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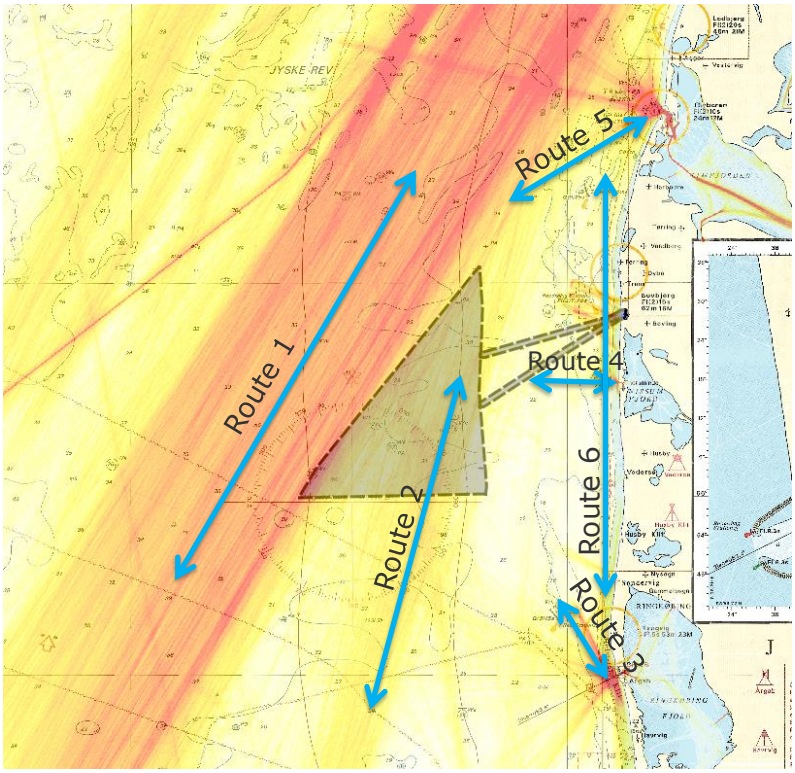
THOR OFFSHORE WIND FARM

MARITIME TRAFFIC AND SAFETY OF NAVIGATION



RAMBØLL

THOR OFFSHORE WIND FARM
MARITIME TRAFFIC AND SAFETY OF NAVIGATION

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1. INTRODUCTION

Rambøll is conducting a preliminary assessment of the maritime traffic safety related to construction, operation and decommissioning of the Thor Offshore Wind Farm (OWF) in the given investigation area; see given in Figure 1-1. The investigation area is placed in the North Sea off the coast of Thorsminde and Nissum Fjord.

The development of the project, Thor OWF, is in its early stage and the final location and layout of the Thor OWF within the investigation area is not decided. According to this the project is not finally adopted and will later undergo an EIA process.

A central part of assessing the maritime traffic safety in relation to construction projects at sea and a requirement according to the Danish Maritime Authority (DMA) is to conduct a consultation of the users of the water; ref. /1/. The present report documents such a consultation conducted for the proposed Thor OWF and presents a qualitative and preliminary risk assessment based on this.

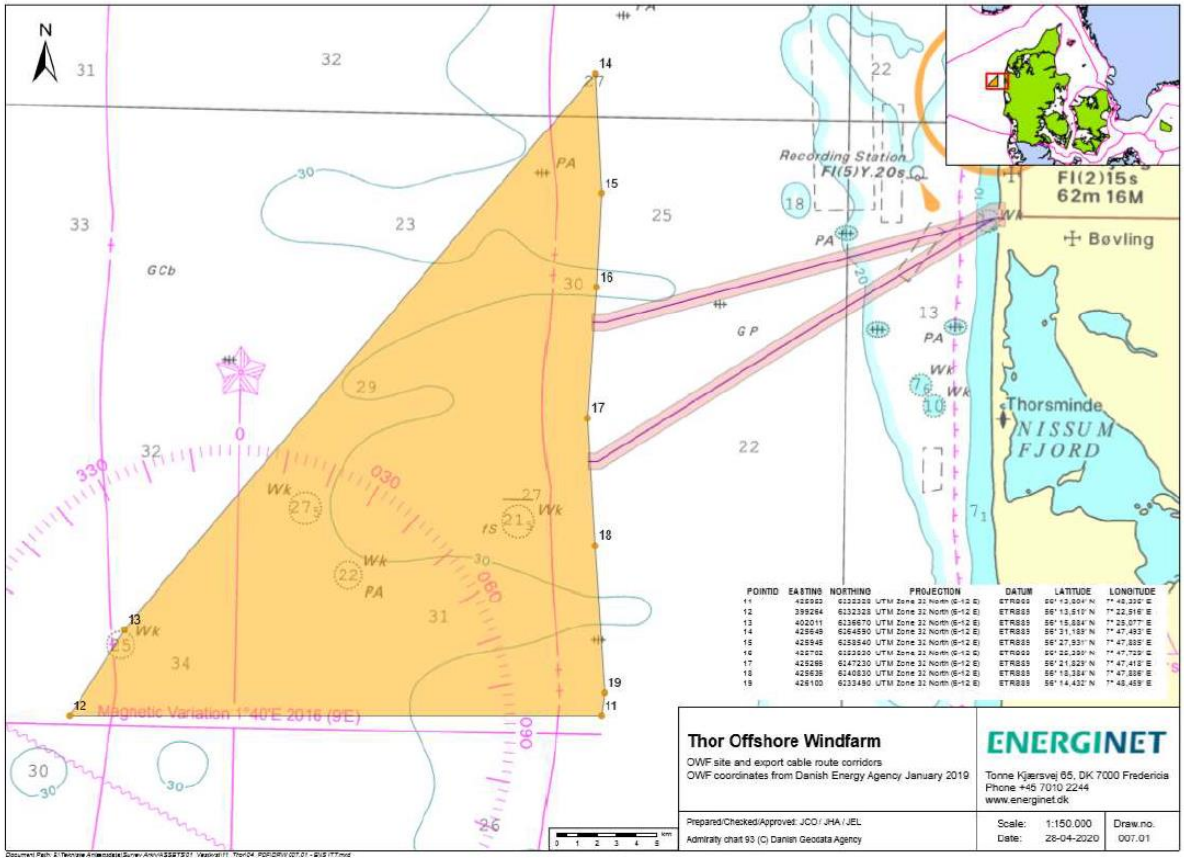


Figure 1-1 Shows the investigation area as an orange triangle. The cable corridors (CC) are marked as pink lines going from the investigation area to the shore.

The investigation area is placed 20 km. outside the coast of the western Denmark with the nearest harbours being Thorminde, Thyboron and Hvide Sande. The investigation area is placed in an area with water depth varying between 21 and 34 meters.

1.1 The investigation area

The investigation area is a gross area for Thor OWF and has the size of 440 km^2, whereas the excepted area occupied by the wind farm will be 180-220 km^2. The wind turbines will have a capacity between 8 and 15 MW, and the total capacity of the wind farm will be between 800 and 1000 MW.

There are two possible cable corridors which can be seen in Figure 1-1. The cable corridors will be between 20 and 25 km and will be landing at Tuskær north of Nissum Fjord.

From Figure 1-2, it can be seen which parts need to be established in the construction and operation of Thor OWF.

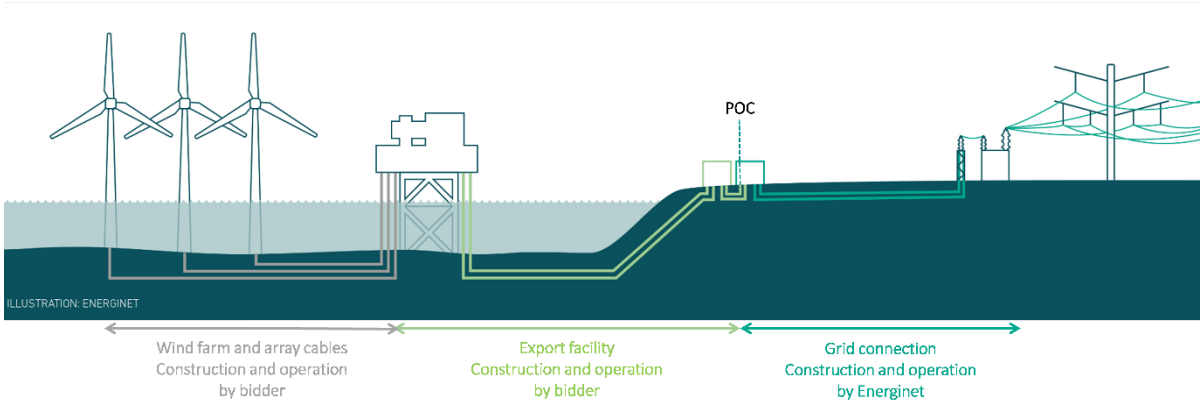


Figure 1-2. Sketch of the cabling of the Thor OWF.

Around the investigation area there are known cable corridors, see Figure 1-3.

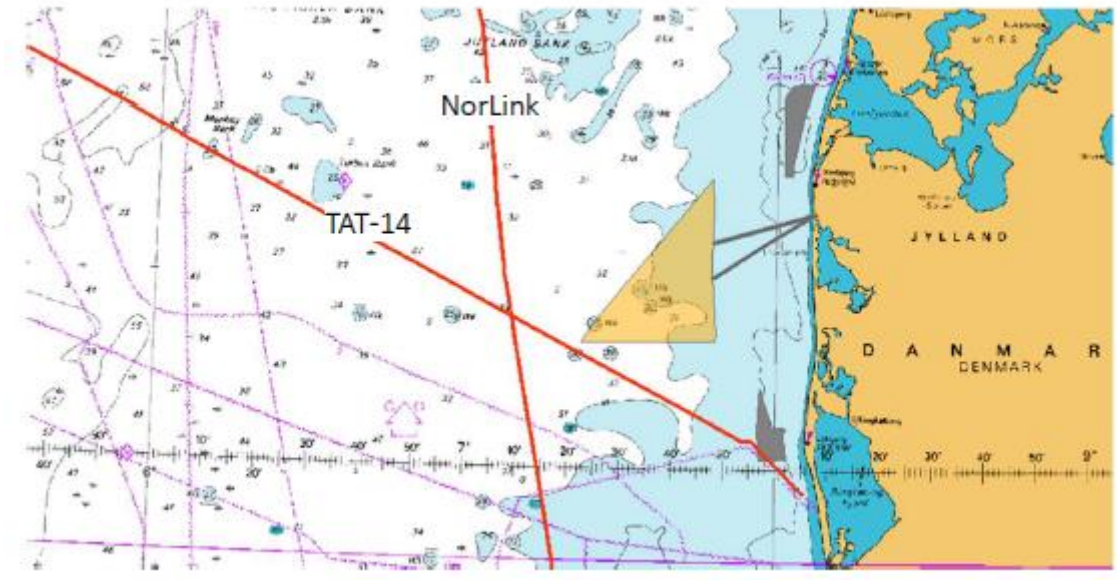


Figure 1-3 Shows known cable corridors in the area around the investigation area.

The dimensions of the wind turbines to be used at the Thor OWF are not given, but Energistyrelsen has given examples of the size of the wind turbines which can be used. The dimensions of the turbines which will be installed for Thor OWF will be decided by the winner of the concession, tendered for by the Danish Energy Agency (DEA). For the purpose of the

preliminary assessments of Thor OWF, the DEA has provided expected range of turbines from 8MW to 15MW, see Table 1-1 .

Table 1-1 Shows the likely dimensions of the offshore wind turbines.

	8 MW turbine	**15 MW Turbine**
Wing diameter/rotor diameter, m	170	260
Hub height, m	105	150
Tip height, m	190	280

1.2 References

/1/ "Assessment of safety of navigation in connection with marine construction works", Danish Maritime Authority, version of January 2019.

/2/ "Safety of Navigation – Energy Systems", Danish Maritime Authority, https://www.dma.dk/SikkerhedTilSoes/Sejladssikkerhed/EntreprenoeropgaverSoes/Sider/HavvindmoellerEnergianlaeg.aspx (accessed October 2020)

/3/ "Afmærkning af danske farvande", 9. udgave, Søfartsstyrelsen (Danish Maritime Authority)

2. MARITIME TRAFFIC ANALYSIS

In this section, we present an overall analysis of the ship traffic near the investigation area. The ship traffic analysis is based on AIS data of ship registrations covering a full year from January 1, 2019 to December 31, 2019. The AIS data is obtained from the Danish Maritime Authority (DMA), and the purpose of the analysis is to provide a basis for the consultation of the users of the water as well as for supporting the preliminary risk assessment in Section 4.

2.1 Density maps and routes

As shown in Figure 2-1, main ship traffic routes have been identified based on a density plot where the number of observed ships are indicated in cells of 100 x 100 m. The routes indicate areas with a higher amount of ships following a specific path. The routes are presented below in Table 2-1.

Table 2-1 Shows the routes and their descriptions.

Route	Description
Route 1	Includes the main traffic west of the investigation area.
Route 2	Includes the main traffic heading north/south through the investigation area.
Route 3	Traffic to/from Hvide Sande harbour heading to the investigation area.
Route 4	Traffic to/from Thorminde harbour heading to the investigation area.
Route 5	Traffic to/from Thyborøn harbour heading to the investigation area.
Route 6	Goes parallel to the shore.

A passage line has been used for each route which collect data on the ships on the given route. It should here be noted that ships passing the passage line but not using the route will be included in the data for the given route.

Only ships with movement close to or directly towards the investigation area are included. Ships following routes going out from harbours and away from the investigation area are not included.

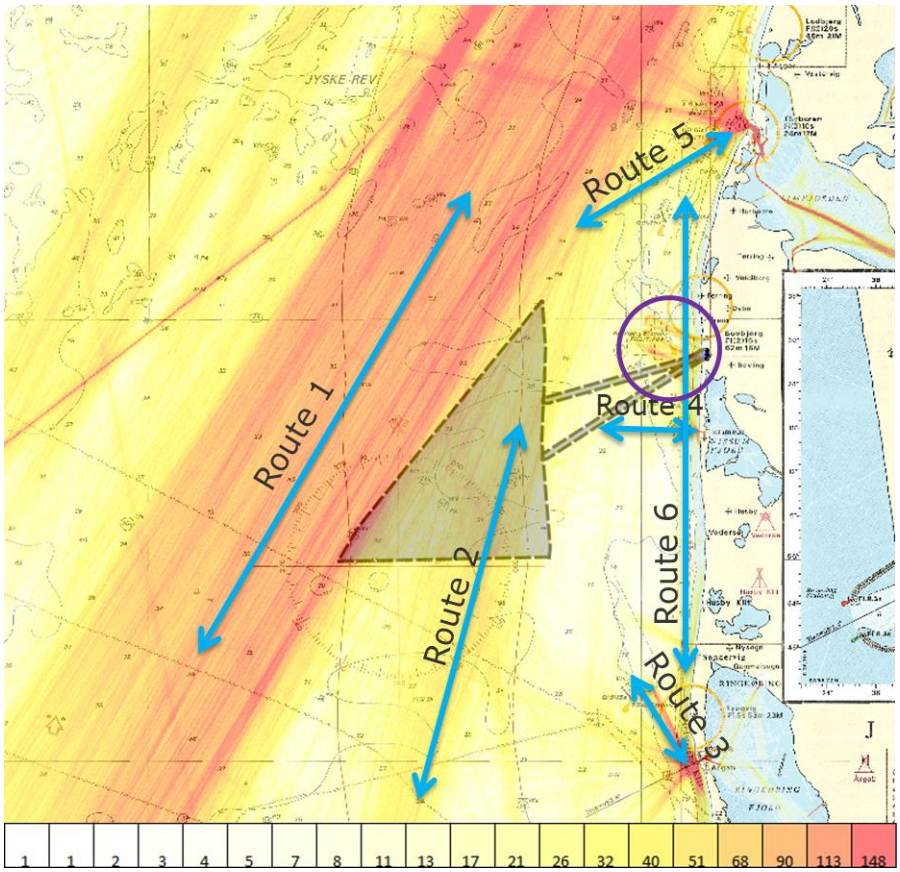


Figure 2-1 Indication of routes mentioned in Table 2-1, including the density map and the sea chart of the area. The AIS used for the density map are from 1st of January to 31st of December 2019.

As shown in Figure 2-1 there are 6 routes, where "route 6" describes all the traffic close to the shore. An area with high activity is seen on the north side of Route 4 in the purple circle. The traffic here has not been given a route number. This traffic consists of dredgers which probably perform sand feeding to the coastline.

2.2 Ship types and sizes

Each route is analysed according to the ship size and the type of ship using the given route.

2.2.1 Overall analysis

Looking at Table 2-2 it is clear that the route and the area with the greatest amount of traffic is "Route 1", which is the main route west of Jutland. Route 3-6 have close to the same amount of traffic. "Route 1" and "Route 2" are clearly used for the heavy traffic such as cargo ships and tankers (see Figure 2-2 and Figure 2-3). The rest of the routes are primarily used by smaller ships especially fishing vessels. The width of "Route 1" (the red band in Figure 2-1) is around 26.5 km.

Looking into Table 2-2 it shows that the traffic going in opposite direction on the routes are close to the same. The difference can be found in the ships using other routes back to the harbour or not going directly back to the same place they came from.

Table 2-2 Number of ships identified on each route in AIS data covering 2019.

Route	Northbound	Southbound	Total
1	9,482	8,363	17,845
2	2,477	2,207	4,648
3	1,441	1,432	2,873
5	1,506	1,365	2,871
6	923	893	1,816
Route	**Westbound**	**Eastbound**	
4	1,437	1,450	2,887

As mentioned above, it is clear from Figure 2-2 that the traffic going around Jutland ("Route 1") consists of the larger ships. This leads to the heaviest traffic going by this route, while the smaller ships are seen on the other routes going to and from the local harbours.

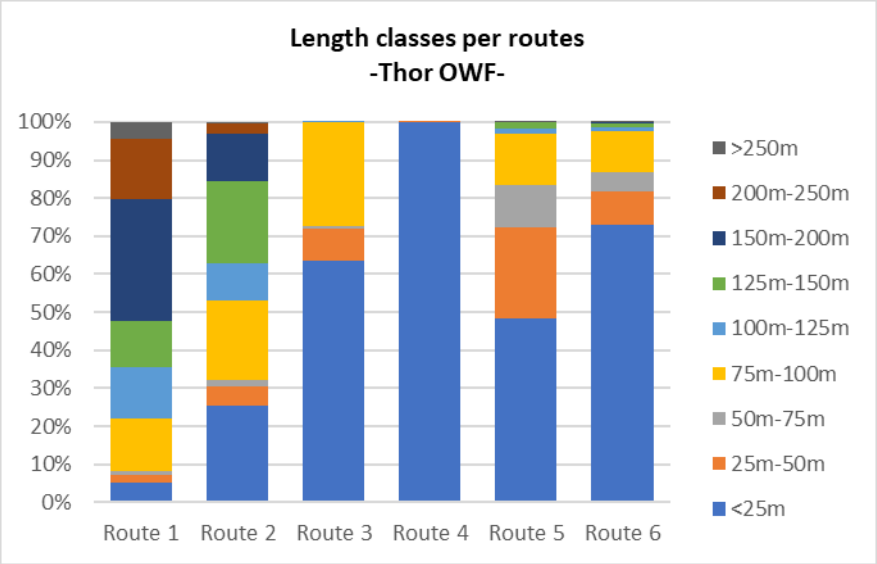


Figure 2-2 Shows the size of the ships on the given routes based on ship sizes given in AIS data from 1st of January to 31st of December 2019.

The type of ships on the routes also confirms that the heavy traffic uses "Route 1" and "Route 2", as it can be seen on Figure 2-3 that these two routes contain mostly cargo ships and tankers.

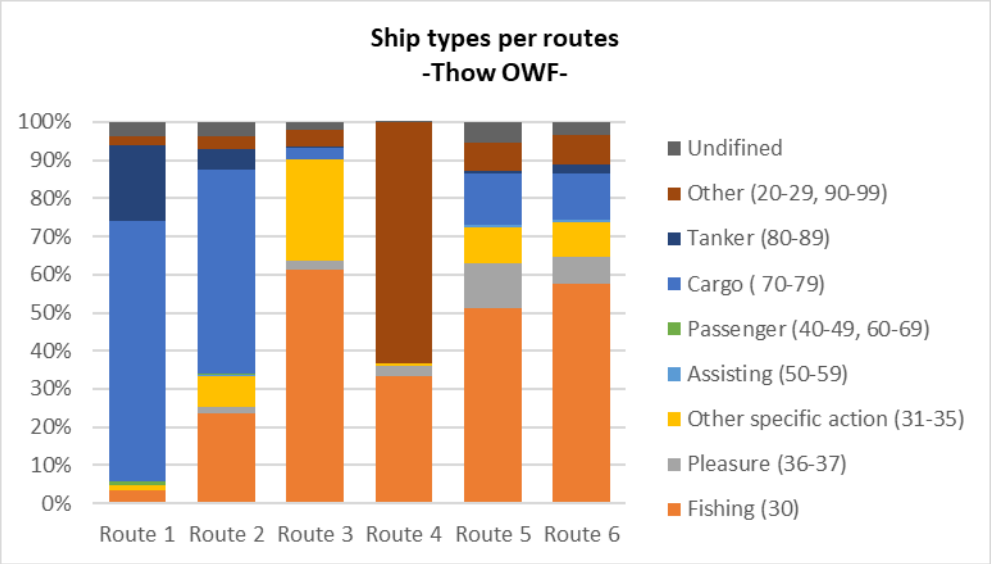


Figure 2-3 Shows type of the ships on the given route based on ship type given in AIS data from 1st of January to 31st of December 2019.

As it can be seen on Figure 2-3, there is a number of ships on Route 4 in the category "others". Almost all of these registrations are the same dredger going in and out of Thorsminde harbour. Also, a rescue vessel is registered going in and out Thorsminde harbour 94 times.

2.2.2 Routes

Route 1: As shown in Figure 2-2, "Route 1" primarily accounts for larger ships. It can be seen that more than 50% of the ships are 150 m or more, while more than 75% are longer than 100 m, based on AIS-data from 2019. Around 90% of the ships on this route are cargo ships and tankers accordingly to Figure 2-3, which fits with the size of the ships using this route. It is clear from Table 2-2 that "Route 1" carries most of the traffic in the area, with around 17,800 ships per year using the route placed on both directions.

Route 2: From Figure 2-2 is it seen that the size of the ships are evenly distributed with roughly 50% being under 100 m. Around 55% of the ships are cargo ships and tankers and 20% being fishing vessels according to Figure 2-3, with numbers based on AIS-data from 2019. From Table 2-2 can it be seen that close to 4,700 ships per year use the route.

Route 3: The route going from Hvide Sande and towards the northwest. As seen in Figure 2-2, this route mainly carry ships shorter than 100 m, where more than 60% are fishing vessels cf. Figure 2-3. "Route 3" is used by close to 2,900 ships per year, based on AIS-data from 2019.

Route 4: This route is used by ships going to and from Thorsminde harbour. Nearly all the ships using Route 4 are under 25m, with most of them being fishing vessels or under the category "other" cf. Figure 2-2 and Figure 2-3, based on AIS-data from 2019. From Table 2-2 can it been that around 2,900 use this route per year.

Route 5: Goes to/from Thyborøn/Limfjorden and to the southwest. At this route around 70% of the ships are under 50 m and close to none of the ships are above 100 m. 50% of the ships are fishing vessels and 10% respectively is pleasure boats and cargo ships cf. Figure 2-2 and Figure 2-3, based on AIS-data from 2019. Table 2-2 shows that close to 2,900 uses this route per year.

Route 6: The route counts the traffic close to the shore and consists 70% of ships under 25 m, and close to none are above 100 m. More than 50% are fishing vessels cf. Figure 2-2 and Figure 2-3, based on AIS-data from 2019. Table 2-2 shows that close to 1.200 ships per year uses this route.

2.3 Fishing vessels

Fishing vessels do not keep to a specific route. The fishing vessels go out and back to the harbours in Hvide Sande, Thyborøn and Thorsminde, but not by using a specific route, cf. Figure 2-4. The investigation area is used by fishing vessels, but not more frequently than the areas north and south of the area.

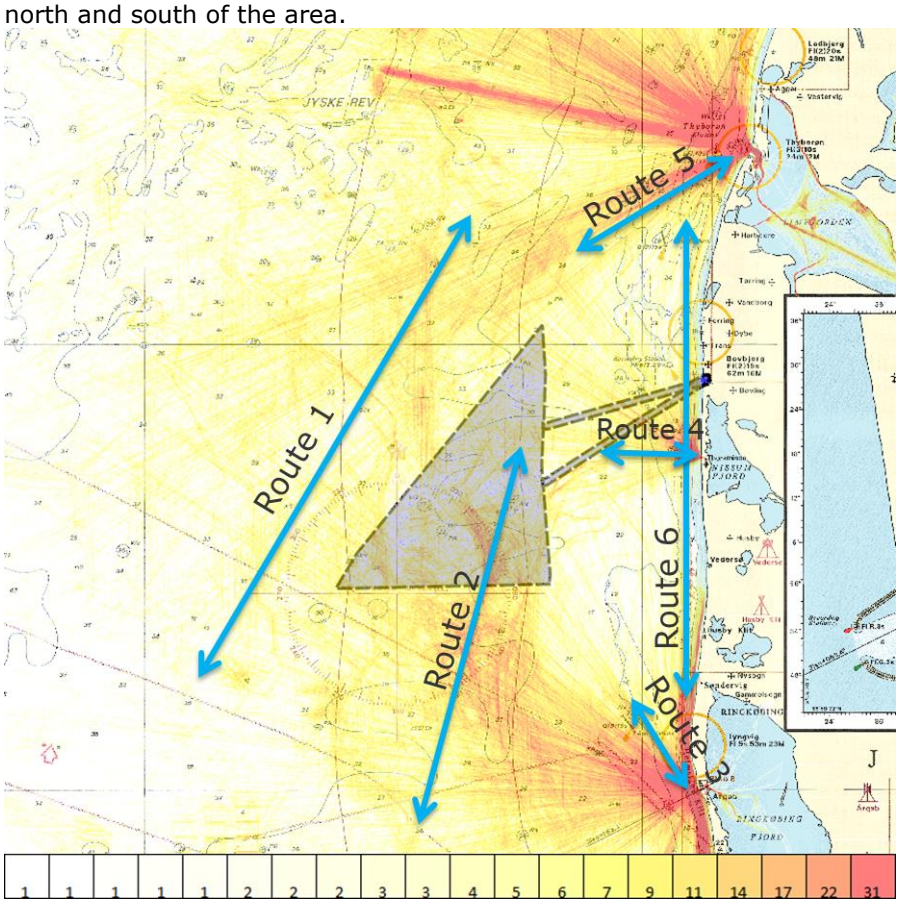


Figure 2-4 Shows the density map for fishing vessels in the area, the overall routes and the sea chart of the area. The AIS used for the density map are from 1st of January to 31st of December 2019.

2.4 Pleasure boats

As seen in Figure 2-3 there are not many pleasure boats using the 6 different routes. It appears that there are most pleasure boats on "Route 5" and "Route 6". The density map in Figure 2-5, shows that the pleasure boats primarily keeps to the shore or goes from/towards Thyborøn from southwest though the investigation area.

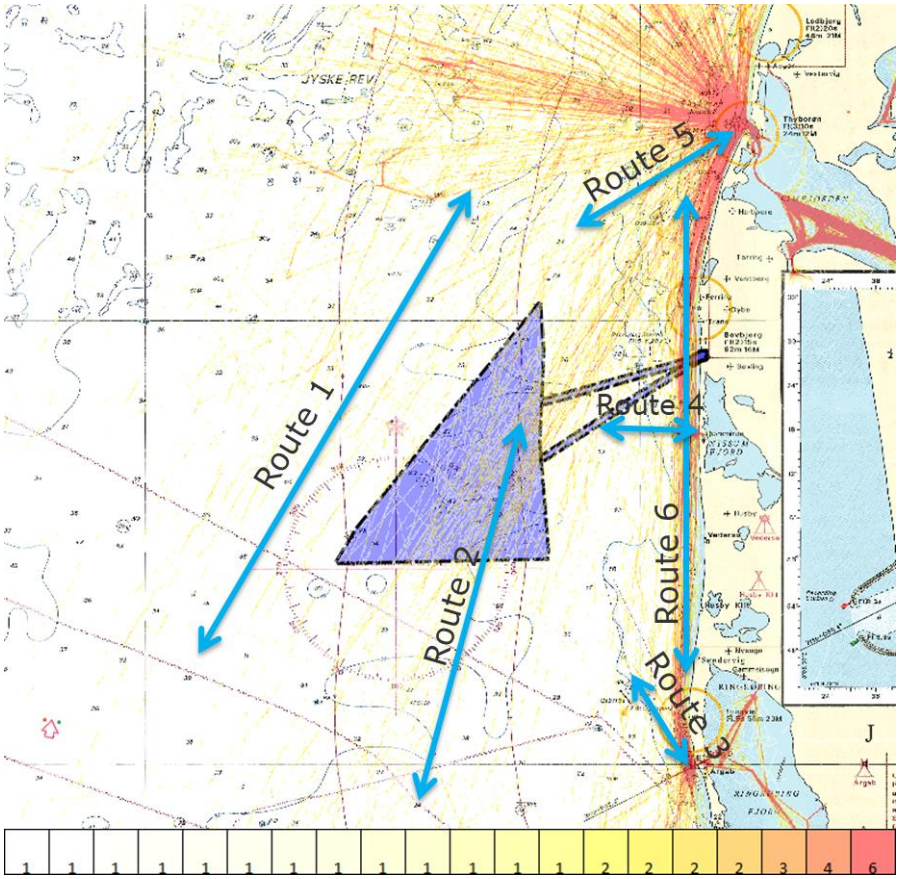


Figure 2-5 Shows the density map for pleasure boats, the overall routes and the sea charts of the area. The AIS used for the density map are from 1st of January to 31st of December 2019.

From Figure 2-3 and Figure 2-5 it can be concluded that the amount of pleasure boats in the investigation area is minimal compared to the amount of other traffic (heavy traffic and fishing vessels). However, not all pleasure boats are represented in the AIS data, and additional pleasure boats may be present in the area. It is expected that most of these smaller pleasure boats navigate relatively close to the coastline.

3. CONSULTATION OF USERS OF THE WATER

A HAZID-workshop was planned to take place in April 2020. Due to the health situation at the given time (Covid-19), it was decided to make a written consultation of the users of the waters instead of a HAZID-workshop.

The background material for the consultation consisted of the following as included in appendices:

- An invitation letter (Appendix 1)
- Background information from Energinet on the investigation area (Appendix 2)
- Presentation of the ship traffic in the area (Appendix 3)

The background information and the presentation of the ship traffic are elaborated in the present report in the previous sections.

3.1 Consultation process

The consultation material was sent out by Rambøll at the 28th of May 2020 with deadline of answers at the 30th of June 2020. A change to the dimensions of the wind turbines where sent out at the 10th of June to all the stakeholders. Here it was also clarified that these dimensions are to be taken only as guidelines.

The Danish Maritime Authority responded on the 11th of June 2020 to draw attention to Danske Tursejlere who could have an interest in the area. The consultation material was therefore sent to Danske Tursejlere the 11th of June. Danske Tursejlere have not responded to the hearing.
A list of stakeholdes, transmission data as well as response data can be seen in Table 3-1.

Table 3-1. Stakeholder transmission data and response data.

	Date of transmission of consultation material	**Consultation response date of receipt**
Coastal Authority	28th of May 2020	30th of June 2020
Danish Shipping	28th of May 2020	16th of June 2020
DanPilot	28th of May 2020	22nd of June 2020
Danish Fishermen	28th of May 2020	29th of June 2020
Joint Defense Command, Navy Staff	28th of May 2020	3rd of June 2020
Dansk Sejlunion	28th of May 2020	23rd of June 2020
Danish Maritime Authority	28th of May 2020	11th of June 2020
Thorsminde Harbour	28th of May 2020	23rd of June 2020
Danske Tursejlere	11th of June	No reply

All replies were collected by Rambøll and are presented in their entirety in Appendix 4.

The replies are shown, summarized and briefly discussed in the following sections. Some replies refer to the main ship traffic routes as defined in Section 2.

3.2 Input from users of the water

This section presents a summary of the consultation responses. The full responses can be seen in Appendix 4.

3.3 Dansk Sejlunion

Dansk Sejlunion has no remarks for establishing a wind farm. Even though there are no remarks, Dansk Sejlunion will appreciate if Danish and foreign pleasure boats are informed about the restriction on the area during the construction phase and beyond.

Tak for reminderen vedr. denne HAZID og tak for invitationen til at deltage.
Vi havde egentlig besluttet os for ikke at svare.
Dansk Sejlunion har ingen bemærkninger til forslaget om at etablere denne vindmøllepark.
Vi tager det for givet, at der gøres en særlig og rettidig indsats for at informere al skibstrafik – også danske og udenlandske lystsejlere – om begrænsninger for sejladsen i området under anlægsarbejdet og fremover.

Figure 3-1 The consultation response given by Dansk Sejlunion in Danish.

Information about the wind farm in harbours, will be a control/action to lower the risk level of the wind farm towards pleasure boats and other ships in the area.

3.4 Danish Shipping

Danish Shipping only have comments towards "Route 1" and "Route 2"; see Figure 3-2 and Figure 3-3. There are no comments regarding the rest of the routes.

Route 1: Danish Shipping points the attention to the lower left corner of the investigation area, which goes into an area with a high density of ships. The concurrency could potentially create dangerous situations. Dangerous situation could occur for regular traffic in case of evasive manoeuvre between two ships where the prescribed rules is to bank starboard to avoid collision. Danish shipping proposes to remove the southwestern corner of the area to make sure that no wind turbines will be placed in this area. Furthermore, Danish Shipping proposes to make the western border of the investigation area parallel with "Route 1", to minimize the risk.

Rute 1:
Her ses den største skibsintensitet, og også de største skibe. I den forbindelse bemærkes det, at parkens sydvestlige hjørne går ind i et område hvor der er hyppig sejlads (mørkerød farve). Samtidig må det formodes, at de skibe som sejler der, vil være nogle som er på en nordnordøstlig kurs op langs Jylland. I forhold til søvejsreglerne vil en typisk manøvre for at undgå sammenstød være at dreje til styrbord, og det vil derfor ved en placering af vindmøller så tæt på den typiske rute være en hindring, og derfor have en negativ indflydelse på sejladssikkerheden. Det anbefales derfor at der i forbindelse med den endelige udformning af parkens udstrækning enten "skærer" det sydvestlige hjørne af, eller bedre endnu laver en udformning som er mere parallel med den typiske kurs skibene benytter og at den lægges i behørig afstand af den hyppige trafik.

Figure 3-2 The consultation response given by Danish Shipping regarding "route 1" in Danish.

Keeping the southwestern corner of the investigation area free from wind turbines or making the western edge parallel with "Route 1" would be a potential mitigation for the risk from "Route 1".

Route 2: Danish Shipping has identified UniFeeder as a user of this route. It would be possible for Unifeeder to go around the investigation area without this giving any maritime traffic safety issues, other than those illustrated for "Route 1".

Unifeeder[1] has calculated that it would give an additional cost of around 550.000 DDK yearly to sail around the investigation area, but not added any references to this calculation. The additional cost will come from Time Charter and bunker. The bypass will be of the magnitude of 5 nautical miles, the bypass is understood to be west of the investigation area with the reference to respond

[1] Unifeeder is a logistics company within cargo/container transport. Unifeeder has transportation routes going around Denmark from the Baltic Sea, Benelux and Germany.

from Danish Shipping. There is also referred to that a bypass of the area will have a bigger impacted on the environment. Danish Shipping points out that a corridor could resolve the issues regarding bypass of the area.

Rute 2:
Vi har identificeret rederier Unifeeder som et af de containerrederier, som benytter denne rute til deres skibe, når de skal til/fra Hamburg/Bremerhaven og rundt Skagen. Ud fra et sejladssikkerhedsperspektiv, så er det muligt at sejle uden om, uden at det skulle have de store konsekvenser. (Se dog ovenstående omkring søvejsregler for de nordgående.) Men en sådan omsejling vil er beregnet til at give 5 sømil per passage i ekstra distance, hvilket både vil have miljømæssige og økonomiske omkostninger i forbindelse med øget brændstofforbrug og tid. Rederiet har beregnet at økonomiske konsekvenser baseret på deres trafikmønster og kan konstatere et årligt merforbrug på Time Charter (T/C) og bunker til ca. DKK 550.000. Beregning er baseret på dagen oliepris og en gennemsnitsbetragtning på deres T/C omkostning.

Ud fra kortudsnittet er det vanskeligt at vurdere udstrækningen på det skitseret område, om der f.eks. er mulighed for at lave en "korridor" gennem området. Men det kan måske undersøges nærmere i det kommende arbejde.

Figure 3-3 The consultation response given by Danish Shipping regarding "route 2" in Danish.

Regarding "Route 2", the bypass of the area is not a risk for the ships or the wind farm itself and should be seen as a cost or environmental impact. Creating a corridor would help the issue stated but could at the same time give a higher risk of ship-ship collision and ship wind turbine collision. If a corridor is chosen, it should be calculated how big an impact it would have on the total risk.

3.5 Joint Defence Command, Navy Staff

The Navy Command informs, doing the consultation for Danish Geodata Agency (of 4th of May 2020) regarding survey and geotechnical drilling prior to the construction phase of Thor OWF, that the Coastal Rescue Service at Rescue station Thorsminde is centrally located in relation to the outlined investigation area. At that time, it was assessed that the survey activities would have none to little impact on the rescue station's function and activities. Hence the Joint Defence Command assesses that the same conclusion can be made for the wind farm when it is laid out and established.

Tak for din henvendelse vedrørende *Thor Havvindmøllepark - Høring af farvandets brugere.*

Det skal dog bemærkes, at forhold vedrørende sejladssikkerhed i Danmark er forankret ved Søfartsstyrelsen og under dennes ressortområde.

Søværnskommandoen har i forbindelse Geodatastyrelsens høring (af 4. maj 2020) vedrørende søopmåling og geotekniske boringer forud for anlægsperioden af Thor havvindmøllepark angivet, at Kystredningstjenesten ved Redningsstation Thorsminde er centralt placeret i forhold til de skitserede undersøgelsesområder. Det er Søværnskommandoens vurdering, at undersøgelserne, som beskrevet, vil have en begrænset til ikke nævneværdig indflydelse på redningsstationens funktion og virke. Dette vurderes ligeledes at gøre sig gældende, når havvindmølleparken er anlagt og etableret.

Figure 3-4 The consultation response given by Joint Defence Command, Navy Staff in Danish.

As stated above, Thor OWF is not assessed to have any major impact on the navigational safety in relation to the operations of the Coastal Rescue Service at Rescue station Thorsminde.

3.6 Danish Fishermen

Danish Fishermen draw the attention to the consultation material showing that fishermen move and fish with a variety of different fishing vessels in the investigation area. Danish Fishermen state that not covering/wrecking the best fishing grounds would give a higher maritime traffic safety and thereby secure a coexistence between offshore wind farms and fishing.

Furthermore, Danish Fishermen note that the maritime traffic safety could be optimised by giving the same distance between the wind turbines and create corridors that would make the navigation easier.

Som det også fremgår af de til høringen fremsendte dokumenter, færdes og fisker en lang række forskellige fiskefartøjer i projekt området. Der vil bedst muligt kunne tages hensyn til fiskeriaktiviteter ved at opstille møllerne, så de bedste fangstområder i projekt området ikke dækkes/ødelægges af havvindmøller. Dette vil i meget høj grad være en risikoreducerende foranstaltning i relation til at optimere sejladssikkerheden for fiskeriet i og omkring Thor havvindmøllepark og sikre en sameksistens mellem havvind og fiskeri. Der vil kunne opnås en yderlig forbedring af sejladssikkerheden, hvis møllerne opstilles i et mønster med samme afstand mellem alle møller og korridorer mellem møllerne så navigation i området gøres så simpelt som muligt.

Figure 3-5 The consultation response given by Danish Fishermen in Danish.

Further consultation of the fishermen is suggested as a part of the detailing of the Thor Offshore Wind Farm.

3.7 DanPilot

DanPilot has informed that they have no comment regarding maritime traffic safety regarding the offshore wind farm.

DanPilot har ingen kommentarer i forbindelse med høringen

Figure 3-6 The consultation response given by DanPilot in Danish.

3.8 Thorsminde Harbour

Thorsminde Harbour direct the attention to the fishers in the area, due to these being the user of the harbour.

Thorsminde Havns brugere er fiskefartøjer, og deres høringssvar vedr. sejladssikkerhedsmæssige interesser for området vil ske via deres fiskeriforening.

Figure 3-7 The consultation response given by Thorminde Harbour in Danish.

3.9 Danish Maritime Authority

The Danish Maritime Authority directs attention to Danske Tursejlere. Danske Tursejlere have been sent the consultation material, but without responding.

Til høringslisten, så kunne du måske tilføje Danske Tursejlere.

Tror de er mere relevante i det område end Dansk Sejlunion.

Figure 3-8 The consultation response given by Danish Maritime Authority in Danish.

3.10 Danish Coastal Authority

The Danish Coastal Authority points out that east of investigation area is an area which is reported to the Maritime Spatial Plan (havplan) as potential raw material areas. Multiple of these areas have the interest of the Danish Coastal Authority. It is noted that the two possible cable corridors are placed in these areas. The Danish Coastal Authority would like to know if the above would influence extraction in the area in the subsequent operating phase, and if there will be a safety zone around the cable corridors.

The Danish Coastal Authority assumes the existing extraction area 562-AD Ferring is not affected during the construction and operation phase. Furthermore, the Danish Coastal Authority expects that there will be an unobstructed passage north/south – direction across the cable corridors as the transport corridor from 562-AD Ferring and to the coastal feeding section in question is partly intersected by the cable corridors.

The Danish Coastal Authority informs that the cabling lands at Tuskær where the Danish Coastal Authority are conducting coastal protection. Hence the construction of the cabling should be coordinated to not collide with sand feeding. It is assumed that there will be no influence on the sand feeding in the area when the cabling is done.

Kystdirektoratet har følgende bemærkninger.

Lige øst for forundersøgelsesområdet er der meldt områder ind til havplanen som potentielle Råstofområder, hvor flere at disse er af interesse for Kystdirektoratet. Der er afsat søkabeltracér gennem disse områder. Det ønskes derfor belyst i hvilket omfang det får betydning for eventuel fremtidig indvinding, herunder om der bliver en sikkerhedszone omkring kabeltracéerne i den efterfølgende driftsfase. Hertil kommer at Kystdirektoratet har et eksisterende indvindingsområde, kaldet 562-AD Ferring, som Kystdirektoratet antager ikke påvirkes hverken under anlægs- eller driftsfasen.

Det forventes, at der i hele anlægsperioden er uhindret passage i nord/syd – gående retning på tværs af kabeltracéet, da transportkorridoren af sand fra indvindingsområdet 562-AD Ferring og indtil den pågældende kystfodringsstrækning, for en dels vedkommende skæres af kabeltracéerne.

I forhold til hvor kabelføringen går i land ved Tuskær, er det en strækning hvor Kystdirektoratet udfører kystbeskyttelse i form af sandfodringer. Det skal derfor koordineres med Kystdirektoratet i hvilken periode den landgående kabelføring anlægges, så det ikke foregår på samme tid med sandfodringer. Det antages tillige med, at når anlægget er anlagt, at det ikke får betydning for de løbende sandfodringer Kystdirektoratet foretager her.

Kystdirektoratet står til rådighed ved koordinering af sandfodringer på strækningen ift. anlægsarbejdet med kabelføringen.

Figure 3-9 The consultation response given by The Danish Coastal Authority in Danish.

The input from the Danish Coastal Authority is mainly related to the future use of the extraction areas and potential limitations in the use of these, which has no direct impact on the navigational safety. It shall however be investigated to what extent there will be restrictions and safety zones around the cable corridors. The Danish Coastal Authority is also concerned with coordination of activities near Tuskær where sand feeding is performed.

3.11 Summary of consultation

The consultation of the users of the water leads to the conclusion that there are no major concerns in relation to the navigational safety in the area. However, it has led to identification of some issues. A summary of the main issues is:

- The western part of the area may interfere with the main ship traffic west of the area.
- Lining up of potential wind turbines to follow the main direction of the traffic west of the area could be considered as a risk reducing measure.
- The main traffic on route 2 now running north/south through the investigation area must either take a detour around the area or go through a dedicated corridor through the investigation area.
- Adequate information to pleasure crafts should be ensured.

- Danish Fishermen address that a simple layout of the wind turbines would make navigation in the area simpler and suggests coordination with the fishing areas in a future layout of the wind farm.
- It must be clarified if a safety zone will be established around the cable corridors.

The input from the consultation of the users of the water will be considered in performing a preliminary risk assessment in Section 4 as well as in future phases of the project.

4. PRELIMINARY RISK ASSESSMENT

The construction, operation and decommissioning of the Thor OWF may have an impact on the navigational safety in the area. However, no specific wind farm layout is yet specified within the investigation area, and any detailed risk assessment may be affected by details in a future project. Therefore, only a qualitative and preliminary risk assessment is performed as described in the following.

4.1 Methodology

IMO's guidance for Formal Safety Assessment sets a framework for risk assessment. Relevant elements are described in Figure 4-1 showing how a project definition and a hazard identification leads up to performing the risk assessment.

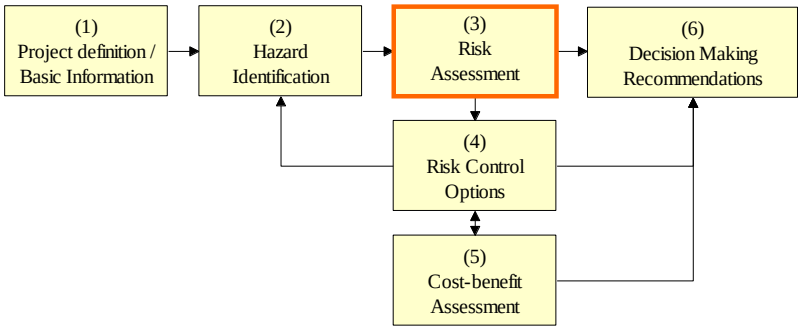


Figure 4-1. Schematic illustration in steps leading up to a risk assessment and decisions taken based on the risk assessment.

The Danish Maritime Authority requires, as part of marine construction works, to perform a risk assessment after having launched preventive measures; ref. /1/. A risk scoring framework is defined where the consequence and probability of identified incidents shall be scored according to given index values resulting in a risk score being the sum of the probability and consequence index. The risk assessment framework is presented in Figure 4-2.

Consequence categories range from 0 (limited) to 4 (catastrophic) whereas probability categories range from 0 (improbably seldom; once every 1.000.000 years) to 7 (often; about once per month). As the sum of the frequency and consequence score, he risk index will therefore range between 0 (limited consequence; improbably seldom) and 11 (catastrophic event occurring about once per month). A risk score of 5 or less is normally assessed to be acceptable.

Incident **(What could go wrong?** **"brainstorm")**	**Consequence figure** (total amount for environmental cleaning, loss of values, loss of lives/injuries per year): 0 in the amount of DKK 20,000 (limited) 1 in the amount of DKK 200,000 (minor) 2 in the amount of DKK 2,000,000 (considerable) 3 in the amount of DKK 20,000,000 (serious) 4 in the amount of DKK 200,000,000 and above (catastrophic)	**Probability** 7=10 accidents/year (often) – about once a month 6=1 accidents/year (relatively often) – once a year 5=0.1 accident/year (probable) – once every 10. year 4=0.01 accident/year (possible) – once every 100. year 3=0.001 accident/year (seldom) – once every 1000. year 2=0.0001 accident/year (very seldom) – once every 10,000. year 1=0.00001 accident/year (extremely seldom) – once every 100,000. year 0=0.000001 accident/year (improbably seldom) – once every 1,000,000. year	**M**	**R** **(C+P)** <5>

Figure 4-2. Risk assessment framework from the Danish Maritime Authority; ref. /1/, section 19. The "consequence figure" index added to the "probability" index gives the "Risk" located in column 5 (R (C+P)).

Due to the early phase and lack of specific wind farm details, no calculation of collision frequencies and quantitative estimation of consequences are performed. However, the principle of assessing the consequence and probability is followed.

The preliminary risk assessment presented here focuses on a qualitative assessment of the risk based on potential hazards identified from the consultation of the users of the water as well as from the basic information on ship traffic in the area. As detailed project information is not available, decision making recommendations and cost benefit assessment is not performed.

The purpose of the preliminary risk assessment is to identify potential risks for further elaboration in a future phase as well as to perform an initial and overall qualitative evaluation of the risk imposed by the Thor OWF to the navigational safety.

The currently available basic information is described in Section 1 and 2, and preliminary hazard identification and risk assessment is presented in the following.

4.2 Preliminary hazard identification

Ramboll has identified a set of hazards based on the consultation responses as well as on the traffic analysis as presented in Section 2. The hazards are preliminary in the sense that a specific project will enable a more project specific hazard identification which may result in additional and/or more detailed hazards. The hazards listed shall therefore be seen as focus points for the future detailing of Thor OWF in relation to navigational safety.

Table 4-1. Preliminary list of hazards.

Hazard ID	Hazard description	Causes	Phase	Origin
1	Commercial ship on route 1 colliding at full speed with wind turbine placed in south-western corner of the investigation area	The investigation area is extending close to and into the area where commercial ships navigate on Route 1. Commercial ships may enter the area in case of evasive actions.	Operation	Based on Danish Shipping
2	Commercial ship on route 1 colliding at full speed with wind turbine in western edge of investigation area	Confusion of navigation if wind turbines in the western part of the investigation area are not aligned with the direction of the ship traffic.	Operation	Based on Danish Shipping
3	Commercial ship on route 1 colliding at full speed with another commercial ship west of the investigation area	Confusion of navigation if wind turbines in the western part of the investigation area are not aligned with the direction of the ship traffic.	Operation	Based on Danish Shipping
4	Commercial ship from route 2 colliding at full speed with wind turbine	The ship traffic currently passes through the area north/south.	Operation	Based on Danish Shipping
5	Fishing vessels colliding with wind turbine during fishing operation in the area	The best fishing grounds may be placed close to or inside the wind farm, or wind turbines are placed in patterns that are difficult to navigate between.	Operation	Based on Danish Fishermen
6	Pleasure craft colliding at full speed with wind turbine	The wind farm will constitute a new set of obstacles and may be seen as a sightseeing area to visit for pleasure crafts – during construction as well as during operation.	Construction, Operation	Ramboll and experience with previous risk assessments
7	Drifting speed ship collision with wind turbine due to blackout	Blackout can happen for any vessel including the larger vessels passing west of the investigation area.	Operation	Ramboll and experience with previous risk assessments
8	Ship colliding with construction vessel	Additional construction traffic in the area during construction	Construction	Ramboll and experience with previous risk assessments

4.3 Preliminary risk assessment

Each of the hazards identified in Section 4.2 result in a risk which is not present today, and the risk level during construction, operation and decommissioning of the Thor OWF will affect the maritime traffic safety. However, the main ship traffic occurs west of the area, and there is plenty of free space to navigate west of the area. East of the area, the water depth is generally more than 20m, and with a distance between the wind farm and the shore of more than 15km there is also plenty of free space for the vessels currently navigating in this area.

Furthermore, it is assumed that general marking requirements and requirements for offshore wind farms as given by the Danish Maritime Authority are followed; ref. /2/ and ref. /3/ section 9. These include:

- Emergency stop procedures
- Design according to IALA Recommendation O-139 - Marking of Man-Made Offshore Structures.
- Distance between lower tip of the wing must be at least 20m relative to HAT (Highest Astronomical Tide)
- A work area is established during construction, but the wind farm is generally open for free navigation during the operational phase.
- Marking of outer wind turbines with yellow lights

The hazards are discussed in the following.

4.3.1 Hazard ID 1, 2 and 3 – Ships passing west of the wind farm

According to the ship traffic analysis, about 8.000 – 10.000 vessels are passing west of the investigation area each year in each direction north/south, and primarily the northbound vessels are expected to navigate closer to the western part of the investigation area. In principle, the width of route 1 is approximately 26.5 km (see section 2.2.1) leaving enough space for passing vessels to navigate around Thor OWF; even with a wind turbine placed in the westernmost corner. However, route 1 is a long route decided by the geographical location of Jutland and the west coast of Holland; see Figure 4-3. Navigators may assume that this route is free of obstacles and only check their surroundings and heading rarely. Even if the probability for a collision is small, this fact may add to the risk, and at least add to the nuisance caused by the obstacle that a wind turbine will be, as a wind turbine placed in the westernmost corner of the investigation area will likely be the only obstacle for the otherwise straight route.

Due to the presence of route 1, Danish Shipping proposes to limit the investigation area and avoid using the westernmost corner. The western part of the investigation area, protruding into route 1, can potentially be identified by analysing the water depth and geography in the Hanstholm area and the heading of ships on route 1. By avoiding the westernmost corner of the investigation area, the risk from hazards 1, 2 and 3 will be significantly reduced.

Danish Shipping also suggests aligning the wind turbines in the western part of the area in a line following the general direction of the traffic. This will assist the passing vessels as the wind turbines appear on radar images and thereby can guide the navigator visually. This could be considered within the investigation area by the future project.

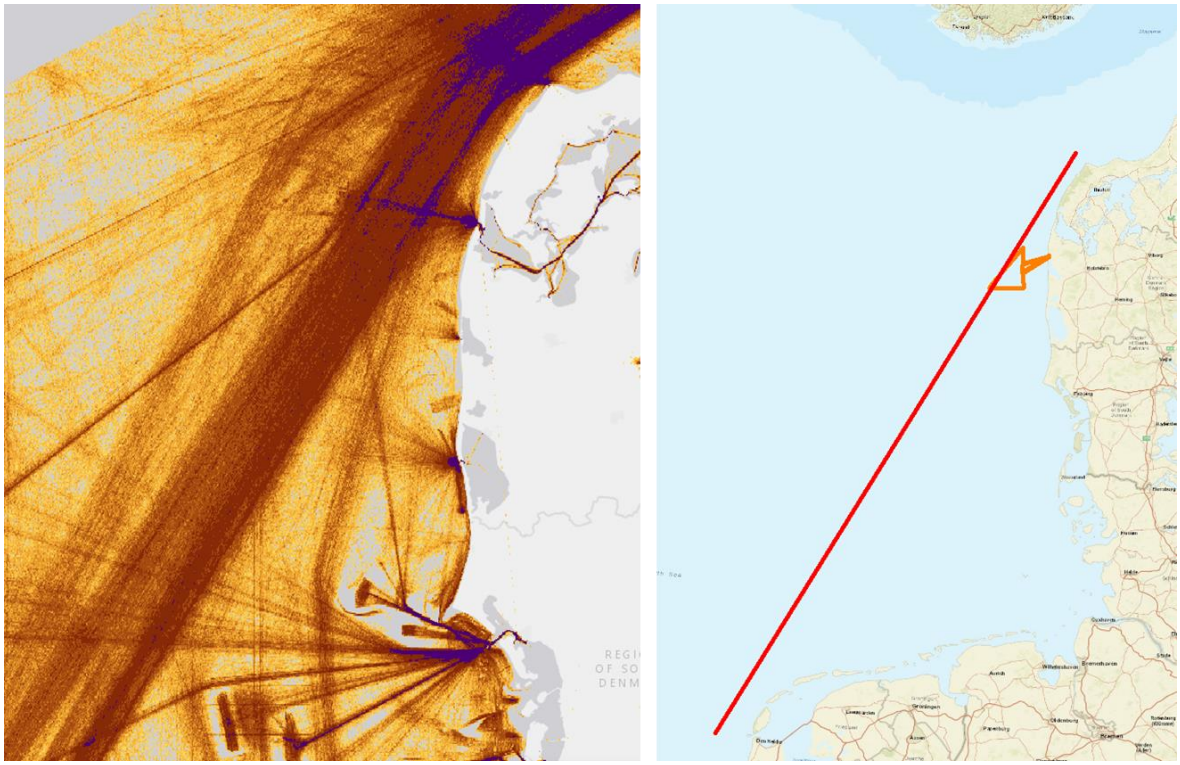


Figure 4-3. Indication of direction of main ship traffic between Holland and Northern Jutland in Denmark. Left: intensity map from Danish Maritime Authority based on 2014 data (http://sofartdk.maps.arcgis.com/). Right: indicative direction of route.

The probability of an evasive action and insufficient space for navigation causing a northbound vessel to enter the investigation area and collide with a wind turbine in the westernmost corner is assessed to be very seldom (probability index 2; see Figure 4-2).

Any collision involving two larger ships, or a ship and a wind turbine, may cause considerable damage in case the collision occurs at full speed. The potential consequence of a collision is therefore assessed to be considerable or even serious (consequence index 2-3).

With a probability index of 2 and a consequence index of 2 to 3, an indicative risk score according to the framework in Figure 4-2 is 4 to 5 and in in principle acceptable. However, it is advised to keep the westernmost part of the investigation area free from wind turbines due to the nuisance of the ship traffic and the potentially added risk for ships initially not being aware of a new obstacle in the straight route between Holland and northern Jutland. This will considerably reduce the navigational risk as well as the reputational risk of adding a nuisance to the main ship traffic route. The layout of the wind turbines within the investigation area to be aligned with the general direction of the ship traffic on route 1 may be considered in addition by a future project.

4.3.2 Hazard ID 4 – Ships approaching from route 2

According to the ship traffic analysis, about 2.200 – 2.500 vessels are, today, passing through the investigation area each year in each direction north/south. Ships following the direction of the current route could potentially lead to a risk of a collision between the ships and the wind turbines. The ships using route 2 will be forced to adjust their course to go around the wind farm. Going around the wind farm will give the same concerns as seen for Hazard ID 1, 2 and 3, adding slightly to the traffic around the area, but not significantly changing the risk picture. It is expected that most ships will lay their course west of the investigation area when leaving the harbour and

thereby not making a last-minute decision on going around the area. Human failures related to last-minute decisions are therefore not assessed to significantly increase the risk. The probability for a collision is therefore assessed as for Hazard ID 1, 2 and 3 to be very seldom (probability index 2; see Figure 4-2).

A corridor through the wind farm, for ship traffic, would let the ships using route 2 have the most optimal route. A corridor would have ships using a narrower passage with a smaller area to avoid collision between ships or collision between ships and wind turbines. The probability of an evasive action causing a vessel to enter the investigation area is assessed to be larger than having vessels going around the investigation area. Creating a corridor would also lead to a higher risk of ship-ship collision with this still being seldom.

Any collision involving two larger ships, or a ship and a wind turbine, may cause considerable damage in case the collision occurs at full speed. The potential consequences of a collision are therefore assessed to be considerable or even serious (consequence index 2-3; see Figure 4-2).

According to Danish Shipping, the detour around the area will not result in any maritime traffic safety issues apart from the ones mentioned for route 1. Hence, an indicative risk score according to the framework in Figure 4-2 is assessed as given in Section 4.3.1 to be 4 to 5 and acceptable. In addition, avoiding wind turbines in the westernmost corner of the investigation area as advised in Section 4.3.1 will considerably reduce the risk.

4.3.3 Hazard ID 5 – Fishing activities in the area

According to Figure 2-4, fishing vessels are using the area for fishing. The fishing vessels are not using any specific route when being in the investigation area. The fishing vessels are, and will be, well-known to the area which will help them to navigate in the investigation area. A collision between a fishing vessel and wind turbine during operation of the windfarm is assessed to be seldom (probability index 3; see Figure 4-2).

To improve the navigational safety, an evenly distributed pattern for the wind farm will help fishing vessels navigate in the area and thereby lower the probability of a ship-wind turbine collision.

A collision between a fishing vessel and a wind turbine is expected to give less damage to the wind turbine, if any, than a similar collision between a large commercial vessel and a wind turbine. The consequences (damage and fatalities) would primarily be to the fishing vessel. Here it must be taken into account that the authorities probably will require that the wind turbines are designed as “collision friendly”, thereby reducing the consequences to the ship in a collision. An average consequence is assessed to be considerable (consequence index 2; see Figure 4-2).

With a probability index of 3 and a consequence index of 2, an indicative risk score according to the framework in Figure 4-2 is assessed to 5 and hence acceptable. However, placing the wind turbines well distributed and outside the best fishing grounds may be used as a risk reducing measure to further limit the probability for impacts. These aspects can be assessed in more detail by consulting Danish Fishermen and performing an updated hazard identification when a more detailed project is proposed.

4.3.4 Hazard ID 6 – Pleasure crafts in the area

According to Figure 2-5, most of the pleasure boats keep close to the shore. This leads to only a few pleasure boats going through the investigation area. Pleasure boat captains may not be used to the area and thereby not be aware of the wind farm. Not being aware of the risk of collision

could lead pleasure boats to collide with the wind turbines, but such a collision would still be very seldom. There is also a risk of collision between masts of tall sailboats and the wings of the turbines. However, this risk is expected to be reduced by the distance between the lower tip of the wings and the highest astronomical tide (HAT) of at least 20m. The probability of collision is hence assessed to be very seldom (probability index 2; see Figure 4-2).

A collision between a pleasure boat and a wind turbine would probably have the greatest impact to the boat and people onboard. Here it must be taken into account that the authorities probably will require that the wind turbines are designed as "collision friendly", thereby reducing the consequences to the ship in a collision. Average consequences are assessed to be minor to considerable (consequence index 1-2; see Figure 4-2).

Providing information of the wind farm in the harbours in multiple language will make the pleasure boats more aware of the area decreasing the probability of a collision. It is assumed that some information is provided.

It could be considered to have a no-go zone around the wind turbines which help avoiding collisions with pleasure boat going close to the wind turbines to have close look. However, in general the area is expected to be open for free navigation during the operational phase.

With a probability index of 2 and a consequence index of 1-2, an indicative risk score according to the framework in Figure 4-2 is assessed to be 3 to 4 and hence acceptable.

4.3.5 Hazard ID 7 – Drifting ships

All motor driven ships using the waters around the investigation area can have a black-out which would lead to a drifting ship. With the prevailing wind coming from the west, ships passing west of the area will be at a higher risk of a collision with a wind turbine during a black-out.

To collide with a wind turbine a ship needs to have a black-out at the wrong time at the wrong place. Moreover, the blackout is often solved within a limited time such that a potential collision is avoided. A collision due to a black-out is therefore assessed to be seldom (probability index 3; see Figure 4-2).

The consequences of a drifting speed collision are expected to be lower than a collision at full speed. Again, taking into account the authority requirement to design the wind turbines as "collision friendly", thereby reducing the consequences to the ship in a collision. The consequence is therefore assessed to be minor (consequence index 1; see Figure 4-2).

With a probability index of 3 and a consequence index of 1, an indicative risk score according to the framework in Figure 4-2 is therefore assessed to be 4 and hence acceptable.

4.3.6 Hazard ID 8 – Construction traffic

There will be additional traffic in the area during the construction phase of the wind farm. The construction traffic patterns are yet unknown, and a risk assessment of the construction traffic movements is not yet performed. However, with enough free space around the area, additional ship traffic to and from the area is not at this stage assessed to add significantly to the maritime risk in the area.

It is a general requirement to create a work area with prohibited access to unauthorized vessels during the construction phase; ref. /2/. Due to the amount of free space at all sides of the area,

this is assessed not to give rise to significant navigational safety issues around the area apart from the nuisance to fishing activities, etc.

The probability of collision due to construction traffic is not assessed, as the amount and nature of construction traffic and activities are not known. However, it is expected that potential risk reducing measures such as specific construction routes, information, activity planning, marking of restricted work areas, guard vessels, etc., can be established if needed to reduce the risk to an acceptable level.

4.4 Summary of the preliminary risk assessment and conclusion

The consultation of the users of the water has provided information regarding any concerns related to the maritime traffic safety. The consultation has been used as basis for a hazard identification and a preliminary qualitative risk assessment following the principles for a risk assessment as required by the Danish Maritime Authority. This preliminary risk assessment concludes that – at the current level of detail – maritime traffic safety, in relation to the Thor OWF established within the limits of the investigation area, is within the acceptable region. However, it is advised to keep the westernmost part of the investigation area free from wind turbines as wind turbines in this area will cause nuisance for the main ship traffic route between Holland and north around Jutland.

General requirements for the wind farm as well as specifically identified concerns are addressed in the discussion of the consultation input and as part of the preliminary risk assessment.

It is expected that the input from the consultation of the users of the water as well as the preliminary hazard identification and risk assessment are used as basis for the next phases of establishment of the Thor OWF. In addition, it is expected that the users of the water are consulted again, and a detailed hazard identification and updated risk assessment is performed when a specific project is further detailed during the EIA process.

APPENDIX 1
INVITATION LETTER

Maj 2020

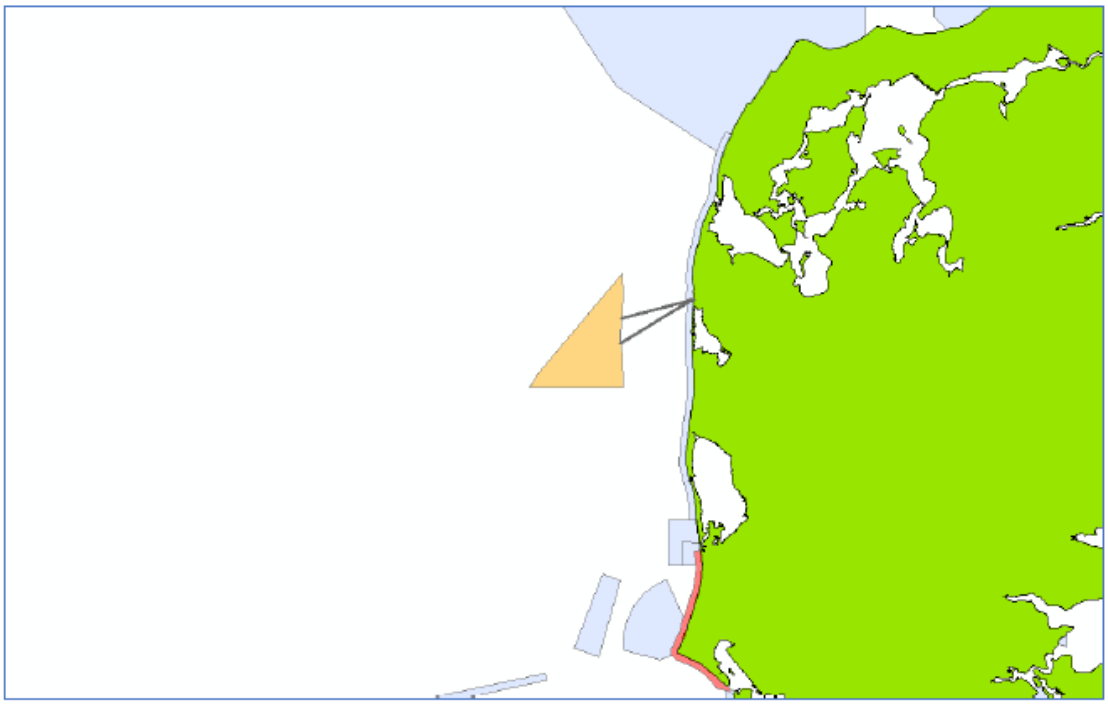
Sejladssikkerhed for Thor Havvindmøllepark
Skriftlig høring

Energinet har fået til opgave fra Energistyrelsen at lave forundersøgelser forud for VVM-fase for mulig opstilling af havvindmøller i området ud for Thorsminde i Nordsøen.

- Der planlægges opført en havvindmøllepark i området ud for Thorsminde og Nissum Fjord i Nordsøen
- Forud for VVM-fase undersøges forskellige tekniske aspekter. Disse undersøgelser vil danne baggrund for efterfølgende VVM-undersøgelser.
- Planlægningen er på et så tidligt stadie, at der ikke er taget stilling til type og placering af møller. Projektet er dermed ikke endeligt vedtaget og skal senere gennemgå en VVM-proces.
- Det er et krav fra Søfartsstyrelsen, at farvandets brugere høres i forbindelse med anlægsarbejder til søs.

Høringen af farvandet brugere gennemføres af Rambøll for Energinet for tidligt at identificere eventuelle sejladssikkerhedsmæssige udfordringer i området ved opstilling af havvindmøller.

Da det ikke er sundhedsmæssigt forsvarligt, grundet de aktuelle anbefalinger fra sundhedsmyndighederne, at gennemføre høringen ved et møde, gennemføres denne skriftligt.



Maj 2020

Udlægningen af havvindmølleparken er endnu ikke fastlagt, og der efterspørges høringssvar vedr.:

- Generelle betragtninger og kommentarer vedrørende sejladssikkerheden i forhold til etablering af en havvindmøllepark inden for forundersøgelsesområdet
- Identifikation af forhold af kritisk karakter for fremtidig sejladssikkerhed relateret til:
    - Placering af vindmøller og kabelkorridor inden for undersøgelsesområdet
    - Evt. særligt kritiske placeringer
    - Evt. særligt kritiske opstillingsmønstre
- Identifikation af mulige risikoreducerende foranstaltninger i relation til de angivne farer

Resultatet af høringen vil indgå i en efterfølgende teknisk rapport vedr. sejladsforholdene som del af grundlaget for fremtidig VVM-proces for et konkret projekt, hvor også en opfølgende høring vil kunne afholdes.

Den skriftlige høring foretages af Rambøll, som konsulent for Energinet.

Thor Havvindmøllepark og skibstrafikken i området er beskrevet som grundlag for høringen i to vedhæftede præsentationer.

- Thor Havvindmøllepark – baggrundsinformation
- Thor Havvindmøllepark – præsentation af skibstrafik

Vi vil gerne have din tilbagemelding vedrørende sejladssikkerheden senest 30. juni 2020 ved besvarelse til Toke Koldborg Jensen, tokj@ramboll.dk. Du er også velkommen til at kontakte mig på tlf. 5161 6726.

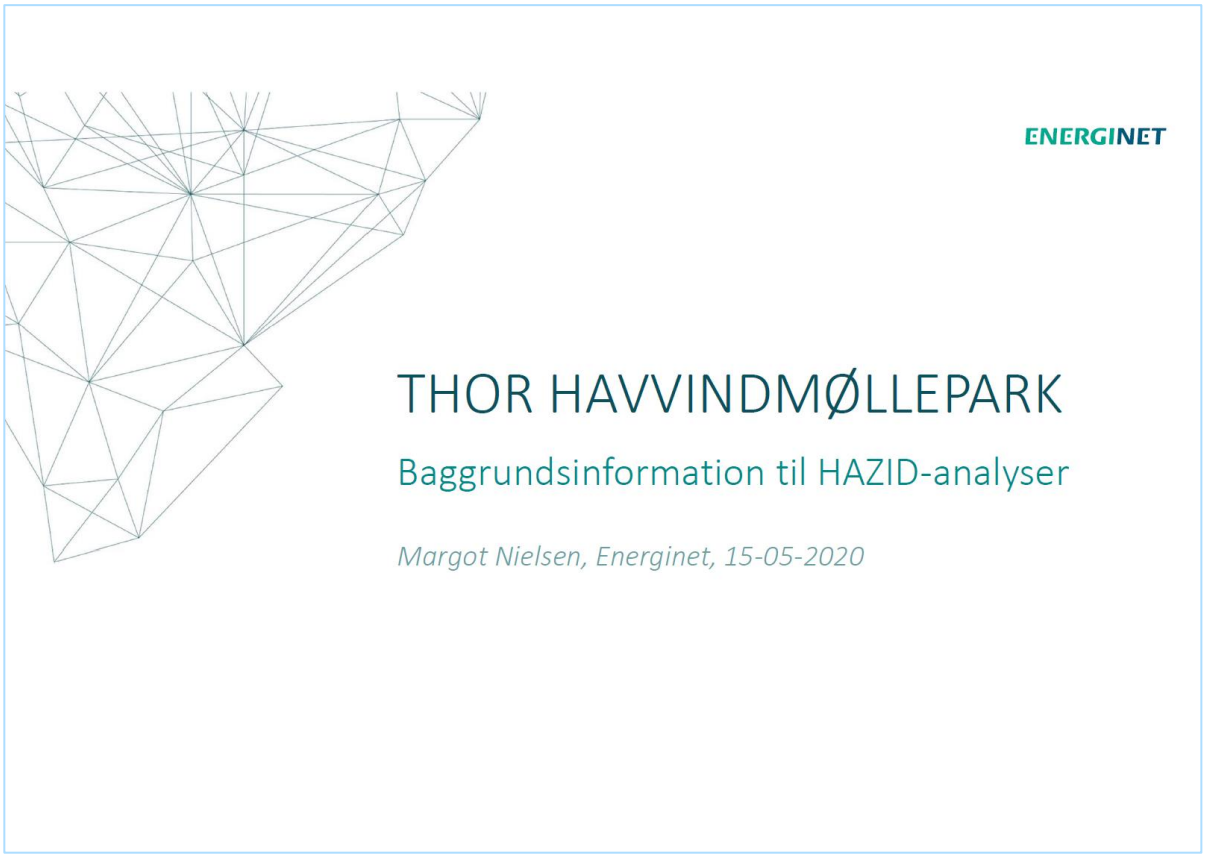
Med venlig hilsen

Toke Koldborg Jensen, Rambøll
E-mail: tokj@ramboll.dk
Telefon: 5161 6726

På vegne af

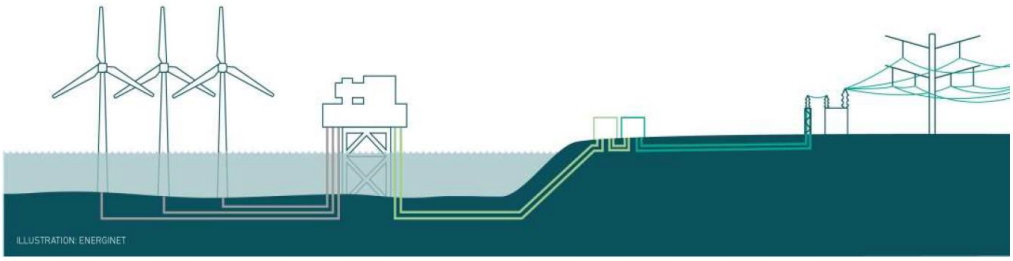
Energinet

APPENDIX 2
BACKGROUND INFORMATION FROM ENERGINET ON THE INVESTIGATION AREA



ENERGINET

SKITSE AF NETTILSLUTNINGEN



Havvindmøllepark

Nettilslutning
(platform, eksportkabler og ny station 1 på land)

Nettilslutning
(Ny station 2, landkabler og udvidelse af Idomlund station)

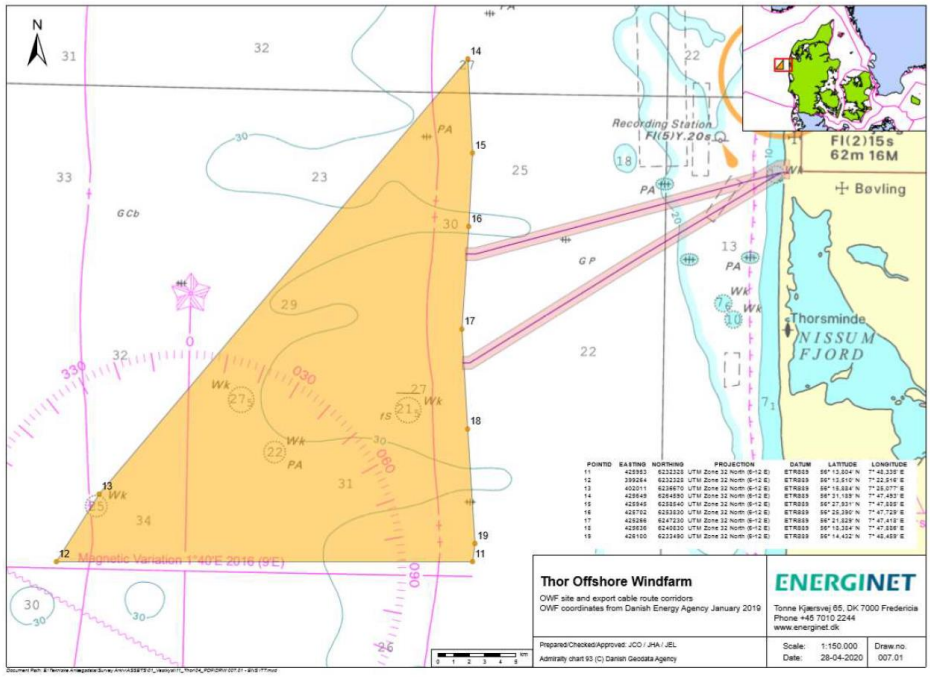
Eksisterende transmissions-system

ENERGINET

FORUDSÆTNINGER GENERELT

- Kapacitet: Min. 800 MW, max 1.000 MW
- Møllekapacitet: Min. 8 MW, max. 15 MW
- Forundersøgelsesområde: 440 km^2
- Forventet endeligt mølleområde: 180 – 220 km^2 inden for forundersøgelsesområdet
- Kabelrute: 2 mulige søkabelruter undersøges (længde 20-25 km)
- Ilandføring: Ved Tuskær nord for Nissum Fjord
- Nettilslutning: Idomlund transformerstation ved Holstebro

FORUNDERSØGELSESOMRÅDE, INKL. KABELRUTER



ENERGINET

PLACERING AF PARK OG PARKLAYOUT

- Forundersøgelsesområdet på 440 km² forventes reduceret til 180 – 220 km² i det endelige udbud af havvindmølleparken.
  Dette kan ikke afgrænses nærmere på nuværende tidspunkt.
- Der foreligger ikke forudsætninger om parklayout eller parkdesign på nuværende tidspunkt

ENERGINET

FORUDSÆTNINGER OM MØLLER

Det forudsættes, at møllernes kapacitet bliver mellem 8 MW og 15 MW.

Sandsynlige mølledimensioner:

	8 MW turbine	15 MW turbine
Wing diameter, m	160	235
Hub height, m	120	140
Tip height, m	210	260

These dimensions are NOT restricting turbines to be chosen by developer later – they can be smaller, they can be larger

ENERGINET

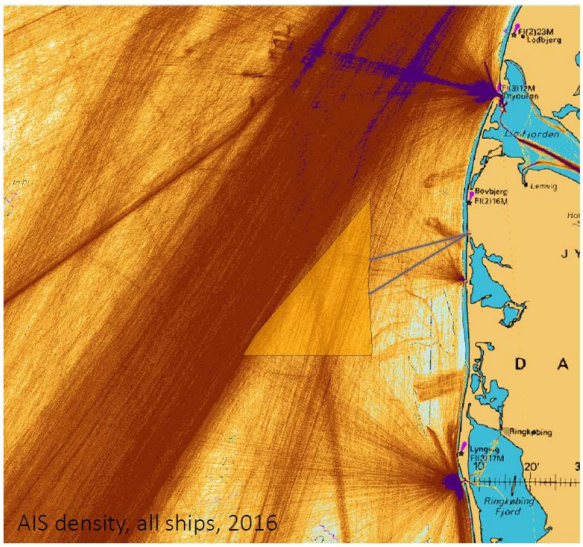
ANLÆGSARBEJDET

Der foreligger ikke specifikke forudsætninger om anlægsarbejdet, heller ikke om, hvilken/hvilke havne der vil blive anvendt som udskibningshavn.

ENERGINET

MARIN TRAFIK

Seneste data, som Energinet er i besiddelse af.



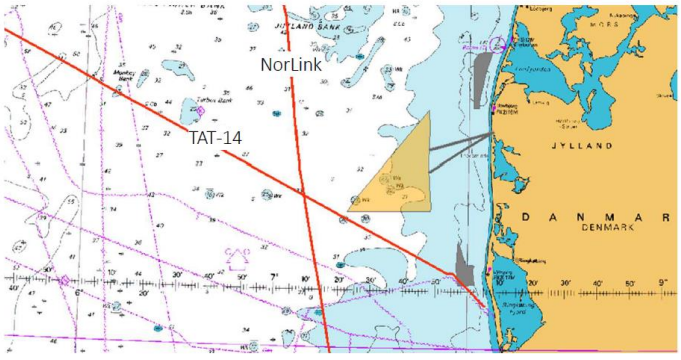
AIS density, all ships, 2016

8

ENERGINET

EXISTERENDE INFRASTRUKTUR

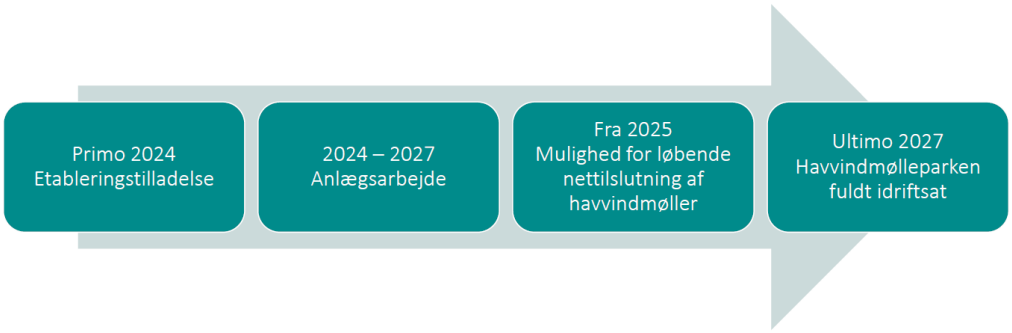
- Telecom kabel TAT14
  ca. 1 NM sydvest for forundersøgelsesområdet
- Interconnector NorLink
  ca. 7 NM vest for forundersøgelsesområdet



9

ENERGINET

FORVENTET TIDSPLAN



APPENDIX 3
PRESENTATION OF THE SHIP TRAFFIC IN THE AREA

THOR OWF
ANALYSE AF SKIBSTRAFIK

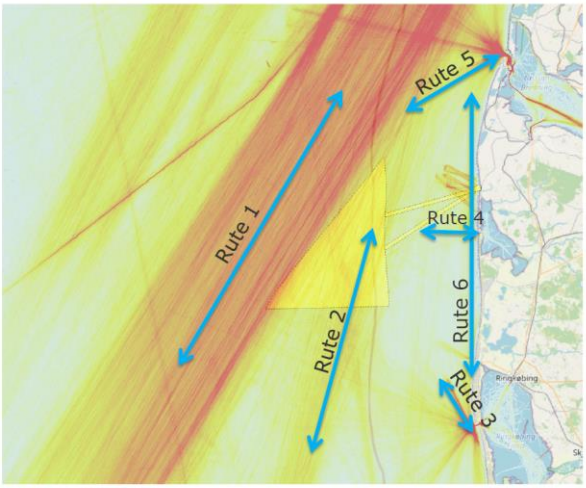
RAMBØLL Bright ideas. Sustainable change.

INDHOLD

- Densitetskort for al trafikken i området med angivelse af "hovedtrafikstrømme" / ruter og med undersøgelsesområdet markeret
- Optælling af skibe på de forskellige ruter
  - Inddelt i længdeklasser; 0-25 m, 25-50 m, 50-75 m etc.
  - Inddelt i skibstyper; tanker, cargo, passager, fiskere, etc.
- Densitetskort for fiskere (AIS) med underliggende søkort
- Densitetskort for lystsejlere (AIS 36+37) underliggende søkort
- Vindforhold

RAMBØLL

DENSITETSKORT OVER SEJLADS OMKRING THOR OWF

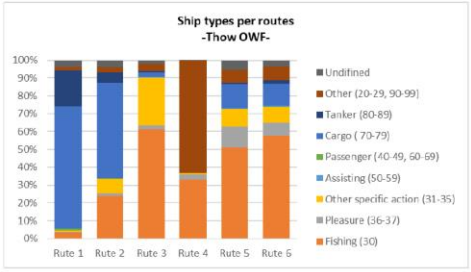


Generelle betragtninger:

- AIS-data for hele skibstrafik for hele 2019
- Størst trafik vest for området (rute 1)
- Mindre fragtskibe og fiskere som sejler igennem/i området (rute 2)
- Ved kysten sejler der primært fiskere (rute 6)
- Ud fra Hvide Sande (rute 3), Thorsminde (rute 4) og Thyborøn (5) sejler der primært fiskere eller andre skibe under 25 m., dog med skibe op til ca. 100 m.

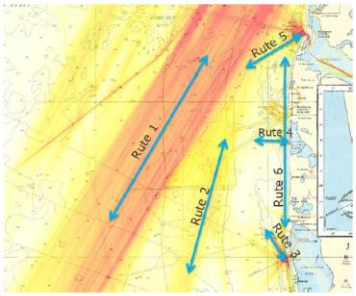
RAMBØLL

SKIBSSTØRRELSER OG –TYPER: THOR OWF



Registrerede skibe i 2019

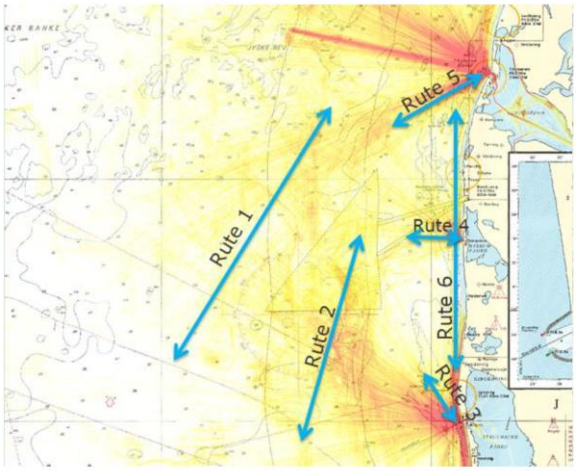
Rute	Nord	Syd
1	9.482	8.363
2	2.477	2.207
3	1.441	1.432
5	1.506	1.365
6	923	893
Rute	Øst	Vest
4	1.437	1.450

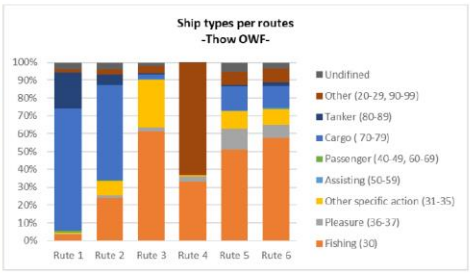


- Størst trafik vest for området (rute 1), primært tank- og containerskibe over 100 m.
- Trafik igennem området består at mindre containerskibe og fiskere
- Trafik ved kysten er primært fiskere og andre mindre skibe

RAMBØLL

DENSITETSKORT OVER FISKERE

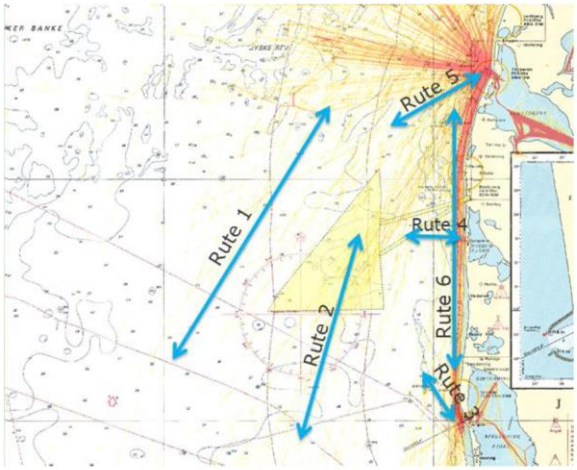


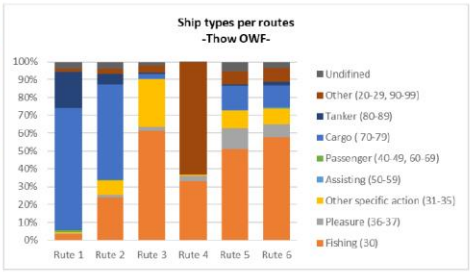


- Fiskere følger ikke nogen bestemt rute ud fra de 3 havne (Hvide Sande, Thorsminde og Thyborøn)
- Størst antal fiskere syd og nord for området

RAMBØLL

DENSITETSKORT OVER FRITIDSSEJLERE

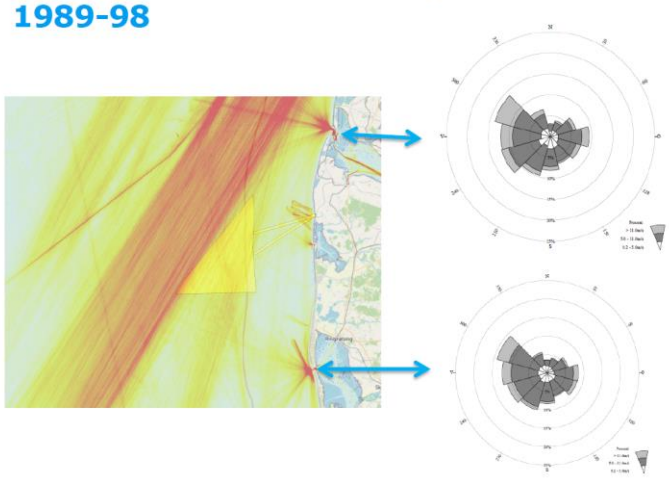




- Sejlbåde holder sig primært til kysten
- Ingen bestemte retninger ud fra de tre havne (Hvide Sande, Thorsminde og Thyborøn)
- Mindre antal sejler til/fra Thyborøn mod Holland/Engelske Kanal, hvilket går igennem området

RAMBØLL

VINDROSER FOR THYBORØN OG HVIDE SANDE I PERIODEN 1989-98



- Vindforholdene i området er fundet en tiårig periode fra 1989-98.
- Primært vind fra vest

RAMBØLL

APPENDIX 4
INPUT FROM THE USERS OF THE WATER

From: Lars Erik Olsen <
Sent: Tuesday, 30 June, 2020 09:56
To: Toke Koldborg Jensen
Subject: SV: Thor Havvindmøllepark - Høring af farvandets brugere

Til Toke K. Jensen

Tak for det tilsendte materiale

Kystdirektoratet har følgende bemærkninger.

Lige øst for forundersøgelsesområdet er der meldt områder ind til havplanen som potentielle Råstofområder, hvor flere at disse er af interesse for Kystdirektoratet. Der er afsat søkabeltracér gennem disse områder. Det ønskes derfor belyst i hvilket omfang det får betydning for eventuel fremtidig indvinding, herunder om der bliver en sikkerhedszone omkring kabeltracéerne i den efterfølgende driftsfase. Hertil kommer at Kystdirektoratet har et eksisterende indvindingsområde, kaldet 562-AD Ferring, som Kystdirektoratet antager ikke påvirkes hverken under anlægs- eller driftsfasen.

Det forventes, at der i hele anlægsperioden er uhindret passage i nord/syd – gående retning på tværs af kabeltracéet, da transportkorridoren af sand fra indvindingsområdet 562-AD Ferring og indtil den pågældende kystfodringsstrækning, for en dels vedkommende skæres af kabeltracéerne.

I forhold til hvor kabelføringen går i land ved Tuskær, er det en strækning hvor Kystdirektoratet udfører kystbeskyttelse i form af sandfodringer. Det skal derfor koordineres med Kystdirektoratet i hvilken periode den landgående kabelføring anlægges, så det ikke foregår på samme tid med sandfodringer. Det antages tillige med, at når anlægget er anlagt, at det ikke får betydning for de løbende sandfodringer Kystdirektoratet foretager her.

Kystdirektoratet står til rådighed ved koordinering af sandfodringer på strækningen ift. anlægsarbejdet med kabelføringen.

Med venlig hilsen

Lars Erik Olsen
Projektleder I Kystbeskyttelse Drift og Anlæg

Miljø- og Fødevareministeriet
Kystdirektoratet I Højbovej 1 I 7620 Lemvig I Tlf. +45 99 63 63 63 I kdi@kyst.dk I www.kyst.dk

From: Henrik S. Lund <
Sent: Monday, 29 June, 2020 15:19
To: Toke Koldborg Jensen
Subject: SV: Thor Havvindmøllepark - Høring af farvandets brugere

Hermed Danmarks Fiskeriforenings kommentarer på høringen omkring Sejladssikkerhed for Thor Havvindmøllepark

Som det også fremgår af de til høringen fremsendte dokumenter, færdes og fisker en lang række forskellige fiskefartøjer i projekt området. Der vil bedst muligt kunne tages hensyn til fiskeriaktiviteter ved at opstille møllerne, så de bedste fangstområder i projekt området ikke dækkes/ødelægges af havvindmøller. Dette vil i meget høj grad være en risikoreducerende foranstaltning i relation til at optimere sejladssikkerheden for fiskeriet i og omkring Thor havvindmøllepark og sikre en sameksistens mellem havvind og fiskeri. Der vil kunne opnås en yderlig forbedring af sejladssikkerheden, hvis møllerne opstilles i et mønster med samme afstand mellem alle møller og korridorer mellem møllerne så navigation i området gøres så simpelt som muligt.

Med venlig hilsen
Henrik S. Lund
Biolog

DANMARKS FISKERIFORENING
Producent Organisation

Direkte +45
Mobil +45
Mail

Nordensvej 3, Taulov
DK - 7000 Fredericia

www.fiskeriforening.dk
cvr.nr. 45 81 25 10

Fra: Mads Korff < > **På vegne af** Hovedmail
Sendt: 22. juni 2020 11:05
Til: Bestyrelse < .>; Konsulenter i DFPO <
Emne: VS: Thor Havvindmøllepark - Høring af farvandets brugere
Prioritet: Høj

Modtaget på hovedmailen.
Høringsfrist 30. juni.

Med venlig hilsen/Kind regards/Freundlichen Grüssen
Mads Christian Korff
Direktionsassistent

DANMARKS FISKERIFORENING
Producent Organisation

From: Flemming Sparre Sørensen <
Sent: Thursday, 11 June, 2020 09:54
To: Toke Koldborg Jensen
Cc: Peter Dam
Subject: Thor Havvindmøllepark - Høring af farvandets brugere(SFS Id nr.: 946262)

Kære Toke

Undskyld jeg først vender tilbage nu, men jeg har desværre ikke haft mulighed før.

Til høringslisten, så kunne du måske tilføje Danske Tursejlere.

Tror de er mere relevante i det område end Dansk Sejlunion.

Og ellers vil jeg, som også på live HAZID workshop være observerende og afvente hvad der måtte komme ind af bemærkninger og høringssvar.

Med venlig hilsen
Flemming Sparre Sørensen
Nautisk konsulent

Sikre farvande
Dir. tlf.:

E-mail:

SØFARTSSTYRELSEN
Tlf.: 72196000

Web: www.soefartsstyrelsen.dk

Følg os:
Søfartsstyrelsen

Danish Martime Authority

From: Morten Glamsø <
Sent: Tuesday, 16 June, 2020 11:56
To: Toke Koldborg Jensen
Cc: Finn Mølsted Rasmussen; Morten Hansen
Subject: RE: Thor Havvindmøllepark - Høring af farvandets brugere

Kære Toke Koldborg Jensen,

Mange tak for at foretage en høring omkring udformningen af Thor Havvindmøllepark som del af forundersøgelserne forud for en VVM.

Danske Rederier har en interesse i placeringen af Thor Havvindmøllepark, idet flere af vores medlemmer passerer det anførte område regelmæssigt.

I den forbindelse har vi følgende kommentarer vedr. indvirkningen på sejladssikkerheden for de 3 anførte ruter i forhold til mølleparkens placering.

Rute 1:
Her ses den største skibsintensitet, og også de største skibe. I den forbindelse bemærkes det, at parkens sydvestlige hjørne går ind i et område hvor der er hyppig sejlads (mørkerød farve). Samtidig må det formodes, at de skibe som sejler der, vil være nogle som er på en nordnordøstlig kurs op langs Jylland. I forhold til søvejsreglerne vil en typisk manøvre for at undgå sammenstød være at dreje til styrbord, og det vil derfor ved en placering af vindmøller så tæt på den typiske rute være en hindring, og derfor have en negativ indflydelse på sejladssikkerheden. Det anbefales derfor at der i forbindelse med den endelige udformning af parkens udstrækning enten "skærer" det sydvestlige hjørne af, eller bedre endnu laver en udformning som er mere parallel med den typiske kurs skibene benytter og at den lægges i behørig afstand af den hyppige trafik.

Rute 2:
Vi har identificeret rederier Unifeeder som et af de containerrederier, som benytter denne rute til deres skibe, når de skal til/fra Hamburg/Bremerhaven og rundt Skagen. Ud fra et sejladssikkerhedsperspektiv, så er det muligt at sejle uden om, uden at det skulle have de store konsekvenser. (Se dog ovenstående omkring søvejsregler for de nordgående.) Men en sådan omsejling vil er beregnet til at give 5 sømil per passage i ekstra distance, hvilket både vil have miljømæssige og økonomiske omkostninger i forbindelse med øget brændstofforbrug og tid. Rederiet har beregnet at økonomiske konsekvenser baseret på deres trafikmønster og kan konstatere et årligt merforbrug på Time Charter (T/C) og bunker til ca. DKK 550.000. Beregning er baseret på dagen oliepris og en gennemsnitsbetragtning på deres T/C omkostning.

Ud fra kortudsnittet er det vanskeligt at vurdere udstrækningen på det skitseret område, om der f.eks. er mulighed for at lave en "korridor" gennem området. Men det kan måske undersøges nærmere i det kommende arbejde.

Øvrige ruter:
Her har vi ikke umiddelbart nogen kommentarer.

Skulle ovenstående give anledning til spørgsmål, så står jeg til rådighed, og vi vil også meget gerne konsulteres igen, i senere faser af projektet.

Med venlig hilsen

Morten Glamsø
Chefkonsulent

M: +45
D: +45

Twitter:

Amaliegade 33
DK 1256 København K

DanskeRederier

From: Christian Lerche <
Sent: Tuesday, 23 June, 2020 10:47
To: Toke Koldborg Jensen
Cc: Henrik Tang Kristensen; Dansk Sejlunion
Subject: Re: Thor Havvindmøllepark - Høring af farvandets brugere

Tak for reminderen vedr. denne HAZID og tak for invitationen til at deltage.
Vi havde egentlig besluttet os for ikke at svare.
Dansk Sejlunion har ingen bemærkninger til forslaget om at etablere denne vindmøllepark.
Vi tager det for givet, at der gøres en særlig og rettidig indsats for at informere al skibstrafik – også danske og udenlandske lystsejlere – om begrænsninger for sejladsen i området under anlægsarbejdet og fremover.

Med venlig hilsen

Christian Lerche
Direktør
Dansk Sejlunion

t (+45)
m (+45)

From: Lisette Sønderby <
Sent: Tuesday, 23 June, 2020 15:27
To: Toke Koldborg Jensen
Subject: VS: Thor Havvindmøllepark - Høring af farvandets brugere
Attachments: Thor Havvindmøllepark - baggrundsinfo til HAZID-analyse.pdf; Thor Havvindmøllepark - præsentation af skibstrafik.pdf; Indbydelse til skriftlig høring for Thor Havvindmøllepark.pdf

Hej Toke,

Tak for din mail.
Thorsminde Havns brugere er fiskefartøjer, og deres høringssvar vedr. sejladssikkerhedsmæssige interesser for området vil ske via deres fiskeriforening.

Med venlig hilsen
Lisette Sønderby
Havnechef
Thorsminde Havn
Vesterhavsgade 1A, Thorsminde
6990 Ulfborg
Tlf 1 – Mob.

From: FKO-SV-N5N54 Bach, Mikael <
Sent: Wednesday, 3 June, 2020 12:18
To: Toke Koldborg Jensen
Subject: SV: Thor Havvindmøllepark - Høring af farvandets brugere [RELEASABLE TO INTERNET TRANSMISSION]

Follow Up Flag: Follow up
Flag Status: Flagged

RELEASABLE TO INTERNET TRANSMISSION

Kære Toke,

Tak for din henvendelse vedrørende *Thor Havvindmøllepark - Høring af farvandets brugere*.

Det skal dog bemærkes, at forhold vedrørende sejladssikkerhed i Danmark er forankret ved Søfartsstyrelsen og under dennes ressortområde.

Søværnskommandoen har i forbindelse Geodatastyrelsens høring (af 4. maj 2020) vedrørende søopmåling og geotekniske boringer forud for anlægsperioden af Thor havvindmøllepark angivet, at Kystredningstjenesten ved Redningsstation Thorsminde er centralt placeret i forhold til de skitserede undersøgelsesområder. Det er Søværnskommandoens vurdering, at undersøgelserne, som beskrevet, vil have en begrænset til ikke nævneværdig indflydelse på redningsstationens funktion og virke. Dette vurderes ligeledes at gøre sig gældende, når havvindmølleparken er anlagt og etableret.

Jeg uddyber gerne ved behov.

Med venlig hilsen

Mikael Bach
kaptajnløjtnant
Stabsofficer

SØVÆRNSKOMMANDOEN
Planlægningssektionen for Nationale Operationer (N5N)
Herningvej 30, 7470 Karup J
Telefon: +45 / Mobil: +45
E-mail:
www.forsvaret.dk

"Næst efter Gud den almægtiges nådige forsyn hviler Kongerigets velfærd, sikkerhed og styrke på Flåden"

RELEASABLE TO INTERNET TRANSMISSION