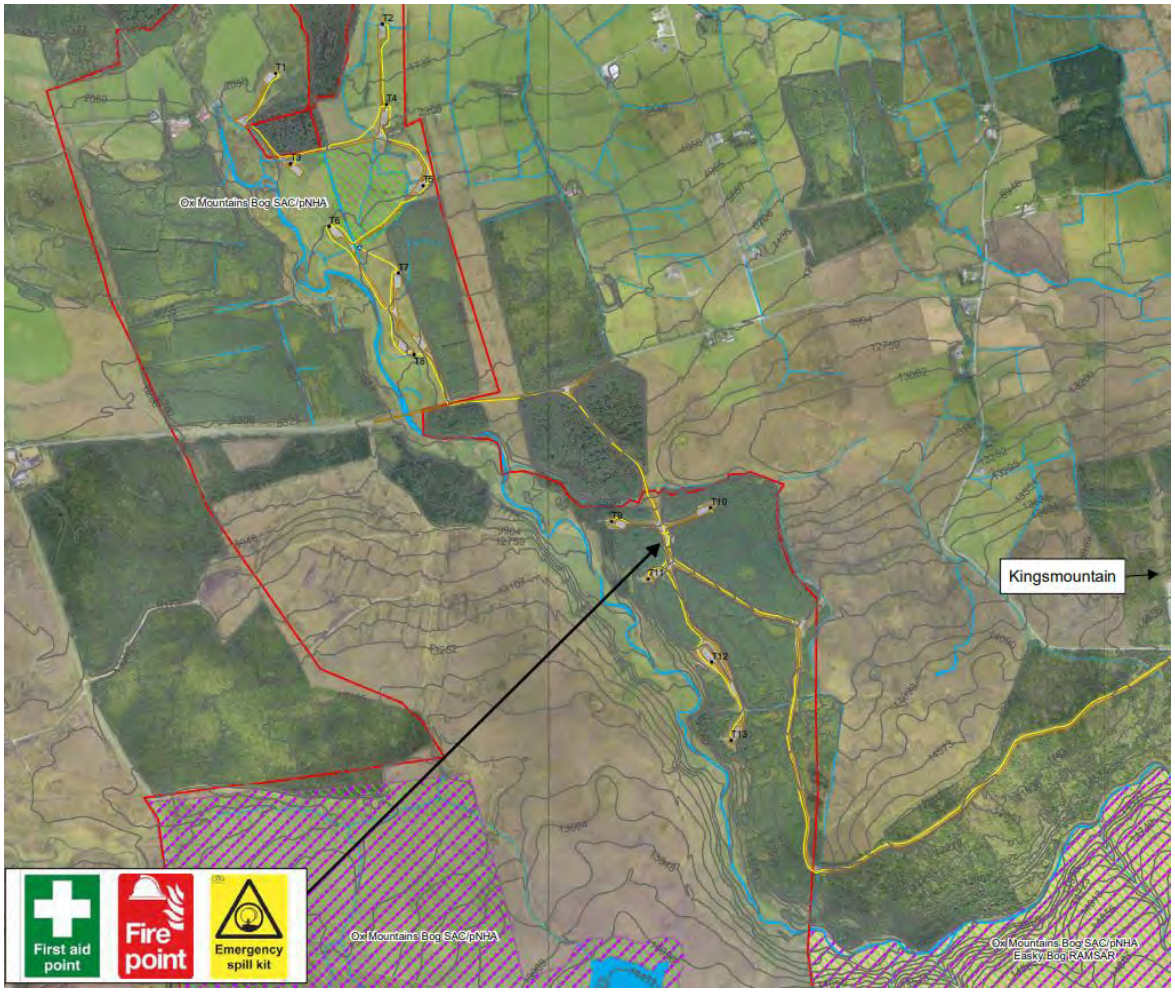

Figure 2-1 Site location

3 METHODS

3.1 Corpse Searches

The core objective of the fatality monitoring study was to estimate the number of avian and bat fatalities attributable to wind turbine collisions. All carcasses located within the study areas, regardless of species, were recorded. For carcasses where the cause of death was not apparent, the fatality was conservatively accredited to the Wind Farm as per Johnson et al. (2003).

Guidance on recommended search area surrounding each wind turbine varies however a radius of no less than 50m is necessary (Rodrigues, 2015). (Atienza, 2011) *Guidelines for Assessing the Impact of Wind Farms on Birds and Bats (Version 4.0)* states ''the ground search area must be at least 10% more than the rotor diameter''. The turbines erected in Dunneill have a maximum turbine sweep diameter of 52m thus the search area should be 57.2m x 57.2m in this case. (Edkins, 2014) *Impacts Of Wind Energy Developments On Birds And Bats: Looking Into The Problem*, recommends the ''search width should be equal to the maximum rotor tip height'', e.g. for a 75m turbine with rotor tip height, the spread of searched area, as a rectangle, square or circle, should be 37.5m in either direction form the turbine base.'' Finally, Eurobats (Rodrigues, 2015) The radius should not be less than 50m. For Dunneill Wind a plot size of 120m x 120m was chosen for the site with each plot centred on a turbine[1]. Each plot required on average 65 minutes search time.

3.1.1 Dog Lead Searches

Carcass searches were traditionally completed by human observers whose efficiency is influenced by a number of factors including; carcass type (size, color, state of decomposition), environmental conditions (vegetation type and density, topography, weather conditions) and observer competence (ability to detect). Reviews of previous studies state human searches are often conducted with low efficiency rates which may contributes to severe bias in mortality estimates. The use of dogs and their olfactory capabilities has been suggested to increase carcass detection rates (Bernardino, 2012).

Numerous studies have been conducted demonstrating that dogs have a superior ability to detect bird and bat carcasses than humans, particularly with small carcasses or in dense vegetation (Homan, 2001) (Arnett, 2006); (Paula, 2011); (Reed, 2011) (Mathews F. M., 2013).

[1] It should be noted that the dog is not kept on a lead and is encouraged to follow its nose thus at times the dog extends the search outside the 60m zone.

3.1.2 Methodology

Methodologies for dog lead corpse searches within the site broadly follow those used by Emma Bennett (2015) who extolls the use of a flexible methodology when completing surveys. ''The dog and handler must adapt their survey technique to the current site conditions. Further, the use of transects should be treated as a guide only, with flexibility to deviate off the transect essential. In ideal conditions, a trained dog will detect the target scent before the survey commences. Allowing the dog the freedom to "follow the nose" and seek out scents is an essential part of the survey''.

Wind conditions can play an important role in determining the capability of a dog to find carcasses. As the scent of a carcass is carried with the wind, each search starts downwind of the turbine and typically works back and forth across wind whilst also moving upwind.

Data recorded at the beginning of the surveys included meteorological data (cloud cover, temperature, and wind velocity) and ground cover information (vegetation type) was documented on a standard plot search record sheet (Appendix 1).

Any carcasses found was photographed in- situ and GPS co-ordinates were recorded. The state of each carcass was recorded on a corpse record card (Appendix 2) using the following condition categories, as per Johnson et al. 2003:

- Intact- a carcass that is completely intact, is not badly decomposed, ad shows no sign of being fed upon by a predator or scavenger.
- Scavenged- an entire carcass which shows signs of being fed upon by a predator or scavenger, or a portion(s) of a carcass in one location such as wings, legs, skeletal remains or pieces of skin.
- Feather Spot- ten or more feathers at one location indicating predation or scavenging. If only feathers are found, 10 or more total feathers or two or more primaries must be discovered to consider the observation a casualty.

3.1.3 Search Calibration / Carcass Removal Trials

Results from the corpse search were calibrated to account for the search dog's ability to find bird and bat corpses and to also account for scavenging of corpses by animals.

In total three efficiency trials were conducted for bats and a single trial was conducted for birds. Corpses were placed in various habitats proportional to habitat representivity within the search areas.

Carcasses were left out in the trial plots by one worker and searched for by the dog and handler team the following day. This period aided in hiding any scent of the person laying the carcass. Each carcass

was positioned within the trial area and its location was tagged using GPS. Once found the surveyor recorded the location to confirm the identity of each bird. All carcasses were removed once the trial was conducted.

3.1.3.1 Carcass removal

(Smallwood, 2010) states 'conventional scavenger removal trials may produce biased estimates by placing groups of 10, 20, and more bird carcasses at once in open terrain study areas, exceeding the capacity of vertebrate scavengers to process and remove all evidence of the carcasses by trial's end' and devised an alternate strategy to avoid scavenger swarming by placing only 1-5 bird carcasses at a time and record scavenging events by placing each carcass in front of camera traps. (Barrientos, 2018) provides a review of searcher efficiency and carcass persistence in infrastructure driven mortality assessment and found small birds are not a substitute for bats during predation trials.

Based on the above, carcass removal trials were conducted surrounding the turbines, in representative habitats. Following methodologies presented in (Smallwood, 2010) camera traps were placed on posts facing the camera north to minimize direct sunlight on the camera's lens and infrared sensors. Cameras placed 1-2 m from the carcass and <1 m above ground and tilted slightly downward to center the carcass in camera's field of view. GPS location, distance and baring to the closest wind turbine was recorded.

Each placed carcass represents one trial and was monitored for 30 days or until scavenger(s) removed the carcass, whichever came first. A determination on carcass removal was made when no body parts containing flesh or bone or > 10 disarticulated feathers could be found.

4 RESULTS

4.1 Corpse Searches

The 13 turbines were searched monthly from April 2021 to March 2022 inclusive.

4.1.1 Carcass Removal Trials

Predation trials were conducted throughout the year. Given the difficulty in finding dead bats rat pups were used as a substitute as they are of similar shape and size. In addition, a variety of bird species were also used. In total 8 successful trials were conducted with the median predation period occurring 2.33 days after laying. This can be considered a high predation value.

4.1.2 Searcher Efficiency Trials

In total 10 bird and bat trials were completed. Of the 10 carcasses laid, one pheasant was completed removed prior to the search. 8 or the remaining 9 carcasses were found thus efficiency is 88.9%.

4.1.3 Incidents recorded during standardised surveys

Four fatalities were discovered over the duration of the corpse searches. As previously stated; for carcasses where the cause of death was not apparent, the fatality was conservatively accredited to the Wind Farm (Johnson, 2003). Photographs of each fatality recorded are given in Table 4-1.

Table 4-1 Photographs and details of each fatality recorded in 2021 to 2022

4.1 An intact Common Pipistrelle (adult male) was recorded on gravel 4m from T2 on the 29/04/2021	

4.2 A corvid feather spot was recorded on grassland 61m from T8 on the 30/04/2021.	
4.3 A corvid feather spot was recorded on grassland on the 29/04/2021 57m from T1.	
4.4 An intact Soprano Pipistrelle was found on the 21/07/2021 at T3 on gravel, 35m from the turbine.	

4.1.4 Collision Rates

Rates are calculated utilising the U.S Fish and Wildlife Service Evidence of Absence (v2.0) {EoA] software; a software application for estimating bird and bat fatalities at wind farms and for designing search protocols. The software estimates the total mortality (M) from the number of carcasses observed (X) and the overall detection probability, which EoA estimates from the search data. Mortality is estimated as M*, which is tied to the user's choice of credibility level (90% likelihood in this case).

Bat and bird collisions were calculated separately.

4.1.4.1 Bat fatalities

The calculation takes into account a 100% search area (a), and a temporal coverage (v) figure of 1; (all months of the bat active season).

Based on the search data, we can assert with 90 (0.9–$\alpha\alpha$) % credibility that there were no more than **46 bat fatalities** over the course of the 2021 to 2022 monitoring period (1 year) at Dunneill windfarm.

4.1.4.2 Bird fatalities

For birds the temporal coverage (v) figure is 1; (searches conducted throughout the year) and a searcher efficiency rate of 88.9% was used.

Based on the search data, we can assert with 90 (0.9–$\alpha\alpha$) % credibility that there were no more than **46 bird fatalities** over the course of 2021 to 2022 monitoring period (1 year) at Dunneill windfarm.

4.1.5 Constraints & Considerations

It should be noted the above projected figures are based on findings in an area of very high predation.

5 DISCUSSION & CONCLUSION

This study comprised a search of 13 wind turbines found at Dunneill. Surveys were conducted from April 2021 to March 2022 inclusive. Monthly searches took two days to complete.

Prior to the 2021 initial search, a rough sketch of the layout of the search site was made using aerial photographs to justify observation made whilst on the ground. Estimates were made concerning searchable area percentage and several other environmental and physical parameters were measured prior to the search. These estimates concluded that all areas surrounding turbine bases were searchable.

Four fatalities (two bats and two bird) were discovered over the survey periods. EoA software gives a 90% confidence no more than 46 bat and 46 bird fatalities occurred in the years surveys. This figure equates to *3.5 bird and 3.5 bat fatalities per turbine*.

Dunneill windfarm provides 11.1MW/YR (https://www.sserenewables.com/onshore-wind/ireland/dunneill/) thus these fatality rates can be interpreted as (90% confidence no more than) 4.14 bat fatalities/MW/yr and 4.14 bird fatalities/MW/yr.

Due to a paucity of current information regarding bird mortality rates at Irish Wind Farms, it is difficult to draw direct comparisons between fatality rates at Dunneill and other Irish Wind Farms. (Sovacool,

2009) completed a literature review of wind farm mortality reports and noted a wide range of fatalities estimates of windfarm collisions between 0 and almost 40 collisions per turbine (worldwide).

(Mathews, Richardson, Lintott, & Hosken, 2016) suggest Common and Soprano Pipistrelle are the most effected bat species by wind turbine collisions in the UK with overall adjusted fatality rates of 0 to 5.25 bats per turbine per month (whilst species composition differs between Ireland and the UK, this report displays relevant research comparable in an Irish context). Mathew's report concludes that ''most of the variability in bat fatalities was due to site-specific factors rather than to overall activity levels. (Suzanne M. Richardson, 2021) shows that Common Pipistrelle are attracted to wind turbines (37% higher activity at turbines then control sites).

5.1 Recommendations

Results of the predation trial suggest carcasses are likely to persist between 0.44 and 12.81 days. The median time for predation to occur on this site was 2.33 days while EOA software calculate an overall persistence of 4.48 days thus predation on the site could be considered high.

Given the high predation rates on site decreasing the interval between surveys; (eg twice monthly surveys) may provide more accurate results.

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7 Appendix 1 Field Record Sheet

Study Area:
Date:
Surveyor:

Turbine No	Start Time	Finish Time	Cloud Cover	Temperature	Wind Speed	Wind Direction	Precipitation	Visibility	% of area searched	Corpse Found	Comments

8 Appendix 2

Mortality Study: Corpse Record Card

Observer name:	Date:
Turbine Number:	Time:
Unique Ref. Number:	
(Tick one)	Carcass state

	Intact	Not badly decomposed, no signs of scavenger activity.
	Scavenged	Entire carcass with signs of being fed upon by a predator/scavenger
	Feather spot	10 or more feathers at one location indicating predation or scavenging

Species			
Sex/Age			
GPS co-ordinates			
Habitat			
Habitat character (e.g. veg height, dominant species)			
Distance from Turbine (m)		Distance from observer when detected (m)	
Comments			

APPENDIX 3 Tables and Figures

The table below (Bennett 2015) lists considerations that influence efficiency rates. Where conditions are less than ideal further time is taken per search.

Summary of factors that influence a dog's ability to detect carcasses (Bennett 2015)

Consideration	Issue	Management
Relationship between dog and handler	Handler must be able to monitor the dogs 'performance to determine interest and likely success on a day-by-day, and hour-by-hour basis	Handlers should be appropriately experienced with dog training and behaviour
	Handler must recognise when the dog has detected a scent to enable them to go off transect	Dog and handler should live together and have a strong relationship outside of work
		Regularly use road kill to stimulate success and monitor performance
Wind speed: Still	On days with no wind there is nothing to carry the scent of the carcass to the dog and detection will be more difficult	Identify days as low wind
		Reduce the distance between transects to allow the dog to cover more ground and be closer to the source of the scent
Wind speed: Low-Medium	Ideal scenting conditions for dogs	Maximum spacing between transects
Wind speed: High	Dogs will become overloaded with scents from much further than the survey area	Reduce spacing between transacts on downwind side of turbine. Allow the dog freedom to follow scents off transects
Wind speed: Extreme	It is more difficult for dogs to locate sources of scents in extreme wind conditions	Allow the dog freedom to follow scents. Maintain constant spacing along transects. Encourage the dog more frequently. Use road kill to stimulate success and monitor performance
Temperature: Extreme cold (<8 °C approximately)	Scents are reduced in cold conditions	Reduce the distance between transects to allow the dog to cover more ground and be closer to the source of the scent
Temperature: Mildly cool to warm (<30 °C approximately)	As scents warm up they become more readily detected	Maintain recommended transect distances (dependent upon wind and precipitation)
Topography: flat	Scents are readily carried from one side of the survey area to the other	Maximum transect spacing
Topography:	Undulating Scents may be not be uniformly detected across the site	Ensure transects encompass depressions as well as rises
Topography: Steep	Steep sites may reduce exposure to scents depending upon the interaction with the wind	Ensure transects are crossing the direction of wind from the survey area
Vegetation: low (<5 cm	) Detection is based on vision and scent	Maximum transect spacing
Vegetation: medium to tall grass	Dogs may be below the optimum scenting area and vegetation may reduce the exposure of the scent to wind	Ensure the dog has the freedom to "hop/bounce" through the survey area to reach the scents above the vegetation height
Vegetation: dense heath land	Vegetation may reduce the exposure of the scent to wind	

Consideration	Issue	Management
	Scented vegetation (i.e. flowers) may increase the time to find target scents	Ensure dogs are adequately target trained to eliminate confounding scents. Reduce transects to cover more terrain
Vegetation: Trees/Scrub	Reduction in wind speed	Reduce distance between transects

Habitats within search area								
Turbine No	Habitat 1	%	Habitat 2	%	Habitat 3	%	Habitat 4	%
1	Gravel	25	Young Conifers	70	GA1	5		
2	Gravel	20	GA1	70	GS4	10		
3	Gravel	35	GA1	35	WS1	15	WD4	15
4	Gravel	25	GA1	70	WL1	5		
5	Gravel	30	GA1	55	WD4	10	WS1	5
6	Gravel	20	GA1	70	GS4	10		
7	Gravel	20	wet grassland	30	WD4	50	(Dense)	
8	Gravel	25	GA1	75				
9	Gravel	25	wet grassland	15	WD4	60		
10	Gravel	25	wet grassland	15	WD4	60		
11	Gravel	25	wet grassland	15	WD4	60		
12	Gravel	35	wet grassland	40	WD4	25		
13	Gravel	25	wet grassland	30	WD4	45		

GA1; Improved grassland, WS1; Scrub, WD4; Conifer Plantation, WL1; Hedgerow

Search Calibration / Carcass Removal Trials

Ten carcasses were laid on the 28/04/2021 with searches conducted on the 29th and 30th.

Table 0-1 Bat Searcher Efficiency

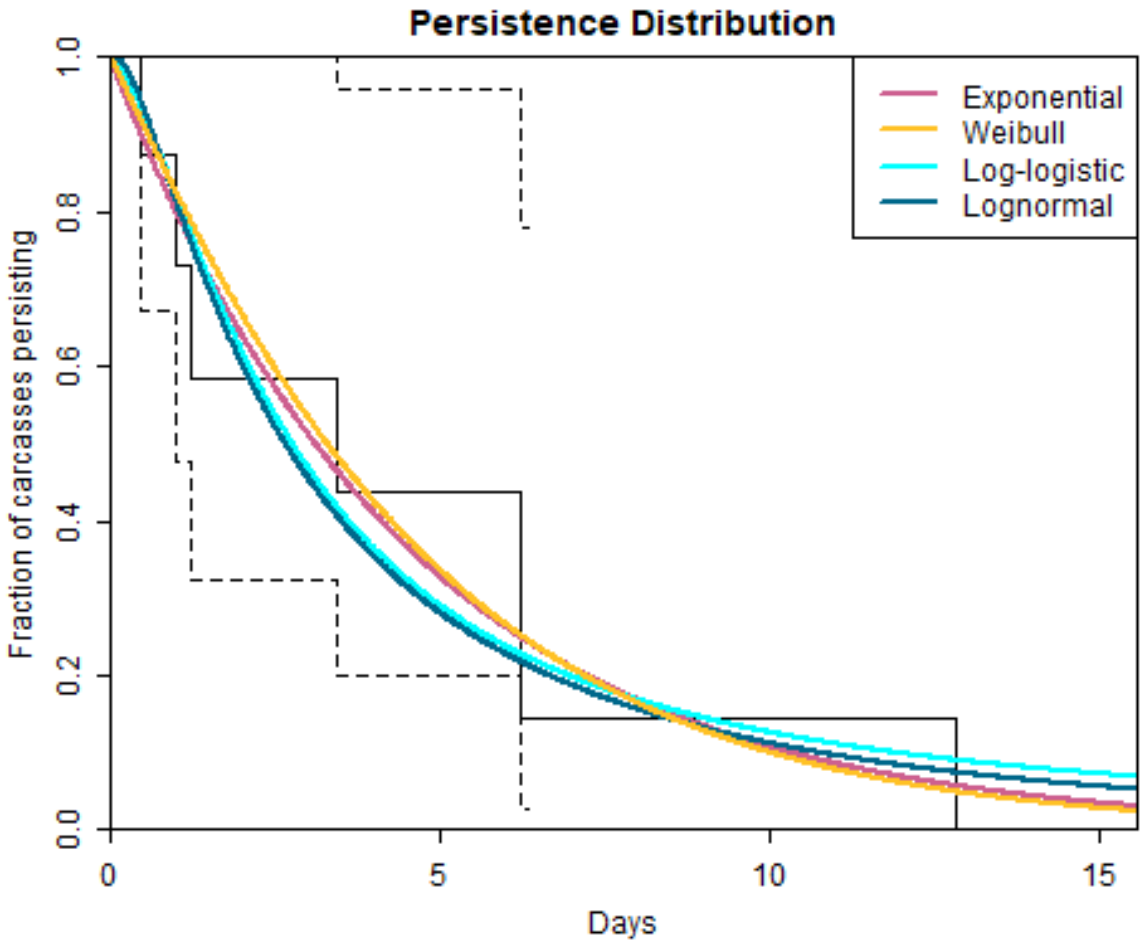
Turbine	Grid Ref		Species used	Habitat	Details
1	116740	329190	Pheasant	Heath	Missed
3	144194	329920	Mallard	Conifer plantation	Found
5	144508	329691	Pheasant	Scrub	Found
6	144308	329690	Bat	Gravel	Found
8	144456	329386	Pheasant	Improved grassland	Predated and removed thus omitted from efficiency calculation
9	145036	328942	Bat	Wet grassland	Found
10	145276	328972	Pheasant	Conifer plantation	Found. Scavenged but some remained
11	145099	328835	Pheasant	Conifer plantation	Found

Turbine	Grid Ref		Species used	Habitat	Details
12	145302	328596	Bat	Wet grassland	Found
13	145339	328357	Pheasant	Wet grassland	Found

Table 0-2 Predation trial – (rat pup corpses used as substitute for bats)

Trial No.	Habitat used in trial	Carcass deployment dates	Carcass removed date	Number of days taken to remove corpse	Carcass used	Notes
1	Conifer plantation	01/05/2021 06:38	14/05/2021 02:07	12.81	Pheasant	Fox predated. Sheep and badger also observed.
2	Improved grassland	30/04/2021 13:32	01/05/2021 19:04	1.23	Pheasant	Fox predated. Buzzard, Raven, Fox, Pine marten also observed.
3	Conifer plantation	21/07/2021 09:50	27/07/2021 14:59	6.21	Shrew	Fox predated
4	Recolonised bare ground	25/11/2021 15:10	26/11/2021 01:41	0.44	Rat pup	Fox predated
5	Conifer plantation	25/11/2021 16:37	last recording 26/11/2021 04:25	-	Mallard	Camera did not record predation event[2]
6	Gravel	21/07/2021 00:00	between 26/7/2021 20:30 and 27/07/2021 11:30	-	Rat pup	Camera did not record predation event
7	Gravel	24/01/2022 13:29	27/01/2022 23:52	3.43	Pheasant	Fox predated. Raven also recorded
8	Gravel	04/11/2021 13:16	05/11/2021 12:45	0.98	Rat pup	Hooded crow predated. Cat also recorded. (Time and date not set correct but time of event is fine)

[2] While predation event was not recorded last observed data is still useful in determining predation levels



Distribution	ΔAIC	r	α	β	95% CI for β
Exponential	0	0.149	0.2229	4.4868	[1.871, 10.76]
Weibull	1.9	0.15	1.0789	4.6245	[1.902, 11.25]
Log-Logistic	2.8	0.167	1.5032	2.7623	[0.9273, 8.228]
Lognormal	2	0.153	1.1923	0.9767	[-0.007432, 1.961]

(for Ir = 30)

Search results April 2021 to March 2022

Turbine No	Date	Start Time	Finish Time	Cloud Cover	Temp	Wind Speed	Wind Direction	Rain	Visibility	% of area searched	Corpse Found	Location	Carcass State	Habitat	Distance from turbine	Species
1	29/04/2021	13:00	14:30	2	10	2	N	2	1	100	Yes	44190 30179	feather spot	young conifer	57m	crow species
2	29/04/2021	15:35	16:35	3	9	2	N	1	1	100	Yes	44436 30249	intact	gravel	4m	bat
3	29/04/2021	14:30	15:30	3	9	2	N	1	1	100	No	-	-	-	-	-
4	30/04/2021	07:45	08:45	1	5	2	NE	1	1	100	No	-	-	-	-	-
5	30/04/2021	09:10	10:00	2	7	2	NE	1	1	100	No	-	-	-	-	-
6	30/04/2021	10:05	11:00	1	9	2	NE	1	1	100	No	-	-	-	-	-
7	30/04/2021	11:05	12:00	1	9	2	N	1	1	100	No	-	-	-	-	-
8	30/04/2021	12:20	13:25	1	10	1	NE	1	1	100	No	44546 29358	feather spot	grass	61m	crow species
9	29/04/2021	16:40	17:30	3	8	2	N	1	1	100	No	-	-	-	-	-
10	29/04/2021	17:35	18:25	2	9	2	N	1	1	100	No	-	-	-	-	-
11	29/04/2021	18:30	19:20	2	9	2	N	1	1	100	No	-	-	-	-	-
12	29/04/2021	19:25	21:00	3	8	2	N	1	1	100	No	-	-	-	-	-
13	30/04/2021	13:30	14:30	1	10	1	NE	1	1	100	No	-	-	-	-	-
1	25/05/2021	12:25	13:25	2	14	1	S	1	1	100	No	-	-	-	-	-
2	25/05/2021	11:20	12:20	2	12	1	S	1	1	100	No	-	-	-	-	-
3	25/05/2021	10:15	11:15	2	12	1	S	1	1	100	No	-	-	-	-	-
4	25/05/2021	09:06	10:05	2	10	1	S	1	1	100	No	-	-	-	-	-
5	25/05/2021	08:00	09:00	2	10	1	S	1	1	100	No	-	-	-	-	-
6	26/05/2021	18:35	19:35	2	14	1	S	1	1	100	No	-	-	-	-	-
7	26/05/2021	17:30	18:30	2	16	1	S	1	1	100	No	-	-	-	-	-

Turbine No	Date	Start Time	Finish Time	Cloud Cover	Temp	Wind Speed	Wind Direction	Rain	Visibility	% of area searched	Corpse Found	Location	Carcass State	Habitat	Distance from turbine	Species
8	26/05/2021	16:25	17:25	2	16	1	S	1	1	100	No	-	-	-	-	-
9	26/05/2021	15:20	16:20	2	16	1	S	1	1	100	No	-	-	-	-	-
10	26/05/2021	14:15	15:15	2	16	1	S	1	1	100	No	-	-	-	-	-
11	26/05/2021	13:10	14:10	2	16	1	S	1	1	100	No	-	-	-	-	-
12	26/05/2021	12:05	13:05	2	14	1	S	1	1	100	No	-	-	-	-	-
13	26/05/2021	11:00	12:00	2	12	1	S	1	1	100	No	-	-	-	-	-
1	25/06/2021	10:10	11:15	3	15	2	W	2	5	100	No	-	-	-	-	-
2	25/06/2021	09:05	10:05	3	13	2	W	2	5	100	No	-	-	-	-	-
3	25/06/2021	08:00	09:00	3	12	3	W	2	5	100	No	-	-	-	-	-
4	24/05/2021	19:05	20:05	3	12	3	NW	2	5	100	No	-	-	-	-	-
5	24/05/2021	18:00	19:00	3	12	4	NW	2	5	100	No	-	-	-	-	-
6	24/05/2021	16:50	17:50	3	12	4	NW	2	5	100	No	-	-	-	-	-
7	24/05/2021	15:40	16:40	3	13	4	NW	2	5	100	No	-	-	-	-	-
8	24/05/2021	14:30	15:30	3	15	4	W	2	5	100	No	-	-	-	-	-
9	24/05/2021	12:15	13:15	3	15	4	SW	2	5	100	No	-	-	-	-	-
10	24/05/2021	11:15	12:15	3	13	3	SW	2	5	100	No	-	-	-	-	-
11	24/05/2021	10:10	11:10	3	13	3	SW	2	5	100	No	-	-	-	-	-
12	24/05/2021	09:05	10:05	3	9	3	SW	2	5	100	No	-	-	-	-	-
13	24/05/2021	08:00	09:00	3	9	3	SW	2	5	100	No	-	-	-	-	-
1	21/07/2021	10:10	11:15	1	24	2	SE	1	1	100	No	-	-	-	-	-
2	21/07/2021	09:05	10:05	1	20	2	SE	1	1	100	No	-	-	-	-	-
3	21/07/2021	08:00	09:00	1	21	2	SE	1	1	100	Yes	541264 85123	intact	gravel	35m	Soprano Pipistrelle
4	20/07/2021	19:10	20:05	1	17	1	W	1	1	100	No	-	-	-	-	-
5	20/07/2021	18:00	19:05	1	17	3	W	1	1	100	No	-	-	-	-	-

Turbine No	Date	Start Time	Finish Time	Cloud Cover	Temp	Wind Speed	Wind Direction	Rain	Visibility	% of area searched	Corpse Found	Location	Carcass State	Habitat	Distance from turbine	Species
6	20/07/2021	16:35	17:50	1	19	3	W	1	1	100	No	-	-	-	-	-
7	20/07/2021	15:15	16:30	1	20	3	W	1	1	100	No	-	-	-	-	-
8	20/07/2021	14:00	15:10	1	20	3	W	1	1	100	No	-	-	-	-	-
9	20/07/2021	12:30	13:25	1	19	3	SW	1	1	100	No	-	-	-	-	-
10	20/07/2021	11:20	12:25	1	19	3	W	1	1	100	No	-	-	-	-	-
11	20/07/2021	10:15	11:15	1	18	3	W	1	1	100	No	-	-	-	-	-
12	20/07/2021	09:05	10:10	1	17	3	W	1	1	100	No	-	-	-	-	-
13	20/07/2021	08:00	09:00	1	17	3	S	1	1	100	No	-	-	-	-	-
1	27/08/2021	08:10	09:15	3	12	3	NW	1	3	100	No	-	-	-	-	-
2	27/08/2021	09:20	10:25	2	19	2	NW	1	3	100	No	-	-	-	-	-
3	27/08/2021	10:30	11:35	2	16	3	NW	1	3	100	No	-	-	-	-	-
4	26/08/2021	18:40	19:45	1	18	2	NW	1	1	100	No	-	-	-	-	-
5	26/08/2021	17:20	18:30	1	18	2	NW	1	1	100	No	-	-	-	-	-
6	26/08/2021	16:10	17:10	1	21	2	NNW	1	1	100	No	-	-	-	-	-
7	26/08/2021	15:00	16:00	1	20	2	NW	1	1	100	No	-	-	-	-	-
8	26/08/2021	13:35	14:40	1	19	2	NNW	1	1	100	No	-	-	-	-	-
9	26/08/2021	12:25	13:30	3	18	2	WNW	1	2	100	No	-	-	-	-	-
10	26/08/2021	11:15	12:20	2	17	2	N	1	2	100	No	-	-	-	-	-
11	26/08/2021	10:10	11:10	3	16	2	N	1	3	100	No	-	-	-	-	-
12	26/08/2021	09:05	10:05	3	16	2	NNW	1	3	100	No	-	-	-	-	-
13	26/08/2021	08:00	09:00	3	19	3	NNW	1	3	100	No	-	-	-	-	-
1	30/09/2021	10:05	11:15	2	7	2	N	1	5	100	No	-	-	-	-	-
2	30/09/2021	09:05	10:00	2	7	2	N	1	5	100	No	-	-	-	-	-
3	30/09/2021	08:00	09:00	2	7	2	N	1	5	100	No	-	-	-	-	-

Turbine No	Date	Start Time	Finish Time	Cloud Cover	Temp	Wind Speed	Wind Direction	Rain	Visibility	% of area searched	Corpse Found	Location	Carcass State	Habitat	Distance from turbine	Species
4	29/09/2021	18:00	19:00	2	8	1	S	1	5	100	No	-	-	-	-	-
5	29/09/2021	16:50	17:55	2	10	2	S	1	5	100	No	-	-	-	-	-
6	29/09/2021	15:40	16:45	2	10	2	NW	1	5	100	No	-	-	-	-	-
7	29/09/2021	14:25	15:25	2	10	2	NW	1	5	100	No	-	-	-	-	-
8	29/09/2021	13:20	14:20	2	12	2	NW	1	5	100	No	-	-	-	-	-
9	29/09/2021	12:20	13:10	2	11	2	E	1	5	100	No	-	-	-	-	-
10	29/09/2021	11:15	12:15	2	11	2	E	1	5	100	No	-	-	-	-	-
11	29/09/2021	10:10	11:10	2	9	2	N	1	5	100	No	-	-	-	-	-
12	29/09/2021	09:05	10:05	2	9	2	N	1	5	100	No	-	-	-	-	-
13	29/09/2021	08:00	09:00	2	9	2	N	1	5	100	No	-	-	-	-	-
1	27/10/2021	10:20	11:25	3	9	2	N	3	3	100	No	-	-	-	-	-
2	27/10/2021	09:10	10:15	3	6	2	N	3	3	100	No	-	-	-	-	-
3	27/10/2021	08:00	09:00	3	6	2	N	3	3	100	No	-	-	-	-	-
4	26/10/2021	18:00	19:00	3	7	2	NE	3	3	100	No	-	-	-	-	-
5	26/10/2021	16:50	17:55	3	7	2	NE	3	3	100	No	-	-	-	-	-
6	26/10/2021	15:40	16:45	3	7	2	NE	3	3	100	No	-	-	-	-	-
7	26/10/2021	14:35	15:35	3	10	2	N	3	3	100	No	-	-	-	-	-
8	26/10/2021	13:30	14:30	3	9	2	N	3	3	100	No	-	-	-	-	-
9	26/10/2021	12:20	13:25	3	9	2	NW	3	3	100	No	-	-	-	-	-
10	26/10/2021	11:15	12:15	3	9	3	NW	3	3	100	No	-	-	-	-	-
11	26/10/2021	10:10	11:10	3	6	3	N	3	3	100	No	-	-	-	-	-
12	26/10/2021	09:05	10:05	3	6	2	N	3	3	100	No	-	-	-	-	-
13	26/10/2021	08:00	09:00	3	6	2	N	3	3	100	No	-	-	-	-	-
1	26/11/2021	13:10	14:15	3	9	4	NE	3	3	100	No	-	-	-	-	-

Turbine No	Date	Start Time	Finish Time	Cloud Cover	Temp	Wind Speed	Wind Direction	Rain	Visibility	% of area searched	Corpse Found	Location	Carcass State	Habitat	Distance from turbine	Species
2	26/11/2021	11:40	13:00	3	9	5	NE	3	3	100	No	-	-	-	-	-
3	26/11/2021	10:30	11:35	3	9	5	N	3	3	100	No	-	-	-	-	-
4	26/11/2021	09:15	10:25	3	3	4	N	3	3	100	No	-	-	-	-	-
5	26/11/2021	08:00	09:10	3	3	4	N	3	3	100	No	-	-	-	-	-
6	25/11/2021	16:35	17:30	3	5	2	E	3	3	100	No	-	-	-	-	-
7	25/11/2021	15:20	16:30	3	6	2	E	3	3	100	No	-	-	-	-	-
8	25/11/2021	14:10	15:10	3	8	3	E	3	3	100	No	-	-	-	-	-
9	25/11/2021	13:00	14:05	3	8	3	E	3	3	100	No	-	-	-	-	-
10	25/11/2021	11:55	12:55	3	5	2	NW	3	3	100	No	-	-	-	-	-
11	25/11/2021	10:45	11:50	3	3	2	NW	3	3	100	No	-	-	-	-	-
12	25/11/2021	09:35	10:40	3	3	2	NW	3	3	100	No	-	-	-	-	-
13	25/11/2021	08:00	09:30	3	3	2	N	3	3	100	No	-	-	-	-	-
1	14/12/2021	12:45	13:55	1	10	3	NE	1	1	100	No	-	-	-	-	-
2	14/12/2021	11:35	12:40	1	10	3	NE	1	1	100	No	-	-	-	-	-
3	14/12/2021	10:25	11:30	1	10	3	N	1	1	100	No	-	-	-	-	-
4	14/12/2021	09:15	10:20	1	9	3	N	1	1	100	No	-	-	-	-	-
5	14/12/2021	08:00	09:00	1	9	3	N	1	1	100	No	-	-	-	-	-
6	13/12/2021	16:50	17:40	1	5	2	W	1	1	100	No	-	-	-	-	-
7	13/12/2021	15:40	16:45	1	5	2	W	1	1	100	No	-	-	-	-	-
8	13/12/2021	14:20	15:35	1	6	2	W	1	1	100	No	-	-	-	-	-
9	13/12/2021	13:00	14:15	1	6	2	W/NW	1	1	100	No	-	-	-	-	-
10	13/12/2021	11:45	12:55	1	6	2	NW	1	1	100	No	-	-	-	-	-
11	13/12/2021	10:30	11:40	1	5	2	N	1	1	100	No	-	-	-	-	-
12	13/12/2021	09:00	10:25	1	5	2	N	1	1	100	No	-	-	-	-	-

Turbine No	Date	Start Time	Finish Time	Cloud Cover	Temp	Wind Speed	Wind Direction	Rain	Visibility	% of area searched	Corpse Found	Location	Carcass State	Habitat	Distance from turbine	Species
13	13/12/2021	07:30	08:55	1	5	2	N	1	1	100	No	-	-	-	-	-
1	27/01/2022	10:00	11:30	2	9	3	N	2	1	100	No	-	-	-	-	-
2	27/01/2022	11:35	12:45	2	9	3	N	2	1	100	No	-	-	-	-	-
3	27/01/2022	12:50	13:55	2	9	3	NE	2	1	100	No	-	-	-	-	-
4	27/01/2022	14:00	15:00	2	10	3	NE	2	1	100	No	-	-	-	-	-
5	27/01/2022	15:05	16:15	2	10	3	NE	2	1	100	No	-	-	-	-	-
6	27/01/2022	16:20	17:35	2	10	3	NE	2	1	100	No	-	-	-	-	-
7	28/01/2022	08:00	09:00	2	9	2	SE	1	1	100	No	-	-	-	-	-
8	28/01/2022	09:05	10:05	2	9	2	SE	1	1	100	No	-	-	-	-	-
9	28/01/2022	10:10	11:15	2	12	2	S	1	1	100	No	-	-	-	-	-
10	28/01/2022	11:20	12:30	2	12	2	S	1	1	100	No	-	-	-	-	-
11	28/01/2022	12:35	13:55	2	14	3	S	1	1	100	No	-	-	-	-	-
12	28/01/2022	14:00	15:10	2	15	3	SW	1	1	100	No	-	-	-	-	-
13	28/01/2022	15:15	16:30	2	14	3	SW	1	1	100	No	-	-	-	-	-
1	28/02/2022	13:05	14:05	3	10	3	W	2	2	100	No	-	-	-	-	-
2	28/02/2022	12:05	13:00	3	11	3	W	2	2	100	No	-	-	-	-	-
3	28/02/2022	11:00	12:00	3	11	3	NW	2	2	100	No	-	-	-	-	-
4	28/02/2022	09:35	10:55	3	11	3	N	2	2	100	No	-	-	-	-	-
5	28/02/2022	08:00	09:30	3	11	3	N	2	2	100	No	-	-	-	-	-
6	27/02/2022	16:50	18:00	3	8	3	S	2	1	100	No	-	-	-	-	-
7	27/02/2022	15:30	16:45	3	9	3	S	2	1	100	No	-	-	-	-	-
8	27/02/2022	14:05	15:25	3	7	3	S	2	1	100	No	-	-	-	-	-
9	27/02/2022	12:40	14:00	3	7	3	W	2	1	100	No	-	-	-	-	-
10	27/02/2022	11:30	12:35	3	8	3	W	2	1	100	No	-	-	-	-	-

Turbine No	Date	Start Time	Finish Time	Cloud Cover	Temp	Wind Speed	Wind Direction	Rain	Visibility	% of area searched	Corpse Found	Location	Carcass State	Habitat	Distance from turbine	Species
11	27/02/2022	10:20	11:25	3	8	3	W	2	1	100	No	-	-	-	-	-
12	27/02/2022	09:05	10:15	3	7	4	NW	2	1	100	No	-	-	-	-	-
13	27/02/2022	07:30	09:00	3	8	4	NW	2	1	100	No	-	-	-	-	-
1	13/03/2022	08:20	09:30	3	8	2	N	2	5	100	No	-	-	-	-	-
2	13/03/2022	09:35	10:50	3	8	2	N	2	5	100	No	-	-	-	-	-
3	13/03/2022	11:00	12:20	3	9	2	NE	1	5	100	No	-	-	-	-	-
4	13/03/2022	12:25	13:40	3	9	2	NE	1	5	100	No	-	-	-	-	-
5	13/03/2022	13:45	15:00	3	11	3	NE	1	5	100	No	-	-	-	-	-
6	13/03/2022	15:05	16:20	3	12	3	E	1	5	100	No	-	-	-	-	-
7	13/03/2022	16:25	17:30	3	9	3	SE	2	5	100	No	-	-	-	-	-
8	13/03/2022	17:35	18:30	3	7	3	SE	2	5	100	No	-	-	-	-	-
9	14/03/2022	08:30	09:40	3	7	3	NE	1	5	100	No	-	-	-	-	-
10	14/03/2022	09:45	10:55	3	7	3	NE	1	5	100	No	-	-	-	-	-
11	14/03/2022	11:00	12:20	3	8	3	NE	1	5	100	No	-	-	-	-	-
12	14/03/2022	12:25	13:30	3	8	3	NE	1	5	100	No	-	-	-	-	-
13	14/03/2022	Area closed off for maintenance														

Collision Rate Calculations

Rates are calculated utilising the U.S Fish and Wildlife Service Evidence of Absence (v2.0) {EoA] software; a software application for estimating bird and bat fatalities at wind farms and for designing search protocols. The software estimates the total mortality (M) from the number of carcasses observed (X) and the overall detection probability, which EoA estimates from the search data. Mortality is estimated as M*, which is tied to the user's choice of credibility level (90% likelihood in this case).

8.1.1 Bats

The calculation takes into account a 100% search area (a), and a temporal coverage (v) figure of 1; (each month of bat active season).

Collision calculation from finding two bat corpses.

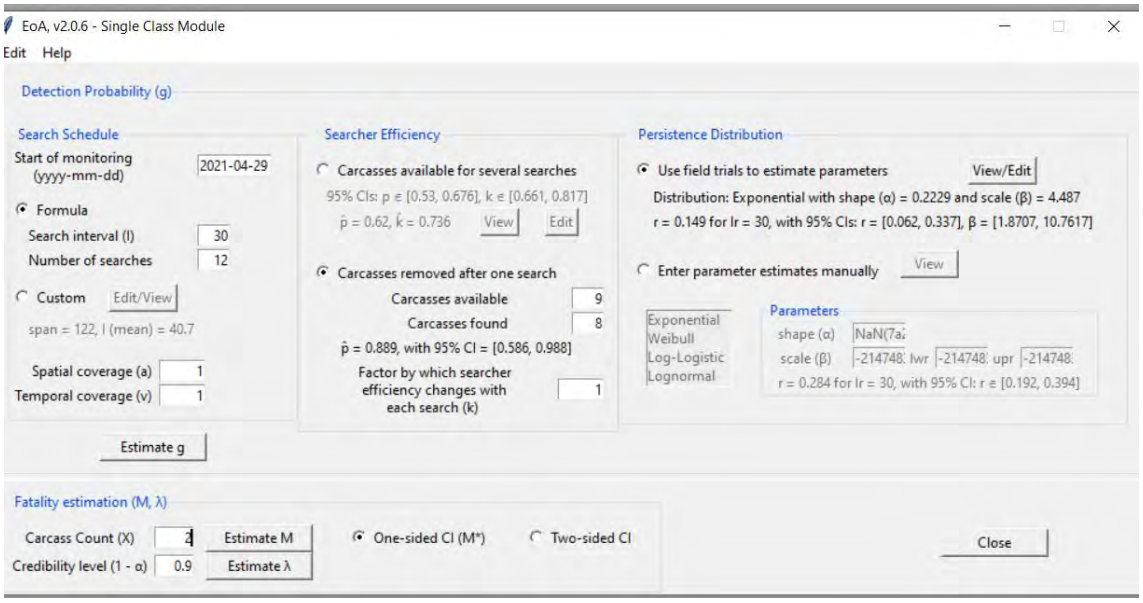


Figure 0-1 Predation Rate

Figure 0-2 Searcher efficiency bats or birds

Summary statistics for fatality estimation (M)

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Results:

Carcasses discovered: X = 2

Full site for full year
  M* = 46 for 1 - alpha = 0.9
  Estimated g: 0.134, 95% CI = [0.0517, 0.248]

Fitted beta distribution parameters for estimated g: Ba = 5.9357, Bb = 38.3105
Temporal coverage (within year) = 1

Full site for monitored period, 29-Apr-2021 through 24-Apr-2022
M* = 46 for 1 - alpha = 0.9
Estimated g: 0.134, 95% CI = [0.0517, 0.248]
Fitted beta distribution parameters for estimated g: Ba = 5.9357, Bb = 38.3105

Searched area for monitored period, 29-Apr-2021 through 24-Apr-2022
M* = 46 for 1 - alpha = 0.9
Estimated g = 0.134, 95% CI = [0.0517, 0.248]
Fitted beta distribution parameters for estimated g: Ba = 5.9357, Bb = 38.3105

Posterior distribution of M

	Full site for full year		Full site for monitored period		Searched area for monitored period	
m	p(M = m)	p(M > m)	p(M = m)	p(M > m)	p(M = m)	p(M > m)
0	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000
1	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000
2	0.0069	0.9931	0.0069	0.9931	0.0069	0.9931
3	0.0144	0.9788	0.0144	0.9788	0.0144	0.9788
4	0.0211	0.9577	0.0211	0.9577	0.0211	0.9577
5	0.0265	0.9312	0.0265	0.9312	0.0265	0.9312
6	0.0307	0.9004	0.0307	0.9004	0.0307	0.9004
7	0.0337	0.8668	0.0337	0.8668	0.0337	0.8668
8	0.0357	0.8311	0.0357	0.8311	0.0357	0.8311
9	0.0368	0.7943	0.0368	0.7943	0.0368	0.7943
10	0.0372	0.7571	0.0372	0.7571	0.0372	0.7571
11	0.0371	0.7200	0.0371	0.7200	0.0371	0.7200
12	0.0366	0.6835	0.0366	0.6835	0.0366	0.6835
13	0.0357	0.6478	0.0357	0.6478	0.0357	0.6478
14	0.0346	0.6131	0.0346	0.6131	0.0346	0.6131
15	0.0334	0.5798	0.0334	0.5798	0.0334	0.5798
16	0.0320	0.5477	0.0320	0.5477	0.0320	0.5477
17	0.0306	0.5172	0.0306	0.5172	0.0306	0.5172
18	0.0291	0.4880	0.0291	0.4880	0.0291	0.4880
19	0.0277	0.4603	0.0277	0.4603	0.0277	0.4603
20	0.0262	0.4341	0.0262	0.4341	0.0262	0.4341
21	0.0248	0.4093	0.0248	0.4093	0.0248	0.4093
22	0.0234	0.3859	0.0234	0.3859	0.0234	0.3859
23	0.0221	0.3638	0.0221	0.3638	0.0221	0.3638
24	0.0208	0.3429	0.0208	0.3429	0.0208	0.3429
25	0.0196	0.3233	0.0196	0.3233	0.0196	0.3233
26	0.0185	0.3049	0.0185	0.3049	0.0185	0.3049
27	0.0174	0.2875	0.0174	0.2875	0.0174	0.2875
28	0.0163	0.2712	0.0163	0.2712	0.0163	0.2712
29	0.0153	0.2559	0.0153	0.2559	0.0153	0.2559
30	0.0144	0.2415	0.0144	0.2415	0.0144	0.2415
31	0.0135	0.2280	0.0135	0.2280	0.0135	0.2280
32	0.0127	0.2152	0.0127	0.2152	0.0127	0.2152
33	0.0119	0.2033	0.0119	0.2033	0.0119	0.2033
34	0.0112	0.1921	0.0112	0.1921	0.0112	0.1921
35	0.0105	0.1816	0.0105	0.1816	0.0105	0.1816
36	0.0099	0.1717	0.0099	0.1717	0.0099	0.1717
37	0.0093	0.1623	0.0093	0.1623	0.0093	0.1623
38	0.0087	0.1536	0.0087	0.1536	0.0087	0.1536
39	0.0082	0.1454	0.0082	0.1454	0.0082	0.1454
40	0.0077	0.1376	0.0077	0.1376	0.0077	0.1376
41	0.0073	0.1304	0.0073	0.1304	0.0073	0.1304
42	0.0068	0.1235	0.0068	0.1235	0.0068	0.1235
43	0.0064	0.1171	0.0064	0.1171	0.0064	0.1171
44	0.0061	0.1110	0.0061	0.1110	0.0061	0.1110
45	0.0057	0.1053	0.0057	0.1053	0.0057	0.1053
46	0.0054	0.0999	0.0054	0.0999	0.0054	0.0999

47	0.0051	0.0948	0.0051	0.0948	0.0051	0.0948
48	0.0048	0.0900	0.0048	0.0900	0.0048	0.0900
49	0.0045	0.0855	0.0045	0.0855	0.0045	0.0855
50	0.0043	0.0813	0.0043	0.0813	0.0043	0.0813
51	0.0040	0.0773	0.0040	0.0773	0.0040	0.0773
52	0.0038	0.0735	0.0038	0.0735	0.0038	0.0735
53	0.0036	0.0699	0.0036	0.0699	0.0036	0.0699
54	0.0034	0.0665	0.0034	0.0665	0.0034	0.0665
55	0.0032	0.0633	0.0032	0.0633	0.0032	0.0633
56	0.0030	0.0603	0.0030	0.0603	0.0030	0.0603
57	0.0029	0.0574	0.0029	0.0574	0.0029	0.0574
58	0.0027	0.0547	0.0027	0.0547	0.0027	0.0547
59	0.0026	0.0521	0.0026	0.0521	0.0026	0.0521
60	0.0024	0.0497	0.0024	0.0497	0.0024	0.0497
61	0.0023	0.0474	0.0023	0.0474	0.0023	0.0474
62	0.0022	0.0452	0.0022	0.0452	0.0022	0.0452
63	0.0021	0.0431	0.0021	0.0431	0.0021	0.0431
64	0.0020	0.0412	0.0020	0.0412	0.0020	0.0412
65	0.0019	0.0393	0.0019	0.0393	0.0019	0.0393
66	0.0018	0.0375	0.0018	0.0375	0.0018	0.0375
67	0.0017	0.0359	0.0017	0.0359	0.0017	0.0359
68	0.0016	0.0343	0.0016	0.0343	0.0016	0.0343
69	0.0015	0.0328	0.0015	0.0328	0.0015	0.0328
70	0.0014	0.0313	0.0014	0.0313	0.0014	0.0313
71	0.0014	0.0299	0.0014	0.0299	0.0014	0.0299
72	0.0013	0.0286	0.0013	0.0286	0.0013	0.0286
73	0.0012	0.0274	0.0012	0.0274	0.0012	0.0274
74	0.0012	0.0262	0.0012	0.0262	0.0012	0.0262
75	0.0011	0.0251	0.0011	0.0251	0.0011	0.0251
76	0.0011	0.0240	0.0011	0.0240	0.0011	0.0240
77	0.0010	0.0230	0.0010	0.0230	0.0010	0.0230
78	0.0010	0.0220	0.0010	0.0220	0.0010	0.0220
79	0.0009	0.0211	0.0009	0.0211	0.0009	0.0211
80	0.0009	0.0202	0.0009	0.0202	0.0009	0.0202
81	0.0008	0.0194	0.0008	0.0194	0.0008	0.0194
82	0.0008	0.0186	0.0008	0.0186	0.0008	0.0186
83	0.0008	0.0178	0.0008	0.0178	0.0008	0.0178
84	0.0007	0.0171	0.0007	0.0171	0.0007	0.0171
85	0.0007	0.0164	0.0007	0.0164	0.0007	0.0164
86	0.0007	0.0157	0.0007	0.0157	0.0007	0.0157
87	0.0006	0.0151	0.0006	0.0151	0.0006	0.0151
88	0.0006	0.0145	0.0006	0.0145	0.0006	0.0145
89	0.0006	0.0139	0.0006	0.0139	0.0006	0.0139
90	0.0006	0.0133	0.0006	0.0133	0.0006	0.0133
91	0.0005	0.0128	0.0005	0.0128	0.0005	0.0128
92	0.0005	0.0123	0.0005	0.0123	0.0005	0.0123
93	0.0005	0.0118	0.0005	0.0118	0.0005	0.0118
94	0.0005	0.0113	0.0005	0.0113	0.0005	0.0113
95	0.0004	0.0109	0.0004	0.0109	0.0004	0.0109
96	0.0004	0.0105	0.0004	0.0105	0.0004	0.0105
97	0.0004	0.0101	0.0004	0.0101	0.0004	0.0101
98	0.0004	0.0097	0.0004	0.0097	0.0004	0.0097
99	0.0004	0.0093	0.0004	0.0093	0.0004	0.0093
100	0.0004	0.0089	0.0004	0.0089	0.0004	0.0089
101	0.0003	0.0086	0.0003	0.0086	0.0003	0.0086
102	0.0003	0.0082	0.0003	0.0082	0.0003	0.0082
103	0.0003	0.0079	0.0003	0.0079	0.0003	0.0079
104	0.0003	0.0076	0.0003	0.0076	0.0003	0.0076
105	0.0003	0.0073	0.0003	0.0073	0.0003	0.0073
106	0.0003	0.0070	0.0003	0.0070	0.0003	0.0070
107	0.0003	0.0068	0.0003	0.0068	0.0003	0.0068
108	0.0003	0.0065	0.0003	0.0065	0.0003	0.0065
109	0.0003	0.0062	0.0003	0.0062	0.0003	0.0062
110	0.0002	0.0060	0.0002	0.0060	0.0002	0.0060
111	0.0002	0.0058	0.0002	0.0058	0.0002	0.0058

112	0.0002	0.0055	0.0002	0.0055	0.0002	0.0055
113	0.0002	0.0053	0.0002	0.0053	0.0002	0.0053
114	0.0002	0.0051	0.0002	0.0051	0.0002	0.0051
115	0.0002	0.0049	0.0002	0.0049	0.0002	0.0049
116	0.0002	0.0047	0.0002	0.0047	0.0002	0.0047
117	0.0002	0.0045	0.0002	0.0045	0.0002	0.0045
118	0.0002	0.0044	0.0002	0.0044	0.0002	0.0044
119	0.0002	0.0042	0.0002	0.0042	0.0002	0.0042
120	0.0002	0.0040	0.0002	0.0040	0.0002	0.0040
121	0.0002	0.0039	0.0002	0.0039	0.0002	0.0039
122	0.0002	0.0037	0.0002	0.0037	0.0002	0.0037
123	0.0001	0.0036	0.0001	0.0036	0.0001	0.0036
124	0.0001	0.0034	0.0001	0.0034	0.0001	0.0034
125	0.0001	0.0033	0.0001	0.0033	0.0001	0.0033
126	0.0001	0.0031	0.0001	0.0031	0.0001	0.0031
127	0.0001	0.0030	0.0001	0.0030	0.0001	0.0030
128	0.0001	0.0029	0.0001	0.0029	0.0001	0.0029
129	0.0001	0.0028	0.0001	0.0028	0.0001	0.0028
130	0.0001	0.0027	0.0001	0.0027	0.0001	0.0027
131	0.0001	0.0026	0.0001	0.0026	0.0001	0.0026
132	0.0001	0.0024	0.0001	0.0024	0.0001	0.0024
133	0.0001	0.0023	0.0001	0.0023	0.0001	0.0023
134	0.0001	0.0022	0.0001	0.0022	0.0001	0.0022
135	0.0001	0.0021	0.0001	0.0021	0.0001	0.0021
136	0.0001	0.0020	0.0001	0.0020	0.0001	0.0020
137	0.0001	0.0020	0.0001	0.0020	0.0001	0.0020
138	0.0001	0.0019	0.0001	0.0019	0.0001	0.0019
139	0.0001	0.0018	0.0001	0.0018	0.0001	0.0018
140	0.0001	0.0017	0.0001	0.0017	0.0001	0.0017
141	0.0001	0.0016	0.0001	0.0016	0.0001	0.0016
142	0.0001	0.0015	0.0001	0.0015	0.0001	0.0015
143	0.0001	0.0015	0.0001	0.0015	0.0001	0.0015
144	0.0001	0.0014	0.0001	0.0014	0.0001	0.0014
145	0.0001	0.0013	0.0001	0.0013	0.0001	0.0013
146	0.0001	0.0013	0.0001	0.0013	0.0001	0.0013
147	0.0001	0.0012	0.0001	0.0012	0.0001	0.0012
148	0.0001	0.0011	0.0001	0.0011	0.0001	0.0011
149	0.0001	0.0011	0.0001	0.0011	0.0001	0.0011
150	0.0001	0.0010	0.0001	0.0010	0.0001	0.0010
151	0.0001	0.0010	0.0001	0.0010	0.0001	0.0010
152	0.0001	0.0009	0.0001	0.0009	0.0001	0.0009
153	0.0001	0.0009	0.0001	0.0009	0.0001	0.0009
154	0.0001	0.0008	0.0001	0.0008	0.0001	0.0008
155	0.0001	0.0007	0.0001	0.0007	0.0001	0.0007
156	0.0000	0.0007	0.0000	0.0007	0.0000	0.0007
157	0.0000	0.0007	0.0000	0.0007	0.0000	0.0007
158	0.0000	0.0006	0.0000	0.0006	0.0000	0.0006
159	0.0000	0.0006	0.0000	0.0006	0.0000	0.0006
160	0.0000	0.0005	0.0000	0.0005	0.0000	0.0005
161	0.0000	0.0005	0.0000	0.0005	0.0000	0.0005
162	0.0000	0.0004	0.0000	0.0004	0.0000	0.0004
163	0.0000	0.0004	0.0000	0.0004	0.0000	0.0004
164	0.0000	0.0004	0.0000	0.0004	0.0000	0.0004
165	0.0000	0.0003	0.0000	0.0003	0.0000	0.0003
166	0.0000	0.0003	0.0000	0.0003	0.0000	0.0003
167	0.0000	0.0002	0.0000	0.0002	0.0000	0.0002
168	0.0000	0.0002	0.0000	0.0002	0.0000	0.0002
169	0.0000	0.0002	0.0000	0.0002	0.0000	0.0002
170	0.0000	0.0001	0.0000	0.0001	0.0000	0.0001
171	0.0000	0.0001	0.0000	0.0001	0.0000	0.0001
172	0.0000	0.0001	0.0000	0.0001	0.0000	0.0001
173	0.0000	0.0001	0.0000	0.0001	0.0000	0.0001
174	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
175	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

==========

Input:
Search parameters
trial carcasses placed = 9, carcasses found = 8
estimated searcher efficiency: p = 0.889, 95% CI = [0.586, 0.988]
k = 1, spatial coverage: a = 1
Search schedule: Search interval (I) = 30, number of searches = 12, span = 360

Carcass persistence:
Exponential persistence distribution with scale (ß) = 4.487
95% CI ß = [1.871, 10.762] and r = 0.149 for Ir = 30 with 95% CI = [0.062, 0.337]
Uniform arrivals

Other
Integrated reference prior for binomial detection probability
p(M = m) proportional to sqrt(m+1)-sqrt(m)
Prior distribution truncated at m = 283

APPENDIX 7.6

BIRD MONITORING PROGRAMME

Planning and Environmental Consultants

Appendix 7-6 – Bird Monitoring Programme

Dunneill Wind Farm

DOCUMENT DETAILS

Project Title:	**Dunneill Wind Farm**
Project Number:	**210207**
Document Title:	**Appendix 7-6 – Bird Monitoring Programme**
Document File Name:	**Appendix 7-6 – F - 04.08.2022 - 210207**
Prepared By:	**MKO** **Tuam Road** **Galway** **Ireland** **H91 VW84**

Planning and Environmental Consultants

Rev	Status	Date	Author(s)	Approved By
01	Final	04/08/2022	SD	PC

Table of Contents

1. INTRODUCTION

This Bird Monitoring Programme has been prepared by MKO for the proposed extension of operation of the existing Dunneill Wind Farm, Co. Sligo. It provides a timeframe and monitoring schedule for the bird population in the study area during the operational phase of the project, informed by surveys undertaken to date. Bird surveys were undertaken from April 2021 to March 2022 inclusive, encompassing one breeding and one winter season, along with autumn and spring passage, in line with Scottish Natural Heritage guidance on recommended bird survey methods to inform impact assessment for onshore wind energy developments (SNH, 2017). Key ornithological receptors (KORs) in the study area were identified based on these surveys.

The objectives of the Bird Monitoring Programme are:

- To record birds using the study area and their interaction with operating turbines
- To monitor short-term and long-term effects on bird populations in the study area, with a particular emphasis on birds of high conservation concern (birds listed on Annex I of the EU Birds Directive or on the Red List of Birds of Conservation Concern in Ireland).
- To undertake collision monitoring for potential bird fatalities as a result of a collision with turbine blades.
- To report on the findings of monitoring at the end of Years 1, 2, 3, 5, 10 and (if applicable) 15 of the extended operational life of the wind farm.
- To ensure any required decommissioning phase monitoring is scheduled to avoid impacts on KORs and other birds of conservation concern during the decommissioning phase.

2. MONITORING METHODOLOGY

2.1 Key Ornithological Receptors

Table 7-6-1 lists the KORs recorded within the wind farm study area during surveys conducted from April 2021 to March 2022 inclusive. These species form the basis of the Bird Monitoring Programme.

Table 7 – 6 – 1 Key ornithological receptors identified during surveys

Species	Scientific Name	Conservation Status
Dunlin	*Calidris alpina*	Annex I of Birds Directive, SCI of Ballysadare Bay SPA and Red List with respect to breeding and wintering populations
Hen harrier	*Circus cyaneus*	Annex I of Birds Directive and Schedule 4 of Wildlife Acts
Merlin	*Falco columbarius*	Annex I of Birds Directive and Schedule 4 of Wildlife Acts
Kestrel	*Falco tinnunculus*	Red List with respect to breeding population and Schedule 4 of Wildlife Acts (1976-2021)
Red grouse	*Lagopus lagopus*	Red List with respect to breeding population
Snipe	*Gallinago gallinago*	Red List with respect to breeding and wintering populations
Buzzard	*Buteo buteo*	Schedule 4 of Wildlife Acts (1976-2021)
Sparrowhawk	*Accipiter nisus*	Schedule 4 of Wildlife Acts (1976-2021)

2.2 Operational Monitoring

Operational monitoring will be undertaken in Years 1, 2, 3, 5, 10 and (if applicable) 15 of the extended life of the wind farm, following SNH (2009) guidance. The surveys that will be undertaken at Dunneill are:

- Monthly flight activity surveys: vantage point surveys.
- Targeted bird collision monitoring (carcass searches) will be undertaken with trained dogs. The surveys will include detection and scavenger trials, to correct for these two biases and ensure the resulting data is robust.

2.2.1 Vantage Point Surveys

Vantage point surveys will be undertaken monthly during operational Years 1, 2, 3, 5, 10 and (if applicable) 15 of the extended life of the wind farm. Vantage point survey methodology will follow guidelines issued by SNH (2009; 2017): the 2021-2022 vantage point locations at Dunneill (VP1 & VP2) will be visited once per month for a 6-hour watch, amounting to 36 hours in the breeding season and 36 hours in the winter season. Surveys will be timed to provide a spread over the full daylight period, including dawn and dusk watches to coincide with the highest periods of bird activity from September to May inclusive. All bird flight activity will be recorded, including interactions with operational turbines.

2.2.2 Collision Monitoring

Carcass searches for bird casualties as a result of collision with turbines will follow survey methods broadly based on guidelines issued by the SNH (2009) and search methods adopted by Duffy and Steward (2008). The study area will be visited once per month during operational Years 1, 2, 3, 5, 10 and (if applicable) 15 of the extended life of the wind farm. During each visit, the base of each operating turbine will be searched for bird carcasses. The area to be searched will be based on the turbine size and surrounding landscape. A trained dog and handler should be used where possible to locate corpses.

If a bird corpse is found, the following details will be recorded: GPS location of each bird carcass, photographic record, carcass condition (intact - carcass that is completely intact or not badly composed; scavenged - evidence that the carcass was fed upon by a scavenger/predator; or feather spot - ten or more feathers indicating predation or scavenging or two or more primary feathers must be present to consider the carcass a casualty), distance from the turbine, date and time.

Carcass removal trials and searcher efficiency trials will be undertaken to account for the ability of the dog to find bird corpses and the likelihood of scavenging of corpses by animals. This is done to ensure a more accurate estimation of the total number of collision victims. During carcass removal trials, a carcass is placed in a study area periodically and is monitored for a set number of days or until scavengers remove the carcass. A determination on carcass removal is made when no body parts containing flesh or bone or >10 disarticulated feathers can be found. During searcher efficiency trials, a number of carcasses are placed in a study area by one worker, then searched for by the dog two days later. A 24-48 hour period between laying carcasses and searching for them will prevent the dog following the scent of the layer rather than the carcasses. The result of these trials is a correction factor that can be applied to the results of the carcass searches.

2.2.3 Summary

Table 7–6–2 summarises the proposed bird monitoring schedule for each monitoring year. Note that Year 15 only applies if the life of the wind farm is extended for 15 or more years.

Table 7 – 6 – 2 Proposed bird monitoring schedule

Survey	Phase	Period	Visits	Survey Method
Vantage point surveys	Year 1, 2, 3, 5, 10 & 15	All year	1 visit per month to all vantage points (VP1 & VP2)	6-hour vantage point watch, including dawn and dusk surveys between September and May.
Collision monitoring	Year 1, 2, 3, 5, 10 & 15	All year	1 visit per month to survey all turbine bases	Targeted carcass search at turbine base, with trained dog if possible.

2.3 Decommissioning Monitoring

Decommissioning monitoring surveys will be undertaken prior to works associated with decommissioning at the wind farm. The survey will include a thorough walkover survey to a 500m radius of the development footprint and all works areas, where access allows. If winter roosting or breeding activity of birds of high conservation concern is identified, the roost or nest site will be located and earmarked for monitoring at the beginning of the first winter or breeding season of the decommissioning phase. If it is found to be active during the decommissioning phase, no works shall be undertaken within a disturbance buffer (Forestry Commission Scotland, 2006; Ruddock and Whitfield, 2007) in line with industry best practice. No works shall be permitted within the buffer until it can be demonstrated that the roost/nest is no longer occupied.

2.4 Reporting

A report summarising the findings of bird monitoring surveys will be submitted to the Planning Authority at the end of each monitoring year (ie. Year 1, 2, 3, 5, 10 and [if applicable] 15). The report will provide the results of the surveys (vantage point surveys and collision monitoring) and discuss potential impacts on birds (particularly KORs) and any recommendations that may inform additional mitigation measures during the operational phase of the wind farm project.

3. BIBLIOGRAPHY

Duffy, K. and Steward, M. (2008). Turbine search methods and carcass removal trials at the Braes of Doune windfarm. Natural Research Information Note 4, Natural Research Ltd, Banchory, UK.

Forestry Commission Scotland (2006). Forest operations and birds in Scottish forests – the law and good practice. Forestry Commission Scotland, Scotland.

Ruddock, M. and Whitfield, D. P. (2007). A review of disturbance distances in selected bird species. Natural Research, Banchory, UK.

SNH (2009). Monitoring the impact of onshore wind farms on birds. Scottish Natural Heritage, Inverness, Scotland.

SNH (2017). Recommended bird survey methods to inform impact assessment of onshore wind farms. Scottish Natural Heritage, Inverness, Scotland

APPENDIX 11.1

NOISE COMPLIANCE MONITORING REPORT

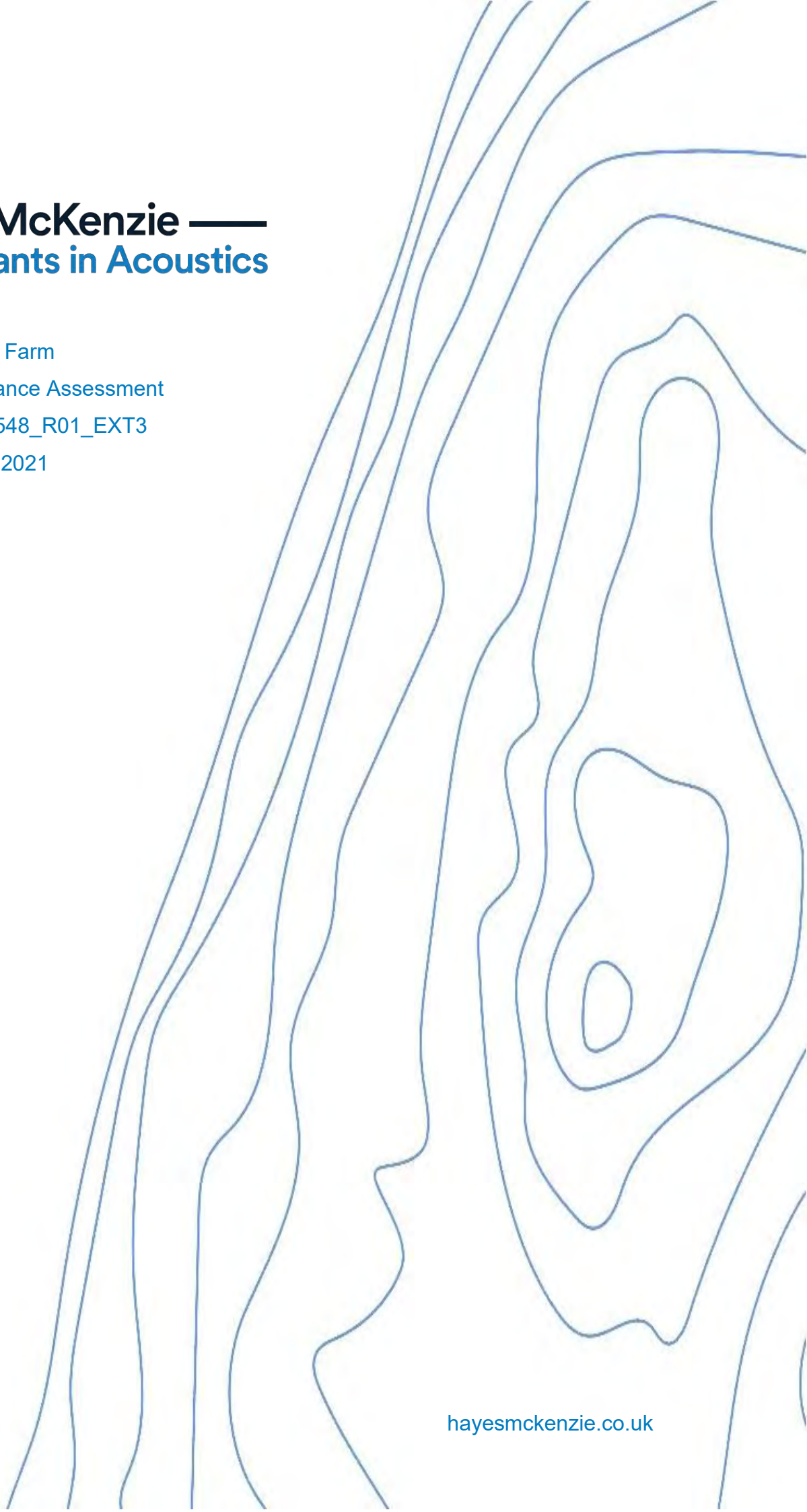
Hayes McKenzie
Consultants in Acoustics

Dunneill Wind Farm

Noise Compliance Assessment

Report HM: 3548_R01_EXT3

17 December 2021



hayesmckenzie.co.uk

Dunneill Wind Farm
Noise Compliance Assessment
Report HM: 3548_R01_EXT3,
17 December 2021

Prepared for: SSE Renewables
Red Oak South,
South County Business Park,
Leopardstown,
Dublin 18, Ireland

Report prepared by: Rob Shepherd MEng, MIOA
Associate

Checked by: Robin Woodward BSc, MIOA
Principal

Approved by: Andy McKenzie PhD, BSc, FIOA
Director

Unit 3, Oakridge Office Park, Whaddon, Salisbury SP5 3HT, UK
+44 (0)1722 710091, salisbury@hayesmckenzie.co.uk

1. EXECUTIVE SUMMARY

1.1 Hayes McKenzie Partnership Ltd (HMPL) have been appointed by SSE Renewables, the owners of Dunneill Wind Farm (planning consent reference PL 03/619), to carry out noise measurements at two dwellings neighbouring the site, as required periodically by the planning conditions, to determine whether the noise limits are being met during the operation of the wind farm.

1.2 The Dunneill Wind Farm consists of 13 turbines and became operational in 2010. The measurements and assessment have been undertaken with due regard to the planning conditions, submitted agreed methodology (included at Appendix B), and in accordance with relevant guidance relating to wind turbine noise (specifically Supplementary Guidance Note 5, *Post Completion Measurements*, of the Institute of Acoustics publication, *A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise*).

1.3 This report presents the results of the monitoring and assessment at two locations.

1.4 This report shows that operational noise levels are below the relevant planning limits at both measurement locations, and demonstrates that the wind farm is operating in compliance with the planning conditions.

2. INTRODUCTION

2.1 Dunneill Wind Farm consists of 13 wind turbines and was granted planning in 2010. A copy of the planning conditions accompanying the decision notice is provided at Appendix A.

2.2 The planning conditions on noise require periodic measurements to assess whether the site is operating within its planning conditions on noise.

2.3 Condition 12 imposed on the Dunneill Wind Farm planning consent states:

12(a) Noise levels emanating from the proposed development following commissioning,

when measured externally at a noise sensitive location, shall not exceed 40dBLAeq for a hub height wind speed of 5m/s or 45dBLAeq for a hub height wind speed of 8m/s.

(b) There shall be no discrete tones or impulses from the proposed development, both during the construction phase and following commissioning. If the noise contains a discrete, continuous note (whine, hiss, screech, hum, etc.) or if there are distinct impulses in the noise, a penalty of +5dB(A) shall be applied to the measured noise level. This increased noise level shall than be used in assessing compliance with the level specified above.

(c) A noise monitoring survey shall be carried out every 5 years over the life of the wind farm, or when otherwise directed by the Planning Authority. The first survey shall be carried out within one year of commissioning of the proposed development. Noise levels during the operation of the windfarm shall be monitored over a range of wind and weather conditions to profile the actual noise detectable at dwellings within 500m of the proposed turbines. The extent and timing of each survey, and monitoring sites used shall be agreed with the Planning Authority in advance. The results of each survey shall be submitted to the Planning Authority within one month of completion of the survey.

(d) An intensive baseline survey shall be carried out at all dwellings located within 500m of the windfarm prior to its construction. The details of this survey shall be agreed in advance with the Planning Authority.

(e) Where it is suspected that the proposed development is the source of excessive noise at a noise sensitive location, or where circumstances have altered, the developer shall undertake a noise monitoring survey if so directed by the Planning Authority. The survey and monitoring sites used shall be agreed with the Planning Authority in advance. The results of the survey shall be submitted to the Planning Authority within one month of completion of the survey. If monitoring shows that the permitted sound level has been exceeded, the offending turbine shall be decommissioned immediately and measures to restore permitted levels shall be taken.

(F) During the construction phase noise levels shall not exceed the background noise level by more than 6dB (A) at any time when measured at any external position at an occupied dwelling. The background levels shall be measured in the absence of any noise from the site on days and at times when construction operations would normally be carried out on the site.

Reason: In order to prevent noise pollution.

2.4 A noise compliance assessment methodology was submitted to and agreed with Sligo County

Council, and this is included at Appendix B. The agreed methodology applies a conversion of the L_{Aeq} noise limits to equivalent L_{A90} noise limits by subtracting 2 dB, as wind farm operational noise measurements are generally carried out using the L_{A90} index to minimise the influence of transient, non-wind farm, related sounds. The resultant noise limits are therefore 38 dB L_{A90} for a hub height wind speed of 5 m/s and 43 dB L_{A90} for a hub height wind speed of 8m/s.

3. NOISE SURVEY

3.1 Noise measurements were carried out at two properties, H42 and H43. The noise measurement locations, and the wind turbines, are shown at Figure 1. A description of the siting of the monitoring equipment, and the measurement procedure, is given below. The coordinate locations of the measurement locations are shown at Table 1 below.

Figure 1 – Noise Measurement & Wind Turbine Locations

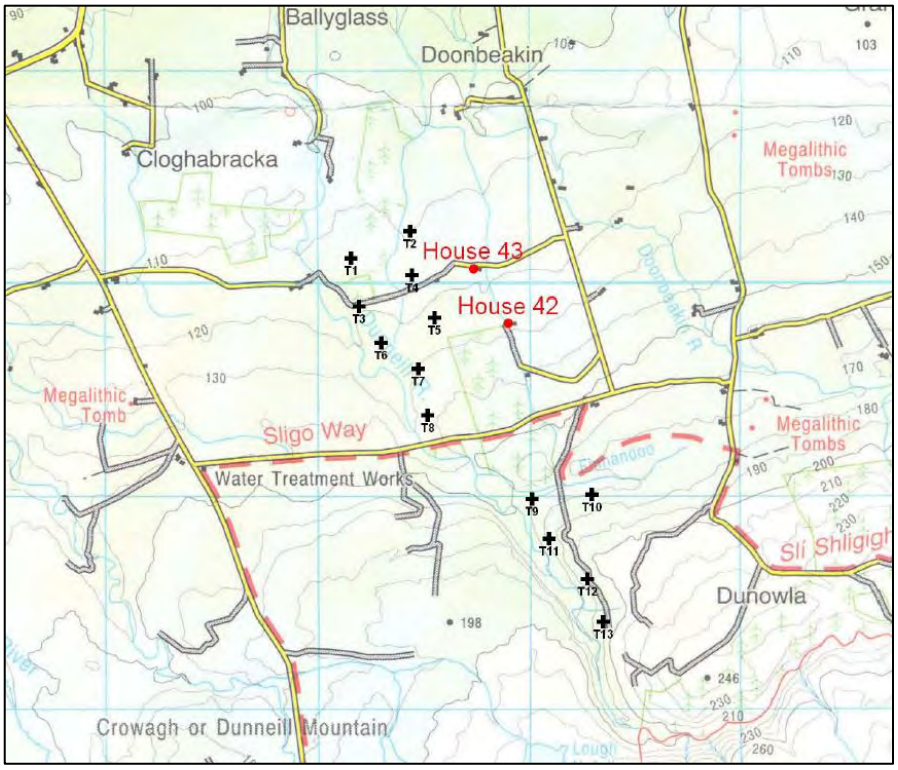


Table 1 – Grid References for Each Turbine and Measurement Location

Location	Latitude	Longitude
House 42	54.21446	-8.84494
House 43	54.21666	-8.84758

Noise Measurement Positions

H42

3.2 H42 is located to the east of the northern turbines. The equipment was located in the garden area to the north east of the property and located away from nearby tall trees as much as possible. This was approximately the same location as has been used previously, and was about 15 m from the building façade and, therefore, in free-field conditions. Photos of the measurement location setup is shown at Figure 2. The dominant noises noted at installation and collection of the equipment were from wind in the trees, birdsong, livestock, running water from the nearby watercourse, and at collection of the equipment it was noted that the turbines were audible but not subjectively dominant compared to other noise.

Figure 2 –Noise Measurement Setup at H42

H43

3.3 H43 is located to the east of the northern wind turbines. The noise monitoring equipment was located in the garden area to the north of the property, on the edge of a lawned area adjacent to a low wooden fence and track, and was about 8 m from the building façade and, therefore, in free-field conditions. The measurement setup is shown at Figure 3. The dominant noises

noted at installation and collection of the equipment were from wind in the trees, distant running water, and distant livestock and a dog barking. At collection of the equipment it was noted that the turbines were audible but not subjectively dominant compared to other noise.

Figure 3 – Noise Measurement Setup at H43

Instrumentation

3.4 The noise measurements were made with RION model NL-52 Sound Level Meters, fitted with 1/2" microphones, which comply with the Class 1 standard in IEC 61672-1:2002[1]. The microphones were fitted with a 45 mm radius foam ball windshield surrounded by a 125 mm radius secondary windshield of 40 mm thickness (based on recommended design specifications within ETSU W/13/00386/REP[2]) and mounted on a tripod at a height of approximately 1.3 metres above ground level.

3.5 The laboratory calibration details for the measurement equipment is detailed at Table 2 below.

Table 2 – Calibration details of measurement equipment

Location and Equipment Reference	Equipment Type	Equipment Details	Serial Number	Calibration Date	Calibration Due Date
H42 HMP 48	Sound Level Meter	Rion NL-52	00231707	09/09/2021	09/09/2023
	Microphone	Rion UC- 59	04776		
	Microphone Preamp	Rion NH-25	21655		
H43 HMP 60	Sound Level Meter	Rion NL-52	00420658	15/07/2021	15/07/2023
	Microphone	Rion UC-59	03438		
	Microphone Preamp	Rion NH-25	10691		
TTC	Calibrator	B&K 4231	2218188	16/12/2020	16/12/2021

3.6 Rainfall data was collected over the period of the noise monitoring survey using Dryptych Pluvimate rain gauges at each location. The rain gauges are very sensitive, being able to measure as little as 0.006 mm of rainfall, and were programmed to give an average reading for each 10-minute interval.

Measurement Procedure

3.7 The measurement equipment was installed at both locations on 6th October 2021 and collected on 4th November 2021 when sufficient data had been collected.

3.8 The sound level meters were programmed to measure a number of statistical noise indices, including the L_{A90}, together with the maximum and minimum levels and the L_{Aeq}, over consecutive 10-minute intervals. Results were automatically stored at the end of each interval and the equipment was time-synchronised to the turbine Supervisory Control and Data Acquisition (SCADA) systems.

[1] IEC 61672-1:2002, Sound level meters - Part 1: Specifications, International Electrotechnical Commission, 2002
[2] ETSU W/13/00386/REP, Noise Measurements in Windy Conditions, Davis R A, Lower M C, 1996

3.9 Field calibration of the noise measurement equipment was carried out before the monitoring period commenced, and was checked at the end of the survey. Changes of no more than 0.1 dB were noted at either location, which is well within normal tolerances.

3.10 Operational data has been supplied by the wind farm operator, taken from the turbine SCADA system, in 10-minute intervals, which included wind speed at the hub height of each of the wind turbines, nacelle position (degrees), and active power output (kW). The hub height wind speed was calculated from the power derived wind speed and corrected nacelle anemometer wind speed in line with IEC 61400-11 (Section 8.2.1). The power corrected hub height wind speed was averaged across turbines 1 to 8. Wind direction was taken as the average nacelle position of the turbines 1 to 8.

4. DATA ANALYSIS AND FILTERING

Rainfall

4.1 Any 10 minute interval where rainfall was recorded at either measurement location has been removed from the derivation of the overall operational at both locations.

Directional Filtering

4.2 The data for each measurement location was filtered to leave only data when it was downwind of the turbines. The operational downwind periods were identified by excluding all data collected during periods where the average wind direction across all turbines from the SCADA system was outside the range of values from the dwelling to the turbines plus 45° on each side. The calculated downwind angles are shown at Table 3 below.

Table 3 – Downwind Angles for Each Measurement Location

Location	Downwind Direction
N42	127-340°
H43	123-327°

4.3 It should be noted that including only wind directions where the measurement location is downwind of the wind farm ensures that worst-case turbine noise levels are assessed. For wind directions where the property is upwind of the wind farm, the propagation conditions could be expected to attenuate (reduce) noise from the wind turbines.

Turbine Data Filtering

4.4 Noise emission from the site are dependent on the operating conditions of the turbines. To allow the operating conditions to be determined, the power outputs of the turbines were considered for each 10-minute interval.

4.5 A 6th order polynomial regression between 4 and 15 m/s hub height wind speeds was derived through the power curve for the installed turbines to encompass from cut-in and up to the maximum power output of the turbine. This regression was then used to assign a minimum accepted power for each wind speed based on tolerance values. The tolerance was set as the regression value minus 0-200 kW, depending on wind speed. The values were chosen by reviewing the measured power output of the turbines against wind speed to determine tolerance values whereby, if the power output was below this value, it was clear that the turbine was not operating normally for the 10 minute interval. These minimum accepted power values were then used to derive a second 6th order polynomial regression. Where the active output power values fell below this second regression, the turbines were deemed as not operating normally, and could occur if the turbine was stopped for part of a 10-minute interval or running in a reduced power mode. The power curve for the installed turbines and minimum accepted power values are shown at Table 4 below.

Table 4 –Power Curve and Power Filtering Values (kW)

Data	Hub Height Wind Speed (m/s)															
	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Power Curve Values	0	26	67	125	203	304	425	554	671	759	811	836	846	849	850	850
Tolerance	0	0	30	50	75	100	100	100	100	100	75	50	50	50	50	50
Minimum Power deemed Operational	0	26	37	75	128	204	325	454	571	659	736	786	796	799	800	800

4.6 If turbines 1 to 8 were operating above the minimum accepted power output (shown at Table 4), then the wind farm was considered ‘operational’ for the purposes of the assessment.

4.7 Under any other conditions some turbines were deemed to not be operating at full capacity, and therefore the data was excluded from any further analysis. In reality, these ‘other conditions’ are most commonly caused by:

- Scheduled shut down of one or more turbine for maintenance or similar
- Periods either side of scheduled shut downs where the turbine has been stopped for part of the 10 minute period and operational for the rest of the period.

4.8 It should also be noted that data from any turbine that was classified as neither operating

normally nor shut down were excluded from calculation of the average wind speed and nacelle position over the duration of the survey.

5. ASSESSMENT

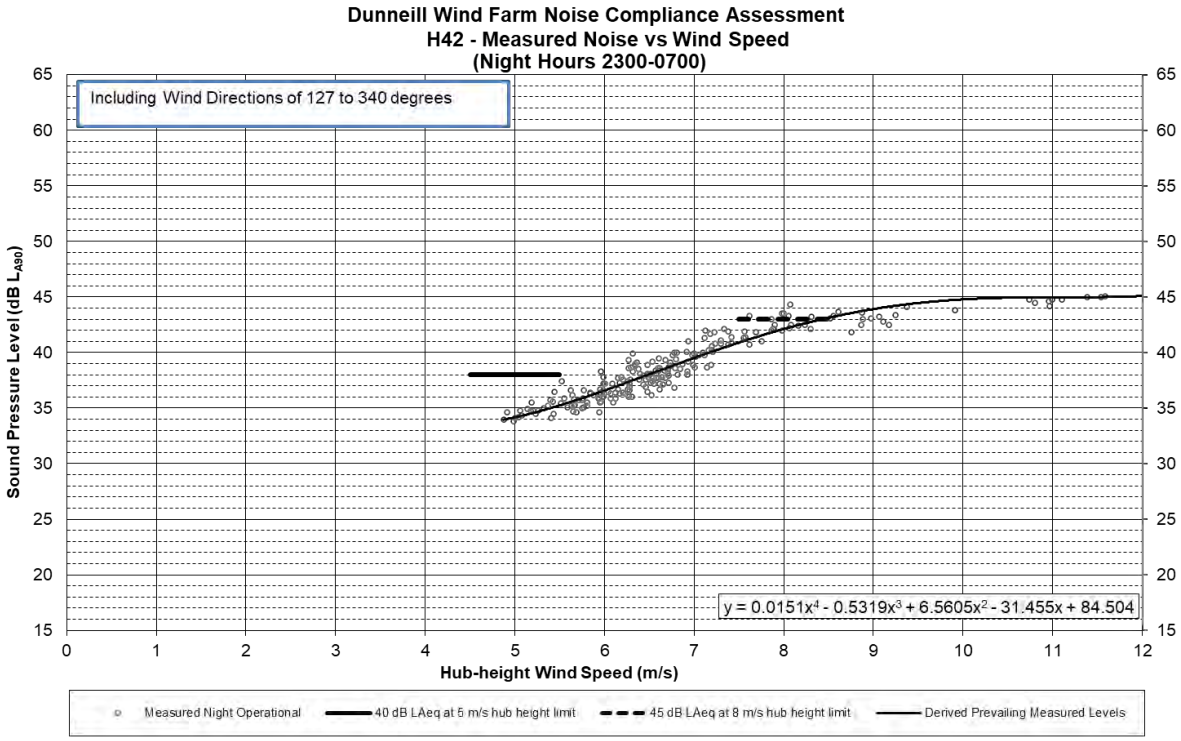
5.1 The measured operational night-time 10-minute L_{A90} noise levels have been plotted against the average hub height wind speeds (as referred to in the planning conditions and calculated from the average power derived or corrected nacelle anemometer wind speed data from the SCADA system). It should be noted that the measured operational noise levels include all sources of noise in the area and not just noise from the wind turbines. The night hours data forms the primary assessment as other non-wind related sources of noise are usually at a minimum at night, whereas the noise from the wind farm remains the same, for the same wind conditions, irrespective of time of day.

Analysis Results

Location H42

5.2 Figure 4 shows the measured night-hours operational and a best fit curve through the data points (the derived prevailing measured levels) for the downwind conditions (detailed at Table 3), and the relevant noise limits.

Figure 4 – Noise Assessment Chart: Night Hours, H42



5.3 The results show that the derived prevailing measured noise levels are below the relevant noise limits. The results are presented in tabular form at Table 5 below.

Table 5 – Binned Assessment Results – H42 (dB L_{A90})

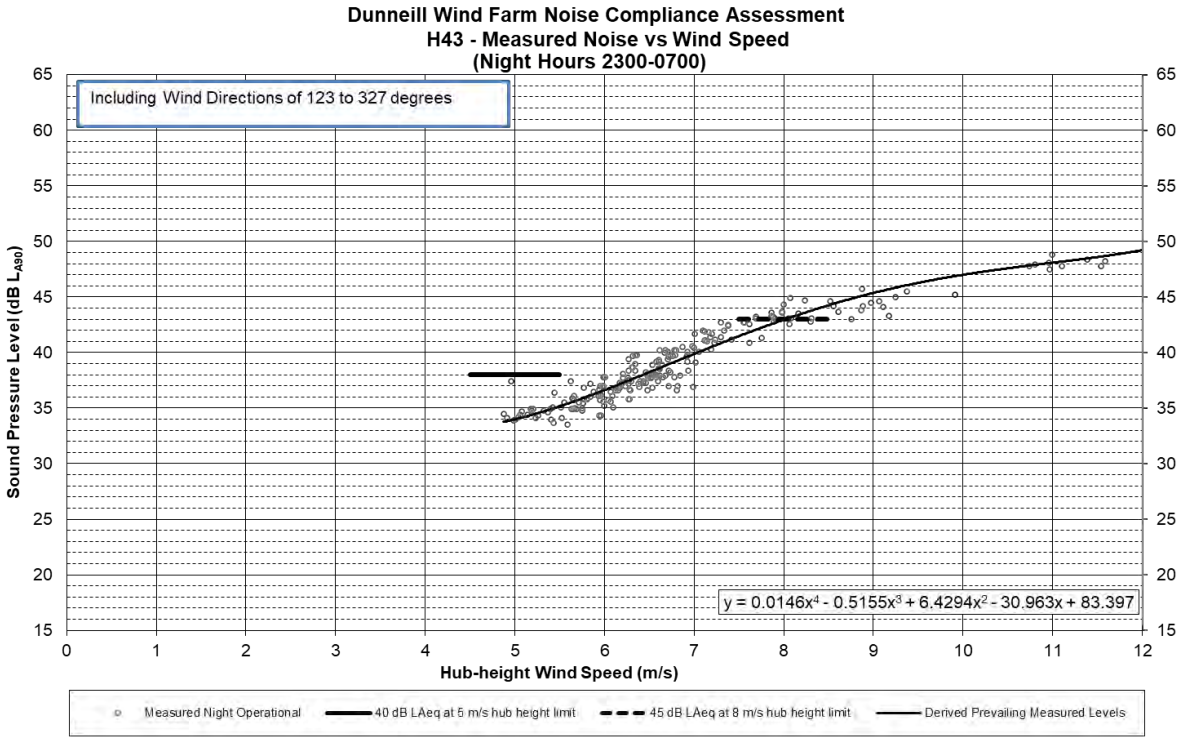
Data	Bin Centre Hub Height Integer Wind Speed (m/s)	
	5	**8**
Average Measured Noise Level (dB L_{A90})	35	42
Number of Data Points	20	24
Noise Limit (dB L_{A90})	38	43
Margin to Noise Limit (dB)	3	1

5.4 The results show that the measured night operational noise levels (which include both wind turbine and background noise) were below the relevant limits by a minimum margin of 1 dB.

Location H43

5.5 Figure 5 shows the measured night operational and derived prevailing measured levels for the downwind conditions (detailed at Table 3), and the relevant noise limits.

Figure 5 – Noise Assessment Chart: Night Hours, H43



5.6 The results show that the derived prevailing measured noise levels are below the relevant noise limits. The results are presented in tabular form at Table 6 below.

Table 6 – Binned Assessment Results – H43 (dB L_{A90})

Data	Bin Centre Hub Height Integer Wind Speed (m/s)	
	5	**8**
Average Measured Noise Level (dB L_{A90})	35	43
Number of Data Points	21	23
Noise Limit (dB L_{A90})	38	43
Margin to Noise Limit (dB)	3	0

5.7 The results show that the measured night operational noise levels (which include both wind turbine and background noise) were below the relevant limits at 5 m/s and meet the limits at 8 m/s.

Additional Results

5.8 The noise limits are specified as L_{Aeq} limit values, however L_{Aeq} is not typically used for the measurement of wind turbine noise, as the L_{Aeq} is easily influenced by 'loud' short term noise

events, which are unlikely to originate from modern wind turbines when measuring in the far-field. Despite this, the results using the L_{Aeq} metric are presented graphically for H42 and H43 at Figure 6 and Figure 7 respectively, and also the binned results are shown at Table 7 and Table 8.

Figure 6 – Noise Assessment Chart: Night Hours, H42 (L_{Aeq})

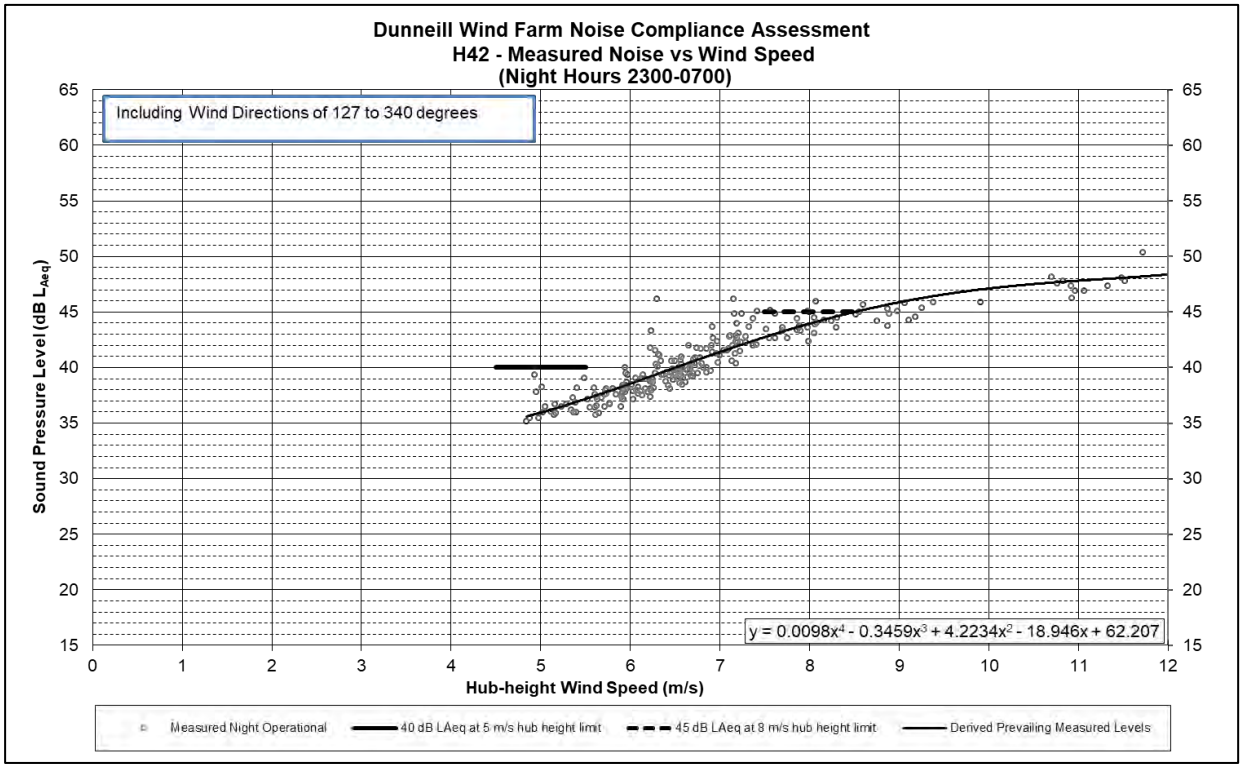


Table 7 – Binned Assessment Results – H42 (dB L_{Aeq})

Data	Bin Centre Hub Height Integer Wind Speed (m/s)	
	5	**8**
Average Measured Noise Level (dB L_{Aeq})	37	44
Number of Data Points	21	26
Noise Limit (dB L_{Aeq})	40	45
Margin to Noise Limit (dB)	3	1

Figure 7 – Noise Assessment Chart: Night Hours, H43 (L_{Aeq})

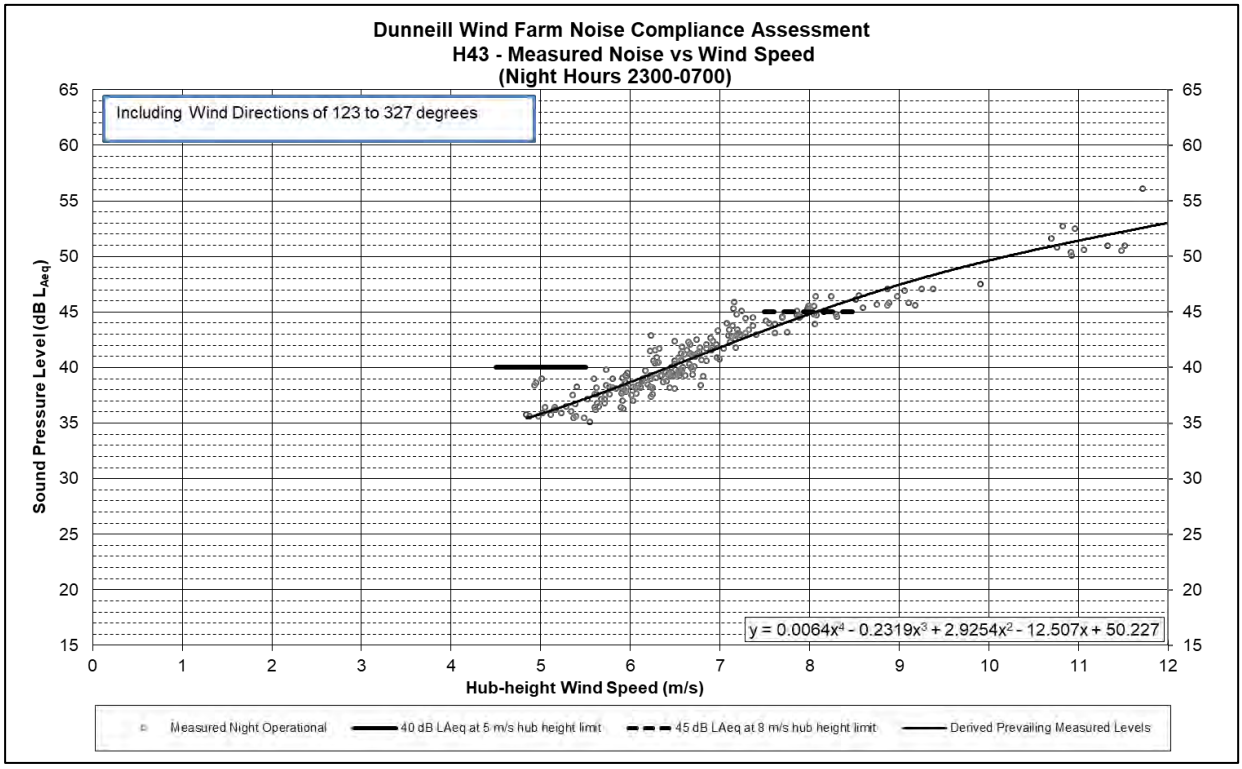


Table 8 – Binned Assessment Results – H43 (dB L_{Aeq})

Data	Bin Centre Hub Height Integer Wind Speed (m/s)	
	5	**8**
Average Measured Noise Level (dB L_{Aeq})	37	45
Number of Data Points	21	25
Noise Limit (dB L_{Aeq})	40	45
Margin to Noise Limit (dB)	3	0

5.9 The results show that the relevant noise limits are met when measured L_{Aeq} noise levels are compared with the L_{Aeq} noise limits.

5.10 For information, the results are also shown graphically at Figure 8 to Figure 15 in Appendix C for the evening and daytime periods, although as noted above, the night hours periods has been used as the primary assessment period due to the lower influence from non-wind farm related noise sources.

6. CONCLUSIONS

6.1 Routine noise measurements have been undertaken at two residential properties near to the operational Dunneill Wind Farm, as required by the planning conditions.

6.2 The measurements and assessment have been undertaken with regard to the planning conditions, the submitted and agreed measurement and assessment methodology and, where appropriate, in accordance with relevant guidance relating to wind turbine noise.

6.3 The results of the noise measurements show that operational noise levels meet the relevant noise limits at both locations, and therefore it has been shown that the wind farm is operating in compliance with the planning conditions relating to noise at these locations.

Appendix A

Planning Conditions Relating to Noise

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Reason: To enable the impact of the development to be re-assessed, having regard to changes in technology and design during the period of twenty years.

9. In the event of the wind power generators remaining unused for a period exceeding 12 months, all proposed structures, including foundations, shall be removed and the site reinstated to the satisfaction of the planning authority.

Reason: In the interest of visual amenity.

10. Upon termination of the use of the wind farm, the mast and turbines shall be dismantled and removed from the site and the site shall be restored to its existing condition in consultation with the planning authority. Prior to the commencement of development, the developer shall lodge with the planning authority, a cash deposit, a bond of an insurance company, or other security to secure the satisfactory reinstatement of the site on the cessation of the project. The amount of the security shall be 100,000 euro.

In the interest of orderly development and visual amenity and to ensure that the structures do not remain on-site in the event of the development not supplying electricity to the national grid.

11. Prior to commencement of development details showing how shadow flicker will be avoided at any nearby house at any time shall be submitted to the Planning Authority. In this regard, a shadow stop device programmed with appropriate baseline data shall be incorporated in to the control system of the turbines.

Reason: In the interest of residential amenity

12(a). Noise levels emanating from the proposed development following commissioning, when measured externally at a noise sensitive location, shall not exceed 40dBL_{Aeq} for a hub height wind speed of 5m/s or 45dBL_{Aeq} for a hub height wind speed of 8m/s.

(b). There shall be no discrete tones or impulses from the proposed development, both during the construction phase and following commissioning. If the noise contains a discrete, continuous note (whine, hiss, screech, hum, etc.) or if there are distinct impulses in the noise, a penalty of +5dB(A) shall be applied to the measured

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noise level. This increased noise level shall than be used in assessing compliance with the level specified above.

(c). A noise monitoring survey shall be carried out every 5 years over the life of the wind farm, or when otherwise directed by the Planning Authority. The first survey shall be carried out within one year of commissioning of the proposed development. Noise levels during the operation of the windfarm shall be monitored over a range of wind and weather conditions to profile the actual noise detectable at dwellings within 500m of the proposed turbines. The extent and timing of each survey, and monitoring sites used shall be agreed with the Planning Authority in advance. The results of each survey shall be submitted to the Planning Authority within one month of completion of the survey.

(d). An intensive baseline survey shall be carried out at all dwellings located within 500m of the windfarm prior to its construction. The details of this survey shall be agreed in advance with the Planning Authority.

(e). Where it is suspected that the proposed development is the source of excessive noise at a noise sensitive location, or where circumstances have altered, the developer shall undertake a noise monitoring survey if so directed by the Planning Authority. The survey and monitoring sites used shall be agreed with the Planning Authority in advance. The results of the survey shall be submitted to the Planning Authority within one month of completion of the survey. If monitoring shows that the permitted sound level has been exceeded, the offending turbine shall be decommissioned immediately and measures to restore permitted levels shall be taken.

(f). During the construction phase noise levels shall not exceed the background noise level by more than 6dB (A) at any time when measured at any external position at an occupied dwelling. The background levels shall be measured in the absence of any noise from the site on days and at times when construction operations would normally be carried out on the site.

Reason: In order to prevent noise pollution.

13(a). Buffer zones should be in place throughout the construction period on all aquatic zones, the minimum distance shall be 25m.

Appendix B

Agreed Compliance Assessment Methodology

Dunneill Wind Farm

Noise Assessment Protocol

for SSE

Rob Shepherd, Hayes McKenzie Partnership Ltd

3548_N01_EXT2, 27 August 2021

1. INTRODUCTION

1.1 Hayes McKenzie Partnership Ltd (HMPL) have been appointed by SSE, the operators of Dunneill Wind Farm in County Sligo, to carry out operational noise measurements as required by the planning conditions on noise which require periodic measurement of noise from the wind farm.

1.2 This document contains the details of the proposed measurement locations and assessment protocol for agreement with Sligo County Council.

1.3 The noise assessment will be carried out with reference to the Planning Conditions, and will take into account relevant recommendations contained within the Department of the Environment *Heritage and Local Government, Wind Energy Planning Guidelines* and current best practice guidance which includes *Supplementary Guidance Note 5, Post Completion Measurements*, to the UK Institute of Acoustics (IOA) publication, *A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise* (GPG).

2. PLANNING CONDITIONS AND APPLIED LIMITS

Planning Conditions

2.1 Condition 12 imposed on the Dunneill Wind Farm planning consent states:

12(a) Noise levels emanating from the proposed development following commissioning, when measured externally at a noise sensitive location, shall not exceed 40dBL_{Aeq} for a hub height wind speed of 5m/s or 45dBL_{Aeq} for a hub height wind speed of 8m/s.

(b) There shall be no discrete tones or impulses from the proposed development, both during the construction phase and following commissioning. If the noise contains a discrete, continuous note (whine, hiss, screech, hum, etc.) or if there are distinct impulses in the noise, a penalty of +5dB(A) shall be applied to the measured noise level. This increased noise level shall than be used in assessing compliance with the level specified above.

(c) A noise monitoring survey shall be carried out every 5 years over the life of the wind farm, or when otherwise directed by the Planning Authority. The first survey shall be carried out within one year of commissioning of the proposed development. Noise levels during the operation of the windfarm shall be monitored over a range of wind and weather conditions to profile the actual noise detectable at dwellings within 500m of the proposed turbines. The extent and timing of each survey, and monitoring sites used shall be agreed with the Planning Authority in advance. The results of each survey shall be submitted to the Planning Authority within one month of completion of the survey.

(d) An intensive baseline survey shall be carried out at all dwellings located within 500m of the windfarm prior to its construction. The details of this survey shall be agreed in advance with the Planning Authority.

(e) Where it is suspected that the proposed development is the source of excessive noise at a noise sensitive location, or where circumstances have altered, the developer shall undertake a noise monitoring survey if so directed by the Planning Authority. The survey and monitoring sites used shall be agreed with the Planning Authority in advance. The results of the survey shall be submitted to the Planning Authority within one month of completion of the survey. If monitoring shows that the permitted sound level has been exceeded, the offending turbine shall be decommissioned immediately and measures to restore permitted levels shall be taken.

(F) During the construction phase noise levels shall not exceed the background noise level by more than 6dB (A) at any time when measured at any external position at an occupied dwelling. The background levels shall be measured in the absence of any noise from the site on days and at times when construction operations would normally be carried out on the site.

Reason: In order to prevent noise pollution.

Applied Limits

2.2 Measurements of wind farm operational noise are usually[1] carried out using the L_{A90} noise index, which represents the noise level exceeded for 90% of the time over a given time interval. The L_{A90} noise index is used as it removes the contribution from transient noise sources not connected with the operation of the wind turbines, whereas the L_{Aeq} can be significantly affected by transient or other noise events over the measurement period.

[1] See Department of the Environment Heritage and Local Government, Wind Energy Planning Guidelines, 2006

2.3 It is therefore proposed that the noise limits are converted to equivalent L_{A90} noise limits for the purposes of the compliance assessment by subtracting 2 dB in accordance with the IOA GPG[2]. The resultant noise limits are therefore 38 dB L_{A90} for a hub height wind speed of 5 m/s and 43 dB L_{A90} for a hub height wind speed of 8m/s.

3. NOISE MEASUREMENT POSITIONS

3.1 Operational noise measurements required according to planning condition 12(C) were previously carried out at 2 noise sensitive locations identified by the planning authority, and it is proposed that the same measurement locations are used.

3.2 The turbine and proposed noise measurement locations (known as House 42 and House 43) are shown at Figure 1 below.

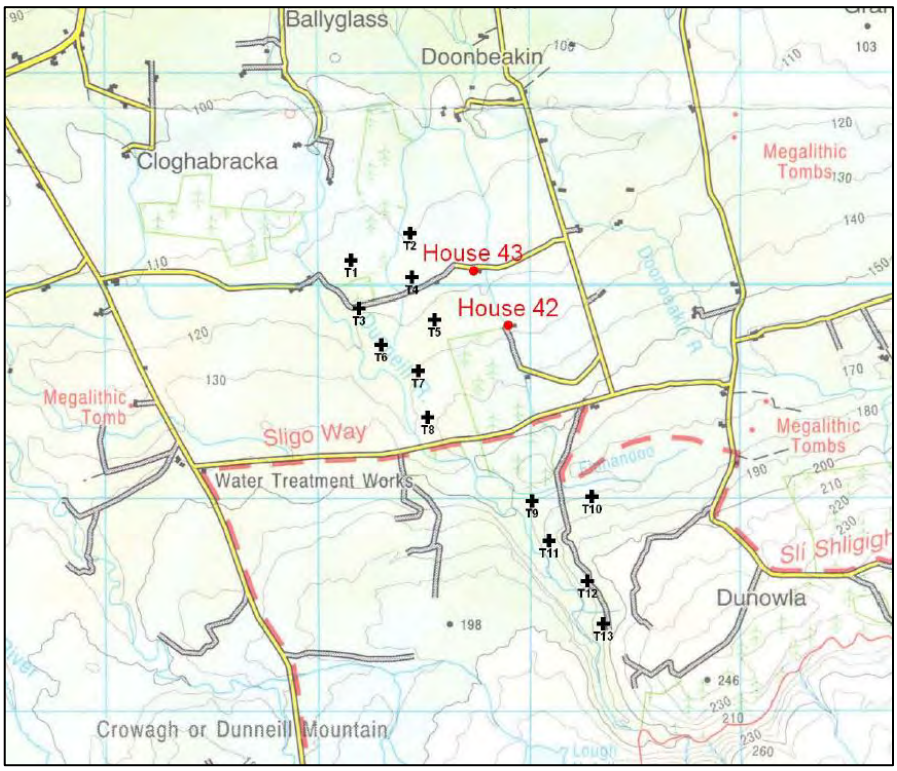

Figure 1 – Proposed Noise Measurement Locations

3.3 The noise measurements will be made using Rion NL-52 Class 1 sound level meters with a traceable calibration within the last 2 years. The data recorded will include 10 minute L_{A90} and L_{Aeq} values. Each sound level meter will be fitted with a ½" microphone mounted within a double

[2] See paragraph 4.2.5 of the UK Institute of Acoustics, *A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Noise from Wind Turbines*, 2013

skin wind shield compliant with the ETSU W/13/00386/REP *Noise Measurements in Windy Conditions* (1996) guidance. The wind shield and microphone will be mounted on a tripod at a height of 1.2-1.5 m above ground level, at least 3.5 m from the nearest building façade, in free-field conditions.

4. MEASUREMENT PROTOCOL

Wind Speed

4.1 Measured operational noise levels will be correlated with the average hub height wind speeds derived from the nearest wind turbines, as these are the turbines that are likely to contribute the most noise at the measurement locations. It is intended that the turbine hub-height wind speed will be calculated from the power derived wind speed in line with the methodology described in IEC 61400-11[3] and IOA GPG SGN5[4].

Wind Direction

4.2 Wind direction will also be taken from the average of the nacelle positions of the nearest turbines.

4.3 It may be necessary to filter measured noise levels for wind direction to evaluate compliance under different wind direction conditions. The primary wind direction condition is considered to be where the measurement location is downwind of the wind farm as this is when operational noise levels at the measurement location are likely to be highest. Any wind direction filtering will be described in the report.

Rain

4.4 A rain gauge will be installed near each of the noise measurement locations. They will log rainfall in 10 minute periods throughout the survey and any period where rainfall is logged will be excluded from the analysis.

Turbine Operation

4.5 Turbine operation will generally be determined for each 10 minute period as either 'On', 'Off' or 'Neither' depending on whether the wind turbine output data shows it to be above a pre-determined power output and/or rotor RPM to indicate normal operation, showing negligible power output and/or close to 0 RPM, or some state matching neither criteria, respectively. Only periods during which all turbines are 'On' will be used to assess total noise levels against the

[3] IEC61400-11: Wind Turbines – Part 11:2013+A1:2018: Acoustic noise measurement techniques

[4] Supplementary Guidance Note 5, *Post Completion Measurements*, of the Institute of Acoustics publication, *A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise*

noise limits. Periods where all turbines are 'Off' may be used to establish background noise levels (see 5.2 below). All other periods will be excluded from further analysis.

4.6 The power output and RPM range to determine the turbine operation varies between different turbine makes and models, is dependent on any site specific operation, and the actual values used will be detailed within the compliance report.

Extraneous Noise Exclusions

4.7 Where noise from extraneous sources, un-related to turbine operation, is apparent in the measured noise data these will be excluded from the analysis. These extraneous noises manifest as unusually elevated noise levels uncorrelated with wind speed. Additionally, should specific times of day show elevated noise levels, which are clearly not related to the wind farm; these periods will also be excluded from the analysis. All exclusions will be detailed within the report.

Background Noise Measurements

4.8 It may be necessary to establish background noise levels (i.e. noise levels without the wind turbines operating) if measured noise levels are above the planning condition noise limits which apply to noise from the wind turbines and not the total noise including background noise. The background noise levels will be used for calculating the background noise correction to the measured operational noise levels.

Required Data-Set

4.9 There are no set specific requirements for the number of data points that should be collected as the amount of data required depends on the spread of data measured. A typical requirement for a valid data set is a minimum of about 10 data points per wind speed bin, and therefore it will be considered that sufficient data is collected once 10 operational data points have been collected in each of the 5 and 8 m/s hub height wind speed bins. However, this requirement may need to be adjusted if the measured noise data shows large unexpected spread.

5. ANALYSIS

Assessment against Limits

5.1 Once extraneous noise, turbine operation, wind direction and rainfall exclusions have been carried out, the remaining total measured noise levels during turbine 'On' conditions will be correlated with the hub height average wind speed for the day (07:00 – 18:00), evening (18:00 – 23:00) and night (23:00 – 07:00) data periods. The average measured noise level will be calculated for each of the 5 and 8 m/s hub height wind speed bins. The night hours operational

noise levels will form the primary assessment as use of the night data minimises the effect from other noise sources, whilst still including turbine noise on the basis that it will not vary between day and night. This provides the simplest and most robust assessment. If it becomes apparent that the use of the night hours data-set as the primary assessment is not appropriate, then further analysis or exclusions may be required to ensure a robust assessment, all of which will be detailed within the compliance report.

Background Noise Correction

5.2 Should the measured noise levels, whilst all turbines are operating normally, exceed the noise limits at the measurement location, then the measured background noise levels will be used to allow a background noise correction to be carried out. The background noise level will be calculated as the average noise level in each of the 5 and 8 m/s hub height wind speed bins. These background noise levels will then be subtracted logarithmically from the binned operational noise levels to determine the contribution from the turbines. This process will be detailed further within the compliance report if used.

5.3 Where background noise levels measured during shut downs are within 3 dB of the overall measured operational levels it is not possible to calculate the wind farm noise level, as the correction is unreliable for such small differences. In this case, where background noise levels measured are within 3 dB of the operational noise levels for any wind speed, the wind farm will be deemed to be compliant at these wind speeds and indicates that turbine noise is equal to or below background noise.

6. OTHER WIND FARM CHARACTER

Tonal component

6.1 It is assumed that there is no significant tonal content from the installed wind turbines. Audio data will be recorded, such that tonal analysis could be undertaken if necessary, but it will not be assessed unless required.

Amplitude Modulation

6.2 The noise limits do not contain limits for amplitude modulation (AM) of the wind turbine noise and therefore AM will not be assessed, although the necessary data to enable an AM assessment to be undertaken may be captured.

7. REPORTING

7.1 A report will be submitted within 1 month of completion of the survey, unless the timeframe is extended in agreement with Sligo County Council.

7.2 The report will describe the equipment used for the noise measurements, the analysis of the measured data, and assessment of compliance against the noise limits specified within the planning conditions.

Appendix C

Additional Noise Assessment Results

Evening and Daytime Periods L_{A90} & L_{Aeq}

Figure 8 – Noise Assessment Chart: Evening Hours, H42 L_{A90}

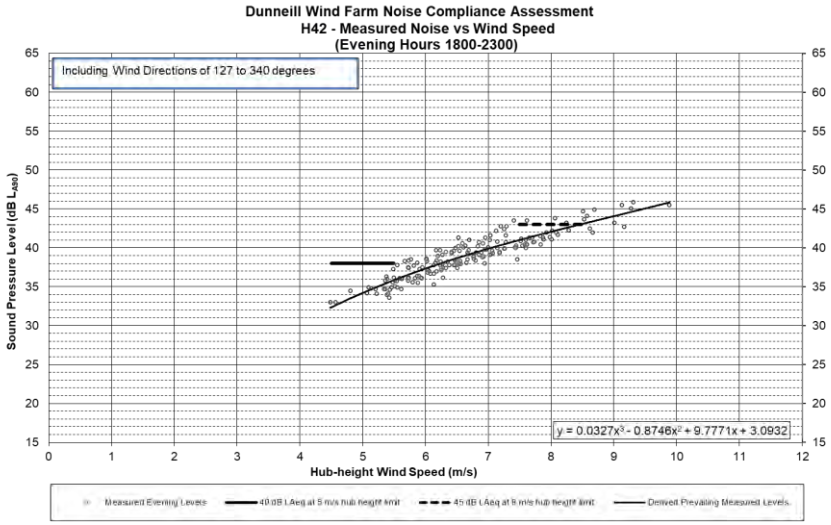

Figure 9 – Noise Assessment Chart: Evening Hours, H43 L_{A90}

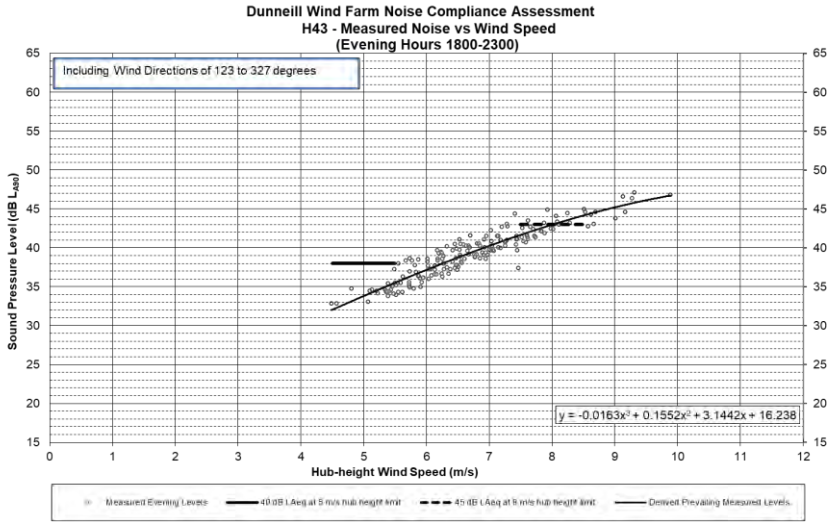

Table 9 – Evening Binned Assessment Results – H42 (dB L_{A90})

Data	Bin Centre Hub Height Integer Wind Speed (m/s)	
	5	8
Average Measured Noise Level (dB L_{A90})	35	41
Number of Data Points	20	26
Noise Limit (dB L_{A90})	38	43
Margin to Noise Limit (dB)	3	2

Table 10 – Evening Binned Assessment Results – H43 (dB L_{A90})

Data	Bin Centre Hub Height Integer Wind Speed (m/s)	
	5	8
Average Measured Noise Level (dB L_{A90})	35	42
Number of Data Points	20	26
Noise Limit (dB L_{A90})	38	43
Margin to Noise Limit (dB)	3	1

Figure 10 – Noise Assessment Chart: Daytime Hours, H42 L_{A90}

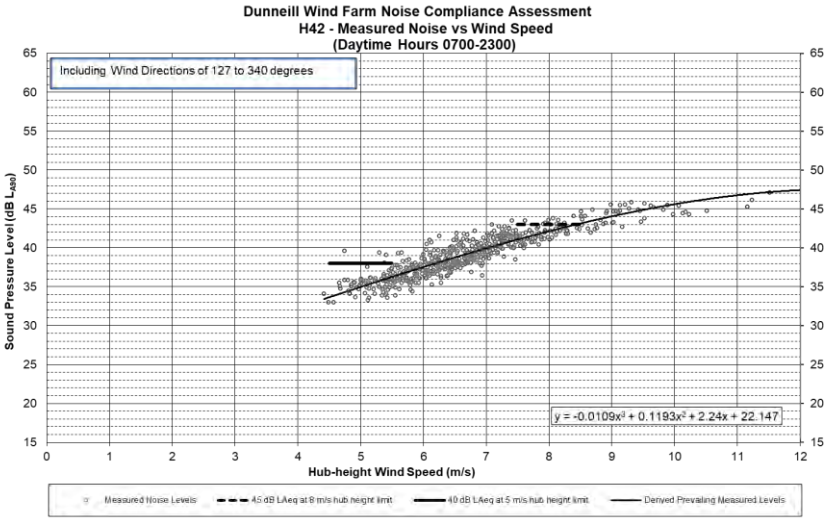

Figure 11 – Noise Assessment Chart: Daytime Hours, H43 L_{A90}

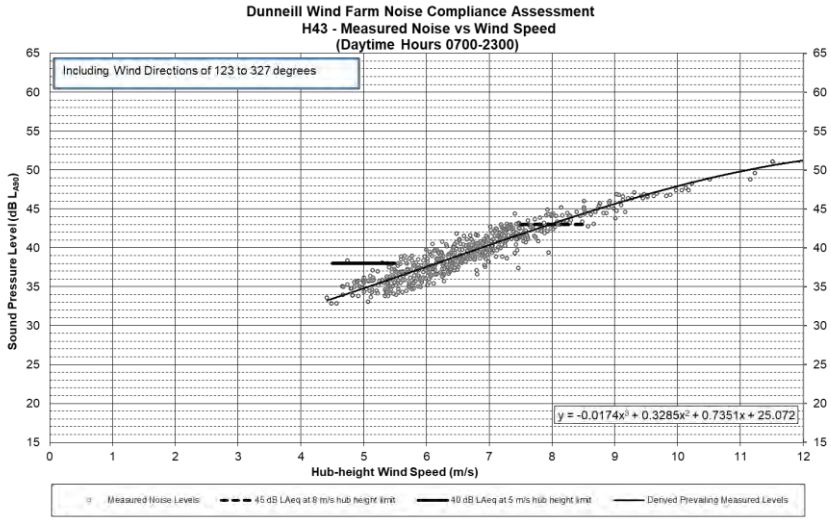

Table 11 – Daytime Binned Assessment Results – H42 (dB L_{A90})

Data	Bin Centre Hub Height Integer Wind Speed (m/s)	
	5	8
Average Measured Noise Level (dB L_{A90})	36	42
Number of Data Points	79	67
Noise Limit (dB L_{A90})	38	43
Margin to Noise Limit (dB)	2	1

Table 12 – Daytime Binned Assessment Results – H43 (dB L_{A90})

Data	Bin Centre Hub Height Integer Wind Speed (m/s)	
	5	8
Average Measured Noise Level (dB L_{A90})	35	43
Number of Data Points	79	67
Noise Limit (dB L_{A90})	38	43
Margin to Noise Limit (dB)	3	0

Figure 12 – Noise Assessment Chart: Evening Hours, H42 L_{Aeq}

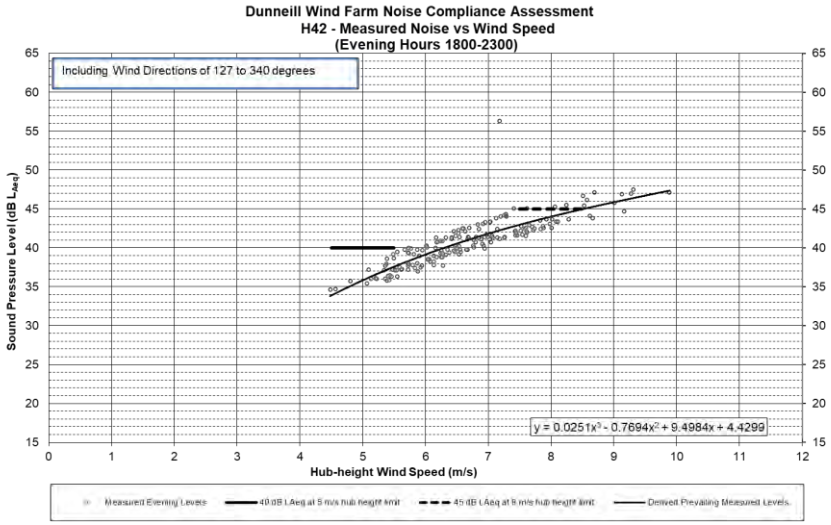

Figure 13 – Noise Assessment Chart: Evening Hours, H43 L_{Aeq}

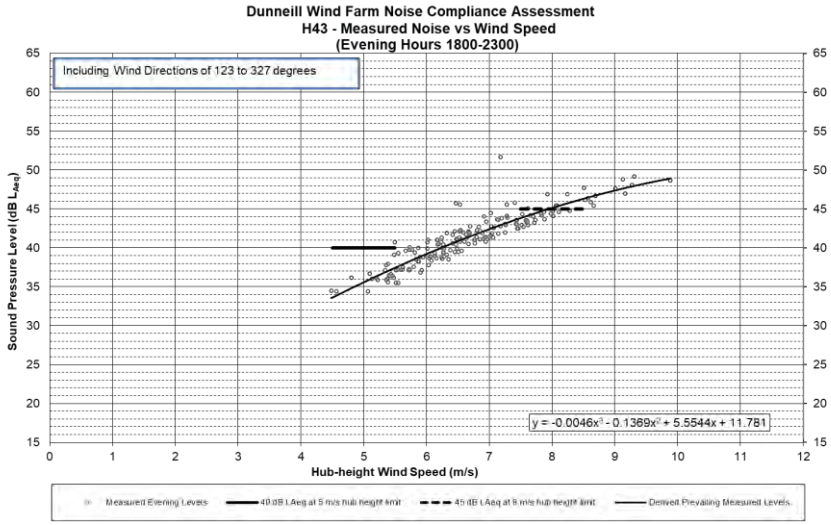

Table 13 – Evening Binned Assessment Results – H42 (dB L_{Aeq})

Data	Bin Centre Hub Height Integer Wind Speed (m/s)	
	5	8
Average Measured Noise Level (dB L_{Aeq})	37	43
Number of Data Points	20	26
Noise Limit (dB L_{Aeq})	40	45
Margin to Noise Limit (dB)	3	2

Table 14 – Evening Binned Assessment Results – H43 (dB L_{Aeq})

Data	Bin Centre Hub Height Integer Wind Speed (m/s)	
	5	8
Average Measured Noise Level (dB L_{Aeq})	37	44
Number of Data Points	20	26
Noise Limit (dB L_{Aeq})	40	45
Margin to Noise Limit (dB)	3	1

Figure 14 – Noise Assessment Chart: Daytime Hours, H42 L_{Aeq}

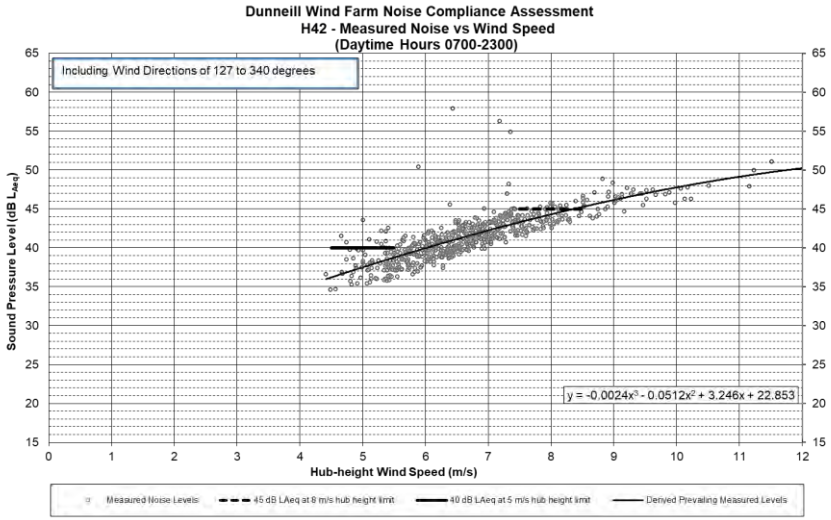

Figure 15 – Noise Assessment Chart: Daytime Hours, H43 L_{Aeq}

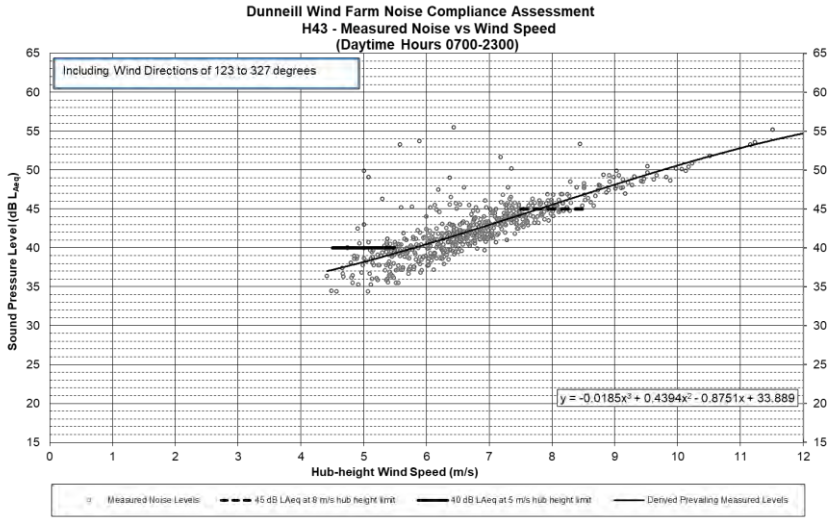

Table 15 – Daytime Binned Assessment Results – H42 (dB L_{Aeq})

Data	Bin Centre Hub Height Integer Wind Speed (m/s)	
	5	8
Average Measured Noise Level (dB L_{Aeq})	38	44
Number of Data Points	79	67
Noise Limit (dB L_{Aeq})	40	45
Margin to Noise Limit (dB)	2	1

Table 16 – Daytime Binned Assessment Results – H43 (dB L_{Aeq})

Data	Bin Centre Hub Height Integer Wind Speed (m/s)	
	5	8
Average Measured Noise Level (dB L_{Aeq})	39	45
Number of Data Points	79	67
Noise Limit (dB L_{Aeq})	40	45
Margin to Noise Limit (dB)	1	0