



- Legend**
- Site Boundary
 - Nocturnal Activity Recorder

TITLE: Nocturnal Activity Recorder Locations	
PROJECT: Annagh Wind Farm, Co. Cork	
FIGURE NO:	2.4
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3. RESULTS

3.1 Avian usage of the Study Area – Vantage point

A total of 2 timed watches of 3 hours duration each were carried out at each of the two vantage points on a monthly basis from October 2021 to March 2022, inclusive. Survey efforts were doubled for February and March to record whooper swan movement over the wind farm site. Two additional VP locations were added to monitor whooper swans wintering on the banks of the Awbeg River / Blackwater SAC (roosting/foraging areas), some 1.3 km south of the closest turbine. Two VPs were required as birds sometimes disappeared from view as a result of various biogeographical land features (hedgerows, depressions, etc). An additional round of surveys were conducted in April to cover the remaining migration period. Surveying effort for VP1 came to a total of 53 hours and 40 minutes, with totals of 54 hours and 19 minutes, and 33 hours and 25 minutes at the two combined Swan VPs (see Appendix 3). Bird activity was recorded from the VPs during each survey.

Table 3-1 shows all the species recorded during regular VP surveys. In total there were 18 individual flight lines of six target species observed during the regular VP (not including swan VPs) survey period. In total 37 species of bird were noted. Of these species, four are of Red-list status under the BoCCI (Gilbert et al., 2021): grey wagtail, redwing, snipe, and woodcock. A total of six are Amber-listed and the remaining 27 are Green-listed. Two species are further protected under Annex I of the EU Birds Directive: peregrine, and whooper swan.

Table 3-2 shows all the species recorded during Swan VP surveys. In total there were 57 target records noted in the form of flightlines (23), polygons (30), and points (four). During swan VP surveys, a total of 20 species were recorded. Of these species, two are Red-listed, four Amber-listed, with the remaining 14 Green-listed. A total of 30 swan records were logged during surveys, 12 of which were recorded as flightlines, with the remaining 18 polygons or points as birds fed or roosted on the ground. All flightlines were outside the 500m buffer zone with the majority also under the rotor swept zone.

3.1.1 Summary Results Winter VPs 2021/22 (October - March)

Target species observed during this survey period comprised of buzzard (11 records), grey heron (one record), greylag goose (one record), mallard (one record), peregrine (two records), and whooper swan (7 records – 5 of which were heard only).

3.1.2 Summary Results Spring Migration 2022 (April)

Target species observed during this survey period comprised of little egret (one record), grey heron (one record), and mallard (one record).

3.1.3 Summary Results Swan VPs Winter 2021/22 (October - March)

Target species observed during the survey period comprised of buzzard (one record), grey heron (one record), greylag goose (17 records), little egret (two records), mallard (two records) mute swan (three records), sparrowhawk (one record), and whooper swan (30 records).



Table 3-1: Bird species recorded during VP surveys winter 2021/22 + spring migration (April) 2022

Name	Latin	*BoCCI	**Annex I
Blackbird	<i>Turdus merula</i>	Green	No
Blue Tit	<i>Cyanistes caeruleus</i>	Green	No
Bullfinch	<i>Pyrrhula pyrrhula</i>	Green	No
Buzzard	<i>Buteo buteo</i>	Green	No
Chaffinch	<i>Fringilla coelebs</i>	Green	No
Dunnock	<i>Prunella modularis</i>	Green	No
Feral Pigeon	<i>Columba livia</i>	Green	No
Fieldfare	<i>Turdus pilaris</i>	Green	No
Goldcrest	<i>Regulus regulus</i>	Amber	No
Goldfinch	<i>Carduelis carduelis</i>	Green	No
Great Tit	<i>Parus major</i>	Green	No
Grey Heron	<i>Ardea cinerea</i>	Green	No
Grey Wagtail	<i>Motacilla cinerea</i>	Red	No
Greylag Goose	<i>Anser anser</i>	Amber	No
Hooded Crow	<i>Corvus cornix</i>	Green	No
Jackdaw	<i>Corvus monedula</i>	Green	No
Jay	<i>Garrulus glandarius</i>	Green	No
Lesser Black-backed Gull	<i>Larus fuscus</i>	Amber	No
Long-tailed Tit	<i>Aegithalos caudatus</i>	Green	No
Magpie	<i>Pica pica</i>	Green	No
Mallard	<i>Anas platyrhynchos</i>	Amber	No
Mistle Thrush	<i>Turdus viscivorus</i>	Green	No
Peregrine	<i>Falco peregrinus</i>	Green	Yes
Pheasant	<i>Phasianus colchicus</i>	Green	No
Pied/White Wagtail	<i>Motacilla alba</i>	Green	No
Raven	<i>Corvus corax</i>	Green	No
Redwing	<i>Turdus iliacus</i>	Red	No
Reed Bunting	<i>Emberiza schoeniclus</i>	Green	No
Robin	<i>Erithacus rubecula</i>	Green	No
Rook	<i>Corvus frugilegus</i>	Green	No
Snipe	<i>Gallinago gallinago</i>	Red	No
Song Thrush	<i>Turdus philomelos</i>	Green	No
Starling	<i>Sturnus vulgaris</i>	Amber	No
Whooper Swan	<i>Cygnus cygnus</i>	Amber	Yes
Woodcock	<i>Scolopax rusticola</i>	Red	No
Woodpigeon	<i>Columba palumbus</i>	Green	No
Wren	<i>Troglodytes troglodytes</i>	Green	No

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

**refers to species listed on Annex I of the EU Birds Directive.



Table 3-2: Bird species recorded during Swan VP surveys, winter 2022

Species	Latin	*BoCCI	**Annex I
Blackbird	<i>Turdus merula</i>	Green	No
Buzzard	<i>Buteo buteo</i>	Green	No
Dunnoek	<i>Prunella modularis</i>	Green	No
Grey Heron	<i>Ardea cinerea</i>	Green	No
Grey Wagtail	<i>Motacilla cinerea</i>	Red	No
Greylag Goose	<i>Anser anser</i>	Amber	No
Hooded Crow	<i>Corvus cornix</i>	Green	No
Little Egret	<i>Egretta garzetta</i>	Green	Yes
Magpie	<i>Pica pica</i>	Green	No
Mallard	<i>Anas platyrhynchos</i>	Amber	No
Mute Swan	<i>Cygnus olor</i>	Amber	No
Pheasant	<i>Phasianus colchicus</i>	Green	No
Raven	<i>Corvus corax</i>	Green	No
Redwing	<i>Turdus iliacus</i>	Red	No
Robin	<i>Erithacus rubecula</i>	Green	No
Rook	<i>Corvus frugilegus</i>	Green	No
Sparrowhawk	<i>Accipiter nisus</i>	Green	No
Whooper Swan	<i>Cygnus cygnus</i>	Amber	Yes
Woodpigeon	<i>Columba palumbus</i>	Green	No
Wren	<i>Troglodytes troglodytes</i>	Green	No

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

**refers to species listed on Annex I of the EU Birds Directive.

3.2 Target Species observations during VP surveys

3.2.1 Buzzard

Winter

Green-listed buzzard was observed on a total of 11 occasions during winter 2021/22 surveys, from both VPs, with a total observation time of 1,180 seconds. Of this, 1,090 seconds was spent in the 0-25m height band. A further 15 seconds was spent at 25-50m with 75 seconds spent at 50-100m. Six of the observations were inside the 500m buffer zone, and five were outside. Eight of the sightings referred to single birds, and three involved two birds.

Spring (April 2022)

There were no sightings of buzzard made during spring migration surveys (April).



Swan VPs

A single buzzard was observed from Swan VP E on the 9th March 2022, seen flying for 180 seconds at 0-25m, outside the 500m buffer zone.

3.2.2 Grey Heron

Winter

Green-listed grey heron was observed once from VP2 on the 11th March 2022, seen flying for 65 seconds at 50-100m, thus inside the rotor swept zone. This sighting involved a flock of five birds and was inside the 500m buffer zone. An additional five sightings had no further information.

Spring (April 2022)

There were no sightings of grey heron made during spring migration surveys (April).

Swan VPs

A single sighting of grey heron occurred from the Swan VP, involving a single bird flying for ten seconds, below the rotor swept zone, at 0-25m, outside the 500m buffer zone.

3.2.3 Greylag Goose

Winter

Amber-listed greylag goose was observed once from VP2 on the 11th March 2022, with two birds seen flying for eight seconds inside the 500m buffer at 25-50m.

Spring (April 2022)

There were no sightings of greylag goose made during spring migration surveys (April).

Swan VPs

Observed on 17 occasions from Swan VP surveys with a total of 77 seconds of flight time of which the majority (60 seconds) was spent at 0-25m. The remaining records refer to birds noted feeding or roosting on the ground for a total of 13 hours and 26 minutes. A maximum count of 80 birds occurred from the Swan VP on the 28th February 2022, with the majority of other sightings involving between 23 and 64 birds.

3.2.4 Lesser Black-backed Gull

Winter

Amber-listed lesser black-backed gull was noted on three occasions between the 4th February 2022 and the 13th March 2022, with a single sighting from VP2 and the remaining two sightings from VP1.

Spring (April 2022)

There were no sightings of lesser black-backed gull made during spring migration surveys (April).

Swan VPs

There were no sightings of lesser black-backed gull made during swan VP surveys.



3.2.5 Little Egret

Winter

There were no sightings of little egret made during winter 2021/22 VP surveys.

Spring (April 2022)

There were no sightings of little egret made during Spring 2022 VP surveys.

Swan VPs

Little egret was recorded twice during winter 2021/22 surveys. On the 9th March 2022, a single bird was recorded from the Swan VPs, outside the 500m buffer zone. An additional sighting was made from Swan VPs on the 1st April 2022 and involved a single bird seen feeding for 300 seconds, below the rotor swept zone and outside the 500m buffer zone.

3.2.6 Mallard

Winter

Amber-listed mallard was noted once during winter 2021/22 surveys on the 8th February 2022, when four birds were observed in flight from VP1. A total of eight seconds of flight time was recorded, all of which occurred below the rotor swept zone (0-25m).

Spring (April 2022)

There were no sightings of mallard made during Spring 2022 VP surveys.

Swan VPs

Two birds were observed at ground level from Swan VP E on the 9th February for a total of 18 minutes.

3.2.7 Mute Swan

Winter

There were no sightings of mute swan made during winter 2021/22 surveys.

Spring (April 2022)

There were no sightings of mute swan made during spring migration surveys (April).

Swan VPs

Amber-listed mute swan was recorded on three occasions from Swan VPs, during winter 2021/22 surveys. All observation time occurred below the rotor swept zone (0-25m), and a maximum count of three birds occurred on the 17th February 2022.



3.2.8 Peregrine

Winter

Annex-I listed peregrine was recorded on two occasions. One sighting involved a bird seen flying for 15 seconds below the rotor swept zone (0-25m), inside the 500m buffer zone, from VP2 on the 9th December 2021. The second sighting involved a bird heard calling for three seconds, from VP1 on the 10th December 2021.

Spring (April 2022)

There were no sightings of peregrine made during spring migration surveys (April).

Swan VPs

There were no sightings of peregrine made during Swan VP surveys.

3.2.9 Snipe

Winter

Red-listed snipe was recorded on five occasions during winter 2021/22 surveys, three of which came from VP2, with the remaining two from VP1.

Spring (April 2022)

There were no sightings of snipe made during spring migration surveys (April).

Swan VPs

There were no sightings of snipe made during Swan VP surveys.

3.2.10 Sparrowhawk

Winter

There were no sightings of sparrowhawk made during winter 2021/22 VP surveys.

Spring (April 2022)

There were no sightings of sparrowhawk made during spring migration surveys (April).

Swan VPs

Green-listed sparrowhawk was recorded once from Swan VPs on the 9th March 2022, and involved a single bird seen hunting in flight for four seconds, below the rotor swept zone (0-25m).

3.2.11 Whooper Swan

Winter

Whooper swan were recorded on seven occasions from VP 2. Two records were flightlines, with the remaining five records heard-only. On the 17th February 2022 four birds were seen flying inside the 500m buffer zone for 86 seconds in the 50-100m height band (rotor swept zone). On the 23rd March 2022, seven birds were noted flying for five seconds outside the 500m buffer zone, and below the rotor swept zone.



Spring (April 2022)

There were no sightings of whooper swan made during spring migration surveys (April).

Swan VPs

A total of 30 records were noted from swan VP surveys between the 17th February 2022 and the 9th March 2022. Of these, 12 were recorded as flightlines, with the remainder recorded at points or polygons of individuals on the ground. This is because birds spent more of their time roosting or grazing in fields. The majority of observation time was spent below the rotor swept zone (0-25m) with a total of 23.5 hours. A total of ten seconds of flight time was recorded at 25-50m. A maximum count of 140 birds, were noted from the Swan VP on the 21st February 2022. Other high counts include 117 birds from the Swan VP on the 18th February, and 111 birds from the same location on the 9th March 2022.

3.2.12 Woodcock

Winter

Red-listed woodcock was noted on two occasions during winter 2021/22 surveys, with both sightings coming from VP on the 9th December 2022 and the 17th February 2022.

Spring (April 2022)

There were no sightings of woodcock made during spring migration surveys (April).

Swan VPs

There were no sightings of woodcock made during swan VP surveys (April).

3.3 Hinterland Survey

Hinterland surveys to establish wintering occupancy within a 10 km radius of the site were carried out over 22 dates across 2021 and 2022. The survey schedule and locations of the Hinterland watches are shown in Table 2-3. A total of 28 bird species were identified during Hinterland surveys within this 7-month period (winter 2021/22 + April 2022).

For site-specific Hinterland survey results see Appendix 5 of this report.

A total of four Annex-I species were recorded during hinterland surveys: hen harrier, little egret, merlin, and whooper swan. A total of five Red-listed species were observed: curlew, lapwing, pochard, shoveler, and snipe. A further 12 Amber-listed species were observed. The remaining seven species are Green-listed.

For site-specific Hinterland survey results see Appendix 4 of this report.

Species of conservation concern that are known to be potentially vulnerable to wind farm developments will be discussed in more detail in this section. Species have been selected for detailed discussion on the basis of conservation status, vulnerability to wind farm developments and if species sightings have been confirmed on or near the proposed wind farm site, which will indicate potential links between species recorded at the proposed site and the surrounding environment.



3.3.1 Black-headed Gull

Amber-listed black-headed gull was recorded once from the River Awbeg, on the 4th November 2021, involving a group of 55 birds.

3.3.2 Buzzard

Green-listed buzzard was recorded on four occasions across three sites (River Blackwater SAC/Annagh Bridge, Eagle Lough pNHA, and Castle Lake (Milltown)) and involved two sightings of single birds, and two sightings of two birds.

3.3.3 Coot

Amber-listed coot was recorded on three occasions, all from Kilcolman Bog SPA between 17th February and 28th March 2022, with two sightings of two birds, and a high count of six birds in March.

3.3.4 Cormorant

Amber listed cormorant was recorded on three occasions between 29th October 2021 and 17th February 2022, all of which occurred at Ballyhea Quarry, always involving single birds.

3.3.5 Curlew

Red-listed curlew was recorded on four occasions. Three sightings occurred at Ballhea Quarry, with 46 birds noted on the 10th December 2021, 60 birds on the 14th December 2021, and 65 birds on the 17th February 2022. A flock of 30 birds were noted along the River Awbeg on the 10th December 2021.

3.3.6 Gadwall

Amber-listed gadwall was recorded from Kilcolman Bog SPA on the 5th December 2021, and the 31st March 2022, involving two and five birds, respectively.

3.3.7 Great Crested Grebe

Amber-listed great crested grebe was recorded once at Ballyhea Quarry, involving one bird on the 30th March 2022.

3.3.8 Grey Heron

Green-listed grey heron was recorded on eight dates across seven sites, with a high count of seven birds recorded at Kilcolman Bog SPA on the 28th March 2022.



3.3.9 Greylag Goose

Amber-listed greylag goose was recorded on ten dates across three sites with high counts of 93 birds at River Blackwater SAC/Annagh Bridge on the 4th November 2021, 112 birds at Kilcolman Bog SPA on the 5th December 2021, and 103 birds at Kilcolman Bog SPA on the 31st January 2022.

3.3.10 Hen Harrier

Annex-I protected hen harrier was recorded once on the 30th March 2022 at the Ballyhoura Mountains SAC.

3.3.11 Lapwing

Red-listed lapwing was recorded on one occasion at River Blackwater SAC/Annagh Bridge on the 4th November 2021 and involved a group of 45 birds.

3.3.12 Lesser Black-backed Gull

Amber-listed lesser black-backed gull was recorded on one occasion at River Blackwater SAC/Annagh Bridge on the 18th February 2022 and involved a group of 80 birds.

3.3.13 Little Egret

Annex-I protected little egret was recorded twice; with one bird recorded at River Blackwater SAC/ Buttevant on the 14th December 2021; and a second sighting of a single individual recorded at River Blackwater SAC/Annagh Bridge on the 2nd March 2022.

3.3.14 Little Grebe

Green-listed little grebe was recorded on five dates between 28th December 2021 and 28th March 2022 across three sites, with a maximum count of ten birds recorded at Kilcolman Bog SPA on the 28th March 2022.

3.3.15 Mallard

Amber-listed mallard was recorded on 19 occasions across 11 dates, and seven sites, between 26th October 2021 and 1st April 2022. High counts of ten and twelve birds occurred on the 31st January 2021 at Eagle Lough pNHA and Ballyhea Quarry, respectively.

3.3.16 Merlin

Annex-I protected merlin was noted on one occasion on the 5th December and involved a sighting of a single bird at Kilcolman Bog SPA.



3.3.17 Moorhen

Green-listed moorhen was recorded on seven dates between 5th December 2021 and 1st April 2022, across three sites, with high counts of two birds and Eagle Lough pNHA on the 31st January 2022, and three birds at Castle Lake (Milltown) on the 28th March 2022.

3.3.18 Mute Swan

Amber-listed mute swan was recorded on eight dates between 4th November 2021 and 13th March 2022, across three sites, with high counts of 88 birds at River Blackwater SAC/Annagh Bridge on the 4th November 2021, and ten birds at the same location on the 13th March 2022.

3.3.19 Pochard

Red-listed pochard was recorded on the 28th March 2022 from two locations, namely Castle Lake (Milltown) and Kilcolman Bog (SPA), involving four and nine birds, respectively.

3.3.20 Shoveler

Red-listed shoveler was recorded on five dates between 28th December 2021 and 28th March 2022. A total of five sightings came from Kilcolman Bog SAC, with an additional sighting from Eagle Lough pNHA. High counts of 74, 60, and 37 all come from Kilcolman Bog SAC on the 28th December 2021, 31st January 2022, and 17th February 2022, respectively.

3.3.21 Snipe

Red-listed snipe was recorded on three dates between 5th December 2021 and 31st March 2022, across three sites, with a high count of three birds at River Blackwater SAC/ Buttevant on the 31st March 2022.

3.3.22 Teal

Amber-listed teal was recorded on eight dates between 26th October 2021 and 31st March 2022, across four sites. High counts of 72, 50, and 59 birds were recorded at Ballyhea Quarry, and Kilcolman Bog SPA on 14th December 2021, 17th February 2022, and 31st March 2022, respectively.

3.3.23 Tufted Duck

Amber-listed tufted duck was recorded once, consisting of a sighting of two birds on the 31st March 2022 at Kilcolman Bog SPA.

3.3.24 White-fronted Goose

Annex-I white-fronted goose was recorded once on the 31st January 2022 and involved a sighting of four birds at River Blackwater SAC/Annagh Bridge.



3.3.25 Whooper Swan

Annex-I listed whooper swan was recorded on nine dates between 26 October 2021 and 13th March 2022, across three sites, namely Kilcolman Bog SPA, River Blackwater SAC (Awbeg River)/Annagh Bridge, and Templebridget. High counts of 129 and 117 birds occurred at River Blackwater SAC/Annagh Bridge on the 31 January 2022 and 18th February 2022.

3.3.26 Wigeon

Amber-listed wigeon occurred on seven dates between 10th October 2021 and 31st March 2022, across four sites, with high counts of 145, 270, and 135 at Kilcolman Bog SPA on the 21st January, 17th February, and 31st March 2022, respectively.

Table 3-3: Bird species recorded during hinterland surveys of 2021/22 + April 2022

Common Name	Scientific Name	Conservation Status	
		BoCCI*	Annex I**
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	Amber	No
Buzzard	<i>Buteo buteo</i>	Green	No
Coot	<i>Fulica atra</i>	Amber	No
Cormorant	<i>Phalacrocorax carbo</i>	Amber	No
Curlew	<i>Numenius arquata</i>	Red	No
Gadwall	<i>Anas strepera</i>	Amber	No
Great Crested Grebe	<i>Podiceps cristatus</i>	Amber	No
Grey Heron	<i>Ardea cinerea</i>	Green	No
Greylag Goose	<i>Anser anser</i>	Amber	No
Hen Harrier	<i>Circus cyaneus</i>	Amber	Yes
Lapwing	<i>Vanellus vanellus</i>	Red	No
Lesser Black-backed Gull	<i>Larus fuscus</i>	Amber	No
Little Egret	<i>Egretta garzetta</i>	Green	Yes
Little Grebe	<i>Tachybaptus ruficollis</i>	Green	No
Magpie	<i>Pica pica</i>	Green	No
Mallard	<i>Anas platyrhynchos</i>	Amber	No
Merlin	<i>Falco columbarius</i>	Amber	Yes
Moorhen	<i>Gallinula chloropus</i>	Green	No
Mute Swan	<i>Cygnus olor</i>	Amber	No
Pochard	<i>Aythya ferina</i>	Red	No
Raven	<i>Corvus corax</i>	Green	No
Shoveler	<i>Anas clypeata</i>	Red	No
Snipe	<i>Gallinago gallinago</i>	Red	No
Teal	<i>Anas crecca</i>	Amber	No



Common Name	Scientific Name	Conservation Status	
		BoCCI*	Annex I**
Tufted Duck	<i>Aythya fuligula</i>	Amber	No
White-fronted Goose	<i>Anser albifrons</i>	Green	No
Whooper Swan	<i>Cygnus cygnus</i>	Amber	Yes
Wigeon	<i>Anas penelope</i>	Amber	No

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

** refers to species listed on Annex I of the EU Birds Directive



3.4 Wintering Bird Survey

The results of the wintering bird transect survey at Annagh are shown below, in Table 3-4.

A total of 27 species were recorded along the transects in the wintering season. No Annex-I protected species were recorded during surveys.

A total of 22 species were recorded in October 2021; 20 species were recorded in December 2021; and 14 species in February 2022. A total of three Red-listed species were recorded across the transects over the wintering surveys: meadow pipit (recorded from TR1 in all months, with an additional record from TR3 in December), redwing (recorded from TR1+2 in October and December, and from TR2+3 in February), and snipe (recorded from TR2 in October, and from TR1+3 in December). A further three Amber-listed species were recorded along the transects: a single goldcrest from TR1 in December; two mallards from TR2 in October; and two starlings from TR2 in October.

Table 3-4: Results of wintering bird transects surveys at Annagh (TR1, TR2 TR3) Winter 2021/22

Species	Latin	October									December									February								
		TR1			TR2			TR3			TR1			TR2			TR3			TR1			TR2			TR3		
		0-25m	25-100m	>100/FO	0-25m	25-100m	>100/FO	0-25m	25-100m	>100/FO	0-25m	25-100m	>100/FO	0-25m	25-100m	>100/FO	0-25m	25-100m	>100/FO	0-25m	25-100m	>100/FO	0-25m	25-100m	>100/FO	0-25m	25-100m	>100/FO
Blackbird	<i>Turdus merula</i>		1		6			2			2	1		4	1		3				2		9	6	1	6		
Blue Tit	<i>Cyanistes caeruleus</i>				1																							
Bullfinch	<i>Pyrrhula pyrrhula</i>				2								1															
Buzzard	<i>Buteo buteo</i>																				1							
Chaffinch	<i>Fringilla coelebs</i>	12			1			10			3	2	2	1							1		1					
Dunnock	<i>Prunella modularis</i>	2									3																	
Fieldfare	<i>Turdus pilaris</i>																									25		
Goldcrest	<i>Regulus regulus</i>													1														
Great Tit	<i>Parus major</i>										1		1															
Grey Heron	<i>Ardea cinerea</i>		1				1					1	1								2							
Hooded Crow	<i>Corvus cornix</i>			2	1												9	2			1		1					



Species	Latin	October									December									February								
		TR1			TR2			TR3			TR1			TR2			TR3			TR1			TR2			TR3		
		0-25m	25-100m	>100/F/O	0-25m	25-100m	>100/F/O	0-25m	25-100m	>100/F/O	0-25m	25-100m	>100/F/O	0-25m	25-100m	>100/F/O	0-25m	25-100m	>100/F/O	0-25m	25-100m	>100/F/O	0-25m	25-100m	>100/F/O	0-25m	25-100m	>100/F/O
Jackdaw	<i>Corvus monedula</i>	4										6									10							
Jay	<i>Garrulus glandarius</i>		4	4		1				2					2								4					
Long-eared Owl	<i>Asio otus</i>				1																							
Magpie	<i>Pica pica</i>						1					1																
Mallard	<i>Anas platyrhynchos</i>						2																					
Meadow Pipit	<i>Anthus pratensis</i>	6									2								3	2								
Mistle Thrush	<i>Turdus viscivorus</i>																					1						
Pheasant	<i>Phasianus colchicus</i>		7				2												1									
Redwing	<i>Turdus iliacus</i>			6	1		2				8	4	11	18	9								43			85		
Robin	<i>Erithacus rubecula</i>	8					2				1	1	1	5	1		3				4		3	1		1		
Rook	<i>Corvus frugilegus</i>		10	8		1				2								5										
Snipe	<i>Gallinago gallinago</i>				1		2				1							1										
Starling	<i>Sturnus vulgaris</i>						2																					
Stonechat	<i>Saxicola rubicola</i>						2				2																	
Woodpigeon	<i>Columba palumbus</i>	10										4		2			6					1	7			5		
Wren	<i>Troglodytes troglodytes</i>		13				3										2				3		4	1				
Species Count		22									20									14								



3.5 Nocturnal Activity Surveys

The results of the nocturnal activity surveys at Annagh are shown below, in Table 3-5.

A total of sixteen species were recorded, of which one is Annex-I protected: whooper swan, which was recorded on two occasions from Annagh North and three times from Annagh South. A further five Red-listed species were recorded, namely barn owl, curlew, redwing, snipe, and woodcock. A total of five additional Amber-listed species were recorded, with the remaining five species being Green-listed.

Each of the sixteen species detected during surveys will be described in further detail in this section, with additional details available in Appendix 5.

Table 3-5: Nocturnal Activity Survey Results

Species	Latin	BoCCI	Annex I	Calls N	Calls S	Calls Sum
Barn Owl	<i>Tyto alba</i>	Red	No	3	151	153
Buzzard	<i>Buteo buteo</i>	Green	No	4	0	4
Coot	<i>Fulica atra</i>	Amber	No	1	0	1
Curlew	<i>Numenius arquata</i>	Red	No	1	3	4
Gadwall	<i>Anas strepera</i>	Amber	No	0	2	2
Grey Heron	<i>Ardea cinerea</i>	Green	No	1	5	6
Little Grebe	<i>Tachybaptus ruficollis</i>	Green	No	1	9	10
Mallard	<i>Anas platyrhynchos</i>	Amber	No	2	7	9
Moorhen	<i>Gallinula chloropus</i>	Green	No	2	24	26
Redwing	<i>Turdus iliacus</i>	Red	No	45	30	75
Snipe	<i>Gallinago gallinago</i>	Red	No	8	53	61
Teal	<i>Anas crecca</i>	Amber	No	2	39	41
Water Rail	<i>Rallus aquaticus</i>	Green	No	3	6	9
Whooper Swan	<i>Cygnus cygnus</i>	Amber	Yes	2	3	5
Wigeon	<i>Anas penelope</i>	Amber	No	0	3	3
Woodcock	<i>Scolopax rusticola</i>	Red	No	1	0	1



3.5.1 Barn Owl

Red-listed barn owl was recorded on three occasions at Annagh North and 151 occasions from Annagh South, with a sum total of 907 calls detected overall. The majority of calls came from a single individual, however, on nine occasions, two birds were heard calling at once, including duets in the form of courtship displays. As the southern recording device was deployed alongside a large, semi-dilapidated barn, it is highly likely that the species is breeding at this location.

3.5.2 Buzzard

Green-listed buzzard was noted on four occasions, with a total of 53 calls logged, with all records coming from Annagh North. On three occasions, two birds were calling back and forth to one another, suggesting a territory occurs in the vicinity. Note, that these records were nocturnal in the true sense, and all occurred within approximately 30 minutes of civil dusk/dawn.

3.5.3 Coot

Green-listed coot occurred on four occasions, with one record from Annagh North, and the remaining three from Annagh South. A sum total of fifteen calls were recorded across four dates, ranging from 14th to 29th March 2022.

3.5.4 Curlew

Red-listed curlew was recorded on four occasions: once from Annagh North, and three times from Annagh South. A sum total of sixteen calls were recorded across three dates, ranging from 3rd to 13th March 2022.

3.5.5 Gadwall

Amber-listed gadwall was recorded on two occasions at Annagh South on the 13th March 2022 (22:25 & 3:24), with a sum total of 29 calls recorded.

3.5.6 Grey Heron

Green-listed grey heron was recorded on six occasions, with one record from Annagh North, and five from Annagh South. A sum total of 34 calls were recorded across four dates, ranging from 2nd to 25th March 2022.

3.5.7 Little Grebe

Green-listed little grebe was recorded on ten occasions, with one record from Annagh North, and nine from Annagh South. A sum total of 26 calls were recorded across nine dates, ranging from 2nd March to 5th April 2022.



3.5.8 Mallard

Amber-listed mallard was recorded on nine occasions, with two records from Annagh North and seven from Annagh south. A sum total of 534 calls were recorded across four dates, ranging from 4th March to 30th March.

3.5.9 Moorhen

Green-listed moorhen was recorded on 30 occasions, with six records from Annagh North, and 24 records from Annagh South. A sum total of 202 calls were recorded across 17 dates, ranging from 6th March to 7th April.

3.5.10 Redwing

Although redwing is not a target species, it is red-listed and frequently vocalises in flight at night and so records have been included for these two reasons. Redwing was recorded on 75 occasions, with 45 records from Annagh North, and 30 from Annagh South. A sum total of 179 calls were recorded across 20 dates, ranging from 2nd March to 4th April.

3.5.11 Snipe

Red-listed snipe was recorded on 61 occasions, with eight records from Annagh North, and 53 records from Annagh South. A sum total of 1,375 calls were recorded across 22 dates, ranging from 2nd March to 8th April.

3.5.12 Teal

Amber-listed teal was recorded on 41 occasions with two records from Annagh North and 39 from Annagh South. A sum total of 815 calls were recorded across 15 dates, ranging from 2nd March to 3rd April.

3.5.13 Water Rail

Green-listed water rail was recorded on nine occasions, with three records from Annagh North, and six from Annagh south. A sum total of 18 calls were recorded across seven dates, ranging from 5th March to 5th April.

3.5.14 Whooper Swan

Annex-I protected whooper swan was recorded on five occasions with two records from Annagh North and three from Annagh South. A sum total of 497 calls were recorded across two dates (16th and 23rd March). Records on the 16th March all occurred within 20 minutes of one another, with 300 calls recorded from Annagh North at 2:54, 76 calls recorded from Annagh South at 3:10, with an additional 30 calls recorded at 3:16. On the 23rd March 2022, 86 calls were recorded from Annagh South at 22:03 with a further five calls recorded from Annagh North at 00:00. Although there is insufficient Irish data on Trektellen to compare results against, numbers correlate very well with statistics based on UK whooper swan movements (see Figure 3-1, below), which have a clear peak in mid to late March.

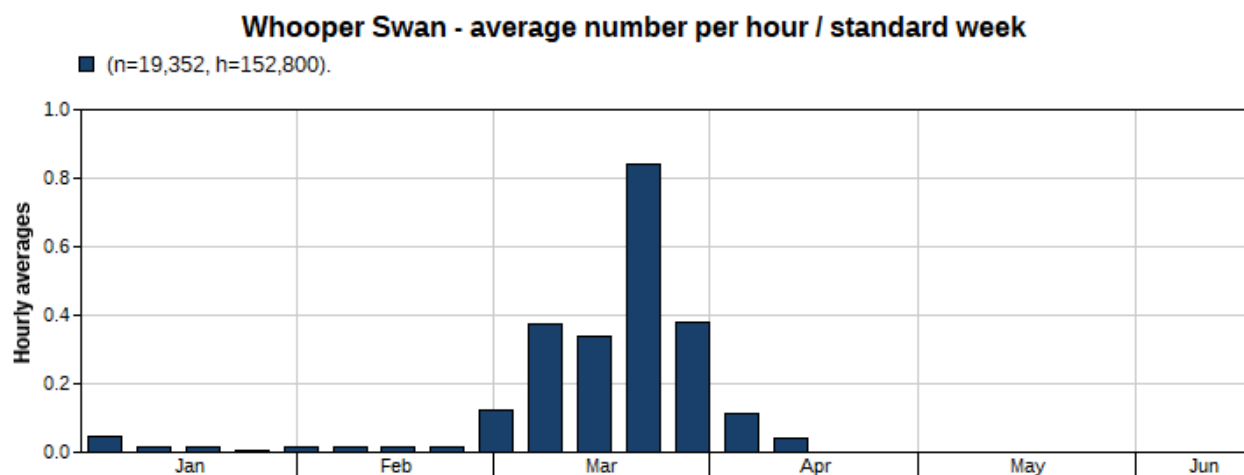


Figure 3-1: Average number per hour/standard week of whooper swans logged in the UK, based on 19,352 records over 152,645 hours (Trektellen, 2022)

3.5.15 Wigeon

Amber-listed wigeon was recorded on three occasions, all of which came from Annagh South, on three dates (13th, 14th & 16th March 2022), with a total of 57 calls recorded.

3.5.16 Woodcock

Red-listed woodcock was recorded once, with a single flight call recorded at Annagh North at 6:11 on the 5th March 2022.



4. DISCUSSION

During vantage point surveys, results did not yield anything that changed the conclusions of previous reports or the collision risk model. The most important observations, especially in light of the Cork County Council further information request, were those of the whooper swan flock which wintered approximately 1.3km to the south of the closest turbine, along the banks of the Awbeg River, which forms part of the River Blackwater SAC (site code: 002170). Birds were not present during every survey visit and appeared to only make use of this site when it was suitably flooded.

The majority of these sightings were as a result of specific vantage point watches (Swan VPs) set up in order to monitor this group, in order to gain a better understanding of their movements in the area. Whooper swan sightings were recorded as flightlines (12), points (1) and polygons (17). Sightings were split in this manner, as birds were monitored at their respective feeding and roosting areas during the targeted Swan VP watches, and mostly spent time on the ground in a relatively loosely defined area, grazing or roosting, and so a polygon is best suited to define this.

There were 37 records of whooper swan during the winter of surveys. This was made up of 5 heard-only records and 32 sightings. The five heard-only records occurred at VP2 on the 23rd March 2022. Of the 32 whooper swan sightings registered during the current study period (combined results from standard VP surveys and new VPs set up specifically to target swans wintering on the banks of Awbeg River), just two occurred during regular VP surveys, namely at VP2, on the 17th February and 23rd March 2022. The sighting on the 17th of February was the only record inside the site boundary, consisting of four birds flying for 86 seconds, at 50-100m. Thus, whilst this record was inside the rotor swept zone, it was the only record of its kind, as birds were highly site faithful to their grazing and roosting areas to the south of the site (in the areas specifically assessed by the newly established Swan VPs). The remaining 30 sightings were recorded at the swan VPs overlooking the swan roosting/foraging area outside the site.

Another key component of this final avian study at Annagh was to investigate nocturnal movements of birds at night, something which is not done too often in Ireland but needs to be applied to wind farm sites across the board, on a national (and international) level. The primary concern was whooper swan as it was not known if the bordering winter flock were crossing the site at night. Results show that, in large, they do not. In total there were five records of whooper swan at night, but these come from just two dates (16th and 23rd March 2022).

It is important to note that nocturnal activity analysis ran from dusk to dawn for six weeks, which equates to constant effort during this period. Typical day-time observer manned VP surveys run for 6 hours a month. To put that into perspective, recording devices ran for approximately nine hours each night for 42 nights, totally 378 hours of remote observer effort in total, or approximately 270 hours per month. That is a 45-fold increase in observation effort, thus a low occurrence rate of whooper swan during nocturnal activity surveys is a much more significant result than the same during monthly manned VP surveys.

On the night of the 16th March, there were three whooper swan occurrences detected: one at Annagh North and two at Annagh South. The recording at Annagh North occurred at 2:54 and involved a minimum of 300 calls as a flock passed over the device, taking a little over five minutes to travel out of range. At 3:10, 76 whooper swan calls were detected over Annagh South, with another 30 calls detected at 3:16. Annagh is a relatively small site, and the time between records signifies that they most likely involve separate flocks. Conditions for migration on the night were ideal, being relatively clear (some passing clouds for the majority of the night – timeanddate.com [accessed 17/06/22]), and with a light 9km/hr SSW tailwind (timeanddate.com [accessed 17/06/22]). These conditions would be ideal for a northerly migration. The previous night (March 15th), there was rain and low cloud (timeanddate.com [accessed 17/06/22]).



On the night of the 23rd March, two whooper swan records occurred: one involving 86 calls detected over Annagh South at 22:03, and another involving five calls over Annagh North at 00:00. A similar situation occurred on the night of the 23rd when conditions improved on the previous night with a decrease in wind and drier conditions. These records coincide with the final sighting of whooper swans by day-time observers, whereby a group of seven birds were seen from VP2 on the 23rd March 2022. Incidentally, the final sightings of whooper swans in the winter of 2020/21 also occurred on the 23rd March 2022, with a record of 23 birds from Kilcolman Bog SP, an additional record of 22 birds from Annagh Bridge, and a final record of seven birds from the River Awbeg.

Comparing results against Trektellen, the five nocturnal whooper swan records, documented at Annagh fit in well with the peak exodus of the species from the UK, which begins in the first week of March, peaks in the final two weeks, and tapers off in early April. With the paucity of nocturnal whooper swan records over Annagh, with dates falling within the peak exodus of the species, evidence suggests that the locally wintering whooper swan population does not traverse the proposed Annagh wind farm at night during their wintering period. However, it appears that either this flock, flocks from elsewhere, or a combination of the two can traverse the site during their departure. With this in mind, the most rational course of action would be to curtail turbine activity at night during the sensitive whooper swan spring migration period between the final quarter of February and mid-April.

Using the same Trektellen data, arrivals in Autumn occur on a broader front with the first birds appearing in late September, peaking between late October and mid-November, before tapering off again in December. Therefore, the following measures shall be adopted to mitigate the possibility of strikes occurring at night during the migration season:

1. From the commencement of operation of the turbines curtailment will be applied during the Autumn (15th of September to the 15th of November) and Spring (1st March – 14th April) migration periods. Curtailment is required during the nocturnal period (dawn to dusk).
2. Annual monitoring shall be carried out for the first three years of the operational phase of the wind farm to monitor the efficacy of the measure and to refine the extent of these curtailment periods. An annual report detailing the results of this monitoring shall be submitted and agreed with Cork County Council and NPWS. This monitoring shall account for annual variation in migration patterns and ensure that curtailment is targeted to key period of movement for the species.
3. The use new technologies to facilitate smart curtailment (e.g. radar) shall be agreed in advance with Cork County Council and NPWS.



5. REFERENCES

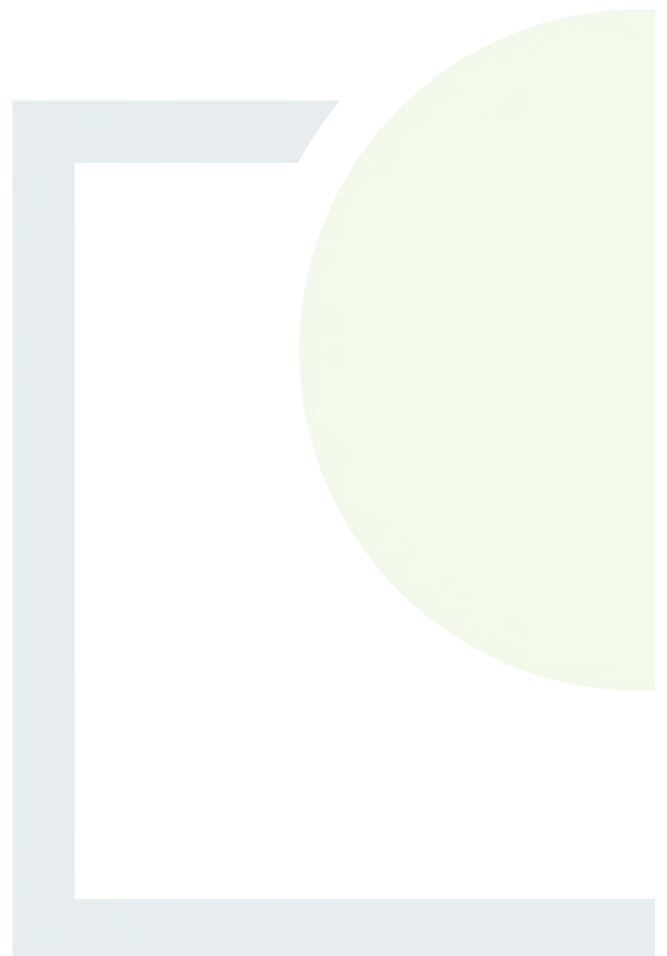
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APPENDIX 1

VP Survey Details - Winter
2021/22 + April 2022



VP	Date	Duration	Observer	Start	End	Cloud	Vis'	Rain	Wind
1	28/10/2021	06:00	BOM	09:35	15:35	8/8	Good	Drizzle	F1 S
1	09/11/2021	06:00	BOM	11:15	17:15	8/8	Good	Showers	F2 W
1	10/12/2021	06:00	BOM	10:40	16:40	1/8	Good	Dry	F2 SW
1	17/01/2022	06:00	BOM	10:55	16:55	8/8	Fair	Dry	F2 S
1	08/02/2022	06:00	BOM	11:30	17:30	8/8	Fair	Dry	F3 S
1	01/03/2022	03:15	BOM	06:05	09:20	1/8	Good	Dry	F1 E
1	27/02/2022	02:45	BOM	16:30	19:15	8/8	Good	Light Rain	F4 SW
1	15/03/2022	03:00	BOM	16:40	19:40	8/8	Fair	Showers	F3 S
1	13/03/2022	03:20	BOM	16:10	19:30	5/8	Good	Showers	F3 SW
1	13/03/2022	03:20	BOM	05:40	09:00	7/8	Good	Showers	F2 S
1	31/03/2022	03:00	BOM	06:00	09:00	0/8	Good	Dry	F2 N
1	31/03/2022	03:00	BOM	18:00	21:00	4/8	Good	Dry	F3 NNW
1	29/03/2022	02:00	DD	06:16	08:16	6/8	Good	Dry	F1 SE
2	26/10/2021	14:00	BOM	10:20	00:20	8/8	Good	Dry	F4 SW
2	04/11/2021	06:00	BOM	09:44	15:44	1/8	Good	Dry	F2 NW
2	09/12/2021	06:00	BOM	11:00	17:00	8/8	Fair	Drizzle	F1 W
2	11/01/2022	06:00	BOM	10:05	16:05	2/8	Good	Dry	F1 SW
2	16/02/2022	03:00	BOM	16:00	19:00	6/8	Good	Heavy Showers	F3 W
2	17/02/2022	03:00	BOM	07:00	10:00	8/8	Good	Heavy Showers	F2 WSW
2	23/02/2022	03:00	BOM	16:00	19:00	6/8	Good	Heavy Showers	F3 W
2	02/03/2022	03:00	BOM	06:20	09:20	6/8	Fair	Drizzle	F3 W
2	11/03/2022	03:00	BOM	16:30	19:30	5/8	Good	Dry	F1 SW
2	02/03/2022	03:05	BOM	16:10	19:15	8/8	Fair	Rain	F2 S
2	30/03/2022	03:00	BOM	06:15	09:15	8/8	Good	Dry	F1 NW
2	30/03/2022	03:14	BOM	17:46	21:00	8/8	Fair	Dry	F2 NE
2	28/03/2022	03:00	DD	06:19	09:19	3/8	Good	Dry	F1 W
2	23/03/2022	03:00	DD	05:30	08:30	2/8	Good	Dry	F1 NW
Swan VP	21/02/2022	03:00	BOM	07:00	10:00	3/8	Good	Dry	F2 NW
Swan VP	18/02/2022	03:00	BOM	16:00	19:00	2/8	Good	Dry	F2 NW
Swan VP	17/02/2022	03:00	BOM	16:00	19:00	2/8	Good	Dry	F2 NW
Swan VP	17/02/2022	00:05	BOM	10:30	10:35	3/8	Good	Dry	F2 NW
Swan VP	22/02/2022	03:00	BOM	16:00	19:00	3/8	Good	Dry	F2 NW

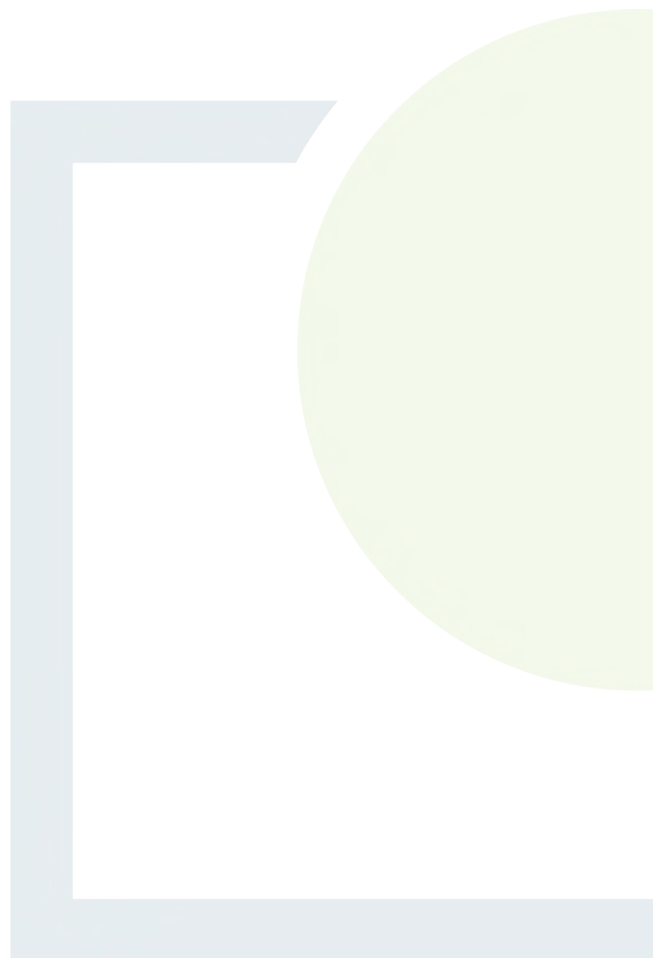
VP	Date	Duration	Observer	Start	End	Cloud	Vis'	Rain	Wind
Swan VP	28/02/2022	03:00	BOM	06:10	09:10	1/8	Good	Dry	F1 N
Swan VP	09/03/2022	03:00	BOM	16:30	19:30	3/8	Good	Dry	F2 NW
Swan VP	06/03/2022	03:00	BOM	06:15	09:15	0/8	Good	Dry	F1 E
Swan VP	16/03/2022	03:10	BOM	05:50	09:00	2/8	Good	Dry	F1 W
Swan VP	01/04/2022	03:00	BOM	18:00	21:00	6/8	Good	Dry	F2 NW
Swan VP	03/04/2022	03:10	BOM	05:50	09:00	0/8	Good	Dry	F0
Swan VP	24/03/2022	03:15	BOD	16:25	19:40	5/8	Good	Dry	F1



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APPENDIX 2

Bird Survey Observations
2021-22



VP	Date	Observer	ID Code	Species	Number	Time	In/Out	Total (s)	0-25m (s)	25-50m (s)	50-100m (s)	100-175m (s)	175m+ (s)
1	28/10/2021	BOM		Blackbird									
2	26/10/2021	BOM		Blackbird									
1	09/11/2021	BOM		Blackbird									
2	04/11/2021	BOM		Blackbird									
2	09/12/2021	BOM		Blackbird									
1	10/12/2021	BOM		Blackbird									
1	17/01/2022	BOM		Blackbird									
1	08/02/2022	BOM		Blackbird									
1	01/03/2022	BOM		Blackbird									
2	16/02/2022	BOM		Blackbird									
2	17/02/2022	BOM		Blackbird									
2	23/02/2022	BOM		Blackbird									
2	02/03/2022	BOM		Blackbird									
1	13/03/2022	BOM		Blackbird									
2	02/03/2022	BOM		Blackbird									
2	30/03/2022	BOM		Blackbird									
2	30/03/2022	BOM		Blackbird									
1	31/03/2022	BOM		Blackbird									
1	31/03/2022	BOM		Blackbird									
2	28/03/2022	DD		Blackbird									
1	29/03/2022	DD		Blackbird									
2	23/03/2022	DD		Blackbird									
Swan VP	06/03/2022	BOM		Blackbird									
Swan VP	16/03/2022	BOM		Blackbird									
Swan VP	01/04/2022	BOM		Blackbird									
Swan VP	03/04/2022	BOM		Blackbird									

VP	Date	Observer	ID Code	Species	Number	Time	In/Out	Total (s)	0-25m (s)	25-50m (s)	50-100m (s)	100-175m (s)	175m+ (s)
1	09/11/2021	BOM		Blue Tit									
2	11/01/2022	BOM		Blue Tit									
1	01/03/2022	BOM		Blue Tit									
2	28/03/2022	DD		Blue Tit									
2	23/03/2022	DD		Blue Tit									
1	10/12/2021	BOM		Bullfinch									
1	08/02/2022	BOM		Bullfinch									
2	30/03/2022	BOM		Bullfinch									
1	09/11/2021	BOM	1	Buzzard	1	15:21	Out	3	3				
1	09/11/2021	BOM	2	Buzzard	2	15:28	Out	6	6				
2	09/12/2021	BOM	3	Buzzard	2	12:20	In	128	63		65		
1	10/12/2021	BOM	4	Buzzard	1	13:50	In	95	95				
2	11/01/2022	BOM	5	Buzzard	1	13:50	In	600	600				
2	11/01/2022	BOM	6	Buzzard	1	14:25	Out	7	7				
2	11/01/2022	BOM	7	Buzzard	1	14:32	In	10	10				
2	16/02/2022	BOM	8	Buzzard	1	17:00	Out	73	73				
1	13/03/2022	BOM	9	Buzzard	2	16:14	In	240	215	15	10		
1	13/03/2022	BOM	10	Buzzard	1	17:33	In	14	14				
2	30/03/2022	BOM	11	Buzzard	1	17:53	Out	4	4				
Swan VP E	09/03/2022	BOM	19	Buzzard	1	17:41	Out	180	180				
1	28/10/2021	BOM		Chaffinch									
2	26/10/2021	BOM		Chaffinch									
2	09/12/2021	BOM		Chaffinch									
1	10/12/2021	BOM		Chaffinch									
2	11/01/2022	BOM		Chaffinch									
1	17/01/2022	BOM		Chaffinch									
1	08/02/2022	BOM		Chaffinch									
2	16/02/2022	BOM		Chaffinch									

VP	Date	Observer	ID Code	Species	Number	Time	In/Out	Total (s)	0-25m (s)	25-50m (s)	50-100m (s)	100-175m (s)	175m+ (s)
2	17/02/2022	BOM		Chaffinch									
2	02/03/2022	BOM		Chaffinch									
1	13/03/2022	BOM		Chaffinch									
2	02/03/2022	BOM		Chaffinch									
2	30/03/2022	BOM		Chaffinch									
2	30/03/2022	BOM		Chaffinch									
2	28/03/2022	DD		Chaffinch									
2	23/03/2022	DD		Chaffinch									
1	09/11/2021	BOM		Dunnock									
1	13/03/2022	BOM		Dunnock									
2	30/03/2022	BOM		Dunnock									
1	31/03/2022	BOM		Dunnock									
Swan VP	01/04/2022	BOM		Dunnock									
2	04/11/2021	BOM		Feral Pigeon									
1	13/03/2022	BOM		Feral Pigeon									
2	09/12/2021	BOM		Fieldfare									
1	10/12/2021	BOM		Fieldfare									
2	16/02/2022	BOM		Fieldfare									
1	10/12/2021	BOM		Goldcrest									
1	13/03/2022	BOM		Goldcrest									
2	23/03/2022	DD		Goldcrest									
2	26/10/2021	BOM		Goldfinch									
2	04/11/2021	BOM		Goldfinch									
2	09/12/2021	BOM		Goldfinch									
1	10/12/2021	BOM		Goldfinch									
1	08/02/2022	BOM		Goldfinch									
1	28/10/2021	BOM		Great Tit									
2	04/11/2021	BOM		Great Tit									

VP	Date	Observer	ID Code	Species	Number	Time	In/Out	Total (s)	0-25m (s)	25-50m (s)	50-100m (s)	100-175m (s)	175m+ (s)
2	11/01/2022	BOM		Great Tit									
1	17/01/2022	BOM		Great Tit									
1	08/02/2022	BOM		Great Tit									
2	02/03/2022	BOM		Great Tit									
1	13/03/2022	BOM		Great Tit									
1	31/03/2022	BOM		Great Tit									
2	28/03/2022	DD		Great Tit									
2	23/03/2022	DD		Great Tit									
2	11/03/2022	BOM	12	Grey Heron	5	18:11	In	65			65		
Swan VP W	01/04/2022	BOM	20	Grey Heron	1	18:50	Out	10	10				
2	26/10/2021	BOM		Grey Wagtail									
Swan VP	06/03/2022	BOM		Grey Wagtail									
2	11/03/2022	BOM	13	Greylag Goose	2	17:38	In	8		8			
Swan VP E	17/02/2022	BOM	21	Greylag Goose	6	10:30	Out	10	10				
Swan VP E	18/02/2022	BOM	22	Greylag Goose	64	16:15	Out	9900	9900				
Swan VP E	18/02/2022	BOM	23	Greylag Goose	64	18:45	Out	10	10				
Swan VP E	18/02/2022	BOM	24	Greylag Goose	64	18:45	Out	1200	1200				
Swan VP E	21/02/2022	BOM	25	Greylag Goose	50	07:10	Out	1200	1200				
Swan VP E	21/02/2022	BOM	26	Greylag Goose	50	07:20	Out	10	10				
Swan VP E	21/02/2022	BOM	27	Greylag Goose	50	07:20	Out	600	600				
Swan VP E	22/02/2022	BOM	28	Greylag Goose	25	18:00	Out	3600	3600				

VP	Date	Observer	ID Code	Species	Number	Time	In/Out	Total (s)	0-25m (s)	25-50m (s)	50-100m (s)	100-175m (s)	175m+ (s)
Swan VP E+W	28/02/2022	BOM	29	Greylag Goose	23	07:23	Out	12		12			
Swan VP E+W	28/02/2022	BOM	30	Greylag Goose	80	07:32	Out	15	10	5			
Swan VP E+W	28/02/2022	BOM	31	Greylag Goose	80	07:32	Out	5880	5880				
Swan VP E	09/03/2022	BOM	32	Greylag Goose	7	16:30	Out	10800	10800				
Swan VP E	09/03/2022	BOM	33	Greylag Goose	42	16:30	Out	10800	10800				
Swan VP E	09/03/2022	BOM	34	Greylag Goose	42	17:00	Out	10	10				
Swan VP E	09/03/2022	BOM	35	Greylag Goose	45	18:17	Out	2580	2580				
Swan VP E	09/03/2022	BOM	36	Greylag Goose	42	19:00	Out	10	10				
Swan VP E	09/03/2022	BOM	37	Greylag Goose	42	19:00	Out	1800	1800				
1	28/10/2021	BOM		Hooded Crow									
2	26/10/2021	BOM		Hooded Crow									
1	09/11/2021	BOM		Hooded Crow									
2	04/11/2021	BOM		Hooded Crow									
2	09/12/2021	BOM		Hooded Crow									
1	10/12/2021	BOM		Hooded Crow									
2	11/01/2022	BOM		Hooded Crow									
1	17/01/2022	BOM		Hooded Crow									
1	08/02/2022	BOM		Hooded Crow									
1	01/03/2022	BOM		Hooded Crow									
1	27/02/2022	BOM		Hooded Crow									

VP	Date	Observer	ID Code	Species	Number	Time	In/Out	Total (s)	0-25m (s)	25-50m (s)	50-100m (s)	100-175m (s)	175m+ (s)
2	16/02/2022	BOM		Hooded Crow									
2	17/02/2022	BOM		Hooded Crow									
2	23/02/2022	BOM		Hooded Crow									
2	02/03/2022	BOM		Hooded Crow									
1	13/03/2022	BOM		Hooded Crow									
1	13/03/2022	BOM		Hooded Crow									
2	02/03/2022	BOM		Hooded Crow									
2	30/03/2022	BOM		Hooded Crow									
2	30/03/2022	BOM		Hooded Crow									
1	31/03/2022	BOM		Hooded Crow									
1	31/03/2022	BOM		Hooded Crow									
2	28/03/2022	DD		Hooded Crow									
1	29/03/2022	DD		Hooded Crow									
2	23/03/2022	DD		Hooded Crow									
Swan VP	06/03/2022	BOM		Hooded Crow									
Swan VP	16/03/2022	BOM		Hooded Crow									
Swan VP	01/04/2022	BOM		Hooded Crow									
Swan VP	03/04/2022	BOM		Hooded Crow									
1	28/10/2021	BOM		Jackdaw									
2	26/10/2021	BOM		Jackdaw									
1	09/11/2021	BOM		Jackdaw									
2	04/11/2021	BOM		Jackdaw									
2	09/12/2021	BOM		Jackdaw									
1	10/12/2021	BOM		Jackdaw									
2	11/01/2022	BOM		Jackdaw									
1	17/01/2022	BOM		Jackdaw									

VP	Date	Observer	ID Code	Species	Number	Time	In/Out	Total (s)	0-25m (s)	25-50m (s)	50-100m (s)	100-175m (s)	175m+ (s)
1	01/03/2022	BOM		Jackdaw									
1	27/02/2022	BOM		Jackdaw									
2	16/02/2022	BOM		Jackdaw									
2	17/02/2022	BOM		Jackdaw									
2	23/02/2022	BOM		Jackdaw									
2	02/03/2022	BOM		Jackdaw									
1	15/03/2022	BOM		Jackdaw									
1	13/03/2022	BOM		Jackdaw									
1	13/03/2022	BOM		Jackdaw									
2	02/03/2022	BOM		Jackdaw									
2	30/03/2022	BOM		Jackdaw									
2	30/03/2022	BOM		Jackdaw									
1	31/03/2022	BOM		Jackdaw									
1	31/03/2022	BOM		Jackdaw									
2	28/03/2022	DD		Jackdaw									
1	29/03/2022	DD		Jackdaw									
2	23/03/2022	DD		Jackdaw									
1	28/10/2021	BOM		Jay									
2	26/10/2021	BOM		Jay									
2	04/11/2021	BOM		Jay									
Swan VP E	09/03/2022	BOM	38	Little Egret	1	16:30	Out	10800	10800				
Swan VP W	01/04/2022	BOM	39	Little Egret	1	18:00	Out	300	300				
2	28/03/2022	DD		Long-tailed Tit									
2	23/03/2022	DD		Long-tailed Tit									
1	28/10/2021	BOM		Magpie									
2	26/10/2021	BOM		Magpie									
1	09/11/2021	BOM		Magpie									

VP	Date	Observer	ID Code	Species	Number	Time	In/Out	Total (s)	0-25m (s)	25-50m (s)	50-100m (s)	100-175m (s)	175m+ (s)
2	04/11/2021	BOM		Magpie									
2	09/12/2021	BOM		Magpie									
1	10/12/2021	BOM		Magpie									
2	11/01/2022	BOM		Magpie									
1	17/01/2022	BOM		Magpie									
1	08/02/2022	BOM		Magpie									
1	01/03/2022	BOM		Magpie									
2	16/02/2022	BOM		Magpie									
2	17/02/2022	BOM		Magpie									
2	02/03/2022	BOM		Magpie									
1	13/03/2022	BOM		Magpie									
1	13/03/2022	BOM		Magpie									
2	02/03/2022	BOM		Magpie									
2	30/03/2022	BOM		Magpie									
1	31/03/2022	BOM		Magpie									
1	31/03/2022	BOM		Magpie									
2	28/03/2022	DD		Magpie									
1	29/03/2022	DD		Magpie									
2	23/03/2022	DD		Magpie									
Swan VP	01/04/2022	BOM		Magpie									
Swan VP	03/04/2022	BOM		Magpie									
1	08/02/2022	BOM	14	Mallard	4	1539	In	8	8				
Swan VP E	09/03/2022	BOM	40	Mallard	2	16:30	Out	10800	10800				
Swan VP W	03/04/2022	BOM	41	Mallard	1	06:33	Out	8	8				
2	26/10/2021	BOM		Mistle Thrush									
1	13/03/2022	BOM		Mistle Thrush									

VP	Date	Observer	ID Code	Species	Number	Time	In/Out	Total (s)	0-25m (s)	25-50m (s)	50-100m (s)	100-175m (s)	175m+ (s)
Swan VP E	17/02/2022	BOM	42	Mute Swan	3	10:30	Out	120	120				
Swan VP E	18/02/2022	BOM	43	Mute Swan	1	16:05	Out	1200	1200				
Swan VP E	21/02/2022	BOM	44	Mute Swan	2	07:10	Out	1200	1200				
2	09/12/2021	BOM	15	Peregrine	1	13:10	In	15	15				
1	10/12/2021	BOM	16	Peregrine	1	12:04	Out	3					
1	28/10/2021	BOM		Pheasant									
Swan VP	16/03/2022	BOM		Pheasant									
Swan VP	01/04/2022	BOM		Pheasant									
1	28/10/2021	BOM		Pied Wagtail									
2	26/10/2021	BOM		Pied Wagtail									
1	09/11/2021	BOM		Pied Wagtail									
2	04/11/2021	BOM		Pied Wagtail									
2	09/12/2021	BOM		Pied Wagtail									
2	11/01/2022	BOM		Pied Wagtail									
1	08/02/2022	BOM		Pied Wagtail									
1	27/02/2022	BOM		Pied Wagtail									
2	16/02/2022	BOM		Pied Wagtail									
2	17/02/2022	BOM		Pied Wagtail									
2	23/02/2022	BOM		Pied Wagtail									
2	02/03/2022	BOM		Pied Wagtail									
2	02/03/2022	BOM		Pied Wagtail									
2	30/03/2022	BOM		Pied Wagtail									
2	30/03/2022	BOM		Pied Wagtail									
2	26/10/2021	BOM		Raven									
1	10/12/2021	BOM		Raven									

VP	Date	Observer	ID Code	Species	Number	Time	In/Out	Total (s)	0-25m (s)	25-50m (s)	50-100m (s)	100-175m (s)	175m+ (s)
2	17/02/2022	BOM		Raven									
Swan VP	16/03/2022	BOM		Raven									
1	28/10/2021	BOM		Redwing									
2	26/10/2021	BOM		Redwing									
1	09/11/2021	BOM		Redwing									
2	04/11/2021	BOM		Redwing									
2	09/12/2021	BOM		Redwing									
1	10/12/2021	BOM		Redwing									
2	11/01/2022	BOM		Redwing									
1	17/01/2022	BOM		Redwing									
1	08/02/2022	BOM		Redwing									
1	01/03/2022	BOM		Redwing									
1	27/02/2022	BOM		Redwing									
2	16/02/2022	BOM		Redwing									
2	17/02/2022	BOM		Redwing									
2	23/02/2022	BOM		Redwing									
2	02/03/2022	BOM		Redwing									
1	15/03/2022	BOM		Redwing									
1	13/03/2022	BOM		Redwing									
1	13/03/2022	BOM		Redwing									
2	02/03/2022	BOM		Redwing									
Swan VP	06/03/2022	BOM		Redwing									
Swan VP	16/03/2022	BOM		Redwing									
2	17/02/2022	BOM		Reed Bunting									
1	28/10/2021	BOM		Robin									
2	26/10/2021	BOM		Robin									
1	09/11/2021	BOM		Robin									

VP	Date	Observer	ID Code	Species	Number	Time	In/Out	Total (s)	0-25m (s)	25-50m (s)	50-100m (s)	100-175m (s)	175m+ (s)
2	04/11/2021	BOM		Robin									
2	09/12/2021	BOM		Robin									
2	11/01/2022	BOM		Robin									
1	17/01/2022	BOM		Robin									
1	08/02/2022	BOM		Robin									
1	01/03/2022	BOM		Robin									
1	27/02/2022	BOM		Robin									
2	17/02/2022	BOM		Robin									
2	23/02/2022	BOM		Robin									
2	02/03/2022	BOM		Robin									
1	13/03/2022	BOM		Robin									
1	13/03/2022	BOM		Robin									
2	02/03/2022	BOM		Robin									
2	30/03/2022	BOM		Robin									
2	30/03/2022	BOM		Robin									
1	31/03/2022	BOM		Robin									
1	31/03/2022	BOM		Robin									
2	28/03/2022	DD		Robin									
1	29/03/2022	DD		Robin									
2	23/03/2022	DD		Robin									
Swan VP	16/03/2022	BOM		Robin									
Swan VP	01/04/2022	BOM		Robin									
Swan VP	03/04/2022	BOM		Robin									
1	28/10/2021	BOM		Rook									
2	26/10/2021	BOM		Rook									
1	09/11/2021	BOM		Rook									
2	04/11/2021	BOM		Rook									

VP	Date	Observer	ID Code	Species	Number	Time	In/Out	Total (s)	0-25m (s)	25-50m (s)	50-100m (s)	100-175m (s)	175m+ (s)
2	09/12/2021	BOM		Rook									
1	10/12/2021	BOM		Rook									
2	11/01/2022	BOM		Rook									
1	08/02/2022	BOM		Rook									
1	27/02/2022	BOM		Rook									
2	23/02/2022	BOM		Rook									
2	02/03/2022	BOM		Rook									
2	02/03/2022	BOM		Rook									
2	28/03/2022	DD		Rook									
2	23/03/2022	DD		Rook									
Swan VP	06/03/2022	BOM		Rook									
Swan VP	16/03/2022	BOM		Rook									
Swan VP	01/04/2022	BOM		Rook									
Swan VP	03/04/2022	BOM		Rook									
2	26/10/2021	BOM		Song Thrush									
1	10/12/2021	BOM		Song Thrush									
2	30/03/2022	BOM		Song Thrush									
2	30/03/2022	BOM		Song Thrush									
2	23/03/2022	DD		Song Thrush									
Swan VP E	09/03/2022	BOM	45	Sparrowhawk	1	17:09	Out	4	4				
1	28/10/2021	BOM		Starling									
2	26/10/2021	BOM		Starling									
2	04/11/2021	BOM		Starling									
2	09/12/2021	BOM		Starling									
1	10/12/2021	BOM		Starling									

VP	Date	Observer	ID Code	Species	Number	Time	In/Out	Total (s)	0-25m (s)	25-50m (s)	50-100m (s)	100-175m (s)	175m+ (s)
2	11/01/2022	BOM		Starling									
1	17/01/2022	BOM		Starling									
1	08/02/2022	BOM		Starling									
1	27/02/2022	BOM		Starling									
2	16/02/2022	BOM		Starling									
2	17/02/2022	BOM		Starling									
2	23/02/2022	BOM		Starling									
2	02/03/2022	BOM		Starling									
1	15/03/2022	BOM		Starling									
1	13/03/2022	BOM		Starling									
1	13/03/2022	BOM		Starling									
2	02/03/2022	BOM		Starling									
2	30/03/2022	BOM		Starling									
2	30/03/2022	BOM		Starling									
1	31/03/2022	BOM		Starling									
1	31/03/2022	BOM		Starling									
2	17/02/2022	BOM	17	Whooper Swan	4	08:55	In	86			86		
2	23/03/2022	DD	18	Whooper Swan	7	06:29	Out	5	5				
Swan VP E	17/02/2022	BOM	46	Whooper Swan	18	10:30	Out	10	10				
Swan VP E	18/02/2022	BOM	47	Whooper Swan	117	16:13	Out						
Swan VP E	18/02/2022	BOM	48	Whooper Swan	117	18:45	Out	10	10				
Swan VP E	18/02/2022	BOM	49	Whooper Swan	117	18:45	Out	1200	1200				
Swan VP E	21/02/2022	BOM	50	Whooper Swan	140	07:10	Out	1200	1200				
Swan VP E	21/02/2022	BOM	51	Whooper Swan	6	07:10	Out	1200	1200				

VP	Date	Observer	ID Code	Species	Number	Time	In/Out	Total (s)	0-25m (s)	25-50m (s)	50-100m (s)	100-175m (s)	175m+ (s)
Swan VP E	21/02/2022	BOM	52	Whooper Swan	30	07:20	Out	10	10				
Swan VP E	21/02/2022	BOM	53	Whooper Swan	30	07:20	Out	60	60				
Swan VP E	21/02/2022	BOM	54	Whooper Swan	6	07:35	Out	15	10	5			
Swan VP E	21/02/2022	BOM	55	Whooper Swan	40	07:40	Out	15	10	5			
Swan VP E	21/02/2022	BOM	56	Whooper Swan	40	07:40	Out	4800	4800				
Swan VP E	21/02/2022	BOM	57	Whooper Swan	20	07:30	Out	10	10				
Swan VP E	21/02/2022	BOM	58	Whooper Swan	20	07:30	Out	5400	5400				
Swan VP E	21/02/2022	BOM	59	Whooper Swan	7	08:04	Out	20	20				
Swan VP E	21/02/2022	BOM	60	Whooper Swan	30	07:30	Out	20	20				
Swan VP E	21/02/2022	BOM	61	Whooper Swan	30	07:30	Out	5400	5400				
Swan VP E	22/02/2022	BOM	62	Whooper Swan	8	16:00	Out	10800	10800				
Swan VP E	22/02/2022	BOM	63	Whooper Swan	2	18:34	Out	10	10				
Swan VP E	22/02/2022	BOM	64	Whooper Swan	2	18:34	Out	8760	8760				
Swan VP E	28/02/2022	BOM	65	Whooper Swan	23	07:25	Out	6300	6300				
Swan VP E	28/02/2022	BOM	66	Whooper Swan	59	07:27	Out	6180	6180				
Swan VP E	28/02/2022	BOM	67	Whooper Swan	8	07:30	Out	10	10				
Swan VP E	28/02/2022	BOM	68	Whooper Swan	8	07:30	Out	5400	5400				

VP	Date	Observer	ID Code	Species	Number	Time	In/Out	Total (s)	0-25m (s)	25-50m (s)	50-100m (s)	100-175m (s)	175m+ (s)
Swan VP E	09/03/2022	BOM	69	Whooper Swan	45	16:30	Out	10800	10800				
Swan VP E	09/03/2022	BOM	70	Whooper Swan	63	16:30	Out	10800	10800				
Swan VP E	09/03/2022	BOM	71	Whooper Swan	63	17:00	Out	10	10				
Swan VP E	09/03/2022	BOM	72	Whooper Swan	63	17:00	Out	1800	1800				
Swan VP E	09/03/2022	BOM	73	Whooper Swan	111	18:17	Out	2580	2580				
Swan VP E	09/03/2022	BOM	74	Whooper Swan	63	19:00	Out	10	10				
Swan VP E	09/03/2022	BOM	75	Whooper Swan	63	19:00	Out	1800	1800				
1	28/10/2021	BOM		Woodpigeon									
2	26/10/2021	BOM		Woodpigeon									
1	09/11/2021	BOM		Woodpigeon									
2	04/11/2021	BOM		Woodpigeon									
2	09/12/2021	BOM		Woodpigeon									
1	10/12/2021	BOM		Woodpigeon									
2	11/01/2022	BOM		Woodpigeon									
1	17/01/2022	BOM		Woodpigeon									
1	08/02/2022	BOM		Woodpigeon									
1	01/03/2022	BOM		Woodpigeon									
1	27/02/2022	BOM		Woodpigeon									
2	17/02/2022	BOM		Woodpigeon									
2	02/03/2022	BOM		Woodpigeon									
1	15/03/2022	BOM		Woodpigeon									
1	13/03/2022	BOM		Woodpigeon									
1	13/03/2022	BOM		Woodpigeon									
2	02/03/2022	BOM		Woodpigeon									

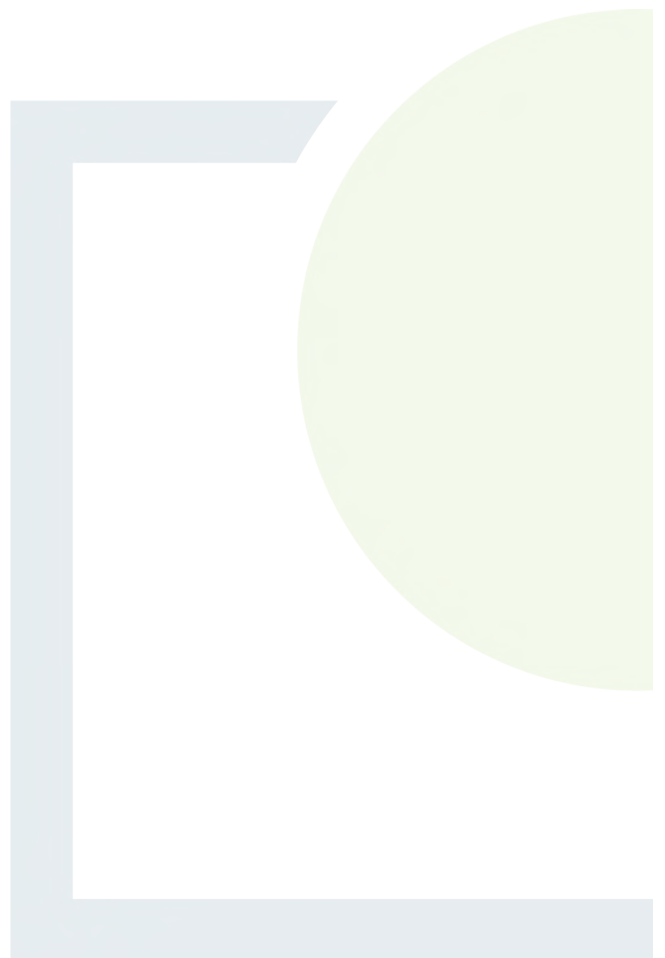
VP	Date	Observer	ID Code	Species	Number	Time	In/Out	Total (s)	0-25m (s)	25-50m (s)	50-100m (s)	100-175m (s)	175m+ (s)
2	30/03/2022	BOM		Woodpigeon									
2	30/03/2022	BOM		Woodpigeon									
1	31/03/2022	BOM		Woodpigeon									
1	31/03/2022	BOM		Woodpigeon									
2	28/03/2022	DD		Woodpigeon									
1	29/03/2022	DD		Woodpigeon									
2	23/03/2022	DD		Woodpigeon									
Swan VP	01/04/2022	BOM		Woodpigeon									
Swan VP	03/04/2022	BOM		Woodpigeon									
1	28/10/2021	BOM		Wren									
1	09/11/2021	BOM		Wren									
1	10/12/2021	BOM		Wren									
2	17/02/2022	BOM		Wren									
2	30/03/2022	BOM		Wren									
1	31/03/2022	BOM		Wren									
2	28/03/2022	DD		Wren									
1	29/03/2022	DD		Wren									
2	23/03/2022	DD		Wren									
Swan VP	06/03/2022	BOM		Wren									
Swan VP	16/03/2022	BOM		Wren									

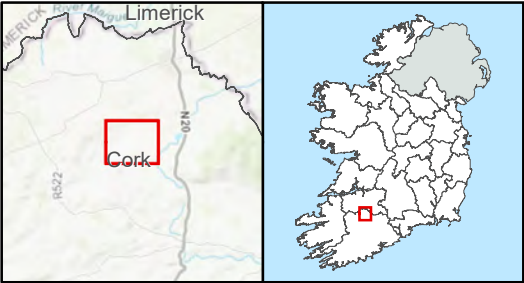
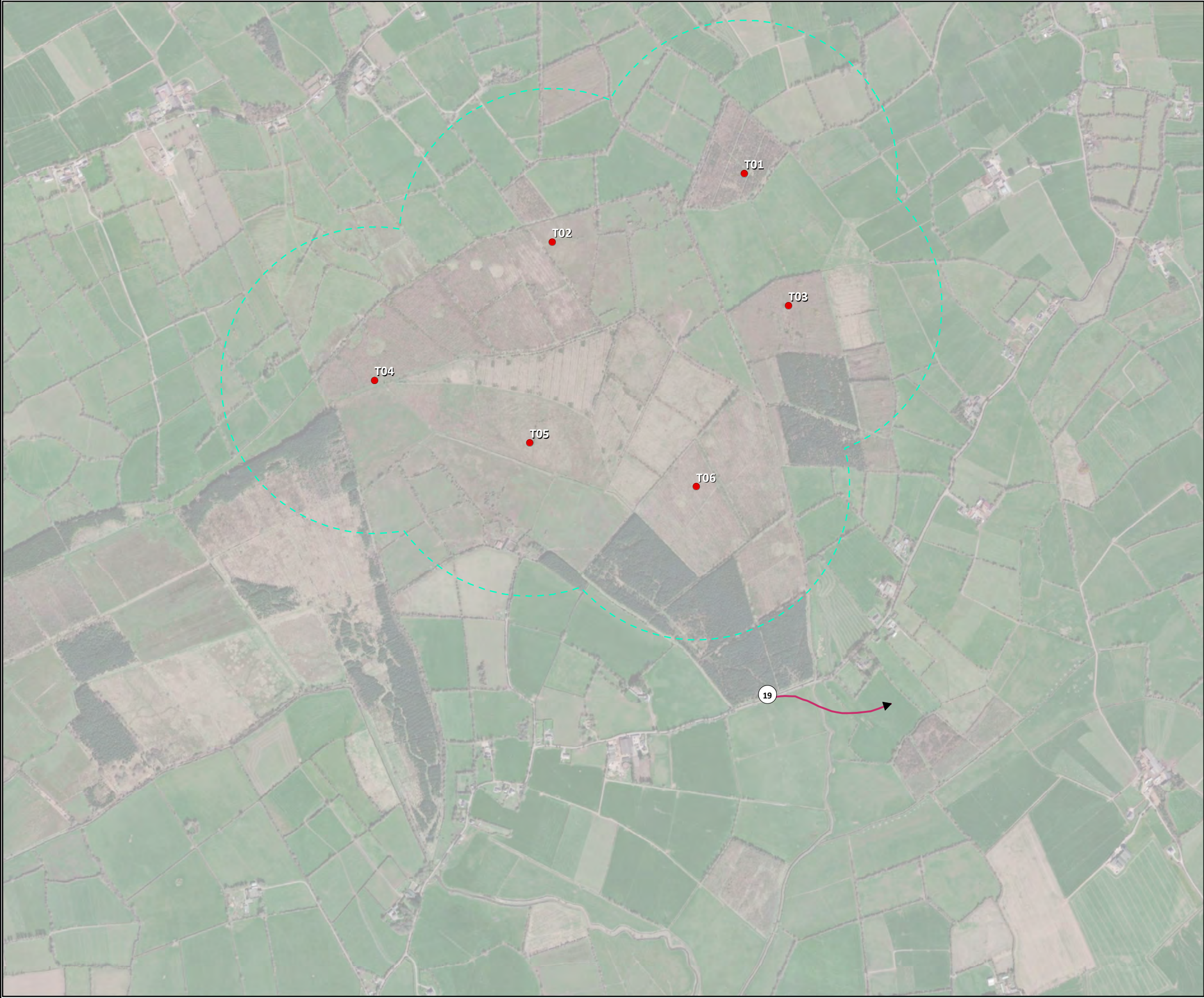


CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE
& PLANNING

APPENDIX 3

Target Species Flight Line
Maps Winter 2021/22





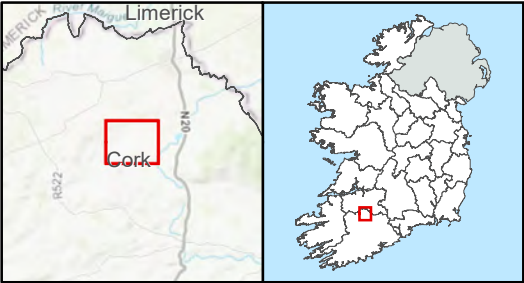
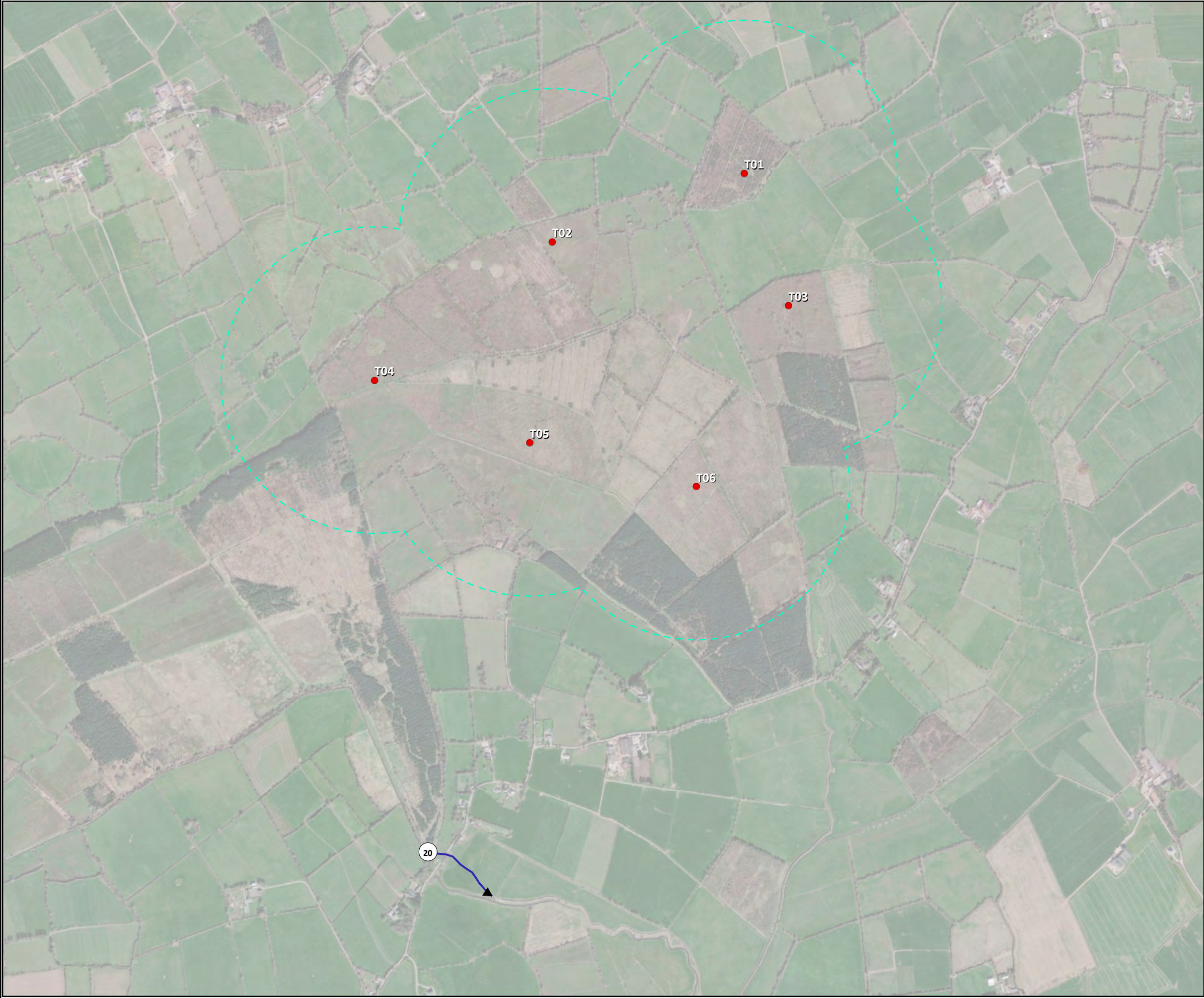
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Observation, Date, Time

→ 19, 09/03/2022, 17:41

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PROJECT:		Annagh Wind Farm, Co. Cork	
FIGURE NO:		1	
CLIENT:		EMP Group	
SCALE:	1:12247	REVISION:	0
DATE:	28/06/2022	PAGE SIZE:	A3



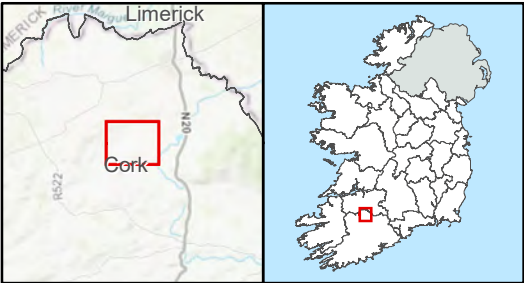
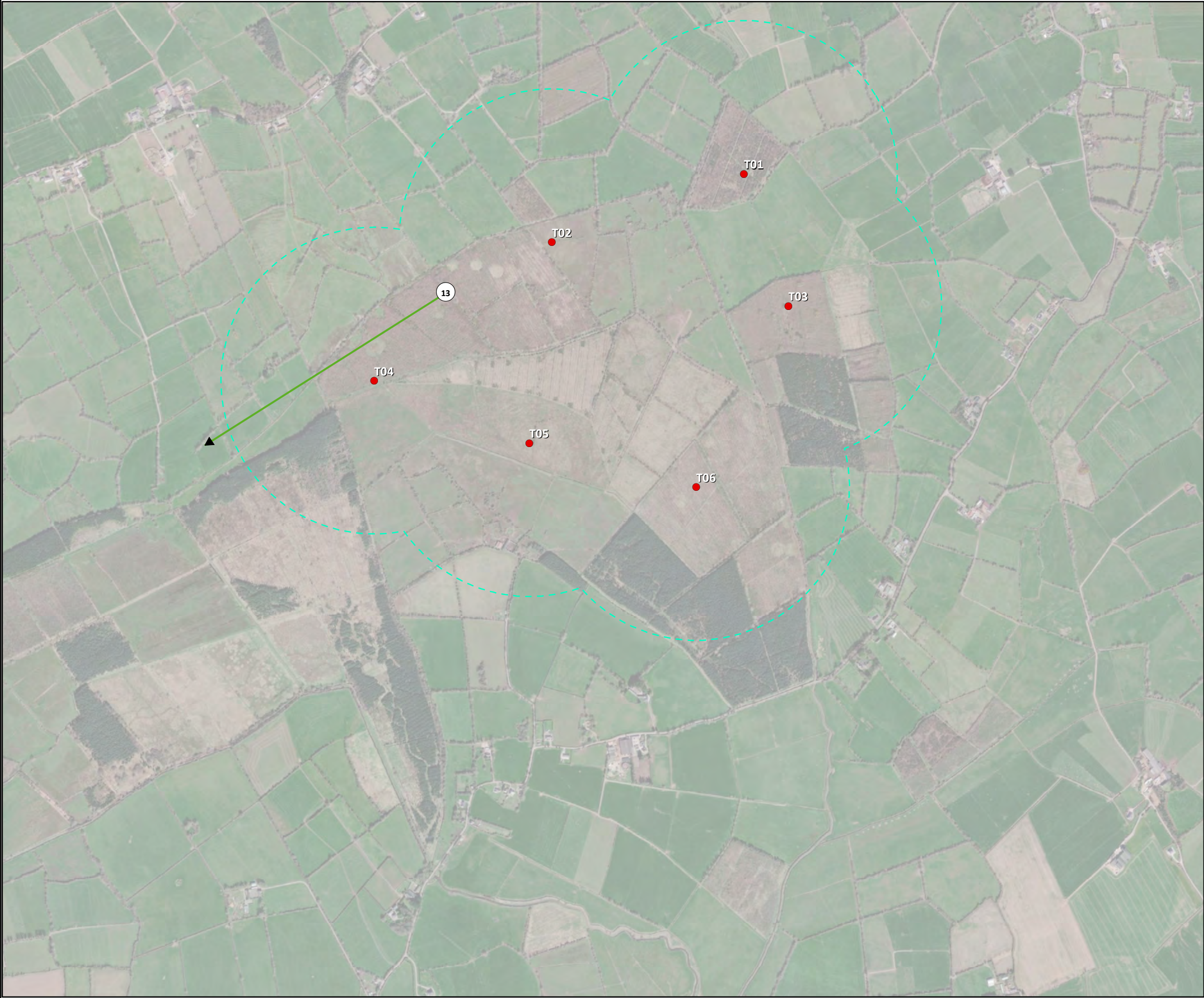
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Observation, Date, Time

→ 20, 01/04/2022, 18:50

TITLE:		Winter 21/22 VP Surveys Grey Heron	
PROJECT:		Annagh Wind Farm, Co. Cork	
FIGURE NO:		2	
CLIENT:		EMP Group	
SCALE:	1:12247	REVISION:	0
DATE:	28/06/2022	PAGE SIZE:	A3



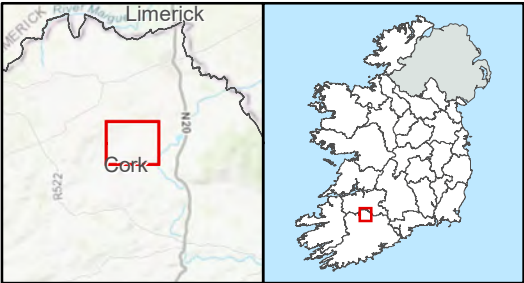
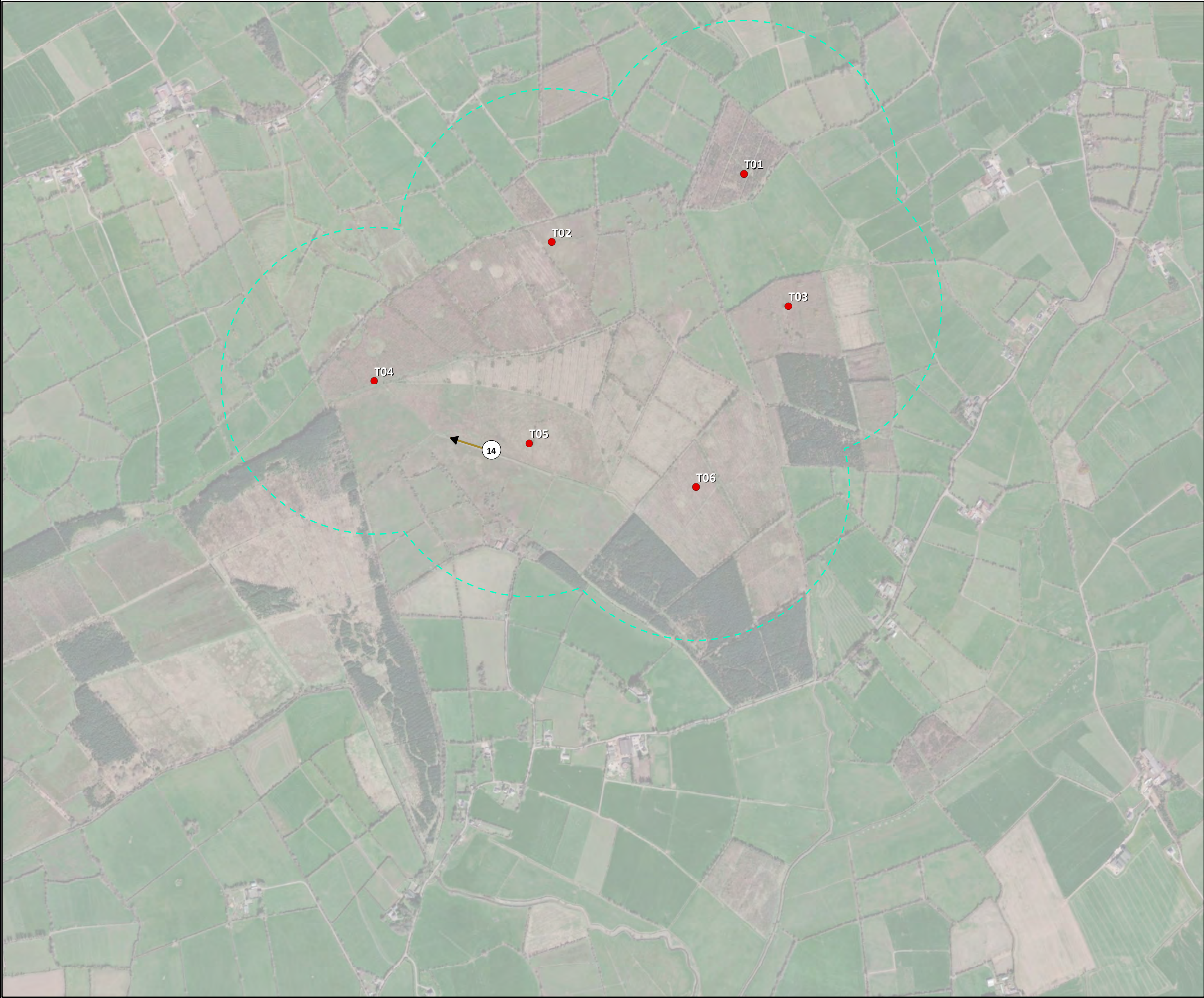
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Observation, Date, Time

→ 13, 11/03/2022, 17:38

TITLE:		Winter 21/22 VP Surveys Greylag Goose	
PROJECT:		Annagh Wind Farm, Co. Cork	
FIGURE NO:		3	
CLIENT:		EMP Group	
SCALE:	1:12247	REVISION:	0
DATE:	25/10/2022	PAGE SIZE:	A3



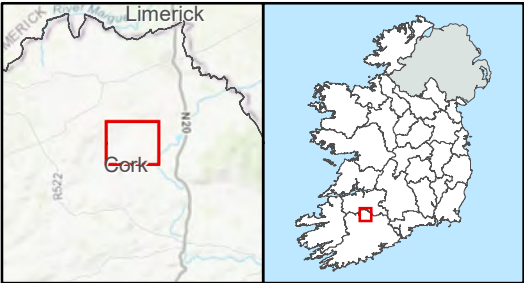
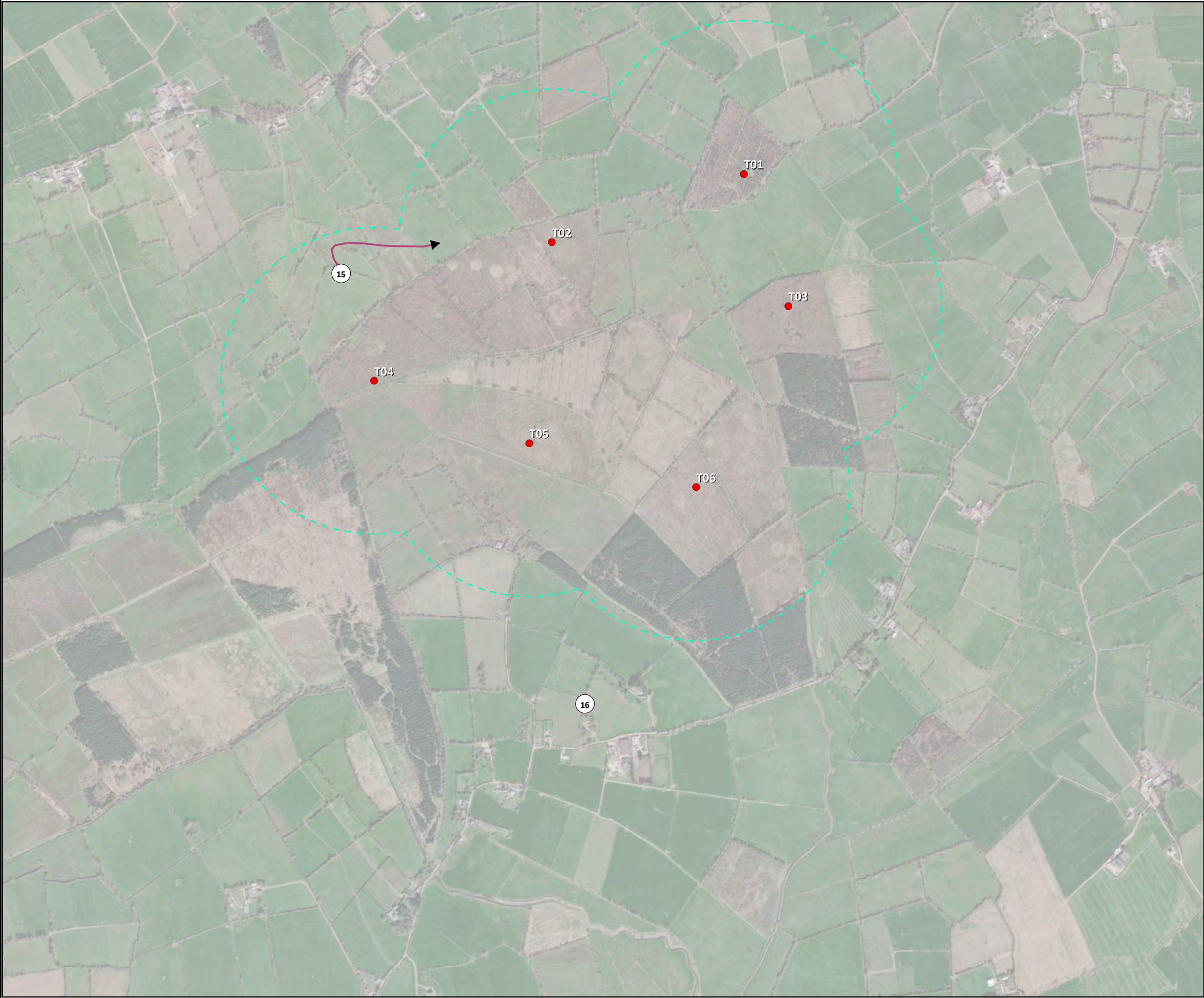
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Observation, Date, Time

→ 14, 08/02/2022, 15:39

TITLE:		Winter 21/22 VP Surveys Mallard	
PROJECT:		Annagh Wind Farm, Co. Cork	
FIGURE NO:		4	
CLIENT:		EMP Group	
SCALE:	1:12247	REVISION:	0
DATE:	25/10/2022	PAGE SIZE:	A3



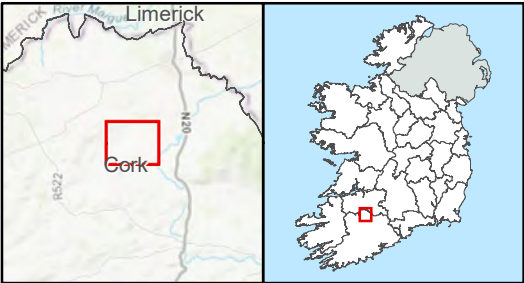
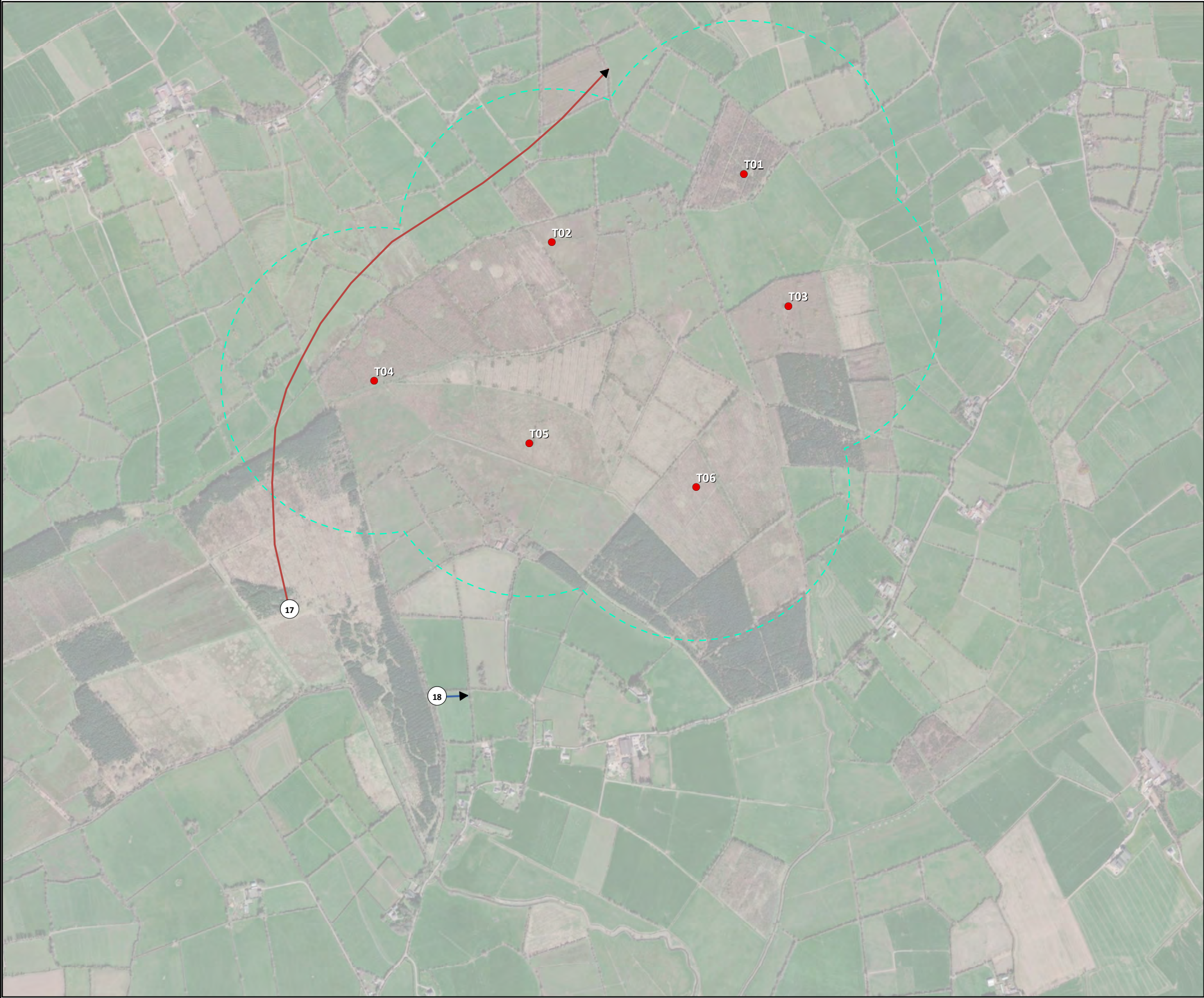
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Observation, Date, Time

- 15, 09/12/2021, 13:10
- 16, 10/12/2021, 12:04

TITLE:		Winter 21/22 VP Surveys Peregrine 1	
PROJECT:		Annagh Wind Farm, Co. Cork	
FIGURE NO:		5	
CLIENT:		EMP Group	
SCALE:	1:12247	REVISION:	0
DATE:	25/10/2022	PAGE SIZE:	A3



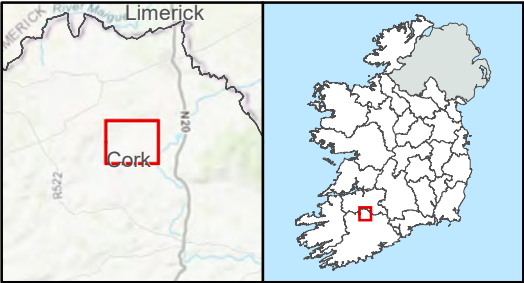
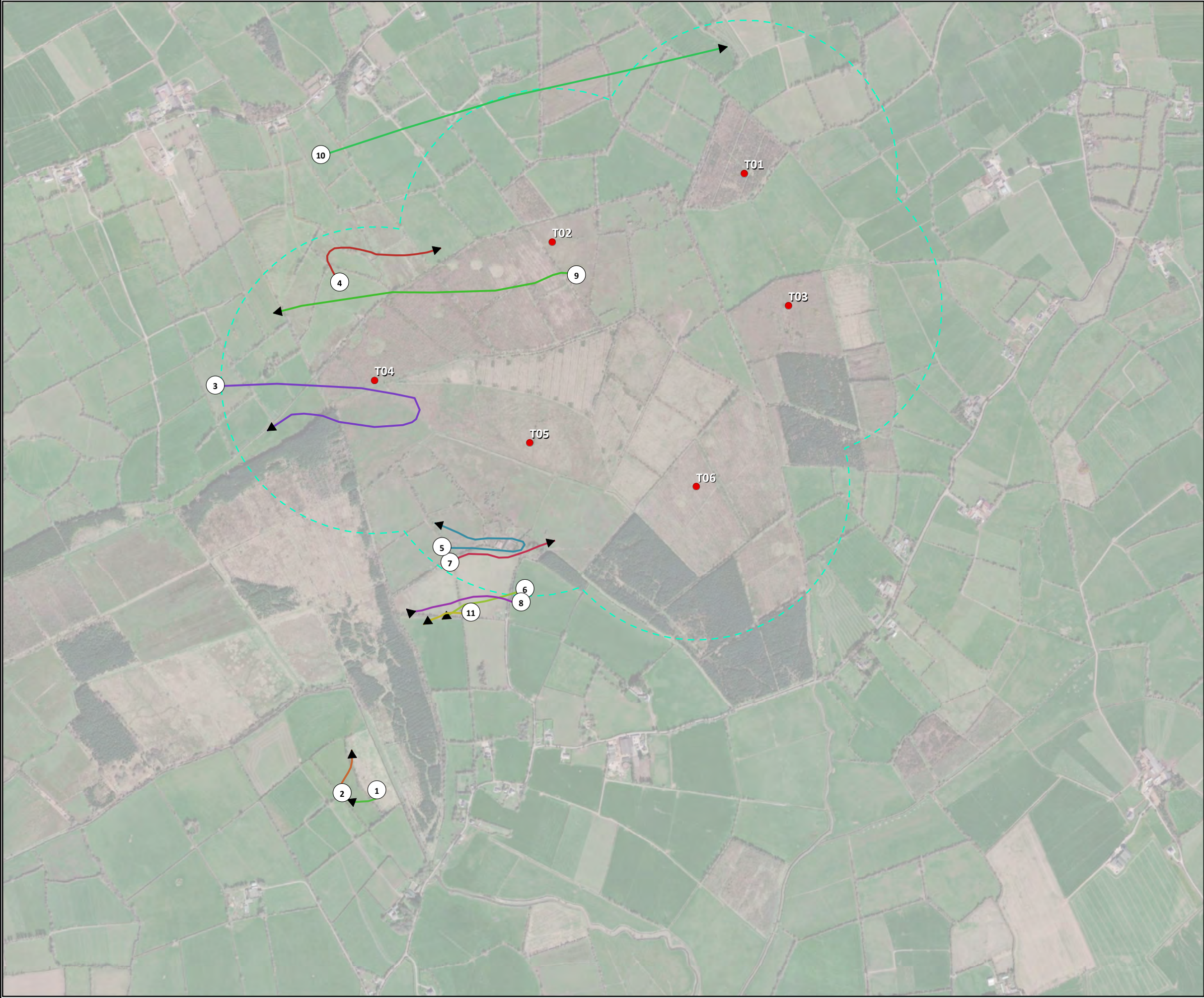
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Observation, Date, Time

- 17, 17/02/2022, 08:55
- 18, 23/03/2022, 06:29

TITLE: Winter 21/22 VP Surveys Whooper Swan	
PROJECT: Annagh Wind Farm, Co. Cork	
FIGURE NO: 6	
CLIENT: EMP Group	
SCALE: 1:12247	REVISION: 0
DATE: 25/10/2022	PAGE SIZE: A3



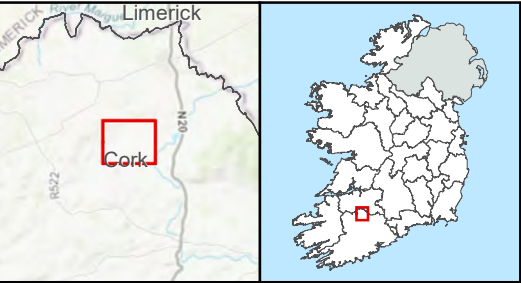
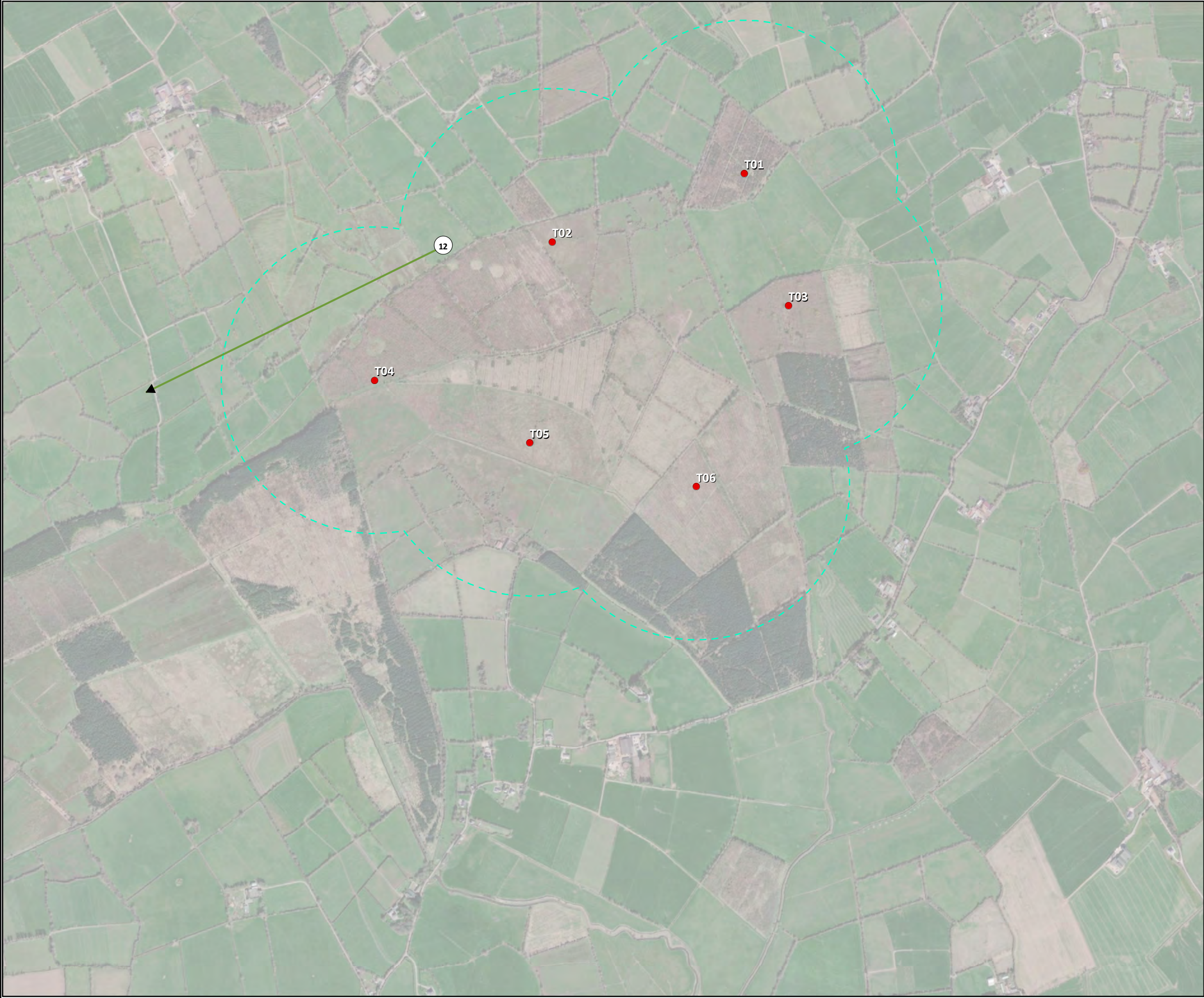
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- Turbine Layout 500m Buffer

id, Date, Time

- 1, 09/11/2021, 15:21
- 2, 09/11/2021, 15:28
- 3, 09/12/2021, 12:20
- 4, 10/12/2021, 13:50
- 5, 11/01/2022, 13:50
- 6, 11/01/2022, 14:25
- 7, 11/01/2022, 14:32
- 8, 16/02/2022, 17:00
- 9, 13/03/2022, 16:14
- 10, 13/03/2022, 17:33
- 11, 30/03/2022, 17:53

TITLE:		Swan VP Surveys Buzzard	
PROJECT:		Annagh Wind Farm, Co. Cork	
FIGURE NO:		7	
CLIENT:		EMP Group	
SCALE:	1:12247	REVISION:	0
DATE:	28/06/2022	PAGE SIZE:	A3



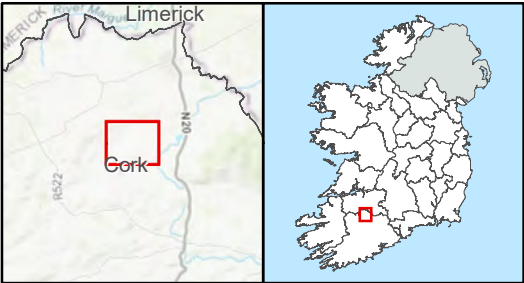
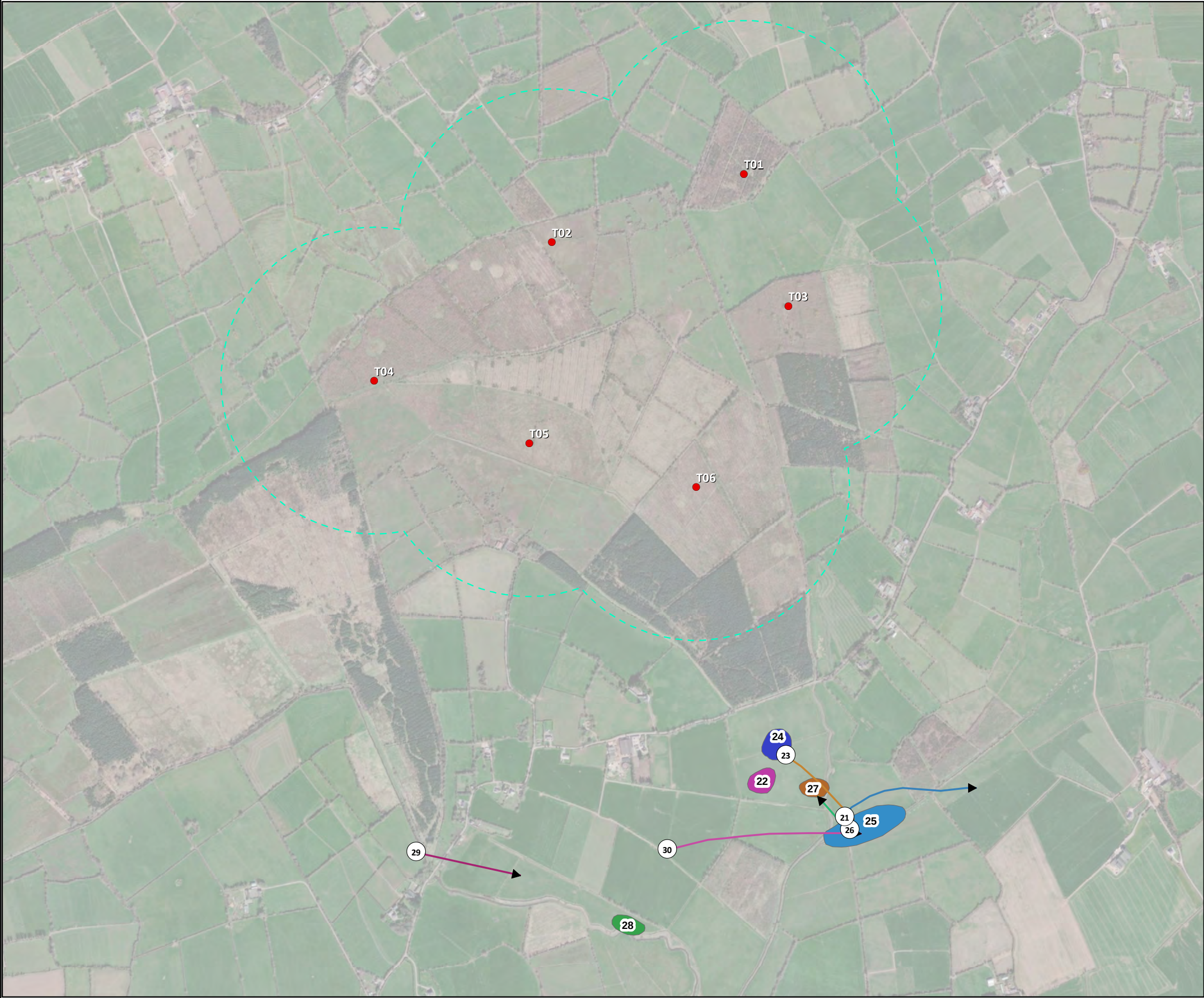
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- Turbine Layout
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id, Date, Time

→ 12, 11/03/2022, 18:11

TITLE:		Swan VP Surveys Grey Heron	
PROJECT:		Annagh Wind Farm, Co. Cork	
FIGURE NO:		8	
CLIENT:		EMP Group	
SCALE:	1:12247	REVISION:	0
DATE:	28/06/2022	PAGE SIZE:	A3



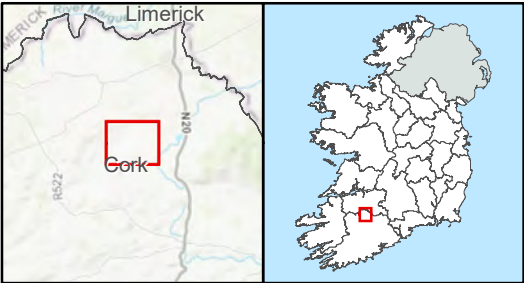
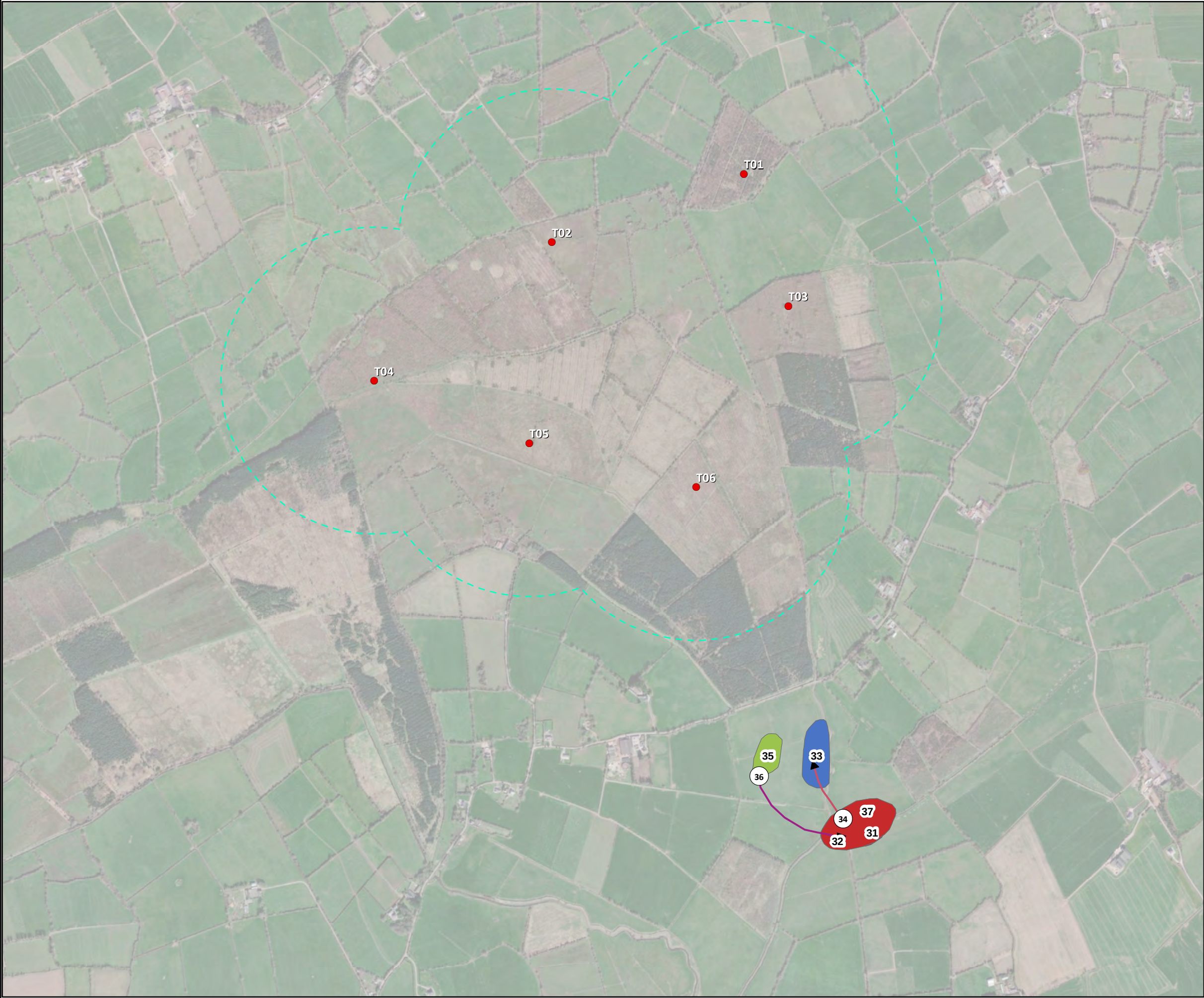
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- Turbine Layout
- Turbine Layout 500m Buffer

Observation, Date, Time

- 21, 17/02/2022, 10:30
- 23, 18/02/2022, 18:45
- 26, 21/02/2022, 07:20
- 29, 28/02/2022, 07:23
- 30, 28/02/2022, 07:32
- 22, 18/02/2022, 16:15
- 24, 18/02/2022, 18:45
- 25, 21/02/2022, 07:10
- 27, 21/02/2022, 07:20
- 28, 22/02/2022, 18:00

TITLE: Swan VP Surveys Greylag Goose 1	
PROJECT: Annagh Wind Farm, Co. Cork	
FIGURE NO:	9
CLIENT:	EMP Group
SCALE:	1:12247
DATE:	25/10/2022
REVISION:	0
PAGE SIZE:	A3



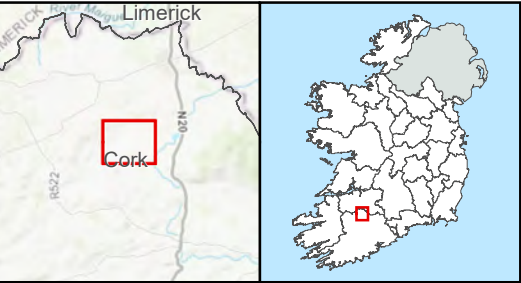
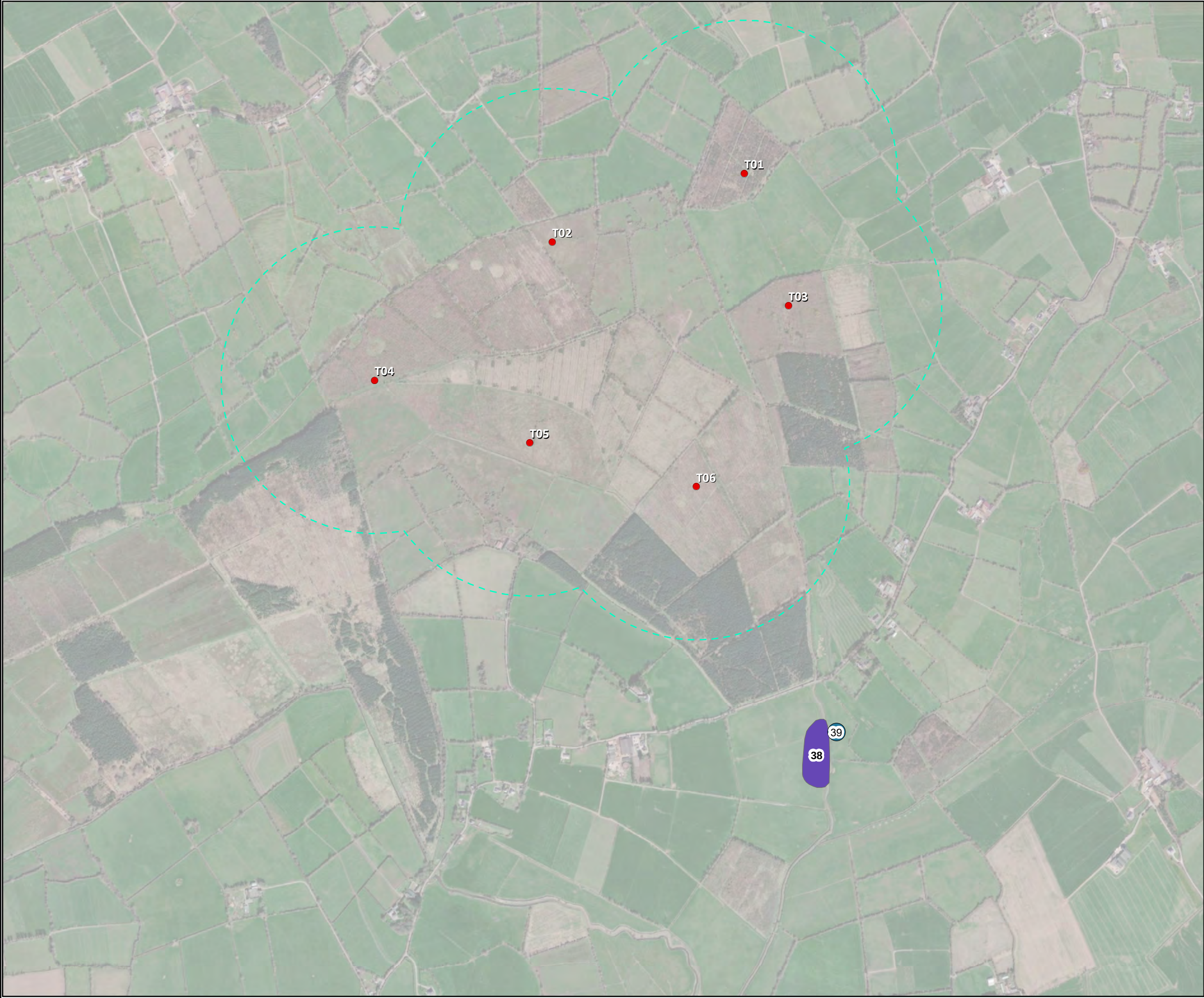
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- Turbine Layout
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Observation, Date, Time

- 34, 09/03/2022, 17:00
- 36, 09/03/2022, 19:00
- 31, 28/02/2022, 07:32
- 32, 09/03/2022, 16:30
- 33, 09/03/2022, 16:30
- 35, 09/03/2022, 18:17
- 37, 09/03/2022, 19:00

TITLE:		Swan VP Surveys Greylag Goose 2	
PROJECT:		Annagh Wind Farm, Co. Cork	
FIGURE NO:		10	
CLIENT:		EMP Group	
SCALE:	1:12247	REVISION:	0
DATE:	25/10/2022	PAGE SIZE:	A3



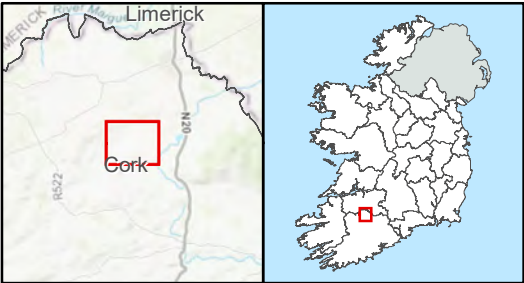
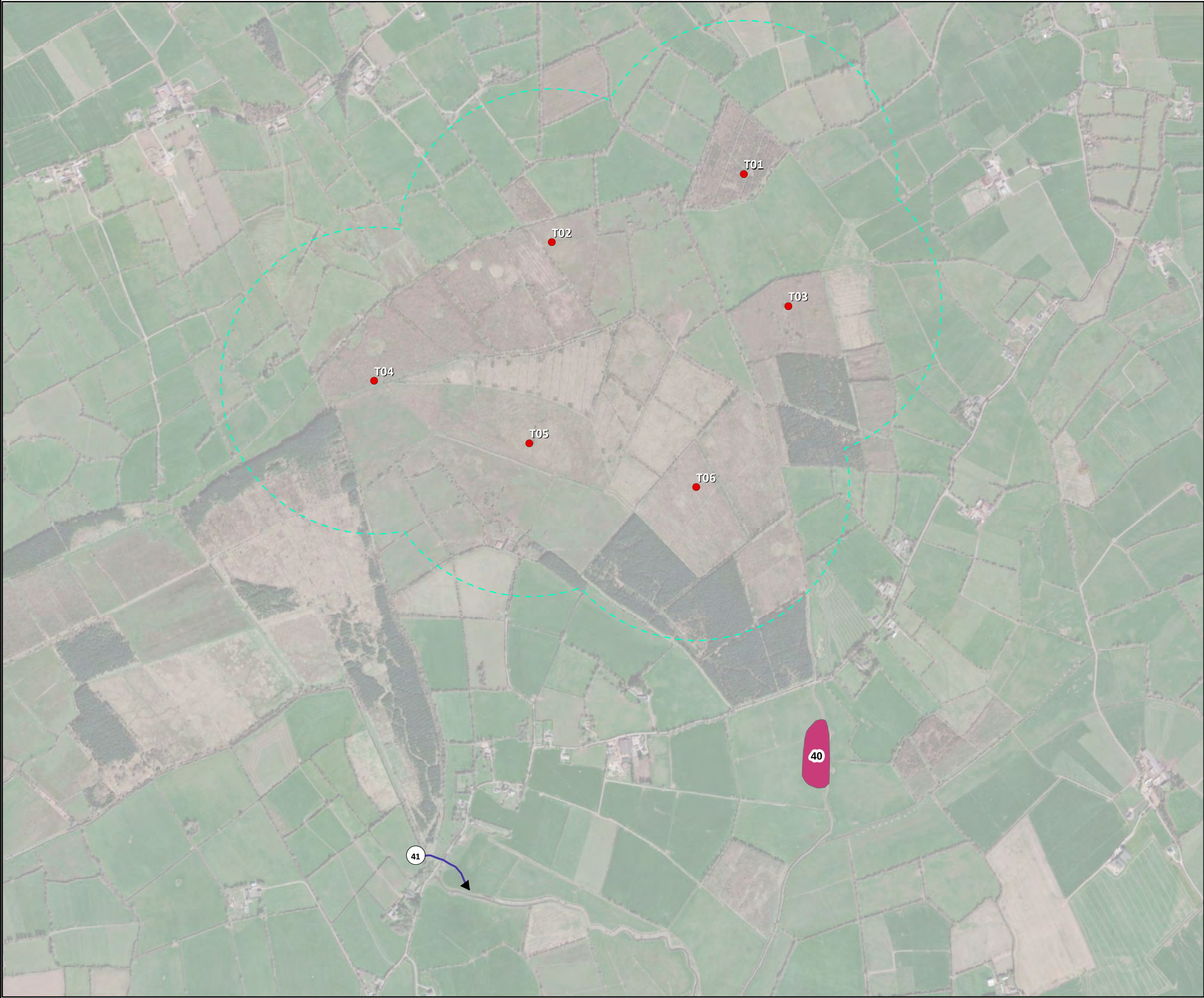
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- Turbine Layout
- Turbine Layout 500m Buffer

Observation, Date, Time

- 39, 01/04/2022, 18:00
- 38, 09/03/2022, 16:30

TITLE:		Winter 21/22 VP Surveys Little Egret	
PROJECT:		Annagh Wind Farm, Co. Cork	
FIGURE NO:		11	
CLIENT:		EMP Group	
SCALE:	1:12247	REVISION:	0
DATE:	28/06/2022	PAGE SIZE:	A3



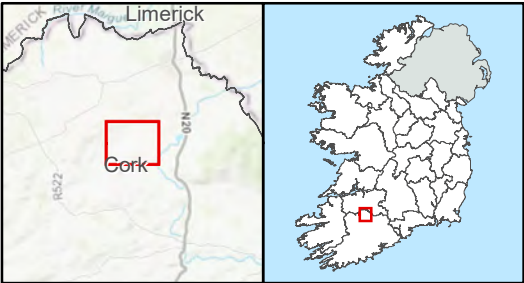
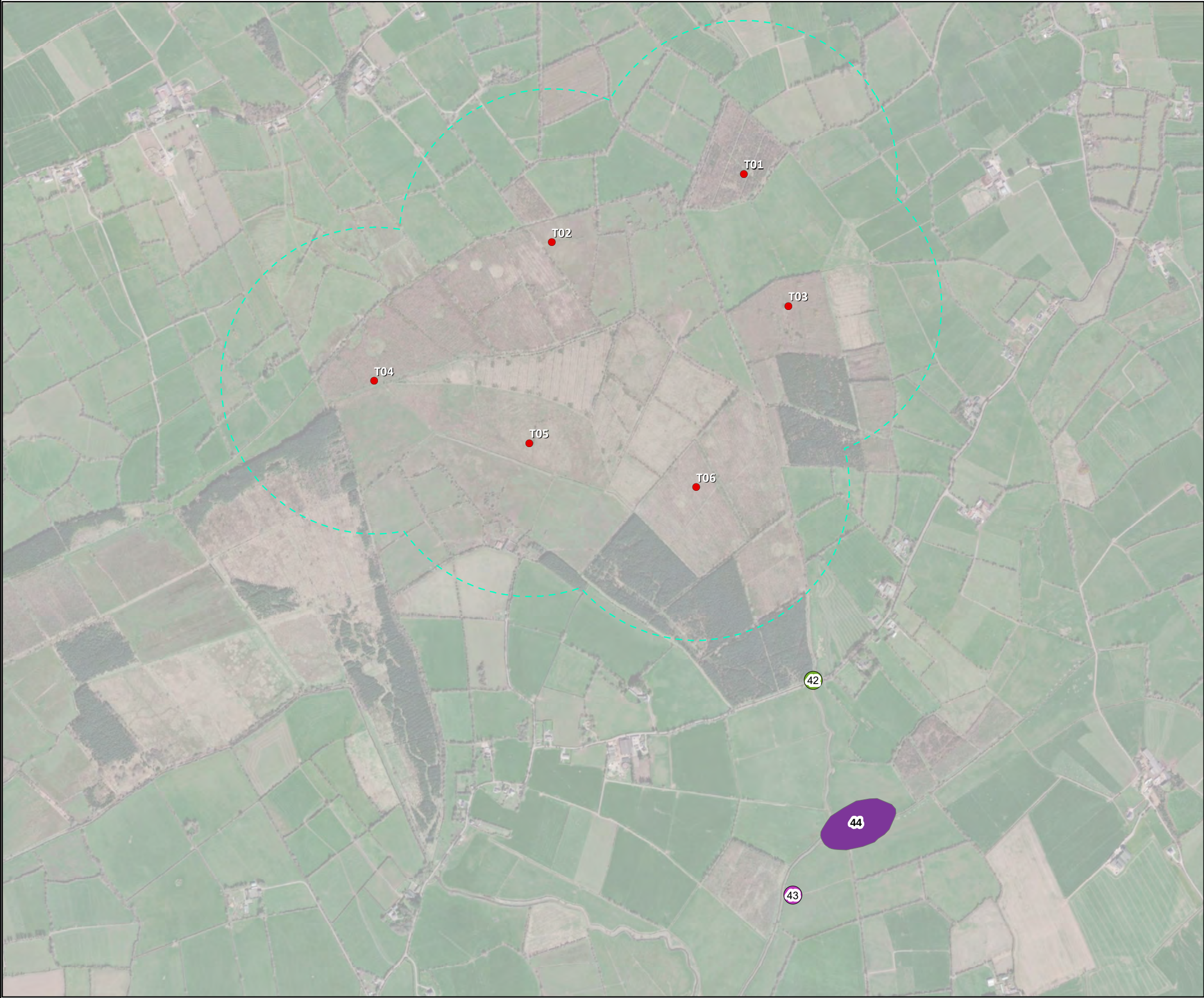
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- Turbine Layout
- Turbine Layout 500m Buffer

Observation, Date, Time

- 41, 03/04/2022, 06:33
- 40, 09/03/2022, 16:30

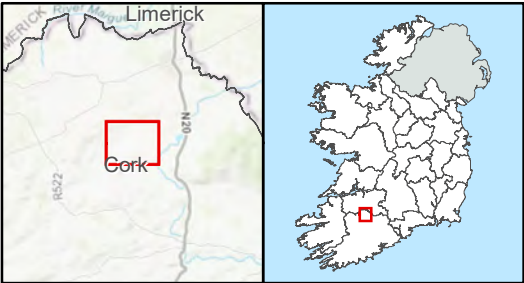
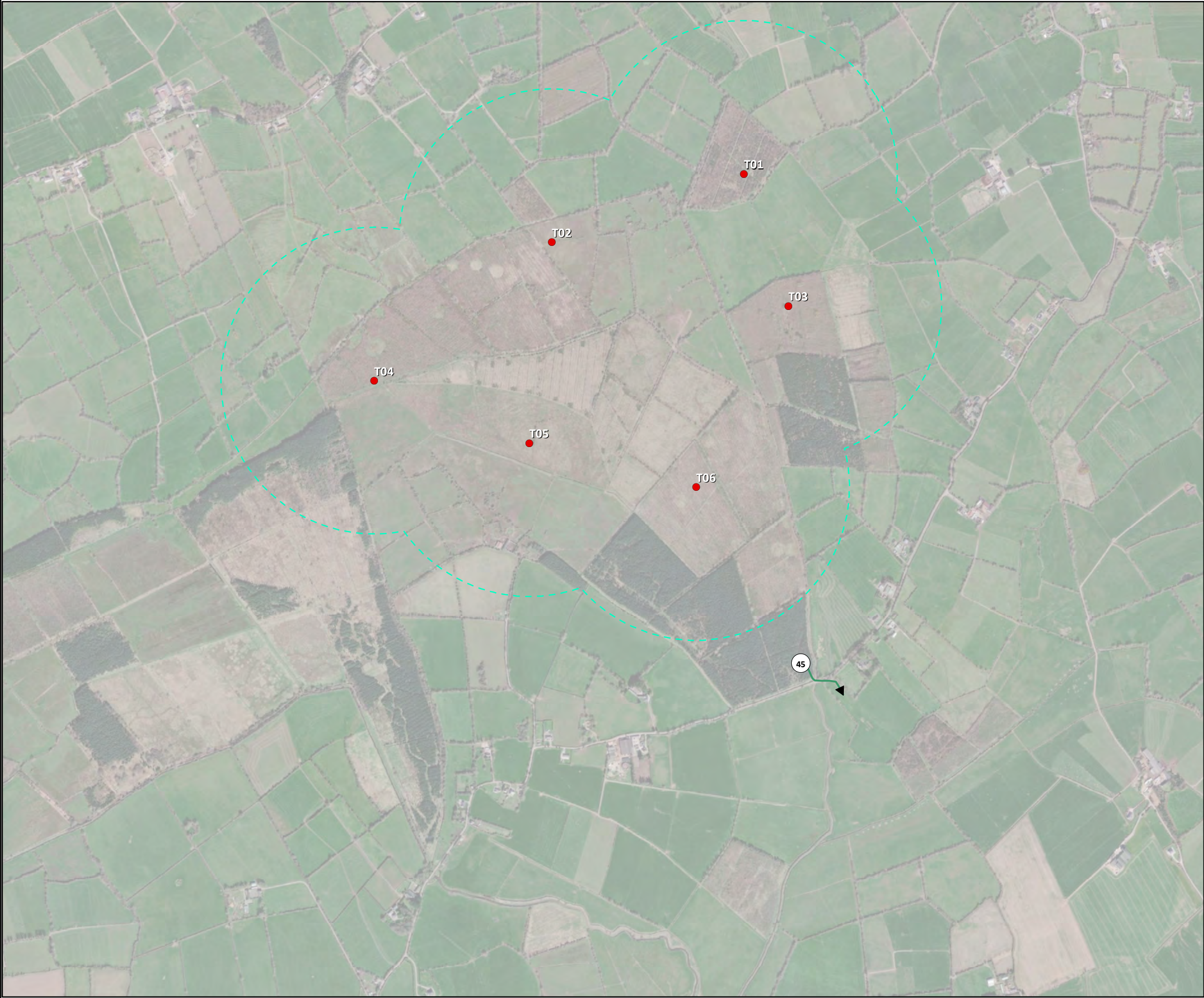
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PROJECT:		Annagh Wind Farm, Co. Cork	
FIGURE NO:		1	
CLIENT:		EMP Group	
SCALE:	1:12247	REVISION:	0
DATE:	25/10/2022	PAGE SIZE:	A3



Legend

- Turbine Layout
- Turbine Layout 500m Buffer
- 42, 17/02/2022, 10:30
- 43, 18/02/2022, 16:05
- 44, 21/02/2022, 07:10

TITLE:		Swan VP Surveys Mute Swan	
PROJECT:		Annagh Wind Farm, Co. Cork	
FIGURE NO:		12	
CLIENT:		EMP Group	
SCALE:	1:12247	REVISION:	0
DATE:	27/10/2022	PAGE SIZE:	A3

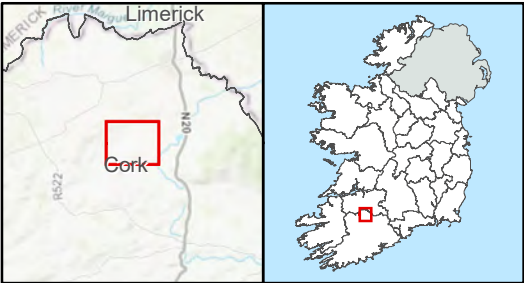
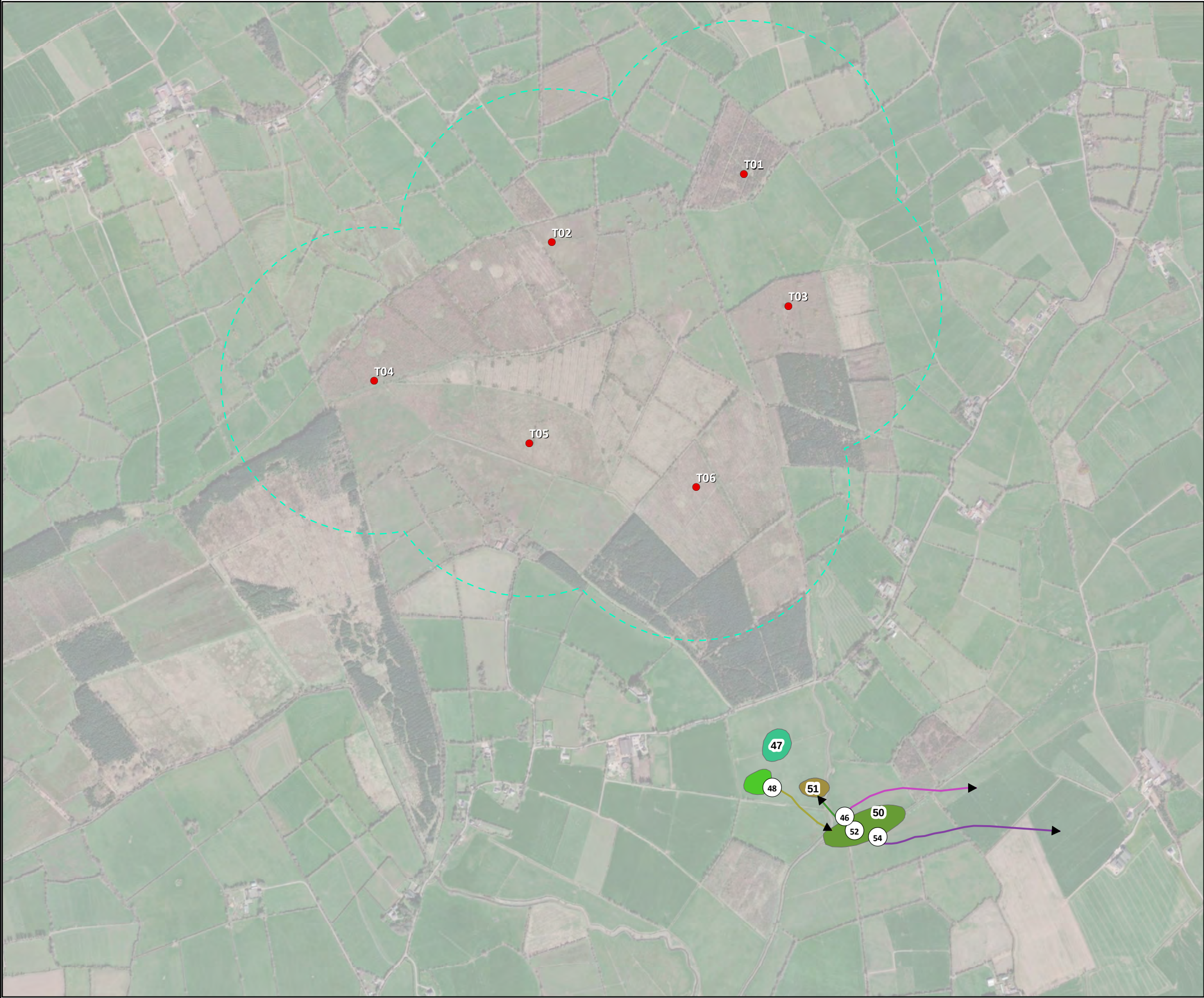


- Legend**
- Turbine Layout
 - - - Turbine Layout 500m Buffer

Observation, Date, Time

→ 45, 09/03/2022, 17:09

TITLE:		Swan VP Surveys Sparrowhawk	
PROJECT:		Annagh Wind Farm, Co. Cork	
FIGURE NO:		13	
CLIENT:		EMP Group	
SCALE:	1:12247	REVISION:	0
DATE:	25/10/2022	PAGE SIZE:	A3



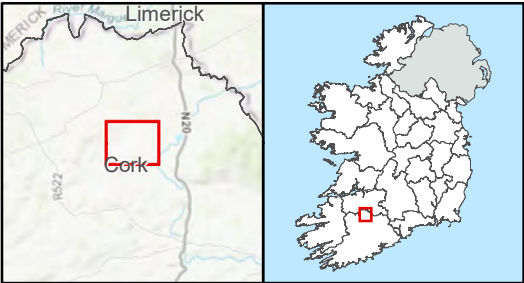
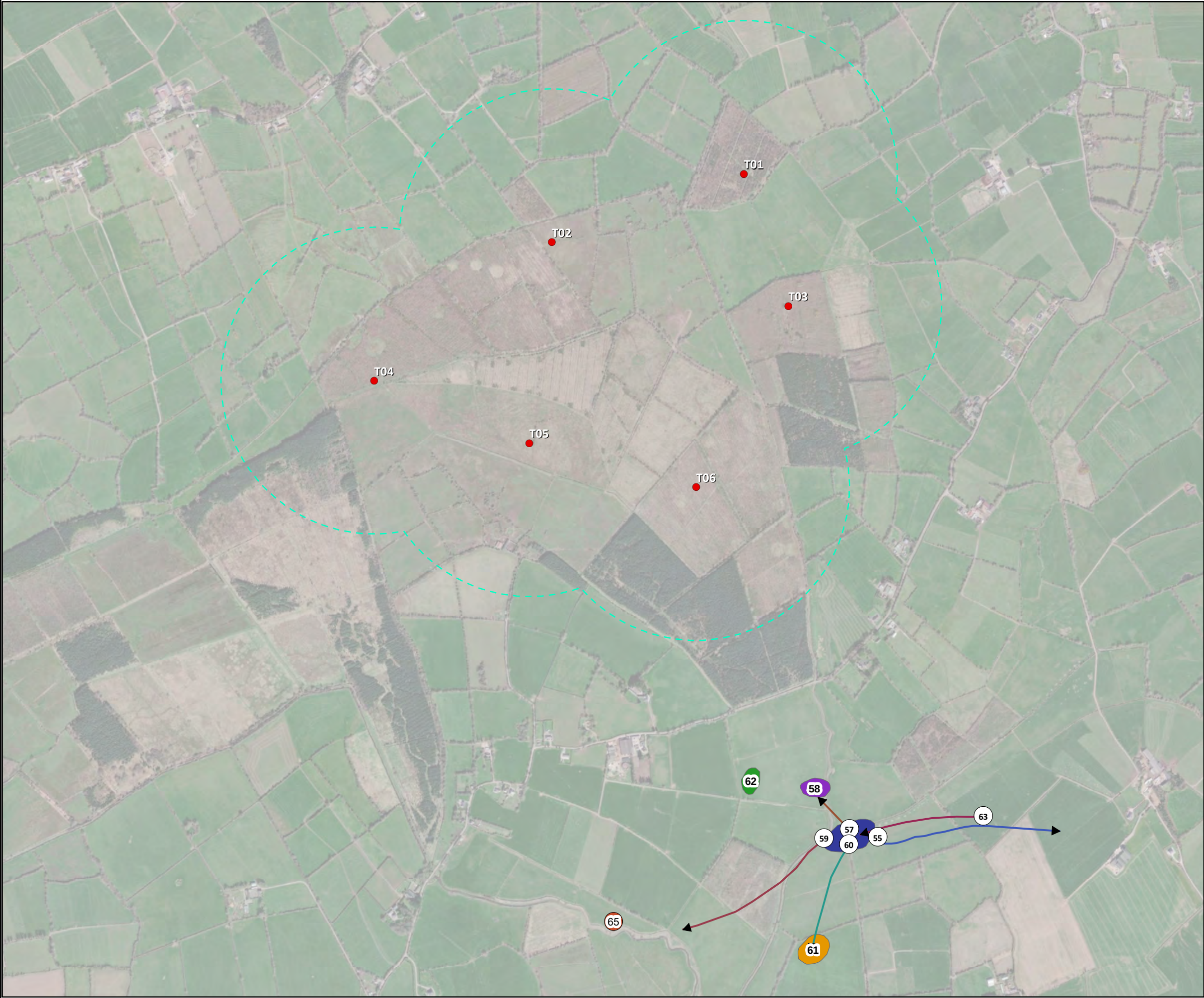
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- Turbine Layout
- Turbine Layout 500m Buffer

Observation, Date, Time

- ➔ 46, 17/02/2022, 10:30
- ➔ 48, 18/02/2022, 18:45
- ➔ 52, 21/02/2022, 07:20
- ➔ 54, 21/02/2022, 07:35
- 47, 18/02/2022, 16:13
- 49, 18/02/2022, 18:45
- 50, 21/02/2022, 07:10
- 51, 21/02/2022, 07:10
- 53, 21/02/2022, 07:20

TITLE:		Swan VP Surveys Whooper Swan 1	
PROJECT:		Annagh Wind Farm, Co. Cork	
FIGURE NO:		14	
CLIENT:		EMP Group	
SCALE:	1:12247	REVISION:	0
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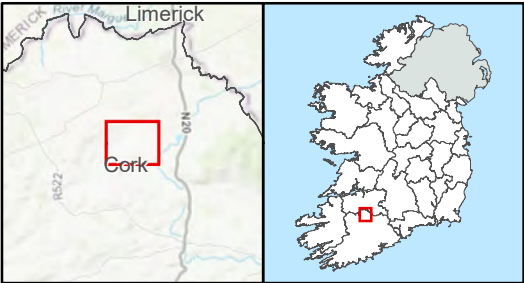
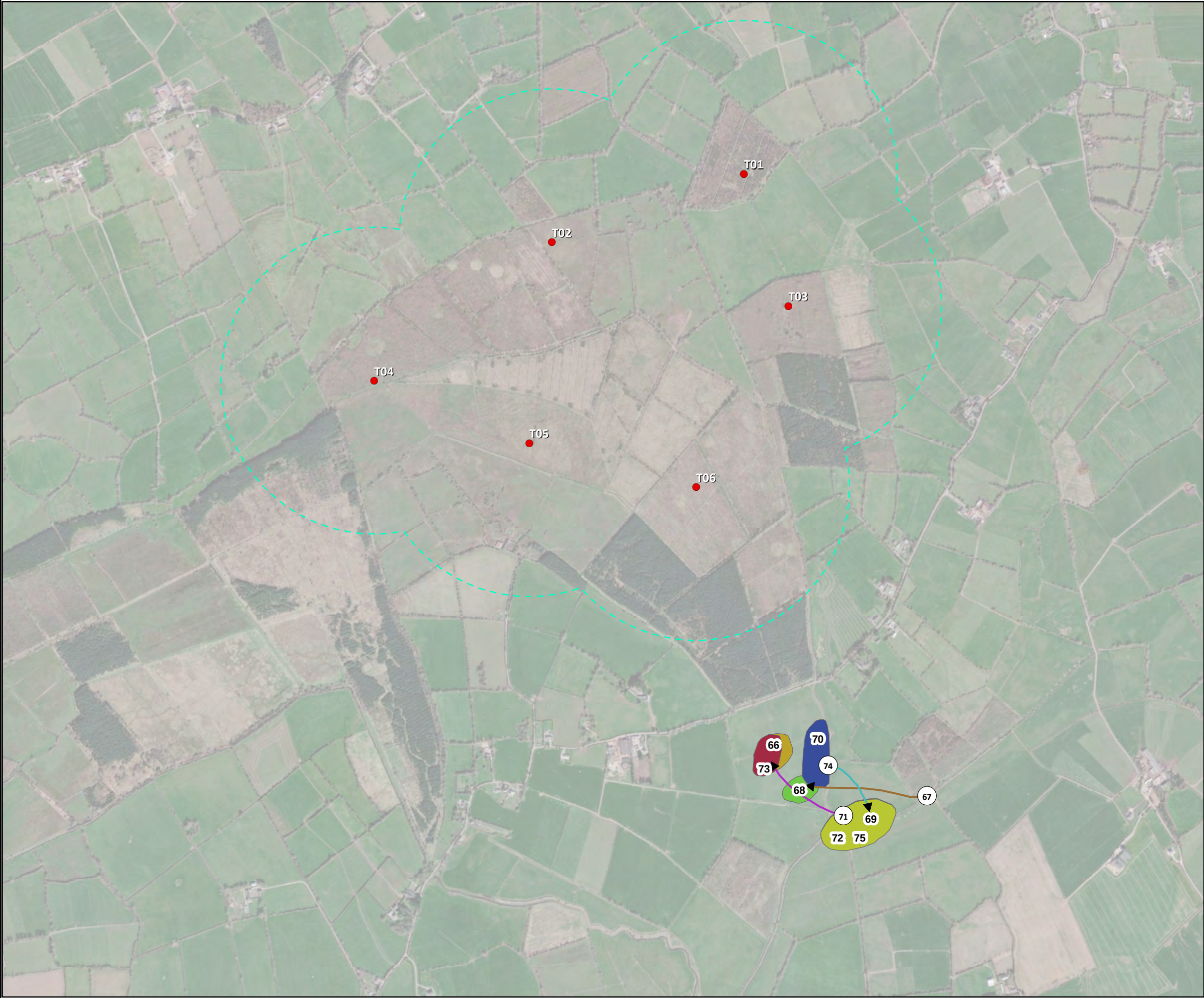
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- Turbine Layout
- - - Turbine Layout 500m Buffer

Observation, Date, Time

- 55, 21/02/2022, 07:40
- 57, 21/02/2022, 07:30
- 59, 21/02/2022, 08:04
- 60, 21/02/2022, 07:30
- 63, 22/02/2022, 18:34
- 65, 28/02/2022, 07:25
- 58, 21/02/2022, 07:30
- 61, 21/02/2022, 07:30
- 62, 22/02/2022, 16:00
- 64, 22/02/2022, 18:34

TITLE: Swan VP Surveys Whooper Swan 2	
PROJECT: Annagh Wind Farm, Co. Cork	
FIGURE NO:	15
CLIENT:	EMP Group
SCALE:	1:12247
REVISION:	0
DATE:	25/10/2022
PAGE SIZE:	A3



Legend

- Turbine Layout
- Turbine Layout 500m Buffer

Observation, Date, Time

- ➔ 67, 28/02/2022, 07:30
- ➔ 71, 09/03/2022, 17:00
- ➔ 74, 09/03/2022, 19:00
- 66, 28/02/2022, 07:27
- 68, 28/02/2022, 07:30
- 69, 09/03/2022, 16:30
- 70, 09/03/2022, 16:30
- 72, 09/03/2022, 17:00
- 73, 09/03/2022, 18:17
- 75, 09/03/2022, 19:00

TITLE:		Swan VP Surveys Whooper Swan 3	
PROJECT:		Annagh Wind Farm, Co. Cork	
FIGURE NO:		16	
CLIENT:		EMP Group	
SCALE:	1:12247	REVISION:	0
DATE:	25/10/2022	PAGE SIZE:	A3



CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE
& PLANNING

APPENDIX 4

Hinterland Survey Results



Site	Date	Cloud	Visibility	Rain	Wind	Common Name	Quantity
River Blackwater SAC/ Buttevant	26/10/2021	5/8	Good	Dry	F3 SW	Mallard	2
Eagle Lough pNHA	26/10/2021	5/8	Good	Dry	F3 SW	Teal	32
Kilcolman Bog SPA	26/10/2021	5/8	Good	Dry	F3 SW	Grey Heron	1
Kilcolman Bog SPA	26/10/2021	5/8	Good	Dry	F3 SW	Mallard	1
Kilcolman Bog SPA	26/10/2021	5/8	Good	Dry	F3 SW	Whooper Swan	0
River Blackwater SAC/Annagh Bridge	28/10/2021	8/8	Fair	Dry	F1	Buzzard	1
River Blackwater SAC/Annagh Bridge	28/10/2021	8/8	Fair	Dry	F1	Grey Heron	1
Castle Lake (Milltown)	28/10/2021	8/8	Fair	Dry	F1	No target species	N/A
River Awbeg	28/10/2021	8/8	Fair	Dry	F1	No target species	N/A
River Blackwater SAC/Annagh Bridge	29/10/2021	3/8	Good	Dry	F1 S	Whooper Swan	5
Ballyhea Quarry	29/10/2021	3/8	Good	Dry	F1 S	Mallard	3
Ballyhea Quarry	29/10/2021	3/8	Good	Dry	F1 S	Cormorant	1
Ballyhoura Mountains SAC	01/11/2021	8/8	Good	Dry	F2 SW	No target species	N/A
River Blackwater SAC/Annagh Bridge	04/11/2021	1/8	Good	Dry	F2 NW	Greylag Goose	93
River Blackwater SAC/Annagh Bridge	04/11/2021	1/8	Good	Dry	F2 NW	Mute Swan	88
River Blackwater SAC/Annagh Bridge	04/11/2021	1/8	Good	Dry	F2 NW	Lapwing	45
River Awbeg	04/11/2021	1/8	Good	Dry	F2 NW	Black-headed Gull	55
Templebridget	09/11/2021	8/8	Good	Dry	F2 W	Whooper Swan	2
River Blackwater SAC/ Buttevant	05/12/2021	5/8	Good	Dry	F2 W	Mute Swan	2
River Blackwater SAC/ Buttevant	05/12/2021	5/8	Good	Dry	F2 W	Teal	1
Eagle Lough pNHA	05/12/2021	5/8	Good	Dry	F2 W	Teal	7
Eagle Lough pNHA	05/12/2021	5/8	Good	Dry	F2 W	Buzzard	2
Kilcolman Bog SPA	05/12/2021	5/8	Good	Dry	F2 W	Teal	7
Kilcolman Bog SPA	05/12/2021	5/8	Good	Dry	F2 W	Gadwall	2
Kilcolman Bog SPA	05/12/2021	5/8	Good	Dry	F2 W	Greylag Goose	112
Kilcolman Bog SPA	05/12/2021	5/8	Good	Dry	F2 W	Merlin	1
Castle Lake (Milltown)	05/12/2021	5/8	Good	Dry	F2 W	Mallard	1
Castle Lake (Milltown)	05/12/2021	5/8	Good	Dry	F2 W	Moorhen	1

Site	Date	Cloud	Visibility	Rain	Wind	Common Name	Quantity
Castle Lake (Milltown)	05/12/2021	5/8	Good	Dry	F2 W	Snipe	1
Ballyhea Quarry	10/12/2021	1/8	Good	Dry	F2 SW	Cormorant	1
Ballyhea Quarry	10/12/2021	1/8	Good	Dry	F2 SW	Teal	40
Ballyhea Quarry	10/12/2021	1/8	Good	Dry	F2 SW	Mallard	1
Ballyhea Quarry	10/12/2021	1/8	Good	Dry	F2 SW	Curlew	46
Ballyhea Quarry	10/12/2021	1/8	Good	Dry	F2 SW	Wigeon	18
River Awbeg	10/12/2021	1/8	Good	Dry	F2 SW	Curlew	30
River Awbeg	10/12/2021	1/8	Good	Dry	F2 SW	Grey Heron	1
Ballyhea Quarry	14/12/2021	8/8	Good	Dry	F2 SW	Mallard	6
Ballyhea Quarry	14/12/2021	8/8	Good	Dry	F2 SW	Wigeon	40
Ballyhea Quarry	14/12/2021	8/8	Good	Dry	F2 SW	Curlew	60
Ballyhea Quarry	14/12/2021	8/8	Good	Dry	F2 SW	Teal	72
Ballyhea Quarry	14/12/2021	8/8	Good	Dry	F2 SW	Grey Heron	1
River Blackwater SAC/ Buttevant	14/12/2021	8/8	Good	Dry	F2 SW	Little Egret	1
River Blackwater SAC/ Buttevant	14/12/2021	8/8	Good	Dry	F2 SW	Mute Swan	1
Eagle Lough pNHA	28/12/2021	6/8	Good	Dry	F2 W	Mallard	6
Eagle Lough pNHA	28/12/2021	6/8	Good	Dry	F2 W	Wigeon	5
Eagle Lough pNHA	28/12/2021	6/8	Good	Dry	F2 W	Teal	5
Eagle Lough pNHA	28/12/2021	6/8	Good	Dry	F2 W	Shoveler	3
Eagle Lough pNHA	28/12/2021	6/8	Good	Dry	F2 W	Little Grebe	4
Eagle Lough pNHA	28/12/2021	6/8	Good	Dry	F2 W	Buzzard	1
Kilcolman Bog SPA	28/12/2021	6/8	Good	Dry	F2 W	Mute Swan	2
Kilcolman Bog SPA	28/12/2021	6/8	Good	Dry	F2 W	Shoveler	74
Kilcolman Bog SPA	28/12/2021	6/8	Good	Dry	F2 W	Teal	44
Kilcolman Bog SPA	28/12/2021	6/8	Good	Dry	F2 W	Mallard	3
Kilcolman Bog SPA	28/12/2021	6/8	Good	Dry	F2 W	Wigeon	89
Kilcolman Bog SPA	28/12/2021	6/8	Good	Dry	F2 W	Greylag Goose	60
Castle Lake (Milltown)	28/12/2021	6/8	Good	Dry	F2 W	Moorhen	1

Site	Date	Cloud	Visibility	Rain	Wind	Common Name	Quantity
Castle Lake (Milltown)	28/12/2021	6/8	Good	Dry	F2 W	Mallard	2
Ballyhoura Mountains SAC	28/12/2021	8/8	Fair	Dry	F2 W	No target species	N/A
River Blackwater SAC/ Buttevant	31/01/2022	8/8	Good	Dry	F3 W	Teal	32
River Blackwater SAC/ Buttevant	31/01/2022	8/8	Good	Dry	F3 W	Grey Heron	2
Eagle Lough pNHA	31/01/2022	8/8	Good	Dry	F3 W	Teal	40
Eagle Lough pNHA	31/01/2022	8/8	Good	Dry	F3 W	Wigeon	35
Eagle Lough pNHA	31/01/2022	8/8	Good	Dry	F3 W	Mallard	10
Eagle Lough pNHA	31/01/2022	8/8	Good	Dry	F3 W	Snipe	2
Eagle Lough pNHA	31/01/2022	8/8	Good	Dry	F3 W	Moorhen	2
Eagle Lough pNHA	31/01/2022	8/8	Good	Dry	F3 W	Grey Heron	1
Eagle Lough pNHA	31/01/2022	8/8	Good	Dry	F3 W	Little Grebe	2
Kilcolman Bog SPA	31/01/2022	8/8	Good	Dry	F3 W	Whooper Swan	3
Kilcolman Bog SPA	31/01/2022	8/8	Good	Dry	F3 W	Wigeon	145
Kilcolman Bog SPA	31/01/2022	8/8	Good	Dry	F3 W	Shoveler	60
Kilcolman Bog SPA	31/01/2022	8/8	Good	Dry	F3 W	Teal	30
Kilcolman Bog SPA	31/01/2022	8/8	Good	Dry	F3 W	Greylag Goose	103
Ballyhoura Mountains SAC	31/01/2022	8/8	Good	Dry	F3 W	Raven	2
Ballyhea Quarry	31/01/2022	8/8	Good	Dry	F3 W	Mallard	12
Ballyhea Quarry	31/01/2022	8/8	Good	Dry	F3 W	Teal	3
Ballyhea Quarry	31/01/2022	8/8	Good	Dry	F3 W	Wigeon	8
Ballyhea Quarry	31/01/2022	8/8	Good	Dry	F3 W	Grey Heron	1
River Blackwater SAC/Annagh Bridge	31/01/2022	8/8	Good	Dry	F3 W	Whooper Swan	129
River Blackwater SAC/Annagh Bridge	31/01/2022	8/8	Good	Dry	F3 W	White-fronted Goose	4
River Awbeg	31/01/2022	8/8	Good	Dry	F3 W	No target species	N/A
Templebridget	31/01/2022	8/8	Good	Dry	F3 W	Whooper Swan	7
River Blackwater SAC/ Buttevant	31/01/2022	8/8	Good	Dry	F3 W	Mute Swan	2
River Blackwater SAC/Annagh Bridge	17/02/2022	5/8	Good	Dry	F2 W	Whooper Swan	95
River Blackwater SAC/Annagh Bridge	17/02/2022	5/8	Good	Dry	F2 W	Greylag Goose	6

Site	Date	Cloud	Visibility	Rain	Wind	Common Name	Quantity
River Blackwater SAC/Annagh Bridge	17/02/2022	5/8	Good	Dry	F2 W	Mute Swan	3
Castle Lake (Milltown)	17/02/2022	5/8	Good	Dry	F2 W	Grey Heron	1
Castle Lake (Milltown)	17/02/2022	5/8	Good	Dry	F2 W	Moorhen	1
Ballyhea Quarry	17/02/2022	5/8	Good	Dry	F2 W	Grey Heron	1
Ballyhea Quarry	17/02/2022	5/8	Good	Dry	F2 W	Curlew	65
Ballyhea Quarry	17/02/2022	5/8	Good	Dry	F2 W	Mallard	1
Ballyhea Quarry	17/02/2022	5/8	Good	Dry	F2 W	Cormorant	1
Ballyhea Quarry	17/02/2022	5/8	Good	Dry	F2 W	Wigeon	15
Kilcolman Bog SPA	17/02/2022	5/8	Good	Dry	F2 W	Shoveler	37
Kilcolman Bog SPA	17/02/2022	5/8	Good	Dry	F2 W	Little Grebe	3
Kilcolman Bog SPA	17/02/2022	5/8	Good	Dry	F2 W	Mallard	2
Kilcolman Bog SPA	17/02/2022	5/8	Good	Dry	F2 W	Wigeon	270
Kilcolman Bog SPA	17/02/2022	5/8	Good	Dry	F2 W	Coot	2
Kilcolman Bog SPA	17/02/2022	5/8	Good	Dry	F2 W	Teal	50
Kilcolman Bog SPA	17/02/2022	5/8	Good	Dry	F2 W	Greylag Goose	60
Castle Lake (Milltown)	17/02/2022	5/8	Good	Dry	F2 W	Buzzard	2
Castle Lake (Milltown)	17/02/2022	5/8	Good	Dry	F2 W	Mallard	7
Castle Lake (Milltown)	17/02/2022	5/8	Good	Dry	F2 W	Wigeon	2
Castle Lake (Milltown)	17/02/2022	5/8	Good	Dry	F2 W	Little Grebe	6
Templebridget	18/02/2022	6/8	Good	Dry	F2 W	Greylag Goose	40
Templebridget	18/02/2022	6/8	Good	Dry	F2 W	Mallard	4
River Blackwater SAC/Annagh Bridge	18/02/2022	6/8	Good	Dry	F2 W	Whooper Swan	117
River Blackwater SAC/Annagh Bridge	18/02/2022	6/8	Good	Dry	F2 W	Greylag Goose	64
River Blackwater SAC/Annagh Bridge	18/02/2022	6/8	Good	Dry	F2 W	Lesser Black-backed Gull	80
Templebridget	22/02/2022					Whooper Swan	2
Templebridget	22/02/2022					Greylag Goose	2
Templebridget	28/02/2022	8/8	Good	Dry	F0	Whooper Swan	3
River Blackwater SAC/Annagh Bridge	02/03/2022					Little Egret	1

Site	Date	Cloud	Visibility	Rain	Wind	Common Name	Quantity
River Blackwater SAC/Annagh Bridge	30/03/2022	2/8	Good	Dry	F1 N	Mallard	1
Ballyhea Quarry	30/03/2022	2/8	Good	Dry	F1 N	Great Crested Grebe	1
Ballyhea Quarry	30/03/2022	2/8	Good	Dry	F1 N	Mallard	1
River Awbeg	30/03/2022	2/8	Good	Dry	F1 N	No target species	N/A
Ballyhoura Mountains SAC	30/03/2022	2/8	Good	Dry	F1 N	Hen Harrier	1
River Blackwater SAC/ Buttevant	31/03/2022	2/8	Good	Dry	F1 N	Teal	6
River Blackwater SAC/ Buttevant	31/03/2022	2/8	Good	Dry	F1 N	Snipe	3
Eagle Lough pNHA	31/03/2022	2/8	Good	Dry	F1 N	Teal	15
Eagle Lough pNHA	31/03/2022	2/8	Good	Dry	F1 N	Snipe	2
Eagle Lough pNHA	31/03/2022	2/8	Good	Dry	F1 N	Moorhen	1
Eagle Lough pNHA	31/03/2022	2/8	Good	Dry	F1 N	Wigeon	10
Kilcolman Bog SPA	31/03/2022	2/8	Good	Dry	F1 N	Greylag Goose	25
Kilcolman Bog SPA	31/03/2022	2/8	Good	Dry	F1 N	Wigeon	135
Kilcolman Bog SPA	31/03/2022	2/8	Good	Dry	F1 N	Teal	59
Kilcolman Bog SPA	31/03/2022	2/8	Good	Dry	F1 N	Little Grebe	5
Kilcolman Bog SPA	31/03/2022	2/8	Good	Dry	F1 N	Coot	2
Kilcolman Bog SPA	31/03/2022	2/8	Good	Dry	F1 N	Moorhen	1
Kilcolman Bog SPA	31/03/2022	2/8	Good	Dry	F1 N	Shoveler	13
Kilcolman Bog SPA	31/03/2022	2/8	Good	Dry	F1 N	Mallard	1
Kilcolman Bog SPA	31/03/2022	2/8	Good	Dry	F1 N	Gadwall	5
Kilcolman Bog SPA	31/03/2022	2/8	Good	Dry	F1 N	Tufted Duck	2
Kilcolman Bog SPA	31/03/2022	2/8	Good	Dry	F1 N	Mute Swan	1
Kilcolman Bog SPA	31/03/2022	2/8	Good	Dry	F1 N	Grey Heron	3
Castle Lake (Milltown)	01/04/2022	3/8	Good	Dry	F2 NW	Moorhen	1
Castle Lake (Milltown)	01/04/2022	3/8	Good	Dry	F2 NW	Mallard	2
River Blackwater SAC/Annagh Bridge	15/03/2022	8/8	fair	Dry	F3 SW	No target species	N/A
River Blackwater SAC/Annagh Bridge	13/03/2022	5/8	Good	Showers	F3 SW	Whooper Swan	44
River Blackwater SAC/Annagh Bridge	13/03/2022	5/8	Good	Showers	F3 SW	Mute Swan	7

Site	Date	Cloud	Visibility	Rain	Wind	Common Name	Quantity
River Blackwater SAC/Annagh Bridge	13/03/2022	5/8	Good	Showers	F3 SW	Greylag Goose	3
River Blackwater SAC/Annagh Bridge	13/03/2022	5/8	Good	Showers	F3 SW	Whooper Swan	present
River Blackwater SAC/Annagh Bridge	13/03/2022	5/8	Good	Showers	F3 SW	Greylag Goose	present
River Blackwater SAC/Annagh Bridge	13/03/2022	5/8	Good	Showers	F3 SW	Mute Swan	10
River Blackwater SAC/Annagh Bridge	13/03/2022	5/8	Good	Showers	F3 SW	Whooper Swan	2
Castle Lake (Milltown)	28/03/2022	N/A	N/A	N/A	N/A	Moorhen	3
Castle Lake (Milltown)	28/03/2022	N/A	N/A	N/A	N/A	Pochard	4
Kilcolman Bog SPA	28/03/2022	N/A	N/A	N/A	N/A	Greylag Goose	5
Kilcolman Bog SPA	28/03/2022	N/A	N/A	N/A	N/A	Coot	6
Kilcolman Bog SPA	28/03/2022	N/A	N/A	N/A	N/A	Grey Heron	7
Kilcolman Bog SPA	28/03/2022	N/A	N/A	N/A	N/A	Wigeon	8
Kilcolman Bog SPA	28/03/2022	N/A	N/A	N/A	N/A	Pochard	9
Kilcolman Bog SPA	28/03/2022	N/A	N/A	N/A	N/A	Little Grebe	10
Kilcolman Bog SPA	28/03/2022	N/A	N/A	N/A	N/A	Magpie	11
Kilcolman Bog SPA	28/03/2022	N/A	N/A	N/A	N/A	Shoveler	12



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APPENDIX 5

Nocturnal Survey Results



Site	Date	Species	BoCCI	Annex I	Calls	Time	C. Dusk	C. Dawn
Annagh N	02/03/2022	Redwing	Red	No	1	03:38	18:49	06:42
Annagh N	02/03/2022	Redwing	Red	No	1	05:59	18:49	06:42
Annagh N	02/03/2022	Redwing	Red	No	3	06:09	18:49	06:42
Annagh N	02/03/2022	Redwing	Red	No	1	06:12	18:49	06:42
Annagh N	02/03/2022	Redwing	Red	No	2	06:14	18:49	06:42
Annagh S	02/03/2022	Grey Heron	Green	No	5	19:04	18:49	06:42
Annagh S	02/03/2022	Little Grebe	Green	No	1	01:08	18:49	06:42
Annagh S	02/03/2022	Teal	Amber	No	5	02:22	18:49	06:42
Annagh S	02/03/2022	Grey Heron	Green	No	10	06:03	18:49	06:42
Annagh S	02/03/2022	Snipe	Red	No	4	06:03	18:49	06:42
Annagh S	02/03/2022	Snipe	Red	No	37	06:10	18:49	06:42
Annagh S	02/03/2022	Snipe	Red	No	25	06:12	18:49	06:42
Annagh N	03/03/2022	Teal	Amber	No	16	19:55	18:49	06:42
Annagh N	03/03/2022	Curlew	Red	No	2	20:56	18:51	06:40
Annagh S	03/03/2022	Barn Owl	Red	No	1	19:08	18:51	06:40
Annagh S	03/03/2022	Grey Heron	Green	No	4	19:34	18:51	06:40
Annagh S	03/03/2022	Curlew	Red	No	8	22:25	18:51	06:40
Annagh S	03/03/2022	Redwing	Red	No	2	03:37	18:51	06:40
Annagh S	03/03/2022	Redwing	Red	No	1	05:51	18:51	06:40
Annagh S	03/03/2022	Redwing	Red	No	1	06:09	18:51	06:40
Annagh S	03/03/2022	Redwing	Red	No	2	06:13	18:51	06:40
Annagh N	04/03/2022	Redwing	Red	No	1	03:32	18:53	06:38
Annagh N	04/03/2022	Redwing	Red	No	4	06:11	18:53	06:38
Annagh N	04/03/2022	Mallard	Amber	No	27	06:12	18:53	06:38
Annagh S	04/03/2022	Barn Owl	Red	No	1	19:21	18:53	06:38
Annagh S	04/03/2022	Barn Owl	Red	No	1	19:31	18:53	06:38
Annagh S	04/03/2022	Barn Owl	Red	No	1	19:39	18:53	06:38
Annagh S	04/03/2022	Barn Owl	Red	No	5	19:40	18:53	06:38
Annagh S	04/03/2022	Curlew	Red	No	4	20:29	18:53	06:38
Annagh S	04/03/2022	Redwing	Red	No	1	02:03	18:53	06:38

Site	Date	Species	BoCCI	Annex I	Calls	Time	C. Dusk	C. Dawn
Annagh S	04/03/2022	Little Grebe	Green	No	1	02:16	18:53	06:38
Annagh S	04/03/2022	Redwing	Red	No	1	05:59	18:53	06:38
Annagh S	04/03/2022	Redwing	Red	No	1	06:04	18:53	06:38
Annagh S	04/03/2022	Snipe	Red	No	9	06:08	18:53	06:38
Annagh N	05/03/2022	Snipe	Red	No	44	19:16	18:55	06:35
Annagh N	05/03/2022	Water Rail	Green	No	2	00:16	18:55	06:35
Annagh N	05/03/2022	Redwing	Red	No	3	05:55	18:55	06:35
Annagh N	05/03/2022	Redwing	Red	No	2	05:58	18:55	06:35
Annagh N	05/03/2022	Redwing	Red	No	11	06:05	18:55	06:35
Annagh N	05/03/2022	Mallard	Amber	No	28	06:06	18:55	06:35
Annagh N	05/03/2022	Redwing	Red	No	6	06:08	18:55	06:35
Annagh N	05/03/2022	Woodcock	Red	No	1	06:11	18:55	06:35
Annagh N	05/03/2022	Redwing	Red	No	1	06:12	18:55	06:35
Annagh S	05/03/2022	Barn Owl	Red	No	1	19:14	18:55	06:35
Annagh S	05/03/2022	Barn Owl	Red	No	1	19:25	18:55	06:35
Annagh S	05/03/2022	Barn Owl	Red	No	1	19:27	18:55	06:35
Annagh S	05/03/2022	Mallard	Amber	No	17	19:27	18:55	06:35
Annagh S	05/03/2022	Barn Owl	Red	No	2	02:04	18:55	06:35
Annagh S	05/03/2022	Barn Owl	Red	No	11	02:08	18:55	06:35
Annagh S	05/03/2022	Redwing	Red	No	1	05:58	18:55	06:35
Annagh S	05/03/2022	Redwing	Red	No	3	06:07	18:55	06:35
Annagh S	05/03/2022	Redwing	Red	No	2	06:12	18:55	06:35
Annagh N	06/03/2022	Buzzard	Green	No	3	18:45	18:56	06:33
Annagh N	06/03/2022	Snipe	Red	No	2	21:39	18:56	06:33
Annagh N	06/03/2022	Moorhen	Green	No	5	02:33	18:56	06:33
Annagh S	06/03/2022	Barn Owl	Red	No	1	21:05	18:56	06:33
Annagh S	06/03/2022	Barn Owl	Red	No	2	21:15	18:56	06:33
Annagh S	06/03/2022	Barn Owl	Red	No	1	21:29	18:56	06:33
Annagh S	06/03/2022	Barn Owl	Red	No	3	21:34	18:56	06:33
Annagh S	06/03/2022	Snipe	Red	No	16	02:00	18:56	06:33

Site	Date	Species	BoCCI	Annex I	Calls	Time	C. Dusk	C. Dawn
Annagh S	06/03/2022	Water Rail	Green	No	2	02:27	18:56	06:33
Annagh S	06/03/2022	Barn Owl	Red	No	1	04:22	18:56	06:33
Annagh N	07/03/2022	No birds	#N/A	#N/A	N/A	N/A	18:58	06:31
Annagh S	07/03/2022	No Birds	#N/A	#N/A	N/A	N/A	18:58	06:31
Annagh N	08/03/2022	No birds	#N/A	#N/A	N/A	N/A	19:00	06:29
Annagh S	08/03/2022	No Birds	#N/A	#N/A	N/A	N/A	19:00	06:29
Annagh N	09/03/2022	Buzzard	Green	No	15	06:51	19:02	06:26
Annagh S	09/03/2022	Mallard	Amber	No	20	19:30	19:02	06:26
Annagh S	09/03/2022	Mallard	Amber	No	8	19:33	19:02	06:26
Annagh S	09/03/2022	Teal	Amber	No	8	19:33	19:02	06:26
Annagh S	09/03/2022	Teal	Amber	No	16	20:36	19:02	06:26
Annagh S	09/03/2022	Snipe	Red	No	8	21:05	19:02	06:26
Annagh S	09/03/2022	Teal	Amber	No	13	22:47	19:02	06:26
Annagh S	09/03/2022	Teal	Amber	No	21	22:51	19:02	06:26
Annagh S	09/03/2022	Teal	Amber	No	135	22:58	19:02	06:26
Annagh S	09/03/2022	Teal	Amber	No	40	23:00	19:02	06:26
Annagh S	09/03/2022	Mallard	Amber	No	350	22:58	19:02	06:26
Annagh S	09/03/2022	Teal	Amber	No	50	23:17	19:02	06:26
Annagh S	09/03/2022	Mallard	Amber	No	70	23:17	19:02	06:26
Annagh S	09/03/2022	Teal	Amber	No	50	23:23	19:02	06:26
Annagh S	09/03/2022	Teal	Amber	No	40	23:30	19:02	06:26
Annagh S	09/03/2022	Teal	Amber	No	20	23:34	19:02	06:26
Annagh S	09/03/2022	Mallard	Amber	No	7	03:26	19:02	06:26
Annagh S	09/03/2022	Redwing	Red	No	1	05:31	19:02	06:26
Annagh S	09/03/2022	Snipe	Red	No	15	06:03	19:02	06:26
Annagh S	09/03/2022	Snipe	Red	No	28	06:05	19:02	06:26
Annagh S	09/03/2022	Teal	Amber	No	4	06:08	19:02	06:26
Annagh S	09/03/2022	Snipe	Red	No	5	06:08	19:02	06:26
Annagh S	09/03/2022	Snipe	Red	No	14	06:09	19:02	06:26
Annagh N	10/03/2022	No birds	#N/A	#N/A	N/A	N/A	19:03	06:24

Site	Date	Species	BoCCI	Annex I	Calls	Time	C. Dusk	C. Dawn
Annagh S	10/03/2022	No Birds	#N/A	#N/A	N/A	N/A	19:03	06:24
Annagh N	11/03/2022	Redwing	Red	No	1	02:07	19:05	06:22
Annagh N	11/03/2022	Redwing	Red	No	2	05:28	19:05	06:22
Annagh N	11/03/2022	Redwing	Red	No	2	05:58	19:05	06:22
Annagh N	11/03/2022	Redwing	Red	No	1	06:00	19:05	06:22
Annagh S	11/03/2022	No Birds	#N/A	#N/A	N/A	N/A	19:05	06:22
Annagh N	12/03/2022	No birds	#N/A	#N/A	N/A	N/A	19:07	06:20
Annagh S	12/03/2022	No Birds	#N/A	#N/A	N/A	N/A	19:07	06:20
Annagh N	13/03/2022	Redwing	Red	No	1	19:21	19:09	06:17
Annagh N	13/03/2022	Redwing	Red	No	1	19:23	19:09	06:17
Annagh N	13/03/2022	Redwing	Red	No	3	19:31	19:09	06:17
Annagh N	13/03/2022	Redwing	Red	No	1	19:33	19:09	06:17
Annagh N	13/03/2022	Redwing	Red	No	1	19:37	19:09	06:17
Annagh N	13/03/2022	Redwing	Red	No	1	19:49	19:09	06:17
Annagh N	13/03/2022	Redwing	Red	No	1	21:43	19:09	06:17
Annagh N	13/03/2022	Barn Owl	Red	No	1	23:45	19:09	06:17
Annagh N	13/03/2022	Redwing	Red	No	3	19:22	19:09	06:17
Annagh N	13/03/2022	Redwing	Red	No	3	19:30	19:09	06:17
Annagh N	13/03/2022	Redwing	Red	No	2	19:34	19:09	06:17
Annagh N	13/03/2022	Redwing	Red	No	1	21:16	19:09	06:17
Annagh N	13/03/2022	Redwing	Red	No	1	21:44	19:09	06:17
Annagh N	13/03/2022	Barn Owl	Red	No	1	23:45	19:09	06:17
Annagh N	13/03/2022	Redwing	Red	No	1	04:14	19:09	06:17
Annagh N	13/03/2022	Redwing	Red	No	1	05:32	19:09	06:17
Annagh N	13/03/2022	Snipe	Red	No	10	05:48	19:09	06:17
Annagh N	13/03/2022	Redwing	Red	No	1	05:49	19:09	06:17
Annagh N	13/03/2022	Snipe	Red	No	5	05:51	19:09	06:17
Annagh S	13/03/2022	Teal	Amber	No	5	19:33	19:09	06:17
Annagh S	13/03/2022	Barn Owl	Red	No	1	19:37	19:09	06:17
Annagh S	13/03/2022	Barn Owl	Red	No	1	19:41	19:09	06:17

Site	Date	Species	BoCCI	Annex I	Calls	Time	C. Dusk	C. Dawn
Annagh S	13/03/2022	Wigeon	Amber	No	37	19:49	19:09	06:17
Annagh S	13/03/2022	Barn Owl	Red	No	1	19:52	19:09	06:17
Annagh S	13/03/2022	Teal	Amber	No	4	19:59	19:09	06:17
Annagh S	13/03/2022	Teal	Amber	No	58	20:55	19:09	06:17
Annagh S	13/03/2022	Gadwall	Amber	No	14	22:25	19:09	06:17
Annagh S	13/03/2022	Barn Owl	Red	No	1	22:32	19:09	06:17
Annagh S	13/03/2022	Barn Owl	Red	No	1	22:35	19:09	06:17
Annagh S	13/03/2022	Barn Owl	Red	No	1	22:28	19:09	06:17
Annagh S	13/03/2022	Little Grebe	Green	No	5	02:12	19:09	06:17
Annagh S	13/03/2022	Moorhen	Green	No	11	02:14	19:09	06:17
Annagh S	13/03/2022	Little Grebe	Green	No	1	02:27	19:09	06:17
Annagh S	13/03/2022	Gadwall	Amber	No	15	03:24	19:09	06:17
Annagh S	13/03/2022	Snipe	Red	No	43	05:45	19:09	06:17
Annagh S	13/03/2022	Curlew	Red	No	2	05:46	19:09	06:17
Annagh S	13/03/2022	Snipe	Red	No	36	05:48	19:09	06:17
Annagh S	13/03/2022	Snipe	Red	No	44	05:51	19:09	06:17
Annagh S	13/03/2022	Snipe	Red	No	35	05:52	19:09	06:17
Annagh S	13/03/2022	Redwing	Red	No	1	05:55	19:09	06:17
Annagh S	13/03/2022	Snipe	Red	No	32	05:55	19:09	06:17
Annagh N	14/03/2022	Buzzard	Green	No	8	18:58	19:11	06:15
Annagh N	14/03/2022	Redwing	Red	No	12	19:20	19:11	06:15
Annagh N	14/03/2022	Redwing	Red	No	2	20:54	19:11	06:15
Annagh N	14/03/2022	Moorhen	Green	No	4	21:21	19:11	06:15
Annagh S	14/03/2022	Teal	Amber	No	3	19:33	19:11	06:15
Annagh S	14/03/2022	Wigeon	Amber	No	8	19:34	19:11	06:15
Annagh S	14/03/2022	Barn Owl	Red	No	4	19:36	19:11	06:15
Annagh S	14/03/2022	Teal	Amber	No	2	19:46	19:11	06:15
Annagh S	14/03/2022	Coot	Amber	No	7	20:06	19:11	06:15
Annagh S	14/03/2022	Teal	Amber	No	26	20:15	19:11	06:15
Annagh S	14/03/2022	Teal	Amber	No	40	20:18	19:11	06:15

Site	Date	Species	BoCCI	Annex I	Calls	Time	C. Dusk	C. Dawn
Annagh S	14/03/2022	Barn Owl	Red	No	14	20:53	19:11	06:15
Annagh S	14/03/2022	Barn Owl	Red	No	1	21:43	19:11	06:15
Annagh S	14/03/2022	Barn Owl	Red	No	2	21:47	19:11	06:15
Annagh S	14/03/2022	Redwing	Red	No	3	21:57	19:11	06:15
Annagh S	14/03/2022	Snipe	Red	No	12	22:57	19:11	06:15
Annagh S	14/03/2022	Barn Owl	Red	No	2	03:08	19:11	06:15
Annagh S	14/03/2022	Barn Owl	Red	No	1	03:12	19:11	06:15
Annagh S	14/03/2022	Redwing	Red	No	1	03:40	19:11	06:15
Annagh S	14/03/2022	Moorhen	Green	No	20	04:19	19:11	06:15
Annagh S	14/03/2022	Moorhen	Green	No	6	05:50	19:11	06:15
Annagh S	14/03/2022	Snipe	Red	No	23	05:51	19:11	06:15
Annagh S	14/03/2022	Snipe	Red	No	52	05:54	19:11	06:15
Annagh S	14/03/2022	Snipe	Red	No	46	05:57	19:11	06:15
Annagh S	14/03/2022	Snipe	Red	No	20	06:02	19:11	06:15
Annagh N	15/03/2022	Grey Heron	Green	No	2	21:25	19:12	06:13
Annagh N	15/03/2022	Redwing	Red	No	1	23:58	19:12	06:13
Annagh N	15/03/2022	Redwing	Red	No	1	01:40	19:12	06:13
Annagh N	15/03/2022	Redwing	Red	No	3	05:20	19:12	06:13
Annagh S	15/03/2022	Barn Owl	Red	No	1	19:36	19:12	06:13
Annagh S	15/03/2022	Barn Owl	Red	No	1	19:52	19:12	06:13
Annagh S	15/03/2022	Barn Owl	Red	No	1	20:02	19:12	06:13
Annagh S	15/03/2022	Teal	Amber	No	60	20:57	19:12	06:13
Annagh S	15/03/2022	Barn Owl	Red	No	1	21:08	19:12	06:13
Annagh S	15/03/2022	Redwing	Red	No	1	21:24	19:12	06:13
Annagh S	15/03/2022	Moorhen	Green	No	5	22:01	19:12	06:13
Annagh S	15/03/2022	Teal	Amber	No	14	22:33	19:12	06:13
Annagh S	15/03/2022	Snipe	Red	No	7	22:37	19:12	06:13
Annagh S	15/03/2022	Snipe	Red	No	6	23:08	19:12	06:13
Annagh S	15/03/2022	Teal	Amber	No	2	23:30	19:12	06:13
Annagh S	15/03/2022	Teal	Amber	No	13	23:35	19:12	06:13

Site	Date	Species	BoCCI	Annex I	Calls	Time	C. Dusk	C. Dawn
Annagh S	15/03/2022	Teal	Amber	No	6	23:40	19:12	06:13
Annagh S	15/03/2022	Teal	Amber	No	4	23:49	19:12	06:13
Annagh S	15/03/2022	Redwing	Red	No	1	23:57	19:12	06:13
Annagh S	15/03/2022	Teal	Amber	No	29	00:27	19:12	06:13
Annagh S	15/03/2022	Grey Heron	Green	No	4	01:27	19:12	06:13
Annagh S	15/03/2022	Teal	Amber	No	12	01:39	19:12	06:13
Annagh S	15/03/2022	Snipe	Red	No	15	01:48	19:12	06:13
Annagh S	15/03/2022	Redwing	Red	No	1	03:23	19:12	06:13
Annagh S	15/03/2022	Redwing	Red	No	1	04:07	19:12	06:13
Annagh S	15/03/2022	Teal	Amber	No	11	05:14	19:12	06:13
Annagh S	15/03/2022	Barn Owl	Red	No	9	05:19	19:12	06:13
Annagh S	15/03/2022	Barn Owl	Red	No	1	05:27	19:12	06:13
Annagh S	15/03/2022	Barn Owl	Red	No	1	05:30	19:12	06:13
Annagh S	15/03/2022	Snipe	Red	No	8	05:46	19:12	06:13
Annagh S	15/03/2022	Snipe	Red	No	65	05:51	19:12	06:13
Annagh N	16/03/2022	Whooper Swan	Amber	Yes	300	02:54	19:14	06:10
Annagh N	16/03/2022	Moorhen	Green	No	7	05:38	19:14	06:10
Annagh S	16/03/2022	Redwing	Red	No	10	19:30	19:14	06:10
Annagh S	16/03/2022	Barn Owl	Red	No	1	19:33	19:14	06:10
Annagh S	16/03/2022	Barn Owl	Red	No	3	19:37	19:14	06:10
Annagh S	16/03/2022	Wigeon	Amber	No	12	19:39	19:14	06:10
Annagh S	16/03/2022	Barn Owl	Red	No	7	20:15	19:14	06:10
Annagh S	16/03/2022	Teal	Amber	No	22	20:25	19:14	06:10
Annagh S	16/03/2022	Teal	Amber	No	4	20:33	19:14	06:10
Annagh S	16/03/2022	Barn Owl	Red	No	6	20:48	19:14	06:10
Annagh S	16/03/2022	Barn Owl	Red	No	1	23:29	19:14	06:10
Annagh S	16/03/2022	Coot	Amber	No	3	23:36	19:14	06:10
Annagh S	16/03/2022	Teal	Amber	No	9	23:46	19:14	06:10
Annagh S	16/03/2022	Snipe	Red	No	47	00:23	19:14	06:10
Annagh S	16/03/2022	Snipe	Red	No	13	00:34	19:14	06:10

Site	Date	Species	BoCCI	Annex I	Calls	Time	C. Dusk	C. Dawn
Annagh S	16/03/2022	Barn Owl	Red	No	4	00:19	19:14	06:10
Annagh S	16/03/2022	Snipe	Red	No	4	01:10	19:14	06:10
Annagh S	16/03/2022	Snipe	Red	No	37	01:47	19:14	06:10
Annagh S	16/03/2022	Snipe	Red	No	10	02:14	19:14	06:10
Annagh S	16/03/2022	Whooper Swan	Amber	Yes	76	03:10	19:14	06:10
Annagh S	16/03/2022	Whooper Swan	Amber	Yes	30	03:16	19:14	06:10
Annagh S	16/03/2022	Barn Owl	Red	No	12	04:20	19:14	06:10
Annagh S	16/03/2022	Barn Owl	Red	No	1	04:50	19:14	06:10
Annagh N	17/03/2022	Redwing	Red	No	5	19:28	19:16	06:08
Annagh N	17/03/2022	Redwing	Red	No	1	20:28	19:16	06:08
Annagh N	17/03/2022	Coot	Amber	No	3	22:14	19:16	06:08
Annagh S	17/03/2022	Barn Owl	Red	No	66	19:53	19:16	06:08
Annagh S	17/03/2022	Barn Owl	Red	No	17	20:08	19:16	06:08
Annagh S	17/03/2022	Barn Owl	Red	No	2	20:30	19:16	06:08
Annagh S	17/03/2022	Barn Owl	Red	No	2	20:44	19:16	06:08
Annagh S	17/03/2022	Barn Owl	Red	No	1	20:52	19:16	06:08
Annagh S	17/03/2022	Water Rail	Green	No	5	23:08	19:16	06:08
Annagh S	17/03/2022	Teal	Amber	No	3	23:16	19:16	06:08
Annagh S	17/03/2022	Barn Owl	Red	No	1	23:20	19:16	06:08
Annagh S	17/03/2022	Snipe	Red	No	22	23:27	19:16	06:08
Annagh S	17/03/2022	Barn Owl	Red	No	4	23:34	19:16	06:08
Annagh S	17/03/2022	Snipe	Red	No	11	00:08	19:16	06:08
Annagh S	17/03/2022	Snipe	Red	No	10	00:28	19:16	06:08
Annagh S	17/03/2022	Barn Owl	Red	No	1	01:41	19:16	06:08
Annagh S	17/03/2022	Redwing	Red	No	2	01:48	19:16	06:08
Annagh S	17/03/2022	Barn Owl	Red	No	1	02:48	19:16	06:08
Annagh S	17/03/2022	Barn Owl	Red	No	1	02:51	19:16	06:08
Annagh S	17/03/2022	Redwing	Red	No	1	03:29	19:16	06:08
Annagh S	17/03/2022	Barn Owl	Red	No	3	03:48	19:16	06:08
Annagh S	17/03/2022	Little Grebe	Green	No	9	03:55	19:16	06:08

Site	Date	Species	BoCCI	Annex I	Calls	Time	C. Dusk	C. Dawn
Annagh S	17/03/2022	Barn Owl	Red	No	1	05:04	19:16	06:08
Annagh S	17/03/2022	Redwing	Red	No	1	05:05	19:16	06:08
Annagh S	17/03/2022	Barn Owl	Red	No	1	05:12	19:16	06:08
Annagh S	17/03/2022	Snipe	Red	No	19	05:13	19:16	06:08
Annagh S	17/03/2022	Redwing	Red	No	1	05:15	19:16	06:08
Annagh S	17/03/2022	Snipe	Red	No	34	05:17	19:16	06:08
Annagh S	17/03/2022	Barn Owl	Red	No	1	05:20	19:16	06:08
Annagh S	17/03/2022	Barn Owl	Red	No	1	05:22	19:16	06:08
Annagh S	17/03/2022	Snipe	Red	No	29	05:30	19:16	06:08
Annagh S	17/03/2022	Snipe	Red	No	60	05:32	19:16	06:08
Annagh N	18/03/2022	Teal	Amber	No	12	21:49	19:18	06:06
Annagh N	18/03/2022	Redwing	Red	No	1	23:21	19:18	06:06
Annagh N	18/03/2022	Redwing	Red	No	1	00:03	19:18	06:06
Annagh S	18/03/2022	Barn Owl	Red	No	5	20:29	19:18	06:06
Annagh S	18/03/2022	Barn Owl	Red	No	16	20:38	19:18	06:06
Annagh S	18/03/2022	Snipe	Red	No	52	22:12	19:18	06:06
Annagh S	18/03/2022	Barn Owl	Red	No	3	23:22	19:18	06:06
Annagh S	18/03/2022	Redwing	Red	No	1	23:53	19:18	06:06
Annagh S	18/03/2022	Redwing	Red	No	1	00:01	19:18	06:06
Annagh S	18/03/2022	Barn Owl	Red	No	3	00:51	19:18	06:06
Annagh S	18/03/2022	Moorhen	Green	No	2	01:28	19:18	06:06
Annagh N	19/03/2022	No birds	#N/A	#N/A	N/A	N/A	19:19	06:03
Annagh S	19/03/2022	Redwing	Red	No	1	05:38	19:19	06:03
Annagh S	19/03/2022	Snipe	Red	No	83	05:51	19:19	06:03
Annagh N	20/03/2022	No birds	#N/A	#N/A	N/A	N/A	19:21	06:01
Annagh S	20/03/2022	Barn Owl	Red	No	2	19:29	19:21	06:01
Annagh S	20/03/2022	Barn Owl	Red	No	5	20:20	19:21	06:01
Annagh S	20/03/2022	Barn Owl	Red	No	25	21:27	19:21	06:01
Annagh S	20/03/2022	Barn Owl	Red	No	3	21:56	19:21	06:01
Annagh S	20/03/2022	Barn Owl	Red	No	2	22:02	19:21	06:01

Site	Date	Species	BoCCI	Annex I	Calls	Time	C. Dusk	C. Dawn
Annagh S	20/03/2022	Barn Owl	Red	No	1	22:09	19:21	06:01
Annagh S	20/03/2022	Barn Owl	Red	No	1	23:00	19:21	06:01
Annagh S	20/03/2022	Barn Owl	Red	No	1	01:58	19:21	06:01
Annagh S	20/03/2022	Barn Owl	Red	No	1	02:11	19:21	06:01
Annagh S	20/03/2022	Water Rail	Green	No	1	02:11	19:21	06:01
Annagh S	20/03/2022	Barn Owl	Red	No	3	02:14	19:21	06:01
Annagh S	20/03/2022	Snipe	Red	No	5	04:47	19:21	06:01
Annagh S	20/03/2022	Redwing	Red	No	1	05:40	19:21	06:01
Annagh N	21/03/2022	No birds	#N/A	#N/A	N/A	N/A	19:23	05:58
Annagh S	21/03/2022	Barn Owl	Red	No	2	19:34	19:23	05:58
Annagh S	21/03/2022	Barn Owl	Red	No	2	20:23	19:23	05:58
Annagh S	21/03/2022	Moorhen	Green	No	5	00:29	19:23	05:58
Annagh S	21/03/2022	Teal	Amber	No	23	01:40	19:23	05:58
Annagh S	21/03/2022	Barn Owl	Red	No	1	02:35	19:23	05:58
Annagh S	21/03/2022	Teal	Amber	No	2	02:39	19:23	05:58
Annagh N	22/03/2022	No birds	#N/A	#N/A	N/A	N/A	19:25	05:56
Annagh S	22/03/2022	Barn Owl	Red	No	1	19:40	19:25	05:56
Annagh S	22/03/2022	Barn Owl	Red	No	3	20:07	19:25	05:56
Annagh S	22/03/2022	Barn Owl	Red	No	9	20:40	19:25	05:56
Annagh S	22/03/2022	Barn Owl	Red	No	6	00:53	19:25	05:56
Annagh S	22/03/2022	Barn Owl	Red	No	6	04:45	19:25	05:56
Annagh S	22/03/2022	Redwing	Red	No	1	05:36	19:25	05:56
Annagh N	23/03/2022	Redwing	Red	No	31	19:34	19:26	05:54
Annagh N	23/03/2022	Snipe	Red	No	9	19:44	19:26	05:54
Annagh N	23/03/2022	Redwing	Red	No	4	19:44	19:26	05:54
Annagh N	23/03/2022	Water Rail	Green	No	1	22:00	19:26	05:54
Annagh N	23/03/2022	Whooper Swan	Amber	Yes	5	00:00	19:26	05:54
Annagh S	23/03/2022	Redwing	Red	No	3	18:45	19:26	05:54
Annagh S	23/03/2022	Barn Owl	Red	No	6	18:48	19:26	05:54
Annagh S	23/03/2022	Teal	Amber	No	3	19:00	19:26	05:54

Site	Date	Species	BoCCI	Annex I	Calls	Time	C. Dusk	C. Dawn
Annagh S	23/03/2022	Barn Owl	Red	No	4	19:24	19:26	05:54
Annagh S	23/03/2022	Barn Owl	Red	No	1	19:33	19:26	05:54
Annagh S	23/03/2022	Barn Owl	Red	No	40	20:50	19:26	05:54
Annagh S	23/03/2022	Barn Owl	Red	No	2	21:29	19:26	05:54
Annagh S	23/03/2022	Barn Owl	Red	No	26	21:58	19:26	05:54
Annagh S	23/03/2022	Whooper Swan	Amber	Yes	86	22:03	19:26	05:54
Annagh S	23/03/2022	Barn Owl	Red	No	15	22:22	19:26	05:54
Annagh S	23/03/2022	Barn Owl	Red	No	1	23:57	19:26	05:54
Annagh N	24/03/2022	No birds	#N/A	#N/A	N/A	N/A	19:28	05:51
Annagh S	24/03/2022	Barn Owl	Red	No	7	20:40	19:28	05:51
Annagh S	24/03/2022	Barn Owl	Red	No	1	21:27	19:28	05:51
Annagh S	24/03/2022	Barn Owl	Red	No	5	19:51	19:28	05:51
Annagh S	24/03/2022	Little Grebe	Green	No	4	21:59	19:28	05:51
Annagh S	24/03/2022	Moorhen	Green	No	5	22:58	19:28	05:51
Annagh S	24/03/2022	Moorhen	Green	No	5	23:46	19:28	05:51
Annagh S	24/03/2022	Barn Owl	Red	No	1	23:53	19:28	05:51
Annagh S	24/03/2022	Snipe	Red	No	36	23:57	19:28	05:51
Annagh S	24/03/2022	Moorhen	Green	No	3	00:15	19:28	05:51
Annagh S	24/03/2022	Water Rail	Green	No	3	00:17	19:28	05:51
Annagh S	24/03/2022	Water Rail	Green	No	1	00:42	19:28	05:51
Annagh S	24/03/2022	Barn Owl	Red	No	2	00:59	19:28	05:51
Annagh S	24/03/2022	Barn Owl	Red	No	2	01:02	19:28	05:51
Annagh S	24/03/2022	Water Rail	Green	No	1	01:06	19:28	05:51
Annagh S	24/03/2022	Barn Owl	Red	No	3	02:44	19:28	05:51
Annagh N	25/03/2022	Redwing	Red	No	1	19:42	19:30	05:49
Annagh N	25/03/2022	Moorhen	Green	No	6	03:07	19:30	05:49
Annagh S	25/03/2022	Grey Heron	Green	No	9	19:41	19:30	05:49
Annagh S	25/03/2022	Snipe	Red	No	15	19:42	19:30	05:49
Annagh S	25/03/2022	Barn Owl	Red	No	12	19:52	19:30	05:49
Annagh S	25/03/2022	Snipe	Red	No	6	20:02	19:30	05:49

Site	Date	Species	BoCCI	Annex I	Calls	Time	C. Dusk	C. Dawn
Annagh S	25/03/2022	Barn Owl	Red	No	1	22:20	19:30	05:49
Annagh S	25/03/2022	Barn Owl	Red	No	1	22:41	19:30	05:49
Annagh S	25/03/2022	Snipe	Red	No	6	23:06	19:30	05:49
Annagh S	25/03/2022	Snipe	Red	No	13	23:41	19:30	05:49
Annagh S	25/03/2022	Moorhen	Green	No	16	23:51	19:30	05:49
Annagh S	25/03/2022	Moorhen	Green	No	3	00:28	19:30	05:49
Annagh S	25/03/2022	Snipe	Red	No	17	01:41	19:30	05:49
Annagh S	25/03/2022	Barn Owl	Red	No	3	02:38	19:30	05:49
Annagh S	25/03/2022	Barn Owl	Red	No	11	02:58	19:30	05:49
Annagh S	25/03/2022	Moorhen	Green	No	4	04:23	19:30	05:49
Annagh S	25/03/2022	Barn Owl	Red	No	1	04:28	19:30	05:49
Annagh S	25/03/2022	Snipe	Red	No	20	05:08	19:30	05:49
Annagh S	25/03/2022	Snipe	Red	No	13	05:13	19:30	05:49
Annagh N	26/03/2022	Barn Owl	Red	No	2	21:32	19:32	06:47
Annagh N	26/03/2022	Moorhen	Green	No	3	02:04	19:32	06:47
Annagh S	26/03/2022	Barn Owl	Red	No	1	20:00	19:32	06:47
Annagh S	26/03/2022	Little Grebe	Green	No	1	23:32	20:34	06:44
Annagh N	27/03/2022	No birds	#N/A	#N/A	N/A	N/A	20:34	06:44
Annagh N	28/03/2022	No birds	#N/A	#N/A	N/A	N/A	20:35	06:42
Annagh S	28/03/2022	Barn Owl	Red	No	1	21:12	20:35	06:42
Annagh S	28/03/2022	Barn Owl	Red	No	1	21:16	20:35	06:42
Annagh S	28/03/2022	Barn Owl	Red	No	1	21:18	20:35	06:42
Annagh S	28/03/2022	Barn Owl	Red	No	1	21:19	20:35	06:42
Annagh S	28/03/2022	Barn Owl	Red	No	33	22:34	20:35	06:42
Annagh S	28/03/2022	Redwing	Red	No	1	02:14	20:35	06:42
Annagh S	28/03/2022	Barn Owl	Red	No	17	02:44	20:35	06:42
Annagh S	28/03/2022	Barn Owl	Red	No	7	02:53	20:35	06:42
Annagh S	28/03/2022	Barn Owl	Red	No	1	03:01	20:35	06:42
Annagh S	28/03/2022	Little Grebe	Green	No	1	03:47	20:35	06:42
Annagh S	28/03/2022	Barn Owl	Red	No	1	03:59	20:35	06:42

Site	Date	Species	BoCCI	Annex I	Calls	Time	C. Dusk	C. Dawn
Annagh N	29/03/2022	No birds	#N/A	#N/A	N/A	N/A	20:37	06:39
Annagh S	29/03/2022	Barn Owl	Red	No	1	21:03	20:37	06:39
Annagh S	29/03/2022	Barn Owl	Red	No	19	21:17	20:37	06:39
Annagh S	29/03/2022	Barn Owl	Red	No	24	22:37	20:37	06:39
Annagh S	29/03/2022	Barn Owl	Red	No	20	22:58	20:37	06:39
Annagh S	29/03/2022	Barn Owl	Red	No	5	00:30	20:37	06:39
Annagh S	29/03/2022	Barn Owl	Red	No	2	02:02	20:37	06:39
Annagh S	29/03/2022	Coot	Amber	No	2	03:18	20:37	06:39
Annagh S	29/03/2022	Moorhen	Green	No	9	04:08	20:37	06:39
Annagh S	29/03/2022	Teal	Amber	No	14	06:01	20:37	06:39
Annagh N	30/03/2022	Snipe	Red	No	15	01:40	20:39	06:37
Annagh S	30/03/2022	Barn Owl	Red	No	1	00:59	20:39	06:37
Annagh S	30/03/2022	Barn Owl	Red	No	1	01:07	20:39	06:37
Annagh S	30/03/2022	Moorhen	Green	No	7	02:18	20:39	06:37
Annagh S	30/03/2022	Moorhen	Green	No	6	02:48	20:39	06:37
Annagh S	30/03/2022	Mallard	Amber	No	7	05:32	20:39	06:37
Annagh N	31/03/2022	Buzzard	Green	No	27	06:58	20:41	06:35
Annagh S	31/03/2022	Teal	Amber	No	2	21:08	20:41	06:35
Annagh S	31/03/2022	Barn Owl	Red	No	1	21:12	20:41	06:35
Annagh S	31/03/2022	Barn Owl	Red	No	2	23:05	20:41	06:35
Annagh S	31/03/2022	Barn Owl	Red	No	1	23:42	20:41	06:35
Annagh S	31/03/2022	Barn Owl	Red	No	1	23:47	20:41	06:35
Annagh S	31/03/2022	Moorhen	Green	No	9	05:21	20:41	06:35
Annagh N	01/04/2022	No birds	#N/A	#N/A	N/A	N/A	20:43	06:32
Annagh S	01/04/2022	No Birds	#N/A	#N/A	N/A	N/A	20:43	06:32
Annagh N	02/04/2022	Little Grebe	Green	No	1	01:01	20:45	06:30
Annagh S	02/04/2022	Barn Owl	Red	No	1	21:13	20:45	06:30
Annagh S	02/04/2022	Barn Owl	Red	No	1	21:29	20:45	06:30
Annagh S	02/04/2022	Moorhen	Green	No	1	00:02	20:45	06:30
Annagh S	02/04/2022	Moorhen	Green	No	2	00:55	20:45	06:30

Site	Date	Species	BoCCI	Annex I	Calls	Time	C. Dusk	C. Dawn
Annagh S	02/04/2022	Barn Owl	Red	No	44	03:21	20:45	06:30
Annagh S	02/04/2022	Moorhen	Green	No	12	03:52	20:45	06:30
Annagh S	02/04/2022	Barn Owl	Red	No	1	04:36	20:45	06:30
Annagh S	02/04/2022	Barn Owl	Red	No	1	04:39	20:45	06:30
Annagh S	02/04/2022	Moorhen	Green	No	7	04:55	20:45	06:30
Annagh S	02/04/2022	Barn Owl	Red	No	1	05:10	20:45	06:30
Annagh S	02/04/2022	Teal	Amber	No	8	05:43	20:45	06:30
Annagh S	02/04/2022	Snipe	Red	No	7	05:48	20:45	06:30
Annagh N	03/04/2022	Redwing	Red	No	1	02:30	20:46	06:27
Annagh S	03/04/2022	Barn Owl	Red	No	1	21:00	20:46	06:27
Annagh S	03/04/2022	Snipe	Red	No	15	21:03	20:46	06:27
Annagh S	03/04/2022	Barn Owl	Red	No	2	21:06	20:46	06:27
Annagh S	03/04/2022	Barn Owl	Red	No	5	21:17	20:46	06:27
Annagh S	03/04/2022	Barn Owl	Red	No	42	21:20	20:46	06:27
Annagh S	03/04/2022	Barn Owl	Red	No	2	21:31	20:46	06:27
Annagh S	03/04/2022	Barn Owl	Red	No	5	21:38	20:46	06:27
Annagh S	03/04/2022	Barn Owl	Red	No	3	04:29	20:46	06:27
Annagh S	03/04/2022	Teal	Amber	No	6	06:10	20:46	06:27
Annagh N	04/04/2022	Snipe	Red	No	4	21:04	20:48	06:25
Annagh N	04/04/2022	Redwing	Red	No	2	05:50	20:48	06:25
Annagh S	04/04/2022	Barn Owl	Red	No	1	21:03	20:48	06:25
Annagh S	04/04/2022	Snipe	Red	No	17	22:01	20:48	06:25
Annagh S	04/04/2022	Moorhen	Green	No	2	22:06	20:48	06:25
Annagh S	04/04/2022	Moorhen	Green	No	7	22:11	20:48	06:25
Annagh S	04/04/2022	Snipe	Red	No	32	00:41	20:48	06:25
Annagh S	04/04/2022	Barn Owl	Red	No	7	01:24	20:48	06:25
Annagh S	04/04/2022	Barn Owl	Red	No	1	01:52	20:48	06:25
Annagh N	05/04/2022	Water Rail	Green	No	2	00:10	20:50	06:53
Annagh S	05/04/2022	Barn Owl	Red	No	2	21:07	20:50	06:23
Annagh S	05/04/2022	Moorhen	Green	No	19	23:26	20:50	06:23

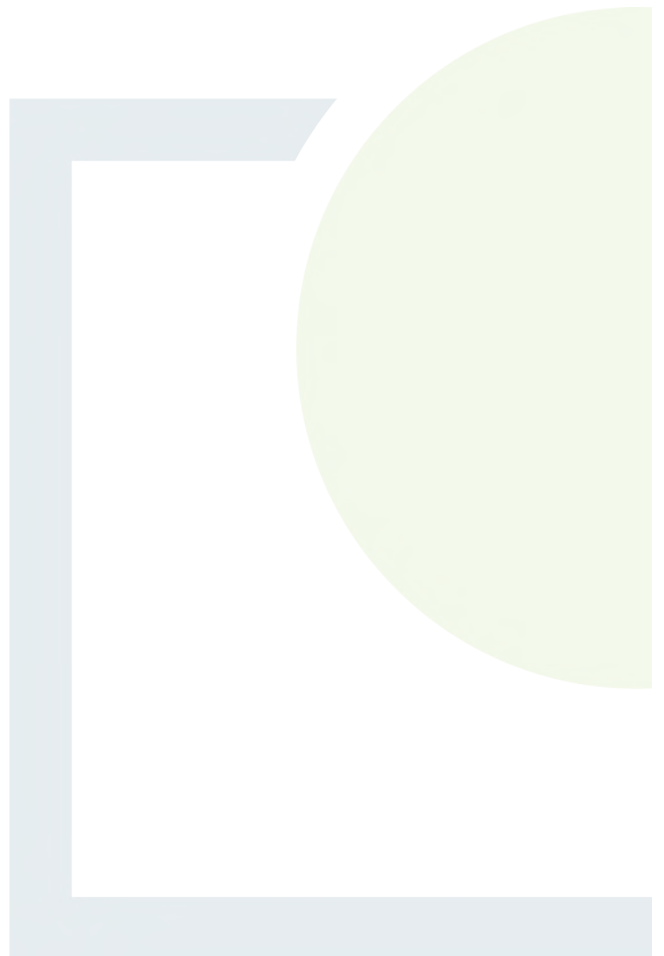
Site	Date	Species	BoCCI	Annex I	Calls	Time	C. Dusk	C. Dawn
Annagh S	05/04/2022	Barn Owl	Red	No	29	23:40	20:50	06:23
Annagh S	05/04/2022	Little Grebe	Green	No	2	01:28	20:50	06:23
Annagh S	05/04/2022	Barn Owl	Red	No	50	03:24	20:50	06:23
Annagh S	05/04/2022	Barn Owl	Red	No	42	03:30	20:50	06:23
Annagh S	05/04/2022	Snipe	Red	No	30	04:04	20:50	06:23
Annagh S	05/04/2022	Moorhen	Green	No	3	04:21	20:50	06:23
Annagh N	06/04/2022	No birds	#N/A	#N/A	N/A	N/A	20:52	06:20
Annagh S	06/04/2022	No Birds	#N/A	#N/A	N/A	N/A	20:52	06:20
Annagh N	07/04/2022	Moorhen	Green	No	8	03:40	20:54	06:18
Annagh S	07/04/2022	No Birds	#N/A	#N/A	N/A	N/A	20:54	06:18
Annagh N	08/04/2022	Snipe	Red	No	18	03:40	20:56	06:15
Annagh S	08/04/2022	Barn Owl	Red	No	1	21:12	20:56	06:15
Annagh N	09/04/2022	No birds	#N/A	#N/A	N/A	N/A	20:57	06:13
Annagh S	09/04/2022	Barn Owl	Red	No	1	21:11	20:57	06:13
Annagh N	10/04/2022	No birds	#N/A	#N/A	N/A	N/A	20:59	06:11
Annagh S	10/04/2022	No Birds	#N/A	#N/A	N/A	N/A	20:59	06:11
Annagh N	11/04/2022	No birds	#N/A	#N/A	N/A	N/A	21:01	06:08
Annagh S	11/04/2022	Barn Owl	Red	No	11	01:12	21:01	06:08
Annagh S	11/04/2022	Barn Owl	Red	No	4	02:15	21:01	06:08
Annagh N	12/04/2022	No birds	#N/A	#N/A	N/A	N/A	21:03	06:06
Annagh S	12/04/2022	No Birds	#N/A	#N/A	N/A	N/A	21:03	06:06
Annagh N	13/04/2022	Swan sp	#N/A	#N/A		21:32	21:05	06:04
Annagh N	13/04/2022	Barn Owl	Red	No	1	02:09	21:05	06:04
Annagh S	13/04/2022	Barn Owl	Red	No	1	01:11	21:05	06:04
Annagh S	13/04/2022	Barn Owl	Red	No	15	01:32	21:05	06:04
Annagh S	13/04/2022	Barn Owl	Red	No	21	02:03	21:05	06:04
Annagh S	13/04/2022	Barn Owl	Red	No	3	04:27	21:05	06:04



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APPENDIX 5

Schedule of Mitigation Measures





SCHEDULE OF MITIGATION MEASURES

This document sets out all mitigation measures as detailed in the Environmental Impact Assessment Report (EIAR) for the proposed Annagh Wind Farm.

1 AIR AND CLIMATE

1.1 Air Quality

1.1.1 Construction Phase

A Construction Environmental Management Plan (CEMP) has been prepared and is included in Appendix 3.1 of Volume 3 of the EIAR. This includes for the following mitigation measures during the construction phase of the proposed wind farm relevant to air quality:

- The internal access roads will be constructed/upgraded prior to the commencement of other major construction activities. These roads will be finished with graded aggregate;
- A water bowser will be available to spray work areas (wind turbine area and grid connection route) and haul roads, especially during periods of excavations works coinciding with dry periods of weather, in order to suppress dust migration from the site;
- All loads which could cause a dust nuisance will be covered to minimise the potential for fugitive emissions during transport;
- Gravel will be used at the site exit point to remove any dirt from tyres and tracks before travelling along public roads;
- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- The access and egress of construction vehicles will be controlled to designated locations, along defined routes, with all vehicles required to comply with onsite speed limits;
- Construction vehicles and machinery will be serviced and in good working order;
- Wheel washing facilities will be provided at the entrance/exit point of the proposed wind farm site;
- The developer in association with the contractor will be required to implement a dust control plan as part of the CEMP (a CEMP is contained in Volume 3, Appendix 3.1. In the event the Planning Authority decides to grant permission for the proposed wind farm, the final CEMP will address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned by the Planning Authority.
- Receptors which receive dusting and soiling from local routes entering the site; and dwellings directly adjacent to the grid connection route construction that experience dust soiling, where appropriate, and with the agreement of the landowner, will have the facades of their dwelling cleaned if required should soiling have taken place;
- Ensure all vehicles switch off engines when stationary – no idling vehicles; and
- Exhaust emissions from vehicles operating within the site, including trucks, excavators, diesel generators or other plant equipment, will be controlled by the contractor by ensuring that emissions from vehicles are minimised through regular servicing of machinery.



1.1.2 Operational Phase

As the operation of the proposed wind farm will have positive impacts on air quality, mitigation measures are considered unnecessary.

1.1.3 Decommissioning Phase

Mitigation measures for the removal of wind turbines from the proposed project site would be similar as per the construction phase with respect to dust control and minimisation. The proposed access tracks across the proposed wind farm site will be left in situ and utilised as agriculture and forest roads following decommissioning and no mitigation measures are proposed. In terms of the underground grid cable, this will be left in situ and so no mitigation measures are proposed.

1.2 **Climate**

It is considered that the proposed wind farm project will have an overall positive impact in terms of carbon reduction and climate change. It will assist Ireland in meeting the new binding renewable energy target for the EU of 32% by 2030. Also, it will aid in increasing the onshore wind capacity, as per the Climate Action Plan 2021. In terms of renewable energy, an increase in electricity generated from renewable sources is to increase to 80% by 2030, with up to 8.2GW of increased onshore wind capacity. This will be achieved by:

- Phasing out fossil fuels;
- Harnessing renewable energy;
- Micro-generation; and
- Other measures.

As set out in the Climate Action Plan 2021, in terms of harnessing renewable energy, the volumes and frequencies of RESS will increase, so that the 80% target is met. The measures required to achieve this include finalising the design and implementation of RESS 2 and RESS 3.

As no significant impacts on climate are predicted during construction, no mitigation measures are proposed. In terms of the operational phase, the operation of the proposed wind farm project will have a positive effect on climate due to the displacement of fossil fuels.



2 NOISE AND VIBRATION

2.1 Construction Phase

- The predicted noise levels from on-site activity from the proposed project is below the noise limits in BS 5228-1:2009+A1:2014. Nonetheless, several mitigation measures will be employed to minimise any potential impacts from the proposed project.
- The noise impact for construction works traffic will be mitigated by generally restricting movements along access routes to the standard working hours and exclude Sundays, unless specifically agreed otherwise. For example, during turbine erection, an extension to the working day may be required, i.e. 05:00 to 21:00, but this would be necessary only on a relatively small number of occasions. If turbine deliveries are required at night, it will be ensured that vehicles on local roads do not wait outside residential properties with their engines idling, and that the local residents will be informed of any activities likely to occur outside of normal working hours.
- Consultation with the local community is important in minimising the impacts and therefore construction will be undertaken in consultation with the local authority as well as the residents being informed of construction activities through the Community Liaison Officer.
- The construction works on site will be carried out in accordance with the guidance set out in BS 5228:2009+A1:2014, and the noise control measures set out Section 4.3.2 of the Construction Environmental Management Plan (CEMP) which is included in Appendix 3.1 of Volume 3 of the EIAR. Proper maintenance of plant will be employed to minimise the noise produced by any site operations.
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the project. Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use.
- The hours of construction activity will be limited to avoid unsociable hours where possible. Construction operations shall generally be restricted to between 07:00 - 19:00 hours Monday to Friday and 07:00 - 13:00 hours on Saturdays. However, to ensure that optimal use is made of fair-weather windows, or at critical periods within the programme, it could occasionally be necessary to work outside these hours. Any such out of hours working would be agreed in advance with the local planning authority.
- The on-site construction and decommissioning noise levels will be below the relevant noise limit of 65 dB $L_{Aeq,1hr}$ for operations exceeding one month, and therefore construction noise impacts are not considered to be significant. However, there is potential for temporary elevated noise levels due to the grid connection works. However, the impact of these works at any particular receptor will be for a short duration (i.e. less than 3 days). Where the works at elevated noise levels are required over an extended period at a given location, a temporary barrier or screen will be used to reduce noise levels below the noise limit where required. The noise impact will also be minimised by limiting the number of plant items operating simultaneously where reasonably practicable.



2.2 Operational Phase

The predicted noise from the proposed wind farm is below the daytime and night-time noise limits at all but one noise sensitive location. There is an exceedance at location R167 during daytime periods at a wind speed of 6 m/s. The noise modelling assumed that this receptor is downwind of all wind turbines. In practice, this will not occur all the time and when the receptor is upwind or cross-wind the actual noise levels will be lower.

To ensure the proposed wind farm is compliant with the daytime noise limit at receptor R167, some of the turbines will need to be operated in noise reduced modes of operation¹. Table 2.1 presents the sound power levels for the Vestas V150 for noise reduced modes of operation and a range of standardised 10m height wind speeds.

Table 2-1: Vestas V150 – Sound Power Levels for a range of Noise Reduced Modes

Modes of Operation	Sound Power Levels for a range of Standardised 10m Height Wind Speeds						
	2 m/s	3 m/s	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s
Normal Operation	91.3	92.5	96.2	100.5	103.5	104.1	104.9
SO0	91.3	92.5	96.2	100.4	103.3	103.9	104.0
SO2	91.3	92.2	96.1	100.1	102.0	102.0	102.0
SO3	91.3	92.2	96.1	99.9	101.0	101.0	101.0
SO4	91.3	92.2	96.1	99.6	100.0	100.0	100.0
SO5	91.3	92.2	96.1	98.8	99.0	99.0	99.0
SO6	91.3	92.2	96.1	97.8	98.0	98.0	98.0

Table 2.2 presents mitigation measures to ensure compliance with the daytime noise limit at receptor R167. The operational noise resulting from the proposed project will meet the noise limits set out in Section 7.4.2 and the predicted noise levels are presented in Appendix 7.7 of Chapter 7 of the EIAR.

¹ It is possible to run the turbines in noise reduced modes of operation (NROs) whereby the noise level is lessened by reducing the rotational speed of the turbines, with a resultant loss of electrical energy production. Mode SO0 refers to a noise reduced mode with a sound power of 104.0 dB rather than 104.9 dB when the turbine operates in normal mode of operation at a standardised 10m height wind speed of 8 m/s.



Table 2-2: Required Turbine Curtailment/Mitigation to Meet Daytime Noise Limits

Turbine ID	Required Noise Reduced Modes to meet Daytime Noise Limit L_{A90}
	Standardised 10m Height Wind Speeds (m/s)
	6
T06	SO2

With mitigation, for some receptors sufficiently far from adjacent wind farms, a new source of noise will be introduced into the soundscape and it is expected that there will be a long-term slight to moderate significance of impact for dwellings within the 35 dB L_{A90} study area with a moderate significance of impact on the closest dwellings to the proposed wind farm.

Should the project be granted permission, an operational noise survey will be undertaken to ensure the project complies with the noise limits. If an exceedance in the noise limit occurs, mitigation measures will be refined to ensure compliance with the noise limits is achieved at all noise sensitive locations. The requirements of the operational noise survey will be in accordance with any relevant planning conditions, but will as a minimum involve noise monitoring at a number of representative noise sensitive locations over a period after the windfarm becomes operational.

2.3 Decommissioning Phase

The noise impact for construction works traffic will be mitigated by restricting movements along access routes to the standard working hours and exclude working on Sundays, unless specifically agreed otherwise with the local authority.

The decommissioning works, which will be of a lower impact than construction works, will be carried out in accordance with the policies and guidance required at the time of the works, and restricted to normal working hours, 07:00 - 19:00 hours Monday to Friday and 07:00 - 13:00 on Saturdays in accordance with best practice.



3 BIODIVERSITY

Mitigation measures are described below which will avoid, reduce and where possible, offset likely significant impacts arising in relation to ecology from the construction, operation and decommissioning of the site. These mitigation measures shall be implemented in full.

3.1 Mitigation by Avoidance and Design

The following measures are incorporated into the proposed wind farm design to reduce impacts on designated sites, flora and fauna through avoidance and design:

- The hard-standing area of the wind farm has been kept to the minimum necessary for the maximum turbine envelope proposed, including all site clearance works to minimise land take of habitats and flora.
- Site design and layout deliberately avoided direct impacts on designated sites.
- All cabling for the project will be placed underground; this significantly reduces collision risk to birds over the lifetime of the wind farm (Drewitt and Langston, 2006).
- The grid connection routes have been selected to minimise land take of potentially sensitive habitats by following the site access tracks and public roads.
- Further mitigation measures for hedgerows/treelines that will be affected by the grid connection route are discussed further in Section 8.6.2.3 of Chapter 8 of the EIAR.
- Care has been taken to ensure that sufficient buffers are in place between wind farm infrastructure and hydrological features such as rivers and streams. Buffers of 50m from natural watercourses have been maintained, excepting where crossing points occur.
- One new stream crossing shall be required within the main wind farm site. A clear-span design has been selected to avoid instream works, and to minimise disturbance of banks and associated indirect effects such as siltation.
- Directional drilling is the proposed installation method where the grid connection crosses the Rathnacally stream. As such, in-stream works will not be required and the potential for contaminant or pollutant input will be greatly reduced as a result.
- The grid cable will be incorporated in the clear span bridge where it crosses the Oakfront stream within the proposed site.
- The design of the grid connection was also carried out with cognisance to ecological features. Cables are to be placed underneath public roads where possible to avoid impact to roadside hedgerows. Further mitigation measures for hedgerows/treelines that will be affected by the grid connection route are discussed further in Section 8.6.2.3 of Chapter 8 of the EIAR.
- The design of TDR Nodes 5 and 6 was carried out with cognisance of the adjacent Inner Shannon Estuary – South Shore pNHA. The route identified is constrained to the existing public road network and does not overlap or abut any habitats, supporting habitats or features of interest for this site.



3.2 Mitigation Measures during Construction

Construction of this project is expected to cause temporary (disturbance) adverse impacts on local ecological receptors, as outlined in the impact appraisal above. The mitigation measures described below will reduce these impacts significantly.

3.2.1 Project Ecologist

A Project Ecologist/Ecological Clerk of Works (ECoW)) will be employed for the duration of the construction phase to ensure that all the mitigation measures outlined in relation to the environment are implemented. The Project Ecologist/ECoW will advise on environmental effects and communicate with the project owner and contractor to ensure the required actions to implement the mitigation prescribed in the EIAR are carried out.

3.2.2 Habitats and Flora

The area of the proposed works will be kept to the minimum necessary, including all site clearance works, to minimise disturbance to habitats and flora. In this case, the footprint of the proposed development has been kept to the minimum necessary, including the use of layout design methods including existing roads and stream crossings to minimise excavation works.

No disturbance to habitats or flora outside the proposed development area will occur. Works will be restricted to the immediate footprint of the development (see CEMP; Appendix 3.1). Machinery, and equipment will be stored within the site compound. Designated access points will be established within the site and all construction traffic will be restricted to these locations. Access to the site will be primarily via the existing local road L1322. HGVs shall approach the site via this road from the East. The met mast access route will be via the existing farm track from the south.

Translocation of Wet Grassland Turves

Turves from the footprint of T02 hard standing area (c. 10, 350m²). will be translocated to adjacent fields in order to preserve the flora and seedbank present within the footprint. The receptor site will be prepared in advance by excavating shallow linear trenches where the existing grassland is retained between trenches, using rubber tyred excavator to minimise soil disturbance. The turves will be directly translocated to the receptor sites and not stockpiled, under the supervision of an ecologist.

Hedgerow and Treeline Reinstatement

Hedgerow and treeline reinstatement will be carried out for the proposed wind farm and TDR Nodes. At the proposed wind farm, 164m of riparian vegetation along the Oakfront River near the site entrance will be reinstated (Line 1). Natural recolonisation is occurring; this will be allowed to proceed unhindered and supplemented by planting willow and alder. Side trimming only will be permitted. A further 124m of hedgerow will be reinstated along Line 2.

This field boundary currently has an earth bank/remnant hedgerow. This hedge will be allowed to recolonise naturally and will also be planted with hawthorn and blackthorn. Side trimming only will be permitted. The combined length of reinstated hedgerow is equal to the combined habitat loss (288m) for Hedgerows and Treelines.



Hedgerows removed or lowered by TDR Node works will be reinstated using the same native species present in original hedgerows. The exception to this is that Ash *Fraxinus excelsior* is not proposed to be used, due to its vulnerability to ash dieback disease. Other large-growing native species such as Alder and Oak are proposed instead. Semi-mature specimens of native provenance will be included to accelerate rehabilitation of these areas. Native, semi-mature specimen trees will be planted where large trees are felled at TDR Nodes to offset the loss of existing trees. A proportion of smaller trees can also be planted with the semi-mature specimens. The species proposed to be planted at these locations are detailed in Table 3-1:

Table 3-1: Species to be replanted at TDR Nodes

Node	Species
7	Willow <i>Salix</i> sp., Birch <i>Betula</i> sp., Rowan <i>Sorbus aucuparia</i> , Hawthorn <i>Crataegus monogyna</i> and Blackthorn <i>Prunus spinosa</i>
8	Hawthorn <i>Crataegus monogyna</i> , Wild privet <i>Ligustrum vulgare</i>
10.1	Hawthorn <i>Crataegus monogyna</i> , Pedunculate Oak <i>Quercus robur</i>
10.2	Hawthorn <i>Crataegus monogyna</i>
10.3	Hawthorn <i>Crataegus monogyna</i> , Alder, Oak, Crab Apple <i>Malus sylvestris</i>
10.4	Hawthorn <i>Crataegus monogyna</i> , Alder, Oak
10.5	Hawthorn <i>Crataegus monogyna</i>
10.7	Hawthorn <i>Crataegus monogyna</i> and Blackthorn <i>Prunus spinosa</i>
10.8	Hawthorn <i>Crataegus monogyna</i>
10.9	Hawthorn <i>Crataegus monogyna</i> , Blackthorn <i>Prunus spinosa</i> , Alder, oak
10.1	Blackthorn <i>Prunus spinosa</i>

All hedgerow planting is required to use plants of native provenance (local if possible). The landscaping contractor is required to be informed well in advance to allow the acquisition of suitable native stock. Locally sourced willow cuttings are suitable where this genus is specified.

Meadow Planting

Meadow planting will consist of seeding the reinstated site compound area after construction has finished with a native wildflower meadow seed mixture. Two wildflower berms will also be created on either side of the Met Mast access track. Wildflower seed mixes are required to be of native provenance; mainstream commercially available mixes are not acceptable.

The following suppliers: Ecoseeds <https://www.ecoseeds.co.uk/> (Northern Ireland) and Design by Nature <http://www.wildflowers.ie/> are reputable and experienced suppliers capable of supplying seed mixes that meet the required criteria. In addition, these suppliers can provide advice on establishment and maintenance of wildflower meadows, as well as identifying suitable seed mixes for the site.

An example of a suitable seed mixture is the 'Butterflies, Bees and Bird Attracting Wildflowers' mix (Product Code GF03²) which tolerates semi-shade. This wildflower seed mix comprises the following species: Birdsfoot

² See <http://www.wildflowers.ie/mixes/gf/gf03.htm>



Trefoil, Black Medick, Cowslip, Devil's Bit Scabious, Meadow Buttercup, Field Scabious, Hemp Agrimony, Kidney Vetch, Lady's Bedstraw, Lady's Ann lace, Lesser Knapweed, Meadowsweet, Mullein, Ox-eye Daisy, Purple Loosestrife, Ragged Robin, Red Campion, Red Clover, Ribwort Plantain, Rough Hawksbit, Sorrel, St Johnswort, Wild Angelica, Wild Carrot, Yarrow, Yellow Agrimony, Yellow Rattle, Teasel, Corn Marigold, Corn Poppy, Corncockle, Cornflower and Scented Mayweed. In particular, the clover species will provide habitat for Large Red Tailed Bumble Bee (Carvell et al., 2011). It is also recommended to include fine leaved grasses such as Red Fescue, Smooth Meadow-Grass and Crested Dog's Tail for conservation of this bee, which was noted in a desk study.

Development of Artificial Pond

An existing pond in the northern area of the site is in suboptimal condition and covered in duckweed and will be enhanced through a shallow extension to this pond, with planting of reeds which will remediate the excess duckweed, as well as allow wildlife to safely access the pond. The pond will be extended by excavating a broad (2-4m) undulating drawdown zone around the southern and eastern margins. Common reed *Phragmites australis* and soft rush *Juncus effusus* will be planted in these margins, as well as the installation of a perimeter fencing to prevent cattle ingress.

Invasive Species

Where invasive non-native species are present at TDR Nodes, measures will be implemented to ensure spread of these species is prevented, and where feasible eradicated as described below in Section 8.6.2.5 of Chapter 8 of the EIAR and in the invasive species management plan (Appendix 8.7 of the EIAR).

3.2.3 Felling of Immature Woodland of Local Importance (Higher Value) at adjacent Inner Shannon Estuary – South Shore pNHA, located outside of its associated SAC

With regards to TDR Node 5, the proposed works are confined to felling of immature Norway Maple trees, preparation of local load bearing surface on the existing roundabout island, and removal of street furniture. The following will be implemented:

- Prior to works an invasive species survey will be undertaken in the area to reconfirm the findings of the EIAR.
- The invasive species plan and management plan (Appendix 8.7 of the EIAR) will be adhered to for works at this area.

3.2.4 Management of the Spread of Non-native Invasive Species

According to Invasive Species Ireland (ISI) invasive non-native species are the second greatest threat (after habitat destruction) to worldwide biodiversity. Invasive species negatively impact Ireland's native species; changing habitats and ultimately threatening ecosystems which impacts on biodiversity as well as economics as they are costly to eradicate.

Halting the spread of non-native invasive species can be achieved via prevention, containment, treatment and eradication.



Prevention

Main Wind Farm Site

Cherry laurel is present in the hedgerow at the proposed site entrance, while Sycamore is the dominant tree species making up the small area of Mixed broadleaved woodland at the site entrance. As such interaction with proposed works is unavoidable for both of these species and containment measures are required in accordance with the invasive species management plan (ISMP) (Appendix 8-7 of the EIAR). Options for eradication are also detailed in the ISMP.

Grid Connection Route

Prior to trimming or vegetation removal along the grid connection an invasive species survey will be undertaken to reconfirm the findings of the EIAR.

Additional Works along the Turbine Delivery Route

Prior to trimming or vegetation removal at turbine delivery work locations, an invasive species survey will be undertaken to reconfirm the findings of the EIAR. As interaction of proposed works with invasive species is likely based on surveys of the existing environment, containment measures are required in accordance with the invasive species management plan (ISMP) (Appendix 8-7 of the EIAR). Options for eradication are also detailed.

Containment, Treatment, Eradication

- Cordoning off the area – this shall include a buffer of 5m surrounding the area of infestation to ensure that seeds are not transported to other sections of the site via vehicular traffic, equipment or PPE.
- No machinery or personnel shall be allowed within this restricted area. Similarly, there shall be no storage of materials within or adjacent to this restricted area.
- There shall be no vegetation clearance or trimming within the cordoned area (except where undertaken in accordance with the invasive species management plan) as this can lead to the species recolonising other areas via the wind, water if displaced into drains, or soil and vegetation attached to machinery, vehicles or personnel.
- If schedule III species are present, no soil or vegetation shall be removed from this area unless it is securely contained and is transported under licence to a suitably licenced facility for treatment.
- For non-schedule III species, no soil or vegetation shall be removed from this area unless it is securely contained and is to be disposed of appropriately onsite or transported to a suitably licenced facility for treatment.
- Informing all site staff through toolbox talk as part of site inductions.
- Any new sightings of the species shall be relayed to construction staff and the developer via the project ecologist/ECOW. These areas shall follow the same protocol as described above.
- Reporting sighting(s) to the NPWS and NBDC and liaising with the NPWS.

3.2.5 Mammals (excluding bats)

A preconstruction mammal survey will be undertaken to reconfirm the findings of the EIAR.

An ecologist will supervise areas where vegetation, scrub and hedgerow removal will occur prior to and during construction as appropriate (e.g., an ecologist may be required during some clearance works of areas where vegetation is too dense to check beforehand). This will ensure that any site-specific issues in relation to wildlife not currently present (e.g. Badger setts, Red squirrel dreys) on site will be reconfirmed prior to commencement of works so as to allow appropriate mitigation measures to be put in place.



In the event that an issue arises, the NPWS will be updated, consulted with, relevant guidelines shall be followed and any licences/amendments to licences will be sought from NPWS. Construction operations will take place predominantly during the hours of daylight to minimise disturbances to faunal species at night. Some works along the grid connection route and wind farm site may occur at night but the project ecologist/ECOW shall limit night-time works to sections of the route / site which avoid sensitive features (e.g. mature treelines).

Badgers

A pre-construction mammal survey including a badger survey will be undertaken within the mammal survey study area to reconfirm the existing environment as described in the EIAR and, in the event that a Badger sett should be encountered at any point, then NPWS will be informed and NRA *Guidelines for the Treatment of Badgers Prior To the Construction of National Road Schemes* will be followed.

A number of Badger setts including active setts were present within the site boundary area during surveys, and there are records of Badger in the local area. Badgers can move between setts regularly and may also excavate new setts within their territory. As such there is potential for the layout and status of the Badger setts onsite to change in the intervening period between planning and construction stages.

A derogation/disturbance licence will be required if planning is granted, and as such a derogation report and licence application have been prospectively submitted to NPWS to initiate consultation and to obtain a licence or indication of licence grant in support of the planning application.

Setts within the footprint of proposed infrastructure/felling areas will require (following evacuation if active) controlled destruction under ecological supervision. Based on baseline conditions, one sett will require controlled destruction. Setts in close proximity to the development will require temporary hard-blocking and exclusion for the duration of construction works to ensure that Badgers potentially occupying these setts during construction works are not injured. Setts affected by proposed felling only will be hard blocked for the duration of felling operations, but will be unblocked after felling is completed, provided adequate buffers between construction areas and setts exist.

No hard-blocking or sett exclusions will be undertaken during the Badger breeding season (December-June inclusive).

Construction of an artificial sett will be undertaken in consultation with NPWS due to the presence of a sett close to infrastructure which may be damaged and/or destroyed, and which will be closed with no alternative setts nearby during construction. The artificial sett will be located c. 50m from the existing sett in question.

A report detailing evacuation procedures, sett excavation and destruction, and any other relevant issues will be submitted to the NPWS, in fulfilment of the wildlife licence conditions.

Details on the location of setts, proposed mitigation and location of artificial sett are included in the confidential Appendix: Badger Report.

Vegetation clearance

There is the potential for setts to be discovered during vegetation clearance works. Care will need to be taken during this early stage of the development and a competent ecologist will be required on-site for these works. If setts are discovered all works within 30m of the sett shall cease including vegetation clearance. NPWS shall be contacted, and a derogation/disturbance licence shall be sought/amended as required. An activity survey shall be carried out to assess the potential for the sett to be used by Badgers.



Measures to prevent the injury of Badgers during proposed mitigation measures

In the event that a Badger is found injured during the proposed mitigation measures, it is important to realise that injured Badgers will be frightened and can be very dangerous. They are strong animals and are not used to being handled, so no attempt will be made to touch an injured Badger, as this could result in workers being bitten. NPWS shall be contacted along with ISPCA and potentially a vet specified by NPWS capable of treating the species.

Otter

No evidence of otter holts was observed within the study area, and otter signs were limited to a single spraint, indicative of the Oakfront stream being used as a commuting corridor. A pre-construction mammal survey will be undertaken (no later than 12 months prior to construction) within the mammal survey study area to reconfirm the existing environment as described in the EIAR and, if an Otter holt should be encountered at any point, then NPWS will be informed and NRA *Guidelines for the Treatment of Otters Prior To the Construction of National Road Schemes* will be followed.

Red Squirrel

Where possible, any required felling of trees in forestry areas will be limited to time periods outside which Red Squirrel may have young in dreys (peak period January to March). If this is unavoidable, then areas to be clear felled will be surveyed in advance by a suitably qualified ecologist to determine whether any occupied dreys are present. Suitable mitigation measures will be implemented and a derogation/disturbance licence will be sought if dreys are found within the felling footprint or adjacent areas.

Irish Stoat

Since stoat dens are difficult to detect, mitigation measures should focus on avoiding impacts during the breeding season. Since stoats are born in April, and reach adult size by September, the implementation of mitigation measures for breeding birds (no vegetation removal between March-August inclusive) will avoid disturbance to stoat during the majority of their breeding season.

If vegetation clearance is unavoidable during this period, then areas to be clear felled will be surveyed in advance by a suitable qualified ecologist to determine whether any stoat are present. A licence under the Wildlife Act will be sought as necessary.

Irish Hare, Pygmy Shrew and Hedgehog

These species are mobile and will disperse, however, hibernating Hedgehogs and the young of Irish Hare, Pygmy Shrew or Hedgehog are vulnerable during clearance of vegetation. An ecologist will check for the presence of hibernating hedgehog and or young mammals as appropriate, prior to vegetation clearance works prior to or during construction (as necessary).

Where habitat is too dense the ecologist will supervise vegetation removal and grassland trimming / maintenance during clearance works as appropriate.:

- Outside of the bird breeding season (March 1st to August 31st inclusive) attention will be paid to the removal of vegetation, scrub and hedgerow with regards to leverets, October to March for hibernating Hedgehog and September to October for breeding Pygmy Shrew as is appropriate.
- Within the breeding bird season and outside of it, attention will be paid to the removal and/or maintenance of dense grassland for breeding hare (all year), pygmy shrew (April to October) and Hedgehog (April to July).



3.2.6 Bats

Buffer Zone

To minimize risk to bat populations, a buffer zone is required around any treeline, hedgerow, woodland feature, into which no part of the turbine should intrude.

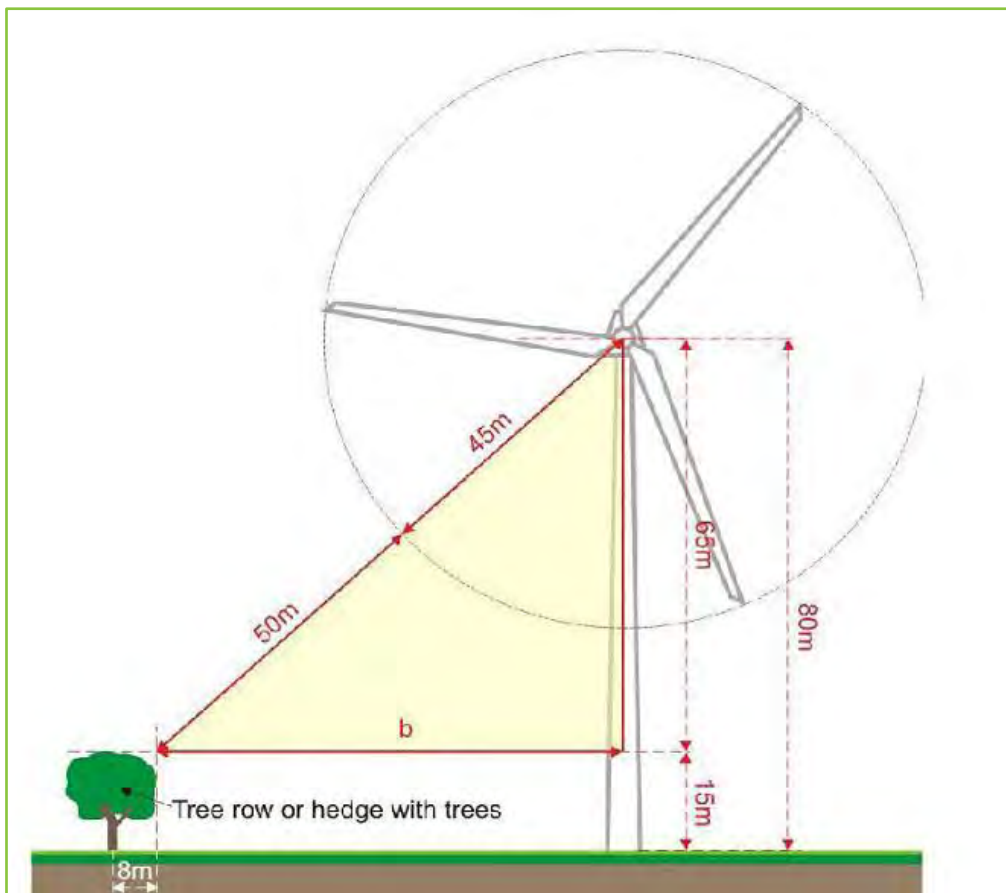
According to SNH (2021) guidance:

“The Eurobats guidance recommends a 200m buffer around woodland areas. There is, however, currently no scientific evidence to support this distance in the UK and it is recommended that a distance of 50m between turbine blade tip and nearest woodland (or other key habitat features such as wetlands etc.) is adequate mitigation in most, lower risk situations. Exceptionally, larger buffers may be appropriate, e.g. near major swarming and hibernation sites. The longevity of wind farms should also be taken into account and the maximum growth, or management, of woodland and other relevant habitat features considered in their planning.

These distances were taken into account during the design phase of the proposed Annagh Wind Farm Development.



The following formula was used to calculate the required felling buffer for each turbine (taking into account the height of surrounding woodland/plantations at each turbine location):



$$b = \sqrt{\{(50 + bl)^2 - (hh - fh)^2\}}$$

where: b = the distance on the ground
between the edge of the canopy and the turbine (m)
bl = blade length (m)
hh = hub height (m)
fh = feature height (m)

$$b = \sqrt{\{(50 + 75)^2 - (100 - fh)^2\}}$$

Note: fh for each turbine location is given in column 3 of Table 3-2 below:

Locations representative of the habitat types and features at turbine locations were surveyed, and the bat activity survey findings recorded informed the application of the 50m blade tip buffer described above at all six proposed turbine locations. Surrounding habitats, height of surrounding trees and felling buffer calculated using the above equation are included in Table 3-2 below. Note that the tree heights have been increased to allow for growth prior to felling, thereby expanding the buffers.



To minimise risk to bat populations, a buffer zone is required around any treeline, hedgerow, woodland feature, into which no part of the turbine should intrude.

Table 3-2: Assessment of potential turbine/bat conflict zones (based on proposed turbine blade length 75m)

Turbine number	Habitats Requiring Felling	Surrounding Tree Height (fh/m)	Tree Height allowing for growth (m)	Felling Buffer Radius (m)
1	Mixed broadleaved/conifer woodland	7	9	86
2	Mixed broadleaved/conifer woodland	7	9	86
3	Mixed broadleaved woodland	12	15	92
4	Mixed broadleaved woodland	7	9	86
5	Immature woodland	4.5	6	82
6	Mixed broadleaved woodland	7	9	86

Existing trees will be cleared around all six turbines to provide a vegetation-free buffer zone around each turbine. All buffers will be maintained throughout the lifetime of the wind farm.

The following mitigation measures for bats are proposed:

Supervision of vegetation clearance

An ecologist/ECOW will supervise areas where vegetation, scrub and hedgerow removal will occur prior to and during construction as appropriate (e.g., ecologist may be required during some clearance works of areas where vegetation is too dense to check beforehand). This will ensure that any site-specific issues in relation to wildlife not currently present (e.g., Bat roost locations) on site will be discovered prior to commencement of works to allow appropriate mitigation measures to be put in place. In the event that an issue arises, the NPWS will be informed and the relevant guidelines will be implemented as appropriate (e.g. NRA guidelines).

Retention of trees

Several species of bats roost in trees. Treelines and mature trees within the wind farm site will be avoided and retained intact. Overall impacts on these areas will be reduced through modified design and sensitivity during construction. Any trees and treelines along approach roads and planned site access tracks will be retained unless felling is unavoidable.

Retained trees should be protected from root damage by an exclusion zone of at least 7 metres or equivalent to canopy height. Such protected trees will be fenced off by adequate temporary fencing prior to other works commencing.

Tree Felling Measures (TDR)

Where mature trees with low bat roosting potential are proposed to be felled, these trees will be left in situ for 24 hours prior to disposal. This will allow any bats present to escape.



It is noted that only low potential trees were identified at TDR Nodes; two trees with heavy Ivy growth (TDR Nodes 8 and 10.3) and three trees with single knot holes (TDR Nodes 10.1, 10.4 and 10.8) are within TDR Node footprints. These trees may have potential for individual/small numbers of bats to roost opportunistically and are classified as having low suitability for roosting bats.

Compensation for loss of commuting routes/Diversion from felling buffers

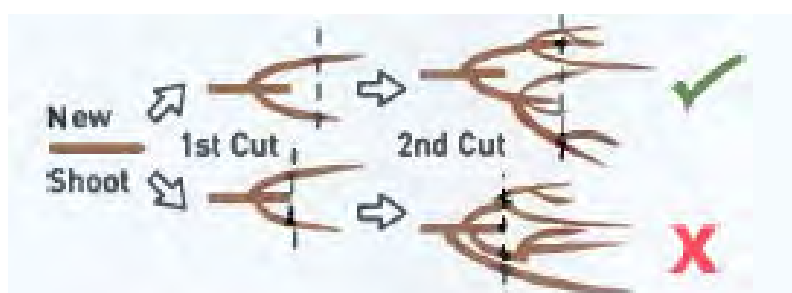
Linear features such as hedgerows and treelines serve as commuting corridors for bats (and other wildlife). The magnitude of habitat loss is Imperceptible. The total length of hedgerow to be removed is 277m (2.3 % of this habitat type within the study area), although it is noted that a large proportion of this is either within or bounding forestry blocks and as such is better considered as woodland edge in terms of bat habitat. A total of 11m (0.4% of this habitat type in study area) of treelines will be lost. This is made up of two parallel 5.5 -metre lengths along the Oakfront stream. Felling around turbines will alter commuting and foraging routes associated with existing woodland edges.

Where woodland edges are affected by turbine felling buffers, bats will be directed away from tree-free buffers along an alternative commuting route by planting new pollinator-friendly hedgerows. These will be planted directly into the soil, or alternatively in 1m high embankments if the soil is too wet. These embankments will be constructed using excavated material from nearby roads and hard standings. It is proposed to create double lines of hedgerow, with Alder and Willow on one side, and pollinator-friendly hedgerow species on the other. Planting of these species will be staggered to prevent excessive shading and aid establishment of the hedgerows.

All hedgerow planting is required to use plants of native provenance. The landscaping contractor is required to be informed well in advance to allow the acquisition of suitable native stock. 2–3-year-old alder and willow trees are required for hedgerows A-F, to help accelerate establishment. These will be supplemented with planting of whips.

The following fast-growing damp tolerant species are to be planted along the inner edges of these hedgerows: grey willow *Salix cinerea*, goat willow *Salix caprea*, and alder *Alnus glutinosa*. The following native fruiting hedgerow species are to be planted along the outer edges of these hedgerows: whitethorn *Crataegus monogyna* (75% of total), blackthorn *Prunus spinosa*, bird cherry *Prunus padus*, elder *Sambucus nigra*, dog rose *Rosa canina*, crab apple *Malus sylvestris*, field rose *Rosa arvensis*.

Tightly cut hedgerows with flat tops provide little benefit to wildlife, taller and bulky hedgerows are required as this provides more shelter for wildlife. When the hedgerows are maintained, stems will be cut a little above the last cut (see Plate 3-1) as cutting back to the exact same point depletes the energy of the hedgerow, forms a build-up of scar tissue which discourages new growth.



Source:Teagasc

Plate 3-1: Hedgerow Level of Cut



Light annual cutting of hedgerows is not good for wildlife as it limits the production of flowers and fruit. The sites hedgerows will be cut every three to four years in rotation if cutting is required, as this will leave areas of undisturbed hedgerows. Cutting equipment used will be sharp so as not to shatter or fray the hedge. Shattering and fraying allows for disease to enter plants and can lead to decay and weaken the vigour of the hedgerow. A finger-bar cutter is recommended as the most appropriate tool to minimise fraying and smashing of branches (Heritage Council, 2017). A flail-type hedge cutter is unsuitable for hedge trimming in situations where hedgerow health is a priority.

Hedgerow maintenance will not be carried out between the 1st of March and 31st of August as this is the nesting period for birds and any maintenance at this time will disturb breeding; this is in keeping with the Wildlife Act 1976 (as amended).

Habitat retention, replacement and landscaping

Habitat replacement and landscaping could compensate for or add to the wildlife value of the area and also provide areas of aesthetic as well as wildlife interest. In general, landscape design should aim to retain the quality of the landscape and ensure its protection within the landscaping programme. Existing hedgerows and semi-natural scrub or semi-natural grasslands within the study area outside of the footprint of the development will be retained and incorporated into the landscaping. Disturbed areas will be allowed to recolonise naturally.

The riparian vegetation along the Oakfront River near the site entrance will be reinstated, with the removal of non-native species. Where necessary, existing hedgerows onsite will be planted with native fruit and seed-bearing species to enhance their foraging potential and strengthen their role as wildlife corridors. Two new sections of hedgerow/treeline will be planted along the eastern land ownership boundary to enhance ecological connectivity within the landscape and provide shelter and food for wildlife.

Lighting restrictions

In general, artificial light creates a barrier to bats so lighting should be avoided where possible. Construction operations within the wind farm site will take place during the hours of daylight where possible to minimise disturbances to faunal species at night. Some works along the cable route and wind farm site may occur at night but the project ecologist/ECOW shall limit night-time works to sections of the route / site which avoid sensitive features (e.g. mature treelines). Where lighting is required, directional lighting (i.e. lighting which only shines on work areas and not nearby countryside) will be used to prevent overspill.

This can be achieved by the design of the luminaire and by using accessories such as hoods, cowls, louvers and shields to direct the light to the intended area only.

Pre-construction Surveys

If three years lapse from between planning-stage surveys in 2020 and installation of the wind turbines, it will be necessary to repeat one season of surveys during the activity period (EUROBATS, 2014). Future survey work will be completed according to best practice guidelines available (Hundt, 2012; Collins, 2016; SNH, 2019; 2021) and includes static detector, activity and roost inspection surveys.



3.2.7 Avifauna

Subject to other environmental concerns (e.g., run-off), the removal of vegetation and scrub as well as trimming of trees along the TDR will be undertaken outside of the bird breeding season (March 1st to August 31st inclusive). This will help protect nesting birds.

This in line with best practice recommendations for mitigation measures in regard to birds and wind farms (Drewitt, A. L. and Langston, R. H., 2006).

The clearance of vegetation, including forestry plantation, should only be carried out in the period February to September inclusive, i.e. outside the main bird nesting season. Where vegetation removal is required outside this period, vegetation will be inspected for nesting birds by a suitably qualified Ecologist. In the event of birds nesting within areas required to be felled suitable mitigation (implementation of buffer zones and/or seasonal constraints; nest monitoring) will be put in place and felling will only proceed upon agreement with NPWS and receipt of a wildlife licence.

Construction operations will take place during the hours of daylight to minimise disturbances to roosting birds, or active nocturnal bird species. This is in line with best practice recommendations for mitigation measures in regard to birds and wind farms (Drewitt and Langston, 2006). Limited operations such as concrete pours, turbine erection and installation of the grid connection may require night-time operating hours; these works will be supervised by the project ecologist/ECOW.

Toolbox talks will be undertaken with construction staff on disturbance to key species during construction. This will help minimise disturbance. This is in line with best practice recommendations for mitigation measures with regard to birds and wind farms (Drewitt and Langston, 2006).

Re-instated hedgerows will be planted with locally sourced native species. This will result in habitat enhancement for local species of conservation importance such as Greenfinch. This is in line with best practice recommendations for mitigation measures in regard to birds and wind farms (Drewitt and Langston, 2006).

The translocation of wet grassland from the road and hardstanding footprint associated with T02 will offset habitat loss for breeding Meadow Pipit and Skylark.

Kingfisher: Implement mitigation measures outlined in Chapter 10 - Hydrology and Water Quality of the EIAR, the CEMP and Aquatic Ecology Mitigation, section 3.2.8 below, to minimise and prevent the identified indirect impacts to water quality.

A re-confirmatory survey (March/April) will be conducted of the proposed turbine locations, Roads and hard standings to assess any evidence of Buzzard, Kestrel, Sparrowhawk, Snipe and Woodcock activity or taking up of new territories. Should any new nests be recorded, works at these locations will be restricted to outside the breeding season (April-July) or until chicks are deemed to have fledged (following monitoring). A similar survey will be implemented for Barn Owl, focusing on the derelict farmhouse near the proposed met mast access track. Although not currently used by this species, this building could be re-occupied by breeding Barn Owl and as such if present at the time of construction a seasonal restriction to avoid disturbance to breeding birds will be required. Works at this location will be restricted to outside the breeding season (April-July) or until chicks are deemed to have fledged (following monitoring).



3.2.8 Aquatic Ecology - Water Quality Measures during the Construction Phase

Proposed Mitigation Measures for the Construction Stage of the project

Construction phase mitigation for hydrology will follow that outlined in section 10.7 of Chapter 10 of the EIAR, and the mitigation measures outlined will be adhered to in conjunction with those outlined in this section. Construction phase mitigation measures for aquatic ecology predominantly involve the preservation of water quality.

All measures for the protection of water quality within the proposed development site, as detailed in the CEMP, will also protect the aquatic ecology and fisheries value of downstream watercourses.

The measures adopted within the CEMP (including recommendations from Inland Fisheries Ireland) will ensure effective protection of aquatic ecological interests downstream of the proposed development, particularly the habitats supporting sensitive aquatic species and with connectivity to the Blackwater River SAC (002170).

Proposed Mitigation Measures for Tree Felling

Localised tree felling will be required in the vicinity of turbine T1, T2, T3, T4 and T6 hardstand areas, the substation (and associated access track) and along the access tracks to T1 and T6 (see Figure 5.1 in Aquatic Ecology Report). It is estimated that 12.6ha of existing broadleaf forestry will be felled to facilitate development of the proposed wind farm infrastructure (e.g., turbine hardstands, substation compound and associated access tracks). There are potential source-receptor pathways from felling areas to both the Ardglass River and Oakfront River.

The installation of buffer zones adjacent to the aquatic zone are particularly important adjacent to the Ardglass River and adjoining drainage channel located near turbine T4 (c.130m shortest instream distance) and the Oakfront River and associated drainage channel near turbine T3 (c.160m shortest instream distance). Given the close proximity of felling areas to receiving watercourses and potential source-receptor pathways (i.e. drainage channels), a minimum buffer zone for felling areas of 15m will be applied. Check dams/silt fences will be installed within the drainage channels adjoining the Ardglass and Oakfront Rivers (i.e. those providing hydrological connectivity from felling areas to receiving watercourses). Drains and silt traps will be maintained throughout all felling works, ensuring that they are clear of sediment build-up and are not severely eroded. Broadleaf brash mats will be used to support vehicles on soft ground and mineral soils erosion and avoiding the formation of rutted areas, in which surface water ponding can occur. Brash mat renewal will take place before they become heavily used and worn. Provision will be made for brash mats along all off-road routes, to protect the soil from compaction and rutting. Where there is risk of severe erosion occurring, extraction will be suspended during periods of high rainfall.

To ensure tree clearance methodology that reduces the potential for sediment and nutrient run-off, the construction methodology will follow the specifications set out in the following best practice guidance documents:

- DAFM (2019). Standards for Felling and Reforestation;
- Forestry Service (2000a). Forest Service Forestry and Water Quality Guidelines;
- Forestry Service (2000b). Forest Harvesting and Environmental Guidelines.



Additional mitigation measures for the protection of aquatic ecology and receptors during felling activities will follow those outlined in section 10.7.1.2 and 10.7.1.6 of Chapter 10 of the EIAR (e.g., minimum buffer zone widths along watercourses).

Given the sensitivity of aquatic ecological receptors in the Ardglass River, Oakfront River and downstream-connecting Blackwater River SAC (002170) (e.g. salmonids, lamprey species, kingfisher, otter, white-clawed crayfish), it is proposed to undertake felling in the spring period to facilitate the sowing of grass seeds post-harvest to aid sediment filtration and nutrient absorption, using native grass species *Holcus lanatus* and *Agrostis capillaris* (DAFM, 2018). Machine operations will not take place in the 48-hour period before predicted heavy rainfall, during heavy rainfall or in the 48-hour period following heavy rainfall (DAFM, 2018). Removal of branch lop-and-top and other debris (brush) from felling areas within 20m of drainage channels will reduce nutrient seepage immediately post-felling and in the proceeding years after felling has occurred (DAFM, 2019).

In the presence of mitigation measures, potential impacts to aquatic ecology resulting from tree felling are considered **slight negative, short-term and in the local context**.

Potential impacts to qualifying interest species and habitats of the downstream-connecting Blackwater River SAC (002170) are considered **not significant and short-term in context of the European site**, in the presence of mitigation.

Mitigation measures for access track construction

It is proposed to construct approximately 4.5km of new internal access tracks and 0.1km of turning heads and carry out upgrades to c.0.4km of existing agricultural tracks (including bend widening) to facilitate site access and construction activities. All track widening will be undertaken using clean uncrushable stone with a minimum of fines to reduce the risk of suspended solid releases to receiving watercourses.

Still traps will be placed in the new roadside swales. Proposed new tracks will be drained via roadside swales with stilling ponds at the end of the swale. These grassed swales will serve to detain flow and reduce the velocities of surface water flows. The swales will be 0.3 m deep with a bottom width of 0.5 m and side slope of 1 in 3. The swales will be constructed in accordance with CIRIA C698 Site Handbook for the Construction of SuDS which can be used in conjunction with CIRIA C753 The SuDS Manual. Where roadside drains are laid at slopes greater than 2%, check dams will be provided.

Mitigation measures to protect site hydrology and water quality are provided in section 10.6 and 10.7.1 of chapter 10 of the EIAR. These include measures to reduce or prevent surface water run-off, suspended solids, hydrocarbons, site wastewater, cement and nutrients escaping to receiving surface waters. The mitigation measures proposed will reduce potential direct and indirect impacts from the construction of access tracks. The risk of water quality impacts to receiving watercourses via siltation or nutrient release will be further reduced through siltation management as detailed in the CEMP (Appendix 3.1).

The 13 no. surface water drains within the site boundary to be crossed by access tracks during the construction phase will be via precast box culverts (refer to section 10.6.4 of chapter 10 of the EIAR). Silt Protection Controls (SPCs) are proposed at the location of the drain crossings. It is proposed that the SPCs will consist of a minimum of silt traps containing filter stone and filter material staked across the width of the swales and upstream of the outfall to any watercourse.

In the presence of mitigation measures, potential impacts to aquatic ecology resulting from access track construction are considered **slight negative, short-term and in the local context**.



Potential impacts to qualifying interest species and habitats of the downstream-connecting Blackwater River SAC (002170) are considered **not significant and short-term in in context of the European site**, in the presence of mitigation.

Mitigation measures for turbine base and met mast construction

The greatest threat to aquatic ecology from turbine base construction (based on site topography and the layout of surface water features) are impacts to water quality identified at turbines T3 and T4 which are located approx. 130m and 170m from the Ardglass River and Oakfront River, respectively (indirect connectivity via drainage ditches). Both the Ardglass and Oakfront Rivers share downstream hydrological connectivity with the Awbeg River and Blackwater River SAC (002170), with the shortest hydrological distances to the European site being 0.7km and 1.4km, respectively (via surface water drains and the rivers).

Please refer to section 10.6 of Chapter 10 of the EIAR for detailed mitigation measures for site drainage and silt attenuation to prevent impacts to the water quality of downstream watercourses during the construction phase. These include measures to prevent run-off erosion from vulnerable areas and consequent sediment release into nearby watercourses to which the proposed development site discharges.

The mitigation measures proposed will reduce potential direct and indirect impacts from the construction of the turbine foundations/hardstands. The risk of water quality impacts to receiving watercourses via siltation or nutrient release will be further reduced through siltation management as detailed in the CEMP.

In the presence of mitigation measures, potential impacts to aquatic ecology resulting from turbine base and met mast construction are considered **slight negative, short-term and in the local context**.

Potential impacts to qualifying interest species and habitats of the downstream-connecting Blackwater River SAC (002170) are considered **not significant and short-term in in context of the European site**, in the presence of mitigation.

Mitigation measures for site drainage

Permanent roadside drainage will be installed as part of the construction stage. This will include the use of interceptor drains, swales, check dams and stilling ponds. These measures will buffer site run-off during periods of high rainfall by retaining the water until the storm hydrograph has receded. The proposed locations of the stilling ponds are provided in the Surface Water Management Plan (SWMP) contained in Appendix 10.3 of the EIAR and in the Planning Drawings. Silt fencing will be provided at strategic locations (See section 10.7 in Chapter 10 Hydrology and water Quality of the EIAR) to further protect watercourses during the construction phase.

Site drainage, including silt traps and stilling ponds, will be put in place in parallel with construction, such that excavation for new infrastructure will have a functional drainage system in place. The stilling ponds will remain in place during the construction phase. The stilling ponds will drain diffusely overland, over existing vegetated areas, within the site boundary. The stilling ponds will be back-filled and the swales that were connected to them will be re-connected to the outfall once construction is completed. Silt Protection Controls (SPCs) are proposed at the location of all drain crossings. SPCs will consist of a minimum of silt traps containing filter stone and filter material staked across the width of the swales and upstream of the outfall to any watercourse.

It is noted that there is little direct connectivity between the development area and the riverine watercourses draining the site (i.e. heavily vegetated drainage channels connecting to the Ardglass River and Oakfront River), so the risk of silt-laden surface water run-off to receiving watercourses is greatly reduced, even in the absence of mitigation.



However, detailed mitigation measures to protect water quality (which include but are not limited to sediment run-off control and management of concrete and aquatic buffer zones) in respect of site drainage are outlined in Chapter 10 of the EIAR and the CEMP.

Please refer to section 10.6 of Chapter 10 of the EIAR for detailed mitigation measures for site drainage and silt attenuation to prevent impacts to the water quality of downstream watercourses during the construction phase.

Mitigation measures for GCR installation

In addition to the crossing on 6 no. drainage channels, there will be a requirement for 2 no. riverine watercourse crossings along the GCR in total. These are on the Rathnacally Stream (GCR-WCC1) and Oakfront River (WF-HF5).

The crossing of the Rathnacally Stream on the L1322 will be via horizontal directional drilling (HDD), located approx. 1.5km upstream of the Blackwater River SAC (002170). Mitigation measures relating to water quality preservation are outlined in detail in section 10.7 of chapter 10 of the EIAR. These measures will also serve to protect sensitive aquatic ecological receptors and Blackwater River SAC (002170) qualifying interest species and habitats. Although no-instream works are proposed, the drilling works will only be completed during a dry period between July and September (as required by Inland Fisheries Ireland for in-stream works) to avoid the salmonid spawning season and sensitive life stage period. A pre-construction otter survey to reconfirm the findings of the EIAR will be undertaken in the vicinity of the drilling locations to ensure that no breeding or resting areas are located within 150m of the drilling locations (no holts recorded in these locations to date during otter surveys). Should an otter breeding (holt) or resting area (couch) be detected, a derogation licence would need to be obtained from the NPWS to facilitate drilling works.

Excavation of the grid route trench will require excavation of soils/subsoils which has the potential to impact the water quality and aquatic habitat of receiving watercourses. Excavated spoil emanating from the cut trenches, where appropriate (i.e. when trenching within private tracks or the public road verge) will be used to back-fill the trenches. Any excess will be disposed of off-site, at an appropriate licenced facility. All excavated material emanating from trenches within the public road network will be disposed at an appropriate licenced facility. Mitigation measures to prevent the escapement of suspended solids to receiving watercourses (e.g. silt fences, interceptor drains, stilling ponds, drain blocking etc.) are outlined in section 10.7 of chapter 10 of the EIAR and the CEMP. On the Rathnacally Stream, silt fences will also be constructed in the vicinity of the excavated areas on the stream banks to prevent siltation of the adjacent watercourse. An Ecological Clerk of Works (ECoW) will monitor both turbidity and observe the riverbed during the drilling process to detect any leakage (frac-out) of drilling fluid. Should this leakage be observed, works will cease immediately. If drilling fluids are required, a biodegradable fluid such as CLEARBORE shall be used rather than Bentonite.

The GCR crossing of the Oakfront River (WF-HF5) will be via a single span, pre-cast concrete bridge. This will avoid the requirement for instream works. Nevertheless, installation will only be completed during a dry period between July and September (as required by Inland Fisheries Ireland for in-stream works) to avoid the salmonid spawning season and sensitive life stage period. Potential releases of sediment-laden surface run-off as a result of bank clearance works to facilitate bridge installation/access will be mitigated against through the water quality mitigation measures applicable throughout the site (see section 10.7 of chapter 10 of the EIAR and the CEMP).

Further mitigation measures in relation to the grid connection cable route (including the spread of invasive species) are outlined in the CEMP and will be fully implemented.



In the presence of mitigation measures, potential impacts to aquatic ecology resulting from GCR installation are considered **slight negative, short-term and in the local context**.

Potential impacts to qualifying interest species and habitats of the downstream-connecting Blackwater River SAC (002170) are considered **not significant and short-term in in context of the European site**, in the presence of mitigation.

Mitigation measures for turbine delivery route

The TDR will cross the Rathnacally Stream at a local road crossing on the L1322 (GCR-WCC1). This crossing is located approx. 1.5km upstream (by water) of the Blackwater River SAC (002170). There are no instream works required at the bridge structure to facilitate turbine delivery, although hedgerow trimming and wall lowering will be required to facilitate oversail. These minor, localised works could in the absence of mitigation cause impacts to the water quality of the receiving Rathnacally Stream and downstream Blackwater River SAC (002170).

Mitigation measures relating to water quality preservation are outlined in detail in section 10.7 of Chapter 10 of the EIAR and in the CEMP. These measures, which include but are not limited to silt fences, roadside drain blocking, refuelling protocols and spoil disposal, will also serve to protect sensitive aquatic ecological receptors and Blackwater River SAC (002137) qualifying interests such as Atlantic salmon, lamprey species, otter and white-clawed crayfish.

In terms of hydrology and water quality, the significance of the effect of the works associated with TDR onto the receiving waters has been assessed as “not significant” (section 10.7.3 of chapter 10 of the EIAR).

In the presence of mitigation measures, potential impacts to aquatic ecology resulting from turbine delivery are considered **not significant , short-term and in the local context**.

Potential impacts to qualifying interest species and habitats of the downstream-connecting Blackwater River SAC (002170) are considered **not significant and short-term in in context of the European site**, in the presence of mitigation.

Works within and adjacent to watercourses, as part of HDD and new bridge construction, will adhere the guidelines set out in the best practice documents as listed below:

- CIRIA (2001). Control of water pollution from construction sites - Guidance for consultants and contractors (C532). Construction Industry Research and Information Association, London.
- CIRIA (2006). Control of Pollution from Linear Construction Project; Technical Guidance (C648). Construction Industry Research and Information Association, London.
- CIRIA (2015a). Manual on scour at bridges and other hydraulic structures, second edition (C742). Construction Industry Research and Information Association, London.
- CIRIA (2015b). Environmental Good Practice on Site (4th edition) (C741). Construction Industry Research and Information Association, London.
- CIRIA (2019). Culvert, screen and outfall manual (C786). Construction Industry Research and Information Association, London.
- DHPLG (2019). Draft Revised Wind Energy Development Guidelines. Department of Housing, Planning and Local Government. December 2019
- Enterprise Ireland (unknown). Best Practice Guide (BPGCS005) Oil storage guidelines.



- IFI (2016). Guidelines on Protection of Fisheries during Construction Works in and adjacent to waters. Inland Fisheries Ireland, Dublin.
- IFI (2019) Windfarm scoping document (draft). Inland Fisheries Ireland, Dublin.
- IWEA (2012). Best Practice Guidelines for the Irish Wind Energy Industry. Guidance prepared by Fehily Timoney and Company for the Irish Wind Energy Association.
- Kilfeather, P.K. (2007). Maintenance and protection of the Inland Fisheries resource during road construction and improvement works. Requirements of the Southern Regional Fisheries Board. Southern Regional Fisheries Board, Clonmel, Co. Tipperary
- Murphy, D.F. (2004). Requirements for the Protection of Fisheries Habitat During Construction and Development Works at River Sites. Eastern Regional Fisheries Board, Dublin.
- NRA (2008). Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes. National Roads Authority.
- PPG1 - General Guide to Prevention of Pollution (UK Guidance Note);
- PPG5 – Works or Maintenance in or Near Watercourses (UK Guidance Note);
- SNH (2012). Assessing the cumulative impact of onshore wind energy developments. Scottish Natural Heritage, March 2012.
- SNH (2019b). Good Practice during Wind Farm Construction (4th edition). Scottish Natural Heritage.

3.2.9 Other Species

In the event that construction is required to proceed during the breeding season of common frog (approximately January – midsummer), a preconstruction amphibian survey will be completed and translocation under licence will be required where active breeding drains are within the development footprint. Protection of existing hydrological conditions where drains are adjacent to or within the zone of influence (i.e. could be impacted by drainage works elsewhere) is required. In the event that the hydrology of existing breeding areas within the zone of influence cannot be maintained, translocation to suitable receptor sites will be used.

Amphibian fencing will be erected to prevent re-entry to areas which have been evacuated and any areas which could be occupied by amphibians during the construction period.

3.2.10 Afforestation of Replant Lands

The following measures to protect water quality will be implemented during afforestation:

Exclusion zones for machinery

- Exclusion zones for machinery will ensure that machines do not traverse close to watercourses on site during forestry operations.
- With respect to exclusion zones, measures outlined in Section 3.5 of the Environmental Requirements for Afforestation (December 2016), will be adhered to.



Silt and sediment control

- Silt traps will be deployed to control movement of silt and sediment, as outlined in Section 4.3 of Environmental Requirements for Afforestation (December 2016). Silt traps will be constructed at end of mound drains at 50 m intervals.
- Silt traps will be maintained throughout all planting works, ensuring that they are clear of sediment build-up.

Drainage and cultivation

- All drains will protect aquatic zones (order 1 - Emlagh Stream 27) from any sediment and nutrients contained in water draining off the site as outlined in section 3.7.1 of Environmental Requirements for Afforestation (December 2016).
- Drains will be maintained throughout all planting works, ensuring that they are clear of sediment build-up and are not severely eroded.
- There will be no vegetation removal within 20 m of a drainage ditch.

Afforestation

- A setback area of 5m will be applied along the relevant watercourses present in the project area (there are three that run west-east into the Emlagh Stream 27), as specified in Section 4.4 of the Environmental Requirements for Afforestation (December 2016).

Setbacks

- A 5-metre-wide (minimum) setback will be applied along relevant watercourses (as defined in Circular 12/2017) located within or adjoining the site. This setback is to remain undisturbed during establishment and throughout the forest rotation. Apply and maintain as per details set out in Tables 5 and 6 of the Environmental Requirements for Afforestation (DAFM, 2016).
- A setback of 10 m from the aquatic zone, Emlagh 27 stream which runs along the eastern boundary of the site for 240 m will be implemented.
- There will be no mounding or machine work within 10m of Aquatic Zone except for essential fencing purposes.
- There will be no mounding or machine work within 5 m of Relevant Water Course-RWC (drains and minor watercourses linked to aquatic zones which have potential to carry significant amounts of sediment/nutrients).

Chemical use

- Chemical use will be kept to an absolute minimum, depending on site requirements; chemicals will only be applied in dry weather.
- Chemicals will not be applied within 20m of the aquatic zone or within watercourses setbacks or other sensitive areas.



In the event that afforestation proceeds during the breeding season of common frog (approximately January – midsummer), translocation under licence will be undertaken where active breeding drains are within the development footprint.

Protection of existing hydrological conditions where drains are adjacent to or within the zone of influence (i.e. could be impacted by drainage works elsewhere) are required. In the event that the hydrology of existing breeding areas within the zone of influence cannot be maintained, translocation to suitable receptor sites will be used.

Amphibian fencing will be erected to prevent re-entry to areas which have been evacuated and any areas which could be occupied by amphibians during afforestation.

3.3 Mitigation Measures during the Operation of the project

3.3.1 Designated Nature conservation sites

Implement mitigation measures outlined in section 3.3.6 below and Chapter 10 - Hydrology and Water Quality of the EIAR, in addition to the NIS to minimise and prevent the identified indirect impacts on water quality as outlined previously.

3.3.2 Habitats and Flora

Implement mitigation measures outlined in section 3.3.6 and Chapter 10 - Hydrology and Water Quality of the EIAR, in addition to the NIS, to ensure that there will be no contamination of water bodies due to siltation or contaminated run-off during the operational phase.

Invasive species will continue to be treated within the project area according to the invasive species management plan for as long as they persist within the site.

Either of the following options are required to be used in maintaining the wildflower meadow: actively managed grazing, or mechanical mowing.

Light annual grazing using sheep or cattle can be used to maintain the planted wildflower meadow. In spring or summer grazing of the site will be avoided to favour early or late flowering species respectively and allow the development of nectar and seeds for ground nesting birds and mammals. Active management of grazers and regular observation of conditions onsite will be required to determine the correct stocking level at the outset. It is noted that the use of sheep carries a higher risk of overgrazing if too many are present, increasing the need for close observation in the initial stages.

Mechanical mowing can also be used, either in combination with grazing, or alone. If mowing only is used, one cut and lift per year between October – February is required. This can be split into rotational mowing where half is cut late in the year and half is cut early the following year, however all areas should only be cut once per year.

Low intensity management in the less intensive farmland will be maintained throughout the lifetime of the wind farm. Low density grazing provides cost effective maintenance of grassland and increases the site's conservation value. A corridor of 5m strips of rough grassland will be maintained in selected areas of intensive farmland.



These rough grassland borders will be fenced off and light annual grazing or yearly topping will ensure that rough grassland vegetation is maintained. This will provide suitable habitat for mammals, and larval foodplants for butterfly species, as well as providing a riparian buffer for agricultural runoff towards the adjacent Ardglass 18 stream.

3.3.3 Badgers

Felling/vegetation clearance operations (maintenance of felling buffers) within 50m of badger setts are not allowed during the badger breeding season (December-June inclusive). Outside the breeding season, the following buffers apply: no heavy machinery (tracked vehicles) may be used within 30m of badger setts; no machinery (wheeled vehicles) may be used within 20m of badger setts; activities of any description are not permitted within 10m of sett entrances (10m vegetation buffer to be retained around setts).

Information on sett locations and implementation of buffer zones is contained in the confidential Appendix: Badger Report.

An artificial sett will be constructed within the site boundary to mitigate the potential loss and/or damage of one Main/Annex Sett in close proximity to access tracks and associated felling buffer. A buffer of existing vegetation will be retained around the artificial sett location. The artificial sett will comprise of at least eight chambers and five entrances. The chambers shall be comprised of approximately 750mm x 450mm sized rectangular nest chambers constructed of untreated wood (standard soft wood 4" x 2") and with a height of approximately 450mm. The chambers are connected by a 300mm diameter corrugated (ribbed) plastic pipe tunnel system.

3.3.4 Bats

Feathering of Blades

Turbines will operate in a manner which restricts the rotation of the blades as far as is practicably possible below the manufacturer's specified cut-in speed (SNH 2021). This is achieved by feathering the blades during low wind speeds; the angle of the blades is rotated to present the slimmest profile possible towards the wind, ensuring they do not rotate or 'idle' when not generating power.

Turbine blades spinning in low wind can kill bats, however bats cannot be killed by feathered blades which are not spinning (Horn *et al.*, 2008). The reduction in speed resulting from feathering compared with normal idling may reduce fatality rates by up to 50% (SNH 2021).

As such, the feathering of blades to prevent 'idling' during low wind speeds is proposed for all turbines.

Cut-in Speeds/Curtailment

Increasing the cut-in speed above that set by the manufacturer can reduce the potential for bat/turbine collisions. A study by Arnett *et al.*, (2011) showed a 50% decrease in bat fatality can be achieved by increasing the cut-in speed by 1.5 m/s.

Species with elevated risk of collision (Leisler's bat, soprano and common pipistrelle) in particular would benefit from increasing the cut-in speed of turbines, as dictated on a case-by case basis depending on the activity levels recorded at each turbine.



Although the proposed turbine locations are within areas of the Site that will have lower activity levels than the linear features and edge ecology recorded during surveys (open areas and plantation woodland), the locations within the site identified to represent areas post-construction (within plantation woodland) and open space have a moderate to high activity level. Therefore, increased cut-in speeds will be implemented from commencement of operation. Cut-in speeds will be increased during the bat activity season (April-October) and/or where weather conditions are optimal for bat activity (see below) from 30 minutes prior to sunset and to 30 minutes after sunrise at all turbines.

Cut-in speeds restrictions will be operated according to specific weather conditions:

1. When the air temperature is above approximately 10 to 11°C at nacelle height.
2. Generally, bat activity peaks at a wind speed range of 5.0 to 6.5m/s (at nacelle height).

Due to the considerable unnecessary down time resulting from the proposed “blanket curtailment” (above) and the advances in smart curtailment, a focused curtailment regime is proposed as described below from year four of operation. This will focus on times and dates, corresponding with periods when the highest level of bat activity occurs within the Site. This includes the use of the SCADA (Supervisory Control and Data Acquisitions) operating system (or equivalent) to only pause/feather the blades below a specified wind speed and above a specified temperature within specified time periods.

Post-constructions surveys will be undertaken for the first three years of operation to confirm if blanket curtailment restrictions can be amended in line with post-construction activity levels.

The post construction surveys will be used to update the current curtailment regime (blanket curtailment) designed around the values for the key weather parameters and other factors that are known to influence collision risk. This will include all of the following:

- Wind speed in m/s (measured at nacelle height);
- Time after sunset;
- Month of the year;
- Temperature (°C);
- Precipitation (mm/hr).

Post Construction surveys

Monitoring will take place for at least 3 years after construction, providing sufficient data to detect any significant change in bat activity relative to pre-construction levels. It will assess changes in bat activity patterns and the efficacy of mitigation to inform any changes to curtailment.

During years one to three of operation (under blanket curtailment restrictions) bat activity will be measured continuously between April and mid-October at each turbine location, in combination with carcass surveys. In addition, wind speed and temperature data will be continuously recorded at the nacelle height of each turbine.

Modern remotely operated wind turbines as proposed here allow cut-in speeds to be controlled centrally/automatically, facilitating an operation regime designed to minimise harmful impacts to bats.



The feathering of turbine blades combined with increased cut-in speeds have been shown to reduce bat fatalities from 30% to 90% (Adams et al., 2021, Arnett et al., 2008, 2011, 2013; Baerwald et al., 2009). The most recent of studies showed a 63% decrease in fatalities (Adams et al., 2021).

Monitoring Curtailment

If, following the initial 3 years of post-construction surveys, bat activity increases above the baseline and/or remains consistently high and carcass searches indicate fatalities are occurring (refer below), increased cut-in speeds will continue. This will subsequently be monitored in years 5, 7, 10, 15, 20, 25 and 30 with further review after each monitoring period.

Alternatively, if it is found that the results of bat activity surveys and fatality searches confirm that the level of bat activity at turbine locations is reduced (to low) then consent will be sought from Cork County Council (in consultation with NPWS) for the cessation in the requirement for these cut-in speeds / curtailment measures, or a reduction on the timing restrictions for these measures.

Where post construction acoustic surveys are undertaken, they will utilise full spectrum automatic detectors deployed, as a minimum, for one complete bat activity season.

Acoustic monitoring will be supplemented with thermal imaging cameras etc. to provide more detailed information on bat activity in the vicinity of turbines. Due to the level of Leisler's activity within the study area, nacelle-level surveys³ are also proposed for the post construction surveys. These will be used to identify the level of Leisler's bat activity above the tree canopy and within the height of the rotor-swept area.

An assessment of static data gathered during operational surveillance will be completed using the online analysis tool Ecobat as recommended by SNH (2021) as a minimum, or other equivalent guidance as dictated by up-to date standards and practices.

Bat Boxes

A total of eight bat boxes will be installed in mature trees along these field boundaries.

Lighting

It appears that the lighting on top of wind turbines may affect the likelihood of bats colliding with turbines. Research on this topic, which is reviewed in Powelsland (2009), indicates that intermittent lighting is less likely to cause species to collide with turbines.

As such, flashing red aviation obstruction lights will be provided on perimeter turbines, subject to approval by the IAA. These will not negatively impact bats (Bennett and Hale 2014).

Buffer zones

The vegetation-free buffer zones around the identified turbines will be managed and maintained during the operational life of the development. These will be kept clear by mechanical means only and maintained on an annual basis in the same condition as during first clearance.

³ Used to supplement ground-based equipment designed to replicate the survey effort undertaken at the pre-application stage (see Roemer et al., 2017). They are particularly useful at woodland key-holed sites.



Due to mitigation by design, turbines are proposed to be sited at a suitable separation distance from trees and trees or vegetation are to be removed to ensure a woodland-free buffer zone.

The immediate surroundings of individual turbines will be managed and maintained so that they do not attract insects (i.e. the concentration of insects in the wind turbine vicinity should be reduced as much as possible, but not such that insect abundancies affected elsewhere on the site). This will be achieved through physical management of habitats without the use of toxic substances.

The radius of each buffer zone as determined by the height of surrounding vegetation is listed below in Table 3-3 below:

Table 3-3: Vegetation Free Buffer Zones for Bats (based on proposed blade length of 75 m)

Turbine number	Felling Buffer Radius (m)
1	86
2	86
3	92
4	86
5	82
6	86

Monitoring of mitigation measures

The success of the implemented mitigation measures for bats on the project shall be monitored for a period of no less than three years post construction and appropriate measures taken to enhance these if and where required.

Bat fatality monitoring

Whilst no significant residual impacts on bats are predicted, the proposed development could provide an opportunity to gain baseline data on bat/turbine interaction and it is recommended that the scheme be monitored for bat fatalities for the first three years of operation (post construction surveys) and subsequently in years 5, 7, 10, 15, 20, 25 and 30 as part of the additional curtailment monitoring schedule. A comprehensive onsite avian fatality monitoring programme is to be undertaken following published best practice. This fatality monitoring programme will be extended and duplicated for bat fauna.

The primary components of the bird mortality programme are outlined below, and an assessment of bat mortality will essentially follow the same methodology:

- Carcass removal trials to establish levels of predator removal of possible fatalities. This will be done following best recommended practice and with due cognisance of published effects such as predator swamping, whereby excessive placement of carcasses increases predator presence and consequently skews results. No turbines which are used for carcass removal trials will be used for subsequent fatality monitoring.
- Turbine searches for fatalities will be undertaken following best practice in terms of search area (focusing on the hard standing) (SNH, 2019; 2021) while also encompassing the wider search radius defined by bird fatality monitoring requirements, and at intervals selected to effectively sample fatality rates as determined by carcass removal trials in (a) above.



- c) A standardised approach with a possible control group and/or variation in search techniques such as straight line transects/ randomly selected spiral transects/ dog searches will be undertaken. This will provide a means of robustly estimating the post construction collision fatality impact (if any).
- d) Recorded fatalities will be calibrated against known predator removal rates to provide an estimate of overall fatality rates.

Table 3-4: Monitoring schedule proposed for bat mitigation measures

Mitigation measure	Monitoring required	Description	Duration
Newly planted hedgerows	Ensure viable growth of planting	Planted material shall be checked periodically over the growing season to remove dead material. Any dead material shall be replaced within the same season with viable stock according to age/height restrictions already specified in mitigation.	From time of planting to 1 year post construction
Bat boxes and tubes	Monitor bat use	Bat boxes and tubes to be placed at locations removed from wind farm as determined by project ecologist/ECOW at least 1 season before construction start. These shall be examined by a licensed bat specialist according to NPWS recommendations.	From mounting to 3 years post construction.
		Records should be submitted to Bat Conservation Ireland for inclusion in its bat distribution database. If the boxes / tubes are not used within the first three years of deployment re-site if necessary.	
Mitigation measure	Monitoring required	Description	Duration
		Annual cleaning required if well used by bats or if used by birds. Replacement if damaged/lost.	
Mortality study	Fatality monitoring	Corpse searches beneath turbines to assess the impact of operation on bats.	From initial operation conducted during years 1, 2, 3, 5, 7, 10, 15, 20, 25 and 30 post construction.



Table 3-5: Summary of Operational-phase Mitigation Measures for Bats

Moderate-High Level Bat Mitigation Applies to all turbines	Category
A buffer zone free of woodland/trees within 50m of turbine blade tips will be created.	Habitat alteration
Operate the wind turbines in a manner that reduces the movement of the blades below the cut-in speed (e.g. by feathering the blades).	Feathering
Implement blanket curtailment during year 1-3 while post construction surveys are undertaken. The curtailment will involve operating the selected wind turbine from 30 minutes prior sunset to 30 minutes after sunrise at a cut-in speed of 5.5 m/s during specified weather conditions and during the active bat season (April to October).	Blanket curtailment
Implement a monitoring programme during years 1 – 3 post construction to detect any large-scale changes in bat activity including carcass surveys. Bat activity will be measured continuously between April and mid-October at each turbine location. In addition, wind speed and temperature data will be continuously recorded at the nacelle height of each turbine.	Post construction monitoring
If, following the initial 3 years of post-construction surveys, bat activity increases above the baseline and/or remains consistently high and carcass searches indicate fatalities are occurring, increased cut-in speeds will continue. This will subsequently be monitored in years 5, 7, 10, 15, 20, 25 and 30 with further review after each monitoring period. Alternatively, if it is found that the results of bat activity surveys and fatality searches confirm that the level of bat activity at turbine locations is reduced (to low) then a derogation will be sought from Cork County Council (in consultation with NPWS) for the cessation in the requirement for these cut-in speeds / curtailment measures, or a reduction on the timing restrictions for these measures through SCADA (or equivalent) operating systems.	Smart curtailment
Undertake a carcass search during years 1-3, and subsequently in years 5, 7, 10, 15, 20, 25 and 30 as part of the additional curtailment monitoring schedule.	Carcass monitoring
Maintain immediate area around the wind turbines in a manner that does not attract insects.	Maintain vegetation free buffer

3.3.5 Avifauna

A post-construction monitoring programme is to be implemented at the subject site in order to confirm the efficacy of the mitigation measures; the results of this will be submitted annually to the competent authority and NPWS. Published guidance on assessing the impacts of wind farms on birds from English Nature and the Royal Society for the protection of birds recommends the implementation of an agreed post development monitoring programme as a best practice mitigation measure (Drewitt and Langston, 2006).

In addition, published recommendations on swans and wind farms (Rees, 2012) suggests that systematic post construction monitoring; adapted to quantify collision, barrier and displacement, be conducted over a period of sufficient duration to allow for annual variation or in combination effects. The following individual components are proposed.



1) Fatality Monitoring (to be conducted during years 1, 2, 3, 5, 10 and 15 post construction)- A comprehensive fatality monitoring programme is to be undertaken following published best practice; the primary components are as follows:

- a. Initial carcass removal trials to establish levels of predator removal of possible fatalities. This will be done following best recommended practice and with due cognisance to published effects such as predator swamping, whereby excessive placement of carcasses increases predator presence and consequently skews results (Shawn *et al.*, 2010). No turbines which are used for carcass removal trials are to be used for subsequent fatality monitoring. Carcass removal trials shall be continued for the duration of fatality searches.
- b. Turbine searches for fatalities are to be undertaken following best practice (Fijn *et al.*, 2012 and Grunkorn, 2011) in terms of search area (minimum radius hub height = 150m around turbine bases) and at intervals selected to effectively sample fatality rates based on carcass removal rates (e.g. 1 per month).

To be conducted during years 1, 2, 3, 5, 10 and 15 post construction to allow for annual variation and cumulative effects. Dependant on results further monitoring to be agreed with NPWS.

- c. A standardised approach with a possible control group and/or variation in search techniques such as straight line transects/ randomly selected spiral transects/ dog searches will be undertaken. This will provide a means of robustly estimating the post construction collision fatality impact (if any).
- d. Recorded fatalities to be calibrated against known predator removal rates to provide an estimate of overall fatality rates.

Reports will be submitted to the competent authority and NPWS following each round of surveys.

2) Flight Activity Survey (to be conducted during years 1, 2, 3, 5, 10 and 15 post construction) - A flight activity survey is to be undertaken during the summer and winter months to include both Vantage Point and hinterland surveys as Per SNH (2017) guidance:

- a. Record any barrier effect i.e. the degree of avoidance exhibited by species approaching or within the wind farm (Drewitt and Langston, 2006). Target species to be all raptors and owls, all wild goose and duck species, all swan species and all wader species.
- b. Record changes in flight heights of key receptors post construction.

Reports will be submitted to the competent authority and NPWS following each round of surveys. This survey will be conducted during years 1, 2, 3, 5, 10 and 15 post construction to allow for annual variation and cumulative effects. Dependant on results further monitoring requirements will be agreed with NPWS.

3) Monthly Wildfowl Census (to be conducted during years 1, 2, 3, 5, 10 and 15 post construction). A monthly wildfowl census, following the methods utilised for the baseline survey, is to be repeated on a monthly basis during the winter period.



This aims to:

- a. Assess displacement levels (if any) of wildfowl such as swans post construction
- b. Assess overall habitat usage changes within the vicinity of the Annagh Wind Farm Development post construction.

This survey is to be conducted during years 1, 2, 3, 5, 10 and 15 post construction to allow for annual variation and cumulative effects. Dependant on results further monitoring requirements will be agreed with NPWS. Reports will be submitted to the competent authority and NPWS following each round of surveys.

- 4) Breeding Bird Survey (to be conducted during years 1, 2, 3, 5, 10 and 15 post construction). A breeding bird survey (moorland breeding bird and Common Bird Census), following methods used in the baseline survey to be repeated yearly between early April to early July. This aims to:

- a. Assess any displacement effects such as those recorded on breeding birds. Overall density of breeding birds to be annually recorded.

- 5) Breeding Wader Survey (to be conducted during years 1, 2, 3, 5, 10 and 15 post construction). A breeding bird survey, following methods used in the baseline survey to be repeated yearly April-May-June.

Both of the above surveys are to be conducted during years 1, 2, 3, 5, 10 and 15 post construction to allow for annual variation and cumulative effects. Dependant on results further monitoring requirements will be agreed with NPWS.

The FI report has included the additional mitigation measures to mitigate the possibility of Whooper Swan strikes occurring at night during their migration season. These measures were not contained in the original EIAR. These additional mitigation measures are as follows:

1. **From the first year of operation of the turbines curtailment will be applied during the Autumn (15th of September to the 15th of November) and Spring (1st March – 14th April) migration periods. Curtailment is required during the nocturnal period (dawn to dusk).**
2. **Annual monitoring shall be carried out for the first three years of the operational phase of the wind farm to monitor the efficacy of the measure and to refine the extent of these curtailment periods. An annual report detailing the results of this monitoring shall be submitted and agreed with Cork County Council and NPWS. This monitoring shall account for annual variation in migration patterns and ensure that curtailment is targeted to key period of movement for the species.**
3. **The use new technologies to facilitate smart curtailment (e.g. radar) shall be agreed in advance with Cork County Council and NPWS.**

Lighting

Flashing lights are believed to be less attractive to birds than steady lights (NatureScot, 2020). Therefore, the use of flashing red lights will reduce the likelihood of birds being attracted to turbine locations.

It is noted that red light is believed to be more attractive to birds than white light (NatureScot, 2020), however red light is known not to increase the attractiveness of turbine locations for bats (Bennett and Hale, 2014) and due to the level of bat activity onsite this ecological receptor takes precedence and red flashing lights will be used.



Lighting will be fitted with baffles to ensure that the light is directed skywards and will not be discernible from the ground.

Barn Owl Nest Box

A barn owl nest box will be installed upstairs in the derelict farmhouse to the south of the wind farm, and access via an existing window will be guaranteed, to provide nesting habitat in continuity as the building deteriorates. Another nest box will be installed in the stone barn to the west of the farmhouse

3.3.6 Aquatic Ecology

The vegetation-free buffer zones around all turbines will be managed and maintained during the operational life of the development. These will be kept clear by mechanical means only; no chemical methods will be used.

The primary impact to aquatic ecology resulting from the operational phase of the proposed wind farm is an increase in surface water run-off from hard-standing areas, access tracks etc. Mitigation for the maintenance regime is outlined in section 10.7.2 of Chapter 10 of the EIAR – Hydrology and Water Quality.

The potential requirement for Eel brushes was considered, however the drainage channels on site are intermittent/non-perennial in terms of flow and of poor fisheries value, including for eel. Brushes are typically only required to facilitate passage on steeper-gradient barriers located on more permanent, flowing surface water features with higher aquatic value. As these conditions are absent from the site, eel brushes on the lower-gradient drainage channel culverts onsite are not required.

The maintenance of the development will incorporate effective maintenance of the drainage system, including visual inspections in accordance with maintenance schedule in CIRIA C753. Therefore, it is not envisaged that maintenance will involve or accrue significant impacts on the hydrological regime of the area.

Quarterly inspections of the erosion and sediment control measures on site (i.e. drains, swales, outfalls to field drains) will be undertaken for the first year following construction and annually thereafter to ensure operational efficiency.

During the operational phase, oils will be required for cooling the transformers giving rise to the potential for oil spills within the site. To mitigate this risk, transformers will be bunded to over 110% of the volume of oil within them.

3.3.7 Other Species

Insect Shelter Habitats

Mining Bee Banks

Mining bee banks will be created by scraping vegetation away from an existing bank if available, or by constructing a bank from excess spoil generated onsite and will be located in the northern part of the site near the wildflower meadow and rough grassland corridor. Bumblebee nesting habitat and butterfly larval food plants will be provided in the rough grassland strips through annual cutting between November and February. A proportion of the timber being removed (substantial pieces of timber-tree trunk/branches) will be salvaged by cutting into logs to create log stacks/piles, to be used by insects as the timber decays.



Refugia piles and hibernacula will be created, which will also provide shelter for other wildlife such as reptiles, amphibians and small mammals. Refugia piles are produced by piling natural materials such as logs, sticks and leaves; that can be supported by additional materials such as rubble and bricks to form a structure with many cracks and crevices for sheltering.

Log Piles

A proportion of the timber being removed (substantial pieces of timber-tree trunk/branches) will be salvaged by cutting into logs to create log stacks/piles in the areas specified in Figure 3-1. These piles will be used by insects as the timber decays. Logs of different sizes can be stacked on top of each-other or positioned vertically in a pile. It is important to ensure that the logs remain damp and do not dry out by part-burying (some) logs and placing in a partly shaded location within the site.

Refugia/Hibernacula

Refugia piles and hibernacula will be created at the locations shown in Figure 3-1. These provide sheltering locations for a wide range of wildlife, including reptiles, amphibians, small mammals and invertebrates. Refugia piles are produced by piling natural materials such as logs, sticks and leaves; that can be supported by additional materials such as rubble and bricks to form a structure with many cracks and crevices for sheltering. Hibernacula are produced in a similar way, but often require setting into the ground in a shallow pit and topping with soil to enclose the structure and creating a more stable microclimate suitable for hibernating species. These structures will be installed near hedgerows and in areas of woodland within the site, where they are less likely to be disturbed.

3.3.8 Forestry Maintenance Operations

The mitigation measures applied during afforestation will also be employed during maintenance operations.

Terrestrial Mammals

The combined breeding periods for Badger, Irish Stoat, Pine Marten and Pygmy Shrew cover the period December – October. As such if thinning operations are undertaken outside November a pre-felling mammal survey will be undertaken.

There is the potential for Badger setts to become established prior to thinning. If a sett is discovered, NPWS shall be contacted, and a derogation/disturbance licence shall be sought. An activity survey shall be carried out to assess the potential for the sett to be used by Badgers and appropriate measures such as buffer zones, exclusion periods and hard blocking will be undertaken. No hard blocking of active setts will be carried out during the breeding season (December- June inclusive).

If a Pine Marten natal den is located, a 100m exclusion zone within which no construction activity is permitted will be established between March – September inclusive.

If an Irish Stoat breeding site is detected, appropriate protection measures will be implemented during April-August inclusive.

If Pygmy shrew are detected, their breeding/resting places will be protected from April-October.



Avifauna

At thinning stage, tree felling will be undertaken outside of the bird breeding season (March 1st to August 31st inclusive). This will help protect nesting birds. If felling is essential during this period, wooded habitats will be checked by an ecologist prior to clearance. If areas are clear of nesting birds, clearance must proceed within 3 days of checking. If nesting birds are present a derogation licence will be requested from NPWS.

Other Fauna

In the event that thinning proceeds during the breeding season of common frog (approximately January – midsummer), translocation under licence will be undertaken where active breeding drains are within the development footprint. Protection of existing hydrological conditions where drains are adjacent to or within the zone of influence (i.e. could be impacted by works elsewhere) are required. In the event that the hydrology of existing breeding areas within the zone of influence cannot be maintained, translocation to suitable receptor sites can be used.

Amphibian fencing will be erected to prevent re-entry to areas which have been evacuated and any areas which could be occupied by amphibians during thinning activities.

Aquatic Fauna

The water quality mitigation measures listed above will protect aquatic fauna.

3.4 Mitigation Measures during the Decommissioning of the project

3.4.1 Wind Farm and Grid Connection

The same mitigation measures for the wind farm and GCR will apply for the decommissioning phase as for the construction phase.

In relation to aquatic ecology, the same mitigation measures will apply for the decommissioning phase as for the construction phase. In the event of decommissioning of the Annagh wind farm, the access tracks may be used in the decommissioning process. Mitigation measures applied during decommissioning activities will be similar to those applied during construction but will be of reduced magnitude.

It is proposed that turbine foundations and hardstand areas should be left in place and covered with local soil/topsoil to revegetate at the decommissioning stage. It is considered that leaving the turbine foundations, access tracks and hardstand areas in-situ will cause less environmental damage than removing them. The grid connection cable, ducting and substation will be left in situ as part of the national grid, therefore no potential impacts during decommissioning stage are likely to occur. Hence no mitigation measures are required for these elements.

In the presence of mitigation, potential decommissioning phase impacts on aquatic ecology are considered **slight negative, short-term and in the local context**, in the absence of mitigation.

Potential impacts to aquatic qualifying interest species and habitats of the Blackwater River SAC (002170) are considered **not significant negative, short-term and in context of the European site**, in the presence of mitigation.



3.4.2 Forestry Felling at Replant Lands

The same mitigation as applicable for afforestation and maintenance operations will be implemented at harvesting.

3.4.3 Vulnerability to Major Accidents or Disasters

Should a major accident or natural disaster occur, the potential sources of pollution onsite during the construction and operational phases of the Annagh Wind Farm are limited. The primary sources with the potential to cause significant environmental pollution and associated negative impacts on human health and the environment include the bulk storage of hydrocarbons, chemicals and wastes. In the case of the proposed Annagh Wind Farm development site, the storage of chemicals of this kind are strictly limited. For biodiversity, the main possible impacts are considered to be the release of sediment and pollutants into watercourses, which could negatively impact upon aquatic habitats and species.

Potential vulnerabilities relevant to the proposed project are limited to:

- Flooding;
- Fire;
- Major incidents involving dangerous substances;
- Catastrophic events; and
- Landslides.

The risk of flooding is addressed in Chapter 10: Hydrology and Water Quality, which concludes that the wind farm site will have a negligible impact on flood risk in the surrounding area, as a result of the proposed development. Furthermore, there is no expected increase to flood risk along the grid route or TDR.

In the event of extreme weather conditions, the proposed surface water drainage will manage storm water avoiding significant negative impact on the project's infrastructure. Therefore, it is unlikely that the proposed development will result in increased flood risk, and it is unlikely that flood risk would result in effects on human safety (including traffic), water quality, biodiversity, soil stability, material assets and archaeological or architectural heritage, as the increased flood risk is considered negligible.

Mitigation measures are set out in Chapter 10: Hydrology and Water Quality to avoid potential negative impacts during the construction stage with respect to flood risk.

The potential for fire at the proposed Annagh Wind Farm is mitigated against by design. Furthermore, the wind farm will be remotely monitored, and potential accidents will be quickly identified and reported.

In line with IWEA Health and Safety Guidelines for the Onshore Wind Industry (2011), Emergency Response Plans will include emergency response procedures for initial actions in the event of a fire. Records will be kept for testing of fire alarms and drills and maintenance/inspection of fixed and portable firefighting equipment. Information will be provided to employees on fire safety and fire prevention, including risks of and control measures to prevent fire outbreak, evacuation procedures and those responsible for their implementation, and the use of firefighting equipment, in line with HSA guidance.

During the construction phase of the proposed development, an emergency response plan will be in place as set out in Section 6 of the CEMP, included in Appendix 3.1 of Volume 3 of the EIAR.



Given the nature of the proposed development, coupled with the lack of proximity to established Seveso sites, there is a negligible potential risk of negative impact to the proposed development and its receiving environment, as set out throughout the EIAR, arising from the occurrence of major incidents involving dangerous substances.

Potential catastrophic events associated with operational wind turbines include:

- Wind turbine toppling (due to foundation or tower failure);
- Wind turbine rotational failure in extreme wind conditions (due to control system or rotor break failure); and
- Fire.

The primary mitigation against a catastrophic event that may endanger the health and safety of the public has been implemented at design stage through adequate siting of wind turbines which provide sufficient set back distances from occupied buildings and other infrastructure to avoid the risk of negative impact in the event of wind turbine collapse.

The proposed tip height for wind turbines at the Annagh Wind Farm is 175m. No wind turbine is located within 500m of a residential dwelling. The most proximate occupied dwelling (involved landowner) is 690m from a proposed turbine location. No turbines have been located within 1.5 x tip height of the proposed on-site substation. A minimum setback distance of 3.5 x rotor diameter has been imposed between wind turbines and existing HV overhead lines in accordance with EirGrid general functional specifications.

Turbines have been sited with consideration for existing ground conditions to minimise the risk of turbine foundation failure, toppling and landslide. Intrusive site investigations have been carried out to confirm ground conditions at turbine locations as well as slope stability analysis throughout the wind farm site. Other design mitigation measures employed for the siting of wind turbines include the following:

- Areas mapped by GSI as having a high susceptibility to landslides have been avoided;
- Turbine locations have been assessed by site investigation and visually by geotechnical engineers prior to confirmation of final siting;
- Care has been taken in design of road and hard standing alignments, cutting and filling and drainage;
- Peat probing has been carried out at turbine locations. No peat was identified within the wind farm site.

See Chapter 9 of the EIAR: Land, Soil and Geology for more information on ground conditions.

As detailed in Chapter 9: Land, Soils and Geology, a slope stability assessment was carried out at the Annagh Wind Farm site to investigate the lands for potential slope failure. Susceptibility to slope failure is considered 'low' on the site. Site investigation was conducted which revealed no peat on the site. As such, potential peat stability issues were ruled out at the proposed infrastructure locations.

Mitigation by design has been incorporated to the project to avoid potential effects from landslides. Mitigation measures for potential landslide/slope failure is set out in Chapter 9 of the EIAR: Land, Soils and Geology. Mitigation measures relating to flood risk which could have a bearing on potential landslides are detailed in Chapter 10: Hydrology and Water Quality.

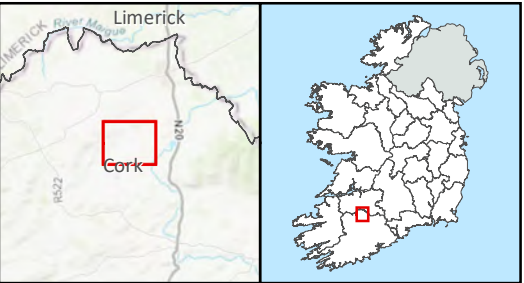
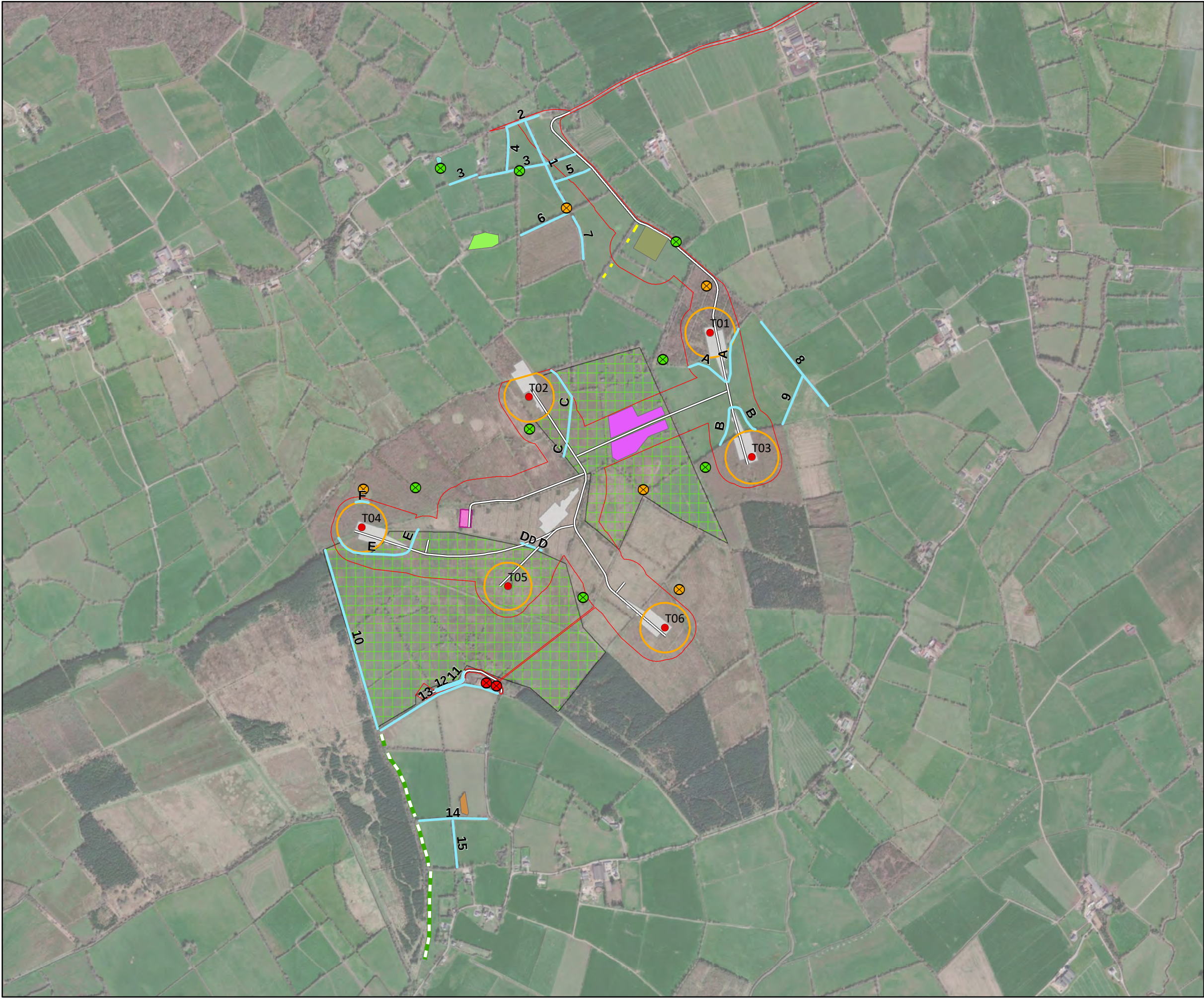


Wind turbines are fitted with sophisticated remote monitoring and control systems to manage rotational speed. Turbines also have the capability to shut down in storm conditions through adjustment of blade pitch. Turbines are also fitted with emergency power supply (EPS) units to provide backup power in the event of a loss of mains power supply that could impact the control system.

Wind turbines shall be fitted with fire suppression systems and will have emergency escape procedures in place for operational staff in the event of fire in a wind turbine. An emergency response plan is contained in the CEMP included in Appendix 3.1 of Volume 3 of the EIAR.

During the construction phase of the proposed development, an emergency response plan will be in place as set out in Section 6 of the CEMP in the unlikely event of a landslide/slope failure.

In relation to potential vulnerability of the project to major accidents and natural disasters it is concluded that the potential susceptibility to natural disaster of the proposed Annagh Wind Farm is negligible. Therefore the potential for any related effects on biodiversity and the environment arising from fire or pollution are also negligible.



Legend

Site Boundary

Turbine Layout

Internal Access Track

Turbine Hardstanding Area

Substation

Low Intensity Farmland

Landscape Management

Name

Bat Buffer Maintenance

Wet Grassland Receptor Site

Wildflower Meadow

Wildlife Pond

Woodland retention

Woodland/scrub retention

Barn Owl Nest Box

Log Pile

Refugia Pile

Landscape Management Lines

Bee Bank

Rough Grassland Strip

TITLE:		Habitat Management Measures	
PROJECT:		Annagh Wind Farm, Co. Cork	
FIGURE NO:		4	
CLIENT:		EMPower	
SCALE:	1:13000	REVISION:	0
DATE:	26/10/2022	PAGE SIZE:	A3





4 LAND, SOILS AND GEOLOGY

4.1 Mitigation by Design and Best Practice

With regard to the proposed development, detailed design and best practice will be implemented as follows:

- The proposed development has been designed in accordance with best practice and the relevant standards.
- The works have been designed and checked by geotechnical and civil engineers, suitably qualified and experienced in excavation and earthworks design and construction methodologies.
- Any excavation and construction related works will be subject to a design risk assessment at detailed design stage to evaluate risk levels for the construction, operation and maintenance of the works. Identified impacts will be minimised by the application of principles of avoidance, prevention and protection. Information on residual impacts will be recorded and relayed to appropriate parties
- A detailed method statement for each element of the works will be prepared by the Contractor prior to any element of the work being carried out.
- Given that the works comprises a significant proportion of excavation and earthworks, suitably qualified and experienced geotechnical personnel will be required on site to supervise the works.
- The Contract will require programming of the works such that earthworks are not scheduled during severe weather conditions. Where such weather is forecast, suitable measures will be taken to secure the works. The Project Manager is the person responsible for determining when works are to be stopped due to weather.

4.2 Construction Phase

The following sections outline appropriate mitigation measures to avoid or reduce the potential impact of the proposed development.

The primary mitigation measure employed has been the design of the wind farm in terms of locating the turbines, access roads, material storage areas and other site infrastructure within an area of commercial forestry where the soils are extensively worked and drained. Extensive work has already been undertaken at the preliminary design stage to apply risk avoidance by design which included:

- Excavation of trial pits to establish overburden and bedrock characteristics.
- Shear vane testing to establish characteristic strengths where soft ground deposits were identified.
- Relocation and micro-siting of turbines, hardstandings and access roads based on the site assessments and geotechnical assessments in order to reduce ground risk associated with the proposed development.

4.2.1 Construction Environmental Management Plan

A Construction Environmental Management Plan (CEMP) has been prepared for the proposed development and is included in Volume 3, Appendix 3.1 of the EIAR. The CEMP defines the work practices, environmental management procedures and management responsibilities relating to the construction phase of the proposed development.



The CEMP describes how the contractor for the main construction works will implement a site Environmental Management System (EMS) to meet the specified contractual, regulatory and statutory requirements including the requirements identified as part of the environmental impact assessment process.

The CEMP will be updated prior to construction to take account of any amendments arising during the consenting process and relevant conditions attached to the planning permission and will be implemented for the duration of the construction phase of the project. The CEMP will be a live document and will be reviewed and updated as required.

Reference to relevant sections of the CEMP with respect to the mitigation of potential impacts to Land, Soils and Geology from the proposed development are outlined below.

4.2.2 Earthworks

The development will be constructed in a phased manner to reduce the potential impacts of the development on the Land, Soils and Geology at the site. Phased construction reduces the amount of open, exposed excavations at any one time. Given that the works comprises a significant proportion of excavation and earthworks, suitably qualified and experienced geotechnical personnel will be required on site to supervise the works.

Details of the proposed methodology and mitigation measures is summarised below and are also outlined in Section 4.3.5 of the CEMP in Appendix 3.1 of Volume 3 of the EIAR.

One of the primary mitigation measures employed at the preliminary design stage is the minimisation of volumes of excavated overburden deposits to be exported off site. Excavated overburden will be retained on-site and reused as far as possible.

This will include:

- Use of suitable site won material (glacial till/bedrock) as general fill in the construction of access tracks, hardstands and in reinstatement around turbine foundations;
- Surplus overburden will be re-used on site in the form of landscaping.

Surplus overburden deposits excavated during the course of the works will be temporarily stored in a level area adjacent to the construction phase excavations prior to reuse.

Some temporary stockpiles (not exceeding 2m in height) of material will be necessary adjacent to the excavation areas prior to reinstatement, however no long-term stockpiles of material will remain after construction and no surplus/waste soil or rock will be removed from the proposed development site. Temporary stockpiles will be sealed and shaped to prevent water ingress, and silt fences will be installed around these areas to filter any runoff.

To mitigate against the compaction of soil at the site, prior to the commencement of any earthworks, the work corridor will be pegged, and machinery will stay within this corridor so that peatland/soils outside the work area are not damaged. Excavations will then be carried out from access tracks, where possible, as they are constructed in order to reduce the compaction of soft ground.



To mitigate against erosion of the exposed soil or rock, all excavations will be constructed and backfilled as quickly as possible. Excavations will stop during or prior to heavy rainfall events. To mitigate against possible contamination of the exposed soils and bedrock, refuelling of machinery and plant will only occur at designated refuelling areas.

Soil excavated from trenches along the proposed grid connection route will be taken to a licenced facility for disposal or recycling where required. If feasible, the upper layers of tarmac and asphalt will be excavated separately to the lower engineered fill layers. The lower engineered fill layers will be reused, subject to suitability testing. The tarmac/asphalt layers will be taken to a licenced facility for disposal or recycling.

All temporary cuts/excavations will be carried out such that they are stable or adequately supported. Gravel fill will be used to provide additional support to temporary cuts/excavations where appropriate. Unstable temporary cuts/excavations will not be left unsupported. Where appropriate and necessary, temporary cuts and excavations will be protected against the ingress of water or erosion.

Interceptor drains will be installed prior to any construction works commencing. Temporary settlement ponds and silt management measures will be installed to mitigate against sediment run-off as required. Further assessment of potential impacts to surface water discharges during the construction phase are discussed in Chapter 10 of the EIAR.

4.2.3 Control of Sediment Laden Runoff

The potential impact from silt laden surface water runoff from increased erosion of exposed overburden deposits will be assessed at site-specific locations particularly at new and existing drainage locations and where earthworks and tree felling are proposed.

Details of the proposed Surface Water Management System and mitigation measures is summarised below and are also outlined in Section 4.3.5 of the CEMP in Appendix 3.1 of Volume 3 of the EIAR.

Best practices will be employed in the prevention of silt laden run-off from entering watercourses as discussed below.

To minimise the impact to surface water quality, existing drainage will be maintained outside the immediate site area, and where appropriate additional site drainage and settlement ponds will be installed as required prior to construction activities. Silt fencing will be installed in new and existing drainage and monitoring of water quality undertaken during the construction phase.

Final drainage will be constructed following the completion of these activities with silt fencing maintained until such time as a vegetation cover has become established. Chapter 10 of the EIAR discusses surface water issues in more detail.

4.2.4 Measures for Spills

Details of oil spill protection measures adjacent to sensitive receptors and emergency spill response procedures are outlined in Section 4.3.5 of the CEMP which is contained in Appendix 3.1 of Volume 3 of the EIAR.

Storage tanks, used to store fuel for the various items of machinery, will be self-contained and double-walled. Refuelling of construction vehicles will be carried out from these tanks or from delivery vehicles at designated refuelling areas.



Specific mitigation measures relating to the management of hydrocarbons are as follows:

- Fuels, lubricants and hydraulic fluids for equipment used on the construction site will be carefully handled to avoid spillage.
- Any spillage of fuels, lubricants or hydraulic oils will be immediately contained, and the contaminated soil removed from the site and properly disposed of;
- Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling; and
- Appropriate spill control equipment, such as oil soakage pads, will be kept within the construction area and in each item of plant to deal with any accidental spillage.

4.2.5 Slope Stability

With regard to slope stability issues, detailed design and construction phase best practice will be implemented as follows:

- The works will be designed and supervised by a suitably qualified and experienced geotechnical engineer or engineering geologist, and hydrologist or drainage engineer.
- Drainage infrastructure will be put in place in advance of turbine excavations. Drains will divert surface water and groundwater away from excavations into the proposed surface drainage network. Uncontrolled, direct and concentrated discharges of water onto the ground surface will be avoided.
- Loading or stockpiling on the surface of soft ground will be avoided. Loading or stockpiling on other deposits will not be undertaken without first establishing the adequacy of the ground to support loads by an appropriately qualified geotechnical engineer experienced in construction within upland conditions.
- A detailed assessment of the stability of conditions at proposed infrastructure locations will be undertaken by a suitably qualified and experienced geotechnical engineer prior to the commencement of all excavations to ensure these activities do not result in or contribute to slope failure.
- Excavations which could have the potential to undermine the up-slope component of an existing slope will be sufficiently supported to resist lateral slippage and careful attention will be given to the existing drainage.
- Where possible, earthworks will not be commenced when heavy or sustained rainfall is forecast. A rainfall gauge will be installed on site to provide a record of rainfall intensity. An inspection of site stability and drainage by the Geotechnical Engineer will be carried out on site when a daily rainfall of over 25mm is recorded on site, works will only recommence after heavy rain with the prior approval of the Geotechnical Engineer following their inspection.

Further details will be given in the CEMP included in Appendix 3.1 of Volume 3 of the EIAR.

Prior to the progression of the project to detailed design and to inform the detailed design of the proposed development, the developer will also ensure that:

- Additional and more extensive ground investigation works are undertaken, and these should be tailored to the engineering requirements of the project.



- The scheme will be developed to full detailed design prior to construction to minimise the risk of ground instability;
- Adequate time is afforded to any designers or contractors involved in the execution of the additional ground investigation works; detailed design and construction works.

4.2.6 Groundwater

To mitigate against the increased vulnerability of the underlying aquifer to groundwater pollution, all excavations will be constructed and backfilled as quickly as possible. Excavations will stop during or prior to heavy rainfall events. To mitigate against possible contamination of the underlying groundwater, refuelling of machinery and plant will only occur at designated refuelling areas. Details of mitigation measures related to spills and fuel storage are outlined above.

The dewatering of the foundation excavations is not expected to cause interference with domestic wells in the area, due to large offset distances to known wells, relatively shallow depths of excavation and temporary short-term nature of dewatering, if required. To monitor groundwater during the construction phase groundwater monitoring wells will be installed between areas of deeper excavations and sensitive groundwater receptors. The wells will be used to monitor groundwater levels and quality to assess any potential impacts during the construction works.

The GSI database is however not complete; it is probable that there are other wells in addition to those in the GSI databases, but are generally associated with houses, the offset to which from the turbines is a minimum of 690m at a financially involved landowner's dwelling. Given the limited depth of the excavations during the construction phase and the distance to sensitive groundwater receptors the potential risk posed to groundwater supply wells is considered to be **Imperceptible** following the implementation of mitigation measures discussed above.

If, however, in the unlikely event of a previously unknown domestic well being impacted by the proposed development, an alternative supply will be provided – either a connection to mains water or a replacement well will be drilled.

The GSI holds records of groundwater wells in the vicinity of the proposed grid connection route. However, trenches are shallow (1.2 m deep) and will only be open for a short period.

Depending on the ground conditions, presence of services, traffic management required, weather conditions, etc., the rate of installation of cable ducting would vary between 50m and 100m per day. Dewatering is therefore unlikely to be required and no impacts on wells is envisaged.

Grid connection and internal cable trenches could provide preferential pathways for groundwater and contaminant movement.

Trenches will be excavated during dry periods where possible in short sections and left open for minimal periods, to avoid acting as a conduit for surface water flows. To further mitigate the risk of cable trenches becoming preferential pathways, clay plugs (or other low permeability material) will be installed at intervals along the trench to stop/inhibit water movement.



4.3 Mitigation Measures during Operation

The main potential residual impact during the operation phase would be the risk to groundwater from contamination from spills. Storage tanks, used to store fuel for the various items of machinery, will be self-contained and double-walled. Refuelling of maintenance vehicles will be carried out from these tanks or from delivery vehicles at designated refuelling areas. Specific mitigation measures relating to the management of hydrocarbons are as follows:

- Fuels, lubricants and hydraulic fluids for equipment used on the site will be carefully handled to avoid spillage.
- Any spillage of fuels, lubricants or hydraulic oils will be immediately contained, and the contaminated soil removed from the site and properly disposed of;
- Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling; and
- Appropriate spill control equipment, such as oil soakage pads, will be kept within the refuelling areas and in each item of plant to deal with any accidental spillage.

Due to the reduced magnitude of the impacts, no additional mitigation measures are required for the maintenance and operation of the wind farm, over and above those incorporated into the design of the substation transformer, which will be bunded to protect soils against accidental leakages of oils and battery fluids.

4.4 Mitigation measures during Decommissioning

Mitigation measures applied during decommissioning activities will be similar to those applied during construction where relevant.

Some of the impacts associated with reinstatement of the site (excavation of turbine bases, access tracks etc.) will be avoided by leaving these in place where possible. The Irish Wind Energy Association (IWEA) (11) states that when decommissioning a wind farm *“the concrete bases could be removed, but it may be better to leave them under the ground, as this causes less disturbance”*. It is proposed to leave the access tracks in-situ at the decommissioning stage. IWEA also state that *“it may be best”* to leave site tracks in-situ depending on the size and geography of the development.

It is considered that leaving the turbine foundations, access tracks and hardstanding areas in-situ will cause less environmental damage than removing and recycling them. It is proposed to retain these elements of the construction and cover with overburden material to allow for re-vegetation of the development site.

Removal of this infrastructure would result in considerable disruption to the local environment in terms of increased sedimentation, erosion, dust, noise, traffic and an increased possibility of contamination of the local water table. However, if removal is deemed to be required by the respective local authority all infrastructure will be removed with mitigation measures similar to those during construction being employed.

Mitigation measures to avoid contamination by accidental fuel leakage and compaction of soil by on-site plant will be implemented as per the construction phase mitigation measures outlined above.



4.5 Cumulative

During the construction of the proposed development there will be the requirement for the importation of engineered fill from source quarries and potential for disposal of materials unsuitable for reuse at licensed facilities. Should these coincide with demand for imported aggregate for maintenance works at the existing wind farms at Boolard and Rathnacally there would be a cumulative impact in terms of demands placed on local quarries for aggregate.

Given the wind farms at Boolard and Rathnacally are already constructed and operational it is considered unlikely significant quantities of aggregate would be required. As such, it is considered there will be an **Imperceptible** cumulative impact during the construction phase of the development.

Prior to mitigation, there was potential for cumulative hydrogeological impacts between the proposed development and the proposed M20 Limerick to Cork and the consented Charleville (Fiddane) and Ballyhea Solar Farms. The mitigation measures described above will ensure the proposed development will have an **Imperceptible** cumulative impact during the construction phase of the development.

No significant, direct negative cumulative effects are envisaged during the operation or decommissioning phase of the proposed development. As such no mitigation measures are required with respect to potential cumulative impacts of the proposed development.



5 HYDROLOGY AND WATER QUALITY

5.1 Construction Stage

5.1.1 Increase in Surface Runoff

Permanent roadside drainage will be installed as part of the construction stage. This will include the use of interceptor drains, swales and check dams. The proposed drainage system will increase time of concentration. Time of concentration (Tc) is time required for an entire catchment to contribute to runoff at the point of interest. These measures will buffer site runoff during periods of high rainfall by retaining the water until the hyetograph has receded. A hyetograph is a graphical representation of the distribution of rainfall intensity over time.

5.1.2 Suspended Solids

The key mitigation measure during the construction phase is locating the proposed turbines 50m from the watercourse. No construction activities or drainage will be within 50m of the watercourses, with an exception for watercourse crossings, access road leading to the proposed substation and turbine T4. The proposed buffer zones will:

- Avoid physical damage to watercourses, and associated release of sediment.
- Avoid excavations within close proximity to surface water courses.
- Minimise the potential for the entry of suspended sediment from earthworks into watercourses.
- Minimise the potential for the entry of suspended sediment from the construction phase drainage system into watercourses, achieved in part by ending drain discharge outside the buffer zone and allowing percolation across the vegetation of the buffer zone.

The following measures shall be implemented during the construction phase:

- settlement ponds with a diffuse outflow detail will be put in place in advance as construction progresses across the site. Erosion control and retention facilities, including settlement ponds will be regularly maintained during the construction phase. The three-stage treatment train (swale – settlement pond – diffuse outflow) proposed to retain and treat the discharges from hard surface areas as a result of the development will reduce any risk of flooding downstream.
- A water quality monitoring programme will be established to ensure that water quality is maintained throughout the construction phase. The details of this programme are outlined below. This programme will ensure that designed measures including settlement ponds are working, and existing water quality is maintained.
- It is proposed to divert an existing field drain as stated in Section 10.6.7 of Chapter 10 of the EIAR. The diversion of the field drain will take place during a dry period. It is proposed to put double silt fences in the drain just upstream and downstream of the diversion area. Prior to construction it is proposed to build a small stone dam within a ditch to prevent water ingress. Clean water accumulated upstream of a dam will be pumped downstream of the construction area.
- Where haul roads pass close to watercourses, silt fencing will be used to protect the streams.
- Silt traps will also be provided at outfalls from roadside swales to settlement ponds.



- Interceptor cut-off drains will be provided on the upslope side of the access roads to prevent the mixing of overland flows with the drainage for the proposed development. These interceptor drains will discharge diffusely over land to avoid concentration of runoff.

The roadside drains will therefore only carry the site access road runoff and so avoid carrying large volumes of water and concentrating flows.

- Where new cross-drains are proposed on this site to convey surface water from roadside swales to settlement ponds, these will be sized at a minimum of 300 mm diameter to avoid blockages.
- Cross drains of 450 mm will be provided to prevent a risk of clogging for drainage crossings and conveying flow from agricultural drains and forestry drains under access track roads.
- Standing water, which could arise in excavations, has the potential to contain an increased concentration of suspended solids as a result of the disturbance to soils. The excavations for turbines will be pumped into the site drainage system (including settlement ponds), which will be constructed at site clearance stage, in advance of excavations for the turbine bases.
- All open water bodies adjacent to proposed construction areas will be protected by fencing including the proposed settlement ponds.
- Excavated subsoil material not required for in-site reinstatement will be removed to the designated material storage areas.
- Silt fencing will be erected at the locations of the drain crossings for the duration of the construction period.
- Site access tracks have been laid out to reduce longitudinal slope of roadside drains where possible. Where roadside drains are laid at slopes greater than 2%, check dams will be provided. This will reduce effective slope and runoff velocities and any consequent potential for erosion.
- Silt fencing will be erected at the location of stream crossings along the cable route.
- The temporary storage of excavated material on site will be put at least 50 m from watercourses.
- An Environmental Clerk of Works (ECOW) will be appointed by the developer to ensure the effective operation and maintenance of drainage and other mitigation measures during the construction process. The operations management of the Site will include regular monitoring of the drainage system and maintenance as required.
- Additional protection will be provided in the form of silt fencing downslope during construction of new watercourse crossings, to further ensure that there is no impact from the development to streams and rivers downslope of the site. All open water bodies adjacent to proposed construction areas will be protected by fencing.
- Daily visual inspections of drains and streams will be performed during the construction period of the new crossing structures to ensure suspended solids are not entering the streams and rivers alongside the work area, to identify any obstructions to channels, and to allow for appropriate maintenance of the existing roadside drainage regime.
- Weather warnings will be monitored, and no construction will take place during extreme events. Large excavations and movements of subsoil or vegetation stripping will be suspended or scaled back if heavy rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast. Works will be suspended by an ECOW if forecasting suggests either of the following is likely to occur:
 - o >10 mm/hr (high intensity local rainfall events).
 - o >25 mm in a 24 hour period (heavy frontal rainfall lasting most of the day).



- o >half monthly average rainfall in any 7 days.
- Prior to works being suspended the following control measures will be completed:
 - o Secure all open excavations.
 - o Provide temporary or emergency drainage to prevent back-up of surface runoff.
 - o Avoid working during heavy rainfall and for up to 24 hours after heavy rainfall events to ensure drainage systems are not overloaded.
- Drains and silt traps will be maintained throughout all felling works, ensuring that they are clear of sediment build-up and are not severely eroded.
- Brash mats will be used to support vehicles on soft ground, reducing peat and mineral soils erosion and avoiding the formation of rutted areas, in which surface water ponding can occur. Brash mat renewal will take place when they become heavily used and worn. Provision will be made for brash mats along all off-road routes, to protect the soil from compaction and rutting. Where there is risk of severe erosion occurring, extraction will be suspended during periods of high rainfall.

Water Quality Monitoring Programme

A monitoring programme will be established to ensure that water quality is maintained. The details of this programme are outlined below. This programme will ensure that designed measures are working, and water quality is not affected.

An Environmental Clerk of Works (ECOW) will be on-site during construction to monitor water quality. Turbidity meters will be installed prior to construction downstream of the site.

Levels of turbidity will be monitored pre-construction to confirm existing levels in the waterbodies. Should the turbidity levels measured during construction be higher than the existing levels, construction will be stopped, and remediation measures will be put in place immediately, to include silt fencing.

Water samples will be taken weekly during ground disturbance works and will include measurement of the parameters provided in Table 5-1 below:

Table 5-1: Surface Water Quality Monitoring Parameters

Parameter	Maximum Value	Regulation
Turbidity	-	-
pH	6.0 < pH < 9.0	Surface Water Regulations 2009
BOD	High Status < 1.3 (mean) or <2.2 (95%ile) Good Status <1.5 (mean) or < 2.6 (95%ile)	Surface Water Regulations 2009
Total Suspended Solids (mg/l)	<25	Salmonid Water Regulations 1988
Total Ammonia (mg/l N)	High Status < 0.04 (mean) or <0.09 (95%ile) Good Status <0.14 (mean) or < 0.065 (95%ile)	Surface Water Regulations 2009



Parameter	Maximum Value	Regulation
Nitrite (NO ₂) (mg/l)	<0.05	Salmonid Water Regulations 1988
Molybdate Reactive Phosphorus (mg/l P)	High Status < 0.025 (mean) or <0.045 (95%ile) Good Status <0.035 (mean) or < 0.075 (95%ile)	Surface Water Regulations 2009

5.1.3 Release of Hydrocarbons

- Refueling of plant during construction will only be carried out at designated refueling station locations on site.
- Storage of fuels, lubricants and hydraulic fluids will occur at the contractor's compound, which will be fenced and have a lockable gate, thereby ensuring that the area in which fuels, lubricants and hydraulic fluids are stored will be properly secured against unauthorized access or vandalism.
- Emergency drip trays and spill kits will be kept available on site, to ensure that any spills from vehicles are contained and removed off site. The emergency response procedure is provided in the SWMP provided in Appendix 10.3.
- Designated contractors' personnel will be trained and certified in oil spill control and clean up procedures, and in the proper and safe disposal of any waste generated through such an event.
- Any diesel, fuel or hydraulic oils stored on site will be stored in bunded storage tanks – the bund area will have a volume of at least 110 % of the volume of such materials stored.

5.1.4 Contamination from Wastewater and Pollutants

- Portaloo and/or containerised toilets and welfare units will be used to provide toilet facilities for site personnel. Sanitary waste will be removed from site via a licenced waste disposal contractor.
- To reduce the risk of invasive species and pathogen introduction (e.g. Crayfish plague), all equipment will be thoroughly checked, cleaned and dried in accordance with best practice as specified in the CIRIA guidelines below. Furthermore, plant machinery which has worked within riparian corridors or come in to contact with water will be steam-cleaned and dried in advance of works commencement in the Blackwater catchment. Crayfish plague is known from the Suir, Deel and Mague Catchments to the north since 2017 but has not been detected to date in the Blackwater catchment. The potential introduction of Crayfish plague is of particular concern at watercourse crossings given the potential for White-clawed Crayfish populations downstream.
 - o CIRIA (2001). Control of water pollution from construction sites - Guidance for consultants and contractors (C532). Construction Industry Research and Information Association, London.
 - o CIRIA (2006). Control of Pollution from Linear Construction Project; Technical Guidance (C648). Construction Industry Research and Information Association, London.
 - o CIRIA (2015a). Manual on scour at bridges and other hydraulic structures, second edition (C742). Construction Industry Research and Information Association, London.
 - o CIRIA (2015b). Environmental Good Practice on Site (4th edition) (C741). Construction Industry Research and Information Association, London.



- o CIRIA (2019). Culvert, screen and outfall manual (C786). Construction Industry Research and Information Association, London.

5.1.5 Release of Cement-Based Products

- Prior to leaving the site, every truck delivering concrete to the site must wash the chute only to a lined pit provided at each turbine location and substation compound.
- There will be no on-site batching of concrete and no storage of cement will be permitted within 50 m of the crossing construction areas, except at turbine T4.
- During all concrete works pH will be measured daily upstream and downstream of works areas. A change in 0.5 pH units will trigger cessation of works and investigation of possible concrete source.
- Where possible, pre-cast elements will be used to minimise the need for wet concrete works within the site.
- Weather forecasting will be used to plan dry days for pouring concrete.
- It will be ensured that the concrete pour site is free of standing water prior to concreting and plastic covers will be available in case of a sudden rainfall event.

5.1.6 Proposed Mitigation Measures for Tree Felling

Tree felling will be permitted under limited felling license(s) from the Forest Service and to the conditions of such a license. A Limited Felling License will be in place prior to works commencing on site. To ensure a tree clearance method that reduces the potential for sediment and nutrient runoff, the construction methodology will follow the specifications set out in:

- Felling and Reforestation Policy, Forest Service, Department of Agriculture, Food and the Marine, Dublin. May 2017
- Standards for Felling and Reforestation, Forest Service, Department of Agriculture, Food and the Marine, Dublin. October 2019
- Forestry Standards Manual (Agricultural, Food and the Marine, 2015)
- Forestry Act 2014 and the Forestry Regulations 2017 (SI No 191 of 2017) and SI 31 of 2020 - Forestry (Amdmt) Regs 2020 re reg 19AA procedures (pdf 99Kb)
- Forest Service. 2000a. Forestry and Water Quality Guidelines. Forest Service, Department of the Marine and Natural Resources, Dublin.
- Forest Service. 2000b. Code of Best Forest Practice – Ireland. Irish National Forest Standard. Forest Service, Department of the Marine and Natural Resources, Dublin.
- Forest Service. 2000c. Forest Harvesting and the Environment Guidelines. Forest Service, Department of the Marine and Natural Resources, Dublin.

The following mitigation measures are proposed:

- Before operation commence, identify a 10m wide exclusion zone along the edge of all aquatic zones;
- Ensure all operators are aware of exclusion zone;
- Machine traffic and timber stacking are not permitted within these zones;



- Trees within the reach of the harvester arm will be felled by harvester, and snedded and bunched outside the exclusion zone;
- Trees outside machine reach to be felled manually by chainsaw operators. Felled trees to be winched out of the exclusion zone where appropriate and safe to do so, or removed by extended harvester arm, for subsequent snedding and processing outside the exclusion zone.
- In all cases, fell trees away from the water feature.
- Regarding aquatic zones, ensure banks remain undisturbed. No branches or debris are to enter the aquatic zone during operations. Immediately and with care, remove any branches that do fall in.
- Minimise the crossing of drains during felling and extraction, and restrict machine activity to brashed extraction racks and haulage routes.
- Where necessary, deploy a heavy-duty plastic culvert lengthways into the channel and cover with brash material. The culvert must be of a diameter approximating the depth of the drain, to avoid any unnecessary undulation along the extraction route.
- Where required, a solution for smaller drains is to temporarily lay log sections lengthways into the channel and overlay with brash. Again, select logs that approximate the depth of the channel to be crossed.
- When installing and removing the temporary crossing, ensure that no work is carried out within the aquatic zone, and that the stream bed and bankside remain undisturbed.
- Carefully remove temporary crossings as they become no longer needed. Any brash padding used must be peeled back carefully away from the water feature, to avoid dislodging collected sediment.
- Direct crossing over the stream bed is not permitted.
- Ensure the feature is crossed at a right angle to the flow of water.
- Where needed, any necessary crossing shall be via an appropriate structure that spans proud of the flow of water and prevents the breakdown and erosion of the banks.
- Solutions include the laying down of a bridge comprising logs overlaid with geotextile and brash to intercept soil falling off wheels.
- Branches, logs or debris will not be allowed to build up in aquatic zones. All such material will be removed when harvesting operations have been completed.
- Timber will be stacked in dry areas, and outside a local 50m watercourse buffer. Straw bales and check dams will be emplaced on the down gradient side of timber storage sites.
- Brash mats will be used to support vehicles on soft ground (e.g. during trenching and drainage construction), reducing peat and mineral soils erosion and avoiding the formation of rutted areas, in which surface water ponding can occur. Brash mat renewal will take place when they become heavily used and worn. Provision will be made for brash mats along all off-road routes, to protect the soil from compaction and rutting. Where there is risk of severe erosion occurring, extraction will be suspended during periods of high rainfall.
- Prior to the commencement of operations, silt traps will be installed within existing forest drains that connect with aquatic zones, either directly or indirectly through other relevant watercourses.
- Silt traps will be staggered along the length of the drain, and not only at the lower reaches towards its outflow.
- Silt trap design can vary, from depressions added to the drain bed, to log sections laid lengthways into the drain, to the use of geotextile barriers



- Silt fences will be utilized where necessary, to block pathway for silt in areas where overland flow is possible.
- Once silt traps and silt fences become functional, they will be regularly checked and maintained as necessary, in order to ensure continued effectiveness throughout operations.
- Felling and extraction and other machine operations onsite (or redirect to more stable areas of the site) will cease during and after periods of rainfall which result in the possibility of the surface mobilisation of silt.
- At least weekly check Silt traps and silt fences will be checked weekly, and maintained as required, to ensure their continued effectiveness throughout works. All excess silts will be removed and disposed of appropriately.
- Daily visual checks will be undertaken of relevant watercourses (primarily at their outflow from the site) and adjoining aquatic zones, to confirm (or otherwise) that no sediment or silt discharge will be arising from site works.
- A record will be kept of the above monitoring, and retain for possible inspection.

5.2 Proposed Mitigation Measures During Grid Connection and HDD

5.2.1 Suspended Solids

- Cables will be installed in trenches adjacent to the site access roads or laid within the access road carriageway corridor, where required. Trenches will be excavated during dry periods in short sections and left open for minimal periods, to avoid acting as a conduit for surface water flows.
- The temporary storage of excavated material on site will be put at least 50 m from watercourses as detailed in soil management plan provided in CEMP. Please refer to Appendix 3.1 of the EIAR.
- Weather warnings will be monitored by an ECOW, and no construction will take place during extreme events to mitigate against potential flooding.
- Any excavated material will be used in the reinstatement of the cable trenches subject to approval. Unsuitable surplus material will be removed from the site to an appropriate licenced facility as detailed in Section 3.6.12 of Chapter 3 of the EIAR. For trenching within the domain of public roads, approved fill material will be imported in accordance with the method statement described in Section 3.
- All excavated soil material will be managed on site in accordance with the CEMP provided in Appendix 3.1 of the EIAR.
- Silt fencing will be provided around any exposed areas to prevent the ingress of suspended solids into adjacent watercourses. These mitigation measures will prevent surface water contamination and will prevent subsequent flows of contaminated water into watercourses.

5.2.2 Hydrocarbons

- Refueling of plant during construction will only be carried out at least 50m from any open water body.
- Storage of fuels, lubricants and hydraulic fluids will occur at the contractor's compound, which will be fenced and have a lockable gate, thereby ensuring that the area in which fuels, lubricants and hydraulic fluids are stored will be properly secured against unauthorized access or vandalism.



- Emergency drip trays and spill kits will be kept available on site, to ensure that any spills from vehicles are contained and removed off site. The emergency response procedure is provided in SWMP provided in Appendix 10.3 of the EIAR.
- Designated contractors' personnel will be trained and certified in oil spill control and clean up procedures, and in the proper and safe disposal of any waste generated through such an event.
- Any diesel, fuel or hydraulic oils stored on site will be stored in bunded storage tanks – the bund area will have a volume of at least 110 % of the volume of such materials stored.

5.3 Proposed Mitigation Measures During Turbine Delivery

There are not specific mitigation measures required for works associated with TDR, except for Node 10.5.

The following mitigation measures are proposed:

- Weather forecasting will be used to plan dry days. This is to avoid sediments and debris being flushed into the stream.
- Trimmed vegetation and segments of the removed wall will be removed from this area and disposed of as licensed facility as described in Section 3.6.12 of Chapter 3 of the EIAR.
- There will be no refuelling or fuel storage at least 50m from any waterbody.

5.4 Proposed Mitigation Measures during Operation and Maintenance

The main hydrological impact of the project is an increase in runoff. This is mitigated by the drainage system. It is anticipated that the drainage system will increase time of concentration and consequently the peak runoff will be decreased. The drainage system will be left in-situ during operational stage.

When operational, the project will have a negligible effect on surface water quality as there will be no further disturbance of soils post-construction.

The following mitigation measures are proposed for replacing or removal of the wind turbine blades:

- Emergency drip trays and spill kits will be available on main wind farm site, to ensure that any spills from vehicles are contained and removed off site.
- Refuelling or maintenance of machinery will not occur within 50m of a watercourse. Mobile bowser, drip kits, qualified personnel will be used where refuelling is required.

Mitigation measures listed in section 5.2.1 are proposed for replacing the grid connection cable.

During the operation stage, small quantities of oil will be used in cooling the transformers associated with the facility. There is therefore a potential for small oil spills. Risks of potential oil leakage and pollutions draining to the watercourse from the installed transformer is mitigated with transformer interceptor bund wall.



It is not envisaged that the maintenance period will involve any significant impacts on the hydrological regime of the area. The maintenance will incorporate effective maintenance of the drainage system. The maintenance regime will include inspecting the following post extreme storm event:

- Drains, cross-drains and culverts for any blockages;
- Outfalls to existing field drains and watercourses;
- Roadside swales for any obstructions;
- Swales;
- Progress of the re-establishment of vegetation.

The maintenance regime will also include implementing appropriate remedial measures as required after the above inspections and testing the water quality at the outfalls at appropriate intervals. Visual inspections will be undertaken during the maintenance period in accordance with maintenance schedule in CIRIA C753.

5.5 Proposed Mitigation Measures during Decommissioning

In the event of decommissioning of the wind farm site, the access tracks will be used in the decommissioning process. Drainage system will be fully functional. Mitigation measures applied during decommissioning activities will be similar to those applied during construction but will be of reduced magnitude.

For the access tracks and turbine foundations it is proposed that they are left in place and covered with local soil/topsoil at decommissioning stage. It is considered that leaving the turbine foundations, access tracks and hardstanding areas in-situ will cause less environmental damage than removing them.

The grid connection ducting and substation will be left in situ as part of the national grid, therefore no potential impacts during decommissioning stage are likely to occur. Hence no mitigation measures are required.



6 POPULATION, HUMAN HEALTH & MATERIAL ASSETS

6.1 Population

As there are no significant effects predicted on population trends and population density, no mitigation measures are required.

6.2 Socio-economics, Employment and Economic Activity

Given that potential effects of the proposed development at construction, operation and decommissioning phases are predominantly positive in respect of socio-economics, employment and economic activity, no mitigation measures are considered necessary.

6.3 Land Use

Mitigation measures for land use are primarily related to preliminary design stage, which has allowed for the prevention of unnecessary or inappropriate ground works or land use alterations to occur. The construction and operational footprint of the proposed development has been kept to the minimum necessary to avoid negative effects on existing land uses as so far as possible.

Existing agricultural tracks have been incorporated into the design in order to minimise the construction of new tracks and roads and minimise the removal of agricultural and forested areas. Where new access tracks are required, these have been sensitively designed in order to minimise impact on agriculture and forestry so far as possible. Electricity cables will be installed underground in or alongside access tracks to avoid negative effects on agricultural and forestry practices.

The construction and decommissioning works will be planned and controlled by a Construction and Environmental Management Plan (CEMP). The CEMP for the construction phase is included in Appendix 3.1 of Volume 3 of the EIAR. This provides details on day to day works and methodologies. As part of these works, the public and other stakeholders will be provided with updates on construction activities which will affect access to lands. This will be communicated to members of the public through a community liaison officer employed for the duration of the construction period.

Prior to the grid connection installation works within public roads, it is proposed that all access points (domestic, business, agriculture) are considered when finalising the temporary road closures and diversions, in order to maintain local access as much as possible and avoid impacts on various land uses. All proposed works and deliveries along the TDR route will also be controlled by a Construction and Environmental Management Plan to avoid undue negative effects to adjacent land uses.

6.4 Recreation, Amenity and Tourism

Mitigation measures for recreation, tourism and amenity are primarily related to preliminary design stage of the wind farm and recreational amenity trail development, which has allowed for the prevention of unnecessary or inappropriate development to occur that would significantly affect any recreational or tourist amenity.



6.5 Human Health & Safety

6.5.1 Construction & Decommissioning

To maintain safety and avoid health impacts on construction workers and the general public, best practice site safety and environmental management will be maintained. The proposed development will be designed, constructed, operated and decommissioned in accordance with the following:

- Safety, Health & Welfare at Work (Construction) Regulations 2013;
- Safety, Health & Welfare at Work Act 2005;
- Safety, Health & Welfare at Work (General Applications) Regulations 2007.

All construction staff will be trained to the correct Health and Safety standards in order to carry out their duties and will be informed and aware of potential hazards. A Construction and Environmental Management Plan is included in Appendix 3.1 of the EIAR, will be circulated to all construction workers which will detail safety protocol and methodology. Furthermore, site investigation has been completed and mitigation has been proposed as detailed in Chapter 9: Lands, Soils and Geology and Chapter 10: Hydrology and Water Quality.

All hazards will be identified, and risks assessed. Where elimination of the risk is not feasible, appropriate mitigation and/or control measures will be established. The contractor will be obliged under the construction contract and current health and safety legislation to adequately provide for all hazards and risks associated with the construction phase of the project.

FÁS Safe Pass registration cards are required for all construction, delivery and security staff. Construction operatives will hold a valid Construction Skills Certificate Scheme card where required.

The developer is required to ensure a competent contractor is appointed to carry out the construction works. The contractor will be responsible for the implementation of procedures outlined in the Safety & Health Management Plan.

In relation to COVID-19, up to date HSE guidance will be consulted regularly in line with HSA recommendations and all reasonable on-site precautions will be taken to reduce the spread of COVID-19 on construction sites, should the virus be prevalent at the time of construction.

Once mitigation measures and health and safety measures are followed, the potential for impact on human health on the construction site during construction and decommissioning is expected to be not significant and temporary to short-term.

Appropriate warning signage will be posted at the construction site entrance, directing all visitors to the site manager. Appropriate signage will be provided on public roads approaching site entrances and along haul routes to maintain public safety.

In relation to the TDR, extra safety measures will be employed when large loads are being transported, for instance, Garda escort will be requested for turbine delivery and a comprehensive turbine delivery plan will be utilised to avoid potential impact to human safety for road users and pedestrians. A traffic and transport assessment has been completed and is detailed in Chapter 13 of the EIAR: Traffic and Transportation.



For the installation of the grid connection cable in the public road, a detailed traffic management plan will be developed in discussion with locals who will be directly impacted by the works, and in agreement with the Local Authority. Public consultation will be conducted along the grid cable route to inform local residents ahead of construction works.

Once mitigation measures and health and safety measures are implemented and followed, the potential for impact on human health for members of the public during construction and decommissioning of the proposed project is expected to be not significant and temporary to short-term.

6.5.2 Operational Phase

For operation and maintenance staff working at the proposed wind farm, appropriate site safety measures will be utilised during the operational phase by all permitted employees.

All personnel undertaking works in or around the turbines will be fully trained and will use appropriate Personal Protective Equipment (PPE) to prevent injury.

Equipment within high voltage substations presents a potential hazard to health and safety. The proposed substation will be enclosed by palisade fencing and equipped with intruder and fire alarms in line with ESB and EirGrid standards.

All electrical elements of the proposed development are designed to ensure compliance with EMF standards for human safety.

All on-site electrical connections are carried by underground cable and will be marked out above ground where they extend beyond the track or hardstanding surface. Details of cables installed in the public road will be available from ESBN.

Lightning conductors will be installed on each turbine as all structures standing tall in the sky require this protection. Turbines specifically require this to prevent power surges to electrical components.

Turbines will be fitted with ice detection systems which will stop the turbine from rotating if ice is forming on a turbine blade. This aims to prevent ice throw which can cause injury.

Rigorous statutory and engineering safety checks imposed on the turbines during design, construction, commissioning and operation will ensure the risk posed to humans is negligible. 24-hour remote monitoring and fault notifications are included as standard in the Turbine Operations and Maintenance Contracts. In addition to scheduled maintenance, the maintenance contracts will allow for call out of local engineers to resolve any issues as soon as they are picked up on the remote monitoring system.

Access to the turbines inner structure will be locked at all times and only accessed by licenced employees for maintenance.

In line with the Health Service Executive's Emergency Planning recommendations, any incident which may occur at the site which requires emergency services, incident information will be provided in the 'ETHANE' format:

- Exact location;
- Type of incident;
- Hazards;



- Access and egress;
- Number of casualties (if any) and condition;
- Emergency services present and required.

The design of the proposed wind farm has considered the susceptibility to natural disasters. The proposed site drainage will mitigate against any potential flooding risk with the use of swales as described in Chapter 10 – Hydrology and Water Quality.

A nominated competent person shall carry out checks and routine maintenance work to ensure the reliability and safe operation of fire-fighting equipment and installed systems such as fire alarms and emergency lighting. A record of the work carried out on such equipment and systems will be kept on site at all times.

Shadow flicker detection systems will be installed on all turbines in order to reduce potential occurrence of shadow flicker on nearby receptors. This is further detailed in Chapter 12 of the EIAR: Shadow Flicker.

In order to ensure the proposed wind farm is compliant with the noise limits, some of the turbines may need to be operated in noise reduced modes of operation in order to protect residential amenity. Details of these mitigation measures are set out in Chapter 7 of the EIAR: Noise and Vibration.

The wind farm system shall include a kill switch that can be operated at any time with an overriding manual shutdown system in case of an emergency.

6.6 Material Assets (Renewable, Non-Renewable Resources and Utility Infrastructure)

Existing services along the proposed grid connection cable route have been predicted through a desktop study and will be confirmed in the pre-construction surveys prior to construction. This will minimise the impact in terms of disruption or damage to existing utilities. It is not intended to divert existing services but instead, where possible, the cable will be laid above or below existing services. Communication with service providers will be maintained for the duration of the construction works where required.

Non-renewable resources of stone and fill will be sourced locally insofar as possible to minimise transportation distances.

The layout of the proposed Wind Farm includes mitigation by design in order to reduce potential impact on the adjacent solar farm located to the north of the wind farm site in the townland of Fiddane. T02 was relocated approximately 110m to the south of its original location in order to reduce shadowing effect on the solar array. This also reduced the requirement for tree felling as the movement of T02 reduced the felling requirement at this turbine location and also resulted in the movement of T05 from a forested area to an open agricultural field. As a result, the total felling required for the proposed project was reduced by 1.9 hectares.

The 12.6 hectares of commercial forestry which will be felled at the proposed Annagh Wind Farm site will be replanted at alternative lands under a felling licence. The proposed replant lands are located at Emlagh, Co. Clare. The total area of commercial forestry replanting is approximately 12.6 hectares.

Where services and street furniture are required to be removed temporarily to accommodate turbine delivery, residents and business in proximity to the works will be informed in advance.



The turbine delivery procedure will follow the steps outlined in the list of accommodation works as set out in Section 3.5.6.1 of Chapter 3 of the EIAR, to avoid negative impact on roads and private property along the TDR including the N69, N18, M20, N20, and L1322 leading to the site. It is likely that turbine delivery will take place outside of regular travelling/commuting hours in order to avoid potential traffic impacts on major routes and will be supervised under Garda escort.

A Construction Waste Management Plan has been prepared for the proposed Annagh Wind Farm and is included in the CEMP in Appendix 3.1 of the EIAR, in line with the "Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects" (2006) as published by the Department of the Environment, Community and Local Government and supported by the Southern Region Waste Management Plan 2015-2021.

The Waste Management Plan will be finalised in accordance with the CEMP following the appointment of the contractor for the main construction works and will take cognisance of any newly published waste management policy.



7 SHADOW FLICKER

Shadow flicker control modules, consisting of light sensors and specialised software, will be installed on the turbines as part of a system to prevent operation during periods when shadow flicker may occur to attain 'zero shadow flicker'. The calculated potential shadow flicker periods will be input into the turbine control software and when the correct conditions are met i.e. the light intensity is sufficient and during a potential period of shadow flicker, and when the thresholds identified in Section 12.5.2 of Chapter 12 of the EIAR have been exceeded individual turbines will cease operation until the conditions for shadow flicker are no longer present. This method of mitigation will be used to fully mitigate all shadow flicker effects resulting in zero shadow flicker.

These are standard widely accepted control modules that are installed in most wind turbines. Appendix 12.2 of the EIAR contains a list of times when each turbine could be shut down to ensure zero hours of shadow flicker from Annagh Wind Farm.

Appendix 12.2 of the EIAR contains all calculated potential shadow flicker periods for each turbine, which will be input into the turbine control software. When a sufficient light intensity is measured during any of these periods, the corresponding turbine will be shut down if required, to ensure zero hours of shadow flicker from Annagh Wind Farm. The shadow flicker modelling has assumed the largest rotor diameter that may be incorporated into the development. Should the rotor diameter be reduced then shadow flicker effects will also be reduced.



8 TRAFFIC AND TRANSPORTATION

This section outlines the various mitigation measures that will minimise or eliminate the potential impacts of the scheme in terms of traffic and transportation. Certain aspects of the development of the scheme to date have already included mitigation in terms of scheme design and route selection, for example. It is considered that no further mitigation measures are required for the operational stage of this development.

8.1 Construction Phase

8.1.1 Main Wind Farm Site

The following mitigation measures are proposed to reduce the impact of the construction activity in relation to the construction phase of the project:

Traffic Management Plan

A detailed traffic management plan (TMP) will be agreed with the road's authority and An Garda Síochána prior to commencing construction. The TMP is included in the CEMP contained in Appendix 3.1 of the EIAR. This includes the following:

Traffic Management Co-Ordinator – A dedicated Traffic Management Coordinator will be appointed for the duration of the project and this person will be the main point of contact for all matters relating to traffic management on the project.

Roads and Routes: The final TMP will clearly identify roads that will be used to access the project site and roads that are not to be used. In some cases, the roads authority may wish that certain roads are not used for HGVs but can be used by LGV traffic. Haul routes to be used for this project are shown on Figure 13-6 of Chapter 13.

One-way Systems: as some of the local roads are relatively narrow, the roads authority may want to introduce a system of one-way construction traffic movements during the construction of the development. Any such one-way systems will be identified in the construction stage TMP in agreement with the roads authority.

Road Closures: with the use of the local roads network for the grid connection route, the narrow carriageway widths for some of the roads proposed may require full road closures. Any such road closures would be agreed with the roads authority in advance of construction and diversions would be incorporated into the traffic management plan.

Road Condition Survey: a pre-condition survey will be carried out on all public roads that will be used in connection with the development to record the condition of the public roads in advance of construction commencing. A post-construction survey will also be carried out after the works are completed. The specification and timing of the surveys will be agreed with the roads authority. Joint surveys shall be completed if the roads authority requests.

Road Reinstatement: All roads will be reinstated expeditiously on completion of the construction works. Roads will be reinstated to their pre-works condition or better and to the satisfaction of the roads authority.

Site Inductions: All workers will receive a comprehensive site induction which will include a section on traffic management and clear guidance on the routes to be used/not used to access the site.



24-Hour Emergency Contact: a 24-hour emergency phone number will be maintained for the duration of the construction works and the number will be noted on temporary signage at each works area (for grid connection) and the site entrance for the wind farm site.

Traffic Management Guidance: all necessary temporary traffic management will be planned and executed in accordance with best practice, including Chapter 8 of the Traffic Signs Manual published by the Department of Transport.

Letter Drops: a letter drop will be carried out to notify members of the public living near the proposed site and cable route to advise them of any particular upcoming traffic related matters e.g. temporary lane/road closure or delivery of turbine components.

Signage: Clear signage relating to the development, both temporary and permanent, will be provided for accessing the site.

Road Sweeper: Appropriate steps will be taken to prevent soil/dirt generated during the works from being transported on the public road. When, if necessary, a road sweeper will be used to maintain the public roads in a clean condition during the construction activities of the project.

Site Entrances: The entrances to the site will be secured when the site is not in use. When necessary, a flagman will be used to assist traffic movements at the site entrance or in other areas as required.

Abnormal Load Deliveries: Abnormal loads will require an abnormal load permit prior to delivery and will be delivered at times and frequencies directed by An Garda Síochána.

8.1.2 Grid Connection Works

Mitigation measures proposed for the grid connection works include:

Road Opening Licence: The road works associated with the grid connection cabling will be completed in line with the requirements of a road opening license as agreed with the local authority.

Route Proofing: In advance of the main grid connection works an assessment will be carried out to define the precise alignment of the cable route within the corridor which has been assessed. This will include slit trenching with the aim of minimising the construction impacts and avoiding existing services in the road.

Maintaining Local Access: reasonable access to local houses, farms and businesses will be maintained at all times during any road closures associated with the grid connection works. The details of this will be agreed with the roads authority in advance of the grid connection works commencing.

Road Cleanliness: Appropriate steps will be taken to prevent soil/dirt generated during the works from being transported on the public road. Road sweeping vehicles will be used when necessary, to ensure that the public road network remains clean.

Temporary Trench Reinstatement: Trenches on public roads, once backfilled, will be temporarily reinstated to the satisfaction of the roads authority.

Haul Route Interface: Aggregates and other materials imported to the wind farm site will be managed to ensure they do not conflict with the grid connection works. Grid connection works will be planned to avoid conflicts with other major activities on the main construction site such as concrete foundation pours and large component deliveries.

Turbine Delivery Route Interface: the delivery of turbine components to the site will need to be managed to ensure there is no overlap with the grid connection works. Grid Connection works are to be scheduled so as not to conflict with turbine deliveries.



8.1.3 Turbine Component Delivery Mitigation

The turbine delivery route has been assessed using a detailed appraisal of potential routes and the identification of the most appropriate route including the required accommodation works along the route to mitigate the impact of the turbine delivery. The impact of the deliveries on traffic is mitigated by delivering components during off-peak or night-time deliveries.

Mitigation measures proposed for the turbine delivery route also include:

- **Programme of Deliveries:** a programme of deliveries will be submitted to the roads authority in advance of deliveries of turbine components to the site. The programme will include details of the dates and times of each component delivery along with the route to be taken. Turbine component deliveries will be carried out during off-peak times and will be done using a convoy and a specialist heavy haulage company.
- **Garda Escort:** Turbine deliveries will be escorted by An Garda Síochána. This will ensure the impacts of the turbine deliveries on the existing road network are minimised.
- **Reinstatement:** Any area affected by the works to facilitate turbine delivery will be fully reinstated to its original condition.
- **Consultation:** Consultation with the local residents and Cork County Council will be carried out in advance to manage turbine component deliveries.

8.1.4 Met Mast Construction

The southern site entrance will be used only for construction of a new section of track to access the met mast location and for installation of the met mast. Appropriate sightlines are not achievable at this site entrance location so the following mitigation measures are proposed:

Banksman: During the construction phase a banksman will control traffic at the southern entrance to maintain traffic safety on the local road during construction activities relating to the installation of the proposed 100m met mast. The southern access will not be used for any other elements of the proposed development during the construction phase.

Note: the southern entrance will only be used during the operation phase for maintenance of the met mast (likely to be no more than one or two vehicles on a quarterly basis). Existing agricultural activity will continue on this laneway.

8.2 **Operation**

Site entrances at the wind farm site shall be maintained continually to ensure conditions at these entrances do not deteriorate. Hedgerow maintenance will be required to ensure continued visibility at the entrances.



8.3 Decommissioning

The traffic impact associated with the decommissioning phase will be significantly less than the construction phase.

All decommissioning works are to be carried out in accordance with a decommissioning plan to be prepared prior to the decommissioning phase of the project and agreed with the planning authority in advance. Traffic management measures identified will be included in the decommissioning plan for the wind farm.

Infrastructure associated with the grid connection will form part of the national grid and will be left in-situ. Therefore, no impacts are envisaged upon decommissioning of the windfarm development and no mitigation is required.

Similar to the construction phase, a banksman will be required at the southern site entrance for the decommissioning (removal from site) of the proposed 100m met mast.

Mitigation measures adopted for project decommissioning shall be in line with those identified for the construction phase of the proposed development.



9 ARCHAEOLOGY, ARCHITECTURAL AND CULTURAL HERITAGE

9.1 Wind Farm

The presence of extensive woodlands plantations, including tree roots, at the locations of the majority of turbines and associated hardstands will preclude advance archaeological site investigations such as geophysical survey and test trenching at their locations. A systematic advance programme of archaeological fieldwalking surveys will be undertaken within all construction areas within these woodlands following pre-construction tree felling to assess whether there are any surface traces of any potential unrecorded archaeological or architectural heritage sites exist within these areas. Archaeological monitoring of ground excavation works during the construction phase will then be carried out within all areas of the Site under licence by the National Monuments Service (NMS) of the Department of Housing, Local Government and Heritage. In the event that any unrecorded, sub-surface archaeological sites or features are identified during these site investigations they will be recorded and cordoned off while the NMS are consulted to determine further appropriate mitigation measures, which may include preservation by avoidance or preservation by record through systematic archaeological excavations.

The locations of all recorded archaeological sites within the environs of construction areas will be cordoned off and the outer edges of their designated Zones of Notification will be clearly signed as 'No Entry: Archaeological Areas' for the duration of the construction phase. These onsite constraints comprise Ringfort CO007-072001-, Enclosures CO007-072002- and CO007-074---- and Fulacht Fia CO007-175----. The locations of the two derelict, late 19th century farmyards within the environs of the Site will also be clearly marked as no entry areas. The locations of these constraints are identified in the project CEMP contained in Appendix 3.1 and will also be identified during the site inductions provided to all onsite work crews during the construction phase. Their locations will be subject to inspections by the appointed archaeologist at regular intervals during monitoring of the construction phase to ensure that the protective measures are being successfully implemented.

9.2 Grid Connection Route and Turbine Delivery Route Work Areas

The programme of archaeological supervision of the construction phase of the Development will also include monitoring ground excavation works and vegetation clearance within the section of the L1322 road in the environs of known archaeological sites located in adjacent fields (i.e., Ringfort CO007-048----, Vernacular House CO007-049001- and Church site CO007-122----). Any required localised ground works within greenfield areas to facilitate the grid connection and turbine delivery will also be subject to archaeological monitoring (e.g., joint bays, site entrance upgrades). An archaeological watching brief of cable trench excavation works in other areas of roadways will be maintained and the extent of this supervision will be agreed in advance with the National Monuments Service as part of the licence application process.

9.3 Monitoring of mitigation measures

There are a number of obligatory processes to be undertaken as part of archaeological licence applications to the NMS and these will allow for monitoring of the successful implementation of the archaeological mitigation measures. Method statements detailing the proposed strategy for all site investigations will be submitted for approval to the National Monuments Service as part of the licence application in advance of the construction phase. These will clearly outline the extent of all ground works and outline the onsite and consultation processes to be enacted in the event that any unrecorded archaeological sites or features are identified.



A report will be compiled on all site investigations which will clearly present the results in written, drawn and photographic formats and copies will be submitted to the National Monuments Service, the Planning Authority and the National Museum of Ireland.



10 LANDSCAPE AND VISUAL IMPACT

Given the highly visible nature of commercial wind energy developments it is not generally feasible to screen them from view using on-site measures, as would be the primary form of mitigation for many other types of development. Instead, landscape and visual mitigation for wind farms must be incorporated into the early stage site selection and design phases. In this instance, the two main forms of landscape and visual mitigation employed were:

- Mitigation by avoidance and design;
- Buffering of Residential Receptors.

10.1 Mitigation by Avoidance and Design

Macro Works have been involved in the proposed project since early 2020, when early-stage constraints studies took place. One of the main mitigation measures brought forward from these early-stage studies was that the layout would avoid the aforementioned River Blackwater Special Area of Conservation (SAC), which enters the most south-western section of the site: the identification of this constraint resulted in a more than 600m distance being established between it and the location of the nearest proposed turbine.

In the second half of 2020, Macro Works were involved in the design optimisation analysis of the initial turbine layout for the proposed development. For the purposes of this analysis, fieldwork was undertaken and a range of key representative viewpoints (VPs) from surrounding receptor locations were selected, and photography was captured. Fourteen VP locations were selected to represent a variety of key receptors viewing distances and viewing angles. Wireframe overlay montages from all 19 of the VPs were produced to analyse the layout and identify degrees of planning risk and potential for design improvement. This analysis began with an objective review of visibility at each VP location, followed by a summary of likely planning risk and recommendations. Consequently, as a result of this analysis, the proposed layout was refined and improved to reduce potential and/or likely visual impacts associated with the proposed development.

10.2 Buffering of Residential Receptors

For the proposed Annagh Wind Farm, a setback distance of 700m is required. All but one residence in the community falls outside this distance. This is:

- P51 A373 (690m SE of T3) – involved landowner.

Consequently, this complies with the setback distance outlined in both the current 2006 Guidelines and the Draft Revised Guidelines (2019).

Variation in residential buffer distances within the nearest kilometre has a much more noticeable effect on perceived turbine scale than when it occurs in the context of more distant views. This is due to the law of perspective; that is, doubling the distance to an object halves its perceived height. The reduction factor is even more pronounced when considered in the context of the ‘swept area’ of turbine blades and not just their tip height. This exponential ‘scale in relation to distance’ scenario is illustrated in Figure 10-1.

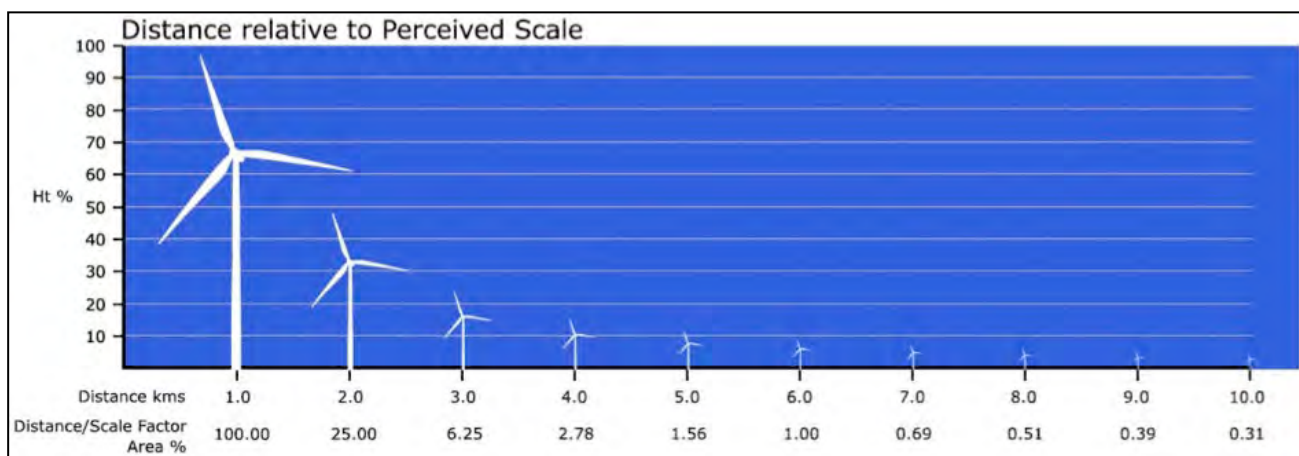


Figure 10-1: Turbine 'scale in relation to distance' relationship



11 TELECOMMUNICATIONS AND AVIATION

11.1 Telecommunications and Broadcasting

The proposed grid connection will be left in situ underground within the public roadway and will not cause any interference to telecommunications or broadcasting. As a result, there are no mitigation measures proposed for the GCR. In advance of the main grid connection works the precise alignment of the cable route within the corridor will be defined. This will include slit trenching which will ensure the avoidance of existing services in the road.

Overhead telecommunication lines will be temporarily disconnected and then reconnected following turbine delivery to the site. No mitigation measures are required.

11.1.1 Aviation

No mitigation measures are required.

In line with the scoping response from IAA, an aeronautical obstacle warning light scheme will be agreed with the authority.

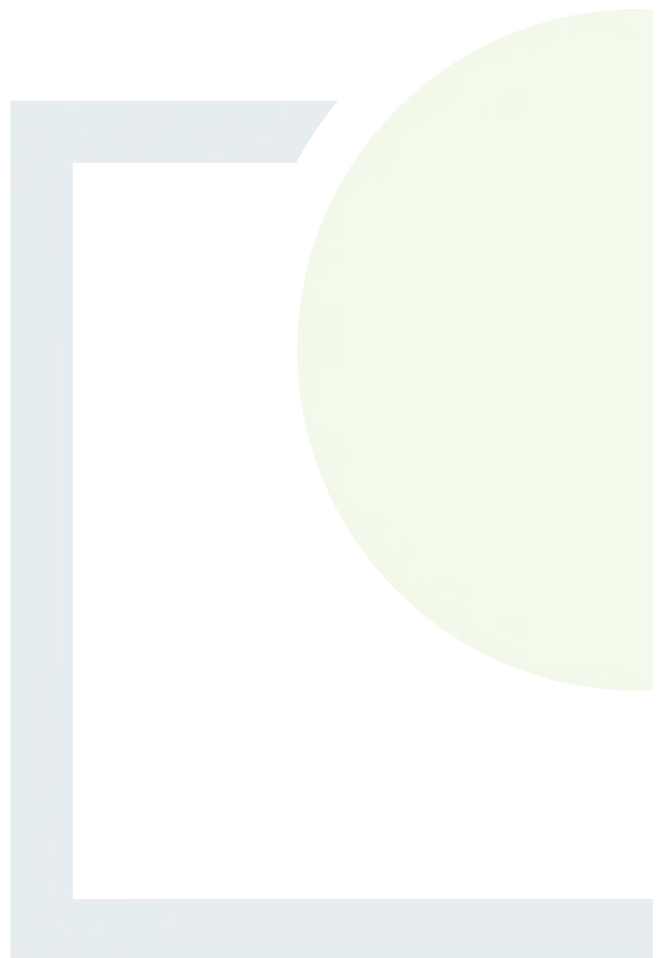
The proposed grid connection will be left in situ underground within the public roadway and will not impact on aviation.

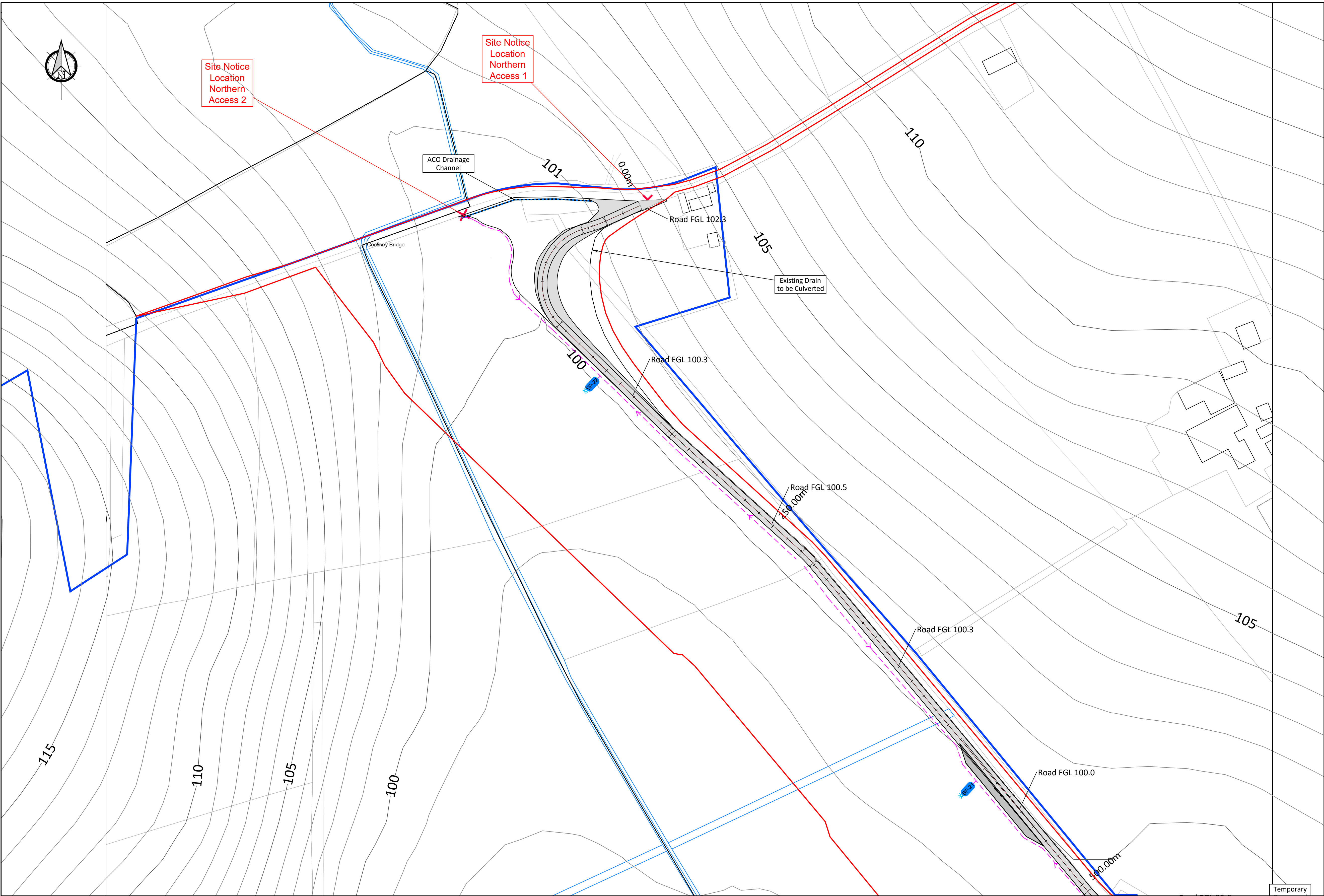


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APPENDIX 6

Drawings





Legend

- Planning Boundary
- Property Boundary
- Proposed Wind Farm Access Track
- Existing Road To Be Upgraded
- Passing Bays
- Turning Areas
- Turbine And Hardstanding Areas
- Private Electrical Network Cable Route
- Indicative Buried Grid Connection Cable Route
- Temporary Compound Area
- Substation Compound
- Indicative Location of Roadside Swale
- Cross Drain
- Indicative Interceptor Ditch With Diffuse Outflow
- Stilling Pond With Diffuse Outflow
- Roadside Drain
- Interceptor Ditch
- ACO Drain
- Diverted Drain
- Culvert
- Sight Lines
- 0.00m
- Wayleave
- Temporary hard standing for the construction phase only, to be used for oversized vehicles associated with turbine component deliveries. To be fenced off when not in use. To be fully reinstated following the construction phase of the project.

Refer to drawings P2359-0100-0014 to P2359-0100-0019 for all 1:500 turbine and hardstand layouts.

KEYPLAN

Scale 1:1000

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PLAN
Scale 1:1000

**FEHILY
TIMONEY**

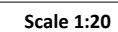
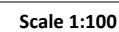
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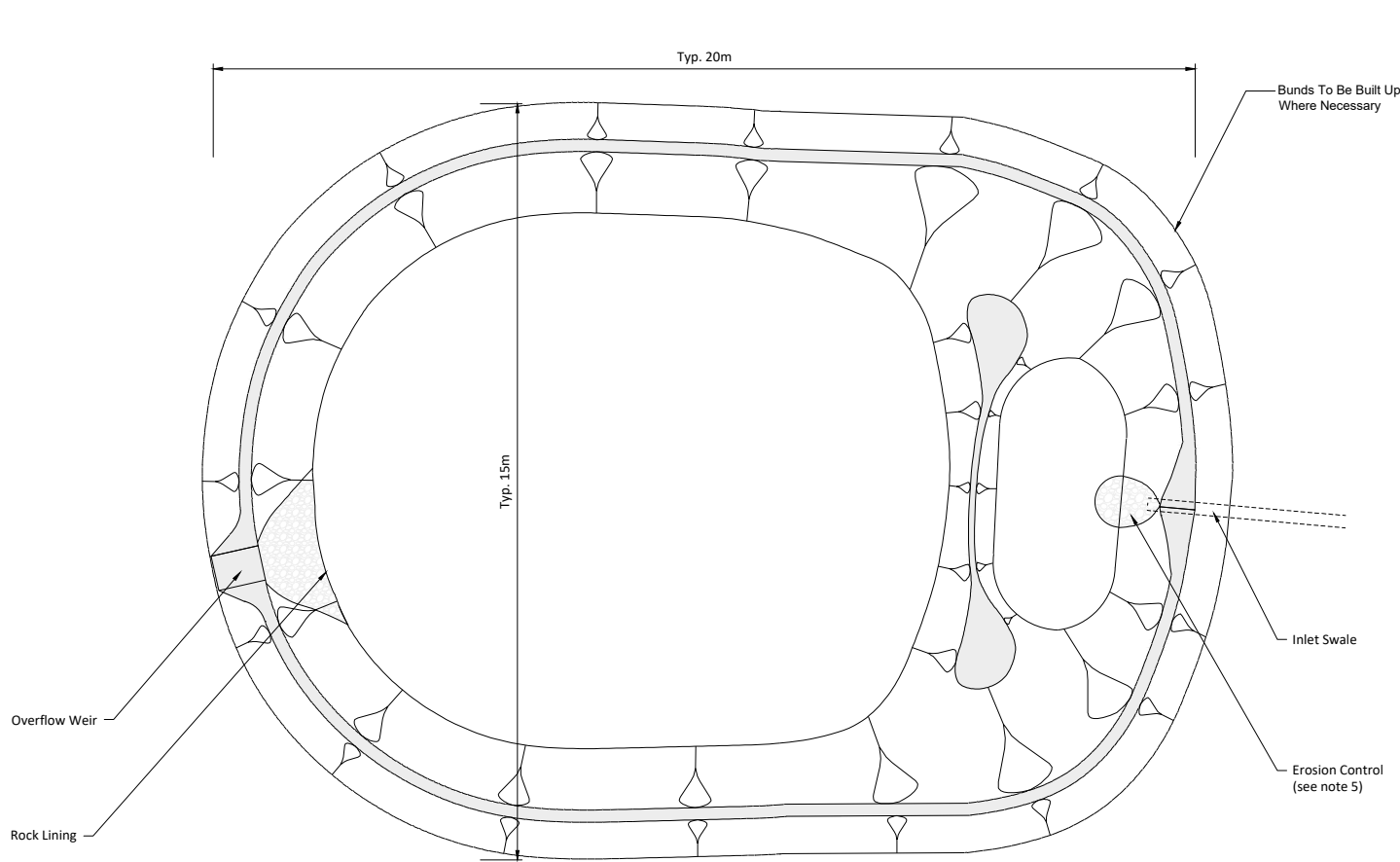
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ANNAGH WIND FARM EIAR	EMPOWER			
	Date	24.11.21	Project number	P2359
	Drawn by	POR	Drawing Number	P2359-0100-0004
	Checked by	TB	Rev	

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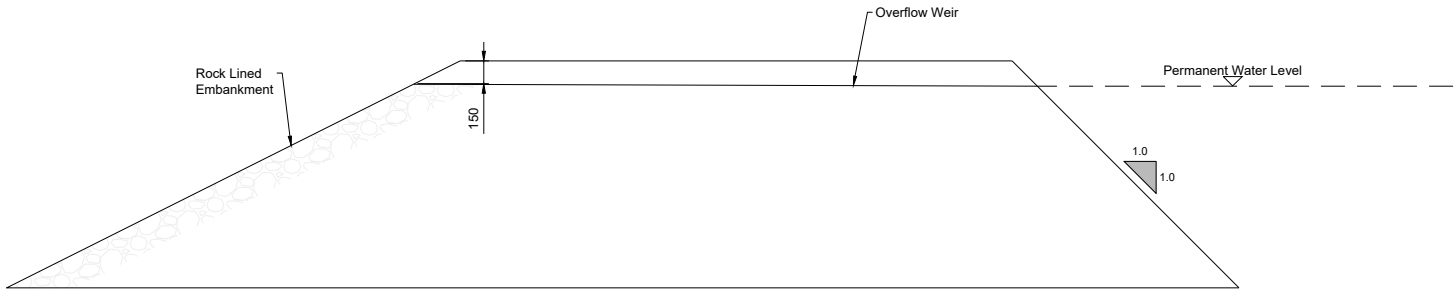
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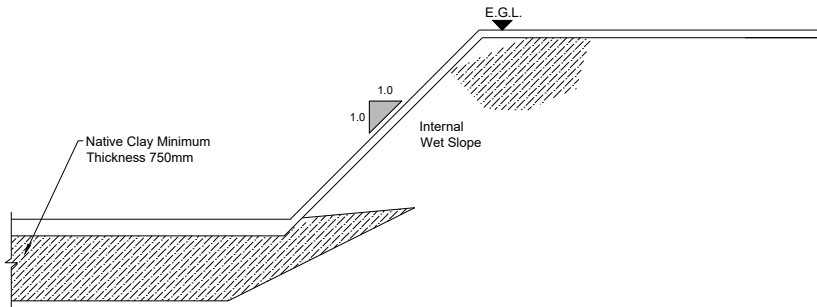
Wednesday 24
November 2021



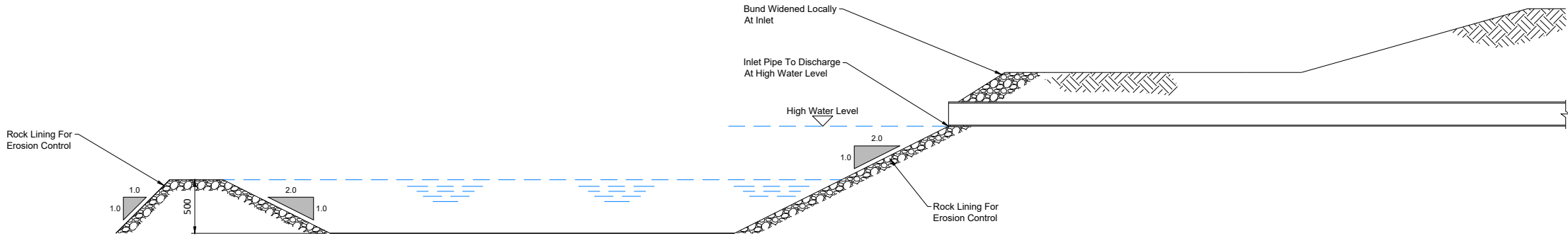
STILLING POND LAYOUT
Scale 1:150



SECTION AT OUTLET
Scale 1:50



**BUND CONSTRUCTION
(Where Pond is Below Ground Level)**
Scale 1:50



SECTION THROUGH FOREBAY
Scale 1:50

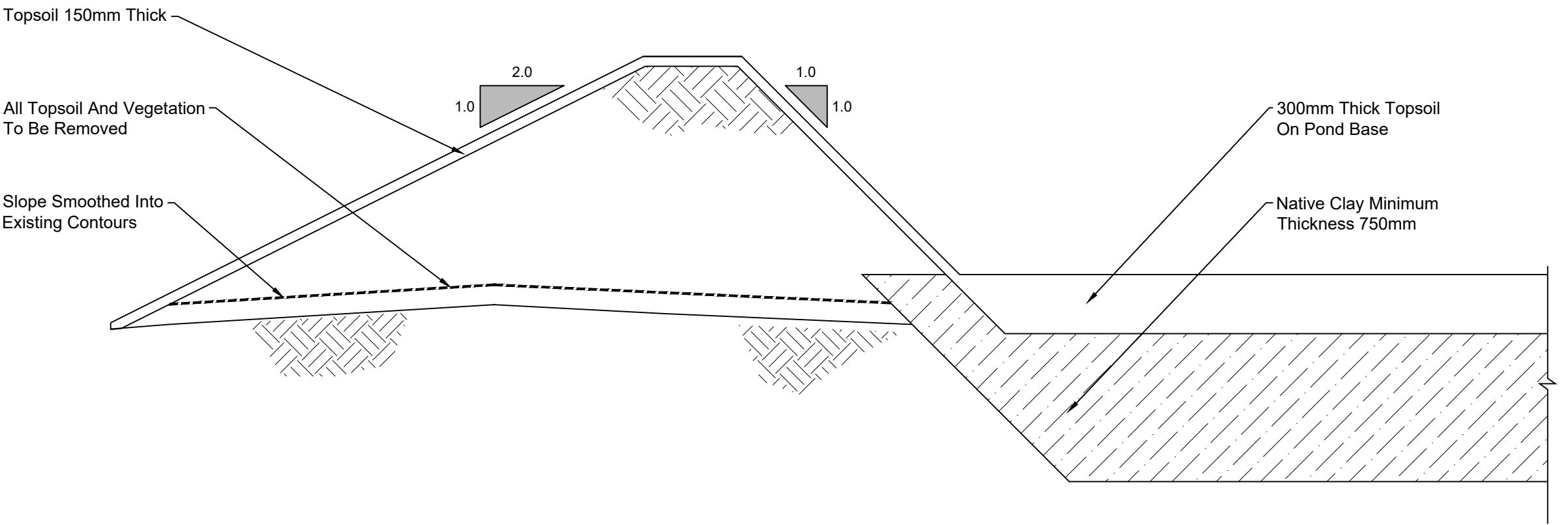
- NOTES**
1. This drawing should only be read in relation to subject of the title. Other information shown on drawing is to be considered indicative only.
 2. All dimensions are in millimetres unless otherwise stated.
 3. The pond base and sides below the permanent water level should be made impermeable by:
Cohesive material using native clay or a synthetic liner 1 mm LLDPE.
 4. Bunds in ponds to be constructed from native clay.
 5. Erosion control to be rock lining. Extent to be agreed on site.
 6. Rock lining to be a 125mm thickness of Class 1B material.
 7. Refer to stilling pond schedules for pond sizes.
 8. Swale inlet at 0.15 m below top of pond.
 9. All ponds to be fenced off.

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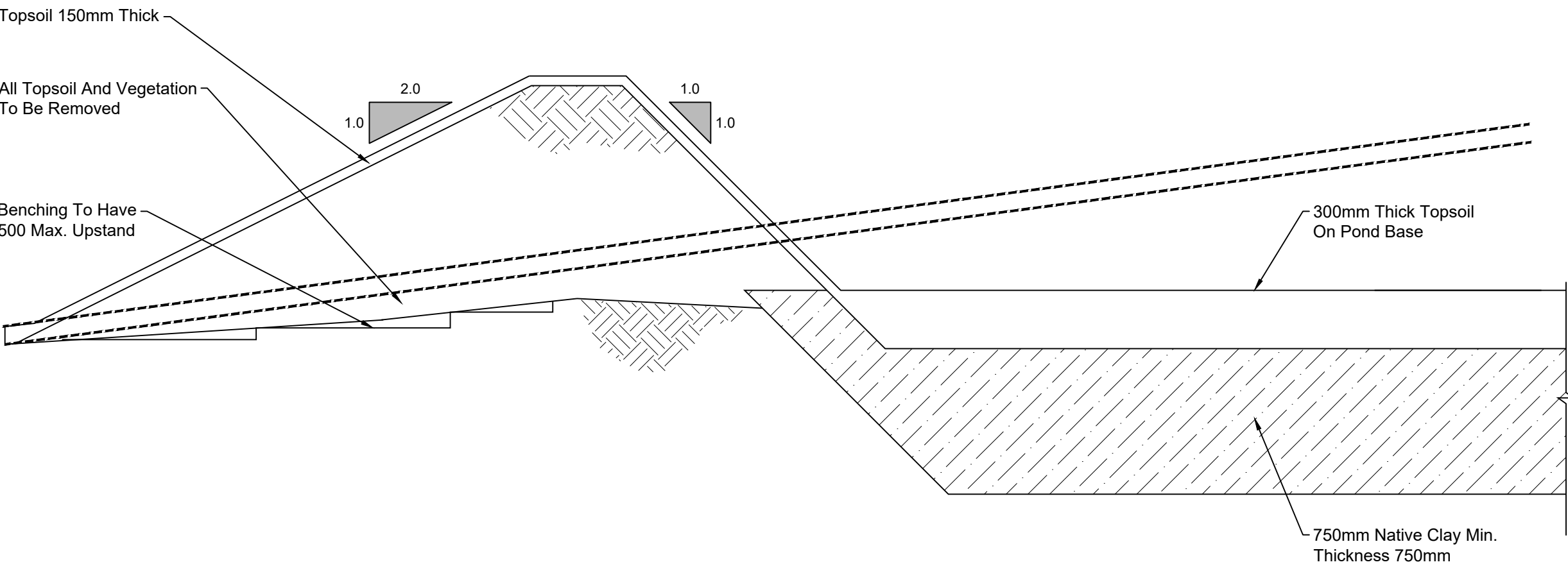
Rev.	Description	App By	Date
A	PLANNING	JH	24.11.21

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SHEET	Date 24.11.21	Project number P2359	Scale (@ A3) As Shown
SETTLEMENT POND DETAIL SHEET 1 OF 2	Drawn by POR	Drawing Number P2359-0501-0004	Rev A
	Checked by TB		

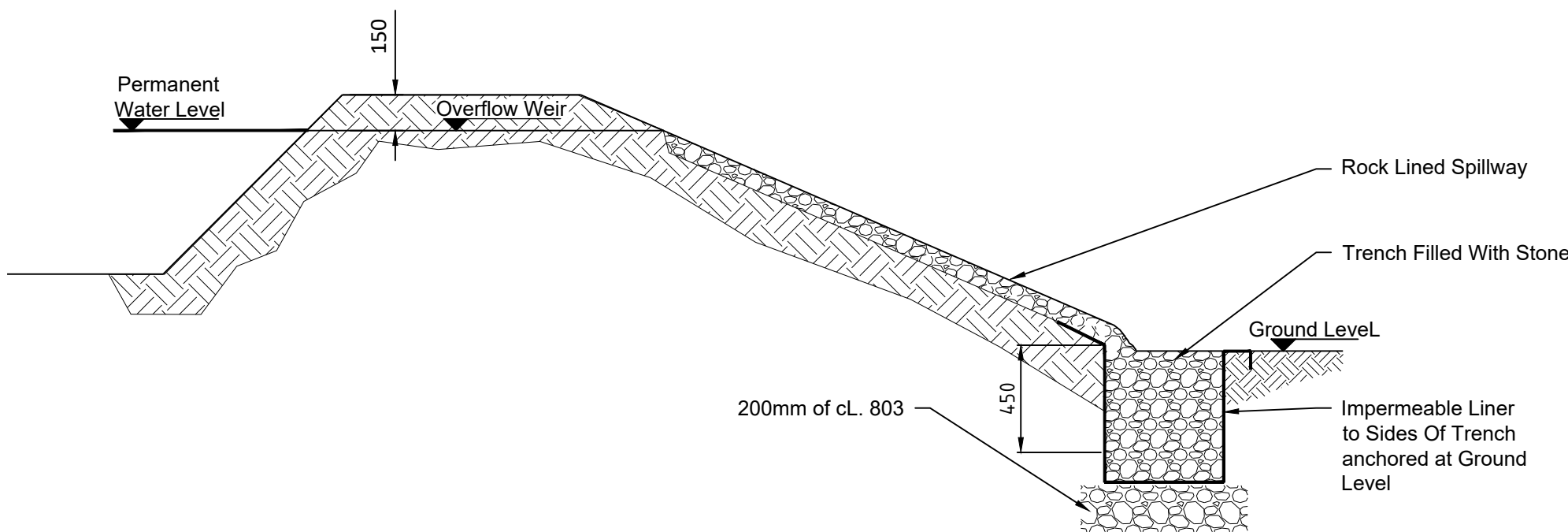
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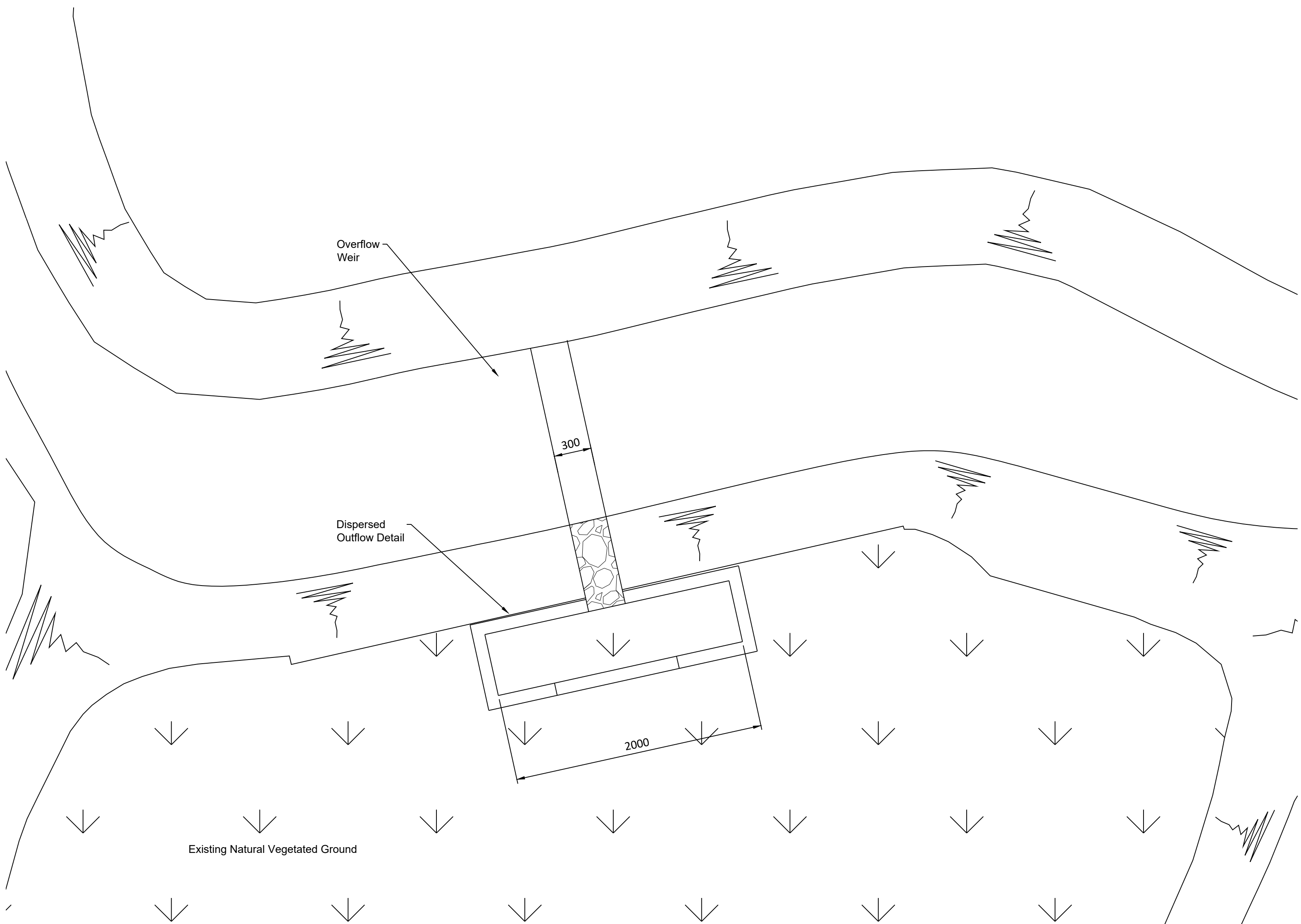
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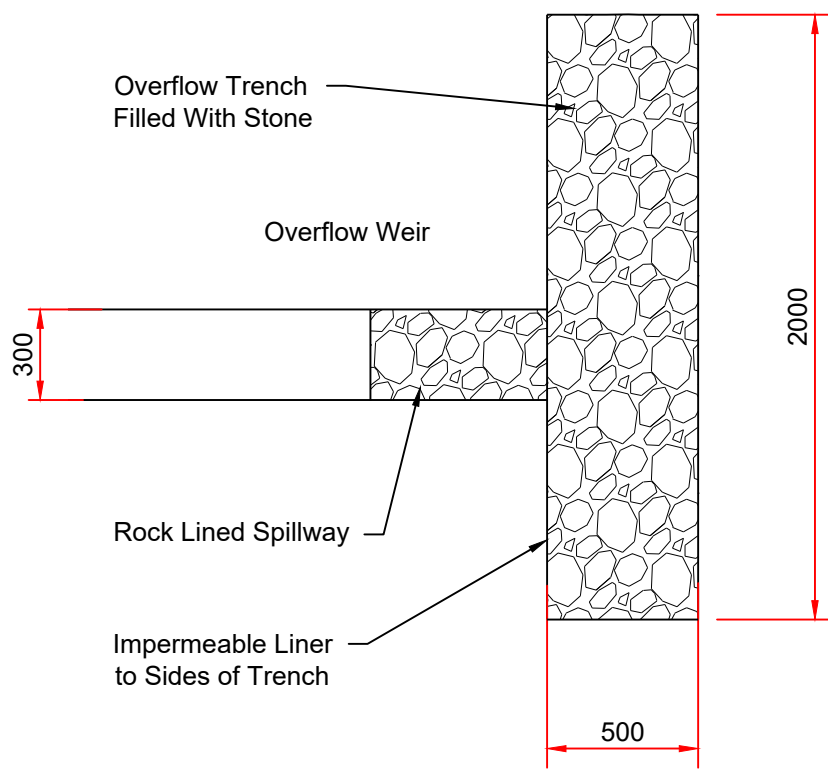
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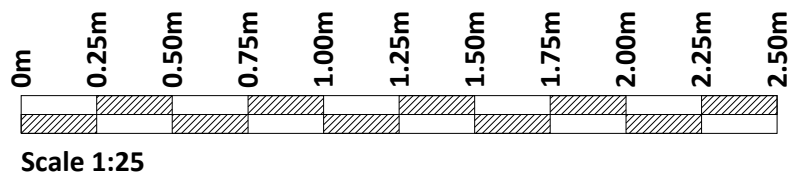
BUND CONSTRUCTION
Scale 1:25



PLAN OF POND OUTFALL DETAIL
Scale 1:25



PLAN
Scale 1:25

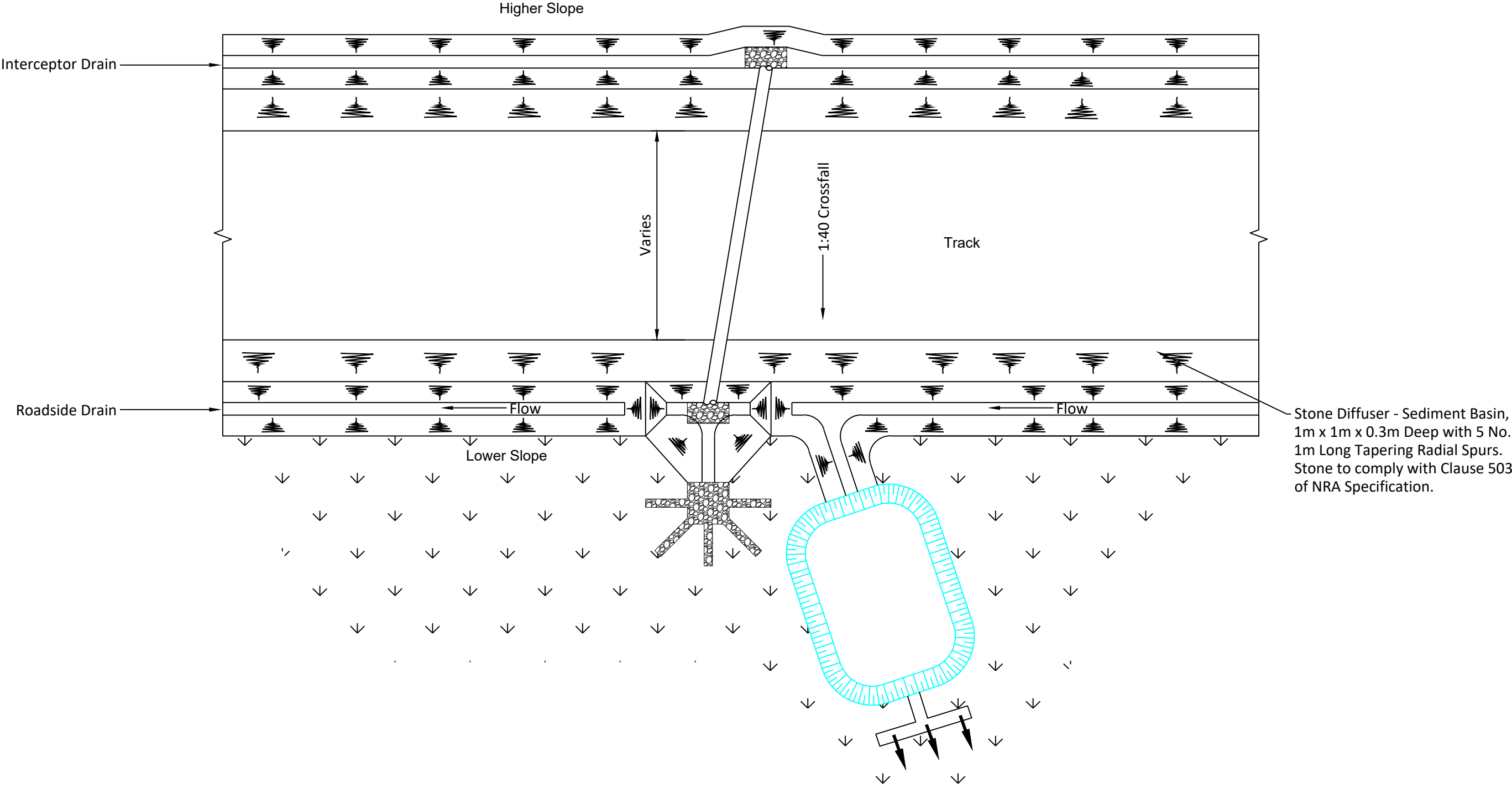


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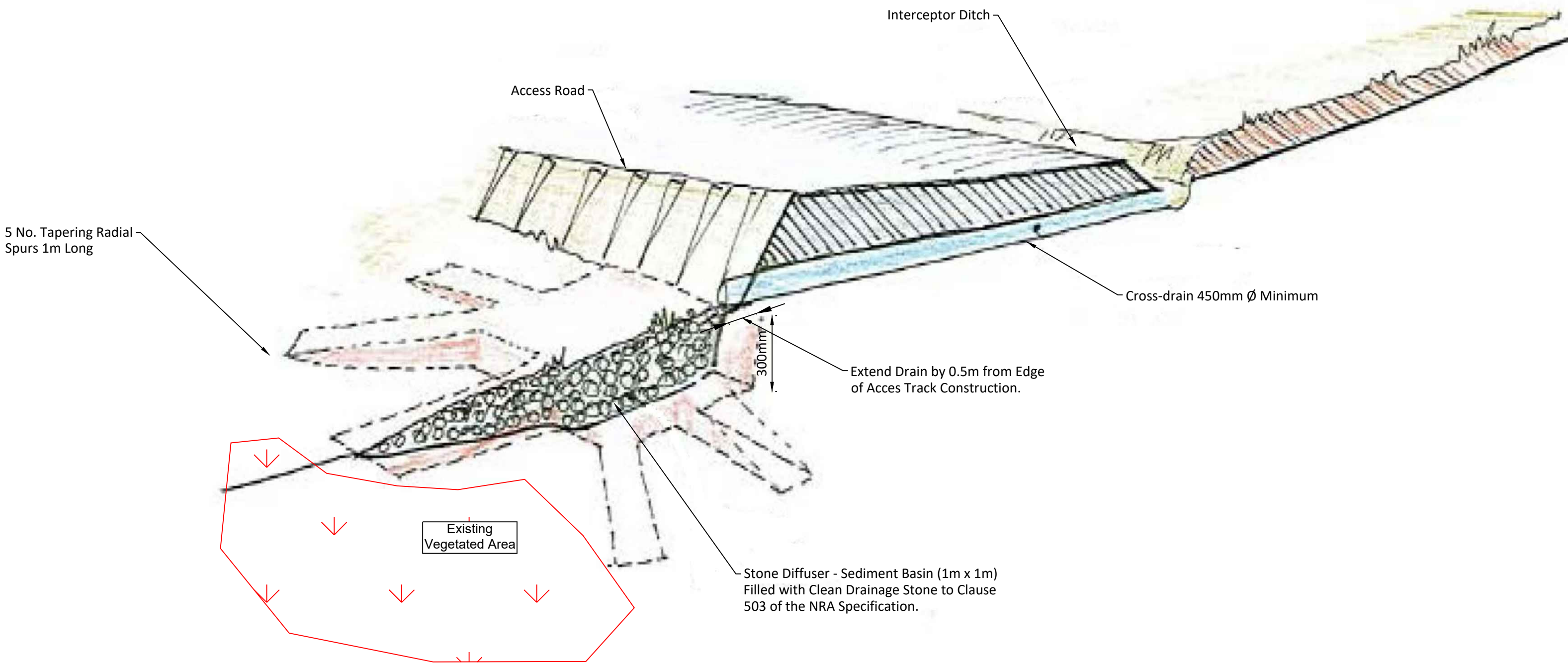
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A	PLANNING	JH	24.11.21

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SETTLEMENT POND DETAIL SHEET 2 OF 2	Drawn by POR	Drawing Number P2359-0501-0005	Rev A
	Checked by TB		

Note 1
Diffuse Outfall will be Provided at Suitable
Locations Determined on Site



**PLAN OF ACCESS TRACK CROSS DRAIN
WITH DIFFUSE OUTFALL DRAINAGE DETAILS (SEE NOTE 1)**
Scale 1:100



CROSS DRAIN WITH DIFFUSE OUTFALL DRAINAGE DETAIL (SEE NOTE 1)
Scale 1:25

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Rev.	Description	App By	Date
A	PLANNING	JH	24.11.21

PROJECT	CLIENT		
ANNAGH WIND FARM EIAR	EMPOWER		
SHEET	DETAIL OF CROSS DRAIN WITH DIFFUSE OUTFALL	Date 24.11.21 Drawn by POR Checked by TB	Project number P2359 Drawing Number P2359-0501-0006 Scale (@ A1) As Shown Rev A



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APPENDIX 7

Appendix 7.1 –
Noise Sensitive Location Details

Appendix 7.2 –
Night time Prevailing Noise

APPENDIX 7.1

NOISE SENSITIVE LOCATION DETAILS

Table A7-1: Noise sensitive location details

ID	Eircode	Eircode Type	Vacant (Y/N)?	Distance to closest Turbine	Turbine reference	ITM X	ITM Y
0	P51RP82	Commercial and Residential	N	2029.4	T04	548103	615896
1	P51FE03	Commercial and Residential	N	1603.7	T05	549686	615496
2	P51N8KN	Residential	N	977.3	T06	550246	616015
3	P51WC8V	Residential	N	949.4	T06	550187	616079
4	P51D8PE	Residential	N	790.1	T06	551204	616311
5	P51AD77	Commercial and Residential	N	1952.0	T06	552219	615705
6	P51KD00	Residential	N	1136.5	T05	549942	615917
7	P51NNW1	Residential	N	1250.7	T05	549915	615806
8	P51WKX0	Residential	N	1921.5	T05	549614	615186
9	P51C953	Residential	N	707.1	T06	550512	616206
10	P51YY09	Commercial and Residential	N	878.3	T06	550503	616033
11	P51K3KA	Residential	N	981.9	T05	550161	616057
12	P51XYF3	Residential	N	1136.5	T05	550050	615904
13	P51HX56	Commercial and Residential	N	2432.7	T05	549218	614782
14	P51P296	Commercial and Residential	N	2294.5	T04	548391	615306
15	P51F30A	Residential	N	1140.7	T05	550072	615899
16	P51D40W	Residential	N	2412.9	T06	549794	614647
17	P51Y63F	Residential	N	1823.3	T05	549629	615284
18	P51DDC0	Residential	N	1200.7	T05	549910	615857
19	P51E6AC	Residential	N	1776.0	T06	552087	615822
20	P51RW10	Commercial and Residential	N	1939.7	T06	551708	615255
21	P51A728	Commercial and Residential	N	1889.7	T06	551343	615128
22	P51KFX4	Residential	N	1135.6	T05	550023	615907

ID	Eircode	Eircode Type	Vacant (Y/N)?	Distance to closest Turbine	Turbine reference	ITM X	ITM Y
23	P51WTK4	Residential	N	725.8	T06	551256	616464
24	P51PNT3	Residential	Y	1128.5	T05	550099	615910
25	P51W299	Commercial and Residential	N	769.9	T06	551317	616474
26	P51T6DK	Residential	Y	709.0	T06	551284	616537
27	P51X256	Residential	Y	717.1	T06	551354	616674
28	P51HW2P	Residential	Y	1809.7	T06	552198	615923
29	P51V65Y	Residential	N	1824.3	T05	549804	615243
30	P51PEF8	Residential	Y	1028.8	T05	549993	616018
31	P51WV3K	Residential	N	1252.0	T05	549939	615800
32	P51V803	Residential	Y	1715.1	T04	549241	615570
33	P56V832	Residential	N	2632.8	T02	549356	620186
34	P56K251	Residential	N	2553.7	T02	549573	620168
35	P56PT82	Residential	N	2690.8	T02	549321	620236
36	P56R850	Residential	N	2694.6	T02	549294	620230
37	P56WD30	Residential	N	901.2	T02	549468	618217
38	P56D799	Residential	N	1251.2	T04	548557	617899
39	P56V436	Residential	N	1771.2	T04	548507	618618
40	P56YY61	Residential	N	3267.6	T02	547968	620078
41	P56KX52	Commercial and Residential	N	3038.1	T02	548165	619947
42	P56TF83	Residential	N	3184.4	T04	547348	619471
43	P56FH63	Residential	N	3115.2	T04	547620	619629
44	P56Y292	Residential	N	3029.1	T04	547641	619533
45	P56RT22	Residential	N	2707.6	T04	547503	618928
46	P56X590	Residential	N	3200.0	T04	547305	619449

ID	Eircode	Eircode Type	Vacant (Y/N)?	Distance to closest Turbine	Turbine reference	ITM X	ITM Y
47	P56D953	Residential	N	2743.8	T04	547674	619174
48	P56CX48	Residential	N	2614.7	T04	547429	618666
49	P56A091	Residential	N	1045.0	T04	549030	618103
50	P56FA02	Residential	N	1466.6	T04	548285	617846
51	P56PX98	Residential	N	3139.0	T02	548003	619933
52	P56K162	Residential	N	3098.5	T04	547741	619704
53	P56NY64	Commercial	N	3091.6	T04	547699	619662
54	P56NY22	Residential	N	3233.2	T04	547366	619558
55	P56XH99	Residential	N	1046.6	T02	549542	618506
56	P56RW02	Commercial and Residential	N	785.1	T02	549616	618216
57	P56W250	Residential	N	899.5	T02	549438	618168
58	P56Y519	Residential	N	1103.9	T04	548912	618087
59	P56E392	Commercial and Residential	N	999.7	T04	548956	617988
60	P56E120	Commercial and Residential	N	1181.2	T04	548676	617949
61	P56TX05	Residential	N	1293.6	T04	548514	617910
62	P56X373	Residential	N	1416.9	T04	548341	617847
63	P56YD61	Commercial and Residential	N	1371.5	T04	548265	617443
64	P56PX05	Commercial and Residential	N	2886.0	T04	547798	619479
65	P56V022	Residential	N	3039.2	T04	547666	619568
66	P56XN72	Residential	N	3101.3	T04	547772	619731
67	P56EP29	Residential	N	3054.3	T02	548189	619991
68	P56RH69	Residential	N	3052.7	T02	548276	620062
69	P56V090	Commercial and Residential	N	2945.5	T02	548715	620236
70	P56TD82	Residential	N	2611.5	T02	549559	620224

ID	Eircode	Eircode Type	Vacant (Y/N)?	Distance to closest Turbine	Turbine reference	ITM X	ITM Y
71	P56AT10	Residential	N	3135.2	T04	547867	619840
72	P56YY02	Commercial and Residential	N	3170.7	T04	547603	619687
73	P56TC67	Residential	Y	3172.4	T04	547387	619494
74	P56D850	Residential	N	3114.5	T04	547580	619594
75	P56N409	Residential	N	3087.8	T04	547844	619766
76	P56Y068	Commercial and Residential	N	2478.4	T02	548917	619812
77	P56Y300	Commercial and Residential	N	1165.1	T04	548838	618104
78	P56KC03	Residential	N	1418.7	T04	548203	617233
79	P56RC98	Residential	Y	3291.8	T04	547832	620005
80	P56YN12	Residential	N	3290.6	T04	547832	620003
81	P56YR70	Residential	N	2801.5	T04	547535	619111
82	P56FD21	Commercial and Residential	N	2266.8	T04	547667	618389
83	P56CT98	Residential	N	1660.7	T04	548047	617769
84	P56KW84	Commercial and Residential	N	1846.9	T04	547818	617639
85	P56XH92	Residential	N	2683.8	T04	547397	618743
86	P56KR53	Residential	N	2912.6	T02	548832	620263
87	P56KP23	Commercial	N	2505.3	T02	548428	619463
88	P51EP21	Commercial and Residential	N	864.7	T06	551533	616816
89	P56RT41	Residential	N	3022.0	T01	553278	619685
90	P56N521	Residential	N	3416.5	T03	554234	618502
91	P56CX73	Residential	N	3004.6	T03	553948	617908
92	P51TR63	Residential	N	819.5	T03	551791	617442
93	P56YE27	Commercial	N	3889.1	T01	554345	619577
94	P56XW95	Commercial	N	3797.9	T01	554132	619789

ID	Eircode	Eircode Type	Vacant (Y/N)?	Distance to closest Turbine	Turbine reference	ITM X	ITM Y
95	P56NP21	Residential	N	1640.2	T01	550642	619545
96	P56PA09	Residential	N	1159.3	T01	551745	618625
97	P56FX46	Residential	N	1082.0	T01	551891	618119
98	P56ET78	Residential	N	1267.6	T01	552050	618253
99	P56TV25	Commercial and Residential	N	2162.5	T03	553115	617780
100	P56TN52	Residential	N	2328.7	T01	552575	619456
101	P56HW84	Residential	N	1845.5	T01	552008	619335
102	P56Y072	Residential	N	1758.5	T01	551906	619305
103	P51WKK0	Residential	N	794.3	T03	551763	617403
104	P56N773	Residential	N	3453.0	T03	554240	618603
105	P56HR40	Residential	N	2811.2	T01	553044	619646
106	P56CY50	Residential	Y	2836.1	T01	553070	619654
107	P56X621	Residential	N	3393.7	T01	553806	619545
108	P56KH97	Commercial	N	2000.4	T03	552859	618153
109	P56K188	Residential	N	2354.4	T01	552617	619447
110	P56A470	Residential	N	858.3	T02	549760	618429
111	P56HH52	Residential	N	934.3	T02	549717	618492
112	P56HX89	Residential	N	2193.7	T01	552966	618410
113	P56TK50	Residential	N	2153.5	T03	553076	617948
114	P56DR94	Commercial	N	1739.6	T03	552580	618152
115	P56EA24	Commercial and Residential	N	949.9	T03	551819	617916
116	P56C894	Commercial	Y	3439.7	T01	553779	619684
117	P56DD79	Commercial	N	2831.2	T01	552674	620062
118	P51HF8R	Residential	N	746.6	T03	551700	617316

ID	Eircode	Eircode Type	Vacant (Y/N)?	Distance to closest Turbine	Turbine reference	ITM X	ITM Y
119	P56HF30	Residential	N	4035.4	T01	554340	619904
120	P56YD52	Residential	N	2862.2	T01	553103	619653
121	P56RR71	Residential	N	3050.4	T01	553326	619667
122	P56K209	Residential	N	3066.6	T01	553344	619670
123	P56AT81	Residential	N	3097.8	T01	553401	619641
124	P56Y036	Residential	N	3136.0	T01	553454	619631
125	P56CH93	Residential	Y	3191.6	T01	553529	619616
126	P56VP82	Residential	Y	3465.8	T01	553852	619610
127	P56X094	Commercial	Y	3812.0	T01	554253	619591
128	P56E128	Residential	N	2181.5	T03	553147	617662
129	P56YH34	Residential	N	2160.8	T03	553125	617679
130	P56XY80	Residential	N	2182.5	T03	553143	617720
131	P51A373	Commercial and Residential	N	694.0	T03	551564	617121
132	P51ER84	Residential	N	861.0	T03	551834	617480
133	P56TD95	Commercial and Residential	N	1112.3	T03	551938	618039
134	P56Y763	Residential	N	1101.9	T01	551902	618165
135	P56YV70	Residential	N	1122.7	T01	551705	618617
136	P56WK02	Residential	N	1256.0	T01	551963	618454
137	P56TY44	Residential	N	1205.0	T01	552006	618171
138	P56X231	Residential	N	1427.3	T03	552248	618127
139	P56V562	Residential	N	1461.7	T03	552283	618133
140	P56A431	Residential	N	1720.4	T03	552560	618149
141	P56E409	Residential	N	2049.1	T03	552928	618099
142	P56R274	Residential	N	2171.2	T01	552906	618547

ID	Eircode	Eircode Type	Vacant (Y/N)?	Distance to closest Turbine	Turbine reference	ITM X	ITM Y
143	P56F201	Residential	N	2138.0	T01	552874	618538
144	P56Y678	Residential	N	2093.2	T01	552819	618563
145	P56WV74	Residential	N	2137.1	T01	552804	618732
146	P56P403	Residential	N	2318.6	T01	552741	619227
147	P56Y431	Residential	N	2327.0	T01	552737	619247
148	P56RK35	Residential	N	2339.1	T01	552736	619269
149	P56C579	Residential	N	2749.5	T01	552826	619805
150	P56WK82	Residential	N	2669.3	T01	552819	619695
151	P56X772	Commercial	N	2596.7	T01	552861	619532
152	P56X772	Commercial	N	2596.7	T01	552861	619532
153	P56X772	Commercial	N	2596.7	T01	552861	619532
154	P56X772	Commercial	N	2596.7	T01	552861	619532
155	P56N153	Residential	N	2949.3	T03	553864	618069
156	P56DP22	Commercial and Residential	N	3320.8	T03	554097	618611
157	P56A363	Residential	N	3399.5	T03	554154	618684
158	P56D259	Residential	N	3429.0	T03	554173	618717
159	P56TW84	Commercial and Residential	N	3450.3	T03	554184	618748
160	P56T663	Commercial and Residential	N	3515.5	T01	554153	619057
161	P56E653	Residential	N	3690.1	T01	554263	619266
162	P56VX20	Commercial and Residential	N	1757.0	T03	552620	618096
163	P56X862	Commercial and Residential	N	2059.5	T01	552795	618526
164	P56H277	Residential	Y	2405.9	T01	553012	618926
165	P56D400	Residential	N	2660.4	T01	552821	619679
166	P56AE76	Residential	N	3038.6	T01	553311	619667

ID	Eircode	Eircode Type	Vacant (Y/N)?	Distance to closest Turbine	Turbine reference	ITM X	ITM Y
167	P56RX63	Residential	N	3117.4	T01	553424	619643
168	P56V265	Commercial and Residential	N	3518.7	T03	554383	618354
169	P56K239	Commercial	N	3482.9	T03	554197	618802
170	P56TD98	Residential	N	2193.1	T03	553160	617642
171	P56F884	Residential	N	1234.3	T03	552203	617592
172	P56HP79	Residential	N	1094.6	T01	551573	618719
173	P56V028	Residential	N	1459.9	T01	552268	618161
174	P56N257	Residential	Y	2893.8	T03	553814	618038
175	P56HC93	Residential	N	888.9	T01	550364	618674
176	P56XE97	Residential	N	828.8	T02	550042	618506
177	P56H635	Residential	N	952.6	T02	549786	618550
178	P56NC84	Residential	N	895.4	T02	549848	618516
179	P56RP86	Commercial and Residential	N	2437.6	T01	549760	620107
180	P56CF99	Residential	N	2344.4	T01	552592	619460
181	P56D324	Residential	N	2022.0	T01	552154	619443
182	P56NV67	Residential	N	2032.7	T01	552149	619461
183	P56Y097	Residential	N	2030.1	T01	552151	619456
184	P56V242	Residential	N	1606.0	T01	552053	618955
185	P56HD89	Residential	N	1817.6	T01	551921	619368
186	P56HW08	Residential	N	1699.4	T01	551838	619283
187	P56XN29	Commercial and Residential	N	1766.7	T01	551727	619437
188	P56VE25	Commercial and Residential	N	1039.2	T01	551202	618886
189	P56E791	Residential	N	1031.5	T01	550903	618945
190	P56N978	Residential	N	1025.9	T01	550879	618940

ID	Eircode	Eircode Type	Vacant (Y/N)?	Distance to closest Turbine	Turbine reference	ITM X	ITM Y
191	P56NH96	Commercial and Residential	N	710.9	T01	550649	618604
192	P56YY36	Residential	Y	1960.3	T01	550478	619845
193	P56WP96	Residential	N	1719.2	T01	550646	619625
194	P56DP60	Residential	N	1675.8	T01	550597	619575
195	P56R672	Residential	N	1386.2	T01	550831	619302
196	P56AE00	Commercial and Residential	N	1371.4	T01	550681	619279
197	P56PC93	Residential	N	1077.1	T01	551644	618620
198	P56XH94	Commercial and Residential	N	2141.7	T01	550048	619910
199	P56DT85	Commercial and Residential	N	1460.4	T01	550595	619357
200	P56XF24	Residential	N	2162.8	T01	552370	619433
201	P56D793	Residential	N	2320.4	T01	552557	619463
202	P56NY73	Residential	N	2149.0	T01	552352	619431
203	P56KX77	Residential	N	2060.1	T01	552217	619438
204	P56X499	Residential	N	1986.5	T01	552177	619375
205	P56KD85	Residential	N	2026.4	T01	552151	619451
206	P56D923	Residential	N	1877.4	T01	551987	619393
207	P56KH70	Commercial	N	1797.5	T01	551898	619360
208	P56WD92	Commercial and Residential	N	1322.5	T01	551311	619147
209	P56HY11	Residential	N	888.9	T01	550516	618748
210	P56KR44	Residential	N	911.9	T02	549760	618491
211	P56FY76	Residential	N	1098.0	T01	551826	618375
212	P56DX08	Residential	N	3367.2	T01	553707	619662
213	P56K376	Residential	Y	1822.8	T01	551979	619329
214	P56A660	Residential	N	2121.8	T01	552326	619419

ID	Eircode	Eircode Type	Vacant (Y/N)?	Distance to closest Turbine	Turbine reference	ITM X	ITM Y
215	P56HE18	Commercial	N	3068.3	T01	553319	619708
216	P56Y978	Commercial	N	1079.6	T01	551810	618364
217	P56TX28	Commercial	N	3116.1	T01	553442	619612
218	P56EK11	Residential	N	1592.0	T01	550657	619499
219	P56XR57	Residential	N	1077.9	T01	550984	618982
220	P56PC66	Residential	N	2029.2	T01	552224	619389
221	P56KC99	Residential	N	2871.9	T01	551309	620747
222	P56YK64	Commercial and Residential	N	2828.5	T01	551909	620529
223	P56HE16	Residential	N	2790.3	T01	551760	620546
224	P56WE41	Residential	N	2559.4	T01	550459	620448
225	P56EV18	Residential	N	2461.6	T01	550102	620268
226	P56PT63	Residential	N	2509.6	T01	549859	620231
227	P56TN66	Commercial	N	2588.3	T01	551727	620343
228	P56TW60	Residential	Y	2865.3	T01	551951	620552
229	P56VP11	Commercial and Residential	N	2637.4	T01	551742	620390
230	P56DR64	Residential	N	2855.1	T01	551794	620603
231	P56FW95	Commercial and Residential	N	2898.6	T01	552028	620554
232	P56DY70	Commercial and Residential	N	3019.2	T01	551415	620877
233	P56KP46	Residential	Y	2663.3	T01	550648	620573
234	P56DX37	Commercial and Residential	N	2619.2	T01	550950	620532
235	P56XR24	Residential	N	2507.9	T01	550097	620315
236	P56KP99	Residential	N	2553.3	T01	550437	620439
237	P56C653	Residential	Y	2593.0	T01	550833	620509
238	P56HH87	Residential	N	2805.4	T01	551008	620715

ID	Eircode	Eircode Type	Vacant (Y/N)?	Distance to closest Turbine	Turbine reference	ITM X	ITM Y
239	P56VH26	Residential	N	2845.2	T01	551516	620677
240	P56N735	Residential	N	4179.8	T01	553121	621411
241	P56X991	Residential	N	4204.7	T01	553121	621441
242	P56HD39	Residential	N	4283.7	T01	553115	621538
243	P56RF70	Residential	N	4134.9	T01	553111	621364
244	P56DX97	Residential	N	4111.7	T01	553111	621336
245	P56ER89	Residential	N	4724.5	T01	553720	621652
246	P56T213	Residential	N	4698.8	T01	553767	621583
247	P56E042	Residential	N	4685.0	T01	553731	621593
248	P56K261	Residential	N	4644.6	T01	553697	621569
249	P56W863	Residential	N	4654.3	T01	553683	621592
250	P56ER04	Residential	N	4669.4	T01	553674	621618
251	P56D883	Residential	N	4696.3	T01	553671	621654
252	P56TK44	Residential	N	4711.8	T01	553659	621683
253	P56C960	Residential	N	4763.1	T01	553632	621766
254	P56RR20	Residential	N	4707.4	T01	553723	621628
255	P56AR24	Residential	N	4710.5	T01	553738	621621
256	P56XT44	Residential	N	4702.5	T01	553741	621608
257	P56Y932	Residential	N	3185.7	T01	552568	620585
258	P56H714	Residential	N	3669.5	T01	552959	620903
259	P56F984	Commercial and Residential	N	4719.1	T01	554340	621068
260	P56T354	Residential	N	4641.8	T01	554342	620949
261	P56ND37	Residential	N	4700.3	T01	553668	621662
262	P56EY62	Residential	N	4693.2	T01	553671	621650

ID	Eircode	Eircode Type	Vacant (Y/N)?	Distance to closest Turbine	Turbine reference	ITM X	ITM Y
263	P56HY79	Residential	N	4234.8	T01	553130	621471
264	P56TY01	Residential	N	3011.6	T01	552400	620485
265	P56P386	Residential	N	4241.8	T01	553974	620761
266	P56W674	Residential	N	4307.6	T01	553991	620840
267	P56YX02	Residential	N	4420.3	T01	553945	621050
268	P56D650	Residential	N	4549.9	T01	554368	620775
269	P56WR59	Residential	N	4472.2	T01	553106	621764
270	P56RT96	Residential	N	4578.8	T01	553172	621849
271	P56R972	Residential	N	4509.8	T01	553135	621791
272	P56VX86	Residential	N	4811.5	T01	553627	621830
273	P56Y651	Residential	N	4789.2	T01	553642	621791
274	P56TN56	Residential	N	4803.5	T01	553694	621771
275	P56DK85	Residential	N	4785.3	T01	553699	621745
276	P56DH31	Residential	N	4771.5	T01	553704	621724
277	P56WD98	Residential	N	4755.7	T01	553710	621699
278	P56F577	Residential	N	4741.1	T01	553713	621678
279	P56KR65	Residential	N	4579.6	T01	553732	621457
280	P56DD80	Residential	N	4855.8	T01	553733	621807
281	P56NC83	Residential	N	4852.9	T01	553736	621801
282	P56FX30	Residential	N	4843.9	T01	553748	621781
283	P56TK46	Residential	N	4850.1	T01	553754	621784
284	P56YY68	Residential	N	4856.6	T01	553760	621788
285	P56R940	Residential	N	4863.2	T01	553766	621791
286	P56DP83	Residential	N	4868.9	T01	553773	621794

ID	Eircode	Eircode Type	Vacant (Y/N)?	Distance to closest Turbine	Turbine reference	ITM X	ITM Y
287	P56ED99	Residential	N	4860.1	T01	553764	621789
288	P56VX29	Residential	N	4881.0	T01	553790	621795
289	P56NP52	Residential	N	4878.2	T01	553793	621790
290	P56YA34	Residential	N	4876.4	T01	553796	621785
291	P56AX79	Residential	N	4873.4	T01	553797	621781
292	P56X253	Residential	N	4871.7	T01	553799	621777
293	P56TP62	Residential	N	4869.0	T01	553802	621771
294	P56PP98	Residential	N	4852.4	T01	553798	621753
295	P56FC43	Residential	Y	4847.2	T01	553793	621750
296	P56E264	Residential	N	4841.6	T01	553788	621748
297	P56PF58	Residential	N	4836.6	T01	553783	621745
298	P56E183	Residential	N	4832.0	T01	553779	621742
299	P56AW62	Residential	N	4826.2	T01	553774	621739
300	P56WV18	Residential	N	4872.5	T01	553747	621818
301	P56AX57	Residential	N	4883.1	T01	553757	621824
302	P56VY99	Residential	N	4895.9	T01	553765	621833
303	P56XV66	Residential	N	4904.2	T01	553773	621838
304	P56FR83	Residential	N	4918.0	T01	553781	621848
305	P56E932	Residential	N	4919.1	T01	553796	621839
306	P56WY83	Residential	N	4918.4	T01	553800	621835
307	P56RH79	Residential	N	4915.1	T01	553804	621828
308	P56RC53	Residential	N	4913.7	T01	553807	621824
309	P56NX65	Residential	N	4910.6	T01	553812	621816
310	P56H668	Residential	N	4908.6	T01	553815	621811

ID	Eircode	Eircode Type	Vacant (Y/N)?	Distance to closest Turbine	Turbine reference	ITM X	ITM Y
311	P56XK03	Residential	N	4905.5	T01	553820	621804
312	P56X096	Residential	N	4904.8	T01	553823	621800
313	P56A489	Residential	N	4900.9	T01	553827	621792
314	P56XY44	Residential	N	4899.5	T01	553833	621786
315	P56VR62	Residential	N	4896.7	T01	553836	621780
316	P56YK50	Residential	N	4895.3	T01	553840	621775
317	P56T291	Residential	N	4223.5	T01	554079	620613
318	P56HW72	Residential	Y	4377.3	T01	553926	621009
319	P56HP20	Residential	N	4689.2	T01	553670	621646
320	P56HX96	Residential	N	4710.2	T01	553754	621607
321	P56PD78	Residential	N	4710.6	T01	553638	621697
322	P56KT54	Residential	N	3771.3	T01	553096	620930
323	P56X588	Residential	N	3559.1	T01	553016	620723
324	P56KX00	Residential	N	4694.8	T01	554397	620967
325	P56X795	Residential	N	4655.5	T01	554335	620978
326	P56A267	Residential	N	4250.0	T01	554402	620216
327	P56PW30	Residential	N	4236.7	T01	554410	620178
328	P56VY02	Residential	N	4675.1	T01	554330	621014
329	P56TC96	Residential	N	4472.9	T01	554422	620579
330	P56H273	Residential	N	4527.7	T01	554416	620678
331	P56T993	Residential	N	4370.3	T01	554367	620481
332	P56DF88	Residential	Y	4589.8	T01	554413	620782
333	P56WN47	Commercial	N	4042.2	T01	553164	621215
334	P56RW35	Residential	N	4421.7	T01	554358	620579

ID	Eircode	Eircode Type	Vacant (Y/N)?	Distance to closest Turbine	Turbine reference	ITM X	ITM Y
335	P56AE93	Residential	N	4555.1	T01	553840	621334
336	P56CD53	Commercial	N	4607.0	T01	553870	621376
337	P56CH74	Residential	N	4799.4	T01	554360	621166
338	P56PK11	Residential	N	4613.0	T01	554335	620913
339	P56F953	Residential	N	4578.6	T01	554342	620851
340	P56Y662	Residential	N	4503.0	T01	554336	620739
341	P56VF61	Residential	N	4400.7	T01	554359	620543
342	P56N227	Residential	N	4569.3	T01	554411	620752
343	P56RV07	Residential	N	4554.1	T01	554412	620726
344	P56A894	Residential	N	4541.4	T01	554415	620702
345	P56P208	Residential	N	4364.2	T01	554380	620451
346	P56W568	Residential	N	4346.1	T01	554384	620415
347	P56AP84	Residential	N	4044.2	T01	554171	620192
348	P56EA06	Commercial and Residential	N	4185.3	T01	554131	620487
349	P56DR72	Residential	N	4245.1	T01	554025	620709
350	P56E370	Residential	N	4605.5	T01	553789	621444
351	P56A377	Residential	N	3994.4	T01	553139	621174
352	P56V902	Residential	N	3510.3	T01	552900	620749
353	P56RR68	Residential	N	3453.6	T01	552939	620649
354	P56N406	Commercial and Residential	N	3279.2	T01	552681	620621
355	P56XR20	Commercial and Residential	N	3289.2	T01	552404	620803
356	P56T860	Residential	N	3029.5	T01	552436	620484
357	P56K033	Residential	N	2994.2	T01	552363	620487
358	P56F512	Residential	Y	3013.0	T01	552314	620537

ID	Eircode	Eircode Type	Vacant (Y/N)?	Distance to closest Turbine	Turbine reference	ITM X	ITM Y
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360	P56KV63	Residential	N	2872.6	T01	552082	620500
361	P56E797	Commercial	N	4233.3	T01	554038	620676
362	P56E727	Residential	N	4569.9	T01	553817	621373
363	P56C840	Residential	N	4582.1	T01	553810	621395
364	P56YD66	Residential	N	4598.0	T01	553770	621450
365	P56ET20	Residential	N	4330.5	T01	553179	621553
366	P56D232	Residential	N	4027.2	T01	553153	621204
367	P56A342	Residential	N	3939.5	T01	553112	621126
368	P56F761	Residential	N	3760.2	T01	552994	620990
369	P56H397	Residential	N	3736.0	T01	552983	620968
370	P56FK18	Residential	N	3722.7	T01	552930	620988
371	P56DY00	Residential	N	3534.5	T01	552895	620783
372	P56K257	Residential	Y	3401.1	T01	552624	620805
373	P56X544	Residential	N	3046.5	T01	552400	620526
374	P56A308	Residential	N	3002.8	T01	552282	620543
375	P56XD90	Residential	N	4564.7	T01	554345	620826
376	P56NV97	Residential	N	4573.9	T01	554397	620776
377	P56Y048	Residential	N	4385.5	T01	554361	620514
378	P56F209	Commercial and Residential	N	4002.9	T01	554118	620196
379	P56N266	Residential	N	4332.4	T01	554395	620376
380	P56X959	Residential	N	4099.8	T01	553163	621286
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382	P56K406	Commercial	N	4222.7	T01	554064	620629

ID	Eircode	Eircode Type	Vacant (Y/N)?	Distance to closest Turbine	Turbine reference	ITM X	ITM Y
383	P56RP44	Commercial	N	4368.5	T01	554348	620503
384	P56TX61	Residential	N	4764.3	T01	553118	622094
385	P56AK25	Commercial and Residential	N	4472.3	T01	552875	621892
386	P56E864	Residential	N	4522.7	T01	552799	621987
387	P56VK02	Residential	N	4659.7	T01	553238	621904
388	P56VF63	Residential	N	4641.8	T01	553223	621892
389	P56ND62	Residential	N	4623.1	T01	553206	621881
390	P56HX23	Residential	N	4825.5	T01	553351	622029
391	P56P027	Residential	N	4839.9	T01	553406	622012
392	P56FV09	Residential	N	4778.8	T01	553343	621980
393	P56TR50	Residential	N	4796.4	T01	553313	622019
394	P56HH60	Residential	N	4787.0	T01	553350	621985
395	P56EP83	Residential	N	4846.8	T01	553415	622015
396	P56D886	Residential	N	4864.5	T01	553620	621900
397	P56HX07	Residential	N	4850.1	T01	553621	621881
398	P56TF43	Residential	N	4835.9	T01	553627	621860
399	P56A628	Residential	N	4923.8	T01	553786	621853
400	P56C972	Commercial and Residential	N	4859.4	T01	553476	621990
401	P56P996	Residential	N	4121.7	T01	554545	619698
402	P56KF78	Commercial	N	4074.5	T01	554545	619587
403	P56PH12	Residential	N	4335.9	T01	554775	619711
404	P56V189	Residential	N	4030.3	T01	554573	619407
405	P56NX56	Residential	N	4178.8	T01	554778	619280
406	P56C580	Residential	N	4023.4	T01	554581	619367

ID	Eircode	Eircode Type	Vacant (Y/N)?	Distance to closest Turbine	Turbine reference	ITM X	ITM Y
407	P56KX88	Residential	N	4303.9	T01	554745	619699
408	P56AP20	Commercial	N	4055.7	T01	554504	619629
409	P56PF67	Residential	N	4621.8	T01	554438	620802
410	P56E670	Residential	Y	4329.5	T01	554488	620229
411	P56KH28	Residential	N	4311.2	T01	554480	620208
412	P56DX68	Residential	Y	4295.1	T01	554497	620149
413	P56FN88	Residential	N	4276.4	T01	554506	620099
414	P56EY18	Commercial and Residential	N	4290.3	T01	554571	620014
415	P56XV76	Residential	N	4202.2	T01	554518	619926
416	P56FW98	Residential	N	4182.9	T01	554527	619870
417	P56FP65	Residential	N	4168.2	T01	554530	619833
418	P56AE44	Residential	N	4154.7	T01	554533	619796
419	P56F433	Residential	N	4028.9	T01	554473	619634
420	P56D927	Residential	N	4003.2	T01	554447	619628
421	P56KF82	Residential	N	4373.0	T01	554811	619721
422	P56YK85	Residential	N	4207.9	T01	554628	619724
423	P56KN26	Residential	N	4157.2	T01	554576	619715
424	P56HX70	Residential	N	4179.8	T01	554600	619718
425	P56H309	Residential	N	3915.3	T01	554599	618972
426	P56RT62	Residential	N	4063.6	T01	554562	619520
427	P56RW21	Residential	N	4051.2	T01	554565	619481
428	P56N594	Residential	N	4008.5	T01	554578	619332
429	P56KR90	Residential	Y	3987.7	T01	554583	619258
430	P56K447	Residential	N	3927.9	T01	554544	619189

ID	Eircode	Eircode Type	Vacant (Y/N)?	Distance to closest Turbine	Turbine reference	ITM X	ITM Y
431	P56AR23	Residential	N	3914.3	T01	554547	619137
432	P56ND83	Commercial and Residential	N	3974.5	T01	554608	619144
433	P56Y952	Residential	N	4278.5	T01	554721	619691
434	P56X205	Residential	N	4339.6	T01	554486	620251
435	P56KN60	Residential	N	4287.2	T01	554502	620126
436	P56C990	Residential	N	4191.5	T01	554524	619893
437	P56P443	Residential	N	4138.3	T01	554540	619745
438	P56A978	Residential	N	3982.6	T01	554426	619624
439	P56DE44	Residential	N	4172.8	T01	554660	619568
440	P56HP76	Residential	N	3992.4	T01	554514	619451
441	P56PY68	Residential	N	3947.7	T01	554545	619245
442	P56TV04	Residential	N	3906.7	T01	554556	619086
443	P56X512	Commercial	Y	4632.5	T01	554462	620789

APPENDIX 7.2

NIGHT TIME PREVAILING NOISE

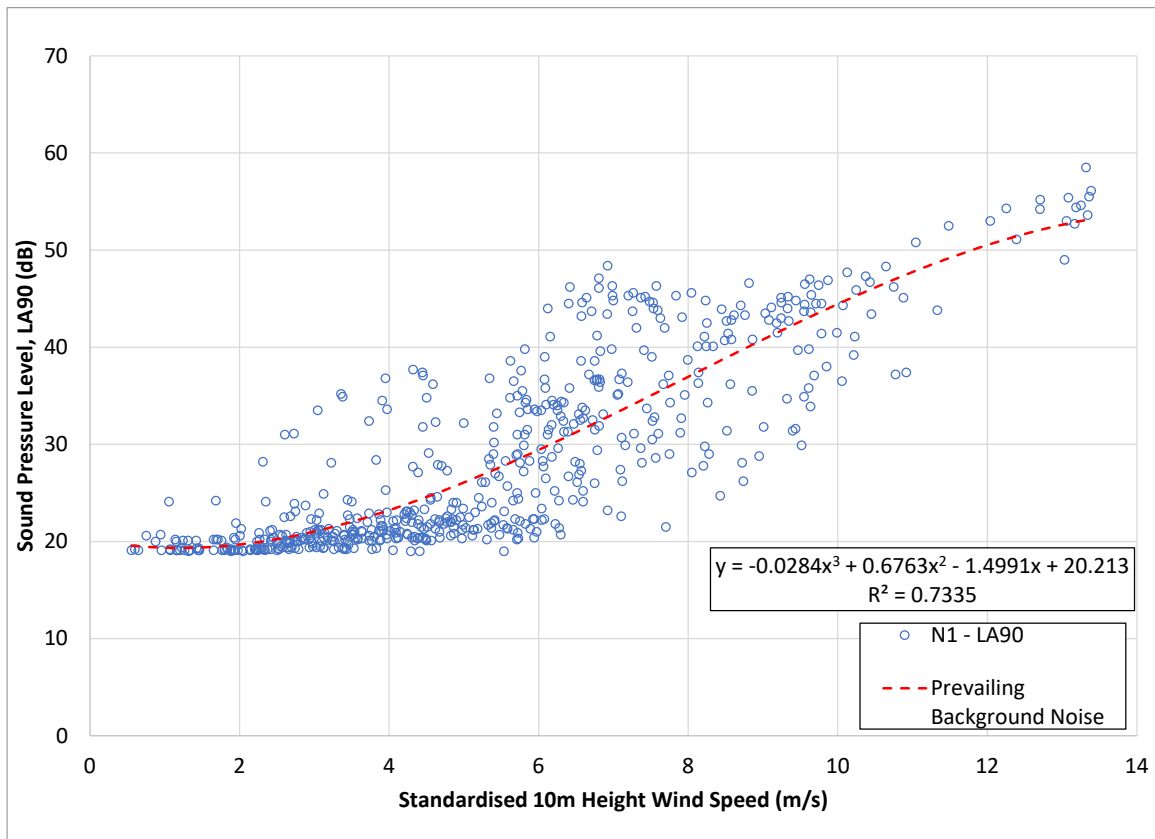


Figure A7.1: Prevailing Night time Amenity Background (L_{A90}) Noise Levels at N1

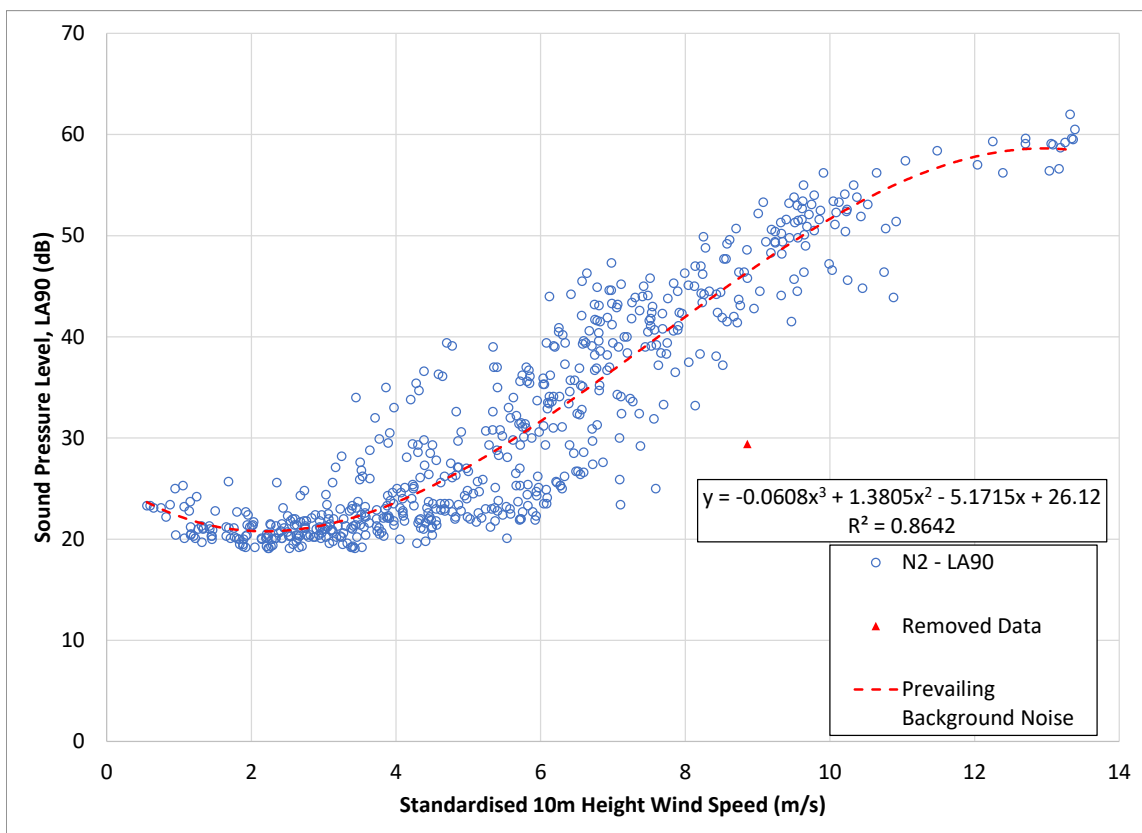


Figure A7.2: Prevailing Daytime Amenity Background (L_{A90}) Noise Levels at N2

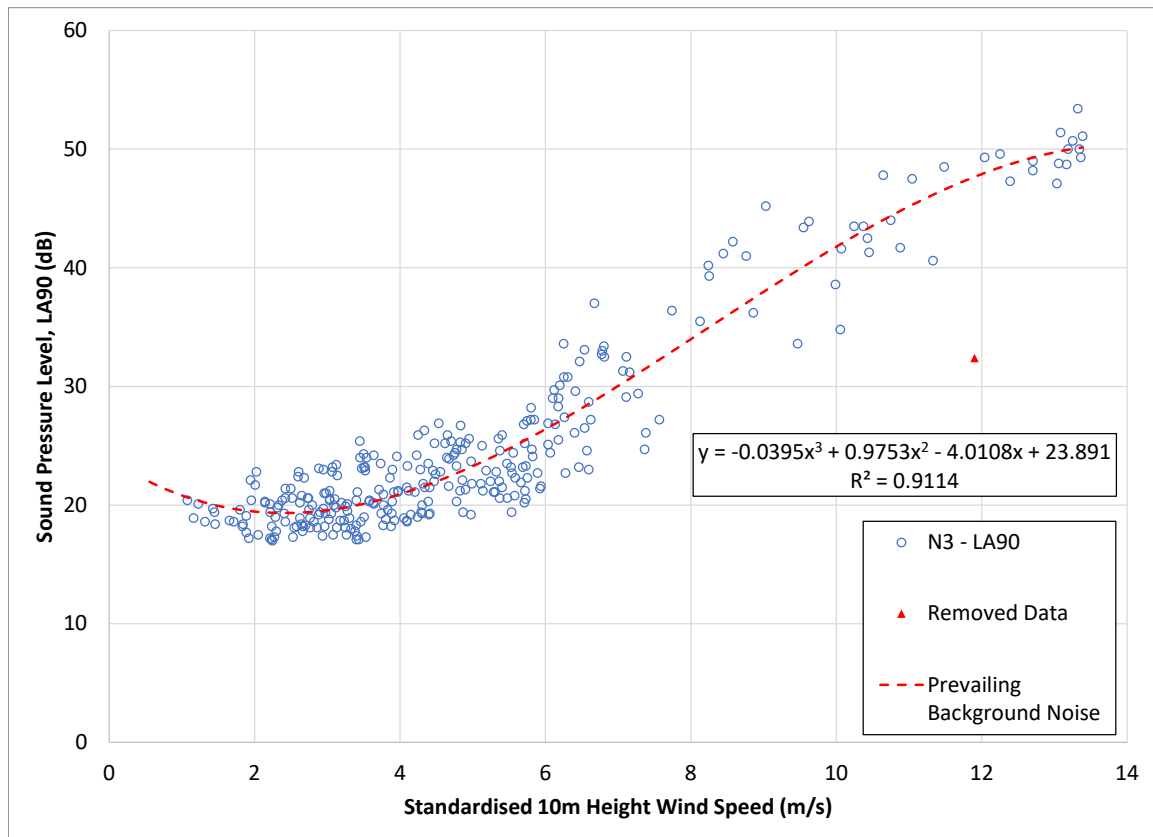


Figure A7.3: Prevailing Daytime Amenity Background (L_{A90}) Noise Levels at N3

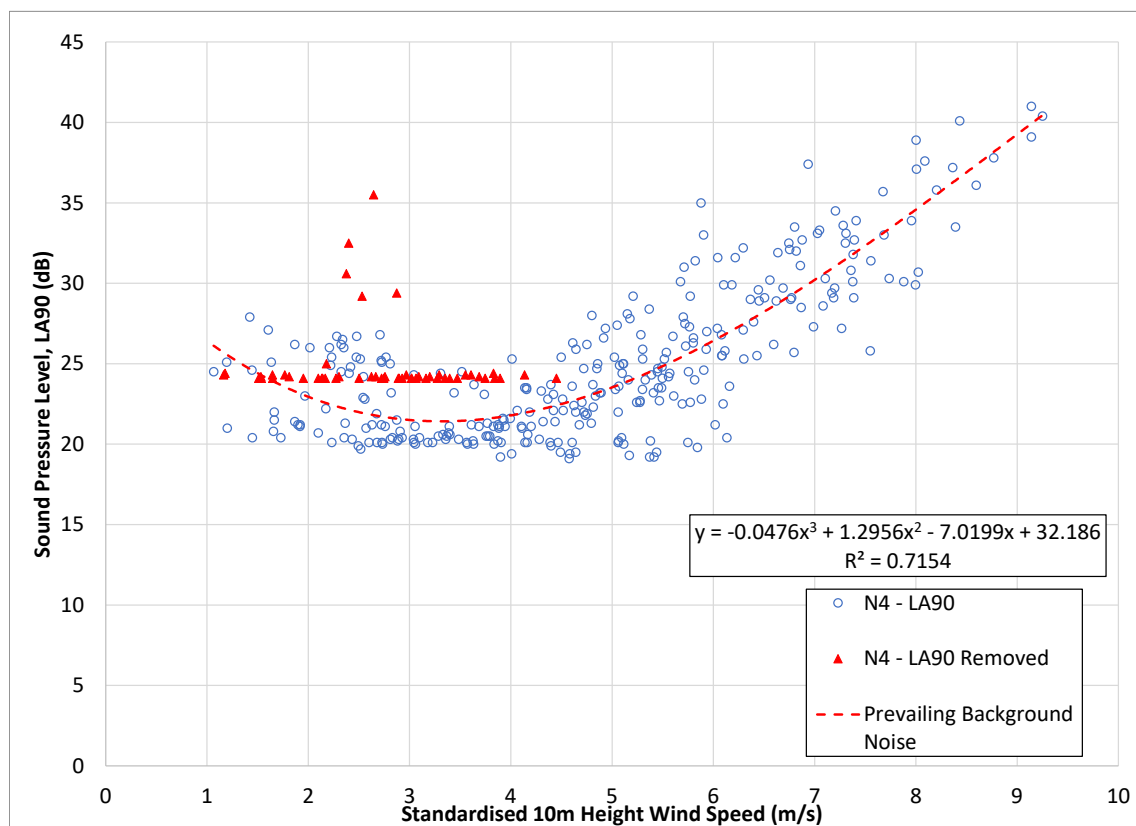


Figure A7.4: Prevailing Daytime Amenity Background (L_{A90}) Noise Levels at N4

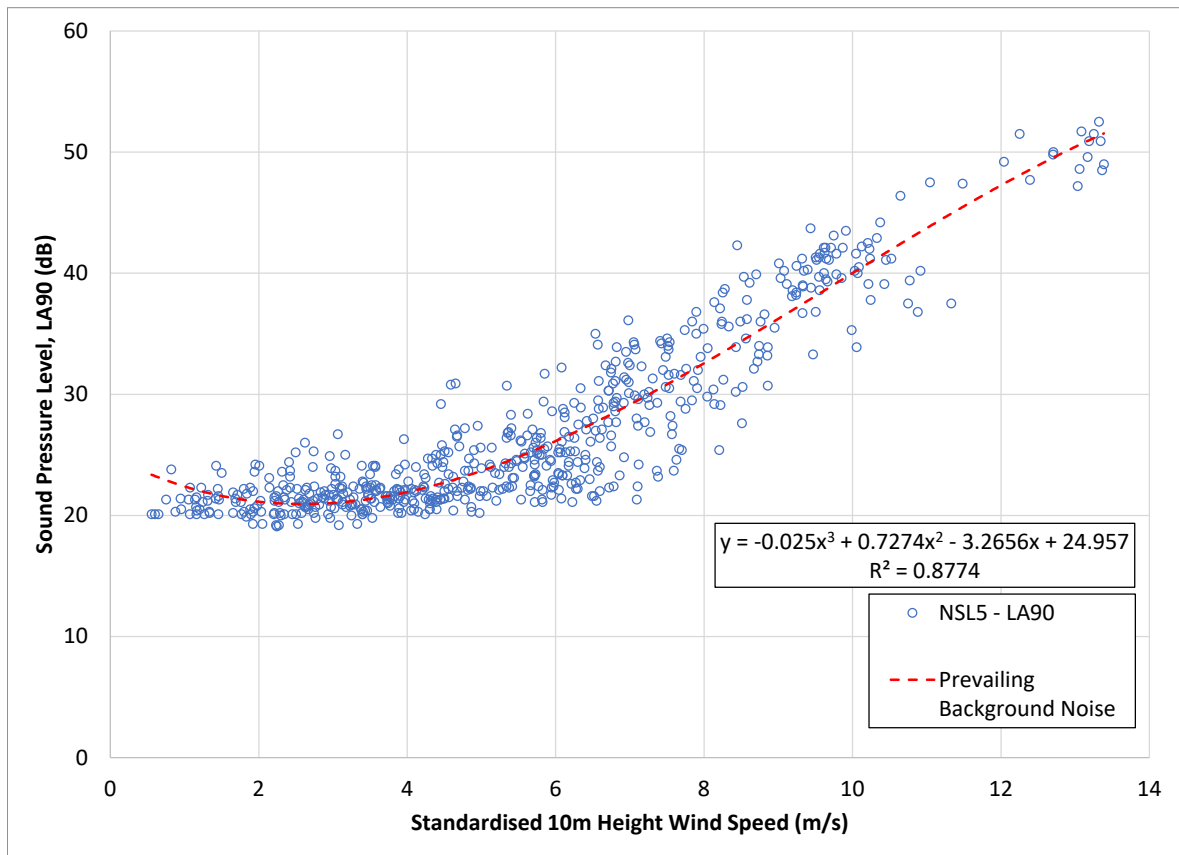


Figure A7.5: Prevailing Daytime Amenity Background (L_{A90}) Noise Levels at N5

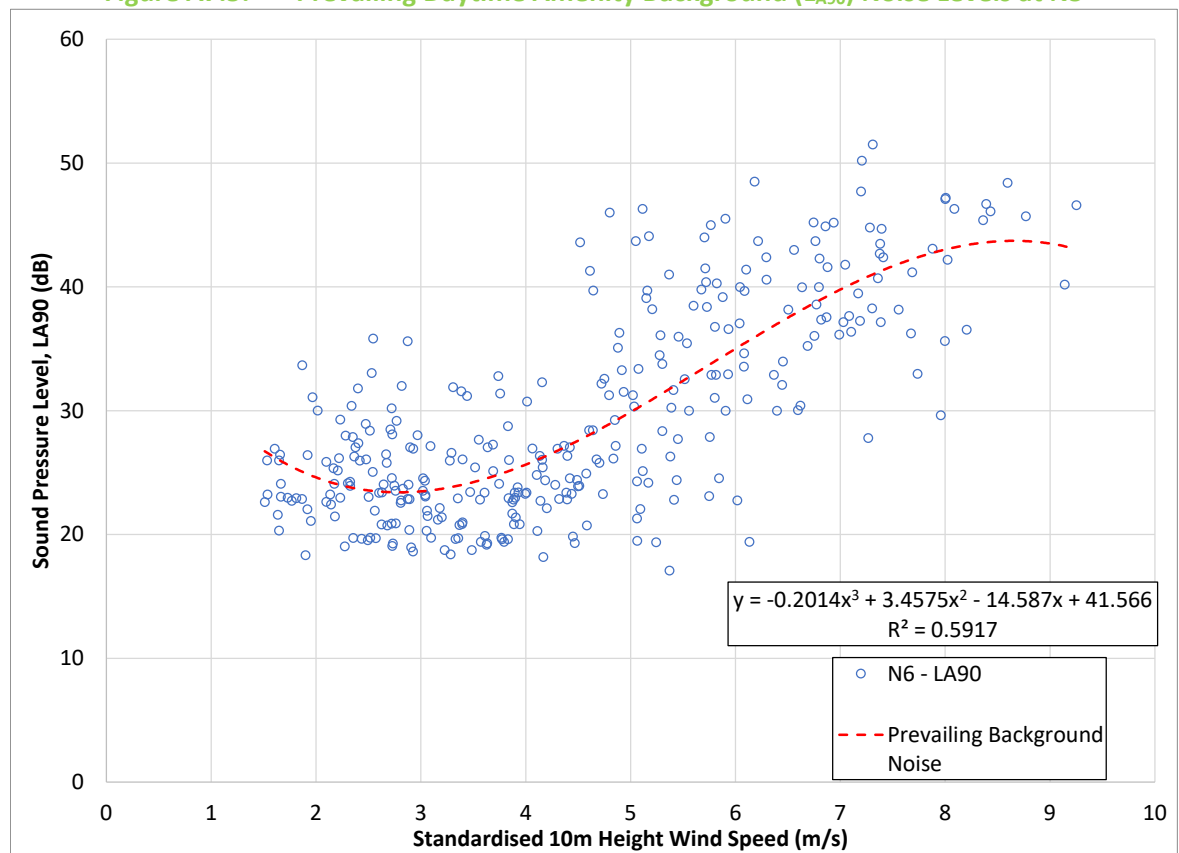


Figure A7.6: Prevailing Daytime Amenity Background (L_{A90}) Noise Levels at N6

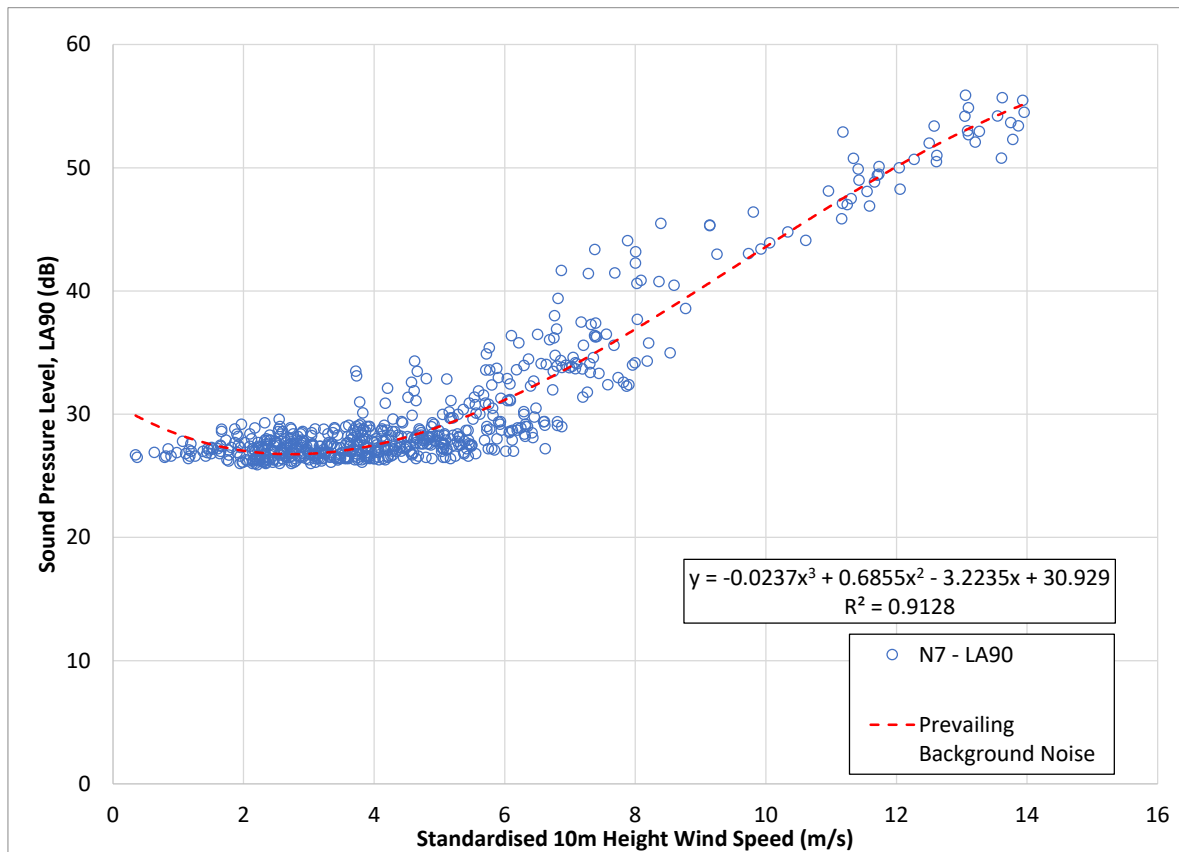


Figure A7.7: Prevailing Daytime Amenity Background (L_{A90}) Noise Levels at N7

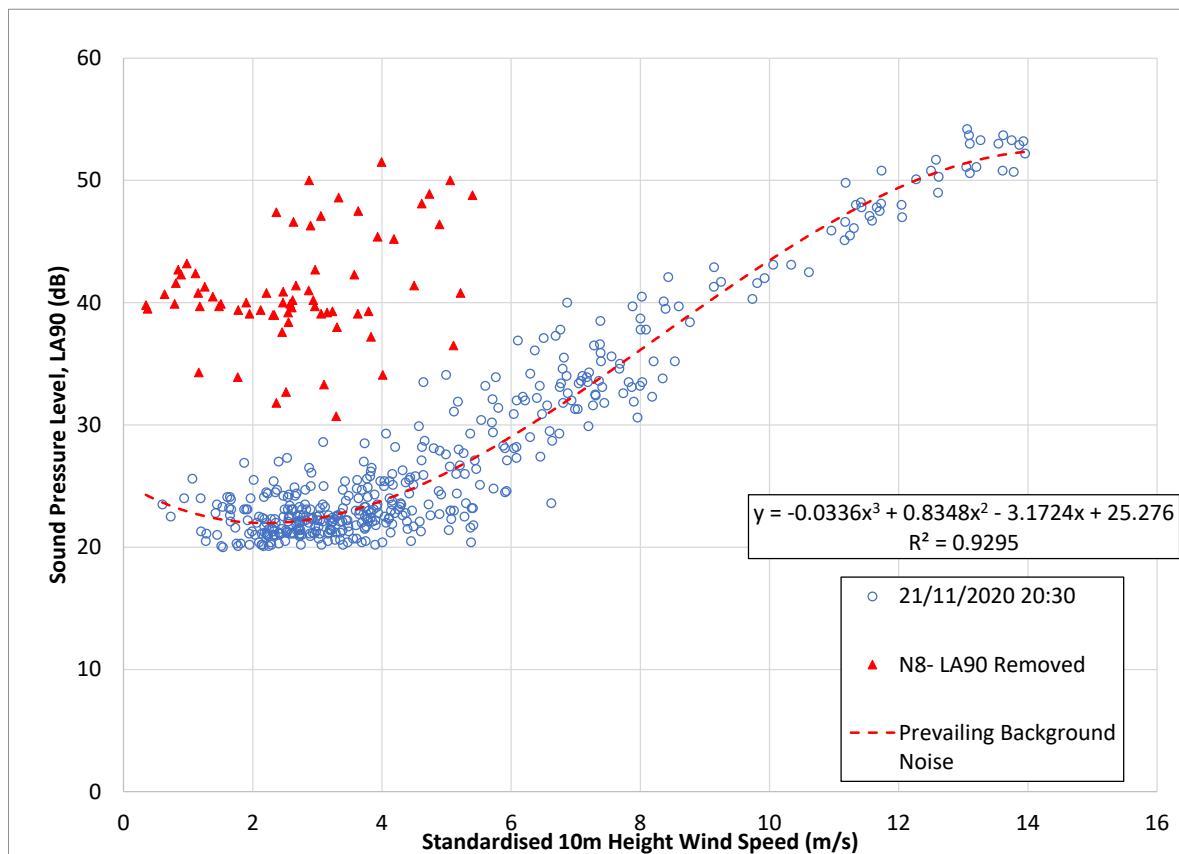


Figure A7.8: Prevailing Daytime Amenity Background (L_{A90}) Noise Levels at N8

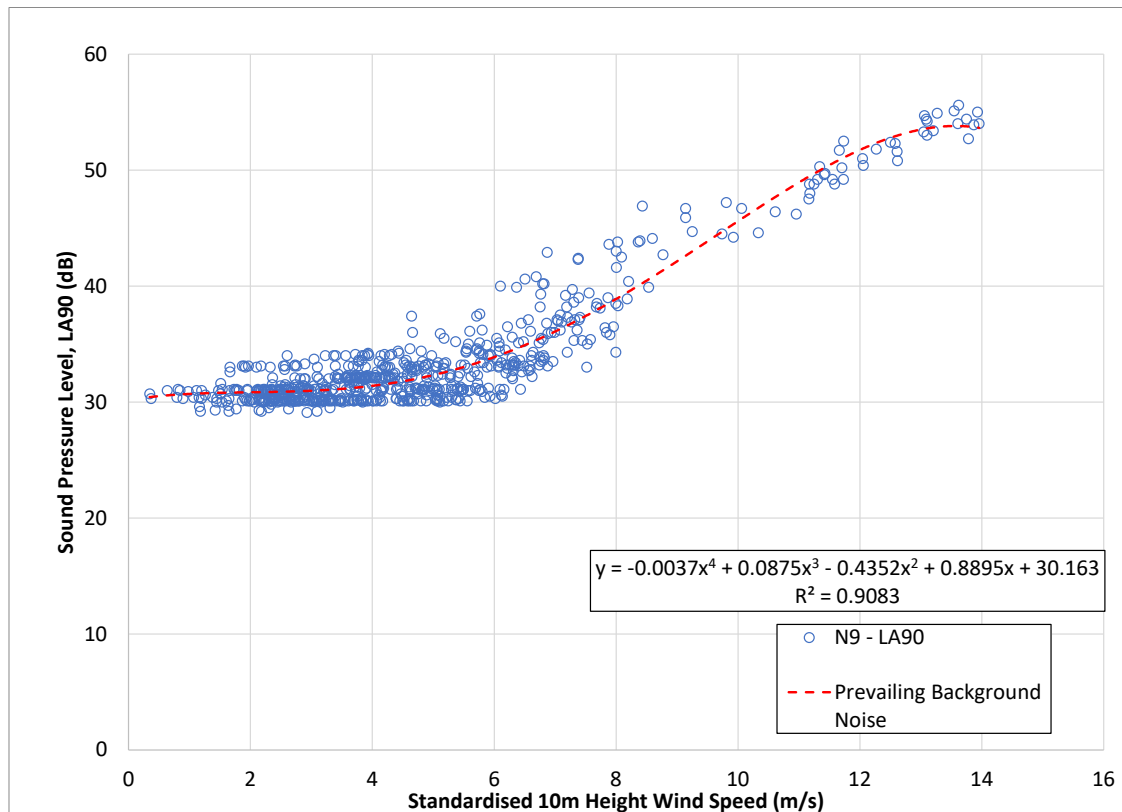


Figure A7.9: Prevailing Daytime Amenity Background (LA90) Noise Levels at N9

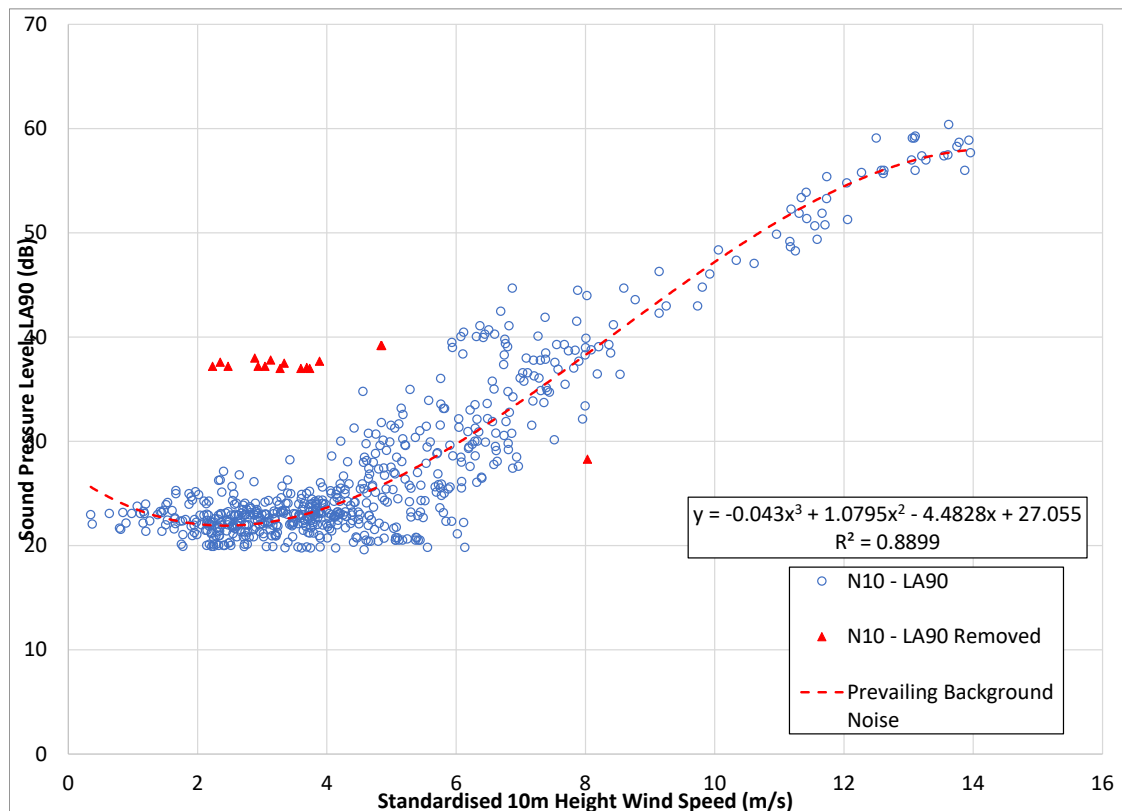


Figure A7.10: Prevailing Daytime Amenity Background (LA90) Noise Levels at N10



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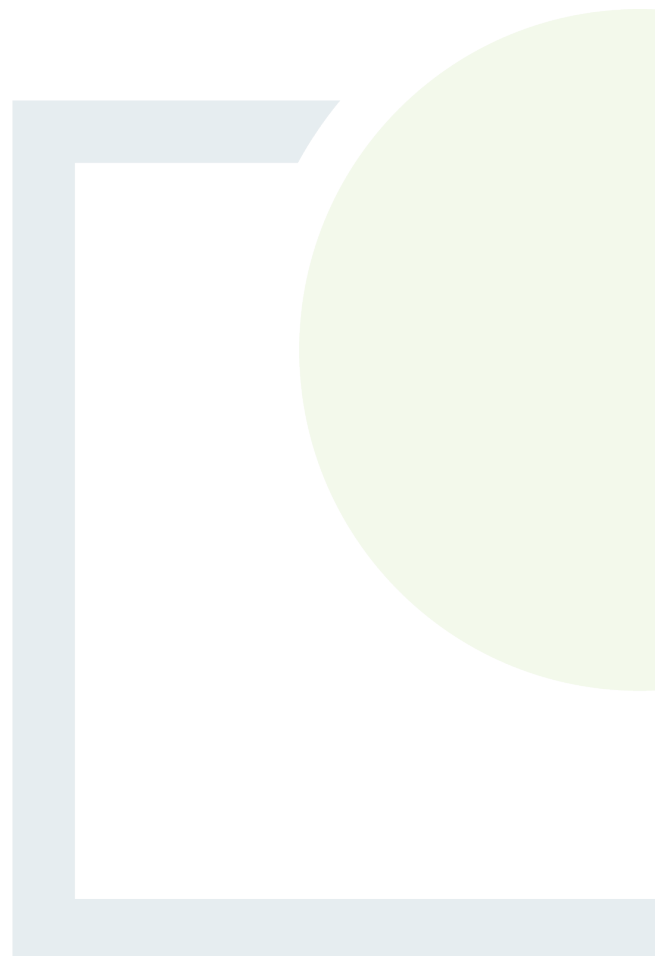




DESIGNING AND DELIVERING
A SUSTAINABLE FUTURE

APPENDIX 3

First Party Appeal





CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE &
PLANNING

ANNAGH WIND FARM

First Party Appeal, Cork County Council Ref. 21/07246

Prepared for: Annagh Wind Farm Limited



Date: January 2023

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ANNAGH WIND FARM LTD. – FIRST PARTY APPEAL

REVISION CONTROL TABLE, CLIENT, KEYWORDS AND ABSTRACT User is responsible for Checking the Revision Status of This Document

Rev. No.	Description of Changes	Prepared by:	Checked by:	Approved by:	Date:
0	Issue for Planning	BC/JK/JH	JH/JK	JH	27/01/2023

Client: Annagh Wind Farm Limited.

Keywords: Annagh, Cork, Wind, Farm, First, Party, Appeal, County, Council, Bord, Pleanála

Abstract: Annagh, Cork, Wind Farm, First Party Appeal, Cork County Council, An Bord Pleanála

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- Appendix 1: Copy of Cork County Council’s Notification of Decision to Refuse Permission
- Appendix 2: Additional Drawing Showing Site Entrance Details and Sightlines
- Appendix 3: Addendum to Natura Impact Statement



1. INTRODUCTION

Fehily Timoney and Company, Core House, Pouladuff Road, Cork has been retained by Annagh Wind Farm Limited (**Applicant**) with a registered address of 2 Dublin Landings, North Wall Quay, North Dock, Dublin 1 to lodge a first party appeal against Cork County Council's Notification of Decision to Refuse Permission pursuant to Planning Reg. Ref. 21/07246. The wind farm site is located within the townlands of Annagh North, Coolcaum, Fiddane, Cooliney, Rathnacally, Farranshonikeen, Ardnageehy and Clashanniv, Co. Cork

This first party appeal considers the 3 no. refusal reasons outlined in Cork County Council's notification to refuse permission and provides justification on the suitability of the subject site for the wind energy development proposed.

We respectfully request that An Bord Pleanála overturns the Planning Authority's decision and grants planning permission for the development. We provide reasons, considerations and arguments which demonstrates that the reason for refusal are not warranted and the proposed development accords with the proper planning and sustainable development of the area.

Please refer to Appendix 1 for a Copy of Cork County Council's Notification of Decision to Refuse Permission. We also submit a cheque made payable to An Bord Pleanála for the sum of €3,000 in respect of the first party appeal fee.

The Notifications of Decision to Refuse Planning Permission which the Applicant seeks to challenge are:

- 1. Insufficient information has been provided to enable the Planning Authority to determine beyond reasonable scientific doubt that the proposed development, either individually and/or in-combination with other plans or projects will not have an adverse effect on Whooper Swan a species of conservation interest of the Kilcolman Bog SPA and an adverse effect of the integrity of the Kilcolman Bog Special Protection Area. Furthermore, based on the information submitted the Planning Authority is unable to determine beyond reasonable scientific doubt that the proposed development, either individually and/or in-combination with other plans or projects will not have an adverse effect on qualifying interest species and the integrity of the Blackwater River (Cork/Waterford) SAC. Therefore, on the basis of the information provided with the application and in light of the Stage 2 Appropriate Assessment undertaken, the Planning Authority cannot be satisfied that the development, individually, or in combination with other plans or projects, would not be likely to have a significant effect on the integrity of the Kilcolman Bog Special Protection Area (Site Code: 004095) and the Blackwater River (Cork/Waterford) SAC (Site Code: 002170) in view of the site conservation objectives of both. In such circumstances, the granting of permission for this development would contravene materially development objective BE 15-2 'Protect sites, habitats and species' of the Cork County Development Plan 2022 and the requirements of the Habitats Directive as set out in Part XAB of the Planning and Development Act 2000 as amended.*
- 2. Having regard to the location of the proposed development in an area of high local biodiversity value, the extent of high valued habitat to be lost and the extent of key ecological receptors to be lost and/or impacted upon by the proposed development it is considered that the proposed development would be likely to have a permanent significant negative effect on an area of high local biodiversity value. Therefore, the granting of permission for this development would contravene materially development objectives BE 15-2 and ET 13-7 of the Cork County Development Plan 2022.*



3. *Taking into account the poor condition and alignment of the public road (L-1307-30) in proximity to the proposed site entrance, and having regard to the plans and particulars submitted with the planning application the applicant has not adequately demonstrated the provision of vehicular sightlines and a safe vehicular entrance onto the public road and that traffic likely to be generated by the proposed development would not endanger public safety by reason of a traffic hazard. The proposed development is therefore considered to conflict with Objective TM 12-8(d) of the Cork County Development Plan 2022 and to grant permission would be contrary to the proper planning and sustainable development of the area.*

This Appeal Response is structured as follows.

- Section 1 – Introduces the subject matter of the Appeal Response, Cork County Council’s Decision to Refuse Planning Permission for a wind farm development in the townlands of Annagh North, Coolcaum, Fiddane, Cooliney, Rathnacally, Farranshonikeen, Ardnageehy and Clashganniv, Co. Cork
- Section 2 – Consultation with Cork County Council and submissions from statutory bodies
- Section 3 – Addresses the grounds for appeal
- Section 4 – Addresses a number of other points raised in the Planners Report
- Section 5 – Concludes the appeal
- Appendices – 3 no. Appendices



2. CONSULTATION WITH CORK COUNTY COUNCIL AND SUBMISSIONS FROM STATUTORY BODIES

In this section of this first party appeal, we review the consultation to-date carried out with Cork County Council and other Statutory and Prescribed Bodies during the planning process, examining the further information request and ultimately the Notification to Refuse Permission by Cork County Council.

The application seeking planning permission was lodged with Cork County Council on the 2nd December 2021 and Cork County Council sought further information on the 04th February 2022. 6 no. items of Further Information / clarification was requested grouped into the following headings.

- Item no. 1: Biodiversity
- Item no. 2: Appropriate Assessment
- Item no. 3: NPWS
- Item no. 4: Noise
- Item no. 5: Engineering
- Item no. 6: EIAR

Statutory observations were submitted by the following;

- N/M20 Project Office
- Department of Defence
- Gas Networks Ireland
- Irish Aviation Authority
- Transport Infrastructure Ireland
- Inland Fisheries Ireland
- Geological Survey of Ireland
- Irish Water
- Department of Agriculture, Food and the Marine
- Department of Housing, Local Government and Heritage (DAU/NPWS)

Of relevance to this appeal are the submissions by the Department of Housing, Local Government and Heritage (DAU / NPWS) and Inland Fisheries Ireland. The DAU made a further submission on the file on the 12th December 2022 in relation to the further information submission made by the Developer.

A comprehensive response was made by the Developer on the 3rd November 2022 which addressed all of the further information items and clarifications raised by the Planning Authority. It is also important to note that the NPWS submission focused on one aspect of the project relating to the potential impact on Whooper Swan and it would appear that all other aspects with regard to the potential impact on local biodiversity and potential impact on the Blackwater SAC have been addressed to the satisfaction of the NPWS.

Whilst it is noted that refusal reason no. 1 indicates that the Planning Authority are not satisfied with the information submitted and that they did not conclude the project would not be likely to have a significant effect on the Whooper Swan, a qualifying interest of the Kilcolman Bog Special Protection Area, it is important to note that the NPWS considered that there was sufficient information provided to address the potential impact on Whooper Swans and recommended a similar mitigation measure to the mitigation measures outlined in the



Further Information submission which is an addendum to the NIS originally submitted. Therefore, it is respectfully submitted that the Planning Authority had, and An Bord Pleanála has, sufficient information available to determine that the proposed project shall not adversely affect the integrity of a European site.



3. GROUNDS FOR APPEAL

Cork County Council's Notification of Decision to Refuse Permission pursuant to Planning Reg. Ref. 21/07246 refused permission for 3 no. reasons as outlined in Section 1. FT offers a rebuttal to each of these reasons in the following subsections.

3.1 Reason 1 – Issues associated with the Whooper swan, Kilcolman Bog SPA and Blackwater SAC

3.1.1 Whooper Swan and Kilcolman Bog SPA

It is important to note in the first instance that the Cork County Council's Planners Report (paragraph 1 page 67) and (paragraph 8 page 80) mis-represents the DAU submission of the 12th December 2022. The Planners Report states:

"DHLGH (Development Applications Unit)/NPWS – See submission dated 12/12/2022. Note that it cannot be ruled out that the flocks in the Awbeg/Annagh area form part of the flocks to which the Kilcolman Bog SPA conservation objective applies. Also questions the potential wind turbine curtailment proposed and untested mitigation technology relating to a European site and question the completeness of the Appropriate Assessment. The NPWS have difficulty with such agreements for that reason."

"The NPWS submission notes that given it cannot be ruled out that the flocks recorded within the Awbeg / Annagh area are not associated with flocks to which the Kilcolman Bog SPA conservation objective apply, and that the proposed Whooper swan migration mitigation measures rely on untested mitigation technology, calls into question the completeness of the Appropriate Assessment. Therefore, the NPWS within their submission state that they will have difficulty with such agreements for that reason. The CCC Ecologist shares this view."

The NPWS submission, whilst recognising that it cannot be ruled out that the flock of Whooper Swans form part of the flocks to which the Kilcolman Bog SPA conservation objectives applies, does recognise that from the information submitted the project is unlikely to displace or disturb the Whooper Swan activities in the area. The NPWS submission states:

"Fijn et al. (2012: 105) observed the related Bewick's swans to forage and rest within (on average) 560m of operational wind turbines, coming closer later in the season. They cited a literature-derived displacement for whooper swans of up to 400m. Annagh wind turbines distances from the feeding and roosting areas recorded in the avian surveys are more than 600m away, so disturbance from moving turbines blade from such a distance are no considered significant."

The site in question where Whooper Swan have been observed feeding in Improved agricultural grassland fields along the banks of Awbeg River / Annagh Bridge, is c. 1.3 km south of the closest turbine.

The NPWS submission also recognises that the collision risk to Whooper Swan is low from dispersal collision during the winter season once the species has migrated to the surrounding area.

"..... Nevertheless, there is only one recorded occurrence of whooper swans dispersing with the rotor-swept area of the proposed wind-farm. The available data indicates a low risk from the dispersal collision with turbine blades in this case."



From the information submitted the only concern was in relation to the Whooper Swan migration and the mitigation proposed to address this potential significant impact. However Page 3 of the NPWS submission addresses their own concerns by recommending a slightly altered mitigation to that contained in the Natura Impact Statement so to avoid significant mortality of migrating Whooper Swans. It is respectfully submitted that Cork County Council did not follow the NPWS approach to include a “Recommended Condition” which a view to addressing the potential migration impact.

Page 70 of the Planners Report assesses the further information submitted with regard to potential impacts on the Whooper Swan in relation to Cork County Council’s Request in Item no. 2 (g & h) of the Further Information Request. The Planners Report suggests that;

“A key part of the further information request related to the Kilcolman Bog SPA and the Whooper Swan which is of conservation interest of this SPA. The applicant has submitted an Avian Monitoring Report for 2021 and 2022 in response to the FI requests in relation to Whooper Swan. This report provides supplementary information to that submitted as part of the EIAR. As set out in detail within the Ecologists report, the ecological view is that there is not enough information on file at this time as to exclude that beyond reasonable scientific doubt the proposal, will not have a significant effect on Whooper swan a species of conservation interest of the Kilcolman Bog SPA. Therefore, given this uncertainty and taking a precautionary approach it is assumed the effects could be significant. Consequently, the Ecology office are unable to complete Appropriate Assessment and any subsequent grant of approval of the proposal would be contrary to Objective 15-2 of the County Development Plan and therefore refusal is recommended”

It is important to note that the above opinion in the Cork County Council’s Planners Report conflicts with the opinion of the NPWS with the NPWS recommending the following condition/ mitigation on page 3 of their Submission dated 12/12/22.

“Further to commitments in p. 41 of the Avian Survey Report, supplied as part of the further Information, the following type of condition is recommended:

Wind-turbine operation will be curtailed between dawn and dusk, from 15 September to 15 December, and between 21 February and 15 April, in any year, unless by further grant of planning permission. Data from a Supervisory Control and Data Acquisition (SCADA) system, or its equivalent, showing compliance with this condition will be made available to the planning authority and the National Parks & Wildlife Service. In addition, targeted corpse searches, based on best-practice and using dogs trained for the purpose, will be carried out during this period, and the annual results reported to the planning authority and the National Parks & Wildlife Service.

Reason: *To avoid significant mortality of migrating whooper swans, a species listed in Annex I of the EU Birds Directive, and as a conservation objective for Kilcolman SPA.”*

The applicant accepts in principle the above condition and commits to the submission of SCADA data to demonstrate compliance. However, the Developer would request An Bord Pleanála to consider the following condition which is more representative of a monitoring condition whilst providing certainty to the NPWS that the principle of their requirements will be complied with.

From the first year of operation of the turbines, curtailment will be applied between dawn and dusk, from 15 September to 15 December, and between 21 February and 15 April. Data from a Supervisory Control and Data Acquisition (SCADA) system, or its equivalent, showing compliance with this condition shall be made available to the planning authority and the National Parks & Wildlife Service and an annual report detailing the results of this monitoring provided.



Annual monitoring shall be carried out during the operational phase of the wind farm for years 1, 2, 3, 5, 7, 10, 15, 20, 25 and 30 to monitor the efficacy of the measure and to refine the extent of these curtailment periods. This monitoring shall account for annual variation in migration patterns and ensure that curtailment is targeted to the key period of movement for the species, with the curtailment period revised accordingly in agreement with the planning authority and NPWS. In addition, targeted corpse searches, based on best-practice and using dogs trained for the purpose, will be carried out during the curtailment period. An annual report (for years 1, 2, 3, 5, 7, 10, 15, 20, 25 and 30) detailing the results of this monitoring shall be submitted to the planning authority and the National Parks & Wildlife Service.

3.1.2 Potential for adverse effects to the integrity of the Blackwater SAC

With regard to the potential for adverse effects to the integrity of the Blackwater SAC, it would appear that the Cork County Council Ecologist is not satisfied with the Developers Response to Item 2 (c) of further information response.

Page 69 of the Cork County Council's Planner Report suggests;

"With regard to item (c) the Ecology office have reviewed the submitted response and are of the view that the applicant has not addressed this matter of concern in full and noting that the qualifying interest species Lamprey and Otter were recorded within the Oakfront Stream, with White-clawed Crayfish assumed to be present in the aquatic receiving environment, the Ecology office are unable to establish beyond a reasonable scientific doubt that adverse effects on the SAC integrity will not result. Therefore, at this time there is not enough information on file to complete Appropriate Assessment and as such the granting of permission of the proposal would be contrary to Objective 15-2 of the County Development Plan."

Item 2 (c) of the Further Information submission sought clarification on the extent of proposed instream works and requested the submission of aquatic surveys at each instream location.

The further information submission clearly outlined and clarified that there would not be any instream works and that a clear-span bridge would be utilised to cross the Oakfront Stream. This approach was considered acceptable in the Inland Fisheries Ireland submission dated 11th January 2022.

A suite of aquatic ecological surveys were undertaken by Triturus Environmental Ltd in September 2020 and April 2021 (Refer to Appendix 4 of the NIS for the Aquatic Report and all associated methodologies used to undertake surveys), these included:

- Habitat Assessment
 - Physical watercourse/waterbody characteristics (i.e. width, depth etc.)
 - Substrate type, listing substrate fractions in order of dominance (i.e. bedrock, boulder, cobble, gravel, sand, silt etc.)
 - Flow type, listing percentage of riffle, glide and pool in the sampling area
 - An appraisal of the macrophyte and aquatic bryophyte community at each site
 - Riparian vegetation composition



- Catchment-wide electro-fishing
- White-clawed crayfish survey
- Lamprey survey
- eDNA analysis (carried out in April 2021) for white-clawed crayfish and crayfish plague
- Freshwater pearl mussel survey
- Biological water quality (Q-sampling)
- Otter survey

The NIS submitted with the application identified that without appropriate mitigation in place, it could not be excluded that there would not be any likely significant effects on the Blackwater River SAC due to the effects on aquatic habitats and species through water quality degradation. This included the potential for adverse effects to qualifying interest species and habitats downstream of the proposed project due to hydrological connectivity if appropriate mitigation is not in place. As such detailed mitigation measures were provided in Table 4-12 of the NIS which will avoid effects on the Blackwater River SAC.

Taking cognisance of measures incorporated into the project design (outlined in section 4.4.1) and mitigation measures (section 4.4.2) to avoid effects, the NIS concluded that the proposed development, alone or in combination with any other plan or project, will not adversely affect the integrity of the Blackwater River (Cork/Waterford) cSAC or any other European site. We therefore respectfully submit that the NIS provides comprehensive and detailed information to allow An Bord Pleanála to reach the same conclusion in its Appropriate Assessment.

Page 69 of the Planner's Report suggests that the Planning Authority were not satisfied with the response to Item 2 (e) of the Further Information response. Where a method statement for any instream works was requested. The Planners Report states;

"The applicant has responded to this item by stating that no instream works are proposed for the development. Based on information provided within the EIAR works will need to be undertaken within watercourses on site be it either to facilitate construction works or development aspects e.g. culverts themselves. Therefore, the Ecology office are not satisfied with the response received as they are of the view that the statement of no instream works is inaccurate based on the application details."

It is important to note that no-instream works are proposed for the project. Culverts will be required but only for field drains. The field drains within the site have been assessed for their potential to offer suitable habitat for species of conservation interest but are considered to be of low value for these species as they are man-made features (artificial in origin) and their size. However, the potential for indirect effects due to downstream connectivity to natural watercourses from all of the works has been assessed within the AA Screening report and NIS and mitigation measures have been included in the NIS to reduce / avoid these indirect effects. As outlined above the method for crossing the Oakfront Stream complies with the IFI requirements. Therefore, it is submitted that the Cork County Council's assertions that instream works will occur is not accurate as clarified in the Further Information submission.

It is important to note that the Further Information clarifies a statement in the EIAR section 3.6.7.1 and the CEMP section 3.3.1.6.2 which states that "dry instream working conditions will have to be established" for the construction of abutments of the clear-span bridge which is proposed to cross the Oakfront stream. It is noted that this statement was a typographical error and that no instream works are in fact proposed – dry or otherwise. In fact, the abutments of the clear-span bridge are proposed to be set back a minimum of 2.5 metres



from the banks of the Oakfront stream and will be constructed without the requirement of any instream works. Please see Figure 3-1 which illustrates the design of the clear-span bridge.

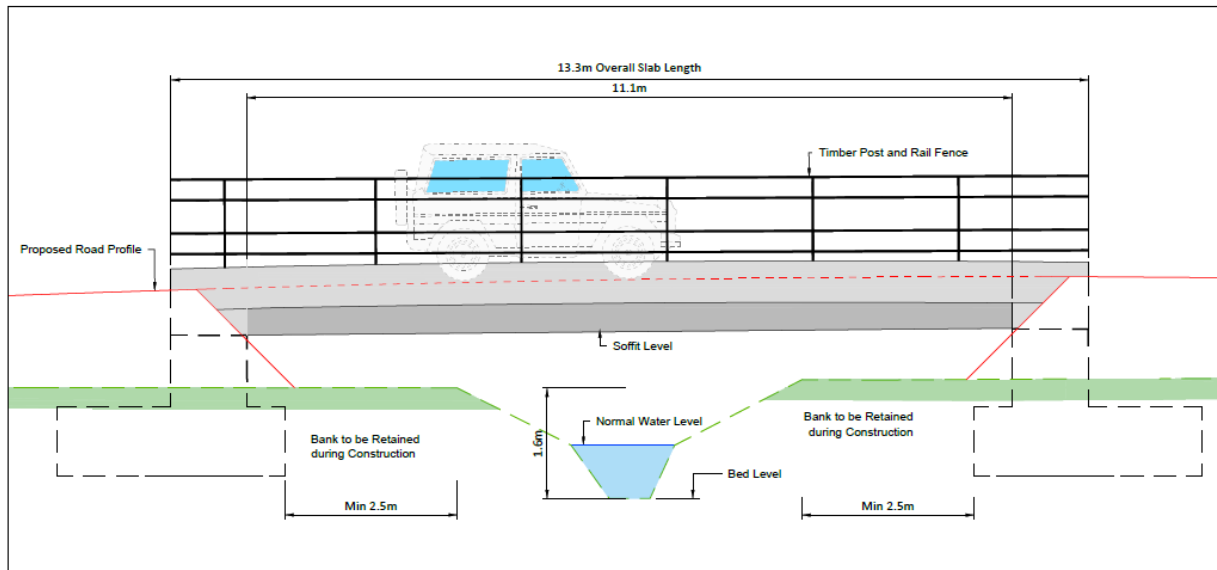


Figure 3-1: Excerpt of Drawing No. P2359-1700-0001– ‘Typical Stream Crossing Details’.

It is important to note that the Cork County Council Planning Report was satisfied with the Biosecurity measures for ensuring no adverse effect to the integrity of the River Blackwater and also appeared to be satisfied with the mitigation measures proposed to avoid silt, hydrocarbon, fresh cement and bentonite contamination of the Blackwater SAC as responded to Item 3 (a) of the Further Information submission. Therefore, it is respectfully submitted that sufficient clarification has been provided to allow An Bord Pleanála to determine beyond a reasonable scientific doubt that the proposed project, alone or in combination with any other plan or project, will not adversely affect the integrity of the Blackwater River SAC.

3.1.3 Cumulative Impacts

Please note that upon review of the Cork Co. Co. Planning Enquiry System, we understand that there is an interconnector proposed to connect adjacent solar farms which will traverse the wind farm site. Please find attached Appendix 3 which is an Addendum to the NIS which assesses this aforementioned project from a cumulative perspective, it has potential to have an in-combination effect with the proposed development however mitigation measures have been developed and included in the NIS to avoid a significant collision risk to Whooper Swan. With the implementation of these measure the proposed project either alone or in combination with other projects or plans will not adversely affect the integrity of Kilcoman Bog SPA or the Blackwater River SAC (or any other European Site).

3.2 Reason 2 – Loss of high-value habitat

Item 1 (a) of the Further Information request from Cork County Council indicates that the Planning Authority has serious concerns with the significant negative effect the development will have on habitats of high ecological value at a local level.

The Planners Report Page 67 states;



“Overall, the Ecology office is of the view that the extent of key ecological receptors to be lost and/or impacted by the proposal is not compatible with Objectives BE 15-2 and ET 13-7 of the County Development Plan and as such the proposal should be Refused. The view is that what has been proposed will ultimately result in a significant reduction of high valued habitats in a landscape dominated by agricultural intensification and which will subsequently have a knock-on negative effect on the biodiversity value of the site and local area as a whole.”

“Regarding the Habitat and Species Management Plan the Ecology office has reviewed the submitted plan and details the Ecologist is of the view that the principle of no net loss of biodiversity at a local level cannot be achieved given the significant extent of high value habitats identified on site to be removed to facilitate the proposal. It is also noted that a considerable proportion of the enhancement measures provided relate to existing high valued habitats where the management regime proposed is largely already practiced i.e. maintenance of low intensity pastureland or allowing natural colonization to continue to occur. This will not lend to the offsetting of a sizeable loss of high valued habitats and associated species and as such the Ecologist is not satisfied with the response received.”

Chapter 2 of the EIAR clearly sets out how the site has been selected and the alternatives considered for the project. A site selection process was carried out by EM Power in 2018 taking into account the environmental effects of each site. Out of 4 no. sites identified by EM Power as being reasonable alternatives, the proposed Annagh wind farm was considered to be the preferred option from a technical, financial, and planning perspective, whilst giving rise to the least likely effect on the receiving environment, in comparison to the alternative sites considered. In this regard we refer to Table 2-2 of Chapter 2 of the EIAR. The project study area is seen to be an optimum location for wind energy development due to the supportive planning policy for the area, the relatively low density of development, its location away from designated European and National sites; its favourable wind speeds and access to the national grid.

A number of alternative layouts were considered in developing the project. The design iteration process aims to avoid environmental sensitivities, minimise potential environmental impacts both on and off site and to maximise the wind potential on site. Chapter 2, of the EIAR examines the 5 no. design iterations that were considered throughout the progression of the project. The design iterations are detailed in Table 2-5, Chapter 2 of the EIAR. The final design iteration was taken forward for the proposed project as it strikes the best balance between the project objective of energy production capacity whilst also minimising effects on the environment. The chosen option provides for the greatest amount of energy production while avoiding potential significant impacts on the receiving environment and achieving appropriate setback from dwellings and sensitive environmental receptors such as the nearby Blackwater River (Cork/Waterford) SAC. The reduction of the number of turbines from 8 to 6 reduced the potential visual impact and the decision to reduce the height of the turbines from 185m to 175m reduced the visual impact further while also achieving 4x tip height setback to non-financially involved landowner's dwellings.

The following measures are incorporated into the proposed wind farm design to reduce impacts on designated sites, flora and fauna through avoidance and design:

- The hard-standing area of the wind farm has been kept to the minimum necessary for the maximum turbine envelope proposed, including all site clearance works to minimise land take of habitats and flora.
- Site design and layout deliberately avoided direct impacts on designated sites.
- All cabling for the project will be placed underground; this significantly reduces collision risk to birds over the lifetime of the wind farm (Drewitt and Langston, 2006).



- The grid connection routes have been selected to minimise land take of potentially sensitive habitats by following the site access tracks and public roads.
- Care has been taken to ensure that sufficient buffers are in place between wind farm infrastructure and hydrological features such as rivers and streams. Buffers of 50m from natural watercourses have been maintained, excepting where crossing points occur.
- One new stream crossing will be required within the main wind farm site. A clear-span design has been selected to avoid instream works, and to minimise disturbance of banks and associated indirect effects such as siltation.
- Directional drilling is the proposed installation method where the grid connection crosses the Rathnacally stream. As such, in-stream works will not be required and the potential for contaminant or pollutant input will be greatly reduced as a result.
- The grid cable will be incorporated in the clear span bridge where it crosses the Oakfront stream within the proposed site.
- The design of the grid connection was also carried out with cognisance to ecological features. Cables will be placed underneath public roads where possible to avoid impacts to roadside hedgerows.
- The design of TDR Nodes 5 and 6 was carried out with cognisance of the adjacent Inner Shannon Estuary – South Shore pNHA. The route identified is constrained to the existing public road network and does not overlap or abut any habitats, supporting habitats or features of interest for this site.

Policy Objective HE 2-3 of the Cork County Development Plan 2014 states that it is an objective of the Plan to:

“Retain areas of local biodiversity value, ecological corridors and habitats that are features of the County’s ecological network, and to protect these from inappropriate development. This includes rivers, lakes, streams and ponds, peatland and other wetland habitats, woodlands, hedgerows, tree lines, veteran trees, natural and semi natural grasslands as well as coastal and marine habitats. It particularly includes habitats of special conservation significance in Cork as listed in Volume 2 Chapter 3 Nature Conservation Areas of the plan.”

The above policy objective has been superseded with Policy Objective BE 15-2 of the Cork County Development Plan 2022 which states the following:

- a) Protect all natural heritage sites which are designated or proposed for designation under European legislation, National legislation and International Agreements. Maintain and where possible enhance appropriate ecological linkages between these. This includes Special Areas of Conservation, Special Protection Areas, Marine Protected Areas, Natural Heritage Areas, proposed Natural Heritage Areas, Statutory Nature Reserves, Refuges for Fauna and Ramsar Sites. These sites are listed in Volume 2 of the Plan.*
- b) Provide protection to species listed in the Flora Protection Order 2015, to Annexes of the Habitats and Birds Directives, and to animal species protected under the Wildlife Acts in accordance with relevant legal requirements. These species are listed in Volume 2 of the Plan.*
- c) Protect and where possible enhance areas of local biodiversity value, ecological corridors and habitats that are features of the County’s ecological network. This includes rivers, lakes, streams and ponds, peatland and other wetland habitats, woodlands, hedgerows, tree lines, veteran trees, natural and semi-natural grasslands as well as coastal and marine habitats. It particularly includes habitats of special conservation significance in Cork as listed in Volume 2 of the Plan.*
- d) Recognise the value of protecting geological heritage sites of local and national interest, as they become notified to the local authority, and protect them from inappropriate development*



- e) *Encourage, pursuant to Article 10 of the Habitats Directive, the protection and enhancement of features of the landscape, such as traditional field boundaries, important for the ecological coherence of the Natura 2000 network and essential for the migration, dispersal and genetic exchange of wild species."*

Similarly, Objective ET 13-7 of the Cork County Development Plan 2022 states that, with regard to areas of County Cork which are "Open to Consideration" for wind farm development:

"Commercial wind energy development is open to consideration in these areas where proposals can avoid adverse impacts on:

- *Residential amenity particularly in respect of noise, shadow flicker and visual impact;*
- *Urban areas and Metropolitan/Town Green Belts;*
- *Natura 2000 Sites (SPA's and SAC's), Natural Heritage Areas (NHA's), proposed Natural Heritage Areas and other sites and locations of significant ecological value;*
- *Architectural and archaeological heritage;*
- *Visual quality of the landscape and the degree to which impacts are highly visible over wider areas.*

In planning such development, consideration should also be given to the cumulative impacts of such proposals."

The Natura Impact Statement submitted with the planning application clearly sets out how European sites have been protected and that with the implementation of the mitigation measures (section 4.4 of the NIS) prescribed the proposed development, alone or in combination with any other plan or project will not adversely affect the integrity of the any European site. Chapter 8 - Biodiversity of the EIAR clearly sets out how all nationally protected sites have been protected and will not be negatively affected by the proposed development. With the implementation of the detailed mitigation measures (described in the Natura Impact Statement, Chapter 8 Biodiversity, Chapter 9 Lands, Soils and Geology, Chapter 10 Hydrology and Water Quality and the CEMP) there will be no significant residual impacts from the main wind farm site, turbine delivery route and grid connection on biodiversity.

This proposed development does not negatively impact on rivers, lakes, streams and ponds, peatland and other wetland habitats. The loss of existing hedgerows and treelines has been minimised with replacement planted provided in the Habitat and Species Management Plan (Appendix 1). The proposed development does however require the felling of commercial forestry which is considered not to be natural woodlands and this forestry would be felled regardless of whether the proposed development is permitted planning or not and in accordance with the Forestry Act, it is a requirement to replant this forestry so to ensure that there is no net loss of forestry stock in the Country which the Developer must comply with.

The study area for all ecological surveys (defined in Table 8.2 of the Biodiversity Chapter in the EIAR) was significantly larger than the footprint of the proposed development, fully encompassing the main wind farm site, the footprint of the proposed grid connection route and turbine delivery route (TDR) nodes. All surveys followed recommended best practice guidelines outlined in section 8.2.5 of Chapter 8 – Biodiversity (of the EIAR) including three years of bat surveys and 2.5 years of avian surveys (3 winter seasons for Whooper Swan) more than the required survey period for both (bats 1 year and birds 2 years respectively under SNH guidance).

Detailed habitat surveys were carried out during the optimal survey period. See Section 8.2.5.2 of Chapter 8 – Biodiversity (of the EIAR) for the survey methodology. The habitat survey of the main wind farm site was undertaken during 29th June, 2nd, 14th and 15th July 2020. A habitat survey along the grid connection (outside the main wind farm site) and turbine delivery route were undertaken between the 10th – 11th June 2021.



Habitats were identified and classified, according to ‘A Guide to Habitats in Ireland’ (Fossitt, 2000)¹. All plant species present in each habitat type, and information on dominant species and plant assemblages were also recorded. Habitats have been appraised and evaluated according to their occurrence as protected habitats under Annex I of the EU Habitats Directive (92/43/EEC) and for their capacity to support rare, threatened and endangered species. The habitat mapping exercise followed ‘Best Practice Guidance for Habitat Survey and Mapping’ (Smith et al., 2011)² published by the Heritage Council.

Scientific and common names for vascular plants follow Parnell and Curtis (2012)³ and Blamey et al., (1996)⁴, respectively. In addition to habitat identification, each habitat was assessed for its ecological significance, based on the National Roads Authority (NRA) Site Evaluation Scheme (NRA, 2009a)⁵ (see Table 8-16 in the Biodiversity Chapter of the EIAR). Habitat boundaries and associated attribute data were mapped using desk-based GIS software, namely ArcGIS 10.4.1, which was also used to calculate habitat areas and lengths.

The habitats within the footprint of the development range in value from locally important lower value to locally important higher value. No habitats of county or national important are located within the footprint of the proposed development. The footprint of the proposed development has been kept to the minimum necessary, including the use of layout design methods including existing roads and stream crossings to minimise excavation works. As part of the constraints study, the impacts on habitats of high ecological value at a local level was minimised. Where loss of habitats of high ecological value at a local level could not be avoided, the impacts of this habitat loss were assessed in the EIAR, see Table 3-1.

Table 3-1: Impact evaluation of key ecological receptors due to habitat loss

Habitat	Area/ length of habitat to be lost (ha)	Percentage loss of each habitat type (%)	Impact	Rationale
(Mixed) broadleaved woodland	7.47ha	12.0 %	<i>Long-term Moderate Reversible</i>	Recent origin and predominantly artificial character
Immature woodland	2.58ha	12.6 %	<i>Long-term Moderate Reversible</i>	Recent origin and predominantly artificial character
Mixed broadleaved/conifer woodland	2.34ha	31.9 %	<i>Long-term Moderate Reversible</i>	Recent origin and predominantly artificial character
Wet grassland	2.19ha	4.4 %	<i>Permanent Slight</i>	Some infrastructure will be left in place after decommissioning

¹ Fossitt J.A. (2000). A Guide to Habitats in Ireland. Heritage Council, Kilkenny

² Smith, G., O'Donoghue, P., O'Hora, K., and Delaney, E. (2011). Best Practice Guidance for Habitat Survey and Mapping. Kilkenny, Ireland.: The Heritage Council.

³ Parnell, J; Curtis, T; and Cullen, E. (2012): Webb's an Irish Flora. Hardback, 8th Edn (March 2012), Trinity College Dublin.

⁴ Blamey, M., Fitter, R. and Fitter, A. (2003). Wild Flowers of Britain and Ireland. London: A and C Black.

⁵ NRA (2009a). Guideline for the Assessment of Ecological Impacts of National Road Schemes, National Roads Authority



Habitat	Area/ length of habitat to be lost (ha)	Percentage loss of each habitat type (%)	Impact	Rationale
Wet grassland [Wet Meadow]	1.08ha	9.6 %	<i>Permanent Slight</i>	Some infrastructure will be left in place after decommissioning
Wet grassland/Improved agricultural grassland	0.14ha	1.1 %	<i>Permanent Imperceptible</i>	Modified nature and access track will be left in place after decommissioning
Wet grassland/Marsh	0.34ha	8.0 %	<i>Permanent Not Significant</i>	Hardstanding left in place after decommissioning and covered with topsoil
Hedgerows WL1	277m	2.3 %	<i>Long-term Not Significant</i>	Small proportion of this habitat which will be lost
Treelines WL2	11m	0.4 %	<i>Long-term Imperceptible</i>	Small proportion of this habitat which will be lost and localised nature of loss
Hedgerows/Earth banks WL1/BL2	5m	0.5 %	<i>Long-term Imperceptible</i>	Small proportion of this habitat which will be lost
Drainage ditches FW4	515m	3.6 %	<i>Permanent Imperceptible</i>	Culverts will be left in place after decommissioning in conjunction with the modified nature and local abundance of this habitat

Replant lands will ensure replacement elsewhere of any felled woodland, with the replanting of 15.5ha of agricultural lands elsewhere. Additionally, intensively managed agricultural land onsite will be seeded and maintained as wildflower meadows.

Further mitigation measures comprising of the translocation of wet grassland turves, hedgerow and treeline reinstatement, meadow management and management of invasive alien plant species will further enhance the existing biodiversity onsite, measures are outlined in Section 8.6.2.3 of Chapter 8 – Biodiversity and the Habitat Species Management Plan (HSMP), see Appendix 1 of the response to Further Information.

Therefore, based on the mitigation by design used to inform the layout of the proposed development (section 8.6.1 of the EIAR) along with the mitigation measures and enhancement measures to be implemented, the Proposed Development is not contrary to Policy Objective BE 15-2 or ET 13-7.

3.3 Reason 3 - Vehicular sightlines and a safe vehicular entrance onto the public road

FT can confirm that Drawing No. P2359-0100-0004 and Drawing No. P2359-0103-001 submitted with the original application and shown in Figure 3-2 below illustrates the site lines available at the proposed new site entrance. 160m sight lines were shown at a setback of 3m from the road edge in the original application submitted.

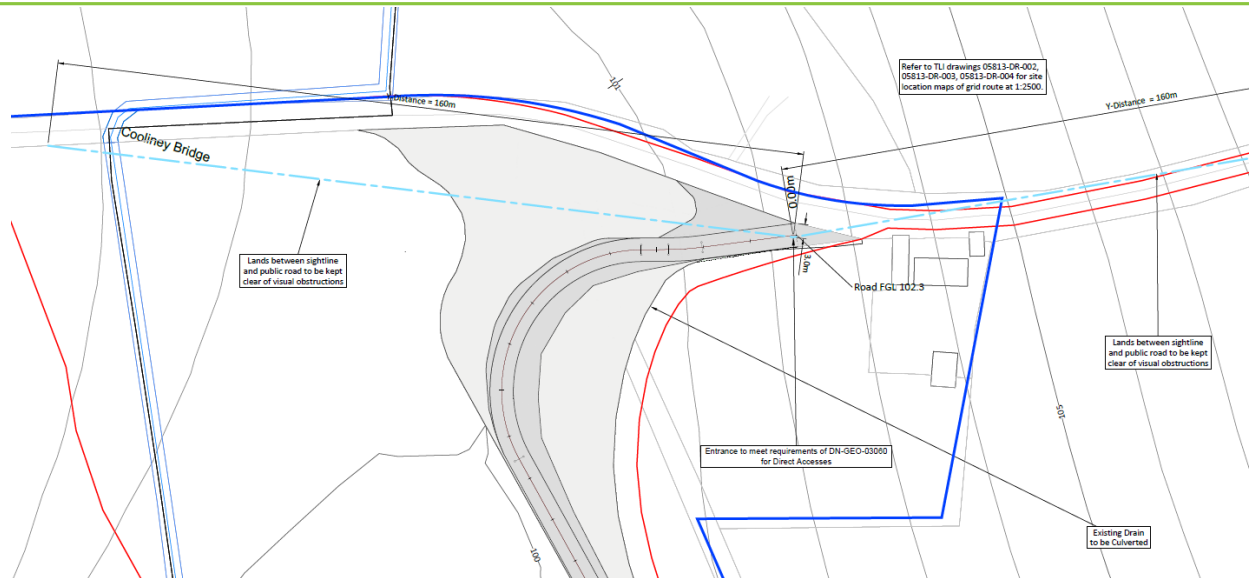


Figure 3-2: Excerpt of Drawing No. P2359-0103-001 – 'Proposed Site Entrance'.

In responding to the Council's further information submission it was clarified that the subject entrance identified as Entrance no. 1 on Drawing No. P2359-0100-0004 was to supersede the existing agricultural entrance to the holding which was identified as Entrance no. 2. Please refer to Figure 3-3 for excerpt of drawing.

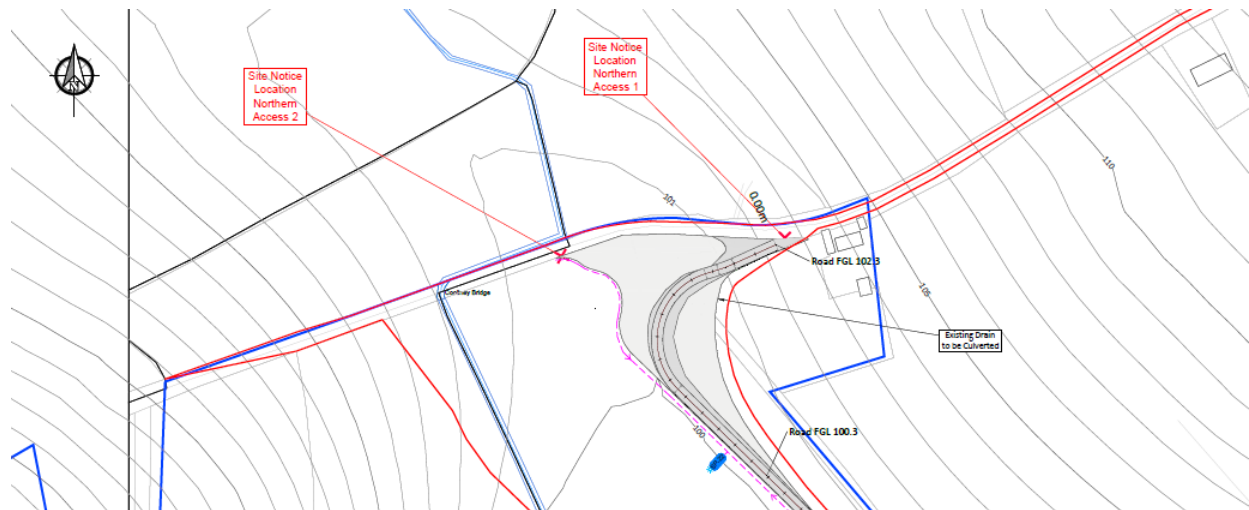


Figure 3-3: Excerpt of Drawing P2359-0100-0004 showing proposed access and access and existing agricultural access to be closed.

It is noted that the Area Engineer requested that an amended sight line entrance drawing be provided showing 90m sight distance from a 4.5m set back from the site entrance. The Drawings submitted showed how the existing entrance i.e. Entrance 2 will be removed with the new Site Entrance 1 being the primary new entrance with a large bellmouth proposed to facilitate the delivery of turbine to site. We do note however that this drawing did not show the 90m sight lines requested by the Area Engineer. We herewith provide Drawing No.



P2359-0103-0011 Rev B which shows the sight lines request by the Area Engineer as Appendix 2 with an excerpt shown in Figure 3-4 below.

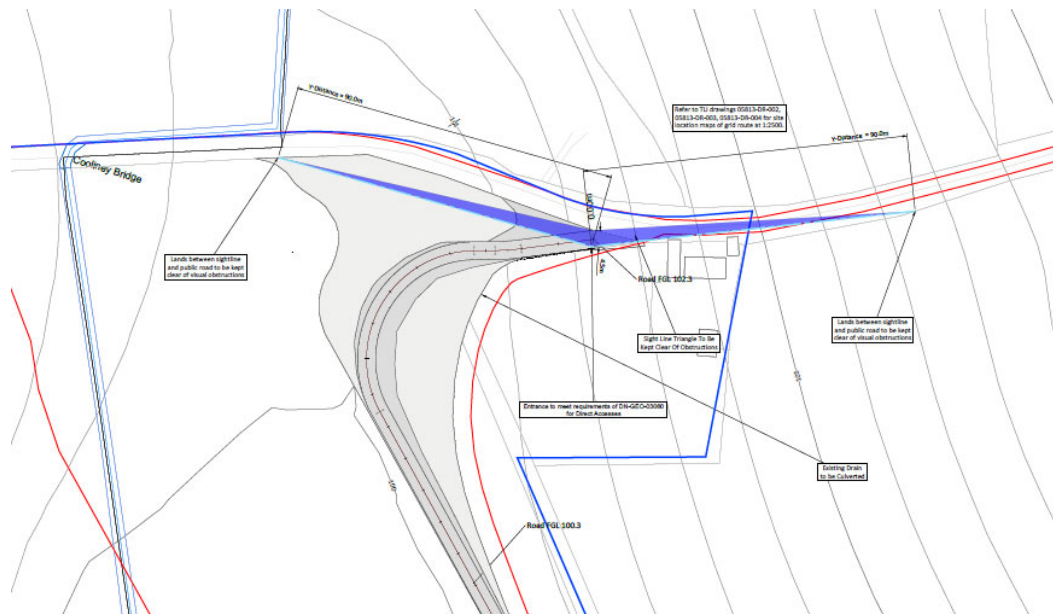


Figure 3-4: Excerpt of Drawing P2359-0103-0011 Rev B showing 90m sight line to the edge of public road.

It is also important to reiterate that the areas shown in light grey is temporary hardstanding for the construction phase only, so to allow the delivery of large components to site. Once construction is finalised this area will be reinstated fully except for the maintenance of sight lines at the entrance.

It is submitted that the entrance fully complies with TII standards DN-GEO-03060 and therefore will not generate a traffic hazard. It is also submitted that once construction is completed the entrance will simulate well into the landscape and will actually improve traffic safety in the area by reducing the forward visibility on the public road by the reduction of the current 'S' bend configuration that currently exists. The felling of habitat at the site entrance was fully assessed in the EIAR.

With regard to the Met Mast, it is proposed to utilise an existing access to the south from the L5528 to construct the mast. The mast, whilst an important feature for capturing data during the lifetime of the development, its construction is minor in nature and the temporary effects of construction traffic will be minimal. In any case it is noted that this issue did not form part of the reason for refusal.



4. OTHER POINTS

The following item in relation to bats was raised in the assessment of the application in the published Planners Report and is addressed below. In addition to the below we note that the Planners Report indicates that additional or updated photomontages would be useful to consider cumulative impacts with the adjacent consented solar farms. It is submitted that the Further Information submitted with regard to Landscape and Visual Impact Assessment adequately addresses the potential cumulative visual and landscape effects. Furthermore it is stated that the Interactions chapter of the EIAR requires further consideration based on the further information submitted, in response it is important to note that the conclusions of the impact assessments carried out and included in the EIAR did not change due to the information submitted at Further Information stage therefore no change to the Interactions Chapter of the EIAR is warranted.

4.1 Bats

The Council's Ecologist raised concerns in relation to the proposed wind farm with regards to bats.

The Planners Report Page 68 states:

"The Ecologist is not satisfied that the proposal will not have a significant impact on the local bat populations even when taking the collision risk mitigation measures into consideration. He has concerns that attempting to apply and enforce a number of measures described e.g. curtailment strategy's in relation to wind speeds, temperature etc. by way of condition attached to a planning permission would not, in reality, be feasible or easily enforced."

Overall, the Ecologist has concerns that the proposal could result in the abandonment and/or collapse of roost sites recorded within the vicinity of the development and increased mortality rates to bats. While Leisler's bat, Soprano and Common pipistrelle are all considered of least concern in Ireland, it is generally accepted that bat populations remain vulnerable to declines both at a local and landscape level with the need to prevent any further losses reflected in national and EU law. Therefore, the ecological view is that the granting of permission of this application has the potential for a detrimental impact on the local bat population and as such would be contrary to Objective BE 15-2 of the County Development Plan."

An updated and revised bat assessment was undertaken between August 2021 and July 2022 in response to the Further Information Request received from Cork County Council. Vantage point surveys, total no. of seven, were undertaken within the study area to observe bat emergence, commuting and foraging activity. The study area for the bat survey is provided in the Bat Monitoring Report 2021 – 2022 (Appendix 3 Confidential Appendix of the Further Information Response). The study area for all bat surveys was larger than the proposed wind farm site band fully encompasses it. The larger study area provides a more comprehensive assessment of bat activity both within the proposed development site and the habitats/features utilised by bats in the greater area. This approach was taken for all bat surveys undertaken (2020 - 2022) for the proposed development to ensure that the impacts on the local population of bats are fully considered.

As outlined by NatureScot (2022), and Chapter 8 – Biodiversity of the EIAR, wind farms can affect bats in the following ways:

- Collision mortality, barotrauma and other injuries;
- Loss or damage to commuting and foraging habitat;



- Loss of, or damage to roosts;
- Displacement of individuals or populations.

As the revised bat assessment undertaken between August 2021 and July 2022 showed comparable bat activity levels onsite to those outlined in Section 8.3.7 Chapter 8 – Biodiversity of the EIAR, the proposed mitigation measures in the aforementioned biodiversity chapter (section 8.6.2.7 construction phase and section 8.6.3.4 operational phase) are sufficient to ensure the avoidance of significant effects on bats, i.e. via habitat retention, replacement and landscaping, light restrictions, buffer zones, supervision of vegetation clearance, retention of trees, diversions from felling buffers, feathering of blades, curtailments and post construction monitoring.

In view of the results of bat surveys undertaken between 2020 and 2022 and the potential impacts of the proposed development on bats, and additional to the proposed mitigation measures in the existing EIAR, the HSMP includes specific measures to ensure that commuting habitat is not severed and there is no net loss of foraging habitat (i.e. hedgerows, treelines and scrub). No roosting sites shall be impacted directly as a result of the proposed wind farm as no roosting sites shall be lost as they are all located outside of the site. Landscaping that is undertaken in accordance with the Pollinator Friendly Planting Code⁶ away from the proposed turbine locations will have a positive effect on invertebrates and, in turn, bats and other wildlife. Specific bat box measures are included within the Habitat and Species Management Plan and will be implemented in full. The Habitat and Species Management Plan includes details on how the immediate surroundings of the turbines shall be managed (without the use of chemicals) so that they do not attract insects.

Increased cut-in speeds will be implemented from commencement of operation. Cut-in speeds will be increased during the bat activity season (April-October) and/or where weather conditions are optimal for bat activity (see below) from 30 minutes prior to sunset and to 30 minutes after sunrise at all turbines.

Cut-in speeds restrictions will be operated according to specific weather conditions:

1. When the air temperature is above approximately 10 to 11°C at nacelle height.
2. Generally, bat activity peaks at a wind speed range of 5.0 to 6.5m/s (at nacelle height).

The applicant notes the County Ecologists “concerns that attempting to apply and enforce a number of measures described e.g. curtailment strategy’s in relation to wind speeds, temperature etc. by way of condition attached to a planning permission would not, in reality, be feasible or easily enforced.” Therefore, the applicant commits to the submission of SCADA data annually to demonstrate compliance with these mitigation measures.

With the implementation of the detailed mitigation measures included in the Chapter 8 Biodiversity and the HSMP the conclusion of the EIAR in relation to the residual ecological effects (section 8.7.5) still stands:

“The resulting impact of the proposed development on local bat populations, with implemented mitigation measures, is considered to be a Not Significant-Slight Residual Negative Reversible Impact and In the Local Context with the favourable conservation status (FCS) of bat species being unaffected and all species confirmed or expected on or near the study areas predicted to persist.”

⁶ National Biodiversity Data Centre (2021) Pollinator Friendly Planting Code. All-Ireland Pollinator Plan 2021-2025. www.biodiversityireland.ie/pollinator-plan.



5. CONCLUSION

The Development is supported by local, regional, national and international policy through the provision of a renewable energy scheme at the subject site. It is submitted that the refusal reasons set out by Cork County Council have been rebutted and the proposed development is in accordance with the proper planning and sustainable development of the area.

We respectfully request An Bord Pleanála have full regard to this submission in the context of this first party appeal against Cork County Council’s Notification to Refuse Permission for three reasons. This submission has clearly demonstrated that the grounds for refusal are rebutted in full.

We respectfully request that An Bord Pleanála overturn Cork County Council’s decision and grant planning permission for the wind farm development in recognition that the site is appropriately designated for wind energy and the contribution that the development can make to meeting Ireland’s legally required targets for onshore wind by 2030.

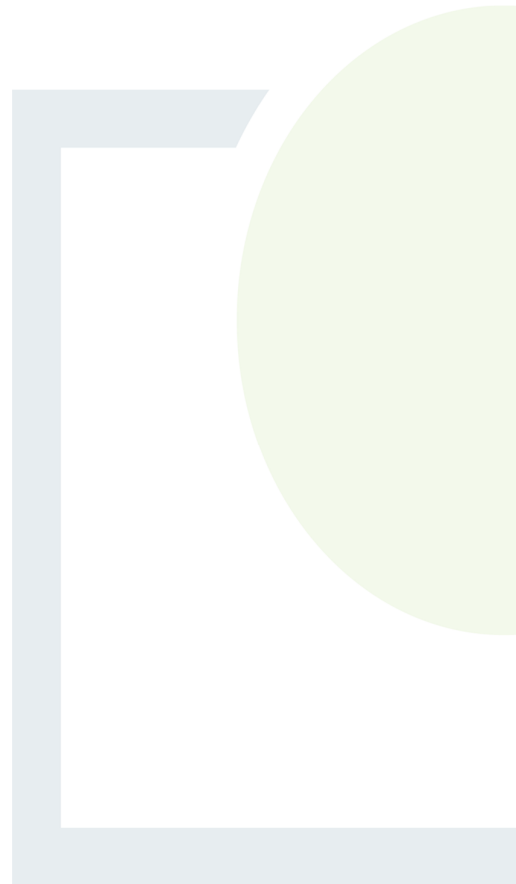
Furthermore the EIAR and NIS submitted with the planning application and the information submitted in this first party appeal clearly demonstrates that the proposed development would not be contrary to Cork County Council’s Policy Objectives BE 15-2 or ET 13-7. In addition, the site entrance drawing (reference P2359-0103-0011 Rev B) showing 90m sight distance from a 4.5m set back from the site entrance, clearly demonstrates that the proposed development would not be contrary to Cork County Council’s Policy Objective TM 12-8(d).



CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE &
PLANNING

APPENDIX 1

Copy of Cork County Council's
Notification of Decision to Refuse
Permission



**CORK COUNTY COUNCIL
PLANNING & DEVELOPMENT ACTS, 2000 – 2010**

NOTIFICATION OF DECISION TO REFUSE TO GRANT

Reference No. in Planning Register **21/07246**

Annagh Wind Farm Limited,
C/o Eamon Hutton,
Fehily Timoney & Company,
Core House,
Pouladuff Road.
Cork.

In pursuance of the powers conferred upon it by the above-mentioned Act the Council of the County of Cork has by Order dated **22/12/2022** decided to **REFUSE** to grant **Permission:**

For the development of land namely:

The development will consist of: Construction of 6 no. wind turbines with a blade tip height of 175m, rotor diameter of 150m and a hub height of 100m; Construction of turbine foundations and crane pad hardstanding areas; Construction of new site tracks and associated drainage infrastructure; Upgrading of existing tracks and associated drainage infrastructure where necessary; Upgrade of entrance onto local road L1322; All associated drainage and sediment control including the installation of new watercourse or drain crossing and the re-use or upgrading of existing internal watercourse and drain crossings; . Construction of 1 no. permanent onsite 38kV electrical substation to ESBN specifications including: - Control building with welfare facilities; - Electrical infrastructure; - Parking; - Wastewater holding tank; - Rainwater harvesting; - Security fencing; - All associated infrastructure, services and site works. 1 no temporary construction site compound and associated ancillary infrastructure including parking; Tree felling to facilitate construction and operation of the proposed development; Installation of medium voltage (20/33kV) and communication underground cabling between the proposed turbines and the proposed on-site substation and associated ancillary works; Erection of 1 no. permanent meteorological mast with a height of 100m above ground level and associated access track; Installation of medium voltage (38kV) underground cabling and associated ancillary works between the proposed on-site substation and the existing Charleville Substation within the townland of Rathnacally. The proposed grid connection will be installed primarily within the public road and will include 2 no. watercourse crossings and the installation of 8 no. pre-cast joint bays; All associated site development works; A 10-planning permission and 35-year operational life from the date of commissioning of the entire wind farm. This application for planning permission is accompanied by an Environmental Impact Assessment Report and Natura Impact Statement:

At: Annagh North, Coolcaum, Fiddane, Cooliney, Rathnacally, Farranshonikeen, Ardnageehy and Clashganniv, Co. Cork

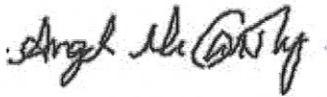
In accordance with the plans and particulars submitted by the applicant

On: 02/12/2021

For the reasons set out in the Final Schedule attached hereto.

An appeal against a decision of the Planning Authority may be made to An Bord Pleanála by any authorised person before the EXPIRATION of the period of FOUR WEEKS beginning on the day of the giving (i.e. Date of Order) of the decision of the Planning Authority.

Signed on behalf of the said Council:



Angela McCarthy
Administrative Officer

Date: 22/12/2022

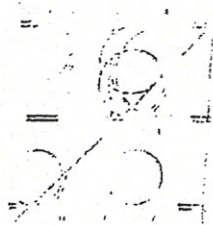
SEE NOTES ATTACHED

Please note that pursuant to S.34 (3) of the Act, the Planning Authority has had regard to submissions or observations received in accordance with these Regulations.

In accordance with Article 20, site notice shall be removed on receipt of this Notification.

FINAL SCHEDULE

No.	Reason
1	Insufficient information has been provided to enable the Planning Authority to determine beyond reasonable scientific doubt that the proposed development, either individually and/or in-combination with other plans or projects will not have an adverse effect on Whooper Swan a species of conservation interest of the Kilcolman Bog SPA and an adverse effect of the integrity of the Kilcolman Bog Special Protection Area. Furthermore, based on the information submitted the Planning Authority is unable to determine beyond reasonable scientific doubt that the proposed development, either individually and/or in-combination with other plans or projects will not have an adverse effect on qualifying interest species and the integrity of the Blackwater River (Cork/Waterford) SAC. Therefore, on the basis of the information provided with the application and in light of the Stage 2 Appropriate Assessment undertaken, the Planning Authority cannot be satisfied that the development, individually, or in combination with other plans or projects, would not be likely to have a significant effect on the integrity of the Kilcolman Bog Special Protection Area (Site Code: 004095) and the Blackwater River (Cork/Waterford) SAC (Site Code: 002170) in view of the site conservation objectives of both. In such circumstances, the granting of permission for this development would contravene materially development objective BE 15-2 'Protect sites, habitats and species' of the Cork County Development Plan 2022 and the requirements of the Habitats Directive as set out in Part XAB of the Planning and Development Act 2000 as amended.
2	Having regard to the location of the proposed development in an area of high local biodiversity value, the extent of high valued habitat to be lost and the extent of key ecological receptors to be lost and/or impacted upon by the proposed development it is considered that the proposed development would be likely to have a permanent significant negative effect on an area of high local biodiversity value. Therefore, the granting of permission for this development would contravene materially development objectives BE 15-2 and ET 13-7 of the Cork County Development Plan 2022.
3	Taking into account the poor condition and alignment of the public road (L-1307-30) in proximity to the proposed site entrance, and having regard to the plans and particulars submitted with the planning application the applicant has not adequately demonstrated the provision of vehicular sightlines and a safe vehicular entrance onto the public road and that traffic likely to be generated by the proposed development would not endanger public safety by reason of a traffic hazard. The proposed development is therefore considered to conflict with Objective TM 12-8(d) of the Cork County Development Plan 2022 and to grant permission would be contrary to the proper planning and sustainable development of the area.



An
Bord
Pleanála

Contact Details

Contact details table

Address	64 Marlborough Street, Dublin 1, D01 V902
Phone	(01) 858 8100 or Lo-call 1890 275 175
Fax	(01) 872 2684
International Phone	+353 1 858 8100
International Fax	+353 1 872 2684

Email Addresses

Normal Planning Appeals and all other appeals	appeals@pleanala.ie
Strategic Housing Development applications or pre-applications	strategichousing@pleanala.ie
Strategic Infrastructure Development applications or pre-applications	sids@pleanala.ie
Viewing decided case files or requesting copies of documents on decided case files	publicaccess@pleanala.ie
Communications	communications@pleanala.ie
General queries	bord@pleanala.ie

Opening Hours

Monday	9.15am – 5.30pm
Tuesday	9.15am – 5.30pm
Wednesday	9.15am – 5.30pm
Thursday	9.15am – 5.30pm
Friday	9.15am – 5.30pm
Saturday	Closed
Sunday	Closed
Public holidays, Good Friday and certain other days	Closed

We are open throughout the day and we do not close for lunch. On certain other days when our office is closed, we will notify the public that we are closed. However, due to exceptional circumstances this might not always be possible. If you are unsure if our office will be open before you visit, please check our website www.pleanala.ie, telephone 01 858 8100 or Lo-Call 1890 275 175 before

How do I make an appeal

Checklist

1.	You must put your appeal in writing (either typed or handwritten), you can use this form to assist – but there is no official form required.
2.	You must clearly state your own name and address. If someone is acting for you, like a planning agent they must clearly state their own name and address as well as your name and address.
3.	You must give us enough details to allow us to identify the application you wish to appeal. Examples of the details we accept are: a copy of the planning authority decision, or the name of the planning authority and the planning register reference number (for example: Ballytown City Council, 23719/18)
4.	You must provide your planning grounds of appeal (reasons and arguments) for your appeal and any items you wish to support your grounds of appeal.
5.	If you are a third party, you must include the written acknowledgement given to you by the planning authority to confirm it received your submission or observation at planning application stage. We can also accept a copy of the acknowledgement.
6.	You must pay the correct fee.
7.	You must make your appeal within 4 weeks from the date that the planning authority has made its decision.
8.	You must post your appeal to : The Secretary, An Bord Pleanála, 64 Marlborough Street, Dublin 1, D01 V902, or deliver it in person to a member of An Bord Pleanála staff at our office during office hours - Monday to Friday from 9.15am to 5.30pm. Please note that the security staff in our office cannot accept appeals.

How much does it cost?

The cost of an appeal depends if you are making a first party appeal or a third party appeal.

You can pay fees by several methods and see the list below, however contact An Bord Pleanála for further details and information.

Further information

- Make a planning appeal
- Make an observation on a planning appeal
- Make an application for leave to appeal
- Make an oral hearing request

Fees: Planning Appeals

The figure will help you find the fee for each case to the nearest of €200. €0.00

First party appeals

First party appeals		Fee
A1	You want to appeal the decision of a planning authority on an application you lodged with it. The appeal does not include retention; The appeal does not relate to commercial development; and The appeal or application does not include an EIAR or NIS.	€220
A2	You want to appeal the decision of a planning authority on an application you lodged with it. The appeal does not include retention; The appeal does not relate to commercial development; and The appeal or application does include an EIAR or NIS.	€220
A3	You want to appeal the decision of a planning authority on an application you lodged with it. The appeal does not include retention; The appeal does relate to commercial development; and The appeal or application does not include an EIAR or NIS.	€1,500
A4	You want to appeal the decision of a planning authority on an application you lodged with it. The appeal does not include retention; The appeal does relate to commercial development; and The appeal or application does include an EIAR or NIS.	€3,000
A5	You want to appeal the decision of a planning authority on an application you lodged with it. The appeal does include retention; The appeal does not relate to commercial development; and The appeal or application does not include an EIAR or NIS.	€660
A6	You want to appeal the decision of a planning authority on an application you lodged with it. The appeal does include retention; The appeal does not relate to commercial development; and The appeal or application does include an EIAR or NIS.	€660
A7	You want to appeal the decision of a planning authority on an application you lodged with it. The appeal does include retention; The appeal does relate to commercial development; and The appeal or application does not include an EIAR or NIS.	€4,500
First party appeals involving		Fee
A8	You want to appeal only against conditions requiring financial	