A Fixed Link Across the Fehmarnbelt and the Environment

Environmental Consultation Response Report

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Preface

With the Environmental Consultation Process the Ministries of Transport of both, Denmark and Germany initiated a consultation procedure concerning the environmental implications of a fixed link across the Fehmarnbelt at an early stage of decision-making. It comprises

- the Environmental Consultation Report issued in January 2006,
- the response period for the public, interest organizations and authorities (30 January – 13 March 2006) and
- this Environmental Consultation Response Report.

64 responses have been received from the public, interest organizations and authorities. The Ministries of Transport wish to thank all respondents for their contributions.

This Environmental Consultation Response Report gives an overview on the consultation process, summarizes the responses and reviews their focal points. In particular it addresses proposals given for environmental requirements and/or environmental optimization of the project and provides preliminary answers on selected issues.

The Environmental Consultation Process aims at the overall goal that responses are meant to serve as an input to the Ministries' of Transport decision-making process on the realization of the fixed link and the future development of the project.

Berlin and Copenhagen, October 2006

Federal Ministry of Transport, Building and Urban Affairs

Ministry of Transport and Energy

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1 Review of the Environmental Consultation Procedure

1.1 Objective of the Environmental Consultation

Besides technical and financial issues the environmental issues play an important role in the decision-making process of the Ministries of Transport.

With the Environmental Consultation Process the Ministries of Transport of Denmark and Germany initiated an innovative consultation procedure concerning the environmental implications of a fixed link across the Fehmarnbelt at an early stage of decision-making. It comprises the Environmental Consultation Report issued in January 2006, the response period (30 January – 13 March 2006) for the public, relevant non-governmental interest organizations and authorities, and this Environmental Consultation Response Report. The objectives of the Environmental Consultation Process are described in the Environmental Consultation Report (ECR, http://www.Fehmarnlink.com):

- to proactively provide the public, interest organizations and authorities with early and comprehensive environmental information through the Environmental Consultation Report
- to give the public, interest organizations and authorities opportunity to express their views on the environmental issues at an early stage in the decision-making process
- to ascertain through the responses of the public, interest organizations and authorities their views on the environmental issues or topics and receive their suggestions for the project's further optimization and
- to develop a programme for further environmental investigations and to establish more precisely the environmental requirements to be met by the project based on the stakeholders' response.

All these objectives aim at the overall goal that responses are meant to serve as an input to the Ministries' of Transport decision-making process and for further environmental investigations as a basis for the forthcoming approval procedures. The views and comments, concern and support given by the public, interest organizations and authorities during the response period will be taken in to consideration in the future development of the project. As an outcome of the environmental consultation procedure a more precise view is expected on the environmental requirements to be fulfilled by any of the solution models. The present Environmental Consultation Response Report is meant to provide preliminary answers and comments to questions and concerns raised.

This Environmental Consultation Response Report is distributed to all respondents of the environmental consultation process and is also available on the website http://www.Fehmarnlink.com.

1.2 Notification Procedure

1.2.1 Press releases

Press releases were issued in Denmark and Germany for kick-off of the response period.

In Denmark, the Ministry of Transport and Energy (MoTE) issued a press release on 30 January 2006 /1/. The press release included a hyperlink to the Fehmarnlink.com website. As a result, press articles appeared in many newspapers both nation-wide and local on 31 January. An interview with Flemming Hansen, Minister of Transport and Energy, was printed in "Berlingske Tidende", one of Denmark's major nation-wide newspapers on 30 January 2006.

In Germany, the Ministry of Science, Economic Affairs and Transport of Schleswig-Holstein (MWV SH) issued a press release on 30 January 2006 /2/. It included a hyperlink to the Fehmarnlink.com website. As a result, press articles appeared in all major local and regional newspapers on 31 January and 1 February. The Federal Ministry of Transport, Building and Urban Affairs (BMVBS) announced the commencement of the consultation procedure on its website.

1.2.2 Distribution of the report

Distribution of the report to selected recipients

The Environmental Consultation Report (ECR) was printed in Danish, German and English versions. A number of selected recipients were provided with printed copies of the ECR.

In Germany, in total approx. 120 selected recipients were provided with more than 400 printed copies of the ECR. These comprised, *inter alia*,

- environmental ministry and agencies (Federal level)
- various ministries and relevant authorities (State level) of Schleswig-Holstein
- selected members of parliaments (Federal and State levels)
- administrations of Ostholstein County, cities, towns and municipalities in the scope of the project
- relevant approval authorities
- legally recognized environmental protection organizations
- other non-governmental interest organizations, such as tourism, fishery, agriculture, wind energy, commerce
- *Aktionsbündnis gegen eine feste Fehmarnbelt-Querung*, a local citizens' action group opposing the fixed link
- German Rail, and Agency for Road Construction and Transport of Schleswig-Holstein
- Scandlines.

In Denmark, in total 100 selected recipients were provided with approx. 400 copies of the ECR. The recipients were, amongst others

- selected ministries including the Ministry of Environment, and agencies
- the Transport Committee of the Danish parliament
- administrations of counties and municipalities in the scope of the project
- environmental interest organizations
- other non-governmental interest organizations
- Danish State Railways, and Road Directorate
- institutions in the scope of the project, such as educational institutions, labor market institutions
- libraries

Distribution of the report upon request

Due to articles in the press a number of individuals in Germany requested copies of the printed version of the Environmental Consultation Report. Also some of the selected institutions requested additional copies. More than 550 copies were forwarded to individuals and institutions upon request by the Federal Ministry of Transport, Building and Urban Affairs. Out of these, the Ostholstein County administration received 140 copies.

In Denmark only a few individuals asked for copies of the report which were provided by the Ministry of Transport and Energy.

1.2.3 Website presentation

Besides the printed Environmental Consultation Report a website was created to support the distribution of the ECR: **http://www.Fehmarnlink.com**. The homepage branches out to the three language versions: Danish, German and English. The web version of each language includes exactly the same information as the printed reports. At the website the printed reports are also available for download as PDF files in all three languages. The website was opened for access on 30 January 2006 and will be kept in operation for presentation of this Environmental Consultation Response Report.

Figure 1: Fehmarnlink.com homepage

The front page of the website was visited 4,685 times during the response period. The German version of the homepage was visited 1,014 times, the Danish homepage 913 times and the English homepage 296 times.

In addition to this special website the ECR has also been made available on the websites of the ministries, providing PDF files for download (BMVBS), or hyperlinks to the Fehmarnlink.com website (MoTE, MWV SH).

1.2.4 HELCOM

On 6 February 2006 the Danish Ministry of Environment officially informed HELCOM, the Baltic Marine Environment Protection Commission. This information follows HELCOM Recommendation 17/3 which requires that the governments of Denmark and Germany inform and, where necessary, consult with any Contracting Party of HELCOM likely to be significantly affected by the construction of an installation with a significant potential adverse impact on the Baltic Sea, in particular proposed activities such as fixed links /3/.

1.3 Responses Received

1.3.1 Number and nature of responses received

In total 64 responses arrived. 48 were received by the German ministry and 16 by the Danish ministry. A letter of receipt has been forwarded to all respondents in both Germany and Denmark. No responses originated from countries outside Germany and Denmark.

The distribution by the types of respondents differs between the two countries as shown in Figure 2. Most of the German respondents are individuals or companies. Most of the responses received in Denmark came from public authorities/institutions and interest organisations, whereas only one individual responded.

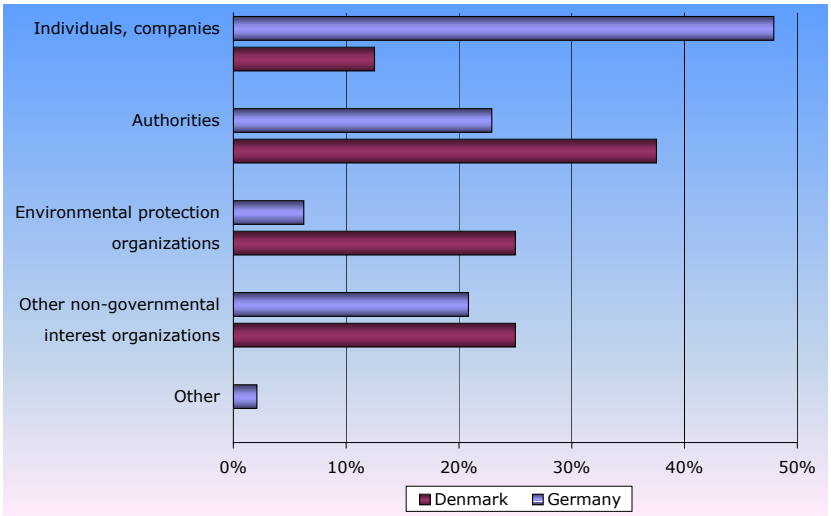


Figure 2: Percentage of types of respondents in Germany and Denmark

Also the regional distribution of respondents differs between the two countries. The German responses the origin of which is shown in Figure 3, indicate a mainly local and regional feedback to the environmental consultation. 77 % of all responses originated from Schleswig-Holstein and Hamburg, most of them from the island of Fehmarn, while 23 % of the responses came from elsewhere in Germany (authorities and institutions). Only few responses arrived from the hinterland corridor of the rail and road upgrading between Lübeck and Grossenbrode. In Denmark 25 % of the responses are of local/regional origin and 75 % came from national public institutions, authorities or non-governmental organizations.

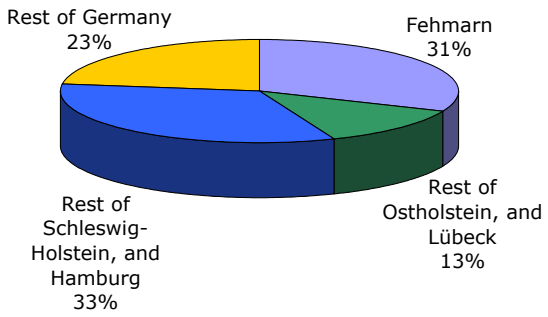


Figure 3: Regional distribution of respondents in Germany

Volume and quality of responses in Germany cover a broad range from a quite short and general level of typically 1-2 pages to an expert level and up to 10 pages.

The environmental topics addressed in the Danish responses are to a high degree those that were in focus during the planning and construction of the two fixed links across the Great Belt and the Øresund. The experiences gained from these two comparable fixed links realized in the period 1988-2000 seem to have influenced the responses.

1.3.2 Sections addressed in the responses

By far most of the responses (90 %) deal with the coast-to-coast section, see Figure 4.

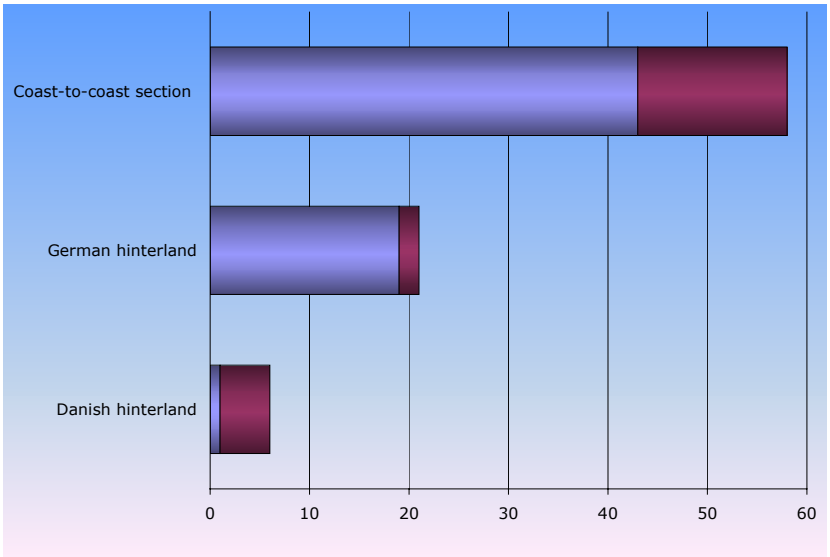


Figure 4: Sections addressed in the responses

1.3.3 Overview of views expressed on the environmental issues

The responses addressed numerous environmental issues and suggestions for environmental requirements and/or optimization of the project concerning all sections, the coast-to-coast section and the German and Danish hinterlands. They are reviewed in the following chapters.

Regarding the **coast-to-coast section** comments were given (in the order of frequency) concerning

- Technical solution model (bridge/tunnel)
- Non-environmental issues (economic, social, political, employment etc)
- Loss of habitats or affection of Natura 2000 sites
- Effects on birds
- Effects on hydrographic conditions, in particular blocking effects on the water
- Effects of sediment spill (bathing water quality, tourism and recreation, fauna and flora)
- Noise exposure at ramp sites
- Other specific issues (in the order of frequency: effects on fish and fishery, ship collision risks, visual effects, effects on tourism, traffic restrictions on a bridge, effects on benthic fauna and flora, marine mammals, air quality, coastal morphology, alignment, comparison with ferry service, etc).

Regarding the **German hinterland section** comments were given (in the order of frequency) concerning

- Loss of habitats or affection of Natura 2000 sites
- Non-environmental issues (economic, social, political, employment etc)
- Noise exposure
- Other specific issues (in the order of frequency: Fehmarnsund bridge, effects on birds, alignment and stations, cultural heritage, effects on tourism, visual effects, rail power line, etc).

Regarding the **Danish hinterland section** comments were given concerning

- Effects on water quality of Guldborgsund (Natura 2000 site) following from the potential influence on the water exchange from the new/expanded bridge across Guldborgsund
- Effects on leisure boat traffic in Masnedsund
- Consequences for horseback riding, cycling and walking paths along the coastline of Lolland near Rødbyhavn
- Loss of habitats/nature in the area of the new hinterland infrastructure, incl. the proposed new station at Rødby
- Noise exposure following from the upgraded railway.

Quite a large number of respondents also addressed issues of a non-environmental character such as effects on economy, employment, issues related to traffic forecast, financing models, ship traffic intensity, capacity of the ferry service, monetary compensation due to losses, etc. Although the Environmental Consultation Report provided information regarding these issues, the objective of the environmental consultation process is primarily confined to the environmental impacts of a fixed link and the upgraded hinterland infrastructure. Questions and remarks related to such non-environmental issues have been noted by the ministries and relevant issues will be considered during the forthcoming political discussion and decision-making process.

In the following chapters the views, remarks and questions from the received responses have been summarized and grouped under relevant headings. Also preliminary comments of the Ministries of Transport to the responses are given, shown in italics.

2 Coast-to-Coast Section

2.1 General issues

Corridor for a fixed link across the Fehmarnbelt

Some respondents argue that an assessment of alignment alternatives in different coastal sections is required in order to find the best approaching point of the fixed link to the coast. This includes an objective way of the determination of the terrestrial horizontal alignment as chosen. A clear description of the basis for determining the horizontal alignment is requested by some respondents.

> ***Comment:*** *The technical investigations carried out during the feasibility studies were concentrated to a 5 km wide corridor between Puttgarden and Rødbyhavn. It was assumed that the fixed link would be situated within this corridor. Based on the results of the feasibility studies the preferred approaching points are situated east of the ferry harbours of Puttgarden and Rødbyhavn for the following reasons:*
>
> - *The connection to the existing rail and road infrastructure in the hinterland is much easier and is thus connected with less territorial impacts than if situated west of the ferry harbours.*
> - *A western approach would have meant that the towns of Puttgarden, Rødbyhavn and Rødby were located much closer to the alignment and a risk of affecting the nature reserve "Grüner Brink" would arise.*
> - *Furthermore the railway marshalling yard east of Puttgarden ferry harbour, which today is more or less taken out of operation since the freight rail traffic has been directed to the Great Belt fixed link in 1997, suggests itself to be re-used for the approach of the fixed link.*
> - *On the Danish side the Regional Plan makes reservations of an area east of Rødbyhavn.*
>
> *The final determination of the horizontal alignment will depend on the selected technical solution model and the results of associated detailed investigations and environmental impact assessments.*

Some respondents argue that the selected corridor for a fixed link across the Fehmarnbelt in general is outdated. Taking into consideration that the main future economic growth is expected in eastern/central Europe, it should be considered to establish the fixed link between Gedser and Rostock instead of between Rødby and Puttgarden.

> ***Comment:*** *The present traffic volume of the Gedser-Rostock corridor is only approximately one tenth of the traffic volume of the Rødby-Fehmarnbelt-Puttgarden corridor. Even if a relatively strong economic growth in eastern/central Europe can be expected in the future, an approx. 40 km long fixed link between Gedser and Rostock (in comparison the fixed link between Rødby and Puttgarden will be only approx 20 km long) is not deemed a realistic option for financial reasons within a foreseeable future.*

Selection of technical solution models

Among those German respondents who address the matter of selection of the technical solution models the majority have reservations about the bridge solution for different reasons (including a bird collision risk, a ship collision risk, and a visual appearance of the landscape also influencing the tourism at Fehmarn). Some respondents prefer the tunnel solution for an anticipated smaller environmental impact (blocking of the water flow, influence on fishery, and risk of bird collisions).

Comment: *As stated in the ECR, the difference between the two preferred technical solution models – cable-stayed bridge and immersed tunnel – is not very pronounced, seen from an environmental point of view. On basis of information available today neither of them is deemed to have long-term adverse consequences for the local marine environment or for the environmental conditions in the Baltic Sea.*

On this background the Ministers of Transport in 2005 agreed that at the present stage the preferred technical solution is a cable-stayed bridge solution and that an immersed tunnel solution is the preferred alternative.

Both solution models are feasible and each of them has advantages and disadvantages. The influence of an immersed tunnel solution on the water flow through the Fehmarnbelt will be slightly smaller than in case of the cable-stayed bridge solution, provided that only one ventilation island is considered sufficient for a well-functioning tunnel ventilation system. On the other hand the results of the hydrodynamic model calculations show that the difference is quite small, and taking the present degree of uncertainty of such model calculations into consideration, the difference between the solution models from an overall environmental perspective can hardly be considered decisive.

Another important aspect to take into account is the significantly larger amount of seabed to be dredged for the tunnel solution compared to the bridge. The effects on the marine ecosystem resulting from the spreading of the spill will be substantially larger in case of the tunnel solution compared to the bridge solution – although the effects for both solutions are considered to be of a temporary character. The permanent effects of the deposits for excess materials will also be larger for the tunnel solution due to the larger size of the sites.

The east bridge, Great Belt fixed link

The marine construction works (dredging and reclamation) of the bridge solution will last 1-2 years less than the similar works for the tunnel which reduces the period where a risk of local environmental impacts including impacts on tourism (bathing water quality, noise, etc) might appear. Furthermore, the advantage of 1.1 billion EUR less investment costs of the bridge solution compared to the immersed tunnel cannot be neglected. On the other hand a certain collision risk for migratory birds cannot fully be excluded in case of the bridge solution at this time, based on the knowledge of preliminary assessments. Also the risk of ship collisions with bridge piers and the navigational safety aspects in case of a bridge must be investigated thoroughly (see below, ship collision risk).

As stated in the ECR, further studies of both the bridge solution and the tunnel solution will be carried out within the

framework of the environmental impact assessments in order assess the environmental implications on a more detailed level and on basis of more detailed design principles and construction methods.

Some respondents criticize that other solution models besides the cable-stayed bridge and the immersed tunnel have been excluded from further considerations apparently only for financial reasons without considering a wider set of factors that might influence the selection of the technical solution model.

Comment: *The emphasis in the Environmental Consultation Report has naturally been put on the environmental issues that should be addressed before making the final selection of the solution model. For that reason other factors that influence the selection of the solution model have not been referred to in detail. A large number of parameters have been considered before the two technical solution models of the ECR were selected. Among the most important parameters are of course the investment costs of the solution models along with the socio-economic features of the different models (see below regarding ranking of solution models).*

The feasibility studies carried out in 1995-99 included 8 possible technical solutions, which were investigated in terms of different evaluation parameters such as construction costs and construction time, traffic capacity, environmental impact as well as financial and socio-economic effects. The 8 solution models comprised bored and immersed tunnels as well as both suspension and cable-stayed bridges. The traffic capacity of the different solution models varied between 1-2 railway tracks, and 0-4 road lanes.

The initial environmental studies conducted as parts of the feasibility studies concluded with an environmental ranking of the 8 solution models based on different environmental criteria, but no ranking of other relevant parameters such as technical or financial had been done at that time.

In order to further narrow down the number of technical solutions to be considered for the political decision about the realization of the project the Ministries of Transport decided in 2003 to continue the ranking for other criteria besides environmental criteria. The evaluation parameters were:

- *Costs and construction time*
- *Financial and economic aspects, including construction costs*
- *Socio-economic aspects (cost/benefit)*
- *Traffic capacity*
- *Traffic restrictions*
- *Navigational aspects*
- *Safety and emergency aspects*
- *Passenger comfort.*

The overall assessment of this wider set of factors including the environmental criteria lead to the result that two technical solution models were selected: the 4+2 cable-stayed bridge and the 4+2 immersed tunnel. In the approval process information will be made available concerning the selection of the technical solution models.

It should be emphasized that the selection of the two solution models made so far has been mostly based on the information made available through the feasibility studies. Some matters have though been investigated further such as traffic restrictions due to high winds in case of a bridge solution, risk of bird collisions with bridge structures and an assessment of the compliance of the design of the immersed tunnel solution with the latest national and international regulations regarding safety in road and railway tunnels.

Results of further detailed investigations of eg environmental, safety and emergency aspects, navigational and geotechnical conditions will be considered at the future design of the selected solution models. In the environmental impact as-

sessments the finally selected solution model will be compared with the selected alternative solution model and with the so-called "zero alternative" (ie the continued ferry service, no fixed link).

Alternative solution models

Two alternative technical solution models are proposed: A German respondent proposes an unventilated twin-tracked bored railway tunnel, while the ferry service should be maintained for road, bicycle and pedestrian traffic. A Danish respondent proposes to consider a shuttle train solution in a bored tunnel with an alignment from Rødbyhavn to Heiligenhafen as an alternative solution model.

> ***Comment:*** *Both alternative solution models would be connected with high investment costs without providing the required advantages of a fixed link (reduced travel time, higher traffic capacity, higher accessibility). Continuing the ferry service would imply that the disadvantages of this system would continue. In general the shuttle train solutions have considerably lower socio-economic cost-benefit ratios than "combined" rail/road solution models, mainly for a lower traffic capacity and because they do not provide reductions in travel time. This makes both alternative solution models proposed by the respondents unfeasible to overcome the barrier that the ferry service constitutes today.*
>
> *Both options would also be connected with a number of disadvantages compared to the preferred solution models. The proposed Danish shuttle train solution would be considerably longer.*

Ship collision risk

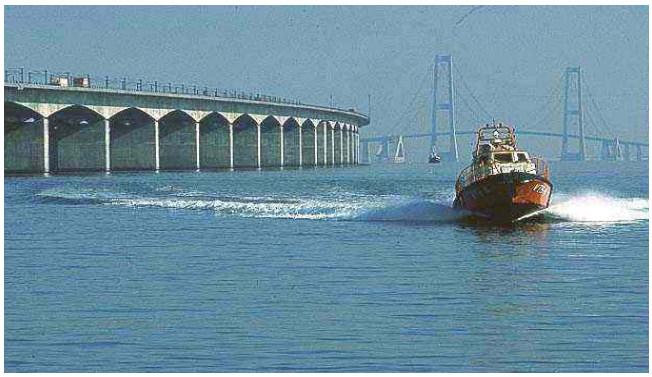
A number of respondents are concerned about the risk of ships colliding with bridge piers and the possible consequences of such incidents to the environment or to the users of the fixed link. Nautischer Verein Vogelfluglinie, a maritime NGO, says introduction of a scheme for separation of navigation routes or pilot systems cannot eliminate this risk. It also has to be considered that the Baltic Sea has recently been designated as a Particularly Sensitive Sea Area (PSSA) which requires precautionary measures for the environment. Some respondents see both tunnel and bridge solutions as sensitive to terror attacks and thus protective arrangements and measures are seen a requirement.

Therefore requirements comprise the need for further investigations into the collision risk of ships including the potential danger to the environment and loss of human lives following from ship collisions, and the need for risk management.

> ***Comment:*** *The questions regarding the safety aspects related to navigational conditions and ship collision in case of a bridge solution are highly relevant and important. They can be grouped into two.*
>
> *The first deals with the impact on the navigational conditions in the Fehmarnbelt: can sufficiently safe navigational conditions be obtained after establishing a bridge and which measures (separation of east and west bound traffic, Vessel Traffic Surveillance systems, pilot guidance service, etc) should be considered?*

Radar tower, Vessel Traffic Surveillance system, Great Belt fixed link

In 2005 the Ministries of Transport decided that this question should be investigated more thoroughly through a so-called "Formal Risk Assessment" based of the requirements set up by the International Maritime Organization (IMO) under the UN. The initial parts of such a risk assessment are under preparation on behalf of the Ministries of Transport by an expert consultant appointed in 2006. The maritime authorities of Germany and Denmark are involved in defining the scope of this risk assessment.



Patrol boat, Vessel Traffic Surveillance system, Great Belt fixed link

The second question deals with the risk and the potential consequences for human beings, transport, environment etc, should ship collisions with the bridge structures lead to damage of the bridge.

The present preliminary design of the bridge structures has to a large degree already taken safety aspects into consideration. The Ministries of Transport share the opinion that safety aspects are crucial. Therefore more detailed investigations including risk assessments will be carried out, once the navigational aspects have been considered carefully.

Correspondingly a number of detailed investigations of safety and emergency issues for the tunnel solution will be needed.

Comparison of environmental impacts from a fixed link and a continued ferry service

A number of German respondents take the view that a continued – and maybe optimized – ferry service should be preferred to a fixed link across the Fehmarnbelt. Different motives lie behind this attitude. Some respondents find that the costs of establishing a fixed link are too high; others fear that a fixed link – due to the disappearance of the ferry service – might influence the tourism at Fehmarn, or that – in case of a bridge – the bridge's mere existence would influence the visual appearance of the landscape in a negative way.

***Comment:** The overall idea behind the political considerations to establish a fixed link across the Fehmarnbelt is that a fixed link would provide an efficient, modern infrastructure for both road and railway transport between Scandinavia and Central Europe. It can hardly be questioned that the ferry service constitutes a barrier in the transport system. One result, among others, is a quite low cross-border interaction between the regions.*

In contrast, a fixed link across the Fehmarnbelt will provide a new, efficient transport corridor enhancing freight and passenger railway transport between Scandinavia and continental Europe. Travel times will be cut considerably and the accessibility will be much higher than today. Furthermore a fixed link is seen as a prerequisite for the generally accepted policy in European countries and the EU to enhance transfer of freight transport from road to more sustainable modes of transport including railways.

In several responses criticism is raised for the lack of a proper comparison of environmental impacts of a fixed link and a ferry service. Such an assessment should have been carried out.

Comment: *At the present stage of decision-making information is available on the level of detail of the feasibility studies. This of course means that a number of issues have not yet been investigated.*

If a political decision is taken to proceed with the project, an environmental impact assessment will be carried out at later stages in the project development based on existing and additional future environmental investigations. According to the practice for environmental impact assessments in Denmark and Germany it can be assumed that assessments will consider the finally selected solution model in comparison with the selected preferred alternative solution model and with the so-called "zero alternative" (ie the continued ferry service without a fixed link). The "zero alternative" might also involve a "zero plus alternative" (ie an optimized ferry service).

Decision making process

The Danish Nature Protection Society claims with reference to Article 2 in the EU EIA Directive, that the anticipated Danish approval procedure conflicts with the intended purpose of the directive. The Protection Society finds that a full Environmental Impact Assessment should be elaborated before a decision on the establishment of a fixed link is taken.

Comment: *The environmental consultation procedure is amongst others meant to give the public, interest organizations and authorities early and comprehensive environmental information about the project and a possibility to express their views, concerns and proposals at an early stage of the decision-making process. The result of the consultation procedure will be incorporated in the Government Agreement between Denmark and Germany. This means especially that environmental issues of a more principle nature will be considered.*

The principle of the Danish parliamentary approval procedure is described in section 6.3 of the ECR.

In practice the Danish approval procedure of the Fehmarnbelt fixed link will presumably take place in two steps: The Parliament's ratification of the Government Agreement will take place in form of an approval of an Act of Planning (Projekteringslov). This act authorizes the Minister of Transport and Energy to carry out further planning and investigations, including an environmental impact assessment. The responsibility for carrying out such investigations will – due to the project's cross-border nature – probably be left with a new bi-national common German/Danish project organization. When the planning basis in this way has been established, including an environmental impact assessment according to national and international obligations, a bill of the Construction Act (Anlægslov) can be presented to the Parliament for final approval of the Fehmarnbelt fixed link project.

Level of detail for general decision-making

As an overall complaint one German environmental protection organization criticizes that complex issues have been simplified in the ECR. Therefore assessments of impacts are connected with numerous uncertainties and a lack of precision. According to the Federal Nature Protection Agency the ECR is regarded as an insufficient basis for a decision-making concerning the technical solution, bridge or tunnel.

Comment: *Infrastructure projects are planned in several planning phases iterating from a general to a very detailed level as is not possible to investigate all relevant issues (technical, environmental, financial etc) on a definite level in advance before taking the political decision on realizing the project or not. From this narrowing down process it is natural that early phases are still more general and all the subsequent phases provide more detailed information.*

Compared with other infrastructure projects the Fehmarnbelt fixed link has already been investigated to a highly detailed degree. The feasibility studies comprised more than 20 reports on environmental aspects comprising field investigations, hydrographic and ecological modelling and risk analyses. They also utilized the knowledge and experience of numerous detailed investigations conducted in connection with the Great Belt and Øresund fixed links. This knowledge base was supplemented by 3 recent investigations into further specific environmental issues, and recent data gathered from environmental and nature conservation authorities.

It was one of the goals of the ECR to present the results of the feasibility studies to the public, interest organizations and authorities. Therefore complex issues had to be made understandable for all readers. In general, an impression of uncertainties in assessments or lack of precision is not backed by the content and volume of studies carried out so far. In addition to this, the ECR itself points out in which particular areas further investigations are seen as relevant and necessary.

According to the Federal Nature Protection Agency cumulative effects (eg in case of birds, benthic fauna and flora, water exchange/ blocking effects) must be considered on a far more detailed level in future studies.

> ***Comment:*** *After completion of the material basis of the ECR, the feasibility studies, it has now become a requirement under various recent environmental EU Directives and national environmental legislation to consider cumulative effects. This will be followed in the future planning stages.*

The agency also complains that the ECR does not sufficiently enough acknowledge the exceptional ecological importance of the Fehmarnbelt due to migration routes of birds, porpoises, seals, fish, and the occurrence of megaripple banks. Specific characters and criteria of the Natura 2000 sites are seen missing.

> ***Comment:*** *The latest available relevant facts of sites – including their specific characters – were gathered from nature protection authorities and compiled in the tables 3.1 and 4.3 and figures 3.4, 3.16, 4.3 and 4.4 of the ECR. The migration routes of birds, porpoises, seals, fish, and the occurrence of megaripple banks (see below, sections 2.3 and 2.4) are addressed. The fauna and flora section is among the most extended ones and provides detailed information in view of the purpose.*
>
> *Besides this, on basis of the initial environmental investigations it can be questioned whether the ecological importance of the Fehmarnbelt could be characterized as "exceptional". Future detailed studies will lead to more certainty.*

Further cooperation

A number of authorities and NGOs are interested in further cooperation in the future planning process.

> ***Comment:*** *One major goal of launching the environmental consultation has been to incorporate the latest knowledge in the further planning process for the benefit of the environment. Therefore the ministries appreciate and will come back to the stated readiness for cooperation and support offered.*

2.2 Human beings

Future coastline, noise and air emissions

Residents of Marienleuchte on the island of Fehmarn are concerned about the future coastline as the disposal sites for excess dredged material will be located off their coast. They are worried that their place will no longer be located on the beach. Also they are concerned that Marienleuchte will be impacted by uninterrupted construction-related noise, air emissions and vibrations. In particular some residents of the southern margin of the place are concerned that the alignment was allegedly changed in a way that the E 47 highway/motorway turns off the existing alignment already at Bannesdorf.

The Municipality of Lolland proposes to consider an alternative strategy for disposal of excess dredged materials. Instead, the materials should be used for other construction purposes. One proposal would be to create a new beach resort off the coast of Lolland, west of Rødbyhavn. Another proposal is to use the material for creating new "artificial" submerged reefs outside the coast of Lolland. This proposal is based on the positive experience from the offshore wind park at Nysted, where the foundations for the wind converters seems to have had a positive effect as new habitats for fish, benthic fauna, etc.

> ***Comment:*** *Although so far no detailed design of the disposal sites has been carried out it can be stated that the sites will be integrated the best possible way into their natural surroundings. This might involve eg an artificial beach landscape similar to that realized west of Puttgarden.*
>
> *All efforts will be taken to minimize construction-related nuisance to the largest extent possible. This includes a careful selection of the construction sites including works areas, camps, storage, offices, and access roads. The sites will be as small as possible and of course there will be limitations imposed on construction activities during the nighttime, weekends and public holidays.*
>
> *The road alignment including the turn-off from the existing alignment has not been changed. The access alignment including ramps and structures will run northwest to north of Marienleuchte, about midway between Marienleuchte and the present rail facilities of Puttgarden station. The concerns seem to be the result of a misunderstanding.*

Agriculture

Typically large-size infrastructure projects require extensive farmland for ecological enhancement as part of the legal compensation scheme. Ostholstein's farmland is among the most productive in the world. Excessive withdrawal of farmland from agricultural production is seen negligent and highly conflicting with agricultural interests. Therefore the Farmers' Organization of Schleswig-Holstein regards the recent standard used for calculating the volume of ecological compensation requirements in Germany as outdated and proposes alternative approaches. According to the Farmers' Organization it is required that marine impacts must not be compensated for on land.

> ***Comment:*** *The comment will be taken into consideration during the in the future planning stages.*

Infrastructure

Several respondents underline that a new station is required on Fehmarn as the existing Puttgarden ferry station will be isolated from the future alignment.

> ***Comment:*** *The demand for a local/regional stop has not been studied so far. The establishment of such a stop will have to be assessed in view of the expected traffic volume in future planning phases. Based on the expected development of the long-distance traffic volume no demand for a new station could be demonstrated during the preparation of the 2003 Federal Transport Infrastructure Plan.*

Tourism and recreation

Many responses deal with the effects on tourism and recreation (construction-related and permanent visual intrusion, noise, bathing water quality, change of landscape character, economic consequences including employment). The German and Danish views of the issue differ greatly.

Many of the German respondents argue that the project will affect tourism which will lead to a further weakening of the structurally weak region. Due to dredging and sediment spill-related turbidity the construction activities would affect the bathing water quality and bathing attraction for many years and thus lead to a negative image of Fehmarn as a major construction site rather than a holiday island. It is required that the dredging activities must take place off peak season, that sediment spill is monitored (like at the Øresund fixed link) and that the recognition status as "Baltic Sea spa" (*Ostseeheilbad*) and "Place of recreation" (*Erholungsort*) are maintained.

But also long-term consequences on tourism worry many because of the anticipated negative visual impact of the bridge, the ramp area at the coast line, noise barriers and toll station. Some German respondents take the view that the aesthetic value of a bridge could be questioned and would hardly compensate for the influence on nature and landscape which are primarily sought by holiday-makers. A number of respondents are concerned that with a fixed link Fehmarn would no longer be an island. Ostholstein's County administration requires that an additional report on direct and indirect effects of the project on tourism (construction-related and permanent visual intrusion, traffic noise, bathing water quality, change of landscape character, economic consequences including employment) is prepared. Schleswig-Holstein's State administration expresses the requirement of assessing the effects on tourism and recreation – threats and opportunities – in the regional planning procedure, also considering appropriate compensatory measures.

In contrast to the broad concern expressed by German respondents about the effect on tourism the few Danish respondents who address this issue mostly seem to see the fixed link as an opportunity of promoting tourism and creation of long-term employment opportunities.

> ***Comment:*** *The ministries are aware of the importance of tourism for the region on both sides of the Fehmarnbelt. For that reason a study, published in February 2006 /4/, of the regional effects of a fixed link has been elaborated on behalf of the Ministries of Transport. A thorough analysis of the effects on tourism – risks and opportunities, construction-related and long-term consequences – and, in particular, the opportunities to mitigate risks will be carried out at a later planning stage. Its scope will comprise the visual effects, especially in the near coastal zone (see also below, section 2.7), noise and emissions, bathing water quality (see also below, section 2.5), change of landscape character, etc.*
>
> *As can be noted from the ECR, very strict but realistic environmental requirements shall be fulfilled by the contractors during construction and intensive control and monitoring activities will safeguard that requirements are fulfilled. The lessons learnt at the Øresund fixed link will be used for the Fehmarnbelt fixed link. This will include a monitoring of dredging activities (sediment spill) and land reclamation activities (disposal sites, ventilation island(s)). Specific attention will be given to ensure that spillage criteria are fulfilled at any time during both dredging and reclamation activities, in particular during the peak holiday season.*
>
> *Long-term spillage from the disposal sites can be eliminated by filling in materials behind closed revetments or bunds which will prevent long-term erosion spill.*

2.3 Fauna and flora

2.3.1 Birds

Birds are one of the most frequently addressed environmental issues in German responses. Comments on this issue are critical throughout and it is complained that the risks of a bridge were underestimated in some aspects, in particular the collision risk. Insufficient data and missing relevant scientific literature concerning the quantity of migratory birds in the Fehmarnbelt area are criticized; recent inventories would lead to higher quantities of individuals. A few respondents conclude that based on the existing information and methods available it is impossible to assess the fixed link's risk of the migration of birds in an international or regional scale.

Some respondents complain that the exceptional importance of the Fehmarnbelt did not appear sufficiently clearly from the ECR, as the migratory corridors of terrestrial birds (southwest-northeast) and water birds (west-east) intersect in the Fehmarnbelt area ("ecological bottleneck"). An environmental protection organization emphasizes the importance of Fehmarnbelt during periods of icing of the Baltic, in particular icing of the Fehmarnsund.

It is criticized that the situation of the Øresund bridge is not comparable to a Fehmarnbelt bridge due to

- a different international importance of the bird migration,
- a different orientation of the bridges in relation to the prevailing migration routes (Øresund bridge: terrestrial birds migrating parallel to the bridge; Fehmarnbelt bridge: water birds migrating perpendicular to the bridge), etc.

Therefore water birds approaching the bridge are said not to have the possibility to change their migration routes or to circumvent the bridge. Hence it is questioned whether the collision risk could be minimized by the same measures (lighting) like in case of the Øresund bridge. Furthermore the collision risk could not be mitigated by switching off the bridge lighting or by using flash lights, as the main impacts would be caused by the headlights of road vehicles.

The Øresund bridge and coastal landscape south of Malmö, Sweden

In particular the conclusion of the ECR on a certain resilience of passerines to some extra mortality is broadly questioned. Population dynamics of the numerous passerine species are not known to a degree of detail which would allow such a generalized statement. Therefore an extensive requirement for further clarification is seen, including detailed predictions on a level of population dynamics. This might involve a modelling of particular species. In order to exclude mass collisions of birds, cumulative effects on a far more detailed population dynamics level is required in future studies.

> ***Comment:*** *Any adverse effect needs to be avoided or mitigated to the extent possible. This includes, inter alia, the collision risk of birds. The report on birds was carried out in 2004-05 in order to provide a preliminary assessment of ecological effects of a bridge link, based on a most recent survey on migrating, staging, wintering, moulting and breeding birds (see ECR, p 46). According to the preliminary findings the magnitude of a collision risk can be considered quite low and will not*

endanger the bird populations as such. The report was not meant to substitute even more detailed investigations and impact assessments which will follow in the future planning phases. These investigations will address the quantity and sensitivity of migratory birds in the Fehmarnbelt area in more detail. These findings will also give clarification whether or not there is a certain resilience of passerines to some extra mortality.

Some institutions comment on with the map (Fig. 3.3 in the ECR) and complain that it is outdated due to its sources originating from 1973 and 1974. Without a weighting of the arrows according to the quantitative significance of the migration routes the map would be misleading, because it would lead to the impression that alternative migration routes – besides the Fehmarnbelt – are in existence which is not the case. Map alternatives are presented.

Concerning birds, the African-Eurasian Water Bird Agreement (AEWA) has to be taken into consideration for assessments of impacts.

Comment: *The map was taken from the feasibility study of 1999. The ECR is mainly based on these initial environmental investigations carried out in 1995-99 (see ECR sections 1.1, 3.1 and 4.1). More recent investigations might partly have improved the knowledge. One major goal of launching the environmental consultation was to learn the latest knowledge about the ecosystem of the Fehmarnbelt. Therefore the comments given are appreciated. These current data and literature will be taken into consideration in the future planning stages. This also includes international conventions like the African-Eurasian Water Bird Agreement (AEWA) under the Convention on the Conservation of Migratory Species (Bonn Convention, CMS) of the UN Environment Programme which entered into force at the end of 1999.*

Some respondents take the view that the Fehmarnbelt must be seen as a "factual" Special Protected Area (SPA) even though it is not legally designated as an SPA under the EU Birds Directive, in particular due to its function as a passage corridor of migrating bird species listed in Annex I of the Birds Directive.

Comment: *Most of the Fehmarnbelt is not designated as an SPA in either of the countries. The designation of the SPA sites of Denmark and Germany was based on systematic inventories and assessments of the territories in accordance with the criteria specified in Article 4 and Annex I of the EU Birds Directive /5/. By far most of the Fehmarnbelt does not meet the criteria of an SPA (see Figure 5 /6/). The procedure resulted in lists of SPA sites in both countries which have been submitted to the EU Commission and thus have obtained SPA recognition status. Sites of unofficial sources are not referred to.*

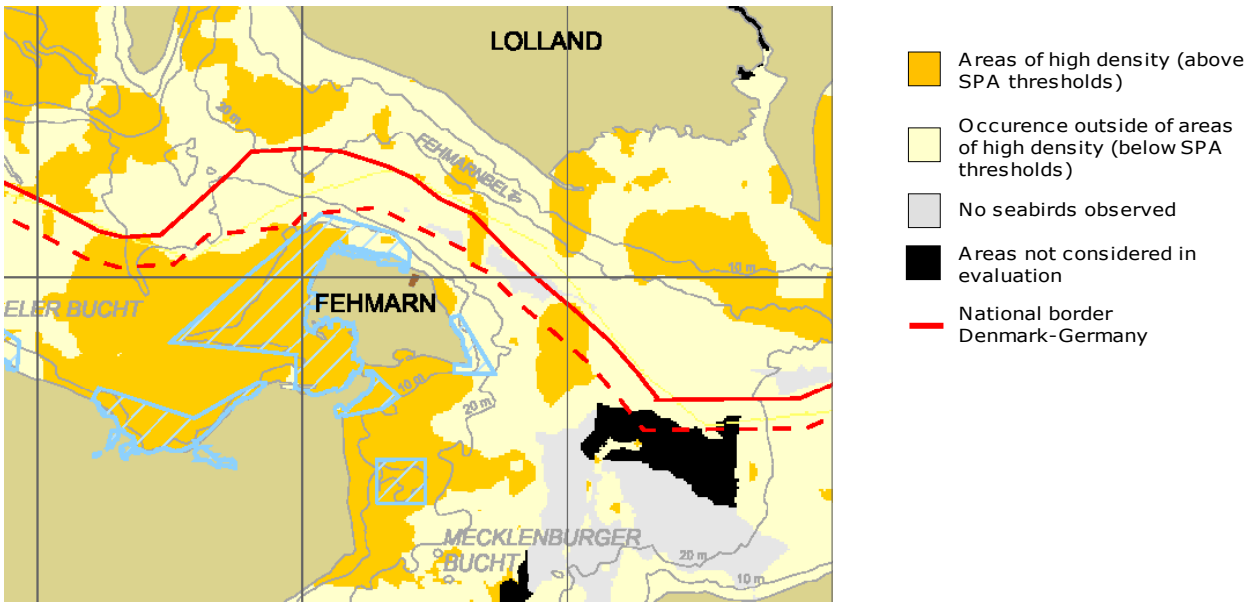


Figure 5: Distribution of seabirds in the Fehmarnbelt (Source: BfN /6/)

2.3.2 Benthic fauna and flora

Complaint is raised by an environmental protection organization that inventories and mappings of 1994 by Institut für Meereskunde, Kiel into benthic flora around Fehmarn have not been taken into consideration. It is criticized by a number of institutions that data of 1995-99 as well as methods used at that time (compared to current methods) are outdated. Therefore a verification and validation with current third party data is urgently required.

The Federal Nature Protection Agency hints on most recent data on benthic fauna (by Institut für Ostseeforschung, Warnemünde) showing the occurrence of more than 241 species (according to the response of the institute itself: more than 300 species) in the Fehmarnbelt, more than anywhere else in the German Baltic. Many of these species are rare and endemic. The high species diversity on such a relatively small area is probably unparalleled anywhere else in the Baltic Sea. Among the species, 37 are red-listed in Germany (the ECR mentioned only 26 species). All this underlines the exceptional importance of the Fehmarnbelt for the ecosystem of the Baltic Sea. Based on latest investigations (2003-05) Institut für Ostseeforschung points on a different species composition of the characteristic benthic fauna species compared to that mentioned in the ECR.

Some German institutions criticize that the experience from the Øresund and Great Belt fixed links was used to draw too optimistic conclusions regarding the limited impact on benthic fauna and flora in the Fehmarnbelt without discussing and documenting the comparability of data. As benthic impacts were addressed in the ECR only on a selective basis, eg the loss of benthic habitats due to bridge piers is missing.

The statement of the ECR that benthic fauna including Common mussels is resilient to sedimentation is criticized by some institutions because it is too generalized and does not represent the state of knowledge.

> ***Comment:*** *Assessments given in the ECR represented the state of knowledge of the feasibility studies. More recent investigations might have improved the knowledge about specific parts of the ecosystem of the Fehmarnbelt. One major goal of launching the environmental consultation was to learn the latest knowledge about the ecosystem of the Fehmarnbelt. Therefore the ministries appreciate the comments given. These current facts will be taken into consideration in the future planning stages.*

The reference to the positive experiences of the Great Belt and Øresund fixed links concerns to a large degree the successful management of the environmental impacts caused by large-scale construction projects. In these two instances the way of implementing environmental criteria with associated monitoring programmes has set new standards, especially for dredging and reclamation activities worldwide.

In accordance with these experiences any impact needs to be avoided or mitigated to the extent possible. This includes, inter alia, precautionary measures to maintain the exchange of benthic larvae, if required.

The possible impact on benthic fauna was addressed in the ECR on page 44. In the environmental impact assessments to follow further attention will be given to the degree of sensitivity of benthic fauna including Common mussels to sedimentation of spilled sediments at the sea bed.

The loss of habitats due to the bridge piers/pylons, the immersed tunnel structure, ventilation islands and disposal sites for excess dredged materials can be calculated to approx 1 km^2 for the bridge solution and 3.5 km^2 for the tunnel solution (including one ventilation island).

Alternative locations of disposal sites should have been investigated because the chosen sites are connected with a permanent loss of benthic habitats including mussel beds. Furthermore some respondents are concerned that dredged material might be disposed by ocean dumping.

***Comment:** The feasibility studies so far addressed two options for disposal of the excess material dredged for bridge foundations or for the immersed tunnel: either the material could be disposed of at appropriate dumping sites at the open sea or could be deposited in near-coastal sites. None of the proposals have been investigated thoroughly from an environmental point of view so far. The proposal to dispose of the material in areas adjoining the existing breakwaters of the harbours of Puttgarden and Rødbyhavn was governed by the objective to minimize their influence on the hydrodynamics (blocking effect) of the Fehmarnbelt. Other alternatives such as a reuse of the materials for other construction purposes have not yet been investigated. Taking the quantity and quality of dredged material into consideration it is – especially for the tunnel solution – not likely that a full re-use would be environmentally and economically feasible. Land-based transport of amounts of sand, mud and clay material of up to 17 million m^3 (tunnel solution) would hardly be acceptable.*

It will be a major task in the future planning phases to develop a definite plan on how to treat the excess dredged material. This should involve all aspects, from an optimization of the construction methods in order to reduce the quantity of dredged masses to a suitable re-use strategy and a systematic search for the optimal locations of disposal sites in the vicinity of the fixed link. The latter should take into consideration environmental aspects (in particular hydrodynamic, nature protection, tourism and recreational aspects). Regardless of where the disposal sites will be located, they will be blended and sympathized with into their natural surroundings. Depending on the definite locations the disposal sites could be developed either as attractive recreational areas with a sandy beach front with bathing or other recreational facilities, or as natural habitats such as a beach ridge landscape on Fehmarn.

The statement of the ECR that foundations of bridge piers can be regarded as artificial reefs is criticized because it is scientifically not agreed. A monitoring is seen required.

Comment: *Recent information from investigations on foundations of offshore wind parks and from the Øresund bridge suggest that such structures seem to act as artificial stone reefs "attracting" fauna species that prefer such reefs, including Common mussels, fish species, etc. Although it might be scientifically disputed there are strong indications that the underwater structures might have a positive effect for many species and therefore can serve to compensate for the loss of habitats on the seabed /7/. The proposal to establish a monitoring programme to follow the effect of such artificial reefs can be supported.*

Import of sand extracted elsewhere at marine locations will also affect benthic habitats at those sites; the environmental impacts connected with this have to be assessed. It was proposed to re-use excess dredged material for improving dykes in Germany and Denmark rather than disposing it in the huge disposal sites.

Comment: *At present some 20 resource areas with a total volume of 285 million m^3 of sand and gravel have been identified as potential sites for extraction of raw material. As soon as the raw material sites have been selected assessments of the related subsequent environmental impacts will be carried out.*

2.3.3 Fish and fishery

The Federal Nature Protection Agency emphasizes that the Fehmarnbelt is important for an exchange of larvae of fish (as well as benthic fauna) between the western and central Baltic Sea and that this exchange must remain undisturbed. The statement of the ECR that pelagic fish eggs and larvae are generally tolerant to exposure to sediment plumes is criticized for being too generalized and not correct. The agency points out that according to Swedish sources, monitoring results of the Øresund bridge suggest at least temporary local to regional, if not permanent impacts on cod spawning.

A major concern also relates to the future possibilities of trawler fishing in the Fehmarnbelt. This includes concern of a loss of fishing grounds in case of a bridge (due to restricted access of safety zones of coastal waters and due to a barrier effect of the west-east trawling). Therefore a tunnel would be preferred by German fishermen's organizations, while Danish fishermen's organizations find that both a tunnel and a bridge solution will affect the trawling activities. Also local spawning grounds, eg of autumn spawning herring might be affected. The impact assessments concerning sediment spill and change of current flow conditions are considered insufficient. Potential impacts are seen in relation to wind and traffic-borne noise and vibration transmitted via the bridge structures into the marine environment which could lead to a disturbance of the animals' orientation. Therefore according to the State administration of Schleswig-Holstein a report describing and assessing the effects on fishery in more detail, and a monitoring programme are required. The national fishery agencies should be involved in the future planning process. Fishermen's organizations in both countries claim their right to monetary compensation.

Danish fishermen's organizations claim that in-depth studies of possible effects on the commercially most important fish species should be carried out in the future. They also ask for a Danish "Red List" of species of the type mentioned for Germany in the consultation report.

Comment: *Any adverse effects need to be avoided or mitigated to the extent possible. This includes, inter alia, maintaining the exchange of fish larvae. In the environmental impact assessments to follow attention will be given to the degree of sensitivity of pelagic fish eggs and larvae to sedimentation.*

To the ministries' knowledge it has not

been documented that sediment spill affected cod spawning in the Øresund, neither temporarily nor permanently. One – quite simple – laboratory experiment had been carried out before start of construction work. It showed that especially fine limestone particles released to the water column during dredging activities could affect cod eggs, but the results were connected with great uncertainty. In reality, the said potential effect has not been observed; neither during dredging works nor after the fixed link was built.

Presently it is not planned to impose restrictions on fishery in the coastal zones. The question regarding a barrier effect in the trawling routes used by fishermen in the area today will be studied in more detail in the future planning stages. When the project has been developed to a more detailed stage and the geotechnical investigations have been carried out, also construction-related effects on fishery can be assessed in detail.

The ECR does not mention a "Red List" of species of fish and the official Danish Red List does not include fish species living in saline waters.

2.3.4 Marine mammals

Some Danish and German comments deal with effects on Harbour porpoises and Harbour seals which are especially protected priority species of the Annex II of EU Habitat Directive. The potential impacts are seen in relation to effects caused by construction activities and traffic-borne noise and vibration which might lead to a disturbance of the animals' communication system, avoidance responses, up to loss of hearing.

Reference is made to results of porpoise monitoring during and after construction of the offshore wind park at Nysted (Rødsand). The studies have shown that the porpoises avoid the areas of construction for a period of up to 1-2 years after finalization of construction activities. Due to the fact that the stock of porpoise has been reduced markedly in the eastern Baltic over the last decades, concern is raised regarding the risk that the porpoises would disappear entirely from the Fehmarnbelt area. Not only this construction-related disturbance but also a "blocking effect" caused by noise and vibrations from the rail and road traffic transmitted via the bridge structures into the marine environment must be considered. Also the potential destruction of foraging grounds – temporarily or permanently – might have consequences for the local stock of porpoise if they are resting in the area.

Formally reference is made to conventions of the UNEP and the European Council: the Bonn and Bern Conventions and the Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS) which have been approved by Germany and Denmark and which require the two countries, *inter alia*, to minimize potential adverse effects on feeding grounds etc of porpoises and seals.

Comment: *Assessments given in the ECR represented the state of knowledge of the feasibility studies. The inventories into porpoises and seals carried out as part of the feasibility studies have, among other factors, formed the basis for the proposal of the Site of Community Importance (SCI) DE 1332-301 "Fehmarnbelt" in the German Exclusive Economical Zone. The Danish half of the Fehmarnbelt is not designated as an SCI. Anyhow, effects on marine mammals will be addressed in more detail using the latest reported investigations available and taking into consideration the requirements of international conventions and agreements in the environmental impact assessments to follow. Should future investigations show that porpoises are breeding and resting in the area, they would be protected under Article 12 of the EU Habitats Directive.*

2.4 Soil

A detailed inventory of the submarine geology is required including involvement of the Agency for Nature and Environment of Schleswig-Holstein (LANU). According to this agency the assessments of the construction-related dredging and reclamation are required to take into consideration the erosion and sedimentation behaviour in the Fehmarnbelt and adjacent areas.

An institution hints on the relevance of changes of the sub-marine surface soil, in particular the 2 m deep megaripple banks found in the Puttgarden area of Fehmarnbelt which might be buried by sedimentation of spilled material. Also it is concerned that the beach ridge landscape including the nature reserve "Grüner Brink" must remain unaffected.

> ***Comment:*** *Assessments given in the ECR represented the state of knowledge of the feasibility studies. Current facts will be taken into consideration in the future planning stages.*
>
> *The occurrence of megaripples in the Fehmarnbelt led, among other factors, to the proposal of the Site of Community Importance (SCI) DE 1332-301 "Fehmarnbelt" in the German Exclusive Economical Zone. Effects on megaripples will be addressed in more detail in the environmental impact assessments to follow.*
>
> *In general it can be stated that megaripples indicate a high current velocity. The local occurrence of megaripple banks is not static but subject to a permanent transition and movement. In total, it is a highly dynamic system. In particular during storms new megaripple formations are created. For this reason it is quite unlikely that megaripple banks will be influenced by sedimentation of construction-related sediment spill, because the sediment will be resuspended due to the high current velocities in the area.*
>
> *The planned geotechnical investigations are expected to give more detailed information regarding the natural sediment dynamics (sediment transport, areas of erosion and accumulation) in the Fehmarnbelt area. The natural processes of sediment transport in the area and of the associated turbidity levels have to be determined in order to create a basis for assessing the expected turbidity impact during dredging and reclamation activities against the natural background turbidity.*
>
> *The beach ridge landscape northwest of Puttgarden including the nature reserve "Grüner Brink" is assumed to remain unaffected because its closest edge is situated 4.5 km from the alignment corridor.*

2.5 Water

It is criticized by a number of institutions that data of 1995-99 as well as methods used at that time (compared to current methods) are outdated. Therefore a verification and validation of the feasibility studies' data with third party data is required. Due to development of marine measurement methods and modelling, measurements and modelling of hydrography and effects on the ecosystem investigated during the feasibility studies are not state-of-the-art: in 1999 the impact was only assessed as a reduction of the cross-section of the water body while the mixing effects were not taken into consideration. Mixing effects due to bridge piers eration. Mixing effects due to bridge piers lead to a small but permanent rate of up-welling of saline bottom water. This influences the bottom current needed for the renewal of the bottom water in the central Baltic Sea. This might affect the stock of cod. The zero solution requirements have to be evaluated in this light.

The zero blocking solution is underlined as a requirement by the Federal Nature Protection Agency because 75 % of the water exchange between the North Sea and the Baltic takes place through the Fehmarnbelt compared to only

25 % through the Øresund. Cumulative effects of other existing infrastructure (other fixed links, offshore wind parks) need to be included in further hydrographic investigations. This also involves an assessment whether blocking effects of 0.3 % (bridge) or 0.1 % (tunnel) respectively are acceptable at all. Additional baseline data are offered for use by the Federal Maritime and Hydrographic Agency, which also requires that in particular the major saline inflows of North Sea water have to be considered. Further investigations are required, in particular into the water exchange (blocking effect) between the Baltic and the North Sea, and the impact of changed local flow conditions (eg on cod spawning).

> ***Comment:*** *There should be no doubt, that the possible consequences of a fixed links influence on the water exchange between the Baltic and the North Sea are of importance. The question regarding the "blocking effect" is therefore recognized as one of the most important issues to assess in detail in future investigations. Based on the results, measures will be developed (eg a further optimization of the technical design) to mitigate and/or compensate for the potential effects. In this context it will also be considered to assess the effect of the existing ferry services on the water exchange in the area.*

The need for strict criteria of allowable sediment spill and a monitoring of sediment spill is also stressed. The explanations of the ECR concerning sediment spill connected with relevant currents in east-southeasterly direction are found insufficient. Concern is expressed regarding changed currents along the coastline which would lead to permanent turbidity. It is concerned that bathing attraction will be made impossible for many years due to significant turbidity of the water during the construction period (dredging and sediment spill, see section 2.2, tourism).

> ***Comment:*** *As mentioned in the ECR, it can already now be stated that there is no doubt that strict criteria to the allowable spill (in magnitude, time and space) will be part of the environmental requirements for the construction works. Experience from the dredging and reclamation works of the Øresund fixed link shows that this can be managed properly in a contractual way and that the contractors will be able and willing to fulfill such strict criteria through proper planning and use of best available technologies. During the dredging works for the Øresund fixed link which involved approx. 7 million m^3 dredged material, turbidity levels did not exceed the bathing water criteria at any time during the bathing season, first of all due to a proper planning of the works.*
>
> *If the disposal sites for excess materials are designed properly and the works are executed as mentioned, there is no reason to believe that the turbidity in the coastal areas will differ from the existing situation and its natural background variation. As it has been the experience from the construction of the Øresund and Great Belt fixed links erosion and resuspension of seabed materials leading to a higher level of turbidity than normally seen will only occur in a short period after completion of the construction works.*

The Federal Maritime and Hydrographic Agency hints on the national Regional Plan for the German Exclusive Economic Zone presently under preparation by the agency. A hint of another respondent deals with an increased blocking effect following the construction of the Fehmarnsund bridge.

> ***Comment:*** *The comments will be taken into consideration in the future planning stages.*

2.6 Air and climate

According to some comments the calculations of the frequency of traffic restrictions for a bridge presented in the ECR are seen as far too optimistic and would in fact be significantly higher due to storm, black ice, and icicles falling down from the superstructure. Rising frequency and intensity of cyclones have to be seen in context with the global warming effect. The traffic restrictions of the Great Belt Bridge are said to be higher than reported in the ECR. In contrast, the ferry system would be permanently accessible. High wind speed conditions might result in a higher risk of traffic accidents.

> ***Comment:*** *The section on wind climate of the ECR was based on a report published in 2005. It investigated the traffic restrictions based on available regional wind measurement data and the latest known traffic restriction data of the other fixed links in the region. No change of traffic restrictions have appeared on the other bridges since which would justify the supposition of traffic restrictions higher than those indicated. In order to avoid the risk of traffic accidents, a Fehmarnbelt bridge would face the access restrictions described in the ECR in case of high winds.*
>
> *It is true though that the Great Belt and Øresund bridges were closed for a number of hours during the winter 2005-06 due to the risk of icicles falling down on the road from the concrete pylons or the cables. The icicles were formed due to quite rare weather conditions. Methods to mitigate such problems are being developed now and lessons learnt can be used at the Fehmarnbelt fixed link, but it should be emphasized that the risk of occurrence of such situations is very low. During the 7 years of operation of the Great Belt fixed link such weather conditions resulting in the formation of ice on cables and concrete surfaces have occurred only once.*
>
> *Both the Øresund and the Great Belt fixed links have rarely been closed due to snow or black ice on the road surface or on the railway. Both bridges benefit from the existence of sophisticated monitoring systems regarding the weather conditions established by the bridge operators giving possibility for early warning and proactive mitigation in case of such weather conditions.*

It is complained that no comparison of air emissions of continued ferry service and road traffic on the fixed link was conducted.

> ***Comment:*** *The section on air quality of the ECR was based on a report published in 2005. The purpose of that report has been to quantify the transport-related air emissions from a changed traffic pattern due to a fixed link across the Fehmarnbelt. The results presented for a fixed link with 4 road lanes and 2 rail tracks (4+2) are independent of the technical solution, bridge or tunnel.*
>
> *As can be taken from the ECR and that report, the analysis compared the transport-related air emissions of a fixed link across the Fehmarnbelt to the continued ferry service as the reference case. The reference case was defined as an infrastructure situation as it would be in 2015 and forward, if a fixed link across the Fehmarnbelt were not built. Among other assumptions, it was assumed that the ferries on the Fehmarnbelt route are improved to a higher capacity (ie an optimized ferry service).*
>
> *The fixed link across the Fehmarnbelt will lead to a reduction of all types of transport-related air emissions compared to the continued ferry service. There will be a reduction of transport-related air emissions both, immediately after opening of the fixed link and in the long run. The greatest reduction in emissions comes from the assumed closure of the ferry line between Rødby and Puttgarden.*

2.7 Landscape

Many responses deal with the visual effects of a bridge. The German and Danish views of the issue differ greatly.

Many German respondents are concerned about the significant visual impact caused by the bridge, ramps and noise barriers. Especially the residents of Marienleuchte feel significantly impacted by huge embankments and concrete structures of the ramps in contrast to the present landscape which they say is characterized by blooming farmland, the natural beach and the Baltic Sea. In particular some residents of the southern margin of the place feel impacted due to an allegedly changed alignment.

The municipal administration of Fehmarn is concerned that a bridge would cause a loss of the identity of the residents of the region and that the visual impact of 281 m high bridge pylons in 7-8 km distance from the coast would be even greater than that of offshore wind parks which themselves had been disputed.

Baltic Sea coast and lighthouse at Marienleuchte, Fehmarn (the railway line runs diagonal through the background)

A requirement for a thorough analysis of the visual impact of a cable-stayed bridge solution, especially in the near coastal zone is expressed by the County of Ostholstein.

The Municipality of Lolland on the contrary sees the bridge as a landmark for the region which could be used to highlight the region's unique position in the centre of the axis between Berlin, Hamburg and the Øresund region.

Comment: *All efforts will be taken to minimize this visual impact of physical structures such as ramps and noise barriers by technical optimization of the design and by blending and sympathizing with into their natural surroundings; although in case of the ramps of the bridge solution visual effect cannot be fully avoided.*

The road alignment at Puttgarden including the turn-off from the existing alignment has not been changed. The alignment of the access to the bridge/ tunnel including ramps and concrete structures will run northwest to north of Marienleuchte, about midway between Marienleuchte and the present rail facilities of Puttgarden station. The concerns seem to be result of a misunderstanding.

It should not be forgotten that the rail and ferry facilities and the wind park should be considered as existing visual background nuisances of Marienleuchte.

A result of the environmental consultation seems to be a strong need for visualizing the bridge and tunnel solutions, especially to illustrate how the landscape would look like in the coastal areas of Puttgarden/ Marienleuchte and Rødbyhavn after a bridge or a tunnel has been established. This would include a visualization of visual relationships from different points of the coasts towards the main bridge and its pylons and include the disposal sites for excess dredged material. Such visualization could be performed in combination with the analysis of the effects on tourism – threats and opportunities – at a later planning stage (see also above, section 2.2). This could illustrate the extent of a change of the landscape character on a more objective basis.

2.8 Cultural heritage and material assets

According to the European Convention on the Protection of the Archaeological Heritage of La Valetta excavation of finds now is a must rather than an option. A certain procedure for prospecting is proposed by the Archaeological Agency of Schleswig-Holstein based on positive experience with the new A 20 motorway. Following the recent legislation finds of archaeological heritage must be excavated according to a certain scheme. Costs for prospecting, test samplings and excavations must be borne by the project proponent.

> ***Comment:*** *The comment given will be taken into consideration in the future planning stages.*

2.9 Environmental management

In its response the Danish Ministry of Environment (MoE) establishes the framework and the level of degree of those environmental requirements that can be expected from the Danish side in relation to the coast-to-coast part of the project. Furthermore the National Environmental Research Institute under the Ministry of Environment addresses the scope of the forthcoming EIA investigations.

The MoE strongly recommends that an environmental management system with associated certified quality assurance systems should be implemented in all parts of the coming project organization. It is also mentioned that the MoE will require the greatest possible transparency and openness concerning access to data and information to the public and authorities regarding environmental conditions before, during and after the construction works.

The MoE assumes that during the coming project development more detailed environmental investigations will be carried out for both the tunnel and the bridge alternatives and finds on that background that it is too early to describe detailed environmental objectives and criteria. At present the environmental requirements could only be described in general terms. Among such general requirements the coming EIA investigations should comprise cumulative effects of the fixed link and other larger construction projects in the area, such as the wind park projects at the Danish and German territories.

The MoE points out that it would be important to carry out the baseline investigations of the EIA as early as possible. This would make it possible to assess the impacts of the fixed link on nature and environment in more detail already at an early stage of the decision-making process.

The MoE also proposes to establish a set of environmental quality objectives with associated criteria for certain zones of the Baltic Sea and other sea areas in the vicinity of the fixed link:

- The "farfield" could be defined as a scope of more than eg 10 km on each side of the fixed link's alignment. For this zone only minimal impacts are to be accepted following changes in the current conditions.
- The "nearfield" could be defined as a zone stretching from 500 m up to 10 km on each side of the alignment. In this zone temporary impacts could be accepted in the construction period and a few years after.
- In a strip of up to 500 m on each side of the alignment permanent impacts on nature and environment due to the direct impacts of the construction works and the existence of permanent physical structures could be accepted.

Finally the MoE states that a number of relevant control programmes should be required during the construction works in order to make it possible to document that the established environmental objectives and criteria have been fulfilled (Before-After-Control-Index (BACI) principle). In general such programmes should be developed and executed by the project proponent in close cooperation with the environmental authorities.

Cutter suction dredger at work, Great Belt fixed link

> ***Comment:*** *It is agreed that it is not feasible at present to establish specific environmental requirements and criteria to be fulfilled by the project. Such requirements and criteria can only be directed to the definite technical solution model. The ministries appreciate the MoE's proposals to establish an overall strategy as part of the future environmental impact assessments.*

The MoE recognizes that the previous investigations show that the physical and hydrographic conditions of the Fehmarnbelt differ from the conditions of the Great Belt and the Øresund. In the ministry's opinion it does not seem meaningful to compensate for the blocking effect of the Fehmarnbelt fixed link. As an alternative to a strict zero blocking solution requirement (in the sense that no change of the water flow must result from the establishment of the fixed link) it is proposed to mitigate the blocking effect to the extent possible by optimizing the technical design of the physical structures.

> ***Comment:*** *The Ministries of Transport share the opinion that the risk, that even a minor blocking of the water flow through the Fehmarnbelt could influence the ecological conditions in the Baltic Sea, should be mitigated to the extend possible. Such mitigation could be done by a further hydraulic optimization of the physical structures (bridge piers, ventilation island(s)). Before it can be ruled out that other ways of mitigating the blocking effect exist, the Ministries also find that intensive marine measurement campaigns should be carried out. These would form the basis for state-of-the-art numerical models with the help of which the blocking effect from a fixed link can be calculated and assessed. The preliminary assessments of the issue show that it will be possible to find a solution which reflects the balance between what is ecologically motivated, technically possible and economically reasonable.*

Greenpeace of Denmark proposes to establish an international expert panel at an early stage that could be involved in the evaluation of the different alternative technical solution model's effects on the water exchange and the possible consequences for the Baltic. Another expert panel should evaluate the traffic forecast for different technical solutions and the associated effects for air quality and climate changes.

> ***Comment:*** *An international expert panel had been appointed by the Baltic Sea states in case of the Øresund fixed link giving expert advice to the Swedish and Danish Ministries of Environment and the owner of the fixed link (Øresundsbro Konsortiet). It will be considered later whether such expert panels should also be established in case of the Fehmarnbelt fixed link.*

3 German Hinterland

3.1 General issues

Hinterland upgrading proposals including the Fehmarnsund Bridge

Various comments are given concerning the proposed road and rail upgrading plans including the decision to keep the Fehmarnsund bridge unchanged.

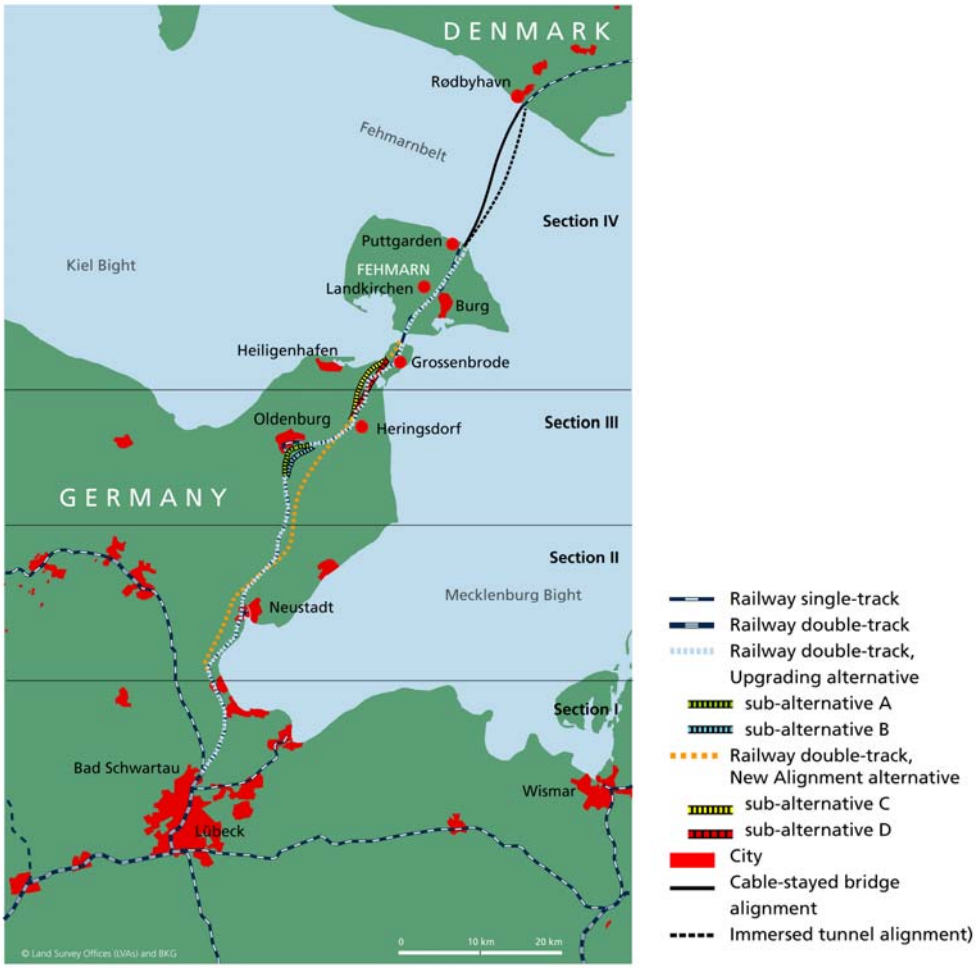
An environmental protection organization points out that according to the German road design standards a forecasted traffic volume of 10,000 vehicles per day would only justify a road layout as a two-lane highway 10.5 m in cross-section rather than a four-lane highway as planned.

A number of respondents point out that a Fehmarnsund bridge remaining two-lane would constitute a bottleneck, as the rest of the B 207 will be upgraded to a four-lane highway. This would lead to congestion in the Fehmarn and Grossenbrode area. The consequences are disputed: a number of respondents including Ostholstein's County administration and the Lübeck Chamber of Commerce consider this unacceptable for capacity reasons and opt for an uninterrupted four-lane highway and twin-track rail throughout the hinterland, including a second Fehmarnsund bridge. Others are more suspicious and see the proposal not to expand the capacity of the crossing of the Fehmarnsund as an attempt to "disguise" the additional costs and impacts of Natura 2000 sites connected with a second Fehmarnsund bridge. In consequence they claim that the environmental impacts of a second Fehmarnsund bridge have to be assessed.

Future road hinterland infrastructure in Germany

An environmental protection organization does not believe that the Fehmarnsund bridge can remain unchanged and it can be anticipated that the bridge must be replaced in the coming years. The municipal administration of Fehmarn argues that due to this bottleneck the overall objective of a significant improvement of the traffic capacity cannot be met and therefore the four-lane upgrading should entirely be given up.

In addition, questions are raised whether the upgrading of the hinterland rail corridor would commence only after completion of the fixed link, when the demand for additional capacity has been materialized, and how long the duration of the construction works of the hinterland upgrading would be.



Future rail hinterland infrastructure in Germany: Upgrading and New Alignment alternatives

Comment: *According to the 2004 Requirements Plan for Federal Trunk Roads the hinterland connection north of the future Heiligenhafen East exit of the A 1 motorway is planned as an upgrading of the B 207 to a four-lane divided highway to Puttgarden – with the exception of the Fehmarnsund bridge. Due to its classification as a "second priority" project it is eligible to be developed up to the final project design. At a first isolated view of the Fehmarnbelt fixed link's expected traffic volume a two-lane highway could be seen as sufficient. But the definite selection of the road width will be made on basis of an assessment of such aspects as traffic quality, road safety and economic efficiency. As the Fehmarnbelt fixed link and its hinterland connection fill a gap within an arterial road corridor (E 47) with motorway standard on both sides, the aspects of road safety and traffic quality are of particular importance. The approx 20 km long fixed link and the 20 km long*

four-lane B 207 highway are also meant to avoid bottlenecks in the future during the busy summer months and at weekends.

A second Fehmarnsund bridge is not required from a road capacity point of view. However, it should be further assessed whether the road width of the bridge could allow for three lanes with limited efforts. This would provide two lanes a direction depending on the traffic demand, in particular during the summer months and at weekends. In case the Fehmarnsund bridge remains two-lane it can be assumed that the traffic quality by far most of the time of the year will be comparable to today's good level even after the realization of the Fehmarnbelt fixed link. As a rule, the construction time of a 20 km highway may last for approx 3 years.

The required capacity of the railway and the highway will be made available in due time. Furthermore the upgrading of the hinterland connection will also depend on the budgetary availability. In the end the duration of the construction works will depend on the extent of the upgrading (railway Upgrading alternative or New Alignment alternative) and can for that reason only be estimated in the future planning phases.

The demand for upgrading the Hamburg-Øresund Region rail corridor was determined within a German-Danish report based on the 2015 traffic volume forecasted in the Federal transport infrastructure planning in 2002/03. In this context it was also discussed, whether a second track expansion would be required for the Fehmarnsund bridge in case the Fehmarnbelt fixed link is realized. It was demonstrated that the required traffic capacity on the railway line can be ensured by operational optimization measures despite the continued existence of a (short) single-tracked railway on the Fehmarnsund bridge. For that reason it was decided to maintain the Fehmarnsund bridge single-tracked.

Rail corridor and alignment alternatives

Various comments are given concerning the proposed alignment alternatives, in particular concerning the three hot spots Neustadt Lagoon, Oldenburg bypass and Grossenbrode-Fehmarnsund area.

In the Neustadt area the rail alignment is seen controversial: most respondents including the Archaeological Agency of Schleswig-Holstein and Ostholstein's County administration support the statement of the ECR that the sensitive Neustadt Lagoon must not be crossed by a twin-track rail and the New Alignment alternative should be the preferred solution. In contrast to this the municipal administration of Neustadt proposes to maintain the existing single tracked railway crossing the lagoon single-tracked and to investigate on a detailed level the feasibility of this option.

As none of all sub-alternatives investigated earlier in the Oldenburg area will be pursued in further planning stages it is seen a requirement to find a new alternative. A "small" Oldenburg bypass is supported by the County of Ostholstein.

Proposals for optimizations (ie less conflicting alignments in sensitive areas) are addressed by several respondents including the County administration and environmental protection organizations. These involve eg alternative alignments bypassing the Neustadt Lagoon and bypassing Oldenburg, and the rail alignment in the Grossenbrode area which to the greatest extent possible should run in parallel to the B 207 highway.

The County of Ostholstein and an environmental protection organization propose that an additional, fully new-build rail corridor should be considered, running parallel to the A 1 motorway all the way between Lübeck and Grossenbrode.

Comment: *Any adverse effect needs to be avoided or mitigated to the extent possible. This includes, inter alia, that the sensitive Neustadt Lagoon should not be subject to avoidable additional impacts. Therefore all suitable optimization proposals including the option to maintain the existing alignment crossing the lagoon single-tracked will be taken into consideration in the future planning phases. The ministries appreciate the proposals on less conflicting alignments in sensitive areas. In case of the Neustadt Lagoon not only avoiding and mitigating the loss of land (habitats, castle) should be aimed at but also avoiding and mitigating the effects of electrification on birds. Whether the proposed single-track option can contribute to this goal will have to be assessed within the forthcoming environmental impact assessments. Decisions will also depend on the capability of such a single-tracked rail portion in relation to the forecasted traffic volume.*

Also a new alignment in the Oldenburg area including the option of a "small" bypass shall be investigated in the future planning phases taking the comments into consideration. This is also true for the detailed design of a less conflicting alignment in the Grossenbrode area.

According to the 2003 Federal Transport Infrastructure Plan (FTIP) the future hinterland connection is planned as a twin-track extension including electrification of the existing railway line including – depending on the alternative chosen – more or less new-build portions. The details of the horizontal alignment will be determined in the corresponding plan approval procedures. A fully new-build rail corridor, running parallel to the A 1 motorway between Lübeck and Grossenbrode is not subject of the Requirement Plan for Federal Rail Infrastructure (Bedarfsplan für die Bundesschienenwege). Besides huge investment costs such a new-build rail corridor would be connected with remarkable disadvantages for the region. As the existing line were to be given up, some country towns and seaside resorts would be disconnected from the railway network.

A proposal of Pro Bahn, a German rail consumer NGO, for speeding up hinterland rail traffic by using tilting trains and without upgrading the alignment is referred to by a local citizens' action group.

Comment: *The upgrading of the Hamburg-Lübeck-Puttgarden (-Copenhagen) rail corridor is primarily aiming at achieving the required capacity to satisfy the forecasted cargo rail traffic on that corridor. The expected increasing demand in passenger long-distance and short-distance rail transport will not lead to a changed supply of passenger transport. In this light an upgrading for tilting trains which solely aims at an acceleration of passenger transport would not contribute to meet the required cargo rail capacities. Hardly any effects worth mentioning could be expected from such an upgrading for tilting trains also due to the topography of the railway line.*

3.2 Human beings

Settlements, agriculture and infrastructure

As the municipal administration of Neustadt and an individual comment, there is a new Neustadt station required in case of the New Alignment alternative. It is meant to serve for long-distance train stops and would be located outside of city limits. According to the municipal administration of Neustadt the existing "downtown station" should be maintained for local trains to Lübeck.

> ***Comment:*** *The demand for a local/regional stop has not been studied so far. The establishment of such a stop will have to be assessed in view of the expected traffic volume in future planning phases. Based on the expected development of the long-distance traffic volume no demand for a new station could be demonstrated during the preparation of the 2003 Federal Transport Infrastructure Plan.*

It is seen a requirement to confirm the statement of the ECR that the twin-track upgrading will allow to keep all 43 level crossings in operation.

> ***Comment:*** *Based on the applicable standards of German Rail a maximum speed of 160 km/h allows to keep level crossings in operation. The criterion for this statement is the maximum speed of 160 km/h regardless whether the upgraded line is single or twin-tracked.*

Agricultural interests require that barrier effects and loss of farmland should be compensated by an extensive land consolidation and land management which also has to include a sustainable planning of the farmland areas required for ecological compensatory measures. Cumulative effects with other local/regional large-size projects should be considered, eg the SKY 2000 offshore wind park in the Lübeck Bight.

> ***Comment:*** *The agricultural interests concerning land consolidation, land management, planning of ecological compensatory measures and cumulative effects will be taken into consideration in the future planning phases.*

Noise emissions

The visual impact caused by 30 km noise barriers along the hinterland rail corridor (especially Oldenburg and Lensahn) is criticized by the County of Ostholstein.

> ***Comment:*** *Where noise exposure exceeds the legal threshold values, noise control measures are statutorily required which cannot be dispensed. All efforts will be taken to minimize this visual impact by technical optimization of the design and by blending and sympathizing with into their natural surroundings to the extent possible.*

Tourism and recreation

A number of responses deal with the effects on tourism and recreation which are seen of the same relevance as in case of the coast-to-coast section. Grossenbrode requires that their spa, tourism and recreational infrastructure have to be taken into consideration in all further planning phases and investigations. Ostholstein's County administration requires that an additional report on direct and indirect effects of the project on tourism (construction-related and permanent visual intrusion, traffic noise, bathing water quality, change of landscape character, economic consequences including employment) is prepared. Schleswig-Holstein's State administration expresses the requirement of assessing the effects on tourism and recreation – threats and opportunities – in the regional planning procedure, also considering appropriate compensatory measures.

Comment: *The ministries are aware of the importance of tourism for Ostholstein. Spa, tourism and recreational issues will be taken into consideration in all further planning phases. A thorough analysis of the effects on tourism – risks and opportunities, construction-related and long-term consequences – and, in particular, the possibilities to mitigate risks will be carried out at a later planning stage. It seems to be an appropriate approach that this analysis should cover both the coast-to-coast section (see above, section 2.2) and the hinterland.*

3.3 Fauna and flora

A number of particular proposals for ecological compensatory measures are given by environmental protection organizations. A number of other respondents complain that no compensatory measures have been described in the ECR so far. One respondent wants to know whether there are fauna passages planned in order to mitigate the barrier effect.

Comment: *The planning of infrastructure projects passes through several phases iterating from a general to a very detailed level. Compensatory measures will be designed in close relation to the magnitude and importance of the interventions they are meant to compensate for. Alike this is also true for mitigating measures. These detailed assessments and planning of measures can only be carried out in a later stage of the planning process. The proposals for compensatory measures will be taken into consideration in the future planning stages.*

Birds

Like in case of the coast-to-coast section birds are one of the most frequently addressed environmental concerns in German responses. Insufficient data require extensive further clarification, including detailed predictions on population dynamics level. The major hinterland impact on birds is seen in a collision risk with the overhead lines and the 110 kV rail power line. The potential effects on birds require specific attention when developing the detailed alignments (horizontal and vertical). An investigation into the collision risk of birds with the new overhead lines and the 110 kV rail power line is required. Mitigation of impacts should also consider the corridor of the new 110 kV overhead power line Lübeck – Göhl which is at present planned by another developer. It crosses Ostholstein County and thus to a large extent the scope of the hinterland.

Comment: *Any adverse effect needs to be avoided or mitigated to the extent possible. This includes, inter alia, the collision risk of birds. The report on birds was carried out in 2004-05 in order to provide a <u>preliminary</u> assessment of ecological effects, based on a most recent survey on migrating, staging, wintering, moulting and breeding birds (see ECR, p 46). The report was not meant to substitute even more detailed investigations and impact assessments to follow in the future planning phases. These investigations will address the quantity and sensitivity of migratory birds in the Fehmarnbelt area in more detail.*

As the risk for migratory birds depends, inter alia, on the exact local alignment (horizontal and vertical), the technical design and the local conditions, mitigation measures can be planned only in a more detailed planning phase. The collision risk of birds with the overhead lines or the 110 kV rail power line will be considered carefully in the future planning phases as parts of environmental impact assessments and, if required, Natura 2000 impact assessments.

Natura 2000 sites

In the light of the numerous Natura 2000 sites touched by the hinterland upgrading the Lübeck Chamber of Commerce strongly recommends to early arrange with the EU Commission on the approvability of the hinterland upgradings.

In the Neustadt area the rail alignment is seen controversial: most respondents including the County administration support the statement of the ECR that the sensitive Neustadt Lagoon must not be crossed by an electrified and extended twin-track rail and the New Alignment alternative should be the preferred solution. In contrast to this the administration of the municipality of Neustadt proposes to maintain the existing alignment crossing the lagoon single-tracked and to investigate the feasibility of this option in detail.

> ***Comment:*** *Any adverse effect needs to be avoided or mitigated to the extent possible. This includes, inter alia, that the sensitive Neustadt Lagoon should not be subject to unavoidable additional impacts. Therefore all suitable optimization proposals including the option to maintain the existing alignment crossing the lagoon single-tracked will be taken into consideration in the future planning phases. As an overall result it can be concluded that the 3 most sensitive areas Neustadt Lagoon, Oldenburg bypass and the Grossenbrode-Fehmarnsund coastal range were confirmed as the major hot spots of conflicting interests.*
>
> *Despite the high number and dense distribution of Natura 2000 sites touched by the hinterland upgrading, the majority of these sites does not seem to be significantly disturbed or affected by the upgrading. This can initially be concluded from the distance of the majority of sites from the hinterland alignment. Detailed Natura 2000 assessments will be carried out in the future planning phases, if so required, taking into consideration the specific structure and composition of the particular natural habitats and species found in these sites in relation to the individual character of operational and construction-related disturbance. The specific requirements of the Natura 2000 sites can be controlled by a careful planning and design. The final alignment will reflect the outcome of the assessments, and mitigation measures might be provided.*

3.4 Soil and water

Inventories, mappings and impact assessments of soils, of the so-called geotopes, and of the geotechnical conditions are required. Extensive and detailed soil and geology data are available at the Agency for Nature and Environment of Schleswig-Holstein (LANU).

Impact assessments of the overburden of groundwater layers are required.

> ***Comment:*** *The comments will be taken into consideration in the future planning stages.*

3.5 Cultural heritage and material assets

The same regulations under the European Convention on the Protection of the Archaeological Heritage of La Valetta apply as described above (see section 2.8). The surroundings of particular estates and an arch bridge in the course of the hinterland rail alignment are protected under section 9 of Cultural Heritage Act of Schleswig-Holstein.

> ***Comment:*** *The information will be taken into consideration in the future planning stages.*

In the Neustadt area the rail alignment is seen controversial: most respondents including the Archaeological Agency of Schleswig-Holstein and the County administration support the statement of the ECR that the sensitive Neustadt Lagoon must not be crossed by a twin-track rail and the New Alignment alternative should be the preferred solution. In contrast to this the municipal administration of Neustadt proposes to maintain the existing alignment crossing the lagoon single-tracked and to investigate on a detailed level the feasibility of this option.

> ***Comment:*** *Any adverse effect needs to be avoided or mitigated to the extent possible. This includes, inter alia, that the sensitive Neustadt Lagoon should not be subject to unavoidable additional impacts. Therefore all suitable optimization proposals including the option to maintain the existing alignment crossing the lagoon single-tracked will be taken into consideration in the future planning phases (see also section 3.1, rail corridor and alignment alternatives).*

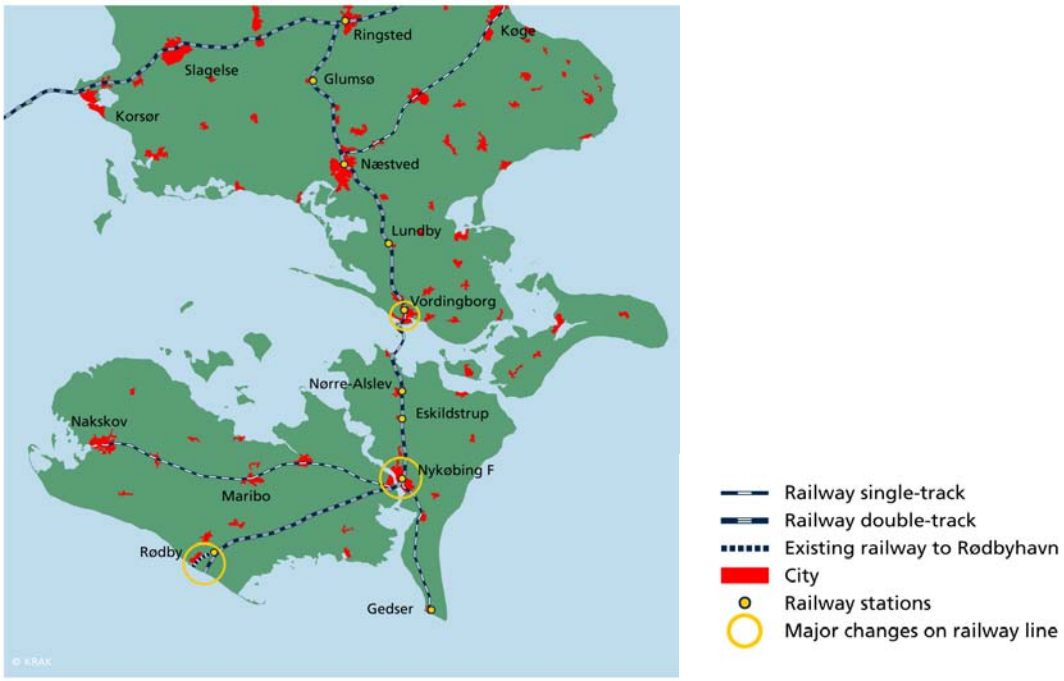
4 Danish Hinterland

4.1 General issues

Hinterland upgrading

The Danish Nature Protection Society proposes to carry out calculations of the consequences for the traffic patterns for a scenario where the transfer of goods from road to rail does not take place as assumed in the traffic forecast. Furthermore it is proposed to assess the consequences for the ferry service between Helsingborg and Helsingør. Finally an analysis of the consequences for the railway traffic capacity on the network around Copenhagen is proposed. The reason behind the proposal is that if the expected transfer of goods is not realized it would mean that the calculated reduction of emissions to air would not be met either.

Comment: *The traffic forecast carried out in 2003 calculated the changes in the traffic pattern for the major transport network in Denmark on basis of common Danish-German assumptions. Similarly the effects on air emissions were based on the changes in the transport system following a fixed link across Fehmarnbelt. The calculations were carried out on basis of generally accepted assumptions used for planning and evaluating future infrastructure projects in Denmark and Germany. Further calculations therefore seem not to be relevant.*



Future rail hinterland infrastructure in Denmark: Extension und upgrading of existing railway

4.2 Human beings

Various comments are given regarding the influence on outdoor activities and recreational facilities in the approach area of the fixed link. It is proposed to map the existing facilities in order to be able to assess the influence on these. This includes an evaluation of the bicycle, horseback riding and walking paths along the coastline of Rødbyhavn.

Comment: *The comment will be taken into consideration in the future planning stages.*

One respondent asks for an assessment of the influence on the leisure boat traffic under the Masnedø bridge due to its upgrading.

> ***Comment:*** *The proposed assessment will be made when a more detailed design has been carried out.*

The Danish fishermen's organization argues that there exists a need for an assessment of the influence on fishery in Masnedsund and Guldborgsund.

> ***Comment:*** *Impacts on fish and fishery in these two waters are not to be expected, but the possible impact will be assessed in connection with the forthcoming impact assessments.*

4.3 Fauna and flora

The Danish Nature Protection Society addresses the loss of habitats of rare species in the area of the Lollandic Dyke as a consequence of the hinterland infrastructure. It is argued that it is not satisfactory only to try to minimize the consequences. Instead, the so-called "net loss principle" should be applied.

> ***Comment:*** *A core guideline of the "no net loss principle" is the requirement that no net loss of the natural potential and functions of habitats must be tolerated. This not only involves the requirement to avoid adverse effects but – as an important tool for achieving the above goal – also allows to stipulate mitigation and compensation measure in case of unavoidable adverse effects. Thus the "no net loss principle" corresponds to Germany's "Eingriffsregelung".*
>
> *First of all it will be investigated how the consequences can be minimized. If it is found ecologically reasonable, the compensation of loss of habitats in the sense of the "no net loss principle" may be envisaged, cost considerations and technical feasibility of such compensation measures providing. The issue will be addressed in the environmental impact assessments to be elaborated for the approach area.*

The municipality of Lolland addresses the possible loss of habitats due to the proposed new railway station of Rødby, a toll station or other facilities such as temporary fabrication sites established in the east of Rødby.

> ***Comment:*** *The issue will be addressed in the environmental impact assessment to be elaborated for the hinterland infrastructure.*

4.4 Water

The County of Storstrøm makes reference to the existing poor water quality of the Natura 2000 site of Guldborgsund due to a high load of nutrients. Expansion of the bridge across Guldborgsund might influence the water flow and thereby lead to a further deterioration of the water quality. Such a development should be avoided.

> ***Comment:*** *The issue will be addressed in the environmental impact assessment to be elaborated for the hinterland infrastructure.*

5 Summary and Outlook

The innovative environmental consultation process concerning the Fehmarnbelt fixed link launched by the Ministries of Transport of Germany and Denmark in January 2006 has given rise to numerous responses from interest organizations, authorities and citizens of both countries. The Ministries of Transport appreciate all comments, concern and support, general and detailed, proposals for environmental requirements and/or optimization of the project and again wish to thank all respondents for their valuable contributions to the consultation process.

In this Environmental Consultation Response Report an overview on the consultation process is given, the responses are summarized and their focal points are reviewed. Concerning the cross-border coast-to-coast section there are joint views of Danish and German respondents in case of some of the environmental issues and different views between the two countries in case of other issues.

Respondents in both countries are concerned by the ship collision risk in case of a bridge, effects on the water exchange through the Fehmarnbelt, marine mammals and fishery, and opt for criteria of allowable sediment spill and a monitoring of sediment spill. On the other hand, the effects of the fixed link on tourism and on the visual appearance of the landscape, in particular in case of a bridge solution, lead to quite different attitudes in Denmark and Germany: a general reluctance of German respondents against the new infrastructure and concern of long-term negative implications clearly contrast to Danish respondents who see positive opportunities for the future development of tourism and other commercial activities and see the bridge as a landmark for the region. Also effects on birds are seen in a quite different way: while this aspect is one of the most frequently addressed environmental issues in German responses, only a few Danish respondents addressed this aspect. In contrast to this, only Danish responses include specific recommendations for implementing an environmental management system including control and monitoring programmes, associated with certified quality assurance systems.

All these comments have led to these ministries' observations:

- The state of knowledge as stated in the ECR has been confirmed by the comments to a large extent. This includes the general knowledge about the most sensitive areas, about major areas of conflicting interests, or about particular adverse effects which require appropriate mitigation or compensation. It also involves the existing knowledge where a present lack of precision or current knowledge gaps due to the preliminary state of data should be bridged by further detailed studies. The impact assessments conducted so far lead to the general impression that this large-scale project has an influence in many areas but which are controllable.
- In the last decades it seems to be a general experience for major infrastructure projects that the longer the decision-making process takes the more likely earlier studies may become outdated and new requirements come up. The knowledge concerning selected environmental issues has improved since the studies of the nineties. One major goal of launching the environmental consultation was to learn the latest environmental knowledge about the Fehmarnbelt and its hinterlands. Therefore the ministries appreciate the comments and current-most facts given. They will be taken into due consideration in the future planning process.
- Based on the knowledge of the ECR together with the comments received in the environmental consultation, the ministries fully agree that further detailed investigations and studies will be carried out, where the knowledge is considered insufficient. A programme for more detailed environmental investigations of particular issues and for a detailed environmental strategy will be elaborated after the overall decision on the realization the fixed link has been taken. The outcome of these

studies will also enable more detailed assessments of the impacts of the fixed link in the environmental impact assessment.

The existing studies together with the information provided through the responses make up a sound basis for the ministries' informed policy-making, whether the fixed link should be realized or not.

6 References

/1/ Fælles dansk-tysk miljøhøring vedr. en fast forbindelse over Femern Bælt

/2/ Verkehrsminister Austermann gibt Startschuss für wichtige Weichenstellung zur festen Fehmarnbeltquerung

/3/ HELCOM Recommendation 17/3 on Information and Consultation with Regard to Construction of New Installations Affecting the Baltic Sea

/4/ Regional Effects of a Fixed Fehmarn Belt Link, Copenhagen Economics ApS and Prognos AG, February 2006

/5/ Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds (Birds Directive)

/6/ see Federal Nature Protection Agency, http://www.habitatmare.de, map 10

/7/ Jens Kjerulf Petersen and Thorleif Malm (2006): Offshore Windmill Farms: Threats or Possibilities to the Marine Environment. Ambio Vol. 35, No. 2, p. 75-80

Bundesministerium
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Transport- og Energiministeriet