Cerema

Centre d'études et d'expertises sur les risques,
L'environnement, la mobilité et l'aménagement

PIANC WG 161

Interaction between offshore wind farms and maritime navigation

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5th YP-Com
Ostend 7th May 2015

<u>Objectif of WG 161:</u> to produce Guidelines & recommendations to assess the required safety distances in vicinity of offshore wind farms

- **Legal issues**
- **Safe distances for navigation**
- **Marking**
- **Electro Magnetic Radiation (EMR)**
- **Emergency situations**
- **Marine Spatial Planning (MSP)**

Liaison with the Aids to Navigation Requirements & Management (ARM) committee of **IALA** in charge to produce guidelines on MSP

EC directive 2014/89 on MSP

Legal issues

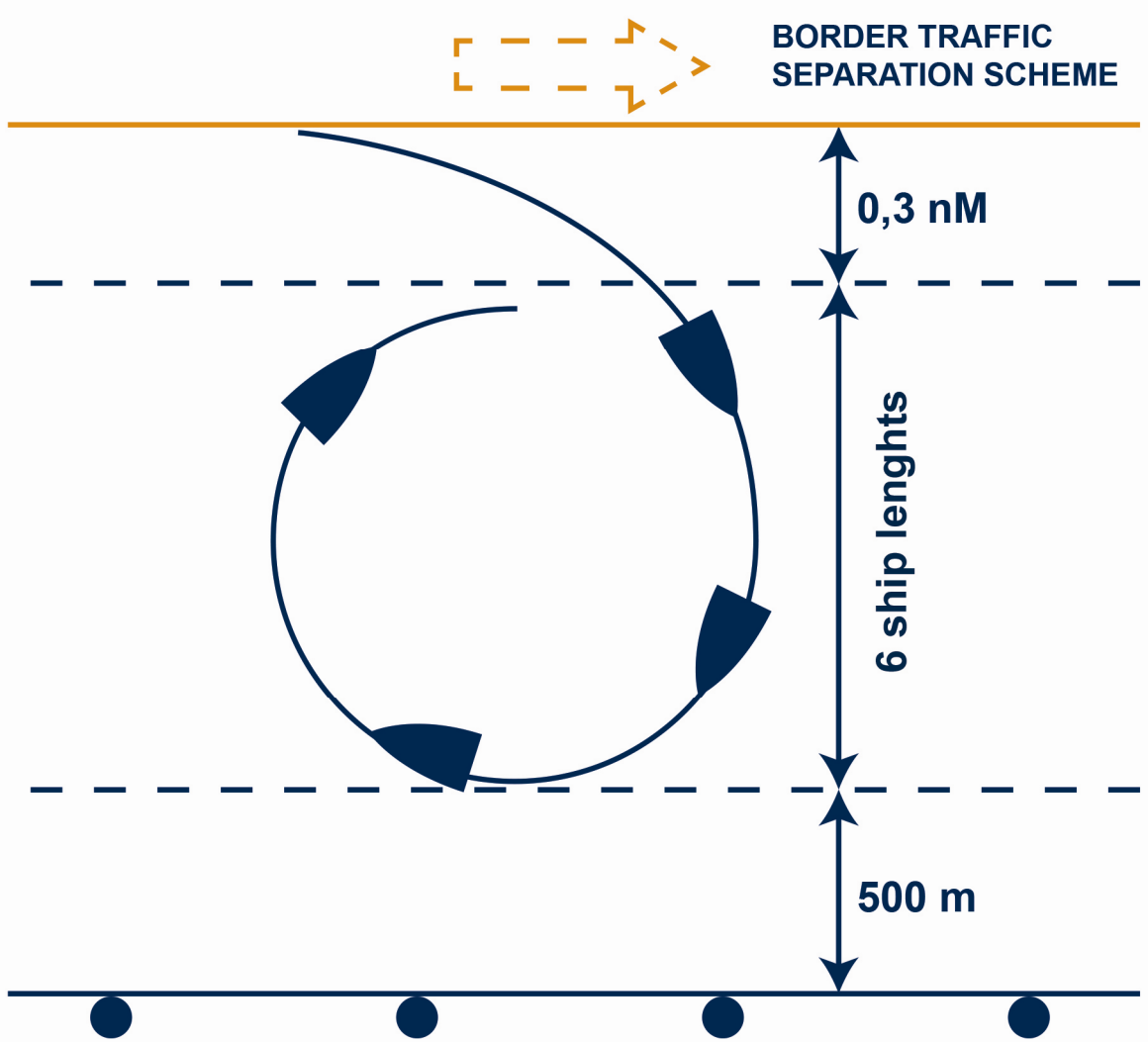
International references

UN (UNCLOS)
UNESCO (MSP)
IMO (SOLAS, COLREG, GPSR, ...)
ITU (RR)
ICAO (ICA convention annex 14)

International recommendations

IMO
IALA
PIANC

Safe distances for navigation



Marking

Rec. O-139

EMR … electromagnetic radiations

Mobile phone base stations

radio and television masts

emergency service radio masts

RADARs (VTS + Civil Aviation + Wheather Office…)

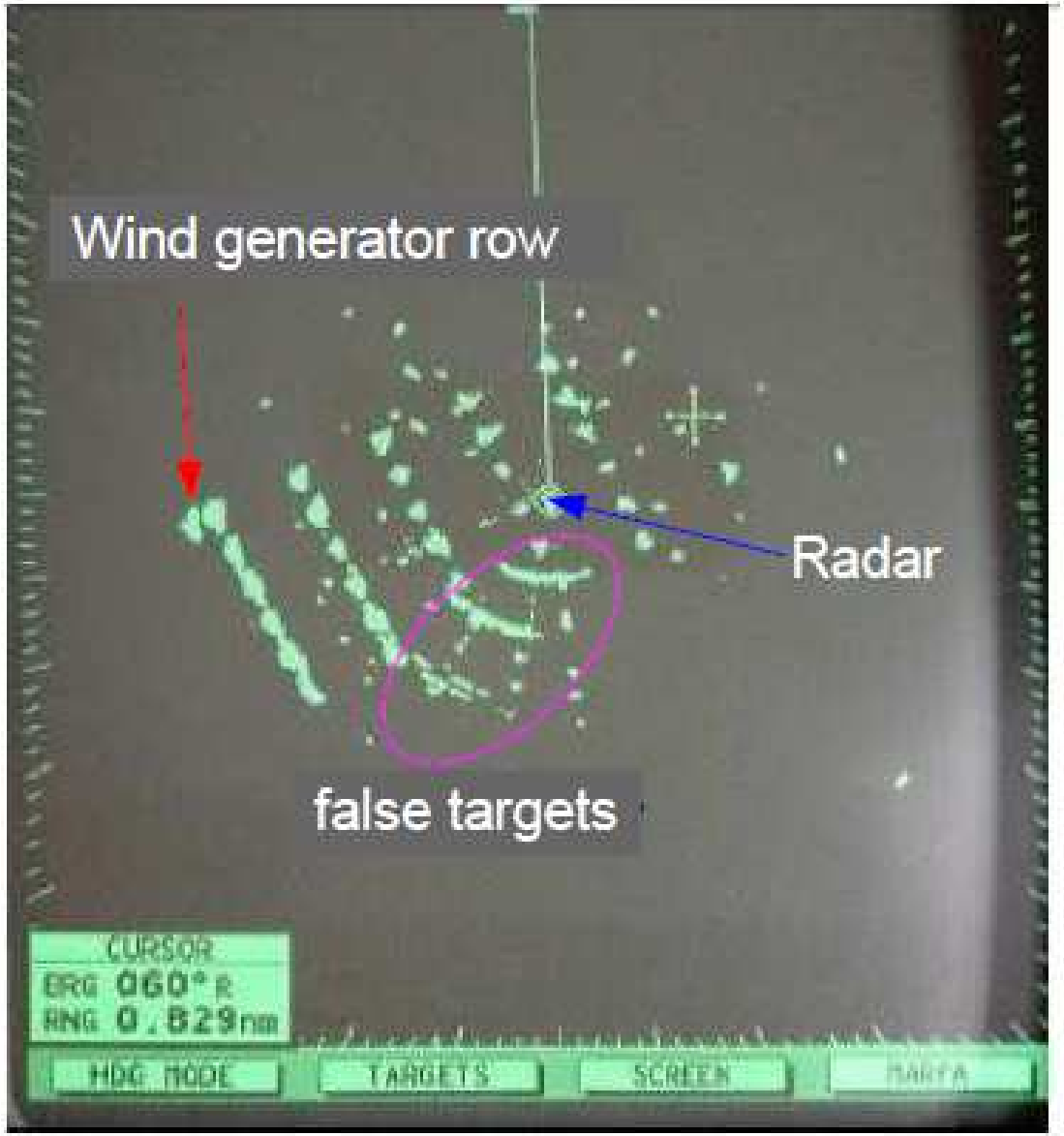
VHF Coastal Radio Station (MRCC)

Direction/Finders (MRCC & VTS)

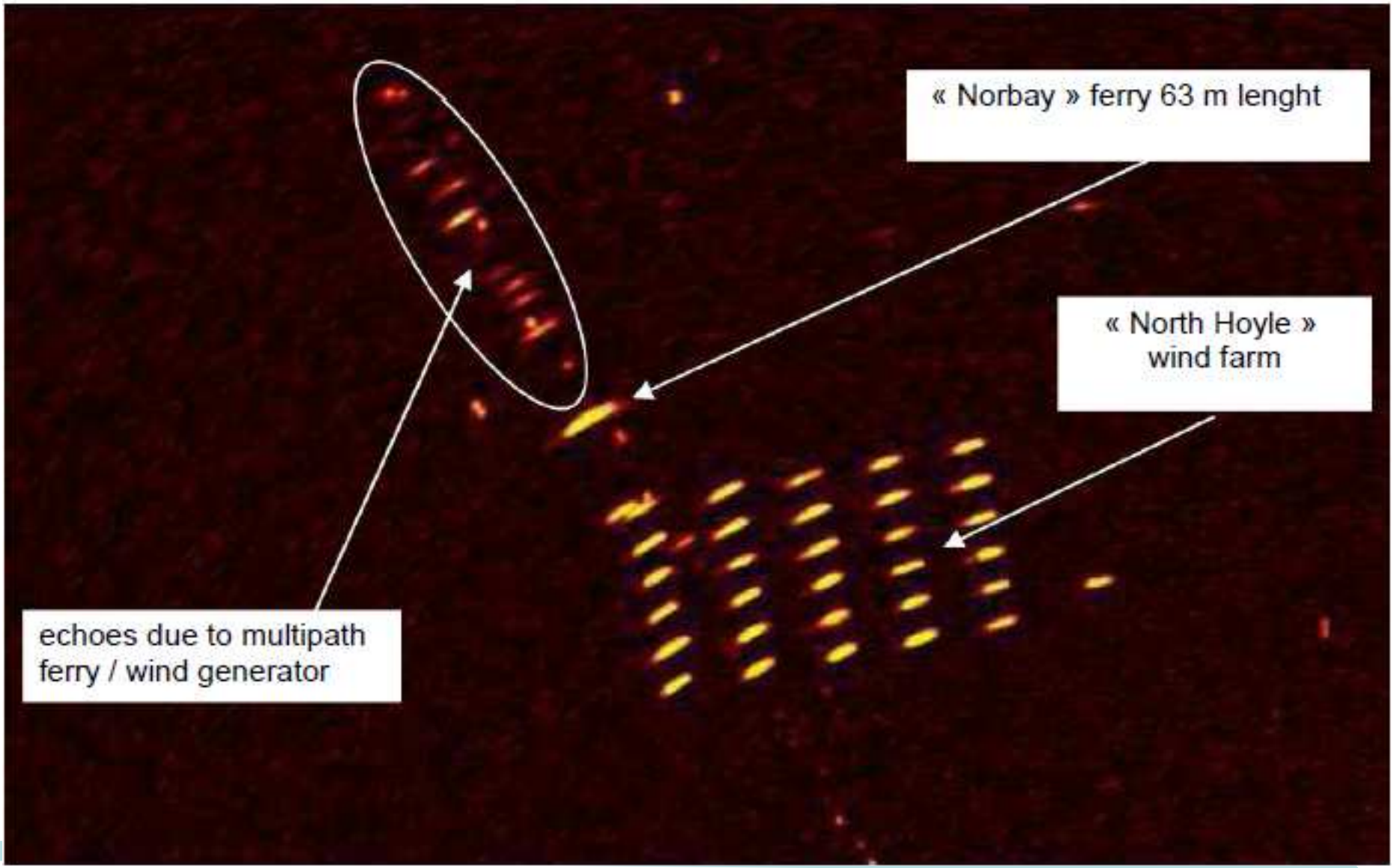
AIS

GNSS & others navigation systems

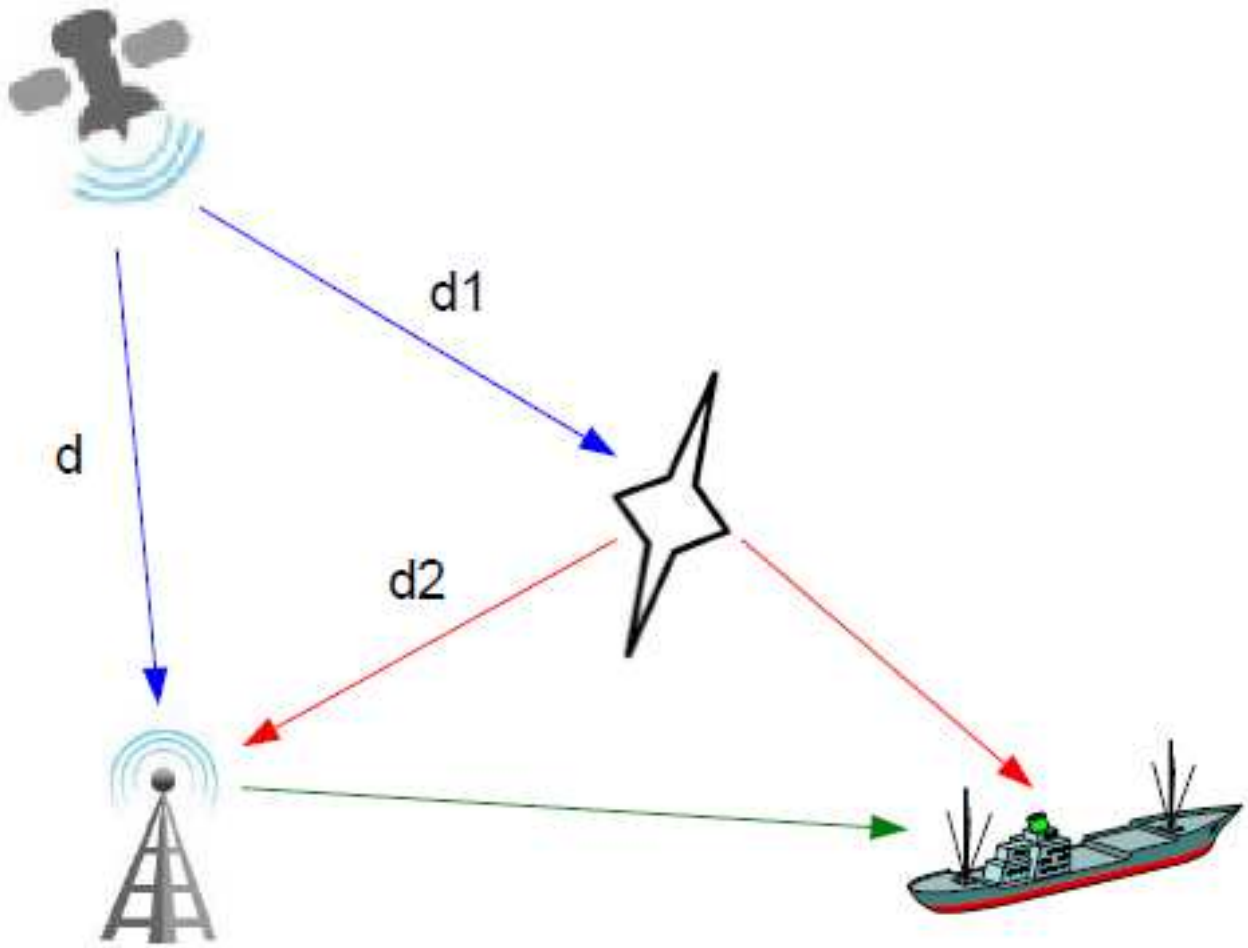
Example of false target



Example of false targets by multipath signal



Disruption of DGPS



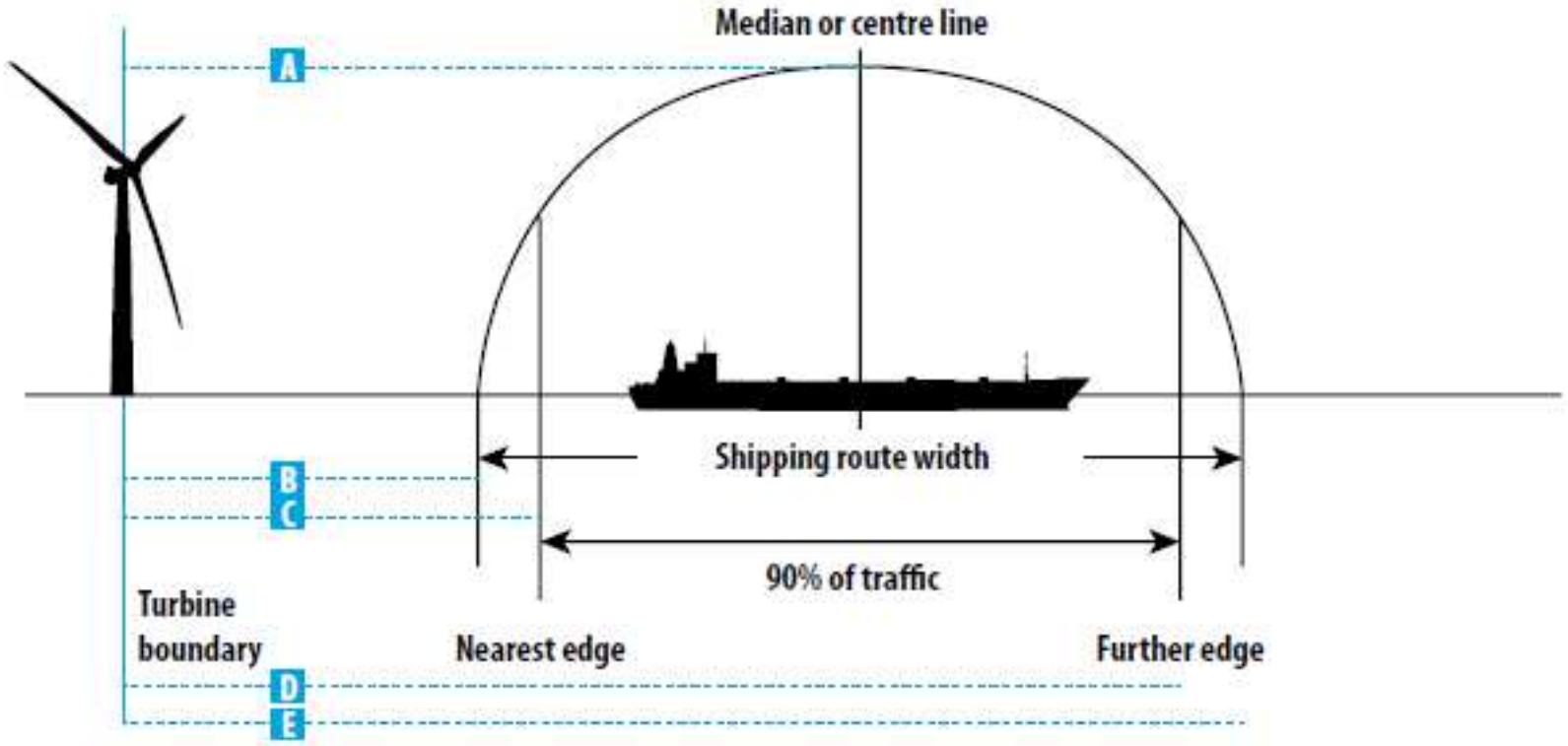
- GPS satellite signal
- GPS signal disrupted
- DGPS signal

Emergency procedures

Risk assessment : **Statistic approach versus an empiric approach !**

Search And Rescue (SAR), Pollution, Salvage & Discovery of unexploded mine or bomb

MSP for navigation



The position of, or where an interactive boundary lies, either needs definition or agreement – which will require interpretative flexibility. Clearly, marine traffic survey information is required to inform such boundaries.

A = Turbine boundary to the shipping route median or centre line.
B = Turbine boundary to nearest shipping route edge.
C = Turbine boundary to nearest shipping 90% traffic level.*
D = Turbine boundary to further shipping 90% traffic level.*
E = Turbine boundary to further shipping route edge.
(= or another % to be determined.)*

Distance in nautical miles (nm) and metres (m) of Turbine Boundary from Shipping Route	Factors	Risk	Tolerability
< 0.25nm (500m)	500m inter-turbine spacing = small craft only recommended	VERY HIGH	
0.25nm (500m)	X band radar interference	VERY HIGH	**INTOLERABLE**
0.45nm (800m)	Vessels may generate multiple echoes on shore based radars	VERY HIGH	
0.5nm (926m)	Mariners' high traffic density domain	HIGH	**TOLERABLE IF ALARP** (As Low As Reasonably Practicable)* * Descriptions of ALARP can be found in: a) Great Britain Health and Safety Executive (2001) Reducing risks protecting people b) IMO (2002) MSC Circ. 1023 dated 5th April 2002 Formal Safety Assessment c) IMO (2007) MSC 83-21-INF2 Consolidated guidelines for Formal Safety Assessment
0.8nm (1481m)	Mariners' ship domain	HIGH	
1 nm (1852m)	Minimum distance to parallel boundary of TSS	MEDIUM	
1.5nm (2778m)	S band radar interference ARPA affected	MEDIUM	
2 nm (3704m)	Compliance with COLREGS becomes less challenging	MEDIUM	
>2nm > (3704m)	But not near TSS	LOW	
3.5nm (6482m)	Minimum separation distance between turbines opposite sides of a route	LOW	
5nm (9260m)	Adjacent wind farm introduces cumulative effect Distance from TSS entry/exit	VERY LOW	**BROADLY ACCEPTABLE**
10nm (18520m)	No other wind farms	VERY LOW	

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