



Spatial restrictions due to safety provisions in the EU, with case studies from the North Sea

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List of abbreviations

AIS	Automatic Identification System
BE	Belgium
BSH	Bundesamt für Seeschifffahrt und Hydrographie
BWO	Bundesverband Windenergie Offshore
COLREG	Convention on the International Regulations for Preventing Collisions at Sea
DE	Germany
DK	Denmark
EC	European Commission
EEZ	Exclusive Economic Zone
EMODnet	European Marine Observation and Data Network
EMSA	European Maritime Safety Agency
ESCA	European Subsea Cables Association
EU	European Union
GWEC	Global Wind Energy Council
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
ICPC	International Cable Protection Committee Ltd
IMCO	Inter-Governmental Maritime Consultative Organization
IMO	International Maritime Organisation
IMP	Integrated Maritime Policy
KIS	Kingfisher Information System
KIS-ORCA	Kingfisher Information System-Offshore Renewable & Cable Awareness
NGOs	non-governmental organisations
NM	Nautical mile
NSEC	North Sea Energy Cooperation
MS	Member State(s)
MSP	Maritime Spatial Planning
NL	The Netherlands
NSSG	North Sea Shipping Group
OREAC	Ocean Renewable Energy Action Coalition
OSPAR	Convention on the Protection of the Marine Environment of the North-West Atlantic
OWF	Offshore wind farm
O&G	Oil and gas
SFV	The Torremolinos International Convention for the Safety of Fishing Vessels
SOLAS	International Convention for the Safety of Life at Sea
UK	United Kingdom
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea
WSV	Wasser- und Schifffahrtsverwaltung des Bundes (Federal Maritime and Hydrographic Agency)

BACKGROUND AND SCOPE OF THE STUDY

Background

It is the national duty of every coastal state to ensure the safety of people and goods. The increase in activities, e.g. the development of the blue economy, increases the risks. Measures and regulations must therefore be established to fulfil these international obligations (IMO). Maritime activities are experiencing an increased competition in spatial terms, i.e. one sector is constrained due to the permanent or temporary occupation of the marine space (water surface, water column, sea floor) by another sector. Particular aspects that contribute to such spatial competition are spatial constraints that result from safety provisions for certain activities, for example in the case of safety distances (buffer zones) which can limit the useable space available for other activities.

This study focuses on safety aspects which are spatially relevant and defined in legal requirements. All other aspects, such as safety on board or occupational safety are not the subject of this study, nor is the evaluation of defined safety requirements with regard to their relevance. The authors realise that safety at sea is an important aspect to ensure the coexistence of different uses. If the positive aspects of safety requirements are not addressed in this study, this is due to the clear content requirements.

All maritime sectors apply management and regulation of safety for developing sustainable and responsible maritime activities. The international legal framework in maritime safety, encompassing global regulations as set up by UNCLOS and IMO, and EU regulations, provide primary safety provisions and regulations for the member states. (...) In the following table we have listed the examples of **maritime sectors**, to which enhanced safety provisions apply, in particular due to the nature of their activity. We differentiate sectors by type of area covered (areal, linear) as well as temporal occupation of the marine space (permanent, periodical or temporary):

Table 1: Types of activities vs. types of areas concerned

Type of area / Type of activity	Permanent installations or allocations	Temporary activities
Surface areas	Offshore wind farms (OWF)	Military training activities
	Oil and gas extraction installations	Fishing grounds (e.g. areas used for gill nets or traps)
	Munition dumping sites	
	Exclusive military areas	
Routes / linear areas	Oil and gas pipelines	Ship traffic
	Power and telecommunication cables	Fishing tracks (e.g. routes used for trawling)

For these sectors, we assume that safety provisions, though they are necessary for risk reduction, may have limiting impacts on e.g. fisheries and other mobile activities beyond the mere space requirements, with different degrees of spatial displacement, depending on the type of activity, the type of area occupied as well as the temporal occurrence. While, as an example, fishing or other vessels need to detour permanent installations above the water level or even the relative buffer zones, military areas can possibly be accessed and crossed, unless military training operations are taking place. In the case of linear physical installations such as pipelines and cables, a crossing is generally possible; however, whether for example a bottom trawler can operate over this area will certainly depend on a multitude of factors, including the depth at which pipelines and cables are, if possible, buried.¹

¹ Please see chapters 0 and 0 for examples.

Scope of the study

The main assumption underlying the topic of spatial restrictions due to safety provisions in the EU is that sectors of the blue economy may not only be constrained by the physical space that other maritime activities occupy temporarily or permanently, but also by additional requirements due to safety reasons (e.g. additional safety distances or buffer zones) in planning settings. On the other hand, safety provisions may also regulate the degree to which a co-location of different maritime activities can take place and be considered in marine spatial planning.

The North Sea, in particular the four Member States listed below, was chosen as an example because it covers large parts of the EU's busiest waters, notably in terms of vessel density (Figure 1), with many co-existing uses and therefore provides a good example of such a pattern of use and the regulations and maritime spatial planning measures required for it.

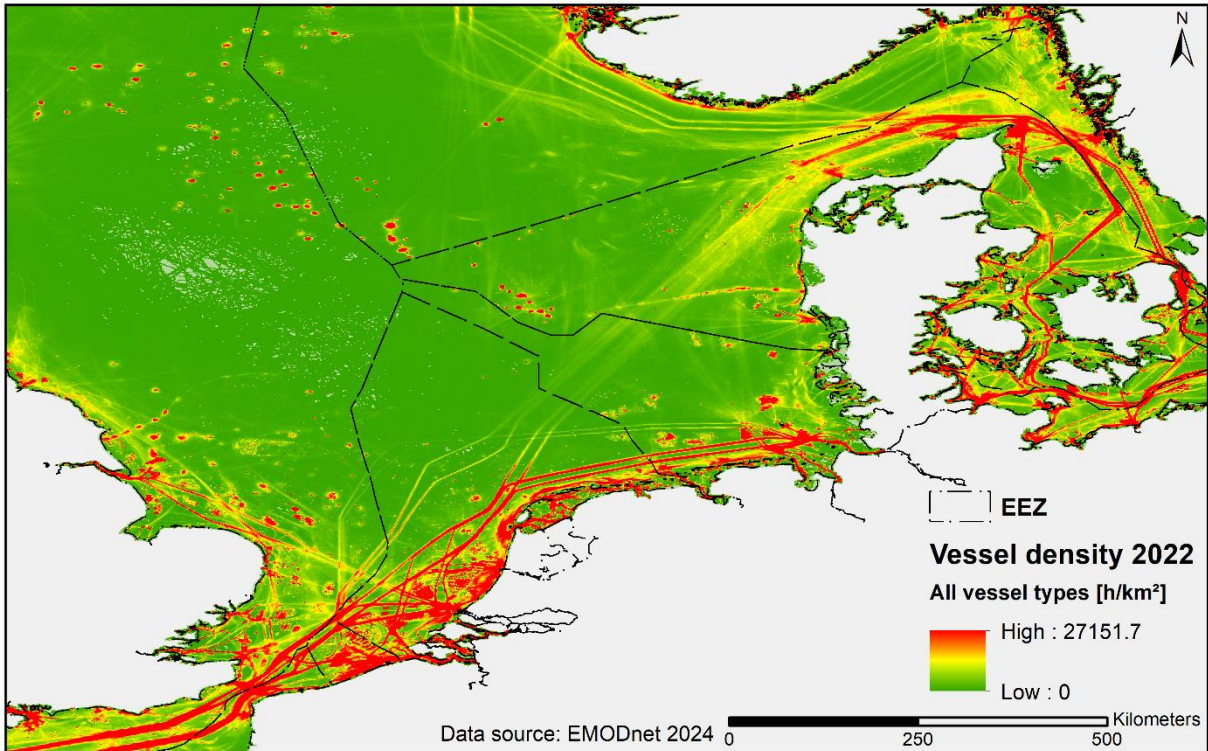


Figure 1: Vessel density of all vessel types in h/km² in the 2022 in the EEZs of BE, NL, DE and DK (source: EMODNet)²

Against this background, the aim of the present work is to shed light on the legal situation of maritime activities regarding their safety provisions as specified further below.

In terms of enhanced safety requirements, in this study we consider the following maritime activities as being relevant for a detailed analysis and have thus focused the literature research on these sectors:

- Offshore wind farms (OWF)
- Oil and gas (O&G) extraction installations
- Military areas and munition dumping sites
- Oil and gas pipelines
- Power and telecommunication cables
- Ship traffic
- Fisheries

² <https://emodnet.ec.europa.eu/geoviewer/>

The study is structured around two main parts:

The first part (Chapter 2) analyses the legal framework at the international and EU level for the activities selected above. It briefly describes the international organisations and related conventions and agreements that are key in the area of maritime safety and provides a detailed overview of those provisions that are relevant in terms of spatial restrictions for other activities. Recommendations issued by recognised international sector organisations are also included in this section.

In the second part (Chapter 3), the study takes a closer look at the case study of the North Sea and analyses the national safety provisions and spatial restrictions in the Exclusive Economic Zone (EEZ) of the following EU Member States (MS):

- Belgium (BE),
- Denmark (DK),
- Germany (DE) and
- the Netherlands (NL).

Furthermore, the study briefly presents some examples of good practices with co-location of maritime activities from the North Sea, where safety requirements could be alleviated, in particular by reducing safety distances between different activities.

SPATIAL RESTRICTIONS DUE TO SAFETY PROVISIONS WORLDWIDE AND IN THE EU

International legal framework in maritime safety

Relevant international organisations

In an international context, the relevant organisations in the area of maritime law and safety are, first of all, the **United Nations** (UN) and in particular the United Nations Convention on the Law of the Sea (UNCLOS) and a specialised UN agency – the **International Maritime Organization (IMO)** that is a competent organisation under UNCLOS for the purpose of regulating international shipping activities in oceans and seas. One of IMO’s central purposes is ‘to encourage and facilitate the general adoption of the highest practicable standards in matters concerning maritime safety, efficiency of navigation and prevention and control of marine pollution from ships (International Maritime Organization (IMO), 2024)’³. IMO has issued several conventions with relevance to safety aspects at sea; the most relevant are listed in the subchapter further below.

At the level of the European Union (EU), the reference organisation in the matter is the **European Maritime Safety Agency (EMSA)**, established to support the European Commission (EC) and the EU Member States in the area of ‘maritime safety, maritime security, prevention of, and response to, pollution caused by ships as well as response to marine pollution caused by oil and gas installations’ (THE EUROPEAN PARLIAMENT AND THE COUNCIL, 2002)⁴. Among others, EMSA is responsible for compiling a yearly overview of accidents at sea and incidents based on information provided by the Member States, as well as for maintaining the European Marine Casualty Information Platform (EMCIP), an information system to store and analyse data on accidents at sea and investigation reports provided by the MS (European Maritime Safety Agency (EMSA), 2024)⁵.

Relevant international conventions, guidance and EU laws

The present subchapter provides a brief overview of the international conventions in the area of maritime safety that play a certain role in terms of spatial restrictions.

The **United Nations Convention on the Law of the Sea (UNCLOS)** sets out the legal framework within which all activities in oceans and seas should be carried out. It is also of strategic importance as it is the basis for national, regional and global action and cooperation (A/RES/74/19, preamble). The EU is a signatory to UNCLOS and as such all obligations of UNCLOS for all activities in the ocean and seas apply to the EU Member States.

UNCLOS includes provisions on (United Nations, 2024)⁶.

- Setting Limits
- Navigation
- Exclusive Economic Zone
- Continental Shelf
- Deep Seabed Mining
- The Exploitation Regime
- Technological Prospects
- The Question of Universal Participation in the Convention
- Pioneer Investors
- Protection of the Marine Environment
- Marine Scientific Research
- Settlement of Disputes

³ <https://www.imo.org/en/About/HistoryOfIMO/Pages/Default.aspx>

⁴ REGULATION (EC) No 1406/2002 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 June 2002 establishing a European Maritime Safety Agency; <https://www.emsa.europa.eu/about/legal-basis.html>

⁵ <https://www.emsa.europa.eu/we-do/safety/accident-investigation.html>, <https://www.emsa.europa.eu/emcip.html>

⁶ https://www.un.org/depts/los/convention_agreements/convention_historical_perspective.htm

In Article 56 §1, UNCLOS states that 'In the exclusive economic zone [EEZ], the coastal State has (a) sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the waters superjacent to the seabed and of the seabed and its subsoil, and with regard to other activities for the economic exploitation and exploration of the zone, such as the production of energy from the water, currents and winds; (...)'.

According to Article 60 §1, coastal States have in the EEZ 'the exclusive right to construct and to authorize and regulate the construction, operation and use of (a) artificial islands; (b) installations and structures for the purposes provided for in article 56 and other economic purposes; (...)'. Moreover, §4 leaves the responsibility of establishing 'reasonable **safety zones** around such artificial islands, installations and structures' with the coastal states. The latter should decide on the breadth of these in accordance with international standards and other criteria, however, this '**shall not exceed the distance of 500 metres**' (Art. 60 §5).

With UNCLOS, the UN also designated IMO as 'the competent international organization' in matters of navigational safety, safety of shipping traffic and marine environmental protection.

The conventions issued by IMO, which play a role in terms of safety at sea, are listed as follows:

International Convention for the Safety of Life at Sea (SOLAS, 1974): SOLAS is one of the key conventions on maritime safety. It sets minimum standards for the safety on commercial vessel. Chapter V specifically focusses on navigation and includes provisions on traffic separation schemes, routeing measures and other spatial restrictions (International Maritime Organization, 2024)⁷.

Convention on the International Regulations for Preventing Collisions at Sea (COLREG, 1972): COLREG includes technical provisions and guidance with the aim of reducing the risk of collisions at sea. Among others, it gives indications on safe speed and the conduct of vessels operating in or near traffic separation schemes (International Maritime Organization, 2024)⁸.

The Torremolinos International Convention for the Safety of Fishing Vessels (SFV, 1977), superseded by the **1993 Torremolinos Protocol**; Cape Town Agreement of 2012 on the Implementation of the Provisions of the 1993 Protocol relating to the Torremolinos International Convention for the Safety of Fishing Vessels⁹: The Protocol takes account of the particular features of fishing vessels and thus provides specific safety provisions for the latter.

Another important international agreement in the context of maritime infrastructure is the **Convention for the Protection of Submarine Telegraph Cables** that was signed in 1884 (DEPARTMENT OF FOREIGN AFFAIRS AND TRADE CANBERRA, 1884).¹⁰ This treaty 'applies outside territorial waters' (Art. 1) and declared it a 'punishable offence to break or injure a submarine cable, wilfully or by culpable negligence (..)' (Art. 2). This convention already defined safety distances to be kept by vessels, including fishing vessels, in the situations where cables are being laid or repaired.

At EU level, the Integrated Maritime Policy (IMP) is the overarching policy framework that sets the foundations for a holistic approach to maritime governance. It acknowledges both the opportunities arising from the development of maritime activities as well as the challenges and conflicts associated to an increasing competition. In terms of safety at sea, the IMP calls for setting up a European network for maritime surveillance in order to overcome the 'challenges and threats relating to safety of navigation, marine pollution, law enforcement, and overall security'. Moreover, the IMP recognises Maritime Spatial Planning (MSP) as an essential instrument for the sustainable development of marine and coastal regions, as well as for restoring the environmental health of Europe's seas. In addition, the IMP refers to the availability of data and information on the marine environment (including natural and human-activity data) as a key element for 'strategic decision-making on maritime policy'. In line with this, it calls for concrete actions towards a European Marine Observation and Data Network. (COMMISSION OF THE EUROPEAN COMMUNITIES, 2007)

An answer to the increasing demand of maritime activities and the need for planning the ocean space is provided by the MSP-Directive. This directive sets a framework for maritime spatial planning that aims at 'promoting the sustainable growth of maritime economies, the sustainable development of marine areas and the sustainable use of marine resources'. It stipulates that each coastal EU Member State 'shall establish and implement maritime spatial planning', taking into account various factors, among other 'environmental, economic and social aspects, as well as

7 [https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-\(SOLAS\),-1974.aspx](https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-(SOLAS),-1974.aspx)

8 <https://www.imo.org/en/About/Conventions/Pages/COLREG.aspx>

9 <https://www.imo.org/en/About/Conventions/Pages/The-Torremolinos-International-Convention-for-the-Safety-of-Fishing-Vessels.aspx>

10 <https://www.iscpc.org/documents/?id=13>

safety aspects'. These plans shall take stock of the 'spatial and temporal distribution of relevant existing and future activities and uses'. Moreover, the MSP-Directive underlines the importance of analysing the interactions between the various activities, uses and interests at sea and specifically refers to sectors such as aquaculture, fishing, the extraction of oil, gas and other energy resources, of minerals and aggregates, the production of energy from renewable sources, maritime transport, military training areas, and submarine cables and pipelines among others. It is worth mentioning that Member States shall implement MSP in accordance with relevant UNCLOS provisions; more specifically, the MSP-Directive states that it 'shall not affect the sovereign rights and jurisdiction of Member States over marine waters which derive from relevant international law, particularly Unclos.' The directive also stipulates that it 'shall not apply to activities the sole purpose of which is defence or national security.' (THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION, 2014)

Relevant in terms of MSP in the EU is also the above mentioned European Marine Observation and Data Network (EMODnet), which is a network of over 120 partner organisations and stakeholders supported by the EU's IMP. EMODnet is the in situ maritime data service of DG MARE, which provides a wealth of marine data, metadata and data products in seven thematic areas – bathymetry, geology, physics, chemistry, biology, seabed habitats and human activities. Amongst others it provides data on blue economy activities as ship density, the positions of offshore installations or maritime spatial plans of EU member states. It also offers a public data submission service to expand and diversify the data offering by helping data collectors and data providers to submit their data for integration into EMODnet. In future, this information platform envisions to serve not just as a data repository but as a catalyst for positive change in marine understanding, conservation and innovation.¹¹ EMODnet is a useful tool to evaluate and communicate about safety and risks when planning the sea space. MSs might want to use additional tools of higher precision/resolution at a later stage of their planning, but at an early stage of the process and also for cross-border discussions EMODnet has proved to be very useful since it covers all the EU sea basins.

Examining EU policies at the sectoral level, we find a number of directives on the establishment and further amendment of the **Community vessel traffic monitoring and information system**, which has the aim of 'enhancing the safety and efficiency of maritime traffic, improving the response of authorities to incidents, accidents or potentially dangerous situations at sea, including search and rescue operations, and contributing to a better prevention and detection of pollution by ships' (THE EUROPEAN PARLIAMENT AND THE COUNCIL, 2002)¹². However, no specific provisions on spatial restrictions are mentioned there.

In the context of **oil and gas installations**, Directive 94/22/EC (THE EUROPEAN PARLIAMENT AND OF COUNCIL, 1994)¹³ gives the Member States the right to 'to determine the areas within their territory to be made available for the exercise of the activities of prospecting, exploring for and producing hydrocarbons'. With Directive 2013/30/EU (THE EUROPEAN PARLIAMENT AND THE COUNCIL, 2013)¹⁴ a 'safety zone' is defined as 'the area within a distance of 500 metres from any part of the installation, established by the Member State' where, with some exception, 'vessels are prohibited from entering or remaining'.

With a focus on **undersea telecommunication cables**, the Council of the EU has issued in 2022 a 'COUNCIL RECOMMENDATION on a Union-wide coordinated approach to strengthen the resilience of critical infrastructure' (COUNCIL OF THE EU, 2022)¹⁵. Among many other aspects, it refers to undersea communications cables as part of the **critical infrastructure** of the EU and invites the Commission to carry out 'a comprehensive study taking stock of the undersea infrastructure, namely undersea communications cables, that connect Member States as well as Europe globally, findings of which should be shared with Member States'.

¹¹ https://emodnet.ec.europa.eu/en/about_emodnet

¹² DIRECTIVE 2002/59/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 June 2002 establishing a Community vessel traffic monitoring and information system and repealing Council Directive 93/75/EEC. This Directive does not apply to fishing vessels, traditional ships and recreational craft with a length of less than 45 metres, among others.

¹³ DIRECTIVE 94/22/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 30 May 1994 on the conditions for granting and using authorizations for the prospecting, exploration and production of hydrocarbons

¹⁴ DIRECTIVE 2013/30/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 12 June 2013 on safety of offshore oil and gas operations and amending Directive 2004/35/EC

¹⁵ Council of the European Union, COUNCIL RECOMMENDATION of 8 December 2022 on a Union-wide coordinated approach to strengthen the resilience of critical infrastructure (2023/C 20/01)

Other reference sector organisations

There are a number of recognised international sector organisations that are active in promoting stakeholder consultation, exchange, research and awareness raising in their relative working areas. A few have also issued specific sector recommendations in the area of safety with some of the most relevant coming from organisations such as the International Cable Protection Committee Ltd (ICPC), the European Subsea Cables Association (ESCA) and WindEurope. Those recommendations related to safety requirements and, in particular spatial restrictions versus other activities are also listed in the overview under Chapter 2.2.

International Cable Protection Committee Ltd (ICPC)

ICPC members include both governmental administrations and private companies that 'own or operate submarine telecommunications or power cables' as well as other entities that are interested in the marine cable sector. Major players of the subsea cable industry (including cable system owners and cable ship operators) are represented in ICPC.

ICPC has issued a large number of publications and recommendations with a focus on improving the security of undersea cables, improving awareness and providing guidance, e.g. with regard to the interaction with other maritime activities. Among many other aspects, it provides recommendations on safety distances and working zones for cables operated in the context of OWF and with regard to fishing activities or marine aggregates extraction.¹⁶

European Subsea Cables Association (ESCA)

ESCA is a European forum of cable owners and operators. Their principal goal is 'the promotion of marine safety and the safeguarding of submarine cables from man-made and natural hazards'¹⁷. They also have elaborated on a number of guidelines including on marine aggregate extraction in proximity of cables.¹⁸

WindEurope

Wind Europe¹⁹ is a wind energy network in Europe representing interests of both the private and research sector with a focus on the development and promotion of the wind industry. As such, their key goals are to support national and international policies and initiatives which promote the development of European and global wind energy markets, infrastructure and technology. Also, WindEurope has drafted recommendations, e.g. on fishing gear restrictions in established OWF.

Other organisations

Other international sector initiatives investigated in the context of the study include the Global Wind Energy Council (GWEC), the Ocean Renewable Energy Action Coalition (OREAC), the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) and, for the case study area, the North Seas Energy Cooperation's (NSEC) and also OSPAR. However, no relevant recommendations in terms of safety distances could be found from these organisations.

¹⁶ <https://www.ispc.org/publications/recommendations/>

¹⁷ <https://www.escaeu.org/about-us/> (accessed 14.03.2024)

¹⁸ <https://www.escaeu.org/guidelines/>

¹⁹ <https://windeurope.org/>

Overview of safety provisions at international and EU level

The following Table provides an overview of the international and EU legal provisions on the matter of safety at sea that play a role when regulating the interaction between selected maritime activities. The focus is set on those regulations that provide indications on particular exclusion zones or safety distances. Relevant regulations and conventions in the broader area of maritime safety (e.g. with a focus on safety on-board or pollution) are still mentioned in the table, even if they have no practical implications in relation to spatial restrictions versus other activities. The table also lists key recommendations issued by recognised international organisations of the relative sector; these are highlighted accordingly.

Table 2: Overview of relevant safety rules and relative spatial restrictions

Geog. scope	Organisation	Main activities concerned	Title legal text	Date	Safety rules (general and specific)	Specific spatial restrictions?
World	UN	<p>Ship traffic</p> <p>OWF</p> <p>Oil & gas inst.</p> <p>Oil & gas pipes</p> <p>Pow. & tel. cables</p> <p>Fisheries</p> <p>Other: Pollution</p>	United Nations Convention on the Law of the Sea (UNCLOS)	1982	<p>Art. 55, 56, 57: An Exclusive Economic Zone (EEZ) of 200 nm is established;</p> <p>Article 56 Rights, jurisdiction and duties of the coastal State in the exclusive economic zone (EEZ) 1. In the exclusive economic zone, the coastal State has: (a) sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living (...)</p> <p>Article 60 Artificial islands, installations and structures in the exclusive economic zone 1. In the exclusive economic zone, the coastal State shall have the exclusive right to construct and to authorize and regulate the construction, operation and use of: (a) artificial islands; (b) installations and structures for the purposes provided for in article 56 and other economic purposes; (c) installations and structures which may interfere with the exercise of the rights of the coastal State in the zone. 2. The coastal State shall have exclusive jurisdiction over such artificial islands, installations and structures, including jurisdiction with regard to customs, fiscal, health, safety and immigration laws and regulations. (...) 4. The coastal State may, where necessary, establish reasonable safety zones around such artificial islands, installations and structures in which it may take appropriate measures to ensure the safety both of navigation and of the artificial islands, installations and structures.</p>	✓

EUROPEAN COMMISSION

Geog. scope	Organisation	Main activities concerned	Title text	legal	Date	Safety rules (general and specific)	Specific spatial restrictions?
						<p>5. The breadth of the safety zones shall be determined by the coastal State, taking into account applicable international standards. Such zones shall be designed to ensure that they are reasonably related to the nature and function of the artificial islands, installations or structures, and shall not exceed a distance of 500 metres around them, measured from each point of their outer edge, except as authorized by generally accepted international standards or as recommended by the competent international organization. Due notice shall be given of the extent of safety zones.</p> <p>Article 79, Article 87</p> <p>Cables and pipelines UNCLOS stipulates the right and freedom to lay and operate a cable or pipeline on the continental shelf in Part IV Part VI (Art. 79) and on the high seas beyond the continental shelf (=200nm zone) in Part VII (Art. 87, Art. 112). Coastal states may not impede a pipeline project on the continental shelf and may not impose fees or charges on the transit pipeline other than any applicable income taxes.</p>	
World	IMO	Ship traffic	International Convention for the Safety of Life at Sea (SOLAS)		1974	Most important of all treaties dealing with maritime safety. Defines minimum standards for the safety on commercial vessels. SOLAS Chapter V specifically addresses navigation and includes provisions related to traffic separation schemes, routeing measures, and other spatial restrictions aimed at enhancing safety at sea.	
World	IMO	Ship traffic Fisheries	International Regulations for Preventing Collisions at Sea (COLREG)		1972	<p>Rule 9 obliges a vessel of less than 20 metres in length or a sailing vessel not to impede the passage of a vessel 'which can safely navigate only within a narrow channel or fairway.' The Rule also forbids ships to cross a narrow channel or fairway 'if such crossing impedes the passage of a vessel which can safely navigate only within such channel or fairway.' Rule 9 also states that 'a vessel engaged in fishing shall not impede the passage of any other vessel navigating within a narrow channel or fairway.'</p> <p>Rule 10 of COLREG deals with the behaviour of vessels in or near traffic separation schemes adopted by IMO. Rule 10 states that ships crossing traffic lanes are required to do so 'as nearly as practicable at right angles to the general direction of traffic flow.' This reduces confusion to other ships as to the crossing vessel's intentions and course and at the same time enables that vessel to cross the lane as quickly as possible. Fishing vessels 'shall not impede the passage of any vessel following a traffic lane' but are not banned from fishing.</p>	

EUROPEAN COMMISSION

Geog. scope	Organisation	Main activities concerned	Title text	legal	Date	Safety rules (general and specific)	Specific spatial restrictions?
World	IMO	Ship traffic Pollution	International Convention for the Prevention of Pollution from Ships (MARPOL)		1973 and 1978	Provisions with the aim of preventing pollution from ships, both from accidental pollution and from routine operations. Furthermore, under MARPOL, special areas, Emission Control Areas (ECAs) and Particularly Sensitive Sea Areas (PSSA) are provided with a higher level of protection than other sea areas.	
EU	EU	Ship traffic	Directive 2002/59/EC		2002	Establishing a Community Vessel Traffic Monitoring and Information System (+ subsequent amendments: Directive 2009/17/EC and Directive 2011/15/EC)	
World	DEPARTMENT OF FOREIGN AFFAIRS AND TRADE CANBERRA	Power & telecom. Cables Shipping Fisheries	Convention for the Protection of Submarine Telegraph Cables (Paris, 14 March 1884)		1884	<p>Art. V: Vessels shall keep a distance of 1 nm (1.852 m) when a cable is being repaired and particular signal.</p> <p>Article VI: Distance ¼ nm (463 m) in particular circumstances (cable being laid, broken, etc.)</p> <p>Article V When a ship engaged in repairing a cable exhibits the said signals, other vessels which see them, or are able to see them, shall withdraw to or keep beyond a distance of <u>one nautical mile</u> at least from the ship in question, so as not to interfere with her operations. Fishing gear and nets shall be kept at the same distance.</p> <p>Article VI Vessels which see, or are able to see, the buoys showing the position of a cable when the latter is being laid, is out of order, or is broken, shall keep beyond a distance of <u>one-quarter of a nautical mile</u> at least from the said buoys. Fishing nets and gear shall be kept at the same distance.</p>	✓

<p>World</p>	<p>International Cable Protection Committee (ICPC)</p>	<p>Power & telec. cables</p> <p>OWF</p> <p>Shipping</p> <p>Oil & gas inst.</p> <p>Oil & gas pipes</p> <p>Fisheries</p> <p>Military areas</p>	<p>ICPC Recommendation #13, The Proximity of Offshore Renewable Wind Energy Installations and Submarine Cable Infrastructure in National Waters, Issue 2C</p>	<p>2013</p>	<p><u>RECOMMENDATION</u></p> <p>In the context of projects with proximity of OWF and cables, in territorial waters, up to 75m depth:</p> <p>Working zone around submarine cables (for cable maintenance) of 500m either side</p> <p>Hazard area around cable repair vessels of 250m radius</p> <p>5.1 Cable Maintenance Vessel Safety Zone: The Safety Zone around the vessel with restricted manoeuvring ability (maintenance or repair vessel) (...) It is also normally requested by the vessel master (in accordance with Article V of the International Convention for the Protection of Submarine Telegraph Cables (1884), for all ships to keep at least 1NM clear whilst they are engaged in cable operations that restrict their ability to manoeuvre. (see also Reg. 1884 below)</p> <p>5.2. Wind Farm Structure Safety Zone: In the EEZ, under UNCLOS article 60, a coastal State can establish a safety zone around an offshore installation up to 500 metres. No such zones are permitted around a submarine cable outside of territorial seas, but under UNCLOS articles 58 and 79, the coastal State is not allowed to take actions that prejudice the possibilities of repairing existing cables. (see UNCLOS above)</p> <p>5.3. Working Zone: A Working Zone is required either side of an in-service submarine cable to enable access for cable maintenance and repair operations by a suitable vessel. (...) The Working Zone for traditional repair scenarios is likely to be in the order of 500m either side of the existing submarine cable.</p> <p>Guidance in this document is considered appropriate for water depths up to 75m.</p> <p>5.4. Hazard Area: a trigger radius around the cable repair vessel - minimum of 250 metres</p>	<p>✓</p>
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EUROPEAN COMMISSION

Geog. scope	Organisation	Main activities concerned	Title text	legal	Date	Safety rules (general and specific)	Specific spatial restrictions?
World	International Cable Protection Committee (ICPC)	<p>Power & telecom. cables</p> <p>Shipping</p> <p>OWF</p> <p>Oil & gas inst.</p> <p>Oil & gas pipes</p> <p>Fisheries</p> <p>Military areas</p> <p><u>Other:</u></p> <p>Marine aggregate extraction, dredging or mining</p>	<p>ICPC Recommendation #15</p> <p>Procedure to be Followed Whilst Undertaking Marine Aggregate Extraction, Dredging or Mining on the Continental Shelf, within the Vicinity of Active Submarine Cable Systems, Issue 2</p>		2020	<p>RECOMMENDATION:</p> <p>Safe distance between dredger or mining vessel and cable: 500 m</p> <p>p. 6) 'It is therefore difficult to be specific with regard to a 'safe distance', however it is generally considered that unless the dredger or mining vessel is using the Global Positional System (GPS), anything less than 500 metres separation between the shallow-water extraction zone and a submarine cable would be a cause for concern, unless notional distances have previously been agreed.'</p>	✓
World	International Cable Protection Committee (ICPC)	<p>Power & telecom. Cables</p> <p>Fisheries</p>	<p>FISHING AND SUBMARINE CABLES WORKING TOGETHER</p>		2009	<p>RECOMMENDATION:</p> <p>Safety distance: 1nm from cable ship during cable installation</p> <p>Burial depth: usually 0,6-1,2 m in coastal areas up to several meters when 'aggressive' fishing gear, etc.</p> <p>p. 15) 'During deep water installation, a cable may not reach the seabed until the ship is more than 10 nautical miles away. Fishing vessels should keep at least 1 nautical mile away from a cableship displaying these signals and should never operate gear astern of such a vessel.'</p> <p>In areas where bottom fishing and other seabed uses occur, cables are usually armoured and buried in the seabed. The burial depth depends on the types of threats present, the hardness of the sediment, the depth of water, and other factors.</p>	✓

EUROPEAN COMMISSION

Geog. scope	Organisation	Main activities concerned	Title text	legal	Date	Safety rules (general and specific)	Specific spatial restrictions?
						In many coastal areas , a burial depth of 0.6 to 1.2 m (2 - 4 feet) is preferred. Where more aggressive fishing gear or anchors are used , cable ships sometimes attempt burial depths of several meters , although this makes recovery more difficult if maintenance is needed later. Most cables in depths greater than 1,000 m (550 fathoms) have not been buried . However, in recent years special ploughs have been developed that can bury cables in water depths as great as 1500 m (820 fathoms).	
Europe	European Subsea Cables Association (ESCA) and the British Marine Aggregate Producers Association (BMAPA)	Power & telecom. cables OWF <u>Other:</u> Marine aggregate extraction, dredging or mining	ESCA Guideline No.19 Marine Aggregate Extraction Proximity Guidelines		2017	RECOMMENDATION: Working zone: 500m either side of the cable Safety distance: 1NM (1.852km) Figure 2: Working zone: 500m p. 14) 'It is therefore difficult to be specific with regard to a 'safe distance', however it is generally considered that any aggregate extraction zone outside of 1NM (1.852km) will have a minimal impact upon a submarine cable.'	✓
North-East Atlantic including the North Sea	OSPAR	OWF Ship traffic Fisheries <u>Other:</u> Pollution	OSPAR Guidance on Environmental Considerations for Offshore Wind Farm Development		2008	p. 11) <i>No endangerment and obstruction of shipping and aviation</i> 35. The safety of shipping and aviation should not be compromised by wind farms and the impact of wind farms on the efficiency of shipping and aviation should be minimised. Therefore the approval authority should develop requirements to be met by, and measures to be applied to, the project, such as regulations or guidance on lighting requirements for wind farms, safety distances to shipping routes, safety zones around the turbines / wind farm, activities permitted within wind farms etc., that are appropriate to reduce the risk of possible collisions of vessels with wind turbines as well as the risk of other possible damage.	

EUROPEAN COMMISSION

Geog. scope	Organisation	Main activities concerned	Title text	legal	Date	Safety rules (general and specific)	Specific spatial restrictions?
EU	WindEurope	OWF Fisheries Military areas Munition dumping sites	Wind Europe Flagship Report	Europe	2020	<p>RECOMMENDATION:</p> <p>Fishing gear restriction: bottom trawling and dredging cannot take place once OWF is established because of Submarine cables.</p> <p>Detailed charts should be made readily available indicating cable sites, exclusion areas and security zones. Opportunity for space sharing between aquaculture and windfarms as exemplified in Holland with Oyster Aquaculture.</p>	
EU	WindEurope	OWF Fisheries	Offshore wind energy in the North Sea industry recommendations for the North Seas energy forum		2017	<p>RECOMMENDATION:</p> <p>'WindEurope calls on the Support Group 1 of the North Seas MoU to collaborate with the industry in maritime spatial planning issues, particularly on assessing areas for building offshore wind projects.'</p>	
EU	EU, European Parliament & Council	Oil & gas installations Oil & gas pipelines	DIRECTIVE 94/22/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 30 May 1994 on the conditions for granting and using authorizations for the prospection, exploration and production of hydrocarbons		1994	<p>(Article 2 1 . Member States retain the right to determine the areas within their territory to be made available for the exercise of the activities of prospecting, exploring for and producing hydrocarbons.)</p> <p>Article 6 (...) 2. Member States may, to the extent justified by national security, public safety, public health, security of transport, protection of the environment, protection of biological resources and of national treasures possessing artistic, historic or archaeological value, safety of installations and of workers, planned management of hydrocarbon resources (...) or the need to secure tax revenues, impose conditions and requirements on the exercise of the activities set out in Article 2 (1).</p> <p>(I.e. Oil and gas exploitation is under national jurisdiction)</p>	

EUROPEAN COMMISSION

Geog. scope	Organisation	Main activities concerned	Title text	legal	Date	Safety rules (general and specific)	Specific spatial restrictions?
EU	THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION	Oil & gas installations	DIRECTIVE 2013/30/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 12 June 2013 on safety of offshore oil and gas operations and amending Directive 2004/35/EC		2013	<p>Safety zone of 500 m around oil and gas installations</p> <p>No external vessels allowed there</p> <p>Article 2: Definitions: (...) (26) 'safety zone' means the area within a distance of 500 metres from any part of the installation, established by the Member State; Article 6: Offshore oil and gas operations within licensed areas: (...) 7. Member States shall ensure that a safety zone is established around an installation and that vessels are prohibited from entering or remaining in that safety zone. (+ exceptions)</p>	✓
World	IMO	Fisheries Shipping	Cape Town Agreement		not in force	The Cape Town Agreement defines minimum requirements on the design, construction and equipment of fishing vessels.[1] It also includes details for the inspection of fishing vessels, as well as mandatory requirements for ship stability, seaworthiness, life-saving appliances, fire safety, ventilation and communication equipment.	
World	IMO	Fisheries Shipping	Torremolinos International Convention for the Safety of Fishing Vessels and Torrem. Protocol		1977 and 1993	Provisions for safety on board of fishing vessels.	

CASE STUDY: SPATIAL RESTRICTIONS DUE TO SAFETY PROVISIONS IN THE NORTH SEA***Special provisions by activity and Member State in the North Sea***

The North Sea basin is one of the busiest sea areas in the world and the EU. It is also a sea area with a high degree of regulation and planning and a comparatively well-recorded area in terms of a variety of maritime data.

The current case study is meant as a starting point for further elaboration or discussion and shall provide insight into the legal situation of safety provisions with spatial relevance regarding six selected fields predominant in the overall pattern of maritime activities:

1. Offshore windfarms
2. Oil and gas extraction installations
3. Military areas and munition dumping sites
4. Oil and gas pipelines
5. Power and telecommunication cables
6. Ship traffic and fisheries

However, not all North Sea countries can be considered as a starting point for further discussion, as this would require more extensive research and the consideration of non-EU countries. The provisions are outlined in a table for each of the maritime activities for the four selected countries bordering the North Sea: Belgium, the Netherlands, Germany, and Denmark. Safety distances – as far as they are defined, further specific provisions or explanations and the source of the national legislations are listed for each state and activity.

Offshore Windfarms**Table 3: National spatial restrictions for offshore wind farms**

OWF	Spatial restrictions due to safety provisions			
MS	<i>Breadth area</i>	<i>safety</i>	<i>Comments / Specific provisions</i>	<i>Legal background / Source</i>
Belgium	500 m		<p>The present decree applies to artificial islands, installations or works for the production of energy from water, currents and winds established in the marine areas over which Belgium is authorised to exercise its jurisdiction.</p> <p>As soon as the operating phase begins, a five hundred metre safety zone will be established measured from each point on their outer boundary. The outer boundary of a wind turbine is defined by the coordinates of the centre of the supporting structure, plus the diameter of the rotor and the rotor blades.</p> <p>Access to the safety zone is prohibited (with some exceptions like: warships, auxiliary vessels, scientific research vessels, cable/pipeline maintenance vessels etc.)</p>	11 APRIL 2012 - Royal Decree establishing a safety zone around artificial islands, installations and works for the production of energy from water, currents and winds in the marine areas under the under Belgian jurisdiction, Art. 3 and 5
Denmark	500 m		<p>§3 Abs. 26. 'safety zone' means an area within 500 m of any part of an installation or of any part of an installation's connected infrastructure; However, this shall not apply to connected infrastructure covered by point 29 (b) and (c) (i.e. any appliance or device on or attached to the main structure of the installation, or any connected pipeline system).</p> <p>Chapter 3, § 18 a. Installations and connected infrastructure covered by</p>	Offshore Safety Act (Offshoresikkerhedsloven)

OWF Spatial restrictions due to safety provisions			
MS	<i>Breadth safety area</i>	<i>Comments / Specific provisions</i>	<i>Legal background / Source</i>
		<p>Paragraph 3(1)(29)(a) and (d) are surrounded by a safety zone.</p> <p>Paragraph 2. Vessels, fishing gear or the like shall not be brought into or present in the safety zone referred to in paragraph 1.</p> <p>Exceptions are amongst other possible with the consent of the installation's operator, the owner of the installation or the supervisory authority.</p>	
Germany	500 m	<p>A safety zone of 500 m radius, measured from the outer boundary of the turbines, must always be established around offshore installations (cf. Section 7 (1) VOKVR). The installation pattern of offshore installations arranged in groups (e.g. offshore wind farms) must be such that a closed safety zone of 500 m radius, measured from the periphery, is created around the installation group. Deviations require the approval of the competent authority of the WSV.</p> <p>Offshore installations arranged in groups must not have a barring effect on shipping. Wind turbines must be grouped. Passages shall allow safe passage taking into account conditions at sea.</p> <p>The passage width between blocks or traffic separation schemes must be at least 2 nm wide with an additional safety zone of 500 m on each side.</p>	<p>Offshore Installations Directive to ensure the safety and ease of navigation, Version 3.1, (2021), Chapter 2, (Richtlinie Offshore-Anlagen zur Gewährleistung der Sicherheit und Leichtigkeit des Schiffsverkehrs, Version 3.1)</p> <p>Ordinance to the International Regulations for Preventing Collisions at Sea 1972 (COLREGs-V)</p>
The Netherlands	500 m	<p>The limitation area with regard to installations in a surface water body, other than mining installations, consists of the installation and the surrounding area, bounded by a line lying at a distance of 500 m from any part of the installation.</p>	<p>Environment Decree (2020), Art. 3.6</p>

For offshore wind farms, all four MS' legal texts prescribe a safety distance or safety zone of 500 meters measured from the outer boundary of the OWF farm, which is usually formed by the outer turbines (BE specifies that the diameter of the rotor and rotor blades should be considered as well).

No vessel traffic is allowed inside the safety area. In the case of BE, exceptions to this ban include warships, installation auxiliary vessels, scientific research vessels or cable/pipeline maintenance vessels. Similar exceptions are assumed also for the other MS. It is also assumed that this restriction does not apply to ships in distress, in the attempt of rescue of life or, generally, in the event of force majeure. In addition, Danish regulations explicitly prohibit vessels to bring fishing gear into the safety area unless there is the consent of the installation's operator, owner or the responsible authority. German regulations specify that the OWF should be arranged in groups, forming a closed safety zone, and should not have a 'barring effect' on shipping, assuring a safe passage with a minimum width of 2 nautical miles in addition to the 500 meters safety distance to the installation.

Oil and Gas Extraction Installations

Table 4: National spatial restrictions for oil and gas extraction installations

Oil & gas installations				
O&G installations: Spatial restrictions due to safety provisions				
MS	<i>Breadth area</i>	<i>safety</i>	<i>Comments / Specific provisions</i>	<i>Legal background / Source</i>
Belgium	/		(No information on oil installations or pipelines found for BE. According to a publication from GAUFRE project, there are only gas pipelines and no oil pipelines in the Belgian part of the North Sea.)	Els Verfaillie, Vera Van Lancker, Frank Maes (2003-2005), GAUFRE: Towards a spatial structure plan for the Belgian part of the North Sea, ANALYSIS Chapter 2: Infrastructure in the BPNS, Cables and pipelines, Marine Geology, Maritime Institute, University Gent
Denmark	500 m		<p>§3 Abs. 26. 'safety zone' means an area within 500 m of any part of an installation or of any part of an installation's connected infrastructure; However, this shall not apply to connected infrastructure covered by point 29(b) and (c). (...)</p> <p>Paragraph 2. Vessels, fishing gear or the like shall not be brought into or present in the safety zone referred to in paragraph 1.</p> <p>Exceptions are amongst other possible with the consent of the installation's operator, the owner of the installation or the supervisory authority.</p> <p>Section 1. Fixed installations, drilling platforms, drilling ships and other installations used for or in connection with the exploration and extraction of raw materials in the subsoil below the seabed in the Danish continental shelf area are surrounded by a safety zone unless the installation is being navigated or towed.</p> <p>Subsection 2. Similar installations in Danish territorial waters are surrounded by a zone for observing order and preventing danger.</p> <p>Section 3. The zones mentioned in section 1(1) and (2) shall extend to 500 metres around the installation, measured from any point on its outermost border or from the buoying mentioned in section 2.</p> <p>Section 4. It shall be prohibited for ships and other vessels without any business at the installation to move into the zones mentioned in section 1(1) and (2). The prohibition shall also apply to fishing gear and the like.</p> <p>Subsection 2. The provisions of subsection 1 shall also apply in connection with Danish ships' unlawful passage of, stays in or fishing in a safety zone established in the continental shelf area of a foreign state.</p> <p>Subsection 4. Permission pursuant to subsection 3 to carry out fishing operations</p>	<p>Offshore Safety Act (Offshoresikkerhedsloven) (2021)</p> <p>Order on safety zones and zones for observing order and preventing danger</p>

Oil & gas installations		O&G installations: Spatial restrictions due to safety provisions		
MS	Breadth area	safety	Comments / Specific provisions	Legal background / Source
			or fishing and sea research in the zones mentioned in section 1(1) and (2) shall be granted after having acquired a statement from the Minister of Fishing.	
Germany	500 m		<p>2.1 Principles</p> <p>1. The construction and operation of offshore installations must not have any impact on the safety and ease of shipping traffic (and within territorial waters also on the navigable condition of federal waterways). [Negative effects] must be avoided or compensated for by protective measures.</p> <p>2. The construction of offshore installations is not permitted where shipping itself or the use of designated or other traffic routes and areas used by shipping (incl. anchorage areas) is impaired (cf. Art. 60 (7) of the International Convention on the Law of the Sea of 1982). A barring effect for shipping traffic may not be caused by offshore installations arranged in groups.</p> <p>3. Shipping routes must not be impaired by the operation of offshore installations.</p> <p>5. A safety zone of 500 m radius, measured from the outer boundary of the turbines, must always be established around offshore installations (cf. Section 7 (1) VOKVR). The installation pattern of offshore installations arranged in groups (e.g. offshore wind farms) must be such that a closed safety zone of 500 m radius, measured from the periphery, is created around the installation group. Deviations require the approval of the competent authority of the WSV²⁰.</p>	Offshore Installations Directive to ensure the safety and ease of navigation, Version 3.1 (2021), Chapter 2, (Richtlinie Offshore-Anlagen zur Gewährleistung der Sicherheit und Leichtigkeit des Schiffsverkehrs, Version 3.1)
The Netherlands	500 m		The restriction area with regard to a mining installation in a surface water body consists of the mining installation and the surrounding area, bounded by a line lying at a distance of 500 m from any part of the mining installation.	Environment Decree (2020), Art. 3.7 (Up to 31.12.2023: Mijnbouwwet, MINING ACT OF THE NETHERLANDS (2019), Art. 43, which has expired since 01.01.2024) ²¹

Apart from the case of Belgium, where no oil installations or pipelines are known to the authors, all other countries DK, DE and NL apply again a safety radius of 500 meters from the outside of the oil extraction installation. In fact, in the case of DK and DE, the same act or directive applies as for OWF (discussed above). For DK, this means that fishing gears are explicitly banned from the safety zone; however, specific permissions for fishing activities or also sea research can be granted by the relevant authority (Minister of Fishing). On the other side, the German relevant directive highlights that offshore installations should be arranged in groups, should not adversely affect ship traffic routes and should not have a barring effect on ship traffic. Also here, deviations from the safety

20 WSV: Wasserstraßen- und Schifffahrtsverwaltung des Bundes (German Federal Waterways and Shipping Administration)

21 Mijnbouwwet (Mining Act of the Netherlands): <https://wetten.overheid.nl/BWBR0014168/2024-01-01> (accessed 13.03.2024)

zone of 500 meters radius are possible with the approval of the competent authority (German Federal Waterways and Shipping Administration).

In the case of NL, the Environmental decree of 2020 defines a restriction area for 'mining installations'. Also, the Mining Act, Article 43, defined a safety zone around mining installations, which should not extend beyond a distance of 500 m measured from the outside of the installation. However, following the last amendments of the Mining Act, in place since 01.01.2024, Article 43 has expired. No other information could be found so far on provisions for the safety zone that are in place since then. However, according to the official website *Noordzeeloket*²², the above safety radius is still valid as 'No shipping or other use is allowed in a 500-metre zone around the platforms'²³.

Military Areas and Munition Dumping Sites

Table 5: National spatial restrictions for military areas

Military areas	Spatial restrictions due to safety provisions			
MS	<i>Breadth area</i>	<i>safety</i>	<i>Comments / Specific provisions</i>	<i>Legal background / Source</i>
Belgium	/		p. 124) The sectors where these shooting exercises are held are mentioned on hydrographical charts of the Belgian coast. During the exercises all ships are advised to avoid the sector. The periods in which the exercises are held are announced to ships (Messages to Seafarers - 'Berichten aan Zeevarenden: BaZ') and airplanes (military bases send messages to the airports of Oostende and Koksijde who send them to the relevant airports).	Sofie Deros, 2005, GAUFRE: Towards a spatial structure plan for the Belgian part of the North Sea, ANALYSIS Chapter 3: Users of the BPN, Military exercises. (GAUFRE project) ²⁴
Denmark	/		Denmark does not have any military areas in the North Sea, hence, there exist no regulations.	
Germany	/		Schleswig-Holstein, coastal areas: Restricted military areas at sea are marked with buoys but are not surrounded by so-called restricted zones. The ordinance contains detailed information on which restricted military areas may be navigated/fished and when, and how this can be recognised. In some military areas shipping is generally prohibited and consequently also fishing. For other areas shipping/fishing is only prohibited during times of manoeuvres. Such times are signalled to seafarers on site. There are also areas where certain activities with ground contact are prohibited.	Ordinance on security measures for military restricted and warning areas on the east and west coasts of Schleswig-Holstein and in the Kiel Canal (Sperr- und Warngbietverordnung - SperrWarngbev)
The Netherlands	/		p. 82) Co-use of exercise zones is permitted in so far as this can be combined with military use. Most defence areas on and above the sea surface are unsafe when being used for shooting and/or flying activities. When no exercises are taking place, these areas can be used for other	North Sea Programme 2022-2027 (2022) ²⁵

22 <https://www.noordzeeloket.nl/en/general/about-noordzeeloket/> (accessed 05.03.2024)

23 <https://www.noordzeeloket.nl/en/functions-and-use/olie-gaswinning/> (accessed 05.03.2024)

24 Sofie Deros, 2005, GAUFRE: <https://www.vliz.be/imisdocs/publications/76052.pdf> (accessed 13.03.2024)

25 North Sea Programme 2022-2027, 2022: <https://www.noordzeeloket.nl/publish/pages/201299/north-sea-programme-2022-2027.pdf> (accessed 13.03.2024)

Military areas		Spatial restrictions due to safety provisions		
MS	Breadth safety area	Comments / Specific provisions	Legal background / Source	
		activities. No permanent objects like drilling platforms or wind turbines may be located in military exercise zones.		

Except for DK, which does not have military areas in the region, all other Member States BE, DE and NL have designated military areas in the North Sea, where different kinds of military training exercises (shooting, flight exercises, exercises with mine disposal, etc.) take place. These areas are recorded in navigation maps. All three countries state that a certain degree of co-use is allowed in these areas for mobile, non-permanent activities like shipping and thus also fishing. Military exercises are announced in advance to ships, partly also to airplanes or airports, as they might also affect the air traffic. During military training periods, other activities are strictly prohibited in the concerned areas.

In the case of DE, some military areas are permanently closed to shipping and thus to fishing activities. There are also areas where certain activities with ground contact are prohibited.

For NL, the official website *Noordzeeloket*²⁶ provides information and a map showing the national military areas, differentiating by former ammunition dumping sites, mine training areas, low flying areas and shooting areas/unsafe zones. According to this source, 'When no exercises are being held, these areas are also available for other uses.' Other official information referring to zones with exclusive use for military training purposes could not be found by the authors. *Noordzeeloket* also states that 'Due to the increasing spatial pressure in the North Sea, combined use of training areas may become more of a focal point, for example, by temporarily opening a military area for the extraction of sand. (...) The planning and spatial development for shipping or for activities with fixed installations, such as wind farms, platforms for oil and gas extraction, and cables and pipes, requires coordination with the military use of the North Sea. The aim is to make multiple use of space within military training areas to the extent possible. In principle, oil and gas extraction with mobile installations is possible within a certain period.'²⁷

In BE, the second Marine Spatial Plan (MSP) for 2020 to 2026 defines in Subsection 10 the zones that are delimited for military exercises and in Subsection 11 the munitions deposit areas and, in particular, the area of 'Paardenmarkt'. While for the latter 'no seabed-disturbing activities are authorised, with the exception of: 1° scientific research into munitions management and disposal, including testing; and 2° management and disposal activities' (Kingdom of Belgium, 2020), in relation to military exercises it is not clear whether there are exclusive military zones in BE that are permanently closed to other activities. In any case, the Belgian MSP states that '(...) the objective is that the Belgian North Sea continues to provide sufficient space for conducting military exercises, attuned to other activities and uses within it.' (p. 59) and 'Abolishing space for military use may make it more difficult to organise military exercises, whereby Belgium would be unable to comply with its international military obligations. Moreover, space for military exercises is essential for the Ministry of Defence.' (p. 81).

Beyond the designated military areas themselves, the authors could not find any information on additional safety distances to be observed by other maritime activities. This applies also to munition dumping sites, which are generally marked in official sea charts as well.

26 <https://www.noordzeeloket.nl/en/general/about-noordzeeloket/> (accessed 05.03.2024)

27 <https://www.noordzeeloket.nl/en/functions-and-use/militair-gebruik/> (accessed 05.03.2024)

Oil and Gas Pipelines

Table 6: National spatial restrictions for oil and gas pipelines

Oil & gas pipelines	Spatial restrictions due to safety provisions			Legal background / Source
MS	Breadth area	safety	Comments / Specific provisions	
Belgium	Protected zone: 1000 m Reserved zone: 500 m		<p>(no oil pipelines and installations known in BE)</p> <p>p. 39: Distances from the gas pipelines:</p> <p><u>Protected zone</u>: inside a zone of 1000 m at both sides of the pipelines:</p> <ul style="list-style-type: none"> - no sand extraction may take place; - no other pipelines may be placed. <p><u>Reserved zone</u>: inside a zone of 500 m at both sides of the pipelines:</p> <ul style="list-style-type: none"> - no other installations may be placed, unless they have to cross the pipeline. <p>(exception: maintenance dredging works and interventions by the owner of the cable for exploitation needs).</p>	Els Verfaillie, Vera Van Lancker, Frank Maes (2003-2005), GAUFRE: Towards a spatial structure plan for the Belgian part of the North Sea, ANALYSIS Chapter 2: Infrastructure in the BPNS, Cables and pipelines
Denmark	200 m along each side of a pipeline or pipeline corridor		<p>Section 1. Ships may not, without urgent necessity, anchor in the cable and pipeline fields laid down for submarine cables and submarine pipelines of any type (pipelines for the carriage of hydrocarbons, etc.), which cover the associated protective zones, cf. Section 4.</p> <p>Subsection 2. In the protective zones, suction dredging, fishing for stones as well as any use of tools and other gear that are dragged on the seabed shall be prohibited. [...]</p> <p>Section 4. A cable or pipeline field covers a 200-metre-wide protective zone along and on each side of the cable or the pipeline such as this field has been marked in the charts, [...] Rather large cable or pipeline fields will, in general, be indicated by means of beacon lines for the uttermost cables or pipelines of the field and, now and then, also for beacon lines for cables or pipelines between these. If nothing else has been announced and marked in the charts, the protective zone of the cable and pipeline field covers the area between the uttermost beacon lines as well as an area of 200 metres outside these.</p>	Cable Order (1992)
Germany	Generally 500 m, 1 nautical mile (1.852 meters) around mooring sites		<p>Designated mooring sites must be kept clear of pipelines, including a safety zone of 1 nm around them.</p> <p>Certain areas prioritised for shipping traffic must be kept free of pipelines or a crossing must be made by the shortest route.</p> <p>3.2 Abs.1. If several submarine installations are planned, they should always be bundled in corridors. Exceptions may be authorised if technical reasons prevent bundling or bundling is not</p>	Offshore Installations Directive to ensure the safety and ease of navigation, Version 3.1 (2021), Chapter 3, (Richtlinie Offshore-Anlagen zur Gewährleistung der Sicherheit und Leichtigkeit des

Oil & gas pipelines				Spatial restrictions due to safety provisions	
MS	Breadth area	safety	Comments / Specific provisions	Legal Source	background /
			reasonable. The distance between the submarine installations must be minimised to the extent necessary for structural reasons. 3.4 Abs. 3. [...] submarine installations in the EEZ and territorial waters of the North Sea have to be buried in a way that they are at a depth of at least 1.5 m below sea bottom level [...] Abs. 5. [...] in (main) fairways submarine installations (in the case of authorised to lying parallel or crossing) have to be at a depth of 3 m below sea bottom level [...]	Schiffsverkehrs, Version 3.1) Ordinance to the International Regulations for Preventing Collisions at Sea 1972 (COLREGS-V)	
The Netherlands	Pipelines: 500 m on either side		P. 104) There is a safety and maintenance zone of 500 metres to either side of cables and pipelines in the North Sea. (...)	North Sea Programme, 2022-2027 (provisions also for cables)	

For oil and gas pipelines, we find a wide spectrum of provisions depending on the MS being analysed: The safety distances range from 200 meters (DK), over 500 m (NL, BE reserved zone, DE generally for offshore installations) and 1000 m (BE protected zone), up to 1 nautical mile, i.e. 1.852 m (DE around mooring sites) on either side of the pipeline.

As indicated above, BE defines two types of areas: a protected zone, with a radius of 1000 m either side of the pipeline, where no sand extraction and no other pipelines are allowed; and a reserved zone of 500 m distance on either side where other installations are prohibited unless they have to cross the pipeline. Exceptions include maintenance dredging works or interventions by the owner or the operator.

In the case of DK, for which a protective zone of 200 meters is prescribed, the relative legal provisions specify that no suction dredging or collection of stones is allowed in this protection zone; in addition, no tools or gears 'dragged on the seabed' should be used in this area. Indirectly, this means that also bottom trawling is prohibited in the protective zone.

DE generally stipulates a safety zone of 500 m around any offshore installation and excludes any such installation within a distance of 1 nautical mile, i.e. 1.852 meters, around designated mooring sites. Moreover, German law specifies the burial depth of pipelines, which should be generally 1,5 m below the sea bottom level. In the case of submarine pipelines laying parallel to or crossing main fairways, the burial depth increases to 3 m below the sea bottom level.

Finally, NL prescribe a safety and maintenance zone of 500 m on either side of the pipeline. This area is particularly relevant when planning and creating new offshore wind farms. However, from the information reviewed it is not clear whether other kind of activities or even navigation is allowed in this area.

Apart from the case of DK, where bottom trawling is banned from the protective zone (even if not directly mentioned), within the scope of this study the authors could not find explicit prohibitions of fishing activities in the surroundings of pipelines. Nevertheless, oil and gas pipelines should generally be recorded in nautical charts, so that bottom trawlers or other fishing vessels operating bottom gears do actively avoid the areas around pipelines. Beyond that, it is also assumed that pipelines are generally buried at a few meters below the sea bottom level – even if this could only be recorded for the case of DE –, so that the risk of incidents with bottom fishing gears might be reduced.

Power and Telecommunication Cables

Table 7: National spatial restrictions for power and telecommunication cables

Power & telec. cables				
MS	Breadth area	safety	Comments / Specific provisions	Legal background / Source
Belgium	Protected zone: 250 m on both sides Reserved zone: 50 m on both sides		Annex, 2.2, 2,3 <u>Protected zone</u> a protective zone of 250 metres shall be created on both sides of the cable; In that zone: - no anchor may be cast - no activity, other than the construction of another cable (...) <u>Reserved area</u> a reserve area of 50 metres shall be created on either side of the power cable in that zone: - no installation may be erected - no cable or pipeline may be constructed The distance from power lines may be less than 50 metres under particular circumstances.	12 March 2002. - Royal decree on the detailed rules for the laying of electricity cables entering the territorial sea or the national territory or which are placed or used in connection with the exploration of the continental Shelf, the exploitation of its mineral resources and other non-living resources thereof or of the operations of artificial islands, installations or establishments under Belgian jurisdiction ²⁸
Denmark	200 m along each side of a cable or cable corridor		Section 1. Ships may not, without urgent necessity, anchor in the cable and pipeline fields laid down for submarine cables and submarine pipelines of any type (pipelines for the carriage of hydrocarbons, etc.), which cover the associated protective zones, cf. Section 4. Subsection 2. In the protective zones, suction dredging, fishing for stones as well as any use of tools and other gear that are dragged on the seabed shall be prohibited. [...] Section 4. A cable or pipeline field covers a 200-metre-wide protective zone along and on each side of the cable or the pipeline such as this field has been marked in the charts, [...] Rather large cable or pipeline fields will, in general, be indicated by means of beacon lines for the uttermost cables or pipelines of the field and, now and then, also for beacon lines for cables or pipelines between these. If nothing else has been announced and marked in the charts, the protective zone of the cable and pipeline field covers the area between the uttermost beacon lines as well as an area of 200 metres outside these.	Cable Order (1992)

²⁸ https://www.ejustice.just.fgov.be/mopdf/2002/05/09_1.pdf#page=1 (accessed 13.03.2024)

Power & telec. cables			
MS	Breadth area	safety	Comments / Specific provisions
			Legal background / Source
Germany	Generally 500 m, 1 nautical mile (1.852 meters) around mooring sites		<p>Designated mooring sites must be kept clear of cables, including a safety zone of 1 nm around them.</p> <p>Certain areas prioritised for shipping traffic must be kept free of cables or a crossing must be made by the shortest route.</p> <p>3.2 Abs.1. If several submarine installations are planned, they should always be bundled in corridors. Exceptions may be authorised if technical reasons prevent bundling or bundling is not reasonable. The distance between the submarine installations must be minimised to the extent necessary for structural reasons.</p> <p>3.4 Abs. 3. [...] submarine installations in the EEZ and territorial waters of the North Sea have to be buried in a way that they are at a depth of at least 1.5 m below sea bottom level [...] Abs. 5. [...] in (main) fairways submarine installations (in the case of authorisation to lying parallel or crossing have to be at a depth of 3 m below sea bottom level [...])</p>
The Netherlands	Electricity cables: 500 m on either side Telecommunication cables: 750 m on either side		<p>P. 104) There is a safety and maintenance zone of 500 metres to either side of cables and pipelines in the North Sea. When creating wind farms, the principle is that a zone of 500 metres in relation to existing pipelines and electricity cables should be adhered to; this rises to 750 metres in the case of telecommunications cables. With a view to efficient use of space, maintenance zones for cables and pipelines may, where possible, be reduced.</p>
			<p>Offshore Installations Directive to ensure the safety and ease of navigation, Version 3.1 (2021), Chapter 3, (Richtlinie Offshore-Anlagen zur Gewährleistung der Sicherheit und Leichtigkeit des Schiffsverkehrs, Version 3.1)</p> <p>Ordinance to the International Regulations for Preventing Collisions at Sea 1972 (COLREGs-V)</p> <p>North Sea Programme, 2022-2027 (as for pipelines above)</p>

As described for pipelines above, also for the case of power and telecommunication cables we see a wide array of safety breadths that range from 50 meters (BE reserved zone), over 200 m (DK) and 250 m (BE protected zone), 500 m (NL power cables, DE generally for offshore installations) and 750 m (NL telecommunication cables), up to 1 nautical mile installation-free zone, i.e. 1.852 m, around mooring sites (DE). In fact, for DK, DE and NL the same safety provisions apply to both pipelines and cables (see also subchapter above).

Only BE has specific provisions for the laying of electricity cables. It defines a protected zone of 250 meters at either side of the cable where no anchoring or other activity is allowed other than the laying of another cable; and a reserved zone of 50 m either side where no other installation can be constructed and also no other cable or pipeline may be laid.

For DK, in the protective zone of 200 meters no suction dredging or collection of stones is allowed; also, no tools or gears 'dragged on the seabed' should be used in this area, which applies indirectly to bottom trawling. Above all, it is prohibited that ships anchor in the cable (and pipeline) fields, unless urgent necessity.

DE generally stipulates a safety zone of 500m around offshore installations and excludes any such installation within a distance of 1 nautical mile, i.e. 1.852 meters, around designated mooring sites. In addition, German provisions give indications on the burial depth of pipelines, which should be generally 1,5 m below the sea bottom level. In the case of submarine pipelines laying parallel to or crossing main fairways, the burial depth increases to 3 m below the sea bottom level.

NL prescribes for electricity cables a safety and maintenance zone of 500 m on either side. This area is particularly relevant when planning and creating new offshore wind farms. In the case of telecommunication cables, the safety distance increases to 750 m with regard to offshore wind farms. As mentioned before for pipelines, it is not clear whether other kind of activities or even navigation is allowed in this area. Nevertheless, according to the North Sea Programme 2022-2027, 'With a view to efficient use of space, maintenance zones for cables and pipelines may, where possible, be reduced.' In fact, for infield cables within OWF, the Programme suggests that 'Research has shown that there must be clearance of 250 metres available on either side of infield cables to facilitate safe maintenance.' (Government of the Netherlands, 2022).

Other Activities: Ship Traffic and Fisheries

For the maritime sectors of shipping and fisheries, the authors could not find particular provisions at national level in terms of safety distances or other requirements in relation to other activities or installations at sea. Nevertheless, as described in the previous subchapters, both activities are affected directly or indirectly by the regulations for other maritime activities, i.e. ships and fishing vessels have to be aware of and comply with these.

CONCLUSIONS AND FURTHER CONSIDERATIONS

Conclusions

At the international level, UNCLOS constitutes the umbrella legal text for different kinds of activities at sea. It establishes the Exclusive Economic Zone and, within the EEZ, it concedes the coastal states the sovereign right to explore and exploit the natural resources – living and non-living – and to construct and regulate the creation and operation of artificial islands, offshore installations and structures. UNCLOS also refers to the need of establishing 'reasonable' safety zones and leaves the responsibility of doing so with the coastal states, with the condition that the breadth of safety areas shall not go beyond 500 metres. This is a key provision of UNCLOS in terms of spatial restrictions and in practice a reference magnitude which is picked up by all kind of maritime activities in subsequent legal texts and recommendations on safety areas.

Deviations from this provision are found in the context of cable operations and especially during cable installation (above all in deep water), repair or maintenance, where safety distances between 500 m and up to 1 nautical mile (1.852 m) are given by international conventions and recommendations to be observed by ships and in particular fishing vessels. Also, other activities like marine aggregate extraction are recommended to be undertaken outside a safety zone of 1 nautical mile around an undersea cable.

No references to safety areas below a breadth of 500 metres have been found as a general rule for the selected maritime activities in international legal texts or official recommendations.

At the EU level, the Integrated Maritime Policy as well as the Maritime Spatial Planning Directive lay the foundations for an effective planning of the activities coexisting in the maritime space. Among other aspects, MSP planners need to ensure the safety of navigation and take into account relevant safety provisions for the different activities, including spatial restrictions versus other uses. Beyond that, the MSP process strives for using best available data and for data sharing. EMODnet as a continuously growing tool is facilitating the access, interoperability and reusability of such data. It is therefore a useful tool in marine planning processes – to share own data, as well as to access the data of others and to communicate and evaluate safety and risks. Member states may wish to use additional tools of higher precision in later stages of their planning, however, at an early stage of the process and for cross-border discussions, EMODnet is already conceived as a helpful instrument since it covers all EU sea basins.

Looking at the case study of the North Sea, the safety distances indicated by international conventions are implemented in all the investigated states of this sea basin in the cases of offshore windfarms and oil and gas extraction installations. For oil and gas pipelines and power and telecommunication cables, the authors found a wider spectrum of provisions for safety distances in relation to other activities and other specific requirements (e.g. burial depth). Further regulations are provided in national legislation for regulating ship traffic, clustering of offshore installations, passage corridors for ships, activities forbidden in safety zones, the aggregation of cables or pipelines in corridors and burying of cables or pipelines.

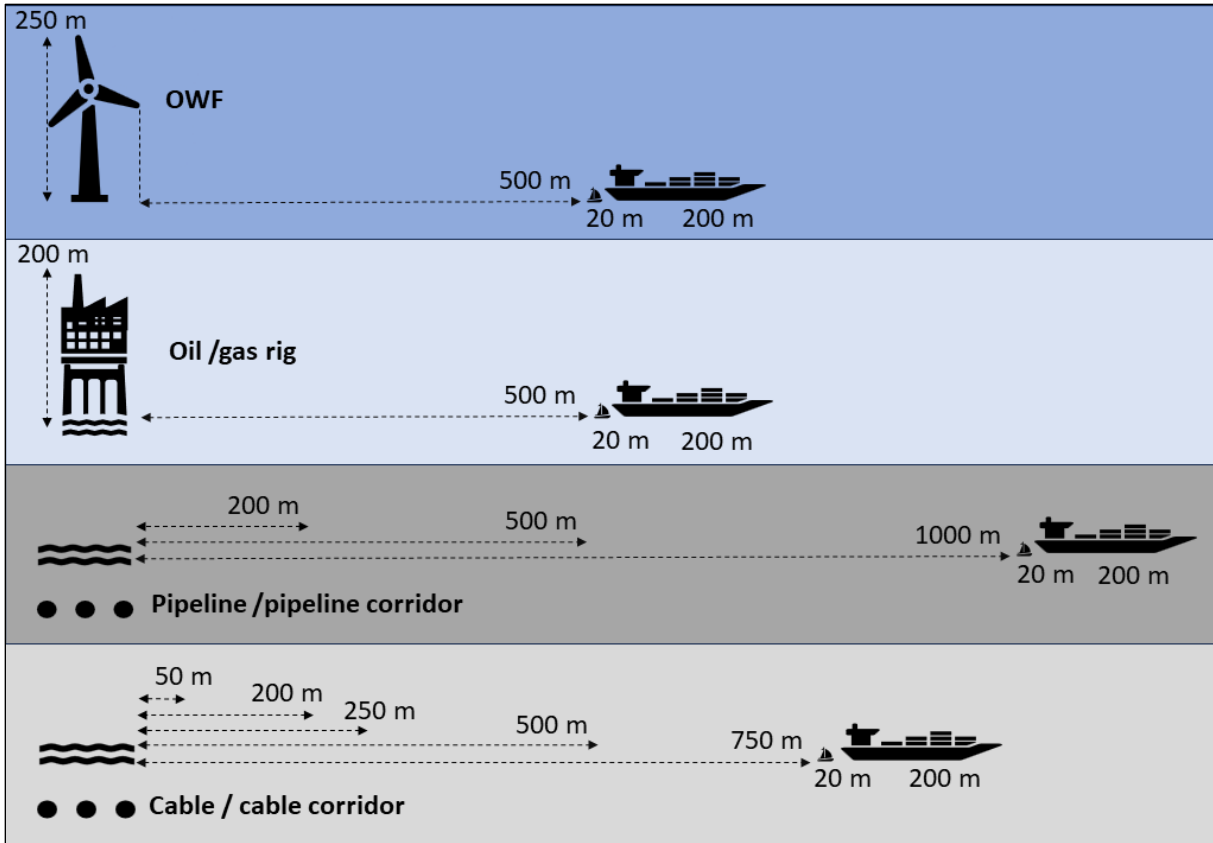


Figure 2: Schematic visualisation of investigated installations at sea (with estimates of average heights) and applied safety distances in BE, NL, DE and DK in relation to an average-sized container vessel and a sailing boat

Table 8: Conversion table between meters and nautical miles

Distance in meters	Distance in nautical miles
50	0.027
200	0.11
250	0.13
500	0.27
750	0.40
1000	0.54

Growing pressure on maritime areas in the North Sea has led to the necessity to achieve the best possible co-location of activities at sea while granting the highest possible safety for all stakeholders. While this can be achieved comparatively easily for some activities, it seems more difficult for others. Especially permanent activities using large areas (particularly OWFs) require good coordination to co-exist with and to avoid negative impacts on other sectors and uses. A further key aspect is the priority that governments give to certain activities; such is the case for military training: despite the growing spatial pressure in the North Sea, some MSs emphasise the importance of keeping military exercise areas in order to fulfil international military obligations. Activities which are shifting on a seasonal or otherwise irregular basis, as is the case with most types of fisheries and in some cases with recreation and tourism, are difficult to include into maritime spatial planning and especially hard to harmonise with other uses. Reduced safety distances below 500 metres have only been identified in the case of particular offshore installations, where there is practical experience of merging maritime activities. Examples of multi-use and associated safety practices in the North Sea can be found in the Annex 1.

To address issues of co-location, the Maritime Spatial Planning Assistance Mechanism has launched a collection of case studies to reflect the growing interest and development of multi-use at sea in Europe. The 'Multi-use and co-existence compendium' provides a compilation of case studies on multiple use (including co-existence and co-use) with lessons learned, so that stakeholders and decision-makers can be informed about current initiatives, challenges and levers to develop multiple use between maritime activities at sea.²⁹

Due to the spatial pressure in the maritime area of the North Sea, several MSs have shown attempts to reduce safety distances and increase co-location with other activities. This becomes clear also when looking at the good practices identified in the context of the study (see Annex 1). The focus of co-location efforts lies predominantly on OWF (being among the installations that use the widest area), often in combination with fishing or aquaculture, or also with solutions to enable shipping/navigation. Efforts in co-location are also expressed for military zones: For those areas that are not restricted to military uses, a co-location with shipping, fishing, recreation, etc. is usually possible in the periods where no military exercises take place; special provisions are found for munition dumping areas, where seabed-disturbing activities are prohibited. Beyond that, MSs like NL acknowledge the need to strengthen the combined use of military zones in future by temporarily opening military areas e.g. to sand extraction or also to mobile installations of oil and gas.

Nevertheless, different situations regarding co-location are observed in the selected MSs: For the example of co-location of fisheries in OWF: BE and DE prohibit this option, while DK and NL allow this, in the latter MS with restrictions. With respect to allowing ship passage through OWF, attempts were found only in NL, also here with restrictions.

Further considerations

The information gathered within the scope of the present study and in particular the national provisions on safety distances of the MS investigated are indicative of the stage of development of maritime activities and co-location in the North Sea – 'one of the busiest maritime areas'³⁰ worldwide. Nevertheless, it could make sense to widen the focus and further explore the legal framework on safety requirements as well as good practices in other countries of the North Sea (UK, Norway) or also in (selected MSs of) other sea basins like the Atlantic Ocean, the Baltic Sea or also the Mediterranean.

Maritime spatial planning is an effective and strategic tool to coordinate the different activities at sea and prevent conflicts. With a broader understanding of safety regulations with spatial relevance and existing and intended examples of multi-use it would be easier to include multi-use in MSP. In view of the different legislation on safety distances in the North Sea Member States studied and the different initiatives experiencing with the multiple use of maritime space (see Annex 1), it could be beneficial to further explore and strengthen cooperation and exchange of experience between the North Sea countries with regard to multiple use. A first step in this direction could be the intensified use of the EMODnet portal. Consideration could also be given to harmonising safety requirements at national level to facilitate cross-border maritime planning.

Further research may also be needed on insurance policies for maritime activities (e.g. OWF, fisheries, shipping, etc.) and possible implications for co-location in order to assess if intended multi-use is feasible with regard to this aspect. In this context and for the specific case of fishing vessels catching unintentionally subsea cables, it would be worth looking as well at the relative provisions on payment of damaged cables or also compensation of gear lost, with a view to improve the cooperation among fishing vessel/shipowner and cable operator.

²⁹ <https://maritime-spatial-planning.ec.europa.eu/co-existence-activities-and-multi-use/multi-use-compendium> (accessed 04.06.2024)

³⁰ <https://www.ospar.org/convention/the-north-east-atlantic/i> (accessed 14.03.2024)

ANNEX 1: EXAMPLES OF MULTI-USE AND ASSOCIATED SAFETY PRACTICES IN THE NORTH SEA

This subchapter presents a selection of projects and good practices that aim at enabling and supporting the co-location of different activities within a shared maritime space. In the majority of cases, the focus lays on the co-use in offshore wind farms, often in combination with fisheries. This is due to the fact that OWF occupy a large marine area and are thus increasingly required to offer possibilities for co-location. Beyond that, OWF are challenging infrastructures in terms of safety, for which feasible solutions need to be developed and proved in practice.

Table 9: Good practice No. 1: KIS-ORCA project

Name of good practice	KIS-ORCA project
Member State(s)/country(ies) involved	UK
Sea basin	North Sea, Atlantic
Period of implementation	ongoing
Activities concerned	Fisheries, power & telecommunication cables, OWF & other offshore renewables
Actors involved	Kingfisher Information Service (KIS) (public), European Subsea Cables Association (ESCA)
Summary of good practice	The project provides very detailed and up-to-date geographical information on subsea cables and offshore renewables to fisheries. The data is offered in the most common map plotter formats for direct integration in the on-board navigation system.
Why a good practice?	Navigational obstacles are usually marked in the official sea charts, which to our knowledge are updated once a year. The updates then need to be integrated into the respective navigation system on board. The KIS-ORCA project (and the KIS project for other navigational obstacles in general) is providing more current information in a very user-friendly way and free of charge.
Co-location?	yes
Reduction of safety distance?	unknown
Replicability	yes
Other aspects to be mentioned	The Kingfisher Information Service – Offshore Renewables & Cable Awareness is a joint initiative of the European Subsea Cables Association (ESCA) and the Kingfisher Information Service of Seafish. The latter is an information system on surface and subsea hazards around the UK with the aim to enhance operational safety of fishing vessels which exists already for over 50 years. They are working with the oil and gas, subsea cable, renewable and marine aggregates industries and provide the information to the fishing industry for free. Fishing plotter formats are updated on a six-month basis. Real-time updates can be acquired from the Kingfisher Bulletin.

	<p>They further provide a gear restrictions website, where information on all UK fishing restrictions can be viewed, shared, filtered by gear and downloaded. KIS is funded by a levy on the first sale of seafood products in the UK, which includes imported seafood. Some projects are also funded from UK fisheries funding schemes.</p>
Source of information (report, link, etc.)	https://kis-orca.org/

Table 10: Good practice No. 2: Improving the coexistence of offshore wind farms and shipping: an international comparison of navigational risk assessment processes, scientific study

Name of good practice	Improving the coexistence of offshore wind farms and shipping: an international comparison of navigational risk assessment processes
Member State(s)/country(ies) involved	UK, DE, DK, NL, BE, SE, US
Sea basin	Applicable to any sea basin
Period of implementation	2018
Activities concerned	All activities
Actors involved	Mehdi et. al (2018), Maritime & Coastguard Agency (MCA) UK, Bundesamt für Seeschifffahrt und Hydrographie (BSH) DE, Søfartsstyrelsen (DMA) DK, Rijkswaterstaat (RWS) NL, FOD Mobiliteit (FOD) BE, Transportstyrelsen (STA) SE, United States Coastguard (USCG)
Summary of good practice	The authors recommend, based on the communication with the respective authorities, a harmonisation of the Navigational Risk Assessment between countries and within countries, between planning and approval stages. They further recommend a combination of the consequence-assessment approach of DE with the probabilistic tools BE and NL are using. Further recommendations regard better input data, tools, a general sharing of experience through forums such as IMO working groups and better stakeholder communication.
Why a good practice?	Current increase in the use of sea space is a problem occurring in many countries. In sharing experiences, communicating procedures and harmonising them at least on the basis of sea basins is crucial in finding good solutions, not repeating mistakes and generally improving the handling of cross-border projects.
Co-location?	yes
Reduction of safety distance? (yes/no, how)	At this stage it is not possible to say what outcomes harmonised navigational risk assessment processes will have in the future.
Replicability?	Yes, especially continuation of the study's recommendations.
Other aspects to be mentioned	
Source of information	https://link.springer.com/article/10.1007/s13437-018-0149-0

Table 11: Good practice No. 3: Borssele Wind Farm

Name of good practice	Borssele Wind Farm
Member State(s)/country(ies) involved	Netherlands
Sea basin	North Sea
Period of implementation	2021-2046
Activities concerned	OWF, ship traffic, power & telec. cables and fisheries
Actors involved	Dutch Government, private OWF interests
Summary of good practice	<p>OWF Borssele has established maintenance zones and shipping corridors which allow and regulate passage through the OWF and restricting fishing gears. These actions can promote co-use of the OWF site.</p> <p>Further key spatial recommendations:</p> <p>'Around the wind turbines and the infield cables, a space of 500 metres radius around the wind turbines and 250 metres on either side of the infield cables must remain free in order to be able to carry out required maintenance safely.'</p> <p>This radius around the turbine 'is composed of a 250-metre maintenance zone and 250-metre safe manoeuvring space for the large maintenance vessels. In the 250-metre manoeuvring space, possible co-use activities on the bottom such as nature development or forms of passive fishing can take place.'</p> <p>These maintenance zones 'can be used as approach routes for maintenance vessels to the various installations so also to the co-use installations. Maintaining fixed maintenance zones creates clarity to all parties using the area and ensures a safer situation in wind farms. In the wind farms, there is only destination traffic and no free passage.'</p> <p>For Passage through wind area a corridor has been constructed which can be used both during the day and at night for ships up to 45 metres without hazardous cargo.</p> <p>Angling will only be allowed in the transit corridor provided that angling does not obstruct the passage of other vessels in the corridor.'</p>
Why a good practice?	Example of how access to OWF and other economic activities can be regulated and co-exist while ensuring safety of operators.
Co-location?	Yes: OWF, shipping, mariculture; potentially: passive fishing, angling.
Reduction of safety distance?	Yes, as the 500 m safety distance for the OWF as whole is overcome by making recommendations on how available space can be used.
Replicability?	Yes, but dependent especially with fisheries and aquaculture on the local conditions.

Name of good practice	Borssele Wind Farm
Other aspects to be mentioned	In 2022 mussel farming began pilot in the Borssele site as well as fisheries activities being considered.
Source of information	<p>Joost Sissingh, 2020, 'Guide to area passport Borssele Exploration co-use Wind Energy Area Borssele'.</p> <p>Rijkswaterstaat Zee en Delta, n.d. 'Code of conduct for safe passage through Borssele Wind Farm Pass'</p> <p>Noordzeeloket, Borssele wind farm zone - Noordzeeloket UK</p>

Table 12: Good practice No. 4: Co-location of fisheries with OWF in Norway

Name of good practice	Co-location of Fisheries with OWF
Member State(s)/country(ies) involved	Norway
Sea basin	North Sea
Period of implementation	2022 (article written)
Activities concerned	OWF /Fisheries
Actors involved	Private and public representatives of fishing interests in Norway as well OWF developers.
Summary of good practice	Maintains bottom trawling incompatible with sites and recommends various passive fishing methods as alternatives. This includes use of gear such as creels for Nephrops and bottom set gillnets for demersal fish species.
Why a good practice?	This shift in gear has in Sweden been tested and has already exhibited net benefits both environmentally and to the community as it encourages technologies favoured by coastal fisheries over foreign fishing fleets.
Co-location?	yes
Reduction of safety distance?	Yes, as it is rather proposing a shared space for both activities under the proper circumstances.
Replicability?	<p>Yes, but many factors must be addressed including:</p> <p>Proper marking and navigation aids used to indicate location of OWF sites for fishers</p> <p>Appropriate gear restrictions to avoid collision, property damage etc.</p> <p>Conduct a fishery intensity study to determine the importance of the specific area as a fishing ground.</p> <p>Marine spatial planning.</p> <p>Fisheries liaison.</p> <p>Bury cables.</p> <p>Increase the inter-turbine distance.</p>
Other aspects to be mentioned	OWF sites have been found to promote growth in fish stocks with higher yields in the area creating synergy opportunities for fisheries and stock restoration programs.
Source of information	'Wind and Fisheries: Desktop Study on the Coexistence Between Offshore Wind and Fisheries in Sothern North Sea,' IIhttps://hdl.handle.net/11250/3030037

Table 13: Good practice No. 5: Co-location of fisheries in OWF in France

Name/title of good practice	Co-location of fisheries in OWF in France
Member State(s)/country(ies) involved	FR
Sea basin	North Sea, Atlantic, Mediterranean
Period of implementation	2023 and ongoing
Activities concerned	OWF, fisheries
Actors involved (name, private/public, etc.)	French government
Summary of good practice	Fishing is envisaged in all French fixed offshore wind farms. The options of co-location in floating wind farms are currently investigated. There are meant to be common rules for fishing in wind farms, particularly concerning navigation safety and risk prevention. Case-by-case rules will be put into place following discussions between fishermen, developers and the government. Specific features of each farm and experience from pilot farms will be taken into account.
Why a good practice?	Fishing in wind farms is generally forbidden in BE and DE. However, in UK and DK it is allowed and in NL fishing is also allowed with restrictions since 2018. The approach to generally allow fishing and establish a set of rules taking into account the needs of navigational safety, fishermen, developers and site-related characteristics can provide a good basis for co-location.
Co-location?	yes
Reduction of safety distance?	More detailed research/experience needed.
Replicability?	Yes, similar rules and processes to establish such rules can and should be replicated.
Other aspects to be mentioned	
Source of information	Maritime spatial planning, Fiche 41: Is fishing in offshore wind farms possible? https://www.debatpublic.fr/sites/default/files/2023-11/MEMN_Fiche_41_Peche_parc_eolien_en_mer.pdf

Table 14: Good practice No. 6: Offshore Wind Energy Shipping Safety Monitoring and Research Programme (MOSWOZ)

Name/title of good practice	Offshore Wind Energy Shipping Safety Monitoring and Research Programme (MOSWOZ)
Member State(s)/country(ies) involved	NL
Sea basin	North Sea, NL EEZ
Period of implementation	2021-2026
Activities concerned	OWF, ship traffic
Actors involved	Rijkswaterstaat (RWS, part of the Dutch Ministry of Infrastructure and Water Management), MARIN (maritime research institute)
Summary of good practice	MOSWOZ is a five-years project that aims at monitoring shipping movements along with the development of offshore activities in the North Sea and, in particular, with the expansion of OWF. Among others, the project looks at safety aspects of shipping and assesses the effectiveness of measures already being practiced (e.g. the Emergency Response Towing Vessels). MOSWOZ is also analysing shipping patterns e.g. outside the main traffic systems, or also those described as 'deviant' (adrift or suffering from weather conditions). The project is also combining historical weather information and relative Automatic Identification System (AIS) data during challenging weather conditions in order to assess the manoeuvring space that vessels required in the past under exceptional conditions.
Why a good practice?	In view of a fast development of offshore activities and an increase in ship traffic densities, the project aims at better understanding shipping patterns, assessing the risk of collision with offshore structures, determining the ship manoeuvring space needed under particular weather conditions and, thus, improving the planning of offshore installations in the North Sea.
Co-location?	No
Reduction of safety distance?	No
Replicability?	Yes, for other EEZ in the North Sea or also other sea basins; ship traffic data (AIS) should be available.
Other aspects to be mentioned	
Source of information	Shipping safety around offshore wind farms (MOSWOZ) - Noordzeeloket UK Development of shipping on the North Sea - MARIN Report 136

ANNEX 2: ACCIDENTS AT SEA RELATED TO INTERACTIONS AMONG MARITIME ACTIVITIES

Since 2011 the European Maritime Safety Agency (EMSA), the European Commission and the member states are operating the European Maritime Casualty Information Platform (EMCIP), which is a database combined with a data sharing system. EMCIP aims to provide background information and profound analysis of accidents at sea as well as better risk-identification and sharing of best practices.

Notifications on marine casualties are obligatory. The database allows for a thorough analysis of accidents at sea, the recognition of trends, the making of recommendations for risk avoidance and improved EU legislation. With the help of EMCIP it is possible to analyse the influencing factors in accidents, such as technical, human, environmental and organisational factors. It is also connected to the Global Integrated Shipping Information System (GISIS) managed by the International Maritime Organisation.

The Annual Overview of Marine Casualties and Incidents published by EMSA every year gives an overview on the development of accidents at sea in European waters. According to the Annual Overview 2023 for the period from 2014-2022 the percentage of accident event types was as follows:

- 55.1 % human action
- 26.3 % system/equipment failure
- 9.6 % other agent or vessel
- 7.0 % hazardous material
- 2.0 % unknown

It can be stated that less than 10 % of all investigated accidents at sea are related to interactions among maritime activities; more than 90 % are related to deficiencies on board or human activities on board or on shore. The percentage of the accident type 'other agents or vessel' varies amongst the investigated vessel type categories, meaning cargo vessels or 'other ships' are more often involved in this accident type:

- Cargo ships 10.5 %
- Passenger ships 7.5 %
- Fishing vessels 7.5 %
- Service ships 9.6 %
- Other ships 14.3%

As contributing factors are identified the following aspects: 'shipboard operation', 'shore management' and 'external environment'. The factor 'external environment' is contributing to accident event types as follows:

- Human action 2.0 %
- System/equipment failure 2.1 %
- Other agent or vessel 3.8 %

The vast majority of accidents are related to human action and/or system/equipment failure in conjunction with shipboard operations and/or shore management. The contributing factor 'Rules, procedures and training', which would comprise safety provisions amongst others, does not contribute to accidents at sea to any relevant degree.

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