FEHILY TIMONEY

DESIGNING AND DELIVERING
A SUSTAINABLE FUTURE

ANNAGH WIND FARM

S131 Responses to Submissions

Prepared for:

Annagh Wind Farm Limited

FEHILY TIMONEY

DESIGNING AND DELIVERING
A SUSTAINABLE FUTURE

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Unit 3/4, Northwood House, Northwood Crescent,
Northwood, Dublin, D09 X899, Ireland

T: +353 1 658 3500 | E: info@ftco.ie

CORK | DUBLIN | CARLOW

www.fehilytimoney.ie

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Abstract: Fehily Timoney and Company is pleased to submit this S131 response report to Annagh Wind Farm Ltd for the proposed Annagh Wind Farm.

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1. INTRODUCTION

Fehily Timoney and Company (FT), on behalf of the applicant (Annagh Wind Farm Limited), are responding to correspondence received from An Coimisiún Pleanála (the Commission) dated 05 December 2025 in relation to the appeal with ref. 322439-25. The Commission has examined submissions on the appeal and has invited the applicant to respond to these submissions pursuant to Section 131 of the Planning and Development Act, 2000 (as amended). This report constitutes the applicant's response to the submissions.

On the 5th June 2025 ACP requested under three separate letters to respond to the following;

- To confirm whether there are any further material differences between the hard copy and soft copies of the EIAR.
- To make a submission on the RePower EU Regulations and the Climate Action Plan 2025.
- To comment on a DAU submission to Cork Co. Co. dated 15th June 2023 in relation to Ballyroe solar farm (Cork Co. Co. Ref. 226901).

On the 6th October 2025 ACP requested that the applicant publishes a site notice and newspaper notice pursuant to Section 142(4) of the Planning and Development Act, 2000.

The Commission should be aware that the submissions from the public may not have had regard to the further information submitted to Cork County Council, concerning cumulative impacts and the first party appeal and appeal responses made by the applicant which constitute addendums to the EIAR and NIS. It would appear that the submissions are based on the original EIAR and NIS submitted with the application in 2021.

Therefore, to address the concerns raised in the submissions made by the public, a combined cumulative impact assessment is hereby submitted for both the EIAR and NIS. The documents combine the original assessments carried out in the EIAR along with the supplementary assessments submitted at further information stage to Cork County Council and at appeal stage to ACP, it is also updated with any new projects since the lodging of the application. The EIAR and NIS cumulative assessments should be read as an addendum to the cumulative assessments prepared as part of the original EIAR and NIS submitted to Cork County Council.

2. RESPONSES TO SUBMISSIONS

2.1 Development Applications Unit

2.1.1 Item 1

ACP should note that the Whooper Swan's main foraging area, Annagh fields, occurs approximately 730 m SE of the windfarm whilst a 2nd feeding area of the species occurs approximately 620 m W of the windfarm

Response:

These distances are correct and align with the information and analysis provided in our previous submission. The Annagh Fields foraging area is located c. 730m southeast of the proposed T06 hard stand, while the Annagh Bogs foraging area is located c. 620m west of the proposed met mast. The closest proposed turbine to Annagh Bogs is T08, which is located just under 800m north-east of the Annagh Bogs foraging area.

We note the distances separating these feeding/roosting sites from the proposed development are in accordance with the zone of sensitivity radius of 600m recommended for I-WeBS sites with whooper swan in the Birdwatch Ireland Guidance Document 'Bird Sensitivity Mapping to Wind Energy' (McGuiness et al. 2015). The authors of this document note they have adopted a conservative approach, acknowledging previous guidance (Percival, 2003) noted that disturbance to whooper swans from wind energy projects occurred at 300m.

2.1.2 Item 2

Both of these locations are also known roosting sites for the species.

Response:

This statement aligns with the information and analysis provided in our previous submission, which noted that the whooper swans also roost at these sites, in addition to their primary roost at Ballyroe quarry pond. Whooper swans were recorded roosting at Annagh Fields on five occasions across winter 2023-24 and winter 2024-25 surveys (see observation IDs 5-7, 23/25, 56, 58, 76 and 106-117 in Appendix 5/Figures 3- 1a&b of Baseline Report for Winter 2023-24/Winter 2024-25 Bird Surveys). Whooper swans were recorded roosting at Annagh Bogs on two occasions, on 29/10/2024 when they were present at dawn (observation ID 31) and 21/02/2025 when a grazing herd remained to roost at dusk (observation ID 103).

Ballyroe Quarry Pond was surveyed less frequently than Annagh Fields (total of four visits during winter 2024-25); however, observations of whooper swan flocks arriving at the pond at dusk on 12th and 21st of November, in addition to numerous crepuscular flights towards and from the pond location observed from Annagh Fields which indicate the pond is regularly used as a night roost.

2.1.3 Item 3

Though lost from view behind a conifer plantation, whoopers have been observed travelling in a direction/flight path towards the windfarm location

Response:

This submission relates to diurnal visual surveys, which indicate a separate set of activity patterns indicative of local movements which are distinct from the migratory movements detected by nocturnal audio surveys.

A single flight line (observation ID 33), representative of eight swans flying north-east from Annagh Bogs several minutes before sunrise was recorded on 29th October 2024, as described in our previous submission. This flight path was an outlier relative to the trends detected by survey observations, which indicate regularly travelled routes between Annagh Bogs, Annagh fields and Ballyroe which do not traverse or veer towards the proposed turbine array based on four winter seasons of VP surveys at the proposed wind farm and one winter season of surveys at Annagh Bogs.

As such, Item 3 above focuses on a single observation, without acknowledging the trends that indicate the regularly travelled routes between feeding and roosting sites are located away from the proposed wind farm. None of the proposed turbines are located between any of the feeding/roosting sites.

The risk that traditional flight paths between Annagh Bogs and Annagh fields could change due to the wind farm is extremely low. Based on observations, the closest flight paths along the main/traditional flight routes between Annagh Bogs and Annagh fields are located 530m south of the closest turbine (T06). The risk that traditional flight paths between Annagh Fields and Ballyroe Quarry could change due to installation of solar panels is also extremely low because the intervening solar panels do not represent a barrier to flying whooper swans.

2.1.4 Item 4

> *Multiple nocturanal flight calls have been recorded at, near and within the proposed windfarm location*

Response:

It is noted that nocturnal audio surveys detected a separate set of activity patterns associated with nocturnal migration, versus the diurnal and crepuscular patterns of local movement detected by visual surveys. As such, any descriptions of nocturnal migratory activity discussed under this item cannot be taken to contradict the assessment of local diurnal and crepuscular flight routes between feeding/roosting sites which avoid the proposed turbine locations (discussed under Item 3 above).

While it is not possible to pinpoint the exact locations of whooper swans flying over and calling based on audio recordings, survey results indicate whooper swans on inward and outward nocturnal migration traversed the area in which the proposed wind farm is located.

The specific location of audio detectors links calls to a general location; the distribution of calls according to detector location and relative to proposed turbine locations are again detailed below as per the previous Section 132 response.

Nocturnal audio survey results indicate whooper swans on inward migration traversed the area in which the proposed wind farm is located in autumn/winter, with the highest number of call registrations (79 out of 80) recorded at Annagh Barn (detector located 392m south of T05) in Autumn 2023 and Annagh 1 (146 call registrations out of 147) (detector located 97m east of T06) in Autumn 2024-25.

During outward migration in spring 2024, total nocturnal flight calls registrations were lower (total of 53) and more dispersed, with 22 at Annagh barn, 9 at Annagh 1, 19 at Annagh 2 (detector located between T01, T02, T03, T05 an T06, closest being T02 at 352m) and 3 at Annagh 3 (detector located 36m east of T04). In spring 2025, a total of 12 call registrations were recorded: six at Annagh 1 and three at Annagh 3.

As such, the highest number of calls were recorded at Annagh Barn to the south of the proposed turbine array. Calls were also recorded at the margins (Annagh 1 and Annagh 3) and within the proposed turbine array (Annagh North/Annagh1).

Nocturnal flight call data from both surveyed winters indicate the majority of activity associated with inward migration occurs in November. Nocturnal flight call registrations indicative of outward migration in spring all occurred in March.

2.1.5 Item 5

> *The in-combination and cumulative impacts section of the information appears to confine itself to discussions of Ballyroe Solar farm, alone though Ballyroe is only one of a large number of solar farms with or proposed for planning in the flock area and solar energy development is only one of a large number of issues potentially affecting the flock.*

Response:

A full assessment of in-combination and cumulative effects was undertaken within the original planning submission and subsequent submissions.

The most recent submission focused on Ballyroe solar farm specifically because it was a contributing factor to ACP's original refusal of the Annagh Wind Farm first party appeal (Inspector's Report ABP-315652-23) and also of the NPWS report/submission on Ballyroe solar farm amendment application (Planning Ref: 22/6901) which informed the inspector's report.

It is further noted, none of the other proposed solar developments in the locality overlap with the areas used regularly by whooper swans. The only recorded instance of whooper swans using another proposed solar farm site was a single observation of five swans grazing in agricultural grassland within the south-eastern part of the adjacent Coolcaum solar farm.

As such, while a full and complete assessment of in-combination and cumulative effects was completed as required, Ballyroe remains the primary focus due to the presence of the roost.

It is noted that Ballyroe Solar farm is currently under construction, and as such it is extremely unlikely that any construction activities associated with this solar farm would overlap with construction of the proposed Annagh wind farm.

It is worth noting the positive impact quarrying activities have had in terms of creating roost habitat; the quarry pond at Ballyroe has expanded due to quarrying activity since 2013 (aerial imagery); extractive activities were noted here during hinterland surveys in 2019. Based on examination of aerial imagery, the more recent quarrying at Ballyroe has approximately doubled the area of open water at Ballyroe available for roosting.

For ease of reference and given the passage of time since the original planning application, further information response and appeal, FT has updated the cumulative assessment and includes same as an appendix to this submission. The updated cumulative assessment of the EIAR and the NIS should be read as an addendum of the original EIAR and NIS.

2.1.6 Item 6

The main roost of the species appears to be at Ballyroe but the solar farm will result in the roost site being surrounded by nearby solar energy development. It is still therefore possible that the flock could be displaced from its main roost site and this is acknowledged in the submitted information

Response:

The previous Section 132 response submission presented a hypothetical worst-case scenario to allow an assessment of likely movements of whooper swan should the Ballyroe roost become unavailable. Our submission does not however, confirm that displacement will take place; quite the contrary, we acknowledge that the solar farm is consented and that the solar development includes for the retention of roosting habitat and enhancement of habitat for whooper swan.

It is also worth noting that since construction of Ballyroe solar farm is currently ongoing, it is highly unlikely that construction of Annagh wind farm would overlap with construction of this solar farm.

It is important to understand that the area of open water which comprises the roost will not be developed as part of the solar farm, in addition to the rough marginal land around the edges of the pond. As such, the continued use of the roost will depend more on whether or not the whooper swans are perturbed by the solar panels in the surrounding fields, rather than any direct encroachment of their actual roosting habitat

2.1.7 Item 7

Such a displacement could even increase again the value of the aforementioned locations near the proposed windfarm in terms of their roosting value for the QI species.

Response:

It is noted that whooper swan is not a QI for any Natura 2000 sites, but are an SCI for Kilcolman Bog SPA, located 9.1 km south-east of the closest proposed turbine (T06).

As noted above, we acknowledge that the solar farm is consented and that the solar development includes for the retention of roosting habitat and enhancement of habitat for whooper swan.

It is true that the hypothetical loss of the Ballyroe roost could increase the value of Annagh Bogs and Annagh Fields for roosting whooper swan. However, we highlight that our assessment does not indicate the construction or operation of the proposed Annagh wind farm would cause displacement of whooper swans from either Annagh Bogs or Annagh Fields.

The locations of these areas relative to tAnnagh Wind Farm are at sufficient distance to prevent displacement of wintering whooper swans (Annagh Fields is located c. 730m from T06, while the Annagh Bogs foraging area is located c. 620m west of the proposed met mast and 800m south-east of T08). As noted above, the distances separating these feeding/roosting sites from the proposed development are in accordance with the zone of sensitivity radius of 600m recommended for I-WeBS sites with whooper swan in the Birdwatch Ireland Guidance Document ‘Bird Sensitivity Mapping to Wind Energy’ (McGuiness et al. 2015).

Regarding suitability of habitats at Annagh Wind Farm, the following is noted; the rough agricultural fields in and adjacent to the southern area of the proposed wind farm, while wet and prone to winter flooding, do not provide favourable foraging opportunities for whooper swan due to low-intensity management and dominance of semi-natural vegetation with lower calorific value than the vegetation characteristics of more intensively managed agricultural habitats which are abundant in the region.

It is also noted that there are no turbines proposed in any lands located between Annagh Bogs and Annagh Fields.

2.1.8 Item 8

Though it is stated that other suitable habitat is available, it should be noted that the species is likely to be choosing the current utilised locations for a reason.

Response:

While wintering site fidelity is generally assumed and is often the case for wintering whooper swans (Rees and Black, 1986), variability in wintering site selection is also common (Gardarsson, 1991).

Contrasting with perceived site fidelity over the shorter term, whooper swans as a species have demonstrated a high degree of adaptability and the ability to exploit new habitats over the long term. Historical wintering grounds included lakes, marshes, brackish lagoons and coastal bays (Owen et al. 1986). A trend of agricultural field use emerged in the 1940s, increasing into the 1960s (Kear, 1963; Sheppard, 1982), and is evident today around Ireland.

Recent studies indicate the use of improved agricultural grassland by this species has increased markedly over the relatively recent past, in contrast to reduced occupancy of lakes and rivers (Boland et al. 2010). The majority of recent studies have recorded Whooper Swans in pasture and arable land (Worden et al. 2009; Boland et al. 2010). While their diet formerly consisted of aquatic vegetation, whooper swans are increasingly recorded grazing on intensively managed pasture and a variety of vegetation associated with tillage land (Boland et al. 2010).

McGuinness et al. (2015) note observations indicative of fluctuations in wintering site use suggest this species may not always remain loyal to specific areas of suitable habitat (Boland & Crowe 2012; Boland et al. 2010).

It must be acknowledged that while variability in site usage can indicate that whooper swans may not be fully dependent on an individual site, by the same token, their tendency to rove around multiple sites which collectively comprise a wider wintering territory indicates the importance of a landscape-scale mosaic of suitable habitats and sites. The observations noted in the NPWS report/submission on Ballyroe solar farm amendment application (Planning Ref: 22/6901) which draw a picture of fluctuating numbers at Kilcolman Bog SPA over the years, in addition to population exchange/merging between swan groups using the SPA and the areas around Annagh are demonstrative of the dynamic composition and distribution of wintering whooper swan populations.

Considering the above, it is evident that while the protection of all utilised sites within a wintering territory should be a priority, the potential for plasticity of whooper swan site and habitat selection over the longer term, in combination with an abundance of suitable habitat in the wider area (i.e. flooded areas and pasture along the Awbeg River) reduce the potential for significant effects in the event of displacement.

The reasons for the use of Ballyroe Quarry Pond, Annagh Fields and Annagh Bogs are evidently the presence of open water for roosting, grazing areas and adequate separation from regular human activity providing seclusion. The abundance of flooding-prone fields and intensively managed pasture in the Awbeg catchment immediately south of Annagh means that a mosaic of similar/suitable habitats is present nearby, and observations of whooper swans in these areas during hinterland surveys confirm they are used as part of a wider wintering area.

Notwithstanding the presence of suitable displacement habitat in the immediate region, it is unlikely that construction and operation of the proposed wind farm will result in displacement of whooper swans from Annagh Fields and Annagh Bogs. It is worth noting that the Department made the following submission on the Ballyroe Solar Farm (Planning Ref. 22/6901): "in order to avoid impacts of direct disturbance and displacement to Whooper Swan that all construction works and activity should be avoided in the period October to mid-April within the area *south* of the public road L5528". The Commission will note that all works associated with the Proposed Annagh Wind Farm are *north* of the L5528.

While we note the abundance of suitable habitat in the wider area and high potential for flexibility in whooper swan site and habitat utilisation, our assessment does not rely on the availability of displacement habitat.

2.1.9 Item 9

> *The concerns regarding the lack of proven efficacy, and examples of ame, of the proposed mitigation appear valid. No peer-reviewed (or otherwise) studies appear to be provided that prove that the proposals have successfully worked or been trialled previously for Whooper SPA flocks.*

Response:

The use of turbine curtailment is commonly proposed as mitigation to mitigate against turbine strikes by birds (Machado et al., 2024; Garcia-Rosa et al., 2023). Notwithstanding the popularity of this approach, more research into the effectiveness of curtailment in preventing bird collisions is needed (Marques et al., 2014). Machado et al., (2024) recommend tailoring curtailment strategies to the temporal and spatial migration patterns associated with target species as a starting point for designing curtailment strategies. These 'blanket curtailment' periods can then be further refined based on observed distribution patterns relative to individual turbine locations, or to inform the active periods for real-time local curtailment (also referred to as 'smart curtailment' or 'shutdown on demand') based on operational monitoring by ornithologists, technological bird detection systems or a combination of both.

'Shutdown on demand' (SDOD) systems have been successfully deployed to reduce mortality of large raptors associated with turbine collisions (Jobson, 2024; Tomé, 2023). While not identical to SDOD, the blanket curtailment approach proposed for Annagh wind farm during whooper swam migration periods is a more cautious approach in that it covers the entire migration period i.e. the times when whooper swans are more likely to traverse the proposed turbine array rather than aiming trigger curtailment only in the event of whooper swan detections.

It is further noted that whooper swans exhibit a high level of macro-avoidance, as demonstrated by a recent study which satellite-tracked the flight paths of migrating whooper swan relative to offshore wind farms in the Irish Sea. This study noted that out of 23 flight paths that brought birds within 6 km of a wind farm, 15 showed deliberate changes in trajectory, altitude or direction, often well before they reached turbine arrays (NIRAS, 2025). Swans have been shown to exhibit horizontal avoidance as they fly past the outer edge of wind farms (Fijn et al., 2012). In relation to nocturnal flight activity, recent studies utilising radar on both offshore and coastal wind farms in Europe have recorded macro-avoidance rates in wildfowl at least as high, or higher at night than during the day, implying that diurnal macro-avoidance rates are comparable to those in periods of lower visibility (Desholm, and Kahlert, 2005). The avoidance rate for whooper swan is defined as 99.5% (SNH, 2018). Available evidence points to a high turbine avoidance rate for whooper swan, minimising the potential for collision in the first instance.

The core of the mitigation strategy outlined in the application is curtailment of turbines at night during the key migration periods when Whooper Swans are most likely to be moving through the area. It is a well-established and widely used approach for protecting migratory birds at wind farms. To ensure this measure remains effective, detailed monitoring during the first three years of operation is proposed. The mitigation also allows for the future use of new technologies, such as radar-based systems that can detect approaching swans and automatically shut down the turbines. Importantly, these technologies will only be introduced if and when they are validated and only with the prior agreement of Cork County Council and NPWS. This means the strategy is adaptive and future-proof, but it does not rely on unproven or experimental methods.

It is also noted that the DAU's original submission on the file (Ref 217246) recommended a condition that turbine curtailment be imposed from 15 September to 15 December, and between 21 February and 15 April each year, increasing the previously proposed curtailment period and thereby implying that the currently proposed curtailment mitigation is suitable.

2.1.10 Item 10

> *The proposed curtailment appears to relate only to the spring and autumn migration period and does not seem to be proposed for the rest of the winter when the flock is using the area and again examples, data etc. does not appear to be Included of where this has worked for a Whooper swan flock.*

Response:

The proposed curtailment periods are based on recommendations contained in a previous DAU submission (Ref 217246); a specific request to increase the curtailment windows to cover the period from 15 September to 15 December, and between 21 February and 15 April each year periods was made in this submission indicating that it was considered to be appropriate mitigation.

The nocturnal audio survey results indicate groups of swans moving through/near the area of the proposed wind farm site at night during migration periods, but do not indicate any nocturnal movements through the proposed wind farm site associated with movement between feeding/roosting sites. In addition, it is well established that the majority of wintering whooper swan movements between feeding and roosting sites occur around dawn and dusk, rather than at night.

The results of visual surveys confirm that the regular flight paths of whooper swans moving between the feeding/roosting sites in the locality do not traverse the proposed wind farm site. This is considered to be due to the fact that the proposed wind farm site is not situated between any of the feeding/roosting sites. While no nocturnal movements between the feeding/roosting sites have been detected, in the event they did occur, they would be unlikely to traverse the proposed wind farm site because it does not encroach in any intervening areas between the feeding/roosting sites.

In summary, the concern that curtailment should extend across the entire winter period is not supported by the evidence. The data show that Whooper Swan movements posing collision risk occur during the recognised migration windows, not during routine winter foraging and roosting, which take place at dawn and dusk and do not intersect with the wind farm site. Both the nocturnal audio surveys and the visual flight-path mapping confirm that the proposed wind farm is not located between any feeding or roosting areas and is therefore not part of the flock's regular movement routes. The curtailment periods proposed are directly aligned with DAU's own recommended windows and are proportionate to the actual risk identified. On this basis, extending curtailment into periods where no risk has been evidenced would be unnecessary and unsupported by survey results.

2.1.11 Item 11

Regarding the two other QI species now found at the site, Teal and Shoveler, no updated Appropriate Assessment documentation for same appears to be provided.

Response:

It is noted that the SCI species shoveler has not been recorded at the proposed wind farm site, but rather at Annagh Bogs.

Wintering teal are widely distributed across the surrounding area and were recorded at a total of nine different hinterland sites during current surveys. This species was observed to use the proposed wind farm site infrequently relative to other sites; there were only two observations of teal at the proposed wind farm site, both in winter 2023-24, versus a total of 36 observations across nine hinterland sites over both surveyed winters (2023-24 and 2024-25). A flock of 30 teal were observed flying north-west within the 0-25m height band for 35 seconds, towards the proposed wind farm site from the direction of Annagh bogs on 12th February 2024. Another flock, comprising 35 teal, were observed flying with the 0-25m height band for 47 seconds on 16th January 2024. This flock flew back and forth along an east-west axis between T5 and T6, before landing in a drainage channel. It is noted that all teal flight activity occurred below potential collision height (lowest proposed blade tip height = 25m).

While there is no defined link between teal wintering at Kilcolman Bog SPA and those observed at the proposed wind farm site (due to the dispersed distribution of the wintering population in the locality), when considering potential for such links, the low usage of the proposed wind farm site versus other areas in the surrounding hinterland and occurrence of flight activity below potential collision height means the conclusions of the NIS remain unaltered.

While the conclusions remain unaltered, the NIS has been updated to take account of the presence teal and shoveler (see NIS addendum included with this response).

2.1.12 Item 12

For Teal it is mentioned that the observed flock within the site was at a distance above the mean foraging distance for the species. This may be accurate but the Commission should note that it is only slightly above the mean and that the mean is as described the mean, therefore it is within the potential foraging distance.

Response:

A range of mean foraging distances for teal was quoted in the NIS, ranging from 0.8 km to 8.4 km. These were calculated by two French studies (Legagneux et al. 2009 and Guillemain et al. 2008, referenced in a review by Johnson, 2014) which calculated mean distances flown (flight distance) between roost site to feeding site for teal during migration and winter. There was considerable variation between different study sites: mean foraging distances of 0.8, 1.0, 2.3, 2.5, 3.8 and 8.4 km were calculated at six different study sites. As such, while variability is present (considered to arise from differing relative location between roosting and feeding areas), the highest mean foraging distance or 8.4 km is an extreme outlier relative to the others.

The NIS conservatively considered the highest mean from this study i.e. 8.4 km to be the core foraging distance for teal rather than a maximum foraging distance (maximum foraging distance is not defined).

As such, we agree with the above submission and note that the use of core foraging distance within the NIS did not preclude the occurrence of higher foraging distances.

Due to subsequent observations of teal at Annagh Bogs and the proposed wind farm site, the NIS has been updated to account for the potential that teal associated with Kilcolman Bog SPA may forage in the area (primarily at Annagh Bogs).

As such, while there is a possibility that teal (and shoveler) potentially associated with Kilcolman Bog SPA may occasionally use Annagh Bogs as part of their wintering range, it is noted that Kilcolman Bog SPA is located to the south-east and as such the proposed wind farm is not positioned between Annagh Bogs and Kilcolman Bog SPA.

In conclusion, the concern raised does not alter the overall assessment or introduce any meaningful risk that has not already been accounted for. The NIS deliberately adopted the most conservative value available (highest mean foraging distance of 8.4km) to ensure that all plausible teal foraging behaviour was fully captured, including occasional longer-range movements. The subsequent update to the NIS further strengthens this by acknowledging that teal associated with Kilcolman Bog SPA may occasionally forage at Annagh Bogs. However, the proposed wind farm is not located between Kilcolman Bog SPA and Annagh Bogs, meaning it is not situated along any expected or natural flight route between these areas. As a result, even if teal occasionally forage at greater distances, there is no credible pathway by which the proposed development would give rise to significant effects.

2.1.13 Item 13

> *Though not a QI species for the site the document also records multiple records of Hen Harrier foraging within the site during the winter. It is not clear from the document what the summer usage of the site is but it is within normal nesting foraging range of the nationally important Ballyhouras breeding harrier population and in addition is relatively close to the Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA. Loss of winter foraging habitat through displacement effects (which occur out to 500 metres or more) can decrease winter survival rates and therefore impact Hen Harrier SPA Conservation Objectives. No information regarding Appropriate Assessment for Hen Harriers appears to be provided here.*

Response:

All previous submissions make clear that hen harrier was only recorded at the proposed wind farm site during winter (total of eight sightings over four winter survey seasons).

A full and detailed assessment of hen harrier was included in the original NIS and EIAR, which identified short-term slight effects associated with habitat loss and disturbance during construction and a long-term not significant effect during operation. No adverse effects were identified, and it is considered that wintering hen harrier will continue to forage at the site during operation.

The nationally important Ballyhouras hen harrier population was also considered within the original submission, which noted the presence of non-designated but regionally important breeding areas for hen harrier in the Ballyhouras as being within the core (breeding season) foraging range. No observations of hen harrier were recorded at the proposed wind farm during the breeding season across all surveys. In the event that foraging hen harrier from non-designated breeding areas occurred in the area of the proposed wind farm site during the breeding season, similarly to winter, it is considered that they would not be deterred from foraging at the site during operation.

The majority of studies on displacement indicate some level of displacement from breeding and winter roosting sites, as noted in the guidance document Hen Harrier and the Wind Energy Sector (NPWS, 2022) which draws on a wide range of studies. Indirect effects can potentially occur, for example, when changes in prey species density or abundance arising from effects of wind energy development may affect foraging predators such as raptors (Pearce-Higgins et al., 2009; Wilson et al., 2015). It is noted in NPWS (2022) that evidence around displacement is inconclusive, with some studies indicating negative effects arising from displacement and others showing no detectable effects.

NPWS (2022) noted the key field study which examined displacement in Hen Harriers found that avoidance extended to 250m from turbines, with reduced flight activity inside this buffer (Pearce-Higgins et al., 2009), and also that Madders and Whitfield (2006) in reviewing a number of studies found little evidence of large-scale displacement, ultimately suggesting that foraging avoidance mostly extended to approximately 100 m around turbines. Further detracting from consistency, Pearce-Higgins et al. (2009) recognised the avoidance rates recorded in their study may be highly site-specific.

Madden and Porter (2007) carried out a study in Ireland (Derrybrien, Co. Galway) which showed hen harriers continued to forage near operational turbines between 10m and 100m away from turbine bases. Their study concluded that absolute or total displacement was not evident, at least short-term, post-construction.

NPWS (2022) noted that because hen harriers hunt largely by auditory cues, it is possible that foraging success and prey detection could be compromised when hunting in close proximity to turbines (see Wilson et al., 2015).

Due to the large spacing between proposed turbines (ranging from 454 to 734m) it is unlikely that foraging hen harrier will be displaced from the area in which the proposed wind farm is located.

Considering the above, in addition to the observed low levels of activity at the proposed wind farm site, the proposed wind farm will not give rise to significant displacement effects during construction, operation or decommissioning.

The conclusions of the NIS remain unchanged.

2.1.14 Item 14

> *Wind farms pose a threat to Whooper Swans through collision with turbine blades, habitat loss and degradation, and disturbance from construction and operation. These impacts are particularly concerning because Whooper Swans are large, migratory birds, and collisions are a known cause of death for them. The risk is elevated when wind farms are located on or near migratory flyways and wintering grounds (which is the case here). Construction can displace swans from nesting and roosting sites, while operational windfarms can cause large-scale avoidance, altering their flight paths and forcing them away from traditional wintering or feeding areas. These impacts can be significant, especially when considering a population's cumulative effect from multiple developments.*

Response:

No diurnal whooper swan movements through the proposed turbine array were detected during visual surveys.

Based on nocturnal audio surveys and the location of roosting/feeding sites in the locality relative to the proposed wind farm, it is assessed that whooper swans on inward and outward migration may traverse the proposed turbine array and the curtailment mitigation proposal has been designed in cognisance of this.

No habitat loss affecting whooper swan will occur, and potential habitat degradation in terms of water quality effects are mitigated against. As discussed in detail above (responses to Items 1, 7 and 8), construction and operation of the proposed wind farm will not result in disturbance to feeding/roosting areas in the locality due to the presence of sufficient buffering distances.

Regarding avoidance and alteration of flight paths, this is acknowledged and discussed above (Item 3). It is worth reiterating here that the high avoidance rate associated with whooper swans is a positive trait in terms of minimising risk of turbine collisions. It is assessed as highly unlikely that avoidance of the proposed turbine array would prevent whooper swans from using their established feeding/roosting sites in the locality, since multiple avenues and angles of approach would remain open in the even the proposed wind farm was constructed. Any potential detours to avoid the turbine array would be minor, and whooper swans would still be able to migrate in and outwards from the feeding/roosting sites in the locality.

In the most arduous detour scenario of whooper swans approaching from the north-west to land at Annagh Fields, minor course adjustments to the south-west or north-east would allow swans to circumnavigate the turbines and land in Annagh Fields with minimal extra flight distance and energy expenditure. The potential obstruction for swans approaching from the north-west to land at Annagh Bogs would be similarly minor and readily surmountable

Taken together, the evidence does not indicate the proposed wind farm presents a significant collision, disturbance, or displacement risk to Whooper Swans. The surveys confirm that the site is not used for diurnal movements, is not located between any feeding or roosting areas, and does not contain habitat relied upon by the species. The only potential interaction relates to occasional nocturnal migration movements which has been addressed through a targeted, precautionary curtailment regime specifically designed for those periods. With no habitat loss, no disturbance to established feeding or roosting sites, and ample space for birds to adjust their approach routes with negligible additional effort, there is no credible mechanism by which the proposed development would prevent Whooper Swans from continuing to use the wider area as they do at present.

2.1.15 Item 15

> *A Natura Impact Statement should present a robust and reasoned scientific assessment and analysis of the implications of the proposals for the relevant conservation objectives of relevant European sites. Best scientific knowledge in the field should be applied to the understanding of the likely effects, and to the assessment and analysis of the implications of the proposals for the conservation objectives and integrity of the sites. When carried out by the competent authority, the appropriate assessment cannot have lacunae and must contain complete, precise and definitive findings and conclusions capable of removing all reasonable scientific doubt as to the effects of the project on European sites.*

Response:

The NIS including addendum, provides a complete, evidence-based and site-specific assessment, drawing on the best available scientific knowledge, published literature, and extensive field surveys undertaken over multiple seasons. It identifies all relevant European sites, examines their conservation objectives in detail, and evaluates each potential impact pathway using a transparent, stepwise methodology consistent with national and EU guidance.

There are no gaps or omissions in the assessment. All relevant species, habitats, and ecological processes have been considered, and where uncertainty existed, the NIS adopted a precautionary approach, ensuring that the analysis erred on the side of environmental protection. The conclusions reached are precise, definitive, and supported by empirical data, including targeted ornithological, hydrological, and habitat surveys. The mitigation measures proposed are clearly described, proportionate, and directly linked to the identified risks, ensuring that any potential effects are fully avoided or reduced to a level where no reasonable scientific doubt remains.

Accordingly, the NIS meets the standard required under Article 6(3) of the Habitats Directive and provides the competent authority with a robust and defensible basis on which to complete its Appropriate Assessment.

2.2 Wild Ireland Defence & SJK

2.2.1 Item 1

The project lacks a legally compliant cumulative assessment.

Response:

The EIAR contains a comprehensive, multi-chapter cumulative assessment fully aligned with the requirements of the EIA Directive, the Habitats Directive, and the EPA's Guidelines on the Information to be Contained in EIARs (2017). The presence of other operational wind farms in the wider landscape is explicitly acknowledged and systematically assessed across all relevant environmental topics.

The EIAR does not rely on a single chapter to address cumulative effects. Instead, it follows the EPA's prescribed approach of embedding cumulative assessment within each environmental factor. Air quality, noise, hydrology, land and soils, archaeology, and other chapters each contain dedicated cumulative impact sections, supported by detailed modelling, mapping and significance evaluations.

The EIAR expressly recognises the existing wind energy context of the site locality. The EIAR identifies all relevant existing and permitted renewable energy developments within the study area and incorporates them into the cumulative baseline.

For ease of reference and given the passage of time since the original planning application, further information response and appeal, FT has updated the cumulative assessment and includes same as an appendix to this submission. The updated cumulative assessment of the EIAR and the NIS should be read as an addendum of the original EIAR and NIS.

2.2.2 Item 2

Cumulative adverse impacts on Whooper Swan and the Kilcolman SPA.

Response:

In response, it is submitted that it would appear that the submission may have taken this view based on a review of the original EIAR and NIS prepared in 2021 and not the further information submission made to Cork County Council, first party appeals and appeal responses.

Please refer to Appendix 1 and 2 which is an updated Cumulative Impact Assessment for the EIAR and the NIS. The addendum combines the cumulative assessments contained in the original EIAR and NIS with the assessments carried out at further information stage and appeal stage and is therefore presented in a single document for ease of reference. Having regard to the passage of time since lodging the planning application in 2021, Appendix 1 and Appendix 2 should be considered as an Addendum to the EIAR and NIS. It includes projects which were permitted since the lodging of the planning application in 2021.

2.2.3 Item 3

The remitted documentation does not take this opportunity to provide a complete and rigorous cumulative assessment that lawfully incorporates Ballyroe Solar Farm and other renewable-energy developments in the surrounding area. This continuing omission is incompatible with Article 6(3) of the Habitats Directive, which requires that an appropriate assessment consider all projects capable of interacting with the development's effects.

Response:

It would appear that the Observer has not had regard to the first party appeal submission in January 2023 which was further updated again by a Section 132 submission made to the Board in July 2025 (Applicants ref. 25-180-FT-EN-XX-LT-EN-0003) which specifically dealt with the issue of Ballyroe Solar Farm and the DAU observation on the planning file. Furthermore, please see latest response to the DAU submission above in Section 2.1.

2.2.4 Item 4

It is claimed that the EIAR does not contain a chapter on a whole life or embedded carbon assessment.

Response:

The climate assessment included in Chapter 6 of the EIAR was carried out in full compliance with the recognised industry standard for wind farm carbon assessment: the Scottish Wind Farm Carbon Calculator (SWFCC). This tool is the benchmark methodology used across Ireland and the UK for evaluating carbon impacts associated with wind energy developments. This is a Life Cycle Assessment (LCA) tool designed specifically for wind farms to provide a "whole-life" assessment by quantifying the "carbon debt" of a project and comparing it against the "carbon savings" it generates. Therefore, "a whole-life or embedded carbon assessment".

The Inspector's Report for ABP-315652 confirms that the climate assessment is adequate, proportionate, and compliant with the EIA Directive and EPA guidance, and that the use of the SWFCC is appropriate for determining whether the project delivers a net climate benefit.

Section 6.4.4 of the EIAR, titled "Carbon Balance" states:

"during the manufacturing and transportation of turbines, and construction and decommissioning of the turbines, 34,417 tonnes of CO2 will be lost to the atmosphere. This represents 2.3% of the total amount of CO2 emissions that will be offset by the proposed wind farm project. Losses during the construction and decommissioning phases will be due to reduced carbon fixing potential, losses from soil organic matter and losses due to felling forestry. Values for turbine life and felling of forestry are presented in Table 6-12.

> *In total, it is estimated that 1,503,810 tonnes of CO2 will be displaced over the proposed thirty five-year lifetime of the wind farm i.e. 42,966 tonnes of CO2 per annum, which assists in realising the ambitious goals of the Climate Action Plan 2019."*

It is notable that the aims of the Climate Action Plan since the submission of the EIAR have only become more ambitious, reinforcing the benefit of consenting the proposed Annagh Wind Farm in order to contribute to the effort in realising these ambitious goals.

The Coolglass case concerned the adequacy of information where embedded carbon was the central claimed benefit of a specific technology. It did not establish a general legal requirement for carbon accounting beyond SWFCC, which is the accepted industry standard for evaluating carbon impacts associated with wind farm construction, drainage, and operational displacement of fossil-fuel generation. This tool already incorporates conservative emission factors for construction materials, transport, excavation and hardstanding installation. The Inspector's Report confirms that this methodology is appropriate, proportionate, and compliant with the EIA Directive and EPA guidance.

Furthermore, the Climate Action Plan and the National Energy and Climate Plan explicitly recognise onshore wind as a low-carbon technology whose lifecycle emissions are a fraction of those associated with fossil-fuel generation, even when construction-phase emissions are included.

2.2.5 Item 5

> *Inadequate assessment of hydrology, drainage, and geotechnical stability. The development site contains multiple watercourses, including tributaries to the Awbeg River which forms part of the Blackwater River SAC catchment. The EIAR proposes new watercourse crossings, significant excavation, and drainage modifications but does not present a sufficiently detailed hydrological model demonstrating the absence of siltation, pollution, or altered flow regimes during high-rainfall events. No robust geotechnical risk assessment has been provided to demonstrate that ground stability will not be compromised by excavation, track construction, or foundation installation.*

Response:

Chapter 10 of the EIAR carries out a comprehensive Hydrology Impact Assessment of the project. Furthermore Section 3 of the Further Information submission dated November 2022, adds further clarification on the potential impact of the project on the Blackwater River SAC. It addresses the following key topics.

- Impacts of loss of floodplain on natural hydrological processes on watercourses;
- Potential for increased risk of surface/ground water pollution;
- Hydrogeological impacts
- Details of proposed mitigation to address identified impacts;
- Assessment of the likely success of proposed mitigation;
- Assessment of potential for the development adverse effects on the integrity of the Blackwater River (Cork/Waterford) SAC

The EIAR and further clarification contains a comprehensive hydrological and hydrogeological evaluation, including detailed mapping of all watercourses, assessment of tributaries to the Awbeg River, and identification of all proposed watercourse crossings. The Inspector confirms that the drainage design, silt-control measures, and water-quality protections are robust, standard, and effective, and that the EIAR demonstrates no risk of siltation, pollution, or altered flow regimes, even during high-rainfall events. The drainage strategy incorporates best-practice measures such as settlement ponds, check dams, controlled discharge, and phased construction sequencing, all of which are recognised by NPWS and IFI as appropriate for protecting downstream SAC catchments.

The EIAR includes a site-specific land and soils assessment, which evaluates peat depth, substrate conditions, slope gradients, drainage patterns, and load-bearing capacity across the site. The site comprises predominantly improved grassland and commercial forestry, with no elevated landslide risk. The assessment concludes that excavation, track construction and turbine foundations can be safely accommodated with standard engineering controls. The claim of potential instability is not borne out by the geotechnical analysis, which demonstrates that the site can safely accommodate the proposed works.

2.2.6 Item 6

> *Critical issue concerns the ongoing inability of the applicant to demonstrate beyond reasonable scientific doubt that the project will not adversely affect Whooper Swan, a qualifying interest of the Kilcolman Bog SPA.*

Response:

The reader is referred to the response provided to the DAU in Section 2.1 above.

2.2.7 Item 7

> *These include the potential for land-stability problems where deep excavation, vegetation removal, and drainage alterations occur; the risk of wildfire ignition in proximity to forestry, especially in areas where emergency access is constrained; the possibility of interference with private wells and groundwater supplies, particularly where recharge sources are unknown; and the potential for interference with telecommunications and mobile signals caused by turbine interference patterns. Road safety, substandard access, and inadequate sightlines have also not been resolved. The EIAR does not quantify how increased runoff, soil compaction, and tree felling may exacerbate existing flooding and drainage problems on local roads or downstream watercourses.*

Response:

With regard to the "potential for land stability problems" it is important to note that the soil types associated with land stability problems are not present at the site. Section 9.3.1 of the EIAR states:

> *"During site walkover there were no indication of the presence of peat on the development site. No evidence of peat was recorded during the intrusive ground investigation."*

Furthermore, Appendix A of Appendix 9.1 of the EIAR is a site investigation report which contains in-situ vane tests and soil logging which shows that the soils present on site are generally firm, stiff or very stiff.

The Land and Soils chapter confirms that the site contains no peat, no deep organic soils and no geomorphological features associated with instability. Excavations for turbine foundations, access tracks and drainage are designed in accordance with geotechnical best practice, and the chapter concludes that no land-stability risks arise, either individually or cumulatively.

With regard to the potential for ignition of wildfire in the proximate forestry, especially in areas where emergency access is constrained. Chapter 11, Section 11.7 deals with potential Health and Safety matters in particular the vulnerability of the project to Major Accidents and Natural Disasters.

> *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 this EIAR.*

Regarding the potential for interference with private wells and groundwater supplies. Groundwater protection and private wells are comprehensively assessed in Chapter 9 (Hydrogeology) which identify all wells within 1 km, classify aquifer vulnerability, assess recharge characteristics and evaluate potential pathways for impact. The EIAR concludes that the development will not interfere with groundwater supplies due to the shallow nature of excavations, the absence of dewatering, the low vulnerability of underlying bedrock and the implementation of strict pollution-prevention measures.

Chapter 11: Population, Human Health & Material Assets contains a dedicated assessment of utility infrastructure, including telecommunications networks. As outlined in Section 11.2, telecommunications providers and infrastructure operators were consulted during the scoping process, and a detailed desktop study was undertaken to identify all relevant utility infrastructure within the study area. Section 11.8 specifically evaluates renewable and non-renewable resources and utility infrastructure, confirming that no telecommunications links, broadcast systems, or mobile-signal infrastructure intersect with the proposed turbine envelope or grid-connection route. Modern turbine design, including non-metallic blades and the absence of reflective surfaces, eliminates the electromagnetic interference issues associated with older turbine models. The EIAR therefore concludes that there is no credible pathway by which the proposed development could interfere with telecommunications, mobile coverage, broadband services, or emergency communications.

Chapter 13: Traffic & Transportation provides a comprehensive, data-driven evaluation of the existing road network, predicted construction and operational traffic, turbine delivery logistics, and the grid-connection works. Section 13.4.2 includes a detailed assessment of the proposed site entrance on the L1322, supported by photographs and a geometric design review in accordance with TII's DN-GEO-03060. The EIAR confirms that the required visibility splays can be achieved and that the entrance can safely accommodate both construction traffic and abnormal loads. On this basis, any concerns relating to road safety and inadequate sightlines have been comprehensively resolved.

Chapter 10 (Hydrology & Water Quality) provides a full quantitative assessment of surface-water runoff, including calculations of pre- and post-development flow rates, the effects of soil disturbance, and the hydrological implications of tree-felling. The chapter evaluates all drainage pathways, watercourse crossings and receiving catchments, and confirms that the proposed drainage design (interceptor drains, settlement features, controlled discharge and attenuation) prevents any increase in peak flows to public roads or downstream watercourses. These findings are then integrated into the traffic and transport assessment, which assesses road conditions during construction and confirms that the drainage system eliminates any risk of additional flooding or waterlogging on local roads.

2.2.8 Item 8

Proposed tree-felling and the associated replant lands in County Clare are not subject to a full integrated environmental assessment.

Response:

It should be noted that the clear-felling of trees in the State requires a felling license. The associated afforestation of alternative lands equivalent in area to those lands being permanently clear-felled is also subject to licensing ('afforestation licensing'). The Forest Service of the Department of Agriculture, Food & the Marine is Ireland's national forest authority and is responsible for all forest licensing.

The EIAR explicitly considers the project "in combination" with other forestry operations, renewable-energy developments, and land-use changes within the study area. This includes cumulative assessments in Chapters 9, 10, 11 and 13, as well as the overarching cumulative assessment in Section 11.10. The EIAR also reflects the Department of Agriculture, Food and the Marine's consultation response, which requires replanting on a like-for-like basis and confirms that the replant lands are subject to separate licensing and environmental scrutiny under the national forestry regulatory system.

In light of the foregoing, the potential replant lands located in Co. Clare are located outside any potential pathways of connectivity with the proposed project. This will ensure that there is no potential cumulative impact associated with this replanting. In addition, the developer commits to not commencing the project until both felling and afforestation licenses are in place and this ensures the afforested lands are identified, assessed and licensed appropriately by the relevant consenting authority.

In summary, the EIAR provides a comprehensive, integrated and legally compliant assessment of tree-felling, replanting and their cumulative ecological and hydrological effects.

2.2.9 Item 9

There appears to be cut paste issues from another development with mentions of development in Mungret and Clarina in Co Limerick. This should be clarified.

Response:

There are references to Mungret and Clarina at various points within the EIAR as these names refer to points along the turbine delivery route.

2.2.10 Item 10

There is a question over the validity of the site Notice

Response:

The Commission's direction of 6th October 2025 under Section 142(4) of the Planning and Development Act 2000 to readvertise the project did not create any requirement to reference RED III in the site notice. A Section 142(4) direction empowers the Commission to prescribe the exact wording to be used, and once issued, the applicant must use that wording without alteration. In this instance, the applicant was required to use the text directed by the Commission. The Commission's prescribed wording therefore constitutes full compliance with the Act and Regulations for the purposes of this remitted application process.

At that time, the RED III site-notice requirements introduced by S.I. 274 of 2025 applied only to applications made on or after 6th August 2025 and Circular CEPP 2/2025 confirms that the new RED III form is required only where an applicant is making a RED III application. This is not a RED III application but a remitted application under the Planning and Development Act, and the Commission expressly chose to prescribe its own wording rather than require the statutory RED III form.

2.3 J&M Foley

2.3.1 Item 1.

The submission raised similar concerns with potential cumulative impacts associated with other permitted infrastructure in the area.

Response:

Please refer to the responses outlined in Section 2.1 and 2.2 above.

2.3.2 Item 2.

The submission refers to the presence of EU Red-Listed species and alleged changes in avifauna flight paths.

Response:

Ecological surveys were carried out in line with NPWS guidance and best practice methodologies, and the findings were incorporated into the NIS and Appropriate Assessment. The presence of sensitive species was duly recorded and assessed, with mitigation measures proposed to avoid or reduce potential impacts. While local observations are noted, anecdotal evidence does not substitute for systematic ecological survey data. The applicant's surveys and assessments remain the appropriate basis for decision-making, and subsequent projects granted consent within the zone of influence have been required to undertake their own site-specific surveys and cumulative assessments, thereby ensuring that impacts on avifauna are comprehensively addressed.

2.3.3 Item 3.

The submission raises concerns regarding human health and welfare, citing WHO recommendations on separation distances.

Response:

In relation to human health and welfare, the applicant has complied with all statutory requirements and guidance relevant to renewable energy developments. The World Health Organization has not issued binding separation distance requirements for solar or wind projects, and Irish planning policy does not prescribe fixed buffer zones. Instead, health and amenity considerations are addressed through established planning processes, environmental assessment, and the imposition of conditions where necessary. The applicant's EIAR and NIS considered potential impacts on human health, including noise, traffic, and visual amenity, and concluded that the project would not give rise to unacceptable effects.

2.3.4 Item 4.

The submission asserts that the applicant has not complied with obligations under the Aarhus Convention.

Response:

All relevant reports, surveys, and assessments were submitted as part of the application and made available for public consultation. The NIS and EIAR were prepared in accordance with statutory requirements. The obligation to provide updated cumulative assessments rests with subsequent applicants, who must consider existing and proposed developments within their own submissions. The documentation therefore remains robust, legally compliant, and sufficient for the purposes of Appropriate Assessment and environmental decision-making.

2.4 J Maher

2.4.1 Item 1

The submission raises concerns regarding the adequacy of public consultation.

Response:

Consultation was carried out in accordance with the Planning and Development Act 2000 (as amended), the Strategic Infrastructure Development procedures, and the Department of Housing, Local Government and Heritage guidance. In addition, the applicant went significantly beyond statutory requirements by preparing and submitting a Community Consultation Report in line with the Draft Revised Wind Energy Development Guidelines (2019), which recommend that applicants provide a detailed account of engagement activities.

The consultation programme commenced in October 2019, well before the planning application was lodged, with a face-to-face public consultation event at Liscarroll GAA Club. This was advertised in the Corkman newspaper and supported by brochures, project information boards, and direct engagement with residents. As the COVID-19 pandemic restricted in-person gatherings, the applicant adapted by hosting a series of four public consultation webinars between December 2020 and September 2021, each advertised in local media and supported by letters and newsletters delivered to all households within 2 km of the site. These letters included Frequently Asked Questions (FAQ) compilations, project newsletters, and clear instructions on how to participate.

To further enhance accessibility, the applicant established a dedicated project website (www.annaghwindfarm.ie) and a Virtual Consultation Room, providing interactive access to project maps, photomontages, videos, and environmental information. A Community Liaison Officer was appointed to act as a direct point of contact for residents, and a Community Communication Tracker was maintained to log and respond to queries. The consultation record demonstrates direct correspondence with residents on issues including proximity to homes, landscape and visual impacts, biodiversity, and the community fund.

Importantly, the consultation process influenced project design. Feedback from residents led to a reduction in turbine numbers from eight to six, refinement of transport and grid connection routes, and adjustments to site access arrangements. The applicant also committed to a Community Benefit Fund in line with the Renewable Electricity Support Scheme (RESS), with input from local clubs and societies.

In summary, the consultation programme was multi-layered, transparent, and responsive, combining in-person events, online forums, direct mail, newsletters, and interactive tools. While COVID-19 restrictions necessitated reliance on virtual methods, the applicant ensured that households closest to the site received hard-copy information and invitations. The consultation record demonstrates that statutory requirements were met and exceeded, and that meaningful engagement occurred at a stage when project design could be influenced.

2.4.2 Item 2

The submission raises concerns regarding the zoning in the Cork County Development Plan.

Response:

The current operative plan is the Cork County Development Plan 2022–2028, which designates the site as “Open to Consideration” for wind energy development. This zoning explicitly allows for commercial wind energy development where proposals can demonstrate avoidance of significant adverse impacts on residential amenity, landscape, and environmental receptors. The EIAR Chapter 4 (Policy) confirms compliance with EU, national, regional, and local policy, including the Climate Action and Low Carbon Development (Amendment) Act 2021, the Climate Action Plan, and Project Ireland 2040. The project contributes materially to Ireland’s legally binding renewable energy targets under the EU Renewable Energy Directive (RED II) and the European Green Deal.

2.4.3 Item 3

According to the latest SEAI Energy Ireland 2025 report, Ireland has gone from an importer of electricity in 2016 to an exporter of electricity in 2019.

Response:

SEAI’s Energy in Ireland reports show that Ireland’s electricity system operates within an interconnected all-island market, where imports and exports fluctuate continuously depending on system conditions, interconnector flows, and market balancing not because Ireland has a structural surplus of electricity. While there were periods in 2019 when Ireland exported electricity through the East–West Interconnector, this does not mean Ireland became a net exporter in any meaningful policy or security-of-supply sense. SEAI’s own analysis emphasises that Ireland remains heavily dependent on imported fossil fuels, and that electricity exports in certain years reflect market dynamics, not national energy independence or surplus generation capacity.

According to the latest SEAI Energy Ireland 2025 report, Ireland has reduced its energy-related greenhouse gas emissions by 16% since 2018 yet remains heavily reliant on fossil fuels as the economy continues to expand. The report also states that the phasing out of peat, coal and significant volumes of gas-fired electricity, have all been made possible through increased renewable generation as well as an increase of almost 55% in net imports of electricity from the UK last year. The data shows that Ireland imported net 10% or more of its gross electricity supply in 23 of the 24 months between October 2023 and September 2025.

Crucially, SEAI, EirGrid and the Climate Action Plan all confirm that Ireland must significantly increase renewable generation, including onshore wind, to meet legally binding 2030 and 2050 climate and energy targets. Temporary export periods do not remove the need for new renewable capacity; rather, they demonstrate the importance of flexible, low-carbon generation to support system stability, reduce fossil fuel reliance, and meet EU obligations.

2.4.4 Item 4

The submission raises concerns regarding the visual prominence of the proposed turbines, their visibility from Dromina sports field, and the suggestion that turbine visibility could interfere with sporting activities .

Response:

EIAR Chapter 15 (Landscape & Visual Impact Assessment), prepared by qualified landscape architects using GLVIA3, EPA and SNH guidance, confirms that while the turbines will be visible from parts of the surrounding area, including the sports field, visibility alone does not equate to an unacceptable or significant adverse impact. The receiving landscape is of medium sensitivity, is not designated as a protected or high-value landscape under the Cork County Development Plan 2022–2028 and has capacity to accommodate wind energy development. The LVIA concludes that the magnitude of visual change at the sports field is moderate and not significant in EIA terms.

The suggestion that turbine visibility could interfere with sporting performance or "confuse players" is not supported by any recognised planning, visual, or safety evidence. The turbines are several kilometres away and appear as distant vertical elements in the wider landscape; they do not obstruct views, cause glare, or create visual distortion. Photomontages were prepared in accordance with SNH Visual Representation Guidelines and are representative of typical views. The choice of viewpoint is consistent with best practice and does not invalidate the assessment. The LVIA also includes cumulative assessment, which confirms that although other turbines exist in the wider area, the proposed development does not give rise to significant cumulative landscape or visual effects.

Overall, the EIAR demonstrates that the proposed turbines will not result in unacceptable visual impacts on the community or on recreational facilities, and the concerns raised do not alter the LVIA's conclusion that the development is visually acceptable within its landscape context.

2.4.5 Item 5

The submission raises a number of concerns regarding designated sites, wintering waterbirds, raptors, and other species in the wider locality.

Response:

These sensitivities were fully recognised and assessed in the EIAR and NIS. Comprehensive ecological surveys were undertaken over multiple seasons in accordance with NPWS guidance, including targeted winter bird surveys, vantage point observations, habitat assessments and mammal surveys. The results confirm that while Whooper Swan, Greylag Goose and other wintering species occur in the wider landscape, the proposed development site itself does not constitute core foraging or roosting habitat, nor does it form part of a designated site. Collision risk modelling and disturbance assessments demonstrate that the project will not give rise to significant adverse effects on these species, either alone or in combination with other plans or projects.

The submission lists a wide range of red- and amber-listed species; however, the EIAR confirms that many of these species are associated with habitats not present within the turbine footprint, such as wet grassland, bog, or open moorland. Their presence in the wider 5 to 10 km landscape does not equate to sensitivity at the development site. All species recorded during systematic surveys were assessed using established methodologies, and no significant displacement, habitat loss, or population-level effects were predicted.

With respect to Annagh Bog and the Irish Hare, the EIAR confirms that the bog and designated sites are located outside the development footprint and that no works are proposed within designated or sensitive habitats. The proposed construction access route has been selected following detailed environmental appraisal to avoid ecological receptors, and mitigation measures to ensure that no significant disturbance to Irish Hare or other fauna will occur.

2.4.6 Item 6

The submission raises a number concerns regarding noise, vibration and shadow flicker

Response:

The Noise & Vibration assessment included in Chapter 7 of the EIAR concludes that all predicted operational noise levels comply with the derived ETSU-R-97 limits, which are the statutory benchmark for wind energy noise assessment in Ireland (EIAR Ch.7, Tables 7.15 & 7.16). Where cumulative noise levels approached limits, mitigation through turbine curtailment modes was modelled and shown to ensure full compliance (Table 7.18). Similarly, the Noise & Vibration chapter confirms that infrasound from modern turbines is significantly below human perception thresholds and well below levels associated with any physiological effects (EIAR Ch.7, Section 7.2.4).

The EIAR concludes that operational vibration will not be perceptible at any dwelling, with predicted vibration levels far below human perception thresholds and orders of magnitude below building damage criteria (EIAR Ch.7, Section 7.2.6).

Chapter 12 of the EIAR demonstrates that no receptors lie within the 500 m zone referenced in the Wind Energy Development Guidelines (2006), and that even under worst-case modelling, only four receptors exceed the 30-hour annual threshold (Table 12-2). In line with the Draft 2019 Wind Energy Development Guidelines, the project commits to zero shadow flicker at all receptors through automated turbine control systems, eliminating the potential for nuisance (EIAR Ch.12, Section 12.8). The EIAR cites international research confirming that wind turbine shadow flicker does not pose a health risk, and that the frequency of turbine blade rotation is far below the 3 Hz threshold associated with photosensitive epilepsy (EIAR Ch.12, Section 12.1.1.1).

2.4.7 Item 7

The submission raises a number of other general concerns relating to residential planning, disproportionate county contribution to climate goals and road capacity

Response:

Under the Cork County Development Plan 2022–2028, the Annagh site is located within an area designated “Open to Consideration” for wind energy development. This zoning explicitly recognises that wind energy and rural housing policies operate under separate policy frameworks and are not mutually exclusive. Rural housing decisions are based on settlement strategy, landscape character, and local need, whereas renewable energy policy is guided by national climate legislation and spatial suitability.

No national policy, statutory instrument, or government paper assigns carbon-reduction quotas to individual counties. Ireland's legally binding climate obligations, under the Climate Action and Low Carbon Development (Amendment) Act 2021, the Climate Action Plan, and EU Renewable Energy Directives, apply nationally, not at county level. The Cork County Development Plan 2022–2028 explicitly supports the continued development of renewable energy infrastructure where sites are suitable and does not impose any cap or proportional limit on Cork's contribution to national renewable energy generation.

With respect to road capacity, the EIAR Traffic & Transportation assessment (Chapter 13) demonstrates that the surrounding road network, including the L1322, N20, N18 and M20, has sufficient capacity to accommodate construction traffic. Baseline traffic volumes were established using TII counter data and site-specific ATC surveys and predicted construction traffic was modelled over a conservative 12-month programme. The assessment concludes that increases in AADT on local and regional roads remain well within acceptable thresholds, with impacts classified as temporary, short-term and not significant. The turbine delivery route has been subject to a full swept-path analysis (Appendix 13-1), confirming that all required movements can be safely accommodated with minor, temporary accommodation works. Access arrangements are therefore compliant with TII guidance and Cork County Council standards, and no capacity or safety constraints have been identified.

3. CONCLUSION

We respectfully request ACP to have full regard to this submission in adjudicating on this planning application.

It is important that this submission in read in conjunction with all previous submission made at Further Information stage and appeal stage in order to carryout a comprehensive EIA and AA of this project. The submission documents have been supported by extensive scientific data relating to birds captured over many years which informs the EIA and AA process.

4. REFERENCES

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DESIGNING AND DELIVERING
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APPENDIX 1

EIAR Addendum on Cumulative Assessment Update

ANNAGH WIND FARM

Addendum to EIAR (Cumulative update)

Prepared for:

Annagh Wind Farm Limited

Date: **January 2026**

Document No:

P25180-FT-EN-XX-RP-EN-0002

Unit 3/4, Northwood House, Northwood Crescent,
Northwood, Dublin, D09 X899, Ireland

T: +353 1 658 3500 | E: info@ftco.ie

CORK | DUBLIN | CARLOW

www.fehilytimoney.ie

Addendum to EIAR (Cumulative update)

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:
1	Final	BC/BOD/JC/AM	JH/BOD	JH	05/01/2026

Client: Annagh Wind Farm Limited

Keywords: Annagh Wind Farm, Annagh, Wind farm, Cork, Renewables

Abstract: Fehily Timoney and Company is pleased to submit this EIA addendum to Annagh Wind Farm Ltd for Annagh Wind Farm.

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1. INTRODUCTION

The EIAR submitted with this planning application included a cumulative impact assessment based on permitted projects at the time of lodging the planning application. At Further Information stage additional projects were considered. Furthermore additional clarification was provided at appeal stage following submissions from prescribed bodies.

Given the passage of time since the lodging of the planning application and planning appeal and recent observations on the planning file, in addition to additional projects being permitted in the area we hereby below submit a comprehensive cumulative assessment. The cumulative assessment should be considered as an addendum to the original EIAR submitted in 2021.

The "new" projects which are being assessed cumulatively in this addendum, which had not been assessed at the time of the original EIAR submitted in 2021, are in **bold** text in the full list of cumulative projects (Appendix 1 of this Addendum). For ease of reference, details of these "new" projects are reproduced below as Table 1.

Table 1: New cumulative projects

Planning Reference Number	Decision	Description	Distance from Project
226536	Conditional	“Fiddane/Ardnageehy Solar Farm”: Permission to amend the design of the previously approved development (planning reference: Cork County Council 17/5799 & an Bord Pleanála ABP-306915-20)	Adjacent
236099 / ABP-320298-24	Conditional	“Fiddane/Ardnageehy Solar Farm”: (expansion from a consented 67.8 ha development to a proposed 92.75 ha development) 10 year planning permission for solar farm and underground grid connection and 40 year operation.	Adjacent/intersecting boundary
225681 / ABP-317577-23	Conditional	“Coolcaum Solar Farm”: A 10 year planning permission for the construction of, and a 40 year operation and subsequent decommissioning of, a development consisting of a 42.6 hectare solar farm	0.6 km from site boundary
225933	Conditional	“Interconnector cable between the consented Fiddane, Coolcaum and Ballyroe solar farms”: The installation of two 33kV electricity grid interconnectors with a combined total length of 2,217m of underground cable with a joint bay and 1,146m of over head line supported by 8 triple pole sets and 5 double pole sets, a temporary construction compound and 4 transformer stations.	Adjacent/intersecting boundary
204041	Conditional	“Ballyroe Solar Farm”: A 10 year planning permission for the development of a 102.76 hectare solar PV farm and 3.425 kilometre underground electricity grid connection (0.34 hectares) giving a total combined area for both the solar farm and underground grid connection of 103.1 hectares.	1.3 km from site boundary

Planning Reference Number	Decision	Description	Distance from Project
ABP-314431-22	Conditional	“Ballyroe Substation”: Ten year permission for the construction of a 110kV ‘Single Bay Tail Fed’ Substation, 110kV Underground Grid Connection (UGC) and all associated works	1.5 km from site boundary

For completeness we include as an appendix the Further Information submission, first party appeal and responses where cumulative impact assessments were undertaken.

This updated cumulative impact assessment reviews all permitted and operational developments within the wider study area to determine whether any in-combination effects may arise with the project. The assessment draws on the original EIAR, updated planning searches, and additional information prepared for this addendum. The purpose of this section is to identify which projects have a realistic potential to interact cumulatively with the proposed project.

1.1 Existing and Permitted Wind Farms

Eight operational wind farms are located within 20km of the proposed project. No additional consented wind farms have been identified within this radius. As all existing wind farms are fully operational and considered as part of the original EIAR, there is no potential for overlapping construction impacts, shared construction corridors, or combined construction-related emissions.

1.2 Large-Scale and Infrastructure Projects

Several large-scale infrastructure projects were identified within 20km of the proposed wind farm. These include:

- Industrial WWTP upgrade near Charleville (7.5km away), located in a different catchment.
- Newmarket Co-operative Creameries WWTP upgrade (20km away), located in a separate sub-catchment with no downstream connectivity.
- 5 ha extension to Scart/Ballyclough quarry (16.2km away).
- Six telecommunications and meteorological masts within 20 km.
- M20 Cork–Limerick Road Improvement Scheme, currently at design stage.

Most of these projects are either located in different catchments, have no hydrological connectivity, or are sufficiently distant that no cumulative ecological or hydrological effects could arise. The M20 scheme is the only project with a theoretical potential for cumulative construction-phase effects, as it may traverse the Blackwater catchment. However, the scheme is not yet at planning stage, and the project will be subject to its own EIA and AA processes.

1.3 Renewable Energy Developments (Solar Farms and Grid Connections)

Seven solar farm developments were identified within 20km of the proposed project. Two of these (Gibbonstown and Ballycullane) are located in a different catchment and screened out. Two others (Gortnagross and Dromalour) are already constructed and operational, and their AA Screening Reports concluded no likelihood of significant effects. As such, they do not present any potential for cumulative construction or operational impacts.

The remaining solar farms; Fiddane/Ardnageehy, Ballyroe and Coolcaum, are located within the Blackwater (Munster) catchment and are the most relevant for cumulative assessment. All three have been subject to AA Screening or NIS, each concluding no adverse effects on Natura 2000 sites.

Several grid connection projects were also identified, including connections for Rathnacally and Boolard wind farms (already constructed) and the consented interconnector cable serving local solar farms. These projects do not overlap temporally or spatially with the proposed development in a manner that could give rise to cumulative effects.

Of the above projects, the majority were considered as part of the cumulative impact assessment included in the original EIAR, the following projects have been submitted in the intervening period:

- Fiddane/Ardnageehy Solar Farm (Refs. 226536 and 236099 / ABP-320298-24)
- Coolcaum Solar Farm (Ref. 225681 / ABP-317577-23)
- Ballyroe Solar Farm (Ref. 204041)
- Ballyroe 110 kV Substation (ABP-314431-22)
- Interconnector cable between the consented Fiddane, Coolcaum and Ballyroe solar farms (Ref. 225933)

1.4 Replant Lands

As the proposed project requires the felling of approximately 12.6ha of forestry, a corresponding replanting area has been identified at Emlagh, Co. Clare (Forest Service Ref. CN88795). The ecological assessment of this site, as set out in the original EIAR, concluded that the replanting lands do not contain any designated habitats, Annex I habitat types, or protected faunal species. The site is dominated by wet grassland of local importance, with higher-value features such as hedgerows and watercourses avoided in the planting layout. Standard forestry setbacks ensure no hydrological impacts on downstream designated sites, including Poulnasherry Bay pNHA.

The updated review confirms that the replanting site will not give rise to significant residual effects and will not contribute to cumulative ecological impacts when considered alongside other plans or projects. No pathways for cumulative effects on Natura 2000 sites or water quality have been identified. Should the Emlagh lands become unavailable, alternative replanting lands of equivalent ecological value and regulatory approval would be used, ensuring no change to the cumulative impact profile.

In the wider area surrounding the replant lands, two forestry applications have been approved and three remain pending, amounting to approximately 29ha of afforestation. If these pending projects were to proceed concurrently with the replanting works, there is potential for temporary cumulative sedimentation effects. However, all forestry operations are subject to mandatory best-practice measures under the Forestry and Biodiversity Guidelines, and the proposed replanting includes robust sediment control measures. With these measures in place, no significant cumulative effects are expected.

Two forestry applications in the vicinity of the proposed replant lands have been approved; three applications are pending. The total area to be afforested equates to 29.03ha, with 10.46ha recently planted, and 3.39ha classed as clear fell and thinning. It is important to note that the replant lands will be subject to their own statutory permitting process.

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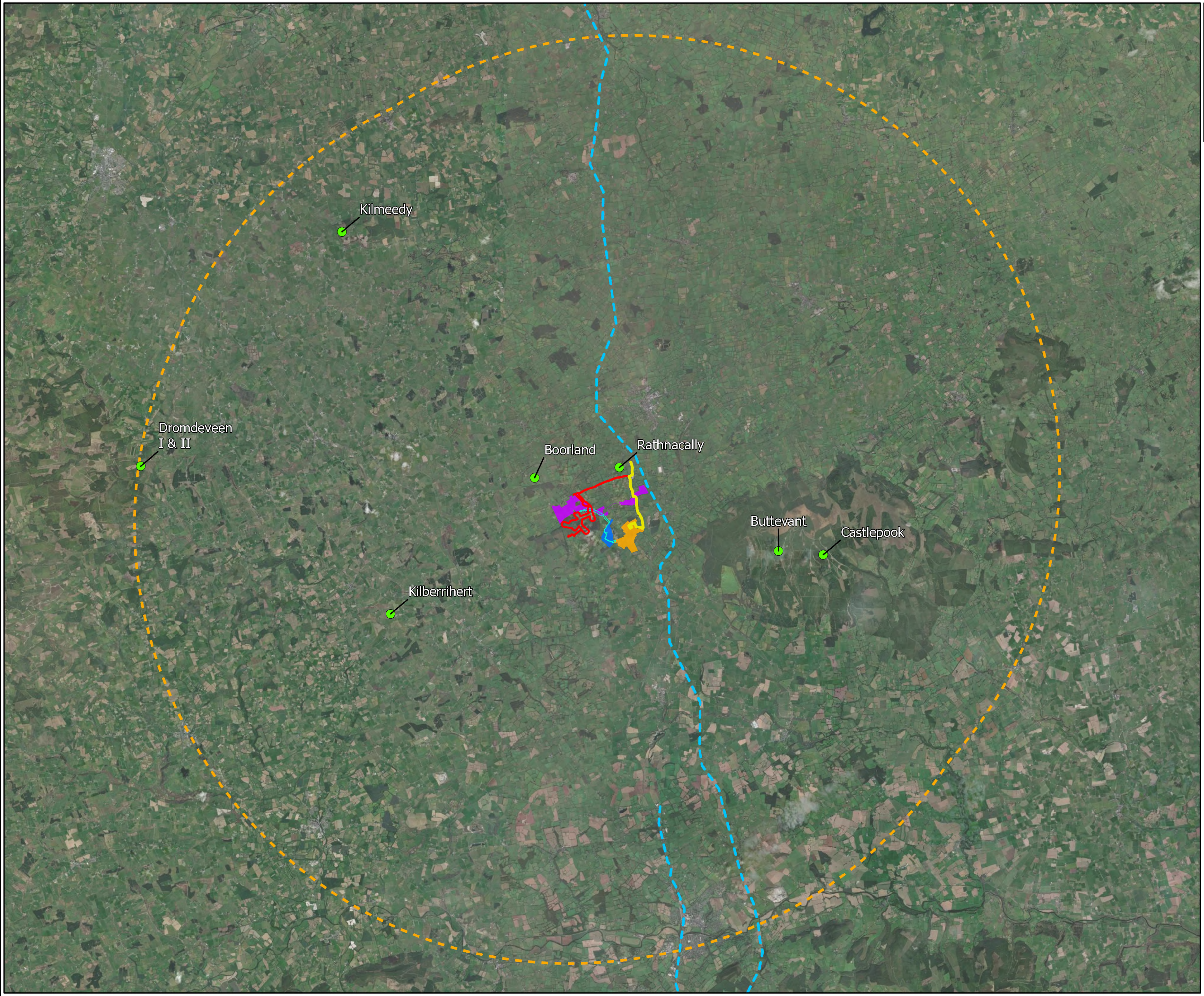

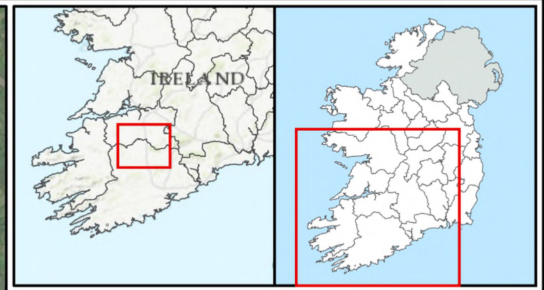

Legend

- Site Boundary
- 20km
- Ballyroe Substation
- Interconnector
- Ballyroe Solar Farm
- Coolcaum Solar farm
- Fiddane/Ardnageehy Solar Farm
- Proposed M20 Route
- Existing Wind Farms

TITLE: Annagh Wind Farm Cumulative Projects	
PROJECT: Annagh Wind Farm	
FIGURE NO: 1.1	
CLIENT: EMPower	
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2. CUMUATIVE UPDATE: DECEMBER 2025

2.1 Addendum to Cumulative Assessment in Original EIAR

2.1.1 Chapter 6: Air and Climate

The geographic extent of the cumulative assessment is considered on a case-by-case basis, in line with the Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions (European Commission, 1999).

Projects within 20km of the proposed project have been considered for cumulative impacts in relation to air quality and climate as the majority of impacts identified in the original EIAR are relating to the construction phase dust and traffic emissions.

A 20km distance is considered a suitable zone of influence considering the emissions associated with the proposed project will be focused on the construction site and significant emissions beyond the construction site are not envisaged. Emissions relating to the TDR have been considered, however, these have been screened out of the cumulative assessment as emissions associated with the transport of turbines and construction works relating to the upgrade of TDR nodes are non-significant.

There are a number of developments and activities which are planned, consented, ongoing or operational within the vicinity of the proposed project, some of which were considered as part of the original EIAR. These are listed in Table 1 below. A full list of all proposed and contented projects considered for the cumulative assessment are contained in Appendix 1 of this addendum report.

Table 2-1: Air and Climate - Cumulative Impacts

Title	Development	Distance	Planning ref.
Fiddane/Ardnageehy Solar Farm	Consented 92.75ha solar farm and grid connection, bordering site to the north.	Adjacent to site boundary	175799, 196817, 226536, 236099 / ABP-320298-24
Ballyroe Solar Farm	Consented 102.76ha solar farm and 3.4km grid connection.	1km southeast	204041
Coolcaum Solar Farm	Consented 42.6ha solar farm.	0.6km from site boundary	225681 / ABP-317577-23
Interconnector cable between the consented Fiddane, Coolcaum and Ballyroe solar farms	The installation of two 33kV electricity grid interconnectors with a combined total length of 2,217m of underground cable with a joint bay and 1,146m of overhead line supported by 8 triple pole sets and 5 double pole sets, a temporary construction compound and 4 transformer stations.	Adjacent/intersecting boundary	225681 / ABP-317577-23

Title	Development	Distance	Planning ref.
Ballyroe Substation	Ten year permission for the construction of a 110kV 'Single Bay Tail Fed' Substation, 110kV Underground Grid Connection (UGC) and all associated works	1.5km from site boundary	ABP-314431-22
Boolard Wind Farm	Constructed 2 turbine wind farm (150.5m tip) and grid connection.	2.36km north west of T4	125997, 155521 & ABP PL.04.245560 175292 (Grid connection)
Rathnacally Wind Farm	Constructed 2 turbine wind farm (150.5 tip) and grid connection.	2.27km north east of T1	124446, 155525 166718 (grid connection)
M20 Motorway	N/M20 Cork to Limerick Improvement Scheme	2-4km east	https://corklimerick.ie/

Cumulative impacts may arise if the construction, operational and maintenance period of these projects occurs simultaneously with the construction of the proposed project. This could result in slight increased traffic emissions, however, provided the mitigation measures as detailed in Section 6.5 of the original EIAR are implemented and the mitigation measures proposed for other developments are implemented, there will be no significant cumulative effects on air quality. In addition, it is important to note that the solar energy developments, including their grid connection (Ballyroe substation) proximate to the site are expected to be operational by late 2026[1]. As the proposed Annagh Wind Farm is still in the planning system, the construction phase of the wind farm is unlikely to act cumulatively with the construction phase of the solar energy developments and substation.

There will be no net carbon dioxide (CO2) emissions from operation of the proposed project. Emissions of carbon dioxide (CO2), oxides of nitrogen (NOx), sulphur dioxide (SO2) or dust emissions during the operational phase of the proposed project will be minimal, relating to the use of operation and maintenance vehicles onsite, and therefore there will be no measurable negative cumulative effect with other developments on air quality and climate.

The nature of the proposed project and other energy developments within 20km are such that, once operational, they will have a cumulative long-term, significant, positive effect on the air quality and climate.

In terms of climate and carbon, the proposed wind farm will act cumulatively with other renewable energy projects in reducing CO2 emissions by displacing fossil fuel in the production of electricity, resulting in a slight-moderate positive impact on climate.

[1] https://soleirerenewable.com/soleire-renewables-granted-planning-permission-for-ballyroe-fiddane-solar-park-in-co-cork/

2.1.2 Chapter 7: Noise and Vibration

2.1.2.1 Construction Phase

There are several solar farms, and wind farms within 7km of the proposed project. It is not expected that there will be cumulative impacts with other large or small scale developments in the vicinity of the proposed project given:

- It is unlikely that the construction phase of the wind farm will align with the construction phase of the proximate solar energy developments (as mentioned in Section 2.1.1)
- The distance between the proposed project and other developments and nature of the works proposed as part of these developments.

Only adjacent windfarms that generate noise greater than 10dB below the proposed project were assessed.

2.1.2.2 Operational Phase

Two operational wind farms are located within approximately 3km of the proposed project: Rathnacally Wind Farm and Boolard Wind Farm, each comprising two turbines. In accordance with the IOA Good Practice Guide (GPG) criteria, the potential for cumulative noise effects has been assessed. The predicted noise contributions from both operational wind farms are more than 10dB below the predicted noise levels associated with the proposed project. As a result, their influence on overall cumulative noise levels is negligible, and no significant cumulative noise impact is expected..

Table 7.16 of the EIAR presents predicted cumulative noise levels adjacent to 10 receptor locations closest to the wind farm. The predicted cumulative noise levels at all receptor locations are presented in Appendix 7.6. It is also noted, that the predicted noise levels are for a worst-case scenario with noise sensitive receptors downwind of the proposed project. In practice, receptor locations will not be downwind of all noise sources and the actual noise levels will be lower than those presented in Table 7.16 and Appendix 7.6 of the EIAR.

The predicted cumulative noise levels comply with the daytime and night-time limits at the majority of noise sensitive locations. However, an exceedance is observed at receptor R167 during daytime periods at standardised 10m height wind speeds of 6 m/s. The noise modelling assumed that this receptor is downwind of all proposed turbines. In practice, this will not occur all the time and the actual noise levels at the receptor will be lower when the receptor is upwind or cross wind of the wind farm. Nonetheless, mitigation measures are outlined in Section 7.6.2 of the original EIAR, and operational noise resulting from the proposed project will meet the noise limits set out in Section 7.4.2.

No significant cumulative noise effects are predicted at any nearby noise-sensitive receptors arising from the proposed project in combination with solar farms in the area. This conclusion reflects the substantial separation distances between the proposed wind turbines, the nearby solar farms, and the closest receptors. In addition, the relative positioning of the receptors means that they are unlikely to be located downwind of both the proposed turbines and the solar farm noise sources. On this basis, no significant cumulative noise impact is expected.

Wind turbine noise also increases with windspeed, with the highest predicted noise levels generated at wind speeds of 8 m/s and above (as shown in Table 7.12 of the original EIAR), while solar farm noise generation is not typically affected by wind speed and environmental noise from solar farms is generally only assessed up to wind speeds of 5 m/s. As shown in the prevailing background noise data (Table 7.4 of the original EIAR), background noise increases significantly at wind speeds of 8 m/s and above. Noise emissions at nearby receptors during higher wind speeds are therefore likely to be masked by wind induced noise. During lower wind speeds (i.e., 5 m/s and below), wind farm noise emissions reduce significantly, and are not considered likely to give rise to significant cumulative noise emissions.

Cumulative noise emissions from the proposed project and nearby developments have been considered in accordance with current best practice guidance (i.e. the IOA GPG). No significant cumulative effects are predicted, with regards to noise emissions.

Table 2-2: Assessment of Cumulative Predicted LA90 Noise Levels for proposed project and Adjacent Wind Farms against Noise Limits

Receptor ID	Description	Predicted LA90 Sound Pressure Level at 10m Standardised Wind Speed, dB												
		2 m/s	3 m/s	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s	11 m/s	12 m/s	13 m/s	14 m/s
R4	Predicted Level	28.2	29.1	32.1	34.2	37.2	37.7	38.5	38.4	38.4	38.3	38.3	38.2	38.0
	Daytime limit	37.5	37.5	37.5	45.0	45.0	45.0	45.0	46.1	48.8	51.2	51.2	51.2	51.2
	Daytime Excess	-	-	-	-	-	-	-	-	-	-	-	-	-
	Night-time limit	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Night-time Excess	-	-	-	-	-	-	-	-	-	-	-	-	-
R10	Predicted Level	29.4	30.4	33.6	35.7	38.7	39.3	40.1	40.0	40.0	39.9	39.8	39.7	39.6
	Daytime limit	37.5	37.5	37.5	45.0	45.0	45.0	46.7	50.0	53.2	56.2	56.2	56.2	56.2
	Daytime Excess	-	-	-	-	-	-	-	-	-	-	-	-	-
	Night-time limit	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Night-time Excess	-	-	-	-	-	-	-	-	-	-	-	-	-
R86	Predicted Level	28.4	29.5	33.0	35.3	38.3	38.9	39.7	39.6	39.6	39.5	39.5	39.4	39.3
	Daytime limit	37.5	37.5	37.5	37.5	45.0	45.0	45.0	45.0	47.7	50.9	50.9	50.9	50.9
	Daytime Excess	-	-	-	-	-	-	-	-	-	-	-	-	-
	Night-time limit	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0

Receptor ID	Description	Predicted LA90 Sound Pressure Level at 10m Standardised Wind Speed, dB												
		2 m/s	3 m/s	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s	11 m/s	12 m/s	13 m/s	14 m/s
	Night-time Excess	-	-	-	-	-	-	-	-	-	-	-	-	-
R138	Predicted Level	26.6	27.2	29.9	32.2	35.2	36.0	36.5	36.4	36.3	36.2	36.2	36.1	36.0
	Daytime limit	45.0	45.0	45.0	45.0	45.0	45.0	45.0	47.9	51.9	55.4	57.4	57.4	57.4
	Daytime Excess	-	-	-	-	-	-	-	-	-	-	-	-	-
	Night-time limit	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Night-time Excess	-	-	-	-	-	-	-	-	-	-	-	-	-
R145	Predicted Level	27.9	28.9	32.2	34.5	37.5	38.1	38.8	38.8	38.8	38.7	38.6	38.5	38.4
	Daytime limit	37.5	37.5	37.5	37.5	45.0	45.0	45.1	49.4	53.6	57.4	60.5	60.5	60.5
	Daytime Excess	-	-	-	-	-	-	-	-	-	-	-	-	-
	Night-time limit	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Night-time Excess	-	-	-	-	-	-	-	-	-	-	-	-	-
R167	Predicted Level	28.8	29.6	32.6	34.9	37.8	38.4	39.1	39.1	39.0	38.9	38.9	38.8	38.7
	Daytime limit	37.5	37.5	37.5	37.5	37.5	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
	Daytime Excess	-	-	-	-	0.3	-	-	-	-	-	-	-	-
	Night-time limit	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0

Receptor ID	Description	Predicted LA90 Sound Pressure Level at 10m Standardised Wind Speed, dB												
		2 m/s	3 m/s	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s	11 m/s	12 m/s	13 m/s	14 m/s
	Night-time Excess	-	-	-	-	-	-	-	-	-	-	-	-	-
R197	Predicted Level	25.9	26.8	29.9	32.4	35.3	35.8	36.4	36.3	36.3	36.2	36.1	36.1	35.9
	Daytime limit	45.0	45.0	45.0	45.0	45.0	45.0	45.8	51.9	51.9	51.9	51.9	51.9	51.9
	Daytime Excess	-	-	-	-	-	-	-	-	-	-	-	-	-
	Night-time limit	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Night-time Excess	-	-	-	-	-	-	-	-	-	-	-	-	-
R205	Predicted Level	24.7	25.5	28.5	31.1	33.9	34.4	35.0	34.9	34.8	34.7	34.6	34.6	34.4
	Daytime limit	37.5	37.5	37.5	37.5	45.0	45.0	45.0	45.0	45.0	47.9	47.9	47.9	47.9
	Daytime Excess	-	-	-	-	-	-	-	-	-	-	-	-	-
	Night-time limit	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Night-time Excess	-	-	-	-	-	-	-	-	-	-	-	-	-
R248	Predicted Level	26.9	27.7	30.8	33.4	36.2	36.7	37.2	37.1	37.1	37.0	37.0	36.9	36.8
	Daytime limit	37.5	37.5	37.5	37.5	45.0	45.0	45.0	45.0	48.0	51.4	54.9	54.9	54.9
	Daytime Excess	-	-	-	-	-	-	-	-	-	-	-	-	-
	Night-time limit	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0

Receptor ID	Description	Predicted LA90 Sound Pressure Level at 10m Standardised Wind Speed, dB												
		2 m/s	3 m/s	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s	11 m/s	12 m/s	13 m/s	14 m/s
	Night-time Excess	-	-	-	-	-	-	-	-	-	-	-	-	-
R263	Predicted Level	29.1	29.3	31.6	35.0	38.4	39.4	39.5	39.3	39.3	39.3	39.3	39.2	39.2
	Daytime limit	37.5	37.5	37.5	45.0	45.0	45.0	45.0	45.0	47.7	51.4	55.4	55.4	55.4
	Daytime Excess	-	-	-	-	-	-	-	-	-	-	-	-	-
	Night-time limit	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Night-time Excess	-	-	-	-	-	-	-	-	-	-	-	-	-

2.1.2.3 *Mitigation Measures during Wind Farm Operation*

The predicted noise from the proposed project 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 crosswind 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 operation2. Table 2.3 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 2-3: 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 2.4 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 of the original EIAR and the predicted noise levels are presented in Appendix 7.7 of the original EIAR.

[2] 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 2-4: Required Turbine Curtailment/Mitigation to Meet Daytime Noise Limits

Turbine ID	Required Noise Reduced Modes to meet Daytime Noise Limit LA90
	Standardised 10m Height Wind Speeds (m/s)
	6
T06	SO2

With the proposed mitigation measures in place, the introduction of the proposed project will result in a new noise source within the local sound environment. For dwellings located within the 35 dB LA90 study area, a long-term slight to moderate level of impact is predicted. A moderate level of impact is anticipated at the closest dwellings to the proposed turbines. These effects are not expected to be significant.

Should the proposed 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.

2.1.2.4 Conclusion

The noise assessment in 2021 concluded with mitigation measures, cumulative operational noise levels from the proposed project and adjacent developments meet the daytime and night-time noise limit derived using the Wind Energy Development Guidelines 2006 which is not considered to be a significant impact.

2.1.3 Chapter 8: Biodiversity

The EC (2001) guidelines on the provision of Article 6 of the Habitats' Directive state that the phrase 'in combination with other plans or projects' in Article 3(3) of the Habitats Directive refers to the cumulative impacts due to plans or projects 'that are currently under consideration together with the effects of any existing or proposed projects or plans.'

According to the Scottish Natural Heritage, 'the cumulative effect of a set of developments is the combined effect of all the developments, taken together' (SNH, 2005).

A cumulative impact arises from incremental changes caused by other past, present or reasonably foreseeable actions together with the proposed wind farm development.

The surrounding environment is dominated by agricultural land, with occasional blocks of forestry. The main damaging operations and threats to the greater regions ecological resources are industrialised agriculture and forestry operations. Afforestation and agriculture have shaped the habitats within the study area. The site is dominated by plantation woodlands, which have replaced agricultural grassland. After plantation woodlands, Improved agricultural grassland and Wet grassland are the next most abundant habitats within the Site.

Improved monoculture grassland where present is interrupted by hedgerows.

Forestry and agriculture can create habitat uniformity which can negatively impact river catchments, alter nesting and feeding habitats for animals. It is noted that the broadleaved forestry plantations onsite are more natural in character than conifer plantations, and the associated drainage does not discharge directly into rivers. Intensive agriculture is currently likely to be the most detrimental activity onsite. Drainage associated with forestry and farming has also altered the habitats onsite.

In-combination impacts may occur should indirect impacts such as a decline in water quality be sufficiently significant to cumulatively add to existing pressures on key species and habitats which form the qualifying interests of European sites. To inform the current appraisal, planning searches were carried out on the relevant planning authority webpages. The replant lands at Emlagh, Co. Clare form part of the overall project and these have been assessed in within the EIAR but are also considered cumulatively with other elements of the proposed project in this section.

2.1.3.1 Replant Lands

As it is proposed to fell approximately 12.6 Ha of forestry for the proposed development[3], a potential replanting site has been identified at Emlagh, Co. Clare. An application for technical approval has been submitted by the applicant to forest service (reference CN88795). Site surveys were undertaken to inform the AA Screening Report (May 2021).

If these replant lands become unavailable, other similarly approved lands will be used for replanting should the proposed project receive planning permission.

The replanting impact assessment which considers potential impacts on ecology and designated sites is included above in Sections 8.5.2, 8.5.4 and 8.5.6 of the original EIAR.

2.1.3.1.1 Emlagh Co. Clare Replant Lands

A potential forestry replacement area has been identified at Emlagh, Co. Clare. The total area identified for replanting at this site is 12.6 Ha.

The site is located in Co. Clare in the townland of Emlagh, northwest of Moyasta village between Kilrush and Kilkee. It is bounded by un-named local roads to the east and west, and also bounded by the Emlagh 27 watercourse to the east. It is located within the Moyasta _010 sub basin. The site is c. 15.5 Ha, with 12.6 Ha identified for replanting.

The site lies at an elevation of < 40m sloping gently from west to east. The soil is mostly peaty gley and surface water gley (acid, deep, poorly drained mineral) based on Namurian shale, sandstone, siltstone and coal bedrock. There are no major seepage areas or wet depressions. The land is currently used for cattle grazing. The proposed replanting site is accessed from the west off the un-named local road bounding the site.

The proposed replanting site is not located within any site designated for nature conservation. However, a number of rare and protected fauna have been recorded from the 10 km and 2 km grid squares in which the proposed replanting site is located.

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[4] Replacement replanting of forestry in Ireland is subject to licence in compliance with the Forestry Act 2014 as amended. The consent for such replanting is covered by statutory instrument S.I. No. 191/2017 - Forestry Regulations 2017 as amended. This legislation provides for development of afforestation and forest road construction project's compliance with the Environmental Impact Assessment Directive insofar as it applies to forestry development.

Furthermore, there is hydrological connectivity between the proposed replanting site via the Emlagh 27 and Lismuse watercourses which discharge to the Lower River Shannon SAC, River Shannon and River Fergus Estuaries SPA and Pounasherry Bay pNHA c. 1.8 km downstream of the site.

The proposed replanting site is primarily located within wet grassland. The wet agricultural grassland habitat has been assessed as being of local importance (higher value). Other habitats identified as of local importance (higher value) such as hedgerows and lowland rivers have been avoided. Permanent Moderate Impacts to wet grassland, Meadow pipit and Skylark were identified. These were the highest level impacts for ecological receptors identified.

Consequently, no potential for significant effects on the Key Ecological Receptors at the site have been identified. No EU Habitats Directive Annex I listed habitats were identified within the site. No protected faunal species were recorded within the proposed replanting site, although the site is likely to be used by regularly occurring common and widespread species that are common in a local and national context.

Impacts on nationally designated sites were considered. As noted above, there is hydrological connectivity between the proposed replanting site via the Emlagh 27 and Lismuse watercourses which discharge to Poulnasherry Bay pNHA c. 1.8 km downstream of the site. The setbacks (10m for natural watercourses, 5m for existing drains) incorporated in the planting design will avoid indirect effects on Poulnasherry Bay pNHA via this hydrological link. No pathways for impact were identified for other pNHAs or NHAs within the zone of influence (ZoI), and therefore no potential for significant effect on other Nationally designated sites exists.

The potential for in-combination impacts to result in significant cumulative effects when considered in-combination with other plans and projects was assessed.

The proposed replanting will not result in any significant residual effects on any ecological receptors or Designated Sites. Therefore, there is no potential for the proposed development to contribute to any potential for cumulative impacts in this regard when considered in-combination with other plans and projects. Similarly, the proposed replanting will not result in significant effects in relation to water quality, given implementation of standard best practice.

Taking the above information into consideration and having regard to the precautionary principle, the proposed afforestation project will not result any significant impacts at any geographic scale and will not have any significant impacts on the ecology of the wider area.

Provided that the proposed replanting is carried out in accordance with the design, best practice and mitigation that is described within the planting specification (see section 8.6.2.11 of the original EIAR), significant impacts on ecology are not anticipated at any geographic scale.

2.1.3.1.2 Other Forestry Applications

Two forestry applications in the vicinity of the proposed replant lands have been approved and three applications are pending. The total area to be afforested equates to 29.03 ha, with 10.46 ha recently planted, and 3.39 ha classed as clear fell and thinning. If the pending afforestation projects were to be carried out at the same time as the proposed project (afforestation of replant lands), it is possible that cumulative impacts of sedimentation could arise. In-combination effects can occur where a project results in individually insignificant effects that, when considered in-combination with impacts of other proposed or permitted plans and projects, can result in significant effects. It is noted however that mitigation measures are proposed to avoid sedimentation.

2.1.3.2 Cumulative Developments

2.1.3.2.1 Existing or Proposed Wind Farms and Turbines

A number of operational wind farms are located within 20km of the proposed project, as detailed below. Updated planning searches confirm that, since the original EIAR was prepared, no new permitted wind farms have been identified within this 20km radius. The baseline therefore remains unchanged, with eight operational wind farms and no additional wind farm developments proposed in the area.

Table 2-5: Existing wind farms within 20km of the proposed project

Wind Farm Name	Number of Turbines	Distance and Direction from Proposed project Site	Status
Rathnacally Wind Farm	2	2.27km Northeast of site	Existing
Boolard Wind Farm	2	2.36km Northwest of site	Existing
Knockatalig Wind Farm	6	8.6km East of site	Existing
Kilberrihert Wind Farm	3	9km Southwest of site	Existing
Castlepook Wind Farm	14	9.7km East of site	Existing
Private Turbine	1	12km Northwest of site	Existing
Kilmeedy Wind Farm	2	16km Northwest of site	Existing
Dromdeeveen I & II Wind Farm	14	20km West of site	Existing

The construction phase of the proposed project has the greatest potential to contribute suspended solids/pollutants to nearby watercourses due to excavation works and general construction works. All of these developments within 20km of the proposed project are already operational and so significant cumulative effects to shared watercourses are not likely to occur. This is also the case for habitats, flora and less mobile species of fauna. The potential for cumulative impacts to birds and bats is considered further below.

2.1.3.2.2 Large Scale/Infrastructure Projects:

A 110 kV single bay, tailfed substation (Ballyroe Substation) is consented (planning ref ABP-314431-22) with a 110 kV underground grid connection cable, located 1.5 km east of the proposed Annagh Wind Farm site boundary. Ballyroe substation is intended to act as a connection point for the various consented solar energy developments in proximity to the proposed Annagh Wind Farm (details on these consented solar farms can be found in Section 2.1.3.2.4 below).

An upgrade to an existing industrial WWTP near Charleville is permitted, consisting of 1 no. anoxic tank, 2 no. aerobic tanks, 1 no. clarifier tank, a cooling tower, chemical dosing tank, splitter tank, polymer dosing kiosk and control room container together with associated plant and pumping systems and all associated site works including earthen berm screening and fencing, in addition to the installation of an underground pumped outfall pipeline for the conveyance of treated waste water from the upgraded treatment plant to a discharge point on the River Maigue located approximately 2km north of the waste water treatment plant site.

This project is located c. 7.5 km from the site and is located in a different Catchment. An AA Screening Report was submitted with this planning application.

An Upgrade to the existing waste water treatment plant (WWTP) at Newmarket Co-Operative Creameries Ltd facility in Newmarket town, Co Cork, within the townlands of Garrannawarrig Upper, Park, Garrannawarrig Lower and Liscongill is permitted (c. 20 km south-west of wind farm site). Also included is installation of an underground pumped pipeline to convey treated water from the facility to a discharge point on the River Dalua and intensification of use of the existing facility through an increase in the duration of the weekly and annual milk processing. An Environmental Impact Statement and Natura Impact Statement accompanied this planning application. This facility is located in a different sub-catchment (Dulua SC 10), with no downstream connectivity.

A 5 Ha extension to an existing limestone quarry and all associated site development and landscaping works is permitted in the townlands of Scart, Ballyclough, and Kilgilky South (North-west of Mallow) (c. 16.2 km from wind farm site). An NIS was submitted with this planning application.

Alterations to the existing 38kV Buttevant sub-station comprising extension to the existing control building, two new transformers T41 and T43, new oil interceptor and associated drainage are permitted (Extension of duration granted under Planning Reg. No. 11/5938). This project is located c. 10 km from the wind farm site.

A total of six mast structure applications including retention and new structures (telecommunications and meteorological masts, ranging from 18-80m in height) are permitted within 20 km of the wind farm site.

The M20 Cork to Limerick Road Improvement Scheme is currently at the Design and Environmental Evaluation stage (stage 3 of the process). This project will involve the construction of a new motorway and/or the improvement of an existing major route (N20). If this project proceeds it will traverse the catchment of the Blackwater River; the route is located 2-4km east of the proposed project. If construction occurred in parallel with the proposed project, cumulative impacts on aquatic receptors could occur. The M20 will be subject to its own consenting process including NIS and EIAR.

2.1.3.2.3 Other Housing Developments

There are no large housing developments in close proximity to the proposed Annagh Wind Farm. An application for completion of 7 no. dwelling houses (house nos. 27-33) and the construction of 18 no. dwelling houses (house nos. 34A-48), a storm water attenuation tank and associated site works on part of a residential development permitted under planning Reg. Nos. 03/4127, 06/10199, 07/7341 and 08/5638 in Kilbrin, Co. Cork is permitted, located c. 13.6 km from the wind farm site.

An application for the completion of housing development of 33 No. housing units comprising of 7 No. two storey detached, 14 No. two storey semi-detached, 10 No. single storey semi-detached and 2 no single storey detached to match existing as part of scheme previously planning permission granted 28/10/04 (Planning Ref. 03/961) and all associated site works in Gortboy, Kilmallock Co. Limerick is permitted, located c. 13.8 km from the wind farm site.

The erection of 6 No. Town houses, 14 No. Semi detached houses, on part of existing foundations (planning ref no. P05/1902) service road, footpaths, and connection to ancillary services in Bruree, Co. Limerick is permitted, located c. 13 km from the wind farm site.

Bruree and Kilmallock are within a different catchment (Shannon Estuary South), while Kilbrin is within a separate sub basin (Blackwater Munster_090).

2.1.3.2.4 Other Renewable Energy Developments

There are a number permitted solar farm applications located in close proximity to the proposed wind farm site: A number of grid connection cables for renewable energy projects are also permitted within 20km.

These include applications for grid connections for Rathnacally and Boolard wind farms, which have already been installed, and a consented application to connect the permitted (adjacent) Fiddane solar farm (identified above) to Charleville 110 kV substation (although this method of connection is now unlikely as Fiddane solar farm has since received consent to connect to the grid via the Ballyroe Substation (described above in Section 2.1.3.2.2). In addition, there is the consented interconnector cable which connects the various solar farms (planning ref. 225933). This interconnector project is assessed cumulatively in its own designated section (1.1.1.1) of this addendum as it was specifically assessed as part of the First Party Appeal.

Other energy projects within 20 km include a change of plan to the control building for Rathnacally wind farm (already constructed) and a 3m high 'lamp post' style relief vent stack servicing the existing above ground natural gas pressure reduction unit with all ancillary services and associated site works in Rathgoggan c. 5.5 km from the wind farm.

Two of the solar farms (Gibbonstown and Ballycullane in Co. Limerick) are located in a different catchment (Shannon Estuary South) and as such no cumulative effects are likely. The remaining five solar farms are located within the same catchment as the proposed wind farm and GCR (Blackwater Munster).

Both Gortnagross and Dromalour solar farms have been constructed. As such, there is no potential for in-combination effects with these developments. The conclusion of the AA screening for the Gortnagross solar farm was that no significant negative effects are likely to occur. This solar farm is located near Mallow in different sub-basins (Ballyclough Stream_020 and Blackwater Munster_120). The conclusion of the AA screening for Dromalour solar farm was also that no significant negative effects are likely to occur. This solar farm is located south of Kanturk a different sub-basin (Allow_070).

In terms of acting cumulatively with the proposed development, the most relevant projects are those that could be constructed at the same time as the proposed Annagh Wind Farm project and GCR which are within the same catchment, as this increases the likelihood of impacts acting cumulatively. As mentioned above in Section 2.1.1, the solar farms are likely to be fully constructed and operational before the construction phases of the proposed Annagh Wind Farm commences. As such, the construction phases of the wind farm and the solar energy developments (including Ballyroe Substation) would not align. In addition, solar farms have no moving parts and installation of panels creates minimal disturbance to the ground. No construction phase cumulative effects are envisaged in this regard.

The Natura Impact Statements for Fiddane/Ardnageehy, Coolcaum and Ballyroe solar farms concluded that no the adverse effects on Natura 2000 sites will occur.

As such, Potential cumulative impacts on aquatic ecology are considered likely slight negative, short-term and in the local context, in the absence of mitigation.

2.1.3.3 Replant Lands

As it is proposed to fell approximately 12.6Ha of forestry for the proposed project[4], a potential replanting site has been identified at Emlagh, Co. Clare. An application for technical approval has been submitted by the applicant to forest service (reference CN88795). Site surveys were undertaken to inform the AA Screening Report (May 2021).

If these replant lands become unavailable, other similarly approved lands will be used for replanting should the proposed project receive planning permission.

The replanting impact assessment which considers potential impacts on ecology and designated sites is included above in Sections 8.5.2, 8.5.4 and 8.5.6 of the original EIAR.

Standard setbacks from natural watercourses and drains ensure no indirect effects on downstream designated sites, including Poulnasherry Bay pNHA. No Annex I habitats or protected faunal species were recorded within the replanting area, and predicted ecological impacts are limited to localised, non-significant effects on wet grassland and common bird species.

Given the absence of significant residual effects and the implementation of standard best-practice measures, the replanting site will not contribute to any cumulative ecological impacts when considered in-combination with other plans or projects. No pathways for cumulative effects on designated sites or water quality have been identified.

Provided that the proposed replanting is carried out in accordance with the design, best practice and mitigation that is described within the planting specification (see section 8.6.2.11 of the original EIAR), significant impacts on ecology are not anticipated at any geographic scale.

Two forestry applications in the vicinity of the proposed replant lands have been approved and three applications are pending. The total area to be afforested equates to 29.03ha, with 10.46ha recently planted, and 3.39ha classed as clear fell and thinning. If the pending afforestation projects were to be carried out at the same time as the proposed project (afforestation of replant lands), it is possible that cumulative impacts of sedimentation could arise. In-combination effects can occur where a project results in individually insignificant effects that, when considered in-combination with impacts of other proposed or permitted plans and projects, can result in significant effects. It is noted however that mitigation measures are proposed to avoid sedimentation.

[4] Replacement replanting of forestry in Ireland is subject to licence in compliance with the Forestry Act 2014 as amended. The consent for such replanting is covered by statutory instrument S.I. No. 191/2017 - Forestry Regulations 2017 as amended. This legislation provides for development of afforestation and forest road construction project's compliance with the Environmental Impact Assessment Directive insofar as it applies to forestry development.

2.1.3.3.1 Farming

The proposed project is predominantly located within forestry, agricultural land and public roads. The diversity of flora within the habitats has been reduced dramatically by drainage, reseeding, fertilisation and intensive grazing by cattle. The main potential impact would be an increase in nutrient levels of local watercourses. There is potential for the proposed project to contribute to a cumulative impact on water quality in drains within the site and local watercourses further downstream of the site, through the potential for sediments and other pollutants entering the watercourses as a result of felling, construction activities in addition to ongoing farming operations.

The risk of such impacts would, for example, greatly increase if such works were taking place during the winter months or times of very high rainfall. Due to the already degraded state of the watercourses draining the proposed project site, any additional pressures such as release of suspended solids and or nutrients as a result of the construction, operational and or decommissioning phases could result in further impacts.

2.1.3.3.2 Forestry

Forestry is one of the main land uses within the main wind farm site and is relatively common but not co-dominant within the greater area. Mixed broadleaved woodland plantation is the most dominant habitat within the proposed site boundary. Impacts often associated with forestry on the local environment are habitat loss, habitat alteration and potential reduction in water quality. It is noted that the plantations onsite are broadleaved and that the associated drains do not discharge directly to watercourses, reducing the potential for negative impacts (compared for example to conifer plantations in upland environments).

A further distinction exists between the plantations in the more intensively managed agricultural areas within the site, where plantations have replaced intensively managed grassland. In this scenario, a lower value habitat has been replaced with a more valuable one in ecological terms. In the less intensively managed wet grassland areas, afforestation and associated drainage may have a neutral or negative effect in the longer term. Comparing the value of un-managed wet grassland with a mature oak plantation is more contingent upon conservation goals, than the inherent value of these habitats.

While forestry may have resulted in a reduction in water quality very locally the water quality in the majority of the streams within the study area is more closely dependent on agricultural activities.

There is potential for felling and construction activities at the wind farm site to act cumulatively with other forestry activities in the same catchment, particularly harvesting operations. While it is difficult to quantify the level of impact with certainty, in-combination effects are considered likely. These would include the increased release of sediments and nutrients to receiving watercourses.

In the absence of mitigation potential indirect cumulative impacts to the River Awbeg could occur and a Medium-term Moderate Reversible Cumulative Impact is considered possible.

2.1.3.4 Arterial Drainage

The Awbeg arterial drainage district encompasses the upper Awbeg catchment, including sections of streams/rivers within and adjacent the proposed site. As Cork Co. Council are technically obliged by the OPW to 'maintain' channels within the arterial drainage district, if maintenance proceeded (works such as dredging, removal of woody debris, vegetation clearance), cumulative effects in could occur in combination with the proposed project. Such effects could occur in parallel (if activities were carried out concurrently), or through overlap of persistent effects. It is noted however that no programme of maintenance is currently in place.

2.1.3.5 Cumulative Impacts during Construction on Key Receptors

Potential Cumulative Impacts during construction on key receptors identified are addressed below:

- Designated Nature Conservation Sites
- Habitats and Flora
- Mammals (excluding Bats)
- Bats
- Avifauna
- Aquatic Ecology and Fisheries
- Other Species.

2.1.3.5.1 Designated Nature Conservation Sites

The proposed site is not within the boundaries of any designated nature conservation site. Therefore, there will be no direct impacts to designated nature conservation sites for the proposed project.

The potential spread of invasive species recorded along the TDR could result in cumulative impacts with other projects along the route. This is particularly pertinent to TDR Nodes within or in close proximity to designated sites. TDR Nodes 5 and 6 at which Norway maple is present are within the Inner Shannon Estuary – South Shore pNHA. While there is little likelihood of this becoming established in habitats for this pNHA is selected, the potential for the spread of invasive species from other nodes to Nodes 5 and 6 could occur.

Although the TDR and replant lands site both drain towards the Lower River Shannon SAC, and River Shannon and River Fergus Estuaries SPA, no significant indirect hydrological effects are likely to arise from TDR Node works, precluding a cumulative effect in this regard.

There is potential for indirect cumulative effects on the Blackwater River (Cork/Waterford) SAC to arise from proposed project in conjunction with the consented Fiddane Solar Farm grid connection, M20 road improvement scheme (if constructed) agricultural, arterial drainage and forestry activities.

There is potential for indirect cumulative effects on the Lower River Shannon SAC, and River Shannon and River Fergus Estuaries SPA to arise from replanting afforestation at Emlagh, Co. Clare in conjunction with agricultural and forestry activities.

Cumulatively there is likely to be a Long-term Moderate Reversible Cumulative Impact without mitigation.

No impacts are predicted to any other Nature Conservation sites during construction of the proposed project and no additive effects due to in combination direct impacts with other existing sources of direct impact are predicted.

An accompanying NIS was prepared for the proposed project and accompanied the original EIAR. The NIS addresses potential impacts on European sites resulting from the proposed project. Where European sites overlapping with nationally designated sites were identified being subject to likely significant effects, the conclusions from the NIS for said European sites is shown here. The NIS has also been updated by way of an addendum, which is now submitted together with this current addendum to the original EIAR.

A total of four pNHAs in the Shannon Estuary within 15km of the replant lands (Poulnasherry Bay pNHA, Scattery island pNHA, Beal Point pNHA and Ballylongford Bay pNHA) are overlapped by two European sites which were considered as part of the NIS.

The possibility of significant effects to these European sites were identified:

- Lower River Shannon SAC (002165)
- River Shannon and River Fergus Estuaries SPA (004077)

Relevant European sites in relation to the wind farm, GCR and TDR are as follows:

A downstream pNHA beyond 15 km overlaps a European site which was considered as part of the NIS. The possibility of significant effects to this European site was identified:

- Blackwater River (Cork/Waterford) cSAC (002170)/Awbeg Valley (Above Doneraile) pNHA (000075)

A pNHA within 15 km of the wind farm overlaps a European site which was considered as part of the NIS. The possibility of significant effects to this European site was identified:

- Kilcolman Bog SPA (004095)/pNHA (000092)

The cumulative assessment in the NIS stated that there is potential for cumulative impacts on the Blackwater River (Cork/Waterford) cSAC arising from the M20 road scheme, forestry, agriculture and arterial drainage maintenance in the absence of mitigation.

2.1.3.5.2 Habitats and Flora

Potential direct impacts during construction have been identified as land take during construction of the proposed project (including turbine hardstands, compound, substation, sections of new access roads and internal cabling), which will lead to some permanent loss of habitat. Other existing or planned sources of land take in the vicinity of the proposed project may result in cumulative impacts. The potential spread of invasive species recorded along the TDR, bordering the main wind farm site and the along the grid connection could result in cumulative impacts with other projects. Cumulatively there is likely to be a Permanent Moderate Reversible Cumulative Impact without mitigation.

2.1.3.5.3 Mammals (excluding Bats)

Mammal breeding or resting sites may be cumulatively impacted by other developments which either remove potential breeding sites and foraging habitats (e.g. road construction) or farming and forestry activities which may for example remove Badger setts, Pine Marten breeding sites, Red Squirrel dreys, etc.

Prior to the implementation of mitigation cumulative effects are likely to be Short-term Moderate Cumulative Impacts which are potentially Reversible.

2.1.3.5.4 Bats

Potential cumulative impacts on bats during the construction phase would be as follows:

- Displacement of populations
- Abandonment of young
- Mortality.

All wind energy developments within 20km identified by the planning search are existing wind farms. As such no construction stage cumulative effects are predicted in this regard.

A bat survey undertaken for Ballyroe solar farm at Longford bridge (located to the west/south of Ballyroe solar farm) recorded Daubenton's bat, common pipistrelle and soprano pipistrelle and noted the latter two species would also hunt along the linear wooded habitats at Ballyroe solar farm. It was also noted that some trees at Ballyroe solar farm have rot-holes that appear to be possibly suitable for roosting bats and there are also some ivy-laden trees.

The trees observed at Coolcaum solar farm did not support large crevices, apertures or cracks that could provide suitable roosting habitat for bats. Some trees did however support ivy growth, suggesting moderate suitability to support roosting bats. There are no structures within the proposed solar farm site footprint that could provide suitable roosting habitat for bats.

It is considered that the adjacent solar developments are unlikely to significantly affect local bat populations in their own right, due to no direct impacts to bat roosts being identified, mitigation/preconstruction surveys requirements and lack of collision risk due to the absence of moving parts at solar PV installations.

Considering that no unmitigated potential construction-stage impacts are identified for the nearby permitted solar farms, and that all wind farms within 20km are existing developments, a Long-Term Imperceptible Cumulative Impact is predicted for bats.

2.1.3.5.5 Avifauna

As noted above, all wind energy developments within 20km identified by the planning search are existing wind farms. As such no construction stage cumulative effects are predicted in this regard. Walkover surveys at the adjacent Fiddane solar farm recorded the following species of interest: Kestrel, Buzzard, Swallow, Snipe, Greenfinch, Grey Heron, Mallard and Sparrowhawk. Construction-stage disturbance of Snipe was identified as a possible effect.

Surveys at the nearby Ballyroe solar farm recorded the following species of interest: Whooper Swan, Little Egret, Curlew, Black-headed Gull, Snipe, Grey Heron and Sand Martin. It is noted that a Ballyroe quarry pond, an known whooper swan roost is present within this solar site. Construction-stage disturbance of Whooper Swan was identified as a moderate impact within the Ballyroe solar farm assessment.

Direct impacts on avifauna during construction are primarily land take related, mainly due to the loss of nesting habitats to key species. In-combination land take is unlikely to result in range loss of any species which frequent the proposed project site.

Disturbance or effective habitat loss indirectly is more difficult to quantify; especially as most species of birds may habituate to disturbance over time.

Detailed assessments were undertaken at appeal stage and for the Section 132 response. These are included in Appendices 2, 3 and 4 of this document. Further detail is also provided in the current Section 131 response document. The surveys undertaken for the Section 132 response provided detailed information on the roosting/feeding habits and distribution of the local wintering whooper swan population, and of diurnal and crepuscular movements indicating the regularly travelled routes used for local travel between feeding and roosting sites. None of the routes used for commuting between the feeding/roosting sites in the locality traverse the proposed wind farm. Nocturnal audio surveys in conjunction with visual surveys provided confirmation that whooper swan migratory activity is confined within the proposed turbine curtailment period as recommended by the NPWS (Ref 217246): 15th September to 15th December, and between 21st February and 15th April each year.

As such, there is no potential for in-combination/cumulative effects in conjunction with the interconnector cable.

Regarding potential in-combination effects on whooper swans and Kilcolman Bog SPA, it is noted that an NIS and detailed assessment of potential effects on whooper swan was undertaken as part of the consented interconnector cable. The assessment for the interconnector cable included a suite of ornithological surveys undertaken during winter 2022-2023 to assess potential effects on whooper swans, including vantage point (VP) watches, targeted distribution and abundance surveys, acoustic surveys, I-webs / hinterland surveys and roost flight monitoring. These surveys indicated no regular whooper swan flight routes crossing the overhead line sections of the interconnector cable. During the construction period, a noise / construction free zone will be implemented from the 15th October to 15th of March. The primary section of overhead line is located to the east of the proposed project.

There is potential population exchange between the Kilcolman Bog SPA whooper swan population and the wintering population at Annagh/Awbeg River. As such, potential for displacement of whooper swans from roosting/feeding sites in vicinity of the proposed project was assessed. Since the proposed project will not give rise to displacement of whooper swans from any of the local roosting/feeding sites (Annagh Bogs, Annagh Fields and Ballyroe Quarry), there is no potential for in-combination effects in this regard.

Based on the evidence available in addition to the fact that the higher value semi-natural habitats at the adjacent solar farms will be retained, any cumulative effects on birds during the construction phase would be a Short-Term Not Significant Cumulative effects.

2.1.3.5.6 Aquatic Ecology

Agricultural practices and potentially commercial forestry activities will continue to occur during the construction activities of the wind farm.

While it is difficult to quantify the level of impact with certainty, in-combination effects are considered likely. These would include the increased release of sediments and nutrients to receiving watercourses. In the absence of mitigation, a Significant Negative, Short-term Cumulative Impact is considered likely.

2.1.3.5.7 Other Species

Frogs are known to occur within the site and may be affected by land take; however, given the amount of displacement and alternative habitats available as well as the retention of semi-natural areas within the adjacent/nearby solar farms, the overall in combination effect is assessed as a Short-term Slight Cumulative Impact which is Reversible.

2.1.3.6 Cumulative Impacts during Operation on Key Receptors

Potential Cumulative Impacts during operation on the following are addressed below:

- Designated Nature Conservation Sites
- Habitats and Flora
- Mammals (excluding Bats)
- Bats
- Avifauna
- Aquatic Ecology and Fisheries

- Other Species

2.1.3.6.1 Designated Nature Conservation Sites

As no direct or indirect effects are predicted on Nature Conservation sites during the operation of the proposed wind farm then no additive effects due to in combination direct impacts with other existing sources of direct impact are predicted.

An accompanying NIS was prepared for the proposed project and accompanied the original EIAR. The NIS addresses potential impacts on European sites resulting from the proposed project.

Where European sites overlap with nationally designated sites, the conclusions from the NIS for said European sites is shown here. The relevant SACs/pNHAs are:

- Lower River Shannon SAC (002165)/ River Shannon and River Fergus Estuaries SPA (004077)/ Poulnasherry Bay pNHA (000065)/ Scattery island pNHA (001911)/ Beal Point pNHA (001335)/ Ballylongford Bay pNHA (001332)
- Blackwater River (Cork/Waterford) cSAC (002170/Awbeg Valley (Above Doneraile) pNHA (000075)

The NIS stated that if the two approved afforestation projects identified were to be carried out at the same time as the proposed project, it is possible that cumulative impacts of sedimentation could arise. It is noted however that mitigation measures have been proposed to avoid such an occurrence.

2.1.3.6.2 Habitats and Flora

No cumulative operational stage effects on terrestrial habitats are predicted. See Aquatic ecology below for details of possible effects on aquatic habitats.

2.1.3.6.3 Mammals (excluding Bats)

Mammal breeding or resting sites may be cumulatively impacted by other developments which either remove

Potential breeding sites (e.g. road construction) or farming or forestry activities which may for example remove Badger setts, Pine Marten or Red Squirrel breeding sites etc.

As noted previously, maintenance of the turbine felling buffers may result in disturbance to badger setts. However, given that no land take is predicted for the operational phase, a Short-term Not Significant cumulative effect is predicted.

2.1.3.6.4 Bats

Potential Cumulative impacts on Bats during operation would be as follows:

- Mortality
- Reduction of local populations.

All of the wind farms discussed below were constructed and operational at the time the original planning application and EIAR were lodged and therefore formed part of the baseline environment against which potential cumulative impacts were assessed. No new wind farm projects have been consented within 20km of the proposed development since the original EIAR was prepared. As such, the operational wind farms listed represent the complete set of relevant existing projects for cumulative assessment. Their operational status, combined with the survey information available at the time of their respective applications, provides the context for evaluating potential in-combination effects on bats during the operational phase of the proposed project.

No bat surveys were undertaken for the nearest wind farm, Rathnacally wind farm (2.27km Northeast), as indicated by planning documents for this project.

Bat surveys including a daytime habitat/roost assessment and a nocturnal bat activity survey were completed for the 2-turbine Boolard wind farm (2.36km Northwest) planning application. The species recorded onsite were Primarily Common and Soprano Pipistrelle, while lower activity was recorded for Leisler's bat, and Brown Long-eared and Natterer's bats were recorded in association with woodland at a ring fort. No bat roosts were observed. A buffer zone of 50m between woodland/hedgerows was specified to mitigate turbine collision and barotrauma risk.

Bat activity surveys were undertaken on three occasions for Knockatalig wind farm (8.6km East). No bats were recorded, and the habitats at the site (conifer plantation, upland heath and bog) were assessed as being sub optimal for bats.

No bat surveys were carried out for Castlepook wind farm (9.7km East), and no mention of bats is made in the associated EIS.

No planning documentation for Kilberrihert wind farm (9km Southwest) is publicly available online. The planning file indicates an EIS was submitted.

An EIS was prepared for Kilmeedy wind farm (16km Northwest), however this is not available online. Reference is made in the planning report to the EIS noting the presence of derelict buildings at the site which could be used by rooting bats. The planning report also noted that further bat surveys were recommended in the EIS. Other documentation refers to this recommendation meeting with approval, but no further information is available online.

The planning file for Dromdeeveen I & II wind farms (20km West) indicates an EIS was submitted; however this is not publicly available online.

The single private turbine (12km Northwest) was a retention application. The planning file contains no reference to ecological surveys being undertaken for this application.

As surveys were not undertaken for Rathnacally wind farm, and limited surveys were carried out for Boolard, the assessment of bat activity levels is not strictly objective as the Ecobat analysis tool was not used as standard practice when these applications were submitted. However, when the locally observed patterns of activity, species composition, nature of the sites, proximity and ecological connectivity are considered cumulatively, cumulative impacts to bats during the operational phase could give rise to a Long-Term Moderate Cumulative Impact prior to mitigation.

When the patterns of activity, species composition, nature of the sites, distance between these sites and the proposed wind farm, and limited ecological connectivity are considered cumulatively, the potential for effects is very low. Therefore, cumulative impacts to bats during the operational phase would be a Long-Term Imperceptible Cumulative Impact.

2.1.3.6.5 Avifauna

Direct impacts on avifauna during operation which may be cumulatively added to by other existing pressures or proposed projects include collision related mortality, ongoing disturbance/displacement and barrier effect.

Table 8-89 of the original EIAR details the wind farm development within 20km of the proposed project. A total of eight operational wind farms are present within this search radius.

Flight height or the flight heights which birds habitually use along either migration or local flight paths is an influencing factor in determining whether the proposed project will combine with additional wind farms to produce additive, synergistic or antagonistic effects. These effects include increased Barrier Effect (potentially obstructing migratory flightpaths), increased collision risk (through combined mortality in susceptible species) and increased disturbance to birds utilising foraging grounds whilst on migration.

Bird surveys at the two closest wind farms (Boolard and Rathnacally) (2.36km Northwest and 2.27km Northeast) were limited to recording of common farmland species during site walkovers and did not include any flight activity surveys. These sites were not identified as potentially important locations for birds during the hinterland survey for the proposed project.

Vantage point surveys, transects for breeding and wintering birds, Red Grouse tape lure, a hinterland survey and crepuscular surveys for Nightjar and owls were completed for Knockatalig wind farm (8.6km East). Diurnal raptors recorded included Sparrowhawk, Merlin, Kestrel, Buzzard and Peregrine falcon, in addition to Hen Harrier which was recorded frequently and observed breeding in the area. Woodcock and Long-eared Owl were recorded during crepuscular surveys.

VP surveys targeting Hen Harrier were completed for Castlepook wind farm (9.7km East). Information on other breeding birds was collected during these surveys, which covered one year. Previous surveys had also been undertaken for an earlier planning application. The surveys detected one breeding pair of Hen Harrier within the site, and a further 10 pairs between 0-5km from the site. Peregrine Falcon and Merlin activity was also recorded, while Red Grouse and Nightjar were identified as having the potential to occur in the wider area of the Ballyhoura Mountains.

No planning documentation for Kilberrihert wind farm (9km Southwest) is publicly available online. The planning file indicates an EIS was submitted.

An EIS was prepared for Kilmeedy wind farm (16km Northwest), however this is not available online. Reference is made in the planning report to common bird species recorded during a site walkover, while the absence of Hen Harrier records in the area is noted. Other documents refer to further bird surveys being recommended however no further information is available.

The planning file for Dromdeeveen I & II wind farms (20km West) indicates an EIS was submitted; however this is not publicly available online.

The single private turbine (12km Northwest) was a retention application. The planning file contains no reference to ecological surveys being undertaken for this application.

Considering the distances of these wind farm sites in relation to the study area, the cumulative collision risk on any avian receptors is considered negligible. Furthermore, studies have found that local wintering birds will habituate to the presence of turbines and therefore avoid collision (Langston & Pullan, 2003). Cumulative collision mortality combined with other wind farm developments is predicted to be a Long-Term Imperceptible Cumulative Impact.

The presence of two turbines at the existing Rathnacally wind farm located 2.3km north-east of the proposed turbines is noted. The potential in-combination/cumulative collision risk with this wind farm is assessed as negligible due to the intervening distance between the two wind farms, the small footprint of Rathnacally wind farm (two turbines, positioned 325m apart), and the high published avoidance rate of whooper swan (99.5%) (SNH, 2018).

Based on the evidence available in addition to the fact there is a significant distance to the majority of these wind farms, that the closer wind farms are of limited scale (two turbines each) and not immediately adjacent, along with the results of hinterland surveys undertaken for the proposed project, any cumulative impacts to birds during the operational phase would be a Long-Term Imperceptible Cumulative Impact.

Regarding potential in-combination effects on whooper swans and Kilcolman Bog SPA, it is noted that an NIS and detailed assessment of potential effects on whooper swan was undertaken as part of the consented interconnector cable. The assessment for the interconnector cable included a suite of ornithological surveys undertaken during winter 2022-23 to assess potential effects on whooper swans, including vantage point (VP) watches, targeted distribution and abundance surveys, acoustic surveys, I-webs / hinterland surveys and roost flight monitoring. These surveys indicated no regular whooper swan flight routes crossing the overhead line sections of the interconnector cable. The underground section was located to avoid potential collisions in areas more frequently traversed by flying whooper swans. Coiled bird flight diverters will be used on the OHL along the interconnector route on the recommendation of the NPWS.

As such, there is no potential for in-combination/cumulative effects in conjunction with the interconnector cable.

Potential for displacement of whooper swans from roosting/feeding sites in vicinity of the proposed project was assessed. Since the proposed project will not give rise to displacement of whooper swans from any of the local roosting/feeding sites (Annagh Bogs, Annagh Fields and Ballyroe Quarry), there is no potential for in-combination effects in this regard.

As such, any cumulative effects on whooper swan during the operational phase would be a Long-Term Imperceptible Cumulative effect.

2.1.3.6.6 Aquatic Ecology

Operational wind farms are not normally considered to have the potential to significantly impact on the aquatic environment. The main risk to watercourses is via water quality impacts, when oils and lubricants are used on the site (e.g. infrastructure maintenance). If such substances leaked from the turbines or maintenance areas or were disposed of inappropriately, there is a risk of water contamination and subsequent impacts to aquatic ecology.

However, the likelihood of this occurring is very low and unlikely to be a significant impact considering the low volumes of vehicular traffic involved in typical wind farm operations and the high standards that are implemented on a well-managed site.

Due to the natural 'grassing-over' the drainage swales and revegetation of other exposed surfaces, and the non-intrusive nature of site operations, there is a negligible risk of sediment release to the watercourses during the operational stage. Potential cumulative operational phase impacts on aquatic ecology are considered Short-term Slight Cumulative Reversible Impacts and in the Local Context, in the absence of mitigation.

2.1.3.6.7 Other Species

Frog forage and breed in areas abutting the site and may also do so within the site. As such this species may be affected by land take however given the large amount of displacement and alternative habitats available the overall in-combination effect is assessed as being likely to result in a Short-term Imperceptible Cumulative Reversible Impacts.

A similar impact is predicted for the invertebrates present on site.

2.1.3.7 Cumulative Impacts during decommissioning on key receptors

The potential cumulative effects during decommissioning are considered to be the same as those described for the construction phase of the proposed project.

2.1.4 Chapter 9: Land, Soils and Geology

In terms of the potential to act cumulatively on Land, Soils and Geology; relevant projects in proximity to the proposed project are listed in Table 2-6.

Table 2-6: Potential Cumulative Impacts from other Developments

Development	Distance to Proposed project (km)	Status	Interface	Potential Cumulative Impact
M20 Limerick to Cork	2-4km	Pre-Planning	Potential for requirement of imported aggregate for construction	Imperceptible
102.76ha Ballyroe Solar Farm	1km	Planning Granted	Potential for requirement of imported aggregate for construction of access tracks	Imperceptible
92.75ha Fiddane/Ardngeehy solar farm.	0.1km	Planning Granted	Potential for requirement of imported aggregate for construction of access tracks	Imperceptible
42.6ha Coolcaum solar farm	0.1km	Planning Granted	Potential for requirement of imported aggregate for construction of access tracks	Imperceptible
Ballyroe Substation	1.5km	Planning Granted	Potential for requirement of imported aggregate for construction of substation	Imperceptible
Interconnector cable between the consented Fiddane, Coolcaum and Ballyroe solar farms	Intersecting	Planning Granted	Potential requirement of fill material for cable trench	Imperceptible

Development	Distance to Proposed project (km)	Status	Interface	Potential Cumulative Impact
Rathnacally Wind Farm	2km	Constructed	Potential for requirement of imported aggregate for maintenance of access tracks	Imperceptible
Boolard Wind Farm	2km	Constructed	Potential for requirement of imported aggregate for maintenance of access tracks	Imperceptible
Replant lands, Emlagh, Co. Clare	72km	Proposed	Regionally and Locally Important Bedrock Aquifers Groundwater wells and springs	Imperceptible

The wider area surrounding the proposed development is characterised primarily by agricultural land and commercial forestry, with no other significant industrial activities present. The original EIAR concluded that the proposed project would give rise to only a Slight impact on geological and hydrogeological receptors. On this basis, and given the limited scale and nature of updated projects in the area, no significant cumulative effects on geology are anticipated.

Minor risks of accidental fuel or oil leaks may arise where plant and machinery are used for drainage or construction works; however, these risks are localised, temporary and effectively managed through standard construction-phase controls.

The updated cumulative review identified the proposed M20 Cork–Limerick Road Scheme and the consented solar farms as the only new projects with a theoretical pathway for cumulative hydrogeological effects, as both are located within the Mitchelstown Groundwater Body (GWB) and ultimately drain to the Blackwater River (Cork/Waterford) SAC. Construction of these projects will involve disturbance of soils and subsoils, giving rise to a Small Adverse magnitude of impact on an Extremely High value receptor. However, the M20 is not yet at construction stage, and the solar farms are expected to be fully constructed prior to commencement of the proposed wind farm. As such, no temporal overlap is anticipated, and the potential for significant cumulative effects does not arise.

The nearby Rathnacally and Boolard wind farms are already constructed and located within the Rathnacally GWB. Any residual run-off from these operational sites represents a Negligible magnitude of impact on a Low value receptor, resulting in an Imperceptible cumulative effect.

A forestry replanting site has been identified at Emlagh, Co. Clare, approximately 70km from the proposed project. Given this substantial separation distance, there is no hydrological or geological pathway for cumulative effects. The EPA currently lists the Kilrush GWB as "Review"; however, irrespective of its final status, the proposed project will not contribute to deterioration of this groundwater body or impede its ability to maintain "Good" status.

Some indirect cumulative demand on local quarries may arise due to the requirement for aggregate and concrete during construction. These effects are diffuse, short-term and typical of regional construction activity, and do not give rise to any significant cumulative geological or hydrogeological impacts.

Overall, having regard to the nature, scale, timing and location of updated projects, no significant cumulative effects on geological or hydrogeological receptors are predicted.

2.1.5 Chapter 10: Hydrology and Water Quality

As part of the assessment of cumulative impacts, planning searches were undertaken using Cork County Council online planning enquiry portals, An Bord Pleanála website and the EIAR portal to search for large scale developments within 20km of the proposed project area. The CCC planning portal was also searched for small scale developments. The majority of the applications were of a scale and/or distance that they would not cause a cumulative effect in relation to Hydrology and Water quality.

Cumulative impact from a hydrological point of view can only occur if assessed developments are hydrologically linked. The major developments which are in the same sub-basin and within 10km from the proposed wind farm are listed below:

- Replant Lands (Forestry Replanting)
- Tree Felling
- Solar farm at Fiddane/Ardnageehy, Charleville, Co. Cork
- Solar farm at Ballyroe, Charleveille, Co. Cork
- Solar farm at Coolcaum, Charleville, Co. Cork
- Substation at Ballyroe, Charleville, Co. Cork
- Interconnector cable between the solar farms listed above, Charleville, Co. Cork
- Boolard wind farm
- Rathnacally wind farm
- N/M20 Motorway
- Knockatalig wind farm
- Castlepook wind farm
- Kilberrihert wind farm
- Kilmeedy wind farm
- Dromdeeveen I & II wind farm
- Private Turbine

2.1.5.1.1 Replant Lands (Forestry Replanting)

Replant sites have been identified at Emlagh, Co. Clare.

The total area approved for replanting is 14.5 ha. The site is located in the townland of Emlagh, 2.8 km from the village of Moyasta in Co. Clare. The site lies at an elevation of < 40m sloping gently from west to east.

There is one natural watercourse present on site flowing along the north-eastern boundary (length along boundary 240 m). This is approximately 0.5m deep (down a 1m bank), slow flowing in a southerly direction and with a silt and gravel substrate. It is little vegetated except along its banks. It flows south eastward, discharging into Poulnasherry Bay (Lower River Shannon SAC), near Moyasta up to 3 km downstream. Drainage channels present are approximately 1m deep, 1m wide but with little water flow, being clogged with vegetation and silt. They discharge/filter into the on-site natural watercourse.

The proposed forestry replanting site is remote from the site of the Proposed Development (in County Clare), and they are not within the same surface water catchment. There is no hydrological connectivity between the replanting site and the site of the Proposed Development, and therefore there can be no cumulative effects or interactions at any phase of the development.

2.1.5.1.2 Tree felling

Tree felling process and construction of the proposed wind farm will have a negative impact of water quality if no mitigation measures are being applied. With mitigation measure listed in Section 10.7.1 of the original EIAR being applied, residual impact of tree felling and construction of the proposed wind farm is not significant. Therefore, there is no cumulative impact.

2.1.5.1.3 Fiddane/Ardnageehy Solar Farm, Charleville

The Fiddane/Ardnageehy solar farm, Charleville is located approximately 0.1km North of the proposed wind farm site and is hydrologically linked to it. Environmental impact assessment screening report of the solar farm concluded that there will be no significant environmental impact as a result of the development. As stated in Section 10.4.2 of the original EIAR, the increase in runoff due to the construction and operational stage of the project is 'not significant'. This will be further reduced with the drainage system within the wind farm site. The release of suspended solids and pollutants during the construction of the proposed wind farm will be mitigated by proposed mitigation measures described in Section 10.7 of the original EIAR. The impact of works associated with GCR and TDR are not significant on hydrology and water quality. Following above, it is concluded that the cumulative impact on hydrology and water quality is not significant.

2.1.5.1.4 Solar farm at Ballyroe, Charleville

Solar farm at Ballyroe, Charleville is located approximately 1km south-east of the proposed wind farm site and is hydrologically linked to the wind farm site. The Solar Farm (2) is located in Awbeg (Buttevant)_010 sub-basin. The GCR and TDR run through this sub-basin. The impact of works associated with GCR and TDR are not significant on hydrology and water quality. Therefore, the cumulative impact is not significant.

2.1.5.1.5 Solar farm at Coolcaum, Charleville

Solar farm at Coolcaum, Charleville is located approximately 0.6 km from the proposed wind farm site and is hydrologically linked to the wind farm site. The Solar Farm is located in Awbeg (Buttevant)_010 sub-basin. The GCR and TDR run through this sub-basin. The impact of works associated with GCR and TDR are not significant on hydrology and water quality. Therefore, the cumulative impact is not significant.

2.1.5.1.6 Ballyroe Substation, Charleville

The substation at Ballyroe, Charleville is located approximately 1.5km south-east of the proposed wind farm site and is hydrologically linked to the wind farm site. The substation is located in Awbeg (Buttevant)_010 sub-basin. The GCR and TDR run through this sub-basin. The impact of works associated with GCR and TDR are not significant on hydrology and water quality. Therefore, the cumulative impact is not significant.

2.1.5.1.7 Interconnector cable between the solar farms

The interconnector cable is adjacent to and intersecting the proposed wind farm site and is hydrologically linked to the wind farm site. The cable is located in Awbeg (Buttevant)_010 sub-basin. The GCR and TDR run through this sub-basin. The impact of works associated with GCR and TDR are not significant on hydrology and water quality. Therefore, the cumulative impact is not significant.

2.1.5.1.8 Boolard Wind Farm

The Boolard Wind Farm is located approximately 2.4km North West of the proposed wind farm site and is hydrologically linked to it. It is situated within Oakfront_010 sub-basin. The Boolard wind farm is operational, therefore, no soil disruption and release of suspended solids is anticipated. As stated in Section 10.4.2 the increase in runoff due to the construction and operational stage of the project is 'not significant'. This will be further reduced with the drainage system within the wind farm site. The release of suspended solids and pollutants during the construction of the proposed wind farm will be mitigated by proposed mitigation measures described in Section 10.7. The impact of works associated with GCR and TDR are not significant on hydrology and water quality. Therefore, the cumulative impact on hydrology and water quality is not significant.

2.1.5.1.8.1 Rathnacally Wind Farm

The Rathnacally Wind Farm is located approximately 2.3km east of the proposed wind farm site and is not directly hydrologically linked to the wind farm site. The Rathnacally Wind Farm is located in Awbeg (Buttevant)_010 sub-basin. The GCR and TDR run through this sub-basin. The impact of works associated with GCR and TDR are not significant on hydrology and water quality. The Rathnacally wind farm is operational, therefore, no soil disruption and release of suspended solids is anticipated. Therefore, the cumulative impact is not significant.

2.1.5.1.9 N/M20 Motorway

The proposed Cork-Limerick improvement scheme is not in the same sub-basin as the proposed wind farm. Therefore, it is concluded there is no potential for cumulative impact.

2.1.5.1.10 Knockatalig Wind Farm

The Knockatalig Wind Farm is located approximately 8.6km east of the proposed wind farm site and is not hydrologically linked to it. Therefore, there is no potential for cumulative impact.

2.1.5.1.11 Castlepook wind farm

The Knockatalig Wind Farm is located approximately 9.7km east of the proposed wind farm site and is not hydrologically linked to it. Therefore, there is no potential for cumulative impact.

2.1.5.1.12 Kilberrihert wind farm

The Kilberrihert Wind Farm is located approximately 9km south of the proposed wind farm site and is not hydrologically linked to it. Therefore, there is no potential for cumulative impact.

2.1.5.1.13 Kilmeedy wind farm

The Kilmeedy Wind Farm is located approximately 16km north of the proposed wind farm site and is not hydrologically linked to it. Therefore, there is no potential for cumulative impact.

2.1.5.1.14 Dromdeeveen I & II wind farm

The Dromdeeveen I & II wind farm is located approximately 20km west of the proposed wind farm site and is not hydrologically linked to it. Therefore, there is no potential for cumulative impact.

2.1.5.1.15 Private Turbine

The Private turbine is located approximately 12km west of the proposed wind farm site and is not hydrologically linked to it. Therefore, there is no potential for cumulative impact.

2.1.5.1.16 Replant Land

The replant land is located approximately 70.2km north-west of the proposed wind farm site and is not hydrologically linked to it. Therefore, there is no potential for cumulative impact.

2.1.6 Chapter 11: Population, Human Health and Material Assets

As part of the cumulative impact assessment included throughout this EIAR, planned, proposed, consented and existing developments/projects in the area of the proposed project were considered for potential cumulative impacts on the receiving environment. Construction and proposed developments within 20km of the proposed project were considered for the purpose of this assessment.

As set out in Section 11.2 of the original EIAR, a 20km distance was considered a reasonable zone of influence for the purpose of assessing potential cumulative impacts on population, human health and material assets, considering the limited size and extent of the project, the nature of the impacts and the relatively non-sensitive receiving environment. Smaller projects were examined in closer proximity to the proposed project including development within 2km of the wind farm site, and within 250m of the GCR and TDR nodes.

The list of all projects considered for the cumulative assessment are included in Appendix 1 of this addendum. Each of the projects listed in Appendix 1 were considered with respect to potential cumulative impacts on Population, Human Health and Material Assets. Projects for which cumulative impacts were not identified were discounted from the impact assessment. Developments in the planning system within the vicinity of the wind farm site, GCR and TDR consisting of one-off housing and agricultural developments were identified for potential cumulative assessment, however, these developments are small in scale and will have an imperceptible cumulative impact with the construction and operation of the proposed wind farm, in relation to population, human health and material assets.

This is due to the significant setback of the proposed wind farm from nearby planned, proposed and existing projects and the brief to temporary nature of the proposed construction works associated with the GCR and TDR. Therefore, potential cumulative impacts associated with small scale development were considered to be imperceptible.

There are two existing wind farms in proximity to the proposed wind farm site. These are the Boolard Wind Farm, approx. 2.3km northwest and the Rathnacally Wind Farm, approx. 2.3km north east. Furthermore, there are a number of consented solar farms located directly adjacent to the proposed project site. The proposed project, in combination with the Boolard and Rathnacally Wind Farms and the Solar Farms, will have a cumulative impact on land use in the area, introducing additional renewable energy land use to an established agriculture area. The proposed project will reduce the overall available agricultural land by approx. 4 hectares. This is expected to have a non-significant to slight long-term negative impact on agricultural land availability in the area of the proposed project.

The cumulative impact of the proposed project in combination with the Boolard and Rathnacally Wind Farms and other wind farms within 20km on Landscape and Visuals is detailed in Chapter 15: Landscape and Visual. The cumulative visual impact of the proposed project is considered to contribute an additional cumulative effect that is in the order of medium-low, which will reduce to Low in the wider surrounds of the study area. This has potential cumulative impact on residential amenity in proximity to the site. The significant setback distance between the proposed turbines and existing dwellings along with the presence of thick treelines and hedgerows throughout the area will reduce potential cumulative visual impact between the proposed wind farm and the existing Boolard and Rathnacally Wind Farms with respect to residential amenity. Therefore, cumulative visual impact on residential amenity is considered long-term, non-significant and negative.

Cumulative noise impacts have been assessed for the proposed project cumulatively with the existing Boolard and Rathnacally Wind Farms, in relation to residential amenity. The cumulative predicted noise levels comply with the daytime and night-time noise limits derived using the Wind Energy Development Guidelines 2006, at all sensitive locations. However, for some receptors a new source of noise will be introduced into the soundscape and it is expected that there will be a slight to moderate significance of impact, with dwellings closest to the project with a long-term moderate significance of impact.

The consented Fiddane/Ardnageehy Solar Farm is located directly adjacent to the north of the proposed project. In addition, the Ballyroe solar farm (1.3km) and the Coolcaum solar farm (0.6 km) are located in close proximity to the proposed project. Should the consented solar farm be constructed at the same time as the proposed project there would be potential for temporary cumulative impact on human health as a result of construction works which may cause cumulative noise, vibration, dust and increased traffic at nearby dwellings, causing a negative impact on residential amenity. However, as described in Section 2.1.1, it is unlikely that the construction of the solar farms will align with the construction phase of the proposed project. Therefore, the construction phase of the solar development will not act cumulatively with the construction phase of the wind farm.

Due to the sparse population in proximity to the consented Fiddane/Ardnageehy Solar Farm and the significant setback from the proposed wind farm to nearby dwellings, cumulative impact on human health and residential amenity is considered temporary, negative and non-significant.

The consented Fiddane/Ardnageehy Solar Farm was intended to utilise the same grid connection route as the proposed project, however it now appears that it will connect into the Ballyroe Substation instead. Therefore, the grid connection route associated with the proposed project will not act cumulatively with the grid connection of the solar farm

The electricity generating capacity of the proposed project, in combination with the consented solar farms and existing wind farms in proximity to the site, will have a long-term significant positive cumulative impact on utility infrastructure and renewable energy resource in the greater area and will have a positive impact on national renewable energy resources as well as reduction in requirements for the use of non-renewable fossil fuels. This will increase national savings on fossil fuel imports.

The proposed M20 motorway project has been examined for potential in-combination effects with the proposed project There is potential for short-term positive socio-economic benefits to the study area and greater area as a result of the construction phase of both the proposed project and the M20 project due to employment opportunities associated with the construction of the projects. There is also likely to be indirect cumulative impacts in terms of demands placed on local quarries for aggregate and concrete required during the construction phase of the proposed project in combination with the M20 motorway project. This is likely to be a moderate negative impact on non-renewable stone resources.

The replant lands identified at Emlagh, County Clare form part of the proposed project and have been examined for potential cumulative impact on population, human health and materiel assets. The replant lands site is in agricultural use and is located in an agricultural area with areas of commercial forestry located throughout the landscape. The addition of 12.6ha of broadleaf forestry at the Emlagh site is not expected to cause a significant impact on population, employment and economic activity, recreation, amenity and tourism, human health and safety, non-renewable resources and utility infrastructure. The addition of 12.6ha of forestry will have a slight positive impact on renewable forestry resources in the area of the site and will have an insignificant to slight negative impact on availability of agricultural lands in the area due to a change in land use from agriculture to forestry.

Planning applications on the Clare County Council Website, An Coimisiún Pleanála Website and EIAR Portal Website have been examined to identify proposed or permitted developments with potential cumulative effects on the area in combination with the planting of 12.6ha of forestry at the replant site. Planning applications in proximity to the site consist of residential one-off dwellings, various agricultural developments and forestry related development. It is unlikely that these proposed and consented developments will have a negative cumulative effect on population, human health and materiel assets in the area of the replant lands at Emlagh, County Clare due to their size and nature.

2.1.7 Chapter 12: Shadow Flicker

The IWEA Guidelines recommend that all existing and/or permitted wind farm developments within 2km of a proposed project should be considered in a cumulative shadow flicker assessment, however, the key factor to determine whether cumulative effects may occur is whether receptors are located within overlapping 10 rotor diameter areas around multiple wind farms. There are two wind farms in the vicinity of the proposed project:

- Boolard Wind Farm (Cork County Council planning ref. 125997) to the northwest, comprising of two turbines with a 101 m rotor diameter, and;
- Rathnacally Wind Farm (Cork County Council planning ref. 124446) to the northeast, comprising of two turbines with a 114 m rotor diameter.

Both developments are located greater than 2km from the nearest turbine for the proposed project. A plot detailing the 10 rotor diameter areas around each development and the proposed project is shown on Figure 12-1 of the original EIAR.

There are no shadow flicker receptors located where the study areas for proposed project and Boolard Wind Farm overlap, therefore there will be no cumulative effects as a result of Boolard Wind Farm.

There are two shadow flicker receptors (ID 69 & 75 from Table 12-2 of the original EIAR) within the overlapping study areas of proposed project and Rathnacally Wind Farm, however, shadow flicker modelling has been undertaken which has found that no shadow flicker effects will occur at either property as a result of the Rathnacally turbines. It can therefore be concluded that there is no potential for cumulative shadow flicker impacts when considering proposed project, Boolard Wind Farm and Rathnacally Wind Farm.

2.1.8 Chapter 13: Traffic and Transportation

All known existing and proposed projects within the study area that could potentially generate a cumulative impact with the project in relation to traffic and transportation during construction, operation and decommissioning were identified and examined as part of this assessment. Table 2-7 provides details of the projects within the study area that were considered for cumulative impacts.

Further details on existing and proposed projects assessed in the EIAR for cumulative impacts are contained in Chapter 1.

Table 2-7: Cumulative Projects

Project/Operation	Description
Replanting Works	Replant lands have been identified in the townland of Emlagh, near Kilkee, County Clare and are considered cumulatively with the project in this EIAR.
Fiddane/Ardnageehy Solar Farm, Co. Cork	Consented 92.75ha solar farm bordering site to the north. Separate planning application for grid connection.
Ballyroe Solar Farm, Co. Cork	Consented 102.76ha solar farm and 3.4km grid connection approximately 1km from the proposed wind farm site.
Coolcaum Solar Farm, Co. Cork	Consented 42.6 ha solar farm approximately 0.6km from the proposed project site boundary.

Project/Operation	Description
Ballyroe Substation, Co. Cork	Consented substation approximately 1.5km from the proposed project site boundary.
Interconnector cable between the solar farms described above	Consented 33kV interconnector cable intended to connect the solar farm developments described above.
N/M20 Cork to Limerick scheme	the planned M20 project located east of the site

The transport environment surrounding the proposed development is characterised by a rural road network serving agricultural lands, dispersed dwellings and small-scale commercial activity. The original EIAR concluded that, with implementation of the Construction Traffic Management Plan (CTMP), the proposed wind farm would give rise to no significant residual traffic impacts. This updated cumulative assessment therefore focuses on whether any newly consented or recently constructed projects could interact with the proposed development to generate cumulative traffic effects.

A range of projects were reviewed, including solar farms, substations, grid infrastructure, the forestry replanting and the proposed M20 Cork–Limerick scheme. The majority of these developments were screened out for cumulative traffic assessment for the following reasons:

- The replanting site at Emlagh, Co. Clare is located approximately 70km from the proposed development and uses an entirely separate local road network. Traffic associated with replanting is minimal (occasional HGV delivery of saplings and machinery mobilisation) and cannot interact with wind farm construction traffic. It was therefore screened out.
- The consented solar farms at Fiddane/Ardnageehy, Ballyroe and Coolcaum, as well as the Ballyroe substation and the interconnector cable, are all expected to be constructed in advance of the proposed project, as outlined in Section 2.1.1. As these projects will not generate construction traffic during the same period as the proposed project, no temporal overlap exists, and cumulative construction traffic impacts cannot arise.
- Operational solar farms, substations and wind farms generate only very low levels of maintenance traffic, typically one or two light vehicle visits per month. These levels are insignificant relative to the construction traffic associated with the proposed project and do not contribute to cumulative effects.
- Several nearby renewable energy developments and grid assets use different access routes or connect to the regional road network at locations remote from the proposed wind farm haul routes. These projects were screened out as they cannot contribute to cumulative traffic volumes on the roads affected by the proposed development.
- The proposed M20 Cork–Limerick motorway is currently at feasibility/design stage. In the unlikely event that construction overlapped with the proposed project, there would be potential for cumulative traffic impacts. However, given the project's scale, any such impacts would be dominated by the M20 works, with the wind farm contributing only a minor proportion of overall traffic.

In summary, having regard to the location, scale and timing of surrounding developments, as well as the very limited traffic they generate during either construction or operation, no meaningful interaction with the proposed wind farm's construction traffic is anticipated. The majority of reviewed projects either lie outside the relevant road network, will be completed in advance of the proposed works, or produce only negligible maintenance traffic. Even in the unlikely event of overlap with the M20 scheme, the CTMP provides robust measures to avoid conflict between traffic management arrangements. Accordingly, the updated assessment concludes that the proposed project will not give rise to any significant cumulative traffic or transport effects.

2.1.9 Chapter 14: Archaeology, Architectural and Cultural Heritage

An updated cumulative impact assessment has been undertaken for the proposed project, drawing on the full list of permitted, proposed and operational developments identified in Section 2.1 of this report. Each project was reviewed to determine whether it could interact spatially, temporally or functionally with the proposed project in a manner that might give rise to cumulative effects on archaeological or architectural heritage. This assessment builds on the findings of the original EIAR and reflects the most up-to-date planning and cultural heritage information available.

The original EIAR concluded that, with the implementation of standard mitigation, the proposed project would not give rise to significant direct or indirect impacts on archaeological or architectural heritage. This updated cumulative assessment therefore focuses on whether any newly consented or recently constructed projects could combine with the proposed project to generate cumulative cultural heritage effects.

Across the study area, the majority of reviewed projects were screened out for cumulative assessment for one or more of the following reasons:

- The replant lands at Emlagh, Co. Clare lie approximately 70km from the proposed project and contain no recorded archaeological sites or protected structures. Although a children's burial ground lies 50 m outside the southern boundary, the replanting works will not interact with this feature, and there is no shared landscape setting or cultural heritage receptor that could give rise to cumulative effects.
- Several nearby solar farms including Fiddane/Ardnageehy, Ballyroe, and Coolcaum have undergone detailed archaeological assessment, including geophysical survey and targeted investigations. These assessments identified subsurface archaeological features in some locations, all of which are subject to preservation in situ, buffer zones, non-intrusive panel footings, or archaeological monitoring as conditions of permission. As these mitigation measures fully address the archaeological sensitivities within each landholding, and as the proposed project does not affect these sites or their settings, no cumulative cultural heritage effects can arise.
- The Ballyroe Substation and the interconnector cable traverse landscapes with known archaeological potential, including areas rich in ringforts and fulachtaí fia. Both projects are subject to preservation by record and full archaeological monitoring during ground disturbance. These works are localised, self-contained, and do not overlap spatially or visually with the proposed project. As such, they do not create any pathway for cumulative effects.
- The Boolard and Rathnacally wind farms are fully constructed. Archaeological monitoring during their construction phases either revealed no archaeological material (Boolard) or identified features that were fully excavated and preserved by record (Rathnacally). As these sites are now operational and involve no further ground disturbance, they cannot contribute to cumulative archaeological impacts with the proposed project.

- More distant wind farms—Knockatalig, Castlepook, Kilberrihert, Kilmeedy, Dromdeeveen I & II, and a private turbine—are located between 8 km and 20 km from the proposed project. These projects lie outside the zone of influence for setting-based impacts and do not share archaeological receptors or landscape features with the proposed project. They were therefore screened out.
- The N/M20 Cork–Limerick Improvement Scheme lies 2km to 4 km east of the proposed project. While its detailed cultural heritage impacts cannot yet be determined, Transport Infrastructure Ireland projects are subject to comprehensive archaeological assessment and mitigation, including geophysical survey, test trenching, excavation and building recording. As the scheme is not at construction stage and its impacts will be addressed through its own statutory processes, no cumulative effects arise at this time. These include investigations such as geophysical surveys, test trenching, excavations and building surveys to ensure that any previously unrecorded assets are preserved by avoidance or by record.

Having regard to the location, scale, timing and archaeological context of all relevant developments, as well as the extensive mitigation already secured for nearby solar farms, substations and grid infrastructure, there is no pathway for cumulative cultural heritage impacts to arise in combination with the proposed project. The reviewed projects either lie outside the relevant cultural landscape, have no shared receptors, or have already addressed archaeological sensitivities through preservation in situ or preservation by record. Accordingly, the updated cumulative assessment concludes that the proposed project will not give rise to any significant cumulative effects on the cultural heritage resource.

Table 2-8: Summary of construction phase impacts on cultural heritage sites within 1km of wind farm

Monument No.	Class / Condition	Distance from nearest wind farm elements	Indicative Value	Type of Impact	Quality	Magnitude	Duration	Significance of Impact
CO007-033----	Ringfort (levelled)	960m north of T2 650m west of site entrance	Medium	None predicted	Neutral	n/a	n/a	None
CO007-036001- (RPS 00021)	Country House (Extant)	House is 1.26km north of the site entrance and south end of demesne lands is 650m to north of entrance The nearest turbine (T1) is located 2.1km to the south	Medium	None predicted	Neutral	n/a	n/a	None
CO007-041----	Redundant record	160m southwest of compound	Negligible	None predicted	Neutral	n/a	n/a	None
CO007-042----	Ringfort (levelled)	415m northeast of T1 350m east of access track	Medium	None predicted	Neutral	n/a	n/a	None
CO007-043001-	Ringfort (extant)	430m northeast of T1 380m east of access track	Medium /High	None predicted	Neutral	n/a	n/a	None
CO007-043002-	Moated site (levelled)	500m northeast of T1	Medium	None predicted	Neutral	n/a	n/a	None

Monument No.	Class / Condition	Distance from nearest wind farm elements	Indicative Value	Type of Impact	Quality	Magnitude	Duration	Significance of Impact
CO007-044----	Earthwork (levelled)	800m northeast of T1	Medium	None predicted	Neutral	n/a	n/a	None
CO007-045001- (RPS 0020)	Country house (extant)	840m northeast of compound 1,000m northeast of T1	Medium	None predicted	Neutral	n/a	n/a	None
CO007-045002-	Graveyard (extant)	930m northeast of compound 1,120m northeast of T1	Medium	None predicted	Neutral	n/a	n/a	None
CO007-045003-	Church (partially levelled)	930m northeast of compound 1,120m northeast of T1	Medium	None predicted	Neutral	n/a	n/a	None
CO007-070----	Ring-barrow (partially levelled)	440m northwest of T4	Medium	None predicted	Neutral	n/a	n/a	None
CO007-071----	Ringfort (levelled)	450m north of T4	Medium	None predicted	Neutral	n/a	n/a	None

Monument No.	Class / Condition	Distance from nearest wind farm elements	Indicative Value	Type of Impact	Quality	Magnitude	Duration	Significance of Impact
CO007-072001-	Ringfort (extant)	80m north of Met Mast access track 190m southwest of T5	Medium /High	None predicted	Neutral	n/a	n/a	None
CO007-072002-	Enclosure (partially levelled)	100m north of Met Mast access track 190m southwest of T5	Medium	None predicted	Neutral	n/a	n/a	None
CO007-073----	Mound (extant)	825m southwest of T6	Medium	None predicted	Neutral	n/a	n/a	None
CO007-074----	Enclosure (partially levelled)	360m southeast of T2 370m northeast of T5 80m east of access track	Medium	None predicted	Neutral	n/a	n/a	None
CO007-075----	Fulacht fia (levelled)	260m northeast of T3	Medium	None predicted	Neutral	n/a	n/a	None
CO007-076----	Mound (levelled)	380m east of T3	Medium	None predicted	Neutral	n/a	n/a	None

Monument No.	Class / Condition	Distance from nearest wind farm elements	Indicative Value	Type of Impact	Quality	Magnitude	Duration	Significance of Impact
CO007-115----	Castle – unclassified (levelled)	1,000m south of Met Mast	Medium	None predicted	Neutral	n/a	n/a	None
CO007-135----	Fulacht fia (extant)	250m east of T3	Medium	None predicted	Neutral	n/a	n/a	None
CO007-137----	Castle – unclassified (levelled)	390m southeast of T3	Medium	None predicted	Neutral	n/a	n/a	None
CO007-144----	Bridge (Extant)	1,000m south of Met Mast	Medium	None predicted	Neutral	n/a	n/a	None
CO007-175----	Fulacht fia (levelled)	70m west of substation 170m east of T4	Medium	None predicted	Neutral	n/a	n/a	None
None	North Farmyard (derelict)	200m north of access track	Low	None predicted	Neutral	n/a	n/a	None

Monument No.	Class / Condition	Distance from nearest wind farm elements	Indicative Value	Type of Impact	Quality	Magnitude	Duration	Significance of Impact
None	South Farmyard (derelict)	Existing farm track outside yard wall will form access to met mast	Low	None predicted	Neutral	n/a	n/a	None

Table 2-9: Summary of operation phase impacts on cultural heritage sites within 1km of wind farm

Monument No.	Class / Condition	Distance from nearest wind farm elements	Indicative Value	Type of Impact	Quality	Magnitude	Duration	Significance of Impact
CO007-033----	Ringfort (levelled)	960m north of T2 650m west of site entrance	Medium	None predicted	Neutral	n/a	n/a	None
CO007-036001- (RPS 00021)	Country House (Extant)	House is 1.26km north of the site entrance and south end of demesne lands is 650m to north of entrance The nearest turbine (T1) is located 2.1km to the south	High	Indirect	Negative	Low	Long term (reversible)	Slight
CO007-041----	Redundant record	160m southwest of compound	Negligible	None predicted	Neutral	n/a	n/a	None
CO007-042----	Ringfort (levelled)	415m northeast of T1 350m east of access track	Medium	None predicted	Neutral	n/a	n/a	None
CO007-043001-	Ringfort (extant)	430m northeast of T1 380m east of access track	Medium /High	None predicted	Neutral	n/a	n/a	None

Monument No.	Class / Condition	Distance from nearest wind farm elements	Indicative Value	Type of Impact	Quality	Magnitude	Duration	Significance of Impact
CO007-043002-	Moated site (levelled)	500m northeast of T1	Medium	None predicted	Neutral	n/a	n/a	None
CO007-044----	Earthwork (levelled)	800m northeast of T1	Medium	None predicted	Neutral	n/a	n/a	None
CO007-045001-	Country house (extant)	840m northeast of compound 1,000m northeast of T1	Medium	Indirect	Negative	Low	Long term (reversible	Slight
CO007-045002-	Graveyard (extant)	930m northeast of compound 1,120m northeast of T1	Medium	None predicted	Neutral	n/a	n/a	None
CO007-045003-	Church (partially levelled)	930m northeast of compound 1,120m northeast of T1	Medium	None predicted	Neutral	n/a	n/a	None
CO007-070----	Ring-barrow (partially levelled)	440m northwest of T4	Medium	None predicted	Neutral	n/a	n/a	None
CO007-071----	Ringfort	450m north of T4	Medium	None predicted	Neutral	n/a	n/a	None

Monument No.	Class / Condition	Distance from nearest wind farm elements	Indicative Value	Type of Impact	Quality	Magnitude	Duration	Significance of Impact
	(levelled)							
CO007-072001-	Ringfort (extant)	80m north of Met Mast access track 190m southwest of T5	Medium /High	Indirect	Negative	Low	Long term (reversible)	Slight
CO007-072002-	Enclosure (partially levelled)	100m north of Met Mast access track 190m southwest of T5	Medium	Indirect	Negative	Low	Long term (reversible)	Slight
CO007-073----	Mound (extant)	825m southwest of T6	Medium	Indirect	Negative	Low	Permanent	Slight
CO007-074----	Enclosure (partially levelled)	360m southeast of T2 370m northeast of T5 80m east of access track	Medium	Indirect	Negative	Low	Long term (reversible)	Slight
CO007-075----	Fulacht fia (levelled)	260m northeast of T3	Medium	None predicted	Neutral	n/a	n/a	None
CO007-076----	Mound (levelled)	380m east of T3	Medium	None predicted	Neutral	n/a	n/a	None

Monument No.	Class / Condition	Distance from nearest wind farm elements	Indicative Value	Type of Impact	Quality	Magnitude	Duration	Significance of Impact
CO007-135----	Fulacht fia (extant)	1,000m south of Met Mast	Medium	None predicted	Neutral	n/a	n/a	None
CO007-137----	Castle – unclassified (levelled)	250m east of T3	Medium	None predicted	Neutral	n/a	n/a	None
CO007-175----	Fulacht fia (levelled)	390m southeast of T3	Medium	None predicted	Neutral	n/a	n/a	None
None	North Farmyard (derelict)	200m north of access track	Low	Indirect	Negative	Negligible	Long term (reversible)	Not significant
None	South Farmyard (derelict)	Existing farm track outside yard wall will form access to met mast	Low	Indirect	Negative	Negligible	Long term (reversible)	Not significant

Table 2-10: Summary of construction phase impacts - grid connection and turbine delivery route work areas

Monument No.	Class / Condition	Distance from road	Indicative Value	Type of Impact	Quality	Magnitude	Duration	Significance of Impact
CO007-045002-	Graveyard (extant)	70m to south	Medium	None predicted	Neutral	n/a	n/a	None
CO007-045003-	Church (partially levelled)	80m to south	Medium	None predicted	Neutral	n/a	n/a	None
CO007-048----	Ringfort (levelled)	25m to north	Medium	None predicted	Neutral	n/a	n/a	None
CO007-049001-	Vernacular house (derelict)	10m to south	Medium	None predicted	Neutral	n/a	n/a	None
CO007-049002-	Ringfort (extant)	65m to south	Medium	None predicted	Neutral	n/a	n/a	None
CO007-122----	Church (levelled)	20m to north	Medium	None predicted	Neutral	n/a	n/a	None
None	Water pump encasement	3m to north	Negligible	Direct	Negative	Medium	Permanent	Not significant

Monument No.	Class / Condition	Distance from road	Indicative Value	Type of Impact	Quality	Magnitude	Duration	Significance of Impact
None	Levelled mill site	10m to north	Low	None predicted	Neutral	n/a	n/a	None

2.1.10 Chapter 15: Landscape and Visual

2.1.10.1 Scottish Natural Heritage Guidelines (2012)

The Scottish Natural Heritage (SNH) Guidance relating to 'Assessing the Cumulative Effects of Onshore Wind Farms (2012) identify that cumulative impacts on visual amenity consist of combined visibility and sequential effects. The same categories have also been subsequently adopted in the Landscape Institute's 2013 revision of the Landscape and Visual Impact Assessment Guidelines. The principal focus of wind energy cumulative impact assessment guidance relates to other wind farms - as opposed to other forms of development. This will also be the main focus herein, albeit with a subsequent consideration of cumulative impacts with other forms of notable development (existing or permitted), particularly within the Central Study Area.

> *"Combined visibility occurs where the observer is able to see two or more developments from one viewpoint. Combined visibility may either be in combination (where several wind farms are within the observer's arc of vision at the same time) or in succession (where the observer has to turn to see the various wind farms).*
> *"Sequential effects occur when the observer has to move to another viewpoint to see different developments. The occurrence of sequential effects may range from frequently sequential (the features appear regularly and with short time lapses between, depending on speed of travel and distance between the viewpoints) to occasionally sequential (long time lapses between appearances, because the observer is moving very slowly and / or there are large distances between the viewpoints.)"*

Cumulative impacts of wind farms tend to be adverse, rather than positive, as they relate to the addition of moving manmade structures into a landscape and viewing context that already contains such development. Based on guidance contained within the SNH Guidelines relating to the Cumulative Effects of Wind Farms (2005) and the DoEHLG Wind Energy Guidelines (2006), cumulative impacts can be experienced in a variety of ways. In terms of landscape character, additional wind energy developments might contribute to an increasing sense of proliferation. A new wind farm might also contribute to a sense of being surrounded by turbines with little relief from the view of them.

In terms of visual amenity, there is a range of ways in which an additional wind farm might generate visual conflict and disharmony in relation to other wind energy developments. Some of the most common include visual tension caused by disparate extent, scale or layout of neighbouring developments. A sense of visual ambivalence might also be caused by adjacent developments traversing different landscape types. Turbines from a proposed project that are seen stacked in perspective against the turbines of nearer or further developments tend to cause visual clutter and confusion. Such effects are exacerbated when, for example, the more distant turbines are larger than the nearer ones and the sense of distance is distorted.

Table 2-11 below provides Macro Works' criteria for assessing the magnitude of cumulative impacts, which are in accordance with the SNH Guidelines (2012).

Table 2-11: Magnitude of Cumulative Impacts

Magnitude of Impact	Description
Very High	The proposed wind farm will strongly contribute to wind energy development being the defining element of the surrounding landscape. It will strongly contribute to a sense of wind farm proliferation and being surrounded by wind energy development. Strongly adverse visual effects will be generated by the proposed turbines in relation to other turbines.
High	The proposed wind farm will contribute significantly to wind energy development being a defining element of the surrounding landscape. It will significantly contribute to a sense of wind farm proliferation and being surrounded by wind energy development. Significant adverse visual effects will be generated by the proposed turbines in relation to other turbines.
Medium	The proposed wind farm will contribute to wind energy development being a characteristic element of the surrounding landscape. It will contribute to a sense of wind farm accumulation and dissemination within the surrounding landscape. Adverse visual effects might be generated by the proposed turbines in relation to other turbines.
Low	The proposed wind farm will be one of only a few wind farms in the surrounding area and will be viewed in isolation from most receptors. It might contribute to wind farm development becoming a familiar feature within the surrounding landscape. The design characteristics of the proposed wind farm accord with other schemes within the surrounding landscape and adverse visual effects are not likely to occur in relation to these.
Negligible	The proposed wind farm will most often be viewed in isolation or occasionally in conjunction with other distant wind energy developments. Wind energy development will remain an uncommon landscape feature in the surrounding landscape. No adverse visual effects will be generated by the proposed turbines in relation to other turbines.

2.1.10.2 Department of Environment, Heritage and Local Government (DoEHLG) 'Wind Energy Development Guidelines' (2006)

The aforementioned DoEHLG guidelines provide direction on wind farm siting and design criteria for a number of different landscape types. The main wind farm site and central study area is considered to be located within a landscape that is consistent with the 'Transitional Marginal Landscapes' type. However, there are also some aspects of the 'Hilly and Flat Farmland' landscape type.

The associated guidance that is applicable, with respect to cumulative effects in 'Transitional Marginal Landscapes' type is:

> *"This would have to be evaluated on a case-by-case basis, but great caution should be exercised. The spatial enclosure often found in transitional marginal landscapes is likely to preclude the possibility of seeing another wind energy development. However, should two or more wind energy developments be visible within a confined setting a critically adverse effect might result, depending on turbine height and wind energy development extent and proximity."*

However, it is worth noting that the setting of the proposed project is not within a "confined setting," or anything resembling such. The associated guidance is applicable, with respect to cumulative effects in 'Hilly and Flat Farmland' landscape type is:

> *"It is important that wind energy development is never perceived to visually dominate. However, given that these landscapes comprise hedgerows and often hills, and that views across the landscape will likely be intermittent and partially obscured, visibility of two or more wind energy developments is usually acceptable."*

General guidance in relation to cumulative effects is provided in Chapter 6 of the Guidelines – 'Aesthetic Considerations in Siting and Design'. The most relevant aspect of guidance in this instance is contained in the fourth bullet point, which states:

> *"It is preferable to avoid locating turbines where they can be seen one behind another, when viewed from highly sensitive key viewpoints (for example, viewing points along walking or scenic routes, or from designated views and prospects), as this results in visual stacking and, thus, confusion. This may not be critical, however, where the wind energy development to the rear is in the distant background."*

It should be noted that the Draft Revised Wind Energy Development Guidelines 2019 maintain the above guidance on siting and design.

2.1.10.3 Cumulative Zone of Theoretical Visibility

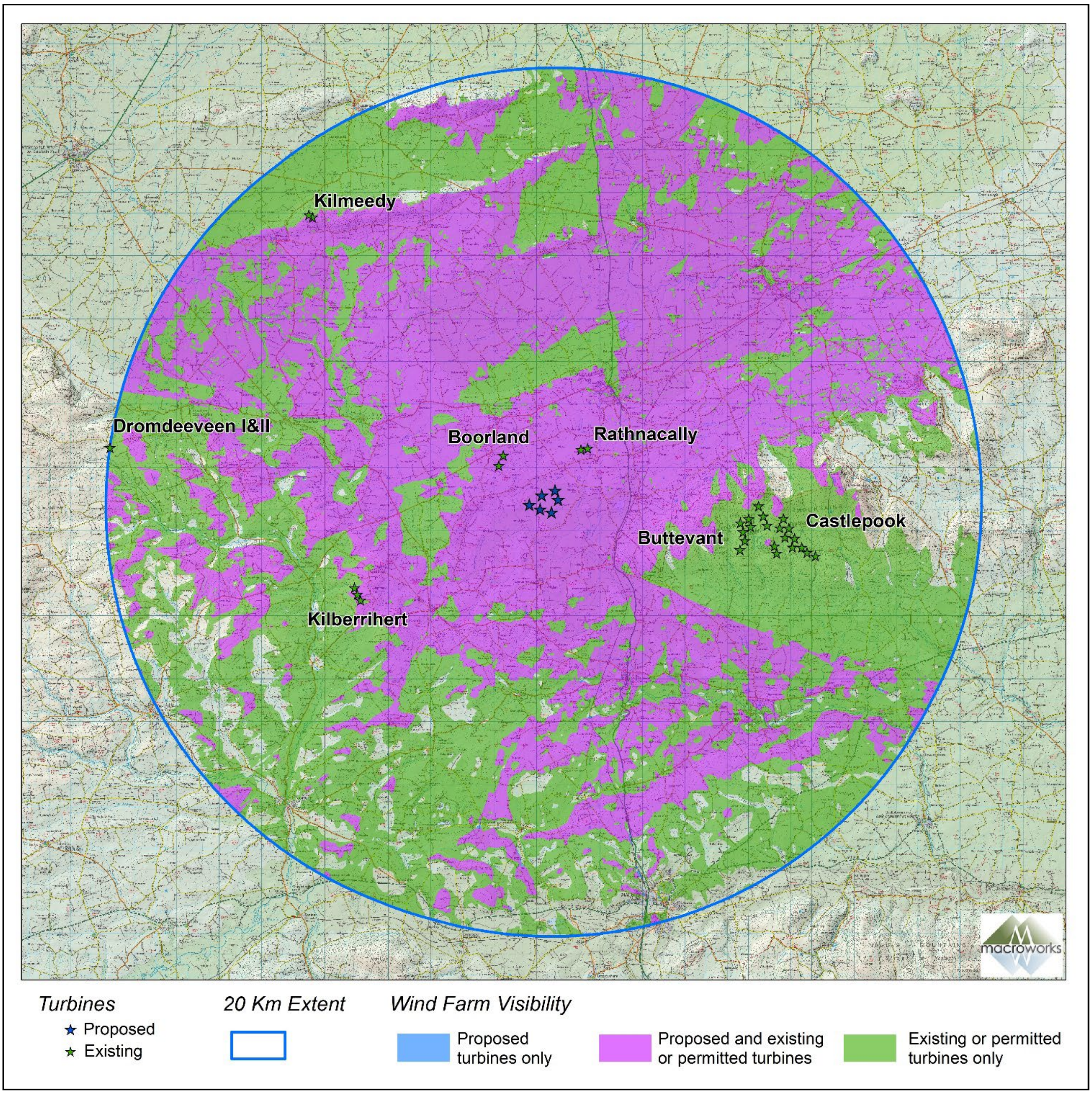

Figure 2-1: ZTV indicating the cumulative theoretical visibility of the proposed project in combination with all other wind farms in the study area.

A cumulative Zone of Theoretical Visibility (ZTV) map has been prepared for the wind energy developments contained within the study area and is included in Appendix 15.2 of the original EIAR.

However, a small-scale version of this map can be seen above, at Figure 2-1.

The cumulative ZTV map indicates the following key points:

- There is a moderate proportion (i.e. 47.4%) of theoretical intervisibility between the proposed wind farm and cumulative wind farms in the study area. This will result in the majority of the study area experiencing no cumulative visibility.
- A modest proportion (i.e. 42%) of the study area will experience theoretical visibility of existing turbines only.
- No part of the study area will have visibility of the proposed Annagh turbines only.
- Approx. 10% of the study area will not have any view of the proposed wind farm or that of any existing wind farms within the study area.

Please note that as the cumulative ZTV map does not account for vegetation screening, it vastly overestimates the potential for intervisibility between these developments, particularly at distances of more than 10-12km from the proposed wind farm.

2.1.10.4 Nature of Cumulative Impact

As part of this application, a comprehensive planning search for large projects in the wider proximity to the site has been completed and is included in appendix 1 of this addendum.

In terms of wind energy developments, there are seven operational wind farms and no known permitted or proposed wind farms contained within the study area. These are set out in Table 2-12 below.

Table 2-12: Cumulative Wind Farms within the study area

Wind Farm Name	Number of turbines	Distance and Direction from nearest proposed turbine	Status
Rathnacally Wind Farm	2	c. 2.3km to the northeast	Operational
Boolard Wind Farm	2	c. 2.5km to the northwest	Operational
Buttevant Wind Farm	6	c. 8.7km to the southeast	Operational
Kilberrihert Wind Farm	3	c. 9.1km to the southwest	Operational
Castlepook Wind Farm	14	c. 9.4km to the southeast	Operational
Kilmeedy Wind Farm	2	c. 17.0km to the northwest	Operational
Dromdeeveen Wind Farm	1	c. 20km to the west	Operational

The appraisal of cumulative impacts with other wind energy developments is based on the cumulative ZTV maps included in Appendix 15.1 of the original EIAR and wireframes provided in Volume 4 of same. Given the absence of other tall structures within the study area, it is considered that there is no potential for in combination effects with other types of development.

The nature of cumulative visibility within the study area is analysed in Table 2-13 below, using the same viewpoints that are used for the main visual impact assessment:

Table 2-13: Nature of cumulative visibility

VRP Ref.	Number of other wind farms in view	Nearer or further than the Proposed project	Combined View (within a single viewing arc - 90°)	Succession View (within a series of viewing arcs from the same location)	Sequential View (view of different developments moving along a linear receptor)
VP1	2	Nearer and further	Yes	-	-
VP2	0	-	-	-	Yes
VP3	2	Nearer and further	Yes	-	Yes
VP4	1	Further	Yes	-	Yes
VP5	1	Further	Yes	-	-
VP6	0	-	-	-	-
VP7	1	Further	Yes	-	Yes
VP8	0	-	-	-	-
VP9	1	Further	Yes	-	-
V10	1	Further	Yes	-	-
VP11	3	Nearer and further	Yes	Yes	Yes
VP12	1	Nearer	Yes	-	-
VP13	1	Further	Yes	-	-
VP14	0	-	-	-	-
VP15	0	-	-	-	-
VP16	1	Nearer	-	-	-
VP17	0	-	-	-	-
VP18	3	Nearer and further	Yes	Yes	-
VP19	2	Similar	Yes	-	-

In terms of non-wind energy developments, there are a number of consented solar farms in close proximity to the site.

The Fiddane/Ardnageehy Solar Farm (ref 226536, 236099 / ABP-320298-24) will be immediately adjacent to the north of the proposed project; the Ballyroe Solar Farm (ref. 204041) will be approximately 1km to the southeast; and the Coolcaum Solar farm (ref. 225681 / ABP-317577-23) will be approximately 0.6km southeast. These solar farms will be connected by an interconnector cable (ref. 225933) and connector to the grid via the Ballyroe Substation (ref. ABP-314431-22).

The adjacent consented Fiddane/Ardnageehy solar farm will be visible in localised views of the proposed wind farm and particularly from VP9, which is from the local road to the northwest of the wind farm site where the solar array will be visible in the immediate foreground. A similar scenario occurs for VP10 which is nearby along the same road, but where the solar farm will not be in the immediate foreground field. Of the nine viewpoints where the bare-ground wireframe images indicate there is potential for intervisibility between either of the solar farms (usually Fiddane rather than Ballyroe), only four (VP3, VP4, VP9 and VP10) have potential for noticeable intervisibility with the proposed project. This is because intervening vegetation tends to screen the solar farm/s in all other cases.

Where the proposed project will be visible in conjunction with the consented solar farms there will be an obvious thematic relationship, being the generation of renewable energy from natural sources (wind, sun), which is positive in perceptual terms. However, they also represent a distinct intensification of built development within a rural setting, albeit of a rural nature, because wind farms and solar farms are synonymous with rural landscapes in Ireland.

In purely visual terms, the two forms of development could barely be more dissimilar in form – one of tall moving, light tone structures and the other a low ground hugging dark tone surface knitted into the field pattern. This contrast of form avoids the likes of visual clutter and ambiguity, whilst also appearing compatible in terms of adjacent or even underlying land uses - much like turbines rising from farmland or forestry. In this respect there is a strong sense of landscape utility, which is one of the key values of productive rural landscapes like this. There will be a stronger sense of the immediate landscape context shared by the proposed project and consented solar farms being transformed into an energy landscape. However, this will be a very localised impact and beyond approximately 500m from the solar farm the landscape character will return to that of a rural landscape that contains a solar development and a wind farm rather than one that is defined by these two forms of renewable energy.

The selected route for the M20 is around 3km to the east at its nearest point. Given the separation distance and its current status, it is not considered that the current preferred M20 alignment will give rise to significant cumulative visual impacts. It will contribute slightly to an overall increase in the scale an intensity of development within the central study area in a landscape character / landscape fabric sense.

2.1.10.5 Cumulative Impact Summary

To begin with, as noted in Section 15.10.3 of the original EIAR, the majority of the study area will experience no cumulative visibility, while approx. 10% of the study area will not have any view of the proposed wind farm or that of any existing wind farms within the study area. Bearing this in mind, using the largely quantitative cumulative analysis outlined above in Section 15.10.4 of the original EIAR, a summary assessment of the nature of cumulative effects is provided hereunder.

Approximately one third (i.e. 6 of 19) of the viewpoints will have no other cumulative wind farms visible within the same viewing context as the proposed project. Of the 19 viewpoints where there will be other cumulative wind farms visible within the same viewing context, 8 viewpoints are likely to experience visibility of just one of the existing windfarms in the study area; three viewpoints are likely to experience visibility of two existing windfarms in the study area and two viewpoints are likely to experience visibility of three existing windfarms. It is worth noting that although there are seven operational wind farms in the study area, no more than three of those are likely to be concurrently visible from any of the 19 selected viewpoints. As an overview, cumulative visibility tends to adhere to two broader categories, although there remains variance from such generalised categories as follows.

The first category tends to be views from within 15km to the southeast, south or southwest of the proposed project, where views of the existing Boolard and/or Rathnacally Wind Farms are experienced in conjunction with the proposed project. As previously stated, both of these existing wind farms are within 2.5km of the nearest proposed turbines, and both possess two turbines each. In instances where cumulative visibility is likely to arise, these turbines appear as a background feature to the proposed turbines, where stacking or visual disharmony or clutter is effectively negligible. Where such cumulative views occur from outside the central study area, it also has the broader visual effect of consolidating wind energy development into one extended lowland realm within the study area.

The second category relates to broader views from the west, northwest, north or northeast of the proposed project. In these instances, views of the more immediate, existing Boolard and/or Rathnacally Wind Farms can be experienced in conjunction with the proposed project, as well as considerably more distant, harder-to-discern ridgeline silhouettes of the Buttevant (Knockatalig) Wind farm, more than 8km from the proposed project.

Section 6.5 of the Wind Energy Development Guidelines 2006 highlight the potential aesthetic issue of turbines from different schemes becoming stacked in perspective, when viewed from “highly sensitive key viewpoints.” However, this does not occur in the case of the proposed project. In addition, atmospheric perspective (i.e. fading of distant objects) also serves to differentiate between the turbines of each development, reducing the likelihood of confusing or cluttered cumulative views of the aforementioned schemes. It is considered that the number of cumulative schemes within the study area is moderate (i.e. seven), with the existing/constructed wind farms containing a moderate number of turbines (i.e. 30 turbines between the seven aforementioned existing/constructed wind farms). Crucially, two-thirds of these (i.e. 20 out of 30 turbines) occur in the distinct geographic anomaly (within the context of the study area) of the Ballyhoura Mountains, which contain a very separate sense of place, landscape fabric and character than that of the wider study area. In that regard, the potential clutter or confusion between such existing upland turbines with those of existing or proposed lowland turbines (set over 8km apart) is highly unlikely to occur.

Overall, the proposed project represents a modest increase in the total number of turbines in the study area (i.e. an increase from 30 to 36 turbines), but not a more disparate dissemination of those turbines within this landscape. However, it is an area where wind energy development is a characteristic and complementary feature of the productive, progressive rural landscape, but without becoming a dominant land use.

Lastly, as referenced in Section 15.7.2.1 of the original EIAR, forest felling will be necessary to accommodate the construction of the proposed turbines, hardstands, crane pads, access tracks and the onsite substation. All forestry that is removed (i.e. 12.6ha) will be subject to forest replanting provisions, which will be provided on a site at Emlagh, Moyasta, Co. Clare. Owing to these replacement lands being outside the study area, there will be no potential for cumulative impacts to arise from the proposed forestry Harvest Management Plan.

However, the potential for cumulative impacts to arise from the proposed replant lands at Emlagh, in combination with any existing, consented or proposed projects in the wider vicinity of those lands needs also to be here addressed. In terms of planning policy context, it should be noted that the replant lands at Emlagh are not within a designated heritage landscape and not within 4km of a designated scenic route. Rather, these lands are within a designated 'Settled Landscape' (i.e. "areas where people live and work") that is also within 'Landscape Character Type' 10 'Flat Estuarine Farmland and Islands.' According to Section 13.3.2.1 of the Clare County Development Plan 2017-2023, such Settled Landscapes "…make up the majority of the County" and "contain the resources of land, soil, minerals and water that are used to sustain the economy" and where forestry is one of the envisaged land uses. In addition, there are multiple semi-mature and mature commercial forestry blocks located within 1km of the Emlagh site, including lands aligning its northern border. Lastly, there are no known existing, consented or proposed projects in the broader vicinity of the site that have the potential for significant cumulative impacts to arise from the proposed forestry Harvest Management Plan.

For the reasons outlined above, it is considered that the cumulative impact is likely Medium in the localised area shared by the proposed project and consented solar farms (Fiddane/Ardnageehy, Ballyroe and Coolcaum). Though it should be noted that there are also some positive thematic associations between the two forms of renewable energy. The magnitude of cumulative effects in respect of other wind farms is deemed to be Medium-low. Thus, significant cumulative impacts are not considered to occur. Overall, it is considered that the proposed wind farm will not contribute to significant cumulative effects in relation to other wind farms and other forms of development.

2.1.11 Chapter 16: Telecoms and Aviation

All known existing and proposed developments within the study area that could potentially generate a cumulative impact with the project during construction, operation and decommissioning were identified and examined as part of this assessment. The full list of projects are contained in Appendix 1 of this addendum. There will be no cumulative impacts relating to the proposed project and surrounding developments in relation to telecommunications or aviation.

During the development of any large project that holds the potential to effect telecoms or aviation, the Developer is responsible for engaging with all relevant Telecoms Operators and Aviation Authorities to ensure that the proposals will not interfere with television or radio signals by acting as a physical barrier. In the event of any potential impact, the Developer for each individual project is responsible for ensuring that the necessary mitigation measures are in place. Therefore, as each project is designed and built to avoid impacts arising, a cumulative impact is unlikely to arise.

Replant lands at Emlagh, County Clare have been assessed cumulatively with respect to telecommunications and aviation. According to Comreg Siteviewer[5], there is no telecommunication infrastructure in proximity to the replant lands site. The closest mast is located approx. 5.5km west at Kilkee. The most proximate airport to the Emlagh site is Shannon, located approx. 42km east of the replant lands site. Due to lack of proximity, the afforestation of the Emlagh site is not expected to have any cumulative effects on telecommunications and aviation with the proposed project.

[5] Comreg Siteviewer. https://siteviewer.comreg.ie/#explore

2.1.12 Chapter 17: Interactions of the Foregoing

Chapter 17 of the original EIAR considers the potential for interactions and inter-relationships between one aspect of the environment and another which can result in an impact being either positive or negative, as well as having varying significance. The chapter considers potential significant environmental effects that may occur in terms of the interaction and inter-relationships of Air Quality & Climate, Noise & Vibration, Biodiversity, Land, Soils & Geology, Hydrology & Water Quality, Population & Human Health, Material Assets, Shadow Flicker, Traffic & Transportation, Archaeology, Architectural & Cultural heritage, Landscape & Visual and Telecommunications & Aviation, as a result of the proposed project as described in Chapter 3 of this EIAR. Direct, indirect, cumulative, and interactive impacts were considered during the siting of the proposed turbines and associated infrastructure in order to minimise impacts on the environmental aspects mentioned above. The interactions and inter-relationships of the potential impacts as set out throughout this EIAR are detailed in this Chapter.

Table 17-1 of Chapter 17 provides a matrix detailing the key interactions and inter-relationships between the key environmental aspects of the proposed project, including the wind farm, grid connection route (GCR) and turbine delivery route (TDR). It is important to note that these have already considered cumulative impacts as some have already been assessed in the potential impact section of each chapter of the EIAR

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APPENDIX 1

Full list of cumulative projects

Development Name/Type	Coordinates (ITM)	Year	Planning Reference Number	Decision	Status	Description	Address	Distance from Project
Solar Farm	**X 552801 Y 616708**	**2022**	**226536**	**Conditional**	**Finalised**	**“Fiddane/Ardnageehy Solar Farm”: Permission to amend the design of the previously approved development (planning reference: Cork County Council 17/5799 & an Bord Pleanála ABP-306915-20)**	**Fiddane Ballyhea Charleville Co.Cork**	**Adjacent**
Solar Farm	**X 551123 Y 619019**	**2023**	**236099 / ABP-320298-24**	**Conditional**	**Finalised**	**“Fiddane/Ardnageehy Solar Farm”: (expansion from a consented 67.8 ha development to a proposed 92.75 ha development) 10 year planning permission for solar farm and underground grid connection and 40 year operation.**	**Fiddane, Cooliney Coolcaum, Ballynoran, Ballynadrideen Ardnageehy, Charleville Co. Cork**	**Adjacent/intersecting boundary**
Solar Farm	**X 551786 Y 617496**	**2022**	**225681 / ABP-317577-23**	**Conditional**	**Finalised**	**“Coolcaum Solar Farm”: A 10 year planning permission for the construction of, and a 40 year operation and subsequent decommissioning of, a development consisting of a 42.6 hectare solar farm**	**Coolcaum Churchtown Mallow Co.Cork**	**0.6 km from site boundary**
Underground Electricity Cable	**X 551786 Y 617496**	**2022**	**225933**	**Conditional**	**Finalised**	**“Interconnector cable between the consented Fiddane, Coolcaum and Ballyroe solar farms”: The installation of two 33kV electricity grid interconnectors with a combined total length of 2,217m of underground cable with a joint bay and 1,146m of over head line supported by 8 triple pole sets and 5 double pole sets, a temporary construction compound and 4 transformer stations.**	**The Townlands of Fiddane, Cooliney, Ballynoran, Coolcaum & Ballyroe, Charleville, Co.Cork.**	**Adjacent/intersecting boundary**
Solar Farm	**X 552801 Y 616708**	**2020**	**204041**	**Conditional**	**Finalised**	**“Ballyroe Solar Farm”: A 10 year planning permission for the development of a 102.76 hectare solar PV farm and 3.425 kilometre underground electricity grid connection (0.34 hectares) giving a total combined area for both the solar farm and underground grid connection of 103.1 hectares.**	**Townlands of Ballyroe, Dromin, Ballynadrideen Ardnageehy, Rathnacally and Clashganniv in Ballyhea Charleville, Co. Cork**	**1.3 km from site boundary**
Substation	**X 552801 Y 616708**	**2022**	**ABP-314431-22**	**Conditional**	**Finalised**	**“Ballyroe Substation”: Ten year permission for the construction of a 110kV ‘Single Bay Tail Fed’ Substation, 110kV Underground Grid Connection (UGC) and all associated works**	**Townlands of Ballyroe, Ballynadrideen, Ardnageehy, Rathnacally and Clashganniv in Ballyhea, Charleville, County Cork**	**1.5 km from site boundary**
Residential	X 551786 Y 617496	2021	215390	Conditional	Finalised	To construct a new garden equipment storage shed with all associated site and ancillary works	Coolcaum, Churchtown, Mallow, Co. Cork	0.6km from Turbine 3
Residential	X 549406 Y 618188	2020	205460	Conditional	Finalised	Retention and completion of an extension to gable end of existing dwelling and permission for construction of a new vehicular entrance.	Ardglass, Charleville, Co. Cork	0.8km from Turbine 2
Residential	X 550579 Y 619511	2020	204273	Conditional	Finalised	To install a septic tank with percolation area and all associated site works.	Milltown, Charleville, Co. Cork	1.6km from Turbine 1
Residential	X 550861 Y 620510	2020	204888	Conditional	Finalised	Construct a two storey/storey and a half style extension to rear of cottage, domestic garage, entrance and a secondary wastewater treatment	Milltown, Charleville, Co. Cork	2.4km from Turbine 1

Development Name/Type	Coordinates (ITM)	Year	Planning Reference Number	Decision	Status	Description	Address	Distance from Project
						system including renovations and alterations to existing cottage and all associated site works.		
Residential	X 548197 Y 619981	2020	206498	Conditional	Finalised	To demolish part of dwelling house and to erect a bungalow type extension with attic development to remaining dwelling house also to decommission existing effluent treatment system and percolation area and install a new waste water treatment unit and polishing filter all within their site.	Boolard, Newtownshandrum, Charleville, Co. Cork	2.8km from Turbine 2
Residential	X 552720 Y 615373	2020	204706	Conditional	Finalised	Retention of detached domestic garage/store, timber store and partial attic conversion to include 2no. rooflights to rear of existing dwelling house. Permission to construct a new single storey extension to rear and side of existing dwelling house.	Ballynageragh, Ballyhea, Co. Cork	2.5km form Turbine 6
Agricultural	X 552030 Y 614490	2019	195540	Conditional	Finalised	Construct a bovine livestock unit with underground effluent storage tank and all associated site and ancillary works.	Ballindillanig, Churchtown, Mallow, Co. Cork	2.7km from Turbine 6
Agricultural	X 548678 Y 620309	2019	196819	Conditional	Finalised	Construction of milking parlour including dairy, plant room, collection yard and slatted tank.	Clyderragh, Newtown, Co. Cork	2.7km from Turbine 2
Residential	X 553086 Y 617929	2018	187048	Conditional	Finalised	Retention of alterations to elevations of existing dwelling house from that granted under planning reference no. 06/9062, retention of 2 number velux style roof lights on rear elevation, also retention of constructed domestic garage and all associated site works.	Ballynadrideen, Ballyhea, Charleville, Co. Cork	2.1km form Turbine 3
Residential	X 552789 Y 615373	2018	186347	Conditional	Finalised	a) construct a rear extension to existing dwelling house, b) entrance, waste water treatment system and all other site works	Ballynageragh, Ballyhea, Co. Cork	2.5km from Turbine 6
Residential	X 552213 Y 619384	2017	176925	Conditional	Finalised	The construction for a new dwelling house with domestic garage, entrance, wastewater treatment plant and percolation area with all associated site and ancillary works.	Farranshonikeen, Ballyhay, Charleville, Co. Cork	1.9km from Turbine 1
Residential	X 553152 Y 617706	2016	166283	Conditional	Finalised	Construction of extension to rear and alterations to existing dwelling house, raising of roof of existing dwelling and alteration to existing window layout on side elevations, installation of Velux style windows to front roof and all associated site works.	Ballynadrideen, Ballyhea, Charleville, Co. Cork	2.7km from Turbine 6
Residential	X 548197 Y 619981	2016	166602	Conditional	Finalised	Retention of as built extension constructed off eastern gable of the original cottage, alterations to the original cottage, relocation of the vehicular entrance point and associated site works (Amendments to permission granted under Planning Reg. No. N/1092/90)	Boolard, Newtownshandrum, Charleville, Co. Cork	2.8km from Turbine 2

Development Name/Type	Coordinates (ITM)	Year	Planning Reference Number	Decision	Status	Description	Address	Distance from Project
Agricultural	X 552620 Y 619157	2016	164520	Conditional	Finalised	Retention for 3 no. attached buildings, concrete yard, boundary walls and associated works and for Retention of Change of Use from agriculture to a paunch manure and de-watered sludge storage faculty. Permission is sought to construct a side extension to this paunch and de-watered sludge facility and to extend the existing concrete yard and boundary walls together with contaminated water collection sump and disposal pipework to adjacent wastewater treatment plant and associated works all on their lands.	Ardnageehy, Charleville, Co. Cork	1.8km from Turbine 1
Agricultural	X 551117 Y 618838	2015	155604	Conditional	Finalised	Retention of 2 no. agricultural structures to include the following: (1) straw bedded calf shed, (2) roofless cubicles and slatted slurry channel, and (B) construction of 5 no. agricultural structures to include the following: (3) straw bedded calf shed, (4) shed over existing livestock handling area, (5) roof over roofless cubicles and slatted slurry flow channel to be retained (see point 2 above), (6) shed over soiled yard, and (7) 1 no. silage pit, along with associated site works. This development is within the curtilage of a Protected Structure (RPS No: 00020)	Cooliney Houe, Cooliney, Charleville, Co. Cork	0.95km from Turbine 1
Substation Cable	X 551123 Y 619019	2019	196817	Conditional	Finalised	Consisting of: Installation of 4,387 metres of underground electricity cable between a proposed solar farm at Fiddane, Ballyhea, Charleville, Co. Cork and Charleville 110kV ESB Substation at Clashganniv, Ballyhea, Co. Cork to be installed entirely under public roads. The underground electricity cable passes through the townlands of Ardglass, Fiddane, Cooliney, Rathnacally, farranshonikeen, Ardnageehy and Clashganniv, County Cork. A Natura Impact Statement will be submitted to the Planning Authority with this application.	Ardglass, Fiddane, Cooliney, Rathnacally, Farranshonikeen, Ardnageehy, Clashganniv, Co. Cork	0.01km from Main Wind Farm Site
Solar Farm	X 552803 Y 616819	2020	204041	Conditional	Finalised	A 10 year planning permission for the development of a 102.76 hectare solar PV farm and 3.425 kilometre underground electricity grid connection (0.34 hectares) giving a total combined area for both the solar farm and underground grid connection of 103.1 hectares. The proposed solar farm will consist of the installation of a 40 year operation and subsequent decommissioning of a series of ground mounted solar photovoltaic (PV) panels, mounted on steel support structures, together with 1 single storey ESB control room, 12 electrical transformation enclosures, underground cabling, inverters, CCTV poles and cameras, deer type security fencing, existing site	Townlands of Ballyroe, Dromin, Ballynadrideen, Ardnageehy, Rathnacally, and Clashganniv in Ballyhea, Charleville, Co. Cork	0.9km from Main Wind Farm Site

Development Name/Type	Coordinates (ITM)	Year	Planning Reference Number	Decision	Status	Description	Address	Distance from Project
						entrance from the L5529 road, access tracks, hardstanding area, landscaping and biodiversity measures and all associated ancillary development works, for the purpose of generating renewable energy electricity. The proposed solar farm is located in the townlands of Ballyroe and Dromin, Ballyhea, Charleville, County Cork. The proposed underground electricity grid connection is to be installed entirely under public roads from the proposed solar farm at Ballyroe to Charleville 110kV ESB substation, which passes through the townlands of Ballyroe, Ballynadrideen, Ardnageehy, Rathnacally and Clashganniv in Ballyhea, Charleville, County Cork. A Natura Impact Statement will be submitted to the planning authority with this application.		
Boolard Wind Farm	X 548173 Y 619110	2017	175292	Conditional	Finalised	Works to connect the permitted Boolard Wind Farm (Reg. Refs. 12/5997 and 15/5521/PL.04.245560) to the existing Charleville 110kv ESBN substation comprising as follows: installation of approximately 5.694 km of 20kv underground electricity cable and fibre communications cable in ducting; 12 no. joint bays, 12 no. communications chambers and 2 no. earth link boxes (all underground); access covers to chambers and boxes at finished surface level; ancillary marker posts and marker plates as necessary; the replacement of an existing concrete pipe with a box culvert under an existing agricultural track and the construction of new parapet walls above the track; and all associated site development and reinstatement works. The development will consist of alterations to permitted wind farm site layout (as per Reg. Ref. 12/5997 and 15/5521 / PL.04.245560) as follows i) widening of permitted vehicular site entrance, ii) provision of 2 no. turning areas/overrun areas for turbine delivery/construction vehicles off the permitted wind farm site road iii) localized realignment and refinement of internal wind farm site road network, iv) increased crane pad size at both permitted turbine locations, and v) also, construction of control building (minor change of location from Reg. Ref. 15/5521/PL.04.245560).	Boolard, Shinanagh, Clyderragh, Cloghanughera, , Killaree, Ardmore, Kiltass, Milltown,, Garrynagranoge, Ballypierce, Clashganniv,, Rathnacally, Charleville, Co Cork.	1.65km from Main Wind Farm Site
Solar Farm	X 549744 Y 617851	2017	175799	Conditional	Finalised	Development of a 67.8 hectare Solar PV Farm. The proposed solar farm will consist of the installation of a 30 year operation and subsequent decommissioning of a series of ground mounted solar photovoltaic (PV) panels, mounted on steel support structures 2.1m in height, together with 1 single storey ESB control room,	Fiddane, Ballyhea, Co. Cork, Co. Cork	0.1km form Main Wind Farm Site

Development Name/Type	Coordinates (ITM)	Year	Planning Reference Number	Decision	Status	Description	Address	Distance from Project
						14 electrical transformation enclosures, underground cabling, CCTV poles and cameras, deer type security fencing, site entrance, hardstanding area, landscaping along part of the northern site boundary and other associated development works, for the purpose of generating renewable energy electricity.		
Underground Electricity Cable	X 552697 Y 620047	2016	166718	Conditional	Finalised	The installation of 458m of 20kV underground electricity cable, to be contained within ducting; ancillary marker posts; and all associated site development and reinstatement works. The works are required to connect the permitted Rathnacally Wind Farm (Pl. Reg. Nos. 12/4446 and 15/5525) to the existing Charleville 110kV ESBN substation.	Rathnacally and Garrynagranoge, Charleville, Co. Cork	2.5km from Main Wind Farm Site
Wind Farm	X 552355 Y 619939	2015	155525	Conditional	Finalised	Construction of control building for wind turbine development (change of plan from that permitted under planning reg. No. 12/4446) to meet new ESB Network standard.	Rathnacally, Charleville, Co. Cork	2.5km from Main Wind Farm Site
Gas pressure unit	X 553339 Y 623045	2017	174136	Conditional	Finalised	The development will consist of the installation of a 3m high 'lamp post' style relief vent stack servicing the existing above ground natural gas pressure reduction unit with all ancillary services and associated site works	The Turrets DRI, The Turrets, Rathgoggan Middle, Charleville, Co.Cork	5.5km from Main Wind Farm Site
Mast	X 561605 Y 617299	2017	175773	Conditional	Finalised	Replacement of an existing telecommunications mast 10m high with one of 18m in height, so as to continue to supply a Broadband and Phone service from existing compound. The existing 7 dishes and 2 antennae will be transported across to the new mast and 8 new dishes will be added to enhance the service. Four of the five cabins on site, will be retained including one for the Limerick Fire Service	Ballyhoura Mountains, Carker North, Ballycoskery, Co. Cork	11km form Main Wind Farm Site
Solar Farm	X 564362 Y 628642	2018	18679	Conditional	Finalised	developing a solar farm on a site located in the townland of Gibbonstown, Kilmallock, Co. Limerick. The proposed solar farm will comprise the construction and operation of solar PV arrays mounted on metal frames on an approx. 20 ha site inclusive of a single electrical control building up to 5 inverter units, a temporary construction area and ancillary facilities, drainage swales, boundary security fence with CCTV units, an access track, all associated works (inclusive of gross floor space of proposed works up to 146 sq. m) and habitat management and enhancement measures. The planning application is accompanied by an environmental report and stage 2 screening for appropriate assessment	Gibbonstown,, Kilmallock,, Co. Limerick.	15km from Main Wind Farm Site

Development Name/Type	Coordinates (ITM)	Year	Planning Reference Number	Decision	Status	Description	Address	Distance from Project
Solar Farm	X 561315 Y 664440	2017	17326	Conditional	Appealed	(for a 10 year permission) development of a solar PV Farm comprising of the installation of a solar PV array consisting of approximately 13.08 hectares of solar panels on ground mounted steel frames, 1 no. single story delivery substation, 4 no. single story inverter/transformer units, drainage swales, underground cable ducts on site, temporary construction compound (including site offices, portable toilets and parking area), boundary security fence, site entrance, access tracks, CCTV and all associated site works, This planning application is accompanied by an Environmental Report, Stage 1 Screening for Appropriate Assessment, Ecology Report, Archaeological Impact Assessment and Photomontages	Ballycullane, Kilmallock, Co Limerick	15km from Main Wind Farm Site
Solar Farm	X 551618 Y 600253	2015	157003	Conditional	Finalised	A 5 MW solar farm comprising approximately 22,200 photovoltaic panels on ground mounted frames within a site area of 15.38 hectares, 2 no. single storey inverter/transformer stations, 1 no. single storey delivery station, security fencing, CCTV and all associated ancillary development works.	Gortnagross, Mallow, Co. Cork	18km from Main Wind Farm Site
Solar Farm	X 551618 Y 600253	2021	214498	Unconditional	Finalised	ENTENTION OF DURATION for A 5 MW solar farm comprising approximately 22,200 photovoltaic panels on ground mounted frames within a site area of 15.38 hectares, 2 no. single storey inverter/transformer stations, 1 no. single storey delivery station, security fencing, CCTV and all associated ancillary development works. - Extension of duration of permission granted under planning reference: 15/7003	Gortnagross, Mallow, Co. Cork	18km from Main Wind Farm Site
Solar Farm	X 537729 Y 600630	2016	164601	Conditional	Finalised	A 5 MW solar farm comprising approximately 22,200 photovoltaic panels on ground mounted frames within a site area of 12.23 hectares, 2 no. single storey inverter/transformer stations, 1 no. single storey delivery station, security fencing, CCTV and all associated ancillary development works	Dromalour, Coolclogh, Kanturk, Co. Cork	20km from Main Wind Farm Site
Residential	X 553803 Y 621705	2021	215518	Refused	Decided	The construction of a residential development of 56 no. units which will consist of the following: - 12 no. 3-bed semi-detached, 14 no. 3-bed end-terrace, 5 no. 3-bed mid-terrace and 9no. 2-bed mid terrace 2-storey dwelling houses along with 16 no. 1-bed maisonettes. Access to the proposed development is to be provided via the existing road serving the adjoining Brindle Hill residential development. Planning permission is also sought for connection to all necessary public services,	Brindle Hill, Rathgoggan South, Charleville, Co. Cork	5km from Main Wind Farm Site

Development Name/Type	Coordinates (ITM)	Year	Planning Reference Number	Decision	Status	Description	Address	Distance from Project
						secure bicycle parking and bin storage, associated landscaping and all ancillary works necessary to facilitate the development.		
Residential	X 552990 Y 622158	2021	215885	Refused	Finalised	The construction of new 45-unit housing development consisting of the following: 26 No. 3-bedroom townhouses, and 19 no. 2-bedroom townhouses, 2 no new vehicular entrances, storm and surface water sewers including attenuation system, public lighting, boundary walls, footpaths, public footpath, open spaces together with all other ancillary site works.	Harrison Place, Rathgoggan Middle, Charleville, Co. Cork	5.2km from Main Wind Farm Site
Residential	X 552932 Y 623271	2021	214872	Conditional	Finalised	A residential development comprising 98 no. residential units, (44 no. semi-detached houses and 48 no. terrace houses and 6 no. one bedroom apartments), and a creche building and all ancillary site development works. Ancillary site development works include connection to the public water main and foul sewer, surface water drainage and attenuation, and access roads, footpaths, vehicle parking, landscaping, boundary treatments and site development works above and below ground.	Rathgoggin Middle, Charleville, Co. Cork	5.8km from Main Wind Farm Site
Waste Water Treatment Plant Upgrade	X 553977 Y 625709	2017	174645	Conditional	Finalised	The development will consist of an upgrade to existing waste water treatment plant. The upgrade works shall include installation of 1 no. anoxic tank, 2 no. aerobic tanks, 1 no. clarifier tank, a cooling tower, chemical dosing tank, splitter tank, polymer dosing kiosk and control room container together with associated plant and pumping systems and all associated site works including earthen berm screening and fencing. The works shall also include the installation of an underground pumped outfall pipeline for the conveyance of treated waste water from the upgraded treatment plant to a discharge point on the River Maigue located approximately 2km north of the waste water treatment plant site. The outfall pipeline shall be routed from a new outfall pump sump within the treatment plant site, extending northwards across agricultural lands in the townlands of Creggane and Garrane in Co. Limerick to the discharge point also located in Garrane, Co. Limerick. (The outfall pipeline installation within Co. Limerick shall be subject to approval of a separate application for planning permission to Limerick City and County Council).	Rathgoggan North, Charleville, Co.Cork	7.5km from Main Wind Farm Site

Development Name/Type	Coordinates (ITM)	Year	Planning Reference Number	Decision	Status	Description	Address	Distance from Project
						The development works relate to an activity for which a revised Industrial Emissions Directive Licence is required.		
Waste Water Treatment Plant Upgrade	X 532007 Y 607604	2016	164597	Conditional	Finalised	Upgrade to the existing waste water treatment plant (WWTP) with proposed plant including balance tank, anoxic, anaerobic and aeration tanks, proposed clarifier tank, Dissolved Air Flotation (DAF) plant, underground effluent pumping station, culverts, control room, filters and concrete plinths. The proposed development will include the demolition of the existing 11 meter bio-tower at the Newmarket Co-Operative Creameries Ltd facility in Newmarket town, Co Cork, within the townlands of Garrannawarrig Upper, Park, Garrannawarrig Lower and Liscongill. Installation of an underground pumped pipeline to convey treated water from the facility to a discharge point on the River Dalua, 4 kilometers to the south east of the facility, utilizing the R576 road corridor, including all necessary pipeline connection, drainage and vent infrastructures. Intensification of use of the existing facility through an increase in the duration of the weekly and annual milk processing period at the Newmarket Creamery resulting in an increase in milk processing up to a maximum of 80 million gallons per annum. These changes will be subject to an amendment by EPA, of the existing site Industrial Emissions Directive Licence. An Environmental Impact Statement and Natura Impact Statement accompany this planning application. The proposed development includes work to Allen's Bridge, a recorded monument under the National Monuments Act and is located within the zone of potential for the historic town of Newmarket which has a Recorded Monument designation.	Scarteen Lower, Garrannawarrig Upper, Park, Garran, Newmarket, Co. Cork	19.5km from Main Wind Farm Site
Mast	X 546413 Y 612545	2018	184049	Conditional	Finalised	Retain a 24 metre high lattice telecommunications support structure (previously granted permission under Pl. Reg. No. 09/6155 which was a temporary permission which has expired) carrying antennae and link dishes together with associated equipment units and security fencing	Sally Park, Knockardbane, Liscarroll, Co. Cork	7.5km from Main Wind Farm Site
Mast	X 546207 Y 612436	2017	176148	Conditional	Finalised	Retention of the existing 18m high telecommunications mast structure together with antennas, dishes and associated cabin, apparatus and security fencing.	Sally Park Td, Liscarroll, Co.Cork	7.8km from Main Wind Farm Site

Development Name/Type	Coordinates (ITM)	Year	Planning Reference Number	Decision	Status	Description	Address	Distance from Project
Mast	X 559744 Y 614866	2017	177356	Conditional	Finalised	Erection of a 1 x 80m permanent meteorological mast for the purpose of collecting meteorological data. The meteorological mast is a lattice structure of 80m height that will be fixed to ground anchors by guy wires.	Streamhill East, Ballyhoura, Doneraile, Co.Cork	9.8km from Main Wind Farm Site
Substation	X 554648 Y 609792	2016	167138	Unconditional	Finalised	Alterations to the existing 38kV Buttevant station comprising of extension to the existing control building, two new transformers T41 and T43, new oil interceptor and associated drainage - Extension of duration granted under Planning Reg. No. 11/5938	Buttevant 38KV Station, Spital, Buttevant, Co. Cork	10km from Main Wind Farm Site
Mast	X 553927 Y 613026	2020	204649	Conditional	Finalised	To construct a 30m multi-user lattice telecommunications support structure, carrying antenna and dishes enclosed within a 2.4 metre high palisade fenced compound together with associated ground equipment cabinets and associated site works.	Kilbroney, Buttevant, Co. Cork	10km from Main Wind Farm Site
Residential	X 555468 Y 630609	2017	17939	Conditional	Finalised	the erection of 6 No. Town houses, 14 No. Semi detached houses, on part of existing foundations (planning ref no. P05/1902) service road, footpaths, and connect to ancillary services	Railway Road,, Main Street, Bruree,, Co. Limerick.	13km from Main Wind Farm Site
Residential	X 543209 Y 607018	2019	194460	Conditional	Finalised	Completion of 7 no. dwelling houses (house nos. 27-33) and the construction of 18 no. dwelling houses (house nos. 34A-48), a storm water attenuation tank and associated site works on part of a residential development permitted under planning Reg. Nos. 03/4127, 06/10199, 07/7341 and 08/5638.	27-48 Garran na Dara, Knockballymartin, Kilbrin, Co. Cork	13.6km from Main Wind Farm Site
Residential	X 560798 Y 627297	2017	17926	Conditional	Finalised	the completion of housing development of 33 No. housing units comprising of 7 No. two storey detached, 14 No. two storey semi-detached, 10 No. single storey semi-detached and 2 no single storey detatched to match existing as part of scheme previously planning permission granted 28/10/04 (Planning Ref. 03/961) and all associated site works	Gortboy,, Kilmallock.	13.8km from Main Wind Farm Site
Mast	X 533287 Y 621908	2020	20754	Conditional	Appealed	the construction of an 18 metre high free standing communications structure with its associated antennae, communication dishes, ground equipment and all associated site development works	Broadford Eircom Exchange, Tullaha, Broadford, Co. Limerick	16.5km from Main Wind Farm Site

Development Name/Type	Coordinates (ITM)	Year	Planning Reference Number	Decision	Status	Description	Address	Distance from Project
Quarry	X 546865 Y 603750	2019	195802	Conditional	Appealed	An extension to the existing limestone quarry and all associated site development and landscaping works in the townlands of Scart, Ballyclough, and Kilgilky South. The proposed extension is 5ha. to the east of the existing quarry and will be accessed via a new access road, to be constructed, to the west of the existing quarry, leading directly onto the L1201-57. The applicant is seeking a 15 year planning permission. The proposed development will include; (1) a change of extraction method to blasting; (2) crushing and screening of aggregates; (3) construction of the new access road and upon completion of this new access road, cessation of use of existing access onto the L5302-12 for quarrying activities; (4) installation of a prefabricated administration office and portable toilet; (5) parking area; (6) wheel wash; (7) weighbridge; (8) covered fuel storage area; (9) entrance signs; (10) lighting; (11) CCTV cameras; (12) a rainwater harvesting tank and (13) new overhead and underground power supply. An Environmental Impact Assessment Report (EIAR) will be submitted to the Planning Authority with the Planning Application. A Natura Impact Statement (EIS) will be submitted to the Planning Authority with the Planning Application.	Scart, Ballyclough and Kilgilky South, Cecilstown, Mallow, Co. Cork	16.2km from Main Wind Farm Site
Mast	X 559466 Y 605968	2020	206049	Conditional	Appealed	To erect a 30m telecommunications support structure carrying antenna and dishes and, together with associated ground equipment cabinets and associated equipment, extension to existing access track and site works within a Coillte forest.	Coillte Forest, Lisnagrough, Doneraile, Co. Cork	16.6km from Main Wind Farm Site
Sewerage Scheme	X 557279 Y 598087	2019	195078	Conditional	Finalised	The alteration of Mallow Sewerage Scheme to remove combined sewer overflows from the network. The proposed scheme will include: 1. The alteration of Mallow Wastewater Treatment Plant to provide for wastewater treatment capacity for 22,000pe (increased from 18,000pe) at Ballyellis, Mallow. The WWTP upgrade will comprise construction of new local pumping station, refurbishment/replacement of inlet works, distribution chambers, alteration of existing tanks, construction of plinths and kiosks, sludge import acceptance unit, sludge tanks, chemical storage tanks, associated pumps, replacement of sludge presses in existing sludge building with centrifuges, all with associated odour control facilities, electrical control panels and kiosks, standby power generation equipment and diesel tank, extensions to existing access roads and all associated site	Mallow WWTP, Mallow Bridge Pump Station,Mallow , Ballyellis,Bearforest Lwr,Ballydahin.Spa Glen, Carhookeal,Quartertown Lower,Castlelands,Annabella, Lackanalooha,Kilknockan	19.5km from Main Wind Farm Site

Development Name/Type	Coordinates (ITM)	Year	Planning Reference Number	Decision	Status	Description	Address	Distance from Project
						development and site excavation works above and below ground. 2. Construction of a new pump station at Bearforest Lower, Mallow, to transfer flows from the network to the WWTP at Ballyellis. The development will contain a foul sump, storm sump, valve chamber, lifting gantries, access stairs, control house with MV Substation, storm tank, interconnecting pipework and chambers, overflow pipework and chambers from storm tank to river Blackwater, twin rising mains to WWTP at Ballyellis, flow meter chambers, odour control equipment, 2.4m high boundary fence, access gate, access roads, hardstanding areas, landscaping and all associated site development and site excavation works above and below ground. Existing pump station to be decommissioned and above ground structure demolished on completion. 3. Upgrade of sections of the sewer network in Mallow comprising construction of pipelines and chambers in fields, public open spaces, roads and footpaths in the townlands of Ballyellis, Bearforest Lower, Ballydahin, Carhookeal, Quartertown Lower, Castlelands, Mallow, Annabella, Lackanalooha, Kilknockan and Spa Glen. Pipelines will include a crossing of the river Blackwater between Castlelands and Bearforest Lower east of Mallow Bridge. A Natura Impact Statement (NIS) will be submitted to the Planning Authority with this application.		
Residential	X 550579 Y 619511	2020	204273	Conditional	Finalised	To install a septic tank with percolation area and all associated site works.	Milltown, Charleville, Co. Cork	<100m from Grid Route
Residential	X550861 Y 620510	2020	204888	Conditional	Finalised	Construct a two storey/storey and a half style extension to rear of cottage, domestic garage, entrance and a secondary wastewater treatment system including renovations and alterations to existing cottage and all associated site works.	Milltown, Charleville, Co. Cork	<100m from Grid Route
Residential	X 551000 Y 620731	2017	176711	Conditional	Finalised	Construct a dwellinghouse and detached domestic garage	Ardmore, Charleville, Co. Cork	<100m from Grid Route
Residential	X 551476 Y 620615	2017	175058	Conditional	Finalised	Construction of 2 storey dwelling house, garage, effluent treatment system, polishing filter, entrance and all associated.	Garrynagranoge, Charleville, Co.Cork	<100m from Grid Route
Residential	X 551747 Y 620501	2020	205664	Conditional	Finalised	To build a garage and all associated site works.	Garrynagranogue, Charleville, Co. Cork	<100m from Grid Route

Development Name/Type	Coordinates (ITM)	Year	Planning Reference Number	Decision	Status	Description	Address	Distance from Project
Agricultural	X 551118 Y 618949	2015	155604	Conditional	Finalised	Retention of 2 no. agricultural structures to include the following: (1) straw bedded calf shed, (2) roofless cubicles and slatted slurry channel, and (B) construction of 5 no. agricultural structures to include the following: (3) straw bedded calf shed, (4) shed over existing livestock handling area, (5) roof over roofless cubicles and slatted slurry flow channel to be retained (see point 2 above), (6) shed over soiled yard, and (7) 1 no. silage pit, along with associated site works. This development is within the curtilage of a Protected Structure (RPS No: 00020)	Cooliney House, Cooliney, Charleville, Co. Cork	<100m from Grid Route
Residential	X 552213 Y 619384	2017	176925	Conditional	Finalised	The construction for a new dwelling house with domestic garage, entrance, wastewater treatment plant and percolation area with all associated site and ancillary works.	Farranshonikeen, Ballyhay, Charleville, Co. Cork	<100m from Grid Route
Agricultural	X 552620 Y 619157	2016	164520	Conditional	Finalised	Retention for 3 no. attached buildings, concrete yard, boundary walls and associated works and for Retention of Change of Use from agriculture to a paunch manure and de-watered sludge storage faculty. Permission is sought to construct a side extension to this paunch and de-watered sludge facility and to extend the existing concrete yard and boundary walls together with contaminated water collection sump and disposal pipework to adjacent wastewater treatment plant and associated works all on their lands.	Ardnageehy, Charleville, Co. Cork	<100m from Grid Route
Solar Farm	X 552801 Y 616708	2020	204041	Conditional	Finalised	A 10 year planning permission for the development of a 102.76 hectare solar PV farm and 3.425 kilometre underground electricity grid connection (0.34 hectares) giving a total combined area for both the solar farm and underground grid connection of 103.1 hectares. The proposed solar farm will consist of the installation of a 40 year operation and subsequent decommissioning of a series of ground mounted solar photovoltaic (PV) panels, mounted on steel support structures, together with 1 single storey ESB control room, 12 electrical transformation enclosures, underground cabling, inverters, CCTV poles and cameras, deer type security fencing, existing site entrance from the L5529 road, access tracks, hardstanding area, landscaping and biodiversity measures and all associated ancillary development works, for the purpose of generating renewable energy electricity. The proposed solar farm is located in the townlands of Ballyroe and Dromin, Ballyhea, Charleville, County Cork. The proposed underground	Townlands of Ballyroe, Dromin, Ballynadrideen, Ardnageehy, Rathnacally, and Clashganniv in Ballyhea, Charleville, Co. Cork	<100m from Grid Route

Development Name/Type	Coordinates (ITM)	Year	Planning Reference Number	Decision	Status	Description	Address	Distance from Project
						electricity grid connection is to be installed entirely under public roads from the proposed solar farm at Ballyroe to Charleville 110kV ESB substation, which passes through the townlands of Ballyroe, Ballynadrideen, Ardnageehy, Rathnacally and Clashganniv in Ballyhea, Charleville, County Cork. A Natura Impact Statement will be submitted to the planning authority with this application.		
Wind Farm	X 552630 Y 620159	2016	166718	Conditional	Finalised	The installation of 458m of 20kV underground electricity cable, to be contained within ducting; ancillary marker posts; and all associated site development and reinstatement works. The works are required to connect the permitted Rathnacally Wind Farm (Pl. Reg. Nos. 12/4446 and 15/5525) to the existing Charleville 110kV ESBN substation.	Rathnacally and Garrynagranoge, Charleville, Co. Cork	<100m from Grid Route
Agricultural	X 550637 Y 618509	2016	165452	Conditional	Finalised	Construction of soiled water/effluent storage tank and walled silage pit with concrete apron	Cooliney, Ballyhea, Co. Cork	<200m from Grid Route
Commercial	X 525598 Y 651216	2017	171014	Conditional	Finalised	for the change of use from a ground floor office to a dental clinic consisting of surgery rooms ancillary offices, reception and waiting areas, staff room and WCs with signage, external plant housing and associated site works	Main Street,Foynes,Co. Limerick	<100m from N2
Residential	X 525506 Y 651268	2018	181097	Conditional	Finalised	construction of a rear extension to existing dwelling and to construct a pitched roof over existing front bay window and porch area and all associated works	Corgrig,Foynes,Co. Limerick	<100m from N2
Residential	X 540035 Y 651849	2016	16764	Conditional	Finalised	construction of a two storey extension to the side of an existing house together with all associated site works	Dromlohan,Kilcornan Co. Limerick	<150m from N3
Residential	X 540035 Y 651849	2021	21623	On Hold	Further Information	an independent living unit/granny flat attached to an existing dwelling	Dromlohan,Kilcornan,Co. Limerick	<100m from N3
Residential	X 540572 Y 652216	2016	161204	Conditional	Finalised	the construction of a dwelling house, entrance, wastewater treatment system and all ancillary site works (Ref No. of Outline Permission 13/374)	Boherboy,Kilcornan, Co. Limerick	<200m from N3
Residential	X 550635 Y 653763	2021	21757	Conditional	Finalised	demolition of two storey extension to rear and outbuildings, construction of single storey extension to rear and detached single storey domestic shed and covered patio to rear, new window to side(east) at ground floor level, new window to side(west) at ground floor level and two new windows to rear at first floor level and all ancillary site works	Ballybrown, Clarina, Co. Limerick	<200m from N3

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Commercial	X 548119 Y 652334	2016	16747	Conditional	Finalised	the construction of (1) two extensions to the rear of the existing public house and alterations of the exterior and interior of the building (2) demolition of two store buildings to the rear and all associated site works	"De Bucket", Ferrybridge, Kildimo	<200m from N3
Road Part 8	X 504168 Y 651980	2019	198000	Pending	New Application	the proposed improvement works will be carried out within the existing 60kph speed limit zone over a length of 750m between L6135 Curraghchase Junction and the L6125 Junction. The improvement works proposed comprise a reduction of the N69 carriageway width to 6.5m over the 750m length of the scheme with a footway installed on the southern side (school side) and kerbing and a grass verge on the northern side of the carriageway. The proposed works also include for the installation of LED public lighting on the northern side of the carriageway, road lining and signage as well as surface water drainage along both sides of the N69 carriageway and pavement improvement works. Accommodation works will be undertaken as required including improvement works in and around the community hub of the national school and GAA club grounds. The implementation of the works proposed will result in a rearrangement of the existing road network in the vicinity of the scheme. Changes to the existing road network will include the reduction of road width to 6.5m over a 750m length and the installation of a kerbed footway abutting the westbound carriageway and kerbing and a verge abutting the eastbound carriageway over the scheme length	Townlands of Killeen, Ballyvogue,, Cowpark, Curraghchase North and Boherboy,, Kilcornan, Co. Limerick.	<200m from N4
Residential	X 551655 Y 641711	2017	171104	Conditional	Finalised	1. demolish existing front porch. 2. demolish lean to garage to side. 3. demolish flat roof extension to rear. 4. construct new storey and a half extension to rear of existing dwelling. 5. carry out internal alterations to existing dwelling including all associated site services and works	Ballybrown,Clarina, Co. Limerick.	<200m from N4
Residential	X 550440 Y 653715	2017	17605	Conditional	Finalised	attic conversion and for the erection of a road side commercial sign for my business premises	Clarina Village,Clarina, Co Limerick	<200m from N4

Development Name/Type	Coordinates (ITM)	Year	Planning Reference Number	Decision	Status	Description	Address	Distance from Project
Commercial	X 550545 Y 653654	2020	20748	Conditional	Finalised	amendments to planning permission 19/792. The amendments will provide for a revised building design and layout, reconfiguration of the retail sales and off-licence area, hot & cold food preparation areas, seating for on-site food consumption, all ancillary visitor toilets, and retail storage together with first floor increase to ancillary office/staff/storage areas. Permission is also sought for any amendments to previously approved site/parking and all associated site works.	O'Sullivans Centra,Ballybrown,Clarina, Co. Limerick	<200m from N4
Residential	X 557652 Y 654270	2016	16452	Conditional	Finalised	the construction of a storey and a half type dwelling house, site entrance, boundary walls, waste water treatment system and associated site works.	Rosbrien, Co. Limerick	<200m from N6
Residential	X 551161 Y 647489	2016	161200	Conditional	Finalised	construction of a single storey extension to the side of existing dwelling and all ancillary site works	Ballygeale, Patrickswell, Co. Limerick	<250m from N7
Residential	X 551898 Y 637830	2016	161065	Conditional	Finalised	for the construction of extension to existing dwelling house, incorporating minor changes to elevational treatment and all ancillary works.	Dohora,Banogue,Croom, Co. Limerick	<250m from N8
Agricultural	X 551996 Y 638140	2019	19116	Conditional	Finalised	the construction of a livestock shed with underground storage tanks, feeding area, dungstead, concrete yards and all ancillary site works	Dohora,Croom, Co. Limerick	<200m from N8
Agricultural	X 551876 Y 638135	2021	21631	Pending	New Application	construction of a poultry house, concrete apron, soiled water storage tank and all associated ancillary site works	Dohora,Croom, Co. Limerick	<200m from N8
Residential	X 554332 Y 619920	2015	155734	Conditional	Finalised	Construction of an extension and external porch and alterations to existing dwelling, construction of a new relocated site entrance to replace existing entrance, construction of a new roadside boundary wall with railings and replacement of the existing septic tank with proprietary treatment unit	Ballyhay Td, Ballyhea, Charleville, Co. Cork	<100m from N9
Commercial	X 554126 Y 619811	2015	156761	Conditional	Finalised	Development to modernise and extend internal office and staff facilities (totaling 218.12sq.m), at a site of 7.692ha, all contained within the building footprint of the existing permitted warehouse development. The proposed development consists of: a) The modernisation and extension of the existing Goods In Office area comprising: -The internal reconfiguration of existing ground floor staff welfare facility block; -The construction of a first floor mezzanine office extension (132.17sq.m) to existing office space to accommodate expended open plan office space and	Lidl Regional Distribution Centre, Ballyhay, Charleville, Co. Cork	<100m from N9

Development Name/Type	Coordinates (ITM)	Year	Planning Reference Number	Decision	Status	Description	Address	Distance from Project
						an office; - The provision of new roof plant, incl. condenser units; and -The provision of 3 no. new windows to east elevation of existing permitted warehouse. b) The extension of the existing Transport and Goods Out Offices area comprising: - The replacement of the existing ground floor Transport Office with a new enlarged Ground Floor Transport Office (36.66.sqm); - The construction of a new first floor Goods Out Office (37.43sq.m) to accommodate an office and a meeting room above the existing ground floor staff welfare facility block; - The construction of a new access staircase and first floor walkway (11.86sq.m) to new first floor Goods Out Office; - The provision of new roof plant, incl. condenser units; - The provision of 1 no. new window to west elevation of existing permitted warehouse. c) All associated site development works above and below ground level. Primary vehicular and pedestrian access to the development will be maintained from the existing site entrance from Local Road L1322.		
Commercial	X 553784 Y 619703	2021	215029	Further Information	On Hold	Retention for the office and toilet at the rear of the existing storage unit and planning permission to build a new pallet warehouse, loading bays, effluent treatment system, polishing filter and all associated site works.	Ballyhea, Ballyhay, Charleville, Co. Cork	<100m from N10.1
Residential	X 553579 Y 619593	2021	215141	Refused	Finalised	Retention of existing extension to side of dwelling, and for existing storage sheds. Permission for the construction of pitched roof in place of existing flat roof and for extension to side of existing dwelling. Also, permission for new septic tank and percolation area and all associated site works.	Ardnageehy, Ballyhea Ballyhay, Charleville, Co. Cork	<100m from N10.2
Agricultural	X 553511 Y 619594	2020	206020	Conditional	Finalised	Permission for retention of modifications to existing field entrance (increasing size of existing entrance) for the use for agricultural purposes.	Ballyhay, Charleville, Co. Cork	<100m from N10.2
Solar Farm	X552803 Y 616819	2020	204041	Conditional	Finalised	A 10 year planning permission for the development of a 102.76 hectare solar PV farm and 3.425 kilometre underground electricity grid connection (0.34 hectares) giving a total combined area for both the solar farm and underground grid connection of 103.1 hectares. The proposed solar farm will consist of the installation of a 40 year operation and subsequent decommissioning of a series of ground mounted solar photovoltaic (PV) panels, mounted on steel support structures, together with 1 single storey ESB control	Townlands of Ballyroe, Dromin, Ballynadrideen, Ardnageehy, Rathnacally, and Clashganniv in Ballyhea, Charleville, Co. Cork	<100m from N10.3

Development Name/Type	Coordinates (ITM)	Year	Planning Reference Number	Decision	Status	Description	Address	Distance from Project
						room, 12 electrical transformation enclosures, underground cabling, inverters, CCTV poles and cameras, deer type security fencing, existing site entrance from the L5529 road, access tracks, hardstanding area, landscaping and biodiversity measures and all associated ancillary development works, for the purpose of generating renewable energy electricity.The proposed solar farm is located in the townlands of Ballyroe and Dromin, Ballyhea, Charleville, County Cork. The proposed underground electricity grid connection is to be installed entirely under public roads from the proposed solar farm at Ballyroe to Charleville 110kV ESB substation, which passes through the townlands of Ballyroe, Ballynadrideen, Ardnageehy, Rathnacally and Clashganniv in Ballyhea, Charleville, County Cork. A Natura Impact Statement will be submitted to the planning authority with this application.		
Substation Electricity Cable	X 551123 Y 619019	2019	196817	Conditional	Appealed	Consisting of: Installation of 4,387 metres of underground electricity cable between a proposed solar farm at Fiddane, Ballyhea, Charleville, Co. Cork and Charleville 110kV ESB Substation at Clashganniv, Ballyhea, Co. Cork to be installed entirely under public roads. The underground electricity cable passes through the townlands of Ardglass, Fiddane, Cooliney, Rathnacally, farranshonikeen, Ardnageehy and Clashganniv, County Cork. A Natura Impact Statement will be submitted to the Planning Authority with this application.	Ardglass, Fiddane, Cooliney, Rathnacally, Farranshonikeen, Ardnageehy, Clashganniv, Co. Cork	<100m from N10.4
Residential	X 552213 Y 619384	2017	176925	Conditional	Finalised	The construction for a new dwelling house with domestic garage, entrance, wastewater treatment plant and percolation area with all associated site and ancillary works.	Farranshonikeen, Ballyhay, Charleville, Co. Cork	<100m from N10.6
Residential	X 550637 Y 618509	2016	165452	Conditional	Finalised	Construction of soiled water/effluent storage tank and walled silage pit with concrete apron.	Cooliney, Ballyhea, Co. Cork	<250m from N10.10
Wind Farm	X: 559596 Y: 616394	2013 & 2015	135885 154019	Conditional	Finalised	Constructed 6 turbine wind farm (150m tip)	Knockatalig, Co. Cork	8.6km east from Main Wind Farm Site
Wind Farm	X: 560447 Y: 617200	2011	114947	Conditional	Finalised	Constructed 14 turbine wind farm (150m tip)	Castlepook, Co. Cork	9.7km east from Main Wind Farm Site
Wind Farm	X: 541366 Y: 613338	2010	105791	Conditional	Finalised	Constructed 3 turbine wind farm (125m tip)	Kilberrihert, Co. Cork	9km south west from Main Wind Farm Site

Development Name/Type	Coordinates (ITM)	Year	Planning Reference Number	Decision	Status	Description	Address	Distance from Project
Wind Farm	X: 529825 Y: 619950	2011	11165	Conditional	Finalised	Constructed 2 turbine wind farm (126m tip)	Kilmeedy, Co. Limerick	16km north west from Main Wind Farm Site
Wind Farm	X: 529825 Y: 619950	2012	127031	Conditional	Finalised	Constructed 14 turbine wind farm (150m tip)	Dromdeeveen I & II, Co. Limerick	20km west from Main Wind Farm Site
Private Turbine	X: 529825 Y: 619950	2012	12281	Conditional	Finalised	Constructed single turbine (27m tip)	Woodfield, Dromcollogher, Co. Limerick	12km north west from Main Wind Farm Site
Boolard Wind Farm	T1: X 548173, Y 619110 T2: X 548400, Y 619587	2012 2015 2017	125997 155521	Conditional	Finalised	Constructed single turbine (27m tip)	Boolard, Shinanagh, Clyderragh, Cloghanughera, , Killaree, Ardmore, Kiltass, Milltown,, Garrynagranoge, Ballypierce, Clashganniv,, Rathnacally, Charleville, Co Cork.	2.36km north west of Turbine 4
Rathnacally Wind Farm	T1: X 552056, Y 619858 T2: X 552373, Y 619918	2012 2015	124446 155525	Conditional	Finalised	Constructed 2 turbine wind farm (150.5 tip) and grid connection.	Rathnacally, Charleville, Co. Cork	2.27km north east of Turbine 1

Existing and Permitted Wind Farms Within 20km of the Main Wind Farm Site considered Cumulatively in Chapter 15: Landscape and Visual

Wind Farm Name	Number of Turbines	Distance and Direction from Proposed Development Site	Status
Boolard Wind Farm	2	1km southeast of site	Existing
Rathnacally Wind Farm	2	2.27km northeast of T1	Existing
Knockatalig	6	8.6km east	Existing
Castlepook	14	9.7km east	Existing
Kilberrihert	3	9km southwest	Existing
Dromdeeveen I & II	14	20km west	Existing
Kilmeedy	2	16km northwest	Existing

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APPENDIX 2

Further Information

FEHILY TIMONEY

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

ANNAGH WIND FARM

FURTHER INFORMATION REPORT

Prepared for: Cork County Council

Cork County Council
Comhairle Contae Chorcaí

Date: November 2022

Core House, Pouladuff Road,

Cork, T12 D773, Ireland

T: +353 21 496 4133 | E: info@ftco.ie

CORK | DUBLIN | CARLOW

www.fehilytimoney.ie

ANNAGH WIND FARM LTD. FURTHER INFORMATION RESPONSE

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

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1. INTRODUCTION: FURTHER INFORMATION RESPONSE

This report is prepared to address the further information (FI) requested by Cork County Council in respect of the Annagh Wind Farm planning application (21/07246). Where necessary it shall be used to identify revisions to the initial EIAR prepared. This report correlates the FI items with the relevant EIAR chapters where necessary highlighting the alterations to the various sections of the EIAR. Elements of the EIAR that are not altered by the response to the FI will not be commented upon as they remain the same.

This overall report is to be read in conjunction with the EIAR submitted and forms part of the EIA process. It is important to note that Section 172(1G) of the Planning & Development Act 2000 (as amended), requires the competent authority in carrying out of an EIA to consider the following:

- The EIAR;
- Any further information furnished to the planning authority or the Board;
- Any submissions or observations validly made in relation to the environmental effects of the proposed development.

In carrying out an EIA the planning authority may have regard to and adopt in whole or in part any reports prepared by its officials or by consultants, experts or other advisers and may attach conditions to the grant as it considers necessary to avoid, prevent or reduce and, if possible, offset the significant adverse effects on the environment of the proposed development.

The planning application was lodged with the Planning Authority, Cork County Council on 02/12/2021. Cork County Council responded to the application with their request for further information dated 04/02/2022.

This Further Information Response provides the wording of each item, followed by our considered response. For clarity throughout the response, the following formats are used:

"*Italic Blue*" = quote from EIAR, AA Screening, NIS, submitted planning documents and appendices;

"*Italic Red*"= proposed alteration to the EIAR, AA NIS, submitted planning documents and appendices;

"*italic*" from all other sources.

2. ITEM 1 - BIODIVERSITY

2.1 Habitats and Species Item 1 (a)

(a) The Planning Authority has very serious concerns with the significant negative effect the development will have on habitats of high ecological value at a local level. The loss of high valued and semi-natural habitats from the site would be contrary to Objective HE 2-3 of the County Development Plan. Therefore, the applicant is requested to submit a revised development design which significantly modifies the footprint of the proposal, reducing the impact on habitats of high ecological value, Adherence to the mitigation hierarchy and 'mitigation by avoidance' of seminatural habitats of high value, and habitats of local importance to biodiversity should be a priority.

Response

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 the Council 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 chosen to take 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.

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."*

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 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 (outlined 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 is legally committed to.

Detailed habitat surveys were carried out, see Section 8.5.1.3 of Chapter 8 – Biodiversity (of the EIAR) for potential impacts. 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 2-1.

Table 2-1: 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 %	*Long-term Moderate Reversible*	Recent origin and predominantly artificial character
Immature woodland	2.58ha	12.6 %	*Long-term Moderate Reversible*	Recent origin and predominantly artificial character
Mixed broadleaved/conifer woodland	2.34ha	31.9 %	*Long-term Moderate Reversible*	Recent origin and predominantly artificial character
Wet grassland	2.19ha	4.4 %	*Permanent Slight*	Some infrastructure will be left in place after decommissioning
Wet grassland [Wet Meadow]	1.08ha	9.6 %	*Permanent Slight*	Some infrastructure will be left in place after decommissioning
Wet grassland/Improved agricultural grassland	0.14ha	1.1 %	*Permanent Imperceptible*	Modified nature and access track will be left in place after decommissioning
Wet grassland/Marsh	0.34ha	8.0 %	*Permanent Not Significant*	Hardstanding left in place after decommissioning and covered with topsoil
Hedgerows WL1	277m	2.3 %	*Long-term Not Significant*	Small proportion of this habitat which will be lost
Treelines WL2	11m	0.4 %	*Long-term Imperceptible*	Small proportion of this habitat which will be lost and localised nature of loss
Hedgerows/Earth banks WL1/BL2	5m	0.5 %	*Long-term Imperceptible*	Small proportion of this habitat which will be lost
Drainage ditches FW4	515m	3.6 %	*Permanent Imperceptible*	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.

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.

2.2 Habitats and Species – Item 1 (b)

(b) The applicant is requested to submit a Habitat and Species Management Plan which shall be prepared having regard to principle of no net loss of biodiversity at a local level. This plan shall include the following:

- *Details of all measures to be taken to protect and enhance habitats of local biodiversity value occurring at the site and the species which utilise the same within the vicinity;*
- *A description of target habitats and range of species appropriate to the site;*
- *Appropriate strategies for maintaining existing and targeted habitats and species;*
- *Information in relation to details of habitat linkages; and continuity of habitat within and outside the site;*
- *Timelines for new planting and habitat creation;*
- *Details of ecological oversight and monitoring which shall include a detailed post construction Mammal and Bird Monitoring Programme which shall be in line with appropriate guidelines.*
- *The plan shall include a map identifying the areas to be managed.*
- *The plan should have cognizance to potential operational impacts on species and habitats as a result of the proposal.*

Response

Please see detailed Habitat and Species Management Plan (HSMP) in Appendix 1. The measures outlined in the Habitat and Species Management Plan are to be undertaken on lands within the control of the applicant.

2.3 Habitats and Species – Item 1 (c)

(c) The applicant is requested to submit an Outline Habitat Reinstatement Plan detailing biodiversity restoration measures to be implemented once operation and decommissioning of the site ceases. This shall include the following:

- *Description of target habitats and range of species appropriate for the site;*
- *Method statement for ground forming, soil preparation and habitat and species establishment;*
- *Details of water (ground and surface) management;*

- *Details of habitat linkages and continuity of habitat within and outside the site;*
- *Selection of appropriate strategies for maintaining or introducing target habitats and species;*
- *Details of ecological oversight.*

Response

Please see detailed Habitat Reinstatement Plan (HRP) in Appendix 2.

2.4 Bats – Item 1 (d)

(d) The planning authority has concerns in relation to the potential impact the proposal will have on local bat populations and considers that the significance of impact to local populations of a number of bat species may have been underestimated. Survey results presented indicate that the proposed windfarm site is an important location for bats, with the proposal site occurring within the core sustenance zone (CSZ) of a number of bat roosts identified, including a maternity roost which is of significant local, if not regional value. A revised impact assessment is required which shall have regard the CSZ of species identified as occurring within the site and the potential impact of loss of habitat, reduction in prey abundance, collision risk and the potential for colony collapse. Cumulative impacts should also be addressed. The revised assessment shall also confirm whether the mitigation measures proposed are sufficient to ensure the avoidance of significant effects on any potentially vulnerable species. Mitigation measures should have cognisance to the resilience and conservation status of bat roosts.

Response

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). The study area is larger than but fully encompasses the proposed wind farm site. 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 considered. Reference to this study area therefore refers to this larger parcel of lands, the location of records / features are also provided in relation to the proposed development where relative to provide context. Walked transects were undertaken within the study area and surrounding local roads at dusk to identify flight paths between nearby roosts and key foraging areas within the study area, see Appendix 3 for full bat survey methodologies. A colony of Leisler's bat was observed from VP1 on 31st August 2021 and 20th May 2022 foraging over the centre-north of the study area c.20 minutes after sunset. A total of five species of bat were recorded within the study area during the walked transects undertaken in 2020 and 2022, namely Leisler's bat, common pipistrelle, soprano pipistrelle, natterer's bat and whiskered bat.

The results of bat roost surveys undertaken within the study area in 2022 noted that two minor pipistrelle roosts were present to the north (outside the site approximately 750m from the closest turbine) of the proposed development. A soprano and common pipistrelle maternity roost is present at the south-east of the study area (approximately 610m from the closest turbine). The proposed development site is within the core sustenance zone (CSZ) of the soprano pipistrelle roosts and most of the proposed development site is within the CSZ of the common pipistrelle roost.

Applying the precautionary principle, the minor pipistrelle roost (not identified to species level) present to the north (outside) of the proposed development site is considered to be soprano pipistrelle. A Leisler's bat spring/ autumn roost is present to the west (outside) of the proposed development site. The CSZ for Leisler's bat is 3km and the colony was observed foraging over the study area c.15- 20 minutes after sunset in May 2020, August 2021 and May 2022, therefore the proposed development site is likely within the CSZ for a roost of this species. Commuting routes into the proposed development site were observed for soprano and common pipistrelle, where they then dispersed to forage along hedgerows, treelines and forestry edges across the site. Small numbers of Leisler's were observed commuting into the north of the study area from a westerly direction. Leisler's bat were recorded foraging over open ground at the centre-north of the study area (within the proposed development site) and also in the shelter of hedgerows, treelines and forestry edges across the study area.

Section 8.5.7 Chapter 8 of the EIAR assesses the cumulative effects of the proposed wind farm.

Section 8.5.7.2 of the EIAR provides details on the developments within the surrounding area and there potential to give rise to cumulative impacts with the proposed development:

The cumulative impacts on bats during the construction phase are outlined in section 8.5.7.6:

Potential cumulative impacts on bats during the construction phase would be as follows:

- *Displacement of populations;*
- *Abandonment of young;*
- *Mortality.*

All wind energy developments within 20 km identified by the planning search are existing wind farms. As such no construction stage cumulative effects are predicted in this regard.

There are two permitted solar farm applications located in close proximity to the proposed wind farm site, Fiddane, Co. Cork located 0.1 km from wind farm (Ref 175799; permitted), and Ballyroe/Rathnacally, Co. Cork located 0.9 km from wind farm (Ref 204041; permitted).

Bat surveys were not completed for the adjacent Fiddane solar farm and assessment was limited to habitat suitability based on a site walkover, in addition to a desktop study. The authors noted that based on the site walkover, common and soprano pipistrelle, Leisler's bat, brown long-eared bat and Natterer's bat could be present, with a possibility of other species including roosting Daubenton's bats. No assessment of potential impacts on bats was included.

Reference to potential tree roost assessments and a bridge emergence survey is made within the EcIA for the Ballyroe solar farm, however no details on the results of these surveys were provided.

Although no assessment of bat activity levels was carried out at these sites, it is considered that these solar developments are unlikely to impact significantly on local bat populations in their own right, due to no direct impacts to bat roosts being identified, and lack of collision risk due to the absence of moving parts at solar PV installations.

There is an additional undecided solar farm application, Coolcaum, Co. Cork located 0.6 km from the wind farm (Ref 225681; undecided). The enhancement of hedgerows to provide additional screening for solar farm can result in a positive effect to these corridor habitats for bats. Installation of panels creates minimal disturbance to the ground and the installations are stationary once operational so there is negligible collision risk.

Therefore, habitat loss and disturbance during all stage of these projects will be limited, and no cumulative effects the conclusion in the EIAR still stands.

Considering that no construction-stage impacts are identified for the nearby permitted solar farms, and that all wind farms within 20 km are existing developments, a Long-Term Imperceptible Cumulative Impact is predicted for bats.

The M20 Cork to Limerick Road Improvement Scheme is currently at the route selection stage (stage 2 of the process). If this project proceeds, the route selection corridor is located 2-4 km east of the proposed site. If construction occurred in parallel with the proposed development, cumulative impacts on bat habitats could occur.

As noted in section 8.5.7.3 of the biodiversity chapter 8 of the EIAR:

Intensive grassland management is prevalent in parts of the main wind farm site and is the dominant land use in along the GCR. The diversity of flora within the habitats has been reduced dramatically by drainage, reseeding, fertilisation and intensive grazing by cattle. The main potential impact would be an increase in nutrient levels of local watercourses. There is potential for the proposed wind farm to contribute to a cumulative impact on water quality in drains within the site and local watercourses further downstream of the site, through the potential for sediments and other pollutants entering the watercourses as a result of felling, construction activities in addition to ongoing farming operations.

As noted in section 8.5.7.4 of the biodiversity chapter 8 of the EIAR:

Forestry is one of the main land uses within the main wind farm site and is relatively common but not co-dominant within the greater area. Mixed broadleaved woodland plantation is the most dominant habitat within the proposed site boundary. Impacts often associated with forestry on the local environment are habitat loss, habitat alteration and potential reduction in water quality. It is noted that the plantations onsite are broadleaved and that the associated drains do not discharge directly to watercourses, reducing the potential for negative impacts (compared for example to conifer plantations in upland environments).

As noted in section 8.5.7.5 of the biodiversity chapter 8 of the EIAR:

The Awbeg arterial drainage district encompasses the upper Awbeg catchment, including sections of streams/rivers within and adjacent the proposed site. As Cork Co. Council are technically obliged by the OPW to 'maintain' channels within the arterial drainage district, if maintenance proceeded (works such as dredging, removal of woody debris, vegetation clearance), cumulative effects in could occur in combination with the proposed project. Such effects could occur in parallel (if activities were carried out concurrently), or through overlap of persistent effects. It is noted however that no programme of maintenance is currently in place.

The felling of forestry, ongoing agricultural land management practices and arterial drainage in the greater area has the potential to result in cumulative effects if they occur in parallel with the construction phase of the proposed development. Impacts could occur due to habitat loss, habitat alteration reducing potential foraging habitats, roosting habitat and corridors for movement. An impact to water quality could result in cumulative effects to bats that forage on aquatic insects along watercourses e.g. Daubenton's bat.

The cumulative impacts on bats during the operational phase are outlined in section 8.5.7.7:

Potential Cumulative impacts on Bats during operation would be as follows:

- *Mortality;*
- *Reduction of local populations.*

No bat surveys were undertaken for the nearest wind farm, Rathnacally wind farm (2.27 km Northeast), as indicated by planning documents for this project.

Bat surveys including a daytime habitat/roost assessment and a nocturnal bat activity survey were completed for the 2-turbine Boolard wind farm (2.36 km Northwest) planning application. The species recorded onsite were primarily Common and Soprano Pipistrelle, while lower activity was recorded for Leisler's bat, and Brown Long-eared and Natterer's bats were recorded in association with woodland at a ring fort. No bat roosts were observed. A buffer zone of 50m between woodland/hedgerows was specified to mitigate turbine collision and barotrauma risk.

Bat activity surveys were undertaken on three occasions for Knockatalig wind farm (8.6 km East). No bats were recorded, and the habitats at the site (conifer plantation, upland heath and bog) were assessed as being sub optimal for bats.

No bat surveys were carried out for Castlepook wind farm (9.7 km East), and no mention of bats is made in the associated EIS.

No planning documentation for Kilberrihert wind farm (9 km Southwest) is publicly available online. The planning file indicates an EIS was submitted.

An EIS was prepared for Kilmeedy wind farm (16 km Northwest), however this is not available online. Reference is made in the planning report to the EIS noting the presence of derelict buildings at the site which could be used by rooting bats. The planning report also noted that further bat surveys were recommended in the EIS. Other documentation refers to this recommendation meeting with approval, but no further information is available online.

The planning file for Dromdeeveen I & II wind farms (20 km West) indicates an EIS was submitted, however this is not publicly available online.

The single private turbine (12 km Northwest) was a retention application. The planning file contains no reference to ecological surveys being undertaken for this application.

As surveys were not undertaken for Rathnacally wind farm, and limited surveys were carried out for Boolard, the assessment of bat activity levels is not strictly objective as the Ecobat analysis tool was not used as standard practice when these applications were submitted. However, when the locally observed patterns of activity, species composition, nature of the sites, proximity and ecological connectivity are considered cumulatively, cumulative impacts to bats during the operational phase could give rise to a Long-Term Moderate Cumulative Impact prior to mitigation.

Due to the limited information on bat activity available for the more distant wind farms and the fact the Ecobat analysis tool was not used as standard practice when these applications were submitted, it is not possible to carry out a strictly objective analysis.

However, when the patterns of activity, species composition, nature of the sites, distance between these sites and the proposed wind farm, and limited ecological connectivity are considered cumulatively, the potential for effects is very low. Therefore, cumulative impacts to bats during the operational phase would be a Long-Term Imperceptible Cumulative Impact for these more distance wind farms.

The cumulative impacts on bats during the decommissioning phase are outlined in section 8.5.7.8:

The potential cumulative effects during decommissioning are considered to be the same as those described for the construction phase of the proposed development.

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 Code[1] away from the proposed turbine locations will have a positive effect on invertebrates and, in turn, bats and other wildlife. Specific bat box recommendations are included within the Habitat and Species Management Plan. 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.

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.

[1] National Biodiversity Data Centre (2021) Pollinator Friendly Planting Code. All-Ireland Pollinator Plan 2021-2025. www.biodiversityireland.ie/pollinator-plan.

2.5 Badgers - Item 1 (e)

(e) *The applicant is requested to quantify the loss of Badger territory/habitat associated with the social group recorded within the proposed development site and provide an assessment of the potential impacts on the group in the short to long term. This assessment should take into consideration cumulative impacts associated with the loss of habitat from other developments (recent and under consideration) in the area.*

Response

There will be some loss of potential badger foraging habitat due to the development, see Table 2-2:

Table 2-2: Badger habitat loss

Foraging potential	Habitats	Area of habitat to be lost - percentage loss of each habitat type
Primary	Semi-natural and improved agricultural grassland fields within and surrounding the site.	5.97ha -27.8%
	Grassy verges along hedgerows within the site.	0.1ha – 1.1%
	Sections of broadleaved and mixed broadleaved/conifer woodland with an open understory.	7.47ha – 12%

Sections of agricultural fields and plantation woodland will be lost within the proposed footprint. As such there shall be long-term loss of foraging areas within the site. However, the proposed felling buffers will provide alternative foraging habitat and some extent of the existing grassland lost will recover post construction along track verges. Additionally, there is extensive comparable grassland habitat in the surrounding landscape.

A total of eight setts are located in areas which may be impacted, directly and/or indirectly by the proposed development. Details on the location and status of badger setts are included in the confidential badger report. Setts at dispersed locations showed signs of recent activity when surveyed on 6th May 2021, indicating a family group making use of a network of setts. As no latrines (which indicate territorial boundaries) were observed, the area is occupied by a single-family group. Of these eight setts, there is one main sett (active), one annex/ main sett (active), four annex (two active and two inactive), one subsidiary sett (inactive), and one outlier (inactive). One of the active annex setts within the footprint of a proposed turbine felling buffer will need to be destructed under licence and will be directly lost. An artificial sett will be constructed in an adjacent area within the site boundary and ownership boundary of the relevant landowner 6 months in advance of any proposed works. The remaining setts require buffer zones, or temporary hard / soft blocking during felling works / construction (under licence), but these setts will remain post-construction. One inactive outlier sett and one active annex / main sett will be hard blocked before construction works. Active entrances will have one-way gates installed (plus proofing around sides of gates) to allow badgers to exit but not to return. Exclusion measures will not be carried out to active setts during the breeding season (December – June inclusive). Disused setts or setts verified as inactive will be soft blocked for a minimum of five days, and if they remain undisturbed, they will be hard blocked. Hard blocking will be removed post-construction.

One inactive annex and one active main sett will be hard blocked during turbine buffer felling. Once felling works are completed, these setts may be re-opened. No works will be undertaken within 50m. Fencing shall be installed around the perimeter of the area of works to discourage badgers from utilising the area. There is the potential for disturbance to badger setts within and in close proximity to construction works. As such, the as stated in section 8.5.1.4 *the potential exists for a Medium-term Significant Reversible Impact (prior to mitigation). without mitigation*.

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. A report detailing evacuation procedures, sett excavation and destruction, and any other relevant issues was submitted to the NPWS.

There are eight operational wind farms, closest 2.27km northeast of the site, and no proposed or permitted wind farms within 20 km of the proposed development. As these are already operational, no cumulative effects are envisaged for badger.

There are two permitted solar farm applications located in close proximity to the proposed wind farm site, Fiddane, Co. Cork located 0.1 km from wind farm (Ref 175799; permitted), and Ballyroe/Rathnacally, Co. Cork located 0.9 km from wind farm (Ref 204041; permitted). There is an additional undecided solar farm application, Coolcaum, Co. Cork located 0.6 km from the wind farm (Ref 225681; undecided). Installation of panels creates minimal disturbance to the ground. Therefore, habitat loss and disturbance during all stages of these projects will be limited, and no cumulative effects are envisaged in this regard.

The M20 Cork to Limerick Road Improvement Scheme is currently at the route selection stage (stage 2 of the process). If this project proceeds, the route selection corridor is located 2-4 km east of the proposed site. If construction occurred in parallel with the proposed development, cumulative impacts on badger habitats could occur.

Intensive grassland management is prevalent in parts of the main wind farm site and is the dominant land use along the GCR. Forestry is one of the main land uses within the main wind farm site and is relatively common but not co-dominant within the greater area. There is potential for felling and construction activities at the wind farm site to act cumulatively with other agricultural forestry activities in terms of habitat loss and disturbance to badger. However, due to the proposed mitigation measures which will be carried out under licence, such as temporary blockings of setts, creation of artificial setts and buffer zones, disturbance to badger as a result of the proposed development will be minimised. Habitat loss will also be minimised through the measures outlined in the HSMP, Appendix 1, which will enhance the existing intensive agricultural and forestry land within and adjacent to the site for badger through grassland management, meadow planting, repair and enhancement of existing hedgerows, removal of conifer plantation and riparian planting as well as the development of artificial ponds and insect shelter habitats which will food sources.

However, at stated in the section 8.7.4 of the EIAR *the implementation of mitigation measures will reduce residual impacts to Long-term Imperceptible Negative Reversible Impacts in the local context.*

2.6 Badgers – Item 1(f)

(f) *The applicant is requested to provide any information pertaining to correspondences with the NPWS in respect of derogation licenses required to facilitate the proposal.*

Response

A confidential badger report was submitted to NPWS for a badger derogation licence/ disturbance consent application on 30th November 2021, prior to lodging the planning application seeking consent for the Wind Farm. No response was received. The wildlife licencing unit was called on 12th October 2022 for an update, but they have had no response from the district conservation officer since forwarding them the report on 01st December 2021. A request for the wildlife licensing unit to bring this application to the DCO's attention again and forward it on to the NPWS scientific unit was made during this call.

Consultation was requested with the local NPWS ranger 30th September 2021, however the ranger stated they would not be able to discuss this application due to staffing issues on their side.

2.7 Hen Harrier – Item 1 (g)

(g) *The applicant is requested to provide information in relation to known existing and historic Hen Harrier nest and winter roosting sites relative to proposed development site. Data may be submitted as a confidential report if there are relevant issues of concern relating to the locations arising.*

Response

Ornithological surveys were completed over two years from winter 2019 to summer 2021 consisting of VP surveys, transect surveys, hinterland surveys as well as targeted species surveys for barn owl, woodcock, nightjar and kingfisher, detailed in Section 8.2.3.5 of Chapter 8 – Biodiversity of the EIAR. Hen harrier was a target species for this site. Surveys for Hen Harrier breeding and roosting sites were also carried out within 10km of the proposed Wind Farm, fulfilling and exceeding the requirement set out in SNH Guidance (2017). The SNH (2017) guidance notes that for Raptors '*Any roost sites within 2km of a proposed wind farm site should be Identified*'.

Information arising from the NPWS data request included notification of four confirmed hen harrier breeding sites within 5-10 km of the main wind farm (2015) and four confirmed and three possible hen harrier breeding sites in the same area in 2010. The 10 km buffer also intersects one of nine non-designated but regionally important breeding areas for hen harrier (Ballyhoura Mountains), as established in the 2015 National Hen Harrier Survey.

Hen harrier were not recorded during the summer 2019 or 2020 surveys. One ringtail hen harrier was recorded in January 2021, flying below the rotor-swept height band. There were two sightings of hen harrier in the winter period of 2020, the first on October 14th flying below rotor swept height band. The second was a ringtail on 18th December, flying low and appearing to go to ground within the buffer zone, a short distance to the west of the met mast. Subsequent dusk surveys throughout the winter season confirmed the site is not a habitual roosting location for Hen Harrier. There is no indication the species breeds on site or uses the site as a habitual winter roost. No regular roosting sites were observed in the study area.

No observations of hen harrier were recorded during hinterland surveys, including searches of the Ballyhoura mountains. This species is considered to be present in the 10km grid square encompassing the wind farm site.

However, this 10km grid square also encompasses the Ballyhoura Mountains a non-designated (not an SPA) but regionally important breeding area for Hen Harriers.

Additional winter ornithological surveys were completed in the winter 2021/2022, see Appendix 4 for full report. Vantage Point (VP) surveys carried out at the site from October 2021 to April 2022 (inclusive) involved carrying out 2 x 3-hour watches at each VP every month. A portion of dawn and dusk surveys were carried out during this period to note the potential movement of hen harrier to and from roosting site if present. Two VPs were visited each month, with an additional two VPs added in February 2022 to monitor whoopers swans some 1.3km to the south of the closets turbine. Surveys efforts were doubled in February and March 2022. The wintering birds surveys, based on existing BTO guidance (BBS or CBS; Bibby *et al*, 2000), comprised a total of three no. c. 1 km transects which were selected and centred on different habitats present within the subject sites. Hinterland surveys, following I-WeBS (Irish Wetland Bird Survey) methodology (Lewis et al, 2019) and Raptors: a field guide to survey and monitoring (Hardey et al. 2013), were carried out in suitable woodland, heath, rough grassland and wetland habitats in the area surrounding the proposed wind farm site. Nocturnal activity surveys were programmed to record non-stop from civil dusk to civil dawn (as ascertained from: timeanddate.com) between March 2nd 2022 and April 13th 2022, totalling 42 nights.

During the extensive survey effort, no hen harrier were recorded onsite during winter 2021/2022 surveys. During hinterland surveys, a single hen harrier was recorded once on the 30th March 2022 at the Ballyhoura Mountains SAC (8.2km from the closet turbine). This distance is significantly greater than the core foraging range for the species (2km) and the upper end of the maximum foraging range (10km). The lack of records of the species of the 2.5 years of surveys would indicate that the site is not of high value for the species.

The findings of the 2021/2022 winter survey, reconfirm the finding of the EIAR.

Section 8.7.6 – Chapter 8 Biodiversity

It is considered that with the implementation of mitigation, the proposed wind farm development will have a Slight-Imperceptible Reversible Residual Impact on birds.

3. ITEM 2 – APPROPRIATE ASSESSMENT

3.1 Blackwater River (Cork/Waterford) SAC – Item 2 (a)

(a) It is noted that Turbine T03, Turbine T05 and the access track to the proposed met mast are located within an area classified as at risk of flooding (LAP Flood Risk Zones A & B). Applicants are requested to provide assessment of the implications of works on the nearby waters of the Blackwater River SAC and its associated qualifying habitats and species. This should include an assessment of the following:

- *Impacts of loss of floodplain on natural hydrological processes on watercourses;*
- *Potential for increased risk of surface/ground water pollution;*
- *Details of proposed mitigation to address identified impacts;*
- *Assessment of the likely success of proposed mitigation;*
- *Assessment of potential for the development adverse effects on the integrity of the Blackwater River (Cork/Waterford) SAC*

Response

In response to item 2(a):

Please note that the following response is a summary of information found in the EIAR and does not change the conclusions and findings of the EIAR. Some additional text has been added to clarify the information in the context of the request for further information.

While the area in which the Proposed Development is located has been classified as at risk of flooding in the Local Area Plan (LAP), a site-specific flood risk assessment (FRA), presented as Appendix 10.2 of the EIAR, found that flood risks at the site are considered to be low.

A hydraulic capacity assessment was carried out in Section 6 of the FRA. The capacity was determined at four locations, identified as part of the site inspection. It was determined that the Oakfront Stream does not overtop at these locations for extreme flood events (1%AEP and 0.1%AEP).

With regard to "*Impacts of loss of floodplain on natural hydrological processes on watercourses*"*:* FT do not anticipate any significant impacts due to loss of floodplain.

While made ground surfaces constructed at the site (foundations for each turbine, substation, local hardstanding around each turbine, crane pads and access roads) may increase run-off and affect the existing hydrological processes at the site, the total footprint of these construction areas (9.03 ha) will be proportionately low relative to the footprint of the surrounding sub-basin areas (3853 ha) which will remain as existing.

As described in section 10.4.2.1 of the EIAR, a comparison of the Rational Equation (RE) for peak run-off pre-construction versus peak run-off post-construction indicated that the significance of the effect on the increase in runoff is "Not Significant" on receiving waters because the estimated increase in the peak runoff is low compared to the flows of receiving waters, and not being concentrated at one point. It is important to note that the impact is deemed not significant even before any mitigation measures are implemented. The mitigation measures will further reduce impacts.

As detailed in 10.6.1 of the EIAR, it is not expected that overland flows will be obstructed to any great extent by the drainage layout. However, at the locations set out in the planning drawings, interceptor drains will collect overland flows on the upslope side of the access tracks and hardstanding areas.

Collected water will be carried under wind farm infrastructures by cross drains. The overland flow will then discharge diffusely on the downslope side over vegetated areas within the site boundary. A Sustainable Drainage Systems (SuDS) design approach shall ensure that existing drainage patterns shall be maintained throughout the site.

As detailed in 10.6.2 of the EIAR, road drainage will be over the edge, where the surface runoff will be collected in swales. Swales will be connected to settlement ponds at the end of the swale. Water will ultimately percolate to ground, or travel overground and be assimilated into the existing drainage network within the boundary of the proposed development at appropriate greenfield run-off rates. There will be no direct discharges from the wind farm to any existing natural watercourse. The settlement ponds will be designed to provide sufficient retention time and a low velocity environment to allow suspended solids of a very small particle size to fall out of suspension prior to allowing the water to outfall to the receiving environment. The locations of settlement ponds are illustrated on the drawings submitted with the planning application.

With regard to "*Potential for increased risk of surface/ground water pollution"* and *"Details of proposed mitigation to address identified impacts":* FT do not anticipate any significant impacts to these receptors, following the implementation in full of the mitigation measures outlined in Section 10.7 of the EIAR and section 4.4 of the NIS.

The pollutants of potential concern, associated with the Proposed Development, are:

1. Silt/sediment/suspended solids;
2. Hydrocarbons;
3. Contamination from wastewater and pollutants;
4. Cement-based products;
5. Pollution associated with tree-felling operations.

FT have considered each of the pollutants of potential concern and proposed mitigation measures for each, as set out in Section 10.7 of the EIAR and section 4.4 of the NIS. FT do not anticipate any significant impacts from the above pollutants, as the proposed mitigation measures will be implemented in full.

The mitigation measures proposed as set out in the EIAR are as follows (See Appendix 5 for the full Schedule of Mitigation Measures):

Mitigation measures protecting against silt/sediment/suspended solids

- The 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) that will be implemented to retain and treat the discharges from hard surface areas as a result of the development will reduce any risk of flooding downstream. Dimensions of these ponds are given in the drawings ref. P2359-0501-0004 and P2359-0501-0005 in Appendix 6.

- It is proposed to divert an existing field drain as stated in Section 10.6.7 of the EIAR. The diversion of the field drain will take place during a dry period. Double silt fences will be put in the drain just upstream and downstream of the diversion area. Prior to construction a small stone dam will be constructed within the ditch to prevent water ingress. Clean water accumulated upstream of the 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 damns 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 to set out the monitoring programme in more detail.
- 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:
    - >10 mm/hr (high intensity local rainfall events).
    - >25 mm in a 24 hour period (heavy frontal rainfall lasting most of the day).
    - >half monthly average rainfall in any 7 days.
- Prior to works being suspended the following control measures will be completed:
    - Secure all open excavations.
    - Provide temporary or emergency drainage to prevent back-up of surface runoff (e.g. dewatering of locally flooded depression by means of a submersible pump and hosing).
    - Avoid working during heavy rainfall and for up to 24 hours after heavy rainfall events to ensure drainage systems are not overloaded.

Mitigation measures protecting against hydrocarbons

- Refuelling of plant during construction will only be carried out at designated refuelling 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 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.

Mitigation measures protecting against wastewater and pollutants

- Portaloos 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 C532, C648 and C741 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 Maigue 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.

Mitigation measures protecting against 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.

Mitigation measures protecting against pollution associated with tree-felling operations

- Before operations commence, a 10m wide exclusion zone will be identified along the edge of all aquatic zones
- It will be ensured that all construction staff are aware of exclusion zone
- Machine traffic and timber stacking will not enter 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 will 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, trees will be felled away from water bodies.
- Regarding aquatic zones, banks will remain undisturbed. No branches or debris will be allowed to enter the aquatic zone during operations. Any branches that do fall in will be removed immediately and with care.
- Minimise the crossing of drains with forest harvesting machinery during felling and extraction and restrict machine activity to brashed extraction racks and haulage routes.
- Where this will be 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 this will be required, a solution for smaller drains is to temporarily lay log sections lengthways into the channel and overlay with brash. Again, logs will be selected that approximate the depth of the channel to be crossed.

- When installing and removing the temporary crossing, it will be ensured that no work is carried out within the aquatic zone, and that the stream bed and bankside remain undisturbed.
- Temporary crossings will be removed as they become no longer needed. Any brash padding used will 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.
- 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 retained for possible inspection.
- 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.

With regard to the "*Assessment of the likely success of proposed mitigation*": FT respectfully submit that the proposed water monitoring programme will ensure that designed mitigation measures are performing as required, 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. A review of the programme of works will be used to identify which recent works item may have been the likely source of the turbidity and the methods will be amended to reduce the risk of siltation.

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

Table 3-1: Proposed Water 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
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

FT respectfully submit this monitoring programme will adequately assess the success of the proposed mitigation.

With regard to the "*Assessment of potential for the development adverse effects on the integrity of the Blackwater River (Cork/Waterford) SAC"* a Natura Impact Statement has been provided to examine the potential for the development adversely affect the integrity of the Blackwater River (Cork/Waterford) SAC. In light of the conclusions of the assessment which it shall conduct on the implications for the European sites concerned, the competent authority is enabled to ascertain that the proposed development will not adversely affect the integrity of any of the European sites concerned.

3.2 Blackwater River (Cork/Waterford) SAC – Item 2 (b)

(b) The applicant is requested to provide an assessment of potential hydrogeological impacts on the Blackwater River (Cork/Waterford) SAC. This should have regard to Chapter 9 of the EIAR which states the potential impacts on hydrogeological receptors, prior to mitigation, is considered to be significant as underlying groundwater is identified as intersecting with the SAC. Further clarification is also required with respect of the excavation of borrow pits as implied by section 7.2 of the noise chapter in the EIAR. An assessment of potential for impact on groundwater arising from the excavation of borrow pits should be submitted, if applicable.

Response

Please note that the following response is a summary of information found in the EIAR and does not change the conclusions and findings of the EIAR. Some additional text has been added to clarify the information in the context of the request for further information.

As outlined in Section 9.3.3.1 of the EIAR, the Mitchelstown Groundwater Body (GWB) is identified as intersecting with Designated Special Areas of Conservation (SAC) Conservation Objectives Species, including those in the Blackwater River (Cork/Waterford) SAC. The majority of the proposed wind farm site and a portion of the proposed grid connection is located within the Mitchelstown GWB. As shown in Figure 9.3 of the EIAR the majority of the grid connection and northern extremity of the proposed development site is underlain by the Rathnacally GWB.

Section 9.2.5 of the EIAR outlines the evaluation criteria which are based on the Institute for Geologists Ireland (IGI) "Guidance for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements". In line with the IGI Guidance, the receiving environment (Hydrogeological Features, including the Mitchelstown GWB) was first identified. Using the NRA rating criteria in Appendix C of the IGI Guidance, the importance of the hydrogeological features was rated (Table 9.2 of the EIAR). The rating criteria determined the importance of the Mitchelstown GWB as 'Extremely High' as "*Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation e.g. SAC or SPA status*". This was followed by an estimation of the magnitude of the impacts on hydrogeological features (Table 9.4 and Section 9.5 of the EIAR, Sections 3.2.1, 3.2.2, 3.2.3 and 3.2.4 below).

The matrix in Table 9-5 of the EIAR (replicated in Table 3-2 below) determines the significance of the impacts based on the importance and magnitude of the hydrogeological impacts as determined by Tables 9.2 and 9.4 of the EIAR. The 'Extremely High' importance was considered against each impact.

Table 3-2: Table 9-5 of EIAR - Ratings of Significance of Impacts for Geology/Hydrogeology (NRA, 2009)

Importance of Attribute	Magnitude of Impact			
	Negligible	Small Adverse	Moderate Adverse	Large Adverse
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant/Moderate	Profound/Significant	Profound
High	Imperceptible	Moderate/Slight	Significant/Moderate	Profound/Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight/Moderate

The activities for the proposed development which have potential to hydrogeologically impact the Blackwater River (Cork/Waterford) SAC were described in Section 9.5 of the EIAR. It is noted that a conservative approach was taken in describing the worst-case scenario in the absence of mitigation measures. This is not an indication of actual impacts which will occur as mitigation measures are designed to ensure the proposed development will not hydrogeologically impact the Blackwater River (Cork/Waterford) SAC. The proposed wind farm will not be developed without implementing the mitigation measures outlined in Section 9.10 of the EIAR.

An assessment of potential hydrogeological impacts on the Blackwater River (Cork/Waterford) SAC are described below. Mitigation measures are also considered as part of this assessment. Please note this is clarification on information previously contained in the EIAR and does not constitute additional information.

3.2.1 Construction Phase Impacts

3.2.1.1 Groundwater Levels during Excavation works

No borrow pits are proposed at the site and no associated dewatering works are proposed. Any reference made to borrow pits in the EIAR was a typographical error and is superseded by this report.

Smaller scale temporary dewatering may occur at some excavations (i.e. turbine bases, substation, met mast, temporary compound, cable trenches), and these have the potential to affect local groundwater levels. However, temporary reductions in groundwater levels by temporary dewatering will be very localised and of small magnitude due to the nature and permeability of the subsoil geology, which comprises moderate to low permeability alluvium and glacial deposits. The nearest turbine (T6) to the Blackwater River (Cork/Waterford) SAC is 0.65km and 0.4km to the Oakfront surface water which flows into the SAC. Dewatering is not expected to cause interference with the Blackwater River (Cork/Waterford) SAC due to the large offset distance, relatively shallow depths of excavation and temporary short-term nature of dewatering, in the unlikely event that dewatering is required. Additionally, it is considered that groundwater levels will revert to the pre-construction situation when there is no longer a requirement to control groundwater levels.

Trenches for the proposed grid connection route 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 the Blackwater River (Cork/Waterford) SAC is envisaged.

Therefore, the magnitude of the hydrogeological impact (Table 9-4 of the EIAR), prior to mitigation, is considered to be ‘Negligible’ on the Blackwater River (Cork/Waterford) SAC. The significance of these potential impacts, prior to mitigation, is considered to be ‘**Imperceptible**’.

The Impact classification is negative, imperceptible significance, short term, direct and low probability.

To monitor groundwater during the construction phase, groundwater monitoring wells will be installed between areas of deeper excavations and sensitive groundwater receptors, including the Blackwater River (Cork/Waterford) SAC. The wells will be used to monitor groundwater levels and quality to assess any potential impacts during the construction works.

Following the application of this mitigation measure, the residual effects of dewatering will remain ‘**Imperceptible**’.

3.2.1.2 Tree Felling

An area of the proposed development site comprises of commercial broadleaf forestry. Felling of approximately 12.6 ha of broadleaf forestry is required within and around the wind farm infrastructure to accommodate the construction of some turbines, hardstands, crane pads, access tracks, onsite substation, grid connection, temporary compounds and permanent met masts.

Proposed tree felling will involve the use of heavy felling machinery and exposure of underlying soils to surface water runoff, which could result in soil erosion. This also could lead to an increase in sediment and nutrient concentrations in the surface water run-off which may in turn impact groundwater.

The use of plant and machinery during tree felling works will require the storage and use of fuels and oils. Their storage and use present potential for spills and leaks which could contaminate underlying exposed soils and groundwater.

The extent of any potential contamination is expected to be localised and of small magnitude due to the nature of the works, and the nature and permeability of the subsoil geology, which comprises moderate to low permeability alluvium and glacial deposits. However, according to the ‘Summary of Initial Characterisation’ report for the Mitchelstown GWB, “*there is a high degree of interaction between surface water and groundwater in this GWB*” with groundwater “*discharged to surface as springs or as baseflow to rivers crossing the*” GWB. Without the consideration of mitigation measures, there is a potential risk for localised groundwater contamination from the proposed development to migrate to the Oakfront surface water and subsequently the Blackwater River (Cork/Waterford) SAC.

The magnitude of the hydrogeological impact (Table 9-4 of the EIAR), prior to mitigation, is considered to be ‘Small Adverse’ on the Blackwater River (Cork/Waterford) SAC. Having regard to Table 9-2 and Table 9-5 of the EIAR, the significance of these potential impacts, prior to mitigation, is considered to be ‘**Significant**’.

The Impact classification is negative, significant significance, permanent, indirect and high probability.

Measures to mitigate the risk of groundwater contamination from tree felling are discussed in detail in Section 9.10 of the EIAR.

The following includes a list of applicable measures presented in the EIAR:

- Adherence to Construction Environmental Management Plan (CEMP) which outlines the work practices, environmental management procedures and management responsibilities relating to the construction phase of the proposed development;
- Heavy machinery to track over brash mat to prevent erosion of soils;
- Brash mat to be removed after all felling operations to prevent acidification;
- Implement workspace corridor to prevent damage of soils outside the work area;
- Fuelling to only occur at designated refuelling areas;
- Control of sediment laden runoff to prevent groundwater contamination;
- Control of spills to prevent groundwater contamination;
- Slope Stability measures to prevent landslides and unwanted movement of soil.

The implementation of these industry standard mitigation measures will break the pathway between the potential source and receptor (Blackwater River (Cork/Waterford) SAC). Therefore, the magnitude of the hydrogeological impact of the proposed development on the Blackwater River (Cork/Waterford) SAC is considered to be ‘Negligible’. As a result, the residual effects of tree felling is ‘**Imperceptible**’.

3.2.1.3 Earthworks

The proposed development will require construction phase earthworks associated with the excavation of turbine bases, removal of overburden deposits for the construction of turbine foundations, temporary site compound, sub-station, grid connection trenches, turbine hard standings, internal access roads and permanent met mast.

The following earthworks excavations will be required:

- Excavation of Topsoil and Alluvium deposits;
- Excavation of Glacial Till to bedrock/founding stratum (as required).

The following filling and material deposition operations will be required:

- Deposition of surplus topsoil and Glacial Till deposits in berms for reinstatement proposes around turbine bases and hardstands;
- Importation and Filling of site won and imported General Fill and Engineering Aggregates.

Turbines of the size proposed for Annagh Wind Farm have foundation depths of 4m and diameters of 22m. Ideally, a suitable bearing stratum is encountered within 3m from ground surface so that the turbine foundation can be finished at / near existing ground level. Where deeper excavations (3-5m) are required to reach a suitable bearing stratum, soil replacement (engineered fill) is used to bring up the excavation so that the turbine foundation is finished at / near existing ground level.

Some temporary stockpiles of material may be necessary prior to reinstatement; however, no permanent stockpiles of material will remain after construction.

It is proposed that all onsite materials excavated shall be retained on site and re-used where suitable as part of the construction phase to minimise the import materials requirements.

Surplus topsoil, alluvium and glacial till recovered from excavations will be used for reinstatement proposed around turbine bases and hardstands.

Effects to the existing hydrogeological regime associated with earthworks associated with the construction phase of the proposed development are:

- Potential for groundwater pollution from the removal of overburden deposits particularly at proposed turbine locations. The aquifer underlying the proposed wind farm site and the majority of the proposed grid connection route is classified by the GSI as ranging from 'Low' to 'Medium' groundwater vulnerability with areas of 'High' and 'Extreme' vulnerability and exposed bedrock present in these areas (Figure 9-5 of the EIAR). It is proposed to remove the overlying topsoil, alluvium and Glacial Till deposits as outlined in the proposed design.
- The vulnerability of the aquifer to groundwater pollution particularly during construction stage will be increased as overburden is removed thus reducing the level of protection from groundwater pollution.
- Potential for silt infiltration to groundwater as a result of increased surface runoff and reduced protection of the aquifer. Soil erosion as a result of exposure of soils in open excavations and temporary storage of excavated materials represents a potential impact to the underlying groundwater aquifer.
- Reduction in groundwater levels from dewatering of excavations as required during the construction stage if high groundwater is encountered.

The extent of any potential contamination is expected to be localised and of small magnitude due to the nature of the works, and the nature and permeability of the subsoil geology, which comprises moderate to low permeability alluvium and glacial deposits.
However, according to the 'Summary of Initial Characterisation' report for the Mitchelstown GWB, "*there is a high degree of interaction between surface water and groundwater in this GWB*" with groundwater "*discharged to surface as springs or as baseflow to rivers crossing the*" GWB. Without the consideration of mitigation measures, there is a potential risk for localised groundwater contamination from the proposed development to migrate to the Oakfront surface water and subsequently the Blackwater River (Cork/Waterford) SAC.

The magnitude of the hydrogeological impact (Table 9-4 of the EIAR) in a worst-case scenario, prior to mitigation, is considered to be 'Small Adverse' on the Blackwater River (Cork/Waterford) SAC. Having regard to Table 9-2 and Table 9-5 of the EIAR, the significance of these potential impacts, prior to mitigation, is considered to be '**Significant**'.

The Impact classification is negative, significant significance, permanent, indirect and high probability.

Measures to mitigate the risk of groundwater contamination from earthworks are discussed in detail in Section 9.10 of the EIAR. The following includes a list of applicable measures presented in the EIAR:

- Adherence to Construction Environmental Management Plan (CEMP) in Volume 3, Appendix 3.1 of the EIAR, which outlines the work practices, environmental management procedures and management responsibilities relating to the construction phase of the proposed development.

- Minimisation of volumes overburden deposits excavated and reuse on site where possible.
- Sealing of temporary stockpiles to prevent to prevent surface runoff.
- Implement workspace corridor to prevent damage of soils outside the work area.
- Excavations will be constructed and backfilled as quickly as possible and will stop during of prior to heavy rainfall events to prevent erosion of exposed soil or rock.
- Excavations will be constructed such that they are stable or adequately supported.
- 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.
- Fuelling to only occur at designated refuelling areas.
- Control of sediment laden runoff to prevent groundwater contamination.
- Control of spills to prevent groundwater contamination.
- Slope Stability measures to prevent landslides and unwanted movement of soil.

The implementation of these industry standard mitigation measures will break the pathway between the potential source and receptor (Blackwater River (Cork/Waterford) SAC). Therefore, the magnitude of the hydrogeological impact of the proposed development on the Blackwater River (Cork/Waterford) SAC is considered to be 'Negligible'. As a result, the residual effects of earth works is '**Imperceptible**'.

3.2.1.4 Slope Stability

The proposed development and proposed infrastructure locations are located within areas of 'Low' susceptibility.

Impacts to the existing environment associated with potential slope instability and failure include:

- Slope failures have the potential to impact the existing geological and hydrogeological conditions from the removal and deposition of landslide/slope failure material and the exposure of underlying overburden deposits and bedrock to an increase in surface water runoff and subsequent increase in erosion.
- The impact of a slope failure could potentially result in the influx of acidic and/or peat laden waters into downgradient surface water features resulting in a decrease in the receiving water's pH values. This may impact groundwater quality in the underlying Regionally and Locally Important Aquifers and in any groundwater abstractions in the vicinity of a landslide event.

According to the 'Summary of Initial Characterisation' report for the Mitchelstown GWB, "*there is a high degree of interaction between surface water and groundwater in this GWB*" with groundwater "*discharged to surface as springs or as baseflow to rivers crossing the*" GWB. In the event of a slope failure (low susceptibility) and without the consideration of mitigation measures, there is a potential risk for localised groundwater contamination from the proposed development to migrate to the Oakfront surface water and subsequently the Blackwater River (Cork/Waterford) SAC.

The magnitude of the hydrogeological impact (Table 9-4 of the EIAR) in a worst-case scenario, prior to mitigation, is considered to be 'Small Adverse' on the Blackwater River (Cork/Waterford) SAC. Having regard to Table 9-2 and Table 9-5 of the EIAR, the significance of these potential impacts, prior to mitigation, is considered to be '**Significant**'.

The Impact classification is negative, significant significance, short term, indirect and low probability.

Measures to mitigate the risk of groundwater contamination in the event of a slope failure are discussed in detail in Section 9.10 and the CEMP (Appendix 3.1 of Volume 3) of the EIAR. The following includes a list of applicable measures presented in the EIAR:

- 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.
- 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.
- Earthworks will not be commenced when heavy or sustained rainfall is forecast.

The implementation of these mitigation measures will break the pathway between the potential source and receptor (Blackwater River (Cork/Waterford) SAC). Therefore, the magnitude of the hydrogeological impact of the proposed development on the Blackwater River (Cork/Waterford) SAC is considered to be 'Negligible'. As a result, the residual effects of slope failure is '**Imperceptible**'.

3.2.1.5 Internal Access Roads and Hardstands

There will be approximately 4.98km of internal access tracks associated with the proposed wind farm development. This will be a combination of existing track upgrade and construction of new tracks; approximately 4.6km of new track construction and approximately 0.38km of existing track upgrade. Hardstand areas will be provided at each turbine location. The nearest access road/hardstand (at turbine T6) to the Blackwater River (Cork/Waterford) SAC is 0.65km and 0.4km to the Oakfront surface water which flows into the SAC.

All access tracks will be 5m wide along straight sections and 5.6m wider at bends. The access track for the met mast located at the south of the site will be 3.5m wide. The tracks will be finished with a well graded aggregate. The drainage system will be installed adjacent to the internal access tracks. Existing drainage infrastructure will be maintained and upgraded where necessary.

There will be no floating roads required in the Proposed Development.

The stone required for the construction of the internal access roads will be sourced from quarries in the vicinity.

Access track formation will consist of a minimum 500mm hardcore on a geotextile separator. The construction methodology for newly constructed tracks will be as follows:

- The formation will be prepared to receive the geotextile membrane;
- Stone will be placed and compacted in layers to minimum 500mm depth;
- A drainage ditch will be formed, within the excavated width and along the sides of the track;
- Surplus excavated material will be placed along the side of sections of the tracks and dressed to blend in with surrounding landscaping and partially obscure sight of the track.

Potential impacts to the existing hydrogeological regime associated with the construction of proposed access tracks and hardstands are:

- Potential for groundwater pollution from the removal of overburden deposits. The aquifer underlying the proposed wind farm site is classified by the GSI as ranging from 'Low' to 'Medium' groundwater vulnerability with areas of 'High' and 'Extreme' vulnerability and exposed bedrock present in these areas. It is proposed to remove the overlying topsoil, alluvium and glacial till deposits as outlined in the proposed design.
- The vulnerability of the aquifer to groundwater pollution particularly during construction stage will be increased as overburden is removed thus reducing the level of protection from groundwater pollution.
- Potential for silt infiltration to groundwater as a result of increased surface runoff and reduced protection of the aquifer. Soil erosion as a result of exposure of soils in open excavations and temporary storage of excavated materials represents a potential impact to the underlying groundwater aquifer.
- Potential for groundwater pollution from the use of cement-based compounds during the construction phase.

The extent of any potential contamination is expected to be localised and of small magnitude due to the nature of the works, and the nature and permeability of the subsoil geology, which comprises moderate to low permeability alluvium and glacial deposits. However, according to the 'Summary of Initial Characterisation' report for the Mitchelstown GWB, "*there is a high degree of interaction between surface water and groundwater in this GWB*" with groundwater "*discharged to surface as springs or as baseflow to rivers crossing the*" GWB. Without the consideration of mitigation measures, there is a potential risk for localised groundwater contamination from the proposed development to migrate to the Oakfront surface water and subsequently the Blackwater River (Cork/Waterford) SAC.

The magnitude of the hydrogeological impact (Table 9-4 of the EIAR) in a worst-case scenario, prior to mitigation, is considered to be 'Small Adverse' on the Blackwater River (Cork/Waterford) SAC. Having regard to Table 9-2 and Table 9-5 of the EIAR, the significance of these potential impacts, prior to mitigation, is considered to be '**Significant**'.

The Impact classification is negative, significant significance, permanent, indirect and high probability.

Measures to mitigate the risk of groundwater contamination from the construction of internal access roads and hardstands are discussed in detail in Section 9.10 of the EIAR.

The following includes a list of applicable measures presented in the EIAR:

- Adherence to Construction Environmental Management Plan (CEMP) in Volume 3, Appendix 3.1 of the EIAR, which outlines the work practices, environmental management procedures and management responsibilities relating to the construction phase of the proposed development;
- Minimisation of volumes of overburden deposits excavated and reuse on site where possible;
- Sealing of temporary stockpiles to prevent surface runoff;
- Implement workspace corridor to prevent damage of soils outside the work area;
- Excavations will be constructed and backfilled as quickly as possible and will stop during or prior to heavy rainfall events to prevent erosion of exposed soil or rock;
- Excavations will be constructed such that they are stable or adequately supported;
- 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;
- Fuelling to only occur at designated refuelling areas;
- Control of sediment laden runoff to prevent groundwater contamination;
- Control of spills to prevent groundwater contamination;
- Slope Stability measures to prevent landslides and unwanted movement of soil.

The implementation of these industry standard mitigation measures will break the pathway between the potential source and receptor (Blackwater River (Cork/Waterford) SAC). Therefore, the magnitude of the hydrogeological impact of the proposed development on the Blackwater River (Cork/Waterford) SAC is considered to be 'Negligible'. As a result, the residual effects of the construction internal access roads and hardstands is '**Imperceptible**'.

3.2.1.6 Internal Cabling and Grid Connection

As outlined in Chapter 3 of the EIAR, electricity generated from wind turbines shall be collected at medium voltage (20/33kV) by an internal circuit of buried cables which will follow on-site access tracks. This circuit shall terminate at the proposed onsite substation before being exported to the grid via a buried cable to the existing Charleville 110kV substation.

Connection works will involve the installation of ducting, joint bays, drainage and ancillary infrastructure and the subsequent running of cables along the existing road network. For cable trenches located in public roads, the contractor will excavate cable trenches and then lay high density polyethylene (HDPE) ducting in the trench in a surround of cement bound material (CBM). Back-filling and reinstatement in public roads will be to a specification to be agreed with the road authority.

A similar construction methodology will apply for cable trenches laid within site access tracks. In this case the cable-ducts will generally be laid when the track is being constructed and will follow the edge of the site access tracks. The trenches within these locations will generally be backfilled using the excavated material.

Potential impacts to the existing environment associated with the proposed internal cabling and grid connection works include:

- The proposed grid connection, associated excavations, and ducting may present a preferential pathway for the movement of groundwater and/or contamination in the subsurface. However, the subsoil at the proposed development is predominantly glacial till which has a low permeability throughout the majority of the proposed grid connection route.

The extent of any potential contamination is expected to be localised and of small magnitude due to the nature of the works, and the nature and permeability of the subsoil geology. However, according to the 'Summary of Initial Characterisation' report for the Mitchelstown GWB, "*there is a high degree of interaction between surface water and groundwater in this GWB*" with groundwater "*discharged to surface as springs or as baseflow to rivers crossing the*" GWB. Without the consideration of mitigation measures, there is a potential risk for localised groundwater contamination from the proposed development to migrate to the Oakfront surface water and subsequently the Blackwater River (Cork/Waterford) SAC.

The magnitude of the hydrogeological impact (Table 9-4 of the EIAR) in a worst-case scenario, prior to mitigation, is considered to be 'Small Adverse' on the Blackwater River (Cork/Waterford) SAC. Having regard to Table 9-2 and Table 9-5 of the EIAR, the significance of these potential impacts, prior to mitigation, is considered to be '**Significant**'.

The Impact classification is negative, significant significance, permanent, indirect and high probability.

Measures to mitigate the risk of groundwater contamination from the construction of internal cabling and the grid connection are discussed in detail in Section 9.10 of the EIAR. The following includes a list of applicable measures presented in the EIAR:

- Adherence to Construction Environmental Management Plan (CEMP) in Volume 3, Appendix 3.1 of the EIAR, which outlines the work practices, environmental management procedures and management responsibilities relating to the construction phase of the proposed development;
- Minimisation of volumes of overburden deposits excavated and reuse on site where possible;
- Sealing of temporary stockpiles to prevent surface runoff;
- Implement workspace corridor to prevent damage of soils outside the work area;
- Excavations will be constructed and backfilled as quickly as possible and will stop during or prior to heavy rainfall events to prevent erosion of exposed soil or rock;
- Excavations will be constructed such that they are stable or adequately supported;
- 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;
- Fuelling to only occur at designated refuelling areas;
- Control of sediment laden runoff to prevent groundwater contamination;
- Control of spills to prevent groundwater contamination;
- Slope Stability measures to prevent landslides and unwanted movement of soil.

The implementation of these industry standard mitigation measures will break the pathway between the potential source and receptor (Blackwater River (Cork/Waterford) SAC). Therefore, the magnitude of the hydrogeological impact of the proposed development on the Blackwater River (Cork/Waterford) SAC is considered to be 'Negligible'. As a result, the residual effects of the construction of internal cabling and the grid connection is '**Imperceptible**'.

3.2.1.7 Turbine Delivery Route

The proposed turbine delivery route (TDR) will be from Foynes as described in more detail in Chapter 13 of the EIAR.

The following accommodation works are required along the TDR at the following locations. These works do not form part of the proposed development but have been assessed in the EIAR:

- Cut-through at the Clarina Roundabout;
- Cut-through at the Mungret Interchange - West Roundabout;
- Widening at the Mungret Interchange - East Roundabout;
- Local widening at the junction of the N20 and the L1322;
- Local widening along the L1322 from the N20 to the site entrance.

The accommodation works associated with the TDR route will include the excavation of existing overburden deposits. This may present a preferential pathway for the movement of groundwater and/or contamination in the subsurface. However, the subsoil at the proposed development is predominantly glacial till which has a low permeability throughout the majority of the proposed grid connection route.

The extent of any potential contamination is expected to be localised and of small magnitude due to the nature of the works, and the nature and permeability of the subsoil geology. However, according to the 'Summary of Initial Characterisation' report for the Mitchelstown GWB, "*there is a high degree of interaction between surface water and groundwater in this GWB*" with groundwater "*discharged to surface as springs or as baseflow to rivers crossing the*" GWB. Without the consideration of mitigation measures, there is a potential risk for localised groundwater contamination from the proposed development to migrate to the Oakfront surface water and subsequently the Blackwater River (Cork/Waterford) SAC.

The magnitude of the hydrogeological impact (Table 9-4 of the EIAR) in a worst-case scenario, prior to mitigation, is considered to be 'Small Adverse' on the Blackwater River (Cork/Waterford) SAC. Having regard to Table 9-2 and Table 9-5 of the EIAR, the significance of these potential impacts, prior to mitigation, is considered to be '**Significant**'.

The Impact classification is negative, significant significance, permanent, indirect and high probability.

Measures to mitigate the risk of groundwater contamination from TDR accommodation works are discussed in detail in Section 9.10 of the EIAR. The following includes a list of applicable measures presented in the EIAR:

- Adherence to Construction Environmental Management Plan (CEMP) in Volume 3, Appendix 3.1 of the EIAR, which outlines the work practices, environmental management procedures and management responsibilities relating to the construction phase of the proposed development;

- Minimisation of volumes overburden deposits excavated and reuse on site where possible;
- Sealing of temporary stockpiles to prevent to prevent surface runoff;
- Implement workspace corridor to prevent damage of soils outside the work area;
- Excavations will be constructed and backfilled as quickly as possible and will stop during of prior to heavy rainfall events to prevent erosion of exposed soil or rock;
- Excavations will be constructed such that they are stable or adequately supported;
- 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;
- Fuelling to only occur at designated refuelling areas;
- Control of sediment laden runoff to prevent groundwater contamination;
- Control of spills to prevent groundwater contamination;
- Slope Stability measures to prevent landslides and unwanted movement of soil.

The implementation of these industry standard mitigation measures will break the pathway between the potential source and receptor (Blackwater River (Cork/Waterford) SAC). Therefore, the magnitude of the hydrogeological impact of the proposed development on the Blackwater River (Cork/Waterford) SAC is considered to be 'Negligible'. As a result, the residual effects of the TDR accommodation works is '**Imperceptible**'.

3.2.2 Operation Phase Impacts

Very few potential direct impacts are envisaged during the operational phase of the wind farm. These include:

- Some construction traffic may be necessary for maintenance of turbines, hardstands and access tracks which could result in minor accidental leaks or spills of fuel/oil.
- The grid transformer in the substation and transformers in each turbine are oil cooled. There is potential for spills / leaks of oils from this equipment resulting in contamination of soils and groundwater.

The magnitude of the hydrogeological impact of operation phase impacts on the Blackwater River (Cork/Waterford) SAC is considered to be 'Negligible'. The significance of these potential impacts, prior to mitigation, is considered to be **Imperceptible.**

The Impact classification is negative, imperceptible significance, short term, direct and low probability.

Although it is not envisaged that the operation of the proposed development will result in significant impacts on the hydrogeological regime within the study area, 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, which will be implemented in full, 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 and groundwater against accidental leakages of oils and battery fluids.

3.2.3 Decommissioning Phase Impacts

The potential impacts associated with decommissioning will be similar to those associated with construction but of reduced magnitude.

During decommissioning, it may be possible to reverse or at least reduce some of the impacts caused during construction by rehabilitating construction areas such as turbine bases, hardstanding areas and site compound. This will be done by covering with topsoil to encourage vegetation growth and reduce run-off and sedimentation.

Other impacts such as possible contamination by fuel leaks will remain but will be of reduced magnitude.

Grid connection cables will be left in the ground, therefore no potential impacts during decommissioning stage are likely to occur.

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

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.

3.2.4 Cumulative Impacts

Relevant projects in proximity to the proposed development are listed in Table 9.11 in Section 9.8 of the EIAR. Section 9.8 outlines there is a potential **Significant** cumulative impact with the proposed M20 Limerick to Cork and the consented Annagh and Ballyhea Solar Farm as the developments are located within the Mitchelstown GWB and could potentially discharge to the Blackwater River (Cork/Waterford) SAC if constructed simultaneously. The Rathnacally and Boolard Wind Farms are constructed, it was considered in Section 9.8 of the EIAR that the significance of this potential cumulative impact is **Imperceptible**.

The mitigation measures summarised above and in Section 9.10 of the EIAR 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.

3.3 Blackwater River (Cork/Waterford) SAC – Item 2 (c)

(c) The applicant is requested to clarify the extent of any proposed instream works e.g. use of cofferdams, excavation of watercourse beds etc. required to facilitate the proposal on natural watercourses or any watercourse/drain with the potential to be inhabited by qualifying species of the Blackwater River (Cork/Waterford) SAC.

Where instream works are required the applicant shall submit details of aquatic surveys conducted at each instream location, where applicable. An assessment of the likely impact on aquatic species within and proximal to the works areas should be provided along with detailed mitigation measures.

It is noted that there should be no interference with, bridging, draining, or culverting of any watercourse its banks or bankside vegetation to facilitate this development without the prior approval of Inland Fisheries Ireland (IFI). The applicant should submit details by way of the further response as to any correspondences with IFI in relation to the same.

Response

Clarification is provided here to confirm that no in-stream works are proposed for the development. The Oakfront Stream will be crossed with a clear-span bridge, the design of which negates the necessity for instream works; this is described in more detail below. The Rathnacally stream, along the GCR will be crossed with horizontal directional drilling. There are no other stream crossings proposed. Field drains will be crossed with culverts which will only be installed in dry conditions and one field drain will be diverted around the base of turbine T4 as described in 10.6.7 of the EIAR.

There will be one new crossing over the Oakfront Stream and 13 over existing field and forestry drains for the purposes of the proposed windfarm development. The one watercourse crossed by internal wind farm access tracks is on the Oakfront Stream (EPA name) which is a part of the Awbeg [Buttevant] sub-catchment. As described in Section 3.5.10 of the EIAR and Section 2 of the NIS, the method for crossing the Oakfront Stream within the wind farm site is by single-span concrete bridge.

It is proposed to construct a clear span bridge at this location to minimise environmental impacts by avoiding instream works. The bridge will be of adequate length and will be designed to ensure that no in-stream works will be required and that the existing stream banks are not disturbed during construction. Sufficient free-board will be allowed for in the proposed bridge designs to allow for 1 in 100-year fluvial flood conditions. In order that flood flows would not be obstructed, the stream crossings will be sized to convey a 1 in 100-year flood flow with a 20 % allowance for Climate Change. So as not to interfere in any way with the bed or bank of the watercourse, bridge foundations will be designed and positioned at least 2.5m from the river bank. The beams of the bridge will be precast off site and transported to the site for installation. The beams will house a flat formation of precast ducts to allow for both the export grid connection cable and internal circuit cables to cross the stream at this point. Cover of 450mm will be provided in the deck between the bridge surface and the 38kV export cable ducts.

The 13 minor drain (such as manmade agricultural and forest drains) crossings will be crossed by culverting the drain underneath the access track. Drainage design requires that these culverts are appropriately sized to take the 1 in 100-year flood flow with a 20% allowance for Climate Change. A Section 50 application will be required to obtain the consent of the OPW for the construction of the crossing over the Oakfront Stream.

3.3.1 Watercourse Crossings Along the GCR

There is one existing watercourse located along the proposed GCR. This watercourse is the Rathnacally Stream, also part of the Awbeg [Buttevant] sub-catchment. The existing road bridge at this point consists of a shallow concrete bridge with a 5.3m carriageway and 0.8m verge. The bridge cannot accommodate the cable due to lack of headroom. As such the stream will be directly crossed. The crossing will be by horizontal directional drilling (HDD).

3.3.2 Turbine Delivery Route (TDR) Watercourse Crossings

The TDR crosses a number of watercourses along the route between the Port of Foynes and the proposed wind farm site. There are no specific accomodation works requried at bridge points along the TDR. Works will be requried at Node 10.5 in proximity to the Rathnacally Stream on the L1322. These works include hedgerow trimming and the lowering of a wall to accommodate vehicle oversail. There are no works requried within the stream.

3.3.3 Turbine Delivery Route (TDR) Watercourse Crossings

The assessment for Likely Significant Effects to European sites as a result of the proposed stream crossings have been detailed in section 3 (AA Screening) of the NIS submitted. As detailed in Table 3-1 of the NIS, Blackwater River (Cork/Waterford) cSAC (002170), Ballyhoura Mountains SAC (002036), Kilcolman Bog SPA (004095), Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161) and River Shannon and River Fergus Estuaries SPA (004077) and Lower River Shannon SAC (002165) are within the Zone of Influence (ZoI) of the proposed development.

While no instream works are proposed for the development, the crossing point at the Oakfront Stream and the numerous drain crossing point all have a downstream hydrogeological connection to the Blackwater River (Cork/Waterford) cSAC.

Therefore, Likely Significant Effects were identified for the Blackwater River (Cork/Waterford) cSAC (002170) due to effects on aquatic habitats and species through water quality degradation and mobile SCIs through disturbance.

The conclusion of the AA Screening found that it cannot be excluded, on the basis of objective information provided in Table 3-2 of the NIS, that the proposed development, individually or in combination with other plans or projects, will have a likely significant effect on the following European sites:

- Blackwater River (Cork/Waterford) cSAC (002170);
- Kilcolman Bog SPA (004095);
- Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161).

As such detailed mitigation measures were provided in Table 4-12 of the NIS will avoid or reduce these effects on the Blackwater River (Cork/Waterford) cSAC (002170) or any other European site.

The mitigation measures outlined were designed to adhere to the guidelines set out in the best practice documents as listed below:

- NPWS Crayfish Plague leaflet (2009)
  http://www.npws.ie/sites/default/files/publications/pdf/Crayfish_leaflet.pdf
- Biodiversity Ireland Guidelines; Check, Clean and Dry
  http://www.nonnativespecies.org/checkcleandry/
- 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.

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 will not adversely affect the integrity of the Blackwater River (Cork/Waterford) cSAC or any other European site.

3.3.4 Consultation with IFI

A scoping request letter and scoping report detailing a description of the proposed development, draft mapping, preliminary table of contents of the EIAR and outline of the methodology for assessment was distributed to consultees including IFI on the 22nd of September 2020. The IFI south-western office was also contacted on 27th September 2021 to confirm receipt of the scoping report and whether any issues had been identified by Fisheries Officers. No response has been received to date.

3.4 Blackwater River (Cork/Waterford) SAC – Item 2 (d)

(d) The National Parks & Wildlife Service (NPWS) have raised concerns in respect of the assessment provided within the NIS in relation to mitigation proposed to avoid silt, hydrocarbon, fresh cement and bentonite contamination of the streams upstream of the Awbeg River system. As recommended by the NPWS the applicant is requested to submit a detailed reasoned assessment of the mitigation measures proposed, along with a description of the same. The in-combination effects of the timing of works with regard to drainage maintenance works in downstream stretches of the river (carried out by Cork County Council) should also be assessed.

Response

In response to item 2(d), below are the specific mitigation measures associated with silt, hydrocarbon, and fresh cement. The use of bentonite is being avoided as detailed in 3.6.7.2 of the EIAR and 4.3.3 of the CEMP. – A biodegradable fluid such as CLEARBORE is proposed in place of bentonite.

These measures are considered to be reasoned as they are based on the Ciria standards listed in the previous item response. Please see the appended Schedule of Mitigation Measures (Appendix 5) for the full breakdown of mitigation measures proposed for the project.

Mitigation measures protecting against silt

- The 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.
- It is proposed to divert an existing field drain as stated in Section 10.6.7 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 is it 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 damns 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:
    - >10 mm/hr (high intensity local rainfall events).
    - >25 mm in a 24 hour period (heavy frontal rainfall lasting most of the day).
    - >half monthly average rainfall in any 7 days.
- Prior to works being suspended the following control measures will be completed:
    - Secure all open excavations.
    - Provide temporary or emergency drainage to prevent back-up of surface runoff
    - Avoid working during heavy rainfall and for up to 24 hours after heavy rainfall events to ensure drainage systems are not overloaded.

Mitigation measures protecting against hydrocarbons

- Refuelling of plant during construction will only be carried out at designated refuelling 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 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.

Mitigation measures protecting against 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.

There is no proposed use of bentonite in the construction works.

The Awbeg River (west branch) forms part of the Blackwater River (Cork/Waterford) cSAC c.1.5km west of the closest turbine, while the Awbeg River (east branch) forms part of the Blackwater River (Cork/Waterford) cSAC c. 3.8km east of the closest turbine, east of Farran bridge.

The watercourses downstream have been historically straightened and deepened as part of arterial drainage works.

Drainage maintenance works effects aquatic habitats and species due to habitat loss, habitat alteration, disturbance and displacement. The increased sedimentation levels rising from these proposed works can result in mortality to species directly within the footprint and downstream of the area of works as well as, the smothering of breeding, foraging and nursery habitats including spawning beds. The loss and alteration of habitats can create a barrier to movement upstream and downstream of the area of works which can have a long term effect. There is the potential for cumulative effects on the Blackwater River (Cork/Waterford) cSAC, if the proposed works were carried out at the same time as drainage maintenance works within the Awbeg River downstream. Consultation will be undertaken with Cork County Council prior to the commencement of works to ensure that works associated with the proposed wind farm development will be timed to avoid periods where drainage maintenance works will be undertaken within the Awbeg River. FT have considered each of the pollutants of potential concern and proposed mitigation measures for each, as set out in Section 10.7 of the EIAR, section 4.4 of the NIS and the CEMP provided.

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 will not adversely affect the integrity of the Blackwater River (Cork/Waterford) cSAC or any other European site.

3.5 Blackwater River (Cork/Waterford) SAC – Item 2 (e)

(e) The applicants are requested to submit a Method Statement for any instream works required to facilitate the proposal. The Method Statement should take account of particular site conditions and recommended best practice with a view to minimizing the risk of impact to water quality and aquatic ecology of the watercourse during the construction works.

Response

Please note that the following response is a summary of information found in the EIAR and does not change the conclusions and findings of the EIAR. The information has been reproduced and re-written in such a way to clarify the information in the context of the request for further information.

No in-stream works are proposed for the development. The Oakfront Stream will be crossed with a clear-span bridge, the design of which negates the necessity for instream works. The Rathnacally stream, along the GCR will be crossed with horizontal directional drilling. There are no other stream crossings proposed. Field drains will be crossed with culverts which will only be installed in dry conditions and one field drain will be diverted around the base of turbine T4 as described in 10.6.7 of the EIAR.

3.6 Please see response to item 2 (c) above. Blackwater River (Cork/Waterford) SAC – Item 2 (f)

(f) The applicant is requested to submit details of biosecurity measures to be implemented during the works phase of this project in order to minimize the risk of introduction of crayfish plague to the Awbeg River and its associated tributaries. These measures should be developed having regard to recommendations set out the NPWS and National Biodiversity Data Center.

Response

Mitigation by avoidance has been implemented in order to minimise the risk of introduction of crayfish plague to the Awbeg River and its associated tributaries. 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 NPWS, Biodiversity Ireland and 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.

- Care has been taken to ensure that sufficient buffers are in place between wind farm infrastructure and hydrological features such as rivers and streams.
- 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 (HDD) 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.

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

- NPWS Crayfish Plague leaflet (2009)
  http://www.npws.ie/sites/default/files/publications/pdf/Crayfish_leaflet.pdf
  Biodiversity Ireland Guidelines; Check, Clean and Dry
  http://www.nonnativespecies.org/checkcleandry/
- 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.

Additional mitigation measures to be implemented include water baseline and monitoring, silt traps silt fencing, settlement ponds, a three-stage treatment train and other surface water measurements outlined in Section 4.4.2 of the NIS will further minimize the risk of introduction of crayfish plague to the Awbeg River and its associated tributaries.

3.7 Blackwater River (Cork/Waterford) SAC – Items 2 (g) and 2 (h)

(g) *Additional information is required in relation to the known historic use of the site and surrounding lands by Whooper Swan. This should include an identification of locations of nearest known existing and historic Whooper Swan sites relative to the proposed development site. Applicants are also requested to submit an assessment of potential for activities associated with the construction and/or operation of the windfarm to cause disturbance / displacement to Whooper Swan at/ from these sites. The assessment should take account of the likely cumulative effects of development in the surrounding area. It is noted that a flock of 130 Whooper Swan were recorded by the Ecology Office within a field 500m south of the proposal site in January 2022.*

(h) *There are concerns in relation to the potential impact the proposed development may have on migration / commuting routes of Whooper swan, a qualifying interest species of the Kilcolman Bog SPA. Given that species of swan, including Whooper Swan can undertake nocturnal migration, and taking into consideration that this species usually vacates roosting grounds for feeding grounds at dawn, the potential for the proposed windfarm site to intersect migration / commuting routes for this species cannot be fully discounted at this time'. Therefore, the applicant is requested to undertake a nocmig (nocturnal migration I Nocturnal flight call (NFC)) survey of the site and provide an updated assessment of any likely implications (direct and indirect) of the proposed development for Whooper swan and other avian species.*

Response

A total of 2.5 years (3 winter seasons and 2 summer seasons) of ornithology surveys have been carried out at the proposed Annagh Wind Farm site. All surveys were fully compliant with the Scottish Natural Heritage (SNH, 2017)[2] methodology and indeed exceeded the required 2 year recommended in this methodology. Field surveys were undertaken to gather detailed information on bird distribution and flight activity in order to predict the potential effects of a wind farm development on birds. The field surveys comprised two main elements; vantage point (VP) watches and targeted distribution and abundance surveys which comprised:

- VP watches undertaken over one two years at 2 VPs (winter 2019/20, winter 2020/21, summer 2019, summer 2020 and winter 2021/22)
- Transect/point count surveys (winter 2019/20, winter 2020/21, summer 2019, summer 2020)
- Hinterland surveys (winter 2019/20, winter 2020/21, summer 2019, Summer 2020)
- Evening/nocturnal transect survey and watch for Woodcock (summer 2020, summer 2021)
- Habitat assessment and nocturnal transect survey for Nightjar (summer 2021).

A third winter of ornithology surveys was conducted over the winter 2021/22 period from October to March. Dawn and dusk surveys were carried out during this period. Vantage points were chosen to cover a specific viewshed of the proposed development site. Each was chosen specifically to encompass the view of all the proposed turbines. In response to the FI request additional rounds of dawn and dusk survey were undertaken at VPs 1 and 2 during the months of February, March and April 2022. An additional round of surveys was conducted in April 2022 to cover the spring migration period.

[2] Now named NatureScot.

An additional two VPs (Swan VP E & Swan VP W) were added in February 2022 in response to the RFI, to look at whooper swan roosting/foraging sites in the greater area.

Section 8.3.8 in Chapter 8 – Biodiversity details the sites for whooper swan in the vicinity of the proposed wind farm. The primary site for Whooper Swan in the surrounding area is the banks of Awbeg River / Annagh Bridge, where flocks of this species have been observed feeding in Improved agricultural grassland fields c. 1.3 km south of the closest turbine. Flock sizes ranged between 6-107 birds (averaging 45 birds), recorded on seven occasions over winter 2019-20 and winter 2020-21. A maximum count of 140 birds, observed at roost, 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, see Appendix 4 for full results of further surveys were conducted during the winter 2021/22 season (October 2021 – April 2022, inclusive).

There will be felling activities with potential disturbance during felling and construction works for birds foraging/ roosting nearby the site. Disturbance and/or habitat loss will be a Short-term Slight Impact (Criteria: EPA, 2022).

There are eight operational wind farms, closest 2.27 km northeast of the site, and no proposed or permitted wind farms within 20 km of the proposed development. There may be some cumulative impacts during the operational phase of the windfarm with surrounding existing wind farms.

There are two permitted solar farm applications located in close proximity to the proposed wind farm site, Fiddane, Co. Cork located 0.1 km from wind farm (Ref 175799; permitted), and Ballyroe/Rathnacally, Co. Cork located 0.9 km from wind farm (Ref 204041; permitted). There is an additional undecided solar farm application, Coolcaum, Co. Cork located 0.6 km from the wind farm (Ref 225681; undecided). Installation of panels creates minimal disturbance to the ground and the installations are stationary once operational so there is negligible collision risk. Therefore, habitat loss and disturbance during all stage of these projects will be limited, and no cumulative effects are envisaged in this regard.

The M20 Cork to Limerick Road Improvement Scheme is currently at the route selection stage (stage 2 of the process). If this project proceeds, the route selection corridor is located 2-4 km east of the proposed site. If construction occurred in parallel with the proposed project, cumulative impacts on whooper swan habitats could occur.

Intensive grassland management is prevalent in parts of the main wind farm site and is the dominant land use in along the GCR. Forestry is one of the main land uses within the main wind farm site and is relatively common but not co-dominant within the greater area. There is potential for felling and construction activities at the wind farm site to act cumulatively with other agricultural forestry activities in terms of habitat loss and disturbance to whooper swan.

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 the 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, if 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 focus was on whooper swan to establish if the local wintering flock are moving over the proposed wind farm 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, it is prudent 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.

Addendum: Additional measures to be included include section 4.4.2 of the NIS and section 8.6.3.5 of the Biodiversity chapter.

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 of new technologies to facilitate smart curtailment (e.g. radar), to identify whooper swan approaching the proposed wind farm site and trigger the immediate shut down of all turbines, shall be agreed in advance with Cork County Council and NPWS.*

The residual effects to whooper swan remain unchanged within Chapter 8 (Biodiversity) of the EIAR and the NIS.

Residual impacts to birds (including whooper swan) Section 8.7.6 Chapter 8 (Biodiversity) of the EIAR

It is considered that with the implementation of mitigation, the proposed wind farm development will have a Slight-Imperceptible Reversible Residual Impact on birds.

NIS conclusion in relation to Kilcolman Bog SPA (004095)

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 proposed development will not adversely affect the integrity of the Kilcolman Bog SPA (004095) or any other European site.

4. ITEM 3 - NPWS

4.1 NPWS – Item 3 (a)

(a) *A detailed reasoned assessment of the mitigation measures proposed to avoid silt, hydrocarbon, fresh cement and bentonite contamination of the streams upstream of the Awbeg system part of the Munster Blackwater cSAC is required. The structure, capacity and other details of silt settlement equipment, ponds, etc. must be described. The in-combination effects of the timing of works with regard to drainage maintenance works in downstream stretches of the river (carried out by Cork County Council) should also be assessed. The reason is to ensure a complete assessment of the impacts of construction (and decommissioning) on the downstream cSAC.*

Response

In response to item 3(a),

See response to item 2(d). With regard to the “structure, capacity and other details of silt settlement equipment, ponds etc”, these are given in the drawings P2359-0501 series. which can be found in Appendix 6. Please note that these drawings were included in the original planning application and do not constitute any amendments or additions to the original application.

4.2 NPWS – Item 3 (b)

(b) *A dawn and dusk (incl. at least l hr dark-side) survey of the wind turbine areas for commuting whooper swans, carried out by competent ornithologists during the wintering period. The reason this is recommended is to properly assess potential collision risk of an Annex I species.*

Response

See response to Section 3.7 Blackwater River (Cork/Waterford) SAC – Items 2 (g) and 2 (h).

4.3 NPWS – Item 3 (c)

(c) *Consideration should be given to redesign of the proposal with a greater emphasis on adherence to the mitigation hierarchy and 'mitigation by avoidance' of semi-natural habitats of high value and local importance to biodiversity. This is particularly relevant in the context of the local landscape which is dominated by intensive agriculture and highly improved/modified habitats of low biodiversity value. Any redesign of the proposed development should also adhere to the principle of 'no net loss of biodiversity' in accordance with recent and current EU Biodiversity Strategies and recognised best practice.*

Response

See response to Section 2.1 Habitats and Species Item 1 (a).

4.4 NPWS – Item 3 (d)

(d) *Particular consideration should be given to moving the location of T02 to an area of lower biodiversity value than mentioned above. The reason for this is the local biodiversity value of species-rich semi-natural grassland. Also proposals for the management of such grasslands to conserve and enhance, these habitats within the proposed wind-farm study area are recommended.*

Response

Due to suitability of the proposed location in terms of wind energy yield and separation from residential buildings, it is not feasible to move the location of T02. T02 is in an area of wet grassland [wet meadow]. Across the site, 1.08ha of this habitat will be lost, that is 9.6% loss of this habitat type onsite. The impact of this habitat loss will be permanent slight, see Table 2-1. Furthermore, the proposed felling buffers around T02, involving the removal of mixed broadleaved plantation woodland, will provide a potential new area for this grassland to spread into. Additionally, intensified agricultural land will be seeded and maintained as wildflower meadows, enhancing the species-rich semi-natural grassland onsite. The management of these grasslands are outlined in the HSMP, Appendix 1.

4.5 NPWS – Item 3 (e)

(e) *Clarification that trained dogs will be used in bat fatality monitoring, as opposed to being optional*

Response

Trained dogs will be used in bat fatality monitoring, as these are more efficient and faster than humans in locating carcasses, achieving more robust results (NatureScot 2022 – Bats and onshore wind turbines – survey, assessment and mitigation).

4.6 NPWS – Item 3 (f)

(f) *Clarification of whether there was sufficient experienced survey of the area considered to be used by hen harrier as a roost site within the wind-farm, in order to detect how frequently it was U:sed*

Response

See response from Section 2.7 Hen Harrier – Item 1 (g)

5. ITEM 4 – NOISE

5.1 Noise – Item 4 (a)

(a) *A noise contour map detailing the study area relative to the proposed turbines should be submitted for the purpose of clarity. In addition the respective locations and distances of all noise sensitive receptors within 500m, 1000m,1500m and 2000m of the turbines should be presented and quantified, with all occupied, unoccupied and permitted dwellings identified. Any dwellings that have a specific interest in the project and are associated with it should also be highlighted. For the purpose of completion the number of receptors that were identified as farm buildings etc and were not considered as part of the impact assessment and not assessed against the derived daytime and night time noise levels should also be quantified and indicated*

Response

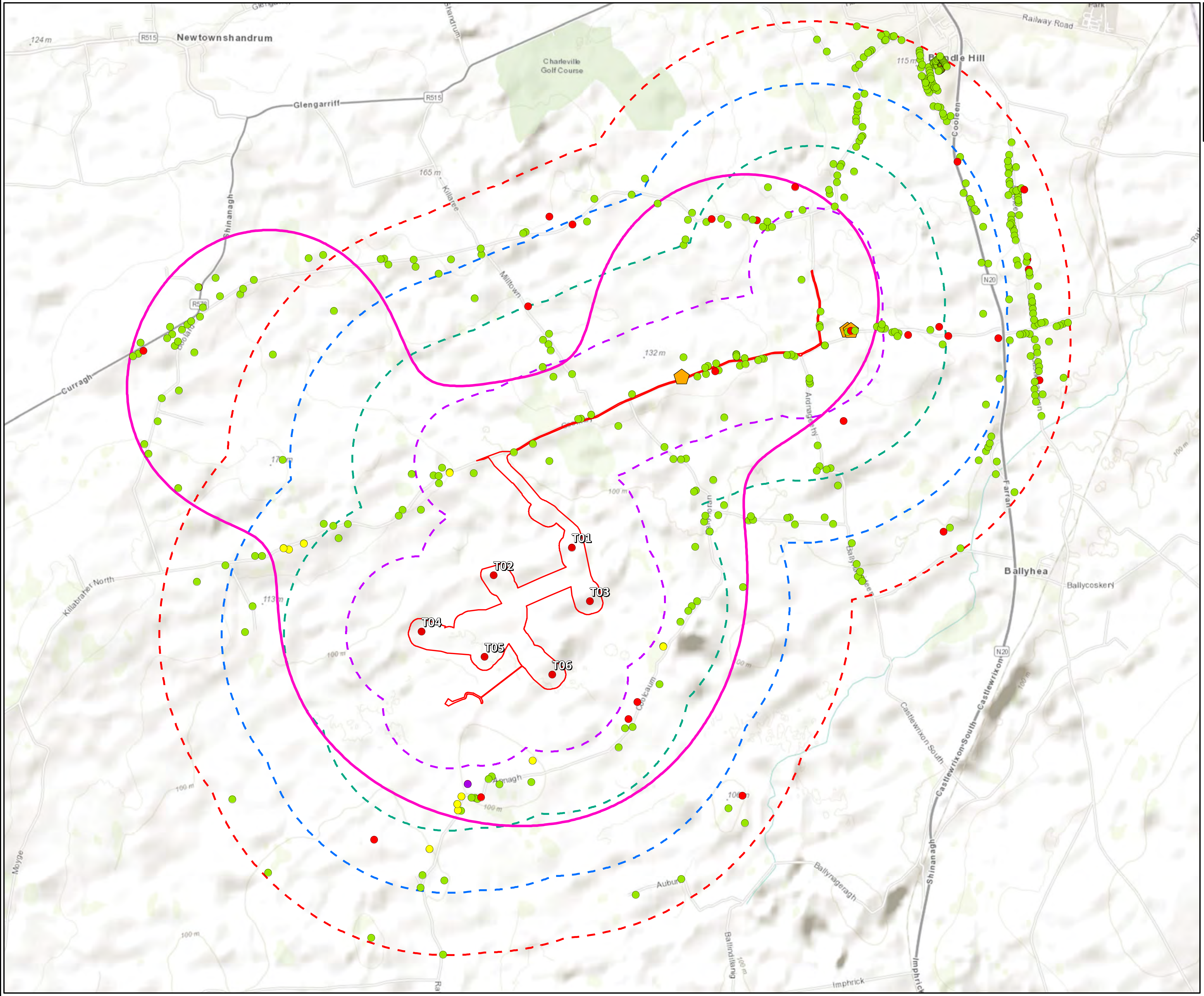
Please note that the following response contains some additional information to that which was contained in the original EIAR. Newly permitted residential dwellings have been added into the assessment.

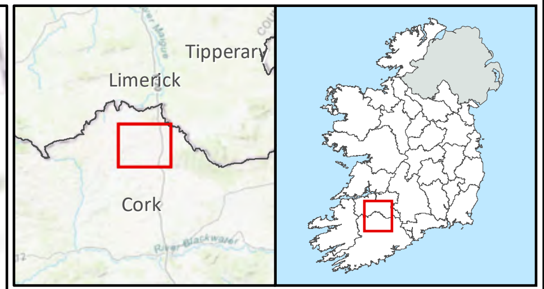
It is not possible to generate a true contour map as the prediction methodology includes a Valley Correction of +3dB where noise propagation occurs across a valley or a concave profile. This correction, where applied, is added for certain Turbine/Receiver combinations to take account of ground reflection effects as detailed in the IOA Good Practice Guide to the Application of ESTU-R-97 for the assessment and rating of wind turbine noise. A contour map is provided without the Valley Correction. Note that the actual noise level for assessment purposes are identified as been between 0-3dB higher than the contour presented, depending on the ground profiles and Valley Correction. Predicted noise levels, including valley corrections are presented in Table 7.5.1 of Appendix 7.

The noise sensitive locations are identified based on Eircode information. These are classed as residential, building (i.e. commercial and residential) or commercial. Commercial properties are not normally considered noise sensitive, unless they are classed as a noise sensitive location, e.g. a hospital, school or hotel. It is not usual to class farm buildings noise sensitive locations if these were not classed as residential or buildings, under the Eircode system. Details of Eircode information and distances to the closest turbines are provided in Appendix 7.1.

However, planning applications near the site have been reviewed. Only new residential developments have been considered. Proposed extensions to existing properties have been excluded in addition to farm building that are not considered noise sensitive. Three applications have been identified as being potentially affected by the development. The application numbers are 048126, 066089 and 225190. These locations are closer to the Rathnacally Windfarm and this is the main noise source. Noise from the proposed windfarm at these locations are within the windfarm noise limits.

Path: R:\Map Production\2022\P22-085\Workspaces\P22-085_GIS_Fig5-1_Noise_Contour_Map_A3.mxd





Legend

- Site Boundary
- 500m Distance Band
- 1km Distance Band
- 1.5km Distance Band
- 2km Distance Band
- 35dbBuffer
- Proposed Turbine Layout
- Permitted Developments

Receptors

- Occupied
- Unoccupied
- Occupied, within project landholding
- Unoccupied, within project landholding

TITLE:	Noise Contour Map		
PROJECT:	Annagh Wind Farm, Co. Cork		
FIGURE NO:	5-1		
CLIENT:	EMPower		
SCALE:	1:30000	**REVISION:**	0
DATE:	01/11/2022	**PAGE SIZE:**	A3

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N S E W

0.5 0.25 0 0.5 Kilometers

5.2 Noise – Item 4 (b)

(b) *The referenced noise sensitive receptors that each background noise monitoring location is considered to be representative off should be quantified and also shown on a suitably scaled map. A clear trail should be presented :and evident between the selected background noise monitoring locations, the clusters of identified sensitive receptors they are deemed to be representative off and the dwellings within such clusters with the highest predicted noise levels*

Response

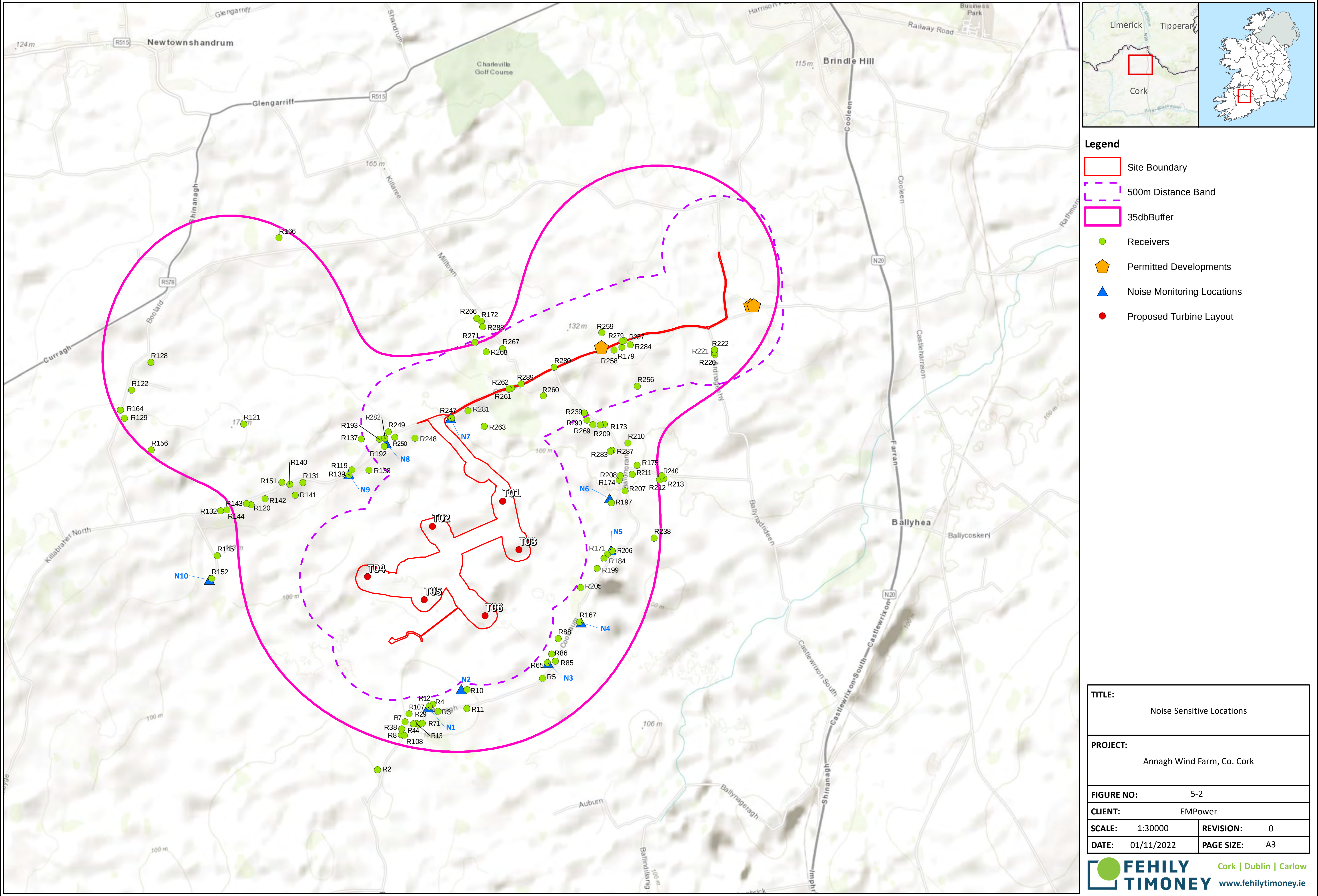
Please note that the response to this item constitutes clarification only and does not amend or change the information contained in the original EIAR.

The noise monitoring locations were chosen to be representative of the closest receptors to the proposed windfarm. The table below summarises the noise monitoring locations and the adjacent properties that the monitoring location represents. Reference to the noise sensitive locations can be seen in Figure 5.2. The noise monitoring locations are presented in Figure 7.2 of the original EIAR.

Table 5-1: Noise monitoring locations and representative locations

Noise Monitoring Location	
N1	This represents locations R4, R12, in addition to properties along road, outside the village.
N2	This represents the single property R10
N3	This represents properties south east of the development, approximately 5No properties
N4	This represents a single property south east of site (R167)
N5	This represents properties along the road south east of proposed development
N6	This represents properties to east of the proposed site, the closest of which is R197. It also represents properties northwest of the site, along road
N7	This represents properties isolated properties at R247, R281 and R263 to the north east of the development
N8	Group of properties north of development (Noise sensitive locations R137, R193, R282, R249, R250, R282 and R248)
N9	This represents properties north of the proposed development, the closest of which are noise sensitive locations R139, R138, R119
N10	This represents two properties north west of the site at R152, and R145

Path: R:\Map Production\2022\P22-085\Workspaces\P22-085_GIS_Fig5-2_Noise_Monitoring_Locations_and_representative_locations_A3.mxd



Legend

- Site Boundary
- 500m Distance Band
- 35dbBuffer
- Receivers
- Permitted Developments
- Noise Monitoring Locations
- Proposed Turbine Layout

Kilometers
0.5 0.25 0 0.5

TITLE:	Noise Sensitive Locations
PROJECT:	Annagh Wind Farm, Co. Cork
FIGURE NO:	5-2
CLIENT:	EMPower
SCALE: 1:30000	**REVISION:** 0
DATE: 01/11/2022	**PAGE SIZE:** A3

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5.3 Noise – Item 4 (c)

(c) *It is submitted as per Section 7.4. l that in some cases, the prevailing background noise is higher at lower wind speeds and in keeping with Institute of Acoustics guidelines the lowest derived background noise level is adopted for all wind speeds where this derived minimum occurs. Any explanations why this may have occurred should be submitted by the applicant having regard to any inspections/observations undertaken during the course of the monitoring and analysis undertaken*

Response

Please note that the response to this item constitutes clarification only and does not amend or change the information contained in the original EIAR.

The Institute of Acoustics Good Practice Guide to the Application of ETSU-R-97 addresses this specific issue in section 2.9 of Supplementary Guidance Note 2: Data processing and derivation of ETSU-R-97 Background curves. The process for deriving the prevailing background noise curve involves using lines of best fit to represent the background data (the guidance note states normally a third order polynomial is considered appropriate). This can occasionally result in the data at lower windspeeds being higher. Note that the best fit curve is selected and often this may result in a better fit to data around the mid windspeeds. The guidance notes states that “where a noise curve increases at lower wind speeds then levels should be fixed at the minima.” This is the approach adopted for the Annagh Windfarm assessment and is the most conservative approach for developing noise limits.

5.4 Noise – Item 4 (d)

(d) *No prevailing background noise level data and corresponding curves appears to have been submitted for night-time periods. This should be clarified.*

Response

Please note that the response to this item constitutes clarification only and does not amend or change the information contained in the original EIAR.

The night time criteria are absolute levels and not dependent on the night time prevailing noise levels. The nighttime data is presented in Appendix 7.2 for completeness.

The number of datasets, measured at nighttime, at each integer wind speed are shown in table 5.2 below. Wind speed ranges which did not satisfy the criteria of at least 5 data points in any 1 m/s wind speed bin are greyed out.

The prevailing nighttime background noise level in dB L_{A90} relative to standardised 10 m height wind speeds are provided for each monitoring location as per the requirements of the survey. The prevailing background noise level is plotted as a solid line at each monitoring location. In all cases, the highest order of polynomial used is a fourth order polynomials provided lines of best fit to the scatter data.

Locations N7 and N9 have higher noise levels at low windspeeds than the other locations. This may be due to another noise source in the area. Location N9 was next to a farm with livestock, including goats and chickens, so possibly this contributed to the night noise level.

Finally, the prevailing nighttime background noise levels are presented Table 5.2 based on the best fit curves for the night noise data.

Table 5-2: Number of Valid Datasets: Noise Monitoring Locations N1 – N10 –Nighttime

Wind Speed (at standardised 10 m height), m/s	Valid Datasets									
	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10
0	0	0	0	2	0	10	10	9	10	8
1	29	30	0	38	30	131	131	118	131	113
2	52	52	9	64	53	129	141	124	139	117
3	83	85	26	78	86	132	161	134	161	139
4	84	86	45	62	87	76	103	82	101	93
5	68	68	44	43	69	51	95	64	93	79
6	86	88	38	37	88	36	69	39	77	68
7	63	73	29	12	73	14	38	29	38	38
8	40	46	34	12	46	12	43	38	41	40
9	32	35	24	10	36	10	14	13	14	14
10	28	37	13	4	38	4	5	5	5	5
11	8	8	5	0	9	2	4	3	3	3
12	3	3	5	0	3	13	17	15	15	15
13	12	12	3	0	12	7	8	7	7	7
Total Number of Data Points	588	623	275	362	630	627	839	680	835	739
	Did not satisfy the criteria of at least 5 data points in any 1 m/s wind speed bin									

Table 5-3: Prevailing Background Noise – Daytime Amenity Periods

Location	Prevailing Background Noise $L_{A90,10min}$ (dB) at Standardised 10 m Height Wind Speed (m/s)										
	2	3	4	5	6	7	8	9	10	11	12
N1	19.7	21.0	23.2	26.1	29.4	33.1	37.0	40.8	44.5	47.8	50.5
N2	20.8	21.4	23.6	27.2	31.7	36.7	42.0	47.1	51.7	55.3	57.8
N3	19.5	19.6	20.9	23.3	26.4	30.1	34.0	38.0	41.8	45.2	47.9
N4	21.5*	21.5	21.8	23.5	26.4	30.2	34.6	39.3	39.3§	39.3§	39.3§

Location	Prevailing Background Noise $L_{A90,10min}$ (dB) at Standardised 10 m Height Wind Speed (m/s)										
	2	3	4	5	6	7	8	9	10	11	12
N5	21.1	21.0	21.9	23.7	26.1	29.2	32.6	36.3	40.0	43.8	47.3
N6	23.5*	23.5	25.6	29.9	35.0	39.8	43.0	43.5	43.5§	43.5§	43.5§
N7	26.3*	26.3	26.7	28.1	30.3	33.0	36.2	39.6	43.2	46.7	50.0
N8	20.9	21.0	22.4	24.7	27.9	31.5	35.5	39.5	43.3	46.7	49.4
N9	30.8	30.8	31.0	31.8	33.2	35.4	38.4	41.9	45.7	49.4	52.5
N10	22.1	22.2	23.6	26.3	29.7	33.8	38.3	42.8	47.2	51.1	54.4

* - lowest derived background noise level is adopted for all wind speeds below where this derived minimum occurs. For example, at monitoring location N9 the lowest derived background noise level occurs at a wind speed of 4 m/s. The trend line fitted to noise data showed a higher noise level at 2 and 3 m/s. Therefore, using this criterion, the noise level at 2 and 3 m/s has been assumed to be equal to that of the noise level at 4 m/s.

§ - noise level restricted to the highest derived point

5.5 Noise – Item 4 (e)

(e) It is submitted as per section 7.5.3.1 that the predicted noise levels from the proposed project are below the daytime and nighttime noise levels except at receptor R167 during daytime periods at a wind speed of 6 m/s with mitigation detailed as per Section 7.6.2. This does not appear to correlate with the dataset presented in Table 7.15. This should be reviewed and clarified. A further overall review of the submitted data should be undertaken to ensure that there is a clear trail and consistency between the computer-generated results and the final conclusions.

Response

The information is presented in Table 7.15, is the noise level without mitigation. As the noise exceeds the criteria only at one windspeed, details of the noise with mitigation are presented in Appendix 7.7 in Table 7.6.1.

6. ITEM 5 – ENGINEERING

6.1 Engineering – Item 5 (a)

(a) *Applicant is to indicate minimum sightlines of 90m in both directions at 4.5m setback from nearest roadedge for Northern entrance 2. No obstructions are to be within this sight triangle. This is to be indicated on site layout for assessment.*

Response

Please note that the response to this item constitutes an amendment to the original EIAR.

In response to item 5(a), the site layout drawing (P2359-0100-0004) has been amended to indicate minimum sightlines of 90m in both directions at 4.5m setback from nearest roadedge for Northern entrance 2. An additional note has been included in the drawing indicating that there is to be no obstructions within this sight triangle.

6.2 Engineering – Item 5 (b)

(b) *Applicant is seeking permission to provide additional entrance immediately to East of existing entrance (Northern entrance 2). Applicant is to provide reasoning for new entrance at this location. Applicant is to submit how to provide minimum sightlines of 90m in both directions at 4.5m setback from nearest roadedge keeping in mind rear & forward sightlines in particular. No obstructions are to be within this sight triangle. This is to be indicated on site layout for assessment.*

Response

Please note that the response to this item constitutes clarification only and does not amend or change the information contained in the original EIAR.

In response to item 5(b), the additional entrance immediately East of the existing entrance (Northern entrance 1) is to facilitate the turbine delivery route. Large components associated with the wind farm construction will be transported to site via Northern entrance 1. The large entrance bellmouth is required for abnormally loaded vehicles to negotiate the turn into the site. The bellmouth will combine Northern entrances 1 and 2 into the main site entrance for the wind farm.

Post-construction, the applicant considers this entrance design will enhance safety and forward visibility for local road users travelling on the L1322 local road. The 'S' bend near the proposed main wind farm entrance has poor forward visibility for road users due to the tree canopy and vegetation as shown in Figures 6-1 and 6-2 below. The areas marked in red are the approximate extents of entrance clearing to construct the main wind farm entrance. On completion of the site entrance clearing, forward visibility at this bend will increase significantly.

Figure 6-1: Forward Visibility on L1322 looking West

Figure 6-2: Forward Visibility on L1322 looking East

The site layout drawing (P2359-0100-0004) has been amended to indicate minimum sightlines of 90m in both directions at 4.5m setback from nearest road edge for Northern entrance 2. An additional note has been included in the drawing indicating that there is to be no obstructions within this sight triangle.

6.3 Engineering – Item 5 (c)

(c) Applicant is intending to access site from South off the L5528 which is not suitable for construction traffic due to number of bridges along route. Also access of public road is on a bend with restricted forward and rear sightlines. All access to site is to be via the Northern access only.

Response

In response to item 5(c), the southern access point will be used for construction of the met mast only. Section 13.4.2.1 of the EIAR states that "*This entrance will be used for the construction and operation of the 100m met mast only and will not be used for construction of other elements of the project*". Construction of the met mast will be of very low impact and short duration relative to the construction of the wind turbines. This southern access point is in closer proximity to the met mast location and thereby minimises tracking across the site. It will not be used by any construction traffic associated with construction of the wind turbines and therefore impacts are expected to be not significant. Construction traffic for construction of the wind turbines will be exclusively via the northern access point as illustrated on Figure 13.1 of the EIAR.

6.4 Engineering – Item 5 (d)

(d) Applicant is to liaise with local companies on road to site to agree delivery times so as the road edges will not be damaged by two HGV's passing on regular basis. Copy of same to be submitted for assessment.

Response

Please note that the response to this item constitutes clarification only and does not amend or change the information contained in the original EIAR.

In response to item 5(d), as detailed in section 4 of the CEMP: *"The local authority may impose restrictions on the use of some local roads. These will be agreed in liaison with Cork County Council prior to construction and will be outlined in this section, as well as specific signage requirements for construction works. Some of the existing local roads are narrow, and to this effect, one-way delivery and access route systems may be employed to mitigate against unsuitable two-way construction traffic. Using local roads is unavoidable, however, introducing a one-way system where necessary and restricting construction traffic access to a small number of roads will minimise disruption to the local community."*

FT have identified a number of commercial properties on local roads near the proposed wind farm site. These companies will be contacted prior to construction in order to make traffic arrangements which will prevent damage of road edges. Contact details have been collected for: Dawn Meats Charleville; O'Brien Refrigeration and Catering Equipment; Williams Poultry and Macs School of Motoring.

These companies and any additional companies identified at the time of construction will be contacted prior to commencement of construction on site.

6.5 Engineering – Item 5 (e)

(e) Prior to development commencing a Road conditioning survey is to be undertaken and submitted to Planning Authority for assessment.

Response

The requirements for a Road conditioning survey prior to the commencement of development is noted and agreed. The applicant is happy to accept a condition of planning for same.

6.6 Engineering – Item 5 (f)

(f) Prior to development commencing the developer shall submit and agree a detailed traffic management plan for the construction phase of the works. This will detail how all deliveries and site traffic and it will be managed and controlled.

Response

The requirements for a detailed traffic management plan prior to the commencement of development is noted and agreed. The applicant is happy to accept a condition of planning for same.

6.7 Engineering – Item 5 (g)

(g) Applicant to provide details of supply of water to compound. Applicant is to liaise with Irish Water on ducting installation proposal and seek approval of same for assessment.

Response

In response to item 5(g):

Please note that the response to this item constitutes clarification only and does not amend or change the information contained in the original EIAR.

Piped water mains are not proposed for the development.

As detailed in 10.6.6 of the EIAR "*During the construction phase, it will be necessary to provide bottled water for potable supply for the construction personnel. A water tanker will supply water used for other purposes*."

Section 10.6.5 of the EIAR mentions *"The runoff from roofs will be collected to a rainwater harvesting tank." This is expanded in the surface water management plan (SWMP) which is section 4.3.6 of the CEMP. The relevant text in the SWMP reads: "In accordance with SuDs best practice, it is proposed to include rainwater harvesting tanks within the surface water system which will comprise of a filter, an underground tank and a pump. The system allows rainwater to run down the roof and into the guttering and downpipes in the normal way before passing through the filter, which removes any leaves and debris. Rainwater is then stored in the underground tank for reuse."*

Therefore, water supply at the site will be a combination of potable water supplied by a water tanker and water for non-drinking purposes (e.g. flushing toilets) to be collected via rainwater harvesting. No piped water mains will be required for the site.

In the case where Irish Water mains are encountered during trenching and ducting operations (laying the cable), the following options for construction may be used:

- Piped Culvert Crossings – Where sufficient cover is available, the cable ducts will be laid above the culvert with a minimum separation distance, 300mm to be agreed with the local authority and ESBN within the parameters assessed in the EIAR.
- Piped Culvert Crossings - Where sufficient cover is not available, the cable ducts will be laid under the culvert with a minimum separation distance, 300mm to be agreed with the local authority and ESBN within the parameters assessed in the EIAR.
- Flatbed Formation over Culverts - where the cable duct is to be installed over an existing culvert where sufficient cover is not available, the ducts will be laid in a much shallower trench the depth of which will be determined by the location of the top of the culvert. The duct will be laid in this trench in a flatbed formation over the existing culvert and will be encased in a reinforced concrete surround as per ESBN specification within the parameters assessed in the EIAR.

A Summary of Standard Specification for ESB Networks 38kV Ducting is contained in Appendix 3 of the CEMP. When crossing existing culverts or buried services, the following methodology will be employed:

- The general method of trench construction will follow the procedure outlined above for Installation of cable ducting.
- The service infrastructure shall be located and marked by an engineer in accordance with the Code of Practice for Avoiding Underground Services.
- All services will be safeguarded and protected in accordance with the asset owner's specifications.
- Within 500mm of the existing service, hand digging will be employed to expose it.
- Cable ducts shall pass over or under the existing service, depending on the depth of the service and other constraints.
- A minimum separation distance of 300mm shall be maintained between the cable ducts and the existing service.
- Existing services within the trench shall be left in the same condition as they were found. Any issues shall be reported to the asset owner immediately.

6.8 Engineering – Item 5 (h)

(h) Applicant is to submit details of management of wastewater from compound office/canteen

Response

In response to item 5(h):

Please note that the response to this item constitutes clarification only and does not amend or change the information contained in the original EIAR.

As detailed in 10.6.5 of the EIAR: *"A foul system is proposed within the station to cater for the wastewater generated in the welfare facilities. The foul system will consist of an underground pipe network, foul manholes and a 9 m3 full retention foul effluent storage tank. The tank will have an associated high-level alarm which will be connected to the control building. A foul holding tank to be maintained and emptied quarterly is the most preferable means of treating and disposing of foul waste from the site. The licensed contractor charged to empty and dispose of the waste will be the holder of a valid waste collection permit."*

As detailed in 10.6.6 of the EIAR *"Portaloo and/or containerised toilets and welfare units with storage tanks will be used to provide toilet facilities for site personnel during construction" and, "All portaloo units located on site during the construction phase will be operated and maintained in accordance with the manufacturer's instructions and will be serviced under contract with the supplier. All such units will be removed off-site following completion of the construction phase."*

As detailed in 3.1.4.1 of the CEMP, "*A wastewater holding tank will be provided outside the substation compound fence line so that it can be maintained where required without requiring access to the substation compound. The wastewater holding tank will be a sealed storage tank with all wastewater transported by tanker off site as required by an authorised waste collector to a wastewater treatment plant. Only waste collectors holding valid waste collection permits under the Waste Management (Collection Permit) Regulations, 2007, will be employed to transport wastewater away from the site. The proposed wastewater storage tank will be fitted with an automated alarm system that will provide sufficient notice that the tank requires emptying. The wastewater storage tank alarm will be part of a continuous stream of data from the site's turbines, wind measurement devices and electricity substation that will be monitored remotely 24 hours a day, 7 days per week. This approach for managing wastewater on site has become standard practice on wind farm sites, which are often proposed in areas where finding the necessary percolation requirements for on-site treatment can be challenging and has been accepted by numerous Planning Authorities and An Bord Pleanála as an acceptable proposal."*

6.9 Engineering – Item 5 (i)

(i) No surface water to be allowed onto public road. Measures to be submitted on new site layout so as not to take place at entrances

Response

Please note that the response to this item constitutes clarification only and does not amend or change the information contained in the original EIAR.

In response to item 5(i), sufficient drainage measures have been considered to ensure no surface water accumulates onto the public road. Please refer to Drawing Number P2359-0100-0004 included in Appendix 6 of this report. The finished ground level of the entrance is **102.3 - metres**.
OSI Contour levels on the L1324 public road to the east of the main site entrance are **105 - metres** rising to **110 - metres** to the east. Any surface water runoff from the east is expected to flow into the site and collect in the roadside drainage network provided. The first 150 -metres of internal access track from the main site entrance is at a finished ground level of **101 - metres** sloping down to **100.3 - metres** as surface water runoff flows into the site. The drainage network conveys the flow to stilling pond with diffuse outflow (SP22).

Contours to the west of the main site entrance are **101 – metres** rising to **105 - metres**. The roadside drainage network extends to the main entrance bell-mouth and road edge along the western side. Surface water runoff from the site flowing west is expected to drain into the internal roadside drains provided. Mitigation measures previously submitted in Chapter 13 section 13.7.1 of the main EIAR include a road sweeper commissioned during construction to prevent soil/dirt generated from construction works being transported onto the public road. When necessary, a road sweeper will be used to maintain the public roads in a clean condition during the construction activities of the project.

Site Layout Drawing number P2359-0100-0004 has been revised to include an ACO drainage channel traversing the bell-mouth entrance parallel to the public road. The channel will be installed such that the top grating is flush with the finished ground level and the outlet is below the level of the channel. The channel will connect to the roadside drain and convey flows into the site. This drainage channel will prevent water ponding at the main site entrance.

6.10 Engineering – Item 5 (j)

(j) Applicant is to submit a flood risk assessment for site.

Response

In response to item 5(i), a Flood Risk Assessment has been completed for the site and is presented as Appendix 10.2 of the EIAR.

6.11 Engineering – Item 5 (k)

(k) Applicant is to provide details of agreement with the ESB that will be allowed to connect to the ESB station at Rathnacally Charleville to East of site.

Response

In response to item 5(k), the planning application seeks consent for the laying of cables up to the fence of the ESB station at Rathnacally Charleville. This is the expected point of connection to the national grid for Annagh Wind Farm. Whilst preliminary assessments have been carried out on the capacity of the station to accommodate the development and preliminary discussions have been undertaken with ESB, it will not be until the proposed development has planning consent in place and is successful in any forthcoming electricity auction under the RESS scheme that connection will be allowed to this node. This process is similar to all renewable energy projects in the Country.

6.12 Engineering – Item 5 (l)

(l) Applicant to submit details of public consultation with residents along entire access route for application.

Response

In response to item 5(l):

Please note that the response to this item constitutes clarification only and does not amend or change the information contained in the original EIAR.

As detailed in 5.4 of the EIAR, Community consultation events were organised and prepared by the developer. EMPower are committed to developing wind energy projects in a socially sustainable manner where the local community's views are taken on board and integrated into the project's design. EMPower began community consultation in late 2019 at the outset of the proposed development during the feasibility stage. This aimed to involve the community from the outset of the proposed development with an objective to maintain inclusion and transparency throughout the development process.

Community engagement was conducted by members of the development team who acted as the Community Liaison Officers (CLOs). Their role was to raise awareness of the proposed development in the local community, engage with individuals in the area, distribute project information and updates, and invite feedback from the public. The following paragraphs summarise the community consultation which took place throughout the feasibility stage and pre-planning process of the Annagh Wind Farm.

In order to engage with local residents while observing public health guidance and restrictions surrounding COVID-19, alternative consultation methods were employed including online webinars, virtual consultation and information rooms, and distribution of information by email and post.

A report detailing the community consultation is included in Appendix 5.5, in Volume 3 of the EIAR. Materials distributed to the public are included in Appendix 5.3 of the EIAR. In addition to workshops and webinars a project website remains live for the project. The project website and online virtual exhibition can be accessed at: https://annaghwindfarm.ie/

Please note that the turbine delivery route and the cable route form part of the online virtual exhibition. In this sense, the residents along the entire access route are included in the public consultation. In addition to public consultation activities already carried out, the public will be further consulted as part of the road opening license for the cable route. Residents along the turbine delivery route will be made aware of the potential disruptions prior to delivery occurring.

6.13 Engineering – Item 5 (m)

(m) Applicant should forward details of a proposed wheel washing facility and measures to deal with the cleaning of any mud on the road in the vicinity of the entrance on all occasions that deliveries are made to the site during construction before development commences.

Response

In response to item 5(m):

Please note that the response to this item constitutes clarification only and does not amend or change the information contained in the original EIAR.

As detailed in 3.3.1.3 of the CEMP, wheel wash facilities will be located at the site entrance to reduce construction traffic fouling public roads. Wheel wash facilities will be on impermeable hardstanding which will collect all washing and divert to a waste tank. Each wheel wash will come with an additional water tank which will be filled regularly. These units will be self-contained and will filter the waste for ease of disposal. Waste will be removed from each unit and from site by a proposed contractor.

4.3.3.5.2.12 of the CEMP states that this waste will be removed from each unit and from site by a permitted contractor to a licensed facility. Measures will be in accordance with the invasive species management plan (ISMP) (Appendix 5 of the CEMP) and Regulation 49 of the EC (Birds & Natural Habitats) Regulations (2011).

4.3.9 of the CEMP states the following: "*Public roads shall be kept free of mud, dust, spillages and debris from the construction site, construction plant or haulage vehicles. Any necessary measures shall be put in place at the site entry/exit points.*"

Please refer to our response to item 5(i) above that no surface water will gather on the public road due to drainage design.

6.14 Engineering – Item 5 (n)

(n) Applicant is to clarify details of management of wastewater from compound office/canteen.

Response

In response to item 5(n), please see response to item 5(h).

6.15 Engineering – Item 5 (o)

(o) Area office is requesting that this applicant enter discussions with the developer of reg. ref. 17/5799 to utilise the same duct for purposes of their development. Failure to do so will result in refusal from area office on grounds of over intensification of utility servers on a rural road which has no capacity for additional ducting.

Response

In response to item 5(o): it is respectfully submitted that it is not possible to utilise the same duct of another electricity generator. EIRGRID and ESB requirements stipulate that individual generators and technologies must have their own independent connections. In this regard it is understood that no consent is in place for any other grid connection along the public road except for the Annagh Wind Farm proposal.

7. ITEM 6 - EIAR

7.1 EIAR – Item 6 (a)

(a) Having regard to the above items the applicant is requested to submit an updated EIAR with all chapters updated in response to items raised in this further information request.

Response

In response to item 6(a), this further information response responds in full to the items raised in the Further Information request from Cork County Council. This response is an addendum which clearly highlights where additional assessments have been undertaken and additional supporting information provided and refers back to the original EIAR and NIS. This will allow for a comprehensive assessment by Cork County Council.

7.2 EIAR – Item 6 (b)

(b) The applicant is requested to include a clear and comprehensive summary schedule of all mitigations measures and monitoring proposals.

Response

In response to item 6(b): Please find a Schedule of Environmental Commitments and Mitigation measures in Appendix 5 which has been summarised from the EIAR and CEMP. The schedule clearly sets out all additional measures in response to this further information submission, which will be implemented in full.

7.3 EIAR – Item 6 (c)

(c) Chapter 15 notes cumulative impacts. In relation to non-wind energy cumulative effects the two consented solar farms and the proposed M20 are referenced. The proposed development should be assessed further in terms of cumulative impacts of the existing wind farms in the area, permitted solar farms in the area, planned solar developments in the area and the proposed M20 particularly in terms of chapters 8, 11, 15 and 17. Further assessment and updated EIAR chapters including a revised LVIA that takes account of cumulative effects of development in the area should be submitted.

Response

The EIAR has assessed all projects where cumulative impacts could occur. The cumulative impact assessments for Chapters 8, 11, 15 and 17 are summarised below. Please note that these are summaries of the EIAR chapters and do not change the conclusions and findings of the EIAR. Please note however that additional text is provided in responding to the LVIA Cumulative assessment and this should be considered in addition to the Cumulative Impact Assessment section of the LVIA Chapter. The additional text is provided to correct an error in the document which stated that there are no solar farms within 2km of the site, where in fact there are two.

Please note that the additional text does not change the conclusions of the cumulative impact assessment as the solar farms were included in the wireframe montages.

The response to this RFI item is written in subsections for each of the chapters: 8, 11, 15 and 17.

Chapter 8:

In response to item 6(c), below is an extract taken from Chapter 8 (section 8.5.7) of the EIAR, which details the potential cumulative impacts on biodiversity from the proposed development, together with existing wind farms in the area, permitted solar farms in the area, planned solar developments in the area and the proposed M20. Text from this section with regard to farming and forestry has been largely removed in the interest of brevity and to more accurately address the RFI (i.e. with specific regard to wind farms, solar developments and the M20 development; not farming and forestry).

Existing or Proposed Wind farms and Turbines

A number of operational wind farms exist within 20km of the main wind farm site; these are detailed and discussed below. Projects along the GCR and TDR were also considered. Note that planning searches for proposed wind farms were also conducted (see Appendix 1.2 of the EIAR).

There are eight operational wind farms and no proposed or permitted wind farms within 20 km of the proposed development.

The following existing wind farms within 20 km of the proposed development were examined for potential cumulative effects on Biodiversity with the proposed development.

Table 7-1: Existing and permitted wind farms within 20 km of the proposed development

Wind Farm Name	Number of Turbines	Distance and Direction from Proposed Development Site	Status
Rathnacally Wind Farm	2	2.27 km Northeast of site	Existing
Boolard Wind Farm	2	2.36 km Northwest of site	Existing
Knockatalig Wind Farm	6	8.6 km East of site	Existing
Kilberrihert Wind Farm	3	9 km Southwest of site	Existing
Castlepook Wind Farm	14	9.7 km East of site	Existing
Private Turbine	1	12 km Northwest of site	Existing
Kilmeedy Wind Farm	2	16 km Northwest of site	Existing
Dromdeeveen I & II Wind Farm	14	20 km West of site	Existing

The construction phase of Annagh Wind Farm has the greatest potential to contribute suspended solids/pollutants to nearby watercourses due to excavation works and general construction works. All of these developments within 20km of the proposed wind farm site are already operational and so significant cumulative effects to shared watercourses are not likely to occur. This is also the case for habitats, flora and less mobile species of fauna. The potential for cumulative impacts to birds and bats is considered further below.

Large Scale/Infrastructure Projects:

The M20 Cork to Limerick Road Improvement Scheme is currently at the route selection stage (stage 2 of the process). This project will involve the construction of a new motorway and/or the improvement of an existing major route (N20). If this project proceeds it will traverse the catchment of the Blackwater River; the route selection corridor is located 2-4 km east of the proposed site. If construction occurred in parallel with the proposed project, cumulative impacts on aquatic receptors could occur.

Other Renewable Energy Developments

There are two permitted solar farm applications located in close proximity to the proposed wind farm site, and four more within 20km:

1. Fiddane, Co. Cork, Co. Cork (Ref 175799; permitted) (0.1 km from wind farm) (AA Screening report submitted)
2. Ballyroe/Rathnacally, Co. Cork (Ref 204041; permitted) (0.9 km from wind farm) (NIS Submitted)
3. Gortnagross, Co. Cork (Ref 157003; permitted) (18 km from wind farm) (AA Screening Report Submitted)
4. Gibbonstown, Kilmallock, Co. Limerick (Ref 20143; permitted) (15 km from wind farm) (AA Screening report submitted).
5. Ballycullane, Kilmallock, Co Limerick (Ref 17326; permitted) (15 km from wind farm) (AA Screening report submitted).
6. Dromalour, Coolclogh, Kanturk, Co. Cork (Ref 164601; permitted) (20 km from wind farm) (AA Screening report submitted).

A number of grid connection cables for renewable energy projects are also permitted within 20km.

These include applications for grid connections for Rathnacally and Boolard wind farms, which have already been installed, and a consented application to connect the permitted (adjacent) Fiddane solar farm (identified above) to Charleville 110 kV substation.

Other energy projects within 20 km include a change of plan to the control building for Rathnacally wind farm (already constructed) and a 3m high 'lamp post' style relief vent stack servicing the existing above ground natural gas pressure reduction unit with all ancillary services and associated site works in Rathgoggan c. 5.5 km from the wind farm.

In terms of acting cumulatively with the proposed development, the most relevant projects are those that may be constructed at the same time as the proposed Annagh Wind Farm project and are within the same catchment, as this increases the likelihood of impacts acting cumulatively. Solar farms have no moving parts and installation of panels creates minimal disturbance to the ground. No cumulative effects are envisaged in this regard.

Two of the solar farms (in Co. Limerick) are located in a different catchment (Shannon Estuary South) and as such no cumulative effects are likely. The remaining four solar farms are located within the same catchment as the proposed wind farm and GCR (Blackwater Munster).

The conclusion of the AA screening for the Fiddane solar farm was that no significant negative effects are likely to occur.

The grid connection route for this solar farm overlaps part of the proposed Annagh wind farm GCR; it is considered that the two cables will be installed in separate trenches at different times. The Fiddane solar farm grid cables will be installed in the bridge deck at the Rathnacally crossing point, while the proposed Annagh GCR will be routed under the stream bed using HDD. As such, construction-stage cumulative effects are not anticipated. There could be potential for persistent effects arising from siltation to occur, which could be cumulative, prior to mitigation.

The Ballyroe/Rathnacally solar farm NIS concluded that with the mitigation measures proposed, there will not be significant impacts on water quality of nearby watercourses and European Sites. Given the absence of overlapping infrastructure between this and the current project, there is not considered any potential for significant in-combination impacts on aquatic ecology.

The conclusion of the AA screening for the Gortnagross solar farm was that no significant negative effects are likely to occur. This solar farm is located near Mallow in different sub-basins (Ballyclough Stream_020 and Blackwater Munster_120). The conclusion of the AA screening for Dromalour solar farm was also that no significant negative effects are likely to occur. This solar farm is located south of Kanturk a different sub-basin (Allow_070).

As such, Potential cumulative impacts on aquatic ecology are considered **likely slight negative, short-term and in the local context**, in the absence of mitigation.

Cumulative Impacts during construction on key receptors

Potential Cumulative Impacts during construction on key receptors identified are addressed below:

- Designated Nature Conservation Sites;
- Habitats and Flora;
- Mammals (excluding Bats);
- Bats;
- Avifauna;
- Aquatic Ecology and Fisheries;
- Other Species.

Designated Nature Conservation Sites

The main wind farm site is not within the boundaries of any designated nature conservation site. The grid connection route does not traverse any designated nature conservation site. Therefore, there will be no direct impacts to designated nature conservation sites for the main wind farm site or the grid connection.

The potential spread of invasive species recorded along the TDR could result in cumulative impacts with other projects along the route. This is particularly pertinent to TDR Nodes within or in close proximity to designated sites. TDR Nodes 5 and 6 at which Norway maple is present are within the Inner Shannon Estuary – South Shore pNHA. While there is little likelihood of this becoming established in habitats for this pNHA is selected, the potential for the spread of invasive species from other nodes to Nodes 5 and 6 could occur.

Although the TDR and replant lands site both drain towards the Lower River Shannon SAC, and River Shannon and River Fergus Estuaries SPA, no significant indirect hydrological effects are likely to arise from TDR Node works, precluding a cumulative effect in this regard.

There is potential for indirect cumulative effects on the Blackwater River (Cork/Waterford) SAC to arise from wind farm construction and grid cable installation in conjunction with the consented Fiddane Solar Farm grid connection, M20 road improvement scheme (if constructed), agricultural arterial drainage and forestry activities.

There is potential for indirect cumulative effects on the Lower River Shannon SAC, and River Shannon and River Fergus Estuaries SPA to arise from replanting afforestation at Emlagh, Co. Clare in conjunction with agricultural and forestry activities.

Cumulatively there is likely to be a *Long-term Moderate Reversible Cumulative Impact* without mitigation.

No impacts are predicted to any other Nature Conservation sites during construction of the proposed wind farm project and no additive effects due to in combination direct impacts with other existing sources of direct impact are predicted.

An accompanying Natura Impact Statement (NIS) has been prepared for the proposed development and accompanies the EIAR. The NIS addresses potential impacts on European sites resulting from the proposed development. Where European sites overlapping with nationally designated sites were identified being subject to likely significant effects, the conclusions from the NIS for said European sites is shown here.

Relevant European sites in relation to the replant lands are as follows:

A total of four pNHAs in the Shannon Estuary within 15 km of the replant lands (Poulnasherry Bay pNHA, Scattery island pNHA, Beal Point pNHA and Ballylongford Bay pNHA) are overlapped by two European sites which were considered as part of the NIS.

The possibility of significant effects to these European sites were identified:

- Lower River Shannon SAC (002165);
- River Shannon and River Fergus Estuaries SPA (004077).

Relevant European sites in relation to the wind farm, GCR and TDR are as follows:

A downstream pNHA beyond 15 km overlaps a European site which was considered as part of the NIS. The possibility of significant effects to this European site was identified:

- Blackwater River (Cork/Waterford) cSAC (002170)/Awbeg Valley (Above Doneraile) pNHA (000075).

A pNHA within 15 km of the wind farm overlaps a European site which was considered as part of the NIS. The possibility of significant effects to this European site was identified:

- Kilcolman Bog SPA (004095)/pNHA (000092).

The cumulative assessment in the NIS stated that there is potential for cumulative impacts on the Blackwater River (Cork/Waterford) cSAC arising from the M20 road scheme, forestry, agriculture and arterial drainage maintenance in the absence of mitigation.

Habitats and Flora

Potential direct impacts during construction have been identified as land take during construction of the wind farm (including turbine hardstands, compound, substation, sections of new access roads and internal cabling), which will lead to some permanent loss of habitat. Other existing or planned sources of land take in the vicinity of the proposed wind farm may result in cumulative impacts. The potential spread of invasive species recorded along the TDR, bordering the main wind farm site and the along the grid connection could result in cumulative impacts with other projects. Cumulatively there is likely to be a *Permanent Moderate Reversible Cumulative Impact* without mitigation.

Mammals (excluding Bats)

Mammal breeding or resting sites may be cumulatively impacted by other developments which either remove potential breeding sites and foraging habitats (e.g. road construction) or farming and forestry activities which may for example remove Badger setts, Pine Marten breeding sites, Red Squirrel dreys, etc.

Prior to the implementation of mitigation cumulative effects are likely to be *Short-term Moderate Cumulative Impacts* which are potentially *Reversible*.

Bats

Potential cumulative impacts on bats during the construction phase would be as follows:

- Displacement of populations;
- Abandonment of young;
- Mortality.

All wind energy developments within 20 km identified by the planning search are existing wind farms. As such no construction stage cumulative effects are predicted in this regard.

Bat surveys were not completed for the adjacent Fiddane solar farm and assessment was limited to habitat suitability based on a site walkover, in addition to a desktop study. The authors noted that based on the site walkover, common and soprano pipistrelle, Leisler’s bat, brown long-eared bat and Natterer’s bat could be present, with a possibility of other species including roosting Daubenton’s bats. No assessment of potential impacts on bats was included.

Reference to potential tree roost assessments and a bridge emergence survey is made within the EcIA for the Ballyroe solar farm, however no details on the results of these surveys were provided.

Although no assessment of bat activity levels was carried out at these sites, it is considered that these solar developments are unlikely to impact significantly on local bat populations in their own right, due to no direct impacts to bat roosts being identified, and lack of collision risk due to the absence of moving parts at solar PV installations.

Considering that no construction-stage impacts are identified for the nearby permitted solar farms, and that all wind farms within 20 km are existing developments, a *Long-Term Imperceptible Cumulative Impact* is predicted for bats.

Avifauna

As noted above, all wind energy developments within 20 km identified by the planning search are existing wind farms. As such no construction stage cumulative effects are predicted in this regard. Walkover surveys at the adjacent Fiddane solar farm recorded the following species of interest: Kestrel, Buzzard, Swallow, Snipe, Greenfinch, Grey Heron, Mallard and Sparrowhawk. Construction-stage disturbance of Snipe was identified as a possible effect.

Surveys at the nearby Ballyroe solar farm recorded the following species of interest: Whooper Swan, Little Egret, Curlew, Black-headed Gull, Snipe, Grey Heron and Sand Martin. It is noted that a quarry lake is present within this site, and the Awbeg River runs along its border, making it a favourable location for wetland and water birds. Construction-stage disturbance of Whooper Swan was identified as a moderate impact; no other bird species were assessed.

Direct impacts on avifauna during construction are primarily land take related, mainly due to the loss of nesting habitats to key species. In-combination land take is unlikely to result in range loss of any species which frequent the subject site.

Disturbance or effective habitat loss indirectly is more difficult to quantify; especially as most species of birds may habituate to disturbance over time.

Based on the evidence available in addition to the fact that the higher value semi-natural habitats at the adjacent solar farms such as the quarry lake and surrounding area will be retained, any cumulative impacts to birds during the construction phase would be a *Short-Term Not Significant Cumulative Impact*.

Aquatic Ecology

Agricultural practices and potentially commercial forestry activities will continue to occur during the construction activities of the wind farm. While it is difficult to quantify the level of impact with certainty, in-combination effects are considered likely. These would include the increased release of sediments and nutrients to receiving watercourses. In the absence of mitigation, a *Significant Negative, Short-term Cumulative Impact* is considered likely.

Other Species

Frogs are known to occur within the site and may be affected by land take; however, given the amount of displacement and alternative habitats available as well as the retention of semi-natural areas within the adjacent/nearby solar farms, the overall in combination effect is assessed as a *Short-term Slight Cumulative Impact* which is *Reversible.*

Cumulative Impacts during operation on key receptors

Potential Cumulative Impacts during operation on the following are addressed below:

- Designated Nature Conservation Sites;
- Habitats and Flora;
- Mammals (excluding Bats);
- Bats;
- Avifauna;
- Aquatic Ecology and Fisheries;
- Other Species.

Designated Nature Conservation Sites

As no direct or indirect effects are predicted on Nature Conservation sites during the operation of the proposed wind farm then no additive effects due to in combination direct impacts with other existing sources of direct impact are predicted.

An accompanying Natura Impact Statement (NIS) has been prepared for the proposed development and accompanies the EIAR. The NIS addresses potential impacts on European sites resulting from the proposed development.

Where European sites overlap with nationally designated sites, the conclusions from the NIS for said European sites is shown here. The relevant SACs/pNHAs are:

- Lower River Shannon SAC (002165)/ River Shannon and River Fergus Estuaries SPA (004077)/ Poulnasherry Bay pNHA (000065)/ Scattery island pNHA (001911)/ Beal Point pNHA (001335)/ Ballylongford Bay pNHA (001332);
- Blackwater River (Cork/Waterford) cSAC (002170/Awbeg Valley (Above Doneraile) pNHA (000075).

The NIS stated that if the two approved afforestation projects identified were to be carried out at the same time as the proposed project, it is possible that cumulative impacts of sedimentation could arise. It is noted however that mitigation measures have been proposed to avoid such an occurrence.

Habitats and Flora

No cumulative operational stage effects on terrestrial habitats are predicted. See Aquatic ecology below for details of possible effects on aquatic habitats.

Mammals (excluding Bats)

Mammal breeding or resting sites may be cumulatively impacted by other developments which either remove potential breeding sites (e.g. road construction) or farming or forestry activities which may for example remove Badger setts, Pine Marten or Red Squirrel breeding sites etc.

As noted previously, maintenance of the turbine felling buffers may result in disturbance to badger setts. However, given that no land take is predicted for the operational phase, a *Short-term Not Significant* cumulative effect is predicted.

Bats

Potential Cumulative impacts on Bats during operation would be as follows:

- Mortality;
- Reduction of local populations.

No bat surveys were undertaken for the nearest wind farm, Rathnacally wind farm (2.27 km Northeast), as indicated by planning documents for this project.

Bat surveys including a daytime habitat/roost assessment and a nocturnal bat activity survey were completed for the 2-turbine Boolard wind farm (2.36 km Northwest) planning application. The species recorded onsite were Primarily Common and Soprano Pipistrelle, while lower activity was recorded for Leisler's bat, and Brown Long-eared and Natterer's bats were recorded in association with woodland at a ring fort. No bat roosts were observed. A buffer zone of 50m between woodland/hedgerows was specified to mitigate turbine collision and barotrauma risk.

Bat activity surveys were undertaken on three occasions for Knockatalig wind farm (8.6 km East). No bats were recorded, and the habitats at the site (conifer plantation, upland heath and bog) were assessed as being sub optimal for bats.

No bat surveys were carried out for Castlepook wind farm (9.7 km East), and no mention of bats is made in the associated EIS.

No planning documentation for Kilberrihert wind farm (9 km Southwest) is publicly available online. The planning file indicates an EIS was submitted.

An EIS was prepared for Kilmeedy wind farm (16 km Northwest); however this is not available online. Reference is made in the planning report to the EIS noting the presence of derelict buildings at the site which could be used by rooting bats. The planning report also noted that further bat surveys were recommended in the EIS. Other documentation refers to this recommendation meeting with approval, but no further information is available online.

The planning file for Dromdeeveen I & II wind farms (20 km West) indicates an EIS was submitted; however this is not publicly available online.

The single private turbine (12 km Northwest) was a retention application. The planning file contains no reference to ecological surveys being undertaken for this application.

As surveys were not undertaken for Rathnacally wind farm, and limited surveys were carried out for Boolard, the assessment of bat activity levels is not strictly objective as the Ecobat analysis tool was not used as standard practice when these applications were submitted.

However, when the locally observed patterns of activity, species composition, nature of the sites, proximity and ecological connectivity are considered cumulatively, cumulative impacts to bats during the operational phase could give rise to a *Long-Term Moderate Cumulative Impact* prior to mitigation.

Due to the limited information on bat activity available for the more distant wind farms and the fact the Ecobat analysis tool was not used as standard practice when these applications were submitted, it is not possible to carry out a strictly objective analysis. However, when the patterns of activity, species composition, nature of the sites, distance between these sites and the proposed wind farm, and limited ecological connectivity are considered cumulatively, the potential for effects is very low. Therefore, cumulative impacts to bats during the operational phase would be a *Long-Term Imperceptible Cumulative Impact*.

Avifauna

Direct impacts on avifauna during operation which may be cumulatively added to by other existing pressures or proposed developments include collision related mortality, ongoing disturbance/displacement and barrier effect.

Table 7-1: details the wind farm development within 20 km of the proposed Annagh Wind Farm development. A total of eight operational wind farms are present within this search radius.

Flight height or the flight heights which birds habitually use along either migration or local flight paths is an influencing factor in determining whether the proposed development will combine with additional wind farms to produce additive, synergistic or antagonistic effects. These effects include increased Barrier Effect (potentially obstructing migratory flightpaths), increased collision risk (through combined mortality in susceptible species) and increased disturbance to birds utilising foraging grounds whilst on migration.

Bird surveys at the two closest wind farms (Boolard and Rathnacally) (2.36 km Northwest and 2.27 km Northeast) were limited to recording of common farmland species during site walkovers and did not include any flight activity surveys. These sites were not identified as potentially important locations for birds during the hinterland survey for the proposed Annagh wind farm.

Vantage point surveys, transects for breeding and wintering birds, Red Grouse tape lure, a hinterland survey and crepuscular surveys for Nightjar and owls were completed for Knockatalig wind farm (8.6 km East). Diurnal raptors recorded included Sparrowhawk, Merlin, Kestrel, Buzzard and Peregrine falcon, in addition to Hen Harrier which was recorded frequently and observed breeding in the area. Woodcock and Long-eared Owl were recorded during crepuscular surveys.

VP surveys targeting Hen Harrier were completed for Castlepook wind farm (9.7 km East). Information on other breeding birds was collected during these surveys, which covered one year. Previous surveys had also been undertaken for an earlier planning application. The surveys detected one breeding pair of Hen Harrier within the site, and a further 10 pairs between 0-5 km from the site. Peregrine Falcon and Merlin activity was also recorded, while Red Grouse and Nightjar were identified as having the potential to occur in the wider area of the Ballyhoura Mountains.

No planning documentation for Kilberrihert wind farm (9 km Southwest) is publicly available online. The planning file indicates an EIS was submitted. An EIS was prepared for Kilmeedy wind farm (16 km Northwest); however this is not available online. Reference is made in the planning report to common bird species recorded during a site walkover, while the absence of Hen Harrier records in the area is noted. Other documents refer to further bird surveys being recommended however no further information is available.

The planning file for Dromdeeveen I & II wind farms (20 km West) indicates an EIS was submitted; however this is not publicly available online.

The single private turbine (12 km Northwest) was a retention application. The planning file contains no reference to ecological surveys being undertaken for this application.

Considering the distances of these wind farm sites in relation to the Croaghaun study area, the cumulative collision risk on any avian receptors is considered *negligible*. Furthermore, studies have found that local wintering birds will habituate to the presence of turbines and therefore avoid collision (Langston & Pullan, 2003). Cumulative collision mortality combined with other wind farm developments is predicted to be a *Long-Term Imperceptible Cumulative Impact*.

Based on the evidence available in addition to the fact there is a significant distance to the majority of these wind farms, that the closer wind farms are of limited scale (two turbines each) and not immediately adjacent, the lack of migration paths during survey, along with the results of hinterland surveys undertaken for the proposed development, any cumulative impacts to birds during the operational phase would be a *Long-Term Imperceptible Cumulative Impact*.

Aquatic Ecology

Operational wind farms are not normally considered to have the potential to significantly impact on the aquatic environment. The main risk to watercourses is via water quality impacts, when oils and lubricants are used on the site (e.g. infrastructure maintenance). If such substances leaked from the turbines or maintenance areas or were disposed of inappropriately, there is a risk of water contamination and subsequent impacts to aquatic ecology.

However, the likelihood of this occurring is very low and unlikely to be a significant impact considering the low volumes of vehicular traffic involved in typical wind farm operations and the high standards that are implemented on a well-managed site.

Due to the natural 'grassing-over' the drainage swales and revegetation of other exposed surfaces, and the non-intrusive nature of site operations, there is a negligible risk of sediment release to the watercourses during the operational stage. Potential cumulative operational phase impacts on aquatic ecology are considered *Short-term Slight Cumulative Reversible Impacts* and in the *Local Context*, in the absence of mitigation.

Other Species

Frog forage and breed in areas abutting the site and may also do so within the site. As such this species may be affected by land take however given the large amount of displacement and alternative habitats available the overall in-combination effect is assessed as being likely to result in a *Short-term Imperceptible Cumulative Reversible Impacts.*

A similar impact is predicted for the invertebrates present on site.

Cumulative Impacts during decommissioning on key receptors

The potential cumulative effects during decommissioning are considered to be the same as those described for the construction phase of the proposed development."

Chapter 11:

Further in response to item 6(c), below is an extract taken from Chapter 11 (section 11.11) of the EIAR, which details the potential cumulative impacts on human health, population and material assets from the proposed development, together with existing wind farms in the area, permitted solar farms in the area, planned solar developments in the area and the proposed M20. Again, text from this section with regard to farming and forestry has been largely removed in the interest of brevity and to more accurately address the RFI (i.e. with specific regard to cumulative impacts from wind farms, solar developments and the M20 development; not farming and forestry).

The list of all projects considered for the cumulative assessment are included in Appendix 1.2 of Volume 3 of the EIAR. Each of the projects listed in Appendix 1.2 were considered with respect to potential cumulative impacts on Population, Human Health and Material Assets. Projects for which cumulative impacts were not identified were discounted from the impact assessment.

There are two existing wind farms in proximity to the proposed wind farm site. These are the Boolard Wind Farm, approx. 2.3km northwest and the Rathnacally Wind Farm, approx. 2.3km northeast. Furthermore, there are two consented solar farms in proximity to the site, the Fiddane Solar Farm (planning application 196965 Cork County Council), located directly adjacent to the north of the Annagh Wind Farm site, and the Dromin/BallyroeSolar Farm located 1.2km to the southeast of the site (planning application 204041 Cork County Council). The proposed development in combination with the Boolard and Rathnacally Wind Farms and the Fiddane and Dromin Solar Farms will have a cumulative impact on land use in the area, introducing additional renewable energy land use to an established agriculture area. The proposed Annagh Wind Farm will reduce the overall available agricultural land by approx. 4 hectares. This is expected to have a non-significant to slight long-term negative impact on agricultural land availability in the area of the wind farm site.

The cumulative impact of the proposed development in combination with the Boolard and Rathnacally Wind Farms and other wind farms within 20km on Landscape and Visuals is detailed in Chapter 15 of the EIAR: Landscape and Visual. The cumulative visual impact of the proposed development is considered to contribute an additional cumulative effect that is in the order of medium-low, which will reduce to Low in the wider surrounds of the study area. This has potential cumulative impact on residential amenity in proximity to the site. The significant setback distance between the proposed turbines and existing dwellings along with the presence of thick treelines and hedgerows throughout the area will reduce potential cumulative visual impact between the proposed wind farm and the existing Boolard and Rathnacally Wind Farms with respect to residential amenity. Therefore, cumulative visual impact on residential amenity is considered long-term, non-significant and negative.

Cumulative noise impacts have been assessed for the proposed wind farm project cumulatively with the existing Boolard and Rathnacally Wind Farms, in relation to residential amenity. The cumulative predicted noise levels comply with the daytime and night-time noise limits derived using the Wind Energy Development Guidelines 2006, at all sensitive locations. However, for some receptors a new source of noise will be introduced into the soundscape and it is expected that there will be a slight to moderate significance of impact, with dwellings closest to the project with a long-term moderate significance of impact.

The consented Fiddane Solar Farm is located directly adjacent to the north of the Annagh Wind Farm site in the townland of Fiddane. Should the consented solar farm be constructed at the same time as the proposed Annagh Wind Farm there is potential for temporary cumulative impact on human health as a result of construction works which may cause cumulative noise, vibration, dust and increased traffic at nearby dwellings, causing a negative impact on residential amenity.

Due to the sparse population in proximity to the consented Fiddane Solar Farm and the significant setback from the proposed wind farm to nearby dwellings, cumulative impact on human health and residential amenity is considered temporary, negative and non-significant.

The consented Fiddane Solar Farm, located in the townland of Fiddane, utilises the same grid connection route as the proposed Annagh Wind Farm. The works associated with the Annagh GCR are expected to take place over a 2-month period and will be a "rolling" construction site, meaning that these works will not be concentrated in any one area of the route for a long period of time. However, should the Fiddane Solar GCR be installed simultaneously or directly before or after the proposed Annagh GCR, this may have a cumulative impact on nearby dwellings due to prolonged impacts from noise and dust. This has potential to cause a temporary, moderate and negative impact to residential amenity as a result of construction activities.

The electricity generating capacity of the proposed development, in combination with the consented solar farms and existing wind farms in proximity to the Annagh site, will have a long-term significant positive cumulative impact on utility infrastructure and renewable energy resource in the greater area and will have a positive impact on national renewable energy resources as well as reduction in requirements for the use of non-renewable fossil fuels. This will increase national savings on fossil fuel imports.

The proposed M20 motorway project has been examined for potential in-combination effects with the proposed Annagh Wind Farm Project. The route options presented show two potential routes, both located over 3 km east of the Annagh Wind Farm site. There is potential for short-term positive socio-economic benefits to the study area and greater area as a result of the construction phase of both the Annagh Wind Farm and the M20 project due to employment opportunities associated with the construction of the proposed projects. There is also likely to be indirect cumulative impacts in terms of demands placed on local quarries for aggregate and concrete required during the construction phase of the proposed development in combination with the M20 motorway project. This is likely to be a moderate negative impact on non-renewable stone resources.

Chapter 15:

Further in response to item 6(c), below is an extract taken from Chapter 15 (sections 15.10.2 to 15.10.5) of the EIAR, which details the potential cumulative impacts on landscape and visuals from the proposed development, together with existing wind farms in the area, permitted solar farms in the area, planned solar developments in the area and the proposed M20. Again, text from this section with regard to farming and forestry has been largely removed in the interest of brevity and to more accurately address the RFI (i.e. with specific regard to wind farms, solar developments and the M20 development; not farming and forestry).
This RFI response has been prepared by Macro Works Ltd. who undertook the application stage Landscape and Visual Impact Assessment (Chapter 15 of the EIAR).

As noted in the RFI, Chapter 15 does include reference to two consented solar developments and the proposed M20 Limerick to Cork Motorway, which are then discounted as not likely to contribute to significant cumulative impacts in conjunction with the proposed Annagh Wind Farm. This was on the basis that *"these consented and proposed developments are very different in nature, context, scale and location to that of this proposed wind energy development."* However, it should be noted that the consented solar farms are included within the cumulative wireframe images in the submitted photomontage set within relevant views (9 out of 19 views).

Priority is given in section 15.10 to assessing cumulative impacts in relation to other wind farms within the study area. Seven such developments are identified and comprehensively assessed using cumulative ZTV mapping, cumulative wireframe montages and associated assessment table along with a two-page cumulative assessment summary that also includes consideration of proposed forestry replant lands.

In response to the RFI, Macro Works have prepared an updated cumulative development map to further investigate the potential for cumulative impacts, particularly in relation to other forms of development, which were only lightly addressed in the project LVIA (see Figure 7-1 below).

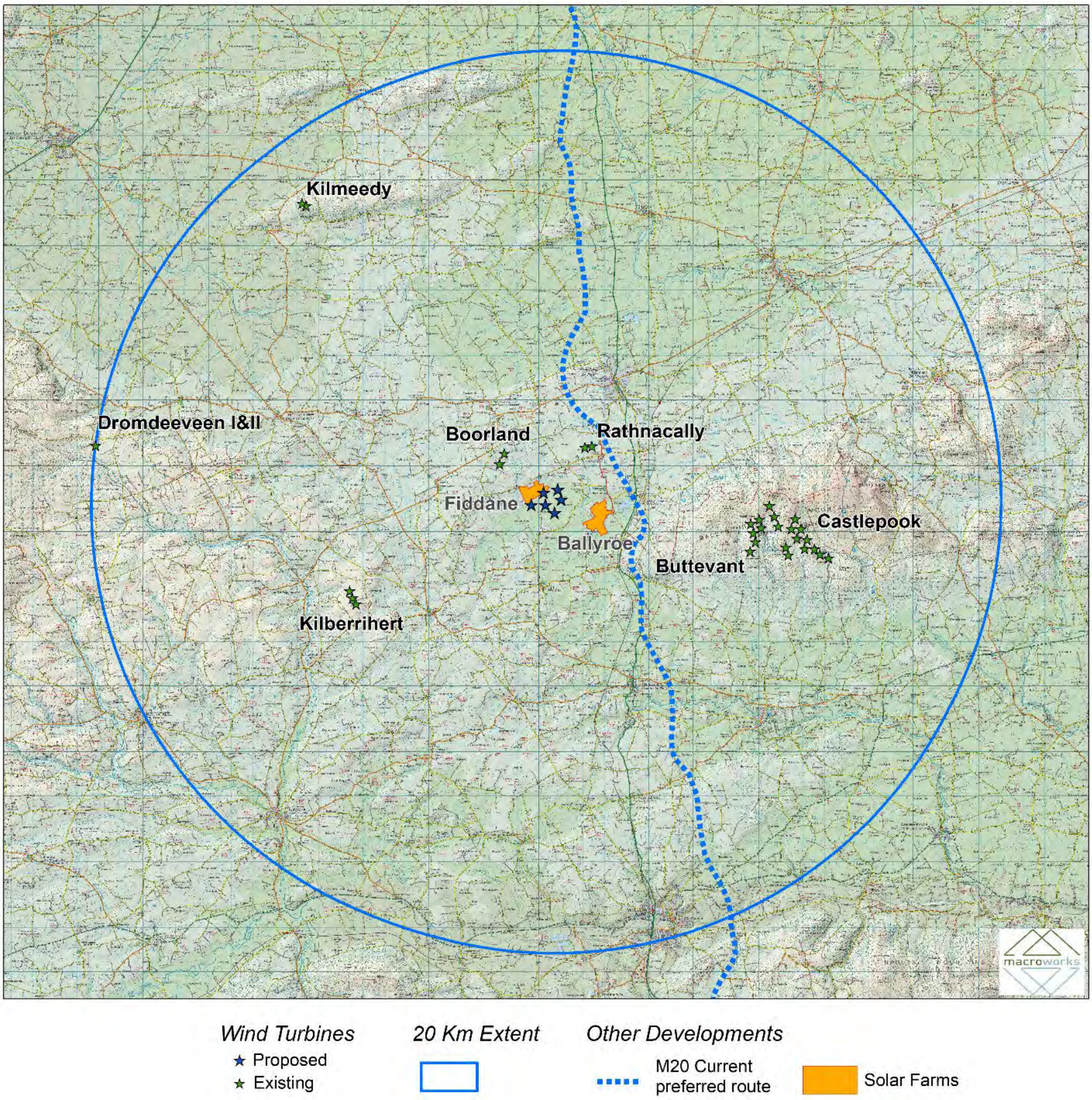

Figure 7-1: Relevant cumulative developments within the Annagh Wind Farm Study Area

Excluding other wind farms, which have been comprehensively addressed in the project LVIA, the key consideration hereunder will be the two consented solar developments and the current preferred route of the M20. It would appear from the photomontage set that the two solar farms that have been included as outlined are the same as those now shown in Figure 1.

Consequently, Chapter 15 was incorrect in stating that all of these developments were beyond 2km of the proposed wind farm or intended only to state that separation distance in relation to the M20 sites (route options).

The Fiddane Solar Farm will be immediately adjacent to the north of the proposed Wind Farm and the Ballyroe Solar Farm will be approximately 1km to the southeast. The current preferred route of the M20, which is subject to public consultation and change, is around 3km to the east at its nearest point. Given the separation distance and its current status, it is not considered that the current preferred M20 alignment will give rise to significant cumulative visual impacts. It will contribute slightly to an overall increase in the scale an intensity of development within the central study area in a landscape character / landscape fabric sense.

The adjacent consented Fiddane solar farm will be visible in localised views of the proposed wind farm and particularly from VP9, which is from the local road to the northwest of the wind farm site where the solar array will be visible in the immediate foreground. A similar scenario occurs for VP10 which is nearby along the same road, but where the solar farm will not be in the immediate foreground field. Of the nine viewpoints where the bare-ground wireframe images indicate there is potential for intervisibility between either of the solar farms (usually Fiddane rather than Ballyroe), only four (VP3, VP4, VP9 and VP10) have potential for noticeable intervisibility with the proposed wind farm. This is because intervening vegetation tends to screen the solar farm/s in all other cases.

Where the proposed wind farm will be visible in conjunction with the either or both of the consented solar farms there will be an obvious thematic relationship, being the generation of renewable energy from natural sources (wind, sun), which is positive in perceptual terms. However, they also represent a distinct intensification of built development within a rural setting, albeit of a rural nature, because wind farms and solar farms are synonymous with rural landscapes in Ireland.

In purely visual terms, the two forms of development could barely be more dissimilar in form – one of tall moving, light tone structures and the other a low ground hugging dark tone surface knitted into the field pattern. This contrast of form avoids the likes of visual clutter and ambiguity, whilst also appearing compatible in terms of adjacent or even underlying land uses - much like turbines rising from farmland or forestry. In this respect there is a strong sense of landscape utility, which is one of the key values of productive rural landscapes like this. There will be as stronger sense of the immediate landscape context shared by the proposed Annagh Wind Farm and consented Fiddane solar farm being transformed into an energy landscape. However, this will be a very localised impact and beyond approximately 500m from the solar farm the landscape character will return to that of a rural landscape that contains a solar development and a wind farm rather than one that is defined by these two forms of renewable energy.

Overall, it is considered that the original LVIA contained within Chapter 15 was light in terms of its consideration of cumulative effects with, in particular, the two consented solar farms. It also potentially misrepresented their distance from the wind farm site in the chapter text (but not the wireframe montages). Nonetheless, the assessment of a Medium-low cumulative impact remains a reasonable one for the vast majority of the study area. Based on the more detailed consideration of cumulative effects contained in this RFI response, it is considered that the cumulative impact is likely to be Medium in the localised area shared by the proposed Annagh Wind Farm and consented Fiddane Solar farm. Though it should be noted that there are also some positive thematic associations between the two forms of renewable energy. In summary, it is still considered that the proposed wind farm will not contribute to significant cumulative effects in relation to other wind farms and other forms of development.

Chapter 17:

Chapter 17 considers the potential for interactions and inter-relationships between one aspect of the environment and another which can result in an impact being either positive or negative, as well as having varying significance. The chapter considers potential significant environmental effects that may occur in terms of the interaction and inter-relationships of Air Quality & Climate, Noise & Vibration, Biodiversity, Land, Soils & Geology, Hydrology & Water Quality, Population & Human Health, Material Assets, Shadow Flicker, Traffic & Transportation, Archaeology, Architectural & Cultural heritage, Landscape & Visual and Telecommunications & Aviation, as a result of the proposed project as described in Chapter 3 of this EIAR. Direct, indirect, cumulative, and interactive impacts were considered during the siting of the proposed turbines and associated infrastructure in order to minimise impacts on the environmental aspects mentioned above. The interactions and inter-relationships of the potential impacts as set out throughout this EIAR are detailed in this Chapter.

Table 17-1 of Chapter 17 provides a matrix detailing the key interactions and inter-relationships between the key environmental aspects of the proposed project, including the wind farm, grid connection route (GCR) and turbine delivery route (TDR). It is important to note that these have already considered cumulative impacts as some have already been assessed in the potential impact section of each chapter of the EIAR.

7.4 EIAR – Item 6 (d)

(d) Chapter 17 should be updated and the interactions and inter-relationships should be reassessed having regard to the further information requested.

Response

In response to item 6(d), we have reviewed Chapter 17 and can advise that there is no change to the interaction chapter of the EIAR as a consequence of this response to the Further Information submission.

7.5 EIAR – Item 6 (e)

(e) Chapter 2 and the selection, consideration and assessment of alternatives should be reviewed and updated having regard to the further information requested.

Response

In response to item 6(e), we have revised Chapter 2 and submit that there are no changes to the site selection process and consideration of alternatives as a consequence of this response.

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

APPENDIX 1

Habitat and Species Management Plan

FEHILY
TIMONEY

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

ANNAGH WIND FARM

HABITAT AND SPECIES MANAGEMENT PLAN

Prepared for: EMPower Ltd.

Date: November 2022

Core House, Pouladuff Road, Cork, Ireland
T: +353 21 496 4133 E: info@ftco.ie
CORK | DUBLIN | CARLOW
www.fehilytimoney.ie

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1. INTRODUCTION

This Habitat and Species Management Plan (HSMP) sets out the implementation of habitat and species enhancement features at the proposed wind farm site. The plan includes both mitigation and enhancement measures, which are clearly differentiated. Additionally, maintenance measures are detailed. All mitigation, enhancement and maintenance measures included in this HSMP will be implemented in full.

The measures contained in this HSMP uphold the principle of no net loss of biodiversity at the local level.

The HSMP includes the following:

- Details of all measures to be taken to protect and enhance habitats of local biodiversity value occurring at the site and the species which utilise the same within the vicinity;
- A description of target habitats and range of species appropriate to the site;
- Appropriate strategies for maintaining existing and targeted habitats and species;
- Information in relation to details of habitat linkages; and continuity of habitat within and outside the site;
- Timelines for new planting and habitat creation;
- Details of ecological oversight and monitoring which shall include a detailed post construction Mammal and Bird Monitoring Programme which shall be in line with appropriate guidelines;
- A map identifying the areas to be managed; and
- The plan shall have cognisance to potential operational impacts on species and habitats as a result of the proposal.

1.1. Study Area

The proposed wind farm site includes lands in the townlands of Annagh North, Coolcaum, Cooliney and Fiddane County Cork. The proposed grid connection will travel along the L1322 upon leaving the wind farm site and terminate at Charleville 110 kV substation in the townland of Rathnacally, County Cork. The site is accessed from the L1322 local road which meets the N20 at Ballyhea, approximately 4km to the east of the proposed site entrance.

The geographic scope of the HSMP is confined to the Land ownership boundary (optioned lands) for the proposed wind farm, and TDR Nodes. It is noted that mitigation measures are restricted to within the wind farm site planning boundary and TDR Node locations.

Enhancement measures are proposed within the planning boundary, and also on the optioned lands beyond the site boundary. Proposed enhancement measures are located in the townlands of Annagh North, Coolcaum, Cooliney and Fiddane listed above.

1.2. Designated Nature Conservation Sites

European (Natura 2000) sites within the potential zone of influence (ZoI) of this project, such as candidate Special Areas of Conservation (cSACs)[1] and Special Protection Areas for birds (SPAs) were also identified as part of the ecological appraisal. A separate report for Appropriate Assessment (AA) screening and Natura Impact Statement were prepared to appraise the potential impact on European sites and, in respect of the NIS only, specify mitigation measures to avoid any adverse effect on the integrity of such European sites.

There were no Annex 1 habitats identified within the proposed development boundary. However, within the Zone of Influence (ZoI) of the Wind Farm area, there is a Candidate Special Areas of Conservation (cSAC), which is protected under the under the European Union (EU) 'Habitats Directive' (92/43/EEC), as transposed in Ireland by the European Communities (Birds and Natural Habitats Regulations 2011 (S. I. No. 477 of 2011) (as amended) and Part XAB of the Planning and Development Act 2000 (as amended). The following European Sites are within the ZoI of the proposed development:

- Blackwater River (Cork/Waterford) cSAC,
- Kilcolman Bog SAC;
- Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA;
- Lower River Shannon SAC;
- River Shannon and River Fergus Estuaries SPA.

[1] Note: At present many SACs in Ireland are currently 'candidate' SACs and referred to as cSACs. The relevant Statutory Instruments for the SACs in Ireland have not yet been made, however, these "candidate" sites must still be afforded the same level of protection as if they were SACs in accordance with the Habitats Directive.

1.3. Habitats

The following habitats (Figure 1) are located within the study area, as classified by Fossitt (2000):

- Improved Agricultural Grassland (GA1)
- Wet Grassland (GS4)
- Wet Grassland/Marsh Mosaic (GS4/GM1)
- Wet Grassland/Dry Meadows and Grassy Verges Mosaic (GS4/GS2)
- Wet Grassland/Improved Agricultural Grassland Mosaic (GS4/GA1)
- Wet Grassland/Marsh/Conifer Plantation Mosaic (GS4/GM1/WD4)
- Wet Grassland/Scrub Mosaic (GS4/WS1)
- Recolonising Bare Ground/Scrub Mosaic (ED3/WS1)
- Hedgerows (WL1)
- Treelines (WL2)
- Hedgerows/Treelines Mosaic (WL1/WL2)
- Scrub (WS1)
- Mixed Broadleaved Woodland/Scrub Mosaic (WD1/WS1)
- Immature Woodland (WS2)
- Mixed Broadleaved Woodland (WD1)
- Mixed Broadleaved/Conifer Woodland (WD2)
- Conifer Plantation (WD4)
- Reed and Large Sedge Swamps/Conifer Plantation Mosaic (FS1/WD4)
- Reed and Large Sedge Swamps/Mixed Broadleaved Woodland Mosaic (FS1/WD4)
- Artificial Pond (FL8)
- Drainage Ditches (FW4)
- Lowland/Depositing Rivers (FW2)
- Buildings and Artificial Surfaces (BL3)

These habitats are linked to varying degrees, both within and beyond the proposed development site.

Hedgerows and treelines provide linkages running through the site and into the surrounding countryside. Woodland edges at the site connect to the network of hedgerows/treelines. Woodland edges also provide some connectivity with the landscape beyond the site, but on a lesser and more localised scale than hedgerows/treelines, which extend across the landscape.

There are continuous areas of improved agricultural grassland, within the northern part of the site, and in the surrounding landscape, where this is the dominant habitat type. There is a large continuous area of wet grassland in the southern part of the site, with some continuity of similar habitats – marshy fields and wet grassland extending beyond the site to the west. Within the site, the other area of wet grassland, which grades to a mosaic of wet grassland/improved agricultural grassland, is separated from the larger southern area by plantation woodland.

Areas of broadleaved plantation woodlands within the site abut conifer plantations outside the site, providing continuity of wooded habitats as a broad category.

The drains, rivers and streams running through the site provide connectivity with the wider hydrological network, and also with the terrestrial habitats they intersect and abut.

Similarly, the network of hedgerows, treelines and woodland edges also ultimately connect all habitats present onsite, and those in the wider landscape.

A connectivity map showing the hedgerow/treeline and woodland edge network onsite and in adjoining areas is provided in Figure 3.

1.3.1 Target Habitats

Within the habitats listed above, a number are targeted by the measures proposed in this management plan. These habitats and the applicable measures are summarised in Table 1-1, and described in detail below:

Table 1-1: Target Habitats

Habitat	Proposed Measures
Wet Grassland (GS4) (wet meadow)	Translocation of turves from T02 hard standing footprint
Hedgerows (WL1) Treelines (WL2)	New planting, enhancement of existing
Mixed Broadleaved Woodland/Scrub Mosaic (WD1/WS1)	Retain existing stand in improved agricultural grassland to south of wind farm
Mixed Broadleaved Woodland (WD1)	Retain woodland at quarry north/east of wind farm
Artificial Pond (FL8)	Enhancement
Lowland/Depositing Rivers (FW2)	Restoration & enhancement of riparian vegetation at site entrance
Buildings and Artificial Surfaces (BL3)	Installation of barn owl boxes

Wet Grassland GS4 (Wet Meadow)

The wet grassland present in the central part of the study area, consisting of three distinct fields, was less heavily grazed and less disturbed during habitat surveys, and more closely resembled wet meadow-type habitats. A similar range of plants to those described above are present, with the addition of selfheal *Prunella vulgaris*, ribwort plantain *Plantago lanceolata*, meadowsweet *Filipendula ulmaria*, common marsh bedstraw *Galium palustre*, square-stalked St John's-wort *Hypericum tetrapterum,* common sorrel *Rumex acetosa*, cat's ear *Hypochaeris radicata*, red clover *Trifolium pratense*, devil's-bit scabious *Succisa pratensis*, quaking grass *Briza media*, meadow thistle *Cirsium dissectum*, Common spotted orchid *Dactylorhiza fuchsia*, field woodrush *Luzula campestris*, sweet vernal grass *Anthoxanthum odoratum*, smooth hawksbeard *Crepis capillaris and* marsh lousewort *Pedicularis palustris*. A number of sedges including flea sedge *Carex pulicaris*, brown sedge *Carex disticha*, oval sedge *Carex leporina* and hairy sedge *Carex hirta* were also recorded in these fields.

The central field has similarities with the Annex 1 habitat *'Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410].* As this habitat type is likely to be declining at a national level, it is potentially of **County Importance**. This field is outside the proposed development footprint.

The wet meadow-type fields to the north (overlapped by T02) do not correspond with the Annex 1 habitat *'Molinia meadows [6410].'*

However, their semi-natural character, lack of management, low level of disturbance and light grazing regime means they are good-quality semi-natural grasslands. As such they are ***locally important higher value*.** The footprint of the proposed turbine T02 hard standing and the internal site access track network are within this habitat type.

It was noted during subsequent casual observations of these fields (after detailed habitat surveys) that they had been grazed heavily since habitat surveys were undertaken. This demonstrates how the habitats in this area are subject to the dynamic processes and random changes associated with free-roaming cattle.

Hedgerows WL1

The hedgerows within the wind farm study area are of variable character and quality, ranging from mature hawthorn *Crataegus monogyna* and willow *Salix* Sp. hedges to the severely trimmed low hedgerows characteristic of over-zealous agricultural management.

In addition to hawthorn and willow, hedgerows also contained blackthorn *Prunus spinosa*, elder *Sambucus nigra* and ash *Fraxinus excelsior* trees, with dog rose Rosa canina and bramble *Rubus fruticosus* in the understory. Species such as cleavers *Gallium aparine*, scaly male fern *Dryopteris affinis*, soft shield fern *Polystichum setiferum*, hart's tongue fern *Asplenium scolopendrium*, hogweed *Heracleum sphondylium*, false brome *Brachypodium sylvaticum* and false oat-grass *Arrhenatherum elatius* were associated with the marginal areas of hedgerows.

The semi-natural character, structural diversity and usefulness to wildlife of this habitat makes it ***locally important, higher value*.**

A number of hedgerows are intersected by the proposed internal access track network and grid connection.

Treelines WL2

The established treelines marking field boundaries in drier parts of the study area are comprised primarily of ash *Fraxinus excelsior*, with occasional beech *Fagus sylvatica* and sycamore *Acer pseudoplatanus*. Alder *Alnus glutinosa* treelines flank sections of the Oakfront stream running through the study area. A mature aspen *Populus tremula* treeline is present in the southern-eastern part of the study area.

The treelines onsite are variable in character. Some have large gaps, due to cutting of lower-growing hedgerow species and retention of mature specimen trees during agricultural management. Treelines which are unmanaged are in a better state, with less gaps present.

This habitat is ***locally important, higher value*.**

A double alder treeline is intersected at one point by the proposed internal access track network and grid connection.

Mixed Broadleaved Woodland/Scrub Mosaic WD1/WS1

This habitat mosaic is represented by a stand of sycamore *Acer pseudoplatanus*, Ash *fraxinus excelsior* and hawthorn *Crataegus monogyna* trees growing on a limestone outcrop in the centre of an improved agricultural grassland field.

This habitat is ***locally important, higher value.***

This habitat is outside the proposed development footprint.

Mixed Broadleaved Woodland WD1

The broadleaved woodland onsite is predominantly composed of plantation woodlands made up of Ash *fraxinus excelsior,* pedunculate oak *Quercus robur* and Scot's pine *Pinus sylvestris* and alder *Alnus glutinosa*.

Ash plantations made up of trees ranging from 8 – 12m in height are present in the northern and south-eastern parts of the study area. In the south-eastern area, alder *Alnus glutinosa* is also present in wetter areas. The ground flora in these plantations ranges from a drier assemblage consisting of nettle *Urtica dioica*, hogweed *Heracleum sphondylium*, bramble *Rubus fruticosus* and rough meadow-grass *Poa trivialis* to wet grassland/marsh-type vegetation found in wetter areas. Reed canary grass *Phalaris arundinacea*, common valerian *Valeriana officinalis*, meadowsweet *Filipendula ulmaria*, tufted hair-grass *Deschampsia cespitosa*, purple loosestrife *Lythrum salicaria*, ragged robin *Silene flos-cuculi* and common marsh bedstraw *Galium palustre* are common in wetter parts, while gypsywort *Lycopus europaeus* and wood horsetail *Equisetum sylvaticum* were also recorded.

An area of the drier type ash plantation lies within the proposed footprint of turbine T03.

The plantations in the western and southern parts of the study area consist of alternating rows of pedunculate oak *Quercus robur* and downy birch *Betula pubescens.* Ground flora is grassy, with Yorkshire fog *Holcus lanatus,* creeping buttercup Rannunculus repens, nettle *Urtica dioica* and rough meadow-grass *Poa trivialis.* Tutsan *Hypericum androsaemum* and soft shield fern *Polystichum setiferum* and ivy *Hedera helix* were recorded in association with an old hedgerow subsumed by this habitat. Turbines T04 and T06 are located within this plantation type, as is a section of the felling buffer around T02.

A narrow strip of mixed broadleaved woodland is present at the proposed site entrance. This is dominated by sycamore *Acer pseudoplatanus* and also includes ash *Fraxinus excelsior*. Individual sitka spruce *Picea sitchensis* and cedar *Cedrus* Sp. trees are also present. Hart's tongue fern *Asplenium scolopendrium*, scaly male fern *Dryopteris affinis*, ivy *Hedera helix*, honeysuckle *Lonicera periclymenum* and the non-native Wilson's honeysuckle *Lonicera nitida* are present in the shrub and ground layers. This area is within the footprint of the proposed bell-mouth site entrance.

A plantation dominated by alder *Alnus glutinosa* is present in the southern part of the study area. No proposed infrastructure is located within this plantation type.

Examination of historical aerial imagery[2] indicates the more mature plantations were not present in 1995 but had been planted by 2000, with more recent blocks having been planted by 2012.

An area of self-seeded woodland is present in the northern part of the study area. This small woodland composed of Ash *fraxinus excelsior,* hawthorn *Crataegus monogyna* and elder *Sambucus nigra* has developed in a disused quarry pit. Ivy *Hedera helix* is present on some trees. The woodland is used for shelter by cattle and much of the ground is bare. Where ground vegetation is present around the edges and inaccessible slopes, wood dock, meadowsweet *Filipendula ulmaria,* rough meadow-grass *Poa trivialis* and selfheal *Prunella vulgaris* can be found. No proposed infrastructure is located within this woodland.

[2] http://map.geohive.ie/mapviewer.html

This habitat is ***locally important, higher value.***

The woodlands/plantations on site do not correspond to any Annex 1 habitat types.

Artificial Pond FL8

A small pond is present along the northern boundary of the study area, in the corner of an improved agricultural grassland field. This waterbody appears to have been created by a depression left after extractive activities associated with farming. It is oblong, measuring approximately 20 by 14 metres and was completely covered in duckweed *Lemna* Sp. when surveyed. Floating sweet-grass *Glyceria fluitans* was present around it's margins.

This habitat is ***locally important, higher value*** due to its potential to develop into a breeding area for amphibians. Its current condition makes it sub-optimal for this purpose, however.

This pond is outside the proposed development footprint.

Lowland/Depositing Rivers FW2

The Oakfront river is a large stream flowing from north-south through the eastern side of the study area. It has a wet width of c. 2-3m and depth ranging from c. 5cm to 0.4m. The bed contains fine gravel and sand. Flows are dominated by shallow glides, with occasional riffles and pools. Parts of the stream had been extensively straightened historically although some limited natural features by way of meanders remained (some good recovery of riparian areas also). The stream has been impacted by cattle and machinery access, as well as runoff from surrounding farmland and forestry. Large accumulations of mud are present at and downstream of fording points. Bankside vegetation varies from recovering riparian vegetation (recently cleared) to dense riparian hedgerows and alder treelines. The stream is relatively highly shaded where the latter are present.

Four fish species including brown trout, European eel, three-spined stickleback and *Lampetra* sp. (ammocoetes) were recorded via electro-fishing at the sampling sites along the Oakfront. Some suitable habitat for White Clawed Crayfish was present along this river, however none were recorded. The river has no suitability for freshwater pearl mussel given historical straightening and heavy siltation pressures.

Biological water quality at the sampling sites on the Oakfront River ranged from Q2-3 to Q3 (poor status).
This habitat type is intersected by the proposed internal access track footprint, however the crossing methodology selected (clear span bridge) selected will avoid habitat loss. The watercourses within the study area could be subject to indirect effects arising from pollution associated with wind farm construction.

This Oakfront stream is ***locally important, higher value*** where it flows through the habitat survey study area. Aquatic ecology Site B5 is classified as ***Internationally Important*** due to its location within the Blackwater River (Cork/Waterford) SAC.

Buildings and Artificial Surfaces BL3

This habitat is represented by derelict houses and farm buildings, and occupied houses. These buildings may range in their value from ***locally important, lower value*** to ***locally important, higher value*** depending on their suitability for and animals such as bats, barn owl and swallows.

This habitat type is not overlapped by any proposed infrastructure.

1.4. Target Species and Groups

Following extensive desk studies and field studies a range of key ecological receptors were identified at the site. These are detailed within EIAR Chapter 8: Biodiversity. The enhancement and mitigation measures detailed here will protect these species, in addition to improving the biodiversity value of the site generally.

1.3.2 Bats

A total of eight bat species were recorded at the site, namely common, soprano and Nathusius' pipistrelle, and Leisler's, brown long-eared, Daubenton's, Natterer's and Whiskered bats. The measures that will be implemented to protect bats are:

Bat Buffer Maintenance, Alternative Bat Commuting Routes, Bat Boxes, Riparian Treeline Restoration, Hedgerow/Treeline Restoration, New Hedgerow/Treeline Planting, Woodland Retention and the Wildlife Pond.

1.3.3 Bees

Bumblebees, including the near-threatened Large Red Tailed Bumble Bee *Bombus (Melanobombus) lapidaries* identified in the desktop study, will benefit from the 5m rough grassland strips, meadow planting, hedgerow planting and low-intensity farmland maintenance.

Earth banks will be created to provide nesting habitat for mining bees, which in Ireland are represented by the genera *Andrena* and *Nomada.* Mining bees, and pollinators in general, will also benefit from the 5m rough grassland strips, meadow planting, hedgerow planting and low-intensity farmland maintenance.

1.3.4 Lepidoptera

Rough grassland/overgrown verges are used by the larval stages of butterfly species including Orange Tip, Red Admiral, Peacock, Small, Tortoiseshell, Comma, Painted lady, Ringlet, Meadow Brown and Speckled Wood. These species will benefit from the 5m rough grassland strips, in addition to other semi-natural habitats such as wildflower meadows, hedgerows and low-intensity farmland.

A number of moth species were also recorded. These will also benefit from interventions and measures to create and enhance semi-natural habitats at the site.

1.3.5 Odonata

Damselflies and dragonflies will benefit from the artificial pond enhancement, in addition to measures which create and enhance semi-natural habitats in general. In particular, the artificial pond enhancement will provide a suitable area for the Vulnerable Scarce Blue Tailed Dragon Fly *Ischnura pumilio* identified in the desktop study, which is found in muddy sites with standing water.

1.3.6 Insects (general)

In addition to bees and Lepidoptera, a range of insect species will benefit from measures which create and enhance semi-natural habitats at the site. These include the creation of rough grassland and pollinator - friendly habitats described above, in addition to the creation of log piles which will provide insect habitats.

1.3.7 Badger

A range of measures including the creation of an artificial sett, sett exclusion (if required), seasonal restrictions, buffer zones, restrictions on machinery use and vegetation clearance, temporary hard blocking and monitoring are proposed to ensure badgers are not negatively impacted by the proposed development. No hard-blocking or exclusion will be undertaken at active badger setts during the breeding season (December – June inclusive).

1.3.8 Small Mammals

Small mammals such as wood mouse and pygmy shrew will benefit from the creation of rough grassland strips, maintenance of low intensity farmland, and wildflower planting. These features will provide increased cover and food for these animals.

The abovementioned species, in addition to other small mammals such as hedgehog, will also benefit from the installation of Hibernacula which will provide shelter.

1.3.9 Frogs

The artificial pond enhancement will increase structural diversity, providing breeding areas for the common frog.

1.3.10 Raptors

Birds such as barn owl and kestrel are likely to benefit from the provision of rough grassland strips and other semi-natural densely vegetated and diverse open habitats through increased abundance of small mammal prey. These features are located away from proposed turbine locations.

1.3.11 Ground-nesting Birds

Ground nesting birds such as meadow pipit and skylark are likely to benefit from rough grassland strips, low intensity pasture management and wildflower planting.

1.3.12 Small Passerines

Small passerines as a general grouping will benefit from nature friendly management of the site including hedgerow planting and enhancement, and the creation and maintenance of semi-natural grassland habitats.

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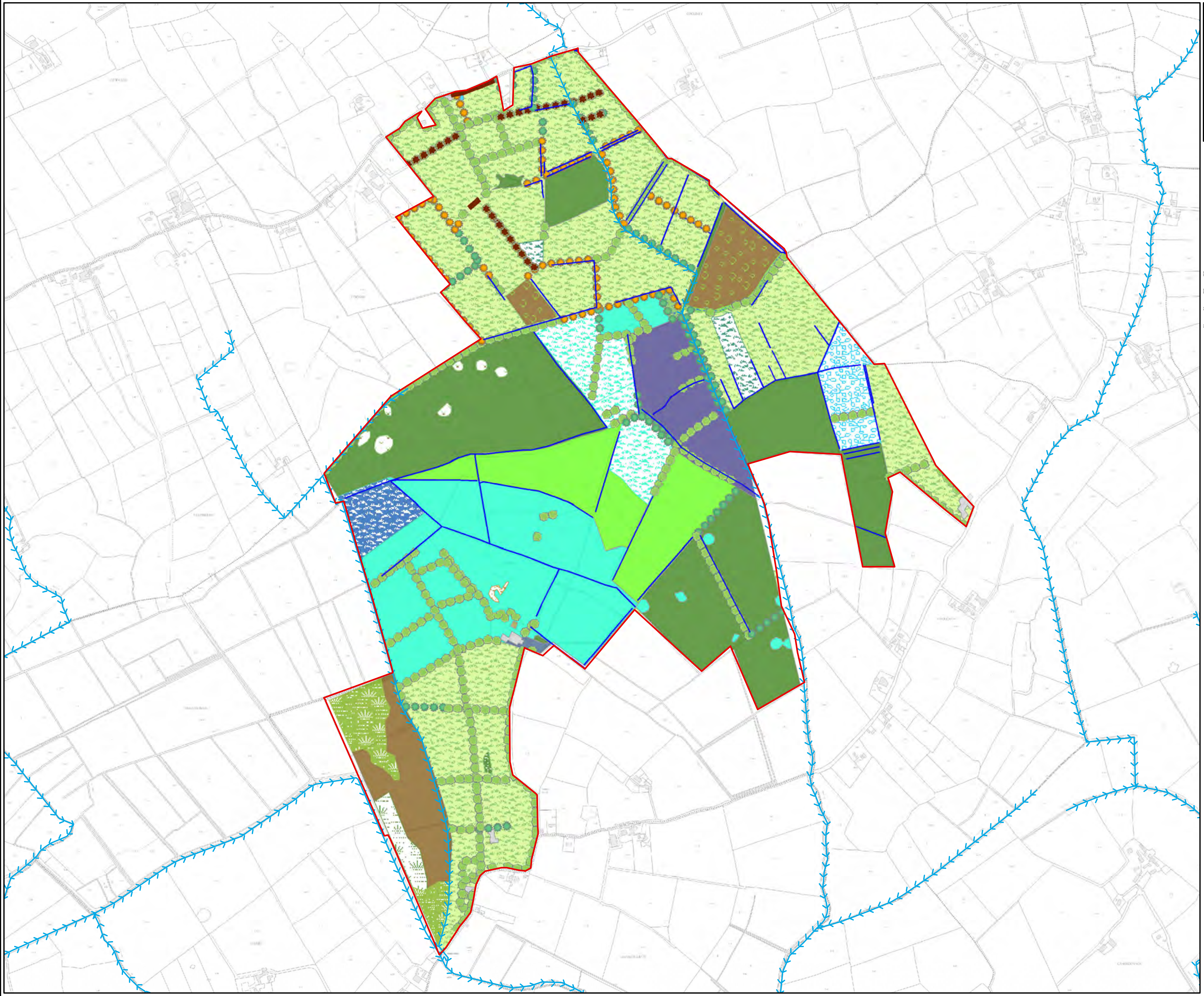

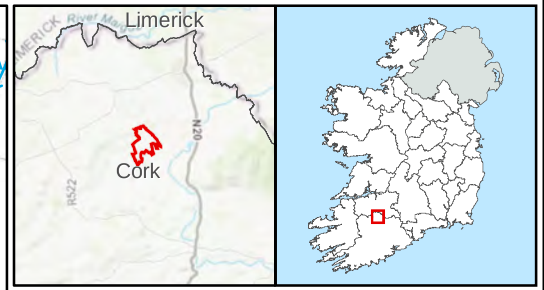

Legend

- Study Area
- Rivers

Linear Habitats

- BL2 Earth banks
- ED2 Spoil and bare ground
- FW4 Drainage ditches
- WL1 Hedgerows
- WL1/BL2 Hedgerows / Earth banks
- WL1/WL2 Hedgerows / Treelines
- WL2 Treelines

Habitat Areas

- BL1 Stone walls and other stonework
- BL3 Buildings and artificial surfaces
- ED3/WS1 Recolonising bare ground / Scrub
- ED5 Refuse and other waste
- FL8 Other artificial lakes and ponds
- FS1/WD1 Reed and large sedge swamps / (Mixed) broadleaved woodland
- FS1/WD4 Reed and large sedge swamps / Conifer plantation
- GA1 Improved agricultural grassland
- GA1 Improved agricultural grassland (Rank)
- GS4 Wet grassland
- GS4 Wet grassland [Wet Meadow]
- GS4/GA1 Wet grassland / Improved agricultural grassland
- GS4/GM1 Wet grassland / Marsh
- GS4/GM1/WD4 Wet grassland / Marsh / Conifer plantation
- GS4/GS2 Wet grassland / Dry meadows and grassy verges
- GS4/WS1 Wet grassland / Scrub
- WD1 (Mixed) broadleaved woodland
- WD1/WS1 (Mixed) broadleaved woodland / Scrub
- WD2 Mixed broadleaved/conifer woodland
- WD4 Conifer plantation
- WS1 Scrub
- WS2 Immature woodland

TITLE:	Habitats		
PROJECT:	Annagh Wind Farm		
FIGURE NO:	1		
CLIENT:	EMP Group		
SCALE:	1:12500	**REVISION:**	0
DATE:	25/10/2022	**PAGE SIZE:**	A3

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2. MITIGATION MEASURES

2.1. Translocation of Wet Grassland Turves

Turves from the footprint of T02 hard standing area will be translocated to adjacent fields identified in Figure 4 to preserve the flora and seedbank present within the footprint. The entire T02 hard standing footprint will be translocated (c. 10,350m^2). The receptor site currently supports less diverse wet grassland/improved agricultural grassland (GS4/GA1) Mosaic.

The receptor site will be prepared in advance of works taking place on the T02 hard standing, by excavating shallow linear trenches where the existing grassland is retained between trenches. The adjoining drains will also be blocked to retain water in this area. These measures will reduce the likelihood of translocated turves drying out. A rubber tyred excavator will be used to dig the trenches, to minimise soil disturbance.

The receptor sites have been located close to the T02 hardstanding (c. 160m east) to provide similar ground conditions and facilitate rapid translocation. The combined extent of the receptor sites is c. 20,850 m^2. This allows room to excavate linear receptor trenches while retaining existing vegetation between the trenches.

The turves will be directly translocated to the receptor sites and not stockpiled, under the supervision of an ecologist. Turves will be lifted into place using the rubber-tyred excavator and adjusted manually where required. Watering of newly translocated turves will be carried out to prevent drying and aid in establishment.

2.2. Maintenance of Bat Buffers

The areas surrounding turbines will be actively managed to discourage foraging by bats. The buffer extent around each turbine has been calculated based on turbine dimensions and the height of surrounding trees (see EIAR Chapter 8: Biodiversity). Where buffers overlap both woodland and open habitats, the full circular buffer will be applied to both the wooded area and adjacent open habitat as the area to be managed to discourage bat foraging. Buffer sizes for turbines in wooded areas range from 86-92m from the turbine base. Where no woodland is present (applicable to T05), a conservative buffer of 82m has been applied within which grassland will be managed as required to discourage foraging bats.

Tree-free buffers will be maintained around all turbines to reduce risks to bats. These bat felling buffers will be maintained by keeping vegetation short, which will minimise insect abundance. This will be achieved by mechanical means only, and pesticides and toxic substances shall not be utilised. The buffers shall be cut twice per year, in spring and summer as required. This is applicable primarily to areas where plantation woodland will be removed, but mowing will be implemented in existing grassland within buffers as required if regular grazing is not occurring.

2.3. Provision of Alternative Bat Commuting Routes

Where woodland edges are affected by turbine felling buffers, bats will be directed away from tree-free buffers along an alternative commuting route. This will be achieved by planting new pollinator-friendly hedgerows along Lines A-F (see Figure 4, Table 2-1), using methods described below. Willow and Alder will also be included in these hedgerows due to their rapid growth and tolerance of damp soils.

These species 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 on-site. It is proposed to create double lines of hedgerow, with alder and willow on one side, and pollinator-friendly hedgerow species listed in Table 2-1 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 (local if possible). 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.

Table 2-1: Species to be planted in new hedgerows for commuting bats

Linear Feature	Fast-growing damp tolerant species	Native fruiting hedgerow species
A-F	Plant: grey willow *Salix cinerea,* goat willow *Salix caprea,* alder *Alnus glutinosa.*	Plant: whitethorn *Crataegus monogyna* (75%), blackthorn *Prunus spinosa*, bird cherry *Prunus padus,* elder *Sambucus nigra,* dog rose *Rosa canina,* crab apple *Malus sylvestris* and field rose *Rosa arvensis.*

2.4. Hedgerow and Treeline Reinstatement at TDR Nodes

Where tree felling is required, *Long-term Significant Reversible* impacts to treelines and hedgerows may occur. This is primarily due to the presence of sections of good-quality mature hedgerow along parts of the L1322 local road which may be removed or damaged as a result of TDR Node works. Therefore, as a mitigating action, hedgerows removed or lowered by TDR Node works will be reinstated immediately following the delivery of turbine components 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 it's vulnerability to ash dieback disease. Other large-growing native species such as alder and oak are proposed instead. Reinstatement of hedgerows will occur using the methods described in Section 3. 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 2-2, and TDR Node locations are shown in Figure 2. These hedgerows will be maintained in the same way as described in Section 3.2.

Table 2-2: Species to be replanted at TDR Nodes

Node	Species
7	Willow *Salix* sp., Birch *Betula* sp., Rowan *Sorbus aucuparia*, Hawthorn *Crataegus monogyna* and Blackthorn *Prunus spinosa*
8	Hawthorn, Wild privet *Ligustrum vulgare*
10.1	Hawthorn, Pedunculate Oak *Quercus robur*

Node	Species
10.2	Hawthorn
10.3	Hawthorn, Alder *Alnus glutinosa*, Oak, Crab Apple *Malus sylvestris*
10.4	Hawthorn, Alder, Oak
10.5	Hawthorn
10.7	Hawthorn and Blackthorn
10.8	Hawthorn *Crataegus*
10.9	Hawthorn, Blackthorn, Alder, oak
10.1	Blackthorn

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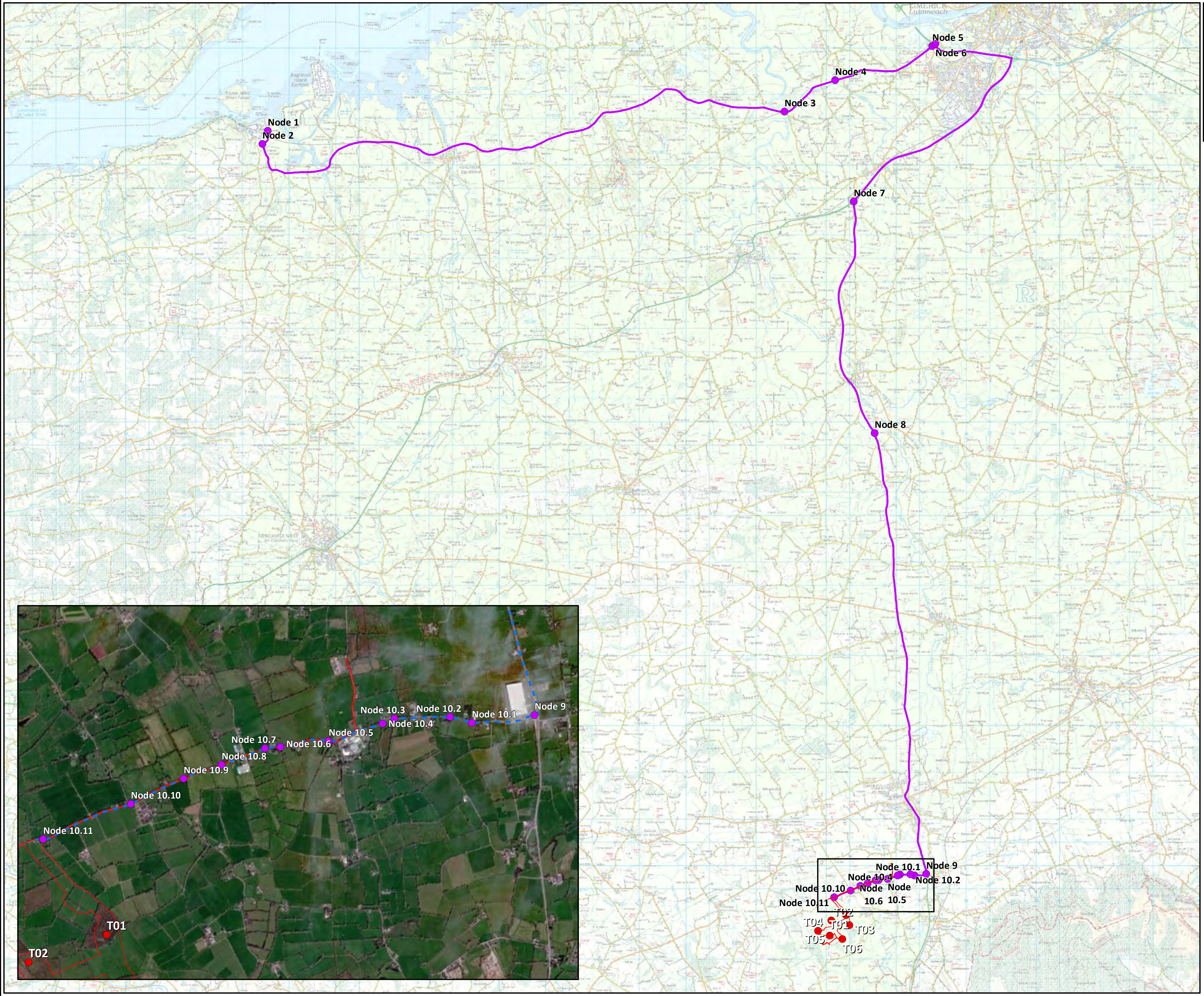

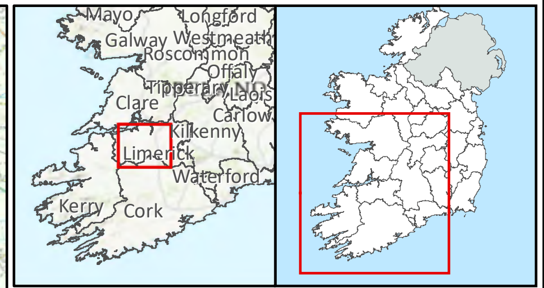

Legend

- Site Boundary
- Turbine Layout
- TDR Nodes
- Turbine Delivery Route

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PROJECT:	Annagh Wind Farm, Co. Cork
FIGURE NO:	2
CLIENT:	EMPower
SCALE: 1:160000	REVISION: 0
DATE: 25/10/2022	PAGE SIZE: A3

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2.5. Artificial Badger Sett

An artificial sett will be constructed within the planning 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.

A suite of other measures is also detailed in the confidential badger report to ensure disturbance of badgers does not occur. No works (hard-blocking, sett destruction, vegetation clearance, exclusions) with potential to affect any occupied setts will be undertaken during the breeding season (December- June inclusive).

See confidential appendix: badger report for details of the location of the artificial sett and comprehensive mitigation for badgers.

The sett will be constructed 6 months in advance of any proposed works within the site and badgers will be encouraged to use the sett using baiting. 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.

The chambers shall be installed at the end of branches, off the main pipe run, as badgers like the security of a defendable ‘end’ situation. The sett will be comprised of at least eight rectangular nest chambers constructed from wood. Plastic pipes shall be used to connect the chambers as they are more flexible and greatly simplify the construction process.

The tunnels shall be constructed from 12” (300mm) diameter pipes throughout – reduced at entrances to 9” (225mm) with the use of safety cones, cut to required diameter. The 9” openings at the entrances shall be installed to restrict the size to reduce the chance of ingress by dogs but will allow badgers easy access. Plastic pipes will be used as they are the light, easy to handle, fit together well and make the straightness of the trenches less critical. Pipe branches/cut openings in the piping, shall be left open to the surrounding soil, allowing the badgers to excavate and expand the sett. Perforated piping shall be used throughout to ensure that water can escape from the pipes. The entrances/tunnels to the sets shall be placed at different heights to ensure that there is good air circulation through the sett. A strong wire mesh shall cover the entire sett to prevent the persecution of its inhabitants.

Monitoring of the artificial sett will be carried out to determine use by badgers during the construction and operational phases.

<u>Further Consultation with NPWS</u>

NPWS will be contacted immediately should any of the following events occur:

- A new sett is recorded within the study area during works;
- There is evidence of badger persecution during surveys; and
- Hard-blocked and/or destructed setts are re-occupied by badger during construction.

Plate 2-1: Example of artificial badger sett

Plate 2-2: Wooden chambers and piping

3. ECOLOGICAL ENHANCEMENT

3.1. Grassland Management

3.1.1. Maintenance of Low Intensity Pastureland

Low intensity management in the less intensive farmland (see Figure 4) will be maintained throughout the lifetime of the wind farm. The current management where cattle roam between fields will be maintained by the present land manager. In the event of the land changing hands or new agricultural management, a similar style of management will be maintained (using cattle), either through a similar open field system, or by active management of the herd with a focus on conservation grazing. Low density grazing provides cost effective maintenance of grassland and increases the site's conservation value. If active management is selected, grazing will be rotational and a proportion of fields will not be grazed in spring or summer, 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.

Guideline stocking densities for conservation grazing using cattle or sheep are detailed below in Table 3-1:

Table 3-1: A guide to stocking levels for lowland grassland - number of animals per hectare of grassland (Nature Conservancy Council 1986)

No of grazing weeks per year	Sheep	Cattle
2	60	15
4	30	8
6	20	5
8	15	4
10	12	3
12	10	2.5
14	8.5	2
16	7.5	2
20	6	1.5
24	5	1
36	3.5	1
52	2.5	0.5

3.1.2. Rough Grassland Buffers in Intensive Farmland

A corridor of 5m strips of rough grassland will be maintained in selected areas of intensive farmland (see Figure 4). This will provide suitable habitat for mammals, and larval foodplants for butterfly species. These rough grassland borders will be fenced off and light annual grazing or yearly topping will ensure that rough grassland vegetation is maintained. Furthermore, this strip of rough grassland will provide a riparian buffer for agricultural runoff towards the adjacent Ardglass 18 stream.

3.2. Existing Hedgerows: Repair and Enhancement

3.2.1. Riparian treeline restoration

The riparian vegetation along the Oakfront Stream near the site entrance will be reinstated (this was previously removed by the landowner). Natural recolonisation is occurring; this will be allowed to proceed unhindered and supplemented by planting willow and alder. The non-native species cherry laurel will be removed (see Invasive Species Management Plan) This feature is shown on Figure 4 (see Line 1).

3.2.2. Hedgerow/Treeline restoration

To enhance existing hedgerows they will be planted with native fruit and seed-bearing species to increase their foraging potential and strengthen their role as wildlife corridors. The hedgerows within the site are of varying quality; many do not require any intervention, while planting and layering is necessary in poorer quality areas. It is important to maintain the hedgerows appropriately, allowing them to become tall and bulky to provide shelter for wildlife. It is also important to remove gaps as they weaken the hedgerow's role as wildlife corridors, especially for bats.

It is proposed to repair existing hedgerows and treelines where neglect has allowed gaps to open, and where hedgerows/treelines have been felled during the course of agricultural management. This will be achieved by replanting of targeted areas with pollinator-friendly hedgerow species.

Proposed locations for enhancement of existing hedgerows are shown on Figure 4 (see Lines 2, 3, 4, 5, & 13). The species proposed to be planted at these locations are detailed in Table 3-2, however the landscaping operative will need to assess each hedgerow before planting to determine the quantities required, and ensure planting is targeted in the required areas. Where gates are no longer in use, planting to fill these gaps is also recommended. Young trees will require protection until established.

3.2.3. New Hedgerow/Treeline Planting

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. Pollinator-friendly hedgerow species and larger tree species will be planted (listed in Table 3-2 below). For the location of these features, see Lines 8, 9 and 10 in Figure 4.

A new section of hedgerow/treeline will also be planted along the western land ownership boundary. This will fill gaps along existing commuting corridor made up of intermittent conifer plantation edge, in addition to providing food and shelter for wildlife. Alder and Willow will be planted along this field boundary (see Table 3-2 below for details). For the location of this feature, see Line 10 in Figure 4.

Table 3-2: Species to be planted for hedgerow enhancement and new hedgerows

Linear Feature	Species Planted/Notes
1	Plant: goat willow *Salix caprea* and alder *Alnus glutinosa.* Allow existing riparian vegetation to recover.
2	Plant: blackthorn *Prunus spinosa* and bird cherry *Prunus padus.* Allow existing whitethorn *Crataegus monogyna* to recover.
3	Plant: whitethorn *Crataegus monogyna* (75%), pedunculate oak *Quercus rubra,* alder *Alnus glutinosa,* blackthorn *Prunus spinosa* and field rose *Rosa arvensis.* Allow existing hedgerow species to recover.
4	Plant: bird cherry *Prunus padus,* elder *Sambucus nigra,* alder *Alnus glutinosa,* dog rose *Rosa canina* and crab apple *Malus sylvestris.* Allow existing hedgerow species to recover.
5	Plant: pedunculate oak *Quercus rubra,* alder *Alnus glutinosa,* blackthorn *Prunus spinosa* and crab apple *Malus sylvestris.* Allow existing hedgerow species to recover.
8	Plant: pedunculate oak *Quercus rubra*, alder *Alnus glutinosa,* grey willow *Salix cinerea,* whitethorn *Crataegus monogyna.*
9	Plant: pedunculate oak *Quercus rubra*, alder *Alnus glutinosa,* grey willow *Salix cinerea,* whitethorn *Crataegus monogyna* and bird cherry *Prunus padus.*
10	Plant: grey willow *Salix cinerea,* goat willow *Salix caprea* and alder *Alnus glutinosa.*
13	Plant: whitethorn *Crataegus monogyna* (75%), blackthorn *Prunus spinosa*, elder *Sambucus nigra* and field rose *Rosa arvensis.* Allow existing hedgerow species to recover.

As for areas with reinstated hedgerows (Section 2.4, 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.

3.3. Woodland Retention

Two areas of self-seeded woodland in intensive farmland to the north and south of the proposed wind farm will be retained as biodiversity areas.

These are the wildwood which has developed in a disused agricultural borrow pit north of the wind farm, and the stand of mixed broadleaved woodland/scrub growing on a limestone outcrop to the south of the wind farm. See Figure 1: Habitat Map and Figure 4: Habitat Management Measures for the locations of these stands.

3.4. Development of Artificial Pond

A pond is present in the northern area of the site following extractive activities (see Figure 4) This oblong pond, approx. 20 x 14m is currently in suboptimal condition and covered in duckweed, likely due to nutrient run-off. A shallow extension to this pond, with planting of reeds will remediate the excess duckweed, as well as allow wildlife to safely access the pond. The best wildlife ponds will have very gently sloping sides, providing extensive areas of very shallow water (just a few centimetres in depth); that will allow a wide band of emergent vegetation to become established around the margins of the pond (See Plate 3-1 and Plate 3-2). Also, the variation in depth will produce varying habitats providing breeding areas for the common frog, as well as a suitable area for the Scarce Blue Tailed Dragon Fly *Ischnura pumilio*, which is found in muddy sites with standing water. *Juncus effusus* will be planted on the borders of this pond, as this is a plant which commonly cooccurs with *Ischnura pumilio* (Allen *et al* 2010).

The pond will be extended by excavating a broad (2-4m) undulating drawdown zone around the southern and eastern margins. Common reed *Phragmtes australis* and soft rush *Juncus effusus* will be planted in these margins. The pond will be fenced off along the outer boundary of the drawdown zone to prevent cattle access which could cause disturbance and pollution.

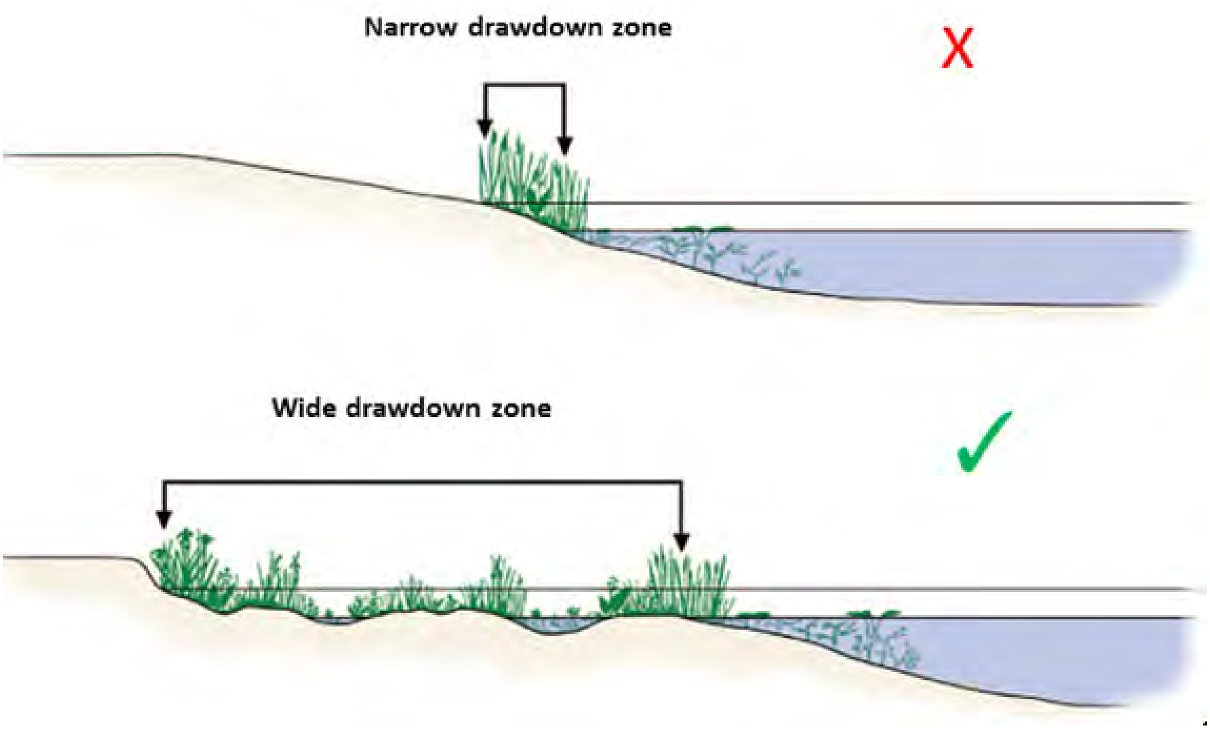

Plate 3-1: Create broad undulating drawdown zones, a valuable area for wildlife (Freshwater Habitats Trust, 2016).

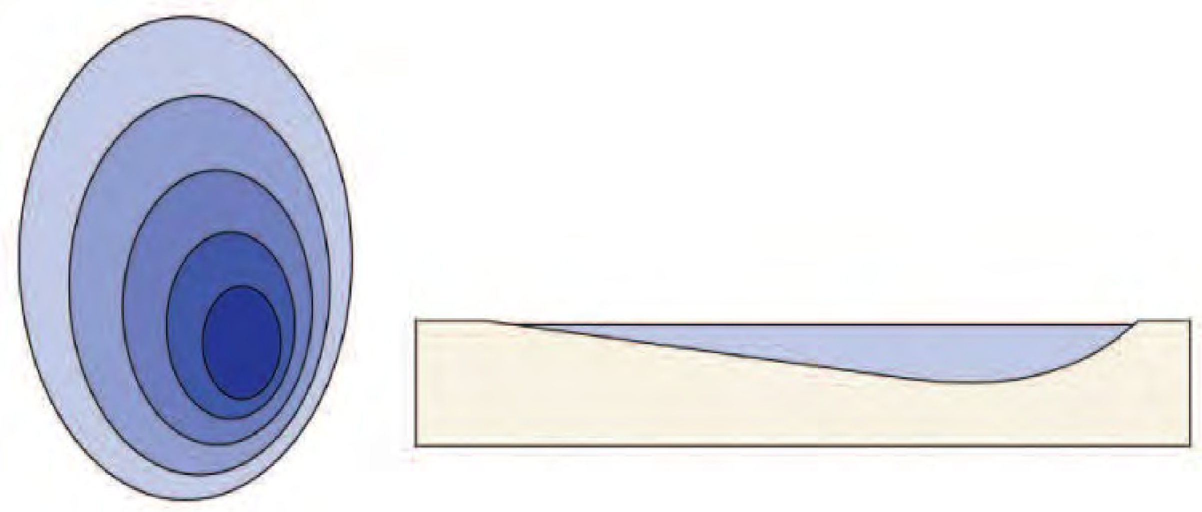

Plate 3-2: Asymmetric profile- useful to combine shallow water areas with great depth (Freshwater Habitats Trust, 2016).

3.5. Barn Owl Nest Boxes

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. This will 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.

These nest boxes will be maintained and replaced as required during the lifespan of the wind farm. Any maintenance work may only be carried out from October to February inclusive to ensure the Barn owl nesting season is avoided under the supervision of a qualified ecologist.

3.6. Bat Boxes

A total of 16 bat boxes will be installed in trees along Lines 6, 7, 14 and 15 (four boxes per line). Schwegler bat boxes or a similar specification of bat box made from durable material such as woodcrete will be installed in mature trees along these field boundaries.

The most frequently recorded species were common and soprano pipistrelle, and Leisler's bat. A total of four other species, namely Nathusius' pipistrelle, brown long-eared, Daubenton's, Natterer's and Whiskered bats were also recorded, but less frequently.

Based on the proportional occurrence of these species, and the use of both crevice and tree hollow type boxes by common and soprano pipistrelle, an even mix of eight crevice type bat boxes and eight tree hollow type bat boxes are proposed (choice of bat box types is informed by the NPWS publication 'Bat Mitigation Guidelines for Ireland [Version 2] as summarised in Table 3-3).

Installation will be carried out under supervision of an ECoW.

Table 3-3: Types of bat box used by different species (NPWS/Marnell et al., 2022)

Species	Summer/ maternity	Summer/non-breeding	Hibernation*	Notes
Myotis daubentonii	H	H	-	-
Myotis mystacinus	H	H	-	-
Myotis nattereri	H	?	-	-
Pipistrellus nathusii	H	H	-	-
Pipistrellus pipistrellus	C	C/H	C	H are rarely used as maternity roosts.
Pipistrellus pygmaeus	C	C/H	C	-
Nyctalus leisleri	H	H	H?	-
Plecotus auritus	H	H	-	Maternity roosts

* Large well-insulated hibernation boxes may be more successful.

H – tree hollow-type box, providing a void in which bats can cluster.

C – tree crevice-type box, with 25-35mm crevices.

? – few data on which to base an assessment.

3.7. Insect Shelter Habitats

3.7.1. Mining Bee Banks

South-east facing banks made up of well-drained soil will be created in the northern part of the site near the wildflower meadow and 5m rough grassland corridor (Figure 4). These can be created by scraping vegetation away from an existing bank if available, or by constructing a bank from excess spoil generated onsite.

It is important to avoid heavily compacting it with machinery. The south-facing sections of banks will be required to be kept clear of vegetation using mechanical means only. This can be carried out in winter as required (frequency depends on rate of re-vegetation) by scraping away vegetation.

3.7.2. Bumblebee Nesting Habitat/Butterfly Larval Food Plants

The 5m rough grassland strips will provide habitat for bumblebees and butterflies, among other insects (see Figure 4).

This will be cut annually between November-February. This will allow long/tussocky grass to establish during March – October, which is used as nesting habitat by bumblebees. Cutting outside this period is acceptable as colonies die off in October/November while mated queens hibernate. A number of species commonly found in rough grassland/overgrown verges are used by the larval stages of butterfly species including Orange Tip, Red Admiral, Peacock, Small, Tortoiseshell, Comma, Painted lady, Ringlet, Meadow Brown and Speckled Wood.

3.7.3. 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 4. 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.

3.7.4. Refugia/Hibernacula

Refugia piles and hibernacula will be created. 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. Locations are specified in Figure 4.

(Source: Green Mumbles accessed Oct 2022)

Plate 3-3: Example of a hibernacula

3.8. 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 (See Lines 11 & 12 in Figure 4).

Wildflower seed mixes are required to be of native provenance; mainstream commercially available mixes are not acceptable.

Ecoseeds https://www.ecoseeds.co.uk/ (Northern Ireland) or another reputable and experienced supplier capable of supplying seed mixes that meet the required criteria shall be used.

A typical wildflower meadow plant assemblage includes the following species: Birdsfoot Trefoil, Black Medick, Cowslip, Devil's Bit Scabious, Meadow Buttercup, Field Scabious, Hemp Agrimony, Kidney Vetch, Lady's Bedstraw, 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, 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 the desk study.

Flowering species recorded within the wet grassland habitats onsite will also be incorporated into the planting mix.

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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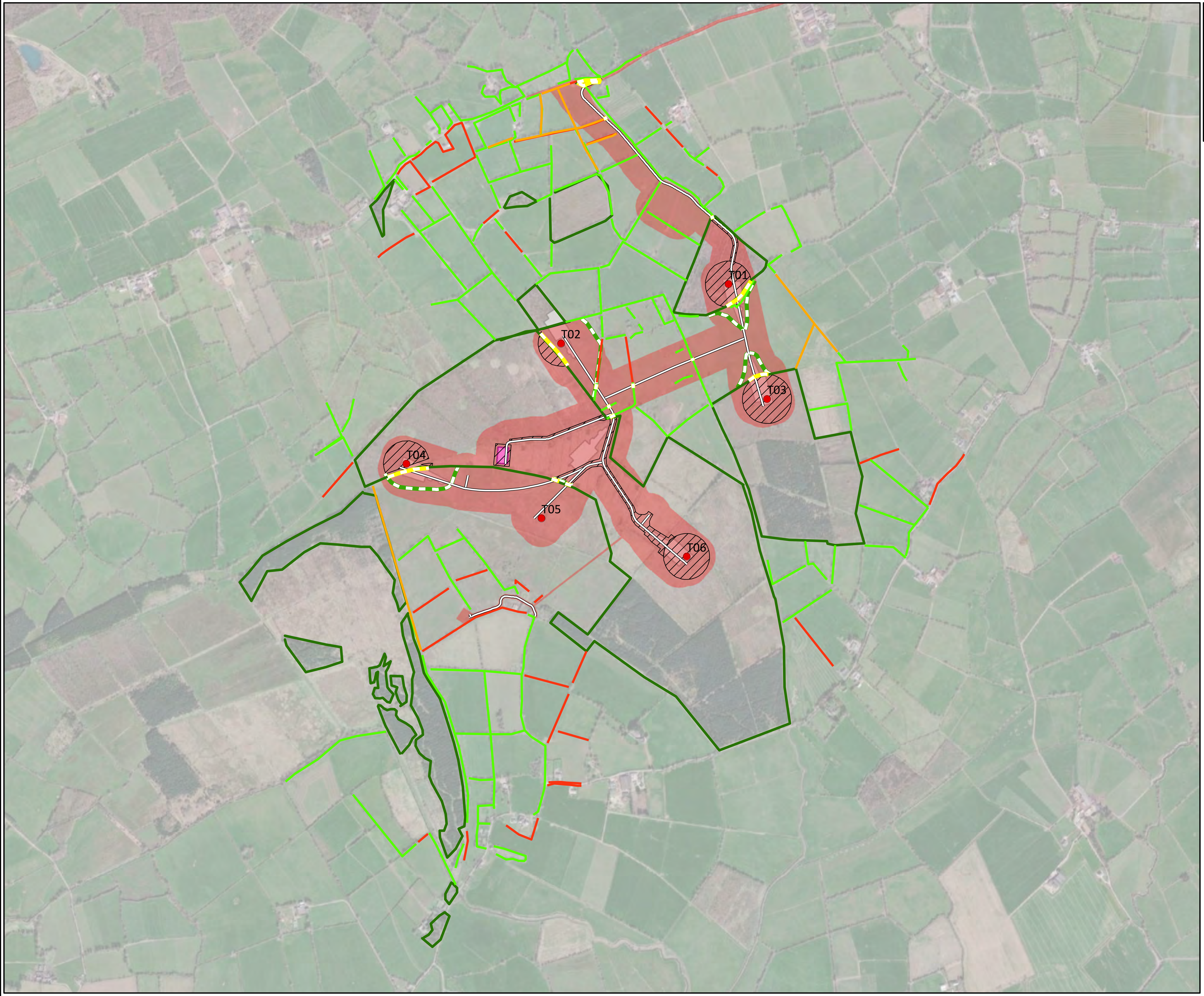

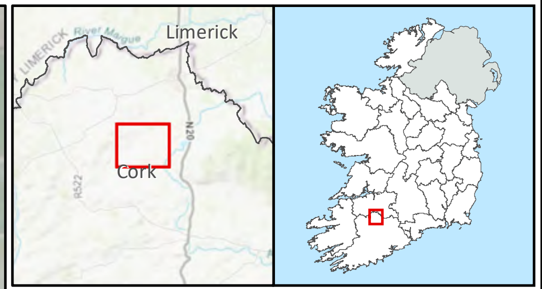

Legend

- Site Boundary
- Substation
- Turbine Layout
- Internal Access Track
- Turbine Hardstanding Area
- Connectivity Breaks
- Enhancement Planting
- Existing Hedgerow / Treelines
- Existing Poor Quality Hedgerows / Banks
- Existing Woodland Edge
- Mitigation Planting

TITLE: Ecological Connectivity	
PROJECT: Annagh Wind Farm, Co. Cork	
FIGURE NO: 3	
CLIENT: EMPower	
SCALE: 1:14000	**REVISION:** 0
DATE: 26/10/2022	**PAGE SIZE:** A3

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Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
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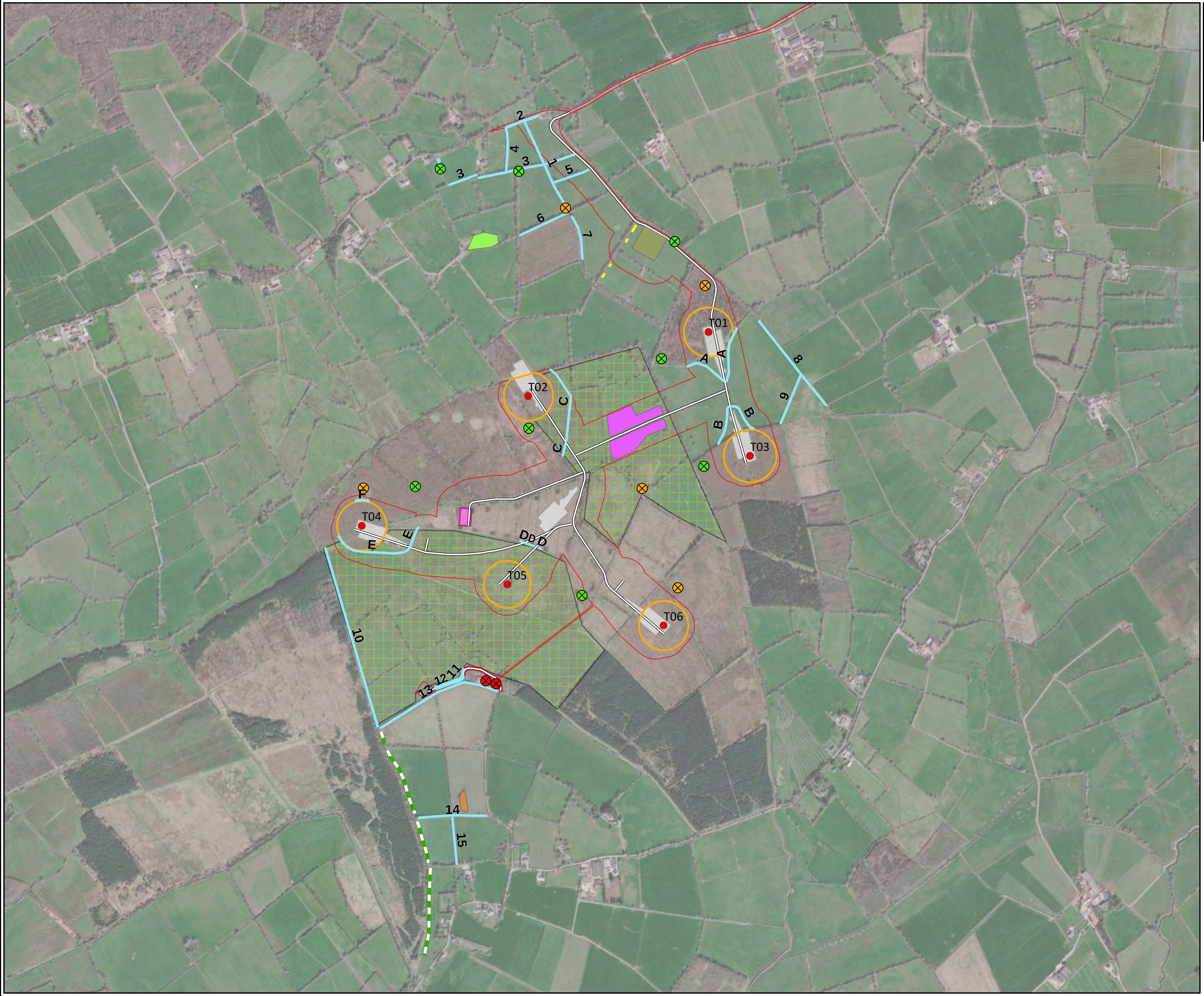

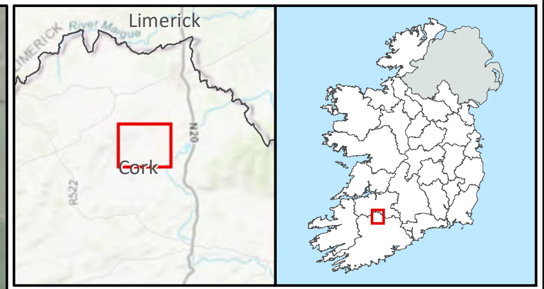

Legend

- 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

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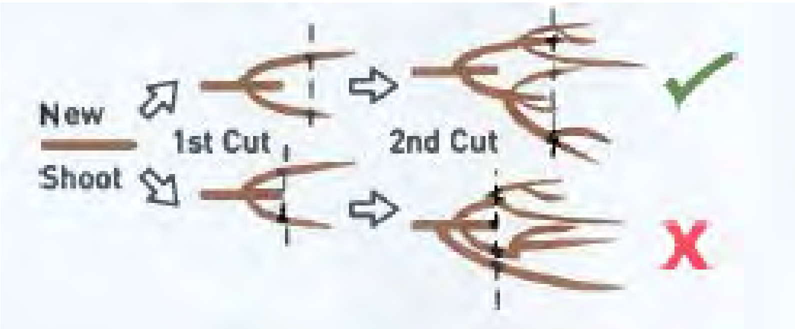
4. MAINTENANCE

4.1. Hedgerow Maintenance

Tightly cut hedgerows with flat tops provide little benefit to wildlife, taller and bulky hedgerows are recommended as this provides more shelter for wildlife. When the hedgerows are maintained, stems will be cut a little above the last cut (see Plate 3-4) 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 3-4: 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 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 may disturb breeding; this is in keeping with the Wildlife Act 1976 (as amended).

4.1.1. Semi-mature Trees

Larger trees can be slower to establish following transplantation and need help until established. These trees may require watering and provisions should be made for this. While establishing, the trees will not require pruning, except where dead branches form or branches are damaged by winds. These branches should be carefully removed to prevent the introduction of disease.

4.2. Wildflower Meadow and Rough Grassland Buffer Maintenance

4.2.1. Wildflower Planting

Light annual grazing using sheep or cattle may be used to maintain the planted wildflower areas (see Figure 4). 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.

4.2.2. Rough Grassland Buffers

Wild grasses and forbs will be allowed to re-colonise the rough grassland buffers.

Light annual grazing using sheep or cattle may be used to maintain the rough grassland strips (see Figure 4).

Mechanical mowing can also be used to maintain the rough grassland buffers. If mowing is used, these will be cut annually between November-February.

The timing of mowing has been restricted to avoid impacts to ground nesting birds between March – August inclusive, and also to avoid disturbing bumblebees and other insects. Species such as meadow pipit, skylark and possibly snipe could begin to use the site when the grass sward is allowed to become taller and denser.
Any material arising from mowing will be removed (cut and lift). Grass cuttings may be used as hay or disposed of at a licensed facility off-site.

5. MONITORING

5.1. General Monitoring of Management Measures

Commencing in year 1 of operation the status of the habitats created, enhanced hedgerows and the species enhancement measures will be checked as per Table 3-4 below. Monitoring will be undertaken by a qualified ecologist appointed by the development. The timing of monitoring is provided in Table 3-4 below. This will follow implementation of the plan to confirm whether habitats have successfully established and to identify any issues that need to be addressed. Following these monitoring visits, a short status report will be prepared. This will identify any necessary actions to ensure the success of the HSMP, which will be implemented on foot of the report findings.

A final assessment of the condition and success of the various habitat and species management and enhancement prescriptions will also be undertaken in Year 34 (i.e., in the year before the final year of operation).

5.2. Post-construction Monitoring - Bats

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).

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 surveys 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.

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:

a) 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.

b) 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.

5.3. Post-construction Monitoring - Birds

5.3.1. General Avifauna Monitoring

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).

c. 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.

d. 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).

e. 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.

5.3.2. Whooper Swan Additional Monitoring Measures

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 of new technologies to facilitate smart curtailment (e.g. radar), to identify whooper swan approaching the proposed wind farm site and trigger the immediate shut down of all turbines, shall be agreed in advance with Cork County Council and NPWS.

Table 3-4: Summary of Habitat & Species Management Measures

Measure	Target Species/Habitat	Implementation Timeline	Monitoring	Ongoing management
Mitigation				
Wet Grassland Translocation	Wet grassland GS4 (wet meadow)	To be carried out immediately as the T02 hard standing footprint is being stripped	Years 1, 2, 3, 5, 10, 15, 20, 30, 34	Ensure wet soil conditions & appropriate grazing/mowing regime
Bat Buffer Maintenance	All bat species except lesser horseshoe bat	Buffers to be cleared prior to turbine installation. Clearance will take place outside the bird breeding season (March-August inclusive)	Annual monitoring throughout lifespan of wind farm (mid- late summer)	Ensure vegetation is kept low
Alternative Bat Commuting Routes	All bat species except lesser horseshoe bat pollinators	From project initiation	Years 1, 2, 3, 5, 10, 15, 20, 30, 34	Ensure establishment; ensure hedgerows are not cut back excessively and are maintained as a viable corridor.
Hedgerow/Treeline Reinstatement at TDR Nodes	Hedgerows/Treelines Associated bird & insect species	To be planted immediately following delivery of turbine components	Years 1, 2, 3, 5	Ensure establishment
Artificial Badger Sett, Badger Mitigation	Badger	Prior to and during construction	During fulfilment of NPWS conditions	Ensure continued function of mitigation measures during fulfilment of NPWS conditions
Enhancement				
Low Intensity Pastureland Maintenance	Wet grassland GS4 Associated plant, bird & insect species Pollinators	From project initiation	Years 1, 2, 3, 5, 10, 15, 20, 30, 34	Maintain existing grazing regime/implement targeted conservation grazing
Rough Grassland Buffers	Bumblebees Butterfly Larvae Pollinators	From project initiation	Years 1, 2, 3, 5, 10, 15, 20, 30, 34	Maintain appropriate mowing/grazing regime. Maintain fencing.

Measure	Target Species/Habitat	Implementation Timeline	Monitoring	Ongoing management
	Wood mouse Pygmy shrew Barn owl Kestrel Meadow pipit Skylark			
Riparian Treeline Restoration	Treelines WL2 Lowland/Depositing Rivers FW2 Bats Birds	From project initiation	Years 1, 2, 3, 5, 10, 20, 30, 34	Ensure establishment; ensure treeline is not cut back excessively
Hedgerow/Treeline Restoration	Hedgerows/Treelines Small mammals Bats Insects Birds	From project initiation	Years 1, 2, 3, 5, 10, 20, 30, 34	Ensure establishment; ensure hedgerows are not cut back excessively
New Hedgerow/Treeline Planting	Small mammals Bats Insects Birds	From project initiation	Years 1, 2, 3, 5, 10, 20, 30, 34	Ensure establishment; ensure hedgerows are not cut back excessively
Woodland Retention	Small mammals Bats Insects Birds	From project initiation	Years 1, 2, 3, 5, 10, 20, 30, 34	Ensure continued presence
Wildlife Pond	Frogs Dragonflies Insects Bats	During wind farm construction	Years 1, 2, 3, 5, 10, 20, 30, 34	Ensure fringing vegetation establishment; ensure fencing is maintained
Barn Owl Nest Boxes	Barn Owl	Following wind farm completion	Years 1, 2, 3, 5, 10, 20, 30, 34	Ensure boxes are well maintained and/or replaced as required
Bat Boxes	All bat species except lesser horseshoe bat	From project initiation	Years 1, 2, 3, 5, 10, 20, 30, 34	Ensure boxes are well maintained and/or replaced as required

Measure	Target Species/Habitat	Implementation Timeline	Monitoring	Ongoing management
Mining Bee Banks	Mining bees	Following access track construction	Years 1, 2, 3, 5, 10, 15, 20, 30, 34	Ensure continued presence; vegetation to be scraped off annually
Log Piles	Small mammals Insects	Following access track construction	Years 1, 3, 5, 10, 20, 30, 34	Ensure continued presence; add material as required
Refugia/Hibernacula	Small mammals Insects	Following access track construction	Years 1, 3, 5, 10, 20, 30, 34	Ensure continued presence; add material as required
Meadow Planting	Small mammals Insects Birds	During temporary compound reinstatement	Years 1, 2, 3, 5, 10, 15, 20, 30, 34	Ensure continuation of appropriate grazing/mowing regime

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FEHILY TIMONEY

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

APPENDIX 2

Habitat Reinstatement Plan

FEHILY TIMONEY

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

PROPOSED ANNAGH WIND FARM

HABITAT REINSTATEMENT PLAN

Prepared for:

EMPower

Date: November 2022

Core House, Pouladuff Road, Cork, T12 D773, Ireland

T: +353 21 496 4133 | E: info@ftco.ie

CORK | DUBLIN | CARLOW

www.fehilytimoney.ie

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1. INTRODUCTION

Fehily Timoney and Company (FT) were requested to prepare a Habitat Reinstatement Plan (HRP) for the Annagh Wind Farm Development (Planning Ref. 217246) in response to further information requested by Cork Co. Council.

The measures proposed aim to uphold the principle of no net loss of biodiversity at the local level.

1.1 Study Area

The proposed wind farm site includes lands in the townlands of Annagh North, Coolcaum, Cooliney and Fiddane County Cork. The proposed grid connection will travel along the L1322 upon leaving the wind farm site and terminate at Charleville 110 kV substation in the townland of Rathnacally, County Cork. The site is accessed from the L1322 local road which meets the N20 at Ballyhea, approximately 4km to the east of the proposed site entrance.

The geographic scope of the HRP is confined to the Land ownership boundary (optioned lands) for the proposed wind farm, and TDR Nodes. It is noted that mitigation measures are restricted to within the wind farm site planning boundary and TDR Node locations.

Habitat reinstatement measures are proposed within the planning boundary, and also on the optioned lands beyond the site boundary. Proposed reinstatement measures are located the townlands of Annagh North, Coolcaum, Cooliney and Fiddane listed above.

1.2 Permission Period

A ten-year consent is being requested for this development. That is, planning consent for the construction of the development would remain valid for ten years following the grant of permission. We note that the Wind Energy Development Guidelines (2006) state that "*Planning Authorities may grant permission for a duration longer than 5 years if it is considered appropriate, for example, to ensure that the permission does not expire before a grid connection is granted. It is, however, the responsibility of the applicants in the first instance to request such longer durations in appropriate circumstances*". This text also appears in section 7.22 of the Draft Revised Wind Energy Development Guidelines (2019). A 10-year planning permission is considered appropriate for a development of this size to ensure all consents are in place. The expected physical lifetime of the proposed candidate turbine is approximately 35 years. After this time, the developer will make a decision whether to replace the turbines (subject to obtaining the necessary permission) or decommission the turbines, as is proposed in this application.

2. DECOMMISIONING

During decommissioning, cranes will disassemble the above ground turbine components which will be removed off site for recycling. All the major component parts are bolted together, so this is a relatively straightforward process.

The foundations will be covered over and allowed to re-vegetate naturally. Leaving the turbine foundations in situ is considered a more environmentally sensible option as to remove the reinforced concrete associated with each turbine would result in environmental nuisances such as noise and vibration and dust.

It is proposed that the internal site access tracks and turbine hard standings will be left in place. The access tracks will continue to be used for forestry and agriculture access. Turbine hardstandings shall be covered over with soil from the site and left to revegetate naturally.

It is expected that the temporary accommodation works along the TDR will not be required for the decommissioning phase as turbine components will be broken up on site and removed using standard HGVs.

Grid connection infrastructure including substation and ancillary electrical equipment shall form part of the national grid and will be left in situ.

It is expected that the decommissioning phase will take no longer than 6 months to complete.

A detailed decommissioning plan will be agreed in advance of construction with Cork County Council.

Temporary accommodation works will not be required for the decommissioning phase as turbine components will be broken up on site and removed using standard HGVs.

Access to the met mast for construction, operational maintenance and decommissioning will be made from the south of the site via an existing agricultural laneway, in the townland of Annagh North.

Authorised waste management facilities have been identified in the greater County Cork area as listed on the Local Authority Waste Facility Register by the National Waste Collection Permit Office. The authorised waste facilities utilised during the construction and decommissioning of the proposed project will depend on the contractors appointed and will depend on the capacity of the various facilities at the time of construction and decommissioning. A list of existing licensed waste facilities in proximity to the wind farm site is presented in Table 3-5 Chapter 3 Description of the Proposed Development of the EIAR. These facilities were identified at the time of the preparation of the EIAR.

3. TARGET SPECIES AND GROUPS

Following extensive desk studies and field studies a range of key ecological receptors were identified at the site. These are detailed within EIAR Chapter 8: Biodiversity. The enhancement and mitigation measures detailed here are designed to protect these species, in addition to improving the biodiversity value of the site generally.

3.1 Bats

A total of eight bat species were recorded at the site, namely common, soprano and Nathusius'pipistrelle, and Leisler's, brown long-eared, Daubenton's, Natterer's and Whiskered bats. Bats will benefit post decommissioning through the revegetation of bat buffers, the maturing of trees along the commuting routes and other hedgerow and treeline restorations, bat boxes and the restored wildlife pond.

3.2 Bees

Bumblebees, including the near-threatened Large Red Tailed Bumble Bee Bombus (*Melanobombus*) *lapidaries* identified in the desktop study, will benefit from the 5m rough grassland strips, meadow planting, hedgerow planting and low-intensity farmland maintenance.

Earth banks are proposed to be created to provide nesting habitat for mining bees, which in Ireland are represented by the genera Andrena and Nomada. Mining bees, and pollinators in general, will also benefit from the 5m rough grassland strips, meadow planting, hedgerow planting and low-intensity farmland maintenance.
Odonata

Damselflies and dragonflies will benefit from the artificial pond enhancement, in addition to measures which create and enhance semi-natural habitats in general. In particular, the artificial pond enhancement will provide a suitable area for the Vulnerable Scarce Blue Tailed Dragon Fly *Ischnura pumilio* identified in the desktop study, which is found in muddy sites with standing water. The features shall remain following decommissioning.

3.3 Insects (general)

In addition to bees and Lepidoptera, a range of insect species will benefit from measures which create and enhance semi-natural habitats at the site. These include the creation of rough grassland and pollinator -friendly habitats described above, in addition to the creation of log piles which will provide insect habitats. There will be an increase in food and shelter habitat for insects after decommissioning through the continued maturing of planted trees and hedgerows, the revegetation of the bat buffer areas and the remaining pond and shelter habitats, as well as the likely spread of flowering grassland and tree species planted onsite into the wider landscape through seed dispersal.

3.4 Badger

A range of measures including creation of an artificial sett are proposed to ensure badgers are not negatively impacted by the proposed development. The revegetation of the bat buffer areas and maturing of fruit and seed-bearing trees will provide additional foraging opportunities for badgers after the decommissioning of the wind farm.

3.5 Small mammals

Small mammals such as wood mouse and pygmy shrew will benefit from the creation of rough grassland strips, maintenance of low intensity farmland, and wildflower planting. These features will provide increased cover and food for these animals.

The abovementioned species, in addition to other small mammals such as hedgehog, will also benefit from the installation of Hibernacula which will provide shelter.

3.6 Frogs

The pond enhancement will increase structural diversity, providing breeding areas for the common frog. The measures shall remain following decommissioning.

3.7 Raptors

Birds such as barn owl and kestrel are likely to benefit from the provision of rough grassland strips and other semi-natural densely vegetated and diverse open habitats through increased abundance of small mammal prey. These features are located away from proposed turbine locations. The features shall remain following decommissioning.

3.8 Ground-nesting Birds

Ground nesting birds such as meadow pipit and skylark are likely to benefit from rough grassland strips, low intensity pasture management and wildflower planting. The bat buffer areas will be allowed revegetate after decommissioning providing additional nesting habitat to these birds.

3.9 Small Passerines

Small passerines as a general grouping will benefit from nature friendly management of the site including hedgerow planting and enhancement, and the creation and maintenance of semi-natural grassland habitats. The bat buffer areas will be allowed revegetate after decommissioning providing additional nesting habitat to these birds.

4. REINSTATMEMENT MEASURES

The following measures are proposed within the Habitat Reinstatement Plan (HRP). All measures are located within the main wind farm site.

4.1 General Measures

The following general measures shall be adopted:

- The same mitigation measures for the wind farm and GCR will apply for the decommissioning phase as for the construction phase.
- Turbine hardstanding's shall be covered over with subsoil and left to revegetate naturally. Topsoil shall not be imported onto the site to fulfil this measure. Seeds from the wet grassland receptor site shall be transplanted at T02, to re-instate this habitat type at this location.
- A final assessment of the condition and success of the various habitat and species management and enhancement prescriptions outlined in the HSMP will be undertaken in Year 34 (i.e., in the year before the final year of operation). Necessary actions to ensure the success of the HSMP will be implemented on the foot of the final assessment's findings.

4.2 Translocation of Wet Grassland Turves

As part of the Habitat and Species Management Plan for the proposed wind farm turves from the footprint of T02 hard standing area (c. 10, 350m^2) will be translocated to receptor site to preserve the flora and seedbank present within the footprint. The adjoining drains shall be block during the installation process to retain water in this area. No works are required within the receptor site and therefore no excavation works shall be carried out within this habitat. The blocked drain shall remain in situ and unchanged following decommissioning.

Seed collection shall be carried out within the receptor site for sowing on the new soil covering the turbine hardstand area at T02. Drain blocking in this area will encourage the establishment of wet grassland species.

4.3 Bat Buffers

Tree-free buffers which will be maintained around all turbines for the full extent of the operational phase of the wind farm to reduce risks to bats by keeping vegetation short. This will be achieved by mechanical means only, and pesticides and toxic substances shall not be utilised. Following the dismantling and removal of turbines from the site all maintenance works shall cease and the area will be allowed to naturally recolonise to rough grassland, scrub and woodland. These reinstated areas will lead to an increase in bat foraging habitats for populations within and outside the site.

4.4 Alternative Bat Commuting Routes

As part of the Habitat and Species Management Plan alternative bat commuting routes are being established within the wind farm site to connect severed hedgerows, treelines and woodland edges. The measure is proposed to ensure the connectivity of bat commuting routes through the site during the operational phase of the wind farm and to steer bats away from turbines reducing their potential collision risk. This includes the planting of double lines of hedgerow, with alder and willow on one side, and pollinator-friendly hedgerow species on the other. The proposed decommissioning works will not require the removal of these features due to their setback distance from proposed infrastructure. The features shall remain in situ following decommissioning of the wind farm. In the event that for some unforeseen circumstance a section of these commuting routes needs to be removed, any losses must be re-established through the planting of new native trees to ensure that any gaps created are filled before the completion of the decommissioning phase.

4.5 Hedgerow and Treeline Reinstatement at TDR Nodes

It is expected that temporary accommodation works will not be required for the decommissioning phase as turbine components will be broken up on site and removed using standard HGVs. In the event that a tree needs to remove for some unforeseen circumstance they will be reinstated using the same native species present in original hedgerows (excluding Ash *Fraxinus excelsior* due to its vulnerability to ash dieback disease). Semi-mature specimens of native provenance will be included to accelerate rehabilitation of these areas.

4.6 Artificial Badger Sett

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. The artificial badger sett will remain in place after the decommissioning of the wind farm.

4.7 Grassland Management

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. These fenced off areas will not be removed during the decommissioning phase of the proposed development.

4.8 Existing Hedgerows: Repair and Enhancement

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. The decommissioning of the wind farm may result in some temporary loss of habitat, primarily to hedgerows at access points which may require partial removal to facilitate the removal of turbine parts. However, the turbine components will be broken up on site and removed using standard HGVs which will greatly reduce the level of vegetation clearance required in comparison with the construction phase. Where sections of hedgerows that need to be removed, they will be replaced with similar native fruit and seed-bearing species to maintain the wildlife connectivity onsite and to its surroundings.

4.9 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 *Phragmtes 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. The pond, along with the perimeter fencing, will remain after the decommissioning of the wind farm.

4.10 Barn Owl Nest Boxes

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. These barn owl boxes will remain in situ after decommissioning of the wind farm, increasing available nesting habitats to barn owl within the site.

4.11 Bat Boxes

A total of eight bat boxes will be installed in mature trees along these field boundaries. These bat boxes will remain in situ after decommissioning of the wind farm, increasing roosting habitats for bats within the site.

4.12 Insect Shelter Habitats

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. These insect shelter habitats will remain after the decommissioning of the wind farm site.

4.13 Meadow Plating

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. These meadows will remain after the decommissioning of the wind farm and may spread into other grassland areas within and outside the side, as they will provide a seed bank of flowering grassland species for birds and mammals to spread.

5. CONCLUSION

The Habitat and Species Management Plan for Annagh Wind Farm has been considered in terms of its potential to impact on or alter the findings of the NIS. No previously unidentified effects will arise from the measures, additional to those already described in the NIS.

As the same mitigation measures for the wind farm and GCR will apply for the decommissioning phase as for the construction phase, no degradation to ground and surface water quality are envisaged. The existing detailed mitigation measures to be implemented in Table 4-12 of the NIS will avoid or reduce potential the proposed measures to have an adverse effect on the integrity of the Blackwater River (Cork/Waterford) cSAC (002170) or any other European site.

The HSMP measures will be monitored throughout the operational phase of the wind farm and a final time before the final year of operation, to ensure the success of various habitat and species management and enhancement prescriptions. These habitats will be well established by the decommissioning stage and be allowed to develop and mature after decommissioning phase. Following the dismantling and removal of turbines from the site all maintenance works shall cease. The turbine hardstands shall be covered in soil and the area will be allowed to naturally recolonise to rough grassland, scrub and woodland. These reinstated areas will lead to an increase in bat foraging habitats for populations within and outside the site. This will provide resting and foraging habitat for mobile target species within and outside the site. The increased botanical species richness onsite, through the planting of fruiting and seed-bearing trees and meadow planting will lead to a spread of these species outside the site through their dispersal via birds and small mammals.

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APPENDIX 3

Bat Monitoring Report 2021-2022

CONFIDENTIAL APPENDIX

Bat Survey

Annagh Wind Farm Development

Charleville

Co. Cork

Report prepared for Fehily Timoney & Co.

By Karen Banks MCIEEM

23rd October 2022

CONFIDENTIAL APPENDIX CONTAINS SENSITIVE INFORMATION ON THE LOCATION OF BAT ROOSTS

Greenleaf Ecology

Coolnacaheragh
Lissacreasig
Macroom
Co. Cork
Tel: 0834218641
Email: greenleafecology@outlook.com

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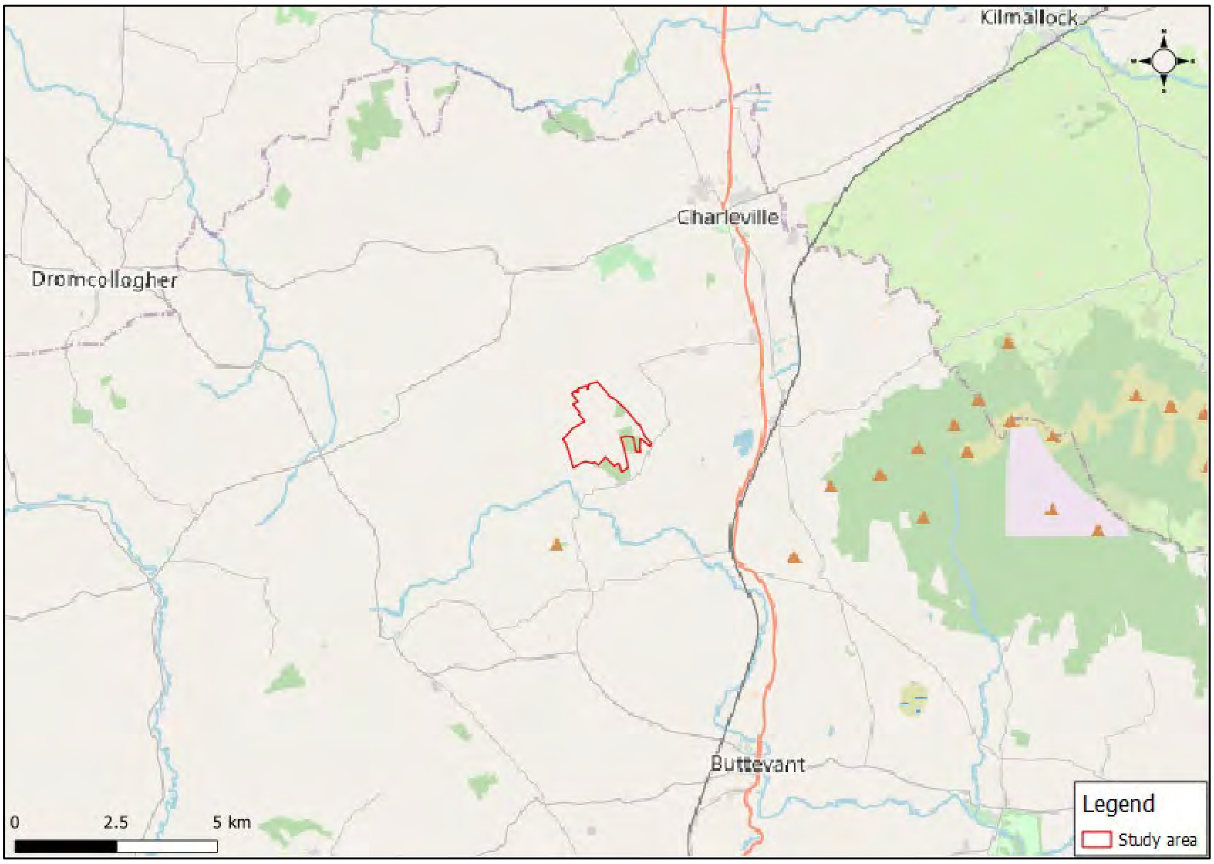
1 Introduction

Greenleaf Ecology were commissioned by Fehily Timoney to undertake bat surveys of the proposed Annagh Wind Farm in response to request for further information no. 1 (d) from Cork County Council (Planning Ref: 21/07246).

The study area comprises the land ownership boundary; the proposed site is located within the study area (as detailed in the EIAR prepared for Annagh Wind Farm). The location of the wind farm study area is illustrated in Figure 1-1.

Figure 1-1: Study area location



1.1 Proposed Works

For a description of the proposed development please refer to the EIAR prepared for Annagh Wind Farm.

1.2 Legislative Context

All Irish bats are protected under the Wildlife Act (Revised). Also, the EC Directive on The Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive 1992), seeks to protect rare species, including bats, and their habitats, and requires that appropriate monitoring of populations be undertaken. Across Europe they are further protected under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1982), which, in relation to bats, exists to conserve all species and their habitats. The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979, enacted 1983) was instigated to protect migrant species across all European boundaries. The Irish government has ratified both these conventions.

All bats are listed in Annex IV of the EU Habitats Directive (92/43/EC) and the Lesser Horseshoe bat is further listed under Annex II of the same Directive.

Local Planning Authorities are required to give consideration to nature conservation interests under the guidance of the SEA Directive 2001/42/EC. This Directive states that the protected status afforded to bats means that planning authorities must consider their presence in order to reduce the impact of developments through mitigation measures.

Destruction, alteration or evacuation of a known bat roost is a notifiable action under current legislation and a derogation licence has to be obtained from the National Parks and Wildlife Service (NPWS) before works can commence.

In addition, it should be noted that any works interfering with bats and especially their roosts, may only be carried out under a licence to derogate from Regulation 23 of the Habitats Regulations 1997, (which transposed the EU Habitats Directive into Irish law) issued by the NPWS. The details with regards to appropriate assessments, the strict parameters within which derogation licences may be issued and the procedures by which and the order in relation to the planning and development regulations such licences should be obtained, are set out in Circular Letter NPWS 2/07 "Guidance on Compliance with Regulation 23 of the Habitats Regulations 1997 - strict protection of certain species/applications for derogation licences" issued on behalf of the Minister of the Environment, Heritage and Local Government on the 16th of May 2007.

1.3 Objectives

The objectives of the bat surveys were to assess:

- Key foraging areas for bats within the study area; and
- Key flight routes from bat roosts within the study area and surrounding landscape.

2 Methodology

2.1 Field Survey

This bat survey and assessment was undertaken in accordance with the following guidelines:-

- Andrews, H. (2018) Bat Roosts in Trees. A guide to identification and assessment for tree-care and ecology professionals. Pelagic Publishing.
- Bat Conservation Ireland (2010) G*uidance notes for Planners, Engineers, Architects, and Developers*;
- Collins, J. (ed.) (2016) *Bat Surveys for Professional ecologists: Good Practice Guidelines (3rd ed.)*. The Bat Conservation Trust, London;
- Marnell, F., Kelleher, C. & Mullen, E. (2022) Bat mitigation guidelines for Ireland v2. Irish Wildlife Manuals, No. 134. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland; and
- Scottish Natural Heritage (2019) *Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation*. Scottish Natural Heritage.

2.2 Surveyor Information

The survey was undertaken by Karen Banks, MCIEEM.

Karen is an ecologist with 16 years' experience in the field of ecological assessment. She holds a BSc in Environment and Development from Durham University and is a full member of the Chartered Institute of Ecology and Environmental Management. Karen is an experienced and skilled bat surveyor, first gaining a scientific licence to disturb bats from Natural England, UK in 2008. Karen is trained in bat handling and capture methods and currently holds a bat disturbance licence granted by the NPWS. Karen has undertaken bat survey and assessment for numerous projects, including bridge repair and replacement works, domestic dwelling repair and demolition works, wind farm developments and large-scale infrastructure projects such as flood relief schemes, road developments and pipeline schemes. Karen has also represented Cork County Council as an expert witness for bats at an Oral Hearing.

2.3 Bat Activity Survey

2.3.1 Vantage Point Surveys

Vantage Point (VP) surveys were undertaken within the study area to observe Leisler's bat (*Nyctalus leisleri*) emergence, commuting and foraging activity. A total of seven VP surveys were undertaken between August 2021 and July 2022 (see Table 2-1). The surveys were undertaken from 20 minutes before dusk (when still light) until bats were no longer visible. VP survey locations are illustrated in Figure 2-1.

The surveys were aided by the use of Hawke Frontier 8x42 binoculars, a Hawke Endurance 20-60x85 spotting scope and the Guide TrackiR Pro 19mm thermal imaging scope.

Notes on bat flight paths and foraging areas were made and locations of bat activity were marked on a map (Figure 3-1 and Figure 3-4).

Survey dates and weather conditions are detailed in Table 2-1.

Figure 2-1: Annagh Wind Farm, Vantage Point Survey Locations

2.3.2 Walked Transects

Walked transects were undertaken within the study area and surrounding local roads at dusk to identify flight paths between nearby roosts and key foraging areas within the study area.

An Anabat Walkabout detector was utilised for the survey, which records bat echolocation calls directly on to an internal SD memory card. Each time a bat is detected, an individual time-stamped (date and time to the second) file is recorded. Data were then downloaded and all recordings were analysed by the Anabat Insight software analysis programme version 2.0.1.

All surveys were undertaken by two people (surveyors were bat specialists Ms Karen Banks and Dr Isobel Abbott, assisted by junior ecologist Mr Cathal MacPartholan).

Survey dates and weather conditions are detailed in Table 2-1.

Table 2-1: Annagh Wind Farm: Bat Activity Survey Dates and Weather Conditions

Date	Survey	Surveyors	Weather Conditions
09/08/2021	VP 1	KB & IA	Temp at dusk: 14°C; Wind: Beaufort Force 0-1; no precipitation
31/08/2021	VP 1	KB & CMP	Temp at dusk: 14°C; Wind: Beaufort Force 2; no precipitation
30/09/2021	VP 1	KB & CMP	Temp at dusk: 12°C; Wind: Beaufort Force 3; no precipitation
13/05/2022	VP 2	KB & CMP	Temp at dusk: 12°C; Wind: Beaufort Force 3; no precipitation
16/05/2022	VP 3	KB & CMP	Temp at dusk: 13°C; Wind: Beaufort Force 4; no precipitation
20/05/2022	VP 1	KB & CMP	Temp at dusk: 11°C; Wind: Beaufort Force 4; no precipitation
09/07/2022	VP 3 & transect	KB & CMP	Temp at dusk: 19°C; Wind: Beaufort Force 2; no precipitation
12/08/2022	Transect	KB & CMP	Temp at dusk: 17°C; Wind: Beaufort Force 2; no precipitation
29/09/2022	Transect	KB & CMP	Temp at dusk: 13°C; Wind: Beaufort Force 4; no precipitation
01/10/2022	Transect	KB & CMP	Temp at dusk: 13°C; Wind: Beaufort Force 2; no precipitation
02/10/2022	Transect	KB & CMP	Temp at dusk: 13°C; Wind: Beaufort Force 2; no precipitation

3 Results

3.1 Bat Activity Surveys

This section describes the results of VP surveys undertaken in 2021 and 2022 and walked transect surveys undertaken in 2022. Reference is also made to the results of bat activity transect and roost surveys undertaken in 2020 and 2021 for context.

3.1.1 Vantage Point Surveys

A colony of Leisler's bat was observed from VP1 on 31st August 2021 and 20th May 2022 foraging over the centre-north of the study area (Figure 3-1) c.20 minutes after sunset. The colony was clearly visible as it foraged high over the study area, however, due to the low light levels present at dusk, the direction of flight into the study area was not observed.

No bats were observed emerging from any of the buildings located at the northern study area boundary during the surveys undertaken from VP2 and VP3.

3.1.2 Walked Transects

A total of five species of bat were recorded within the study area during the walked transects undertaken in 2020 and 2022, namely Leisler's bat, common pipistrelle, soprano pipistrelle, natterer's bat and whiskered bat.

Leisler's bat

A large colony of Leisler's bat (estimated to comprise c.65 bats) was recorded foraging over the centre of the study area during the transect undertaken in May 2020. The location of the core Leisler's bat foraging area recorded in May 2020 is illustrated in Figure 3-1.

A small number of Leisler's bat were recorded flying into the north of the study area from a westerly direction during the transects undertaken in July 2022 and October 2022 and a small number of Leisler's bat were recorded commuting along the south-eastern boundary of the study area, adjacent to the local road, in August 2022. Moderate numbers of this species were also recorded in foraging along the hedgerows, treelines and woodland edge habitats present across the study area during the walked transects undertaken in 2020 and 2022. The location of Leisler's bat calls recorded during the walked transects undertaken in 2020 and 2022 is illustrated in Figure 3-1, the calls from the walked transects have been combined to illustrate the main areas of study area usage recorded across all the transect surveys.

Flight lines of Leisler's bat observed commuting into the study area in July, August and October 2022 are illustrated in Figure 3-4.

Pipistrelle

During the transects undertaken in August 2022 and October 2022, soprano and common pipistrelle were recorded emerging from the maternity roost present at the south-east of the study area and commuting along the treeline to the north-west of the roost and along forestry edge before dispersing to forage within the study area field boundaries and woodland edge habitat. Both soprano and common pipistrelle were also recorded foraging along the local road adjacent to the maternity roost.

Soprano pipistrelle were recorded in September 2022 commuting into the study area from the local road at the south of the study area, flying along the sheltered access track and then dispersing to forage along forest edge, scrub and treelines within the study area.

Soprano pipistrelle were also recorded commuting into the study area along a treeline present at the north-west of the study area before dispersing to forage along the hedgerows and treelines across the north and centre of the study area.

The location of pipistrelle species bat calls recorded during the walked transects undertaken in 2020 and 2022 is illustrated in Figure 3-2.

Flight lines of pipistrelle bats observed commuting into the study area are illustrated in Figure 3-4.

Myotis Species

A small number of *Myotis* species, namely whiskered and natterer's bat were recorded at the periphery of the study area during the walked transects undertaken in 2022 (Figure 3-3).

Figure 3-1: Annagh Wind Farm- Leisler's bat calls and core foraging area recorded during transects undertaken in 2020 and 2022

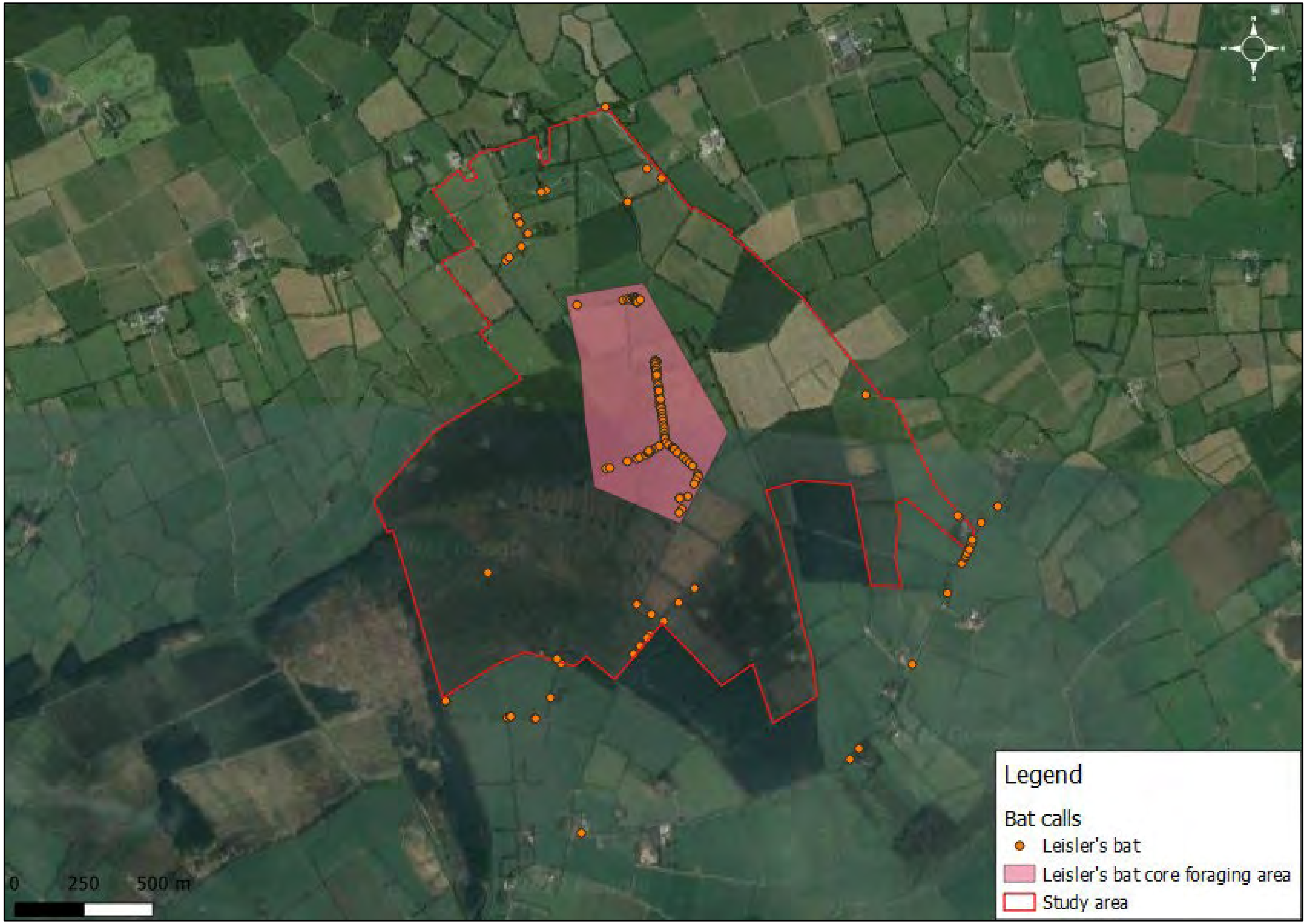


Figure 3-2: Annagh Wind Farm- Pipistrelle bat calls recorded during transects undertaken in 2020 and 2022

Figure 3-3: Annagh Wind Farm- Myotis species bat calls recorded during transects undertaken in 2020 and 2022

Figure 3-4: Annagh Wind Farm- flight lines recorded during walked transects undertaken in 2022

3.2 Interpretation and Evaluation of Survey Results

The results of bat roost surveys undertaken within the study area in 2021 indicate that two minor pipistrelle roosts were present at the north of the study area and a soprano and common pipistrelle maternity roost was present at the south-east of the study area (Figure 3-5). The core sustenance zone radius of common pipistrelle and soprano pipistrelle is 2km and 3km respectively[1]. Applying the precautionary principle, the minor pipistrelle roost (not identified to species level) present at the north of the study area is considered to be soprano pipistrelle. The study area is entirely within the core sustenance zone (CSZ) of the soprano pipistrelle roosts and most of the study area is within the CSZ of the common pipistrelle roost.

A Leisler's bat spring/ autumn roost is present to the west of the study area. The CSZ for Leisler's bat is 3km and the colony was observed foraging over the study area c.15- 20 minutes after sunset in May 2020, August 2021 and May 2022, therefore the study area is likely within the CSZ for a roost of this species.

Commuting routes into the study area were observed for soprano and common pipistrelle (Figure 3-4). These species then dispersed to forage along hedgerows, treelines and forestry edges across the study area. Small numbers of Leisler's were observed commuting into the north of the study area from a westerly direction (Figure 3-4). Leisler's bats were recorded foraging over open ground at the centre-north of the study area (Figure 3-1) and in the shelter of hedgerows, treelines and forestry edges across the study area.

[1] Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London.

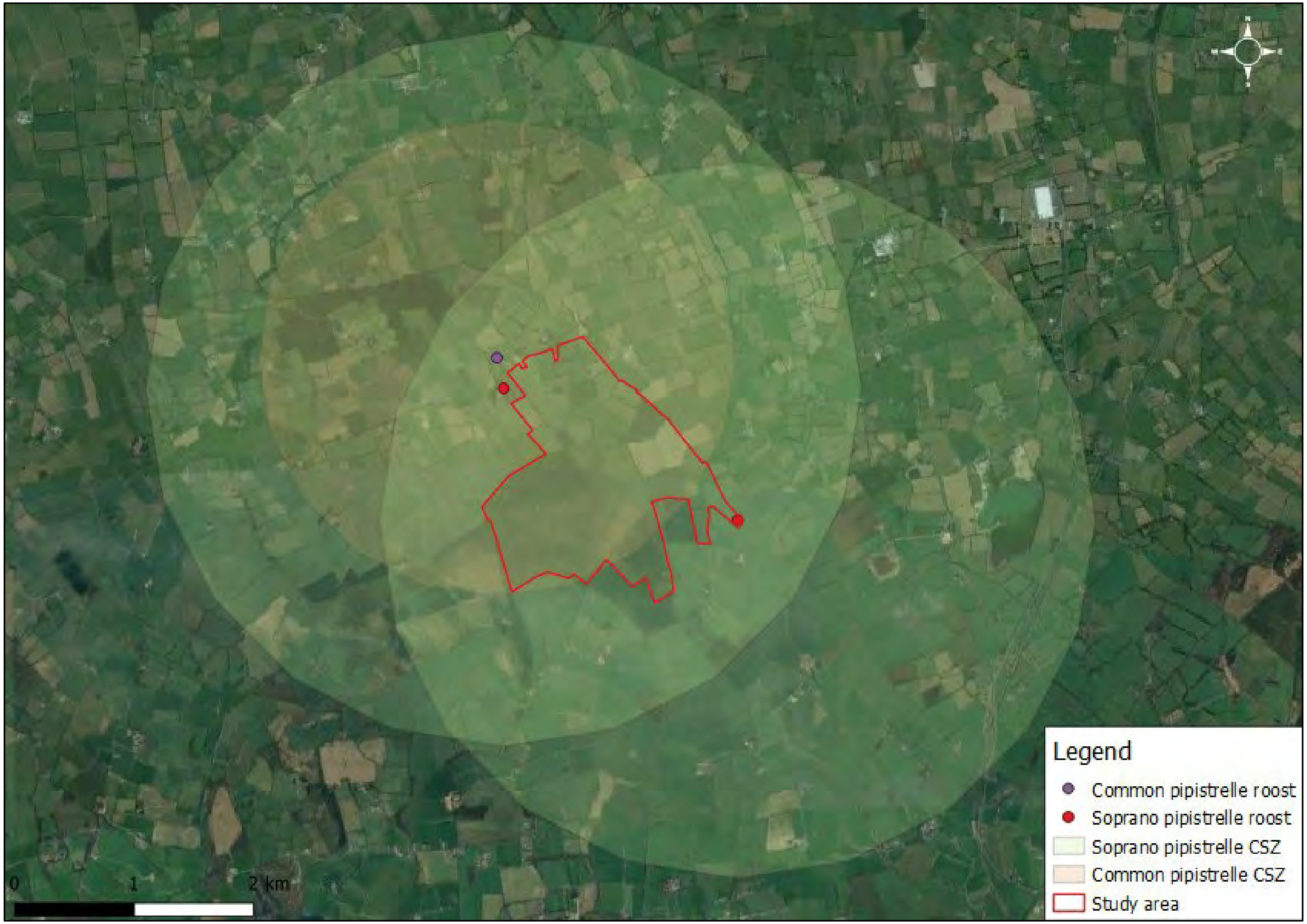


Figure 3-5: Annagh Wind Farm- common and soprano pipistrelle roost core sustenance zones

4 Mitigation

As outlined by Scottish Natural Heritage (2019), and Annagh Bat Survey Report (Fehily Timoney, 2021) wind farms can affect bats in the following ways:

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

4.1 Current EIAR Bat Mitigation Measures

The following sections provide a summary of the bat mitigation measures included within the EIAR prepared for Annagh Wind Farm (Fehily Timoney, 2021).

4.1.1 Construction Phase

Buffer Zone

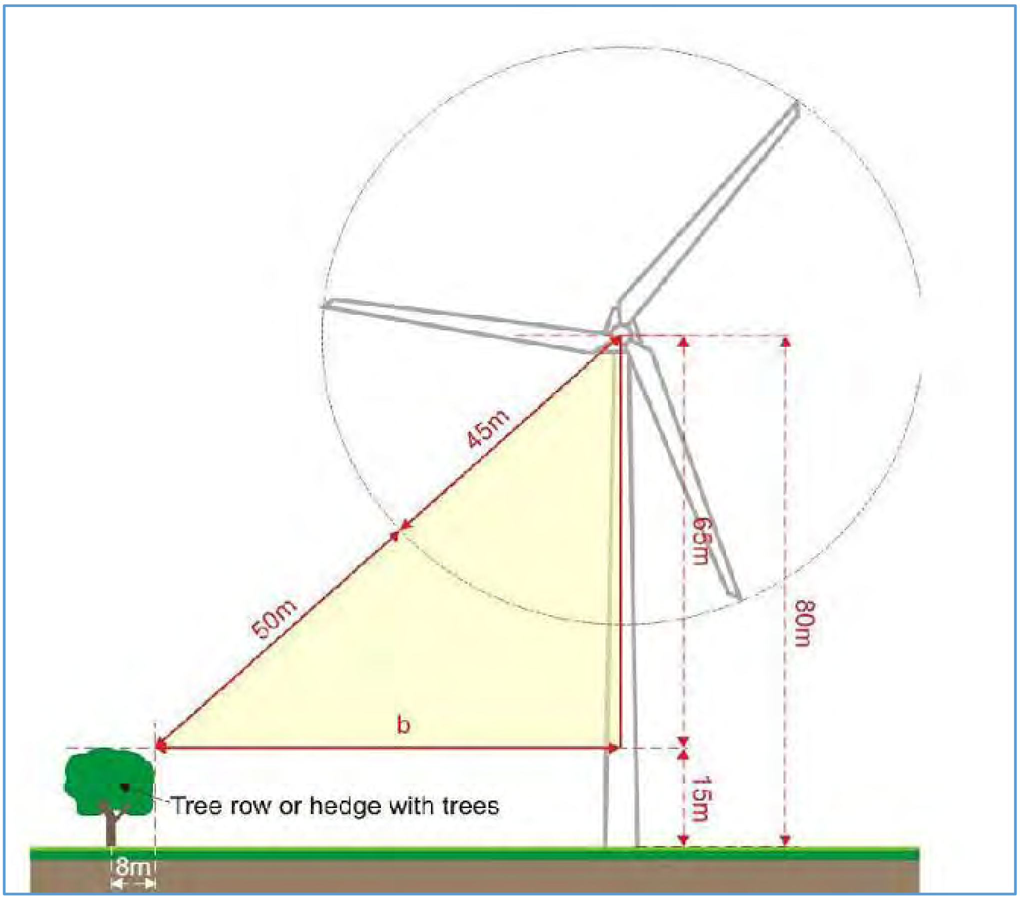
To minimize risk to bat populations, a buffer zone is required around any treeline, hedgerow, woodland feature, into which no part of the turbine should intrude.

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 8-91:

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. 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.

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. This will be achieved by planting new pollinator-friendly hedgerows along Lines A-F . Willow and Alder will also be included in these hedgerows due to their rapid growth and tolerance of damp soils. These species 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 listed below 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 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 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 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.

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.

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.

4.1.2 Operational Phase

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 occur 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 (ºC)
- 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 surveys[2] 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.

[2] 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.

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.

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.

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.

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:

a) 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.

b) 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.

4.2 Further Recommendations

In addition to the provision of compensatory planting, as detailed in the EIAR and Section 4.1.1 of this report, it is recommended that the Habitat and Species Management Plan 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). Landscaping that is undertaken in accordance with the Pollinator Friendly Planting Code[3] away from the proposed turbine locations will have a positive effect on invertebrates and, in turn, bats and other wildlife.

Specific bat box recommendations should be included within the Habitat and Species Management Plan (final number and location to be agreed on the ground at the pre-construction phase with the bat specialist/ Ecological Clerk of Works).

The Habitat and Species Management Plan should include details on how the immediate surroundings of the turbines shall be managed so that they do not attract insects.

[3] National Biodiversity Data Centre (2021) Pollinator Friendly Planting Code. All-Ireland Pollinator Plan 2021-2025. www.biodiversityireland.ie/pollinator-plan.

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Appendix A: Description of Irish Bat Species

Ireland has ten known bat species from two distinct families. Each is briefly described below. For a more comprehensive overview see Roche *et al* (2014). The conservation status of each species is derived from NPWS (2019).

Vespertilionidae:

Common pipistrelle (*Pipistrellus pipistrellus*)

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

Soprano pipistrelle (*Pipistrellus pygmaeus*)

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

Nathusius' pipistrelle (*Pipistrellus nathusii*)

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

Leisler's bat (*Nyctalus leisleri*)

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

Brown long-eared bat (*Plecotus auritus*)

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

Natterer's bat (*Myotis nattereri*)

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

Daubenton's bat (*Myotis daubentonii*)

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

Whiskered bat (*Myotis mystacinus*)

This species, although widely distributed, has been rarely recorded in Ireland. It is often found in woodland, frequently near water. Flying high, near the canopy, it maintains a steady beat and sometimes glides as it hunts. It also gleans spiders from the foliage of trees. Whiskered bats prefer to roost in buildings, under slates, lead flashing or exposed beneath the ridge beam within attics. However, they also use cracks and holes in trees and sometimes bat boxes. The conservation status of this species is Favourable.

Brandt's bat (*Myotis brandtii*)

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

<u>Rhinolophidae:</u>

Lesser horseshoe bat (*Rhinolophus hipposideros*)

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

Conservation have been designated in Ireland for its protection. Where it occurs, it is often found roosting within farm buildings. The conservation status of this species is Inadequate.

FEHILY TIMONEY

CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE
& PLANNING

APPENDIX 4

Avian Monitoring Report
2021-2022

FEHILY TIMONEY

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

ANNAGH WIND FARM ORNITHOLOGICAL SURVEYS

BASELINE ORNITHOLOGICAL SURVEYS – ANNAGH WIND FARM: WINTER 2021/22

Prepared for: EMPower

EMPower

Date: October 2022

Core House, Pouladuff Road, Cork, T12 D773, Ireland

T: +353 21 4964 133 | E: info@ftco.ie

CORK | DUBLIN | CARLOW

www.fehilytimoney.ie

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EXECUTIVE SUMMARY

Ornithological surveys for Annagh Wind Farm searched for and recorded all bird species, focusing primarily on the wind farm site but also taking in the surrounding region. Surveys were conducted during the winter 2021/22 season (October 2021 – March 2022, inclusive) and continued into April 2022 to cover the final wintering period of whooper swans.

The methodology for the 2021/2022 vantage point surveys at Annagh Wind Farm adhered to Scottish Natural Heritage guidance (SNH, 2017) for assessing the impact of proposed wind farm developments on target species' breeding and wintering populations. Two timed watches of three hours duration were carried out from two VPs (VP1 and VP2) every month from October 2021 to January 2022 (inclusive) totalling 24 hours per VP. Additional hours were conducted at VPs 1 and 2, and an extra VP (Swan VP -this was split into Swan VP E and Swan VP W, and were alternated, depending on where birds were feeding on a given survey) were added to the schedule in February 2022 following a request for further information by Cork County Council on nocturnal movements of wintering whooper swans in the vicinity of the site. For February and March, a total of 11 hours and 40 minutes were conducted at VP1, with 12 hours conducted at VP2, and 12 hours and 15 minutes conducted at the combined (east and west) Swan VPs. For April 2022 surveys, six hours were conducted at VP1, six hours and 14 minutes at VP2, and six hours and ten minutes at combined Swan VPs. Winter bird transect surveys, and hinterland surveys were also undertaken during this period.

During vantage point surveys, a total of 37 species were recorded. 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.

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 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.

During hinterland surveys surrounding the proposed site, a total of 28 species were noted. Of these, a total of four are Annex-I protected, namely: hen harrier, little egret, merlin, and whooper swan. A further five Red-listed species were observed: curlew, lapwing, pochard, shoveler, and snipe, with an additional 12 Amber-listed. The remaining seven species are Green-listed.

During wintering bird transects a total of 27 species were detected. Of these, three species are red-listed: meadow pipit, redwing, and snipe; three are amber-listed.

A total of sixteen species were detected during nocturnal activity surveys. Of these, just whooper swan is Annex-I protected. 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.

1. INTRODUCTION

Fehily Timoney & Company (FT) was appointed by EMPower to undertake a 3rd winter of ornithological surveys at the proposed Annagh wind farm from 2021-2022. As well as providing additional monitoring of bird activity within the study area, the surveys were also carried out to provide additional information to address the request for further information (RFI) by Cork County Council (CCC), in relation to the potential for whooper swans to traverse the site both by day and night. Two additional vantage point locations were set up to monitor whooper swans wintering on the Blackwater Flats, some 500m south of the proposed wind farm site. The site was also acoustically monitored at night to detect any potential whooper swans, and other target species flying over. This report presents the results of the ornithological surveys and summarises the activity of specific target bird species, as well as non-target species. The study area of Annagh Wind Farm is near Charleville, Co, Cork.

This avian assessment for surveys completed includes the assessment of bird species occurring within the proposed site boundary, and surveys of surrounding habitats of value to birds. Surveys adhered to Scottish Natural Heritage guidance (SNH, 2017). The following surveys were carried out:

- Vantage Point survey (original VPs and a newly appointed Swan VPs);
- Nocturnal Migration Survey;
- Hinterland survey;
- Breeding Wader survey, and;
- Winter bird transect survey.

The monthly assessment of bird species within the site was completed using vantage point survey watches. Surveys took place at two vantage point (VP1 & 2) locations from October 2021 to March 2022 (inclusive). Each VP was subject to two watches per month, each consisting of three hours in length (six hours surveyed per VP per month). Survey efforts in February and March were doubled, so that a total of four three-hour (twelve hours) watches were conducted per month. Two additional VPs were added in February 2022 to monitor whooper swan activity some 500m south of the site, in response to the CCC RFI. Two were required as locations offered different views, and were required to be alternated, depending on where birds were situated on a given day or time of day. Migration surveys were carried out in Early April 2022.

Hinterland surveys were completed in potential favourable bird habitats within a 10 km radius of the proposed wind farm development. This survey method was used to assess species populations surrounding the proposed development site. Wintering bird surveys were completed along transects within the site.

1.1 Study Area

The proposed Annagh wind farm is located c. 7.3 km southwest of Charleville, Co. Cork near the Co. Cork/Co. Limerick border. The study area encompasses parts of the townlands of Cooliney, Fiddane, Annagh North, Cullig and Coolcaum. The VP surveys study area was the VP viewsheds and 500m turbine buffers. Breeding bird, breeding wader and wintering bird transects were surveyed within the land ownership boundary.

Surrounding habitats and land uses are described by Corine 2018[1] as: Pastures (code 231), land principally occupied by agriculture with significant areas of natural vegetation (code 243), Broad-leaved forests (code 311) and Coniferous forests (code 312). Figure 1-1 displays the site location within the study area.

During site surveys, habitats such as wet grassland (GS4), conifer plantation (WD4), hedgerows (WL1), treelines (WL2) and improved agricultural grasslands (GA1) were recorded (Fossitt, 2000). At Annagh, (mixed) broadleaved woodland (WD1), improved agricultural grasslands (GA1) and wet grassland (GS4) are the dominant habitat types.

The protected European sites within 15 km of the proposed Wind Farm are:

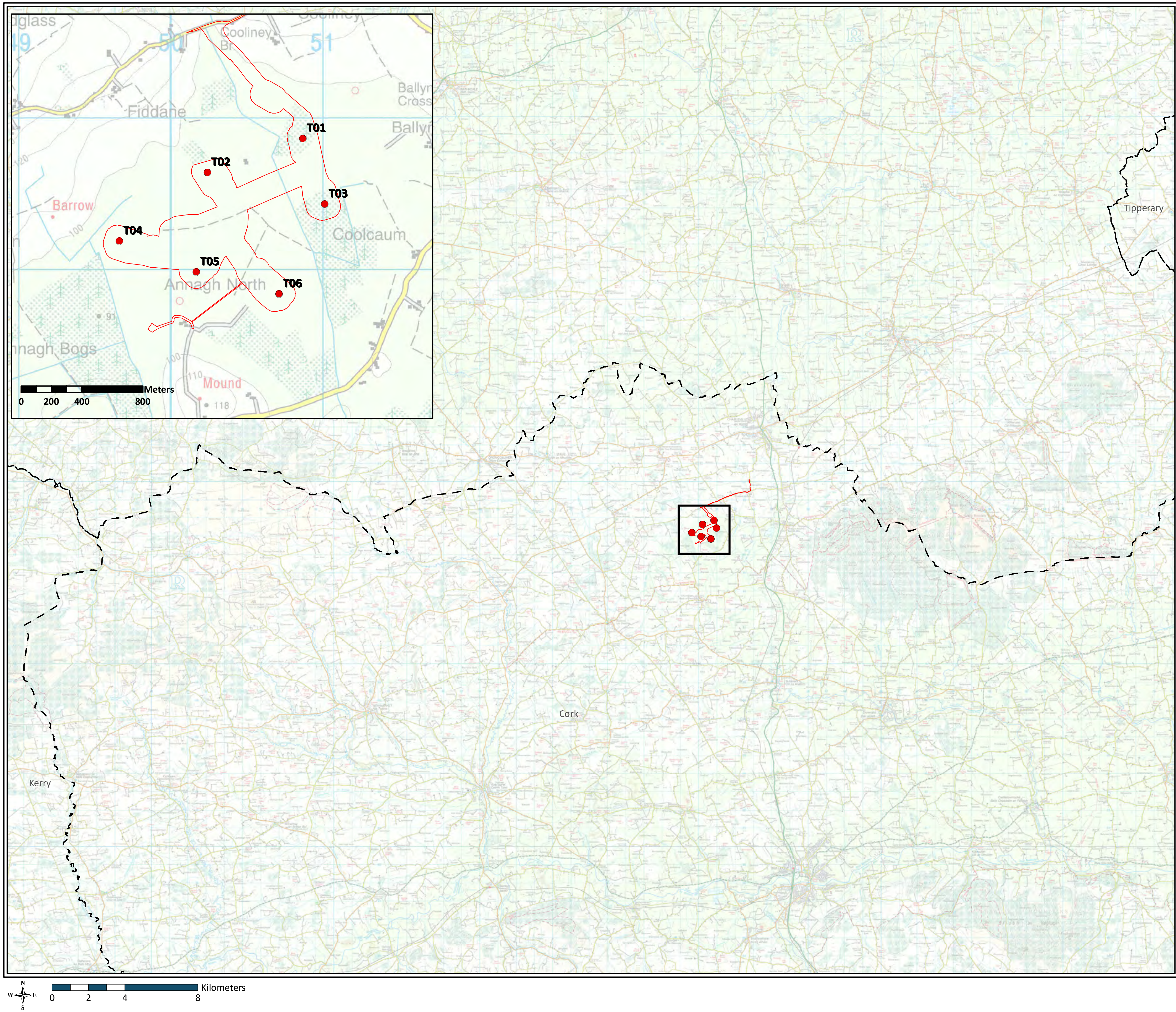
- Blackwater River (Cork/Waterford) SAC (002170);
- Ballyhoura Mountains SAC (002036);
- Kilcolman Bog SPA (004095).

The protected national sites within 15 km of the proposed Wind Farm are:

- Eagle Lough pNHA (site code 001049);
- Kilcolman Bog pNHA (side code 000092);
- Ballyhoura Mountains pNHA (site code 002036);
- Ballinvonear Pond pNHA (Site code 000012);
- Mountrussel Wood pNHA (Site code 002088);
- Awbeg Valley (Above Doneraile) pNHA (Site code 000075);
- Ballintlea Wood pNHA (Site code 002086);
- Castleoliver wood pNHA (Site code 002090).

1 https://gis.epa.ie/EPAMaps/. Accessed 20/10/22 at 12:30.

Path: R:\Map Production\2019\P2050\Workspace\Ornithology\P2050_GIS_Fig1-1_Wind_Farm_Site_Boundary_and_Location_A3.mxd



Legend

County Boundaries

Proposed Site Boundary

Proposed Turbine Layout

TITLE: Wind Farm Site Boundary and Location	
PROJECT: Annagh Wind Farm, Co. Cork	
FIGURE NO: 1.1	
CLIENT: EMPower	
SCALE: 1:200000	**REVISION:** 0
DATE: 25/10/2022	**PAGE SIZE:** A3

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2. SURVEY METHODOLOGY

The following surveys were carried out:

- Vantage point survey (VPs 1 & 2, and Swan VPs East & West);
- Nocturnal migration survey;
- Hinterland survey;
- Winter bird transect survey.

Vantage point surveys carried out at the proposed wind farm adhered to Scottish Natural Heritage guidance (SNH, 2017). Hinterland surveys were completed in potentially favourable bird habitats within a c. 10km radius of the proposed Annagh Wind Farm site, the surveys were undertaken following methodology by Hardey *et al*. (2013), Lewis *et al*, (2019) and O' Donoghue, (2012). Winter bird transect surveys were conducted following a modified wintering bird transect survey method based on Brown and Shepherd (1993) and recommended in published guidance from Scottish Natural Heritage (2017).

2.1 Vantage Point Surveys

Vantage Point (VP) surveys were carried out between October 2021 and March 2022 (inclusive) at the proposed Annagh Wind Farm in accordance with the Scottish Natural Heritage methodology for onshore wind farms (SNH, 2017). An additional round of surveys was conducted in April 2022 to cover the spring migration period. Two fixed VP locations (Annagh VP1 and VP2) overlooking the study area were used during the VP surveys (Table 2-1). An additional two VPs (Swan VP E & Swan VP W) were added in February 2022 in response to the RFI, to look at whooper swan roosting/foraging sites in the greater area. Dawn and dusk surveys were carried out during this period. Table 2-2 gives the VP locations. Vantage points were chosen to cover a specific viewshed of the proposed development site. Each was chosen specifically to encompass the view of all the proposed turbines. Figure 2-1 displays the site location and vantage points within the study area.

The main purposes of vantage point survey watches are to collect data on *target species* that will enable estimates to be made of:

a. The time spent flying over the defined survey area;
b. The relative use of different parts of the defined survey area; and
c. The proportion of flying time spent within the upper and lower height limits as determined by the rotor diameter and rotor hub height.

The specific vantage points and turbines within their viewsheds can be seen in Table 2-1 below:

Table 2-1: Vantage point viewshed and turbines encompassed

Site	Vantage Point	Turbine number(s) covered in viewshed
Annagh	VP 1	1-6
	VP 2	1-6
	Swan VP E	N/A
	Swan VP W	N/A

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

In line with recommended best practice (SNH, 2017 and Band *et al*. 2007), viewshed analysis was undertaken using ARCMAP 10.4.1, to calculate a theoretical zone of visibility from each vantage point. Visibility is calculated from each vantage point along an invisible layer suspended at the predicted lowermost height passed through by the rotor blade tips, using an observer height of 1.5 m. We note the following from SNH guidance in respect of priority areas for viewshed analysis (emphasis added):

> *"Where the key purpose is to estimate the risk of collision with turbines,* ***it is the visibility of the airspace to be occupied by the turbine rotors (the collision risk volume) that is of prime importance****. Therefore, it is recommended that visibility be calculated using the least visible part of this airspace, i.e. an imaginary layer suspended at the lowermost height passed through by the rotor blade tips (typically about 20-30m above ground level). Predicting visibility at this level is a simple task using GIS, however it should be noted that the baseline should take account of any forestry or other features that will potentially obstruct the view. For example, forestry may be 10-30m high and if viewshed height is taken as 20-30m ground level the visible area could be overestimated if there is forestry within the viewshed. Being able to view all or most of the site to ground level can be helpful in gauging overall bird activity and usage of the site but is not as important as being able to view the collision risk volume"*

Following SNH guidance (2017), watches were conducted to sample diurnal and crepuscular activity of target species and *exceeding* the required effort from SNH.

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

Flight heights are estimated visually as allowed for in SNH (2017) guidance. Flight height estimation using a clinometer or rangefinder is accepted as an *alternative* means of determining flight height however this is often not practicable (equipment may be clumsy and birds may be lost from view whilst trying to focus additional equipment on a target species rapidly moving out of sight); it should be noted that in practice many flocks of swans do not fly close enough to a surveyor for a rangefinder to be used, resulting in most flights heights being estimated in any case. As is often the case an experienced observer will be able to record accurate observations at a higher frequency.

As previously mentioned, VP surveys were carried out at the site from October 2021 to March 2022 (inclusive) involved carrying out 2 x 3-hour VPs at each VP every month. Two VPs were visited each month, with an additional two VPs added in February 2022 to monitor whoopers swans some 500m to the south of the site. Surveys efforts were doubled in February and March 2022. As per SNH guidance (2017), a minimum of 36 hours of vantage point effort was carried out at each vantage point during the wintering period. The proportion of survey time that activity was recorded inside and outside the 500m turbine buffer was used as part of the overall analysis and assessment of target species usage of the study area. Vantage point locations can be found in Table 2-2, below. All surveys were conducted during suitable weather conditions.

Table 2-2: Grid References for VP locations at Annagh Wind Farm

Site	Vantage Point	Easting, Northing (ITM)
Annagh WF	VP 1	550115, 616205
	VP 2	550037, 616468
	Swan VP E	551055, 616249
	Swan VP W	550007, 615687

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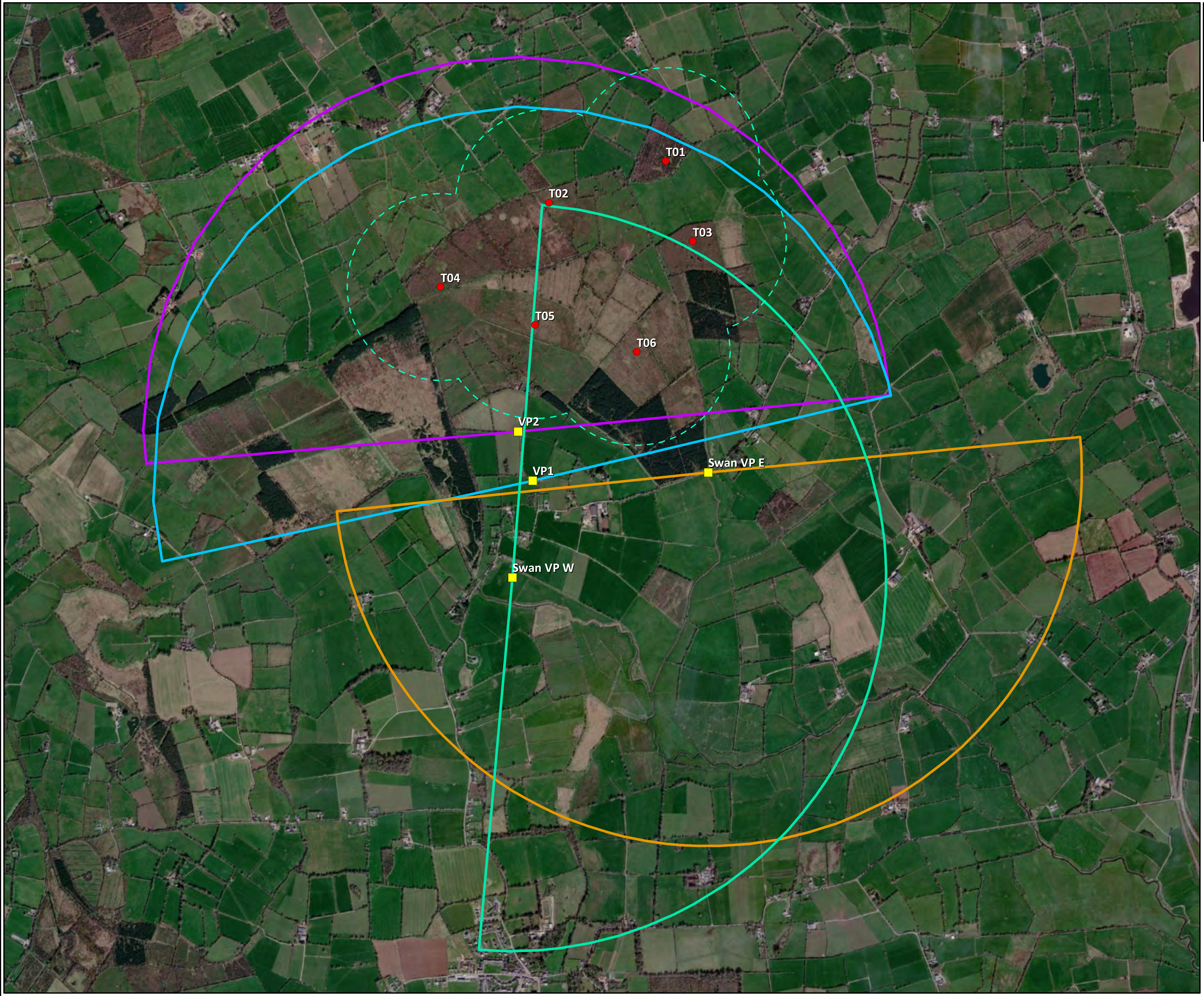

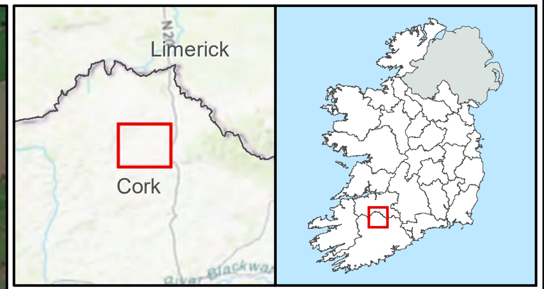

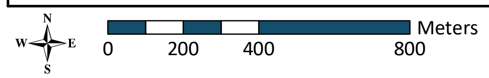

Legend

- Vantage Point (VP) Locations
- Turbine Layout
- Turbine Layout 500m Buffer

2km Viewsheds

- VP1 Viewshed
- VP2 Viewshed
- Swan VP E Viewshed
- Swan VP W Viewshed

TITLE:	Vantage Point Locations and Viewsheds (based on a target height of 30m and observer height of 1.5m)		
PROJECT:	Annagh Wind Farm, Co. Cork		
FIGURE NO:	2.1		
CLIENT:	EMP Group		
SCALE:	1:20000	**REVISION:**	0
DATE:	25/10/2022	**PAGE SIZE:**	A3

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Hinterland Surveys

The methodology used for wetland sites during hinterland surveys followed I-WeBS (Irish Wetland Bird Survey) methodology (Lewis *et al*, 2019), whereby each location was surveyed for the duration necessary to identify and obtain a count for all target species present. The same approach was adapted for non-wetland sites. A hinterland survey for raptors was conducted in accordance with Raptors: a field guide to survey and monitoring (Hardey *et al*. 2013) to assess hen harrier and other raptor activity over the winter and breeding periods in the greater surroundings. Surveys for hen harrier breeding and roosting sites were also carried out within 10km of the proposed Wind Farm, fulfilling and exceeding the requirement set out in SNH Guidance (2017).

The surveys were carried out in suitable woodland and wetland habitats in the area surrounding the proposed wind farm site. This comprised of nine sites within 10 km from the proposed wind farm site. These sites were chosen as they had suitable habitat for the following target species: raptors, waders, waterfowl, and barn owl. Surveys were carried out between October to March in the winter of 2021/22. An additional migration round was conducted in April 2022. Table 2-3 indicates where within the 10 km area around the proposed wind farm hinterland surveys were carried out.

Table 2-3: Hinterland survey locations

Report Name	ITM (X)	ITM (Y)	Dates Visited
River Awbeg	552564	614751	28/10/2021 04/11/2021 10/12/2021 31/01/2022 30/03/2022
Ballyhea Quarry Lakes	553351	617062	29/10/2021 10/12/2021 14/12/2021 31/01/2022 17/02/2022 30/03/2022
Ballyhoura Mountains SAC	559159	616959	01/11/2021 28/12/2021 31/01/2022 30/03/2022
River Blackwater SAC/Annagh Bridge	549814	615638	28/10/2021 29/10/2021 04/11/2021 31/01/2022 17/02/2022 18/02/2022 02/03/2022 13/03/2022 15/03/2022 30/03/2022

Report Name	ITM (X)	ITM (Y)	Dates Visited
River Blackwater SAC/Buttevant	554265	609841	26/10/2021 05/12/2021 14/12/2021 31/01/2022 31/03/2022
Castle Lake (Milltown)	550153	619611	28/10/2021 05/12/2021 28/12/2021 17/02/2022 28/03/2022 01/04/2022
Eagle Lough pNHA	556064	610328	26/10/2021 05/12/2021 28/12/2021 31/01/2022 28/03/2022 31/03/2022
Kilcolman Bog SPA	558072	610856	26/10/2021 05/12/2021 28/12/2021 31/01/2022 17/02/2022 28/03/2022 31/03/2022
Templebridget	551055	611136	09/11/2021 31/01/2022 18/02/2022 22/02/2022 28/02/2022

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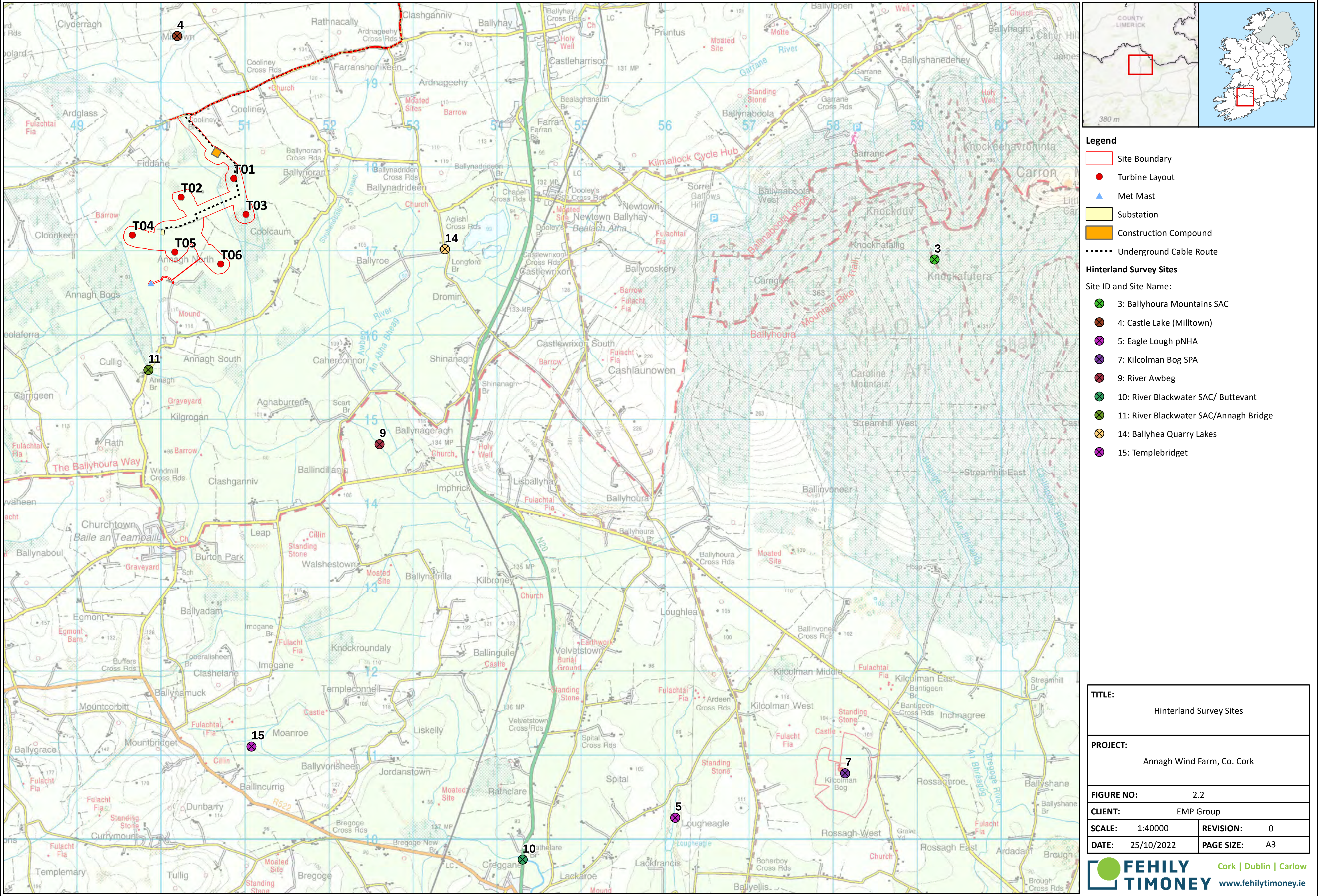

Legend

- Site Boundary
- Turbine Layout
- Met Mast
- Substation
- Construction Compound
- Underground Cable Route

Hinterland Survey Sites

Site ID and Site Name:

- 3: Ballyhoura Mountains SAC
- 4: Castle Lake (Milltown)
- 5: Eagle Lough pNHA
- 7: Kilcolman Bog SPA
- 9: River Awbeg
- 10: River Blackwater SAC/ Buttevant
- 11: River Blackwater SAC/Annagh Bridge
- 14: Ballyhea Quarry Lakes
- 15: Templebridget

TITLE:	Hinterland Survey Sites		
PROJECT:	Annagh Wind Farm, Co. Cork		
FIGURE NO:	2.2		
CLIENT:	EMP Group		
SCALE:	1:40000	**REVISION:**	0
DATE:	25/10/2022	**PAGE SIZE:**	A3

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0 0.5 1 2 Kilometers

2.2 Wintering Bird Surveys

For wintering birds, the method utilised was based on the existing British Trust for Ornithology (BTO) Breeding Bird Survey (BBS or CBS; Bibby *et al*, 2000). The study area for this survey comprised a total of three no. c. 1 km transects which were selected and centred on different habitats present within the subject sites (See Figure 2-3 for the location of transects). Birds were counted over three visits, spaced two months apart, between October and February, inclusive. Surveyors recorded all birds seen or heard as they walked methodically along the transect routes.

Birds were noted in four distance categories, measured at right angles to the transect line (within 25 m, between 25 m-100 m and over 100 m from the transect line) and those seen in flight only. Recording birds in distance bands gives a measure of bird detectability and allows relative population densities to be estimated if required (BTO, 2018).

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

> *"Surveys of farmland passerines especially on more intensive arable habitat are generally not required"* (SNH 2017).

The wintering bird transect schedule is available in Table 2-4:

Table 2-4: Wintering bird transect Survey Details

Date	Transect	Time	Weather Conditions
29/10/2021	TR1, TR2, TR3	9:00 – 13:00	Cloud: 3/8 oktas, Rain: none, Wind: F1, Visibility: good
14/12/2021	TR2, TR1, TR3	10:50 – 13:20	Cloud: 4/8 oktas, Rain: none, Wind: F2, Visibility: good
22/02/2022	TR1, TR2, TR3	12:05 – 15:00	Cloud: 6/8 oktas, Rain: none, Wind: F3, Visibility: good

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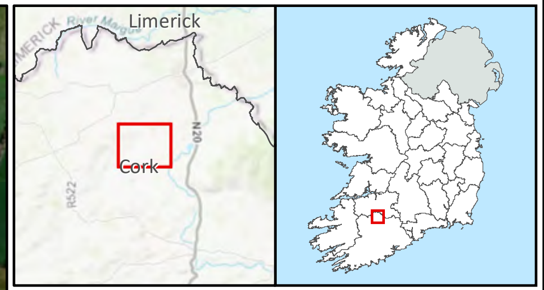

Legend

- Site Boundary
- Turbine Layout
- Bird Survey Transect
- Construction Access
- Internal Access Track
- Turbine Hardstanding Area
- Substation
- Construction Compound

TITLE: Wintering Bird Transects			
PROJECT: Annagh Wind Farm, Co. Cork			
FIGURE NO:	2.3		
CLIENT:	EMPower		
SCALE:	1:12500	**REVISION:**	0
DATE:	25/10/2022	**PAGE SIZE:**	A3

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2.3 Nocturnal Activity Surveys

Nocturnal activity surveys methods are based on 'A Protocol for Standardised Nocturnal Flight Call Monitoring (Gillings *et al*., 2018). Two AudioMoths, autonomous recording units (ARUs), were deployed in the north and south of the site (see Table 2-5 for coordinates).

Table 2-5: Locations of sound recording devices.

Site	ITM (X)	ITM (Y)	Recording Dates
Annagh North	550617	617814	02/03/22 to 13/04/22
Annagh South	550107	616661	02/03/22 to 13/04/22

These were programmed to record non-stop from civil dusk to civil dawn (as ascertained from: timeanddate.com) between March 2nd 2022 and April 13th 2022, totalling 43 nights. The chosen recording period reflects the typical migration period of whooper swan in the UK, based on data retrieved from Trekellen (https://www.trektellen.org/ [date of last access: 13/06/22]). This data is based on 19,352 user-submitted records of whooper swan recorded either visually (vismig [short for visual migration]) or at night (nocmig [short for nocturnal migration]), from across the UK, involving over 152,645 watch and/or recording hours.

ARUs were placed strategically at the northern and southern boundaries of the site to maximise detection of birds and to correlate any potential records. Both recorders were set at a sample rate of 24,000 Hz, with a maximum recording length of one hour – that is, each night of recordings were split into one-hour segments. Every two weeks, recorders were retrieved to replace memory cards and batteries.

Recordings were later analysed using Audacity – free software which allows the user to visualise audio files via sonogram. Recordings were scrolled at a moderate pace, with spectrograms scanned visually, and details (species, time, number of calls, ARU location) were noted in excel.

As well as whooper swans, other target and non-target species were also recorded.