

## Annex 12.2

Limerick City & County Council Planning Department. Inspection Purposes Only!

Limerick City & County Council  
08 JUN 2022  
Planning and Environmental Services



## SHADOW - Main Result

**Calculation:** Knockastanna Wind Farm Shadow

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) [BIRR]  
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
1.57 2.08 2.82 4.36 5.20 4.37 4.15 3.90 3.54 2.68 1.94 1.23

Operational time  
N NNE NE ENE E ESE SE SSE S SSW SW WSW  
474 506 474 393 367 429 493 651 746 771 721 630

W WNW NW NNW Sum  
545 489 562 509 8,760

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:  
Height contours used: Elevation Grid Data Object: Knockastanna\_EMDGrid\_0.wp  
Obstacles used in calculation  
Eye height for map: 1.5 m  
Grid resolution: 1.0 m

All coordinates are in Irish ITM - IRTN295 (IE), geocentric, GRS80

### WTGs

No.	Easting	Northing	Z [m]	Row data/Description	WTG type		Power, rated [kW]	Rotor diameter [m]	Hub height [m]	RPM [RPM]
					Valid	Manufact.				
1	585,709	656,611	328.6	T2	No	GE WIND ENERGY	1,500	70.5	64.7	20.0
2	585,859	656,448	362.5	T3	No	GE WIND ENERGY	1,500	70.5	64.7	20.0
3	586,006	656,286	396.5	T4	No	GE WIND ENERGY	1,500	70.5	64.7	20.0
4	586,153	656,124	428.4	T5	No	GE WIND ENERGY	1,500	70.5	64.7	20.0

### Shadow receptor-Input

No.	Name	Easting	Northing	Z [m]	Width [m]	Height [m]	Elevation a.g.l. [m]	Slope of window [°]	Direction mode	Eye height (ZVI) a.g.l. [m]
H3	H3	585,571	657,274	228.3	2.5	2.5	0.5	90.0	"Green house mode"	3.0
H4	H4	585,147	656,923	237.5	2.5	2.5	0.5	90.0	"Green house mode"	3.0
H5	H5	585,067	656,758	239.1	2.5	2.5	0.5	90.0	"Green house mode"	3.0

### Calculation Results

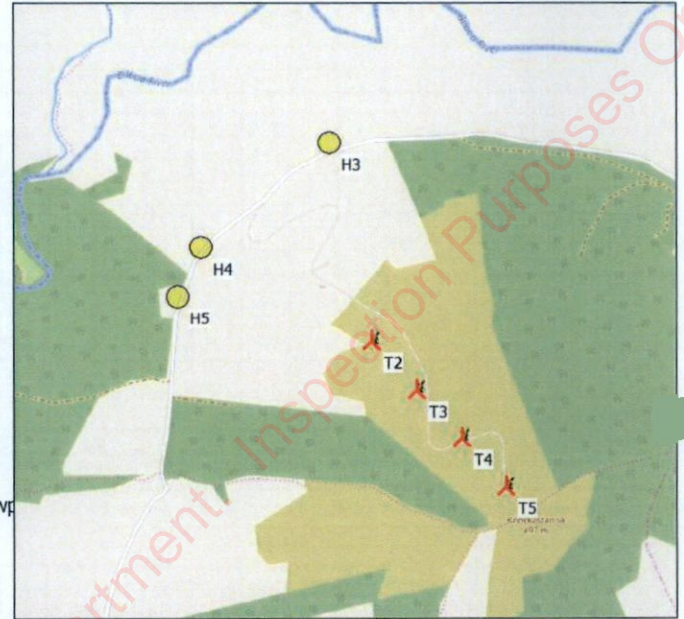
Shadow receptor

No.	Name	Shadow, worst case			Shadow, expected values	
		Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow hours per year [h/year]	
H3	H3	40:38	59	0:47	4:44	
H4	H4	16:41	47	0:31	2:28	
H5	H5	16:23	56	0:25	2:34	

Total amount of flickering on the shadow receptors caused by each WTG

No.	Name	Worst case [h/year]	Expected [h/year]
1	T2	44:12	5:57
2	T3	30:05	3:55
3	T4	0:00	0:00
4	T5	0:00	0:00

Total times in Receptor wise and WTG wise tables can differ, as a WTG can lead to flicker at 2 or more receptors simultaneously and/or receptors may receive flicker from 2 or more WTGs simultaneously



Scale 1:25,000  
Existing WTG Shadow receptor

Project:

# Knockastanna Wind Farm

Licensed user:

**Galetech Energy Services**

Clondargan, Stradone

IE-CO. CAVAN H12 NV06

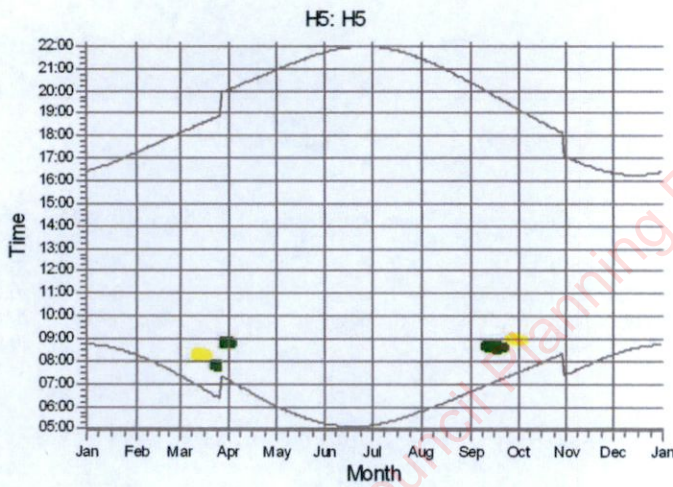
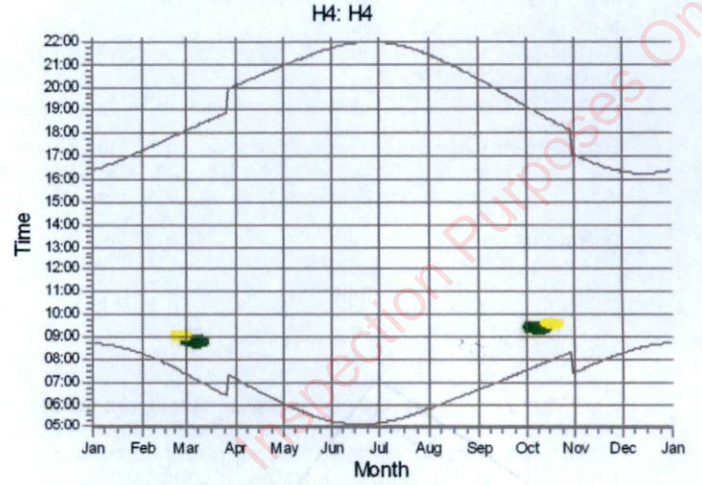
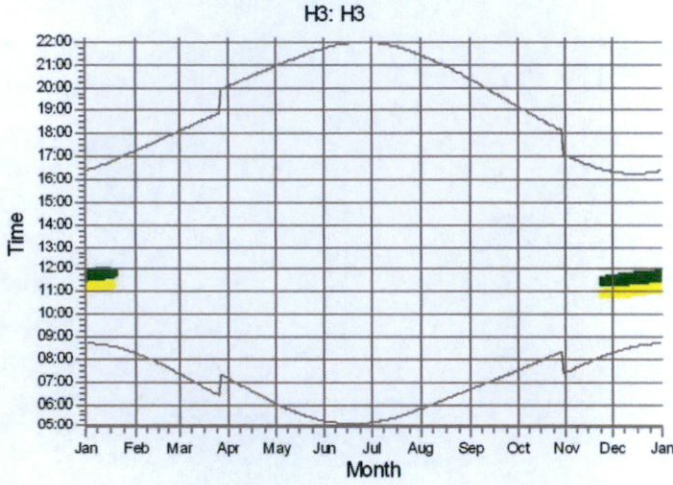
+353 49 5555050

Calculated:

04/01/2022 12:20/3.3.246

## SHADOW - Calendar, graphical

Calculation: Knockastanna Wind Farm Shadow



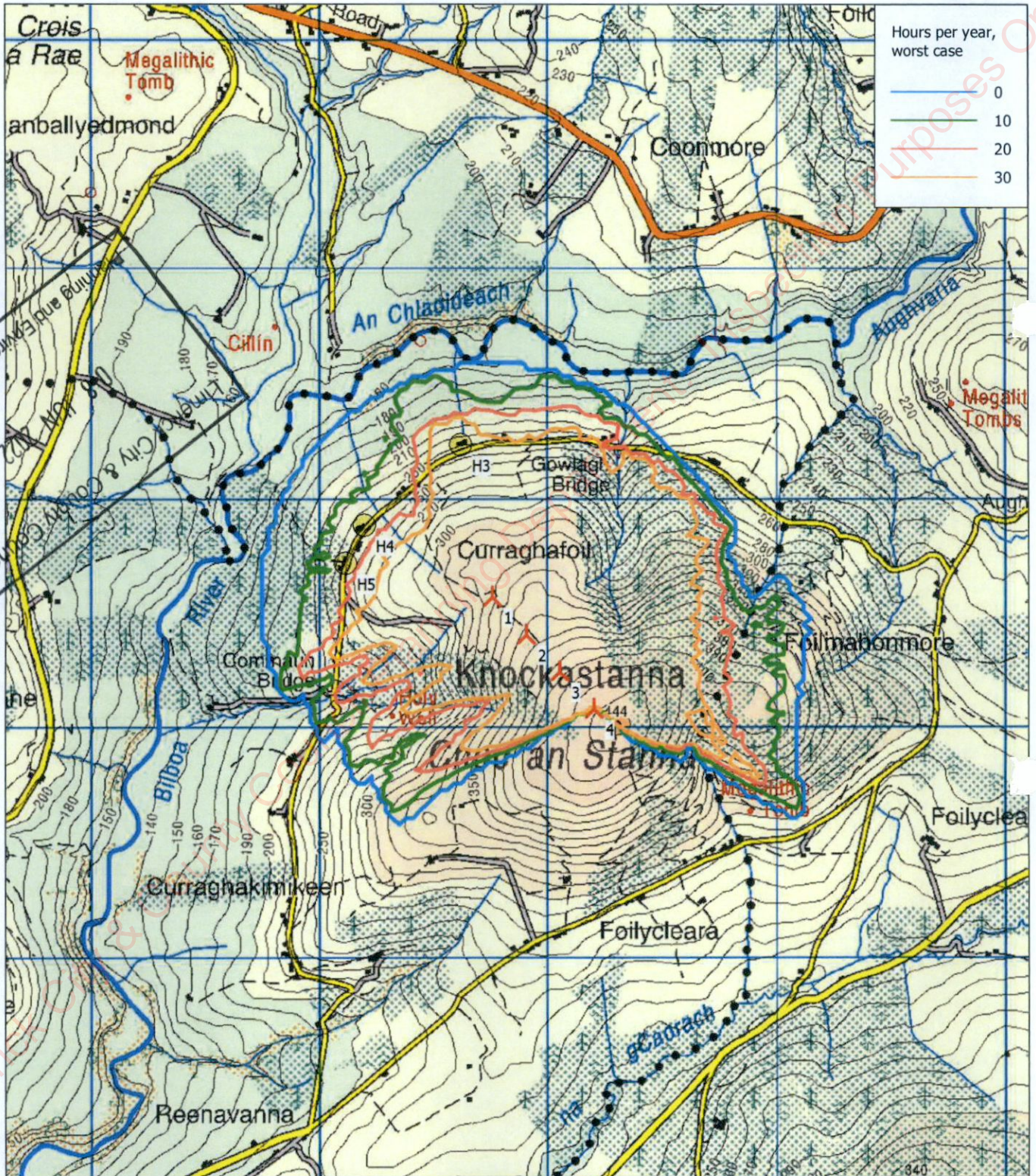
WTGs

1: T2

2: T3

**SHADOW - Map**

**Calculation:** Knockastanna Wind Farm Shadow



Map: Bitmap map: DS Map.jpg , Print scale 1:25,000, Map center Irish ITM-IRENET95 (IE), geocentric, GRS80 East: 585,780 North: 656,610

Existing WTG      Shadow receptor

Flicker map level: Elevation Grid Data Object: Knockastanna\_EMDGrid\_0.wpg (1)

# Annex 13.1

Limerick City & County Council  
08 JUN 2022  
Planning and Environmental Services





Óglaigh  
na hÉireann  
DEFENCE FORCES IRELAND

Ceanncheatru an Aer Chor  
Air Corps Headquarters

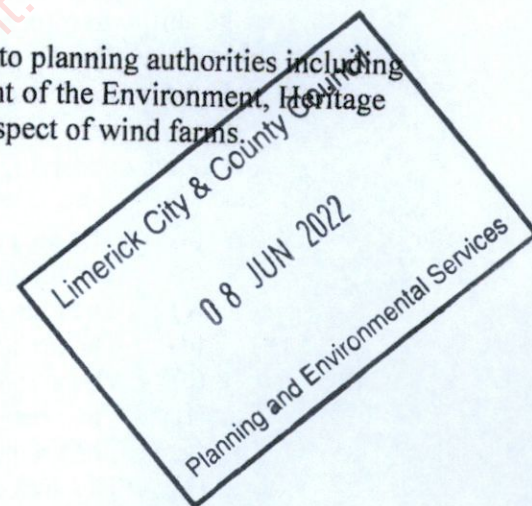
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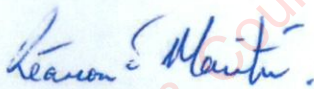
GOC AC 

Air Corps Wind Farm/Tall Structures Position Paper

Sir,

1. The attached is the draft Air Corps Position Paper agreed and developed in concert with the flying units under the auspices of CAS Ops.
2. It is recommended that it be forwarded to the Directorate of Operations for transmission to the Department of Defence.
3. The AC position contained within this paper should be notified to planning authorities including An Bord Pleanála. It should also be forwarded to the Department of the Environment, Heritage and Local Government to inform its policies and guidance in respect of wind farms.





Raymond Martin, Lt Col  
CATSO



Air Corps Wind farm/Tall Structures Position Paper.

**1. Objective:**

This position paper is intended to ensure that

- a. Air Corps operations and training may be accomplished in a safe and economical manner;
- b. Baldonnel remains a viable aerodrome for IFR and VFR traffic;
- c. The ability to train military flying skills is protected;
- d. Vital navigation routes to and from the regions to Baldonnel and the Dublin area are protected to safeguard the ability of the Air Corps to fulfill its role.

**2. Statement of position.**

- a. The Air Corps is opposed the erection of wind farms or other obstacles which will affect its ability to train and operate in a safe and economic manner.
- b. The Air Corps is opposed to any wind farms or tall structures in the following areas:

(1) Lands underlying military airspace used for flying activity

- (a) The area contained in Danger Area EI-D1.
- (b) The area contained in Danger Area EI-D5.
- (c) The area contained within Danger Area EI-D6.
- (d) The area contained within Danger Area EI-D13.
- (e) The area contained within Danger Area EI-D14.
- (f) The area contained within Restricted Area EI-R15.
- (g) The area contained within Restricted Area EI-R16 within 20NM of Baldonnel.
- (h) The area contained within Military Operating Areas, MOAs 3 and 4 within 20NM of Baldonnel.

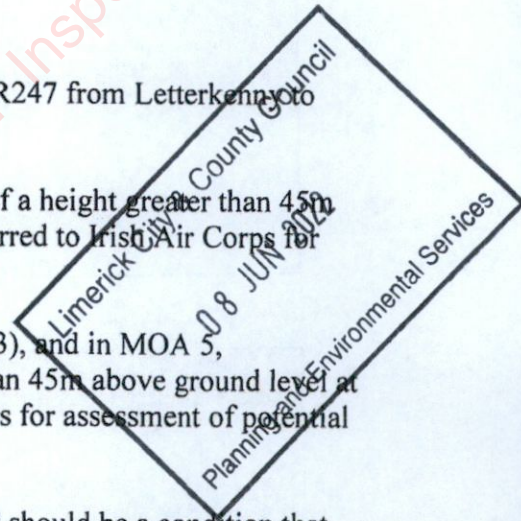
(2) Areas wherein military flying occurs at low level as identified in the annexes listed below.

- (a) Annex A: Low flying training areas within MOA 4 in the areas of
  - a. Blessington
  - b. Edenderry/Allenwood/Rathangan
  - c. Kilmeague/Newbridge
- (b) Annex B: low flying training area West (LFTA WEST).

- (3) A distance of 5NM or less from military installations.
- c. The following routes are identified as critical low level routes in support of Air Corps operational requirements and the Air Corps is opposed to the erection of wind farms or tall structures within 3NM of the route centerline which could affect Air Corps' ability to access regional areas.
- (a) N/M1
  - (b) N/M2
  - (c) N/M3
  - (d) N/M4
  - (e) N/M6
  - (f) N/M7
  - (g) N/M8
  - (h) N/M9
  - (i) N/M11
  - (j) N25
  - (k) N17 between Sligo and Knock
  - (l) N15/N13 between Sligo and Letterkenny
  - (m) N14 from Lifford to Letterkenny and R245 and R247 from Letterkenny to Fanad Head.

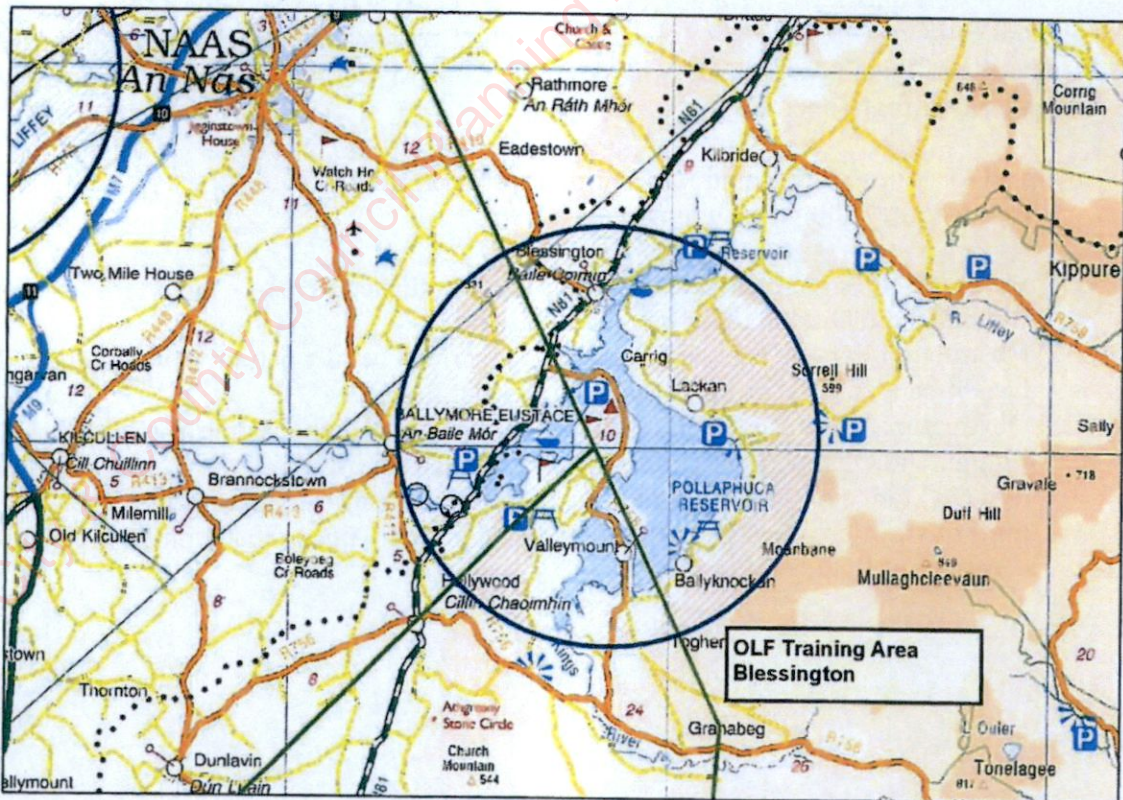
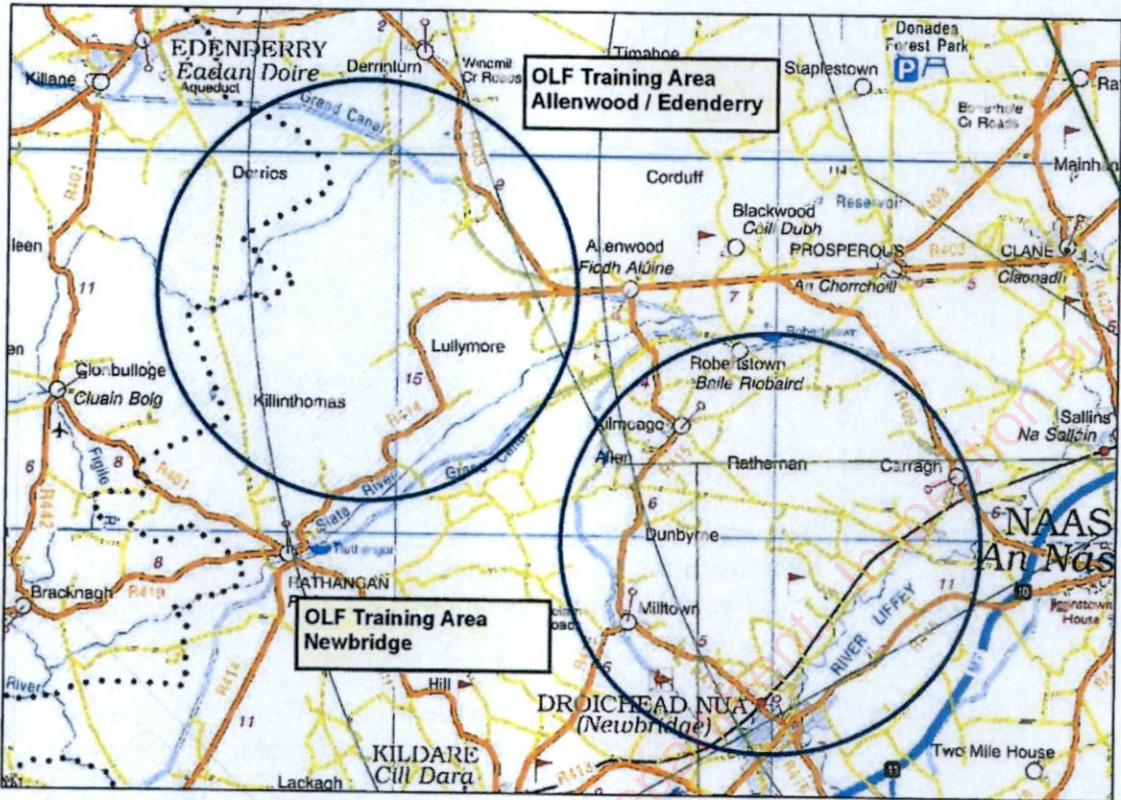
Applications or proposals for structures in these areas of a height greater than 45m above ground level at the site of the object must be referred to Irish Air Corps for assessment of potential impact on flight operations.

- d. In MOA 4 outside of the areas identified in b.(1) (2) and (3), and in MOA 5, applications or proposals for objects of a height greater than 45m above ground level at the site of the object must be referred to the Irish Air Corps for assessment of potential impact on flight operations.
- e. In all locations where wind farms or masts are permitted it should be a condition that they meet the following lighting requirements
- (1) Single turbines or structures, or turbines delineating corners of a wind farm, should be illuminated by high intensity strobe lights (Red).
  - (2) Obstruction lighting elsewhere in a wind farm will be of a pattern that will allow the hazard be identified and avoided by aircraft in flight.
  - (3) Obstruction lights used should be incandescent or of a type visible to Night Vision Equipment. Obstruction lighting fitted to obstacles must emit light at the near Infra-Red (IR) range of the electromagnetic spectrum, specifically at or near 850nanometres (nm) of wavelength. Light intensity to be of similar value to that emitted in the visible spectrum of light.





Annex A  
Low Flying Areas - MOA 4



Annex B

Low Flying Area – LFTA WEST

1. Area contained within the following grid L6972; L6945; M0745; M0772
2. Routes are primarily within valley areas.
3. Applications for wind farms/masts should be referred to Air Corps Operations for assessment against low flying routes.

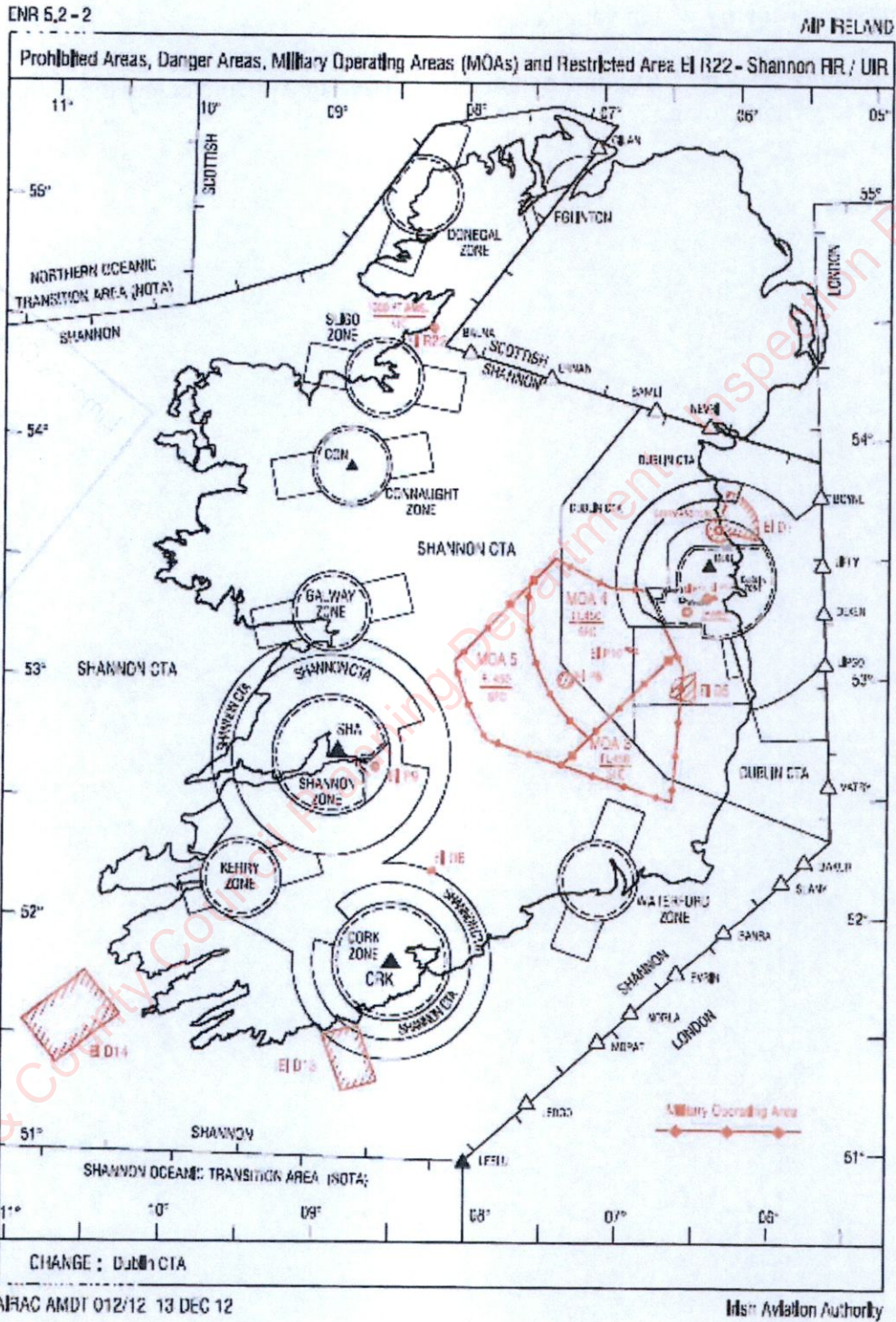
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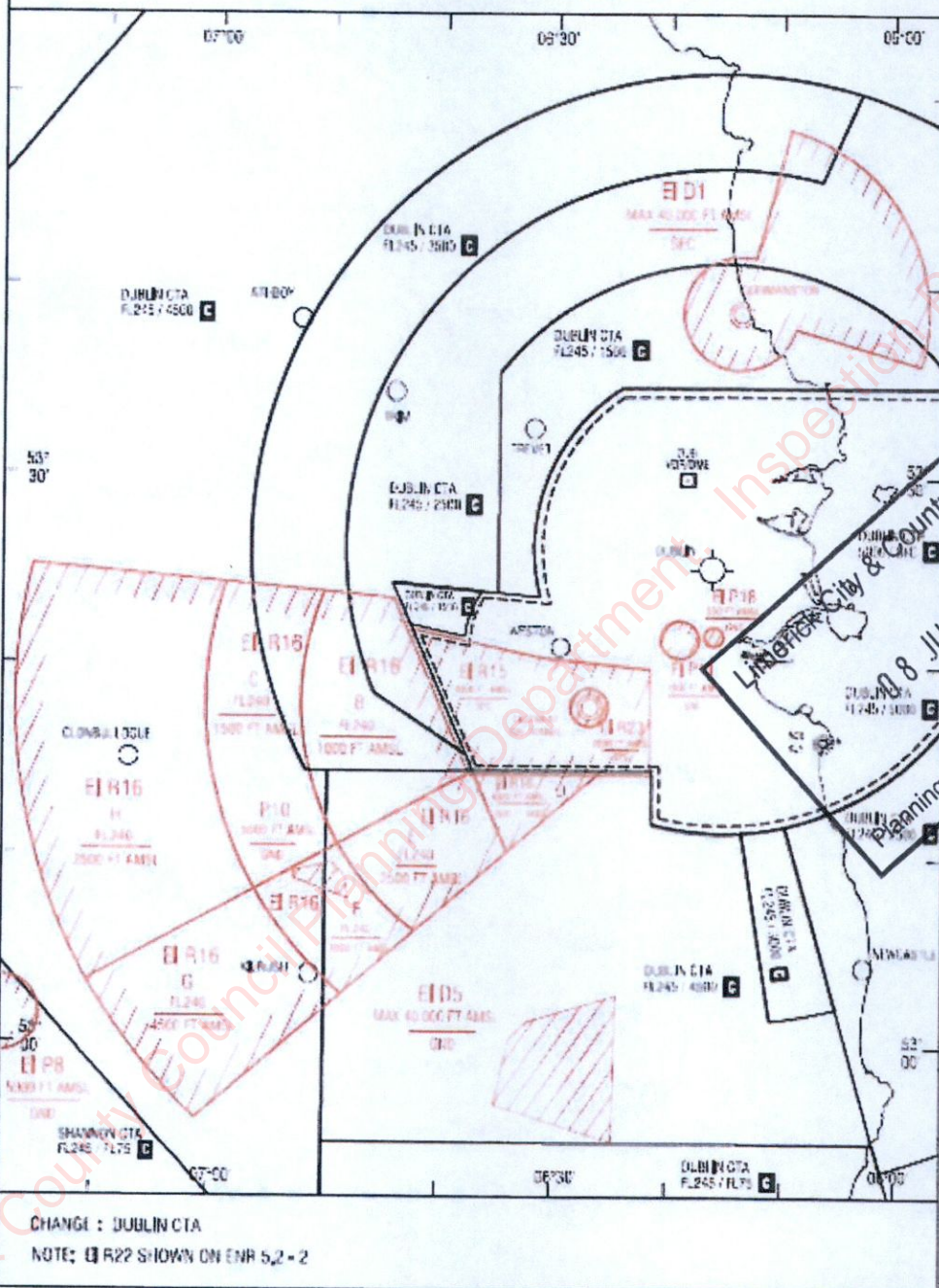
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Annex C

Designated Airspace  
Restricted Areas, Danger Areas and Military Operating Areas



RESTRICTED AREAS EI R15, EI R16 AND EI R23 - SHANNON FIR



Irish Aviation Authority

AIRAC AMDT 012/12 13 DEC 12

Limerick City & County Council Planning and Environmental Services  
Inspection Department  
8 JUN 2022

Annex D

Low Level Routes



## Annex 13.2

Limerick City & County Council  
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