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Estonian Maritime Spatial Plan

Draft Impact Assessment Report**,**
FOR PUBLIC DISPLAY

Work No: 296718 **Tallinn-Tartu**

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INTRODUCTION

This Impact Assessment (hereinafter IA) is being carried out for the Estonian Maritime Spatial Plan. The preparation of the Estonian Maritime Spatial Plan and the IA of the plan has been initiated by the Government of the Republic Order No. 157 of 25.05.2017. The aim of the MSP is the long-term planning of the use of the Estonian marine space, which takes into account social, economic, cultural as well as environmental impacts and needs in a balanced way.

The overall objective of the Strategic Environmental Assessment (SEA) is to take environmental considerations into account in the preparation and implementation of the plan, thereby ensuring a high level of environmental protection and promoting the principles of sustainable development. Well-established common practices, supported by the SEA Directive and Estonian legislation, is rather a natural environment-centered approach. However, the impact on the social (including health), cultural and economic environment is also important when implementing plans. Therefore, the so-called **Extended Impact Assessment** is carried out on the Maritime Spatial Plan, i.e., the MSP impact assessment process integrates the SEA with the assessment of the social, cultural, and economic impacts.

The plan and IA are compiled by OÜ Hendrikson & Ko in cooperation with experts from the University of Tartu, the Estonian Marine Institute of the University of Tartu, the Center for Applied Research in Social Sciences, the University of Tallinn and OÜ Roheline Rada. Planning and impact assessment have been organized and established by the Ministry of Finance.

The figures are not translated in this document. All the topics covered in the figures are available in English from the map application, which is available on the Maritime Spatial Plan Portal at mereala.hendrikson.ee/en.html. The Impact Assessment Annexes have not been translated and are available in Estonian on the Maritime Spatial Plan Portal at http://mereala.hendrikson.ee/lahendus.html.

1 PURPOSE AND NATURE OF THE ESTONIAN MARITIME SPATIAL PLAN

The Maritime Spatial Plan is a tool for long-term planning of the use of the sea. The aim of marine area planning is to agree on the principles of the use of the Estonian marine area in the long term in order to attain and maintain a good status of the marine environment and to promote the maritime economy.

The plan under assessment is a national level strategic document guiding the spatial development of the marine area. The plan addresses the long-term vision of the Estonian marine area, defines the principles of spatial development, and provides general guidelines and conditions for the use of the marine area. Interconnections with the land include functional links between the sea and the land, such as ports and cables for prospective cooperation. The MSP does not impose binding conditions on land.

The Estonian marine area planning focuses on the combined use of the marine area and new uses of the sea. For traditional uses, such as fishing, maritime transport, the rules of using the sea are already well established and do not require significant additional regulation. Guidelines for all uses are provided to accommodate new uses of the sea into the marine space.

Of the new uses for the sea, marine area planning identifies wind energy development areas and recommends areas suitable for shellfish and seaweed farming. In order to provide guidelines for fish farming, the plan identifies areas unsuitable for this activity. Other uses of the sea are not defined as spatially binding areas.

The Maritime Spatial Plan is the basis for issuing superficies licenses and environmental permits determining the more precise use of the sea (hereinafter referred to as license).

2 IMPACT ASSESSMENT METHODOLOGY

2.1 THE ECOSYSTEM-BASED APPROACH

The principle that the Maritime Spatial Plan must be based on an ecosystem-based approach has been internationally recognized in recent years. The EU Maritime Spatial Planning Directive also states that the Member States shall apply the ecosystem-based approach to the establishment and implementation of the Maritime Spatial Plan (Article 5 (1)).

The principle of the ecosystem-based approach in the Baltic Sea Region has been embodied in the guidance documents of the HELCOM VASAB MSP Working Group and in the framework of the Baltic Scope project.

The guidance material is titled "The Ecosystem-Based Approach in the Maritime Spatial Plan – A Checklist Toolbox" and guidelines for the aforementioned project implementation in Estonia, drafted in the framework of the Baltic Scope project,[1] highlights the following:

1) Maritime Spatial Planning must become the basis for directing economic and other activities at sea to avoid conflicts between different sectors and to ensure the sustainable use of marine areas and the preservation of the marine environment.

The planning process and the impact assessment shall be carried out simultaneously, taking into account as far as possible the environmental impact, including socio-economic, cultural, and health impact, of the implementation of the plan, in order to ensure sustainable and balanced spatial development.

2) Because the marine environment offers a wide range of benefits to mankind, environmental activities are largely horizontal in spatial planning, meaning that other areas must be planned in an environmentally sensitive way. Taking into account the marine environment is the only way to ensure the development of a sustainable maritime economy.

This comprehensive impact assessment provides important input for the implementation of the ecosystem-based approach to Maritime Spatial Plan (see Chapter 4 for more details).

3) As the sea is very dynamic in nature and knows no national borders, such horizontal impacts should be considered for the Baltic Sea as a whole and not separately for all countries. Therefore, Member States should, wherever possible, respecting international law and conventions, cooperate with the third countries concerned in the relevant marine areas.

In the preparation of the Maritime Spatial Plan, the potential transboundary impact was also assessed (see Chapter 4.9), and international cooperation with several countries took place. An important role is also played by the ongoing Baltic Sea projects and international seminars where the Ministry of Finance will introduce the Estonian Maritime Spatial Plan process (e.g., Pan Baltic Scope, BalticRIM, LandSeaAct, The Gulf of Finland Science Days, MSP Global Conference, Connecting Seas Conference, etc.). More specifically, cooperation and inclusion are discussed in Chapter 5.

4) The Maritime Spatial Plan must be based on an ecosystem-based approach. An important measure to ensure integrated ecosystems is to support Blue Sea Economy

[1] Implementation of the Marine Strategy Framework Directive in Marine Spatial Planning, Estonian Marine Biological Society 2018

initiatives during the Maritime Spatial Plan. An ecosystem-based approach gives priority to protecting marine ecosystems while recognizing the need for society to maximize the profit from the use of marine resources. The Blue Growth Strategy emphasizes the need to harness untapped marine resources (such as seaweed and shellfish) for the creation of new jobs and economic growth, while protecting biodiversity and preserving the ecosystem services that our healthy marine and coastal ecosystems provide.

So far, knowledge on the management of the Blue Economy has been inadequate, and as a result of the impact assessment, areas suitable and unsuitable for the development of aquaculture have been proposed, taking into account existing knowledge and studies. A study has been carried out on marine areas suitable for growing shellfish and/or algae[2], and a model has been created for the economic benefits from the exploitation of marine resources, including aquaculture (The Marine Economic Benefit Model)[3]. In 2019, KAUR commissioned a survey to develop a methodology for evaluating the benefits of selected marine ecosystems and to model the maps of their ecosystem benefits to the entire Estonian marine area[4]. On the basis of this work, the Marine Economic Benefit Model was complemented by ecosystem services (PlanWise4Blue)[5].

The HELCOM / VASAB Ecosystem-Based Approach Guide[6] outlines a number of principles that must be followed when drafting the Maritime Spatial Plan and conducting Impact Assessment to ensure an ecosystem-based approach.

1) **Taking account of environmental objectives, maintaining and achieving good environmental status, and the precautionary principle**. The overall objective is that the Maritime Spatial Plan ensures the long-term good environmental status of the marine area, and thus the precautionary principle should be used when planning activities and assessing impact. Activities that, according to current scientific knowledge, are expected to have a significant impact on the marine ecosystem, and the impact of which may not be sufficiently predictable at present or in certain parts, will require additional specific research and risk consideration at subsequent planning stages or at a project level.

During the preparation of the plan, both the Planning and the Impact Assessment Task Group have worked closely together to avoid significant adverse environmental impact and conflicts between uses of the sea area at the earliest possible stage of strategic planning.

2) **Consideration of the best available knowledge.** In-depth and up-to-date knowledge can best help protect the components of the marine ecosystem. These include understanding the state of the marine environment as well as understanding the various social and cultural values of the marine area.

The following baseline analyzes have been carried out during the elaboration and preparation of the Maritime Spatial Plan:

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[2] Identification of areas suitable for invertebrate and algae cultivation, Estonian Marine Institute, University of Tartu 2016

[3] Estonian economic model: The Marine Economic Benefit Model (Model of Economic Profit, Costs and Benefits of Using Marine Resources to Assess Current Economic Activities in the Marine Area), Praxis Center for Policy Studies 2017

[4] Base analysis for Selected Ecosystem Services in Marine Areas (commissioned by KAUR), OU Hobikoda, 2019

[5] Nõmmela, K, University of Tartu CASS; Kotta, J., OÜ Hobikoda; Piirimäe, K., OÜ Roheline Rada Supplementing the model of economic benefits from the use of marine resources with ecosystem services ; Commissioned by Ministry of Finance, 2019 (https://www.rahandusministeerium.ee/et/system/files_force/document_files/mudeli_taiendamine_okosusteemiteenustega_aruanne.pdf)

[6] Guideline for the implementation of ecosystem-based approach in Maritime Spatial Planning (MSP) in the Baltic Sea area, 2016

- Implementation of the Marine Strategy Framework Directive in Marine Spatial Planning, Estonian Marine Biological Society 2018
- Collection and analysis of baseline data for assessing social and cultural impacts, OÜ Hendrikson & Ko, 2017
- Survey of bats migrating south or southwest across the sea from the island of Saaremaa, Estonian Fund for Nature, 2017
- Compilation of data on migratory corridors of birds in the Estonian marine area, creation of corresponding map layers and analysis of the impact of wind farms on bird feeding areas, Estonian Ornithological Society, 2017
- Identification of suitable fish farming areas in the Estonian marine area, EULS Institute of Veterinary Medicine and Animal Husbandry, 2017
- Economic Benefits of Using Marine Resources (Model of Economic Profit, Costs and Benefits of Using Marine Resources to Assess Current Economic Activities in the Marine Area), Praxis Center for Policy Studies 2017
- Analysis of ice conditions and drawing of maps (ice probability map and ice cover duration map, *worst-case scenario* map based on 2010/2011, hummock ice probability map, etc.), TUT Institute of Marine Systems, 2016
- Identification of areas suitable for invertebrate and algae cultivation, Estonian Marine Institute, University of Tartu 2016
- Assessment of the distribution and marine use of seals NGO Pro Mare, 2019
- Bird staging area analysis, Estonian Ornithological Society, 2019

3) **Development of alternative solutions.** Reasonable alternatives must be developed, taking into account the environmental, socio-economic, and cultural impact involved and the measures proposed to avoid or mitigate them. The planning process must reflect, in a transparent manner, the trade-offs between different maritime interests and users in the different uses of the marine area.

The purpose of the Impact Assessment was to determine the suitability of the proposed development areas for the new uses of the marine space (e.g., development areas suitable for wind energy, see the detailed description of the development of suitable areas in the Plan, Chapter 5.6.2). While it was not possible or reasonable to spatially design development areas for some activities, the impact assessment identified areas not suitable for fish farming, for example. This was done by mapping sensitive areas, which are often used at the level of species group, habitat type, or species that are sensitive to development and its associated impact (species-rich areas). Mapping suitable or unsuitable areas for development activities and thereby assessing the impact will help to avoid the environmental risks associated with implementation at subsequent planning stages or at the project level.

4) **Mitigation measures**: The purpose of the measures is to prevent and reduce any possible adverse environmental impacts. To achieve this, planning must take into account environmental objectives, including marine biodiversity and the maintenance of a network of protected areas.

The main purpose of this Maritime Spatial Plan Impact Assessment is to identify any adverse impacts that are likely to occur and, first, to avoid them or to identify the reasons why implementing the action can result in such adverse impacts and provide mitigation measures to eliminate them. This helps prevent or reduce the number of potential site-specific conflicts later in the development process with less room for maneuvering. In addition, the impact assessment analysis focuses on nature conservation constraints and key risks and identifies location-specific and site-specific impacts to be analyzed at the project level, taking into account technological solutions. It provides developers with relevant information and certainty about environmental issues (conditions) that may need to be taken into account as they develop their initial project concept. It can also be more cost-effective in the long run. If possible, mitigation measures are taken into account in the early planning process; it is likely to be technically easier and cheaper to integrate them at the project level. This, in turn, can lead to the development of new, creative, and innovative solutions.

5) **Participation and communication.** All relevant authorities and stakeholders, as well as the wider public, are involved at an early stage in the planning and impact assessment process. Participation processes must take into account existing power structures, resources, and the diverse needs of stakeholders.

An ecosystem-based approach is created involving different stakeholders throughout the planning and impact assessment process. See Chapter 5 for details.

6) **Adaptation.** Changes in nature and in the management of ecosystems are inevitable. Sustainable use of the ecosystem should be accompanied by a process that involves monitoring, reviewing, and evaluating both the process and the outcome, as changing circumstances and new knowledge may require tailored guidance at project level evaluation.

The plan includes an action plan that maps the follow-up activities for the implementation and application of marine-related activities and the specification and ongoing updating of marine area information.

Taken together, the ecosystem-based approach implies that the use of marine space must be planned in a way that ensures the long-term viability of marine ecosystems. This, in turn, means that planning decisions need to be considered first and foremost with a view to preserving the good status of marine ecosystems and the environment, taking into account the outcome of this impact assessment and the mitigation measures proposed. Chapter 2.3 describes how environmental considerations have been taken into account when developing a planning solution, taking into account the above principles of the ecosystem-based approach.

See chapter 4.2 of the Plan for an overview of the consideration of the proposals made in the Impact Assessment.

2.2 FOCUS ON ASSESSING THE RELEVANT IMPACT OF THE MARITIME SPATIAL PLAN

In addition to the coherence between different uses of the sea, it is important to take into account broad-based environmental considerations from the early stages of planning. The sustainable use of the marine environment is based on directing the various uses of the sea, taking into account their nature and natural conditions. Therefore, the potential impact of the use of the sea on the natural, social, and cultural environment and the economic environment were analyzed in an integrated way parallel to the development of the planning solution. Broad-based impact analysis has made it possible to direct activities both spatially and through guidelines and conditions set out in planning, with the aim of achieving and maintaining good environmental status. The impact assessment has been carried out, taking into account the degree of accuracy of the planning document and the extent of its content.

The Spatial Planning Solution provides an overview of the uses of the marine area and provides guidelines and conditions for the sustainable development of each use, also taking into account other uses**. For many uses (fisheries, aquaculture, maritime transport, marine rescue, pollution control, border management, seabed infrastructure, marine tourism and recreation, nature protection, marine culture, national defense, mineral resources, and dumping), the Maritime Spatial Plan does not foresee significant spatial changes.** Legislation and maritime practice are already well established in these areas of use. Following the implementation of the plan, the prevailing state of affairs in the marine space for these uses, including in terms of environmental impact, will be maintained. With regard to combined use, both planning and impact assessment provides guidance on developments in the field through guidelines and conditions.

The Maritime Spatial Plan focuses primarily on new uses of the sea where development interest already exists or is predictable due to good preconditions: **aquaculture and energy production**. In order to develop these areas and promote combined use, the plan defines both guidelines and conditions and, for wind energy, spatial development areas. For new uses, the plan can be seen as a document that creates new opportunities and can also have environmental impacts.

2.3 TAKING INTO ACCOUNT ENVIRONMENTAL CONSIDERATIONS IN THE DEVELOPMENT OF THE MSP

One of the most important new uses of the marine area is **wind energy development**, for which the spatial development areas are determined in the plan, in addition to guidelines and conditions. The designation of wind energy development areas was based first of all on conditions suitable for wind energy (wind, sea depth, ice, wave height), on the basis of which areas in principle suitable for the construction of wind farms were selected.

The role of impact assessment in assessing a Strategic Planning Document is to review the overlap of potential wind energy development areas with nature conservation sites and naturally sensitive areas in the preparation of the Maritime Spatial Plan in order to exclude conflicts at the project level and minimize associated environmental impact. Wildlife Sensitivity Mapping is considered to be an effective tool for identifying naturally sensitive areas (or biodiverse areas of need to be protected) where the development of renewable energy (or other proposed marine area activities) can affect the maintenance of the good environmental status of biodiversity and the integrity of sites[7,8].

Mapping of areas suitable for spatially planned activities in the marine area, including wind energy, and of sensitive wildlife areas, will help to identify:

- Environmental risks related to the development areas of the proposed activities and their implementation for protected natural objects, including Natura 2000 network sites and marine habitats and biota (discussed in Chapter 4.2).
- Sets out the conditions for the licensing phase of proposed activities and the baseline task of the impact assessment, which must be the basis for assessing significant adverse impacts at the project level.

The preparation of the Maritime Spatial Plan and the Impact Assessment was based on existing marine studies and expert analyses (during the planning process, a number of marine space analyzes were carried out to map sensitive areas). This Impact Assessment has already proposed, at a strategic level, the avoidance of more important wildlife sensitive areas on the basis of the principle of prevention and the precautionary principle. In cases where marine wildlife mapping needs to be refined, and the impact of the proposed activity depends on technical solutions, it is proposed to include in terms of the planning decision that the relevant studies need to be specified or further conducted in the licensing phase. The specificity of the marine area is that much less data is available on the marine environment compared to the land, and it is unreasonably costly and time consuming to collect new data covering the entire marine area. Thus, for some marine biota (e.g., mapping of fish spawning grounds) and the seabed, the time horizon of planning (studies lasting several years) did not allow for more accurate and extensive research. In such situations, expert analysis has been used, and it is proposed to include in terms of the planning solution that the relevant studies need to be specified or further carried out at the licensing phase. In addition, the Impact Assessment

[7] Draft Guidance Document Wind Energy Developments And EU Nature Legislation. DRAFT 17.05.2019

[8] European Commission (2019) The Wildlife Sensitivity Mapping Manual: Practical guidance for renewable energy planning in the EU.– currently in draft

proposes the inclusion of relevant studies in the Action Plan and sets a condition for the obligation to carry out such studies at the project level.

The Impact Assessment was based on the fundamental principles of environmental law and applied the precautionary principle, which requires that insecure environmental risks are minimized and the principle of prevention, according to which activities involving environmental hazards are generally prohibited. For example, the impact assessment for fish spawning grounds has been based on the depth of the sea and, in accordance with the precautionary principle, to avoid significant adverse impacts, identified <5 m marine areas as sensitive areas in terms of fish, freshwater and migratory fish, generally do not spawn much deeper (perch, pike, to name some most important ones). In other cases, location-based spawning site surveys at the project level shall be conducted and taken into account when planning more specific activities.

In order to attain and maintain the good environmental status of the sea, a network of protected areas, both nationally and internationally (Natura 2000), has been taken into account in the development of the planning solution, including the planned areas, for these areas, the spatially planned new uses of the marine space, i.e., in particular, development areas of wind energy which could have a negative impact on the environment were excluded.

Selected wind energy development areas were already refined during the draft solution process, excluding on the basis of the information known by that time any overlaps with previously known areas of natural value, including protected areas and important known migratory corridors of birds[9]. In order to minimize impact (visual impact, noise, shading, etc.) on humans, wind turbine areas closer than 10 km to the land (including islands with permanent population) were excluded. In order to avoid conflict, wind farm areas were excluded in special areas of national defense and also in areas unsuitable for national defense reasons. In this way, the best possible solution for wind energy development areas was found with the degree of precision suitable for the Estonian National Maritime Spatial Plan on the basis of the available information (see Figure 2.2-1)

Initial analysis of impacts already at the draft solution stage helped to develop the best possible solution at the strategic level.

[9]Compilation of data on migratory corridors of birds in the Estonian marine area, creation of corresponding map layers and analysis of the impact of wind farms on bird feeding areas, Estonian Ornithological Society, 2017

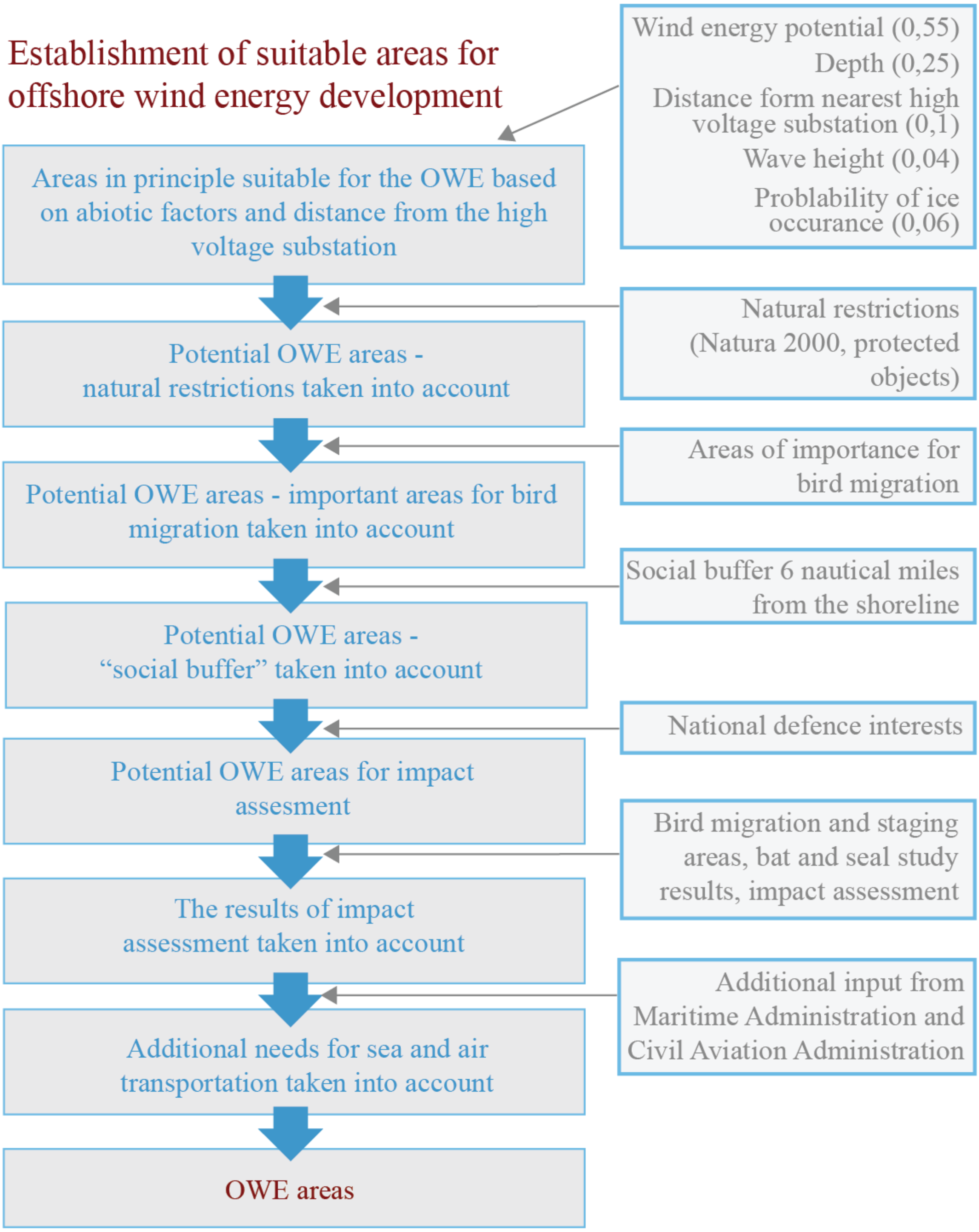

Figure 2.2-1. Finding areas suitable for the development of wind energy.

In preparation of the plan, the following studies were commissioned by the Ministry of Finance in order to refine the selected areas of wind energy in the preparation of the main solution:

- Study of bats migrating south or southwest across the sea from the island of Saaremaa[10],
- analysis of bird staging areas[11],
- Assessment of the distribution and marine use of seals[12].

The areas suitable for the development of wind energy were reviewed by both bat and seal experts, and no further proposals were made to modify the wind energy development areas.

During the analysis of bird staging areas, all known bird information was mapped in the Estonian marine area. Bird experts also took into account the migratory corridors of marine area birds and designated sensitive areas for birds. In addition to the sensitive areas, the IA also mapped the main migratory corridors of terrestrial birds above the sea and consequently proposed a reduction in wind energy development area No 1 (see Chapter 4.2.2 and Figure 4.2.2-4).

Along with the wind energy development area, their potential cable connections to the land must be considered. The planning solution proposed possible cable corridors, and the role of the impact assessment was to assess their impact at the strategic planning document level, in particular on the conservation objectives of the Natura 2000 sites. As the exact technological solutions for the proposed activity are unknown at this stage of the planning process, the IA suggested alternative locations for cable corridors, which would exclude any impact on the conservation objectives of the Natura 2000 network (see Chapter 4.3 for details). The assessment of Natura 2000 sites brought out proposals for amending the planning solution and required amendments were made in the MSP. The impact assessment did not preclude the laying of cables in the proposed corridors and pointed out that the laying of cables at other locations is more economically feasible. However, in such a case, an appropriate location alternative at the project level of wind farms would have to be found, which would have a long-term impact on the conservation objectives of the Natura 2000 network.

At the public display of the basic solution (17.02-18.03.2020), the Maritime Administration and the Civil Aviation Administration submitted their proposals regarding the areas suitable for the development of wind energy. Based on the proposals, the scope of wind energy development areas no. 1 and 2 were reduced (see the development of the planning solution, chapter 5.6.2 of the Plan). This impact assessment report deals with an earlier proposal for a planning solution, dated November 2019. As the impacts have been assessed in relation to larger areas, the conclusions of the submitted impact assessments are not affected by this amendment.

Another new area of marine use in the Estonian Maritime Spatial Plan is **aquaculture**. The Maritime Spatial Plan does not specify specific areas for this use but provides guidelines and conditions for the development of the sector. The precise spatial areas of aquaculture will be defined in the course of the licensing procedure, including the environmental impact assessment, which must take into account the guidelines and conditions established by the Maritime Spatial Plan, taking into account the location of vulnerable wildlife areas and the location of suitable and/or unsuitable areas for aquaculture. The establishment of fish farms

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[10] Basic Study of Marine Spatial Planning “Study of Bats at Sea around Saaremaa, July-October 2018” Estonian Nature Foundation, 2019

[11] Basic Study of Marine Spatial Planning “Analysis of Bird Staging Areas” Estonian Ornithological Society, 2019

[12] Basic Study of Maritime Spatial Planning “Estonian Maritime Spatial Planning: Assessment of the distribution and marine use of seals”. Report on Applied Research Contract No. 1.9-1/404-1. I., Jüssi; M., Jüssi, 2019.

in areas of protected natural objects is prohibited and excluded. This condition minimizes the impacts of fish farming on places of natural value and their protective purposes. The major impact of fish farming is associated with changes in water quality and the loss of seabed habitats near the farm (see chapter 4.2.5 for details).

The Impact Assessment also addresses the cumulative and synergistic impacts of different proposed activities. The guidelines in the plan favor cluster solutions, i.e., the development of several different uses of the sea, e.g., the impact of nutrients released from the farm into the water can be mitigated by shellfish and algae cultivation that would be created along with the fish farms. In order to achieve positive socio-cultural and economic synergies, the development of aquaculture, in particular shellfish farming, is favored in wind energy development areas.

3 RELATIONSHIP OF THE MARITIME SPATIAL PLAN TO STRATEGIC PLANNING DOCUMENTS AND ENVIRONMENTAL POLICY

3.1 RELATIONSHIP TO RELEVANT PLANNING DOCUMENTS

The relationship between the plan and the relevant planning documents, including international framework documents and planning guidelines, is described in Chapter 2 of the Plan. Starting points. The relevant section of the Plan sets out the main approaches and agreements that underpin the Maritime Spatial Plan. The following is a brief overview of the Estonian spatial plan related to maritime spatial planning.

National Spatial Plan *Estonia 2030+*

National planning emphasizes the efficient and sustainable use of the marine area and Estonia's openness to the sea and sets out general directions for achieving this as a principle theme development. In the field of energy production, national planning foresees strong development in wind energy, including in the offshore area. In the longer term, the development of energy networks provides for the possibility of connecting to Latvia by submarine cable. In order to increase the security of supply on the islands and the introduction of local renewable energy sources, the aim has been to establish a high-voltage loop connecting West-Estonian islands and the mainland, which will allow better connection of offshore wind farms to the grid. The planning predicts an increase in international trade flows using sea transport. National planning also identifies major global trends with a spatial impact, which also have a major impact on the future use of the marine area:

- shifting the focus of the global economy to Asia;
- transition to a knowledge-based economy;
- population aging;
- urbanization;
- changes in climate;
- increasing the influence of ecological values;
- transition to the widespread use of renewable energy;
- the fast growth of the so-called green and silver economies.

National planning provides a general basis for the Maritime Spatial plan in the form of spatial trends.

County-Wide Spatial Plans

The valid plans of Estonian counties concern land. However, maritime affairs play an important role in the planning of marine counties, reflecting in overall trends, mobility, and infrastructure through ports and maritime transport, as well as in recreation and rescue capacity. Most of the issues related to the sea have been dealt with in Saaremaa that is located in the middle of the sea.

The **Saare County-wide spatial plan** sees an increasing role for the blue economy - trade, shipbuilding, fishing, boat storage, repair, and production, etc. The development of small craft harbors will be promoted, small craft harbors of national and county importance and community harbors will be distinguished. The county plan states that restoring the passenger ship connection to Latvia and visiting Saaremaa harbors by more cruise ships is a priority for tourism. The trend is that ports are increasingly multifunctional, fulfilling many functions other than mooring and enabling traditional fishing. The multifunctional use of ports has been prioritized for further development. The Saare County-wide spatial plan notes that the locations of offshore wind farms will be determined by a national Maritime Spatial Plan.

The spatial vision of the **Lääne County-wide Spatial Plan** specifically highlights openness to the sea and fast maritime connections. Business areas are being developed near ports. The Spatial Development Principles outline recreational opportunities for coastal areas.

The **Harju County-wide Spatial Plan** sets the guideline for openness to the sea - the attractiveness of the coastal area in terms of residential preferences and economic activity. The development potential of ports has been especially emphasized.

The **Lääne-Viru County-wide Spatial Plan** gives priority to sea access (incl., sets the rule for beaches of recreational value to be accessible from public roads every 500 m in sparsely populated areas and every 200 m in densely populated areas) and maritime connections facilitating the development of the recreational economy. For the development of maritime tourism, a chain of ports along the coast, consisting of various small craft harbors, is planned to complement the land connections.

The **Ida-Viru County-wide Spatial Plan** emphasizes the role of the Port of Sillamäe with the international cargo and passenger port. The plan links the sea to the diverse recreational, economic potential of Ida-Viru County's cultural environment, natural and industrial landscapes, highlighting the development of the resort, spa, and marine tourism on the north coast.

Maritime county plans have also linked the sea to the theme of valuable landscapes. In some counties, marine areas have been seen as parts of valuable landscapes (e.g., Harju County, Lääne-Viru County). Coastal areas with attractive nature and unique coastal culture have been designated as valuable landscapes in all counties. The Saare County-wide Spatial Plan most closely associates the marine area with valuable landscapes. For example, land use conditions for valuable landscapes require the preservation and restoration of marine culture-related features on the sea-bound landscapes - historic berths, net shelters, trawl ramps, piers, agar collecting sites, etc; nor should the location of new buildings on the sea-side landscape disturb the sea views.

County plans highlight the regional importance and specificity of the sea and thus serve as an input for the preparation of a maritime plan.

Hiiu Island MSP

The plan established in 2016 sets out the general conditions for the use of Hiiu Island MSP. Ship transport, pipelines and cables, waste, mineral extraction, agar fishing, recreation, development areas of wind energy, and aquaculture are identified (aquaculture can be developed outside the designated areas, if necessary).

The Supreme Court ruling of 08.08.2018 has annulled Hiiu County Governor's Planning Order No. 1-1/2016/114 with regard to the development areas of wind energy production.

The Hiiu Island Maritime Spatial Plan will remain valid as a separate document from the national Maritime Spatial Plan. The methodological experience of Hiiu Island Maritime Spatial Plan has been taken into account in the preparation of the national plan.

Pärnu Bay area MSP

The spatial plan established in 2017, bordering Pärnu County, defines the use of marine space, which takes into balanced account the different interests and spatial development needs at sea. The time horizon of the planning is 2030+. The Maritime Spatial Plan covers an area of ca 2600 km 2. Areas covered by the plan are fisheries, aquaculture, maritime transport, and related infrastructure, recreation and tourism, cultural goods, renewable energies, dumpsites, infrastructure outside of maritime transport, national defense, and maritime safety. For each area, principles are outlined for future development, licensing, impact assessment, and planning other activities in the marine area. The use of the sea in Pärnu Bay has been discussed in more detail. Functional relationships between land and sea are shown. Proposals for legislative changes have been made to extend the scope of rights for local governments to operate within one nautical mile in the marine area in the future. The activities required to implement the Maritime Spatial Plan are outlined.

The Pärnu County Maritime Spatial Plan will remain valid as a separate document from the national maritime spatial plan. The methodological experience of Pärnu County Maritime Spatial Planning has been taken into account in the preparation of the national plan.

3.2 COMPLIANCE WITH ENVIRONMENTAL OBJECTIVES

The following section provides an overview of the international, European Union, and national environmental objectives relevant to the planning document and describes how these objectives have been taken into account in the preparation of the planning document.

Water Framework Directive 2000/60/EC

The EU Water Framework Directive (2000/60/EC) is a piece of legislation designed to provide a coherent framework for action to plan and organize water protection in the European Union. The directive sets out, among other things, environmental objectives. Among other things, measures must be taken to prevent the deterioration of surface water bodies.

The framework for action established by the Directive covers all other water directives and sets as the main objective of water protection the achievement of good status for all waters (including surface water and groundwater) by 2015.[13] The implementation of the requirements of the Water Framework Directive and the framework for action set out therein is carried out nationally through water management plans.

The vision of the plan to be assessed underlines the good environmental status of the marine area. As a general principle of the planning solution, it has been developed, taking into account, in particular, the network of protected areas both nationally and internationally (including areas under planning). No new uses have been spatially planned for these areas, which could have adverse impacts on the environment.

Marine Strategy Framework Directive 2008/56/EC

The Marine Strategy Framework Directive provides the framework within which the Member States shall take the necessary measures to achieve or maintain good environmental status in their marine waters by 2020 at the latest. Marine Strategies shall adopt an ecosystem-based approach to the management of human activities, ensuring that these activities are under overall pressure to achieve good environmental status and that the ability of marine ecosystems to respond to human-induced change is not compromised while ensuring the sustainable use of marine goods and services for present and future generations. The Directive contributes to the coherence of the various policies, agreements, and legislative measures affecting the marine environment and aims at ensuring the integration of environmental concerns into such policies, agreements, and measures.

The achievement of the objectives of the Marine Strategy Framework Directive in Estonia is achieved through the Estonian Marine Strategy.

[13] https://www.envir.ee/et/eesmargid-tegevused/vesi/veemajanduskavad/veepoliitika-raamdirektiivi-rakendamine

The vision of the plan to be assessed underlines the good environmental status of the marine area. As a general principle of the planning solution, it has been developed, taking into account, in particular, the network of protected areas both nationally and internationally (including areas under planning). No new uses have been spatially planned for these areas, which could have adverse impacts on the environment.

European Union Strategy for the Baltic Sea Region

The strategy unites eight EU Member States around the Baltic Sea - Estonia, Lithuania, Latvia, Poland, Sweden, Germany, Finland, and Denmark. The strategy has three general objectives:

- saving the sea,
- connecting the region,
- increasing well-being

and a wide range of policy and cross-cutting issues stemming from these objectives:

- capacity building,
- climate change,
- cooperation with neighboring non-member countries,
- spatial planning.

The plan emphasizes the good environmental status of the sea and the importance of the conservation of fish stocks. The conditions set, in conjunction with the legislation, help to reduce the use of hazardous substances and their associated impacts. The plan sets conditions for compensatory measures for the fish farms that potentially release the most nutrients into the sea. The plan designates waterways and reflects fairways. Erection of potentially obstructing structures (e.g., wind turbines) on fairways under the conditions of the plan is excluded. Important areas affecting maritime safety (e.g., wind energy, aquaculture) are subject to conditions to specify the synergy during the licensing process. The plan does not regulate issues related to agriculture, forestry, education, and health.

Estonian Marine Strategy

The main objective of the EU Marine Strategy Framework Directive (2008/56/EC; MSRD) is to maintain or achieve, by 2020, at the latest, good environmental status (GES) in its marine environment, which can be achieved through taking national measures. Each country needs to develop and implement a Marine Strategy for its maritime domain to promote the sustainable use of the seas and preserve marine ecosystems.

The implementation of the Marine Strategy takes place in six-year cycles, with one cycle consisting of the assessment of the status of the marine area, the development and subsequent updating of the monitoring program, and the establishment, implementation, and updating of the corresponding Action Plan.

The Action Plan of the Estonian Marine Strategy[14] takes into account the already established development plans and their implementation plans, and new measures have been proposed in addition to the measures already implemented and being implemented. Measures include the establishment of a network of marine protected areas in the Estonian EEZ, the establishment of regional plans for aquaculture to manage potential environmental pressures,

[14] https://www.envir.ee/sites/default/files/meetmekava_032017_f.pdf

the enhancement of marine pollution response capacities to respond to environmental emergencies at sea, and other activities.

The Maritime Spatial Plan is in line with the main objective of the Marine Strategy. The activities outlined in the Marine Strategy Action Plan are largely in line with those needed to implement the Maritime Spatial Plan.

The Climate Policy Principles until 2050

The Climate Policy Principles Document was prepared under the leadership of the Ministry of the Environment and with the support of stakeholders. For the first time, this document agreed on a long-term vision of Estonia's climate policy and on the path towards it. According to the vision of climate policy, by 2050, Estonia will be a competitive, low-carbon emission economy. The country's readiness and capacity to minimize the negative impacts of climate change and to make the most of the positive impacts are assured. Estonia's long-term target is to reduce its greenhouse gas emissions by almost 80 percent by 2050 compared to 1990 levels. Moving towards this target will reduce greenhouse gas emissions by approximately 70 percent by 2030 and 72 percent by 2040 compared to 1990 levels. The Climate Policy Principles Document contains policy guidelines covering the whole economy), sectorial policies to mitigate climate change in the areas of energy and industry, transport, agriculture, forestry, and land use, and sectorial policies to adapt to the impacts of climate change.

In line with the climate policy goal to ensure a low-carbon emission economy by 2050, the Maritime Spatial Plan has placed great emphasis on the balanced development of wind energy and the identification of appropriate areas.

The Development plan for adaptation to climate change until 2030

The main objective of the development plan is to increase the preparedness and capacity of the national, regional, and local levels to adapt to the impacts of climate change.

The Development Document provides a framework for action to reduce Estonia's vulnerability to the impacts of climate change. The Development Plan was drawn up on the basis of in-depth studies and analyses to identify the impact of climate change on priority areas and adaptation measures to be implemented over a period of time up to 2030 as part of a long-term vision for 2100.

The Development Plan sets eight sub-objectives according to the priority areas of the established economic and administrative structure in the Republic of Estonia (separately and partly in synergy). The measures required are set out according to the objectives.

The need for adaptation to climate change has been taken into account in the design of the Maritime Spatial Plan. Attention has been paid to rescue capabilities, the natural environment, and the balanced development of the blue economy. Energy has a significant focus on finding suitable areas for wind energy development.

4 DESCRIPTION OF THE ENVIRONMENT AFFECTED AND THE IMPACT OF IMPLEMENTING THE PLAN

4.1 HYDROMETEOROLOGY AND HYDRODYNAMICS

4.1.1 Water temperature and salinity

Water temperature and salinity largely determine the ecosystem characteristics of the area, including, e.g., species composition. The temperature and salinity fields of the Baltic Sea are characterized by great variation in time and space, due to complex topography, strong gradients both horizontally and vertically, and great variability of the atmosphere at different time scales.

The exchange of water in the Baltic Sea with the ocean is limited as it occurs only through the narrow and shallow straits of Denmark. Saltier water flowing through the Strait and Beld Strait does not easily mix with lower density Baltic Sea water and tends to sink into deeper basins. At the same time, less saline surface water flows out of the Baltic Sea. The boundary between the two masses of water, called the halocline, consists of a layer of water whose salinity changes rapidly. For example, in the Baltic Sea offshore and in the Gulf of Finland, a halocline is located approximately 60 to 80 meters deep. The halocline acts as a lid, limiting water mixing in the vertical direction.

In the deeper parts of the open sea (> 80 m), there is usually a triple layer of temperature and salinity in summer and a double layer in winter. The seasonal upper mixed warm and fresh layer is typically 10-30 m thick, and its temperature and salinity depend on the hydrometeorological conditions of a particular period. Salinity in the upper layer is usually between 6 and 7.5 g/kg, and the temperature does not normally exceed 20°C. Below the upper mixed layer is a seasonal jump layer in temperature and salinity that separates the upper layer from the cold intermediate layer. The temperature of the intermediate layer generally varies between 1 and 4°C, and the salinity varies between 7 and 8g/kg. Below the intermediate layer, at a depth of 60-100 m, is the salinity jump layer, under which is in turn warmer (5-6 °C) and saltier (10-12 g/kg) water from the North Sea. The water in the bottom layer is often hypoxic or even anoxic. In winter, the upper mixed layer usually reaches the halocline, i.e., 60 to 80 m deep [15].

Water temperatures reach their peak in the Estonian coastal sea, usually in late July and August. In calm and sunny weather, shallow coastal areas can warm up quickly, but as the wind intensifies, coastal water mixes with cool offshore water or is replaced completely by offshore water. In the autumn, when the sea loses heat to the atmosphere, the opposite is true: calm and cool weather cools off the coastal water more quickly, but over a period of time, the currents bring warmer water to the coast again.

During the coldest months, water temperatures throughout the sea remain suboptimal (<10 °C). During the warmest month, water temperatures on the surface are above optimal almost throughout the marine area (>18ºC), taking into account average temperatures for the warmest month (August for the surface layer, September for the bottom layer) and the coldest month (March).

[15] Estonian Marine Strategy Action Plan for Achieving and Maintaining Good Environmental Status of the Estonian Marine Area and the Strategic Assessment of the Environmental Impact, 2015 (compiled by: Tallinn University of Technology Marine Systems Institute, OÜ Alkranel)

Impact of the MSP

There is no direct environmental impact of the planning solution on the salinity or temperature of the water (except on the soil directly in contact with the cable). Significant impacts in the larger salinity regime can be related, in particular, to changes in the intensity of water exchange between the Baltic Sea and the North Sea or to changes in rainfall patterns.

There is no direct environmental impact of the planning solution on the salinity or temperature of the water (except on the soil directly in contact with the cable).

4.1.2 Wind

The Estonian wind climate is shaped by the frequent low-pressure and high-pressure alternation, or cyclonic activity, characteristic of the northern part of the temperate zone, which causes windy weather. The intensity of cyclical activity in the Baltic Sea area depends on the general atmospheric circulation over the Atlantic and the Eurasian continent, generally defining the speed and direction of the wind blowing in the Estonian territory, and seasonal variability - the strongest winds and more frequent storms are characteristic of the period October to January, the period with the days of weaker wind and longer lulls is usually from May to August. The direct impact of the Baltic Sea on winds is mainly limited to islands and coastal areas (about 10 km from the coast to the sea and a 20 km wide inland zone), where the power of the winds gathering speed over a wide water field gradually declines due to the obstacles in the form of forests and hills. In addition to higher wind speeds, there are more winds and breezes in the coastal areas compared to the hinterland. Because of the presence of breezes, i.e., the land and sea winds, the direction of the wind on the coast is often different from that of inland winds.

The average annual wind speed is 150 meters to 8.5 to 9 meters per second in sea areas west of the islands, with gusts above 30 m/s. The average annual wind speed in the open middle part of the Gulf of Riga is 8 to 8.5 m/s, with gusts 26 to 28 m/s. The winds of the Väinamere Sea are heavily shaded by islands and the mainland, with annual average wind speeds of less than 8 m/s, however, gusts can still exceed 29 m/s. In the Gulf of Finland, both the wind speed and the intensity of the gusts are clearly decreasing in the west-east direction: the open western part of the Gulf has an average wind speed at the height of 150 m at 8-8.8 m/s, eastern only 7 to 7.5 m/s and gusts > respectively 30 m/s and below 28 m/s.

The number of days with storm winds (>15 m/s) and strong winds is also rapidly decreasing from the coast in the direction of inland. Offshore and windy coasts have an average of up to 40 storm days per year, but in the transitional coastal zone, there are usually 10-20 storm days above the sea and 10-20 km inland, mostly less than 10.

Long-term average wind energy (energy density, W/m^2) is 150 m high in the central part of Gulf of Riga, averaging 700-780 W/m^2 and 810-880 W/m^2 offshore west from Saaremaa, 800-840 W/m^2 near Hiiu Island, in the Gulf of Finland the energy density decreases in the western part (750 W/m^2) to the east (550 W/m^2).

Impact of the MSP

The activities proposed in the context of Maritime Spatial Plan are not of a scale capable of affecting the regional wind climate and have no national or transboundary impact on the spread of air and pollutants. Large wind farms have the strongest local impact on the wind (speed, turbulence, direction, mixing of air layers in the layer close to the substrate), but their impact disappears depending on the configuration of the wind farm to be built within 7 to 9 km of the outermost wind turbine. Even within the wind farm, the wind speed does not decrease by more than 20% (up to 50% up to 100 m directly behind the wind turbine impeller). The change in wind characteristics in the wind farm is negligible at mean wind speeds of 0-4 m/s and at speeds above 12 m/s, with the greatest changes at speeds of 7-10 m/s (just behind the wind turbine impeller) but due to the required distance between the wind turbines (distance minimum> 4 impeller diameters, typically 6-8 impeller diameters), the wind speed inside the wind farm will not decrease to such an extent as to significantly affect the movement of air or the distribution and deposition of pollutants. Recovery of wind speed and other features takes place due to a general regional air pressure gradient and over a very limited area (a few kilometers) and time (a few to tens of minutes).

Air quality may also be affected to a limited extent by ship traffic, but air exchange on the high seas is so good that pollution levels are not exceeded locally or regionally. Possible mitigation measures to reduce air pollution include the use of fuels with lower sulfur content, the use of main engines with lower NO_x emissions, and general speed limitation, which reduces the fuel consumption of ships. In exceptional cases (inversion, a lull in warm weather), ship emissions may only exceed the emission limits when stationary or maneuvering with the engine running in the port/aquatic area/roadstead. The mitigating measures, in this case, could be in particular, better logistics (shorter downtime with the main engine running, fewer ships main engines running at one time in port), and use of ships with a lower level of pollution.

The activities proposed in the context of Maritime Spatial Planning are not of a scale capable of affecting the regional wind climate and have no national or transboundary impact on the spread of air and pollutants.

4.1.3 Ice conditions[16]

In the Estonian marine area, at least in Pärnu Bay and the Väinameri Sea, ice cover occurs every year. In extremely mild winters (e.g., 2007/2008), ice is only found in Pärnu Bay and the Gulfs of Väinameri. In harsh winters (e.g., 2010/2011), the entire Estonian sea area is covered with ice, and even on the west coast of Hiiumaa and Saaremaa, ice is present for 30 days.

On average, Pärnu Bay, Väinameri Sea, and Narva Bay are covered with ice 50% of the time (December 15 to May 1), but in severe winters, the figure can be 85%. In the western and central parts of the Gulf of Finland, the ice period is shorter - 30% on average and 60% during severe winters. However, in the western and central parts of the Gulf of Finland, an important barrier to offshore activities is the ice drift and its potential damage to offshore and coastal facilities.

[16] The chapter is largely based on a basic research of Maritime Spatial Plan: Analysis of ice conditions and drawing of maps (ice probability map and ice cover duration map, worst case scenario map based on 2010/2011, hummock ice probability map, etc.), TUT Institute of Marine Systems, 2016

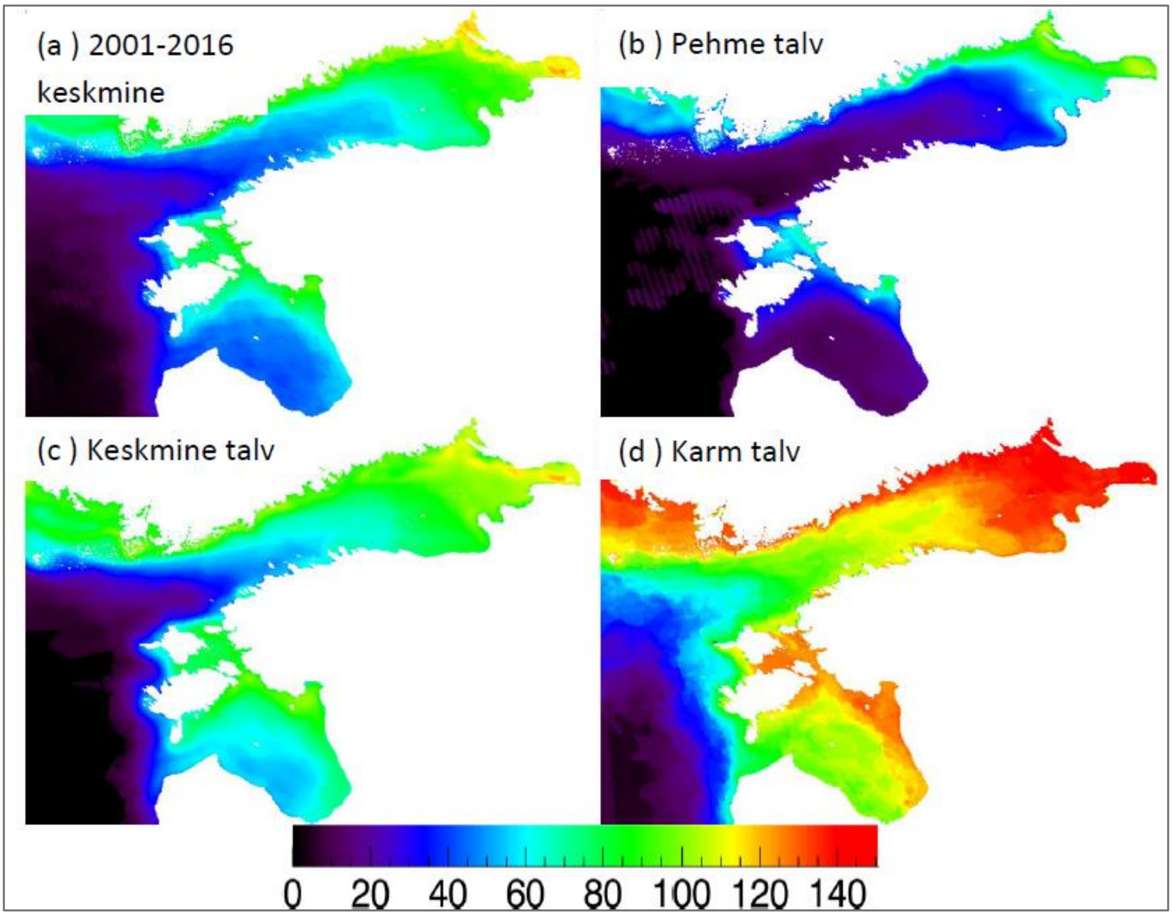

Figure 4.1.3-1. Figure (a) shows the average duration of the ice season in days 2000-2016 at each network point. The duration of the ice season in days with different winter scenarios: (b) mild winters average, (c) average winters average, and (d) harsh winters average. Source: TUT Institute of Marine Systems, 2016

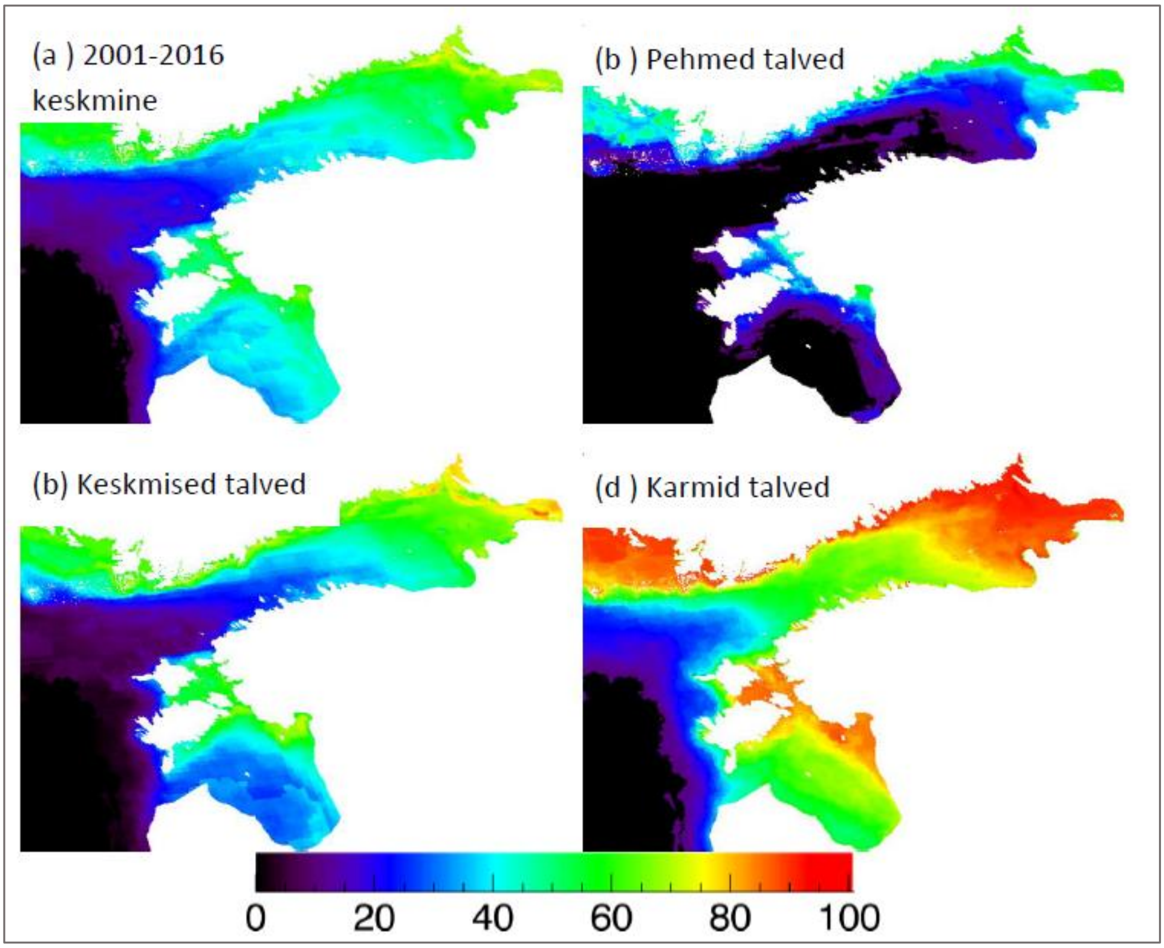

Figure 4.1.3-2. The figure shows the probability (%) of ice occurrence at each point of the space during the period 2000-2016. The likelihood of ice occurring in different winter scenarios: (b) mild winters, (c) average winters, and (d) severe winters. (source: TTU Institute of Marine Systems, 2016)

Drifting ice occurs mainly in areas with a shorter average duration of ice cover - the western and central parts of the Gulf of Finland, the open part of the Gulf of Riga, and the western coast of Saaremaa. In these areas, the sea is deeper, and the coastline does not allow ice cover to anchor permanently, such as in the Väinameri Sea between islands and mainland or in the closed Gulf of Pärnu. The western part of the Gulf of Finland (north of Hiiu County and Vormsi) is characterized by ice flows both east-west (mean 0.02 m/s) and north-south (mean 0.025 m/s). Meanwhile, in the central part of the Gulf of Finland (Paldiski to Kunda), due to the elongated shape of the Gulf of Finland, the drift along the Gulf dominates with an average speed of up to 0.04 m/s. Ice drift is likely to cause damage to stationary offshore installations in the western and central parts of the Gulf of Finland and in the open part of the Gulf of Riga. In these areas, ice fields of tens of square kilometers can drift at 0.23 m/s for 30 to 40 km within 48 hours.

The movement of drift ice causes the formation of hummock ice, which makes it difficult for ships to move during the winter. The analyzed data show that a significant number of hummocks were formed in the border areas of fast ice, where drift ice was piled up/pushed by wind and currents. In severe winters, hummocks can occur in most marine areas of Estonia, including the western Gulf of Finland, where they can persist for a period of 30 days. The areas most affected by the hummocks are Pärnu Bay, Väinameri, and Narva Bay, as these areas also have the longest ice cover duration.

Impact of the MSP

In the western and central parts of the Gulf of Finland and in the opening of the Gulf of Riga, drift ice and the potential damage to offshore and coastal structures are important barriers to maritime activities. Due to the ice conditions, it is necessary to take into account, with more precise designs of facilities (wind turbine type, fish farms, etc.) for the marine area or at the project level that the facilities need to be more resilient to the impacts of ice.

In connection with the formation of ice cover and the movement of hummock ice, it is also necessary to protect the proposed submarine cables in the shallow coastal area in such a way that the cable cannot be broken by the ice. One way to protect the cables from ice would be to immerse them in seabed sediments or to bury the cables. This ensures the safety of wind farms, fish farming facilities, etc., and avoids environmental risks.

In the stage of drawing up the Maritime Spatial Plan, it will not be known, due to the strategic nature of the plan, what the specific solutions will be for the proposed activities, e.g., traffic load related to the maintenance of wind farms (icebreaking works) or possible changes to the sea ice mobility and their consequences, e.g., on seals, as animals may gather for farrowing on fairways maintained by icebreakers or in wind farms with the standing ice. Therefore, at the project level of the proposed activities, it is necessary to assess how the proposed activity, in synergy with other similar development activities, will have an impact on ice cover changes and sea ice mobility. Also, what is the impact of ice-breaking activities during the ice period.

ENVIRONMENTAL MEASURES:

1. In connection with the formation of ice cover and the movement of hummock ice, it is also necessary to protect the proposed submarine cables in the shallow coastal area in such a way that the cable cannot be broken by the ice.
2. Upon more precise design of facilities (wind turbine type, fish farms, etc.) for the marine area or at the project level, that the facilities need to be more resilient to the risks arising from ice conditions.
3. At the project level of the proposed activities, it is necessary to assess how the proposed activity, in synergy with other similar development activities, will have an impact on ice cover changes and sea ice mobility. Also, what is the impact of ice-breaking activities during the ice period.

4.1.4 Waves and currents

The currents of the Baltic Sea depend on the direction and strength of the wind. Water flow along the Estonian coast in the eastern direction is more common. The water level is raised by strong western winds and lowered by east winds. In extreme cases, fluctuations have been 2–2.5 m above and 1.2 m below the mean water level. The wave height is usually 1-2 m, the offshore wave height is 5-6 m during a storm, and up to 10 m during an exceptional western storm. The wave height is 6 meters in the Gulf of Finland and 3-4 meters in the Gulf of Riga. Temporary, short-term elevations and decreases in water levels depend on the topography of the coast and local wind conditions. Changes in water levels are smallest on the offshore coast and increasing towards the eastern part of the Gulf of Finland.

The characteristic current velocity in the surface layer of the Estonian marine area is 10–20 cm/s. However, currents are highly volatile and highly dependent on the local wind. The inertia period, the period of Baltic Sea self-oscillation, and mesomastic processes (synoptic scale) dominate the variability. Maximum current velocities in excess of 1 m/s have been recorded for occasional strong coastal jets in the straits (e.g., Suur Strait) and along the coast (e.g., Gulf of Finland). As the sea area is vertically stratified during the summer months, the vertical distribution of currents is also characterized by stratification. It is important to note that in the deeper layers of the sea (including near the seabed), currents of 40-50 cm/s may occur.

Impact of the MSP

Offshore installations, including wind turbines, where the presence of obstacles in the water directly affects waves, currents, and mixing in their immediate vicinity. Depending on, for example, the location of the wind turbines and the size of the wind farm, these impacts can also extend a certain distance from the wind farm sites. Wind turbines also affect wind conditions in the immediate vicinity of wind turbines and downwind at a certain distance, which in turn causes changes in the conditions of waves, currents, and mixing downwind of the wind turbines.

However, the impact of wind turbines on water flow and currents has so far been considered to be insignificant and local. The activities planned by the planning solution do not have a significant impact on the waves and currents; the impacts on the facilities tend to remain local.

The activities planned by the planning solution do not have a significant impact on the waves and currents, the effects in case of facilities tend to remain local.

4.1.5 Water quality

Seawater quality refers to the set of values and status estimates used to assess the status of seawater. The quality (status) of seawater is assessed through a number of different assessment instruments, depending on the geographical coverage of seawater within the scope of different legal instruments. In Estonia, the methodology for assessing seawater quality differs between coastal waters (up to 1 m from the coastline towards the high seas from the datum line) and offshore. Estimates of coastal water status are based on the evaluation matrix of the EU Water Framework Directive (Estonia's own assessment system is provided by the Minister of the Environment Regulation No 44 [17]).

The aggregate status used to characterize coastal waters consists of two components - the ecological status and chemical status. Depending on the magnitude of the human impact, the ecological status of coastal bodies of water is assessed on a 5-point scale: from very good status with little or no anthropogenic changes to biological status to very poor status (biological parameters deviate very much from the reference conditions, or there is no biota). The biological parameters assessed are divided into three 'quality elements': phytoplankton, benthic flora, and benthic fauna. The physical and chemical parameters of the seawater (nutrient concentrations and water transparency) are additional parameters used to explain the state of the biological parameters and the causes of the changes. The chemical status of a body of water is assessed on a 2-point scale: good - priority pollutants are below a threshold value established as an ecological quality standard; poor - the content of the priority substance is above the quality standard[18].

The official assessment of the ecological and aggregate status of Estonian coastal waters is from 2017 (Figure 4.1.5-1 and Figure 4.1.5-2.). The ecological and chemical status of individual coastal water bodies is separately reported in their respective National

[17] 44 of the Minister of the Environment "Procedure for the Establishment of Surface Water Bodies and the List of Surface Water Bodies the Status Classes of Which have to be Determined, Status Classes of Surface Water Bodies and the Values of Quality Indicators Corresponding to Status Classes and Procedure of Determining Status Classes"

[18] https://www.keskkonnaagentuur.ee/et/eesmargid-tegevused/vesi/meri/rannikuveekogumite-seisund

Environmental Monitoring Reports and displayed in the Environmental Agency's water body map application[19].

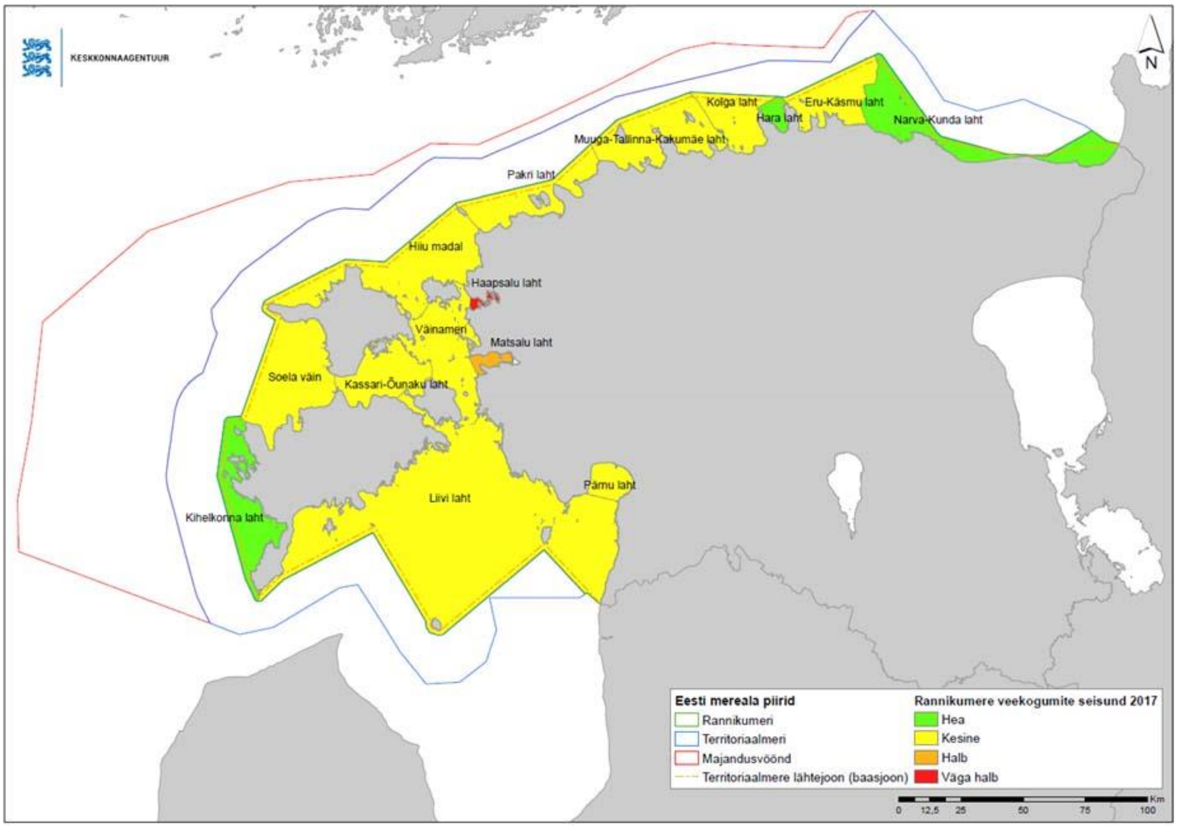

Figure 4.1.5-1. Ecological status of Estonian coastal water bodies based on 2017 assessment (Source: Environmental Agency)

19 https://kaur.maps.arcgis.com/apps/MapSeries/index.html?appid=fd27acd277084f2b97eee82891873c41

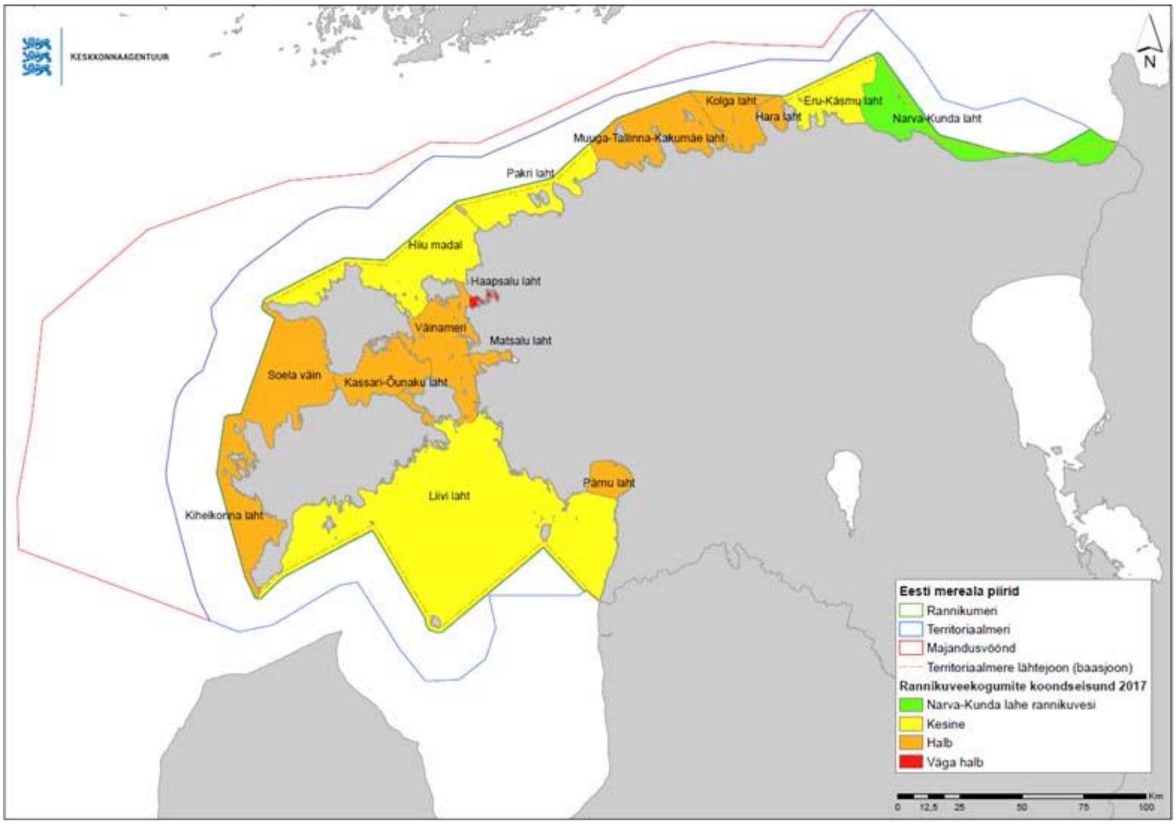

Figure 4.1.5-2. Aggregate status of Estonian coastal water bodies based on 2017 assessment (Source: Environmental Agency)

Marine areas outside the coastal zone are assessed according to the guidelines of the EU Marine Strategy Framework Directive. The MSFD describes the status of a marine area on the basis of eleven Marine Environment Status (SEA) attributes, of which Indicator 5 includes indicators of eutrophication.

Eutrophication is one of the biggest environmental problems in the Baltic Sea today. Eutrophication is caused by the accumulation of nutrients (especially nitrogen and phosphorus compounds) in the marine environment. Due to the nature of the Baltic Sea basin (located in a rainy climate zone, intensive land use) and hydrological features (water exchange with the ocean is very limited, long water retention time is up to 30 years), nutrient accumulation in the Baltic Sea environment is also a natural process, fueled by human activity. The manifestations of eutrophication are a number of simple and complex symptoms, both by individual ecosystem components and at the level of the ecosystem as a whole, including both positive (high secondary production including planktonic fish biomass) and numerous negative (increased primary production - algal blooms, deficiency of oxygen in the demersal water layers, depletion of species diversity) and other phenomena.

The state of the eutrophication of the Estonian marine area has been extensively evaluated in the context of reporting under the EU Marine Strategy Framework Directive (TUT MSI, 2017 [20]). The status assessment methodology is based on a comparison of measured values with predetermined threshold values and is reported on a five-class scale similar to the Water Framework Directive methodology. The units of assessment are the coastal water bodies and the distribution of the high sea areas according to the HELCOM division. Corresponding threshold values are determined either by Estonia's own regulation or according to the values used by relevant HELCOM working groups.

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[20] Assessment of the Marine Environment Status in the EU Marine Strategy Framework Directive (2008/56 / EC) on eutrophication and hydrographic changes (D5 and D7), TUT MSI 2017, TUT MSI 2017, https://www.envir.ee/sites/default/files/d5_d7.pdf

Nitrogen and phosphorus indicators were evaluated as for nutrient concentrations in seawater. Assessments of the total nitrogen concentration in summer were generally in the good and poor classes. Assessments of the total nitrogen concentration in summer were generally in the poor, bad, and very bad classes. The three coastal water bodies between the mainland and the islands and the northern basin of the Baltic Proper were assessed to be in very poor status. Assessments of winter concentrations of inorganic nitrogen were mostly in the poor and very poor class. Nine coastal water bodies were not assessed due to the lack of monitoring data. Assessments of the state of winter phosphate concentrations were mostly in a very poor class. Also, nine coastal water bodies were not assessed due to the lack of monitoring data. Water bodies to the west of the mouth of the Gulf of Finland were in a very poor state.

The nutrients of the Estonian coastal seawater come from many different sources. Land-based sources play a greater role in the areas closer to the coast, while in the case of offshore areas, the movement of seawater and the exchange of water between the various basins of the Baltic Sea are of greater importance.

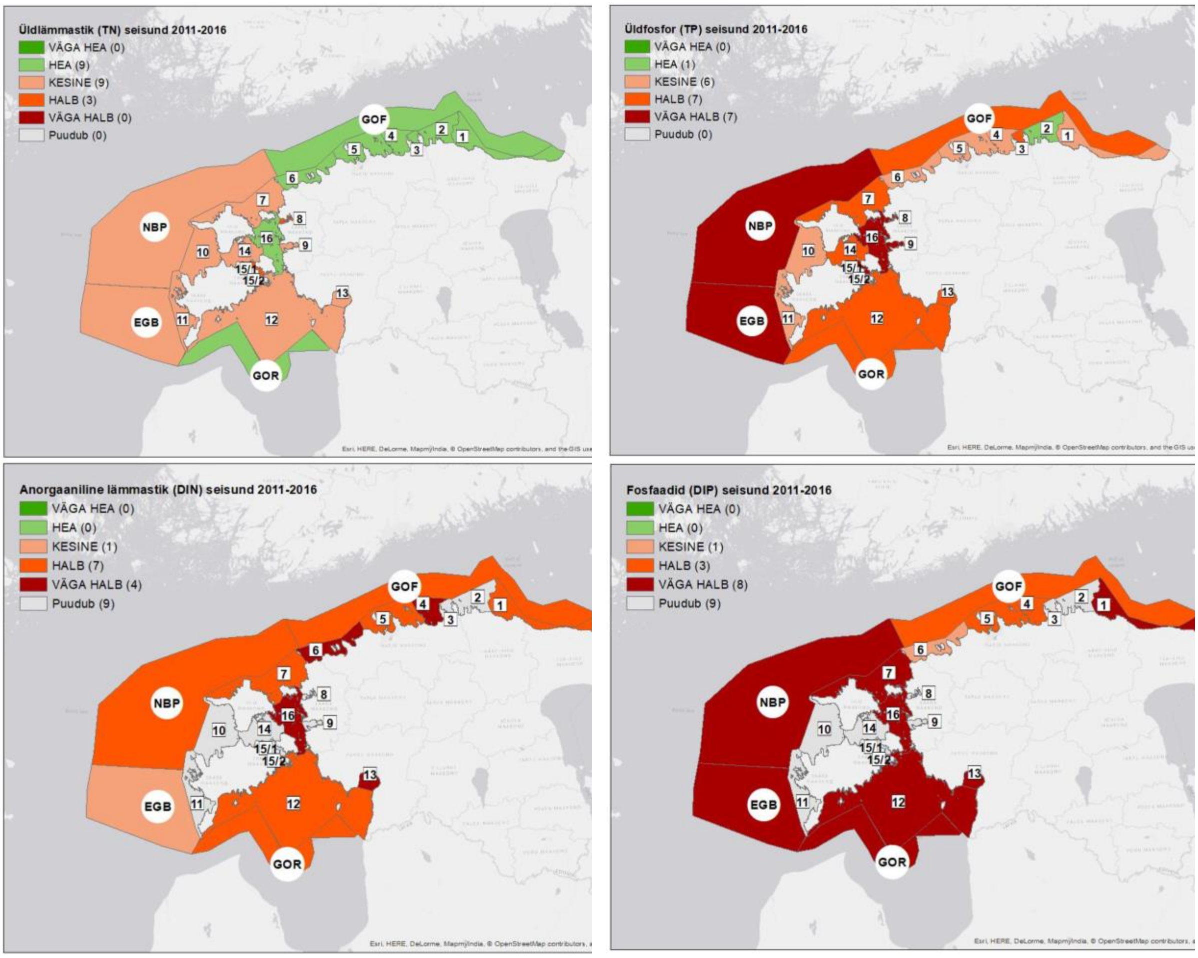

Figure 4.1.5-3. Estimates of the status of the Estonian marine area based on four nutrient indicators in 2011-2016 (Source: TUT MSI, 2017)

Condition assessments based on chlorophyll-a content (mg/m^3) were mostly in the poor category, with four water bodies also in a very bad class (Figure 4.1.5-4). In water bodies where the GES (Good Environmental Status) for this indicator has been achieved, this may be due to the fact that data have only been collected once every six years. In general, there is a discrepancy between estimates for coastal and offshore areas. The difference may be due to the data aggregation methodology since arithmetic averages are used in offshore areas and median averages in coastal areas.

Assessments of phytoplankton biomass (mg/m^3) status were mostly in the moderate, poor, and very poor class, with good status achieved in three coastal water bodies. The variability in estimates of water bodies in the Gulf of Finland may also be due to the frequency of data collection (some water bodies are not adequately covered by monitoring and estimates are based on a small amount of data).

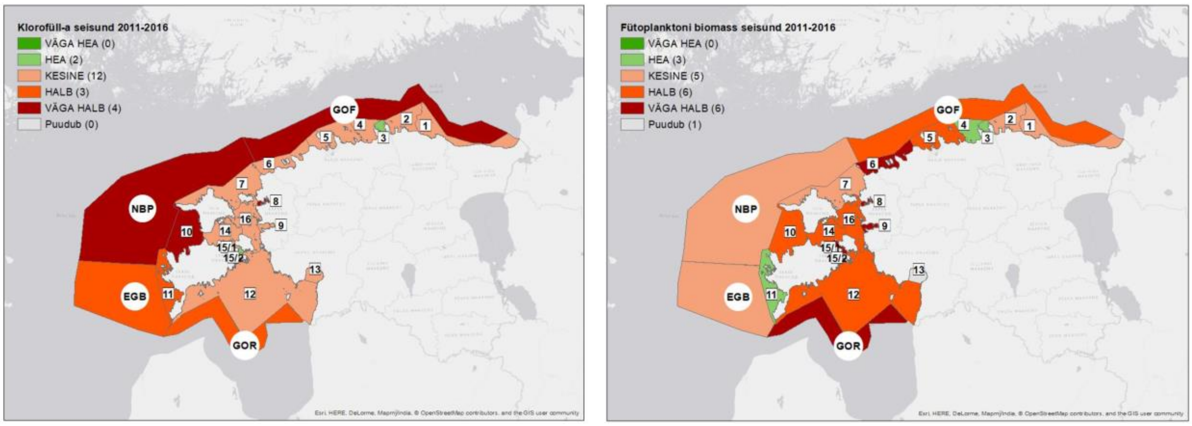

Figure 4.1.5-4. Status assessments of phytoplankton indicators (chlorophyll a and phytoplankton biomass) in the Estonian marine area according to MSFD reporting (Source TUT MSI 2017)

The status assessments based on the transparency of the seawater (Secchi depth) were mostly in the poor class, with four bodies of water also in bad, three in very bad, and two in the good class (Figure 4.1.5-5). Again, two coastal water bodies of the Gulf of Finland qualified for a good class, where only one year of monitoring was performed during the assessment period, and thus this assessment is of low reliability. Three indicators were considered as indicators based on the oxygen concentration of seawater: the Deepwater Oxygen Deficiency Indicator, the oxygen content of the demersal water of the shallow coastal sea, and the oxygen consumption in the deepwater layer. Estimates were given only for the Deep-Water Oxygen Deficiency Indicator, as there is no common methodology or monitoring data for the other two indicators. The results again showed moderate status for offshore areas.

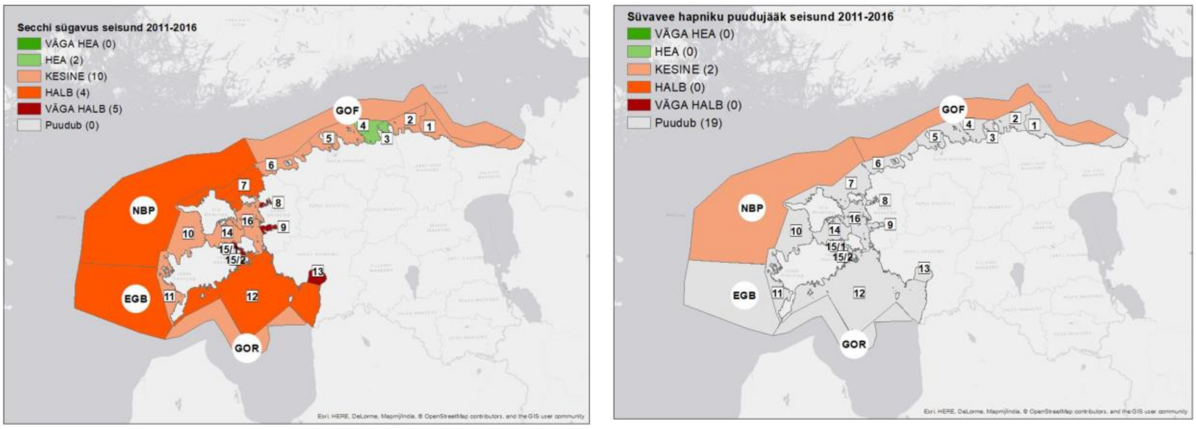

Figure 4.1.5-5. Status assessment of water transparency and oxygen concentration-based indicators in Estonian marine area according to MSFD reporting (Source TUT MSI 2017)

In addition to the above, a number of indicators used mainly for shallow coastal waters were used to provide an overall assessment of eutrophication, such as:

- the proportion of opportunistic species in benthic communities,
- depth distribution of benthic vegetation,
- depth distribution of bladderwrack,
- percentage of perennial species in communities,
- zoobenthos community index,

- soft-bottom benthic fauna.

The status estimates for all of the above-mentioned indicators were significantly better than those based on physical and chemical parameters.

The aggregate assessment of eutrophication (Figure 4.1.5-6) was obtained by aggregating the assessment results of the individual indicators according to the methodology used in the HELCOM HOLAS eutrophication report. According to the aggregate assessment, the Estonian marine area is divided into "very bad," "bad," and "poor" status classes, which is dominated by the "bad" status class.

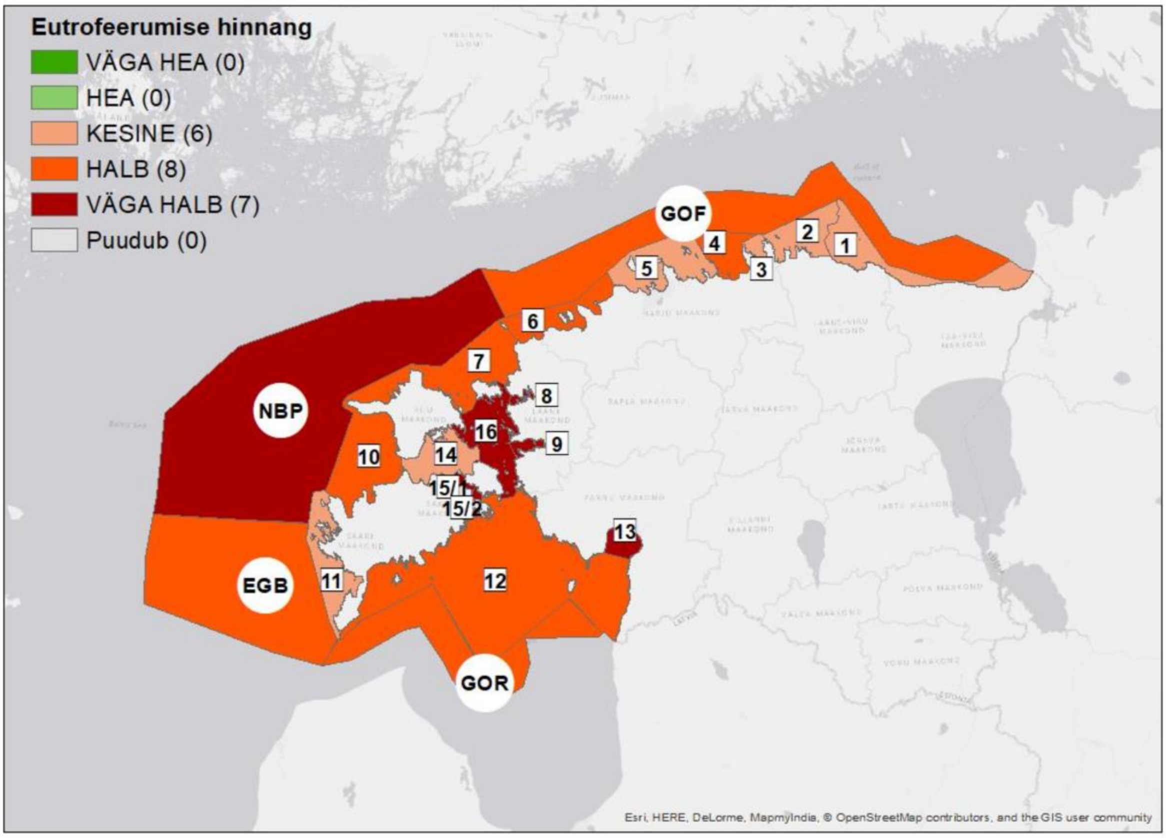

Figure 4.1.5-6. The general assessment of the state of eutrophication (aggregated assessment of all indicators) for the Estonian marine area according to the ETS assessment of the Estonian marine area according to MSFD (source TUT MSI 2017).

Impact of the MSP

The water quality of the marine area is impacted by very different factors in its different parts. In the case of the shallow coastal sea and the Väinameri Sea, it can be assumed that the main influencers of the condition are on land, and the impact itself is manifested through the nutrient flow from inland. In the offshore area, water exchange with other marine areas and the overall level of eutrophication in the Baltic Sea are the major influencing factors.

The impact of the proposed planning solution on a larger scale (assessment units at the level of offshore or coastal water bodies) is likely to be very minimal since the spatial activities foreseen in the planning are all local and have very little impact on the larger scale nutrient flows. None of the status assessments at the assessment unit level are likely to be affected by any of the activities provided by the planning (in any case, the status class of the spatial assessment unit will not change due to the planned activity).

At the same time, several proposed activities (e.g., the establishment of fish farming, installation of wind turbines, etc.) will have a short-term or spatially limited impact on water quality. For example, there can be a certain impact on water quality during the construction phase of the wind farm, where the following earthworks are carried out: leveling the bottom where necessary at the location of each wind turbine installation, stabilizing the foundation base with the filling, filling the foundation cone with sand and laying the cable. For all operations causing bottom disturbances, the impact on water quality will depend on the amount and quality of sediment discharged from the bottom to the water column and the prevailing hydrodynamic conditions. The impact on water quality during the construction phase of the wind farm and the cable route is negative but is likely to be insignificant due to its short-term and local impact and small impact compared to natural variability and other human activities. At the licensing level, it is necessary to assess the impact of the proposed activities on a site-by-site basis and to provide more specific measures to reduce the adverse impacts.

In mining, the main impact on water quality is the generation of suspended matter in the water column. More specific measures to minimize impact must be foreseen in the extraction licensing process.

Large-scale changes in water quality may be associated with fish farms. Impact from the fish farm can be divided into local and larger-scale processes, which require different approaches and depend on the precise size and technology of the fish farm being planned.

Local impact is related to adverse events due to increased nutrient concentrations. These include, for example, increased organic matter content in the seabed below fish cages, oxygen depletion, loss of biota, increased water nutrition, the proliferation of pelagic micro-algae, changes in macro-algae and invertebrate communities, and mass exchanges in the immediate vicinity of opportunistic species. Depending on the specific location of the development and/or existing pressures, the extent and nature of local changes/impact may vary widely. Therefore, the assessment of the impacts of a particular fish farm should take into account, in particular, the technological features of the fish farm and all local features (e.g., the character of the coastal slope, the openness aspect) and hydrological conditions (the nature of tides and waves) affecting the movement of nutrients released from the fish cage in the marine environment (including the rate of nutrient dissolution).

Large-scale processes include nutrient balances in sea basins, which depend on the total nutrient load in the Baltic Sea on the one hand and on climatic factors on the other. The latter determines the movement of nutrients between marine sediments and the water column. It is also important to understand the natural dynamics of nutrient loads in the basin, which, as a rule, depends on climatic and other large-scale factors. For example, the overall nutrient load in the north-eastern part of the Baltic Sea is directly related to the amount of precipitation in the region, and the resulting difference in nutrient loads between years can be dozens of percent.

Measures which directly affect the availability of nutrients in the water column are suitable for mitigating local impacts. These may include algae and shellfish farming near fish cages, technological techniques to prevent nutrient leaching from the fish cage (for example, collecting feed residues and feces in or in the immediate vicinity of the cage) as well as chemical bonding or more efficient dilution of fish farming nutrients. Such measures will make it possible to reduce the negative impacts of the added nutrient flow in the immediate vicinity of the fish farm. It is important to consider the development and location specifics. The intensity of the negative impacts is highly dependent on the fish farm's own parameters and natural conditions in the immediate vicinity of the fish cage. Negative environmental impact is particularly likely to occur in sea areas with limited water exchange (nearshore locations, locations hidden from the wind, narrow and deep bays, extensive shallows).

There are other ways of smoothing out large-scale processes to maintain the overall nutrient balance of the basin. In particular, activities that take into account the overall metabolism, such as the use of local feed (production of fish feed from raw materials from the same basin) are suitable measures. Alternative solutions to balance the nutrient balance of the basin can also be used as compensatory or mitigation measures. For example, more most effective nutrients removal options can be developed for the other nutrient load sources flowing into the same basin drains into nutrient loading sources can contribute in more efficient treatment of the settlement and industrial wastewater, reduction of agricultural burden resulting from the land use or other options of removal of nutrients from the marine environment, such as additional fishing[21] or picking of coastal rejects. It is important to understand the magnitude of the impact of all processes and measures, i.e., larger basins need to consider the transport of nutrients and water between basins, the metabolism between the water column and the seabed. A more detailed national analysis is needed because without adequate assessment of water exchange, and nutrient flows between different parts of the sea, adequate regional measures (e.g., by coastal bodies of water) cannot be proposed, which in turn can lead to inefficient use of resources and unreasonable fish farming costs. On the basis of a more detailed study, it is possible to assess the importance of the proposed load on the marine environment in the context of a natural process.

The development of algae and shellfish farming has the potential to contribute to the achievement and maintenance of the good status of the marine environment by contributing to the removal of nutrients from the marine environment. Based on the average growth rate of shellfish, it is already possible to remove 35 tons of nitrogen and 2.7 tons of phosphorus per 1 km^2 of marine waters from the coastal area of West Estonia at the estimated rate of one year. In addition to nutrient removal, this shell farm significantly increases the transparency of water within a radius of about 1 km^2 and reduces the risk of local algal blooms due to, for example, fish farming or other human activities that add nutrients to the marine environment. Consequently, it is prudent to place shellfish farms in the vicinity of fish farms in the coastal sea, as this combination can compensate for the nutrient fluxes from fish farms to the sea and keep the water in the vicinity of the fish farm transparent. However, it should be borne in mind that shellfish farming, and algae farming may, in some cases, also have negative impacts such as local over-nutrition of the seabed, but such impacts are smaller in magnitude than similar environmental impacts of fish farms. The plan, therefore, favors algae and shellfish farming as a measure to mitigate the impacts of other activities (e.g., fish farming) and does not preclude their creation in protected natural areas where aquaculture could also help to improve the status of the marine environment. However, the development of shellfish and algae cultivation in protected areas must be guided primarily by the conservation objectives of the protected area and the legislation applicable therein, and therefore the plan requires that the impact be specified in cooperation with the Environmental Board. During the planning, protected natural objects, including Natura special protection areas, were identified as inappropriate areas for the fish farm.

With open fish cages that today are the most commonly used, the biggest contributor is the nutrient leaking from the fish cage (nitrogen and phosphorus), which is released into the environment in very different forms - feed, fish excrement, and fish mucus. Local nutrient and organic matter accumulation cause significant problems in the immediate vicinity of the cages. At the same time, in offshore conditions where water movement is intense, this local impact is negligible as substances leaking from the cages are dispersed over large sea areas. In any case, the best available technology with minimal nutrient leakage should be preferred. The choice of technology takes place at the project solution level.

[21] Developing measures to compensate for nitrogen and phosphorus loads directed to the sea through fish farming; J.Kotta, R.Eschbaum, G.Martin, University of Tartu 2019

The impact of the proposed planning solution on a larger scale (assessment units at the level of offshore areas or coastal water bodies) is not relevant since the spatial activities foreseen in the planning are all local and have very little impact on the larger scale nutrient flows.

The impact on water quality during the construction phase of the wind farm and the cable route is negative but insignificant due to its short-term and local impact and its impact is small compared to natural variability and other human activities.

Large-scale changes in water quality may be associated with establishment of fish farms. Fish farm effects can be divided into local and large-scale processes that require different approaches. The development of algae and shellfish farming has the potential to contribute to the achievement and maintenance of good status of the marine environment by contributing to the removal of nutrients from the marine environment.

ENVIRONMENTAL MEASURES:

1. Possible measures to mitigate the impact of the planned activities on the water quality in the Estonian marine area are very area and activity specific and should be envisaged in the planning of each specific development project. At the licensing level, it is necessary to assess the impacts of the proposed activities on a site-by-site basis and to provide more specific measures to reduce the adverse effects.
2. The main impact of mining on water quality is the generation of suspended matter in the water column. More specific measures to minimize impacts must be foreseen in the licencing process.
3. Measures that directly affect the availability of nutrients to the water column are appropriate to mitigate the local effects of the fish farm. These may include algae and shellfish farming near fish cages, technological techniques to prevent nutrient leaching from the fish cage (for example, collecting feed residues and feces in or in the immediate vicinity of the cage) as well as chemical bonding or more efficient dilution of fish farming nutrients. Further measures to minimize the impact must be foreseen in the licensing process.
4. There are other ways of smoothing the large-scale processes of the fish farms to maintain the overall nutrient balance of the basin. In particular, activities that take into account the overall metabolism, such as the use of local feed (production of fish feed from raw materials from the same basin) are suitable measures.

PROPOSALS FOR THE ACTION PLAN:

1. Understanding the magnitude of the effects of all processes and measures is important to smoothing out large-scale processes in fish farms. Larger basins must take into account the transport of nutrients and water between basins, the metabolism between the water column and the seabed. A more detailed national analysis is needed because without adequate assessment of water exchange and nutrient flows between different parts of the sea, adequate regional measures (e.g., by coastal bodies of water) cannot be proposed, which in turn can lead to inefficient use of resources and unreasonable fish farming costs.

4.2 HABITATS AND BIOTA

4.2.1 Fish

Due to the low and variable salinity in the Baltic Sea, spreading of fish of both marine and freshwater origin is prevented, and therefore the number of species is lower than in the sea with normal salinity. At the same time, the fish populations of the Baltic Sea are numerous, which is characterized by the fact that about 1% of the total catch of the world's sea is caught here. One of the main assets of the Baltic Sea is its fish stock.

There are about 30 species of marine fish in Estonian waters, 10 species of migratory fish, and about 20 species of freshwater fish in the coastal sea. These three groups may be further subdivided into different groups according to origin, systematics, the importance of fisheries and nature conservation, reproductive biology, etc. However, species still have very different preferences for habitats and spawning grounds: while some species require deeper areas of the Baltic Sea for spawning, depending on their oxygen and salinity conditions, other species depend on free passage for freshwater spawns or spawn at different depths at the coastal area, due to different preferences in terms of temperature, salinity, substrate, etc.

Many fish species in the Baltic Sea live under stress due to the local salinity and temperature, which makes them more sensitive to environmental changes. And as elsewhere in the world and in the Baltic Sea, Estonian fish fauna is mainly affected by human activity, which has resulted in a decrease in both species richness and the abundance of most fish species. In addition to fishing, there are other human activities that affect fish abundance in the Baltic Sea, such as migration barriers on rivers flowing into the Baltic Sea and river pollution, which are a limiting factor for many fish species in the Baltic Sea. Anoxia in the deeper areas of the Baltic Sea is primarily affected by nutrient inflows resulting from land use, and the proportion of the pollution load resulting from the use of marine is still low. However, it is an important problem for fish spawning in the deeper areas of the Baltic Sea, such as cod and flounder, so it is important that marine area use does not increase the concentration of biogenes.

The majority of the indicators of the Marine Strategy Framework Directive for fish in the state of the Estonian marine environment in 2018[22] did not meet the requirements of good environmental status, mainly due to overfishing, but also to the condition of spawning grounds for salmon and flounder. There are also endangered and restricted species in our waters, such as the whitefish, on whose small numbers of extinct local populations, even minor damage to the spawning grounds, can prove fatal.

In general, shallow coastal waters (less than 15 m) and offshore shoals are more important for fish than sea areas. Most spawning grounds and juvenile fish breeding sites are located in the shallower coastal areas (up to 5 m), or they are crossed by species heading for spawning in freshwater. More open sea areas with depths> 5 m may be spawning grounds for Baltic herring and Baltic flounder. The deepest areas of the Estonian EEZ are generally unsuitable for spawning because they lack the conditions - the required salinity and oxygen regimes - necessary for spawning sea fish (cod, flounder, sprat).

[22]Estonian Marine Institute, UT. Environmental Status of Estonian Marine Area 2018. Report, 2018. https://www.envir.ee/sites/default/files/mere_seisund_2018.pdf

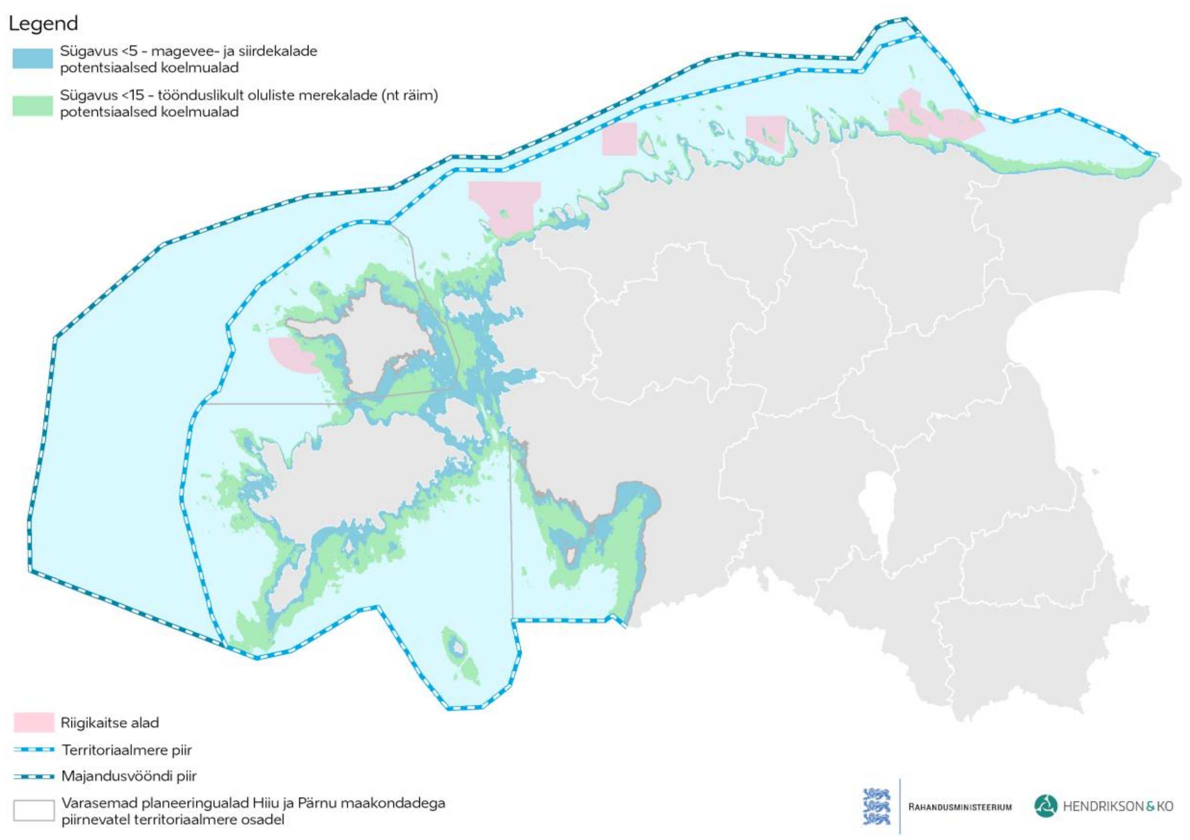

Figure 4.2.1-1. Sensitive areas for fish (potential spawning grounds important for young marine fish)

Impact of the MSP

As fish are distributed throughout the marine area, most marine activities interact with fish and fisheries. Many traditional uses of the marine area have, over the years, achieved a balance and it has been established by law how the use of the marine area is permitted (including minimal or no damage to the fish) whereas, in case of a threat, procedure monitoring and surveillance have been provided. Such uses of the marine area include maritime transport with the construction and dredging of ports, dumping, and selection of new dumping areas, use of deposits, and other marine area use with a long tradition. These uses will not increase significantly according to the Maritime Spatial Plan, and therefore the implementation of the Maritime Spatial Plan will not lead to greater and uncontrolled impact on the fisheries. The most important aspect of these activities is to ensure that, when altering the seabed, the potential fish spawning areas are taken into account, especially for endangered species such as sole.

Another important aspect that needs to be considered is the suspended matter and its spread, which can kill the offspring of fish even when settling on the spawn and larvae further away from the marine area being manipulated. Therefore, in addition to the immediate spawning grounds, the distribution of suspended matter must be taken into account when altering the seabed. No environmental license is generally granted for the use of marine areas that release significant suspended matter into the water column during the fish spawning period.

For some new and intensifying uses of the marine space, such as energy production, aquaculture, and recreational industries, there is little experience of environmental impact assessment and ex-post evaluation. Experiences from other marine areas are helpful, although there are few analogs in the Baltic Sea, especially those with a long history. Depending on the experience of remote areas may be prevented by different natural conditions.

According to the Maritime Spatial Plan, areas suitable for the development of wind energy are envisaged to be somewhat offshore and in deeper areas of the sea. Large-scale fish farming is also conditionally directed to deeper sea areas. Given that the majority of fish spawning grounds and juvenile fish feeding grounds are located in the shallow waters, and coastal areas (up to 5 m in depth) or they are passed through by species heading for spawning in freshwater, conservation of these areas is essential for the sake of maintaining and reproduction of the good status of fish stocks, and this Impact Assessment Report, therefore, recommends that offshore fish farms be established in the marine areas with the depths of at least 5 m.

Based on the knowledge of depth preferences of commercially important fish species (Baltic Sea flounder up to ~ 30 m, Baltic herring ~ 15 m), salinity data and some other spawning ground criteria, the spawning grounds of Baltic Sea flounder modeled in the framework of the Pan Baltic Scope project (Figure 4.2.1-2), and to some extent the spawning grounds of Baltic herring, overlap with energy production areas in the draft plan and deeper marine areas suitable for fish farming.

Figure 4.2.1-2. Possible spawning grounds for Baltic Sea flounder (source: Pan Baltic Scope [23])

As no specific studies have been carried out on the site, it is not possible to say to what extent these or some other species actually spawn in the areas concerned or how important the spawning grounds and migratory paths in the planning area are. Data on migratory routes, location of spawning grounds, technical details of marine area use, their direct and indirect impact are needed to make more accurate forecasts. To this end, the Maritime Spatial Plan requires that upon the planning of new activities in the sea area, during their licensing

[23] http://www.panbalticscope.eu/wp-content/uploads/2019/06/GI-Essential-Fish-Habitats-Ustups-Tallinn_2019_May_EFH.pdf

process, it is necessary to ensure that it is not associated with a significant negative impact on spawning grounds for fish.

The production of energy affects spawning grounds with the spread of noise and suspended matter during the construction phase, which can be avoided by shifting the construction phase beyond the spawning time, while the impacts of the fish farm are longer lasting. In fish farms, fish are close together with each other, which is why fish diseases and parasites, which are transmitted and can infect fish freely living on nature, spread there. Antibiotics, drug residues, and disinfectants used in fish farms can affect the natural ecosystem. The selection of farmed fish depends on whether the (alien) species that come out of the farm can live independently and establish free-living populations or alter the genetic structure of wild populations. In order to avoid this impact or to disseminate a significant impact, the risks associated with biosecurity must be assessed at the licensing level, both at the individual project level and in conjunction with the activities of the area in the near vicinity (e.g., assessing and determining the distances of fish farms of different companies to avoid biosecurity risks).

Energy production and aquaculture will certainly have indirect impacts, including positive ones. For example, changes in the environmental balance (wind turbine foundations and bases, cages, algae, and shellfish farming infrastructure, fish feed released into the marine environment and feces of farmed species) will also alter the species balance of the area. The changing environment will attract and favor some species, while the abundance of other species may decline. At the same time, shellfish and algae farming has certainly a positive impact on the fish on a large scale, as it helps to reduce the problems of over-nutrition in the Baltic Sea. Therefore, shellfish farming, and algae farming can be used as a mitigation measure to capture phosphorus and nitrogen from fish farms. As for fish feed, preference should be given to fish feed made of the fish from the Baltic Sea, which also contributes to the removal of excess nutrients from the Baltic Sea.

Energy production in the sea area also has a potential impact on fish fauna through connecting cables, which during the construction phase, when being embedded into the seabed, affect spawning areas, similarly to other seabed alteration activities. In addition, during their operation, and depending on their physical characteristics, cables have a potential negative impact on fish migration, especially in shallower areas. Electric cables have been shown to slow fish migration somewhat, but this impact can be minimized by shielding the cables. More specific cable laying measures to minimize impact must be foreseen in the licensing process.

Special national defense areas are predominantly located in the Gulf of Finland. The use of ammunition and explosives may have a direct impact on fish in the area. National defense activities (munitions blasting, mine clearance) can directly kill or damage fish or scare them away from the area (spawning grounds). Ammunition and hazardous substances can also enter the marine environment. However, the threat to fish stocks is rather theoretical and, even then, short-term. Major blasting in the water should be planned so that it does not occur in a fish spawning season and in an area where a large amount of fish has accumulated in the restricted area. As a mitigation measure, fish can be pushed out of the area with smaller charges before using larger explosive charges. It is advisable to draw up a protection management plan for the national defense sites, which will map the environmental risks of the activities to the marine biota and measures to prevent or reduce them.

The recreational industry has mostly no direct impact on fisheries. Only recreational fishing can directly affect the fishery, and any significant negative impact thereof is ruled out by fishing regulations, fishing permits, and other measures. Recreational water traffic has some negative impacts if it occurs directly in the spawning area during the spawning season and disturbs the spawning fish. The intensive use of scooters on the spawning ground has a more negative effect, as the turbine engine also kills the newly hatched larvae that pass through it with water. It is, therefore, necessary to provide for time limits for the use of recreational craft in respective marine areas.

The protected part of the Estonian marine area includes predominantly coastal and shallow water areas. The larger protected marine areas designated as the marine areas determined as Natura 2000 networks cover a large part of the coastal waters of Western Estonia and its islands, including, for example, the whole Väinameri Sea and extensive areas around the Sõrve peninsula in Saaremaa. In the coastal waters of the Gulf of Finland, the Natura special protection areas are less extensive and include areas such as Osmussaar, Pakri islands and Kolga Bay, and the marine area of Lahemaa National Park. If, as a rule, a protected marine area has a positive impact on fish, the restrictions may also have negative impacts. For example, protected areas have seen an explosion of the abundance of cormorants whose volume of consumption of critically endangered eels in the Baltic Sea is estimated to be in the same range as human catches.

The implementation of the Maritime Spatial Plan does not foresee any unavoidable negative effects on any species of fish on the basis of the available information.

ENVIRONMENTAL MEASURES:

1. Given that the majority of fish spawning grounds and juvenile fish feeding grounds are located in the shallow waters and coastal areas or they are passed through by species heading for spawning in freshwater, conservation of these areas is essential for the sake of maintaining and reproduction of the good status of fish stocks, **therefore this Impact Assessment Report recommends that fish farms to be established in the marine areas with the depths of at least 5 m.**
2. During the implementation of the activities proposed in the Maritime Spatial Plan (in particular wind energy development and aquaculture), it is necessary to specify the impact within the licensing process and, where appropriate, to implement mitigation measures for fish. As most marine areas have not been studied for fish species and spawning grounds, research on these areas should be carried out prior to the implementation of activities that may have a significant impact on fish fauna.
3. For both proposed new activities and existing activities in the marine area, the most important thing to do is to ensure that any spawning areas of the fish (especially endangered species such as sole) are taken into account when altering the seabed.
4. The potential biosecurity risks associated with aquaculture must be assessed in the licensing process, both at the individual project level and in conjunction with the activities of a near vicinity fish farm (e.g., to assess and determine the distance between farms of different companies to avoid biosecurity risks).
5. Larger blasting and noisy construction activities (placement of wind turbine foundations, etc.) in the water should be planned so that they do not occur during the fish spawning season and area where large numbers of fish have accumulated in the restricted area.
6. More specific cable laying measures to minimize impacts must be foreseen in the licensing process.

PROPOSALS FOR THE ACTION PLAN:

1. Identification of spawning grounds of important fish species in the Estonian marine area (modeling and research).
2. It is advisable to draw up a protection management plan for the national defense sites, which will map the environmental risks of the activities to the marine biota and measures to prevent or reduce them.
3. It is necessary to provide for time constraints areas on the use of recreational craft in the municipal comprehensive plans which are bordered by marine areas.

4.2.2 Birds[24]

More than 60 waterfowl species are associated with the Estonian marine area during their life cycle. In the Estonian waters, waterfowl stop during different seasons, for example, for moulting, wintering, and migration. Waterfowl nesting on the coast and on small islets feed and breed their younglings at sea. In addition, many terrestrial birds are linked to the sea through migration.

The importance of the Estonian coastal sea to waterfowl is primarily due to its geographical location, as it remains directly on one important branch of the East Atlantic migratory route. This branch is used by most Arctic waterfowl species on their way from Eurasian Arctic breeding grounds to wintering areas extending to South Africa. The Estonian marine shoals are suitable migration stops for replenishing the fats for further migration; these shoals are also used as wintering areas. Despite the relatively small area of our aquatic environment, a significant proportion of all birds of some species stop here. According to rough estimates, for example, 48% of the migratory populations of the scaup, 25% of the migratory populations of long-tailed ducks, and 20 - 22% of scoters can stage in our waters.

Bird protection in Estonian marine areas is mainly based on the so-called Birds Directive (Council of Europe Directive on the conservation of wild birds, 2009/147/EC), which obliges EU Member States to implement special measures to protect regularly occurring migratory species, designating the most suitable areas, both in number and size, for their protection as bird sanctuaries. To meet the requirements of the Birds Directive, Estonia established a network of Natura Bird Areas at the beginning of this century, which includes, among other things, 26 areas that include marine areas. One of the main reasons for the inclusion of marine birds into the composition of bird areas was the presence of migratory staging areas of international importance. Important bird areas for the staging of offshore species are the bird areas of Kabli, Kahtla-Kübassaare, Koorunõmme, Vilsandi, Tagamõisa, Kura Gorge, Küdema Bay, Nõva-Osmussaar, Pakri, Pärnu Bay and the Väinameri Sea. Outside the boundaries of the bird protection areas, important staging areas are located in national protected areas (Apollo marine shoal nature reserve) and in protected areas (Hiiu shoal and Gretagrund conservation area). The extension of the Neugrund Nature Reserve and the Kõpu Nature Reserve is to be mentioned as protected areas designed as of today. A discussion of Natura 2000 bird areas can be found in Chapter 4.3. The Natura Bird Area Network was created at the beginning of this century and reflects the state of knowledge at the time. The network covers well the area's most important for birds in shallow coastal waters, but most of the data on the high seas have only been collected since the establishment of the network of bird areas.

As part of the preparation of the Estonian Marine Spatial Plan, the available information on the results of the census of birds staging in the high seas and coastal waters since 2000 was collected for analysis. As a result of the analysis, the abundance forecasts of staging birds with a resolution of 1 km² were prepared covering the entire Estonian marine area. In addition, existing knowledge on the main autumn and spring migration corridors for different bird groups (land birds, geese, black geese, swans, arctic waterfowl) was gathered. Based on the importance of the high seas as bird staging areas as well as migratory corridors, the whole sea was divided into three types of areas (Figure 4.2.2-1):

- **'sensitive areas'** - according to best available knowledge, the most important areas of the high seas for birds that stage and/or fly over the sea. Long-term activities - the construction of high artificial objects (wind farms, bridges) on the high seas, and activities with significant spatial impact on the seabed and its biota (e.g., the establishment of new mines) - in sensitive areas should be avoided;

[24] The chapter is largely based on the basic study of Marine Spatial Plan "Analysis of Bird Staging Areas" Estonian Ornithological Society, 2019

- **most suitable areas for wind energy development due to birdlife** - as wind energy development is one of the major new uses in Maritime Spatial Plan with a potentially significant impact on birds, the most suitable wind energy development areas have been identified. These are areas where, with today's knowledge, the negative impact of wind farms on birds would be minimal;
- **"remaining unclassified areas**" - areas outside the previous areas.

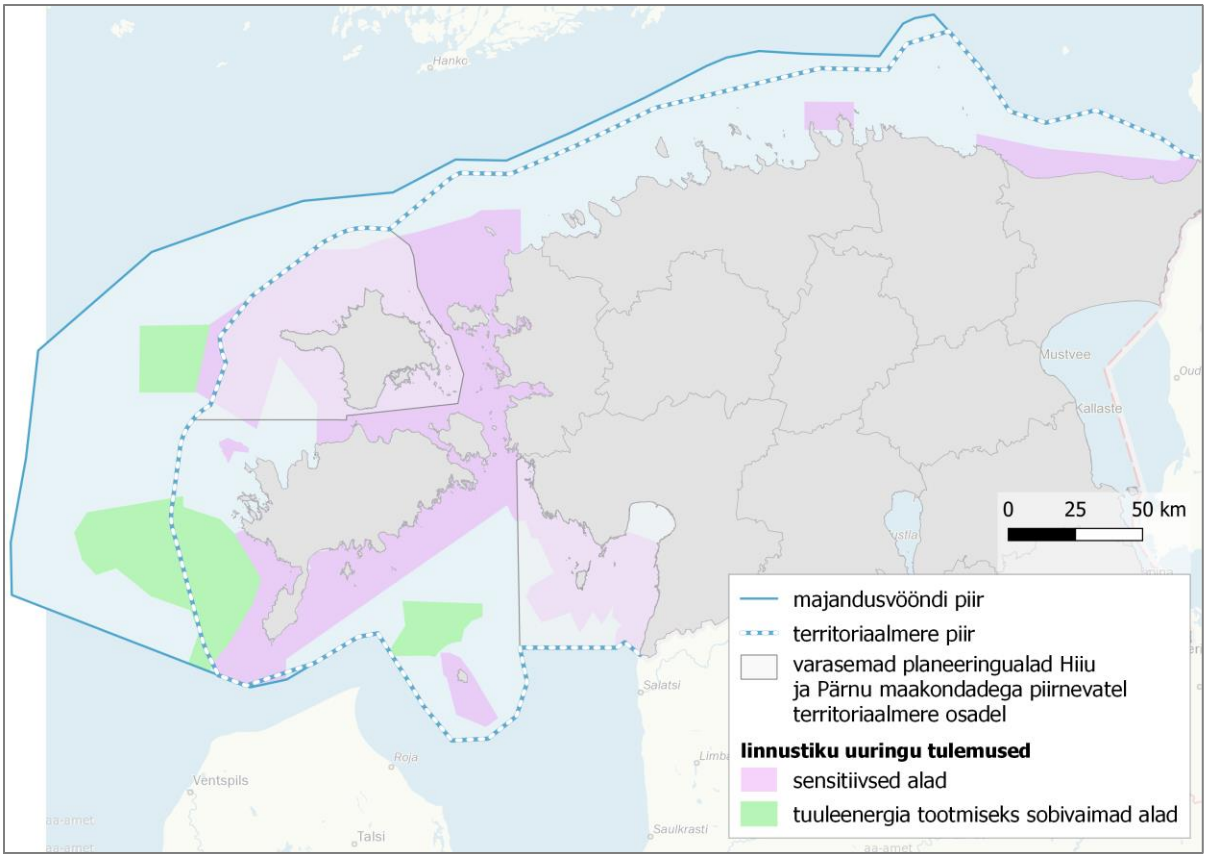

Figure 4.2.2-1. Sensitive areas of the Estonian marine area and areas most suitable for the development of wind energy from the standpoint of birds

Figure 4.2.2-2 shows sensitive areas in terms of birds where, in addition to the sensitive areas designated in the marine area, additional migratory corridors for land birds have been added.

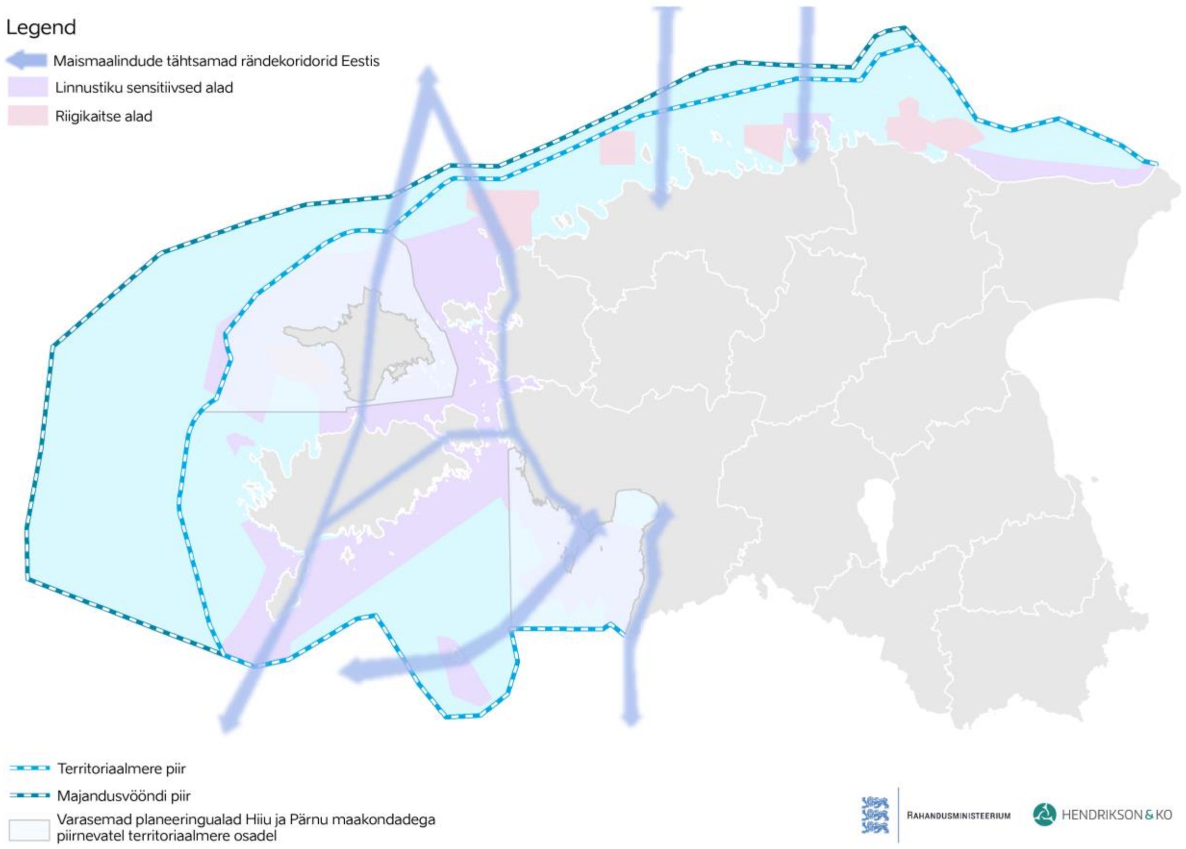

Figure 4.4.2-2. Sensitive areas for birds (source of drawing: "Bird staging area analysis." Estonian Ornithological Society, 2019

Impact of the MSP

The implementation of the Maritime Spatial Plan will not bring (significant) changes to many uses (fisheries; sea transport; search and rescue, pollution control and border management; seabed infrastructure; marine tourism and recreation; protected nature; marine culture; cultural monuments; national defense; dumping, and permanent connections) and for most areas of activity, the current use and regulation of the marine space will continue through existing legislation. From the standpoint of birds, it is important to assess the uses of the marine areas that are likely to have a significant impact on bird species. Of the marine uses planned by the Maritime Spatial Plan, this is primarily wind energy.

Wind energy development means building massive objects in the sea. Wind farms in the marine area constitute an obstacle to birds in flight and migratory routes (birds will avoid them by passing (bypassing) them, thus increasing the migration distance and proportionally increasing the amount of energy consumed by migration at such that a negative impact would occur at the population level) and also present a risk of collision, resulting in injury or, at worst, death to birds[25]. Wind farm areas can be disturbing and discouraging to more sensitive bird species. The main method to minimize this impact is to place wind farms in a location where the impact on birds is minimal. In addition, technical solutions to minimize impact, such

[25]Compilation of data on migratory corridors of birds in the Estonian marine area, creation of corresponding map layers and analysis of the impact of wind farms on bird feeding areas, Estonian Ornithological Society, 2017

as wind turbine layout, size, number, the height of wind blades from the sea surface, etc., can be implemented when it is needed to develop a particular wind farm.

It is appropriate for the level of accuracy of the Maritime Spatial Plan to find suitable locations for the wind energy development areas, and mitigation through technical solutions, etc., can be applied in the next steps (licensing process), if necessary. The Maritime Spatial Plan Solution identifies areas for development in wind energy, which, among other things, take into consideration bird-based considerations. To minimize the impact, the wind energy development areas have been placed outside the existing marine area bird protection areas (Natura 2000 Special Protection Areas). In addition, a bird survey was carried out which, in the light of current knowledge, identified the most important areas of the marine area, the so-called sensitive areas, for staging and migratory birds. The development areas of wind energy proposed in the Maritime Spatial Plan are largely outside these sensitive areas. The study also identified the marine areas most suitable for the development of wind energy, which largely overlaps with the planned wind energy development areas (Figure 4.4.2-1). On the basis of the information currently available, the location of the planned wind energy development areas can be considered successful from the point of birds in case of area 2 and partly also in case of area 1. The proposed wind energy development area 1 in the Gulf of Riga will overlap with a migratory corridor for land birds, so the Impact Assessment Task Group will propose an adjustment to the planning solution as shown in Figure 4.4.2-4. Wind energy development area 3 is partly located in the Hülgerahu sensitive area, which is important primarily as a winter staging place for waterfowl but also as a spring migration area for waterfowl. However, as much of wind energy development area 3 is outside the sensitive area, no reduction of wind area is proposed in this case. However, due to the existence of bird protection values, greater risk must be taken into account in the development of wind technology in this area. The development prospects of a specific area (potential volumes, etc.) will be identified in the impact assessment as part of the licensing procedure.

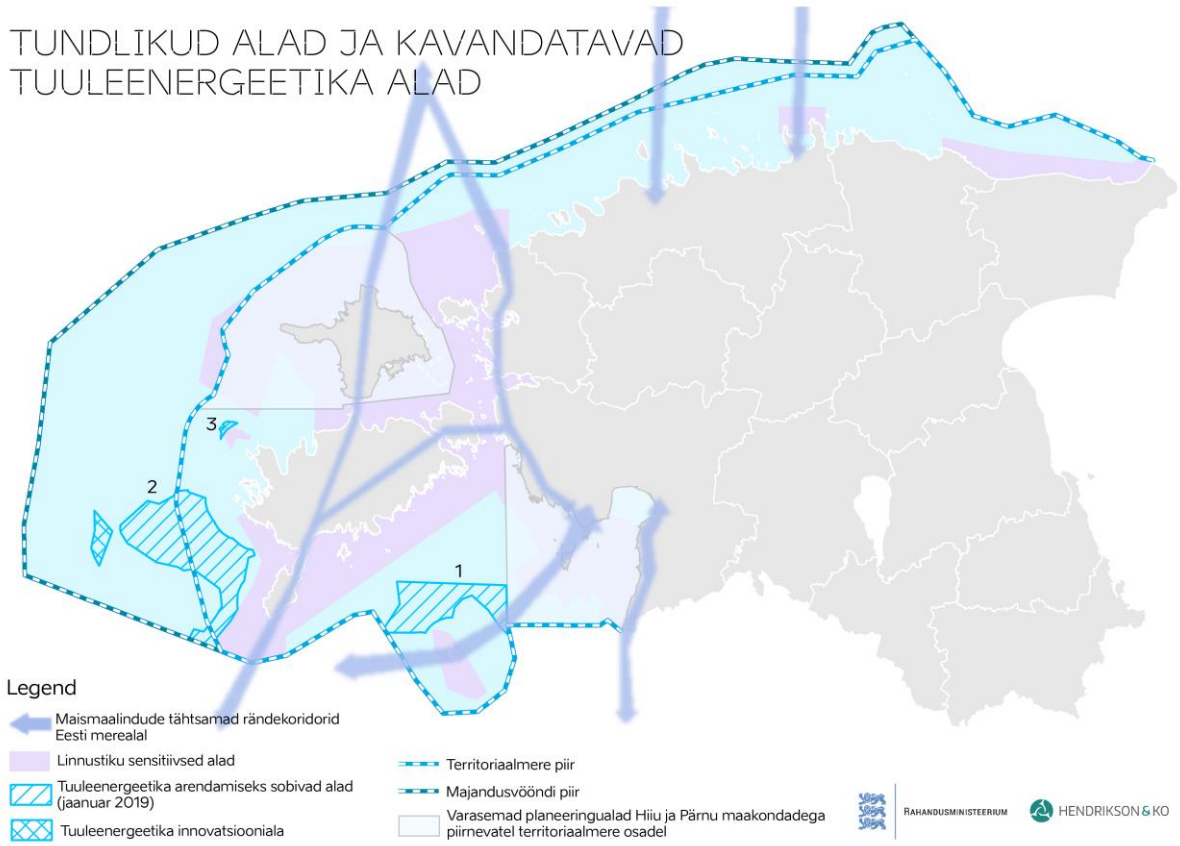

Figure 4.2.2-3. Location of wind energy development areas in relation to sensitive areas for birds

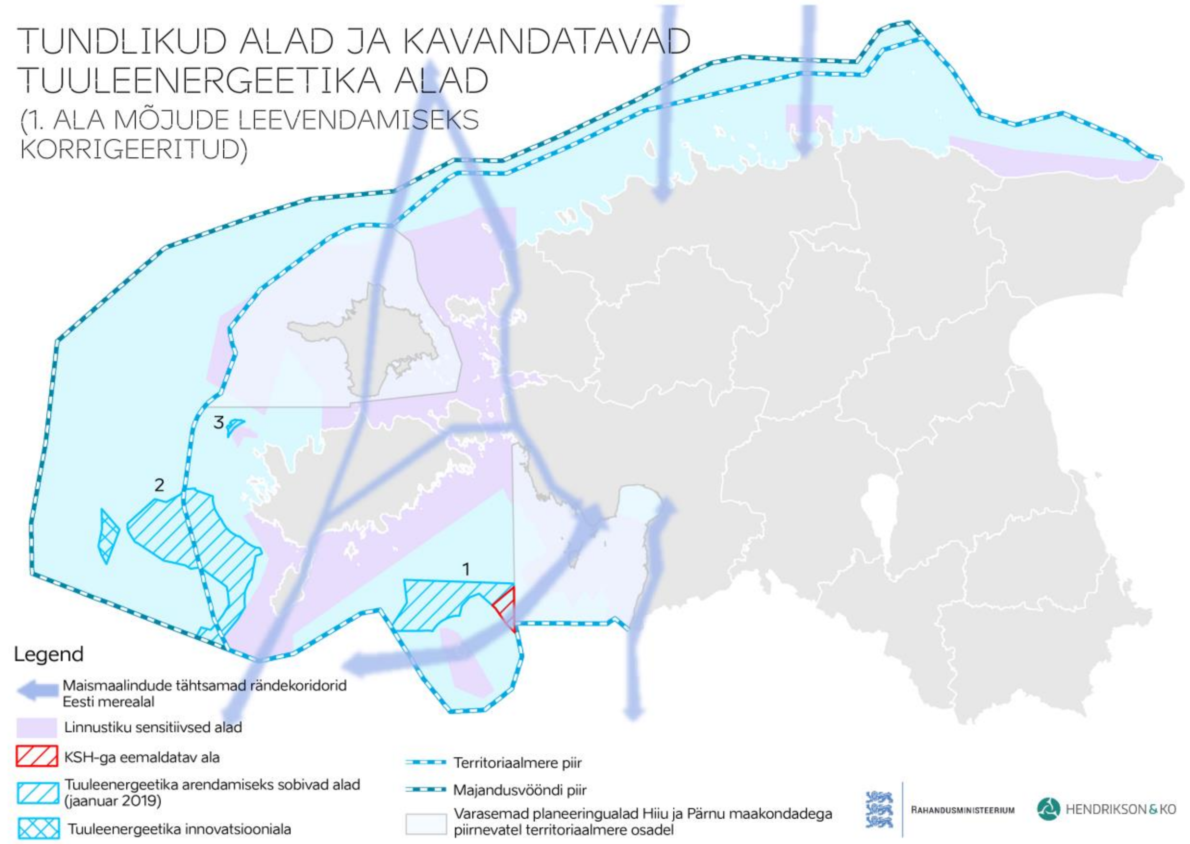

Figure 4.2.2-4. Proposal for the correction of wind energy development area 1 in the maritime planning solution. Red striped area should be excluded from the wind energy development areas.

In sensitive areas, long-term (or irreversible) offshore activities should be avoided, in particular the construction of high-rise objects (wind farms, bridges) and major alterations to the seabed (e.g., the establishment of new mines). Wind farm area No 3 overlaps partially with the sensitive area outlined above, and the prospect of its realization needs to be clarified during the licensing process.

Further wind energy development within and outside the designated areas, irrespective of the location of the sensitive area, is required. The main purpose of the studies is to clarify the suitability of the proposed wind farm from bird protection perspective. In addition, the studies allow specifying possible conditions and mitigation measures for carrying out the activities. The studies should include a census of staging waterfowl in all seasons, in addition to visual and radar surveys of migratory birds in the case of migratory corridor areas. The preferred method for counting staging waterfowl could be ship counting, except for areas that are very shallow or very far from the home ports of the ships. The exact research methodology will be developed as part of project development.

Maritime Spatial Plan also identifies prospective cable corridor locations to connect wind farms to land. The impact of laying submarine cables occurs primarily during construction and are local in nature. The disadvantageous impacts of cable laying can be reduced by the appropriate technical solution and site selection at the project solution level as well as by the selection of the timing of the works.

In the light of current knowledge, it can be said that the Maritime Spatial Plan solution for spatial arrangement of the preferred wind energy use areas 1 and 2 is taking into account bird staging areas and migratory corridors, while area 3 is partly located in a staging and migration area important for birds.

ENVIRONMENTAL MEASURES:

1. **Proposal for adjustment of the planning solution according to Figure 4.2.2-4.**
2. Given the importance of the Estonian marine area for migratory and staging birds, the further wind energy development areas (or beyond them) requires a more accurate assessment of the occurrence and significance of impacts. In the context of the licensing process, the impacts, in the light of the size, exact location and technical solution of the proposed activity, shall be specified in cooperation with the bird expert and, where appropriate, studies shall be conducted.
3. Compared to wind energy development areas 1 and 2, the development perspective for area 3 is somewhat less clear. This area partly overlaps with sensitive marine area where activities with long-term (irreversible) effects should be avoided. The development perspective of area 3 (potential volumes, etc.) will be identified in the impact assessment process as part of the licensing procedure.
4. The impact of short-term activities (such as disturbance resulting of offshore activities or reduced water transparency) can be reduced by choosing the time of the activities.
5. The disadvantageous effects of cable laying can be reduced by the appropriate technical solution and site selection at the project solution level as well as by the selection of the timing of the works.

4.2.3 Seals[26]

Two seal species are common among marine mammals in Estonia - gray seal (*Halichoerus grypus*) and ringed seal (*Pusa hispida*).

Ringed seal is a species with occasional distribution in the Baltic Sea, with subpopulations comprising the coasts of Estonia on the Väinameri Sea/Livonian Gulf and the Gulf of Finland. Animals move between different subpopulations rarely, and rather at the level of individual specimens. The key habitats for ringed seals in Estonia are the Väinameri Sea and the Gulf of Riga - these areas are associated with seal wintering and reproduction areas (Figure 4.2.3-1). During the ice-free period, the main animal resting areas are in the Väinameri Sea and in the southern estuaries of the Väike and Suur Strait (Figure 4.2.3-2). There is regular migration between these areas, in particular south of the Suur Strait, where a migration corridor of vital importance has developed (Figure 4.2.3-3). In addition, the existence of sea ice, whose types, extent and location vary from year to year, is indispensable for the successful reproduction of animals.

The resting areas, mainly in the Väinameri Sea and the southern estuaries of the Väike and Suur Strait, are of great importance throughout the year. The islets of Hiiumaa are abandoned when the sea freezes, but they are used from ice to ice, and in warm winters this use can be practically year-round. Nutrition areas are of great seasonal importance from May to November. The migratory areas are associated with a period of intensive feeding and the main migratory route is important from May to November.

[26] The chapter is largely based on a basic research of Maritime Spatial Plan: „Estonian Maritime Spatial Plan: Assessment of the distribution and marine use of seals". Report on Applied Research Contract No. 1.9-1/404-1. I., Jüssi; M., Jüssi, 2019.

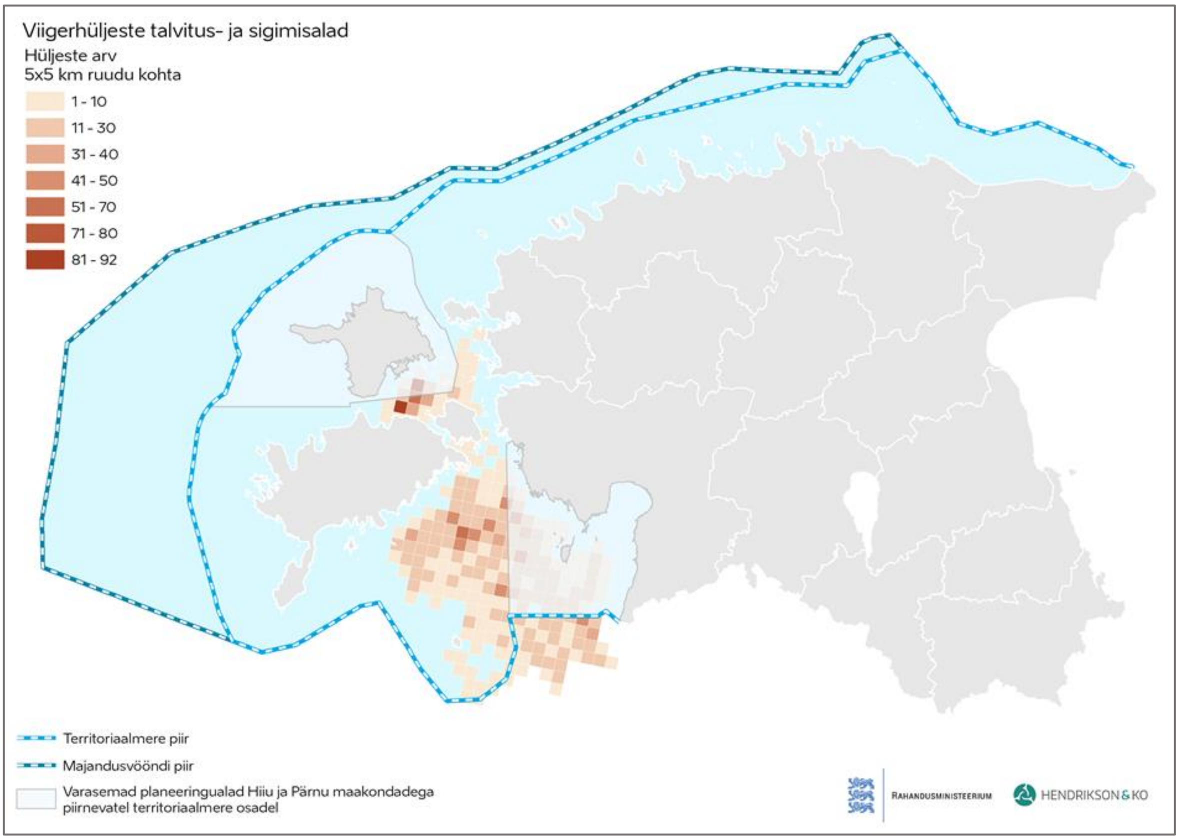

Figure 4.2.3-1. Sensitive areas for ringed seals, and ringed seal wintering and breeding areas (darker areas are more intensively used). Source: Assessment of the distribution and marine use of seals". Report on Applied Research Contract No. 1.9-1/404-1. I., Jüssi; M., Jüssi, 2019.

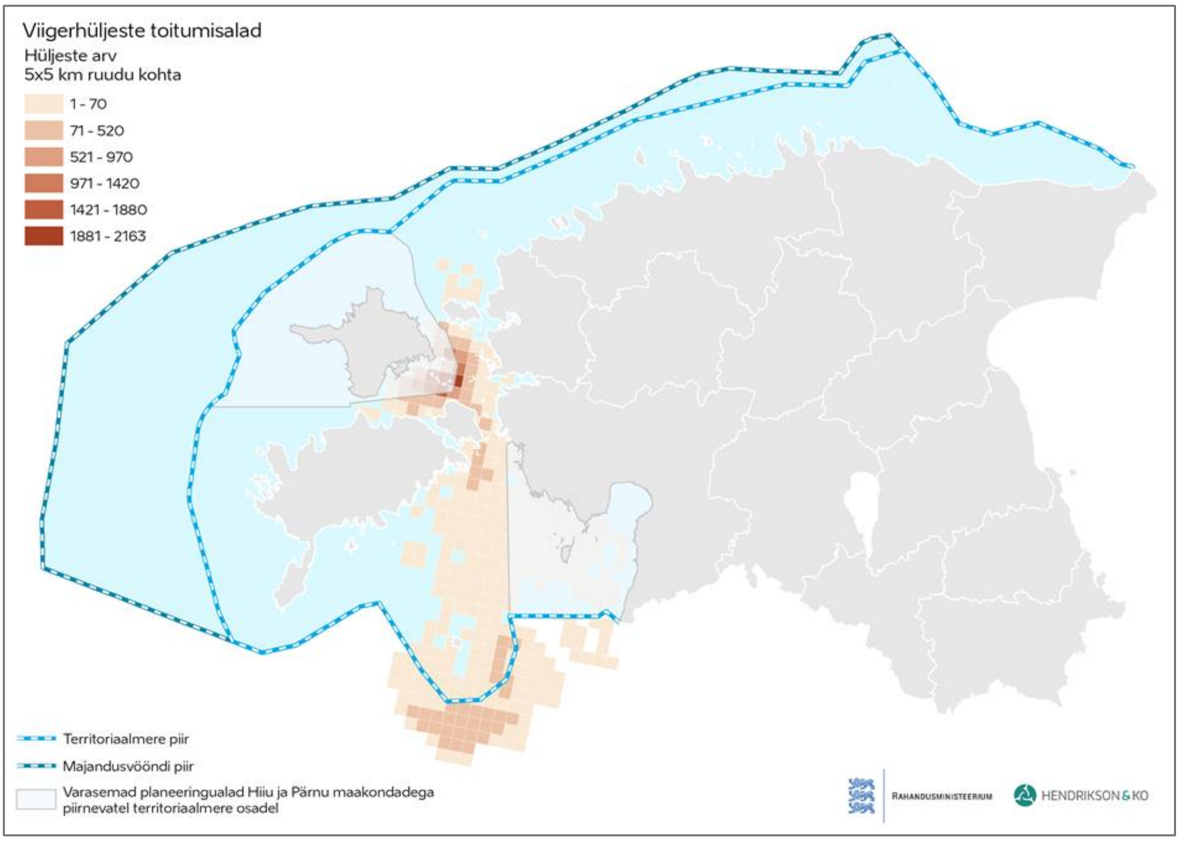

Figure 4.2.3-2. Sensitive areas for ringed seal, ringed seal feeding areas (darker areas are more intensively used). Source: Assessment of the distribution and marine use of seals". Report on Applied Research Contract No. 1.9-1/404-1. I., Jüssi; M., Jüssi, 2019.

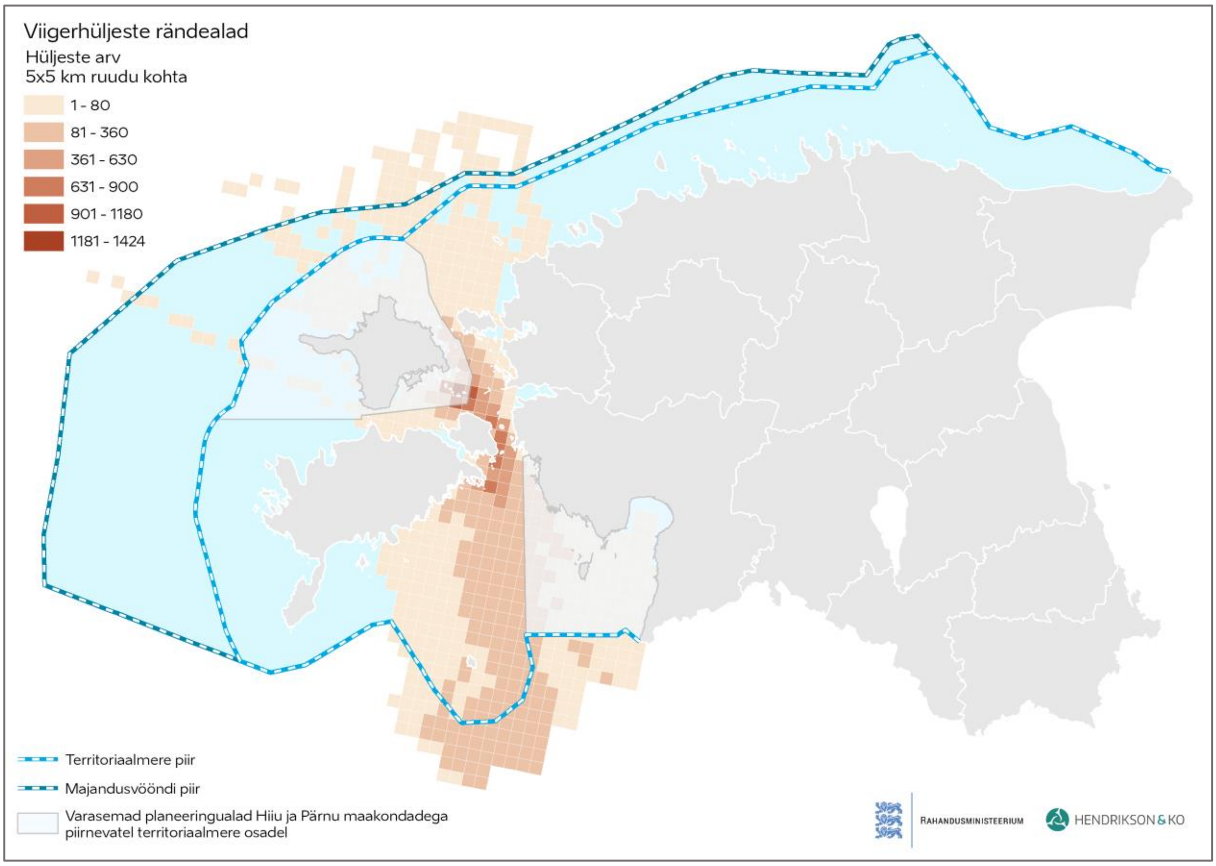

Figure 4.2.3-3. Sensitive areas for ringed seal, ringed seal wintering and breeding areas (darker areas are more intensively used). Source: Assessment of the distribution and marine use of seals". Report on Applied Research Contract No. 1.9-1/404-1. I., Jüssi; M., Jüssi, 2019.

Gray seals are freely mobile throughout the Baltic Sea (Figure 4.2.3-2), but are associated with specific rookery areas and marine areas during the ice-free period and over the years. This species freely uses the coastal waters of entire Estonia. The most important rest areas are predominantly covered by the existing protection regime (permanent habitats for gray seals). The Gray seal is a highly adaptable species that is often accustomed to human activities.

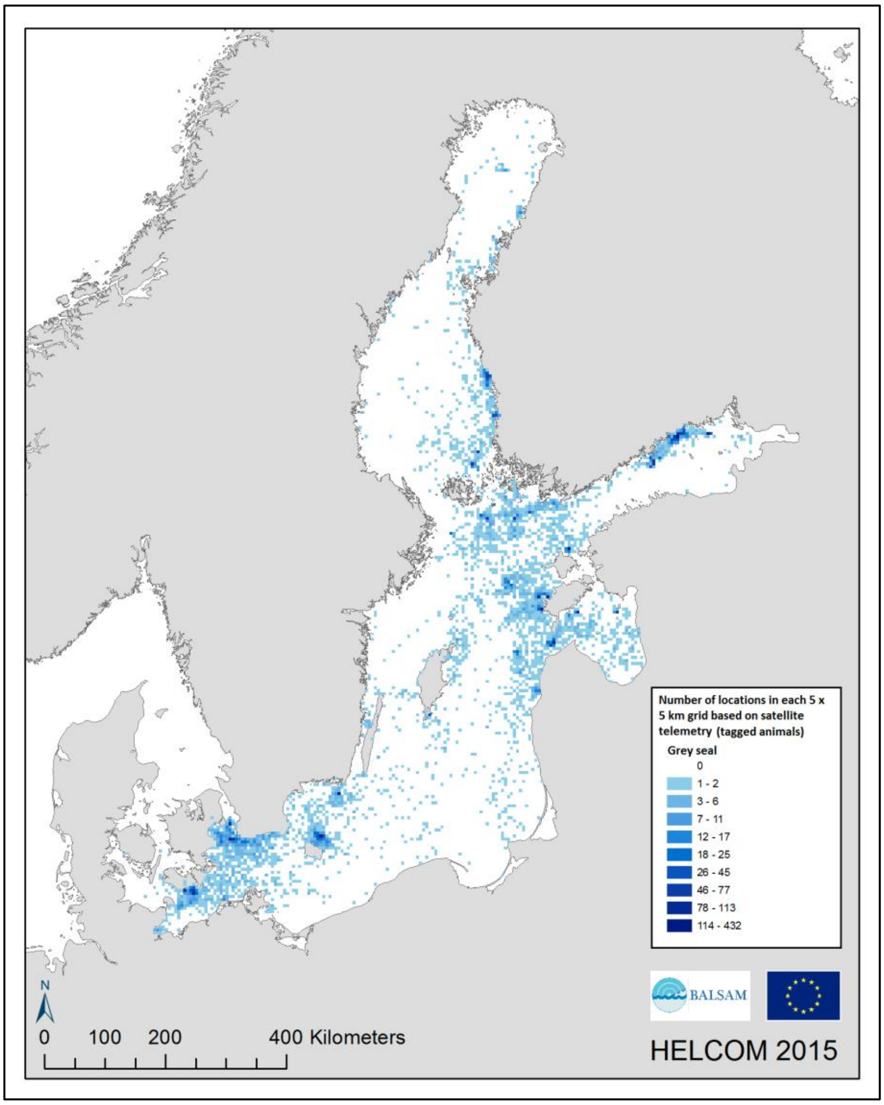

Figure 4.2.3-4. Distribution pattern of gray seal in the Baltic Sea based on telemetry data from HELCOM (source: HELCOM 2015)

While the good environmental status of the gray seal population of the Baltic Sea in the Estonian marine area has been achieved by assessing its abundance, distribution area and distribution pattern, the good environmental status of the ringed seal has not been achieved.[27]

Among the most important anthropogenic factors affecting seals and the well-being of their populations are sensitivity to environmental pollution, mortality in fishing nets (by-catch), and disturbance in breeding grounds. For ringed seals, the impacts of climate change on breeding success are also particularly important. In winter, when suitable ice is not formed or does not persist, the species cannot successfully breed. Particularly in the case of the ringed seal, as a more endangered and sensitive species, it is important to avoid the additional impacts of anthropogenic factors.

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[27] Environmental Status of Estonian Marine Area 2018, Ministry of the Environment 2018 https://www.envir.ee/sites/default/files/mere_seisund_2018.pdf

Impact of the MSP

The implementation of Maritime Spatial Plan will not lead to (significant) changes in many uses of the marine area and in terms of most of the areas of activity, the current use of marine area and the regulation will continue through existing legislation. The uses of the marine area addressed in Maritime Spatial Plan do not contradict the established patterns of marine use of ringed seals and gray seals. The key habitats are covered by various nature conservation measures in the plan. For example, the Väinameri Sea region is an existing protected area, which the plan does not direct to use differently from the current use, and the implementation of the plan will not bring any changes to the ringed seal (or gray seal) population there.

Marine Spatial Planning identifies areas suitable for the development of wind energy, which are predominantly outside marine areas of importance to seals. The Gulf of Riga wind energy development area partially overlaps with the areas used by ringed seals. At the same time, marine mammal experts see no conflict between wind energy development and the use of the marine area by the ringed seal in the Gulf of Riga. While the choice of locations for the uses of wind energy can be considered successful in the accuracy level of the Maritime Spatial Plan, the environmental aspects of marine mammals need to be addressed in the further development of wind energy at the license level.

The impact of wind farms on marine mammals is manifested primarily during the construction phase, and the significance of this impact depends on the technical solution used. For example, the manner in which wind turbines are secured will depend on the intensity of the underwater noise involved and the amount of volatile float that may adversely affect the migration and living conditions of seals in the wind farm during the construction period.

In terms of impact during operation, for example, the disruptive impacts of ship traffic related to the maintenance of wind farms, or possible changes to, for example, marine ice mobility, icebreaking, etc. This also means, for example, planning a maintenance waterway to wind farms where disturbance to ringed seals would be minimized. However, the impact during construction and operation will be specified in the development of specific project solutions, which will clarify the exact locations of the wind turbines, the technical solutions, including cables, maintenance procedures, etc.

Maritime Spatial Plan does not provide for new national defense areas or extend existing ones, but it does take into account the current spatial needs of national defense. The implementation of maritime spatial plans will not bring about changes in the implementation of national defense activities; the status quo for marine mammals is maintained. Existing national defense areas remain in the Gulf of Finland, and a special area south of the Kõpu Peninsula (Hiiu Island area of the Maritime Spatial Plan) is being planned. These areas are not important habitat for breeding and reproduction of the ringed seal, but the potential area of influence is the gray seal as species spreading on the entire marine area. The use of ammunition and explosives may have a direct impact on marine mammals both in the water and on ice in the area. National defense activities (mine control, various exercises) can directly damage or, in the worst case, kill nearby seals. Ammunition and hazardous substances to which marine mammals are a particularly sensitive species may also be released into the marine environment. When carrying out national defense activities in these areas, it is necessary to pay attention to the environmental aspects highlighted and to cooperate with species conservation experts to minimize the impact of the activities, e.g., to prepare an environmental protection plan.

Developing offshore aquaculture is not an activity of major impact for marine mammals. However, the establishment of fish farms in the sea must take into account the potential damage caused by gray seals. It is widely known that the gray seal is a highly adaptable species that grow accustomed to human activities and, unlike the ringed seal, even takes advantage of it, comes to catch fish, for example, in ports, near fishing traps, and aquaculture facilities. This is certainly important when planning fish farms - keep in mind that they can attract animals and cause so-called "pressure" from seals, which can disrupt activity.

The implementation of the Maritime Spatial Plan does not foresee any significant negative impacts on seals.

ENVIRONMENTAL MEASURES:

1. During the implementation of the activities proposed in the Maritime Spatial Plan (in particular the development of wind energy), the impact assessment process needs to include clarification of the impacts, including the necessary expertise and, where appropriate, mitigation measures for marine mammals. The need for further research needs to be considered within each specific project.

PROPOSALS FOR THE ACTION PLAN:

1. It is advisable to draw up a protection management plan for the national defense sites, which will map the environmental risks of the activities to the marine biota, including seals, and measures to prevent or reduce them.

4.2.4 Bats[28]

So far, 14 species of bats have been identified in Estonia, which falls into two groups with different adaptations. Brown long-eared bats, Northern bats and species belonging to the Myotis genus winter in Estonia (or neighboring countries), undertaking only regional migrations from summer habitats to hibernation sites. Nathusius's pipistrelle, Common pipistrelle, and Soprano pipistrelle and Common noctule are migratory and fly to winter in southern Europe.[29] The habitats, breeding and feeding areas of bats are generally terrestrial. According to relatively limited knowledge to date, marine areas are primarily associated with bat migration, but there are also species that make foraging flights above the sea.

There is currently no comprehensive picture of the use of the marine area by bats in Estonia. Only a few studies have been carried out covering very limited marine areas. Current knowledge suggests that migratory species are rare above the Gulf of Finland in autumn, and their relative abundance is lower than around Saaremaa. Bats may be expected to concentrate on the southern coast of Saaremaa in the autumn, especially on the Sõrve peninsula, where they are waiting for suitable weather to cross the Gulf of Riga. Current knowledge suggests that autumn migration of bats is more active in the Irben Strait and is less likely to move west to Sweden. On a few favorable nights, migrating bats can head west from Saaremaa.

For bat migration, it is important to note that when flying over the sea, bats usually fly up to 10 m above sea level, but at sea objects (masts, wind turbines, etc.) the bats rise much higher, for example flying even around wind turbine blades. Migration is possible only in relatively calm weather and favorable wind direction. Based on the study of bats were flying above the sea, when the wind speed was 0.3 to 7.7 m / s. However, according to the study, bats were mostly detected above the sea, with the wind speed below 5 - 6 m/s.

The Action Plan for Protection of Bats[29] points out that the main general hazards of the Estonian bat fauna are the loss and degradation of both summer and winter habitats, deaths in wind farms and traffic, environmental poisons, and natural influences.

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[28] The chapter is largely based on the basic study of the Maritime Spatial Planning "Study of Bats at Sea around Saaremaa from July to October 2018" Estonian Fund for Nature, 2019

[29]Action plan for the Protection of Bats (*Vespertilionidae*). Approved by the Director General of the Environmental Board 15.03.2017 Directive No. 1-1/17/150https://www.keskkonnaamet.ee/sites/default/files/liigikaitse/nahkhiirlaste_tk.pdf

Impact of the MSP

Bats mainly use the marine area for the migratory period flyover, and there is no contact with the aquatic environment. Bats may be affected by activities that disrupt bat flight corridors and migratory routes, thus increasing the risk of bats being killed. Wind energy is the only potential activity affecting bats in marine spatial planning.

Bats may be killed in offshore wind farms located in important flight corridors (migratory routes). The more intensively used the migration route, the more specimens can be killed.

The larger wind energy development areas proposed in the Maritime Spatial Plan are located in the Gulf of Riga and west of Saaremaa (Figure 4.2.4-1). According to current knowledge, the planning solution can be considered suitable for the migration of bats, as the expected main migration direction from the southern coast of Saaremaa (Sõrve spit) to Latvia in Courland has been left open. There are nature reserves in this area which ensure the preservation of the migration corridor. The planned migration corridor also runs across the Gulf of Riga above the islands of Kihnu and Ruhnu, where the plan does not foresee development areas of wind energy either.

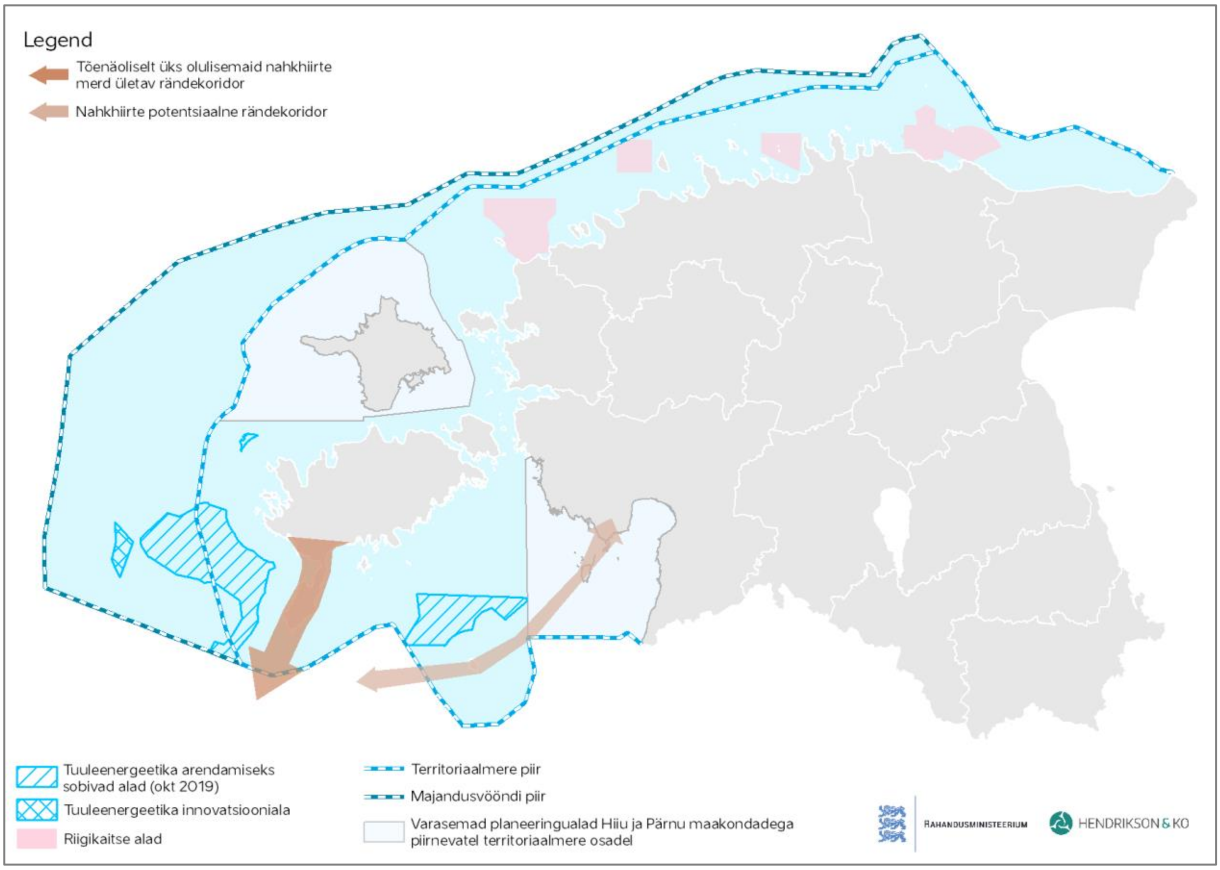

Figure 4.2.4-1. Sensitive areas for bats (source: Expert assessment "Study of Bats in the Sea around Saaremaa, July - October 2018" Estonian Fund for Nature, 2019)

The potential conflict between wind turbines and bats is mitigated by the fact that wind turbines operate at higher wind speeds (average wind speed in the wind farm area above 9 m/s) with little or no bat activity. Wind turbines start working at wind speeds of about 5 m/s and taking into account the migratory speed of bats (about 5-6 m/s), migration usually occurs in relatively quiet weather when the wind turbines do not work or operate at low speeds with little risk to bats. Also, the altitude of bats generally does not coincide with that of wind turbine blades. This fact is likely to significantly reduce the likelihood of death of and significant adverse impacts on bats.

In the light of current knowledge, it can be said that the maritime spatial planning solution for the spatial arrangement of priority areas for wind energy is consistent with the anticipated migration routes of bats and the proposed environmental measures will not result in significant adverse impacts on bats.

ENVIRONMENTAL MEASURES:

1. Information on the major migratory trends and intensities of bats in the Estonian marine area is currently modest, and further development of wind energy development areas requires a more accurate assessment of the impact on and importance for bats. In the context of the licensing procedure, the impacts must be specified by including the necessary expertise and, where appropriate, studies must be conducted.
2. It is important to keep the main migratory routes of bats free from wind farms (to mitigate the risk of collision) or to provide for appropriate mitigation measures if necessary. For example, limiting wind turbine rotor speed to stall (during migration); installation of ultrasonic repellants on wind turbines that guide potential bats in the area away from the wind farm, etc.

PROPOSALS FOR THE ACTION PLAN:

1. Information on the important migratory trends and intensities of bats in the Estonian marine area is currently modest. Wider studies of bats should be conducted in the Estonian marine area.

4.2.5 Seabed habitats and biota

Seabed habitats

Seabed habitat mapping was started in Estonia in 2005, and approximately one third (38%) of the Estonian marine area has been covered by inventories (spring 2019) (Figure 4.2.5-1). With respect to the extent of the marine area covered by the inventories, it should be borne in mind that, as of now, 38% coverage is obtained by aggregating the areas of the survey polygons of all mapping areas, regardless of specific mapping techniques and density of sampling points.

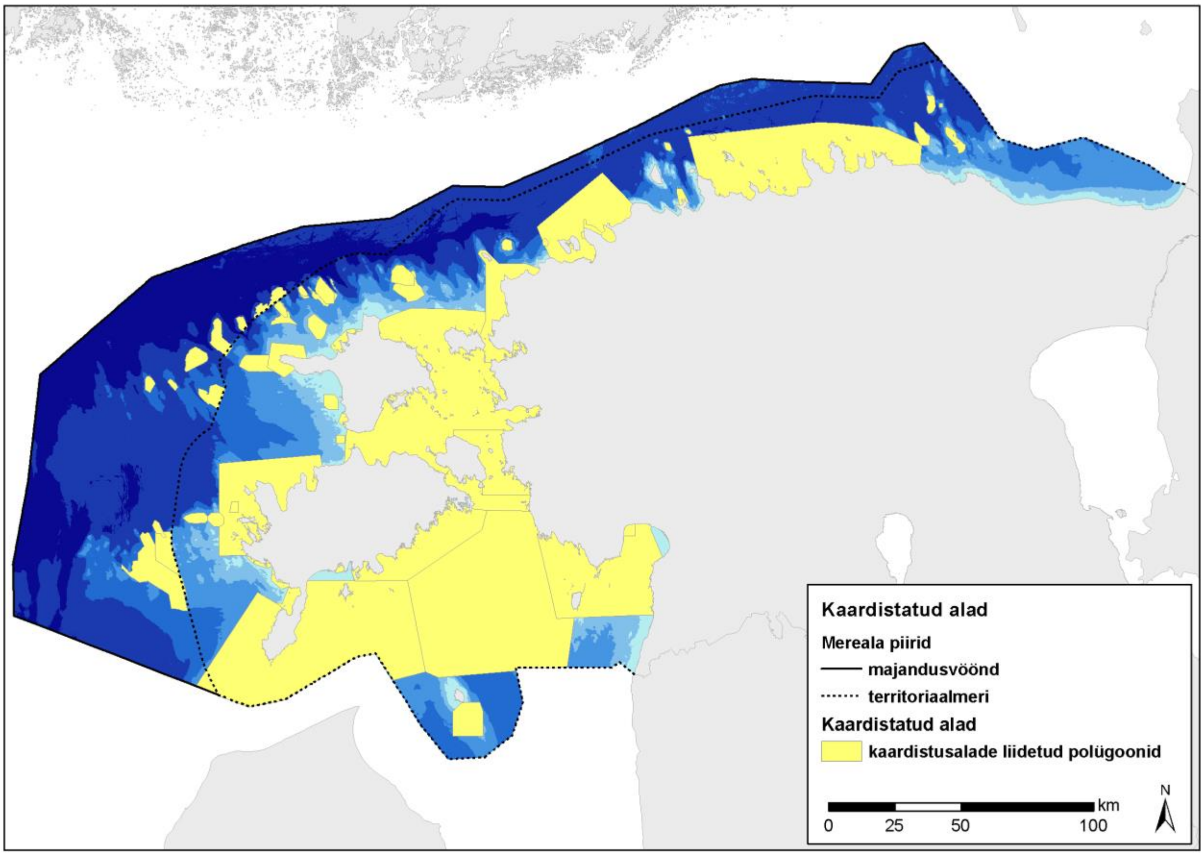

Figure 4.2.5-1. Areas mapped in the Estonian marine area (source: Estonian Maritime Institute, UT, as of spring 2019)

All mapping work to date has been project-based, and the results are based on a very sparse sampling point network for large area mapping. The greater the distances between the sampling points, the less reliable the maps are. Detailed knowledge of the seabed is derived from the points visited at sea. Estimates of the distribution of the seabed substrate and biota for the area between the sampling points are obtained through indirect mathematical methods - interpolation or directed modeling.

Major unmapped areas within the territorial sea are located in the eastern part of the Gulf of Finland and the western and northwestern parts of the territorial sea. Seabed habitats in the EEZ are much less mapped compared to the territorial sea (Figure 4.2.5-1).

Habitat types considered important for nature conservation in the European Union were listed in 1992 in Annex I to the Habitats Directive (92/43/EEC on the conservation of natural habitats and of wild fauna and flora), which combines habitat types from land, sea, and freshwater. There are a total of eight marine habitat types in Annex I of the Habitats Directive, of which six occur in the Estonian marine area (in brackets the Habitats Directive Annex I code):

- sandbanks flooded with seawater (1110, hereinafter "sandbanks"),
- river estuaries (1130),
- mudflats and sandflats (1140, hereinafter "flats") expose with a low tide,
- coastal lagoons (1150),
- wide shallow coves and bays (1160),
- reefs (1170).

Sandbanks and reefs can be considered fully seabed habitat types as they are not related to the shape of the coastline or the land. Far from the coast, in offshore conditions, the presence of river estuaries, mud and sand flats, coastal lagoons, and wide shallow coves and bays, as all these habitat types are directly related to the coastline.[30] Habitats of reefs (1170) and sandbanks (1110), which are more widespread in the Estonian marine area, are, therefore, the focus of attention in the context of Estonian Maritime Spatial Plan.

In 2018, modeling of the distribution of reefs and sandbank habitat types for the entire Estonian marine area was performed based on the available materials (Figure 4.2.5-2). The reliability of the habitat distribution model shown in the figure is due to the density of sampling points - the higher the density of samples from the seabed, the higher the reliability of the habitat model in a particular area.

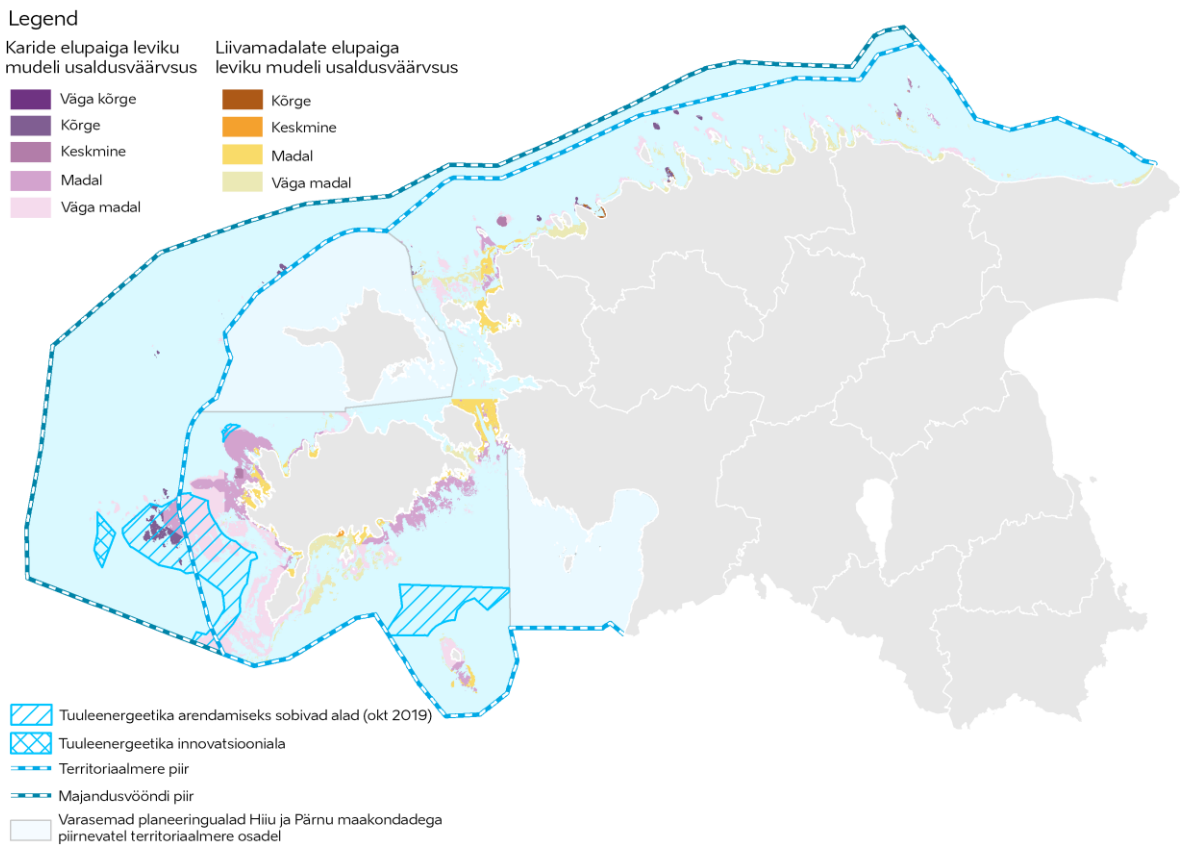

Figure 4.2.5-2. Modeled distribution of habitat types in Annex I of the Habitats Directive - reefs and sandbanks - with the reliability of the habitat distribution model in the Estonian marine area (Source of the map material: Updating map data of Estonian marine habitats, UT Estonian Marine Institute 2018)

According to the Marine Strategy Framework Directive (MSRD), it is also necessary to consider general large-scale habitats in the environmental assessment. EU Commission Decision 2017/848 [31], which establishes the main types of MSFD seabed habitats, has only recently been published, and, therefore, no MSFD seabed habitats have been mapped in Estonia. However, in 2018, MSFD has conducted modeling of the distribution of key types of seabed habitats, based on the same source data as the previous Habitats Directive habitat modeling (Figure 4.2.5-3).

[30] Habitats Directives Inventory of Marine Habitats in Selected Areas in the Estonian EEZ, UT EMI, 2016

[31] eur-lex.europa.eu/legal-content/ET/TXT/PDF/?uri=CELEX:32017D0848&from=NE

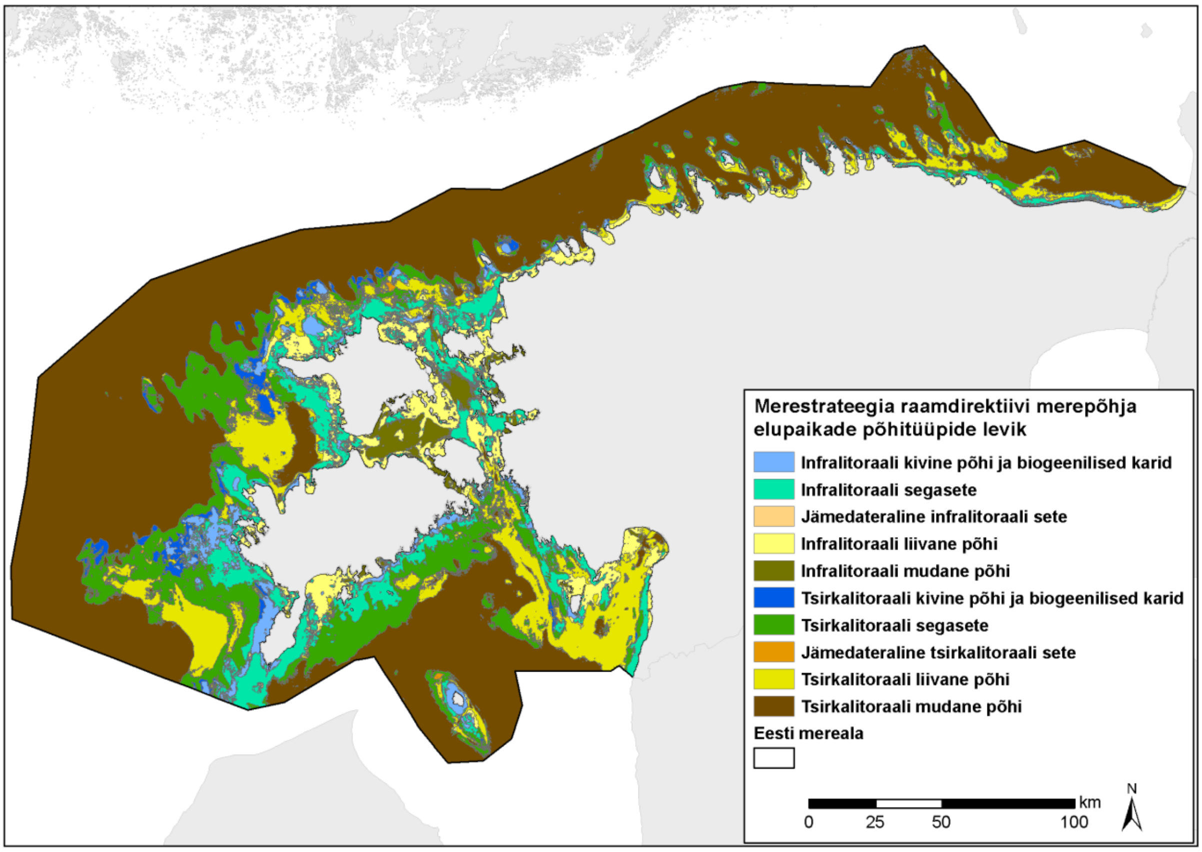

Figure 4.2.5-3. Modeled distribution of the main types of MSFD seabed habitats in the Estonian marine area. (Source: Estonian Maritime Institute, UT 2018)

In addition, a modeled distribution map of HELCOM [32]seabed biotopes (HELCOM HUB or *Helcom underwater biotope and habitat classification system*), level 3, is available from earlier studies (Figure 4.2.5-4)[33].

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[32] Baltic Marine Environment Protection Commission - Helsinki Commission

[33] Reporting on the NEMA project: "Modeling the distribution of marine habitat types and EUNIS level 3 habitats in the Estonian EEZ under the Habitats Directive" Estonian Marine Institute, UT, 2016. http://nema.bef.ee/en/

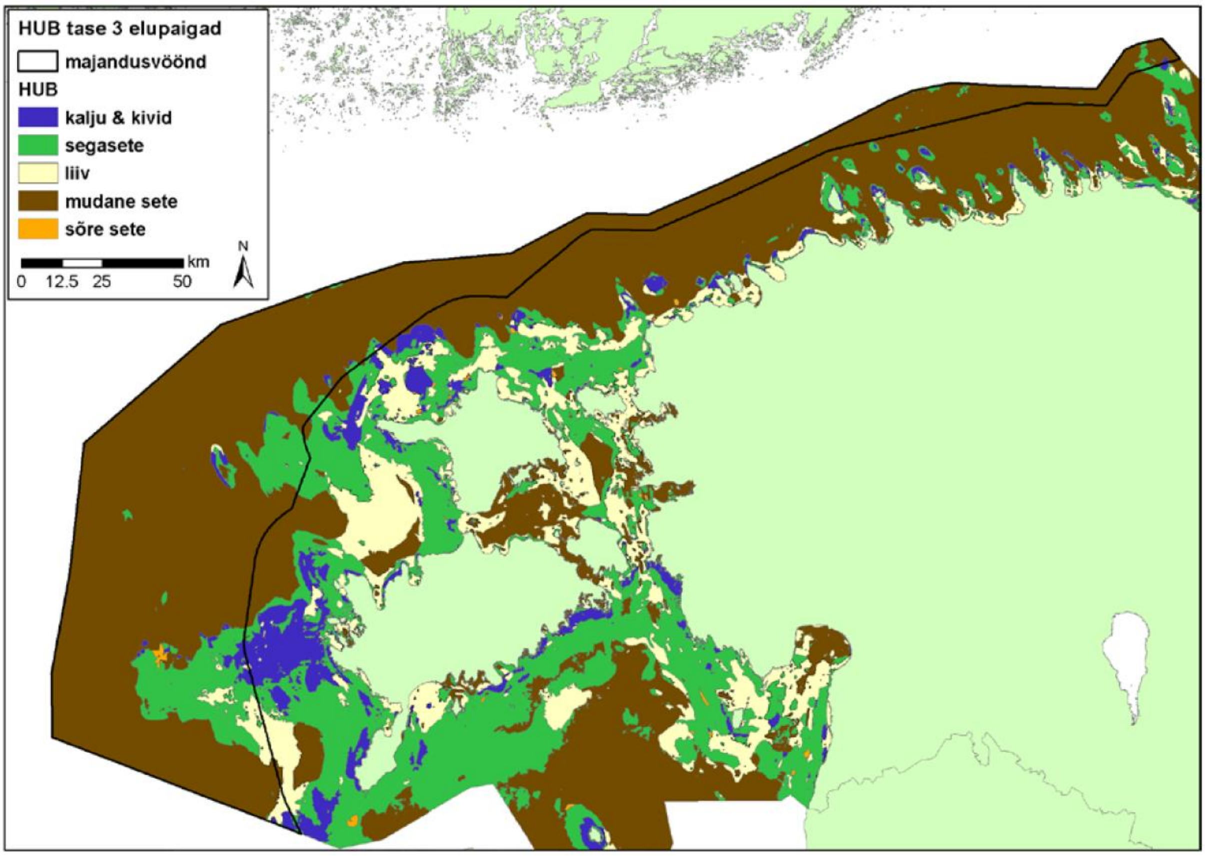

Figure 4.2.5-4. Modeled HELCOM HUB Level 3 Habitat Distribution in the Estonian Marine Area (Source: Estonian Maritime Institute, UT 2016)

In 2018, the status of reefs, sandflats, and sandbanks from the seabed habitats was assessed for reporting in accordance with the Estonian Marine Strategy[34] and all three habitat types were found to be in a favorable state. In addition, oxygen deprivation and macrofauna communities in soft-bottom areas were assessed. Their assessment is predominantly favorable in the Estonian marine area, but no good status was achieved in the Väinameri Sea, Pärnu Bay, and the eastern and offshore parts of the Gulf of Finland.

Seabed habitats

In the Estonian marine area, macroscopic seabed biota is formed of flora (large algae and higher plants) and benthic fauna. In terms of species composition, the biota is quite diverse, with both marine and freshwater species.

Seabed vegetation. On the basis of the data from the years 1992 - 2018, 60 major vegetation taxa (including 57 species and taxa *Ulotrix, Pseudolithoderma,* and *fontinalis* the genus level) have been recorded in the Estonian marine area.

The most frequently occurring species in the Estonian marine area are Vertebr ata fucoides, Cladophora glomerata, and *Ceramium tenuicorne*. The species/ taxa of the brown algae are the most abundant in the Estonian marine area. The differences between vegetation species/taxa in the HELCOM sub-basins are relatively small, with the Gulf of Riga being the most abundant in species.

[34]"Environmental Status of Estonian Marine Area 2018." Report, 2018.
https://www.envir.ee/sites/default/files/mere_seisund_2018.pdf

Large vertebrates. According to the data of the years 1992-2018, 92 zoobenthos taxa (including 73 species and 19 taxa) data are registered in the Estonian marine area.

The most frequently occurring invertebrates in the Estonian marine area are the blue mussel (*Mytilus trossulus*), Baltic clam (*Limecola balthica*) and barnacle attaching to the substrate (*Amphibalanus improvisus*). 59% of the benthic species/taxa belong to the arthropod family. Species diversity is highest in the Gulf of Riga lower basin and lowest in the eastern Gotland basin.

Impact of the MSP

Seabed habitats and biota are influenced by two types of anthropogenic factors:

- local factors (in particular mechanical impact on the seabed, local sources of pollution);
- regional influences (general level of eutrophication in the Baltic Sea, the total level of hazardous substances).

The spatial solutions to the activities to be established by the plan are primarily of local impact and are related to the mechanical impact of the activities on the seabed (disturbance, removal, replacement of the seabed substrate). The specific impact is very specific to the site and the proposed activity, so it is possible to assess the impact of the activities during the licensing process for specific projects.

From the standpoint of the seabed and its biota, the development of wind energy is one of the most important areas of activity proposed in the Maritime Spatial Plan, which may include direct actions that locally affect the seabed. According to current experience, the impact on seabed habitats and biota associated with wind energy development are in particular foundations of wind turbines and erosion control[35],[36],[37],[38],

Impact on benthic habitats. Of the proposed activities, technical developments, i.e., any physical intervention in the seabed environment, will have a greater impact on the seabed habitats. There are reefs (1170) and sandbanks (1110) in the planned wind energy development areas of the EU Habitats Directive Annex I habitat types of conservation value, see Figure 4.2.5-2.

In particular, the construction of wind farms will have an impact on the seabed by capturing or destroying a specific habitat under the foundation. The extent of the impact depends on the technical details and material of the foundation and the area of the seabed below the foundation. The greater the area of the seabed below the foundation, the greater the loss of natural seabed at a particular location. The construction of offshore wind farms should be based primarily on the location of habitat types and, where possible, avoid onsite installation of wind turbines in areas where reefs (1170) are of high conservation value.

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[35] Boehlert, G. W., and Gill, A. B. 2010. Environmental and ecological effects of ocean renewable energy development: A Current Synthesis. Oceanography, 23: 68-81

[36] ICES. 2012. Report of the Workshop on Effects of Offshore Windfarms on Marine Benthos - Facilitating a closer international collaboration throughout the North Atlantic Region (WKEOMB), 27–30 March 2012, Bremerhaven, Germany. ICES CM 2012/SSGEF:13. 57 pp.

[37] Lindeboom, H. J., Kouwenhoven, H. J., Bergman, M. J. N., Bouma, S., Brasseur, S., Daan, R., Fijn, R. C., et al. 2011. Short-term ecological effects of an offshore wind farm in the Dutch coastal zone; a compilation. Environmental Research Letters, 6.

[38] Linley EAS, Wilding TA, Black K, Hawkins AJS, Mangi. 2007. Review of the effects of offshore windfarm structures and their potential for enhancement and mitigation.

The current technological solutions of the wind turbine foundation are the most suitable gravity-based foundation for the conditions of the Estonian marine area, which can be solved both as a monolith and as a combination of several smaller interconnected elements. In the case of more sensitive habitat, a monolithic foundation should be preferred, as in this case, the impact will be one-off (when one monolithic foundation block is laid on the seabed). The foundation material should be as close as possible to the natural substrate (surface roughness, neutral chemical reaction). Enriching the exterior surface of the foundation with natural rock material may also be considered. This allows the creation of an attachment substrate that is as natural as possible, to which marine organisms can attach. In the case of material facilitating attachment of biota, a so-called reef effect is expected[39], which is a very complex phenomenon with both positive and negative impacts. Positive impacts include an increase in biomass attached to the seabed, an increase in the species diversity of the benthic biota, and the foundations of wind turbines attracting fish (easier access to food, shelter, spawning substrate, etc.).

The reef effect is also accompanied by negative impacts, such as the accumulation of dead biomass at the wind turbine foundation and nutrient enrichment of sediments - local eutrophication symptoms; the possible promotion of alien species (the so-called ' *stepping stone* ' effect); and the formation of hard substrates at depth ranges where they do not occur naturally (in turn, colonization of species is unpredictable). Experiments on colonizing a new substrate conducted in the northern Baltic Sea have shown that it is very difficult to predict which species will colonize a particular new substrate in the high seas. Each specific site is different in its conditions, and evaluation (and study) of substrate colonization should be made prior to the implementation of a particular project. Seabed disturbance experiments conducted in Estonia (Neugrund shallow, limestone bottom) have also shown that disturbance of the limestone seabed - mechanical damage - produces changes that can be observed over many years. The soft bottom uses erosion barriers and increases the area of impact of the foundation of each particular wind turbine. Thus, when using erosion barriers, natural material from land-based sources should be used to minimize the impact.

When dismantling wind turbines, it must first be assessed whether removing the foundation can cause more damage than leaving it in the marine environment. Perhaps the option of removing the foundation should be preferred, but in some cases, it may be expedient not to dismantle the foundation.

The development of offshore wind farms will also involve the laying of seabed cables. Their specific impact will also depend on the technology used for the laying of the cable on the seabed, the material of the cable covering, and the voltage inside the cable, which must be addressed in more detail in the licensing and assessment of the proposed activities. Today, cable installation technology has advanced in the direction where laying the cable on the seabed is accompanied with protection thereof along its entire length from potential damage. One of the more commonly used methods of protecting a cable is by burying it in seabed sediments, which ensures safety and avoidance of economic damage, as well as mitigating the environmental impact of some (magnetic field, heat). The construction of cable routes does not, by its very nature, destroy the habitat under the cable route and has a limited geographical impact. In the case of a soft seabed, a temporary groove is created to bury the cable, and the sediment will fall on the installed cable. A sufficient burial depth of the cable to protect the cable from the main external influences is generally considered to be 1- 1.5 m. The success and methods of burial in the sediments are highly dependent on the seabed geology. The establishment and subsequent operation of the cable route will not significantly affect the distribution of habitats. For a particularly hard substrate, there is no significant change in habitat distribution, for a soft substrate there may be some habitat loss and habitat

[39] An artificial reef is a man - made structure or structure that has been laid on the seabed, either intentionally or unintentionally, and serves as a basis for the growth and production of marine life (Hoffmann et al. 2001)

diversification through the addition of hard substrate, but under certain conditions, the added hard substrate (the cable itself) may get buried under soft sediment, in which case the distribution and health of the habitat is not comparable to the previous situation, especially in offshore areas[40]. All in all, the establishment of a cable route to the spread of habitats has a small and short-term impact during both construction and operation.

An important parameter characterizing the status of the seabed habitats is the quality of the habitats (compliance of the biota with the typical structure and preservation of the biological function of the abiotic components of the environment). The establishment of a cable route can affect habitat quality through changes in the substrate and the distribution of species important to the habitat. As the cable route is a particularly hard substrate added to the seabed and its associated additional reef effect, a greater change is expected to occur in the habitat quality in particular on soft bases, as the addition of a hard substrate and a reef effect will increase the species diversity of this habitat through additional substrate formation.[41],[42]. The impact on hard bottoms is minimal since the addition of substrate does not fundamentally alter the conditions of the species populating the habitat. To date, apart from isolated cases [43], the magnetic and electric fields associated with the cables have no impact on benthic biota and individual species, so the impact of these fields on the species composition cannot be assessed. In conclusion, it can be expected that the installation and further operation of the cable route will have only a minor and short-term impact on the quality of the seabed habitats.

Impact on benthic biota. Benthic vegetation is a component of benthic biota that primarily inhabits the photic zone of the seabed. The vegetation communities vary depending on the substrate. In offshore conditions (openness to waves), as a rule, soft beds (sandy and clayey seabeds) have no vegetation. The benthic vegetation of the hard bottoms consists primarily of algae, which have a typical zonality in accordance with the depth in the northern Baltic Sea. In the shallower part, there is usually a green algae zone, followed by the brown algae or bladderwrack zone, and in the deepest part (up to 30 m in the open sea condition), the red algae zone. As a rule, the bladderwrack zone is the richest in biomass and species.

Cable routing creates a substrate suitable for attachment to the bottom vegetation at depth ranges where it may not have been present (especially on soft bottoms). Under hard substrate conditions, the hard substrate formed in the case of the cable route is not significantly different from that of the natural substrate, and thus no impact on the species composition of benthic vegetation is expected. Thus, the added substrate has a significant local impact only on soft bottoms, which is rather rare in the wind energy development areas proposed in the Maritime Spatial Plan. To date, the electromagnetic impacts of cables on benthic species have not been identified.

The benthic fauna is composed of both sessile (sedentary) and mobile species. The sessile species need either a hard substrate to attach or softer sediment to dig itself into. For species attaching to a hard substrate (e.g., shellfish), the addition of a hard substrate is primarily additional habitat and often allows for a more complex, three-dimensional habitat[44]. This has

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[41] Ambrose, R. F., and Anderson, T. W. 1990. Influence of an artificial reef on the surrounding infaunal community. Marine Biology [Mar. Biol.], 107: 41-52.

[42] Langhamer O. 2012. Artificial Reef Effect in relation to Offshore Renewable Energy Conversion: State of the Art. Sci. World J. 2012:1–8. doi:10.1100/2012/386713.

[43] Scott, K., Harsanyi, P., and Lyndon, A. R. 2018. Understanding the effects of electromagnetic field emissions from Marine Renewable Energy Devices (MREDs) on the commercially important edible crab, Cancer pagurus (L.). Marine Pollution Bulletin, 131: 580-588.

[44] Kerckhof F, De Mesel I, Degraer S (2016). Do wind farms favour introduces hard subatrata species? In: Degraer S, Brabant R, Rumes B, Vigin L (eds.): Environmental impact of offshore wind farms in the Belgian part of the North Sea: Environmental impact

often led to the abundance of anchored benthos and the increased biomass in the vicinity of wind farms.

The impact of fitting the cable lines on the soft-bottom benthos may occur particularly in close proximity to the cable through the change of sediment dynamics[45],[46]. In the vicinity of cables and other artificial structures, usually under favorable hydrodynamic conditions, forms in sediments will begin to proliferate[47],[48] The electromagnetic impact on mobile species has been described several times[49]. Mostly it has been either fish or crabs. Such impacts have not been described in our waters, and knowledge to date tends to indicate a lack of impacts.

As a separate risk, cable routes can be highlighted as potential contributors to the spread of alien species, in particular by forming an uninterrupted network of hard substrates in the area of soft sediment.[50] In this way, species attaching to a hard substrate will be able to propagate along the cable routes in a situation where this would naturally be impossible. Cables may also be associated with low-frequency vibration propagation, especially near wind turbines, which in turn may cause changes in the distribution of benthic fauna on the local scale.[51]

To mitigate the impacts of cables, for example, in case of a cay, it is useful to consider burying the cable. For hard substrates (such as "reef" habitat types), it is not practical to bury or cover the cable in deeper parts of the high seas. Where possible, the external surface of the cable should be neutral and allow the organisms to attach. At the same time, protecting the cable in the shallow coastal area, which is therefore strongly affected by ice and storms, is indispensable (recommended depth approx. 1.5 meters). In addition to the shallow areas, international shipping lanes and intersections with other cables or pipelines are potential risk areas. Solutions for advanced cable protection methods are being developed in the design of wind farms.

In addition to wind energy, aquaculture is another type of marine use that is directly related to seabed habitats and biota. The impact of aquaculture on seabed habitats and biota depends on many factors - environmental factors at a given location, the type of aquaculture, and the technology used. Fish farms are primarily associated with eutrophication. The impact of the fish farm is by the nutrients added to the marine environment through the fish farm (see Chapter 4.1.5), which may alter the ecological conditions of the seabed biota, thereby causing changes in the species composition of the biota and the quality of the habitat. However, shellfish and algae cultivation can release nutrients from the marine environment, and their impact is rather to reduce the level of eutrophication. The impacts related to the fish farm

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monitoring reloaded. Royal Belgian Institute of Natural Sciences, OD Natural Environment, Marine Ecology and Management Section: 61-75.

[45] Davis, N., van Blaricom, G. R., and Dayton, P. K. 1982. Man-made structures on marine sediments: Effects on adjacent benthic communities. Marine Biology [Mar. Biol.], 70: 295-303.

[46] Hall, S. J. 1994. Physical Disturbance And Marine Benthic Communities - Life In Unconsolidated Sediments. Oceanography and Marine Biology: an Annual Review, 32: 179-239.

[47] Coates D, Vanaverbeke J, Vincx M, others (2012) Enrichment of the soft sediment macrobenthos around a gravity-based foundation on the Thorntonbank. Offshore Wind Belg Part North Sea Head Underst Environ Impacts R Belg Inst Nat Sci Manag Unit North Sea Math Models Mar Ecosyst Manag Unit Bruss:41–54

[48] Coates, D. A., Deschutter, Y., Vincx, M., and Vanaverbeke, J. 2014. Enrichment and shifts in macrobenthic assemblages in an offshore wind farm area in the Belgian part of the North Sea. Marine Environmental Research, 95: 1-12.

[49] Hutchinson, Z, Sigray, P, He H, Gill, A, King J, Gibson, C (2018) Electromagnetic Field (EMF) Impacts on Elasmobranch (shark, rays, and skates) and American Lobster Movement and Migration from Direct Current Cables. Sterling (VA): U.S. Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2018-003. Sterling (VA): U.S.

[50] Ricciardi, A., and Rasmussen, J. B. 1998. Predicting the identity and impact of future biological invaders: A priority for aquatic resource management. Canadian Journal of Fisheries and Aquatic Sciences [Can. J. Fish. Aquat. Sci.], 55: 1759-1765.

[51] Solan, M., Hauton, C., Godbold, J. A., Wood, C. L., Leighton, T. G., and White, P. 2016. Anthropogenic sources of underwater sound can modify how sediment-dwelling invertebrates mediate ecosystem properties. Scientific Reports, 6: 20540.

should be further assessed in the licensing procedure and, if necessary, mitigation measures should be developed.

No significant negative impacts on the seabed habitats and biota are expected during the implementation of the Maritime Spatial Plan.

ENVIRONMENTAL MEASURES:

1. The implementation of the uses of the marine areas considered in the Maritime Spatial Plan will have an impact primarily on the local level (mechanical intervention on the seabed, etc.). Because the impacts are site and activity specific, impacts are assessed at the licensing level for most areas activities and can be mitigated as appropriate.
2. In areas suitable for the development of wind energy, it is recommended that the location of the wind turbines is based on the location of the habitat types. Avoid installing wind turbines in areas of habitats of high conservation value where possible.
3. To mitigate the effects of cables connecting wind farms to land, consider burying of cables when they pass through a soft substrate (e.g., sandbank habitat type), whereas for hard substrate (e.g., reef habitat type), burying and coating of the cables in deeper offshore areas is not feasible. Where possible, the external surface of the cable should be neutral and allow the organisms to attach.
4. The effects related to the offshore fish farm should be further assessed in the licensing procedure and, if necessary, mitigation measures should be developed.

4.2.6 Protected natural objects

Approximately 19% of the entire Estonian marine area (including the exclusive economic zone) is covered by various types of protected natural objects. The existing network of marine protected areas is very unevenly distributed. All of the existing protected areas are located in the territorial sea. There are predominantly special conservation areas and protected areas for the protection of the sea. The list of protected natural objects in the Maritime Spatial Plan area is given in the following table, and protected sea areas are illustrated in Figure 4.2.6-1.

Table 4.2.6-1. Protected natural objects related to the Estonian Maritime Spatial Plan

Area name	Code
Special conservation areas	
Gretagrund Special Conservation Area	KLO2000344
Kahtla-Kübassaare Special Conservation Area	KLO2000309
Karala-Pilguse Special Conservation Area	KLO2000310
Kasti Bay Special Conservation Area	KLO2000312
Kaugatoma-Lõu Special Conservation Area	KLO2000313
Küdema Bay Special Conservation Area	KLO2000318
Kolga Bay Special Conservation Area	KLO2000003
Koorunõmme Special Conservation Area	KLO2000315

Irben Strait Special Conservation Area	KLO2000316
Kuressaare Bay Special Conservation Area	KLO2000316
Nõva-Osmussaare Special Conservation Area in Harju County and Lääne County	KLO2000165 KLO2000166
Pakri Special Conservation Area	KLO2000167
Paljassaare Special Conservation Area	KLO2000168
Pammana Special Conservation Area	KLO2000222
Prangli Special Conservation Area	KLO2000169
Riksu Coastal Conservation Area	KLO2000327
Ruhnu Special Conservation Area	KLO2000328
Siiksaare-Oessaare Special Conservation Area	KLO2000330
Sutu Bay Special Conservation Area	KLO2000331
Tagamõisa Special Conservation Area	KLO2000332
Vaindloo Special Conservation Area	KLO2000037
Väike Strait Special Conservation Area	KLO2000048
Väinameri Sea Special Conservation Area (Lääne County and Saare County)	KLO2000241 KLO2000339
Nature reserves	
Allikrahu Nature Reserve	KLO1000146
Apollo Shoal Nature Reserve	KLO1000674
Puhtu-Laelatu Nature Reserve	KLO1000176
Rahuste Nature Conservation Area	KLO1000305
Silma Nature Reserve	KLO1000197
Sääre Nature Reserve	KLO1000662
Suurupi Nature Reserve	KLO1000612
Toolse Nature Reserve	KLO1000180
Uhtju Nature Reserve	KLO1000017
Landscape protection areas	
Kasti Landscape Protection Area	KLO1000485
Kübassaare Landscape Protection Area	KLO1000295
Kolga Bay Landscape Protection Area	KLO1000495

Letipea Landscape Protection Area	KLO1000516
Vormsi Landscape Protection Area	KLO1000220
National Parks	
Lahemaa National Park.	KLO1000511
Matsalu National Park	KLO1000300
Vilsandi National Park	KLO1000250
Permanent habitats	
Kerju Gray Seal Permanent Habitat	KLO3000094
Krassi Island Gray Seal Permanent Habitat	KLO3000092
Neugrund Nature Reserve	PLO1000854
Proposed protected areas[52]	
Krassi Nature Reserve	-
Laidevahe Nature Reserve (extension)	-
Neugrund Nature Reserve	PLO1000854
Paljassaare Nature Reserve	-
Mustjõe Beach Landscape Protection Area	-
Vilsandi National Park (extension)	-

[52] In the proposed protected that are highlighted are areas covering the new marine area or extensions to existing protected are as

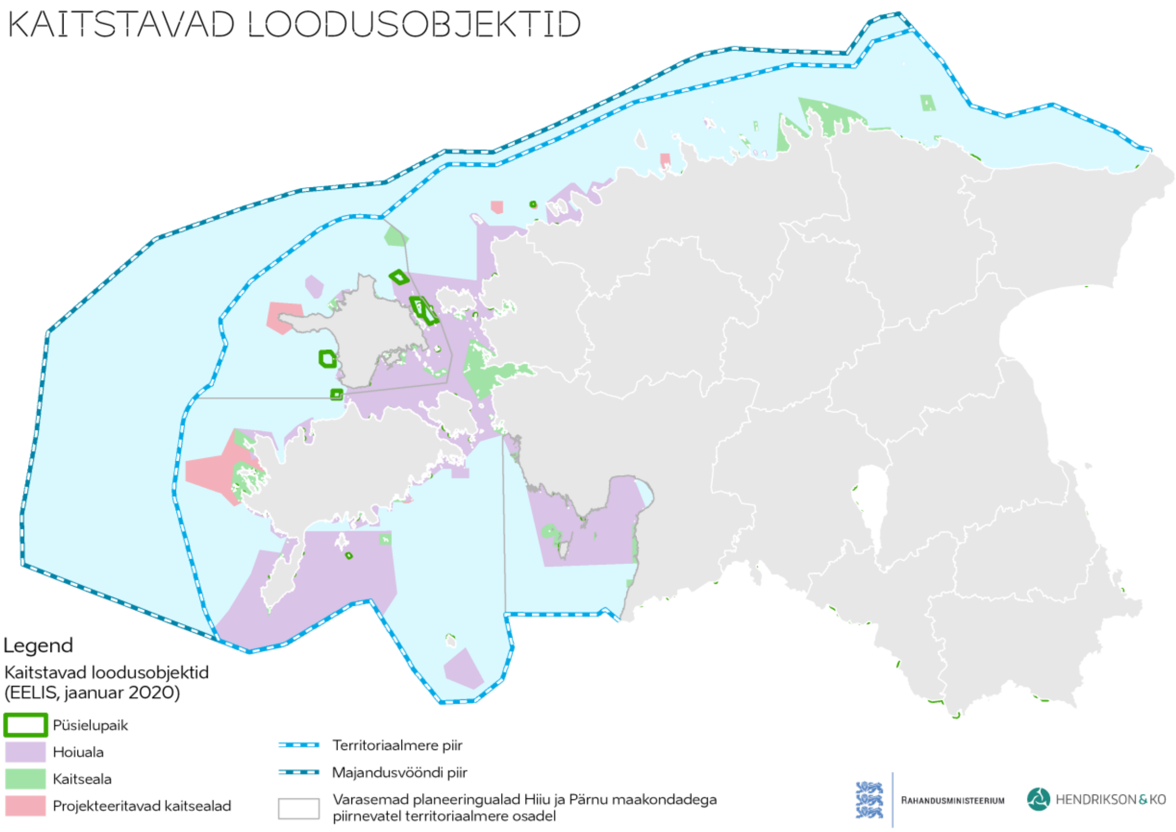

Figure 4.2.6-1. Protected natural objects in the marine area

Most protected natural objects on the marine area are also internationally protected within the Natura 2000 network of nature and/or special protection area. The impact on Natura sites is assessed in a separate chapter in the Natura Assessment Form (Chapter 4.3). Assuming that the Natura assessment essentially covers the impact assessment on overlapping nationally protected natural objects, the impact assessment is not duplicated. This chapter outlines the environmental aspects of nationally protected natural objects without international protection, which are related to the implementation of the plan. Out of the existing protected areas, Uhtju Nature Reserve is partially outside of the Natura special protection areas, and Apollo Shoal Nature Reserve is entirely outside the Natura special protection areas. Also, all proposed new protected areas and planned extensions to existing areas provided in Table 4.2.6-1 are located outside the Natura site network.

The protection of marine areas has been carried out on an area-by-area basis, and the reasons for the protection have mostly been the presence of birds or marine mammals. In some cases, seabed habitats have also been taken into account as protected natural values. So far, the effectiveness of existing protected areas and measures in the Estonian marine area has not been evaluated, and the coherence of the network has not been evaluated or taken into account when establishing a network of protected areas. This would require a comprehensive analysis of the marine area.

As of autumn, 2019, there are virtually no protected areas in the Estonian EEZ. Considering the size of the exclusive economic zone, only a small part of one protected area extends to the exclusive economic zone - approximately 43 km^2 of the Irben Strait Special Conservation Area is located in the exclusive economic zone. The need to protect marine natural resources in the EEZ has been underlined both at the world level (CBD) and in the Baltic Sea region (HELCOM). The lack of protected areas in the Estonian EEZ is primarily due to the lack of information on the location, condition, and also the threats and pressures of potential natural values there. Since 2019, the project “Preparation of Offshore Protected Area Proposals in the Estonian EEZ” (duration 2019–2020, carried out by the Estonian Marine Institute of the University of Tartu) has been launched. In the course of the project, the existing information on the distribution of natural values in the Estonian EEZ from earlier surveys (NEMA[53] and others) will be consolidated, and additional surveys in two selected research areas (the most potential habitat locations in the EEZ based on habitat modeling) will be conducted. During the project, the existing material will be analyzed, combining it with field data. In the case of the identification of protected natural values (benthic habitats, fish, and bird species) and their endangered status, a reasoned proposal to take the marine area under protection shall be made. Areas include the entire Estonian EEZ. The two selected areas under study under the project, as well as the marine areas of the exclusive economic zone studied under the NEMA project, will be considered.

Impact of the MSP

Maritime Spatial Plan sets the sustainable use of the marine space in a way that **ensures the conservation of protected sites and areas as t**he ultimate goal for the protected nature. To achieve these goals, the main principles applied in the planning are:

- The plan map reflects all the natural features protected at sea and does not target other areas of activity for those areas that may be expected to have adverse impacts (e.g., wind energy);
- It is established as a guideline that the use of the marine area in protected natural objects is subject to the site's conservation objectives and restrictions.

The plan identifies three areas for the development of wind energy- in the Gulf of Riga (No. 1), in the East Gotland Basin (No. 2) to the west of Saaremaa and in the North Sea Basin (No. 3) northwest of Saaremaa. The choice of spatial locations for wind energy development was based on the location of protected areas and was taken as an exclusion factor to exclude the direct impact on nature conservation areas (e.g., physical changes to the seabed (including habitat destruction) and changes in waves, water movements, etc.). Protected areas have been established for the preservation of Estonia's natural resources, and therefore human activities causing environmental disturbances are either restricted or prohibited in these territories.

However, the wind energy development areas designated by the plan may have indirect impacts on adjacent parts of the protected area (suspended matter spread, noise during construction, etc.). The more specific impact of wind farms need to be addressed in the next phases of wind energy development within specific projects, once the exact location, scale, technology, etc. of the proposed activity has been identified and mitigation measures taken (e.g., necessary buffer zones).

With regard to aquaculture, the plan gives priority to the balanced development of the sector in naturally suitable areas. In terms of environmental impact, aquaculture clearly distinguishes between the environmental impact of the classical (fish farming) and innovative (farming of algae and shellfish) aquaculture sectors, which also serve as a basis for guiding the use of marine areas towards protected areas. The most important impact of fish farms on the marine environment is the release of nutrients and the favoring of eutrophication, which results in a disturbance of the natural balance and, at worst, in the loss of biota and habitats near the farm. The impact of the fish farm can be mitigated by choosing the appropriate location, breeding scale, and intensity (described in more detail in chapter 4.1.5). Maritime Spatial Plan, therefore, directs the establishment of fish farms outside protected areas, but also into deeper and more open sea areas, where nutrients are dispersed more efficiently, and the impact on conservation values and the environment are minimized.

[53] NEMA project - "Inventory of Natural Values of Estonian Marine Areas and Development of Monitoring Methodology"; http://nema.bef.ee/en/

As potential new nature conservation areas in the exclusive economic zone, some areas which currently coincide with the area No 2 of development of wind energy provided in this plan are under consideration. Possible proposals for protected areas will be finalized by January 2021. The establishment of protected marine sites and preparation of conservation conditions must take into account additional operational constraints in order to balance the achievement of environmental protection objectives in the marine area, such as ensuring species protection at more representative locations, but also the objectives of the need to manage climate change.

The degree of accuracy of marine spatial planning minimizes the potential for adverse effects on protected natural objects. When implementing activities under the licensing process, it is possible to specify the impact and, if necessary, to apply environmental measures. The establishment of protected marine sites and preparation of conservation conditions must take into account additional operational constraints in order to balance the achievement of environmental protection objectives in the marine area, such as ensuring species protection at more representative locations, but the objectives of the need to manage climate change must also be met.

ENVIRONMENTAL MEASURES:

1. The more specific relevant impacts of wind areas shall be addressed in the subsequent stages of wind energy development in the framework of specific projects, once the exact location, volume, technology, etc. of the proposed activity has been identified and mitigation measures implemented (e.g., necessary buffer zones).

PROPOSALS FOR THE ACTION PLAN:

1. The effectiveness of existing protected areas and measures in the marine area has not been evaluated, and the coherence of the network has not been evaluated or taken into account. This would require a comprehensive analysis of the marine area.

4.3 EVALUATION OF NATURA 2000

In addition to the nationally protected natural objects, the planned area includes, in whole or in part, marine Natura 2000 sites. Natura 2000 is a Europe-wide network of protected areas which aims to ensure the conservation of rare or endangered birds, animals and plants and their habitats, or to restore, if necessary, the favorable status of threatened species and habitats across Europe. Natura 2000 sites of community importance and special protection areas have been designated pursuant to Council of Europe Directives 92/43 / EEC and 2009/147/EC. Possible direct and indirect impact on Natura sites have to be taken into account when planning activities with the plans.

The assessment of Natura is a process carried out in accordance with Article 6 (3) and (4) of the Habitats Directive 92/43/EEC. The assessment outlined in this work will be based on the following guidance documents:

- "Evaluation of plans and projects that have a significant impact on Natura 2000 sites. Methodological guidance for the interpretation of Article 6 (3) and (4) of the Habitats Directive" [54];
- "Guidelines for carrying out Natura 2000 assessments in the implementation of Article 6 (3) of the Habitats Directive in Estonia" (KeMÜ, updated 2017) [55];
- "Wind energy developments and Natura 2000" (European Union, 2011)[56].

The Natura assessment begins with the Natura pre-assessment phase, which aims to identify and determine the potential impact of a project or plan on a Natura 2000 site and to assess whether it is possible to objectively conclude that potential adverse impacts are excluded**. As Maritime Spatial Plan provides already for one of the new uses of the marine area for the development of wind energy, the likely impact on Natura 2000 sites is expected, and an appropriate assessment of Natura has been carried out.** In the case of plans with a higher level of generalization (as is the case with marine planning), Natura assessments will be carried out with the required level of precision, having regard to the degree of accuracy of the strategic planning document, which should allow identification of sensitive/threatened areas and conflicts/risks that need to be considered in future planning stages[57].

In the following, the impact of the Estonian MSP solution on the Natura 2000 network areas will be assessed according to the level of accuracy of the Maritime Spatial Plan.

- **Information on the planned activity**

The proposed activities are considered as the implementation of the Estonian Maritime Spatial Plan and the uses of the sea area covered by the spatial plan, guidelines, and conditions. The Plan gives a detailed overview of the planned activities.

- **Characterization of the Natura sites affected by the proposed activity**

The total area of Natura 2000 network areas in the Estonian marine area is 6787 km^2, which is 18.6% of the total marine area. Eighty-seven sites of community importance and 27 special protection areas overlap with the Estonian marine area to a greater or lesser extent. However, 31 of these sites of community importance and 21 special protection areas have conservation objectives directly related to the marine environment, as well as overlapping with the Estonian marine planning area. Figure 4.3-1 illustrates the location of the Natura special protection areas in the proposed marine area, and an overview of the areas is provided in Table 4.3-1. The table lists the areas of Natura sites that are within the planning area and lists marine habitats/species for conservation purposes.

[54] https://www.envir.ee/sites/default/files/naturam6ju_est.pdf

[55] https://www.envir.ee/sites/default/files/natura_m6ju_hindamis_juhis_2017-lopp.pdf

[56] https://ec.europa.eu/environment/nature/natura2000/management/docs/Wind_farms.pdf

[57] Assessment of plans and projects in relation with Natura 2000 sites. Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, FINAL DRAFT, September 2019.

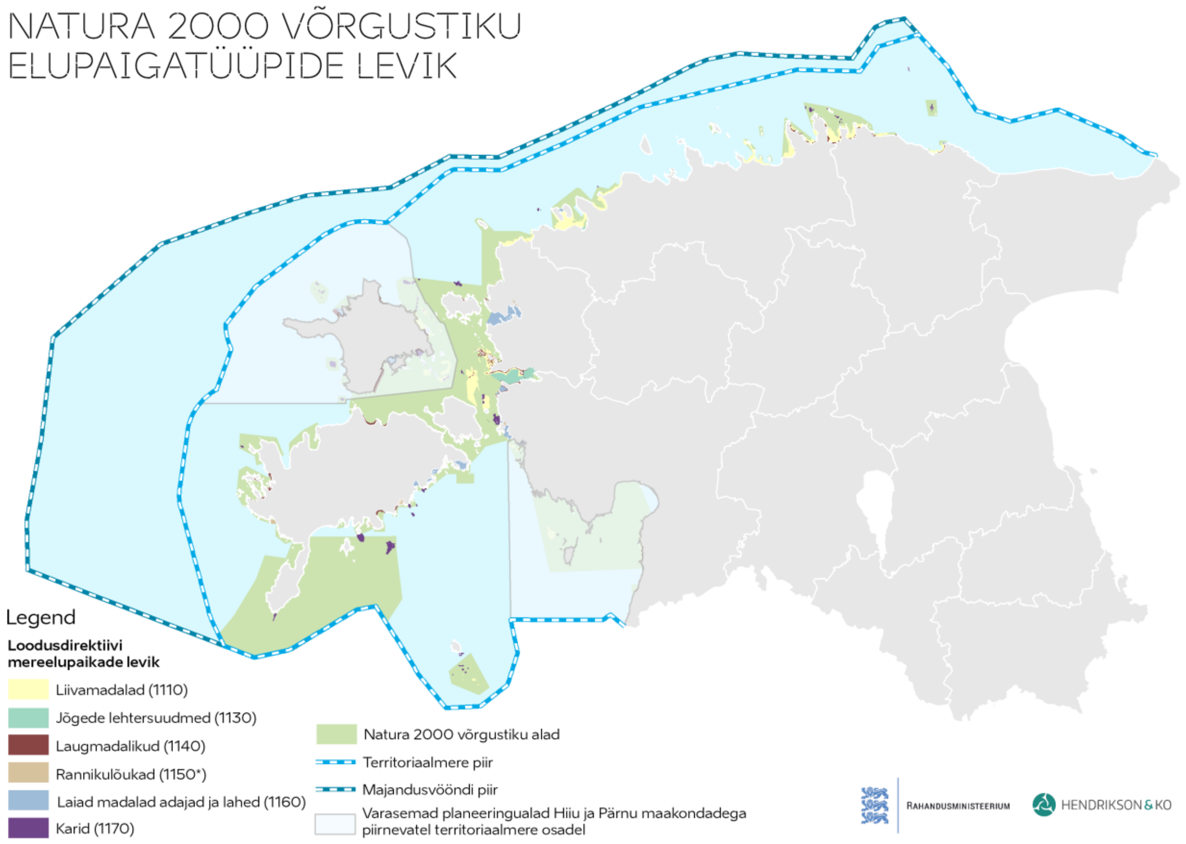

Figure 4.3-1 Location of Natura 2000 sites

Table 4.3-1 The Natura 2000 network includes all or part of the Natura 2000 network sites of community importance and special protection areas.

Name and code	area in the sea (km²)	Purpose of protection[58]
Allirahu Site of Community Importance EE0040402	20	Marine habitat types (1 pc): reefs (1170). Marine species (1 pc): Gray seal. *+ 1 coastal and land-based habitat type.*
Gretagrundi Site of Community Importance EE0040500	147	Marine habitat types (2): sandbanks (1110) and reefs (1170).
Kahtla-Kübassaare Site of Community Importance EE0040412	103	Marine habitat types (5): sandbanks (1110), sandy and muddy foreshore (1140), coastal lagoons (*1150), wide shallow bays (1160), reefs (1170) *+ 15 coastal and land-based habitat types.*
Kahtla-Kübassaare Special Protection Area EE0040412	103	39 bird species.

[58] List of Natura 2000 sites to be submitted to the European Commission as ordered(https://www.riigiteataja.ee/akt/304042017006?leiaKehtiv)

Name and code	area in the sea (km^2)	Purpose of protection[58]
Karala-Pilguse Site of Community Importance EE0040414	14	Marine habitat types (1 pc): coastal lagoons (1150). *+ 17 coastal and land-based habitat types and 1 species.*
Karala-Pilguse Special Protection Area EE0040414	14	11 bird species.
Kasti Bay Site of Community Importance EE0040418	27	Marine habitat types (5 pcs): sandbanks (1110), sandy and muddy foreshore (1140), coastal lagoons (*1150), wide shallow bays (1160), reefs (1170) *+ 10 coastal and land-based habitat types.*
Kasti Bay Special Protection Area EE0040418	27	8 bird species.
Kaugatoma-Lõu Site of Community Importance EE0040441	43	Marine habitat types (4 pcs): sandy and muddy foreshores (1140), wide shallow bays (1160), reefs (1170) *+ 13 coastal and land-based habitat types and 1 species.*
Kaugatoma-Lõu Bay Special Protection Area EE0040441	43	15 bird species.
Kaunispe Site of Community Importance EE0040420	0.02	Marine habitat types (1 pc): coastal lagoons (*1150). *+ 7 coastal and land-based habitat types.*
Kerju Site of Community Importance EE0040421	0.7	Marine species (1 pc): Gray seal. *+ 1 coastal and land-based habitat type.*
Kolga Bay Site of Community Importance EE0010171	22	Marine habitat types (3 pcs): underwater sandbanks (1110), coastal lagoons (*1150), reefs (1170). Marine species (1 pc): Gray seal. *+ 11 coastal and land-based habitat types.*
Kolga Bay Special Protection Area EE0010171	22	14 bird species.
Koorunõmme Site of Community Importance EE0040428	21	*+ 16 coastal and land-based habitat types and 2 species.*
Koorunõmme Special Protection Area EE0040428	21	3 bird species.
Krassi Site of Community Importance EE0010154	0.8	Marine habitat types (1 pc): reefs (1170). Marine species (1 pc): Gray seal. *+ 1 coastal and land-based habitat type.*
Irben Strait Special Protection Area EE0040434	1916	38 bird species.
Küdema Bay Site of Community Importance EE0040432	40	Marine habitat types (4 pcs): underwater sandbanks (1110),

Name and code	area in the sea (km²)	Purpose of protection[58]
		coastal lagoons (*1150), wide shallow bays (1160), reefs (1170). Marine species (1 pc): river lamprey. *+ 15 coastal and land-based habitat types and 3 species.*
Küdema Bay Special Protection Area EE0040432	40	12 bird species.
Lahemaa Site of Community Importance EE0010173	269	Marine habitat types (5): underwater sandbanks (1110), sandy and muddy foreshores (1140), coastal lagoons (* 1150), wide shallow bays (1160), reefs (1170). Marine species (4 pcs): spined loach, European bullhead, river lamprey, salmon. *+ 43 coastal and land-based habitat types and 8 species.*
Lahemaa Special Protection Area EE0010173	269	65 bird species.
Laulasmaa Site of Community Importance EE0010122	0.02	Marine habitat types (1 pc): coastal lagoons (1150). *+ 6 coastal and land-based habitat types and 1 species.*
Letipea Site of Community Importance EE0060231	5	Marine habitat types (5 pcs): underwater sandbanks (1110), sandy and muddy foreshores (1140), wide shallow bays (1160). *+ 4 coastal and land-based habitat types.*
Mullutu-Loode Site of Community Importance EE0040443	0.1	Marine habitat types (1 pc): coastal lagoons (1150). *+ 14 coastal and land-based habitat types and 3 species.*
Mullutu-Loode Special Protection Area EE0040444	7.4	34 bird species.
Nõva-Osmussaare Site of Community Importance EE0040201	219	Marine habitat types (5): underwater sandbanks (1110), sandy and muddy foreshores (1140), coastal lagoons (* 1150), wide shallow bays (1160), reefs (1170). Marine species (2 pcs): European bullhead, river lamprey *+ 28 coastal and land-based habitat types and 2 species.*
Nõva-Osmussaare Special Protection Area EE0040201	219	17 bird species.
Pakri Site of Community Importance EE0010129	173	Marine habitat types (5 pcs): underwater sandbanks (1110), river estuaries (1130), coastal lagoons

Name and code	area in the sea (km^2)	Purpose of protection[58]
		(*1150), wide shallow bays (1160), reefs (1170). *+ 17 coastal and land-based habitat types and 5 species.*
Pakri Special Protection Area EE0010129	173	18 bird species.
Paljassaare Special Protection Area EE0010170	1.4	44 bird species.
Pammana Site of Community Importance EE0040452	9	Marine habitat types (1 pc): coastal lagoons (1150). *+ 10 coastal and land-based habitat types.*
Prangli Site of Community Importance EE0010126	9	Marine habitat types (2 pc): coastal lagoons (*1150) and reefs (1170). *+ 11 coastal and land-based habitat types.*
Riksu Site of Community Importance EE0040461	17	Marine habitat types (1 pc): coastal lagoons (1150). *+ 11 coastal and land-based habitat types.*
Riksu Coast Special Protection Area EE0040461	17	8 bird species.
Ruhnu Nature Conservation Area EE0040462	0.9	Marine habitat types (1 pc): wide shallow bays (1160). *+ 14 coastal and land-based habitat types.*
Siiksaare-Oessaare Site of Community Importance EE0040469	18	Marine habitat types (5): underwater sandbanks (1110), sandy and muddy foreshores (1140), coastal lagoons (* 1150), wide shallow bays (1160), reefs (1170). *+ 14 coastal and land-based habitat types.*
Siiksaare-Oessaare bays Special Protection Area EE0040469	18	41 bird species.
Sutu Bay Site of Community Importance EE0040472	17	Marine habitat types (3pcs): sandy and muddy foreshores (1140), coastal lagoons (*1150), wide shallow bays (1160) *+ 10 coastal and land-based habitat types.*
Sutu Bay Special Protection Area EE0040472	17	9 bird species.
Suurupi Site of Community Importance EE0010140	0.1	*+ 12 coastal and land-based habitat types and 2 species.*
Tagamõisa Site of Community Importance EE0040476	85	Marine habitat types (2 pcs): coastal lagoons (*1150), reefs (1170). Marine species (1 pc): Gray seal. *+ 25 coastal and land-based habitat types and 3 species.*

Name and code	area in the sea (km²)	Purpose of protection[58]
Tagamõisa Special Protection Area EE0040476	85	20 bird species.
Toolse Site of Community Importance EE0060271	3	Marine habitat types (2 pcs): underwater sandbanks (1110), wide shallow bays (1160). Marine species (1 pc): river lamprey. *+ 5 coastal and land-based habitat types and 1 species.*
Toolse Special Protection Area EE0060271	3	6 bird species.
Uhtju Site of Community Importance EE0060220	24	Marine habitat types (1 pc): reefs (1170). Marine species (2 pcs): Gray seal, ringed seal. *+ 1 coastal and land-based habitat type.*
Vaindloo Special Protection Area EE0060270	0.7	6 bird species.
Vesitükimaa Site of Community Importance EE0040490	8	Marine habitat types (1 pc): reefs (1170). Marine species (1 pc): Gray seal. *+ 11 coastal and land-based habitat types and 1 species.*
Vilsandi Site of Community Importance EE0040496	123	Marine habitat types (4): underwater sandbanks (1110), sandy and muddy foreshores (1140), coastal lagoons (*1150), wide shallow bays (1160). Marine species (2 pc): Gray seal, river lamprey. *+ 14 coastal and land-based habitat types and 4 species.*
Vilsandi Special Protection Area EE0040496	123	13 bird species.
Väike Site of Community Importance EE0040486	140	Marine habitat types (3 pcs): underwater sandbanks (1110), coastal lagoons (*1150), wide shallow bays (1160). Marine species (1 pc): ringed seal. *+ 15 coastal and land-based habitat types and 3 species.*
Väinameri Site of Community Importance EE0040002	2106	Marine habitat types (6 pcs): underwater sandbanks (1110), river estuaries (1130), sandy and muddy foreshores (1140), coastal lagoons (*1150), wide shallow bays (1160), reefs (1170). Marine species (6 pcs): Gray seal, ringed seal, spined loach, European bullhead, river lamprey, European weatherfish. *+ 32 coastal and land-based habitat types and 17 species.*

Name and code	area in the sea (km^2)	Purpose of protection[58]
Väinameri Special Protection Area EE0040001	2255	76 bird species.

- **The relevance of the proposed activity to the management of protection**

The proposed activities in the Maritime Spatial Plan are neither related nor necessary to the management of any Natura 2000 site and do not contribute directly or indirectly to the conservation objectives of the sites.

- **Assessment of likely adverse impacts on the integrity of Natura sites and achievement of conservation objectives and design of mitigation measures**

The spatial solution of the plan and the guidelines and conditions set out in the Plan are the basis for the prediction of the impact of the uses of the sea on the Natura 2000 network.

The principle of not targeting marine uses to Natura 2000 sites have been applied in the development of the Maritime Spatial Plan. For many uses (fisheries, aquaculture, maritime transport, maritime rescue, pollution control, border control, seabed infrastructure, maritime tourism and recreation, nature conservation, marine culture, national defense, mineral resources and dumping), the Maritime Spatial Plan does not foresee significant **spatial changes** and sets out the conditions and guidelines for the next steps of the proposed action. Targeting activities outside Natura 2000 sites will help prevent potential direct impact (e.g., physical alteration or destruction of habitats, etc.) onsite conservation objectives. The table below gives an estimate of the impact of the implementation of the Maritime Spatial Plan by activity.

Table 4.3-2 Estimated impact of proposed activities on Natura 2000 sites

The use of the marine area	Content designed by the plan	Appropriate assessment of Natura	Design of mitigation measures and recommendations for next steps
Aquaculture (fish farming; algae and shellfish farming)	The Maritime Spatial Plan does not designate spatial areas suitable for fish farming and algae and shellfish farming, as the technology of offshore fish farms and algae and shellfish farming is still in the development stage and therefore, the designation of suitable spatial areas may unduly restrict the development of a blue economy that respects environmental conditions. The establishment of fish farms and algae and shellfish farms in unsuitable areas determined by the planning solution must be avoided. The development of fish farms and algae and shellfish farming is guided through guidelines and conditions.	In terms of environmental impact, aquaculture clearly distinguishes between the environmental impacts of the classical (fish farming) and innovative (algae and shellfish farming) aquaculture sectors, which are also the basis for directing the use of marine areas regarding protected areas, including the Natura special protection areas. The main impacts of fish farms on the marine environment are the release of nutrients and the promotion of eutrophication, which can lead to changes in the natural balance. At the same time, shellfish and algae farming can remove nutrients from the marine environment and their impact is rather to reduce the level of eutrophication. The impact of the farm can be mitigated through appropriate site selection. The Maritime Spatial Plan directs the establishment of fish farms outside protected natural areas, including Natura 2000 network areas, as well as into deeper and more open sea areas, where nutrients are better dispersed and impacts on conservation values and the environment are minimal - therefore, the so-called unsuitable areas for fish farming have been designated. In the level of precision of the Maritime Spatial Plan, the chances of adverse impacts on the Natura special protection areas and their protection objectives have been minimized through the conditions and guidelines set for the implementation of the Plan. When implementing activities within the licensing process, it is necessary to specify the impacts and, if necessary, to implement environmental measures.	In the case of planning for fish farms and/or algae and shellfish farming, the environmental impacts of the location and/or technical solutions proposed in the project solution must be specified in the licensing process and a Natura assessment must be carried out if necessary. Adverse impact on the conservation objectives of the Natura 2000 site must be ruled out during the implementation of the proposed activity and as a result of the Natura assessment (and through the implementation of the

The use of the marine area	Content designed by the plan	Appropriate assessment of Natura	Design of mitigation measures and recommendations for next steps
			mitigation measures proposed therein).
Maritime transport	The Maritime Spatial Plan reflects the fairways published in the navigation information and determines the water traffic areas on the basis of the main ship traffic directions and the current traffic density.	As the implementation of the Plan does not change the existing situation, no impact on Natura sites is expected during the implementation of the Plan.	-
Maritime rescue, pollution control, state border guarding	The plan determines Ship to Ship or STS areas (3) for loading goods and related state border control. The designated STS areas are located near Tallinn and at least 8 km from the marine areas of the Natura 2000 network.	Natura sites are not within the scope of the activity. In other respects, the plan does not envisage any changes in these areas, and therefore the implementation of the plan does not have the expected impact on Natura sites.	-
Energy production (wind energy, including cable connections)	The Plan identifies areas suitable for the development of wind energy, which, among other things, take into account the areas of the Natura 2000 network: wind energy development areas are directed outside Natura special protection areas and sites of community importance. The Plan also determines conceptual locations of the cable corridors for the connection of the planned wind farms to the onshore transmission network, which will be directed outside the Natura 2000 network areas if possible. Natura assessments have been carried out in the marine area for the conceptual locations of the cable corridors. The Plan determines the conditions necessary for the establishment of connections on the land.	The exclusion of spatial overlaps of areas suitable for the development of wind energy with Natura sites excludes any direct impact on the conservation objectives of Natura sites (see Figure 4.3-2). When planning a wind farm near a Natura site, temporary/indirect impacts may also occur in some cases, e.g., temporary impacts on nature species/habitats during construction (suspended solids, disturbance) The temporary impacts can be mitigated, if necessary, by clarifying the exact details of the activity within the project solution. The Maritime Spatial Plan envisages the development of wind energy outside the special protection areas of the Natura 2000 network and thus excludes adverse impact within the Natura areas. However, given the mobile lifestyle of birds (e.g., migration), adverse impacts (obstacles/deaths during migration, etc.) on special protection areas, their coherence and impact to the birds can in some cases, also occur in case of wind turbines planned outside Natura sites. At the strategic planning level, the main option for minimizing the impact on birds in the process of selecting suitable areas for the development of wind energy is selection of location - development of wind energy is preferred in areas with low ornithological value, which will help minimize cumulative impacts on birds and maintain the coherence of Natura 2000 sites. As a result, the maritime spatial planning process	When developing wind energy areas, the environmental impacts of the location and/or technical solutions proposed in the project solution must be specified in the licensing process and, if necessary, a Natura assessment must be carried out. Adverse impact on the conservation objectives of the Natura 2000 site must be ruled out during the

The use of the marine area	Content designed by the plan	Appropriate assessment of Natura	Design of mitigation measures and recommendations for next steps
		included an analysis of bird staging areas and migratory routes, the results of which indicate that planned wind energy development areas 1 and 2 are located outside marine areas sensitive to birds (which are, to the best of our knowledge, the most important areas for birds staging offshore and/or flying over the sea). Wind energy area No. 3 is partly overlapping with the bird-sensitive Hülgerahu area, which is especially important as a spring migration and wintering place for waterfowl. (In this area it is important to ensure the possibility of migration at the same time ensuring the coherence of the Natura special protection areas). The choice of location of wind energy development areas (areas no. 1 and 2), outside Natura areas and also in the least spatially conflicting areas for birds minimizes the possibility of adverse impact on the conservation objectives of Natura 2000 special protection areas. Consideration of bird-sensitive areas in the choice of the area also minimizes the cumulative impacts and contributes to maintaining a coherent Natura 2000 network. However, wind energy but it is outside Natura 2000 sites and thus excludes adverse impact within the areas. In the further development of Area 3, suitable locations for wind farms, technology, etc. must be found for the development of the wind farm, which would exclude direct and indirect impacts on the conservation objectives of the Natura 2000 network. The initial basic cable connections in the marine area proposed by the Plan for wind farms are planned mostly outside the Natura network areas. However, in some cases the cables still pass through Natura sites (Figure 4.3-2): • a cable corridor from wind energy development area No 1 to Virtsu passes through the **Väinameri Sea Site of Community Importance and Special Protection Area** in a marine section of *ca.* 5 km; • a prospective cable corridor from wind energy development area No 2 to Latvia passes through the **Irben Strait Special Conservation Area** in a marine section of *ca.* 28 km; • The cable corridor from wind energy development area No 2 through Saaremaa to the coast of Pärnu County to Jaagupi or Haapsi villages passes through the **Kaugatoma-Lõu Site of Community Importance**	implementation of the proposed activity and as a result of the Natura assessment (and through the implementation of the mitigation measures proposed therein).

The use of the marine area	Content designed by the plan	Appropriate assessment of Natura	Design of mitigation measures and recommendations for next steps
		and the **Kaugatoma-Lõu Bay Special Protection Area** over a few hundred meters and the **Irbe Strait Special Protection Area** in the marine section of about 17 km. The impact of laying cables on these areas are specified in the following section.	
Seabed infrastructure	The plan will take into account existing seabed infrastructure but will not design any new infrastructure (except for the proposed cable corridors for the connection of wind energy development areas, which will be discussed under wind energy development). Otherwise, the implementation of the plan will not entail any changes, and the status quo will be maintained.	The plan does not envisage any changes to the existing seabed infrastructure, and therefore no impact on Natura sites is expected when the plan is implemented.	In the case of seabed infrastructure, planned on the basis of the conditions and guidelines of the Plan, the impact of any planned activity must be assessed in the licensing process and adverse impacts on the conservation objectives of the Natura 2000 site must be ruled out.
Sea tourism and recreation	The plan does not determine the development areas for sea tourism and recreation. The implementation of the plan will not bring about any significant changes but will set guidelines and conditions for the development of the sector.	As the implementation of the plan will not change the existing situation, no impact on Natura sites is expected when the plan is implemented.	-
Protected natural objects	No additional protected natural objects are planned in the Maritime Spatial Plan. The plan takes into account the existing and designed network of protected areas.	The plan does not change the status of the protected natural objects, and therefore no impact on the Natura sites is expected when the plan is implemented. The consideration of the existing network of protected areas indirectly contributes to the protection of Natura sites, as the protection of Natura 2000 sites is also ensured through the national site protection regime.	-

The use of the marine area	Content designed by the plan	Appropriate assessment of Natura	Design of mitigation measures and recommendations for next steps
Marine culture	Marine spatial planning does not determine specific areas of marine culture due to the degree of generalization.	As the implementation of the plan will not change the existing situation, no impact on Natura sites is expected when the plan is implemented.	-
Cultural monuments[59]	As regards cultural monuments, the Maritime Spatial Plan does not envisage any changes, and the status quo is maintained.	As the implementation of the plan will not change the existing situation, no impact on Natura sites is expected when the plan is implemented.	-
National defense	Maritime Spatial Plan takes into account the spatial needs of national defense, but the plan itself does not envisage changes, but sets guidelines and conditions for the development of the area.	As the implementation of the plan will not change the existing situation, no impact on Natura sites is expected when the plan is implemented.	In the case of national defense objects planned on the basis of the conditions and guidelines of the Plan, the impacts associated with the proposed activity must be assessed each time in the licensing process and adverse impacts on the conservation objectives of the Natura 2000 site must be ruled out.
Mineral resources	No new deposits are planned with the Maritime Spatial Plan, the important to ensure that existing mineral resources remain minable is pointed out.	As the implementation of the plan will not change the existing situation, no impact on Natura sites is expected when the plan is implemented. At the same time, the plan leaves room for the creation of new deposits.	When creating new deposits, preference should be given to areas outside the

59 When supplementing the plan solution in May 2020, the National Heritage Board proposed to designate preservation areas for underwater wrecks in the Maritime Spatial Plan. The areas were specified in June 2020. An impact assessment of the sites will be carried out in July-August 2020.

The use of the marine area	Content designed by the plan	Appropriate assessment of Natura	Design of mitigation measures and recommendations for next steps
			Natura 2000 network. In carrying out the proposed activity, the accompanying impacts must be assessed and adverse impacts on the conservation objectives of the Natura 2000 site must be ruled out.
Dumping	No new dumping areas are planned with the maritime plan. Priority shall be given to the use of existing dumping areas.	As the implementation of the plan will not change the existing situation, no impact on Natura sites is expected when the plan is implemented. At the same time, the plan leaves room for the creation of new dumping areas.	When creating new dumping areas, preference should be given to areas outside the Natura 2000 network. In carrying out the proposed activity, the accompanying impacts must be assessed and adverse impacts on the conservation objectives of the Natura 2000 site must be ruled out.
Permanent Connections	The plan does not envisage any new permanent connections, and the existing situation is maintained.	As the implementation of the plan will not change the existing situation, no impact on Natura sites is expected when the plan is implemented.	-

Conceptual locations of the cable corridors from wind energy development areas

The Maritime Spatial Plan will determine the conceptual locations of the cable corridors to the proposed wind farms. These proposed cable corridors (200 m wide) illustrate the potential for connecting wind farms and have been evaluated according to the degree of accuracy of the Strategic Planning Document. In the case of specific development projects, the locations of the cable corridors may change, and their impact will need to be assessed during the licensing procedure, together with the design of wind farms. The principal cable corridors for the Maritime Spatial Plan solution are generally located so that they do not cross Natura 2000 network sites, but in some locations, this was not possible. The proposed cable corridors will pass through the Väinameri Special Protection Area and Site of Community Importance, the Irben Strait Special Protection Area, Kaugatoma-Lõu Bay Site of Community Importance, and the Kaugatoma-Lõu Bay Special Protection Area (see Figure 4.3-2), therefore, an appropriate Natura assessment will be carried out in the marine area for the conceptual locations of the cable corridors.

The conditions necessary for the establishment of cable connections have been set for the land as a proposal for a planned solution. One of the conditions is that significant adverse impacts on protected sites during construction and operation of both the overhead line and the underground cable line and adverse impacts on the conservation objectives of the Natura 2000 site must be ruled out by finding a suitable location and technical solution.

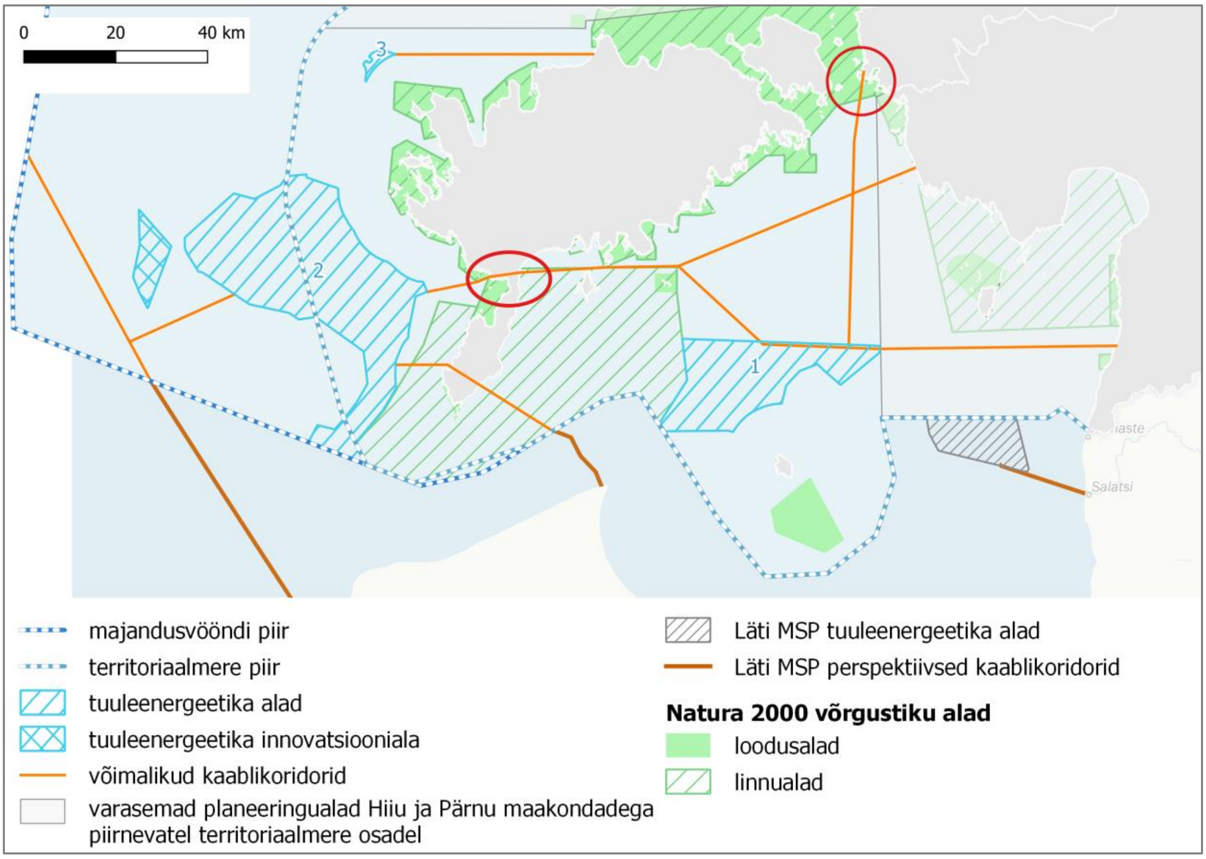

Figure 4.3-2 Natura 2000 network and planned wind energy development areas with possible cable connections in November 2019 (red circles indicate locations where the cable passes through sites of community importance)

Cable laying is expected to have a temporary and local impact. The impact is generally limited in time to the construction period and spatially on the seabed, its habitats, vegetation, and species at a particular location. Therefore, the sites of community importance through the areas of cables are passed through are located within the area affected by the laying of seabed cables. The impact on birds of the laying of cables buried in the seabed (or soil) is not considered significant, and therefore the impact on special protection areas is expected to be marginal and does not require further consideration in this assessment.

Given the scope and nature of the cable laying, Table 4.3-3 provides a more detailed assessment of the impact on the Natura Site of Community Importance that the potential cable corridors pass through.

Table 4.3-3 Probable adverse impacts on Natura 2000 network sites of community importance

Natura 2000 sites	Protection objectives	Identification of impacts	Mitigation measures	Conclusion of the Natura assessment
Väinameri Sea Site of Community Importance EE0040002	Marine habitat types (3 pcs): sandy and muddy foreshores (1140), wide shallow bays (1160), reefs (1170) Marine species (6 pcs): Gray seal, ringed seal, spined loach, European bullhead, river lamprey, European weatherfish. Land and coastal habitat types at the proposed cable location (3 pcs): Small islands and wide (1620), coastal meadows (*1630), alvars - *6280).	The potential cable corridor is planned from the wind energy development area No 1 to Virtsu and passes through the Väinameri Sea Site of Community Importance in the section of *ca* 5 km in the sea and to a small extent also on the land (islets, the coast). There will be no registered places of finding of any of the protected species, nor marine protected habitats along the cable corridor. At the same time, the corridor passes through coastal habitats (including priority habitat types) in the site of community importance (Figure 4.3-3) regarding which adverse impacts (e.g. reduction in area) cannot be excluded.	In order to avoid adverse impact, this assessment proposes to shift the underwater cable corridor so that it does not overlap with the conservation objectives of the nature area, see Figure 4.3-3, which shows the location of the alternative cable corridor	According to the proposal to shift the underwater cable corridor, Figure 4.3-3, the plan solution has been adjusted and a direct impact on the conservation objectives of the Väinameri nature area has been ruled out. The details of the cable construction (location/technical solution, etc.) will be specified in the context of specific project solutions, which will also specify the nature, scale and scope of the impact at the local level. Adverse impacts on Natura 2000 sites can be ruled out through appropriate technical solution and site selection when laying cables.
Kaugatoma-Lõu Site of Community Importance EE0040441	Marine habitat types (4 pcs): sandy and muddy foreshores (1140), wide shallow bays (1160), reefs (1170) Land and coastal habitat types at the proposed cable location (2 pcs): coastal meadows (*1630), alvars - *6280).	The potential cable corridor is planned from wind energy development area no. 2 through Saaremaa to the coast of Pärnu County in the village of Jaagupi or Haapsi and it will pass through Kaugatoma-Lõu Site of community importance on a few hundred meter section of the sea and land. There will be no registered place of finding of any of the protected species of the special area of conservation nor marine protected	In order to avoid adverse impacts, it is proposed to shift the underwater cable corridor so that it does not overlap with the conservation objectives of the nature area, see Figure 4.3-4 showing the location of the alternative cable corridor.	According to the proposal to shift the submarine cable corridor, Figure 4.3-4, the plan solution has been adjusted and a direct impact on the protection objectives of the Kaugatoma-Lõu nature area has been ruled out. The details of the cable construction (location/technical solution, etc.) will be specified in the context of specific project solutions, which will also specify the nature, scale, and scope of the impact at the local

Natura 2000 sites	Protection objectives	Identification of impacts	Mitigation measures	Conclusion of the Natura assessment
		habitats along the cable corridor. At the same time, the corridor passes through two coastal habitats of the site of community importance (Figure 4.3-4) regarding which emergence of adverse impacts (e.g., reduction in area) cannot be excluded.		level. Adverse impact on Natura 2000 sites can be ruled out through appropriate technical solution and site selection when laying cables.

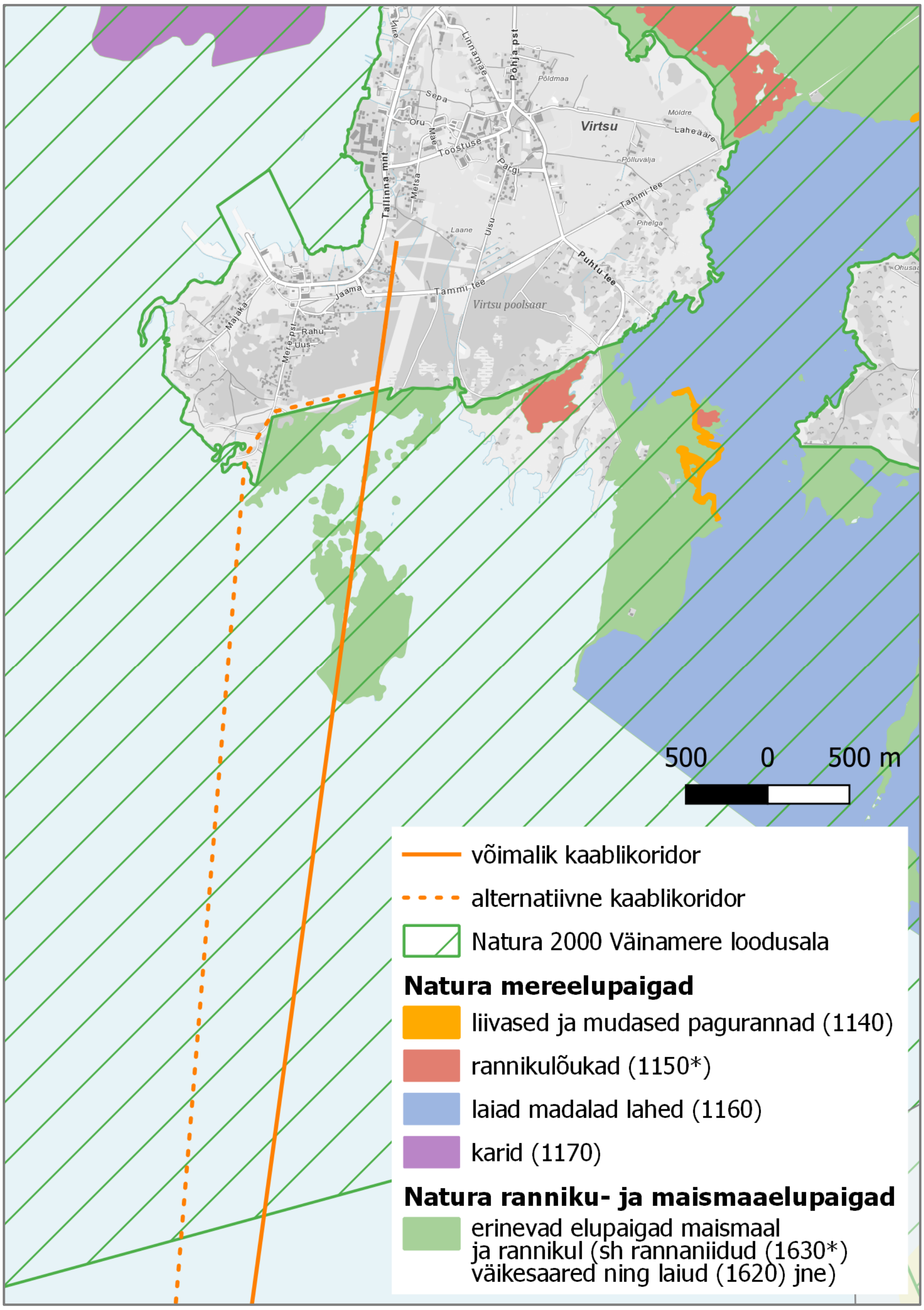

Figure 4.3-3 Planned location of the cable corridor and proposal for its displacement in the Väinameri Sea Site of Community Importance.

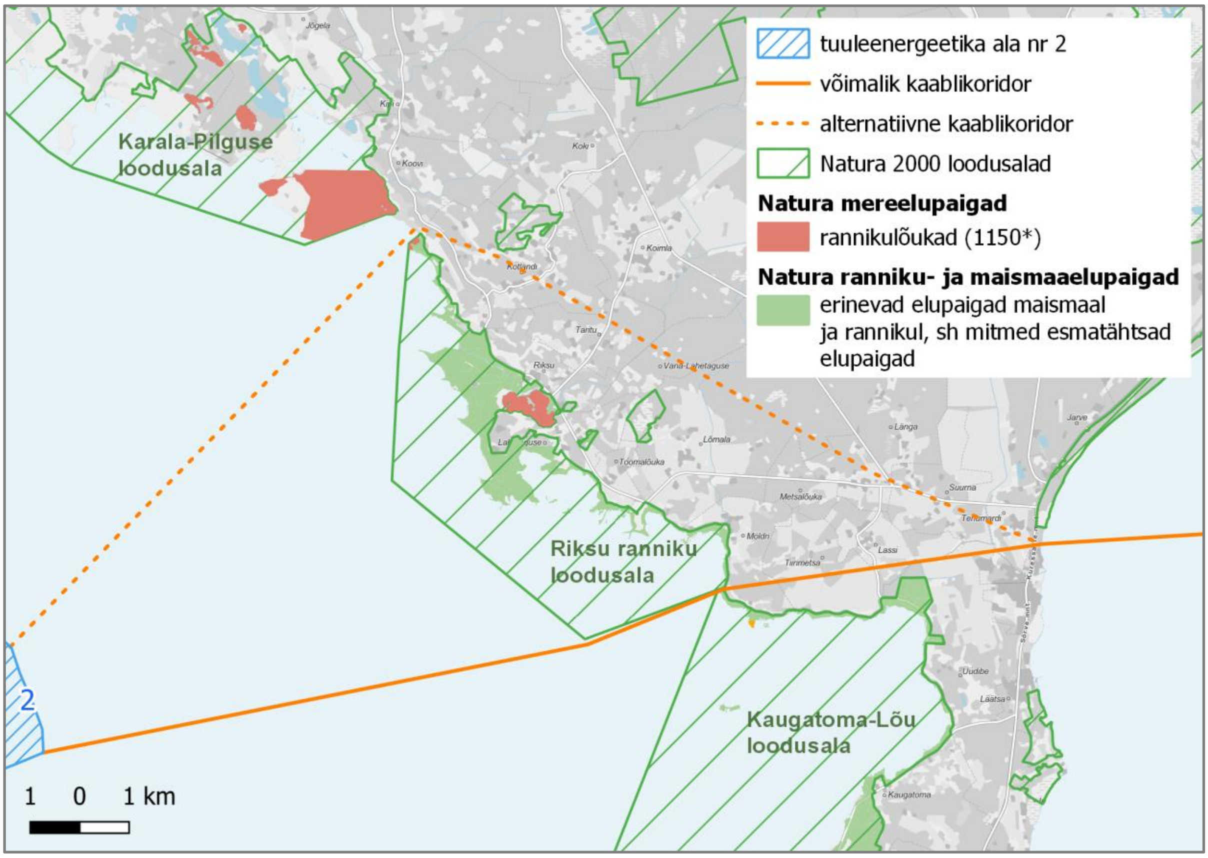

Figure 4.3-4 Proposed location of the cable corridor in the Kaugatoma-Lõu Site of Community Importance and proposal to move the cable to an alternative location

- **Results and conclusion of the Natura assessment**

The Estonian Maritime Spatial Plan addresses several uses of the sea, which do not envisage any spatial changes (or significant spatial changes) to the existing situation; therefore, it can be said that the implementation of the plan does not lead to a different situation for Natura 2000 sites. Such uses of the sea include fisheries; aquaculture; maritime transport; maritime rescue, pollution control, border guarding; seabed infrastructure; marine tourism and recreation; protected natural objects; marine culture; cultural monuments; National defense; mineral resources; dumping; permanent connections. **These uses do not have an adverse impact on Natura 2000 sites and conservation objectives when implementing the plan, in case the conditions and guidelines laid down for that purpose are complied with.**

However, the occurrence of potential adverse impacts must be considered on a case-by-case basis for each of the identified uses during the lower-level planning and project phase. In order to avoid adverse impacts, further analysis of a specific project is needed, taking into account the specific locations and capacities of the facilities, technology, etc. (e.g., EIA, preliminary assessment, specific studies).

However, energy production is a field where new areas and conditions of use are defined more precisely in certain marine areas. Three wind energy development areas, wind energu innovation area and prospective cable corridors will be identified. The spatial design of the Maritime Spatial Plan has been developed, taking into account the location of Natura 2000 sites in order to ensure the favorable status of the sites and their conservation objectives. Possibility of impact in terms of the cables buried in the seabed/soil passing through Natura sites (Väinameri Sea and Kaugatoma-Lõu sites of community importance) were further assessed, and it was proposed to change the locations of the cables in order to avoid adverse impacts. This proposal was accepted. In view of the proposals to change the locations of the cables, the **implementation of the Maritime Spatial Plan** does not **foresee any adverse impacts on Natura 2000 sites or their conservation objectives**.

The degree of accuracy of the Maritime Spatial Plan (lacking detailed information on the locations/technical solutions of the proposed activities, etc.) does not foresee any adverse impacts on Natura 2000 sites or their conservation objectives, taking into account the conditions and guidelines laid down in the plan and the environmental measures provided for in this Impact Assessment to the licensing level.

As a result of the Natura assessment, we recommend location alternatives for marine cables in the new proposed corridors to exclude impacts on Natura 2000 sites and their conservation objectives, and to exclude the impact of the planning solution on Natura 2000 conservation objectives. The details of the cable construction (location/technical solution, etc.) will be specified in the context of specific project solutions, which will also specify the nature, scale and scope of the impact at the local level. Adverse impacts on Natura 2000 sites can also be ruled out through appropriate technical solutions and site selection, but this requires a more detailed assessment at the licensing stage.

ENVIRONMENTAL MEASURES:

1. In the case of activities planned in the Maritime Spatial Plan, in particular the development of wind farms, the establishment of fish farms and/or dumping, the environmental impacts associated with the location and/or technical solutions must be specified during the licensing process and, if necessary, Natura assessment should be carried out. Adverse impacts on the conservation objectives of the Natura 2000 site must be ruled out during the implementation of the proposed activity and as a result of the Natura assessment (and through the implementation of the mitigation measures proposed therein). The likelihood of possible adverse impact can be prevented and further reduced by directing development in the next stages (projects) by taking into account Natura conservation objectives and, where appropriate, implementing mitigating measures.
2. In the case of specific development projects, the locations of the cable corridors may change, and their impact will need to be assessed in the licensing procedure, together with the design of wind farms. At project level, suitable cable locations, technologies, etc. that have no significant impact on the integrity of the Natura 2000 site and the site's conservation objectives shall be identified.

4.4 SOCIAL AND CULTURAL ENVIRONMENT

4.4.1 Impact on socio-cultural needs and well-being

4.4.1.1 Starting points for socio-cultural impact assessment

The assessment of the impact on the social and cultural environment is inherently very closely linked to the development of a planning solution. The inherent part of planning is the shaping of the social and cultural environment, which makes it sometimes difficult to distinguish between planning and impact assessment. Due to the above, this chapter differs from the rest in its structure, and specific planning concepts are also presented. This approach, while different from the rest of the report, is necessary to convey the logic of impact assessment. In the field of social and cultural influences, there is no single standard; the involvement of different stakeholders is important. It is also important that people perceive changes in social and cultural environments differently, i.e., it is difficult to predict the nature and intensity of the impact.

The Estonian marine area fulfills a wide range of social and cultural needs and has a direct and indirect impact on human well-being. The sea offers a variety of resources for human well-being or opportunities stemming from the marine environment. This has led to the emergence of various uses of the sea: from traditional, such as shipping and shipbuilding, fishing to various recreational and sporting facilities, and the emerging blue economy sectors.

There are also very different cultural values associated with the Estonian marine area: material values (e.g., wrecks) and intangible values - historical-cultural, aesthetic, and identity values. Cultural values may or may not have direct economic or livelihood benefits, supporting identity, self-fulfillment, a sense of place, and the quality of the living environment in a wider sense.

Because the sea offers a wide range of benefits, user groups also differ in their social and cultural needs and values. They can also be considered as different communities of marine culture for the purposes of impact assessment. Estonian marine culture is created by a wide variety of marine areas and coastal users - fishermen, shipbuilders, vacationers, surfers, divers, recreational craft owners, and others. Today's Estonian marine culture is therefore also diverse: besides traditional shipping and fishing, and coastal lifestyle, new communities have emerged that have an equal interest in the use of the sea and the coast. With the increase in uses of the sea, the number of different marine culture communities and the pressure on the use of the sea and the coast is increasing. In the context of the assessment of the social and cultural impact of the marine area, the consideration of different interests and the sharing of the marine area are thus important issues.

The results of the cultural mapping of the Estonian coastal and marine area show that the entire Estonian coast is valuable in one way or another (see figures in Annex 2 to the report) - sparsely populated coastal areas are of natural and/or culturally valuable nature, recreational services and social infrastructure (such as community centers, shipbuilding sites, but also museums) that carry local marine culture are concentrated in coastal villages and towns. The coastal sea contains valuable landscapes (e.g., Neugrund Bank), wreckage areas, and marine areas used for water sports. What is planned in the marine area has a direct or indirect impact on the preservation of these values and uses and, thus, on the interests of the user groups. The Impact Assessment addresses the impact on the broader public interest (including international interest) as well as, where appropriate, on the narrow interest of the user group. Alongside the wider public interest, it is also important to consider the interests of local communities, whose well-being, income, and identity are directly dependent on what is planned in the marine area[60].

Regionally, the specific marine culture of a region and the interest of communities in a particular marine area depend on both the natural features and the historical background of the coastal sea: for example, the relatively shallow and warm sea of Lääne County offers somewhat different sea uses than the relatively cold sea coast of Ida-Viru County. The different nature of the marine area (e.g., wind conditions, salinity, ice cover, etc.) will, among other things, allow or limit new marine uses planned by the plan. The activities planned in the Maritime Spatial Plan will, therefore, where appropriate, also assess the regional socio-cultural impact (in addition to the coastal/marine area level) in addition to the overall impact.

[60] The need to distinguish between general public and local interests stems from the fact that certain users are more connected to the coast and the sea on a daily basis than others - e.g., vacationers use the marine area/coast occasionally, summer holidaymakers use it seasonally, etc. Thus, the dependence of different user groups on the marine area also varies. Due to the degree of accuracy of Maritime Spatial Plan, it is important to consider impact in the key of *general interest-user interest* and *the general interest-local interest*.

As the proposed activities in the marine area can take place on the surface, in the water column or on the seabed, where appropriate, the location of socio-cultural[61] impact will be highlighted.

Impact of the MSP

The plan has an overall positive long-term impact. The thoughtful development agreed upon in the plan as a guideline and condition will allow the expansion and sustainable management of the use of the sea. Positive impacts will be based on the well-thought-out opportunities for the sustainable development of new blue economy sectors such as aquaculture and wind energy. The plan values the marine culture and gives it a wider resonance. When designing a planning solution, the prevention or mitigation of significant adverse impacts has already been taken into account by setting conditions to prevent a negative impact (e.g., grouping, 12 km, etc.). The following sections of the Impact Assessment contain, where appropriate, proposals that mitigate and amplify impact from a socio-cultural perspective. See chapter 4.2 of the MSP for an overview of the consideration of the proposals.

In order to increase the positive impact, the socio-cultural impact assessment identifies three general issues that should be addressed when supplementing the planning solution. More detailed recommendations for supplementing the planning solution are given in the thematic subchapters.

- One of the key issues in the Maritime Spatial Plan is the combined use of the marine space, which can range from tolerating the different uses to synergistic combined use. The combined use of the marine area is also a new trend in terms of more general approaches and practices. According to the Muses project (*Multi-Use in European Seas*, 2018[62]), the success of proposed combined uses will depend on a thorough analysis of interactions, funding models and support mechanisms, and the responsiveness of coastal communities for new uses, etc. From the standpoint of assessing the socio-cultural impact, the role of Maritime Spatial Plan is to highlight possible synergies at the national level, while also taking a helpful starting point.
- Enabling the plan. The Maritime Spatial Plan, as a national spatial plan, focuses primarily on major developments in new uses of the sea. In the case of new uses of the sea, which can also be developed closer to the coast, it is advisable to state this clearly. For example, the planning could consider promoting the development of local small-scale distributed energy solutions.
- Planning that supports innovation. Areas of the blue economy are rapidly evolving in terms of technology and institutional, financial, and other aspects, which can make it difficult in the plans to take into consideration the unforeseeable and unpredictable future. However, Maritime Spatial Plan should aim to support innovation and provide general guidance based on known values or threats (e.g., all energy equipment that needs to be anchored must take into account the preservation of cultural values, working with the Ministry of Defense to avoid historic explosives, etc. to find safe anchoring areas).

[61] From the standpoint of impact assessment, it is not always necessary or possible to distinguish whether the impacy is cultural or social because they are intertwined and may also have an economic dimension. For example, the identity of the coastal fisherman derives from his place and area of activity, fishing has both a social impact (e.g., food) and a potential economic impact (e.g., additional income).

[62] See the Report https://muses-project.eu/wp-content/uploads/sites/70/2018/10/D4.3-Sea-Basin-Syntheses.pdf

4.4.1.2 Fisheries

Fishing is one of the oldest uses of marine areas, divided into coastal and trawl fisheries in Estonia. Fishing is also a hobby. Although the number of people employed in fisheries has declined significantly over the last decade, fisheries continue to be a major socio-economic source of employment both on the islands and on the coast. As a traditional maritime industry, fishing contributes to the vitality and employment of the local community, as well as to the maintenance of coastal fishing settlements (coastal villages, boat, and net shelters, docks, ports, etc.) and intangible culture (from maritime traditions and knowledge of the sea in the way of fishing events and societies). As a traditional maritime branch, the land-sea interaction between fisheries is strong. From the standpoint of impact assessment, these are *the cultural and social (and also economic) impact of fisheries. The impact of fisheries* depends on the planning - or the *impact on fisheries*.

In the marine environment, the impact of fishing as an activity on the surface of the water occurs (while there is no significant environmental impact or visual disturbance), but other uses are restricted/influenced by, e.g., nets in the water column or bottom trawling (including trawler movement trajectories).

According to the Maritime Spatial Plan, developed and intensified marine areas will be preserved in the marine area, which means that the current more catch rich areas will be preserved. The plan also supports the rebuilding of fishery resources (spawning grounds) and access to both fisheries at sea and infrastructure on the coast (ports, landing sites). At a general level, the Marine Spatial Plan thus contributes to the social and cultural viability of fishing communities and has a long-term positive impact on fisheries.

There are, however, certain differences between regions: new marine uses such as wind energy development, shellfish and algae farming are more suited for the sea areas around the islands and in western Estonia than for the area in the Gulf of Finland. Thus, somewhat greater pressure on the “fitting” into the marine area is also in Western Estonia: for example, due to the design of wind farms, the amount of trawled sea areas in the Baltic Sea, west of Sõrve, is slightly reduced. However, trawling within the wind farm is not excluded. The innovation area of wind turbines does not overlap with the trawled marine area. There is, therefore, no significant impact on trawling areas. Coastal and recreational fisheries are also not significantly affected: wind turbines are designed to be 6 nautical miles or more away from the coast, in which fishing grounds are preserved (see Figures 4.5.1.3-1 and 4.5.1.3-2).

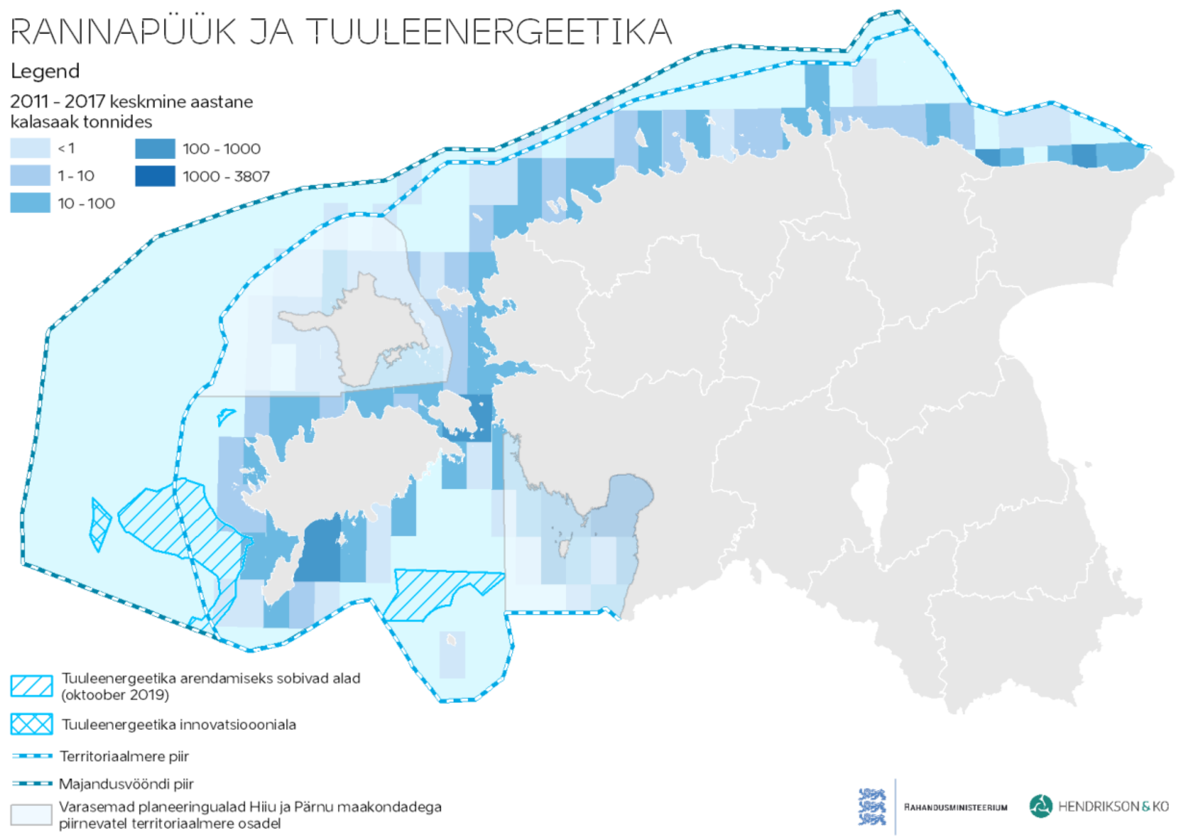

Figure 4.5.1.3-1 Coastal fishing and wind energy development

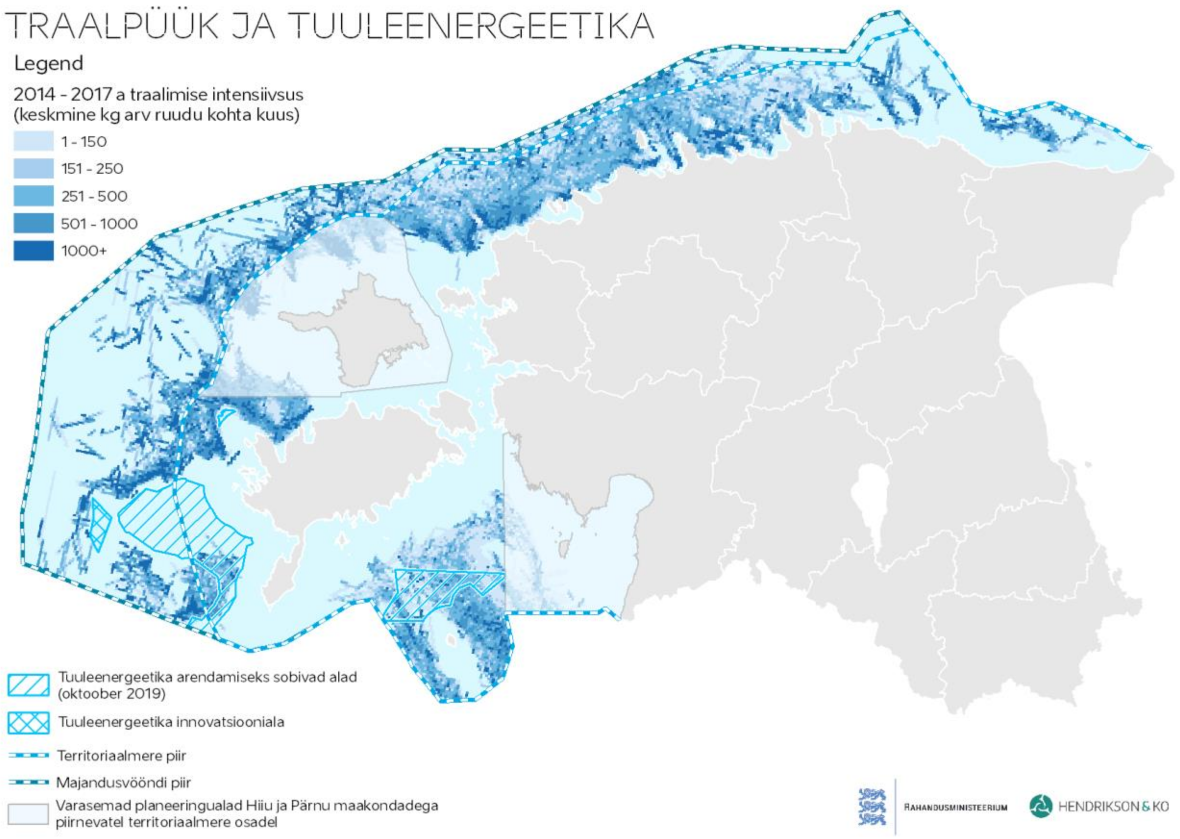

Figure 4.5.1.3-2 Coastal fishing and wind energy development

In terms of aquaculture, the plan does not define areas, but it sets out the conditions: fish farm development is preferred in the deeper high seas. With regard to shellfish and algae farming, the most suitable marine areas are highlighted. The conditions create a fundamental opportunity for trawling and fish farming (e.g., in the Baltic Sea) or algae farming and coastal fishing (e.g., in the Väinameri) in the same marine area. Based on the interest of the fishermen, the socio-cultural impact assessment proposes to consider including a condition in the MSP that also takes into account the interest of fishermen when applying for aquaculture permits: there would be no significant negative impact on the most used and yielding fishing grounds.

From the standpoint of the conservation and future uses of fishing grounds, maximum combined use is recommended - spatial concentration of activities rather than dispersal on the marine area, which is already supported by the planning for certain uses. As combined use pressures are expected to fall most heavily on the Hiiu Shoal, Baltic Sea, Väinameri Sea and Gulf of Riga waters, it is important, especially in these areas, to allow fishermen to enter new blue economy sectors if they wish, utilizing established prerequisites (seafaring skills, regional sea knowledge, etc.).

4.4.1.3 Aquaculture

In Estonia, the aquaculture sector has so far been engaged in fish farming and gathering of agar, which is of interest to the food and confectionery industry and thus to the Estonian population at large. Aquaculture is a developing sector: developing technologies and fields of application (food industry, biotechnology, bioplastics, shellfish farming, for example, as the feed for fish farms, poultry, and domestic animals, etc.). There is potential for fish farms, algae and shellfish farming in Estonian waters.

The impacts of aquaculture on the water surface are local and of low impact (visual disturbance) and may occur in the water column as a growing medium and on the seabed (possible anchoring needs).

Fish farming. Maritime Spatial Plan does not designate fish farm areas but identifies areas that are expected to be inappropriate (e.g., national defense and nature protection, *ship-to-ship* areas, etc.), and shallow and more enclosed marine areas are also inappropriate. Fish farming supports combined use with algae and shellfish farming (for ecological reasons) and states that fish farming can only take place upon application of compensatory measures.

Fish farm planning needs to be done in cooperation with various authorities to ensure the functioning and safety of other important maritime sectors, such as the Maritime Administration to ensure vessel traffic, the Land Board in terms of deposits, etc. Concerning cultural impact, it is important to design fish farms in cooperation with the National Heritage Board, which supports ensuring the good condition of wrecks and maintaining water quality suitable for their preservation.

The conditions set out in the plan largely adjust the *state-developer* relationship (i.e., the guidelines from top to bottom). The terms do not explicitly state how the *developer-current user/stakeholder* relationship is weighed; therefore, decision-making may not be balanced. *The developer-current user* relationship is, for example, balancing the interests of fishermen and aquaculture: under the current planning solution, only spawning grounds are the basis for the decision, not, e.g., finding coherence in the designation of areas suitable for aquaculture in the fisheries used. The proposed activities may also affect coastal values and related activities (recreation, entrepreneurship), so local government involvement may be required. The socio-cultural impact assessment, therefore, proposes that further consideration be given to balancing the interests of the *developer-current user* and the *developer-local government in* the licensing procedure.

The plan excludes the combined use planning of wind farm cable corridors and fish farms, but not the combined use planning of wind farms and the fish farms. The socio-cultural impact assessment suggests that consideration be given to enabling this combined use. As both are new areas of development, public support for the development and implementation of the rules and practices of combined use is essential. The socio-cultural impact assessment proposes to include the topic of the development of rules and practices for combined use and their implementation in the planning agenda. The results of the Maribe project highlight the biggest barriers to entry into the blue economy (Table 4.2.1.4-1).

Figure 4.5.1.4-1. Reason, obstacles, and recommended public support for investing in the blue economy. (Source: Marine investment for the blue economy. Maribe project booklet: work packages, case studies, and results. http://maribe.eu/wp-content/uploads/2016/08/maribe-booklet-final.pdf)

Shellfish and algae farming Maritime Spatial Plan also does not define shellfish and algae farming areas, but rather guides development through conditions and identifies areas that are naturally most suitable for that. The potential for algae cultivation is wider, extending from the Baltic Sea to the Gulf of Finland and also covering the Väinameri Sea and the Gulf of Riga. Areas naturally suitable for shellfish farming lie west of the major islands. Farming is excluded in shipping lanes, STS areas, and areas used for national defense purposes. In the rest of the marine area, shellfish farming, and algae farming can be planned either independently or in combined use (with wind turbines and fish farms). Similarly, to the design of fish farms, the parties involved in the licensing procedure who have an interest in the operation of other economic sectors and in the protection of values are identified. The conditions and guidelines set out in the plan support the functioning of different sectors more broadly.

Because algae farming, in particular, is naturally possible over a wider marine area and is not subject to depth/openness constraints, farms can be located in both deeper and shallower seas, spatially overlapping with the areas of both trawl and coastal fisheries, and have an impact on the coast. Overlaps can lead to the emergence of both synergies and conflicts: for example, aquaculture supports land-sea interactions both on the coast (port operations and local employment) and more broadly (e.g., processing of produce; local marketing of certain products). Conflicts can occur, for example, in terms of fishing grounds and, in principle, with recreational water and coastal uses. In order to increase synergies and prevent/mitigate conflicts, it is important to involve both fishermen and the local authority in the location-based decision-making processes (e.g., within one nautical mile; the scope needs to be clarified as part of a comprehensive analysis of the potential rights and obligations of local authorities in the Maritime Spatial Plan. Involvement processes are foreseen at the licensing procedure stage but are expected to require further discussion on the issue of local government rights in the Action Plan**.** As a new field of application, there is potential for new land-sea interactions (see Figure 4.2.1.4-9 for more land-sea interactions*).*

In order to encourage combined use, the socio-cultural impact assessment also proposes that consideration be given in principle to the combined use of aquaculture farms and solar and wave energy. The potential of wave energy is not considered high in Estonia - the main focus is on developing wind energy. At the same time, it cannot be ruled out that the establishment of farms and the development of energy technologies will create the opportunity and need to use other sources on a small scale. For example, the Maribe project (*Marine Investment for the Blue Economy*, see http://maribe.eu/) highlights the already existing combined uses in other marine areas: combined use of wave energy and algae farming. A wave trap will create a quieter sea area in the windward side, creating a suitable environment for algae cultivation; the energy produced enables the transport of both the wave trap and the algae farm, if necessary).

At the same time, solutions in one marine area may not be suitable for another marine area. Uncertainty is compounded by the lack of awareness of the direction in which technologies are evolving and, consequently, of new opportunities for synergies. However, from a socio-cultural impact standpoint, the Maritime Spatial Plan has to take an enabling approach and consistently support innovation, mitigating known risks based on value preservation needs or anticipated operational conflicts (e.g., when a device requires anchoring, it is necessary to consider the location of monuments, underwater cables, etc., similar to other operating conditions; certain combined uses are not possible - for example, national defense and wave energy).

Technologically, the nature of combined use in linking wind turbine areas and shellfish farming may also be the simultaneous use of the marine area, i.e., the shellfish lines are not directly attached to the wind turbine foundations, but farms use the same area in the sea. Synergies between activities can also be evident in other areas: e.g., shared service vessels and onshore infrastructures, shellfish farming lines can impede access to the space between wind turbines, which contributes to the security of the area's operation; shellfish lines can calm the waves somewhat, which reduces pressure on wind turbine structures [63].

63 Maribe project: https://maribe.eu/blue-economy-growth-science-research-aquaculture-floating-offshore-wind-2/, Maribe final report „Maribe recommendations for future funding calls in Blue Growth MUS and MUP".

4.4.1.4 Maritime transport

Maritime transport is also one of the longer-term uses of the sea, and therefore the cultural impact of maritime transport is widespread: besides material heritage (e.g., ancient finds, ships, maritime schools, shipbuilding sites, etc.,) intangible heritage, which still affects global values (e.g., the sea as freedom and opportunity) and regional perception of place (regional captains and captains' villages, home ports or construction sites of legendary ships, etc.) plays an important role. In Estonia, maritime transport has had very different purposes - e.g., Baltic German land exploration, from legal friendly trade to illegal spirit smuggling, from pleasure trips to fleeing the country.

Today's cultural and socio-economic impact of maritime transport is related to both passenger and freight transport and recreational shipping. Maritime transport related to the activities planned under the plan is also of a service nature. The impact of maritime transport in the water area can be manifested on the water surface (also on ice in the case of ice routes) and partly in the water column, on anchoring on the seabed. The most important basis for maritime transport is safety, which affects or even excludes certain other uses of the sea.

Maritime Spatial Plan reflects known shipping lanes and designates waterborne traffic areas based on traffic volume and directions elsewhere. Outside these areas, traffic is allowed, but it depends on the size and natural conditions of the ship and is rather rare. As a traditional form of marine use, maritime transport is, at the same time, a domain using the marine area that needs to also “accommodate” other activities. The operation of shipping lanes, which is subject to stricter conditions, is therefore essential for maritime transport. At the same time, other maritime uses can take place in waterborne traffic areas if there is a corresponding site-specific interest. The guidelines and conditions to be set have a positive overall and widespread impact on the functioning of maritime transport and other maritime uses.

Maritime Spatial Plan points out that naturally suitable harbors are often already in use and stipulates that when designing new small craft harbors, it is necessary to give priority to naturally suitable locations. In view of the land-sea interactions and the wider socio-economic benefits of the coastal area, it is advisable to design ports also where, in addition to the port's own services, it is possible to use other services of the area, visit sights, etc. within a reasonable distance. The need to take into account the functional hinterland of the port when selecting new small craft harbors is a proposal for the Action Plan: an input to complement the concept of small craft harbors or to prepare another development document.

Ports play an important role in land-sea interactions. The plan proposes a functional classification of ports. The socio-cultural impact assessment also suggests that the functional classification of new maintenance vessels of marine use be considered - the needs of new branches in ports may differ slightly from those of established branches.

The plan also reflects the ice routes typical of the Estonian marine area, also as marine transport, but there is no need to direct the topic further.

4.4.1.5 Maritime rescue, pollution control and guarding the state border

The need for maritime rescue, pollution control, and guarding the state border is present throughout the Estonian marine area due to wider social and national defense needs. In these functions, it is primarily important to ensure coverage and capability in the marine area.

The plan emphasizes the importance of ensuring maritime rescue capabilities throughout the water area, which in terms of land-sea interaction, means systematic planning of accesses and rescue infrastructure across the coastline (i.e., in cooperation between local governments and across local government boundaries). As Maritime Spatial Plan increases diversification of the use of the marine area and intensification of activities, the need for marine rescue is increasing. Addressing the issue is targeted at local government comprehensive plans while identifying a wider need for both maritime rescue and pollution control is important already at the national level, also considering what is planned by the Maritime Spatial Plan: for example, specific sea rescue in the area (for example, when the plan is implemented, new marine uses are expected to occur in the waters of the major islands and of western Estonia, which may require additional and/or region-specific maritime rescue (e.g., potential dangers are collisions wind turbines, encroachment on aquaculture facilities, etc.). The analysis of rescue capabilities and needs assessment at the national level is important in cooperation between the Police and Border Guard Board and interested parties - the assessment of socio-cultural impact proposes to consider including such activities in the Action Plan.

Marine pollution response capacity is concentrated mainly in the Tallinn area, but regional ports must also be prepared for pollution response. The plan considers it important to increase national pollution control capacity. The plan also identifies the growing problem of sea litter, but not the measures or responsible parties to raise awareness and solve the problems. The socio-cultural impact assessment proposes to include the topic in the Action Plan.

In order to guard the state border, the plan designates *ship-to-ship* (STS) areas in the Tallinn area where certain combined use (bunkering) is possible, but others (e.g., aquaculture) are prohibited. The designated marine areas are relatively small and located in the immediate vicinity of nationally important ports and in areas with heavy shipping traffic, and therefore the designation of the areas supports regional functionality.

4.4.1.6 Energy production

The use of the marine area for the development of renewable energy is a new use of the sea in Estonia and thus an important focus of marine area planning. As for the region, the greatest potential Estonia has for developing wind energy is offshore. As energy technologies evolve, the plan points out that in the longer term, the coastal sea can also be used for cooling and thermal energy (on a densely populated coast), and in the longer term, wider opportunities for renewable energy production (e.g., solar and wave energy) are envisaged.

Renewable marine energy has a broader positive and long-term impact. The design of wind farms has a significant impact on the achievement of national renewable energy targets and the direction of the carbon-neutral economy. Wind energy development also plays an important role in generating and transferring economic and social innovation and opportunities for additional employment (see also the impact of energy production on the economic environment in Chapter 4.3.4).

The Maritime Spatial Plan identifies offshore wind farm areas and innovation areas for the design of wind turbines on floating foundations. In both cases, the impact occurs both on the water surface, on the water column, and on the seabed. Wind energy development planning also necessitates the construction of cable corridors from land to wind farms, with the impact on the seabed. The Socio-cultural impact in wind farms is manifested by the visual impact on the water surface and the potential for combined use from the water column to the seabed. Combined use and visual impacts are important impacts that the IA focuses on.

The design of wind energy development areas in the plan was carried out by phased exclusion, where areas that are suitable for natural and wind conditions are gradually excluded from suitable areas for various reasons. Various national interests and needs and nature conservation interests have been taken into account when finding suitable areas for wind farms. The exclusion process has also taken into account the need to mitigate visual impacts and has set wind turbines at least 6 nautical miles from the shoreline (the distance of the wind turbine at the border of the wind zone, closest to the coast is ~ 11.1 km). Based on the interim decisions made during the exclusion, wind energy will not be developed in the Gulf of Finland as it is not feasible in the timeline of the planning. As a result of the exclusion, three development areas have been identified suitable for wind energy development, which are located in the Baltic Proper and the Gulf of Riga. The innovation area of wind turbines is farthest from the coast offshore. Depth variations in wind farm development areas are outlined, but the planning does not specify the stages/phases which area suitable for wind farms should be deployed first. The innovation area of wind turbines can also be immediately deployed. In terms of impact assessment, the methodology generally takes into account balancing different national interests and mitigating the local impact. Considering the need to balance national and local interests, wind turbines may cause visual disturbance for some groups of residents, despite the distance limitation (see further below for visual impact assessment).

Combined use. For wind farms, the possibility of combined use with aquaculture is outlined, in particular with shellfish and algae farming, but fish farm planning is also possible.

For additional opportunities for combined use, the Muses project (*Multi-use in European Seas*[64]) highlights the possibility of combining marine tourism and wind farms in the Baltic Sea, as well as the combined use of diving and wind farms in case of high visibility.

A theoretical long-term option is also the combined use of wind farm areas with other forms of energy as opportunities and technologies develop (including solar and wave energy).

With regard to combined use, Plan4Blue[65] highlights the risk that the combined use areas may be designed too intensively: while pursuing multiple objectives, activities become mutually exclusive or endangering.

From the standpoint of the socio-cultural impact assessment, risks can be mitigated by combined zoning uses: for example, combined use area for wind turbines and shellfish, combined use area for wind turbines and marine tourism, etc. A set of rules can be agreed between interested parties on which parts of the wind farm can be used for visiting and diving, and under what rules, as well as which areas of combined use are so-called "closed." Deploying combined use is a time-consuming activity, and this Maritime Spatial Plan takes the first steps in implementing combined use. The role of the state in the development of combined use is support for the development and implementation of rules and practices, the promotion of bodies/platforms for co-operation and the setting of rules for possible combined use in the development licensing process (a similar recommendation is given in the aquaculture chapter for the Action Plan).

In addition to combined use, the socio-cultural assessment also makes the following suggestions for renewable energy production planning:

- the introduction of wind farms also requires the design of cable corridors on the seabed for connection. The proposal is to include, as a condition for the design of the cable corridors, the need for cooperation with the National Heritage Board (to avoid damaging the seabed's cultural assets) and the Ministry of Defense (to identify potential historic explosives and dangerous objects).
- the threshold for introducing a wind energy innovation area is relatively high, as the area is farthest from the coast. In principle, a cable connection to the innovation area would also be possible via the Venstpils-Hall corridor. The proposal is to consider highlighting the importance of the international corridor in MSP and/or to show the direction on the figures showing the possible cable connections (there is currently no connection to the cable corridor in the innovation area)

[64] https://muses-project.eu/wp-content/uploads/sites/70/2018/10/D4.3-Sea-Basin-Syntheses.pdf

[65] Ida Maria Bonnevie (2019) Spatial analysis of co-location in MSP, Plan4Blue, Final conference 4–5 June 2019, presentation.

- to support marine renewable energy innovation on a broader basis and to include the topic in the Action Plan. It is expedient to develop cooperation in the field of innovation with Latvia and Finland.
- As the distributed generation is being developed globally, the planning could also consider promoting, for example, the development of local small-scale distributed generation solutions (single wind turbines, etc.).

The visual impact of wind turbines

The visual impact of the wind turbines is especially evident on the west coast of Saaremaa, where the smaller wind turbine area (area 3) is located northwest of the Tagamõisa peninsula and the larger area (area 2) from Vilsandi to Sõrve. The nearest wind turbine is 6 nautical miles (*ca* 11.1 km) from the west coast of Saaremaa. In the Gulf of Riga, wind turbines have the most visual impact on Ruhnu island (~ 11 km), the wind turbine parks area visible from Cape Kolka in Latvia (~ approximately 17 km to the nearest wind turbine location), which is why the impact is cross-border (since the wind turbines are not planned to be very close to the coast, and the principle applies that the horizon must not be covered by wind turbines, it is not a significant impact).

Maritime Spatial Plan requires that wind turbines are grouped together in as compact a form as possible to reduce visual impact, with the aim of dividing the horizon to avoid massive coverage with wind turbines. The plan does not explicitly state the considerations on which wind turbines are grouped in order to structure the horizon. The plan also indicates the assumption that the prospective designated areas will be occupied to the extent of about 70% - taking into account water traffic areas, seabed incompatibilities, and other excluding factors. From the standpoint of impact assessment, the distance and location of the wind turbines (horizon coverage and wind turbine formations) are the visual impact parameters that can be guided by the impact assessment of national-level planning.

The visibility of wind turbines from the coast depends on many factors: distance, height, and location of wind turbines; the height of observation point; weather and time (clear/cloudy/foggy, day/night), and similar factors. The **visual impact of** seeing wind turbines, as well as the negative visual effect, depends on the subjective perception of the observer, the cultural value attributed to the viewpoint or the view, and the quality of the landscape, past experience, and other factors[66].

From the standpoint of impact assessment, the observer's experience is different: while wind turbines may affect some part of the population as visual disturbances, some may be neutral or positive: wind turbines may appear interesting and progressive; negative and positive experiences can occur at the same time (e.g., wind turbines may be visually disturbing but at the same time recognized as necessary). The perception of wind turbines as disturbance can change over time - for example, in the course of getting used to the wind farms, the importance of the visual impact may decrease, and the new situation may become more normal.[67] The visibility and impact of wind turbines are thus very diverse.

[66] In the scientific literature, visual impacts have been assessed for the various land-based wind turbines in the world, with the experiences with offshore wind farms being based primarily on European (Denmark, Germany and UK) examples, but also increasingly on the examples of US offshore wind farms (e.g., coasts of Rhode Island, Massachusetts, and New York).

[67] Ladenburg J. (2009) Visual impact assessment of offshore wind farms and prior experience. *Applied Energy*.

Distance, visibility and visual impact of wind turbines

The distance from the coast **of the wind turbines** affects the visibility of the wind turbines to a significant extent - for example, Sullivan et al.,[68] (2013) have been based in terms of sea-based wind turbines on how dominant /visible they are on the marine area in case of good viewing conditions (see Table 4.2.1.4-3 and Figure 4.2.1.4-4, 137 m high wind turbines have been used; for higher wind turbines no relevant analyzes are known).

Table 4.5.1.4-3. Visual impacts of wind turbines at different distances

Assessment grade	Wind turbines with total height up to 137 m, UK
6. Dominates visually by filling the view corridor (strong contrast with shape, color, glare, and movement can further emphasize dominance).	Up to about 10 km
5. Clearly captures the viewer's attention with, e.g., contrast, color, texture, glare, and movement	*Ca* 10—16 km
4. Clearly visible, but does not attract significant attention or dominate the view	*Ca* 16—24 km
3. Visible, does not go unnoticed by ordinary observation	*Ca* 24—32 km
2. Visible when searching, otherwise may go unnoticed for a regular observer	*Ca* 32—44 km
1.Visible after prolonged close observation, otherwise invisible	Over 44km
Wind turbines are not visible	N/A

[68] Sullivan, R.G., Kirchler,L.B. Cothren, J., Winters, L.J. (2013) Offshore Wind Turbine Visibility and Visual Impact Threshold Distances. *Environmental Practice*, Volume 15.

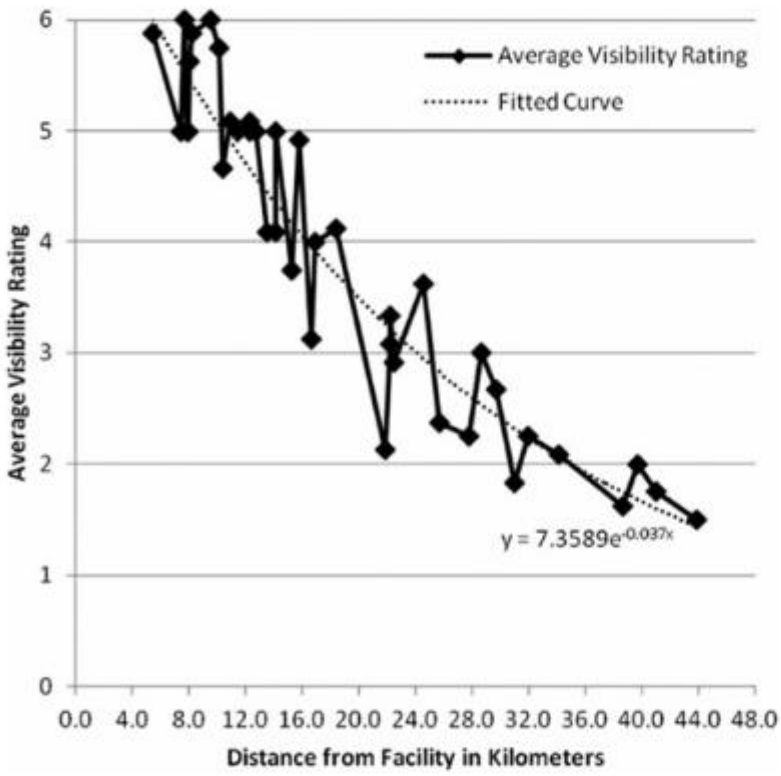

Figure 4.5.1.4-4. Average visibility estimates for the different daytime observation conditions (based on 39 observation sites). Source: Sullivan et al. (2013). The visibility estimates in the vertical axis correspond to the numbering in the table above.

The curvature of the Earth also plays a role in the visibility of offshore wind farms: at some distance, the masts of the wind turbines disappear, then the rotor, and only the blades of the wind turbine appear. The effect of the ground curvature also depends on the height of the observer and the viewpoint (see Figure 4.2.1.4-5).

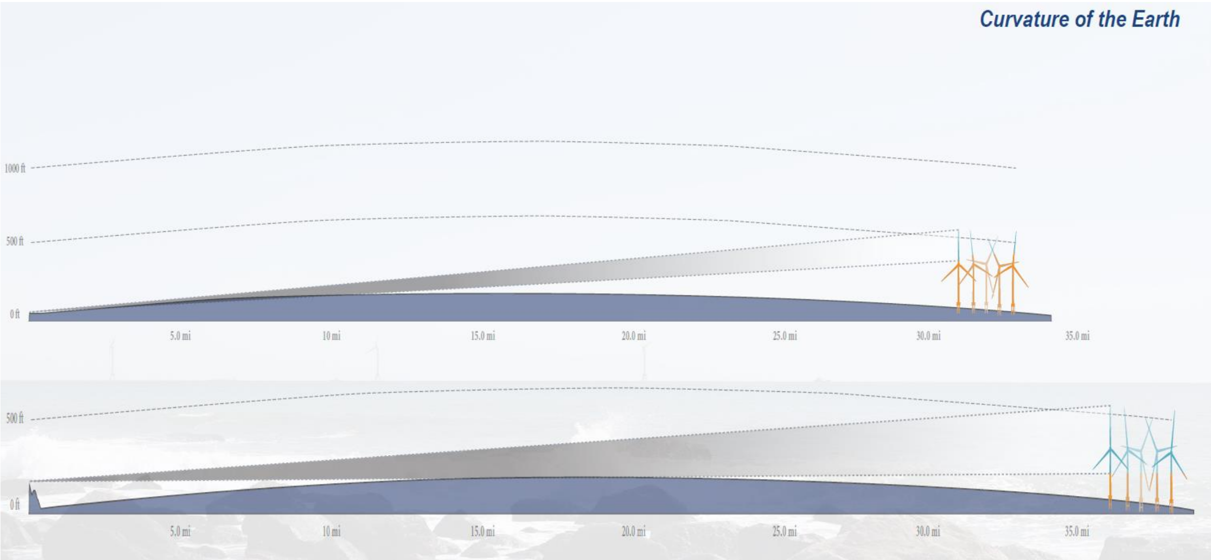

Figure 4.5.1.4-5. Effect of Ground Curvature on Wind Turbine Visibility (Source: Perkins, Visual Impact Assessment- Offshore wind. Presentation).

The visibility of wind turbines varies by night/day and weather conditions: the wind turbines themselves are not visible in the dark, but the lights on top of the masts are visible in the marine area. The visibility of wind turbines is reduced by clouds and fog, etc. The weather conditions reduce the visibility and contrast of[69] wind turbines, and the wind turbines are more visible in contrasting conditions[70] (e.g., in clear weather at sunset).

In the Estonian marine areas, in addition to economic considerations, the results of the GorWind (2010-2012) survey data have been taken into account in determining the closest distance from the coast to the wind farm, according to which approximately 41% of respondents would accept wind turbines as 10 km from the coast (38% were hesitant)[71] In the planning solution, the distance of the wind farm areas was determined slightly further from the survey results: 6 nautical miles, or about 11.1 km from the coast, and this has significantly reduced the dominance of the visual impact. Based on the visual impact grades of Sullivan et al. (2013) and the assumption that Estonian offshore wind turbines are of similar magnitude at maximum altitude, in the Estonian coastal area, wind turbines closest to the coast can be expected to attract the observer's attention from a few coastal viewpoints in Areas 1 and 3, and several viewpoints in Area 2. Wind turbines closer to the coast are expected to be visible for the most part of the year (except in very poor visibility conditions). In clear weather, wind turbines closer to the coast are contrastingly visible in particular for the observers from the western direction (e.g., sunset) in both area 2 and area 3, and for Ruhnu in particular for the observers from the eastern direction (sunrise).

In **order to reduce the visual impact of wind turbines,** it is possible to move the nearest wind turbines further from the coast (approx. 32 km, taking into account Table 4.5.1.4-3) or design free view corridors through wind areas (articulation of the horizon outlined in the plan). Moving wind turbines further into the marine area may have a positive impact on reducing visual disturbances, but it will also increase the unit price of renewable energy, which will affect the wider population socio-economically. In Estonia's circumstances, this would make the development of offshore wind energy virtually unrealistic, as the sea becomes too deep to build wind turbines at such a distance, the Latvian border would partially be involved, and the achievement of climate goals would be jeopardized. Against this background, further analysis will take as a starting point the identification of potential locations for possible view corridors.

In Saare County, the landscapes of Abruka, Kuressaare, Vilsandi RP, Panga, and Ruhnu were originally marked as valuable landscapes of Class I or of potentially national importance. The proposed wind areas are closer than 16 km to Vilsandi National Park and Ruhnu.

In Vilsandi National Park, which also covers the marine area and uninhabited islands and islets, it is expedient to calculate the distance from actually used and inhabited viewpoints rather than from the boundary of the national park. Vilsandi Island and the Elda/Soeginina Cliff are thus important points of view from which the wind turbine areas can be seen. Area No 3 is approx., 18.5 km from Vilsandi Island (near the lighthouse) and the Area No 2 is approx., 15 km from Vilsandi, therefore, the visual impact of wind turbines can be considered as existing but diminishing in a way where wind turbines do not dominate or attract much attention. The wind turbine areas are about 12-13 km from Elda/Soegninina Cliff and also about 11 km from the northern tip of Ruhnu, so it is advisable to mitigate the visual impact in these locations.

There is further justification for planning wind turbine free view corridors for those points along the coast where wind turbines are closest to the coast, the coverage of the horizon with

[69] See, for example, the *Visibility Threshold Study in* conducted in New York State*. The New York State Offshore Wind Master Plan* (2017), which took into account the prevailing local weather conditions throughout the seasons and the various times of the day, and calculated the expected probabilities of offshore wind turbines at different distances from the coast.

[70] Visibility Threshold Study. New York State Offshore Wind Master Plan (2017), NYSERDA Report 17-25s; Bishop, I.D., & Miller, D. (2007). Visual assessment of offshore wind turbines: The influence of distance, contrast, movement and social variables. *Renewable Energy*.

[71] http://gorwind.msi.ttu.ee/home/info

the wind areas is the largest (with few wind turbine free corridors), and for areas that can be considered as key sea view locations based on various sources (see Annex 3).

As part of the impact assessment of the plan, coastal viewpoints were mapped, based on the beautiful viewpoints of Saare County-wide Plan, the Saare Geopark Coastal Objects and RMK rest area information, and the potential viewpoints of valuable Category I landscapes and Instagram mapping results were added. The viewing places were seen as having a broader cultural value, the preservation of which is important to both local people and visitors to the region. The viewpoints were used to determine the distance and coverage of the view from wind farms, and the combination of these two features was used to assess whether the mitigation of visual impacts is necessary. In addition, a social media mapping was conducted on the basis of Instagram, which provided information on the usability of the viewpoints found and qualitative information on which values were associated with one or other viewpoints and how the coast was used[72]. As a result of the visual impact assessment, the following Figure 4.2.1.4-6 was completed, a summary table of results is provided in Annex 3.

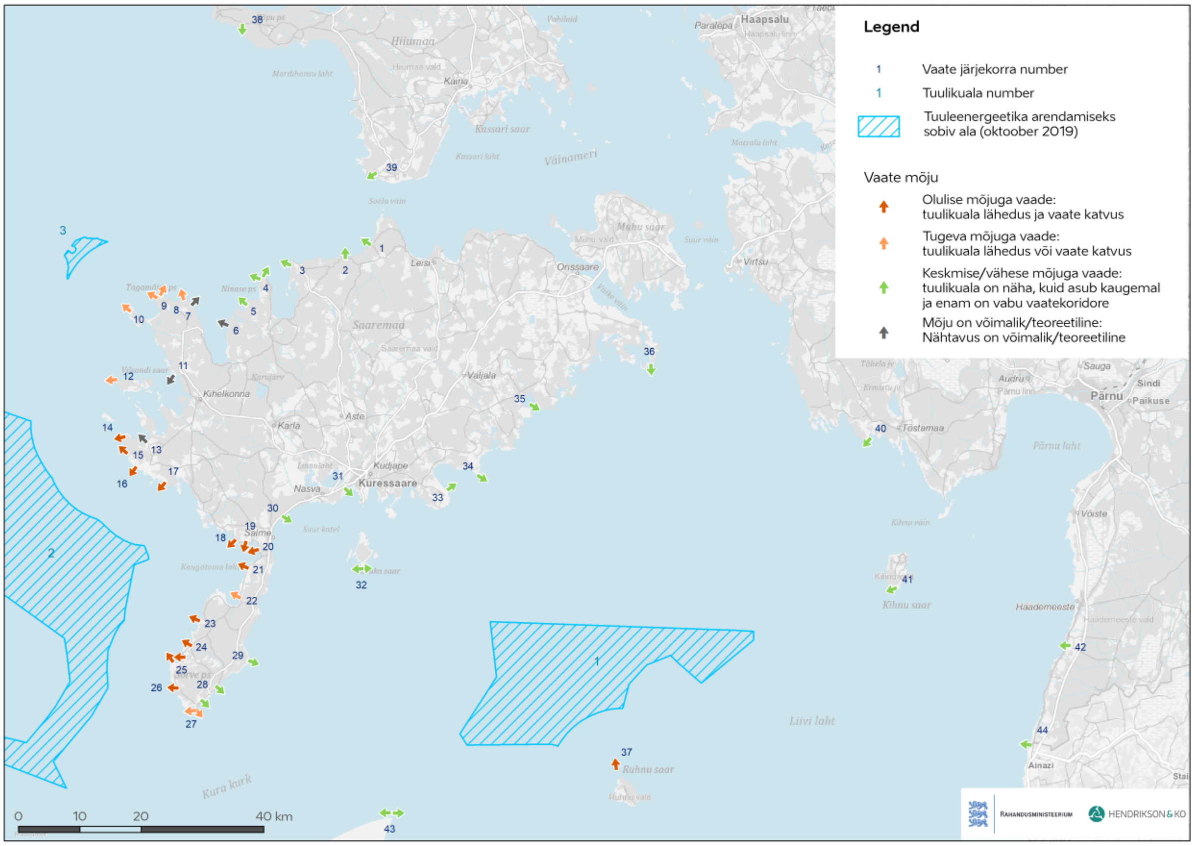

Figure 4.2.1.4-6. Results of views analysis performed during the visual impact assessment (planning solution in October 2019)

The mapping results show that most of the viewpoints where mitigation of impact is needed lie from the Elda Cliff to the tip of the Sõrve Peninsula - the impact is due to both the proximity of the wind farm and the horizon coverage (see Figure 4.2.1.4-6). Based on the results of the

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[72] The social media mapping was performed on Instagram, the results of which are given in Annex 3. Although there are certain limitations when using social media (for example, the user population is rather young and middle-aged), users provide so-called direct and voluntary qualitative information about what the coast and the marine area mean to them. Due to the peculiarities of social media, posts with positive emotions dominate; sharing negative (unpleasant, sad, etc.) emotions, is rather underrepresented. The mapped values primarily reflect the aesthetic, identity, and recreational values of coastal and marine areas, historical-cultural in particular in terms of material objects (e.g., lighthouses, ships, etc.) but less in terms of intangible culture (place perception, stories, customs, etc.).

analysis, the coastline is one of the most visited places, and landmarks are Sõrve Peninsula and the Lighthouse - based on the mapping of social media, it can be concluded that the place is used by both Estonians and foreigners. The socio-cultural impact assessment proposes to design a wind turbine free corridor west of the Sõrve Peninsula to mitigate the impact in this location.

On the Sõrve Peninsula, the beautiful viewing points of the West Coast are also locally concentrated in the Jämaja/Türju region, and along the Lõmala-Kaugatoma road, along the beautiful stretch along the sea in the Tiirimetsa-Kaugatoma section. Since social media mapping did not reveal significant international visitability or usability for these areas, it can be concluded that the areas are of particular interest to local residents and holidaymakers. The socio-cultural impact assessment proposes to design west-facing corridors through the wind farm areas also in the Jämaja/Türju area as well as in the Tiirimetsa-Kaugatoma section.

As Ruhnu is also a Class I valuable landscape, it is important to consider designating a view corridor from the island towards the north to mitigate the visual impacts.

The scope of the view corridors must be determined on the basis of the parameters of the particular wind turbines. The principal locations of the view corridors are visualized in the following figure. The locations and extent of the corridors must be specified in the licensing procedure in cooperation with the municipality, including a visualization that takes into account the parameters of the particular wind farm.

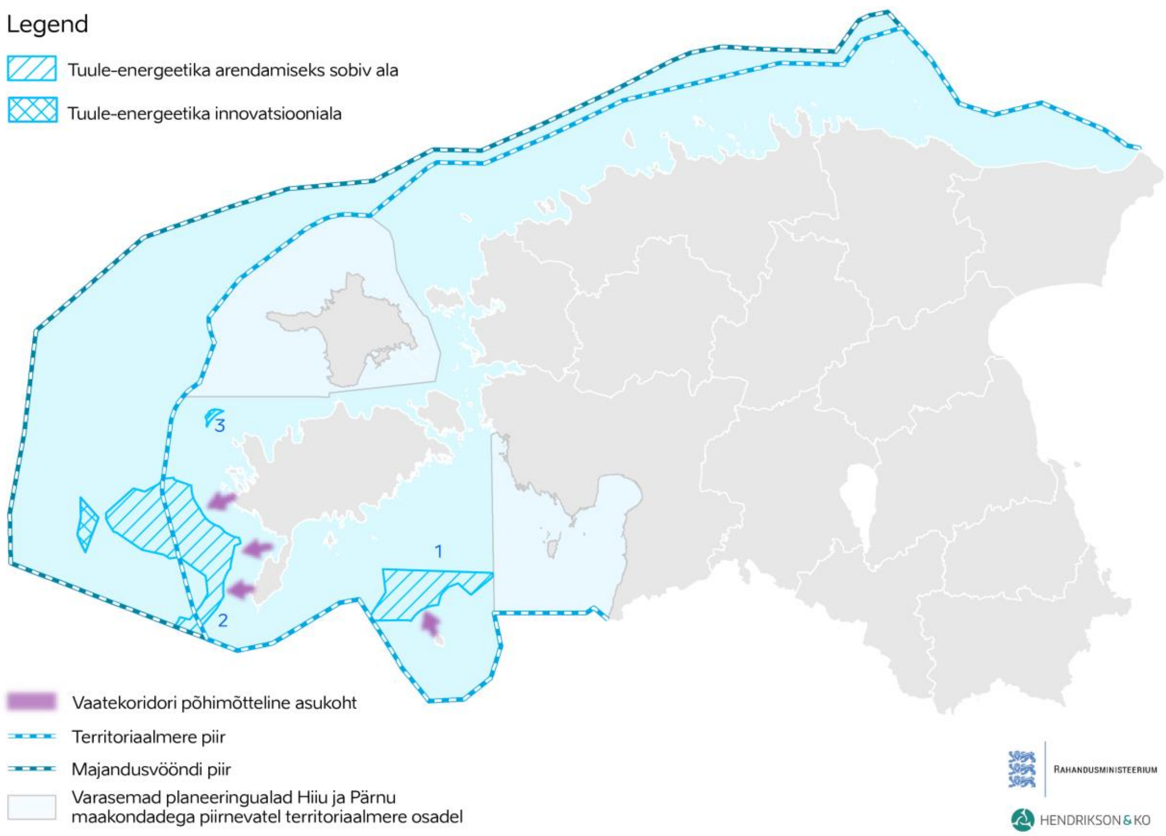

Figure 4.2.1.4-7 Principal locations of view corridors for wind energy development areas (planning solution in November 2019)

Wind turbine layout (formations)

From the standpoint of mitigating the visual impact, it is also important to pay attention to the location or formation of the wind turbines. In the built environment, Maslov et al. (2017)[73] point out that a more regular and symmetrical arrangement is more visually pleasing than a chaotic arrangement.

A more regular and thus more pleasant arrangement can open up from the coast in a few directions - as wind turbines are usually placed along straight or diagonal lines, looking from the coast, alignment is only created in case of a few rows or diagonals. As the angle of view increases, the symmetry of the layout of wind turbines will inevitably decrease (see Figure 4.2.1.4-8), and the wind turbines will be irregularly located in the marine area for the observer.

In addition, irregularities may be exacerbated by the fact that larger wind turbine areas (e.g., Area 2) are developed by various developers who may wish to alter wind turbine formation due to seabed characteristics and other factors (e.g., positioning their wind turbine rows at a different angle or offset compared to the coastal formations). From a visual impact standpoint, there is, therefore, a risk that, when viewed from the coast, there may not be any view corridor where the wind turbines would be located regularly behind each other.

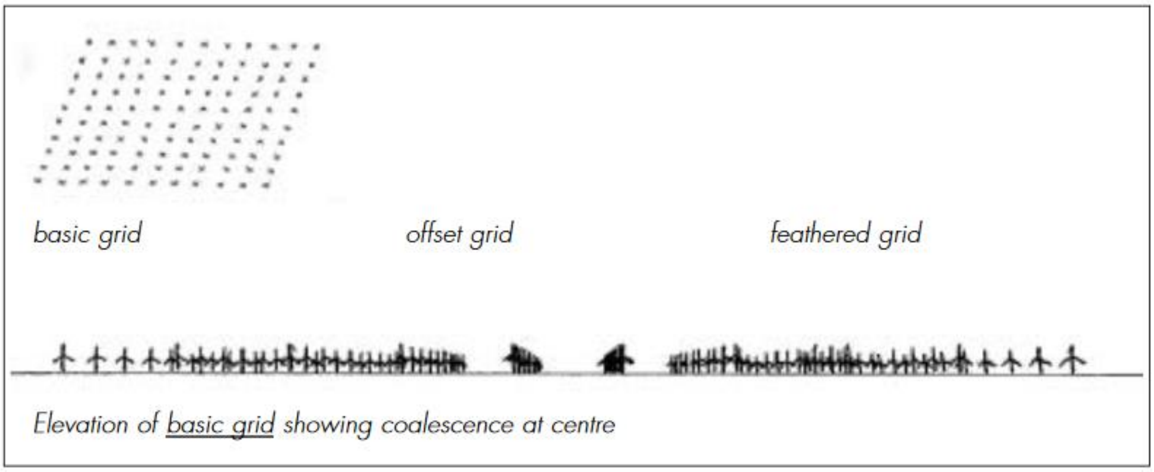

Figure 4.2.1.4-8. Wind turbine placement and viewing angle affect visual symmetry/irregularity (Source: Scott et al.[74])

Maslov et al. (2017) have shown in Figure 4.2.1.4-9 a; b the location, viewpoints, and visual profiles of wind farms in Saint-Nazare (France) from the viewpoints. The wind turbines of Saint-Nazare are 80 m high, and the distance between the wind turbines is 1 km. The wind farm is about 10-30 km from the various points of view of the coast: the closest viewpoints are shown in Figures 6 and 7, the farthest viewpoints, and in Figures 1, 3, and 4. As illustrated by Maslov et al., when viewed from distant coastline viewing points (e.g., the visual profiles in points 2, 3 and 10 and below, respectively), wind farm park formations are less distinctive or negligible due to the distance of the wind farm (point 4). For views from viewpoints 5, 6, and 8, the formation includes both regular sections with wind turbines aligned to one another and irregular sections. The presence of regular sections will mitigate some of the visual impact on the coastal sections where extensive wind areas are planned close to the coast.

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73 Maslov et al. (2017). Evaluating the Visual Impact of an Offshore Wind Farm. Energy Procedia, Volume 105

74 Scott, K.E., Anderson, C., Dunsford, H., Benson, J.F. and MacFarlane, R. (2005). An assessment of the sensitivity and capacity of the Scottish seascape in relation to offshorewindfarms. Scottish Natural Heritage Commissioned Report No.103 (ROAME No. F03AA06).

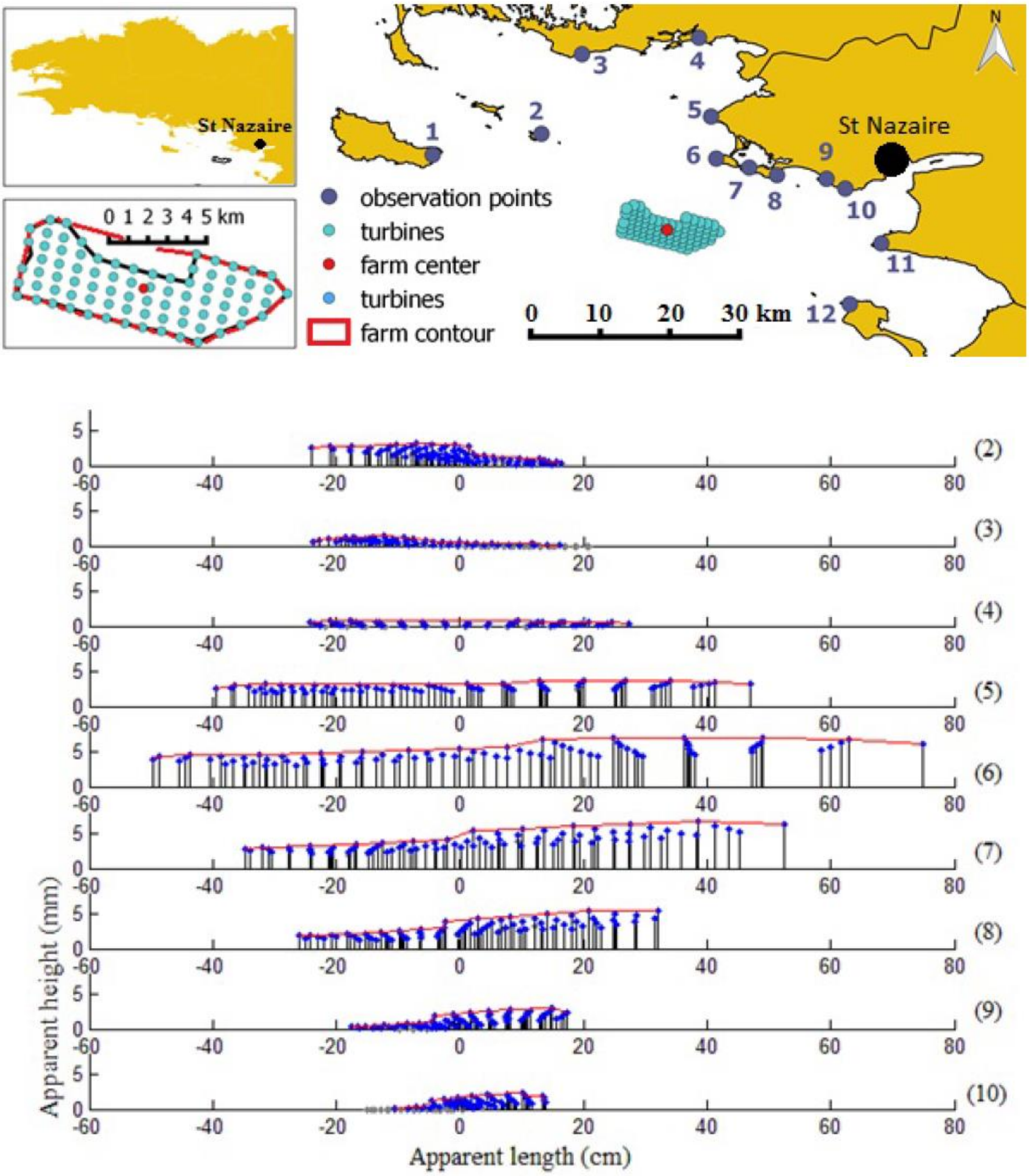

Figure 4.2.1.4-9. Observation points on the French coast and their possible wind turbine formations (number of the point on the map corresponds to visual profile number)

The socio-cultural assessment proposes to include in the planning the condition that when developing wind parks of different developers, it is advisable to consider formations (e.g., regular alignment of wind turbines), which would reduce the visual impact of the wind turbines, in particular from the coastal viewpoints closest to the wind turbine areas and where the proposed offshore wind energy development areas extend deepest into the open sea - namely from area 2 from Sõrve to Elda Peninsula and No 1 north of Ruhnu. The points of view must be specified in cooperation with the local government.

4.4.1.7 Sea tourism and recreation

Sea tourism and recreation is a growing and increasingly diversified area of maritime use. The interest groups in the field are both Estonian-based and international. Recreation has strong land-sea interactions, as more common activities take place on the beach (e.g., beach use, bathing) or rather near the coast (water sports, recreational fishing), and some sports can also take place in wider sea areas (e.g., sailing regattas). Both seaports and small craft ports are important for the functioning of marine tourism.

Maritime Spatial Plan does not designate marine tourism and recreational areas, but sets up supportive conditions, in particular with a view to the need for the combined use of the marine area. The plan supports the provision of recreational facilities in the overall level of accuracy of national planning (e.g., ensuring access to the sea, planning small craft harbors, etc.), but site-based planning is largely done through comprehensive plans.

Although much of the recreation area is planned on the land use plans of local governments, it is likely that user groups will expect the preservation of the *status quo* in the marine area. Maritime county cultural mapping in the context of Maritime Spatial Plan (June 2018) gave different input as in what marine area means to people: space, openness, and peace; the sea as a grounding means and a place for organizing thoughts, etc. Environmental psychologists have pointed out that the sea has a psychologically restoring impact on attention and concentration, which includes *feelings of absence* (mental distance from everyday life and disturbances) and *fascination* (effortless redirection of attention).[75] Based on the above, user groups can be expected to expect preservation of a " *switchable environment* " on most of the coast, both for activities with softer values (e.g., sunset watching) and creative activities (e.g., photography and other arts). Devine-Wright (2009) points out that there is socio-cultural opposition to new developments (including energy projects) when they disrupt the emotional connections or identity creation related to a place[76]. The socio-economic interest in preserving the switching environment is also expected to apply to companies that have made investment decisions based on the vicinity of the sea or the sea view. Therefore, in terms of maritime tourism and recreation (but also in terms of broader identity creation), the consideration of visual impacts (e.g., the impact of wind turbines, in particular, Chapter 4.3.1.7), as well as noise, plays an important role. It is also important to consider the interests of local governments when planning activities in the marine area and to give them the opportunity to have a say in planning decisions.

Implementing the Maritime Spatial Plan would also create new opportunities for marine tourism and combined use of the areas - e.g., visiting wind and aquaculture farms and farms as potential new diving sites (see Chapters 4.2.1.4 and 4.2.1.7). Using this opportunity also means addressing the issue of " *ownership* " of the sea to a large extent: although the marine area is state property, there is a legitimate interest for planners of permanent maritime activities to know and control what takes place in the marine area they use in terms of security and property conservation. The overarching assessment of the socio-cultural impact assessment is, therefore, that enabling the combined use of the marine space requires the development of new rules and practices, with the support of the state.

The impact of offshore travel and sailing tourism is covered in Chapter 4.2.1.5 Maritime Transport.

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[75] See e.g. Hartig, Korpela, Evans, & Garling, 1996; Kaplan, Kaplan, &Brown, 1989; J. Aaron Hippa,*, Oladele A. Ogunseitan, 2011.

[76] Devine-Wright (2009), Rethinking NIMBYism: The Role of PlaceAttachment and Place Identity in Explaining Place-protective Action. Journal of Community & Applied Social Psychology.

4.4.1.8 Cultural Monuments

Several wrecks are protected as cultural monuments in the Estonian marine area. Wrecks are part of the wider maritime cultural heritage, and their survival is in the wider public interest. The relatively small community (divers, underwater archaeologists, rescuers) has a real opportunity to visit the wrecks and is therefore not a public good consumed by a wider public. At the same time, diving communities are international, and there is also international interest in Estonian wrecks.

What is planned at a marine area may have a direct physical impact on the wrecks: e.g., activities may endanger the survival or good condition of the wreck; indirectly, what is planned may also have an impact on the wreck's preservation environment or water quality.

In Maritime Spatial Plan, wrecks have been valued throughout, and conditions have been set to ensure that wrecks remain as they are. The updated planning solution as of June 2020 defines preservation areas for archaeological finds (wrecks) in the deeper marine area where there is no conflict with other important marine uses.[77] The designation of preservation areas ensures clearer rules, and also provides a direct spatial opportunity for the preservation of archaeological monuments. The need to involve the National Heritage Board in several uses of the sea has also been highlighted. The Impact Assessment has, where appropriate, made proposals in the above chapters to clarify the conditions for the preservation of cultural monuments.

Maritime Spatial Plan favors the creation of so-called "diving parks" in high visibility marine areas, which support the possibility of exploring wrecks more widely and practicing diving as water sports. It also allows directing diving activities to wrecks. Maritime Spatial Plan thus has a positive impact both on the preservation of wrecks and on access to cultural sites.

IA wishes to point out that not all wrecks in the marine area have been recognized as cultural monuments, but that does not mean that wrecks have no cultural value. Preservation of this value is currently not reflected in the broader chapter on marine culture or the chapter on cultural monuments. The socio-cultural impact assessment proposes to treat the seabed cultural assets as a single chapter, covering both monuments and non-protected wrecks.

4.4.1.9 Other uses of the sea, and land-sea interactions

Marine Spatial Planning also identifies protected natural sites, national defense, mineral resources, dumping, and permanent links as separate thematic areas.

Protecting **natural objects** has both positive and negative social and cultural implications. Nature conservation is needed more broadly to preserve a clean marine and living environment, protection of specific sites to preserve marine biodiversity, which is why nature conservation is generally and more widely needed to meet people's social and cultural needs. Maritime Spatial Plan also takes into account the existing protected areas.

Similarly, to terrestrial planning, conflicts between nature conservation and marine activities that are considered socio-economically necessary may arise in the marine area. Maritime Spatial Plan sets out conditions for mitigating the conflict, highlighting the need to consider other interests and need for combined use in the design of new protected areas, while also assessing socio-economic impact. Planning thus has a positive impact on enabling combined use.

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[77] The suitability of preservation areas in the context of natural values, including Natura 2000 areas, will be assessed in September-November 2020.

Marine Spatial Planning highlights the **areas used for national defense** that are mainly concentrated along the Gulf of Finland. Additional special areas of national defense may be created if necessary. Other activities in national defense areas are not unequivocally excluded: there is a time limit for combined use during exercises, but at other times the areas are open for navigation. Due to the specific nature of national defense exercises, no objects/facilities that could be damaged by the exercises (e.g., fish cages, aquaculture farm lines) can be located in the special national defense areas. Areas used by national defense thus have both positive and negative impacts on the combined use of the marine space and the consideration of the needs of different stakeholders.

The plan identifies **mineral deposits** and guides the further development of this branch through **mineral resources** guidelines and conditions. The conditions for the use of mineral resources are also aimed at enabling combined use, taking into account fish spawning grounds, cultural sites, nature conservation sites, and waterways. The designation of new deposits and mining reserves shall not be deemed to alter the planning. In principle, therefore, it is possible to designate new deposits also in areas where other interests have been identified. The socio-cultural impact assessment proposes to consider the need to complement the conditions in terms of other potential interests (including threats) (e.g., the need for cooperation with the Ministry of Defense on historical explosives, etc.).

Dumping in the marine area takes place to discharge dredged material into the sea. Maritime Spatial Plan outlines existing dumping areas, and it is also possible to design new dumping areas based on established guidelines. Dumping is not permitted in very shallow marine areas. The conditions for dumping are regulated by law.

Maritime Spatial Plan highlights the need for **permanent connections** but does not explicitly set guidelines or conditions: the permanent connections of both Tallinn-Helsinki and Saaremaa are planned as separate plans and to a greater degree of accuracy than national Maritime Spatial Plan. Permanent connections, however, have a very important direct and indirect (social, economic, cultural) impact on **land-sea interactions**. Maritime Spatial Plan highlights the most important land-sea interactions by topic, based on spatial interfaces. As Estonian marine areas are relatively diverse, the socio-cultural impact assessment proposes to supplement the Plan with the introduction of more regionally location-based land-sea interactions (see Figure 4.2.1.4-9).

The development of **land-sea clusters** is based on the Estonian Regional Development Strategy 2014-2020, the newly developed maritime strategies of the counties (2018-2019), and the cultural mapping of the maritime counties carried out in the framework of Maritime Spatial Plan. These clusters are based on the direct visions and development directions of the county strategies (e.g., the development of the Tallinn-Helsinki twin city in Harju County) as well as analytical generalizations based on the development strategy (e.g., Ida-Viru County as the Estonian adventure tourism region and ranking second as a place to visit after Harju County). The cultural mapping carried out in the context of the Maritime Spatial Plan provided input on regional specificities, strengths, and potential.

As county development strategies have recently been drafted, it is advisable to discuss and further develop land-sea clusters in the preparation of Estonia's new regional development strategy.

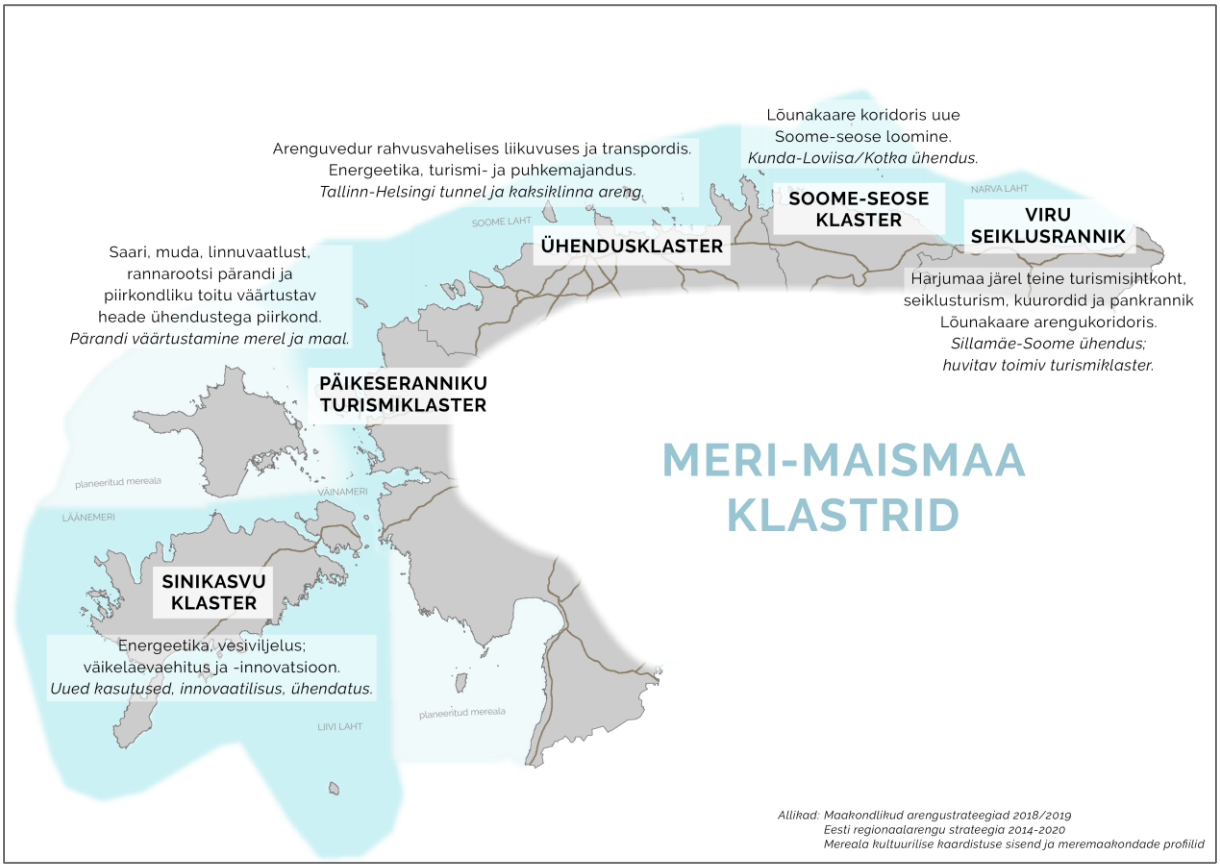

Figure 4.5.1.4-9. Land-sea clusters

Preventing or mitigating significant socio-cultural negative impacts have already been taken into account in the design of the Maritime Spatial Plan. The following are suggestions for further mitigating changes that are perceived negatively by some stakeholders/individuals. Implementation of the plan will have a long-term positive impact on the social and cultural environment. Combined use, enabling and innovative planning plays a key role in leveraging the positive impact. The suggestions below also reflect the potential for leveraging positive impact.

ENVIRONMENTAL MEASURES:

Suggestions to improve the planning solution:

1. In cases where statutory licensing processes do not reflect cooperation with stakeholders, consider including a clause in MSP that also takes into account fishermen's interest in applying for aquaculture licenses: to avoid having a negative impact on the most used and yield rich fishing grounds.
2. Consider allowing for the combined use of wind farms and fish farming.
3. Consider including a condition that both fishermen and local government should be involved in decision-making processes in order to increase synergies and prevent/mitigate conflicts in the aquaculture sector, in case in the current legal space procedural processes do not reflect this need.
4. Consider the principle of enabling the combined use of aquaculture farms with renewable energy (e.g., solar and wave energy).
5. Consideration should also be given in the functional classification of the purpose of new marine use service vessels - the needs of new branches in ports may differ slightly from those of established ones.

7. Consider adding a condition for wind farm cable corridors that requires cooperation with the National Heritage Board (to avoid damaging seabed cultural assets) and the Ministry of Defense (to identify potential historical explosives and hazardous objects).
8. Consider highlighting in MSP the importance of an international network corridor for the development of wind farms and/or show the principle direction of connecting the innovation area in a schematic map showing possible cable connections.
9. Consider the need to mitigate the visual impact of wind energy development. The wind energy development areas are about 12-13 km from Elda/Soegninina Cliff and also about 11 km from the northern tip of Ruhnu, so it is advisable to mitigate the visual impact in these locations (e.g., move wind turbines further into the sea or open a wind turbine-free corridor). It is advisable to design a wind turbine-free corridor to the west of Sõrve, as well as west-facing corridors through the wind turbine areas in the Jämaja/Türju area and the Tiirimetsa-Kaugatoma section. As Ruhnu is also a Class I valuable landscape, it is important to consider designating a view corridor from the island towards the north to mitigate the visual effects. The locations of the wind turbine-free corridors must be specified in cooperation with the local government as the parameters of the wind turbines become clear.
10. Consider adding a condition in the planning that when developing wind turbine parks of different developers, it is advisable to consider formations (such as regular alignment of wind turbines) that reduce the visual impact of wind turbines, particularly from those coastal viewpoints closest to the area and where the proposed areas for wind energy extend to the deepest offshore areas, namely in area 2 from Sõrve to Elda Peninsula and area 1, north of Ruhnu.
11. Consider treating seabed cultural assets as a single chapter and include both monuments and unprotected wrecks.
12. Consider the need to improve conditions for the use of deposits in terms of other potential interests (including threats) (e.g. need for cooperation with the Ministry of Defense on historic explosives, etc.).
13. Consider supplementing MSP with the introduction of more location-based land-sea interactions (See figure 4.2.1.4-9).

PROPOSALS FOR THE ACTION PLAN:

1. Developing measures for traditional maritime users (e.g., fishermen) to enter new sectors of the blue economy, taking advantage of established prerequisites (maritime skills, knowledge of the regional sea, etc.).
2. Developing rules for combined use of the marine area and national support measures.
3. Include the principle of taking into account the functional hinterland of the port when reviewing the concept of small craft harbors / preparing a new development plan.
4. Analyzing the rescue capacity and assessing needs at the state level, in cooperation with the Police and Border Guard Board and interested parties in the light of the situation in the implementation of the plan.
5. Detailed evaluation of the visual effects of the viewpoints of Saaremaa West Coast with visualization. The involvement of an expert in socio-cultural impact assessment is required.
6. Establishment of a sea litter mitigation plan.
7. Development of a marine renewable energy innovation support program, preferably in cooperation with Latvia and Finland.
8. Further development of land-sea clusters (e.g., in preparation of the new Estonian strategy for regional development).
9. Developing potential local benefit mechanisms to balance the interests of the *developer-current user* and the *developer-local government.*

4.4.2 Impact on property

In the marine area, a direct impact on the property may result from natural conditions (e.g., stranding, impacts of waves or ice banks, storms), ship-facility collisions, incompatibility of marine activities, or poor operational practices (e.g., damage to wrecks by divers). Indirect impacts may include factors such as the restoration of damaged vessels or facilities/infrastructure, loss of revenue due to production stoppages, etc. Due to the environment, the impact on the property may also result in a higher impact/risk to life (risk of drowning, distance to the maritime rescue).

Planning has predominantly reduced the risks to the property by **increasing the safety of** the conditions imposed on various areas of marine use**,** such as setting rules for shipping and highlighting the importance of shipping lanes, working with the Ministry of Defense to identify the locations of historic explosives in the context of planned seabed activities. Proposals for improvements have been made to the different chapters of the Impact Assessment, where necessary for safety reasons.

The marine area favors a variety of combined uses of marine area, but at the same time, combined use also brings with it certain risks to the property: combined use, on the one hand, brings together planned marine area activities which, on the one hand, increase safety and, on the other hand, may increase the magnitude and/or accumulation of impact (for example, a ship getting stuck in shellfish lines or in fish cages in wind farm areas where, under adverse conditions, an uncontrolled ship may collide with wind turbines). Methods to mitigate the impact include developing rules, practices, and practices for combined use and assessing the risks of combined use. **In the light of what is planned in the Maritime Spatial Plan, where new uses are emerging in the marine area, it is necessary to complement national risk assessments and, where appropriate, maritime rescue strategies.**

The impact on assets is also possible due to sectoral developments – e.g., intensification of shipping. Measures to mitigate the impact include improving the coverage and effectiveness of marine rescue, which is also highlighted in the planning.

From the standpoint of land-sea clusters, property owners may feel that certain offshore developments (such as wind turbines) may affect their **income earned from the property or value of the property**. Scientific articles show that planned activities in the marine area can have both positive and negative impacts on tourism revenues, for example. For example, Kuehn (2005)[78] has pointed out that[79] offshore wind farms in Denmark did not reduce the number of tourists or summer rental rates. At the same time, Cook (2004) has[80] compared Denmark with Scotland and pointed out that because of different landscape experiences in different countries, the impact is also different: Denmark is a highly developed and urbanized country with many onshore wind farms already in operation. At the same time, tourists in Scotland are looking for a different experience with wildlife and less cultivated landscapes, so expectations and, therefore, the impact may be different from Denmark. For the UK's

[78] Kuehn, S. (2005). Sociological investigation of the reception of Horns Rev and Nysted offshore wind farms in the local communities. ECON Analyse, March.

[79] Horns Rev offshore wind farm in the North Sea, 14-20 km off the coast.

[80] Cook, G. (2004) Renewable Energy Policy in Denmark - An Introduction; Scottish Parliament Information Centre (SPICe): Edinburgh, UK.

Scroby Sands offshore wind farm, the positive impact on tourism in terms of visitors to the wind farm (~ 30,000 people in the first half of the year) has also been highlighted[81].

Regarding changes in real estate prices, Sunak and Madlener (2016)[82] point out that, according to studies in Germany, offshore wind farms reduced real estate prices by 9 to 14% when there was a significant number of wind turbines in the views from the real estate. When few wind turbines were located in the field of view or their impact was marginal, no decline in property prices was observed. In Denmark, however, Jensen et al., (2018) found that while wind turbines influenced property prices, there was no significant impact on offshore wind turbines, as the wind turbines were at least 9 km from the beach or from a particular plot[83]. There are no known studies conducted in Estonia, which makes it difficult to assess the impact on real estate values. It can be assumed that the real estate price change could be perceived as a threat by the landowners from whose land plot opens a direct view of the sea area where the wind turbines are planned and where the wind turbines are located closest to the coast; according to the Maritime Spatial Plan, these areas would be Tagamõisa peninsula, the western coast of Saaremaa from Vilsandi to Sõrve and Ruhnu. In terms of population density, coastal areas are sparsely populated (see Figure 4.2.2.-1), due to which the impact may be rather local depending on the specific nature of the landscape (lack of forests on the coast, etc.).

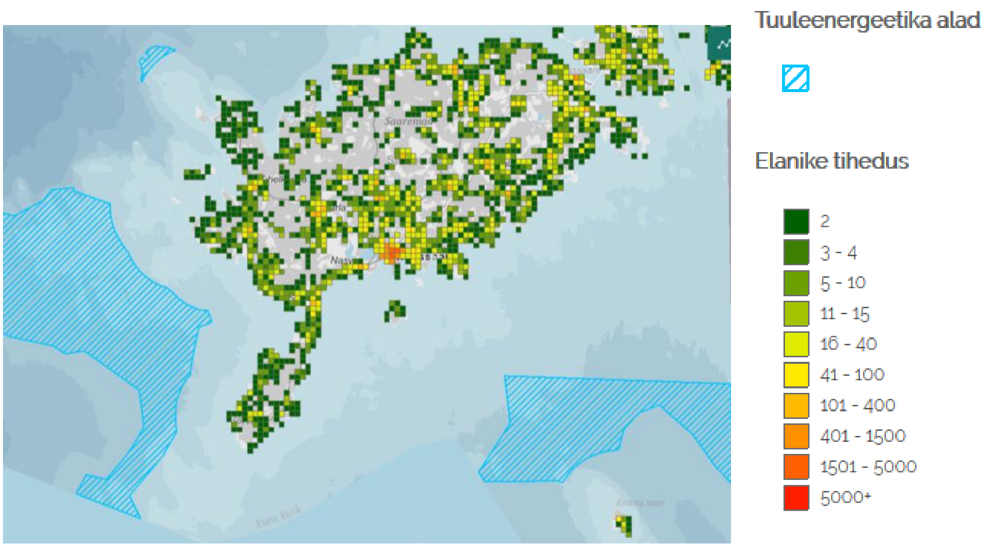

Figure 4.5.2.-1. Population density (people per square kilometer) and planned areas of the wind energy (Extract from the planning map application: mereala.hendrikson.ee)

[81] British Wind Energy Association (2006). The Impact of Wind Farms on the Tourist Industry in the UK; London, UK.

[82] Sunak, Y., & Madlener, R. (2016). The impact of wind farm visibility on property values: A spatial difference-in-differences analysis. Energy Economics

[83] Jensen et al.(2018). The impact of on-shore and off-shore wind turbine farms on property prices. *Energy Policy*.

The implementation of the Maritime Spatial Plan may have indirect effects on people's property through visual impacts.

ENVIRONMENTAL MEASURES:

1. Consider further mitigating the visual impact of wind energy development to prevent potential impacts on landowners whose property may have a direct view of wind turbines. An alternative, but also complementary, measure may be the development of a local benefit mechanism to compensate the landowner, whose dwelling or recreational outbuilding has a direct view of the wind turbine, the potential impact on property prices.

4.5 IMPACT ON HUMAN HEALTH

Marine areas are important for human health and well-being. Many people live in the immediate vicinity of the marine areas, go fishing or consume fish and fish products, spend their leisure time at and by the sea, and the wind blowing at sea gives us energy in the future. All these activities can have both negative and positive impacts on people's health and well-being. The impact can be direct, for example, through accidents at sea or through exposure to various food and airborne contaminants, or indirect, through stress and increased and/or reduced well-being. There are also various recreational activities at sea that improve the health of the population and have a positive impact.

Given the focus of Maritime Spatial Plan, potential health impact, and measures to mitigate and enhance them, in the areas of fisheries, aquaculture, maritime transport, energy production, and marine tourism and recreation will be further analyzed below.

Apart from these, a certain impact may also occur in other areas covered by the Maritime Spatial Plan. For example, some negative impact on public health may occur with the construction of new infrastructures (cables, pipes, etc.), where pollutants are released from bottom sediments back into the water mass, where they pass through fish to the food consumed by people. However, such an impact needs to be assessed on a site-specific basis in the application for a specific project permit and in the EIA (including a prior assessment of contaminant concentrations in sediments, as in the case of the NordStream projects) and, where appropriate, mitigation measures proposed.

It is also important for public health to develop marine rescue and pollution control, which has a positive impact on health and has no direct negative impacts.

Taking into account the marine conservation values addressed in the plan contributes to the creation and maintenance of a clean, species-rich environment, which in turn contributes to human well-being, creates opportunities for movement in the natural environment and acts as a stress reliever.

Marine culture and the appreciation of cultural heritage enhance people's well-being by, among other things, creating opportunities for exercise and engage in sports which have a stress-relieving effect.

National defense activities, such as exercises at sea and seashore, can generate noise that can distract local residents and cause them health and stress-related issues. The potential negative impact of noise can be mitigated through better timing of activities and wider awareness of the population. The plan does not regulate national defense activities.

As Maritime Spatial Plan does not change the current use of the sea area for the extraction of mineral resources, the use of mineral resources and the extraction of mineral resources in the marine area are not associated with any positive or a negative impact on human health. In addition, different regulations must ensure that the material used for dumping is safe for human health and does not contain hazardous substances.

4.5.1 Fisheries

Fish is an important part of the Estonian diet, although we are smaller than average fish consumers compared to many EU countries (EUMOFA, 2018[84]). According to a study commissioned by the Ministry of Rural Affairs, in 2016, the Estonian population consumed 9.6 kg of fish and fishery products per inhabitant (product weight), which included 0.4 kg of self-caught fish or fish obtained free of charge[85]. (Estonian Institute of Economic Research, 2016) In 2015, the consumption of fresh fish was the highest in Western Estonia (6.1 kg per family member) and the lowest in Southern Estonia (2.4 kg per family member), elsewhere 3.8–3.9 kg per family member. Fish consumption is higher than average among fishermen's families.

Impact of the MSP

The Maritime Spatial Plan sees the continuation of fishing as a traditional use throughout the Estonian sea. No significant additional guidelines and conditions will be set for fisheries. In view of the above, the implementation of the Maritime Spatial Plan in the context of fisheries will not have a significant impact on health. The general health impacts of fishing are described below.

Because of the presence of toxic substances such as heavy metals, dioxins, dioxin-like polychlorinated biphenyls (PCBs) in the Baltic Sea, they can end up in fish and hence into the diet of the population. At the same time, the results of different years of assessments of the environmental status of the Estonian marine area are contradictory: high levels of heavy metals have been found at certain points in certain periods, while low levels have been found in other areas. Thus, the environmental status of the Estonian marine area in 2018 does not allow for a coherent assessment of the heavy metals content of fish in the Baltic Sea, and the reliability of the assessment of the status of the high seas has to be considered low due to the lack of monitoring data (Klauson et al., 2018). According to the same overview, it is difficult to estimate the levels of dioxins and dioxin-like PCBs in different fish and other marine organisms. For example, levels above the food safety limits have been found in the Baltic herring and in the Gulf of Finland and the Gulf of Riga and in the flounder in the mouth of the Gulf of Finland, but the levels in the majority of the samples analyzed remain low. This generally indicates that there is a risk, but due to average fish consumption, the risk is low for most people in Estonia. At the same time, there are several risk groups, such as pregnant women and, above all, fishermen's families, whose fish consumption is many times higher, exposure to pollutants is much higher, and there is a real health risk (Roots, 2011[86]).

Fish are generally considered to be healthy foods because they contain omega-fatty acids beneficial to the cardiovascular system, various vitamins (A, E, B1, B6, B12, D) and minerals (potassium, calcium, phosphorus, selenium, and iodine). In addition, fish is a relatively low-fat protein food, and fish protein is easily absorbed. As a result, eating fish has many positive impacts on human health.

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[84] EUMOFA. 2019. The EU Fish Market – 2018 Edition. European Market Observatory for Fisheries and Aquaculture Products.

[85] Estonian Institute of Economic Research. 2016. Consumption of fish and fishery products. Estonian Institute of Economic Research, Tallinn.

[86] Roots O. 2011. Expert assessment of the exposure of coastal fishermen to dioxins and dioxin-like polychlorinated biphenyls. Estonian Environmental Research Center: Tallinn.

The implementation of the Maritime Spatial Plan does not entail any significant health effects that need to be mitigated.

4.5.2 Aquaculture

In addition to fish freely caught in the Baltic Sea, Estonian residents may also consume fish and shellfish and algae farmed in the Baltic Sea in the future. They may also be exposed to the pollutants in the Baltic Sea.

Impact of the MSP

The fish feed may be the main source of dioxins and other harmful substances in farmed fish. Because fish in the Baltic Sea may contain various pollutants (see Chapter 4). 4.3.1.), prior control of the feed is important. Pollutants in the Baltic Sea (especially heavy metals) can also reach the farmed shellfish and algae. However, since aquaculture takes place primarily in the upper aquifers, where pollutant levels are lower than in the bottom sludge, and because HELCOM (*Helsinki Commission*) has assessed the water quality status as good for pollutants (HELCOM, 2018 [87]), it poses a low risk to human health.

Like fish caught in the Baltic Sea, fish farmed in the Baltic Sea has a positive effect on health. As a rule, fatty fish (e.g., rainbow trout) with higher levels of omega-fatty acids beneficial to the cardiovascular system are reared. Low carbohydrate-containing shells and algae rich in minerals are also beneficial to health. In addition, fish, shellfish, and algae farmed locally in Estonia can be better controlled and regulated than imported goods where only spot checks are carried out.

The implementation of the Maritime Spatial Plan does not entail any significant health effects that need to be mitigated.

4.5.3 Maritime transport

A large number of ships pass through the Estonian marine area, which emits exhaust gases and causes noise. Exhaust gases can be transported by winds from the marine areas to the coast, where they deteriorate air quality. Similarly, people living near ports are affected by air quality and noise. In Estonia, air pollution from ships and harbors has disturbed residents of Muuga and Sillamäe areas, where the number of odor nuisances increases significantly in certain adverse weather conditions (Maasikmets et al., 2014 [88]).

Air emissions from maritime transport are governed by Annex VI of MARPOL 73/78, Convention for the Prevention of Pollution from Ships, administered by the International Maritime Organization (IMO), which lays down different emission requirements based on

[87] HELCOM. 2018. HELCOM Thematic assessment of hazardous substances 2011-2016. Baltic Marine Environment Protection Commission (HELCOM).

88 Maasikmets M, Teinemaa E, Saare K, Vainumäe K, Arumäe T, Palu M. 2014. Assessment of ambient air quality, odor nuisance and pollutant emissions in Sillamäe and Vaivara region, Ida -Viru County. Estonian Environmental Research Center: Tallinn.

shipbuilding years and engine characteristics (IMO, 2017[89]). In addition, the sulfur content of marine fuels has been regulated and has been significantly reduced in recent years, which has reduced sulfur dioxide (SO_2) emissions from maritime transport (Sofiev et al., 2018[90]; Campara et al., 2018[91]). In addition, air pollution and noise are caused by the loading of goods (including petroleum products) onboard ships, and the service transport related to maritime transport (including cars carried by ships) (Institute of Marine Systems of Tallinn University of Technology, Alkranel, 2015 [92]). In June 2016, HELCOM submitted a proposal to the IMO to change the Baltic Sea into NECA (*Nitrogen Oxides Emission Control Area*) in addition to SECA (*Sulfur Emission Control Area*) by 2021 and to apply even stricter Tier III requirements to ships built after 1 January 2021.

Impact of the MSP

Historically, ships have been the main users of marine areas, and the planning solution has pointed out that changing the location of shipping lanes and imposing significant restrictions on shipping should generally be avoided when planning other uses. Therefore, no significant additional guidelines and conditions are set for maritime transport. In view of the above, the implementation of the Maritime Spatial Plan will not have a significant health impact. The general health impacts of maritime transport are described below.

The impact of shipping on the Baltic Sea population has been assessed in a recent study by Barregard et al., 2019[93]. In their research, they modeled the content of fine particulate matter content ($PM_{2.5}$) originating from ships both in 2014 before the SECA regulations and in 2016 after the SECA regulations came into force in the Baltic Sea Region in a 0.1 ° × 0.1 ° (approximately 10 × 10 km) network. Exposure to fine particles of air pollution has been shown to affect both cardiovascular and respiratory morbidity (WHO, 2013[94]). In addition, fine particles have been associated with premature birth and low birth weight (Li et al., 2017[95]), diabetes risk (Thiering and Heinrich, 2015[96]), rheumatic (Sun et al., 2016[97]) and neurodegenerative diseases (Xu et al., 2016[98]) They have been recognized by the International Agency for Research on Cancer (IARC) as causing cancer in humans. Figure 4.3.3.-1 shows the population-based concentration of ultra-fine particulates from shipping, which takes into account the location of the population and population density. Based on this, air pollution from maritime transport causes 17-38 early deaths in Estonia each year,

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89 IMO. 2017. Amendments to MARPOL Annex VI. International Maritime Organization. http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Documents/Res_MEPC_286%2871%29_Tier%20III%20ECA%20and%20BDN.pdf

90 Sofiev M, Winebrake JJ, Johansson L, Carr EW, Prank M, Soares J, Vira J, Kouznetsov R, Jalkanen JP, Corbett JJ. 2018. Cleaner fuels for ships provide public health benefits with climate tradeoffs. Nature Communications 9(1):406.

91 Campara L, Hasanspahić N, Srdjan V. 2018. Overview of MARPOL ANNEX VI regulations for prevention of air pollution from marine diesel engines. SHS Web of Conferences 58:01004.

92 Strategic Environmental Assessment of the National Development Plan "Estonian Maritime Policy 2012-2020". Tallinn University of Technology Marine Systems Institute, OÜ Alkranel) Tartu-Tallinn, 2015.

93 Barregard L, Molnàr P, Jonson JE. 2019. Impact on population health of baltic shipping emissions. International Journal of Environmental Research and Public Health 16:1954.

94 WHO. 2013. Review of Evidence on Health Aspects of Air Pollution. REVIHAAP Project Technical Report. World Health Organisation: Copenhagen.

95 Li X, Huang S, Jiao A, Yang X, Yun J, Wang Y, Xue X, Chu Y, Liu F, Liu Y, Ren M, Chen X, Li N, Lu Y, Mao Z, Tian L, Xiang H. 2017. Association between ambient fine particulate matter and preterm birth or term low birth weight: An updated systematic review and meta-analysis. *Environmental Pollution* 227:596-605.

96 Thiering E, Heinrich J. 2015. Epidemiology of air pollution and diabetes. *Trends in Endocrinology & Metabolism* 26:384–394

97 Sun G, Hazlewood G, Bernatsky S, Kaplan GG, Eksteen B, Barnabe C. 2016. Association between air pollution and the development of rheumatic disease: a systematic review. *International Journal of Rheumatology* 2016:5356307

98 Xu X, Ha SU, Basnet R. 2016. A review of epidemiological research on adverse neurological effects of exposure to ambient air pollution. *Frontiers in Public Health* 4:157

according to SECA regulations, with an average of 34 coronary heart disease and 20 stroke cases per year (Barregard et al., 2019[12]).

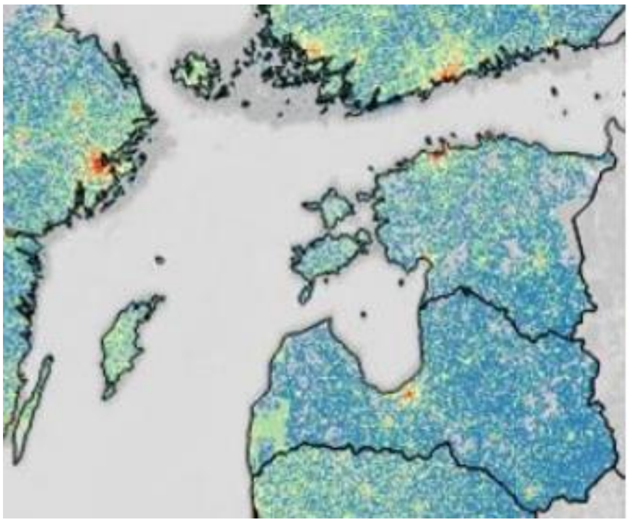

Figure 4.6.3-1. Impact of shipping emissions on the exposure of the Baltic Sea population to ultrafine airborne particles ($PM_{2.5}$) in 2016 (after the SECA regulations came into force) in the 0.1 ° × 0.1 ° network (based on Barregard et al., 2019).

Maritime spatial planning does not envisage changes in maritime transport, so there is no significant impact.

4.5.4 Energy production

With this plan, wind energy development areas located six nautical miles from the coast are planned for the Estonian marine area. In recent years, increasingly more attention has been paid to the health impact of wind turbines, in particular in terms of low-frequency noise, including infrasound (below 20 Hz). However, the research carried out so far has focused on onshore wind farms (van Kamp & van den Berg, 2018[99]), so the results cannot be transferred to offshore wind farms. Although several animal studies have shown minor physiological changes in the outer hair cells of the cochlea following exposure to infrasound, similar human data are lacking, so it is unclear whether such inner ear impacts can causally explain individual symptoms such as tinnitus, dizziness and Meniere's disease (Schmidt & Klokker, 2014[100]). In general, the main complaints about wind turbines are stress, poor quality of sleep, difficulty concentrating, nervousness, exhaustion, headache, dizziness, ringing in the ears (Royy et al., 2014[101]). These symptoms have also been termed "Wind Turbine Syndrome" but have not been recognized as a clinical diagnosis (Pierpon, 2009[102]).

[99] van Kamp I, van den Berg. 2018. Health effects related to wind turbine sound, including low-frequency sound and infrasound. *Acoustics Australia* 46(1):31–57.

[100] Schmidt JJ, Klokker M. 2014. Health effects related to wind turbine noise exposure: a systematic review. *PLoS One* 9(12):e114183

[101] Roy J, Krogh C, Horner B. 2014. Adverse health effects of industrial wind turbines. Canadian journal of rural medicine: the official journal of the Society of Rural Physicians of Canada 19: 21–26.

[102] Pierpon N. 2009. Wind Turbine Syndrome: A Report on a Natural Experiment. K-Selected Books.

However, wind turbines per se, and seeing them seems to be the most disturbing aspect of wind turbines for people (Freiberg et al., 2019[103]). Wind turbines that can be seen from a home window are often not considered aesthetically pleasing (Pedersen et al., 2007[104]). The picture below shows the Sheringham Shoal offshore wind farm, 17 to 23 km off the coast of England (Photo 4.3.4). Wind turbine distress, in turn, causes stress associated with sleep deprivation, headaches, and difficulty concentrating (Roy et al., 2014[20]). People who live near wind turbines rate their quality of life worse than those who live further away or the average of the population (Shephard et al., 2011[105]). However, people living in the vicinity who benefit directly from wind farms have significantly less feeling of being bored (Pedersen et al., 2009[106]).

Figure 4.6.4-1. Sheringham Shoal Offshore Wind Park (source https://www.flickr.com/photos/windeurope/28687503031)

A third explanation for the health problems of people living near wind farms is the nocebo effect, where people have a negative association in their brain between wind turbines and health impacts (Crichton et al., 2014a[107]). In this case, negative health expectations result in clinical symptoms and do not depend on whether or not the perceived health risk is actually present. The nocebo effect is not only related to the wind turbines but may also occur with other subjects. The low-frequency sound produced by wind turbines must not exceed the legal limits, and the human hearing system has been developed so that we are not disturbed, for example, by the low-frequency sounds produced by our own breathing and heartbeat that are

[103] Freiberg A, Schefter C, Hegewald J, Seidler A. 2019. The influence of wind turbine visibility on the health of local residents: a systematic review. *International Archives of Occupational and Environmental Health* 92(5):609–628.

[104] Pedersen E, Persson-Waye K. 2007. Wind turbine noise, annoyance and self-reported health and well-being in different living environments. Occupational and Environmental Medicine 64:480–486.

[105] Shepherd D, McBride D, Welch D, Driks KN, Hill EM. 2011. Evaluating the impact of wind turbine noise on health-related quality of life. *Noise & Health* 13(54):333–339.

[106] Pedersen E, Frits van den Berg. 2009. Response to noise from modern wind farms in The Netherlands. *The Journal of the Acoustical Society of America* 126(2):634–643.

[107] Crichton F, Chapman S, Cundy T, Petrie KJ. 2014a. The link between health complaints and wind turbines: support for the nocebo expectations hypothesis. *Frontiers in Public Health* 2:220.

produced beyond the capacity of one wind farm (Crichton et al., 2014b[108]). However, when a person thinks that wind turbines affect their health, they develop health problems because negative associations induce stress-related physiological activity in the autonomic nervous system and brain, and cause irritation, anxiety, fear, and the like. Moreover, with the current knowledge, it cannot be completely excluded that infrasound generated by wind turbines affects human health (Farboud et al., 2013[109]).

Impact of the MSP

This Maritime Spatial Plan solution is designed to minimize the direct human health impact of wind farms. However, in the planning phase, it is not possible to provide specific numerical data (for example, carry out modeling) on how big the noise wind farms noise could become. In the planning phase, the main locations of the wind farms will be determined, but the exact number, height, and technology of the wind turbines are currently unknown. However, for specific project evaluations, modeling of such noise (including low-frequency noise) would certainly be necessary and should take into account other planned wind farms.

As the areas of wind farms are planned to be at least 6 nautical miles (~ 11.1 km) from land and islands, this will greatly reduce the spread of noise, including infrasound, to the coast. However, reaching and hearing infrasound depends on both the wind direction and strength (Keith, 2018[110]). Because wind and waves also produce infrasound themselves (Le Pichon[111] et al., 2004), it can be unrealistic to distinguish it from wind farm noise in most cases. There are currently no studies showing the health impacts of noise coming from offshore wind farms. As mentioned above, the results of surveys of onshore wind farms cannot be transferred to offshore wind farms. In addition, land-based studies have shown that the effect of the noise of a wind turbine located more than 7 km away on sleep disorders (Nissenbaum et al., 2012[112]).

At the same time, offshore wind farms may have some negative impact and reduced well-being due to distraction and nocebo impacts. Following the plan, the areas of the offshore wind turbines will only be visible in certain directions from the nearest land-based points. Because many of these health impacts are related to psychological mechanisms, health impacts are largely independent of exposure - if a person sees a wind farm, they may develop a negative association and health symptoms that are, in many cases, true. It would, therefore, be important to minimize the visibility of wind farms and to create wind-free corridors. Maslov et al. (2018 [113]) have shown that visual impacts can vary significantly across the coast, depending on whether you see wind turbines directly or at an angle and how many you see. According to a study by Sullivan[114] et al., wind turbines can be seen up to 42 km (22.7 nautical miles) away, and they are in visual focus at up to 16 km (8.6 nautical miles) (Sullivan et al.,

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[108] Crichton F, Dodd G, Schmid G, Gamble G, Cundy T, Petrie KJ. 2014. The power of positive and negative expectations to influence reported symptoms and mood during exposure to wind farm sound. *Health Psychology* 33(12):1588–1592.

[109] Farboud A, Crunkhorn R, Trinidade A. 2013. Wind turbine syndrome': fact or fiction? *The Journal of Laryngology & Otology* 127:222–226.

[110] Keith S. 2018. Wind turbine low frequency and infrasound propagation and sound pressure level calculations at dwellings. *The Journal of the Acoustical Society of America* 144:981.

[111] Le Pichon A, Maurer V, Raymond D, Hyvernaud O. 2004. Infrasound from ocean waves observed in Tahiti. *Geophysical research letters* 31:L19103.

[112] Nissenbaum MA, Aramini JJ, Hanning CD. 2012. Effects of industrial wind turbine noise on sleep and health. *Noise & Health* 14:237–243.

[113]Maslov N, Claramunt C, Wang T, Tang T. 2017. Evaluating the visual impact of an offshore wind farm. *Energy Procedia* 105:3095–3100.

[114] Sullivan RG, Kirchler L, Cothren J, Winters SL. 2013. Offshore wind turbine visibility and visual impact threshold distances. *Environmental Practice* 15(1):33–49

2013). Therefore, it would be important to reduce visibility in areas where more people are living or where people are walking by the sea to enjoy the sunset.

In addition, Crichton et al. (2013) have shown that the occurrence of health impacts depends on the information provided to people: by talking more about the positive impacts of wind turbines, the negative impacts can be reduced. Wind energy helps, firstly, to reduce carbon emissions, which mitigates climate change, and climate change has a significant impact on the health of the Estonian population, for example, through the increase in heat waves (Orru et al., 2015[115]). On the other hand, wind energy development would help reduce air pollution from oil shale energy. A study conducted under the Estonian Energy Sector Development Plan 2030 (ENMAK) found that air pollution from oil shale burning causes at least 20 early deaths in Estonia each year (Orru et al., 2014 [116]) and tens of thousands of people in Ida-Viru County have been significantly disturbed by air pollution from the oil shale sector (Orru et al., 2018 [117]). By using more wind energy, these health impacts can be greatly reduced.

ENVIRONMENTAL MEASURES:

1. Performing accurate modeling of wind farm locations at the licensing environmental impact assessment stage to minimize disruption, making them less visually visible on more visited seacoasts.

PROPOSALS FOR THE ACTION PLAN:

1. Developing compensatory measures of tolerating wind farms for the local community.
2. As the potential health effects of offshore wind farms are likely to be psychogenic to some extent, people should be made more aware of the benefits of wind turbines (reduction in mortality due to reduced air pollution and mitigation of climate change).

4.5.5 Sea tourism and recreation

Maritime tourism and recreation have a significant impact on public health through the promotion and enhancement of active mobility. However, there are several risks associated with the recreational use of marine areas. Thus, 15 people drowned in the sea in 2018, which is 35% of all drownings in Estonia (Oidersalu, 2019[118]). It is also important to note that the number of drownings in the sea has more than doubled compared to 2016 (while the total number of drownings in Estonia has remained at the same level). Another part of the accidents involves fishermen in distress at sea and vessels rescued by the Rescue Board. Therefore, it is extremely important to ensure rescue on larger beaches and at sea.

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[115] Orru H, Lanki T, Forsberg B, Saava A, Åström DO, Indermitte E, Orru K, Åström K, Rekker K, Tillmann K, Kangur T. 2015. Health *Report:* Assessing the Impacts of Climate Change and Developing Adaptation Measures on Planning, Land Use, Human Health and Rescue Capacity (KATI), pp. 168-262. Edited by Roose A. University of Tartu: Tartu

[116] Orru, H. 2014. Assessment of changes in health effects expected to be caused by airborne pollution through sectoral scenarios using ultra fine particulate matter content as pollution indicator in the framework of ENMAK 2030+ Development Fund: Tallinn

[117] Orru H, Idavain J, Pindus M, Orru K, Kesanurm K, Lang A, Tomasova J. 2018. Residents' self-reported health effects and annoyance in relation to air pollution exposure in an industrial area in Eastern-Estonia. International Journal of Environmental Research and Public Health 15(2).

118 Oidersalu E. 2019. Fatalities in water accidents, 2018. Estonian Rescue Board: Tallinn.

Water-related accidents also include explosives found on the seabed. As recreational diving is gaining in popularity, the risk of accidents is also increasing. Occupational health hazards arise from both marine rescue, and explosive mine clearance: highly volatile hydrocarbons are toxic when inhaled, and mine clearance entail is a risk of accidents. Safety and accident issues have also been raised in connection with water tourism, which has also increased and is rather more likely to be promoted by the plan. Generally speaking, the creation of various recreational facilities at the seaside and at sea is beneficial to public health as it improves the physical health of the population and reduces stress. Increasing the potential incremental risks, such as the number of skin cancer cases, can be mitigated through awareness-raising and wider use of remedies.

Another part of the water quality risks is related to bathing water. Previous plans have stressed that popular bathing areas (beaches) would be managed as official beaches/bathing areas with accompanying water sample testing, etc. This monitoring is organized by the Health Board, which also gives regular warnings of deteriorated water quality. The main cause of water quality deterioration is water blooms, including cyanobacteria in water. Cyanobacterial toxins are toxic to humans both by the ingestion of water and by inhalation of airborne droplets (aerosols) on the beach. The problem of cyanobacteria occurs only in hot periods and with certain winds when the cyanobacteria are carried to the coast from the high seas. In Estonia, cyanobacteria are regularly monitored, and warnings are given to the population when these levels are high.

Impact of the MSP

The plan supports the development of maritime tourism and recreation, which in turn supports the active movement of the population, which has a very important impact on the prevention of chronic diseases. With regard to the adverse impacts associated with the development of the sector, the risk of accidents (drowning, injuries, etc.) may be highlighted. There are also noises in water motorsport activities that can cause disturbance to nearby residents and tourists.

Marine Spatial Planning does not plan activities for marine tourism and recreation, which would have a significant environmental impact.

4.6 ECONOMIC ENVIRONMENT

4.6.1 Fisheries

Fishing is an important sector for the Estonian economy. In 2017, 125 economically active companies[119] engaged in sea fishing[120] as their main activity. The number of companies has increased by 34% compared to 2014. The sales revenue of the companies totaled approximately 42.7 million euros in the same year, 17% more than in 2014. In addition, there are 884 sole proprietors registered in Estonia in 2019, whose main activity is sea fishing, according to the Commercial Register. Companies engaged in sea fishing as their main activity employed around 263 people in 2017, 5% less than in 2014. The number of employees per company has also decreased (from 3.0 to 2.1), which is 3.3 times less than the average for Estonian companies. In addition, there is a large number of sea fishing companies in the coastal areas, whose sea fishing is a secondary activity due to its periodic nature (up to four

119 Companies which have indicated sea fishing as the main activity in the Commercial Register (EMTAK 2008 code 03111).

120 An economically active company is a company, which according to the Commercial Register has generated revenue for the financial year.

months per year, according to fishermen, which prevents obtaining a stable income). In 2017, the sales revenue of the companies operating in the field of sea fishing accounted for approximately 0.09% of the total sales revenue of Estonian companies and the number of employees for approximately 0.07% of the total number of employees in Estonian companies.

According to Statistics Estonia and the Ministry of Rural Affairs, Estonian professional fishermen caught 64,477 tons of fish in the Baltic Sea in 2017, of which 17% was coastal fishing, and 83% was offshore trawling. Baltic herring (55%) and sprat (41%) were the main catches in the Baltic Sea that year. In 2017, Pärnu County coastal fishing accounted for 76% of the total coastal fishery. This was followed by Ida-Viru County (11%), Saare County (7%), and Lääne County (4%). In 2017, the number of fishermen entered in fishing permits in Estonian coastal waters was 1950. The highest numbers of professional fishermen were in Saare County (including Ruhnu) (23%), Pärnu County (including Kihnu and Manija) (21%), Hiiu County (17%) and Harju County (16%).

The Marine Economic Benefit Model [121] shows that the total economic benefits from fishing (both trawling and coastal fishing) are highest in the Gulf of Pärnu, amounting to approximately 100,000 euros per km^2(Figure). In terms of the benefits gained, the next important areas are near Lao beach, reaching 3.500 km^2/year, near Konju beach reaching 2,000 euros km^2/year and near Aseri beach, Kakurahu marine area and Kumari-Papilaiu, reaching in these regions over 1000-euro km ^{2}/year. In other areas, the benefits of fishing are lower.

[121] Estonian economic model: The Marine Economic Benefit Model is a simulation model commissioned by the Ministry of Finance, developed in 2016 and is still being updated to date (Pihor, K. et al. Basic Study of Maritime Spatial Planning: The Marine Economic Benefit Model. Praxis Center for Policy Studies. 2016; Nõmmela, K., Kotta, J., Piirimäe, K. (2019). Complementing the model of economic benefits from the use of marine resources with ecosystem services. Tartu Ülikool, OÜ Hobikoda and OÜ Roheline Rada, (https://www.rahandusministeerium.ee/et/system/files_force/document_files/mudeli_taiendamine_okosusteemiteenustega_aruanne.pdf).

When interpreting the results of the economic model, it is important to consider that this is a discussion platform rather than a means of reflecting reality. The values of the model parameters are highly uncertain, because in Estonian circumstances there are often no reliable measured indicators, so the results of the model should be indicative.

The Marine Economic Benefit Model was updated for fisheries data. For trawling, data were entered for the period 2014-2017, a four-year period, and annual average catches per species and per square kilometer of sea area were calculated. As regards coastal fishing, only the data for 2017 were taken into account. Both topics were transferred to the time step of one year.

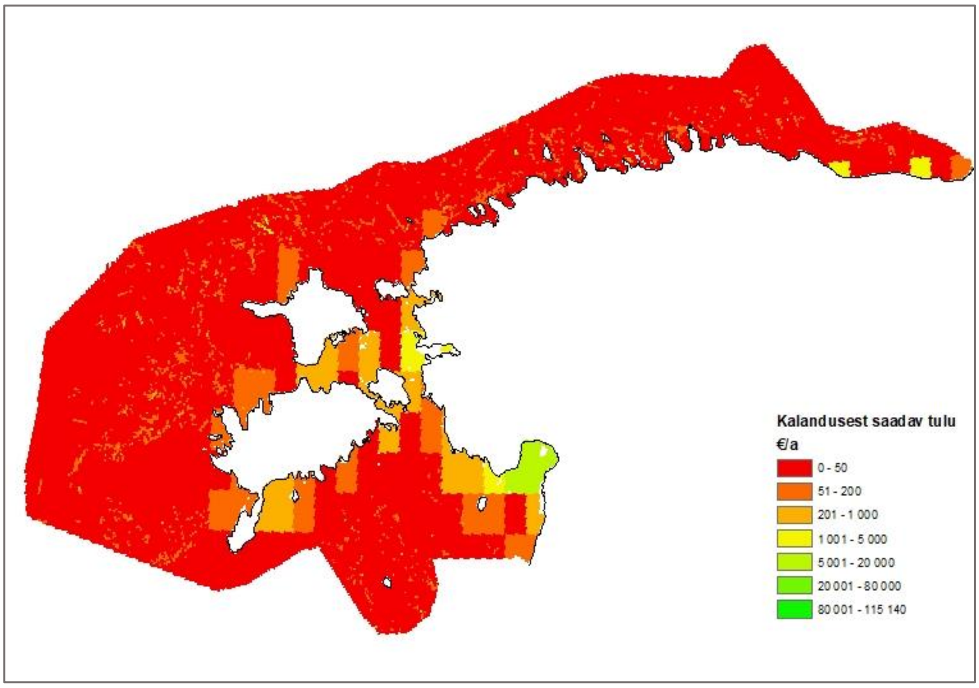

Figure 4.6.1-1. Economic benefits of fisheries in Estonian marine areas, €/km^2/year (Source: The Marine Economic Benefit Model)

The added value of coastal fishing[122] is highest in the Gulf of Pärnu, amounting to over 4,000 euros per km^2/year. The added value is also higher in the Väinameri region, up to 735 euros km^2/year. Near Aseri beach, it is 638 euros km ^{2}/year. Elsewhere, the added value of coastal fishing is less than 1000 euros km^2/year (Figure 4.6.1-2).

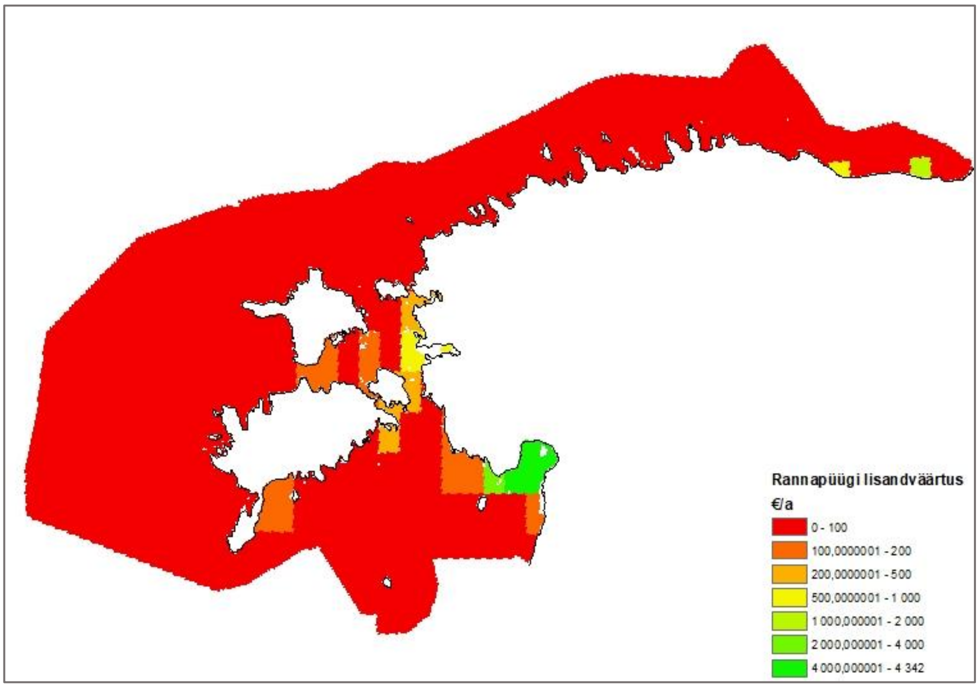

Figure 4.6.1-2. Added value of coastal fishing in Estonian marine areas, €/km^2/year (Source: The Marine Economic Benefit Model)

[122] Value added is calculated by multiplying gross income by the value added parameter (60% by default, assuming that the added value of coastal fishing is analogous to trawling in the absence of more accurate data) (Pihor, K. et al. Basic Study of Maritime Spatial Planning: The Marine Economic Benefit Model. Praxis Center for Policy Studies. 2016).

The added value of trawling in the Estonian marine areas are the largest in the Gulf of Riga, where at times it amounted to 1 500 euros km^2/year. It is also higher in the marine areas near Harju County and in the marine areas near Lääne-Viru County. Elsewhere, the value-added of trawling was less than 1000 euros km^2/year (Figure 4.6.1-3).

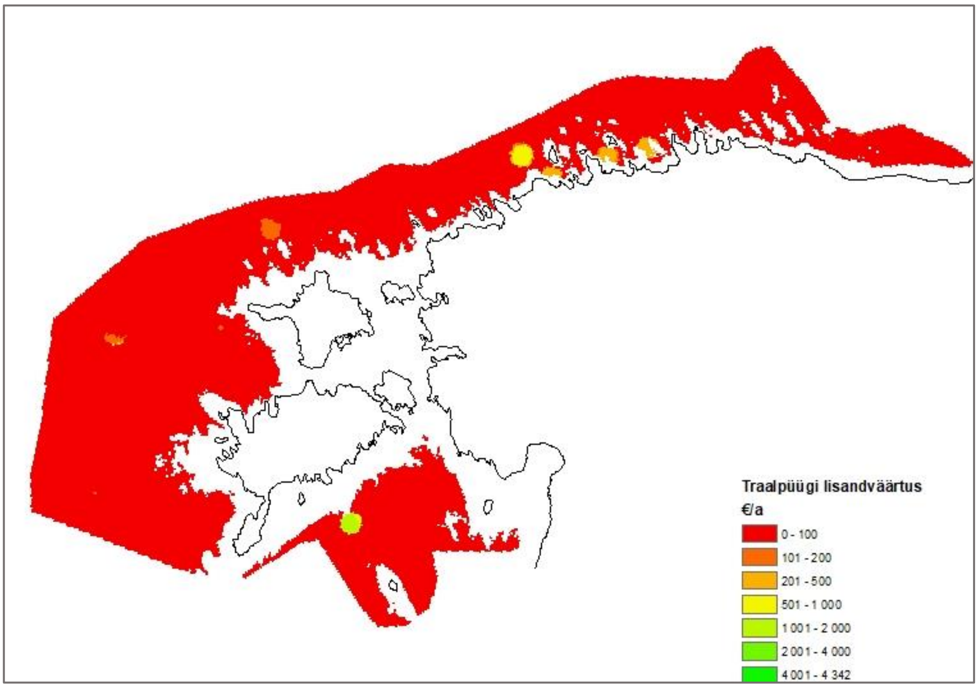

Figure4.6.1-3. Added value of trawling in Estonian marine areas, €/km^2/year (Source: The Marine Economic Benefit Model)

The state income from coastal fishing in[123] Estonian marine areas was proportional to the added value, being the highest in the Gulf of Pärnu, where it reached up to 700 euros per km^2/year. The state revenue is also significant in the vicinity of Lao Beach, Konju Beach and Aseri Beach, Kakurahu marine area, and Kumari-Papilaiu marine area. In other areas, the state income from fisheries is lower (Figure 4.6.1-4).

[123]State income is calculated as a fraction of the gross income (10% by default, assuming these are small businesses, for which coastal fishing is an ancillary activity not subject to VAT), multiplied by the fish catches at primary purchase price of the fish. As a result, the state income is the income tax of the natural person from the dividends paid out. (Pihor, K. et al. Basic Study of Maritime Spatial Planning: The Marine Economic Benefit Model. Praxis Center for Policy Studies. 2016).

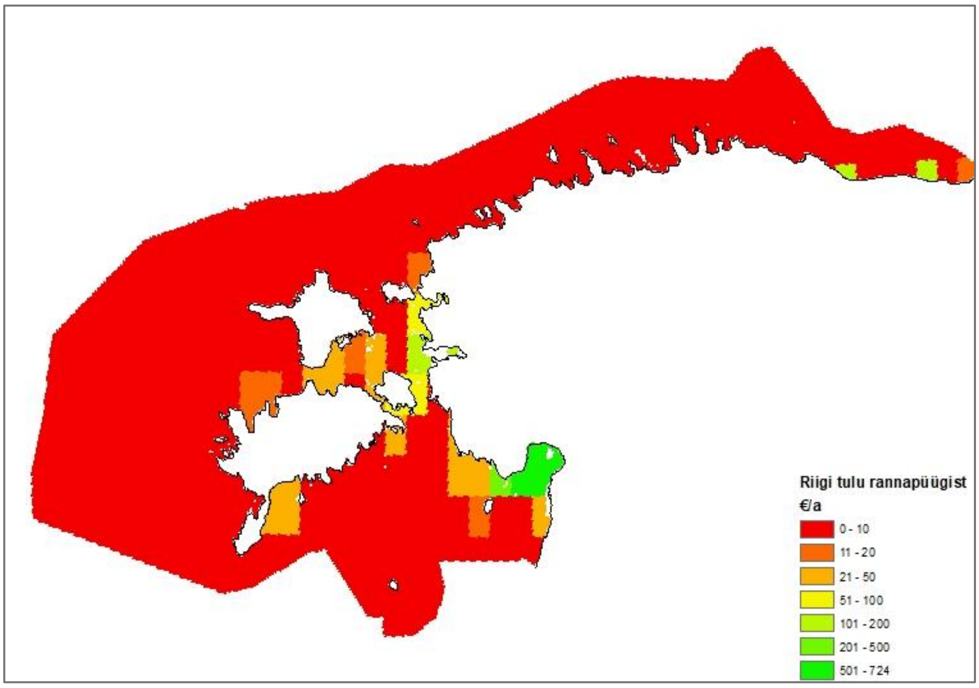

Figure4.6.1-4. State value from coastal fishing in Estonian marine areas, €/km^2/year (Source: The Marine Economic Benefit Model)

State revenue from trawling in Estonian marine areas is also proportional to the added value of trawling. The state revenue from trawling is highest on the southern coast of Saaremaa, amounting to 760 euros km ^{2}/year. The state revenue from trawling is also significant in the sea areas near Harju County and Lääne-Viru County. In other areas, the national income from trawling is lower (Figure 4.6.1-5).

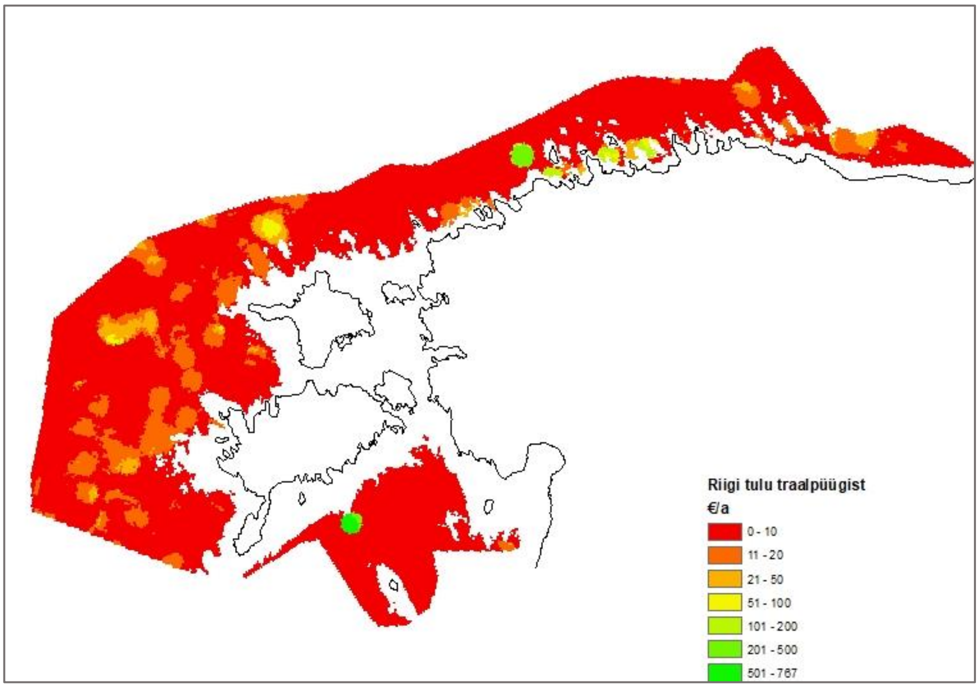

Figure 4.6.1-5. State value from trawling in Estonian marine areas, €/km^2/year (Source: The Marine Economic Benefit Model)

Impact of the MSP

The Maritime Spatial Plan does not foresee changes in fisheries-related marine areas, so the plan has no direct economic impact on the sector. Marine Spatial Planning provides a guideline and condition for ensuring the preservation of spawning grounds located in different marine areas that are important for the natural recovery of fish stocks and for ensuring that spawning grounds would not be subject to significant adverse impacts, which are also important from an economic standpoint - ensuring the sustainability of fish stocks is a key factor in the functioning of the fisheries sector. The Maritime Spatial Plan also identifies as a guideline the maintenance or creation of free access to fishing areas, fishing ports, and landing sites, which is also very important from an economic standpoint since free access is a prerequisite for the operation of fishing companies. In addition, the Maritime Spatial Plan sets a minimum depth requirement for trawl fishing, which does not deviate from the current rule and therefore has no economic impact. The planned wind energy development areas overlap with trawling areas, but as the overlap is small (*ca.* 5% of Estonian trawl fisheries overlap with wind energy development areas) and in principle the operation of trawling in wind energy development area is presumably possible, the impact cannot be considered significant. Impact may be significant to individual businesses.

Fishing activities require the existence of ports and access to and proper operating condition of the infrastructure there. As of the beginning of 2019, there are 171 seaports in Estonia (data from the Port Register). Fishing at sea does not generally preclude other activities.

The implementation of Maritime Spatial Plan does not have a direct economic impact on fisheries. The guidelines and conditions set out in the plan support the functioning of fisheries.

4.6.2 Maritime transport

Maritime transport has always played an important role in the Estonian economic environment by providing international and national connectivity opportunities and by being an important employer and business developer. In 2017, 60 economically active companies were engaged in shipping[124] in Estonia. The number of companies has increased by 15% compared to 2014. Corporate sales totaled approximately 0.5 billion euros in the same year[125], 5% lower than in 2014. Sales per company have also fallen. The sales revenue of shipping companies accounted for approximately 1% of the total sales revenue of Estonian companies in the same year.

Shipping companies employed around 7,676 people[126] in 2017, up 3% from 2014. However, when comparing the number of employees without one of the largest shipping companies, AS Tallink Grupp, the number of employees has decreased by 45% (from 494 to 270) during the period 2014-2017. The average number of employees per company has also decreased (excluding AS Tallink Grupp from 9.7 to 4.6). Similarly, to the decline in the number of employees in shipping companies, the total number of employees in Estonian companies has decreased over the same period (from 7.6 to 6.9). The number of employees in shipping companies accounted for approximately 2% of the total number of employees in Estonian

[123] Companies which have designated as main activities in the Commercial Register (EMTAK 2008 codes): Sea and coastal freight water transport (50101), Sea and coastal passenger water transport (50101) or Towing of ships (50202).

[125] 90% of the total sales revenue was generated by AS Tallink Grupp (only the Company's revenue in the field of maritime transport is included).

[126] 96% of the number of employees was comprised of the employees of AS Tallink Grupp.

companies in 2017. There are also ports related to maritime transport[127], which provide a service to shipping companies and which employed around 800 more people in 2017. In addition, Estonian seafarers work in shipping companies of other countries, but there is no reliable information on their numbers.

According to the Port Register, there are 220 ports in Estonia as of 2019, of which 171 are seaports, of which 73% or 125 are small craft ports. According to Statistics Estonia, approximately 7 million passengers traveled on the main international regular services[128] in2017, and approximately 2.5 million passengers on the main domestic regular[129] services. In the same year, 311 cruise ships with 564,280 cruise tourists visited the Port of Tallinn. In total, approximately 6,500 passenger and cruise ships from abroad visited Estonian ports. The volumes of passenger transport have increased year by year. In passenger transport, international ferry connections are mainly concentrated in the Tallinn area, and domestic ferry connections serve traffic between the mainland and the islands.

In 2017, approximately 34.8 million tons of cargo were transported through Estonian ports, which is 20% less than in 2014. The number of foreign cargo ships visiting Estonian ports and arriving from abroad has also decreased; in 2017, the number of visits of cargo ships was approximately 5,000, which is 4% less than in 2014. The largest cargo ports for cargo transportation are the ports of AS Tallinna Sadam, and the ports of Sillamäe, Pärnu, Paldiski, and Kunda.

According to the Marine Economic Benefit Model, the added value of shipping is up to 0.3 million euros km^2/year. The added value created by the shipping is greatest in the area of international shipping lanes on the high seas, as well as in the vicinity of Tallinn, Muuga, Paldiski, Sillamäe, and Pärnu and on the North-South shipping lane in the Väinameri Sea (Figure 4.6.2-1). The total added value of shipping in the Estonian marine area is approximately 407 million €/year.

[127] Companies that have designated port and waterway activities as the main activity in the Commercial Register (EMTAK 2008 code 52221).

[128] Tallinn - Helsinki - Tallinn; Tallinn - Stockholm - Tallinn; Paldiski - Kappelskär - Paldiski; Riga-Stockholm-Riga

[129] Virtsu - Kuivastu - Virtsu; Rohuküla - Sviby - Rohuküla; Rohuküla - Heltermaa - Rohuküla; Triigi - Sõru - Triigi; Munalaid - Kihnu - Munalaid; Pärnu - Kihnu - Pärnu

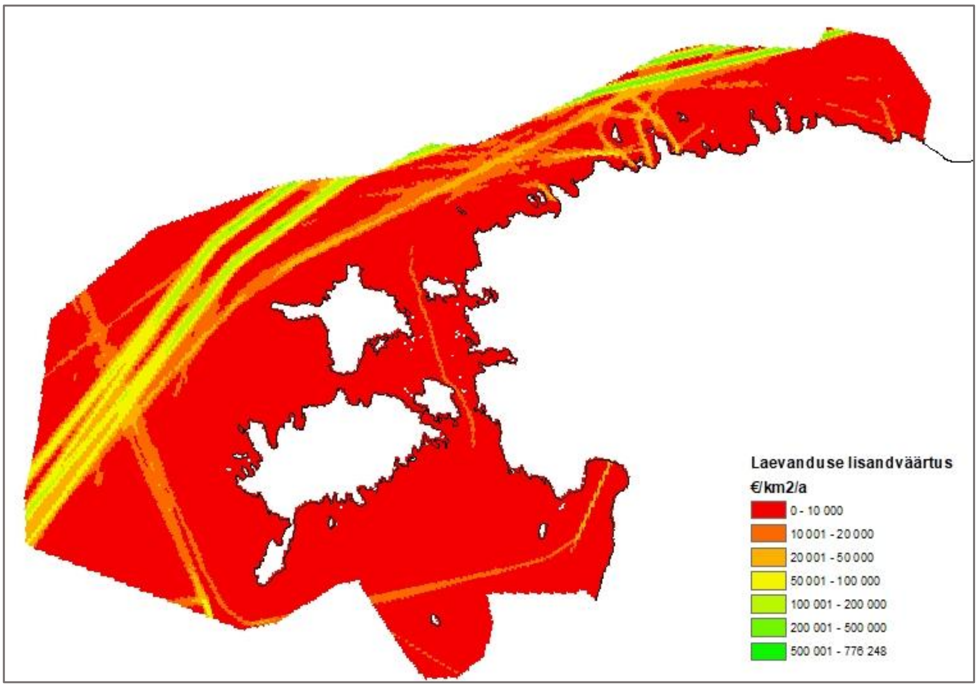

Figure 4.6.2-1 Added value of shipping in Estonian marine areas, €/km^2/year (Source: The Marine Economic Benefit Model)

State revenue from shipping is proportional to the added value of shipping, amounting to 0.1 million euros km^2/year on more active shipping lanes (Figure 4.6.2-2). The largest areas in terms of state revenue are just like in case of added value, international shipping lanes, and the Tallinn, Muuga, Paldiski, Sillamäe, and Pärnu regions and the North-South shipping lane in the Väinameri Sea. The country's total shipping revenue is approximately 200 million euros/year.

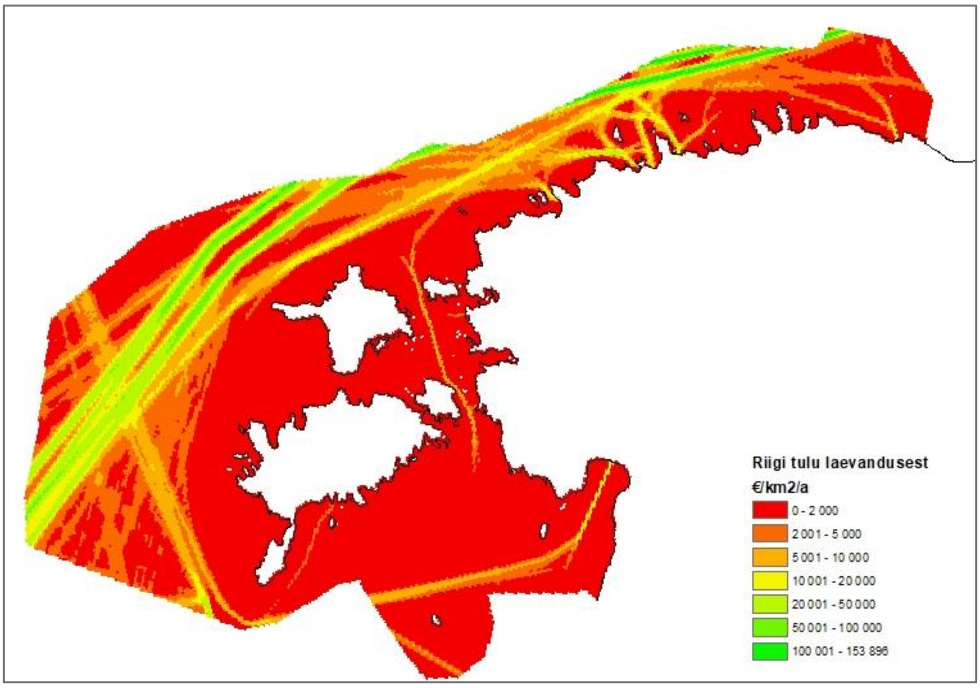

Figure 4.6.2-2. Public revenues from shipping in Estonian marine areas, €/km^2/year (Source: The Marine Economic Benefit Model)

Maritime transport is an international sector whose development is highly dependent on global trends and the competitiveness of the surrounding area. New regulatory developments, technological developments, changes in intergovernmental economic policy relations, etc., may lead to changes in freight and passenger transport, including the opening of new shipping lanes or ports. Also, the volume of sea transport may be significantly affected by the planned tunnel between Tallinn and Helsinki or plans to build bridges between the islands and the mainland, which may change the intensity of use of the sea areas.

Impact of the MSP

The Maritime Spatial Plan does not foresee any changes in the marine areas associated with maritime transport and therefore has no direct economic impact on the sector. As a guideline, Maritime Spatial Plan highlights the potential overlap of waterborne traffic areas with other uses of the sea (including wind energy, aquaculture, etc.), which is a situation where the current functioning of maritime transport is not hindered will have a positive impact on the economic environment. The more economic sectors use the marine areas more multifunctionality, without negative synergies, the greater the positive impact on the economic environment as a whole. As part of the improvement of the planning solution in May-June 2020, the needs of maritime transport in the areas suitable of wind energy development have been taken into account more clearly and better. The surface area of the wind energy development areas was reduced to avoid overlaps with heavy ship traffic areas. The basic passage corridors were also designated for shipping, which must be left free of wind turbines. This avoids possible additional hazard situations and ensures the most optimal routes for maritime transport. Ensuring optimal traffic routes has a clear positive economic impact - additional time and fuel consumption due to lengthening of the voyage is avoided. When bypassing wind energy development areas, the ship's calculated voyage can increase by 10 - 30 km depending on the destination and the time consumption can increase by 0.5 - 1.5 hours. The rate of increase in fuel consumption is difficult to determine, as it depends on the type of vessel, the size of the cargo and many other factors.

In addition, Maritime Spatial Plan sets the guideline, on designing a network of ports, taking into account naturally suitable locations and optimum distances for sailing and motor yachting. From an economic standpoint, this limits the development of potential entrepreneurship in areas where there are capable entrepreneurs and local demand, but naturally unsuitable conditions or the area is outside the optimal range for yachting. From an economic standpoint, the selection criteria for port network design should not be narrowed down to the two factors set out in the Maritime Spatial Plan guidelines, but entrepreneurship should be comprehensively promoted, i.e., all factors should be taken into account when designing new small craft ports or existing port networks.

Shipping requires the availability of ports and access to and the good operating condition of their infrastructure. Shipping may be restricted by nature reserves, where shipping may be subject to additional restrictions and environmental requirements, while Maritime Spatial Plan makes it necessary to consider shipping lanes when creating a new nature site, which is an essential condition for maintaining the positive economic impact of shipping. Shipping may also be obstructed by cables and pipelines located on the seabed and by cultural heritage sites in the vicinity of which anchoring is restricted. For the latter, Maritime Spatial Plan makes it a condition for shipwrecks to be taken into account in cooperation with the National Heritage Board. Contradictions can also occur in the case of overlapping of shipping lanes and aquaculture areas, but to avoid this, Maritime Spatial Plan has made it a condition that the aquaculture development area is not designed for shipping lanes.

Port activities support activities related to shipping, fisheries, aquaculture, marine tourism, recreation, energy generation, marine rescue, border control, pollution control, and national defense, providing access to the sea (including related services). There are no conditions for port activities in Maritime Spatial Plan, and therefore there is no direct economic impact on port activities.

From the economic standpoint of maritime transport, it is important to keep open the shipping routes, especially the shipping lanes, including national and international, and areas suitable for ports, and to avoid the emergence of restrictions in these areas in order to maintain the competitiveness of Estonian maritime transport.

The implementation of the Maritime Spatial Plan does not have a direct economic impact on maritime transport. The conditions set out in the plan will encourage synergies between maritime transport and other economic activities in maritime uses.

4.6.3 Maritime Tourism

Maritime tourism and recreation[130] is an important business area for the Estonian economy. In 2017, 441 economically active businesses were engaged in providing maritime tourism and recreational services[131] (including lodging, dining, and drinking, surfing, and sailing clubs) on the coastal areas. The number of companies has increased by 9% compared to 2014. The total sales revenue of the companies in 2017 was approximately 400 million euros, which is 25% more than in 2014. In 2017, hotel revenue accounted for 58% and food and beverage revenue for 36% of the sales revenue. According to the Commercial Register, 75 economically active companies in Estonia were operating in the same year engaged in the construction of pleasure boats and sports boats and in the rental of water transport equipment. The number of companies has increased by 9% compared to 2014. The total sales revenue of these companies in the same year was approximately 35 million euros, which is approximately the same as in 2014.

Companies engaged in the provision of maritime tourism and recreational services employed around 7,875 people in 2017, about 10% more than in 2014. Hotel staff accounted for 60% of the workforce, and employees of food and drink establishments accounted for 35%. The number of employees per company has remained stable between 2014 and 2017 (approximately 18 employees per company). Companies engaged in the construction of pleasure boats and sports boats, and the renting of water transport equipment employed approximately 252 people in 2017, down by 13% compared to 2014. The number of employees per company has also decreased in recent years (from 4.2 to 3.4). In 2017, the number of enterprises actively engaged in the provision of maritime tourism and recreational services, as well as the construction of pleasure and sports boats and the renting of water transport equipment accounted for approximately 0.9% of the total number of enterprises in Estonia. In the same year, the sales revenue of companies accounted for approximately 0.9% of the total sales revenue of Estonian companies and the number of employees for approximately 2.1% of the total number of employees of Estonian companies.

In addition, nature tourism is actively developing (especially bird watching on the west coast of Estonia and the Kihnu region, as well as elsewhere in the Gulf of Riga). Maritime tourism and recreation also have an indirect impact on other business sectors (adjacent support and ancillary services), whose activities are highly dependent on the competitiveness of maritime tourism and recreation.

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[130] Based on the availability of data, the economic impact of maritime tourism and recreation has been assessed by taking into account he economic performance of companies engaged in providing services in coastal areas (accommodation (including home accommodation/guest apartments, guest houses, hotel; holiday accommodation), eating and drinking places, surfing and sailing clubs) and in the construction of pleasure and sports boats and in the renting of water transport equipment.

[131] The companies involved in providing maritime tourism and recreational services have been selected based on the sites located in the coastal areas mapped in the "Maritime Spatial Planning Baseline: Mapping Social and Cultural Objects" (2016), adding to them the companies that provide related services and their financial performance.

To complement the Marine Economic Benefit Model with ecosystem services[132], a methodology for mapping recreational value as a cultural service in Estonian coastal areas was developed. As part of the work, the recreational, economic value of coastal local governments, which consisted of assessing the material benefits of maritime cultural services, was mapped. In terms of economic value, the value of the socio-cultural objects located in Tallinn was highest. Tallinn was followed by the city of Pärnu. Figure 4.6.3-1 shows the distribution of the economic value of the Estonian coastline on a scale of 0-100 in the comparison of local authorities by the sea.

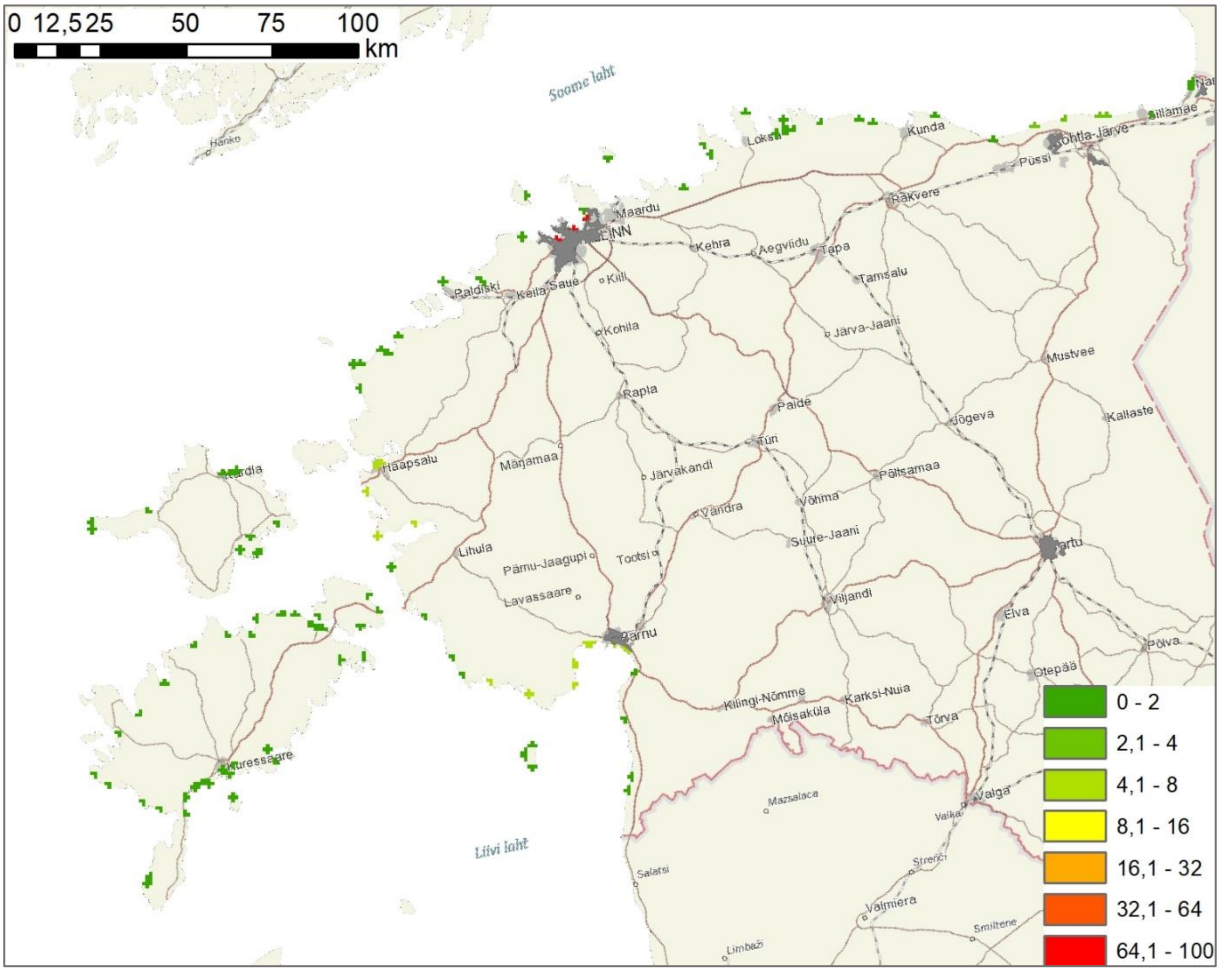

Figure4.6.3-1. Economic value of socio-cultural objects located in Estonian coastal and marine areas by local governments (scale 0-100)

The Estonian maritime tourism and recreation sector has great development potential. In recent years, passenger traffic in Estonia's largest port has grown - in 2017, 311 cruise ships with 564,280 tourists visited the Port of Tallinn. At the same time, the number of visits of these ships can be increased in the long term by providing more attractive tourism services in coastal areas and elsewhere in Estonia. It is also possible to open new shipping lines and receive cruise ships in other Estonian ports. Sailing and recreational tourism also have the potential to grow, in particular, through the rearranging of the network of small craft harbors and the development of coastal tourism services.

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[132] The work was commissioned by the Ministry of Finance. Reference: Nõmmela, K., Kotta, J., Piirimäe, K. (2019). Complementing the model of economic benefits from the use of marine resources with ecosystem services. University of Tartu, OÜ Hobikoda and OÜ Roheline-Rada, (https://www.rahandusministeerium.ee/et/system/files_force/document_files/mudeli_taiendamine_okosusteemiteenustega_aruanne.pdf).

Impact of the MSP

Maritime Spatial Plan does not foresee any changes in the marine areas associated with maritime tourism and recreation and therefore has no direct economic impact on the sector. Maritime Spatial Plan, as a guideline, promotes the development of international passenger ship traffic and maritime recreational and sporting activities in suitable areas, but does not set criteria for the selection of suitable areas. From an economic standpoint, maritime tourism and recreational activities should be encouraged wherever there is a supply and demand. In addition, the plan provides guidance as to considering the potential tourism value in developing new uses of the sea, which is of great economic importance, while encouraging the development of diversified and mutually supportive business in marine areas.

Maritime tourism-related and recreational areas are generally located in the vicinity of the coast and therefore do not interfere with other marine use activities. When visiting cultural heritage sites or other areas offshore, maritime tourism companies must take into account the activities of other economic sectors at sea. Maritime tourism and recreation are directly linked to port operation areas, as many activities require access to the sea. Maritime tourism and recreational activities are also linked to attractive nature reserves and cultural heritage sites and access thereto. Maritime tourism can also be boosted by new uses such as aquaculture (e.g., diving in aquaculture areas) and wind energy (visits to wind farms).

In the field of maritime tourism and recreation, it is important that marine areas have access to ports and access to nature reserves and cultural heritage sites in order to preserve the sector's competitiveness and development potential.

The implementation of Maritime Spatial Plan does not have a direct economic impact on maritime tourism. The guidelines set out in the plan support the functioning of maritime tourism and encourage its development in the planning of new maritime uses.

4.6.4 Energy production

Offshore energy production is a forward-looking industry considering global developments. According to the Energy Development Plan 2030, the aim is to set up wind turbines with a total installed capacity of up to 500 MW in offshore wind farms, the construction of which would significantly develop the business of the sector. In 2017, there were 14 economically active companies in Estonia, whose main activity was generating electricity from wind energy[133]. Compared to 2014, the number of such companies has increased by 56%, from 9 to 14. In 2017, the total sales revenue of these companies was approximately 15 million euros, doubling revenue per company compared to 2014. However, in 2017, only three companies had created jobs in wind energy companies, a total of 4, which was less than in 2014. As of autumn, 2019, 25 companies have been registered in Estonia, whose main activity is generating electricity from wind energy, but the companies currently registered are engaged in wind energy development from onshore wind farms. Analysis of companies' economic performance reveals that wind energy development does not generate a large number of direct jobs, but indirectly (construction, repair, and maintenance, etc.), job creation can still be significant. In addition, it should be borne in mind that wind energy-related economic activity is largely dependent on more windy months of the year when both business profits and labor demand are higher.

[133] According to the Commercial Register, the main activity EMTAK 2008 code 35113 “Electricity generation from wind energy”.

According to the Marine Economic Benefit Model, out of the wind energy development areas in the Maritime Spatial Plan, the area with the largest amount of energy produced (MWh/y) is west of Saaremaa, with 32 to 34 GWh/y/km². The amount of energy produced in the Gulf of Riga is around 32 GWh/y/km² and in the area near Harilaid 33 GWh/y/km². The Marine Economic Benefit Model does not reflect the field of innovation because the criteria used to build the model were based on existing solutions, i.e., did not reflect floating foundations.

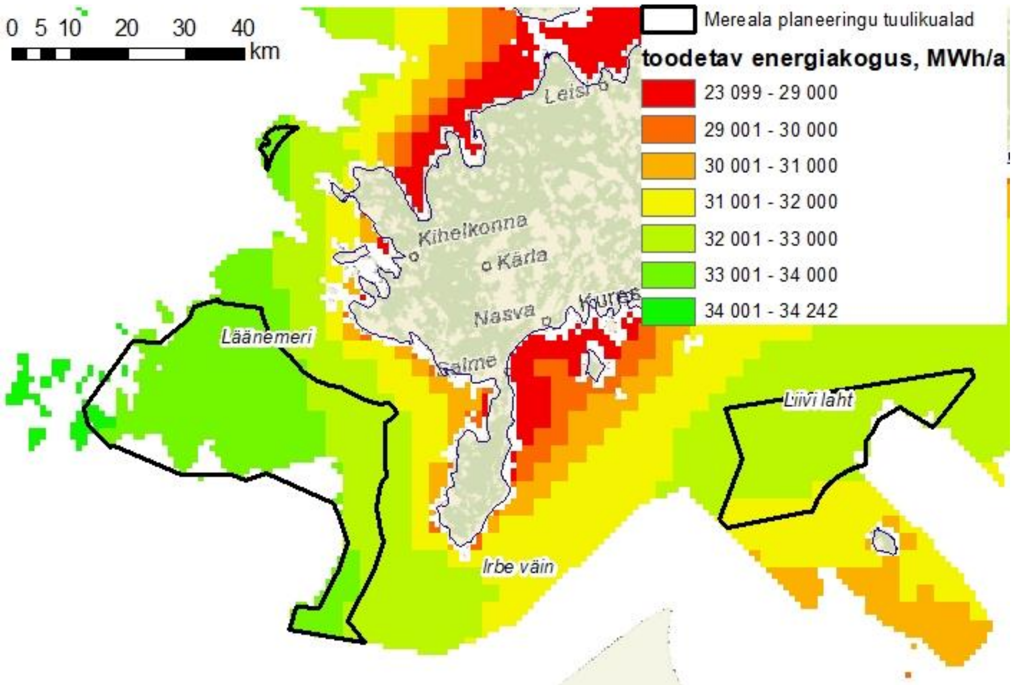

Figure 4.6.4-1. Energy production in planned wind farm areas, MWh/a (The Marine Economic Benefit Model)

[134]According to the Marine Economic Benefit Model, the value-added of the Maritime Spatial Plan wind energy development areas in the Gulf of Riga area is positive throughout most of the area, ranging from -0.04 to 0.23 million €/km2/y. By contrast, the value-added of the wind farm area in the Baltic Sea is negative, almost by half being -0.12. 0.04 million €/km2/y. The area with the highest maximum added value for businesses is the Gulf of Riga. This is followed by Harilaid and then the area west of Saaremaa. The maximum, average, and minimum values of the wind energy development areas are given in the Table. The variation in the potential added value of wind energy development areas is shown in Figure 4.6.4-2. When interpreting the values in the table and the figure, the limitations of the model must be taken into account, including in particular that the model takes into account the network connection to the 330 kV high-voltage line of mainland Estonia, and in case of creation of the connection to the nearby 330 kV high-voltage line in Latvia, the area west of Saaremaa could start providing a significantly higher added value.

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[134] The input to The Marine Economic Benefit Model included wind energy development areas from Maritime Spatial Plan, after which a statistical analysis of the model output was performed.

The wind energy sub-model the Marine Economic Benefit Model was updated in December 2019 (more information The Marine Economic Benefit Model: Updating the Energy Sub-Model, December 2019). When interpreting the model results, it is important to consider that these are indicative results, ie. the model uses currently known data as indicator values and, in the absence of reliable data, does not take into account the depth function, ice conditions and locations of international (especially Latvian) high-voltage power lines. Due to the lack of data, model uncertainty is high, the model combines two approaches: retrospective (current wind turbines and their productivity); in areas of high uncertainty, the perspective is that technology and logistical solutions will evolve.

Table 4.6.4-1. Value-added of wind energy development areas [135], €/km²/y (Source: The Marine Economic Benefit Model)

Wind energy development area	Maximum	Mean	Minimum
Harilaiu	54 474	48 250	42 179
Area west of Saaremaa	45 058	-24 657	-3 615 915
Gulf of Riga	231 505	91 819	-46 588

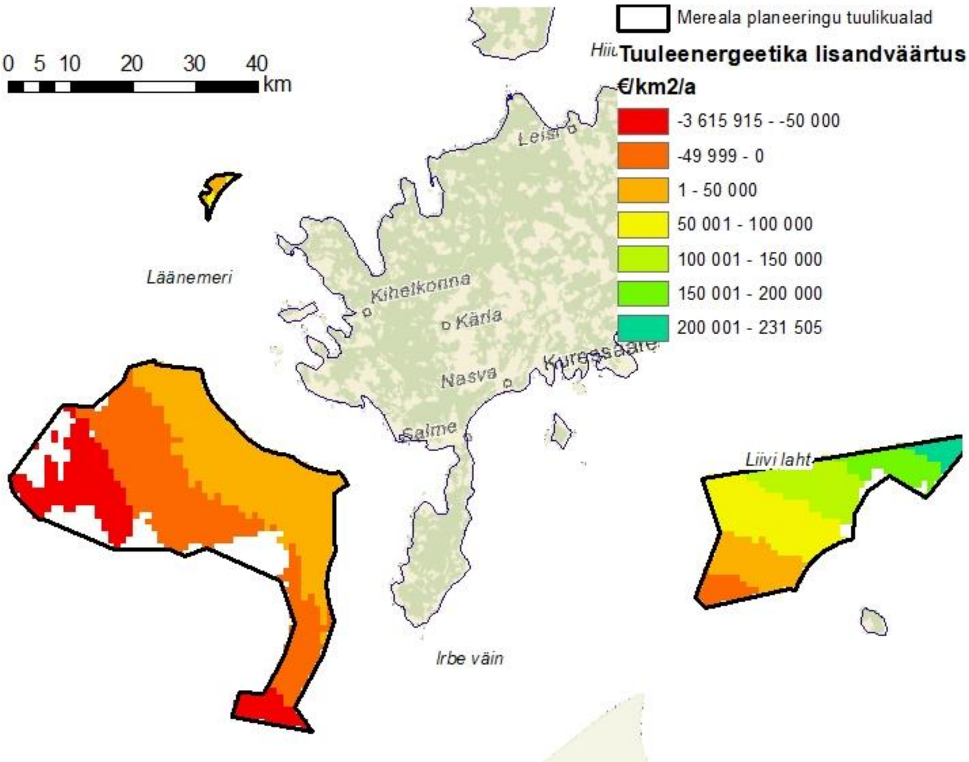

Figure 4.6.4-2. The potential added value of wind energy in planned wind farm areas, €/km²/y (Source: The Marine Economic Benefit Model)

The wind energy development areas in the Maritime Spatial Plan in terms of potential state income in the Gulf of Riga will be stably at slightly less than 0.3 M €/km ²/y, in the area west of Saaremaa at slightly more than 0.3 M €/km²/year. The area with the highest maximum state income from wind energy is the area west of Saaremaa, which had the lowest maximum added value for companies [136]. Areas in the Gulf of Riga and close to Harilaid would provide the maximum amount of state revenue in equal amounts (€ per km² per year). The maximum, average and minimum state revenues for wind energy development areas are given Table 4.6.4-1. The variation in potential state revenues for wind energy development areas is shown in Figure 4.6.4-3. The limitations of the model must be taken into account when interpreting the values in the table and the figure.

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[135] Maximum, minimum and mean values were obtained from the output of The Marine Economic Benefit Model using the Zonal Statistics Tool.

[136] For a company, higher costs mean less added value, while higher costs mean more taxes for the state.

Table 4.6.4-1. State revenue from wind energy[137] in the planned wind energy development areas, €/km²/y (Source: The Marine Economic Benefit Model)

Wind energy development area	Maximum	Mean	Minimum
Harilaiu	303 681	302 728	301 009
Area west of Saaremaa	601 428	309 349	296 600
Gulf of Riga	300 386	292 411	281 701

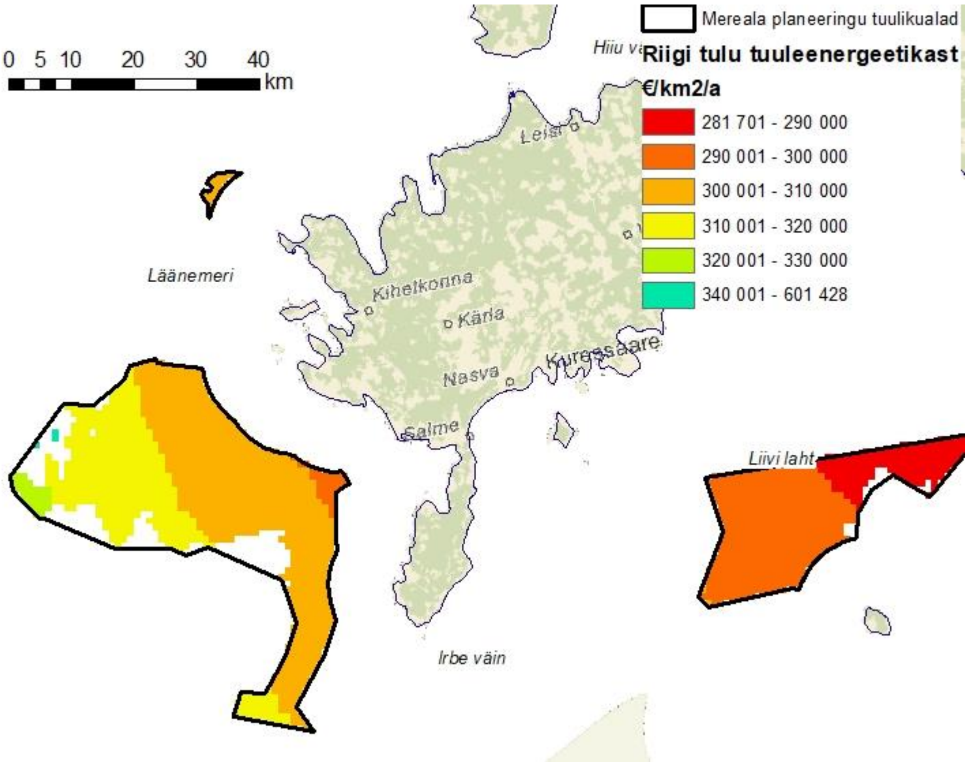

Figure 4.6.4-3. State value from wind energy development in Estonian marine areas, €/km²/year (Source: The Marine Economic Benefit Model)

Impact of the MSP

The introduction of wind energy development in the marine areas would increase economic competitiveness and, as a new field of activity, bring added value to different fields (new skills, technological developments, etc.). Other areas of marine use, known natural, national defense, social, etc. restrictions and other potential conflicts have been taken into account in Maritime Spatial Plan, which means that offshore wind energy development areas do not generally imply restrictions on the planning/development of other economic activities. Maritime Spatial Plan, as a guideline, does not plan to design new protected natural objects for wind energy development areas without assessing the social and economic impact, which is vital to the economic activities of the sector. In addition, Maritime Spatial Plan sets the promotion of aquaculture in wind energy development areas, in particular shellfish farming, which is important for enhancing synergies between economic activities as a condition. The plan also identifies an area of innovation in wind energy that is intended primarily for wind turbines on floating foundations and other innovative solutions. The designation of an innovation area contributes to the economic development of the sector.

[137] Maximum, minimum and mean values were obtained from the output of The Marine Economic Benefit Model using the Zonal Statistics Tool.

Maritime spatial planning will determine the marine areas suitable for **wind energy development**, taking into account other areas of the maritime economy and their possible synergies. Of the planned areas, the area with the highest maximum added value for enterprises is located in the Gulf of Riga and the area with the highest maximum state revenue is located west of Saaremaa. The guidelines and conditions set out in the Maritime Spatial Plan will support the economic development of wind energy, subject to other known limitations.

4.7 IMPACT ON CLIMATE CHANGE

Climate change is primarily attributable to anthropogenic greenhouse gas emissions. Potential consequences of climate change are expected to be an increase in average temperature, rising sea levels, and an increase in extreme weather events (storms, droughts, floods). Reducing the combustion of fossil fuels and the use of renewable energy are considered to be important for climate change management.

In 2017, the Parliament of Estonia adopted the Basic Principles of Climate Policy until 2050, which aims at reducing greenhouse gas emissions by at least 80% by 2050 and replacing carbon-based energy production mainly with local renewable energy production[138]. Out of the local renewable energy production potential, increasing the share of electricity generated by offshore wind farms has the greatest potential for reducing CO_2 in absolute terms. It is estimated that by 2030, Estonia's wind energy could be 12% of total consumption[139].

According to the Estonian Renewable Energy Association, as of the end of 2018, 140 wind turbines with a total capacity of 314 MW will be connected to the grid in Estonia. In 2018, 591 GWh of wind energy was produced for the grid, which is 12% less than a year ago, when total wind energy production reached 669 GWh. Wind energy also accounts for approximately 7% of final electricity consumption.[140]

The projected increase in temperature and total precipitation in climatic scenarios, and the increase in storms will lead to different directions. Changes such as the intensification of eutrophication, the growth of southern alien species, and the decline of key cold-water species will have a negative impact on marine biodiversity and the balance of the marine environment. One of the most important environmental problems in the Baltic Sea is the eutrophication of the sea. In addition, climate change will result in regime shifts in food chains and longer vegetation periods, as well as increasing overall secondary and primary production, the impacts of which on the various processes and general functioning of the marine environment are unknown. The decline in salinity in the Baltic Sea, as well as mechanical disturbances in storms, can affect the species composition and diversity of communities.

Impact of the MSP

The construction of wind farms for electricity production means increasing the share of renewable electricity production, which creates the preconditions for reducing greenhouse gas emissions from the combustion of fossil fuels.

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[138] Basic Principles of Climate Policy until 2050, Ministry of the Environment 2017

[139] Analysis of the Possibilities to Increase the Estonian Climate Ambition, SEIT 219

[140] Renewable Energy Yearbook 2018, ETEK 2019

In the global and national context, the use of wind energy is generally more environmentally friendly than the use of fossil fuels, such as oil shale, which is prevalent in Estonia. For example, it takes about 1.4 kg of oil shale to produce 1 kWh of electricity. If 5% of electricity in Estonia were generated by wind, the need for oil shale would be reduced by 0.67 million tons a year, which, according to an approximate calculation, would save 15 ha of land annually from direct digging. The impact of the mine on vegetation, fauna, and especially on groundwater, may be significantly larger. Production of oil shale electricity emits 1350 kg CO_2, 1.1-1.5 kg NO_x, and 10-18 kg SO_2 into the atmosphere (with today's technology) with producing 1 MWh of electricity.

A study of the Vestas V90-3.0 MW wind turbine[141] found that the wind turbine produces the amount of energy it needs in a lifetime within 6.6 months. However, during its lifetime, this wind turbine generates about 158,000 MWh of energy or 36 times more energy than it consumes in its lifetime. In a very good location, this wind turbine generates about 280,000 MWh during its lifetime (over 20 years). Compared to its environmental impact, this wind turbine emits 230,000 tons less carbon dioxide than when burning coal to produce the same amount of energy. In addition, 80% of the windmill can be reused at the end of its life.

There is currently no practical way to conduct a more accurate assessment of the impact, risks, and vulnerabilities of climate change. The Estonian Marine Strategy sets a cross-cutting target by 2028: "Methodologies for assessing climate change and anthropogenic pressures and their interactions with marine ecosystems in regional cooperation have been developed."

The implementation of the Maritime Spatial Plan will have a direct positive impact on climate change. The introduction of the planned wind energy development areas in Estonia would significantly increase the total production of renewable energy.

4.8 CUMULATIVE IMPACTS

Cumulative impacts are the combined impacts of one or more activities, which can be manifested by the accumulation of similar impacts of several activities, where there may be many activities, and an important aspect is that the addition of activities results in a change[142]. Cumulative impacts may occur when spatial or temporal overlaps, repeated removal or inflow of resources, or landscape changes occur due to the plan (s) and its intended activities[143].

Impact of the MSP

Cumulative impacts on the natural environment can occur in a marine area where, for example, several large-scale activities are planned close by. One of the biggest threats for birds, as well as for other species and marine habitats and biota, is certainly the simultaneous construction of large wind farms. In particular, an impact may accumulate in the Gulf of Riga, where the current MSP designates wind energy development area No 1 (see Figure 4.8-1). Close to this area, there are also wind energy development areas foreseen in the Maritime Spatial Plan of Pärnu and Latvia, as well as several applications for superficies license for the construction of wind farms that have been initiated by far. Adverse impacts can be most

[141] Life cycle assessment of offshore and onshore sited wind energy plants based on Vestas V90-3,0 MW turbines. Vestas Wind Systems A/S, 2006

[142] Peterson, K., Kutsar, R., Metspalu, P., Vahtrus, S. and Kalle, H. 2017. Strategic Environmental Assessment Handbook. Ministry of the Environment, 137 p.

[143] Cooper, L. M. 2004. Guidelines for Cumulative Effects Assessment in SEA of Plans. EPMG Occasional Paper 04/LMC/CEA. imperial College London.

pronounced on birds (see section 4.2.2) and bats (see section 4.2.4), both during the construction phase of wind farms and during their operation.

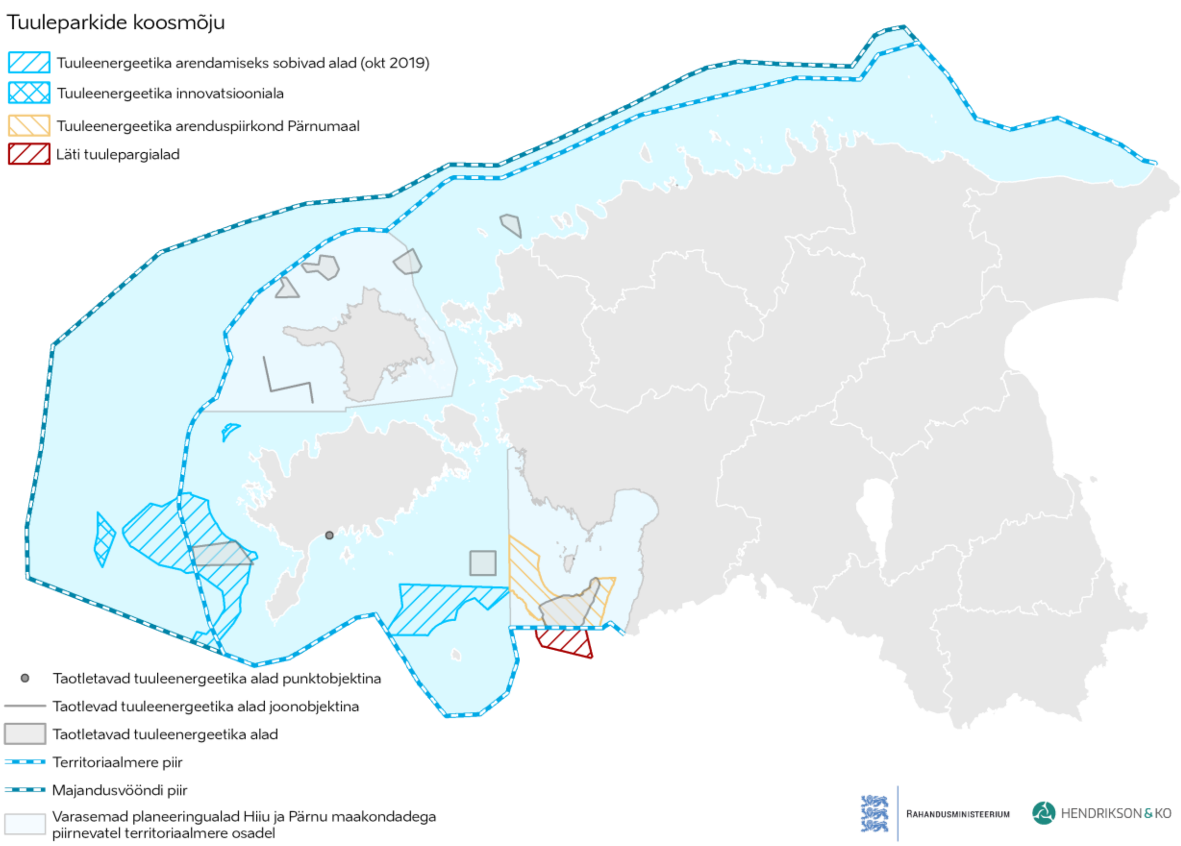

Figure 4.8-1. Planned offshore wind energy development areas and applications for superficies license for the construction of wind farms

In the course of the present Maritime Spatial Plan, information on bird migration and staging areas for all Estonian marine areas was compiled and based on this, sensitive areas for marine birds were identified (Chapter 4.2.2). According to the current information, several wind energy development areas previously defined by Pärnu County Planning, as well as several initiated superficies license applications, will be in the sensitive bird areas (see Figure 4.8-2). If the proposed wind farm areas planned for those areas are realized, it is not known in advance how the birds will adapt to the wind farm and how different bird species will change their behavior patterns.

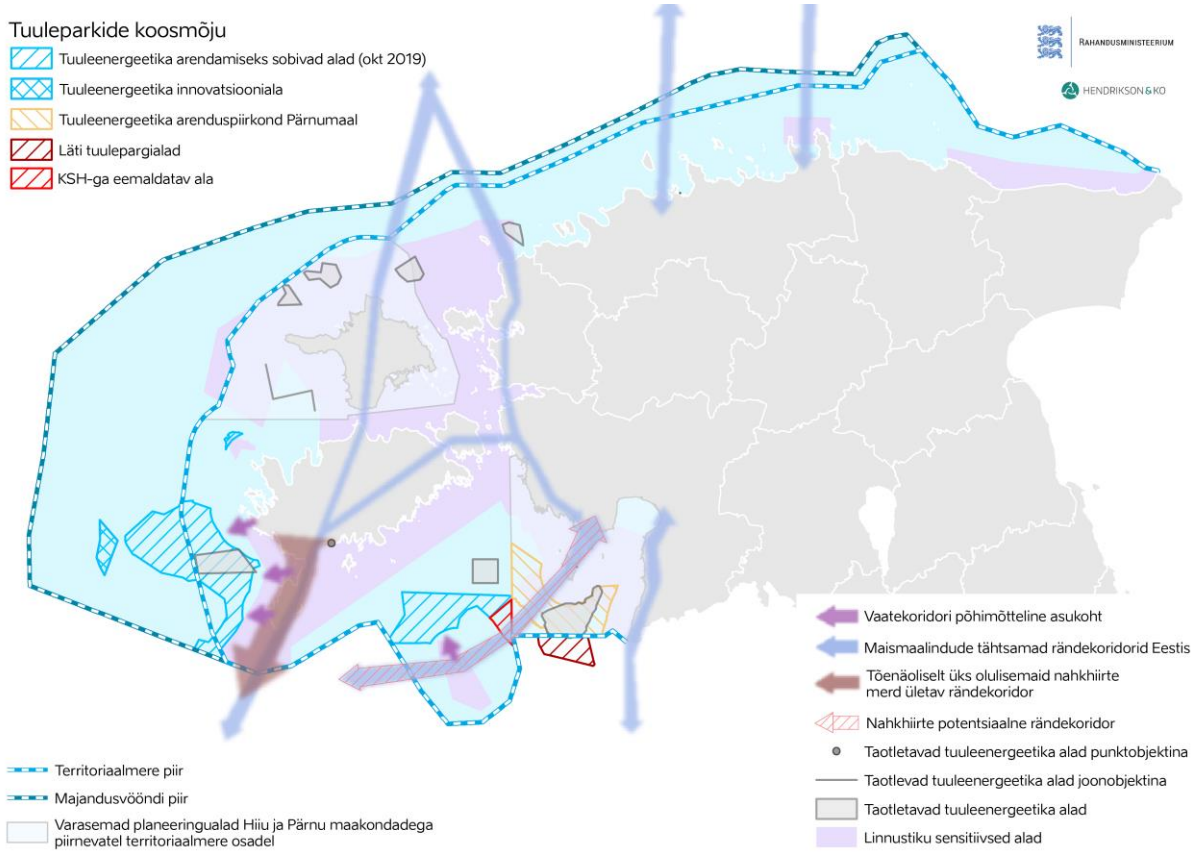

Figure 4.8-2. Planned offshore wind energy development areas and applications for superficies licenses for the construction of wind farms, including nature conservation areas important for birds and bats

Cumulative impacts on birds and bats may occur when several wind farms are simultaneously built close to each other. Unexpectedly, large-scale flight obstruction may occur, and adaptation to it will take longer than when just building a single wind farm. Therefore, in order to avoid cumulative impacts, it is important to provide important migratory corridors for birds and bats (Figure 4.8-2) and to further assess synergies with other envisaged plans and projects during each licensing procedure to avoid bottlenecks and/or obstacles to migration in the marine area. The design of the offshore wind farm areas included in this Maritime Spatial Plan takes into account important migratory corridors as well as sensitive areas for species in order to avoid a significant adverse impact.

The high noise level of construction activities in the area can also disturb the fish there and scare them away from the spawning grounds, creating stress and reducing the spawning efficiency. However, this is a short-term effect. Different large-scale construction works must be carried out at different times to avoid cumulative impacts.

The primary objective of the impact assessment was to avoid conflicting uses of the sea in inappropriate areas; thus, the plan excludes new offshore activities such as wind energy and the establishment of fish farming areas in nature protection areas.

Aquaculture areas are not specifically spatially envisaged the current Maritime Spatial Plan, so in case of planned establishment of fish farms close to each other, it is important to always assess synergies with other activities in the area and, in particular, what changes in water quality and how it affects the status of the water body.

While fish farms in natural waters increase the burden on the environment, the cultivation of seaweed and shellfish as nutrient-depleting aquaculture is considered to be environmentally sustainable management. In addition to nutrient removal, this shell farm significantly increases the transparency of water within a radius of about 1 km^2 and reduces the risk of local algal blooms. Consequently, it is prudent to place shellfish farms in the vicinity of fish farms in the coastal sea, as this combination can compensate for the nutrient fluxes from fish farms to the sea and keep the water in the vicinity of the fish farm transparent.

The Maritime Spatial Plan foresees the need to direct and increase developers' knowledge and confidence in implementing cooperative solutions. Synergistic impacts will also occur, for example, in the joint development of a wind farm and shellfish farming. Compact and well-thought-out development has synergistic positive impacts on both the natural and economic environment, and the proposed activities have a multiplicative or exponential impact on each other.

Cumulative impact model PlanWise4Blue

During the course of the Maritime Spatial Plan, PlanWise4Blue[144], a web application for public use was prepared containing a model of the cumulative environmental impact of human activities. Such a model[145] enables access in the Estonian marine area the environmental impact of the proposed activities on the marine area.

The sub-model of environmental impact dynamically links the existing situation (modeled existing environmental data layers), and the impact matrix (i.e., knowledge of how different human uses and intensity of uses potentially affect a particular marine region) to planned human uses. The sub-model of cumulative impacts allows for the calculation of major environmental risks associated with human use and allows for the display of spatial overlaps between natural values and different human uses. In a sub-model of environmental impact, an impact can be combined through summation, compensation, etc. One effect can increase or decrease the other. In synergism, the combined effect of the two impacts is greater than the sum effect of the individual impacts.

This Impact Assessment used the main solution of the Estonian Maritime Spatial Plan as input to the cumulative impacts sub-model to assess the environmental impact of the activities planned by the Maritime Spatial Plan. In addition, other data layers of human activities available in the marine area that are not reflected in the planning solution were used as input (Pärnu County and Hiiu Island (except for its wind energy development areas that have been abolished) Marine Area County Plans, etc.). The PlanWise4Blue model assessed the combined impacts of marine activities - trawling, inland waterway, dumping and deposits - and wind energy development areas foreseen in the Estonian Maritime Spatial Plan on different ecosystem components, as these activities can have a significant impact on the environment.

The following technical solution was used to analyze the environmental impact of wind energy developments. Wind turbines are built on concrete foundations with a texture similar to natural material, i.e., the material is suitable for anchoring seaweed and large invertebrates, then the foundation is filled with natural rock material. The concrete cone has a height of 10 m and a diameter of 30 m. The distance between the wind turbines was calculated as 7 wind turbine diameters or about 1 km. The cumulative impacts model does not take into account environmental impact during construction, but the environmental impact of gravity-based foundations is clearly smaller than other available solutions.

[144] Nõmmela, K, University of Tartu CASS; Kotta, J., OÜ Hobikoda; Piirimäe, K., OÜ Roheline Rada "PlanWise4Blue: A Web-Based Model for Estimating the Cumulative Environmental Impact of Human Activities and The Marine Economic Benefit Model"; Commissioned by Ministry of Finance, 2019 (https://www.financingministeerium.ee/en/system/files_force/document_files/planwise4blue_model_description.pdf)

[145] When interpreting the results of PlanWise4Blue application, it is important to consider that it is currently used as a discussion platform rather than a means of reflecting reality, as due to the lack of sufficient measurement results, some parameter values have a high degree of uncertainty. In addition, many new human uses (particularly for interactive effects) still have a high level of uncertainty, and further research is needed to determine more accurately the interactive environmental impacts of human use.

In the scenario described above, the model analysis showed that the human uses studied do not have a clear negative environmental impact on a large number of ecosystem indicators. Of the human activities studied, the Estonian marine environment is most affected by water traffic areas and trawling. Fish-eating birds are the most disturbed of these activities, and ship traffic also influences the formation of wintering areas for birds. In addition, waterborne traffic and trawling have a negative impact on bladderwrack and agar habitats and, consequently, on Baltic herring spawning grounds. However, in the case of the predictions described above, the natural recovery potential is greater than the rate of anthropogenic degradation. Water traffic areas and trawling do not have a significant negative impact on other natural values, including marine mammals, other key habitats, and Habitats Directive habitats.

Illustratively, the results of the model analysis are shown in Figure 4.8-4 below as combined impacts of marine activities (trawling, waterborne traffic areas, dumping areas, and deposits) with wind energy development areas foreseen in the Estonian Maritime Spatial Plan for Habitats Directive Habitats (1170) reefs.

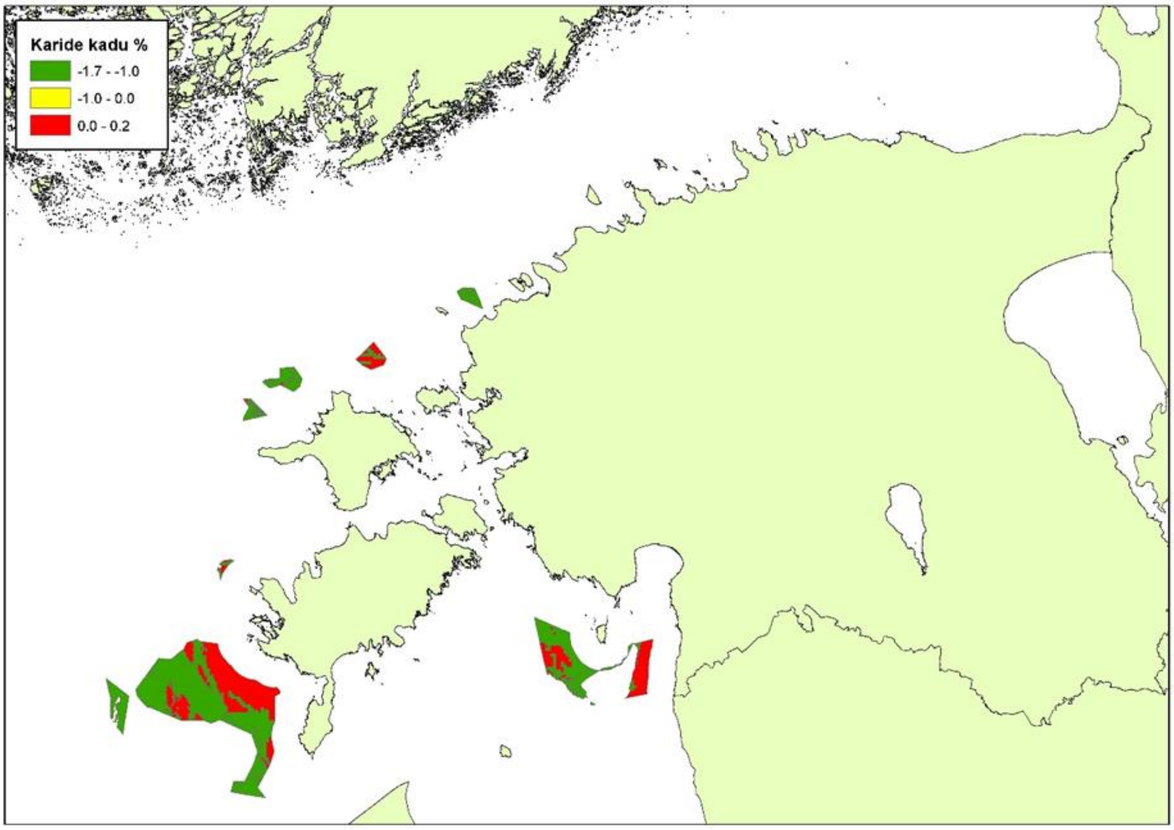

Figure 4.8-4. The PlanWise4Blue model assessed the combined impacts of marine area activities - trawling, waterway traffic, dumping areas, and deposits - and offshore wind areas proposed in the Estonian Maritime Spatial Plan on the Habitats Directive Habitat type reefs (1170). Area loss of reefs (red) as a percentage of the polygon and areas where more reef habitats emerge (green, negative reef loss = reef increment).

According to the predetermined scenario of the model (i.e., wind turbine technical solution – gravity-based foundations, built on concrete foundations with a texture similar to natural material, etc.), the development of wind energy does not lead to significant negative environmental impact. Even in such more open areas of the Baltic Sea, the construction of wind farms can increase the Habitats Directive's Habitat type reef (1170) area by up to 1.7% due to the natural scarcity of stable rocky substrates in the planned wind energy development areas. The growth of this valuable habitat will only be realized if the texture of the concrete foundations of the wind turbines is suitable as an anchorage for seaweed and invertebrates, and there are no other adverse environmental impacts not considered in the model. If a solution other than the one described above is to be used, the parameters of the desired solution for environmental impact assessment must be analyzed with PlanWise4Blue (or a similar approach, i.e., incorporate existing research into the analysis of the impact of wind farms and use the most recent source data map layers on natural values).

The implementation of Maritime Spatial Plan will not have an unfavorable cumulative impact provided that major migratory corridors of birds and bats are ensured and that wildlife sensitive areas such as fish spawning grounds, sensitive bird areas etc. are taken into account.

ENVIRONMENTAL MEASURES:

1. In the licensing procedure, synergies with other similar implemented and, if possible, planned plans and projects shall be assessed in order to avoid cumulative impacts in the marine area, including bottlenecks of and/or obstacles to migration.
2. The potential biosecurity risks associated with aquaculture must be assessed in the licensing process, both at the individual project level and in conjunction with the activities of a near vicinity fish farm (e.g., to assess and determine the distance between farms of different companies to avoid biosecurity risks).

4.9 TRANSBOUNDARY IMPACT

The transboundary environmental impact assessment of Estonia will be carried out in accordance with the international agreements, the Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention), and the Environmental Impact Assessment and Environmental Management System Act. The process and involvement of the transboundary impact assessment are managed by the Ministry of the Environment.

Chapter 5 deals with cross-border information and international cooperation with other countries.

There is no direct transboundary impact from the planning. Most of the spatially planned areas are located at a sufficient distance from the border of the Estonian territorial sea, which is unlikely to have a significant transboundary impact. The proposed wind energy development area No 1 is immediately adjacent to the Latvian marine area. Changes in views can also occur on Cape Kolka, but as the wind turbines are expected to remain visible from only one direction of view (northeast view), this is not a significant impact.

Indirect impact on marine habitats and biota may include:

- Possible adverse transboundary impact on the lifetime impact of the offshore wind farm on birds;
- Potential transboundary impact on fish and seals during the construction phase of the proposed activities (noise, sediment spreading, etc.);
- If the planned wind farm areas are to be connected to a foreign country by a cable (Latvia, Finland, or Sweden) in the future, this activity may lead to a transboundary impact.

The objective of both the Maritime Spatial Plan, to be prepared, and the present impact assessment was to develop a planning solution that takes into account the values of the natural environment (including synergies with other marine activities) and excludes potential conflicts at the project level.

Any potential transboundary impact needs to be specified and assessed during the impact assessment process at each project level.

There is no direct transboundary impact associated with the MSP.

ENVIRONMENTAL MEASURES:

1. Potential transboundary impacts need to be specified and assessed during the EIA process at the project level.

5 OVERVIEW OF THE ORGANIZATION AND INVOLVEMENT OF THE IMPACT ASSESSMENT

5.1 ORGANIZATION OF IMPACT ASSESSMENT

The organizer of the planning and impact assessment is the Planning Department of the Ministry of Finance and OÜ Hendrikson & Ko, a consultant for the preparation of the planning and impact assessment, together with a broad-based Task Group.

Hendrikson & Ko's broad-based expert group on Maritime Spatial Plan and impact assessment included:

Name	Role	Authority
Pille Metspalu	Project manager, planner	Hendrikson & Ko OÜ
Riin Kutsar	SEA Leading Expert	Hendrikson & Ko OÜ
Marika Pärn	Planner, additional specialist	Hendrikson & Ko OÜ
Ann Ideon	Specialist in Social Impact Assessment	Hendrikson & Ko OÜ
Jaanus Padrik, Kairit Kase	Geoinformatics specialist	Hendrikson & Ko OÜ
Kaile Eschbaum	Environmental specialist, additional specialist	Hendrikson & Ko OÜ
Georg Martin	Marine Environment Specialist	Maritime Institute of the University of Tartu
Redik Echbaum	Fisheries specialist	Maritime Institute of the University of Tartu
Jonne Kotta	Marine Environment Specialist (Cartography, Geographic Information Systems, Modeling)	Maritime Institute of the University of Tartu
Kaidi Nõmmela	Specialist in Economic Impact Assessment	Center for Applied Social Sciences, University of Tartu
Kristjan Piirimäe	Geoinformatics consultant	OÜ Roheline Rada
Helen Sooväli-Sepping	Specialist in Cultural Impact Assessment	Tallinn University
Ain Kull	Energy Specialist	University of Tartu
Hans Orru	Specialist in Health Impact Assessment	University of Tartu
Liina Härm	Marine Transport Specialist	Hiiu Sailing Ship Society

The planning process and the impact assessment were carried out simultaneously, taking into account as far as possible the environmental impact associated with the implementation of the plan, including socio-economic, cultural, and health impact, of the implementation of the plan, in order to ensure sustainable and balanced spatial development. The overall timeline for the planning and impact assessment is illustrated in Figure 5.1-1. Annex 4 provides an overview of the cooperation with authorities, stakeholders, and the public in the framework of the planning and impact assessment, together with a more detailed timetable.

Figure 5.1-1. Schedule[146] for the planning and impact assessment

5.2 COOPERATION AND INCLUSION

In accordance with the Planning Act, persons were included whose rights may be affected by the planning, persons who have expressed a wish to be included in the preparation thereof, as well as authorities who may have a legitimate interest in the relevant social, cultural, economic, natural environmental impact or spatial development trends in the planning area, including environmental non-governmental organizations through an organization unifying them, and non-profit organizations and foundations representing the inhabitants of the planned area. Stakeholders are brought together in a separate planning document - the plan for inclusion, see the planning portal mereala.hendrikson.ee[147].

Co-operation with stakeholders, authorities, and interested parties started in the initial phase of planning. In addition to the activities required by the Planning Act, regional discussions were conducted at the SP and DP stages as well as at the draft planning stage. The aim of the regional discussions was to map the values of the marine space and to discuss the regional specificities of maritime use and the resulting principles. Annex 4 provides an overview of the cooperation with authorities, stakeholders, and the public in the framework of the planning and impact assessment.

The EU Maritime Spatial Planning Directive states that as part of the planning and management process, the Member States bordering marine waters shall cooperate with the aim of ensuring that maritime spatial plans are coherent and coordinated across the marine region concerned (Article 11 (1)). Furthermore, the Directive states that where possible, to cooperate with third countries on their actions with regard to maritime spatial planning in the relevant marine regions and in accordance with international law and conventions (Article 12).

Estonia has cooperated with all BRS countries, especially Finland, Sweden, Latvia, and Russia, in the maritime spatial planning process. Different international forums, such as the European Commission and the HELCOM-VASAB Marine Planning Working Group, or international cooperation projects such as Baltic SCOPE, Pan Baltic Scope, Plan4Blue, BalticLines, etc., have been used to organize this cooperation.

Within the framework of the Baltic SCOPE project, Estonia has worked closely with the authorities responsible for maritime spatial planning in Sweden and Latvia. The project has streamlined approaches to cross-border maritime spatial planning and set goals and recommendations for further cooperation. The Plan4Blue project was a co-operation project between Estonia and Finland aimed at creating blue economy scenarios for the Gulf of Finland region.

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146 The schedule has been prepared as of July and is updated on an ongoing basis

147 ESTONIAN MARITIME PLANNING COOPERATION AND INCLUSION PLAN, http://mereala.hendrikson.ee/dokumendid/L%C3%A4hteseisukohad/MSP_kaasamiskava_oktoober_2018.pdf

6 SUMMARY AND CONCLUSION

The comprehensive impact assessment of the Maritime Spatial Plan has analyzed the planning solution in the context of the relevant impact on the natural, economic, cultural, and social environment. In other words, the significant and common impacts of the implementation of the plan, which for some reason needed to be assessed when the plan was being prepared, were assessed. Proposals to prevent and reduce significant environmental impact and recommendations for the consideration of environmental measures for further development and implementation of the planning solution have been made by various environmental sectors.

The preparation of the Maritime Spatial Plan and the Impact Assessment was based on existing marine studies and expert analyses (during the planning process, a number of marine space analyzes were carried out to map sensitive areas). This Impact Assessment has already proposed, at a strategic level, the avoidance of more important wildlife sensitive areas on the basis of the principle of prevention and the precautionary principle. The impact assessment has been carried out, taking into account the degree of accuracy of the planning document and the extent of its content. In cases where marine wildlife mapping needs to be refined, and the impact of the proposed activity depends on technical solutions, it was proposed to include in terms of the planning decision that relevant studies need to be specified or further conducted in the licensing stage to ensure significant marine ecosystems and good condition of the marine environment.

6.1 SUMMARY OF IMPACTS

The role of the planning solution and its assessment, due to the degree of accuracy of the Strategic Planning Document, was to review the existing activities and planned activities in synergy and to promote the diversified use of the marine area. Due to the focus of the planning solution, the cumulative impacts will occur, particularly in areas where new uses for the sea are being planned. The most important points of cumulative impacts are:

1. Wind energy development area No 1 in the Gulf of Riga

Although nature values have also been used as a basis for the designation of wind energy development areas, a further study of bird migration corridors and staging points showed a significant impact in the eastern part of wind area 1. In the areas of the Gulf of Riga and Pärnu Bay, wind energy development areas have also been planned with the Pärnu Maritime Spatial Plan and the Latvian Maritime Spatial Plan. The maximum realization of these areas would be a large-scale wind energy production area, which requires very good wind resources. As a result, it was decided to reduce the wind energy development area No 1 by removing the southeast edge of the area, which accounts for 13% of the total area. Reducing the wind energy development area will have a negative economic impact as well as slightly worsen the chances of meeting the climate targets. In this case, however, the need to mitigate the impacts on birds must be given priority. As it is a large wind energy development area concentrated in one area, the reduction of the area can also be considered as not a significant negative impact in terms of economic impact as it helps to avoid over-consumption of wind resources. This will also free up additional trawl fishing grounds, which would, however, be expected to operate also in conjunction with wind energy.

2. Wind energy development area No 2

During the social and cultural impact assessment, it has been proposed to mitigate the visual impacts by designing "wind turbine free" corridors from major viewpoints. It is not expected that the proposal will have a significant economic impact, as the planning already laid down the principle that the horizon should not be covered by wind turbines. It was also clear that wind energy development areas cannot be 100% covered by wind turbines. As consideration of the proposal would have a significant positive socio-cultural impact and the overall conditions for development would not be significantly worsened, it is appropriate to give careful consideration to the proposal.

3. Water traffic areas and principles of port network development

In order to ensure the optimal functioning of maritime transport, it was decided to designate, in addition to water traffic areas, the basic passage corridors for shipping, which must remain free of wind turbines. The surface area of wind energy development areas was also further reduced to ensure safety in specific heavy ship traffic areas. The economic impact assessment states that, from an economic standpoint, the selection criteria for port network design should not be limited to the factors (natural compatibility and distance) provided as guidelines in Maritime Spatial Plan. At the same time, it must be borne in mind that the creation of new ports is an activity that has a significant impact on the natural environment, and the necessity of this must be carefully considered. During the planning process, it has become clear that in the near future, the existing port network needs attention in particular in order to avoid the poor return on investments already made. The purpose of the planning is to better target the port network, and therefore, some restrictions must be considered indispensable.

Proposals must be taken into account in a balanced way in the further development of the planning solution.

The impact assessment focused on identifying the impact of marine activities in order to avoid conflicts. The MSP excluded new marine activities such as offshore wind farms and the establishment of fish farming areas in nature conservation areas.

6.2 CONCLUSION

The level of detail in the preparation of Maritime Spatial Plan does not foresee any adverse impacts from the implementation of the spatial plan, taking into account the conditions and guidelines set out in the spatial plan and the environmental measures[148] provided in this Impact Assessment for the spatial planning and future licensing levels.

[148] A broad-based approach is meant here, the environmental measures can be targeted at the natural, cultural, social and / or economic environment.