codling wind park

Environmental Impact Assessment Report

Volume 4

Appendix 17.3 Codling Wind Park Dublin Airport Special Aeronautical Study

V 1.0

Codling Wind Park
Dublin Airport
Special Aeronautical Study

0. Document Information

Document title	Codling Wind Park Special aeronautical study
Design organisation	Aeronautical Services And Procedures (ASAP s.r.o.) Moyzesova 1D, 90201 Pezinok, Slovakia , Tel/Fax: +421 33 6408470
ASAP s.r.o. contact	Mr I Whitworth, Email: asap@asap.sk

0.1 *Copyright Statement*

0.2 *Document versions*

Version No.	Pages affected	Date
ASAP internal		
0.1	All	26.03.2023
Customer		
1.0	All	26.03.2023

0.3 *Document version trail*

Version 0.1	Name	Date
Assessment done by procedure designer	Ľubomír Bača	08.03.2022
Check and final sign-off by independent procedure designer*	Ian Whitworth	26.03.2023

* By this sign-off, the Independent Procedure Designer confirms that a full verification of the correctness (to the best of his/her knowledge) of the contents of this Special aeronautical study has been carried out and conforms to the latest version of ICAO Doc 8168 (Aircraft Operations) Volume II.

0.4 *Procedure designer concerns*

I, Ľubomír Bača, have no specific concerns and consider that all safety issues concerning the proposed Codling Wind Park are covered in this document.

0.5 *Abbreviations used*

A/C.	Aircraft
Alt.	Altitude
Alt. Req.	Altitude Required
ARP	Aerodrome Reference Point
ATT	Along-track tolerance
AMSL	Above Mean Sea Level
Cat.	Category
Cont.	Controlling
Diff.	Difference
Dist.	Distance
Eq. Alt.	Equivalent Altitude
ETP	Earliest Turning Point
FAF	Final Approach Fix
FAP	Final Approach Point
FAS	Final Approach Segment
FAWP	Final Approach Waypoint
FHP	Fictitious Heliport Point
HL	Height Loss
HRP	Heliport Reference Point
IAS	Indicated Air Speed
IAWP	Initial Approach Waypoint
IFR	Instrument flight rules

Int. Seg.	Intermediate Segment
ISA	International Standard Atmosphere
IWP	Intermediate Approach Waypoint
MAPt	Missed Approach Point
MACG	Missed approach climb gradient
MOCA	Minimum obstacle clearance altitude
MRVA	Minimum Radar Vectoring Altitude
OAS	Obstacle Assessment Surface
OCA	Obstacle clearance altitude
PAPI	Precision Approach Path Indicator
Pub.	Published
Req.	Required
RDH	Reference Datum Height
RWY	Runway
SOC	Start of Climb
Surf.	Surface
TAA	Terminal Arrival Altitude
TAS	True Air Speed
THR	Threshold
VFR	Visual flight rules
VPA	Vertical Path Angle
XTT	Cross-track tolerance

0.5.1 Obstacle assessment tables and abbreviations

- ***Obstacle data:***

ID	Latitude	Longitude	Alt.	VT

- **ID**entification, Position, **Alt**itude and **V**ertical **T**olerance

- ***Assessment parameters:***

Area	Dist. in	Do	Dz	Dr	DCA	HL	MOC

- Obstacle protection **Area** (primary [**P**], secondary [**S**] or buffer [**B**]).
- **Dist**ance from the **in**ner edge of the secondary area.
- **D**istance to **o**bstacle (Do/Dz/Dr).
- **D**istance to **C**limb **A**ltitude
- **H**eight **L**oss applied.
- **M**inimum **O**bstacle **C**learance applied.

- ***Calculated values:***

Surf. alt.	Diff.	Ac. alt.	Alt. req.

- Obstacle protection **Sur**face **alt**itude at position.
- **Diff**erence between obstacle altitude and surface altitude.
- **A**ir**c**raft **alt**itude at obstacle position.
- **Alt**itude **req**uired to clear obstacle.

- ***Results:***

OCA	MACG (%)	PDG (%)	Cont.	Close-in	Disreg.

- Minimum **O**bstacle **C**learance **A**ltitude.
- **M**issed **A**pproach **C**limb **G**radient.
- **P**rocedure **D**esign **G**radient
- **Cont**rolling obstacle or **No**t.
- Considered **Close-in** obstacle or **No**t.
- Obstacle can be **Disreg**arded in the visual segment.

0.6 *Contents*

1. General

This document details the special aeronautical study that was done concerning the impact of the proposed Codling Wind Park on the flight procedures at Dublin airport (EIDW), Ireland.

1.1 *Geodesic datum*

WGS-84, which was established as the working datum.

Reference Latitude	N 00° 00' 00"	**Semi Major Axis**	6378137 m
Reference Longitude	W 009° 00' 00"	**Eccentricity**	0.0818191908426215
False Easting	500000	**Scaling Factor**	0.9996
False Northing	0	**Projection Type**	Transverse Mercator

1.2 *Altitude units*

All altitudes and heights used in this study are in metres and all bearings are magnetic unless specified otherwise.

1.3 *AIP data*

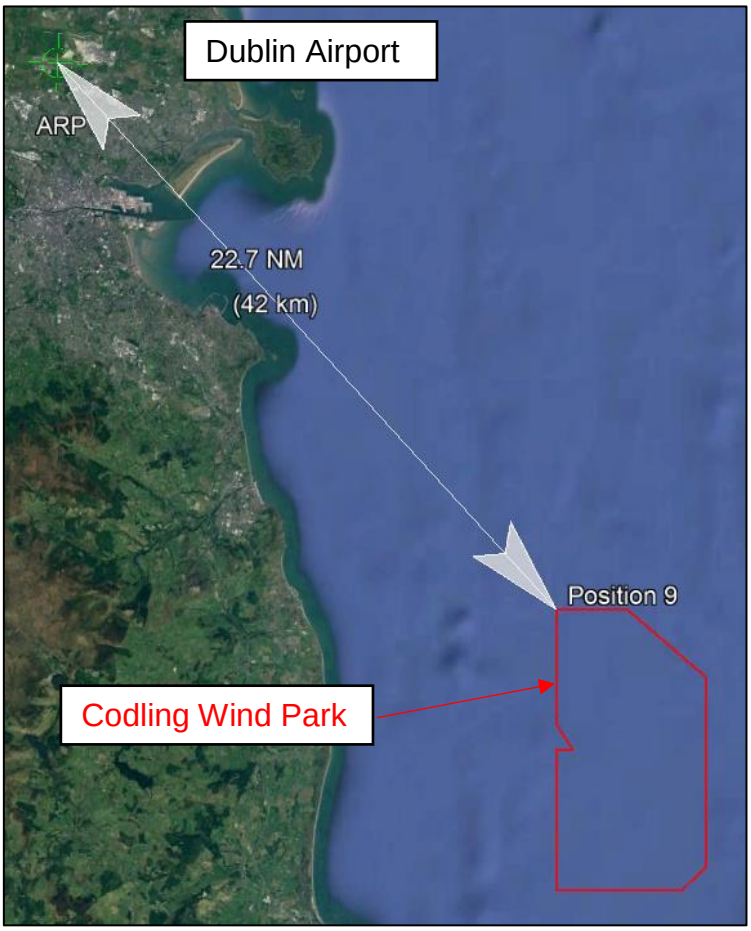
Aeronautical information for Dublin airport was extracted from the Irish AIP (23 Mar 2023) and used in this study.

1.4 *Proposed position and altitude*

The proposed position and altitude data was received via e-mail on the 08/03/2023 from Mike Coleman at Coleman Aviation.

ID	Latitude (WGS84)	Longitude (WGS84)
Position 1	53° 8' 36.0" N	5° 47' 0.0" W
Position 2	53° 6' 31.8" N	5° 43' 0.0" W
Position 3	53° 0' 43.0" N	5° 43' 1.0" W
Position 4	53° 0' 0.0" N	5° 44' 15.0" W
Position 5	53° 0' 0.0" N	5° 50' 35.0" W
Position 6	53° 4' 18.0" N	5° 50' 35.0" W
Position 7	53° 4' 18.0" N	5° 49' 45.0" W
Position 8	53° 5' 6.6" N	5° 50' 37.2" W
Position 9	53° 8' 36.0" N	5° 50' 36.6" W

Elevation (meters AMSL)
Turbine tip height - 320m

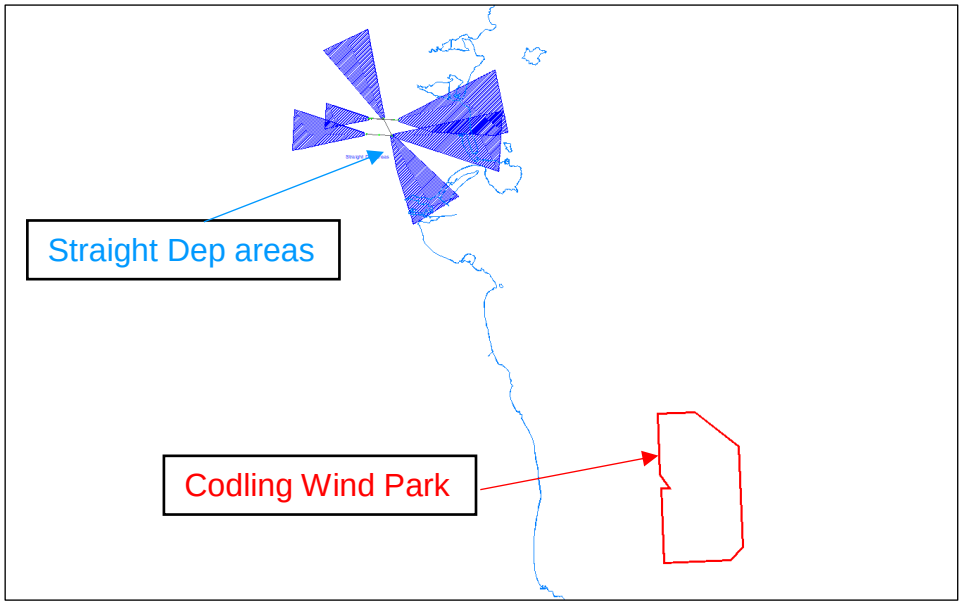


Codling Wind Park location

2. Preliminary assessment

2.1 *Departures*

2.1.1 Straight ahead area



As can be seen in the previous diagram the proposed Codling Wind Park is not within the straight obstacle protection areas for the departures off any runway at Dublin. However, it might affect the area after the turn.

2.1.2 Area after the turn

All aircraft category A & B departures turn at an altitude of 750 ft while aircraft category C & D departures turn at a waypoint that has a crossing altitude of 3000 ft. Category C & D departures off runway 28R turn at a waypoint that has a crossing altitude of 650 ft. After the turn a MOC of 0.8% of the distance to the obstacle is applicable.

If the aircraft altitude at the commencement of the turn is above the proposed structure then a certain amount of MOC already exists. The MOC value equates to the difference between the turn altitude and the elevation of the proposed structure. This MOC value can then be associated with an omnidirectional distance from the DER at which it is applicable. If the proposed structure is within this distance from the DER then the required MOC or more is being applied already at the commencement of the departure turn. If the proposed structure is outside this distance from the DER then the required MOC must be assessed.

Departure	Turn Alt. (ft)	MOC achieved (ft)	MOC>75m	0.8% MOC Radius (km)	Outside Radius	Full assessment required
All Runways Cat. A&B	750	-300	NO	0	YES	YES
R34,28L,16 Cat. C&D	3000	1950	YES	74.3	NO	NO
R28R W&S Cat. C&D	4000	2950	YES	112.4	NO	NO
R10 R/L Cat. C&D	4000	2950	YES	112.4	NO	NO

As can be seen in the previous table the proposed Codling Wind Park is outside the safe MOC distance for aircraft category A&B. Therefore, a more in-depth assessment of these departures is required, see section 3.1 Standard Instrument departures (SIDs).

2.2 *Non-Precision approaches (NPA)*

The proposed Codling Wind Park have an AMSL elevation of 314 m. The ICAO minimum obstacle clearance (MOC) in the primary obstacle protection area for a non-precision approach is 75m. If the published minimum OCA is greater than the elevation of the proposed structure plus the MOC of 75m then the structure is not critical for that non-precision approach but if it is not then a more in-depth assessment would be required when the proposed structure is inside the obstacle protection areas. See the following table for this initial assessment.

Non-precision approach	Structure in area	Pub. OCA (ft)	Obstacle OCA req. (ft)	Assessment required
LOC Runway 28L	Yes	670	1296	NO
VOR Runway 28L	Yes	670	1296	NO
VOR T Runway 28L	Yes	620	1296	NO
LNAV Runway 28L	Yes	740	1296	NO
LOC Runway 10R	No	690	1296	NO
LNAV Runway 10R	No	680	1296	NO
VOR Runway 10R	No	690	1296	NO
LOC Runway 28R	Yes	620	1296	NO
LNAV Runway 28R	Yes	720	1296	NO
LOC Runway 10L	Yes	690	1296	NO
LNAV Runway 10L	Yes	720	1296	NO
LNAV Runway 16	Yes	610	1296	NO
LOC Runway 16	Yes	590	1296	NO
VOR Runway 16	Yes	610	1296	NO
LNAV Runway 34	Yes	710	1296	YES
VOR Runway 34	Yes	650	1296	YES

As can be seen in the previous table some of the non-precision approaches could be affected by the Codling Wind Park. See section 3. In-depth procedure assessment for a more in-depth assessment of these procedures.

2.3 *LNAV/VNAV approaches*

For each LNAV/VNAV approach the Pans-Ops obstacle protection areas were constructed. These areas were then checked to determine if the proposed structure was inside or outside of the obstacle protection areas. A further in-depth assessment would only be required if the proposed structure was inside these areas and the OCA required by the obstacle was above the published OCA value.

The results of this checking are shown in the following table.

LNAV/VNAV	Cat. A	Cat. B	Cat. C	Cat. D	Assessment required
Runway 28L					
Structure in area	NO				
Published OCA	550 ft	560 ft	580 ft	610 ft	NO
Required OCA	0 ft	0 ft	0 ft	0 ft	
Difference					
Runway 10R					
Structure in area	No				
Published OCA	530 ft	540 ft	560 ft	590 ft	NO
Required OCA	0 ft	0 ft	0 ft	0 ft	
Difference					
Runway 28R					
Structure in area	NO				
Published OCA	550 ft	550 ft	580 ft	600 ft	NO
Required OCA	0 ft	0 ft	0 ft	0 ft	
Difference					
Runway 10L					
Structure in area	NO				
Published OCA	550 ft	560 ft	580 ft	610 ft	NO
Required OCA	0 ft	0 ft	0 ft	0 ft	
Difference					
Runway 16					
Structure in area	NO				
Published OCA	660 ft	670 ft	680 ft	690 ft	NO
Required OCA	0 ft	0 ft	0 ft	0 ft	
Difference					
Runway 34					
Structure in area	Yes				
Published OCA	540 ft	550 ft	570 ft	690 ft	YES
Required OCA	1181 ft	1191 ft	1201 ft	1211 ft	
Difference	641 ft	641 ft	631 ft	521 ft	

As can be seen in the previous table the precision approach for runway 34 could be affected by the Codling Wind Park. See section 3. In-depth procedure assessment for a more in-depth assessment of these procedures.

2.4 *Precision approaches*

For each precision approach the ICAO Obstacle Assessment Surfaces (OAS) were constructed. These surfaces were then checked to determine if the proposed structure was inside or outside of the OAS area. Further in-depth assessment would only be required if the proposed structure was inside the OAS and the OCA required by the obstacle was above the published OCA value.

The OAS area in the missed approach only goes to a height of 300m above the threshold after which a maximum primary MOC of 50m may be required. At a height of 300m an aircraft may already have the required primary MOC of 50m above the proposed structure. If this is the case, then no further checking is required but if this 50m is not achieved then a more in-depth assessment is required.

2.4.1 LPV approaches

The previous factors were checked for the LPV approaches at Dublin airport and the results are shown in the following table.

LPV	Cat. A	Cat. B	Cat. C	Cat. D	M/A 50m	Assessment required
Runway 28L						
Structure in area	NO				NO	
Published OCA	452 ft	452 ft	452 ft	455 ft		NO
Required OCA	0 ft	0 ft	0 ft	0 ft		
Difference						
Runway 10R						
Structure in area	NO				YES	
Published OCA	566 ft	576 ft	585 ft	595 ft		NO
Required OCA	0 ft	0 ft	0 ft	0 ft		
Difference						
Runway 28R						
Structure in area	NO				NO	
Published OCA	581 ft	591 ft	600 ft	610 ft		NO
Required OCA	0 ft	0 ft	0 ft	0 ft		
Difference						
Runway 10L						
Structure in area	NO				YES	
Published OCA	590 ft	600 ft	610 ft	620 ft		NO
Required OCA	0 ft	0 ft	0 ft	0 ft		
Difference						
Runway 16						
Structure in area	NO				NO	
Published OCA	414 ft	423 ft	433 ft	442 ft		NO
Required OCA	0 ft	0 ft	0 ft	0 ft		
Difference						
Runway 34						
Structure in area	Yes				NO	
Published OCA	391 ft	404 ft	444 ft	463 ft		YES
Required OCA	1181 ft	1191 ft	1201 ft	1211 ft		
Difference	790 ft	787 ft	757 ft	748 ft		

As can be seen in the previous table one of the LPV approaches could be affected by the Codling Wind Park. See section 3.1 In-depth procedure assessment for a more in-depth assessment of these procedures.

2.4.1 ILS approaches

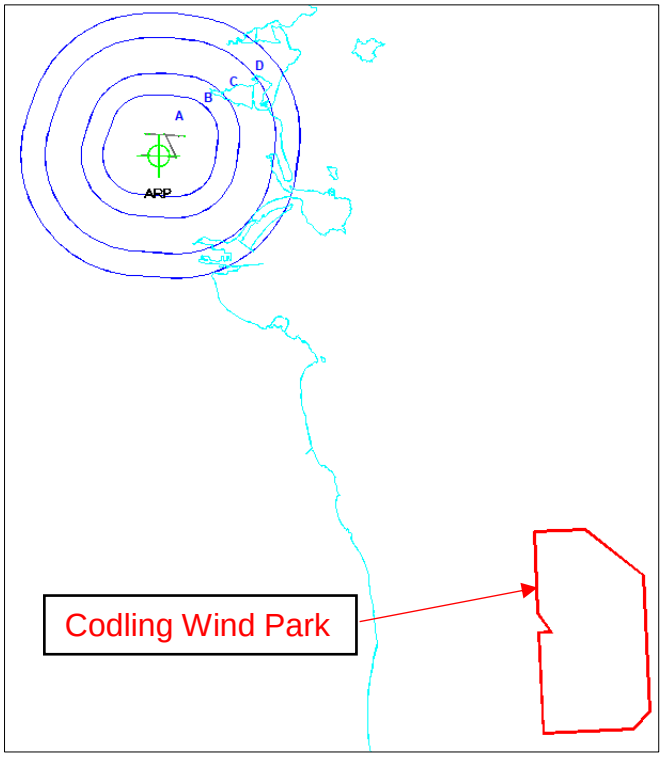
The previous factors were also checked for the ILS approaches at Dublin airport and the results are shown in the following table.

ILS	Cat. A	Cat. B	Cat. C	Cat. D	M/A 50m	Assessment required
Runway 28L Cat I						
Structure in area	no				NO	
Published OCA	351 ft	361 ft	369 ft	380 ft		NO
Required OCA	0 ft	0 ft	0 ft	0 ft		
Difference						
Runway 28L Cat II						
Structure in area	no				NO	
Published OCA	268 ft	281 ft	291 ft	308 ft		NO
Required OCA	0 ft	0 ft	0 ft	0 ft		
Difference	-268 ft	-281 ft	-291 ft	-308 ft		
Runway 10R Cat I						
Structure in area	no				YES	
Published OCA	393 ft	401 ft	410 ft	419 ft		NO
Required OCA	0 ft	0 ft	0 ft	0 ft		
Difference	-393 ft	-401 ft	-410 ft	-419 ft		
Runway 10R Cat II						
Structure in area	No				YES	
Published OCA	305 ft	317 ft	330 ft	344 ft		NO
Required OCA	0 ft	0 ft	0 ft	0 ft		
Difference	-305 ft	-317 ft	-330 ft	-344 ft		
Runway 28R Cat I						
Structure in area	no				NO	
Published OCA	349 ft	357 ft	367 ft	377 ft		NO
Required OCA	0 ft	0 ft	0 ft	0 ft		
Difference	-349 ft	-357 ft	-367 ft	-377 ft		
Runway 28R Cat II						
Structure in area	no				NO	
Published OCA	262 ft	273 ft	286 ft	301 ft		NO
Required OCA	0 ft	0 ft	0 ft	0 ft		
Difference	-262 ft	-273 ft	-286 ft	-301 ft		
Runway 10L Cat I						
Structure in area	no				YES	
Published OCA	384 ft	395 ft	402 ft	413 ft		NO
Required OCA	0 ft	0 ft	0 ft	0 ft		
Difference	-384 ft	-395 ft	-402 ft	-413 ft		
Runway 10L Cat II						
Structure in area	no				YES	
Published OCA	301 ft	313 ft	324 ft	339 ft		NO
Required OCA	0 ft	0 ft	0 ft	0 ft		
Difference	-301 ft	-313 ft	-324 ft	-339 ft		
Runway 16 Cat I						
Structure in area	no				NO	
Published OCA	389 ft	397 ft	409 ft	420 ft		NO
Required OCA	0 ft	0 ft	0 ft	0 ft		
Difference	-389 ft	-397 ft	-409 ft	-420 ft		

As can be seen in the previous table the Codling Wind Park is not affecting any of these ILS approaches.

2.5 *Visual manoeuvring (circling)*

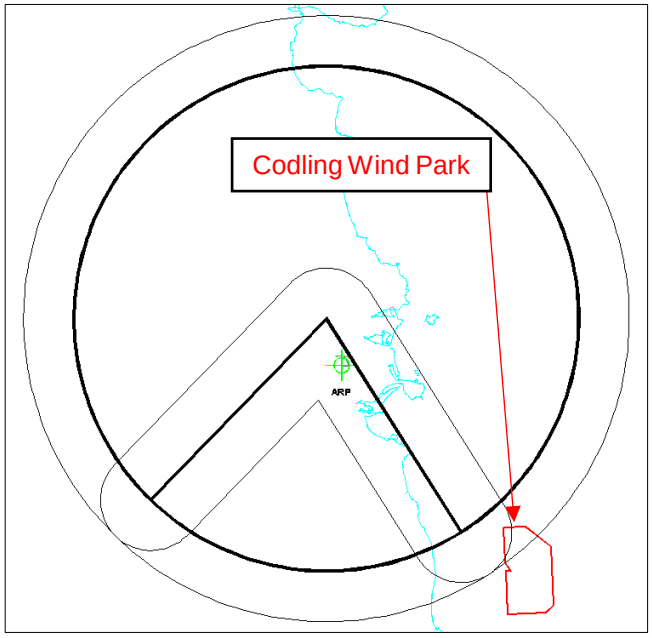
If the required ICAO MOC is achieved over the proposed structure, then no further checking is required. See the following table for this initial assessment.



Visual circling				
Aircraft category	A	B	C	D
Min. Pub. Alt. (ft AMSL)	830	830	1100	1100
MOC req. (ft)	295	295	394	394
MOC achieved (ft)	-220	-220	50	50
Structure in area	NO	NO	NO	NO
Assessment req.	NO	NO	NO	NO

As can be seen in the previous table the visual manoeuvring (circling) is not affected by the Codling Wind Park.

2.6 *Minimum sector altitudes (MSA)*



Homing Facility Position	
ID	DUB VOR/DME
Latitude	53°29'57.80"N
Longitude	006°18'25.60"W
Parameters	
Outer Radius	25 nm
MOC	300 m
Sector 1	
From	226.24° T
To	149.83° T
Sector 2	
From	149.83° T
To	226.24° T

As can be seen in the previous diagram the proposed Codling Wind Park is located inside the MSA based on DUB VOR/DME.

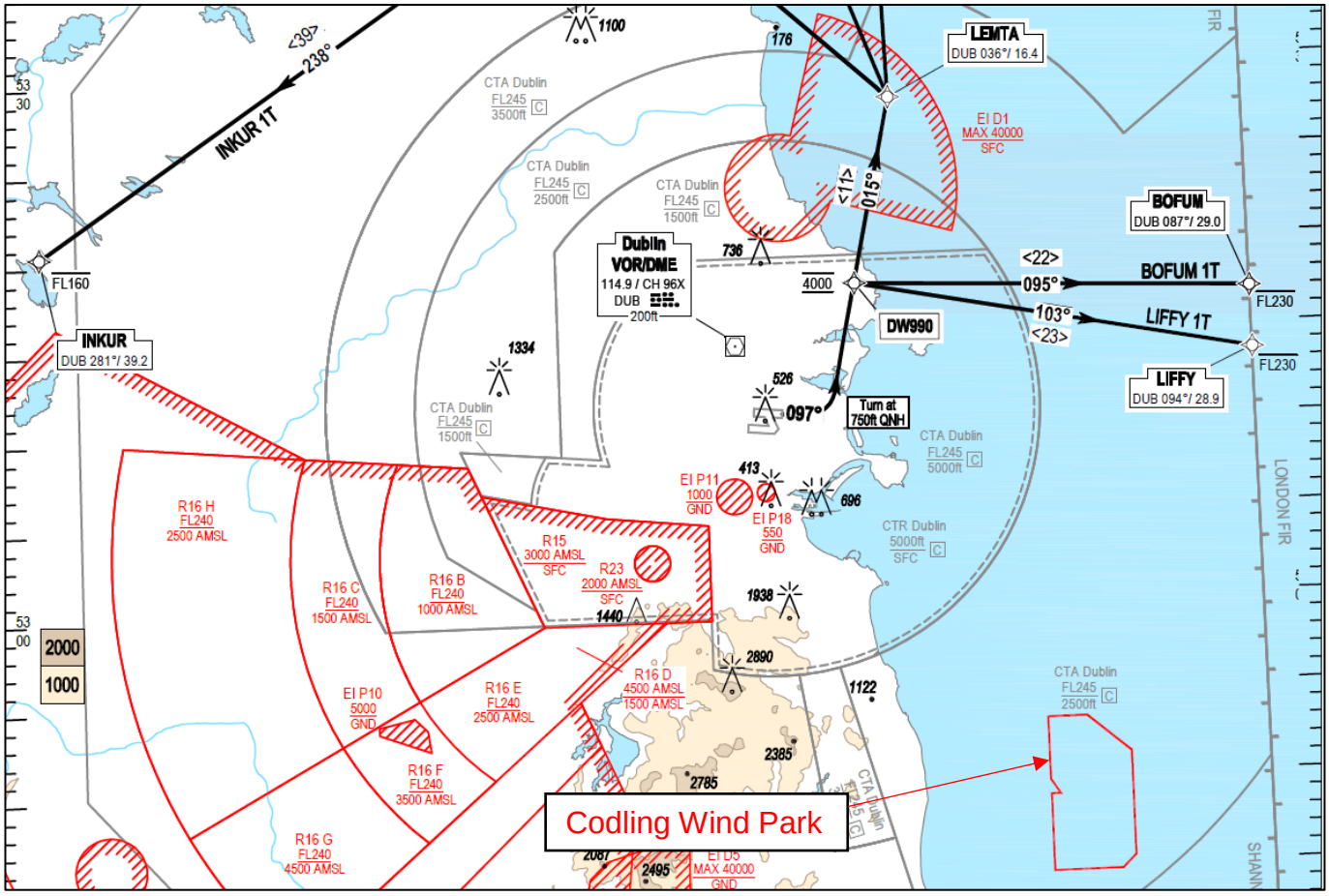
Min. Pub. Alt. (ft)	2400
Structure Alt.	314
MOC required	300
MOC achieved	411
Assessment req.	NO

The minimum sector altitudes based on DUB VOR/DME are not affected by the proposed Codling Wind Park.

3. In-depth procedure assessment

3.1 *Standard Instrument departures (SIDs)*

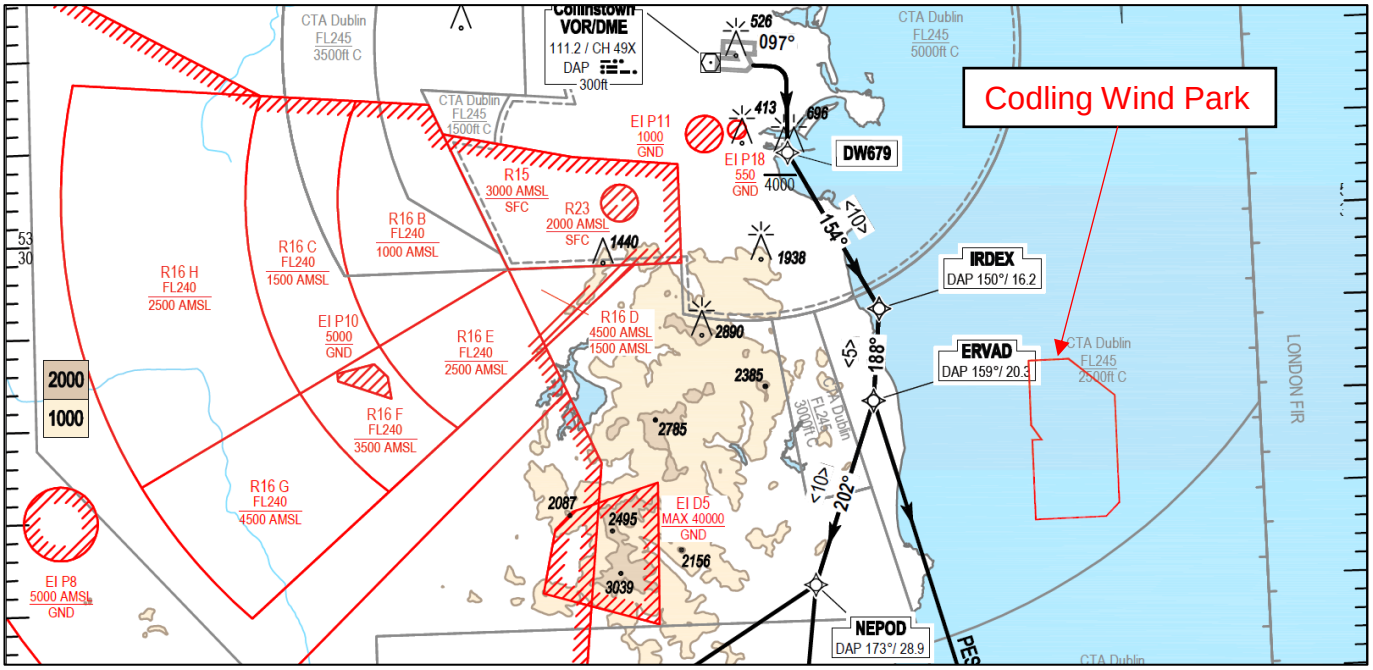
3.1.1 Runway 10L CAT A, B



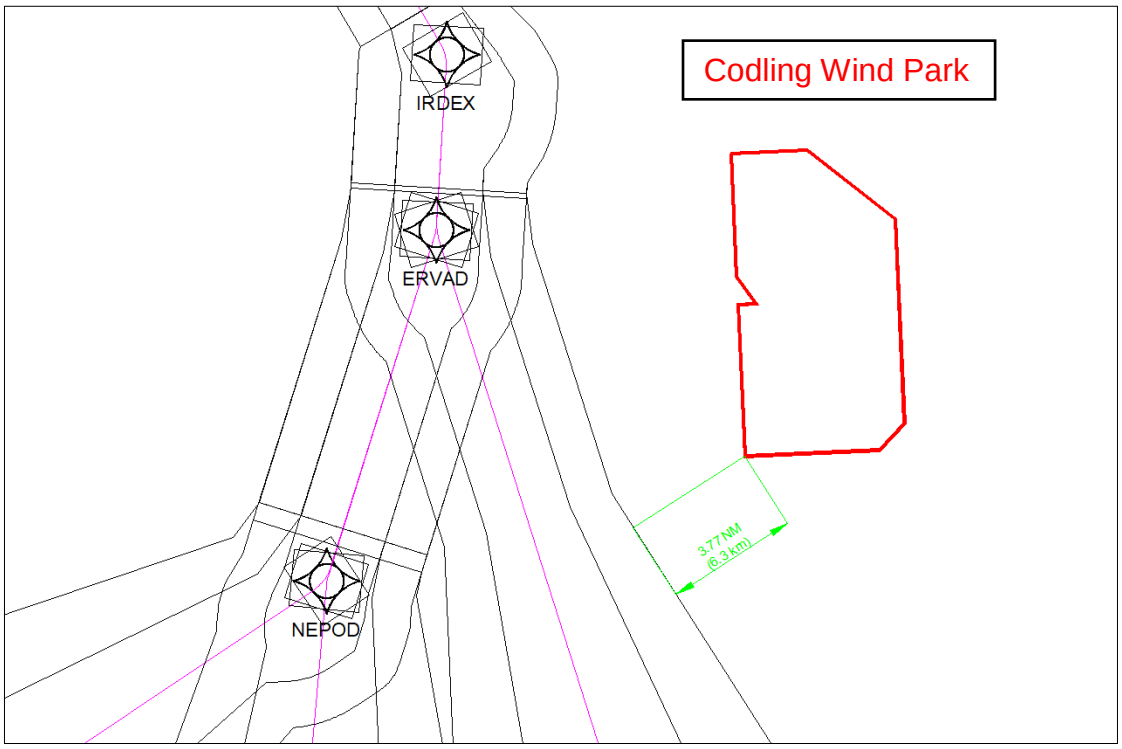
As can be seen in the previous chart, these SIDs are turning to the North, while the proposed Codling Wind Park is situated to the south of runway 10L.

The Standard Instrument Departures (SID's) CAT A, B from Runway 10L are not affected by the proposed structure.

3.1.2 Runway 10R CAT A, B

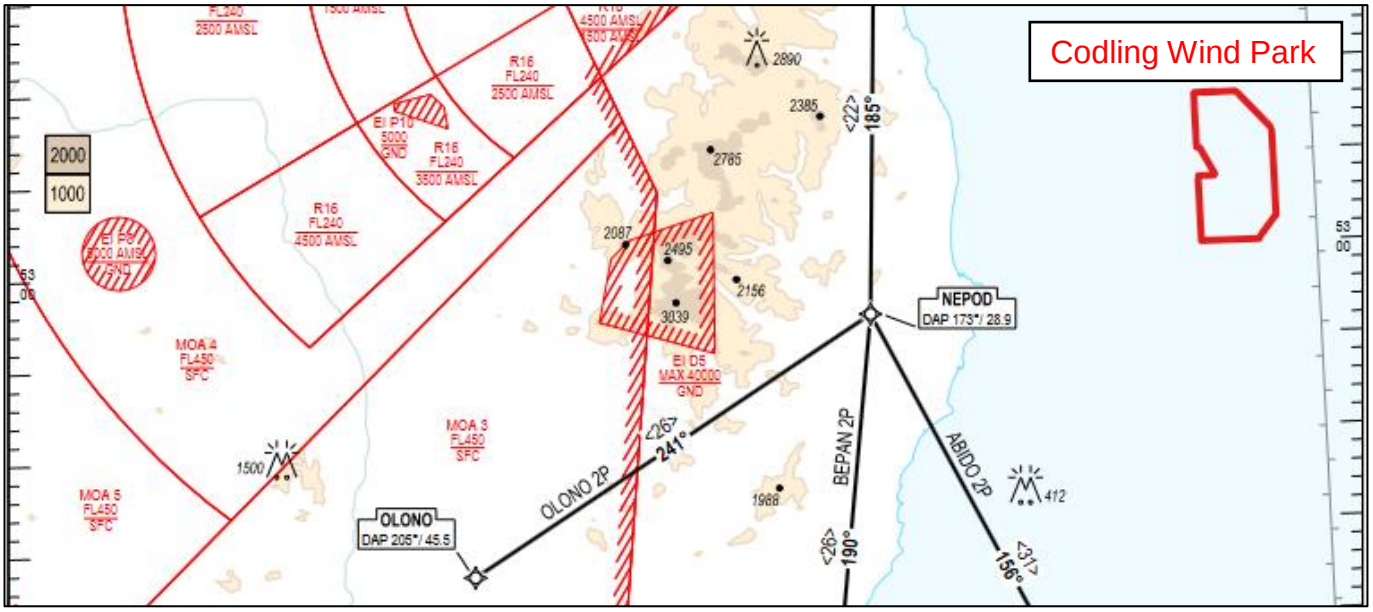


As can be seen in the following diagram the proposed Codling Wind Park is outside the obstacle protection areas associated with the SID's runway 10R CAT A,B.

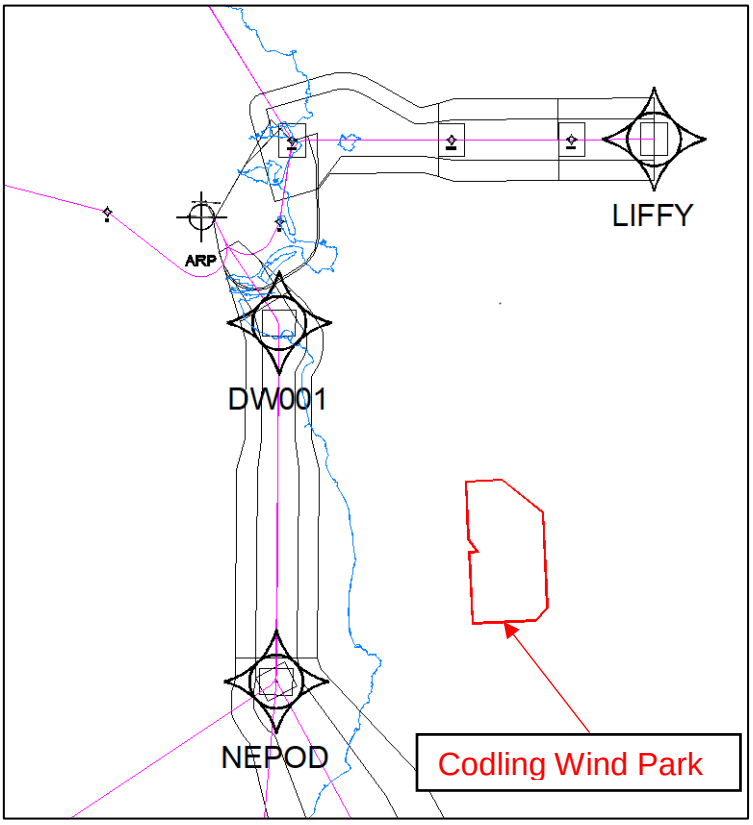


The Standard Instrument Departures (SID's) CAT A, B from Runway 10R are not affected by the proposed structure.

3.1.3 Runway 16 CAT A, B

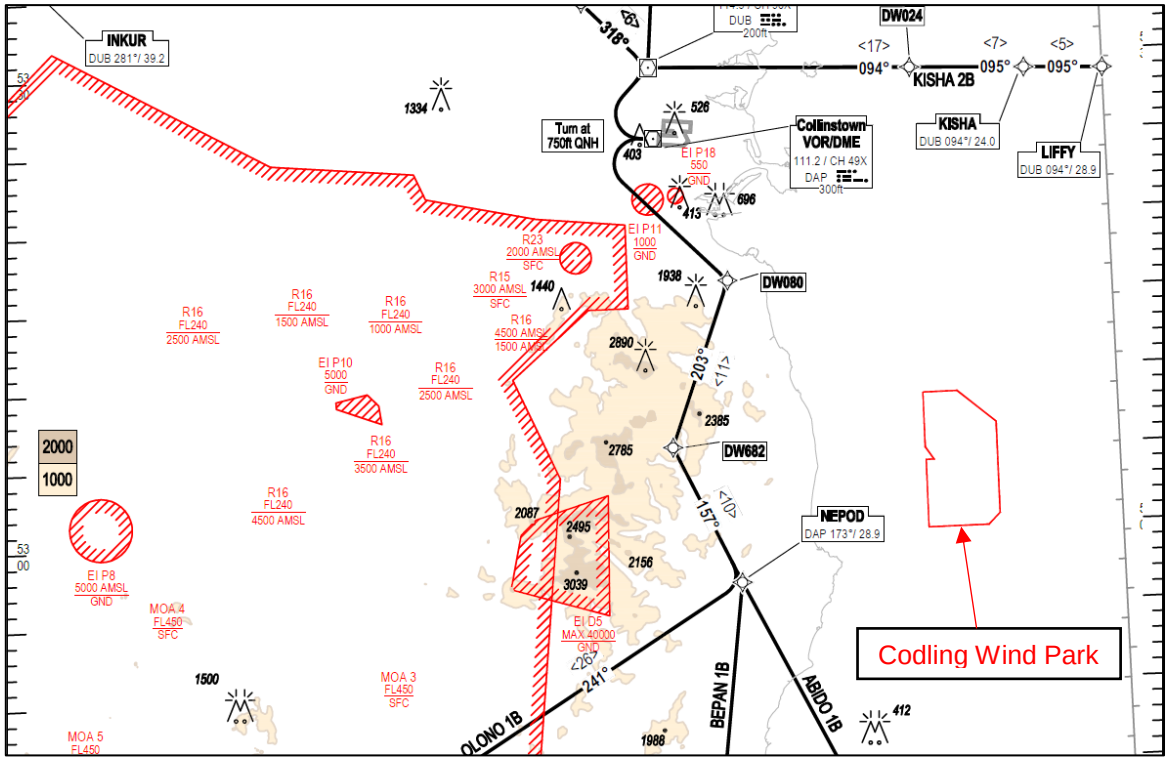


As can be seen in the following diagram the proposed Codling Wind Park is outside the obstacle protection areas associated with the SID's runway 10R CAT A,B.

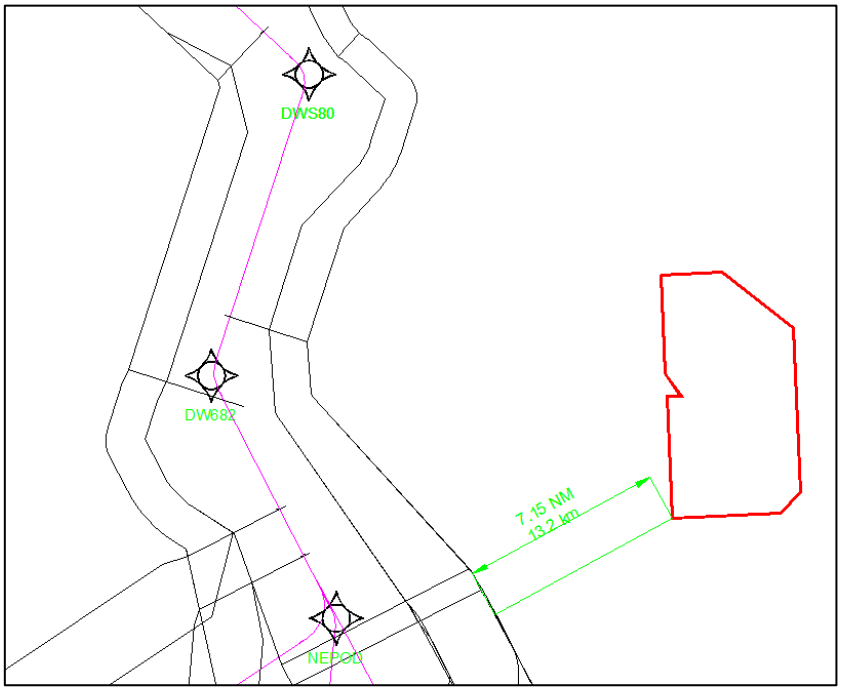


The Standard Instrument Departures (SID's) CAT A, B from Runway 16 are not affected by the proposed structure.

3.1.4 Runway 28L CAT A, B

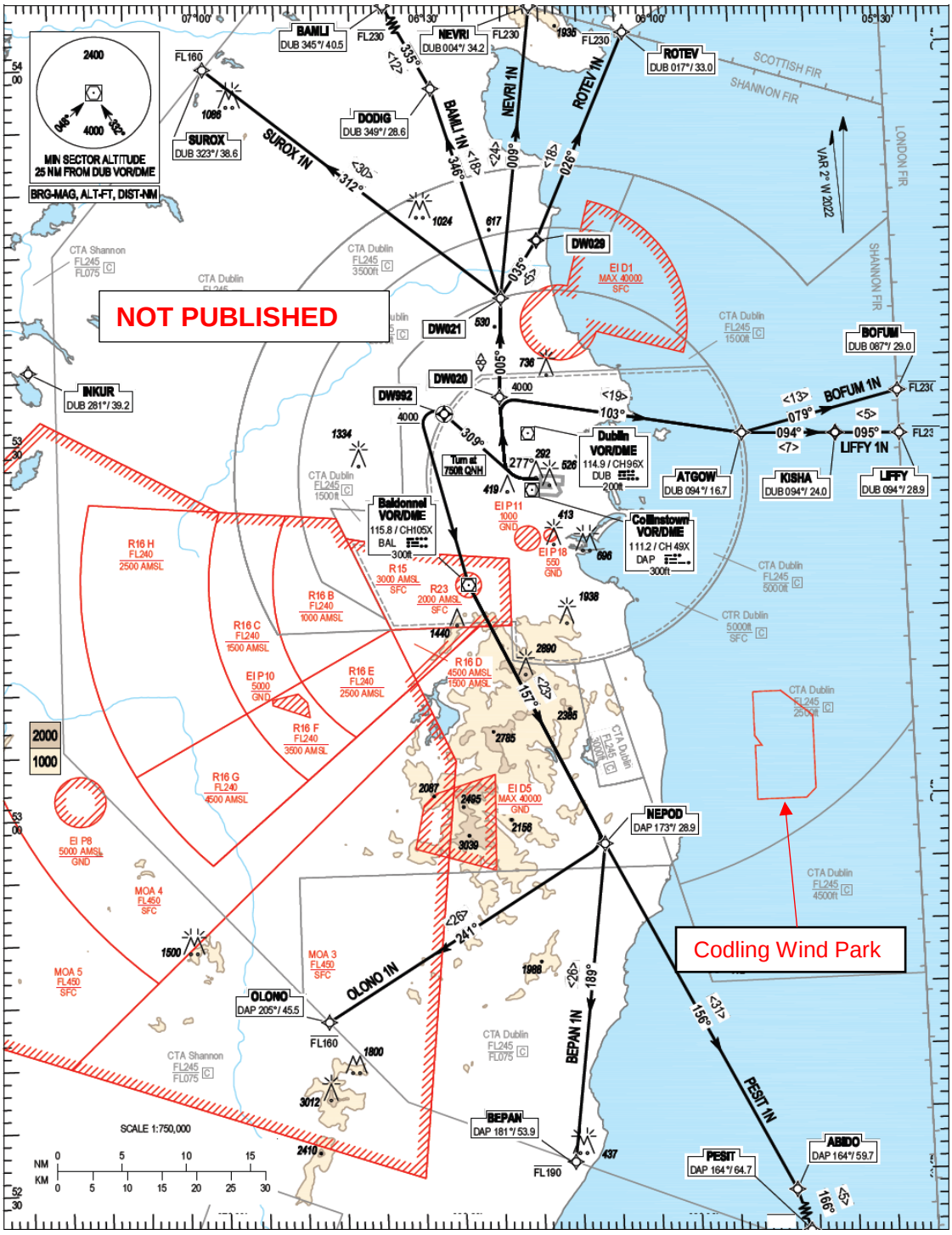


As can be seen in the following diagram the proposed Codling Wind Park is outside the obstacle protection areas associated with the SID's runway 28L CAT A,B.

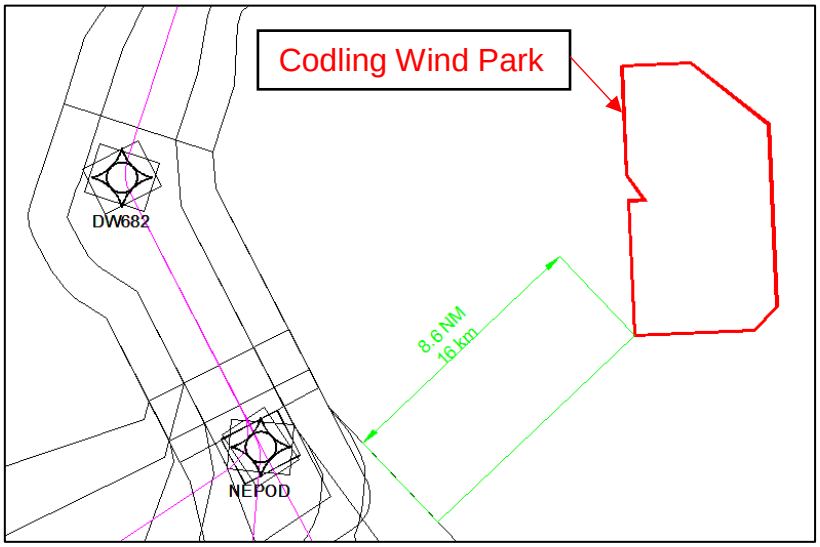


The Standard Instrument Departures (SID's) CAT A, B from Runway 28L are not affected by the proposed structure.

3.1.5 Runway 28R CAT C, D

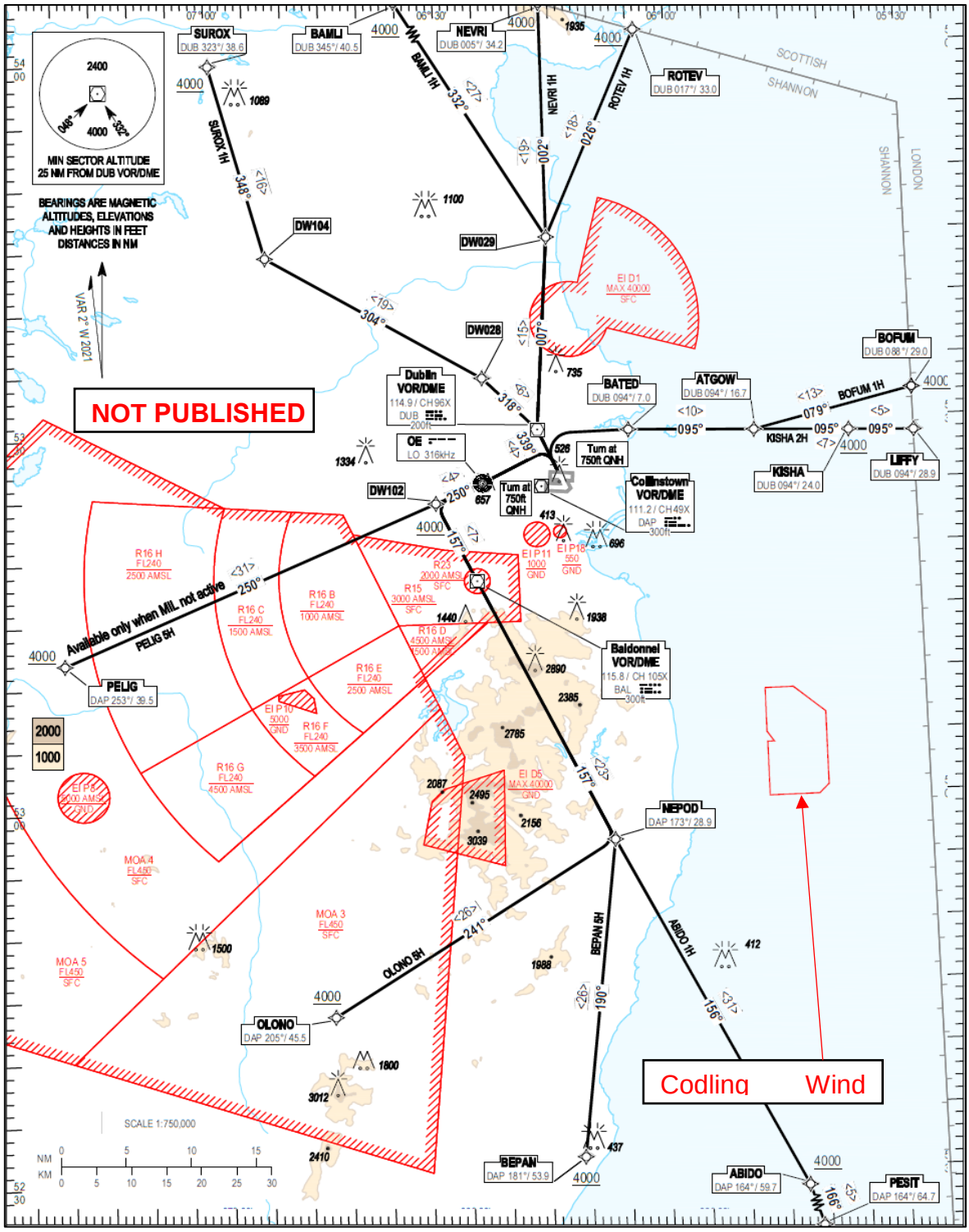


As can be seen in the following diagram the proposed Codling Wind Park is outside the obstacle protection areas associated with the SID's runway 28R CAT A,B.

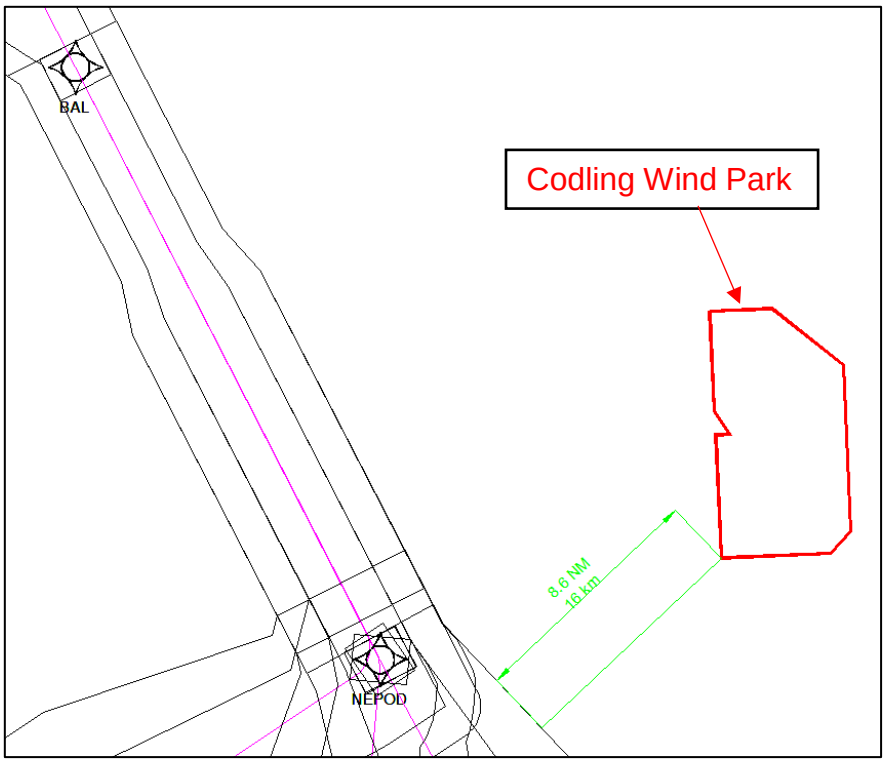


The Standard Instrument Departures (SID's) CAT A, B from Runway 28L are not affected by the proposed structure.

3.1.6 Runway 34 CAT A, B

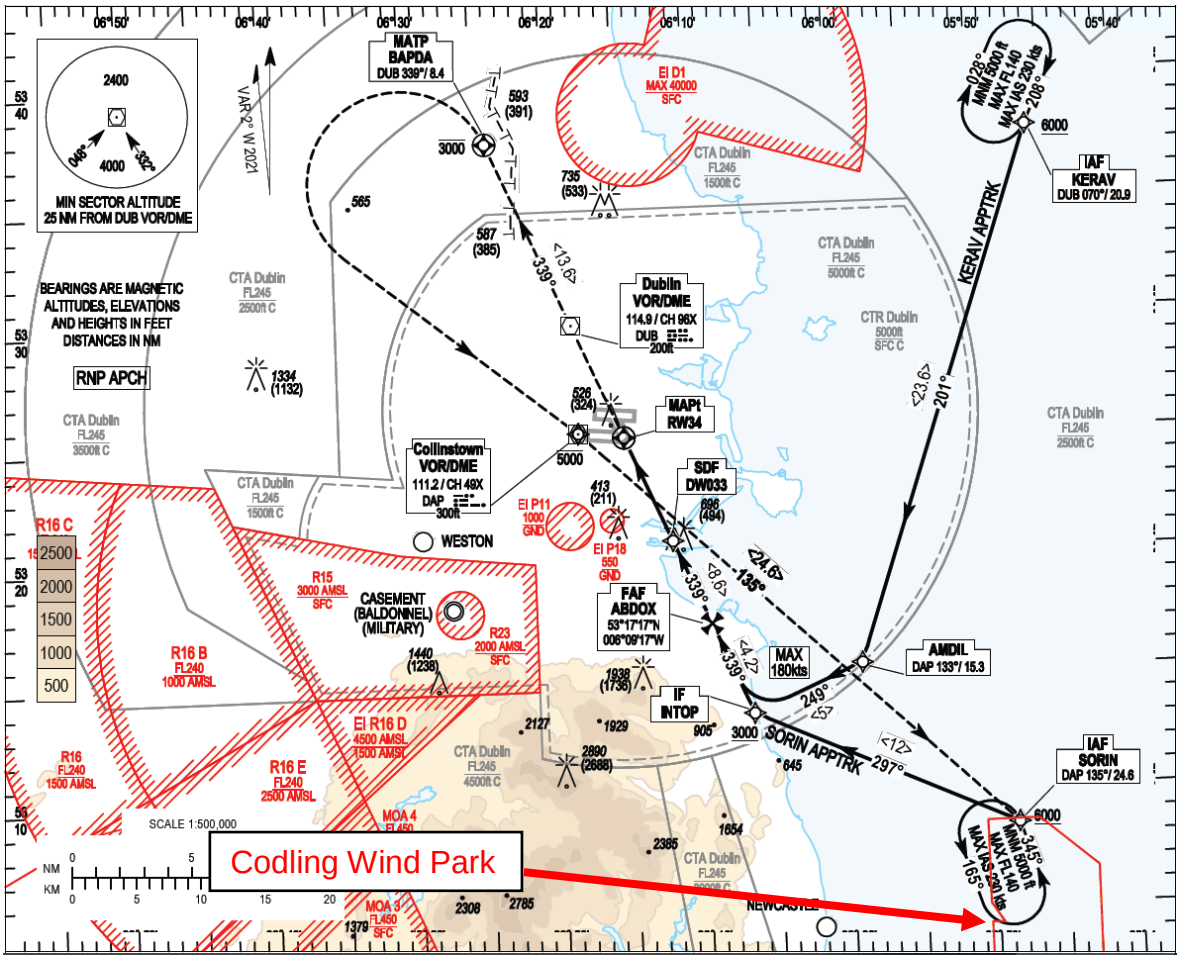


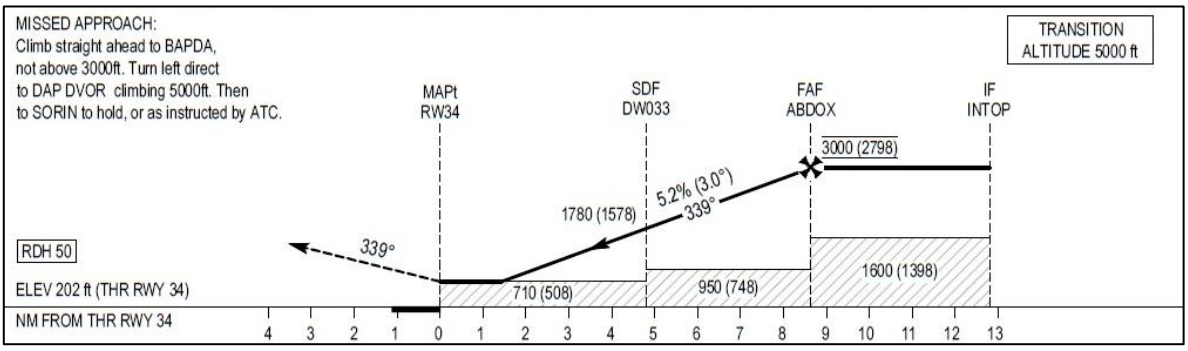
As can be seen in the following diagram the proposed Codling Wind Park is outside the obstacle protection areas associated with the SID's runway 28R CAT A,B



The Standard Instrument Departures (SID's) CAT A, B from runway 34 are not affected by the proposed structure.

3.2 *RNP Runway 34*

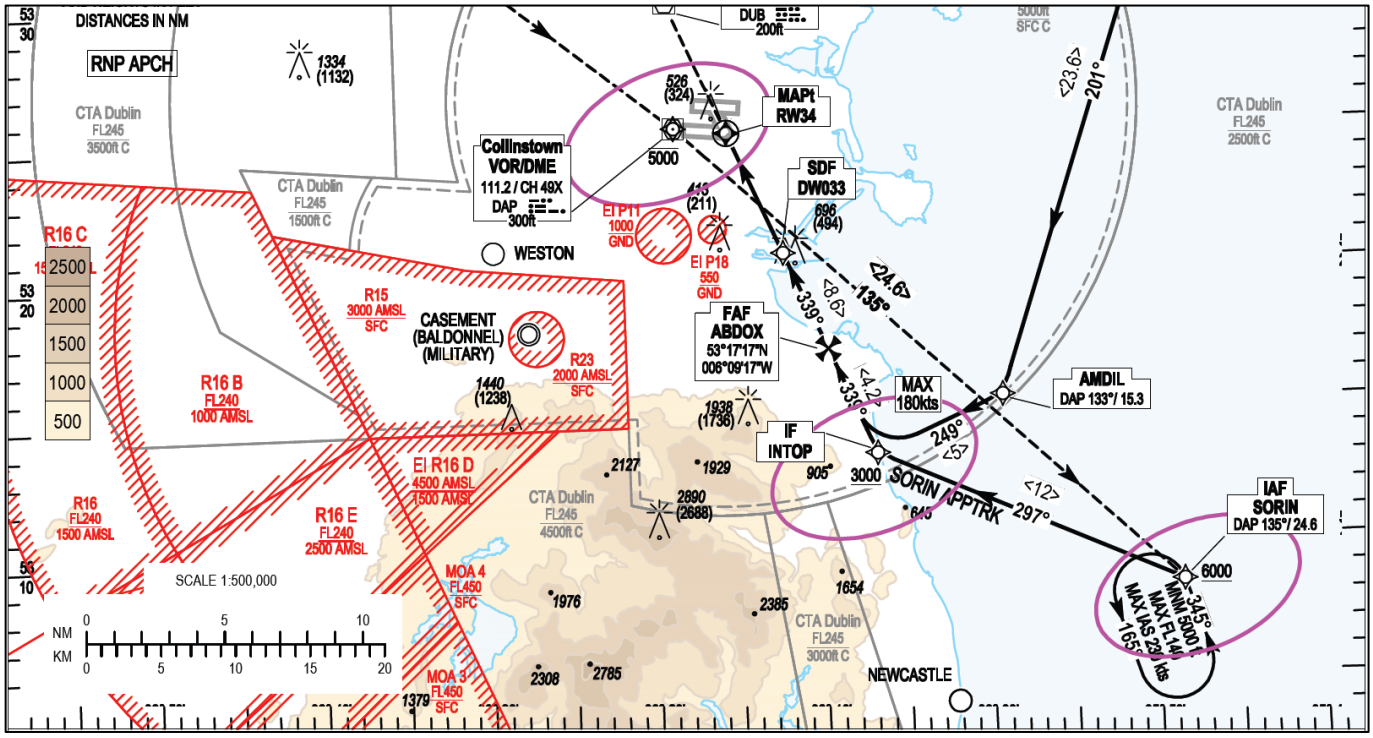




OCA (H)	A	B	C	D
LNAV	710 (508)			
LNAV / VNAV	540 (338)	550 (348)	570 (368)	690 (488)
LPV	391 (189)	404 (202)	444 (242)	463 (261)

3.2.1 LNAV runway 34

As can be seen in the previous diagram the proposed Codling Wind Park are situated inside the obstacle protection areas associated with the initial approach and the missed approach (final) phase.



For the initial approach phase the lower limit is published as 3000 ft at the Intermediate (IF) waypoint INTOP.

Altitude at INTOP (ft)	3000
Turbine tip height - elevation	314
MOC required	300
MOC achieved	594
Controlling	**NO**

For the missed approach phase the constraint at Collinstown VOR/DME (DAP) is a minimum altitude of 5000ft.

Altitude at DAP VOR/DEM (ft)	5000
Turbine tip height - elevation	314
MOC required	300
MOC achieved	1204
Controlling	**NO**

The LNAV 34 approach procedure is not affected by the proposed structures.

3.2.2 LNAV/ VNAV Runway 34

The proposed Codling Wind Park is located inside the obstacle protection areas in the initial approach phase and the missed approach (final) phase as shown in previous section (LNAV runway 34).

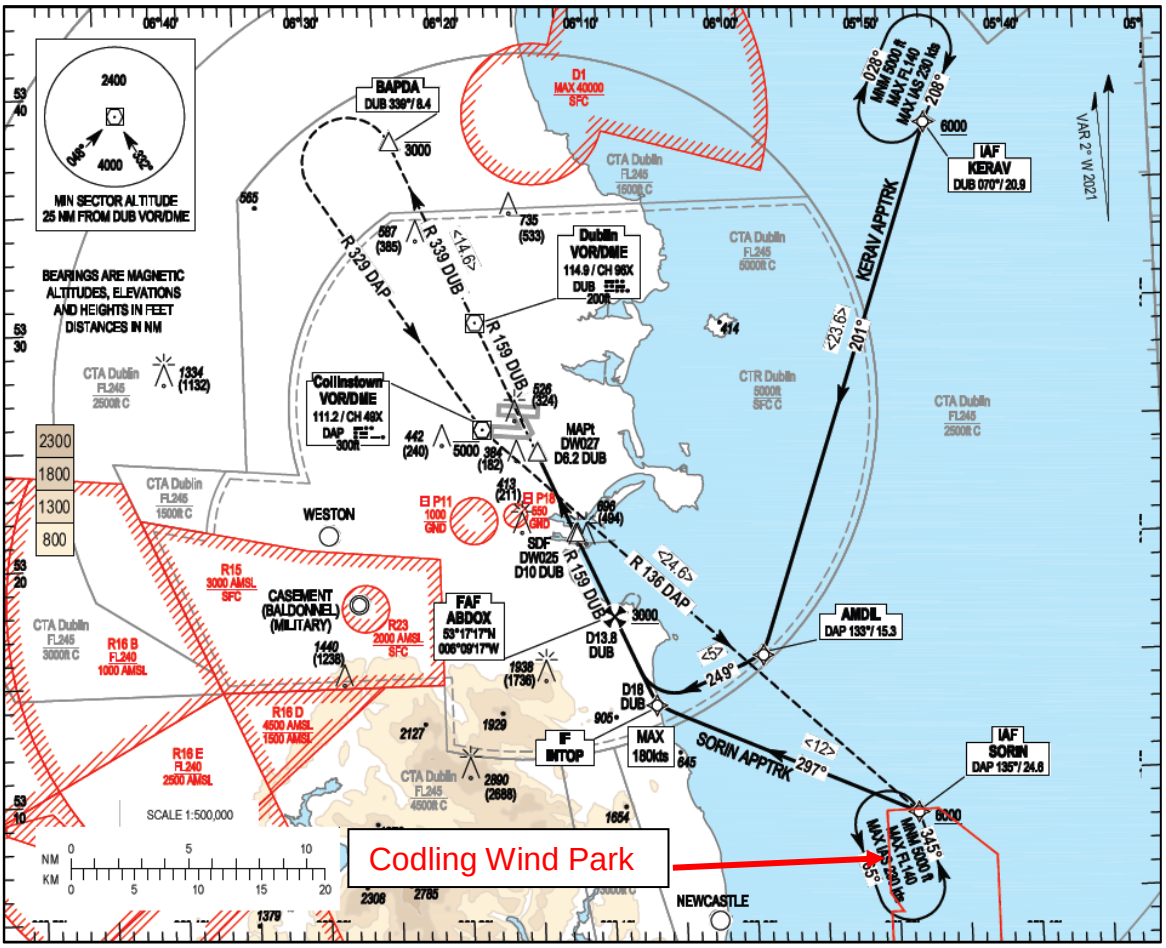
The LNAV/VNAV 34 approach procedure is not affected by the proposed structures.

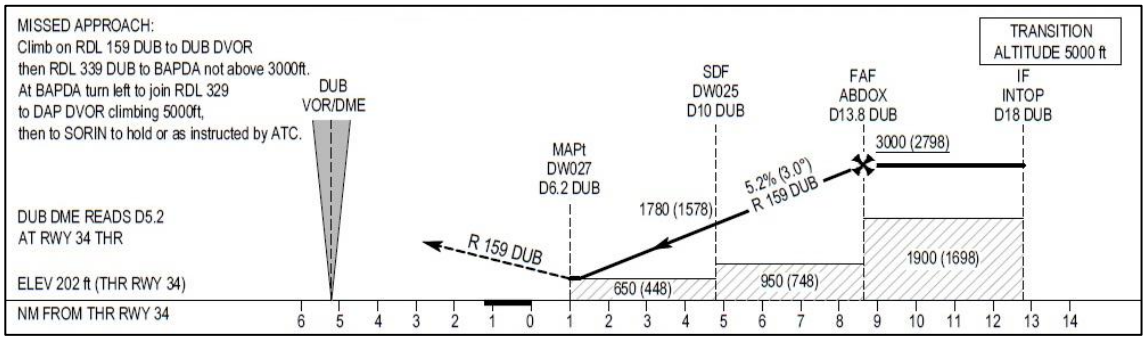
3.2.3 LPV Runway 34

The proposed Codling Wind Park is located inside the obstacle protection areas in the initial approach phase and the missed approach (final) phase as shown in section 3.2.1 LNAV runway 34.

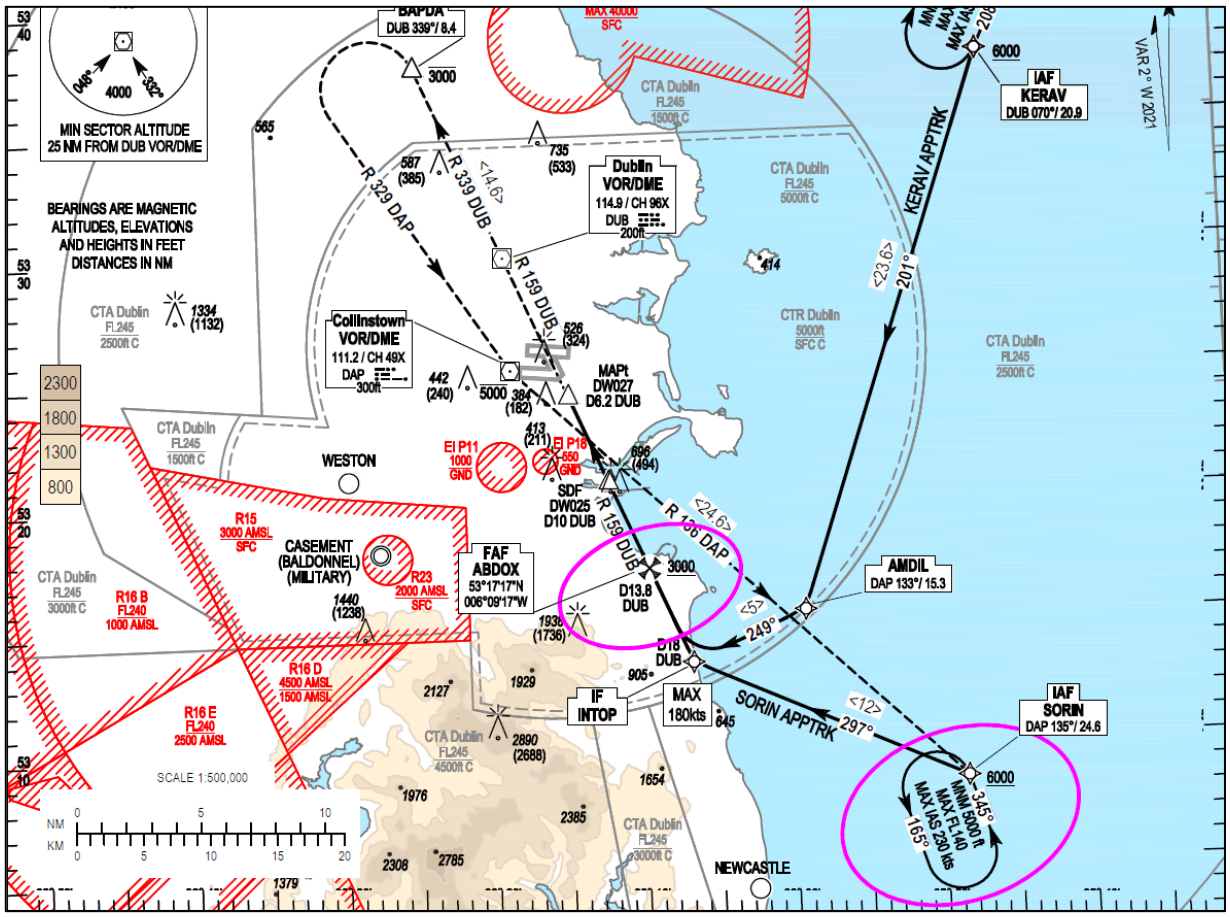
The LPV 34 approach procedure is not affected by the proposed structures.

3.3 *VOR Runway 34*





OCA (H)	A	B	C	D
Straight-in Approach	650 (448)			



Altitude at FAF ABDOX (ft)	3000
Turbine tip height - elevation	314
MOC required	150
MOC achieved	594
Controlling	**NO**

For the initial approach segment the lower limit is 3000ft at the waypoint ABDOX.

Parameters	
Height Above Starting Position	650ft
Climb gradient	2.5 %
Custom Distances	
10 nm	2169 ft
20 nm	3688 ft
30 nm	5207 ft
40 nm	6726 ft
50 nm	8245 ft

The length of the missed approach from the MAPt to the IAF SORIN is more than 50 track miles. The minimum holding altitude at the position SORIN is at 5000ft. As can be seen in the previous table with a climb gradient of 2.5% the altitude of 5000 ft will be reached at approximately 30 miles which is well before the proposed Codling Wind Park.

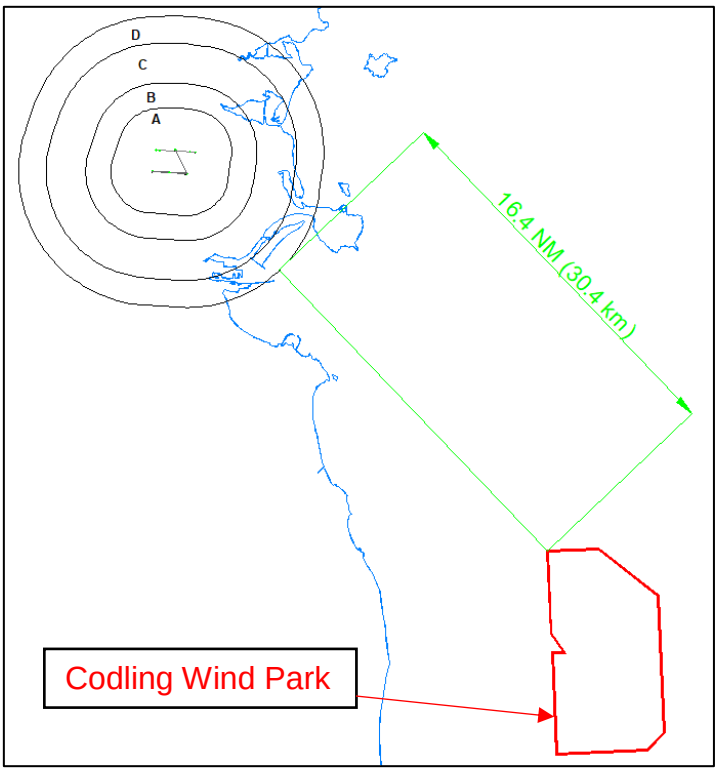
The VOR 34 approach procedure is not affected by the proposed Codling Wind Park.

3.4 *Visual manoeuvring (circling)*

The obstacle protection areas for the visual circling RWY 10/28, RWY16/34 and RWY 10L/28R at the Dublin airport were constructed with the following parameters:

Thresholds	
Position	
ID	THR 10L
Latitude	53°26'13.79"N
Longitude	006°16'50.22"W
Altitude	71.63 m (235 ft)
Position	
ID	THR 10R
Latitude	53°25'20.75"N
Longitude	006°17'24.27"W
Altitude	73.76 m (242 ft)
Position	
ID	THR 16
Latitude	53°26'13.16"N
Longitude	006°15'43.12"W
Altitude	66.14 m (217 ft)
Position	
ID	THR 28L
Latitude	53°25'12.94"N
Longitude	006°15'02.08"W
Altitude	61.57 m (202 ft)
Position	
ID	THR 28R
Latitude	53°26'06.73"N
Longitude	006°14'41.87"W
Altitude	64.92 m (213 ft)
Position	
ID	THR 34
Latitude	53°25'11.66"N
Longitude	006°14'58.54"W
Altitude	61.57 m (202 ft)

Parameters	
ISA	15 °C
Category A	
Altitude	5000 ft
MOC	90 m
IAS	100 kts
TAS (+25 kts)	135.6 kts
Straight Segment [ST]	0.3 nm
Radius	3281.99 m
Category B	
Altitude	5000 ft
MOC	90 m
IAS	135 kts
TAS (+25 kts)	174.3 kts
Straight Segment [ST]	0.4 nm
Radius	5245.97 m
Category C	
Altitude	5000 ft
MOC	120 m
IAS	180 kts
TAS (+25 kts)	224.1 kts
Straight Segment [ST]	0.5 nm
Radius	8371.11 m
Category D	
Altitude	5000 ft
MOC	120 m
IAS	205 kts
TAS (+25 kts)	251.7 kts
Straight Segment [ST]	0.6 nm
Radius	10507.02 m



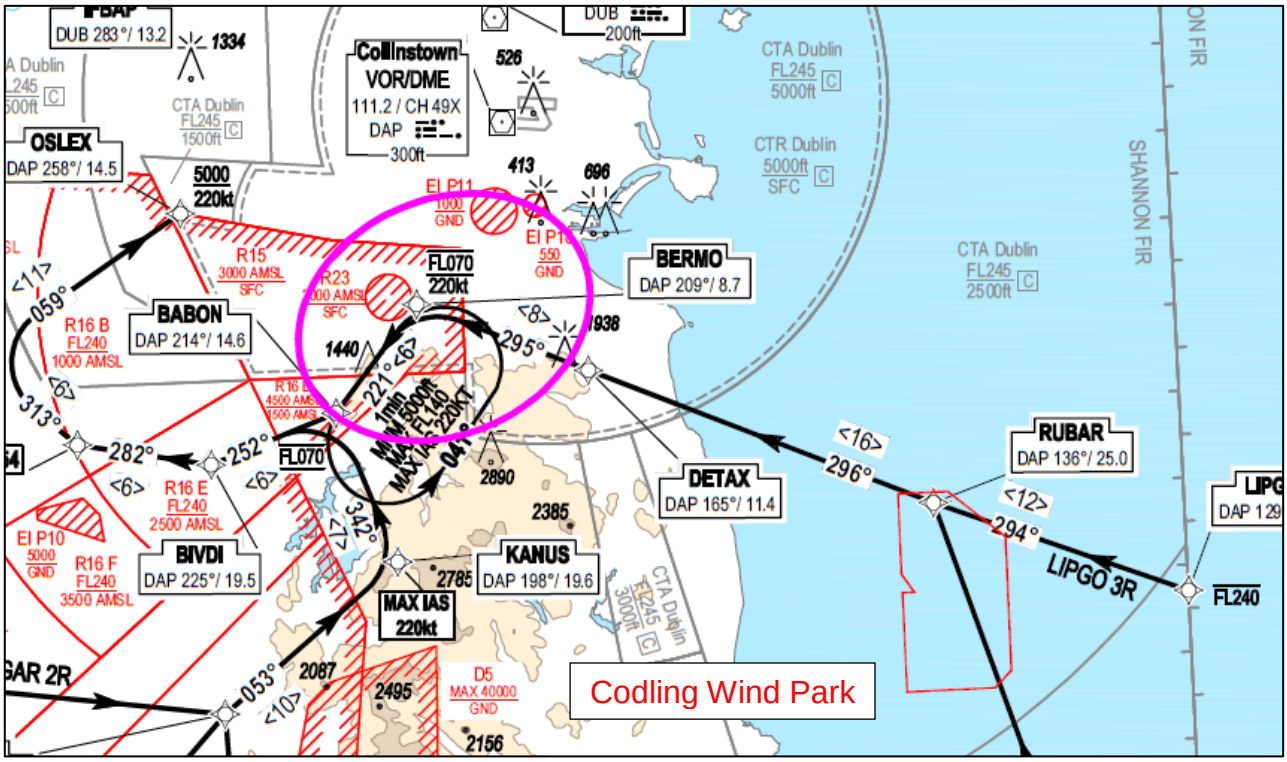
As can be seen in the previous diagram, the proposed structures are situated outside the obstacle protection areas.

The visual manoeuvring (circling) procedures are not affected by the proposed Codling Wind Park.

3.5 *Standard arrival routes (STARs)*

3.5.1 Runway's 10L/R

3.5.1.1 With lateral separation

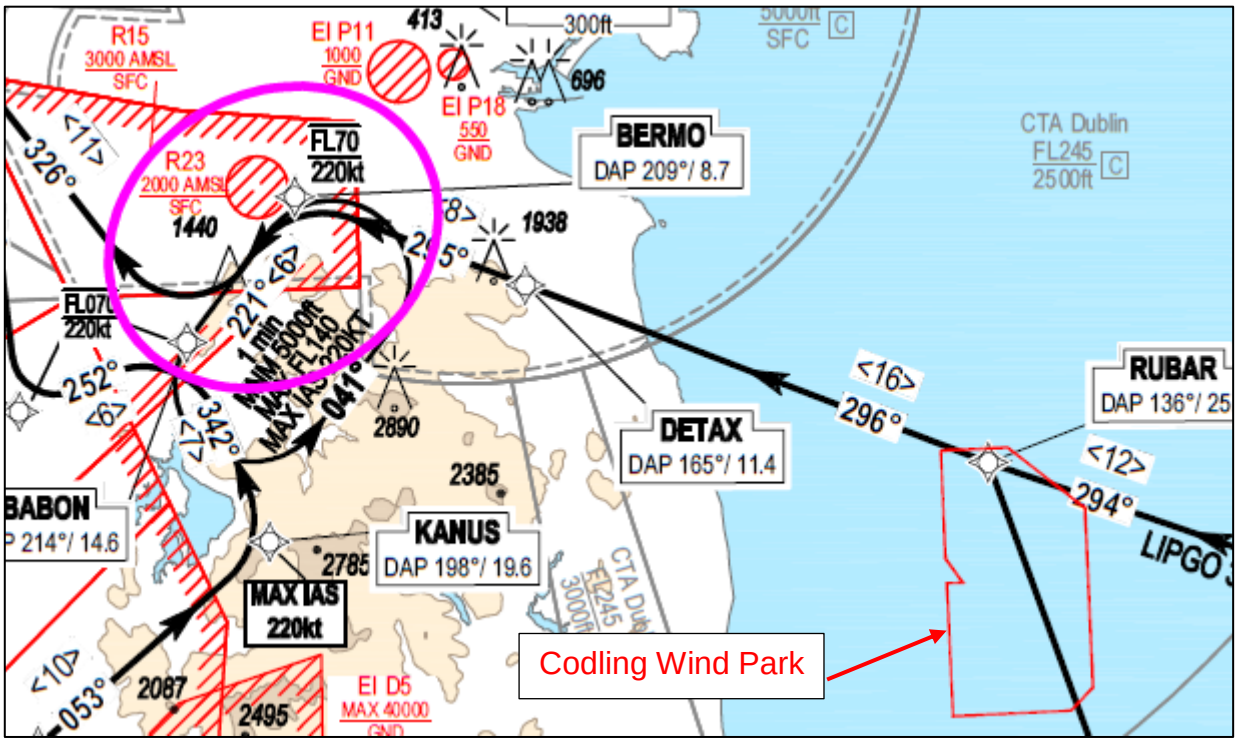


As can be seen on the previous diagram the minimum flight level at waypoint BERNO is FL070.

Altitude at BERMO (FL)	070
Turbine tip elevation	314
MOC required	300
MOC achieved	1813
Controlling	**NO**

The standard instrument arrival procedures with lateral separation for runways 10L/R are not affected by the proposed Codling Wind Park.

3.5.1.2 Without lateral separation

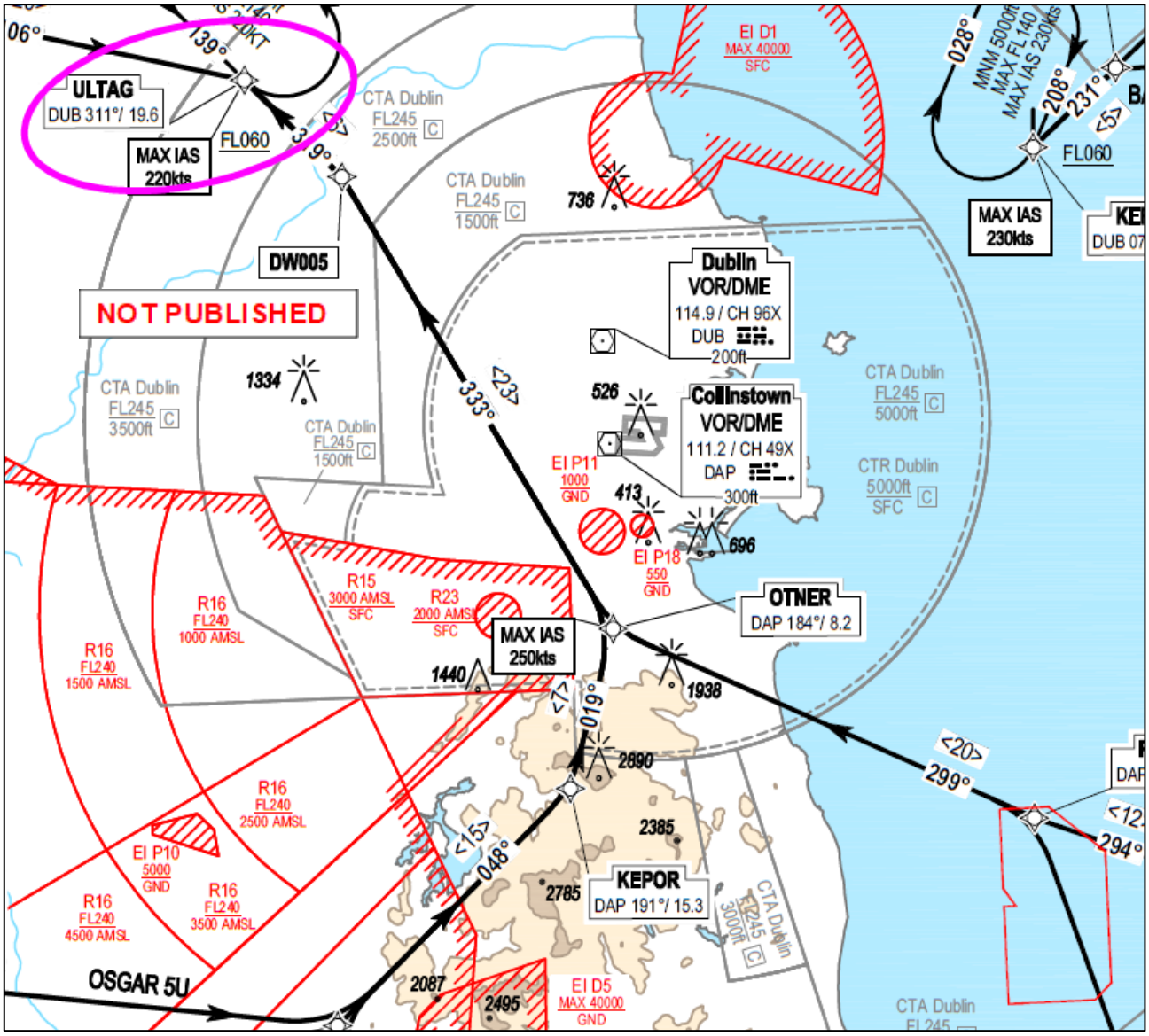


As can be seen on the previous diagram the minimum flight level at waypoint BERNO is FL070.

Altitude at BERMO (FL)	070
Turbine tip height - elevation	314
MOC required	300
MOC achieved	1813
Controlling	**NO**

The standard instrument arrival procedures without lateral separation for runways 10L/R are not affected by the proposed Codling Wind Park.

3.5.2 Runway 16



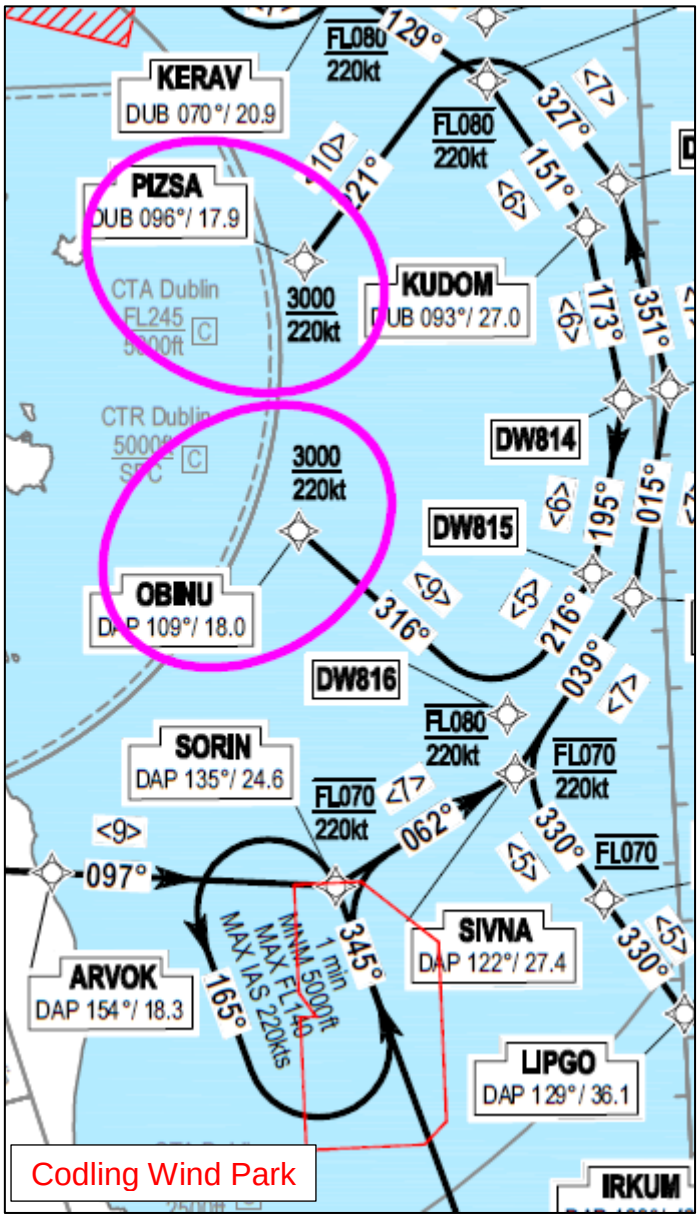
As can be seen on the previous table the minimum flight level at waypoint BERNO is FL060.

Altitude at ULTAG (FL)	060
Turbine tip height - elevation	314
MOC required	300
MOC achieved	778
Controlling	**NO**

The standard instrument arrival procedures for runways 16 are not affected by the proposed Codling Wind Park.

3.5.3 Runway 28L/R

3.5.3.1 With lateral separation

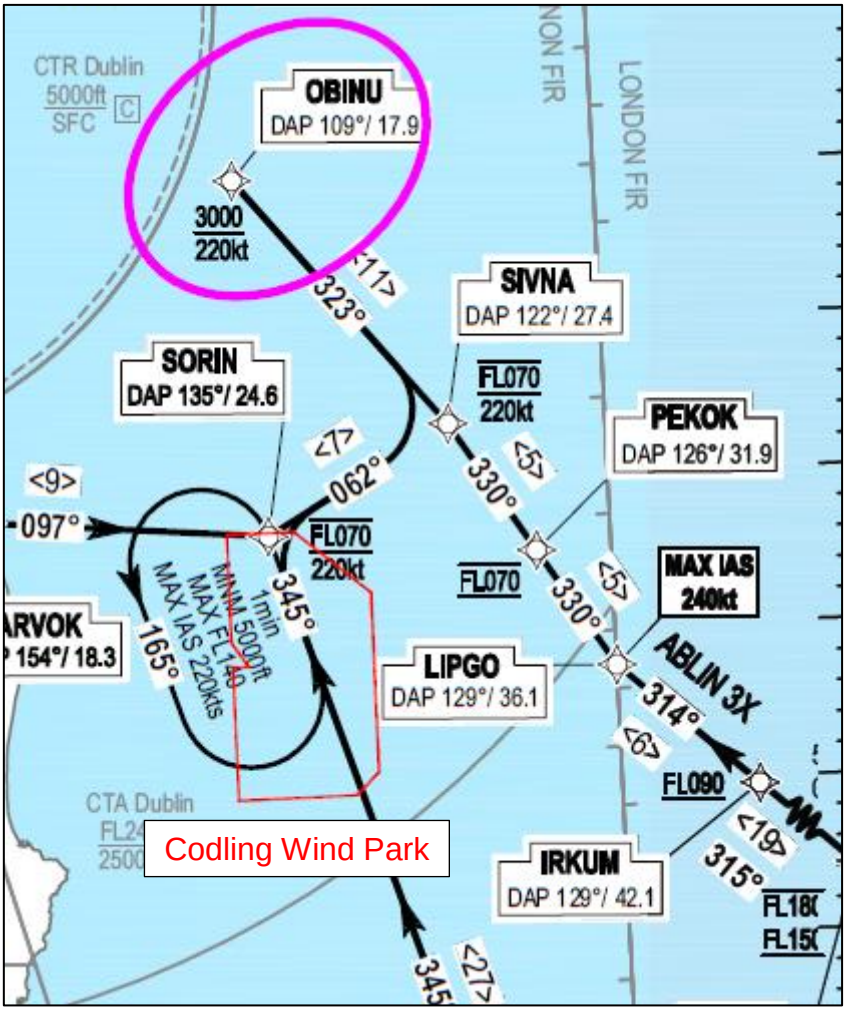


As can be seen on the previous table the minimum altitude at waypoints OBINU and PIZSA is 3000ft.

Altitude at PIZSA, OBINU (ft)	3000
Turbine tip height - elevation	314
MOC required	300
MOC achieved	594
Controlling	**NO**

The standard instrument arrival procedures with lateral separation for runways 28L/R are not affected by the proposed Codling Wind Park.

3.5.3.2 Without lateral separation

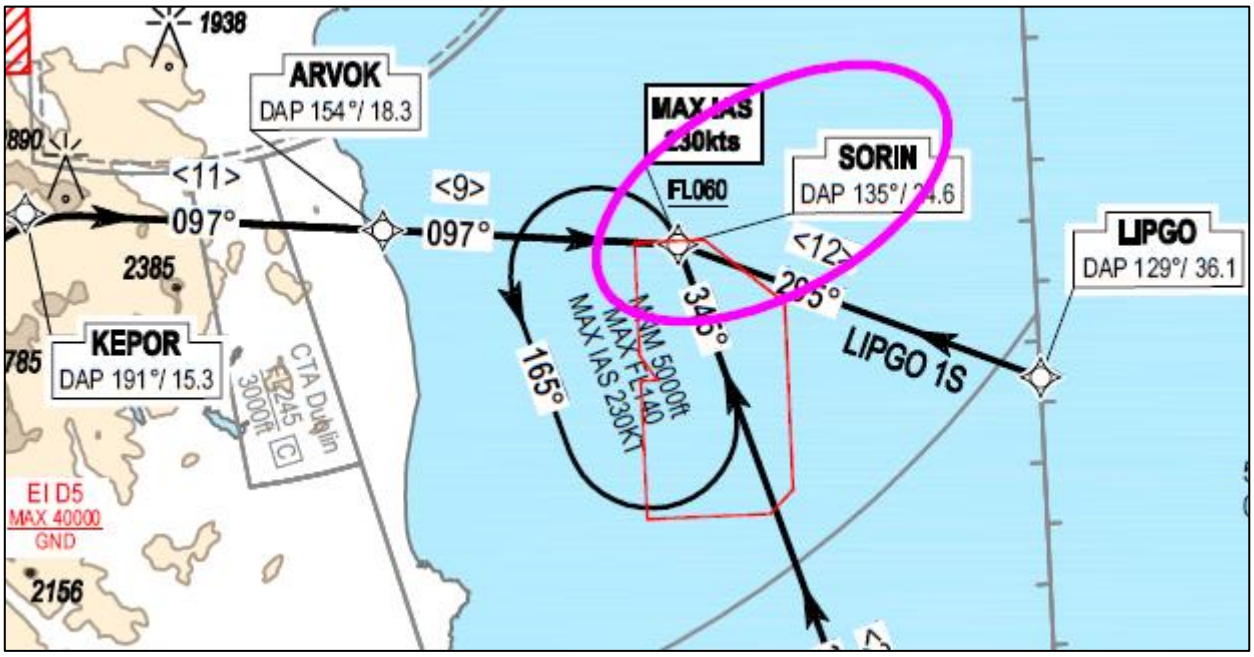


As can be seen on the previous table the minimum altitude at waypoint OBINU is 3000ft.

Altitude at OBINU (ft)	3000
Turbine tip height - elevation	314
MOC required	300
MOC achieved	594
Controlling	**NO**

The standard instrument arrival procedures without lateral separation for runways 28L/R are not affected by the proposed Codling Wind Park.

3.5.4 Runway 34

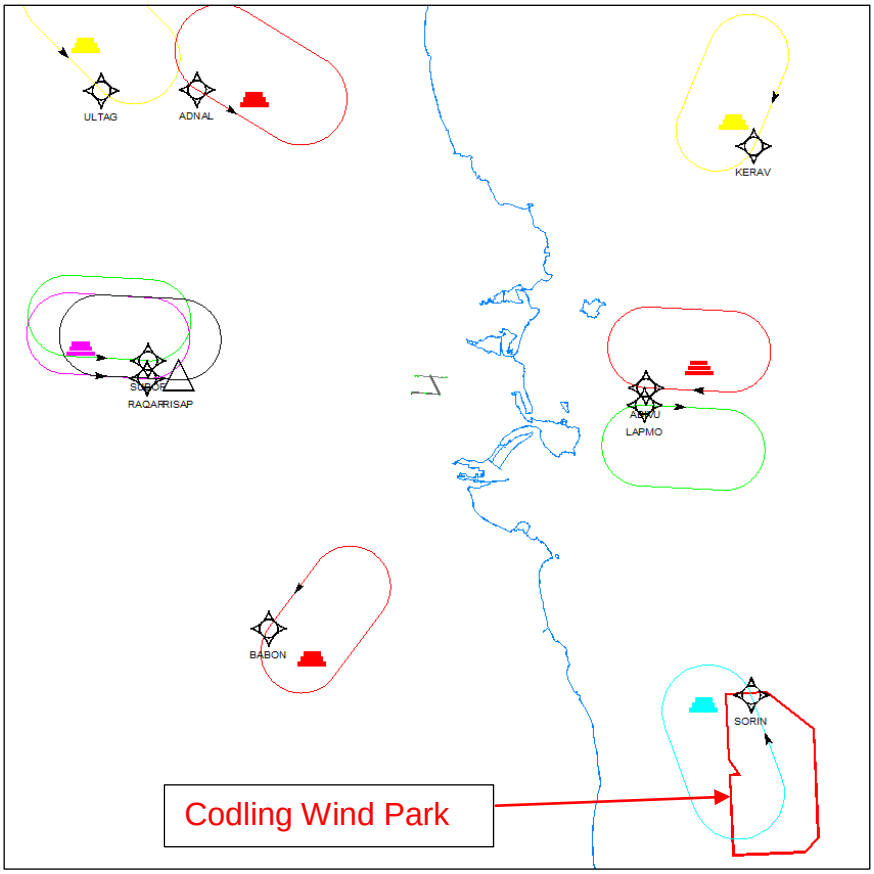


As can be seen on the previous table the minimum flight level at waypoint SORIN is FL060.

Altitude at SORIN (FL)	060
Turbine tip height - elevation	314
MOC required	300
MOC achieved	778
Controlling	**NO**

The standard instrument arrival procedures for runways 34 are not affected by the proposed Codling Wind Park.

3.6 *Holding patterns*



Holding patterns for Dublin airport

All holding patterns related to the Dublin airport have minimum holding altitudes as follows:

Holding waypoint	Minimum altitude	Protection area	Assessment required
ABIVU	3000	NO	NO
ADNAL	5000	NO	NO
BABON	5000	NO	NO
KERAV	5000	NO	NO
LAPMO	3000	NO	NO

Holding waypoint	Minimum altitude	Protection area	Assessment required
RAQAR	4000	NO	NO
RISAP	3000	NO	NO
SORIN	5000	YES	YES
SUBOF	4000	NO	NO
ULTAG	5000	NO	NO

The Codling Wind Park is penetrating the obstacle protection area for the holding over the SORIN waypoint. As can be seen on the previous table the minimum holding altitude at waypoint SORIN is 5000ft.

Minimum holding altitude (ft)	5000
Turbine tip height - elevation	314
MOC required	300
MOC achieved	1204
Controlling	**NO**

The holding pattern over the SORIN waypoint is not affected by the proposed Codling Wind Park.

4. Risk Assessment

4.1 *Risk value explanation*

To simplify the risk evaluation ASAP has created simplified risk assessment values from the guidelines as laid out in ICAO Safety Management Manual (SMM), document 9859 Part 6.

Included in the following ICAO table is how the ASAP risk assessment values correspond to the ICAO values.

Table 6-1. ICAO Risk assessment matrix principles + ASAP values

SEVERITY OF CONSEQUENCES			LIKELIHOOD OF OCCURRENCE			ASAP risk assessment	
Aviation definition	**Meaning**	**Value**	**Qualitative definition**	**Meaning**	**Value**	**Meaning**	**Value**
Catastrophic	Equipment destroyed. Multiple deaths.	5	Frequent	Likely to occur many times	5	High risk	5
Hazardous	A large reduction in safety margins, physical distress or a workload such that the operators cannot be relied upon to perform their tasks accurately or completely. Serious injury or death to a number of people. Major equipment damage.	4	Occasional	Likely to occur sometimes	4		
Major	A significant reduction in safety margins, a reduction in the ability of the operators to cope with adverse operating conditions as a result of an increase in workload, or as a result of conditions impairing their efficiency. Serious incident. Injury to persons.	3	Remote	Unlikely, but possible to occur	3	Medium Risk	3-4
Minor	Nuisance. Operating limitations. Use of emergency procedures. Minor incident.	2	Improbable	Very unlikely to occur	2	Low Risk	2
Negligible	Little consequence	1	Extremely improbable	Almost inconceivable that the event will occur	1		1

4.2 *Risk evaluation*

Procedure	No risk - 0	Low risk - 1 to 2	Medium risk - 3 to 4	High risk - 5
SIDs Runway 10R	0			
SIDs Runway 28L	0			
SIDs Runway 10L	0			
SIDs Runway 28R	0			
SIDs Runway 16	0			
SIDs Runway 34	0			
ILS CAT I/II Runway 28L	0			
LOC Runway 28L	0			
VOR Runway 28L	0			
VOR T Runway 28L	0			
RNP Runway 28L	0			
ILS CAT I/II Runway 10R	0			
LOC Runway 10R	0			
RNP Runway 10R	0			
VOR Runway 10R	0			
ILS CAT I/II Runway 28R	0			
LOC Runway 28R	0			
RNP Runway 28R	0			
ILS CAT I/II Runway 10L	0			
LOC Runway 10L	0			
RNP Runway 10L	0			
RNP Runway 16	0			
ILS CAT I Runway 16	0			
LOC Runway 16	0			
VOR Runway 16	0			
VOR Runway 34	0			
RNP Runway 34	0			
Visual circling	0			
Total assessed risk value		**0**	**No risk**	

The Codling Wind Park has been assessed as not to be a safety risk to flight operations at Dublin airport.

5. Conclusion

The Codling Wind Park does not pose any risk on the flight operations at Dublin airport.

6. End of document