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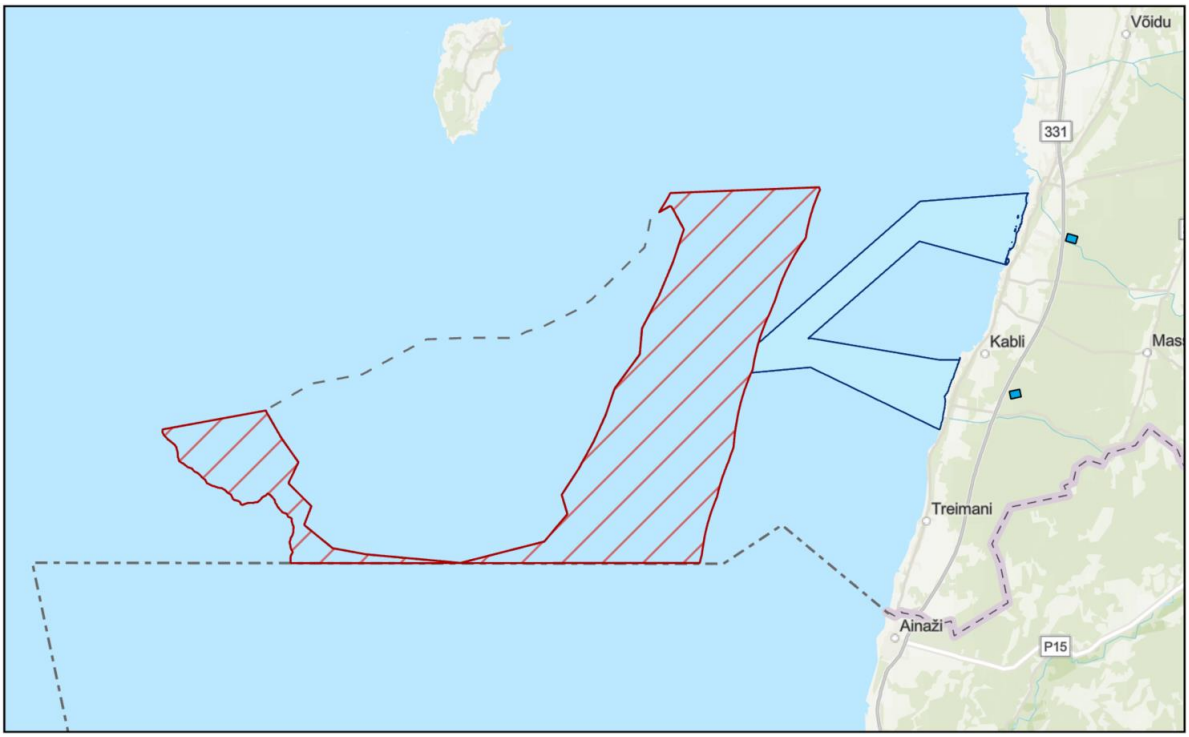
Liivi bay offshore wind park extension area environmental impact assessment

EIA program English summary



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Project nr 24000152

Abbreviations and terminology

Abbreviation / term	English use in this summary
EIA	Environmental Impact Assessment.
SEA	Strategic Environmental Assessment.
TTJA	Consumer Protection and Technical Regulatory Authority; the competent authority and decision-maker.
KeHJS	Environmental Impact Assessment and Environmental Management System Act.
Superficies license	Permit/right to encumber a public water body with structures.
NDSP	National designated spatial plan; used for the state special planning procedure / REP.
Natura 2000	EU network of protected areas under the Habitats and Birds Directives.
IBA	Important Bird Area.
UXO	Unexploded ordnance.
HDD	Horizontal directional drilling.
ROV	Remotely operated underwater vehicle.
EMF	Electromagnetic field.
OWF	Offshore wind farm.
Extension area	The additional Liivi Bay wind farm area planned next to the Liivi Bay offshore wind farm main area.
Export cable	Submarine and onshore cable corridor transporting electricity from the offshore substation/wind farm to the onshore substation.

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Introduction

Liivi Offshore OÜ plans to develop an additional offshore wind farm in Liivi Bay next to the Liivi Bay offshore wind farm already under development. The planned extension area is located southeast, south and southwest of Kihnu Island and west of the Häädemeeste coast, within the potential wind energy development area identified in the maritime county plan for the marine area bordering Pärnu County.

TTJA initiated the superficies license procedure and EIA on 06.09.2024 by decision No. 1-7/24-307. The encumbered public water area required for the offshore wind farm is 168.05 km2 based on the currently specified data. The EIA is mandatory because constructing a wind power plant in a water body is an activity with significant environmental impact under KeHJS.

The EIA covers the extension wind farm area, inter-array cables and two new export cable corridor alternatives whose impacts have not been assessed in the SEA of the Liivi Bay offshore wind farm grid connection NDSP or in the EIA for the main Liivi Bay offshore wind farm. To avoid duplicate assessment, export cable alternatives already assessed in those procedures are not reassessed here. The main area and the extension area are expected to use the same export cable corridor, to be selected from earlier and new corridor alternatives.

1. EIA parties

The developer is Liivi Offshore OÜ, a project company of Enefit OÜ. TTJA is the decision-maker and conducts the EIA procedure. The EIA Program was prepared by Skepast&Puhkim OÜ.

Role	Organization / contact	Main function
Developer	Liivi Offshore OÜ / Karmo Kõrvek	Plans the activity and applies for the superficies license.
Decision-maker and EIA authority	TTJA / Liina Roosimägi	Conducts the superficies license and EIA procedure.
EIA expert / consultant	Skepast&Puhkim OÜ / Jüri Hion	Coordinates preparation of the EIA Program.
Leading EIA expert	Eike Riis, EIA license KMH0154	Leads the expert team and prepares the Natura preliminary assessment.

The program team includes experts in marine and terrestrial biota, birds, bats, fish and fisheries, marine water quality and hydrodynamics, geology and hydrogeology, climate, GIS, socio-economic impacts, maritime transport, noise, vibration and underwater noise.

After completion of the studies listed in the program, the EIA Report will be prepared according to KeHJS § 20. At program stage the future study providers and EIA Report consultants have not yet been selected.

2. Proposed activity

2.1. Objective

The project objective is to build a competitive offshore wind farm in Liivi Bay and to contribute to renewable electricity production and security of supply in Estonia and the Baltic Sea region. Depending on the selected turbine capacity, up to 27 wind turbines are planned in the extension area.

2.2. Location

The project is located in Liivi Bay in the Baltic Sea. The extension area is approximately 10 km from the mainland coast in Häädemeeste municipality and approximately 10 km from Kihnu Island. Water depth is generally 10-25 m in the eastern part and up to 31 m in the western and south-western parts. The average water depth is 22.1 m.

The extension area is linked to the Liivi Bay offshore wind farm main area. The figures in the source program show both the main area and the extension area because the areas are functionally connected.

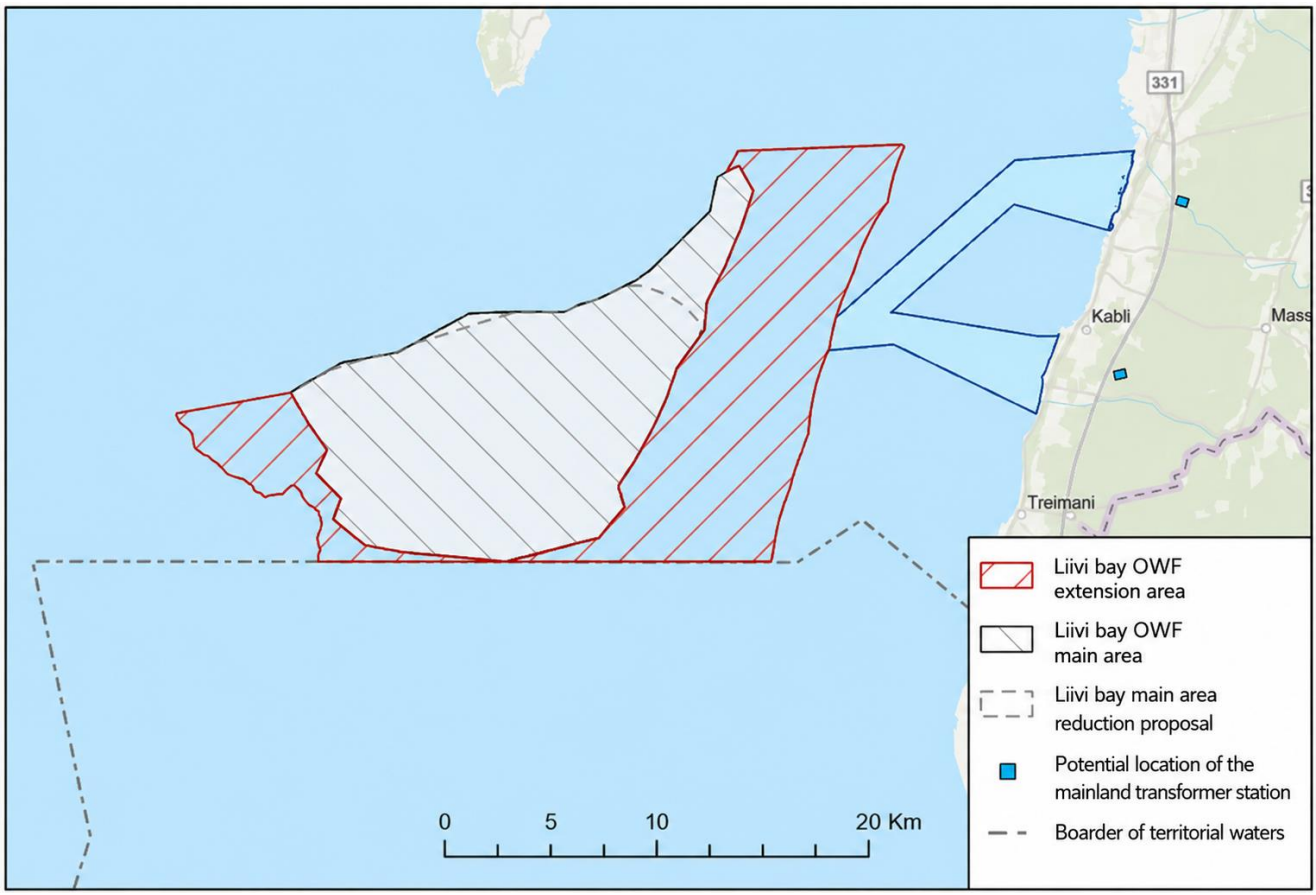

Figure 1. Location of the planned Liivi Bay Extension Area offshore wind farm and export cable corridor alternatives.

2.3. Technical description and alternatives

Project element	Summary
Wind turbines	Up to 27 turbines. Maximum tip height 370 m. Exact turbine type and rated capacity will be determined later; the EIA assesses maximum parameters.
Foundations	Up to 29 offshore foundations, including up to 2 foundations for offshore substations. Alternatives include gravity-based foundations and monopile foundations for turbines; jacket foundations may be considered for substations.
Offshore substations	Up to two offshore substations may be constructed in the extension area. Their technical solution and locations will be determined during design.
Inter-array cables	Up to 220 kV cables between turbines and substations, buried up to 2 m into the seabed.
Export cables	Up to 8 export cables for the extension area and up to 3 for the main area. Cable

	spacing in the marine corridor may be up to 100 m. Voltage up to 330 kV.
Export cable corridors	Two new corridor alternatives are assessed in this EIA. Corridor width is 1.5 km offshore and up to 4 km at the landfall area.
Cable burial	Export cables are buried up to 2 m into the seabed and up to 4 m within the nearshore zone up to 3 km from the coast.
Onshore connection	A joint onshore substation for the main and extension areas is planned. Current alternatives are Arumetsa and Majaka; the location will be determined through the Liivi Bay offshore wind farm grid connection NDSP and design.

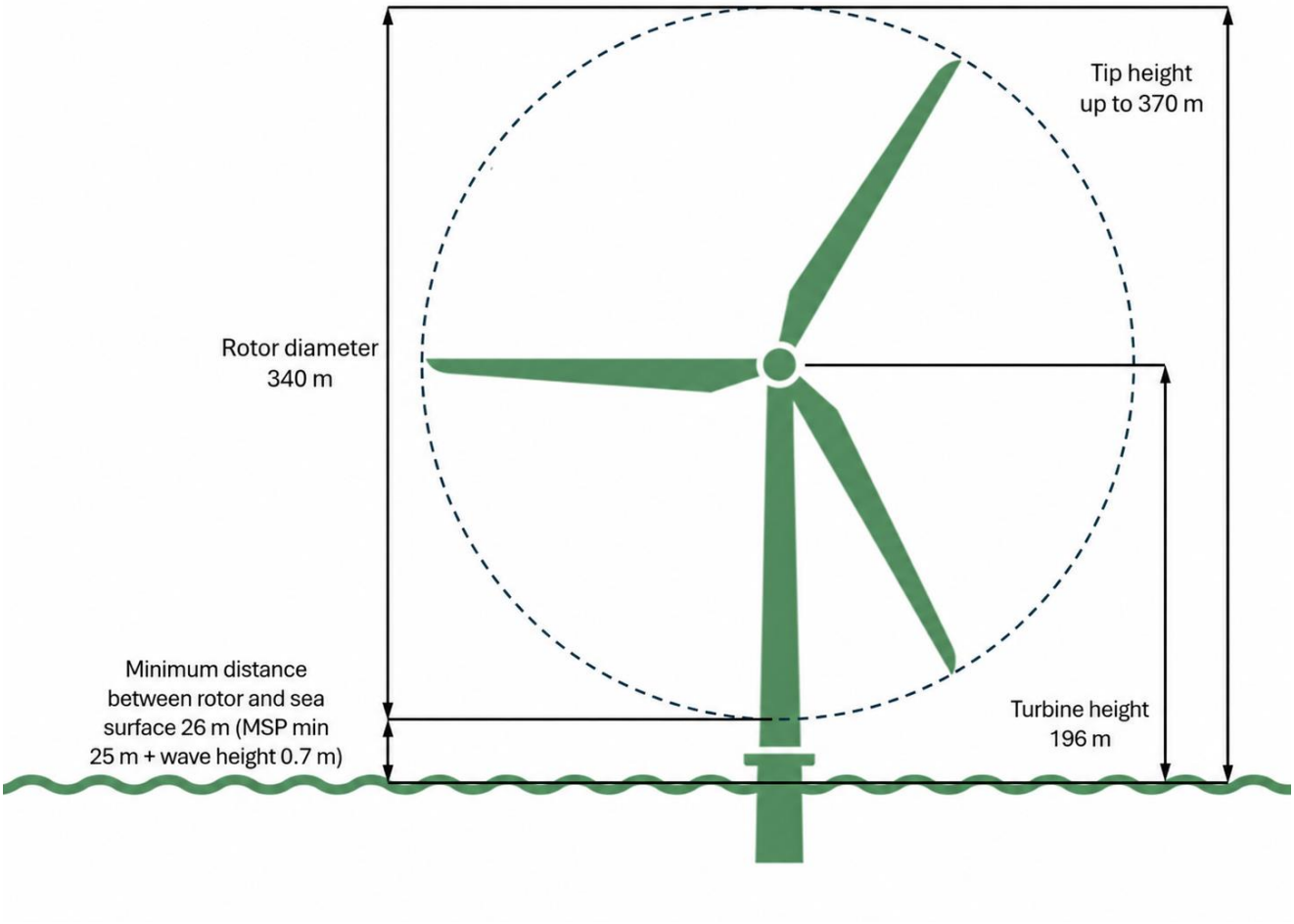

Figure 2. Maximum parameters of the planned wind turbine. Source: Enefit OÜ.

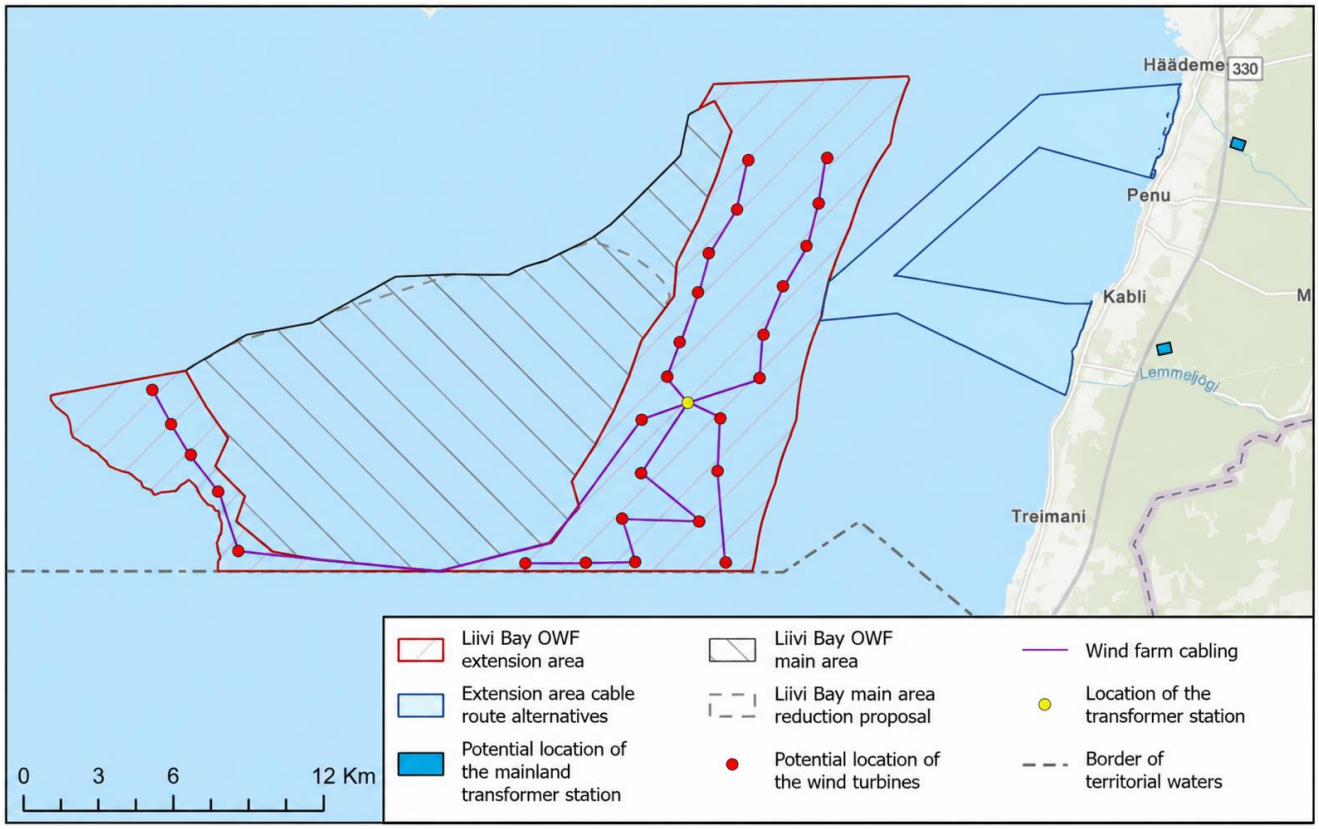

Figure 3. Possible location of extension area turbines, inter-array cabling and offshore substation. Source: Enefit OÜ.

2.4. Development, construction and operation stages

Before construction, detailed geotechnical and geophysical surveys, including magnetometry, will be carried out to support technical design and identify seabed objects such as UXO. Foundation installation is expected to be the construction stage with the greatest environmental relevance.

Stage / technology	Short description and EIA relevance
Pre-construction surveys	Geotechnical, geophysical and magnetometry surveys to inform detailed design and identify hazardous objects.
Foundation installation	Monopiles may require drilling, vibro-driving or piling with noise mitigation; gravity-based foundations require seabed preparation and dredging; jacket foundations may be used for offshore substations.
Cable installation	Inter-array and export cables are installed by cable-laying vessels and buried by jetting, ploughing, sawing or covered with rock/concrete mattresses depending on seabed conditions.
Landfall	Open trenching or HDD may be used; HDD is generally used only where open trenching is prohibited or technically unsuitable.
Operation	Turbines operate at wind speeds of 3-30 m/s. Regular maintenance of turbines and substations is expected.
Lifetime extension / repowering	May be possible after technical feasibility analysis and regular inspections.
Decommissioning	Options include removing turbines and all or part of the foundations, or removing/abandoning cables depending on future environmental, technical and legal conditions.

3. Links with strategic planning documents

The project supports EU and Estonian climate and energy objectives by contributing to renewable electricity production and the transition away from fossil fuels. It is also linked to maritime spatial planning, county and municipal planning documents, and the Liivi Bay offshore wind farm grid connection NDSP.

Document / framework	Relevance for the project
EU climate and energy framework, Paris Agreement and European Green Deal	Supports climate neutrality, greenhouse gas reduction and offshore wind deployment.
Sustainable Estonia 21, Estonian Environmental Strategy and climate policy principles	The project is consistent with the objective of expanding environmentally sustainable energy production.
Estonian Marine Strategy and HELCOM framework	The project must not worsen marine environmental status and must consider good environmental status objectives.
Energy Development Plan 2030 and regional development strategies	Offshore wind is an important future renewable energy source and supports regional energy and economic development.
Estonia 2030+ national spatial plan	Supports the development of renewable energy, including offshore wind, while safeguarding nature conservation, cultural heritage, migration corridors and defence interests.
Estonian Maritime Spatial Plan and Pärnu maritime county plan	The extension area is located in a planned potential wind energy development area. The EIA must specify environmental, technological and stakeholder constraints.
Liivi Bay offshore wind farm grid connection NDSP	Determines the export cable corridor and onshore substation solution to be used by the main and extension areas.
Kihnu and Häädemeeste comprehensive plans	Relevant for landfall, landscape, coastal values, views and onshore cable route planning.

4. Potentially affected environment

4.1. Natural environment

The EIA Program describes the baseline environment for seabed geology, marine water quality, protected natural objects, benthic biota and plankton, marine habitats, terrestrial and coastal habitats, fish, birds, marine mammals and bats. Many assessments rely on existing studies prepared for the Liivi Bay offshore wind farm main area and grid connection, but additional studies are required for the extension area and the new export cable alternatives.

Component	Key baseline and EIA focus
Seabed geology	The area includes Devonian bedrock covered by variable Quaternary sediments. Sediment thickness varies; detailed geotechnical surveys are needed for foundation and cable design.
Seabed sediments	Fine fractions may generate suspended sediment during foundation works and cable installation. Sediment contamination must be analysed before dredging or disposal.
Marine water quality	The relevant coastal water bodies and offshore assessment unit currently have poor overall status; eutrophication indicators do not meet good environmental status.
Protected areas	Relevant protected areas include Pärnu Bay limited-conservation area, Kihnu, Kabli, Luitemaa, Sorgu and Manija protected areas. Pärnu Bay limited-conservation area is closest and potentially most affected.
Benthic biota and habitats	Direct seabed disturbance, suspended sediment, habitat loss, habitat recovery and reef-effect changes must be assessed.
Fish and fisheries ecology	Key issues include spawning areas, herring and other fish resources, migration and effects of sediment, underwater noise and EMF.
Birds	The area is relevant for migratory and marine birds; the EIA must consider collision, displacement, barrier effects and effects on foraging areas.
Marine mammals	Ringed seal and grey seal may use the area; effects from construction, underwater noise, vessel traffic and habitat changes must be assessed.
Bats	Offshore bat migration may occur, especially under low-wind conditions; collision risk and migration patterns require assessment.

4.2. Noise, vibration and underwater noise

The EIA must assess construction and operational noise. Above-water noise is relevant mainly for residents and recreational areas near the coast and from vessels. Operational turbine noise and low-frequency noise, including infrasound, will be modelled. Underwater noise is a key issue for fish and marine mammals, especially if piling, drilling, UXO clearance or intensive vessel activity is required. Mitigation such as bubble curtains may be necessary if pile-driving is used.

4.3. Sea levels, ice, flood areas and climate

The EIA must assess sea-level rise, wave conditions, ice conditions, flood risk, coastal erosion and climate resilience. Climate change is expected to increase temperatures and precipitation and reduce snow/ice duration, while extreme weather and storms remain relevant for construction and operation. The project climate impact is assessed by comparing the life-cycle emissions of offshore wind with fossil-based electricity generation; the program uses a 400 MW indicative capacity and a 30-year lifetime for climate impact calculations.

4.4. Cultural heritage, landscape and socio-economic environment

The EIA covers underwater and onshore cultural heritage, valuable landscapes, views, settlement, land use, local economy, fisheries, tourism, ports, fairways and dangerous enterprises. Underwater cultural heritage must be identified and avoided where necessary. The landfall and onshore corridor alternatives may affect valuable coastal landscapes, heritage sites, tourism and local land use.

The project may affect fisheries through temporary construction disturbance, changes in fishing grounds, safety restrictions, cable protection requirements and potential ecological effects on fish resources. Navigation impacts must be assessed for commercial, small craft and fishing vessel traffic.

5. Assessment methodology

The EIA will compare the proposed activity and realistic alternatives against the baseline / 0-alternative. The methodology combines qualitative and quantitative assessment, including review of legislation and prior studies, new field surveys, expert assessments, consultations with authorities and stakeholders, and modelling where required.

An impact is considered significant if it may exceed environmental tolerance, cause irreversible environmental change, or endanger human health and well-being, cultural heritage or property. The EIA Report will identify direct, indirect, cumulative and transboundary impacts, describe their duration, extent, reversibility and significance, and propose avoidance, mitigation and monitoring measures.

6. Natura 2000 preliminary assessment

The Natura preliminary assessment identifies Natura 2000 sites that may be affected directly or indirectly by construction, operation or decommissioning. The assessment considers both Natura habitat sites and bird sites in the likely area of influence, including protected marine and coastal habitats, bird migration and feeding areas, fish, seals and other conservation objectives.

The preliminary assessment concludes that the possibility of adverse effects on Natura 2000 conservation objectives cannot be excluded at program stage. Therefore, a Natura appropriate assessment must be carried out in the EIA Report on the basis of technical design and the required surveys.

7. Likely significant environmental impacts

The likely impact area is broader than the project footprint and differs by receptor. The exact extent will be refined using survey results, hydrodynamic and suspended sediment modelling, underwater noise modelling, bird and bat data, navigation analysis, fisheries analysis and Natura assessment.

Impact source	Likely affected components
Mechanical disturbance of seabed	Benthic habitats and biota, marine habitats, sediment structure, cultural heritage.
Suspended sediment and deposition	Water quality, fish, spawning grounds, benthic habitats, Natura habitats.
Construction and vessel noise	Marine mammals, fish, birds, local residents, navigation safety.
Underwater impulsive noise	Seals, fish and other marine fauna, especially if piling or UXO clearance is used.
Operational noise and visual effects	Residents, recreation, tourism, valuable landscapes and views.
Electromagnetic fields and cable heat	Fish, benthic biota and potentially other marine organisms near cables.
Physical presence of turbines and foundations	Bird collision risk, displacement, barrier effects, reef effect, navigation and radar/defence systems.
Restrictions and safety zones	Fisheries, navigation, marine uses and access to fishing grounds.
Accidents and pollution	Marine water quality, biota, protected areas and transboundary waters.

8. Required studies and expert assessments

The EIA Report must be based on new studies and expert assessments for the extension area and export cable alternatives. Study scopes must be coordinated with the competent authorities and must be comparable with earlier studies for the main Liivi Bay offshore wind farm to allow cumulative assessment.

Study / expert field	Purpose in the EIA
Benthic biota and habitats	Determine species composition, habitat types, habitat value, expected loss/disturbance and recovery potential.
Seabed geology and geotechnics	Support foundation/cable design; determine sediment properties, volumes, contamination and suitability for cable burial.
Water quality and sediment plume modelling	Assess suspended sediment, nutrient and contaminant release, hydrodynamics and dredging/disposal effects.
Oil spill modelling	Assess accidental pollution risk during construction and maintenance; requested also in transboundary consultation.
Fish and fisheries	Assess fish communities, spawning areas, migration, fisheries effort, restrictions and cable/foundation risk interactions.
Birds	Assess migration, staging, foraging, displacement, collision and barrier effects.
Bats	Assess offshore migration and collision risk in relevant seasons and weather conditions.
Marine mammals	Assess effects on ringed seal and grey seal from noise, disturbance, habitat changes and prey effects.
Noise, vibration and underwater noise	Model construction and operational noise, low-frequency noise, infrasound and underwater noise.

Navigation and maritime safety	Assess vessel traffic, fairways, ports, fishing vessels, small craft, safety zones and navigation risks.
Cultural heritage	Identify underwater and onshore cultural heritage; propose avoidance and mitigation.
Landscape, visual and socio-economic impacts	Assess views, tourism, recreation, settlement, land use, community and local economy.
Natura 2000 appropriate assessment	Assess effects on Natura conservation objectives and site integrity.
Cumulative and transboundary impacts	Assess combined effects with other wind farms, cable projects and transboundary receptors.

9. Cumulative impact assessment

Cumulative impacts must be assessed with the Liivi Bay offshore wind farm main area, other planned offshore wind farms and cable projects, and other marine uses in Liivi Bay. The assessment must consider combined effects on birds, bats, fish, marine mammals, benthic habitats, fisheries, navigation, water quality, landscape and transboundary receptors.

Relevant projects include, among others, Liivi Offshore OÜ export cable alternatives, the Utilitas Wind Saare-Liivi water cable line, and the Estonia Offshore Wind DevCo OÜ Liivi 1 and Liivi 2 offshore wind farm export cable.

10. Transboundary EIA

The project may have transboundary environmental effects because Liivi Bay is shared by several countries and because impacts on birds, bats, fish, marine mammals, navigation and water quality may extend beyond Estonia. Latvia, Lithuania, Finland and Sweden have been involved or notified in the transboundary EIA context.

Latvia emphasized the need to assess impacts on birds, bats, fish, marine mammals, navigation, underwater noise, oil pollution risk and cumulative impacts with Latvian maritime spatial priorities. Lithuania, Finland and Sweden did not identify the same level of detailed issues in the program material, but transboundary effects must be assessed in the EIA Report where relevant.

11. Indicative EIA schedule

Milestone	**Period / time**
EIA and superficies license procedure initiated by TTJA	06.09.2024
Notification of EIA initiation	Within 14 days after initiation
Preparation of EIA Program	2024-2026
Public display and public hearing of the EIA Program	After submission of the program for disclosure
Submission of the EIA Program to TTJA for compliance check	After public disclosure and responses to comments
Studies and expert assessments	After approval of the EIA Program; exact timetable depends on procurement, field seasons and study scope
Preparation of EIA Report	After completion of required studies and expert assessments
Public disclosure and approval of EIA Report	After submission of the EIA Report to TTJA

12. Public involvement and disclosure

The EIA Program lists affected and interested authorities, municipalities, stakeholders and people involved. The list may be updated during the procedure. It includes state authorities, local governments, environmental organizations, defense and transport authorities, heritage authorities, maritime stakeholders, fishing organizations, local communities, developers of nearby projects and transboundary competent authorities.

The chapters on public display, comments and the overview of transboundary consultation are to be supplemented after public disclosure and receipt of authority and stakeholder statements.

13. Source material and annexes

The source program includes annexes with TTJA decision No. 1-7/24-307 of 06.09.2024 on initiating the superficies license procedure and EIA, the superficies license application, and materials to be added when the program is submitted for compliance review, including authority statements, responses, public display comments and the public hearing minutes.

Key source material includes relevant legislation, national, county and municipal planning documents, development strategies, protected area rules and management plans, Environmental Portal, EELIS, KESE, Cultural Monuments Register, baseline studies and analyses prepared for the project, the Liivi Bay offshore wind farm main area EIA Report and underlying studies, and the Liivi Bay offshore wind farm grid connection NDSP and SEA materials.