

MARCH 2020
DANISH MARITIME AUTHORITY

STRATEGIC ENVIRONMENTAL ASSESSMENT OF DENMARK'S FIRST MARITIME SPATIAL PLAN

SCOPING



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PROJECT NO. DOCUMENT NO.
A118775 1

VERSION	DATE OF ISSUE	DESCRIPTION	PREPARED	CHECKED	APPROVED
0.1	16-03-2020	Scoping Report	KHHI/KNRD	UKJ/KNPN	KHHI

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1 Introduction

The Danish Maritime Authority is currently drafting Denmark's first maritime spatial plan (MSP). The plan is prepared in consultation with other affected ministries as well as coastal municipalities and relevant NGOs. The MSP is preliminary drafted and changes to the draft can therefore occur regarding the description below. The MSP reflects Denmark's marine strategy II¹ and the entire Danish marine area is pointed out for several specific purposes and concrete projects, cf. Danish Act on Maritime Spatial Planning².

With the MSP the administration of sea areas changes from a comes-first-serve principle to an overall spatial planning. Hence it is expected that the MSP will contribute positively to supporting that fixed installations at sea etc. are placed in areas considered to be most appropriate for this purpose both regarding the use of the installation and regarding the protection of nature.

The MSP does not change, which activities/installations the authorities can permit etc. or plan for, but the MSP limits the possibilities for some activities in specific areas by pointing out development zones for specific purposes and concrete projects. In this scoping report the expected content of the MSP is overall examined, and on the basis thereof, it is evaluated whether some the broad issues included in the SEA Directive's³ broad term of environment can be excluded from having likely significant environmental effects and therefore not included in the SEA. The exclusion of some issues regarding the term of environment can be motivated in the fact that the specific environmental factor is not affected by the MSP or that the specific environmental factor is not expected to be affected significantly.

When the MSP is approved and issued Danish authorities are expected only to issue permits for activities, which are collaborate with the certain purposes if the

¹ Miljø- og Fødevareministeriet: Danmarks Havstrategi II, første del - God miljøtilstand, basisanalyse og miljømål, april 2019

² Lov nr. 615 om maritim fysisk planlægning af 8. juni 2016 med senere ændringer.

³ Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment

installations are placed or the activity is carried out within a development zone pointed out for the specific purpose or project. The MSP does not itself provide the right to obtain permits within certain areas, but the plan points out the spatial frameworks in which authorities potentially can issue permits according to relevant sector regulation.

In the MSP zones are pointed out for e.g. navigation without limiting the right to free navigation but it is expected that corridors of priority to navigation is held free from fixed installations.

Denmark's MSP is covered by the obligation of SEA according to § 8(1) in the Danish Act on environmental assessment⁴. Therefore, an environmental report must be prepared.

The SEA must provide a high level of protection of the environment by assessing the likely significant impact of the adoption the plan and possible reasonable alternatives thereto. Furthermore, the SEA contributes to the integration of environmental considerations into the preparation and adoption of the MSP.

The environmental report shall include information that may reasonably be required taking into account current knowledge and methods of assessment, the contents and level of detail in the MSP, its stage in the decision-making process and the extent to which certain matters are more appropriately assessed at different levels in that process, cf. § 12(1) and (2) in the Danish Act on environmental assessment.

Prior to the preparation of the environmental report a scoping of the SEA must be made. This report includes a draft on the scoping of the content of the environmental report. This report furthermore determines the extent of the information which will be included in the SEA of Denmark's MSP. An elaboration of the legal basis and process for SEA and scoping is included in Chapter 3.

⁴ Lovbekendtgørelse nr. 1225 af den 25. oktober 2018 om miljøvurdering af planer og programmer og af konkrete projekter

2 Denmark's Maritime Spatial Plan

Denmark's MSP is prepared in accordance with the obligations in the Danish Act on Maritime Spatial Planning. The MSP is expected to include partly rules for governmental and municipal authorities' access to adopt plans and issue permit regarding installations and use of areas on the Danish sea area according other regulation, and partly pointing out areas defined on the map of the MSP.

The MSP includes the energy sector at sea, maritime transport, transport infrastructures, fishery and aquaculture, mining, some types of land reclamation and preservation, protection and improvement of the environment, which are all subjected to different special regulations. The MSP is expected to point out areas in which permits etc. for installations and use within the sectors mentioned above can be issued, and thereby abstain other areas of the sea from these activities. Within these areas the MSP is expected to potentially limit the authorities access to issue permits for areal use and installations for other purposes than those that are included in the specific areas, to the extent that such permits are contrary to the purpose of the specific designation. The MSP is also expected to include that permits and planning must occur in consultation with the authorities which hold the overall responsibility for the purposes and concrete project for which the areas are designated.

Furthermore, the MSP points out aviation zones for airports, corridors for cabling and navigation. Within these areas the MSP will prioritise the area use for these purposes. These activities and uses will however still be possible outside from the respective zones.

In the MSP areas are expected to be designated, which either are or are expected to be pointed out in accordance to the Marine Strategy, Natura 2000 areas or protected areas.

The MSP does not limit sailing or fishing in marine areas, but such limitation can follow from other regulations. The MSP does not cause any limitations of the regulation set to secure relations regarding nature and environmental protection.

The maritime spatial planning is built upon five elements:

- > Ecosystem-based approach
- > Spaciousness
- > Inclusion of best available knowledge
- > Coexistence
- > Correlation between land and sea

Ecosystem based approach

The preparation of Denmark's first MSP is based on an ecosystem-based approach. Furthermore, it is provided in the Act of maritime spatial planning that the MSP is drafted in relation to Denmark's marine strategy. The MSP provides designated areas of marine strategy as well as areas expected to be designated areas of marine strategy.

The ecosystem-based approach to maritime spatial planning follows the holistic mindset from Denmark's marine strategy II, which is built upon four bullets⁵:

- > Eco-system-based management is a *geographic approach*. It is the management of ecosystem components and human activities, which exist in the same geographic area.
- > Ecosystem-based management concerns the *connections* – not only within the ecosystem but also between ecosystem and human. To this is also that humans is an integrated part of the environment – both in relation to its challenges and solutions.
- > Ecosystem-based management especially focuses on *cumulative effects*. Human activities often affect ecosystems in a complex matter. Here it is important to have knowledge about the effect of the sum of the impacts on an entire ecosystem.
- > ecosystem-based management is about acknowledging the many *different objectives and interest* at sea. An ecosystem can have multiple functions (ecosystem services), but possibly not all at once. For example, a sandbank can be used for installing a wind turbine, be the foundation for sand and gravel mining, used as a fishing ground for fishermen or be protected as a habitat for fish. Some activities can coexist whereas others cannot.

Spaciousness

Area designation in Denmark's MSP ensures space for continued maritime innovation and development instead of only designating areas for present technologies. Among other things, this significate that an area designated for sustainable energy is not expected to be specified regarding which types of installation for exploitation of sustainable energy a permit can be issued, e.g. wind power plants or installations for generating energy using wavw energy or ocean currents. Thereby, the technology of the future is also possible under the frameworks of the MSP.

To safeguard the necessary spaciousness in the planning, the MSP also designates overlapping development zones for multiple purposes where the specific use of area must be determined in connection to the specific approvals or permits. Hence, the designation of areas for developments zones does not limit the use of the respective areas for other activities which are not included in

⁵ Miljø- og Fødevarerministeriet: Danmarks Havstrategi II, første del - God miljøtilstand, basisanalyse og miljømål, april 2019

the maritime spatial planning if the other activities are compatible with the objective of the designation of the area as development zone. However, permits for other uses within the designated areas can only be issued in consultation with the minister which is responsible for the sector in which the area is designated.

Inclusion of best available knowledge

Denmark's MSP is based on the best available knowledge. Hence, the MSP is drafted in cooperation with an inter-ministerial steering committee and working group consisting of governmental authorities with responsibilities for activities at and protection of the sea. The authorities have provided data and shared knowledge on the different purposes, which are planned for in the MSP.

Finally, Denmark has participated in international cooperation with neighbouring countries in the Baltic Sea and North Sea respectively as well as an EU expert group on maritime spatial planning, where member states have shared experiences with one another.

Coexistence

In the maritime spatial planning, it is sought to promote the coexistence of different relevant activities and uses under the consideration of nature and environment obligations and interests. The purpose thereof is among other things to create a better framework for the sectors and interests which are planned for in the MSP.

The possibilities for coexistence in connection to drafting the MSP is evaluated regarding the potential of multiple types of installations and activities which could be carried out within the same area, whether this happens simultaneously or at different times. The final evaluation of the possibilities for coexistence is expected to happen in connection to the specific permit etc. for the specific project in the areas. At the same time, it is also evaluated where in the total maritime space the activities are carried out – marine surface, water column, seabed or underground – which gives the opportunity for different sectors and interests to use the same area. For example, mining can coexist with navigation corridors under the consideration of safety of navigation, hence mining is a contemporary in nature and does not include establishment of fixed installations. Fixed installations such as wind turbines can however not coexist with navigation corridors and areas designated for sustainable energy is thereby not expected to be designated in navigation corridors.

In most situations, the possibilities for the coexistence of multiple installations and uses within the same area will however depend on a concrete assessment in connection to specific permits etc. or planning for activities and use. Issuing permits etc. or adopting plans must therefore be carried out under the consultation of other relevant line ministries.

Correlation between land and sea

Denmark's MSP is drafted under the considerations of the relation between installations and use of the Danish maritime areas on one hand, and on the

other hand, land-based infrastructures e.g. gas pipelines running across land and sea, future bridges and tunnel projects, ports as well as municipal and local planning.

The coastal sea areas are predominantly expected to be held clear from larger physical installations, which is planned for in the MSP, and which significantly could prevent or hinder e.g. maritime logistics, fishery, tourism and recreational uses of the sea. However, it is expected that the MSP will consider the possibility for future development of coastal installations e.g. ports and coastal protection which are not included in the MSP. This shall among others support the correlation with the municipal planning.

Special consideration applicable to the SEA of the MSP

With the adoption of Denmark's first MSP specific areas which are expected to be used for specific types of use and installation are designated from an overall planning. The possibility of continuing existing activities at sea is not changed by the adoption of the plan. The adoption of the plan only provides the spatial framework in which authorities can issue permits or adopt plans, but the MSP does not change whether permits can be issued according to sector laws or plans be adopted according to other legal frameworks in a specific area, which is designated for the activity concerned.

The MSP enters into force no later than the 31st of March 2021 and must be revised and updated at least every tenth year. As a principle the first MSP will not in itself lead to significant impacts on the environment as the MSP does not entail possibilities of activities which cannot happen in the Danish maritime areas already. Thereby, the likely significant environmental impacts of the adoption of the plan cannot be distinguished from the effects already happening in the maritime areas today.

The MSP is predominantly expected to lead to positive impacts on the environment as the MSP at an overall level exempt some areas from some types of use.

3 Scoping and SEA

3.1 Legal basis and process for SEA

Denmark's MSP is subject to the requirement of strategic environmental assessment (SEA) in the Danish Environmental Assessment Act, cf. § 8(1.1) of the Act. The environmental assessment will be carried out according to the five steps in Figure 3-1 below.

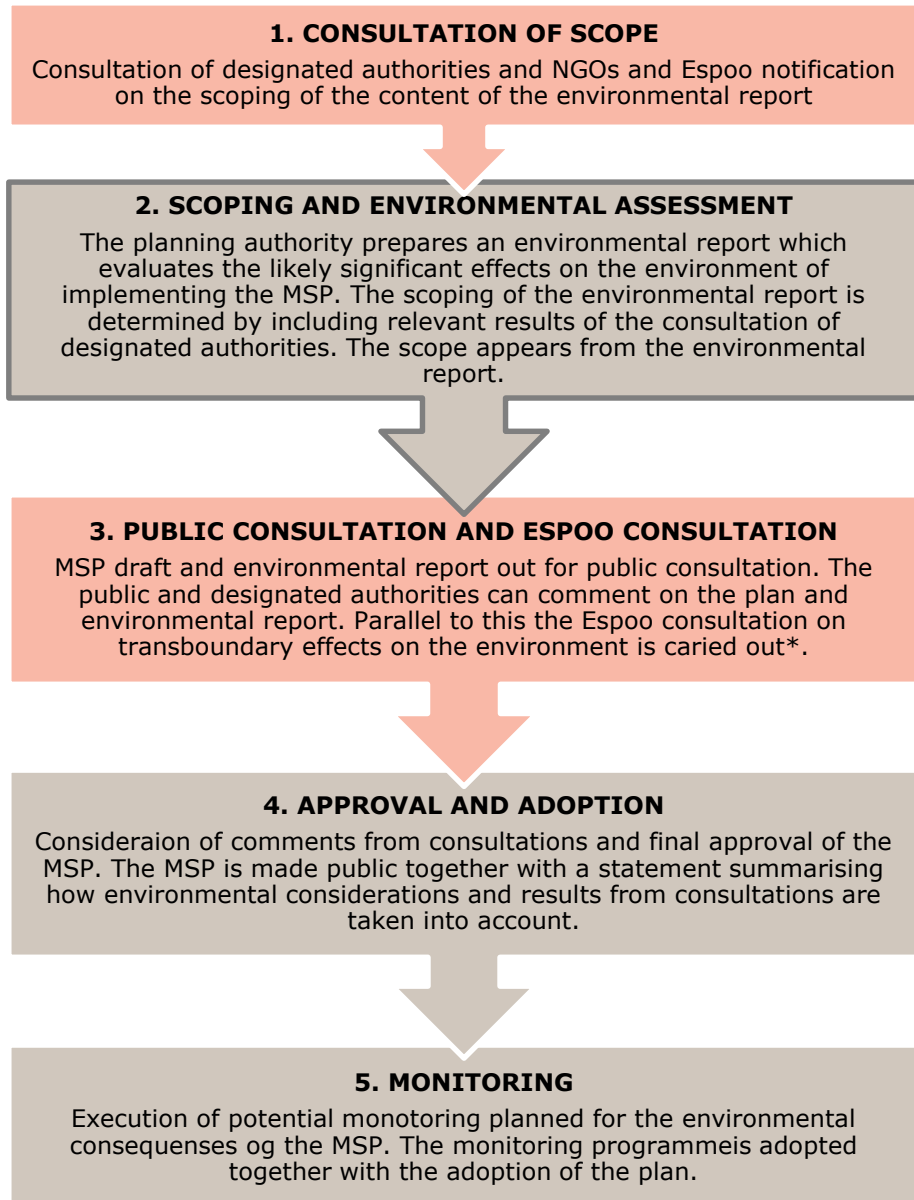


Figure 3-1 Graphic overview of the phases in the SEA process.

- Authorities processing: Danish Maritime Authority
- Public comment period
- Current phase in the SEA process

*The Danish Environmental Protection Agency is point of contact

3.2 Scoping purpose and content

This report is carried out for the purpose of scoping of the SEA of the MSP as well as determining the level of detail of the environmental report. There are no legal requirements to the content or method of scoping the environmental report and for this reason the scope is determined from criteria, which from experience have shown to be relevant, including the identification of:

- > The environmental impacts which derive directly or indirectly from the MSP
- > The environmental impacts which are expected to be addressed later in the compiled approval process.
- > The relevant objective of environment (national/regional/international) which must be included in the environmental assessment.
- > Evaluation criteria connected to the identified environmental impacts, including mapping of data needs and data availability

The Environmental Assessment Act requires that the environmental report must contain a description and evaluation of the likely significant impact on the following environmental factors:

- > biodiversity
- > population
- > human health
- > flora
- > fauna
- > soil
- > land
- > water
- > air
- > climatic factors
- > material assets
- > landscape
- > cultural heritage, including churches and their surroundings as well as architectural and archaeological heritage
- > larger catastrophes made by man or nature
- > resource efficiency
- > the mutual relations between these factors

The purpose of the scoping is then to decide on whether and to what extent the plan can be assumed to cause significant impacts on one or more of the above listed factors. To the extent that it is assumed that one or more of these factors are impacted significantly or if a significant impact on one or more of these factors cannot be excluded, this will be assessed further in the environmental report.

The scoping of the environmental report thereby determines the extent of the information needed to carry out an environmental report in which the likely

significant impacts on the environment from the adoption of the plan and reasonable alternatives are determined, described and evaluated. The level of detail of the SEA depends on the level of detail of the MSP, as well as its stage in the decision-making process.

3.3 Approach and method in the SEA

The SEA is carried out as an objective based assessment where the respective initiatives in the MSP is held up against the environmental objective of the respective areas at sea. The assessment is furthermore based on the environmental factors, which are described in the Environmental Assessment Act § 1(2). The environmental factors cover a range of specific environment topics used as a basis for a description of possible environmental impacts in chapter 3.4. The likely significant environmental impacts are described for each of these environmental factors both isolated and crosswise of the factors.

The assessments are mainly qualitative and are made on the basis of identified evaluation criteria. The evaluation criteria are built on national objectives and purposes behind the designation of specific areas etc. Whether the expected impact is significant or not is decided on the basis of existing available knowledge and experience from carrying out environmental assessments as well as information that may reasonable be required taken into account current knowledge and methods of assessment.

In the SEA it will be evaluated whether the impacts can be avoided by changing the plan, reduced by precautionary measure or through compensation of the effects.

The starting point of the SEA is the description of the existing state of the environment (reference scenario). In this context, a description of the expected development of the existing state of environment if the MSP (alternative 0) is not adopted is made.

3.4 Assessment of environmental impacts across national borders

Pursuant to the Espoo Convention⁶ Denmark is obligated to involve neighbouring states who can potentially be affected of Denmark's MSP in the SEA process.

If a plan is expected to have significant impacts on the environment in another state the planning authority shall as soon as possible inform The Ministry for Environment and Food of Denmark (The Danish Environmental Protection Agency) regarding the consultation of neighbouring states, cf. Environmental Assessment Act § 38(1).

⁶ Bekendtgørelse af konventionen af 25. februar 1991 om vurdering af virkningerne på miljø på tværs af landegrænserne

The neighbouring states affected by Denmark's MSP are involved in the of the SEA process simultaneous and the same way as the Danish public, Danish NGOs and other authorities.

Step one in the Espoo-process is forwarding an Espoo notification in where Denmark informs neighbouring states, which can be affected by the plan. The purpose of the notification is partly to ask the neighbouring states whether they want to participate in the process, and partly if they have any remarks on the forwarded draft of the scope of the environmental report or other wishes of topics that should be assessed in the SEA of impact across national borders. Furthermore, the concerned states must be informed of the time schedule for the MSP and the SEA, the type of the decision that can be made after the process as well as guidance of complaint.

Step two in the Espoo-process is a consultation of the concerned states that want to participate in the SEA process. The material for this consultation includes an environmental report of the transboundary environmental impacts the Danish MSP can have on the affected states as well as a draft of the MSP itself. The neighbouring states will be asked to comment the SEA.

If a neighbouring state has questions or remarks to the SEA of the impacts across national borders, these must be resolved with the neighbouring state before the MSP can be adopted.

3.5 Likely significant environmental impacts

In the following chapters the potential likely significant impacts on the environmental factors listed in the Act on environmental assessment are reviewed in order to identify whether any of the environmental factors on the current knowledge base can be excluded to have any significant environmental impacts as a result of the adoption of the MSP.

3.5.1 Biodiversity, flora and fauna

This subchapter focusses on the organisms, which are included in the SEA and the pressures, which can have a significant impact on species and biotopes. Table 3-1 summarises which groups of organisms/biotopes on which a significant environmental impact is not conceivable as a result from adopting the MSP. At the same time this is linked to the pressures which are pointed out in Denmark's Marine Strategy that will be included in the SEA as well. The environmental issues are reviewed in the following.

Table 3-1 Flora and fauna and possible pressures resulting from the designation of areas in Denmark's first MSP. Pressures which will be included in the SEA are marked with an 'X'.

Organism/habitat and possible pressures	Included in the SEA
Seabed fauna/biotopes	
Physical presence of constructions	X

Changed seabed type (integrity of the seabed)	X
Pollution matters	X
Dispersion of sediments	X
Hydrographic changes	X
Oxygen loss	X
Reef effects	X
Magnetic fields*	
Eel grass	
Birds	
Collision risk	
Blocking	X
Change of behaviour (e.g. territorial or breeding behaviour)	
Displacement/loss of habitat	X
Hydrographic changes	X
Reef effects	X
Bats	
Collision risk	
Fisk	
Physical presence of constructions	X
Changed seabed type	X
Pollution	X
Dispersion of sediments	X
Reef effects	X
Hydrographic changes	X
Magnetic fields*	
Marine mammals	
Hearing damage	X
Flight behaviour	X
Blocking from physical constructions	X
Change of behaviour	
Protected areas	
Bird protection areas/Ramsar areas	X
Natura 2000 Habitats	X
Other protected areas	X

*Reviewed separately.

Seabed fauna (biotopes)

The sea possesses different types of nature and species, which is crucial for the biodiversity. The different uses of the sea can have a positive as well as negative

significance for the biodiversity in an area. The designation of areas for development zones maintain the existing possibility of issuing permit for projects and activities within several sectors. These potential projects/activities can affect ecosystem components and the integrity of the seabed (habitats at the bottom of the sea). The spatial frameworks can thereby maintain existing possibilities for significant impacts on the environment, e.g. whereas the plan enables continued activities invoking dispersion of sediments, discharge of environmentally hazardous substances etc.

On the other hand, constructions such as turbine foundations, bridge piers and energy hubs, which continuously can be permitted and planned for after the adoption of the MSP, can contribute to obtaining a higher biodiversity by e.g. providing an artificial effect of reef or sandbanks. Denmark's first MSP supports the existing and expected nature and environment protection and can entail a positive impact on the marine nature. Biodiversity, flora and fauna is included in the SEA of the MSP.

In connection to the SEA of the MSP information on location of known stone reefs, mussel banks, sandbanks and bubbling reefs are acquired. The SEA will focus on the designation of areas in the MSP and the possible impact on ecosystem components from possible permits issued within these areas. The extent of the effects and the likelihood of impacting the seabed fauna will be assessed from a marine scientific assessment. Indirect effects on the seabed fauna (e.g. hydrographic changes resulting from potential dams or bridge piers) will also be included in the assessment. The total area affected in which the integrity of the seabed is potentially impacted will be assessed to the possible extent. The assessment of the potential will have a parent character and focus on the cumulative effects. The definite assessment of the seabed fauna will be carried out in relation to approving the concrete project or activity and issuing the permit or in relation to the adoption of plans pursuant to other laws.

Eel grass

Eel grass is an indicator species for the environmental status in coastal waters. Eel grass only occurs close to the coast and is limited to depths lower than 6-8 meters.

It is expected that the MSP will designate development zones in coastal waters in which projects can be planned for and permitted. Eel grass is among other things impacted by physical constructions, dispersion of sediments, emission of nitrogen or through changes of hydrographic. Designation of areas in coastal waters for development projects such as bridges and tunnels in the MSP is considered limited whereas the eel grass will only be affected in individual cases. The designation of areas is therefore excluded from having a significant environmental impact. Indirect effects of eel grass in relation to water clarity is addressed under pollution. The effect on eel grass occurrences is therefore not assessed in the SEA.

Birds

Birds that are migrating over seas have a risk of colliding with wind turbines. This occurs especially during spring and fall migration where birds follow determined routes. However, constructions at sea, e.g. energy hubs and drilling platforms can function as a rest area for sea birds and thereby have a positive effect.

Changes in the areal use at sea can potentially effect bird behaviour. Changes of behaviour can include changes in breeding and territorial behaviour or change in migration routes. Change of behaviour can ultimately effect bird's ability to reproduce. There is no adequate knowledge to support behavioural changes of birds as a result from activities at sea can have a potential significant impact on bird population. The issue is therefore excluded from further assessment in the SEA of the MSP.

Experience from previous SEAs of placement of wind power parks has shown that the risk of birds colliding with wind turbines and get killed is very low. However, is not conceivable that development of the MSP zones for sustainable energy according to the goals and objectives of the Danish government to reduce CO₂ emissions can have an impact on bird's migration routes, if a simultaneous development of wind power parks results in a blocking effect. The issue will be assessed further in the SEA of the MSP.

In addition to this, some areas at sea are important hibernation, resting and feeding areas for specific types of birds. These can be displaced or disrupted from seizure of areas for e.g. wind power parks, mining etc. Their feeding grounds can also change because of e.g. changes in hydrography, changes of the integrity of the seabed or because of pollution.

The SEA will focus on pressures, which can potentially become a consequence of the planning of public authorities of their issuing of permits etc. for concrete projects that will be possible after the adoption of the MSP. The potential effects on bird's migration routes, hibernation areas, resting areas and feeding grounds from these pressures will be assessed in the SEA from a number of scenarios for the development of areas for sustainable energy. The assessment is carried out under the consideration of the overall level of detail of the MSP on the basis of information on important migration routes and feeding grounds for birds listed on annex 1 to the Birds Directive as well as important hibernation areas for sea birds. Objective for ensuring considerations of sea birds in relation to displacement and possible coexistence is also included in the SEA of the MSP.

Bats

Bats are protected and included in the Habitat directive. Bats can collide with wings of wind turbines. Worst case, this can result in impacts on bat populations which passes by or lives in areas around development zones for sustainable energy, if the areas are later designated for wind power.

Collisions with wind turbines can present a threat for bats if wind turbines are established in bat's migration corridors. The risk of bats colliding with offshore

wind turbines is low as bats primarily stay near the coast. Bats are however registered at a distance of 22 km (Sjollema et al. 2014) off the coast in connection to migration.

The majority of the areas, which are expected to be designated of development zones for sustainable energy in the MSP, will not be designated in coastal areas, hence the adoption of the MSP will not have any significant environmental impacts on bats.

Fish

Subsequent to the adoption of the MSP, activities potentially affecting fish can still be permitted. It is not conceivable that the pressures, which can have a possible significant effect on fish populations continuously will be permitted in the form of physical presence of constructions, changes to the integrity of the seabed, decreased water quality and oxygen loss (see also subparagraph on Seabed fauna (biotopes)). Besides physical changes in the environment fish can also be affected of water quality, including local oxygen conditions and discharge of environmentally hazardous substances.

The adoption of the MSP is expected to include that some areas are exempted from fixed installations which can potentially affect those fish populations that lay eggs on the bottom of the sea. Fish will there be included in the assessment of biodiversity, flora and fauna in the SEA.

The SEA is carried out in relation to the overall level of the plan on the basis of best available knowledge on crucial spawning and growth areas for fish. The assessment is based on available information in literature at databases as well as Danish Fisheries Agency statistics on fishery.

The assessment is furthermore carried out in relation to the overall level of the plan on the basis of best available knowledge potential emissions of nitrogen and environmentally hazardous substances in designated areas. The starting point of the assessment will be the environmental status within the designated areas and their sensibility to nitrogen.

Marine Mammals

With the designation of areas for specific purposes and concrete projects in the MSP, the framework for spatial planning is set for future area use at sea.

Whales, including harbour porpoises, are strictly protected as they are listed on annex IV to the Habitat Directive. Seals and harbour porpoises are furthermore protected in several Natura 2000 areas, whereas they provide a part of the basis of the appointment of protection.

Harbour porpoises are particularly sensitive to underwater noise and it is proved that underwater noise can result in hearing impairment (Southhall et al. 2007), flight behaviour (Däne et al. 2013, Thompson et al. 2010, Tougaard et al. 2009) or communication disorders (Tougaard 2014) on harbour porpoises. This is assessed further in the SEA under cumulative effects.

It is not conceivable that after the designation of zones in the MSP for different purposes and projects it will continuously be possible to issue permits for establishing activities which can affect marine mammals, why this will be assessed in the SEA. In the SEA the designated areas will be assessed at an overall level on the basis of knowledge concerning the relative density of harbour porpoises and the importance of feeding grounds for common seal and grey seal.

In the SEA the focus will be on the cumulative effects of the designation of areas in the MSP.

Invasive species

In the MSP zones are designated in which authorities continuously can issue permits for activities that can potentially introduce invasive species to the Danish marine environment. Invasive species are primarily introduced from ballast water from shipping. The MSP does not regulate discharge of ballast water. In addition to this, aquaculture can in some occasions introduce new species to the environment. In the MSP areas are designated for energy hubs, which can lead to fillings of stones, sand and gravel. Invasive species will in connection to this possibly be introduced to the Danish marine ecosystems. The methods for constructing energy hubs in the areas designated to development zones in the MSP is however not determined and relations regarding establishment and risks of introducing invasive species will thereby be assessed better in connection to the SEA of the specific plan for establishing concrete energy hubs.

The MSP will not result in any higher risks of introducing invasive species in the Danish EEZ. The issue will not be assessed further in the SEA of the MSP.

International nature protection areas

EU's nature protection directives include the Birds Directive and the Habitat Directive. All Danish Ramsar areas listed as wetlands of international significance coincide with areas protected by the EU's Birds Directive are thereby subject to the same protection.

Natura 2000 sites are internationally protected areas of nature, which are protected based on several species and nature types. It is not conceivable that the MSP can have a significant effect on nature types and species which form the basis of designation in Natura 2000 sites, especially regarding the MSP's designation of development zones for aquaculture near Natura 2000 sites. It is not conceivable that other parts of the MSP can affect nature types and species in Natura 2000 sites. The impact on international nature protection areas will be assessed in the SEA.

Other protected areas

The MSP designation of areas for nature and environment protection are areas designated for protection in the Danish Marine Strategy programme of measure as well as national areas of conservation at sea. Areas designated in the

programme of measure of the marine strategy are designated for the conservation of good marine environment in the future.

Other protected areas will be assessed in the SEA of the MSP.

Magnetic fields

Around all power cables magnetic fields will occur, which can potentially affect marine mammals and fish. Subsea cables are often established as DC cables, meaning the power only runs in one direction. EIAs of e.g. the COBRA cable showed that the magnetic field around a static power cable similar to the COBRA cable is approximately 7 μT at the bottom (Danish Nature agency 2015). For comparison, the earth's own magnetic field in Denmark's is 50 μT and thereby multiple times larger than the magnetic field of the cable.

Static fields are generally not subject to the suspicion of having environmental impacts and the effect on the marine fauna is insignificant.

Contrary to DC cables, fish can detect electric and magnetic fields around AC installations, but as AC cables are rarely used as subsea cables at large distances, magnetic fields are excluded from having a significant impact on fish. Furthermore, there are no sources supporting that electro magnetic fields could hinder migration of fish. The issue will not be assessed in the SEA.

3.5.2 Population and human health

Shipping and safety of navigation

By designating development zones navigation corridors will be considered. The purpose thereof is among other things to enhance the safety of navigation.

It is expected that navigation corridors are designated in the MSP in areas which are preferred exempted from fixed installations. A significant environmental impact on shipping is not expected as a result of the overall maritime spatial planning of use of sea areas. The safety of navigation is thereby not assessed further on the SEA.

Recreational interests

Recreational interests at sea include among other things sailing, fishing, surfing, rowing and diving. The designation of areas for general use is expected to support the use of the areas for recreational purposes but the MSP is not expected to designate areas for recreational purposes only.

Recreational interest will not be assessed in the SEA of the MSP.

3.5.3 Soil and land

As the MSP only covers spatial planning at sea, there will be no risk of the plan affecting soil or land. The effect on the seabed is assessed under the

subparagraph regarding Seabed fauna (biotopes). Soil and land will not be assessed further in the SEA.

3.5.4 Water

Pollution

The environmental factor water includes both surface water, groundwater and seawater. To a great extent, the water quality depends on water clarity, which is determined by the substance of nitrogen and organic matter. In addition to this, water quality depends on the substance of pollutants and environmentally hazardous substances. Oil and gas exploitation and shipping are the primary sources of emission of pollutants and environmentally hazardous substances at sea whereas aquaculture is the primary source of emission of nitrogen from activities at sea.

Aquaculture mitigate nitrogen, phosphor and organic matters and thereby contribute to pollution and potential loss of oxygen, especially in coastal areas. The adoption of the MSP sets out the framework of spatial use, under which authorities can issue permits and adopt plans for e.g. aquaculture, but the MSP does not change whether an authority can issue a permit under sector laws or adopt plans in accordance to other legislation in areas that are designated to that activity respectively.

It is not conceivable that the overall maritime spatial planning of areal use at sea can affect the concentration of nitrogen, phosphor and organic matter in locally defined (coastal) areas of the sea with limited and/or non-optimal flow conditions. The issue will therefore be included in the SEA.

The SEA is carried out on the basis of existing knowledge where the likely effects on local biological conditions and hydrography as well as objective and goals thereof are assessed from different scenarios of development in zones designated for aquaculture in the MSP. After the MSP's designation of areas for research and exploitation of oil and gas, authorities are expected continuously to be able to issue permits for establishing installations that mitigate pollutants and environmentally hazardous substances to the sea. The issue will therefore be assessed further in the SEA.

The overall spatial planning of use of sea areas does not imply an increase of shipping and thereby does not imply an increased emission of pollutants and environmentally hazardous substances to the sea. Emissions of pollutants and environmentally hazardous substances from shipping will thereby not be assessed further in the SEA.

3.5.5 Air

Air emission from e.g. flaring and shipping is regulated internationally through the Gothenburg Protocol and the EU Directive on the reduction of national emissions of certain atmospheric pollutants (Directive (EU) 2016/2284). The latter

Directive sets emission reduction commitments per pollutants for each EU country to be attained by 2020 and 2030.

Shipping can - beside of mitigating CO₂ which is a greenhouse gas (GHG) – include emission of polluting air particles such as sulphur oxides (SO_x) and nitrogen oxides (NO_x). The adoption of the MSP will not affect the amount of shipping and therefore not be assessed further in relation to the impact on air in the SEA of the MSP.

The MSP is expected to designate development zones for research and exploitation of oil and gas. Within these areas, authorities can adopt plans and issue permits for oil and gas research and exploitation. Flaring of oil and gas in connection to exploitation contributes to pollution emissions at sea. This effect from the oil and gas sector is however better assessed in connection to a potential call for tenders and authorities' issuing of permits for emitting polluting particles under the national frameworks for emission limits. The issue will therefore not be assessed further in the SEA of MSP.

Emission of CO₂ from all activities at sea is addressed under Climatic factors.

3.5.6 Climatic factors

Sustainable energy

Production of sustainable energy can potentially replace other sources of energy which pollute air and water environment and mitigate CO₂. A sufficient number of designations of development zones for sustainable energy can contribute to the government's goal on reducing national CO₂ emissions and thereby have a significant positive impact on the climate. Climatic factors will therefore be assessed further in the SEA.

In the SEA climatic factors are assessed from different scenarios for the development in development zones for sustainable energy as well as to which extent these scenarios can contribute to a reduction of the total emission of CO₂ and thereby contribute to meeting the goal of reducing Denmark's emissions, having a positive impact on climatic factors.

The exploitation of oil and gas imply emission of CO₂. The designation of areas in the MSP as development zones for research and exploitation of oil and gas provide the spatial framework in which the authority can issue permits and/or adopt plans for installations etc. for research and exploitation. However, the MSP does not change whether a permit can be issued according to relevant sector regulations in an area designated for the respective activity. The assessment of potential GHG emissions will be carried out at an overall level whereas the further assessment of the effect of oil and gas activities will be carried out in connection to the issuing of the permit.

3.5.7 Material assets

Material assets are in relation to the MSP human and nature made assets, which provide a basis for exploitation, no matter if the exploitation is an acquisition of resources or the use of an area for a specific use, e.g. recreational use. In the SEA the effects of the material assets listed below will be assessed further:

Table 3-2 Material assets, which are included in the SEA of Denmark's MSP

Material assets, which are included in the SEA of Denmark's MSP
Nature-made:
Rock, sand and gravel
Fish and shellfish
Recreational use of areas
Sailing
Oil and gas
(Wind)
Man-made:
Pipeline
Cables
Wind turbines
Infrastructure (bridges/tunnels)
Aquaculture

In the SEA of the MSP nature-made and man-made material assets are distinguished.

Nature-made assets include – as it is shown in Table 3-2 – rocks, sand and gravel as resources, populations of fish which can be caught and recreational use of marine areas. Even though wind is not a physical material asset, wind will be included in the SEA as wind can potentially be transformed into electricity. Man-made material assets include offshore physical installations and artificially established aquacultures.

The focus of the SEA will be the designation of areas in the MSP which can create possible conflicts of interest. Potential conflicts can include the conflict of one activity planned for may exclude another use of the area (e.g. power turbines can exempt areas from exploitation and mining at the seabed). Other types of conflict can include that some activities, which continuously can be permitted after the adoption of the plan, can affect the value of other material assets, such a wind power parks in coastal waters which affects the pricing of summerhouses and/or real estate, tourism or recreational interests. Aside from that, coastal areas are predominantly exempted from physical installations, which can maintain a significantly positive impact on the recreational use of coastal waters.

The assessment of the MSP's impact on material assets will be included in the SEA.

3.5.8 Raw material consumption

Future activities of establishments can require an increased consumption of raw material, including fillings such as Holmene in Hvidovre and Lynetteholmen in Copenhagen, as well as energy hubs in the Danish EEZ. The MSP designates development zones for sustainable energy, in which authorities can plan for and issue permits for the construction of energy hubs. However, the method of establishment is not determined.

3.5.9 Landscape

Visual conditions

Installations at sea can in some cases be seen from land and thereby affect the visual experience of the marine area from land. The MSP designates development zones for sustainable energy in which authorities continuously can issue permits for installations, e.g. wind turbines. On the other hand, some areas are exempted from installations for sustainable energy such as wind turbines.

It is not conceivable that the continuous possibility of authorities to issue permits for installations, which can affect the visual conditions significantly in some areas. Landscape/visual effects will thereby be assessed in the SEA.

In the SEA an overall assessment of the likely impact on the landscape from establishing wind turbines in development zone, which can be seen from land, will be made.

3.5.10 Cultural heritage, including churches and their surroundings as well as architectural and archaeological heritage

Marine archaeology

At sea old shipwrecks and remains of the past are kept. Installations and activities at sea can damage these relics. The impacts on heritage of marine archaeology cannot be identified at strategic level, as the assessment of the effect on relics typically will require that the exact location of activities is known. This knowledge does not occur at this stage of the maritime spatial planning.

Cultural heritage, including marine archaeology will not be assessed in the SEA of the MSP.

3.5.11 Larger catastrophes made by man or nature

At an overall level, the designation of areas for specific uses can potentially over time create the grounds of information of which activities are carried out in the specific areas and thereby enhance the consideration of the different users of marine areas and resources.

It is conceivable that the general risk of larger catastrophes made by man or nature can be impacted significantly by the adoption of Denmark's first MSP. Larger catastrophes made by man or nature will therefore not be assessed in the SEA.

3.5.12 Resource efficiency

The designation of a considerably amount of areas for development of sustainable energy, in which the authorities continuously can issue permits etc. for exploitation of wind power and establishment of energy transmitting connections that transport and distributed the produced energy from production sites to costumers ensures that the MSP supports the possibility of enhancing the resource efficiency. hence, the designation of developments zones for sustainable energy in the MSP can potentially contribute positively to meeting the goals of the government on resource efficiency and thereby have a significant impact on the resource efficiency.

Resource efficiency will be assessed in the SEA at an overall level. In the SEA goals and objectives for resource efficiency will be evaluated against the MSP's designation of development zone for sustainable energy and zones for cable corridors and transmission grids.

3.5.13 Cumulative effects

As a part of the SEA, an overall assessment of the cumulative impact of the environment from the MSP's spatial framework for potentially exploiting the marine area for activities will be carried out. The environmental report will emphasis on the effects which are either derives across activities or derive from a development where several zones are designated for the same purpose in the same geographical areas.

The designation of zones in the MSP and the thereto following limitations and continuously possibilities for carrying out activities can imply cumulative impacts in different scenarios:

- > Cumulative effects where several activities of the same type are continuously possible within the same geographical area
- > Cumulative effects where different types of activities, which have the same effect on the environment, are continuously possible
- > Cumulative effect where different types of activities, which have different effects on the environment, are continuously possible
- > Cumulative effects as a result of transboundary activities continuously are possible

The designation of areas in the MSP for the development of fixed installations, which include the possibility for the authority to issue permits etc. that can

potentially imply a blocking effect on birds' migration routes and displace resident birds and marine mammals. This development must be seen in connection to the plans of other states on designating areas for activities and fixed installations on their sea territory.

Denmark's first MSP can also imply positive cumulative effects as the designation of different development zones in the MSP also implies limitations of where these activities can be permitted.

Table 3-3 summarises the possible cumulative effects which will be assessed in the SEA.

Table 3-3 Overview of cumulative effects, which are assessed in the SEA of the MSP.

Cumulative effect	Planned area use
Blocking of birds' migration routes	Infrastructure (bridges), energy (sustainable)
Displacement of sea birds and marine mammals	Infrastructure (oil and gas), energy (sustainable) and other human activities
Emission of GHG	Exploitation of oil and gas
Pollution of the sea	Aquaculture, exploitation of oil and gas
Accidents	Infrastructure (bridges/tunnels), energy, exploitation of raw materials, oil and gas, navigation corridors, infrastructure (aviation)
Underwater noise (seismic and piling)	Energy (sustainable), energy (oil/gas), exploitation of raw material
Visual changes	Energy (sustainable), infrastructure (bridges/tunnels), aquaculture
Changes of the integrity of the seabed	Energy, exploitation of raw materials, oil and gas infrastructure (bridges/tunnels), aquaculture (cultivation of oysters and mussels)

Hence, cumulative effects of the MSP are included in the SEA.

4 Overview of potential effects

Table 4-1 provides a summary of all the environmental issues as well as the significance of their potential effect.

Table 4-1 Overview of addressed environmental issues and the significance of the potential effects

Environmental issue	No or insignificant effect	Significant effects not excluded
Biodiversity, flora and fauna		
Seabed (biotopes)		X
Natura 2000	X	
Marine mammals		X
Bats	X	
Birds		X
Fish		X
Eel grass	X	
Invasive species	X	
Internationale nature protection areas		X
Other protected areas		X
Population and human health		
Shipping and safety of navigation	X	
Aviation and aviation safety	X	
Recreational interests	X	
Soil and land		
Soil	X	
Land	X	
Water		
Pollution		X
Air		
Air particles	X	
Climatic factors		
Sustainable energy		X
Greenhouse gases		X
Material assets		
Waste	X	
Aquaculture (fish farms)		X
Aquaculture (cultivation of mussels and oysters)		X
Aquaculture (cultivation of mussels in water column)		X
Aquaculture (seaweed)		X
Energy (oil/gas)		X
Energy (sustainable)		X
Fishery		X
Pipelines for distribution of gas		X
Recreational use		X

Exploitation of raw material		X
Siling		X
Increase of insurance		X
Infrastructure for transport		X
Tourism		X
Landscape		
Visual conditions		X
Lights	X	
Cultural heritage		
Marine archaeology	X	
Larger catastrophes made by man or nature		
Work accidents	X	
Plane crash	X	
Oil spills	X	
Undetonated ammunition (UXO)	X	
Resource efficiency		
Material for construction	X	
Energy (assessed under climatic factors)		X
Cumulative effects		
Waste	X	
Barrier effects (birds, marine mammals, fish)		X
Electromagnetic fields	X	
Greenhouse gas emissions		X
Displacement/loss of habitats		X
Pollution		X
Physical pressure from constructions		X
Invasive species	X	
Collision risk	X	
Airborne noise		X
Magnetic fields	X	
Oil spills		X
Permanent change of hydrographic conditions		X
Dispersion of sediments		X
Accidents		X
Underwater noise		X
Visual changes		X
Change of the integrity of the seabed		X

4.1 Assessment criteria, indicators and data needs

In Table 4-2 below several criteria and indicators are suggested for the use of assessing the likely significant impacts on the environment, which have been

identifies in chapter 3.5. The table also provides an overview of the data needed to carry out the SEA of Denmark's first MSP.

Table 4-2 Environmental factors, evaluation criteria, indicators and data need. If a specific need of data is not provided, the SEA will be based on qualitative expert assessment.

Assessment criteria	Indicator	Data
Biodiversity, flora and fauna		
Effect on seabed fauna (biotopes)	Extent of possible effects on areas with stone reef, biogenic reef, sandbanks and bubbling reef.	Information on known stone reef, biogenic reef, sandbanks and bubbling reef Overview of seabed substrates
Effect on habitats for birds listed on the Birds Directive annex I	Extent of possible effect on habitats for birds listed on the Birds Directive annex I Extent of possible blocking of migration route for birds listed on the Birds Directive annex I.	Resting areas for migrating birds listed on annex I. Hibernation areas for sea birds. Important feeding grounds for breeding sea birds and shore birds. Information on migration route for birds listed on annex I.
Effect on fish population	Extent of possible effect on spawning areas for fish for human consumption. Extent of possible effects on water quality in growth areas for fish. Extent of possible effect of habitats of fish for human consumption. Possible effects on migration routes.	Mappings of spawning and growth areas for fish. Habitats of fish for human consumption. Information on potential emissions of nitrogen and environmentally hazardous substances at sea.
Effect on population of harbour porpoise Effect on population of grey seal and common seal	Extent of possible effect on occurrence of harbour porpoises in its habitats. Extent of possible effect on the occurrence of grey seal and common seal in their habitats.	Information of occurrence of harbour porpoises in its habitats. Information on occurrence of grey seal and common seal in their habitats.
Effect on areas for protection of nature and environment	Extent of possible effect on areas for protection of nature and environment, including internationally protected areas and areas appointed in accordance with the programme of measure to Denmark's marine strategy II and national areas of conservation at sea.	Mapping of sites designated according to the Birds directive and the Habitat directive. Mappings of areas appointed in accordance with the programme of measure to Denmark's marine strategy II. Mappings of national areas of conservation at sea.
Water		

Effect on water from emissions of nitrogen and environmentally hazardous substances at sea.	Extent of possible impacts on water quality. Assessment of different scenarios for local biological and hydrographic circumstances and objectives attached thereto. Extent of effect from potential emissions of nitrogen and environmentally hazardous substances at sea.	Qualitative
Climatic factors		
Reduction of emissions of CO ₂ and other GHG	Possible effects on climate from changing CO ₂ emissions.	Expected power production (GW) from sustainable energy sources in planned areas. Goals for reducing CO ₂ emissions. Potential limitation of exploitation of oil and gas.
Material assets		
Effects on material assets and conflicts of interests between planned use and other uses.	Assessment of possible effects implied by potential economical losses and loss of social values from planned uses.	Mapped areas of raw material (MARTA) Statistics of fishery Statistics of tourism Wind patterns Intensity of recreational use
Raw material consumption		
Effect of need for increased raw material consumption	Extent of potential effect on raw material consumption from large fillings and e.g. energy hubs	Qualitative
Landscape		
Effect on visual conditions in coastal areas	Assessment of effects of possible scenarios for development of fixed installations in size and distance from the coast.	Qualitative
Resource efficiency		
Effect of resource efficiency from designating development zones for sustainable energy.	Assessment of expected efficiency and exploitation of marine spaces and resources.	Qualitative

4.2 Objectives and goals included in the SEA

From a review of legal regulations, strategies and programmes of measures which might include goals and objectives as well as guidelines relevant for the

assessment of environmental impacts, Table 4-3 summarises the elements found relevant for the SEA of Denmark's first MSP.

Table 4-3 Goal and objectives included in the SEA.

Framework	Goal/objective
<p>Directive 2014/89/EU of the European Parliament and the Council of 23 July 2014 establishing a framework for maritime spatial planning</p> <p>(Implemented by Danish law: Lov nr. 615 af 8. juni 2016 om maritim fysisk planlægning med senere ændringer)</p>	<p>To promote the sustainable growth of maritime economies, the sustainable development of marine areas and the sustainable use of marine resources, maritime spatial planning should apply an ecosystem-based approach.</p> <p>To promote the coexistence of different relevant activities and uses, taking into account land-sea interactions.</p> <p>To strengthen cross-border cooperation especially between neighbouring EU member states at sea.</p>
<p>Denmark's Marine Strategies</p>	<p>Goal for the environmental status and connected descriptors with objectives on reaching good environmental status in the marine environment by 2020.</p>
<p>Denmark's Climate Act 2019</p>	<p>Reduction of GHG (70 %) before 2030</p>
<p>FN's Sustainable development goals</p>	<p>SDG 7: Affordable and Clean Energy</p> <p>SDG 13: Climate Action</p> <p>SDG 14: Life Below Water</p>

The designation of development zones for sustainable energy might also have an effect on the implementation of EU's Roadmap to a Resource Efficient Europe⁷.

⁷ EU/COM/2011/0571: Roadmap to a Resource Efficient Europe

5 Monitoring of Denmark's MSP

According to the Danish act on Environmental Assessments § 12 (2), the environmental report should include a description of the planned measures for monitoring the possible environmental impacts of Denmark's first MSP. Through monitoring measures, the expected environmental impacts can be either confirmed or invalidated.

In connection to the SEA, it will be determined whether a separate programme for monitoring the environmental impacts should be made or if these can be made through existing monitoring activities.

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