Environmental Impact Assessments

Selected references

3rd of May 2023

NIRAS are experts in environmental impact assessments

Before constructing new, or expanding existing, structures, it can be important to carry out an environmental impact assessment for the sites. Environmental assessment shows whether they comply with the rules of the area and whether they are harmful to flora and fauna.

At NIRAS, we have carried out several environmental impact assessments over several years, this has been done before, among other things, the construction of offshore wind farms, flood protection and port expansions. All environmental impact assessments are carried out for the entire process, thus both through the construction phase and the operational phase.

Optimized and tailored solutions

When building or expanding, it is important to take the environment into account, this is done by making an assessment of how extensive an effect the construction has on the surrounding environment. This assessment is made in collaboration with several experts in these areas, this can be animal life, plant life, cultural heritage, disturbances for people, e.g. visually or noise pollution.

NIRAS emphasizes the importance of establishing a basic understanding of the surrounding environment and local conditions when developing sustainable solutions. We have state-of-the-art numerical models, MIKE software, GIS and 3D CAD software that enable us to help our customers inspect, develop, optimize and present our assessments.

A wide range of services

The projects at NIRAS are always carried out with great professionalism and all the possible environmental consequences that may occur will be assessed by experts in the fields. The assessments have been made in connection with, among other things, the following projects

- Construction and operation of offshore wind farms
- Extension or establishment of ports
- Storm surge protection
- Environmental assessment in relation to EU regulations

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Aflandshage and Nordre Flint Offshore Windfarms, Denmark

Copenhagen Municipality is making a green transition of the capital energy production as a part of their strategy to become climate neutral. The Greater Copenhagen Utility, HOFOR, therefore wants to establish two offshore windfarms in Øresund, Aflandshage and Nordre Flint, with a joined capacity of 410 megawatts. Aflandshage Offshore Windfarm will be located east of Stevns and Nordre Flint Offshore Windfarm between Copenhagen and Malmø, Sweden. The establishment of the offshore windfarms might affect the environment, and HOFOR is therefore making an environmental impact assessment (EIA).

NIRAS is consulting HOFOR Vind A/S about this, and has made the EIA for the two offshore windfarms. Amongst others, the extensive work accounts for the impact on the marine flora, fauna and seabed. Additionally, the windfarms are constructed within the legal framework, which considers existing Natura 2000 areas in Øresund as well as the EU legislation on the Water Framework Directive and the Marine Strategy Framework Directive.

As a part of the EIA, NIRAS has made a background report on coastal morphology, sediment spill and hydraulics. To determine these changes, NIRAS has setup a numerical depth-averaged 2D model in MIKE 21 HD FM and MIKE 21 SW by DHI. The results of the model is compared with the existing conditions to determine the impact of the offshore windfarms on the marine environment. Additionally, NIRAS has investigated the spread of sediment through modelling of spill in MIKE 3 MT.

Year
2019 - 2023

Customer
HOFOR A/S

Contract Fee
19.662.034 DKK

Project Category
Green Wind; Wind energy

#7 Affordable and clean energy

#14 Life below water

Tangkrogen Integrated Plan

Aarhus Municipality and Aarhus Water are facing the challenge of implementing the projects outlined in the Tangkrogen Integrated Plan, which includes the construction of a new large Marselisborg wastewater treatment plant (Aarhus ReWater) and the expansion of the existing Marselisborg Marina. The establishment of Aarhus ReWater will meet the increasing need for wastewater treatment and at the same time release space for urban development and climate adaptation. The expansion of the marina will result in 700 new boat slips and provide opportunities for the development of existing and future marina functions. In conjunction with the project, hydraulic modeling of the conditions around the marina will be conducted in order to illuminate how the new facilities will affect the conditions related to hydraulics, waves, seaweed, and sedimentation.

NIRAS is responsible for the hydraulic calculations that will be performed using the numerical models MIKE21. This involves hydraulic calculations in relation to the discharge pipe in relation to the determination of the future discharge point, including the hygienic impact and bathing water quality. Additionally, hydraulic calculations are performed to determine terrain elevations, covering works, etc. Furthermore, NIRAS has set up a detailed wave and current model combined with calculations of sediment spread from the implementation of the project to determine changes in wave and current conditions and deposition patterns. The impact on the transport of seaweed and the dynamics of the coast south of Tangkrogen have also been examined in connection with the establishment of the Marselisborg Marina.

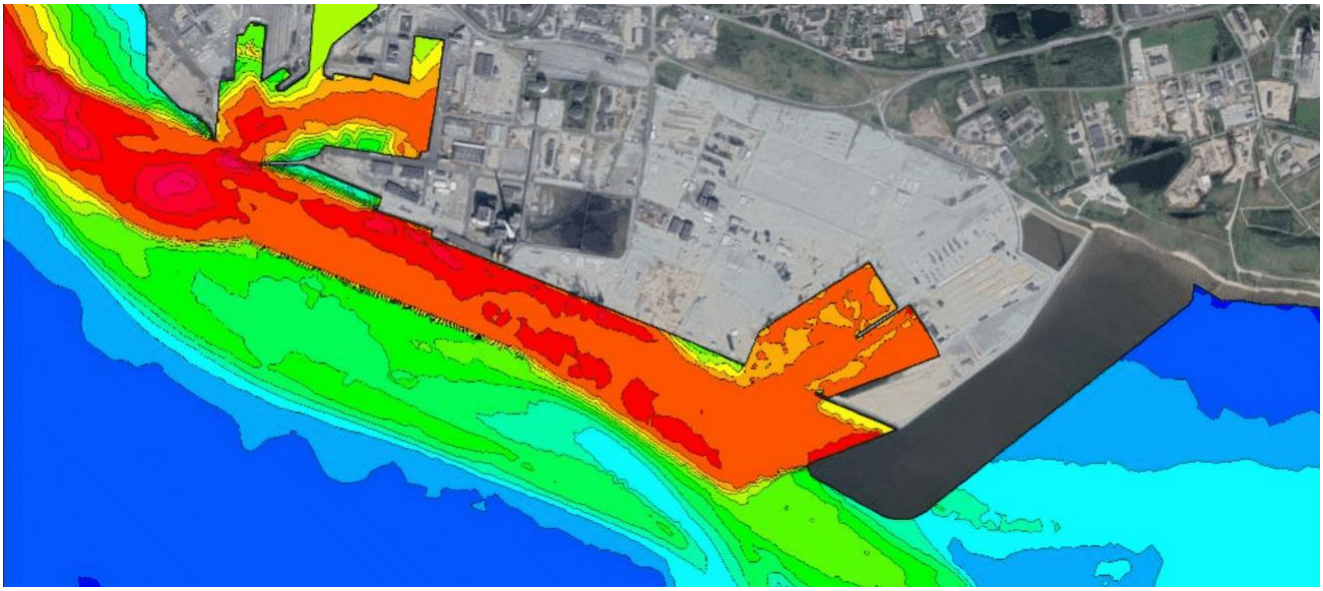
Year
2019 - 2024

Customer
Aarhus Kommune - Mobilitet, anlæg og drift

Contract Fee
20,099,698 DKK

Project Category
Environmental assessments

#6 Clean water and sanitation
#9 Industry, innovation and infrastructure
#14 Life below water



Model Calculations for Stage 5 of Esbjerg Harbour, Denmark

In connection with the EIA study for Stage 5 expansion of Esbjerg Harbor, modeling of hydraulic conditions, sediment dispersion, and morphology for former and future conditions was carried out. The EIA study identified the impact of the facility on the environment, with particular focus on hydraulic and morphological impacts in the Grådyb and Knudedyb tidal areas.

NIRAS was responsible for defining the calculations and analyses that DHI was to perform. In addition, NIRAS was responsible for assessing the numerical modeling and its consequences for the impact on current and wave conditions, as well as extreme water levels during storm surges (Storm Bodil, December 2013). This also included an assessment of the impact on water balance, salinity, fine-grained sediment, dredging quantities, and the impact caused by excavation waste in connection with dredging work. Furthermore, NIRAS was responsible for calculating the spill and spread of excavated sediment in connection with dumping in the North Sea.

Stage 5 expansion and filling towards the south was limited by the harbor boundary and the adjacent Ramsar and Natura 2000 area. The EIA study ensured that the expansion did not lead to critical impacts on the surrounding Natura 2000 wetland area, which is in line with Sustainable Development Goals number 14 and 15, which aim to protect and conserve marine and terrestrial ecosystems.

Year
2019 - 2021

Customer
Esbjerg Havn

Contract Fee
931.345 DKK

Partnership
DHI

Project Category
Harbours and Marine Structures

#14 Life below water
#15 Life on land

International Port at Gulhifalhu, the Maldives

The capital of The Maldives is Male, which is an island with a population of over 140,000 people in approximately 2 km^2. The existing port of Male is the primary port in the Maldives and is used as the hub for import and general cargo to serve the local population as well as the numerous resort islands in the country. The current port is surrounded by rapid urban development which renders any expansion impossible. As such the Government of Maldives contracted NIRAS in partnership with MTBS and local consultants to lead the development of an ambitious project to relocate the primary international port to a new reclaimed island; creating much needed space for not only the port, but also further industrial development in the greater Male region.

The project consists of preparation of a detailed masterplan of the new commercial island of Gulhifalhu, encompassing the new international port, a local distribution port, residential and commercial space and associated utilities such as power, water and sewerage. As a part of the project, specifications and geotechnical investigations were made. Hydrodynamic studies were also undertaken to determine the design wave climate, future sea level rise and associated metocean parameters.

NIRAS has made the detailed design of the reclamation scheme for the new island, including the detailed design of shore- and flood protection revetments to protect the new island from extreme metocean conditions. The design of the revetments are made so that their appearance was in keeping with existing measures in the local area. The design of the port encompassed the design of all components to a level suitable for the letting of an EPC contract. A full Environmental Impact Assessment of the scheme was undertaken to identify any negative effects to the environment, as well as propose any mitigation measures. Finally, NIRAS has produced two sets of tender documents and will continue to support the client with technical assistance.

Year
2019 - 2021

Customer
Government of Maldives

Contract Fee
1.920.000 USD

Partnership
MTBS

Project Category
Harbours and Marine Structures

#9
Industry, innovation and infrastructure

Environmental Impact Assessment of Frederikshavn Offshore Wind Farm, Denmark

Frederikshavn offshore wind farm is planned to be built in Kattegat approximately 4 km east of Frederikshavn. It will include 5 offshore wind turbines with a capacity of up to 72 MW, as well as high-voltage power cables in the ocean and on land. The plan is to have everything finished by 2024.

The offshore wind farm with the connecting high-voltage power cables will possibly have a large impact on the environment. For this reason the Danish Energy Agency has determined due to a preliminary study, that the wind farm can have large environmental impact on the environment, and therefore they have decided that there is a need for an EIA. The preliminary study is made on an area of 5,5 km^2 and is about 4 km of the coast from the expanded Frederikshavn Harbor. The water levels In this area can vary from 11 to 21 m, however the water levels of the cable route vary from less than half a meter closest to land up to above 18 m at the site of the wind turbines. The cable route through the land area is expected to be 5 km and it will run through a Natura-2000 area.

NIRAS has in collaboration with European Energy prepared an environmental impact assessment. This report will show how the offshore wind farm project will possibly impact the environment. The report has been divided into areas that are seen as being the most important focus areas of the environment, this includes: the animals, fishing, sailing conditions, air traffic and the visual impact of the wind turbines as seen from land.

Year
2020 - 2023

Customer
Frederikshavn OWF ApS

Contract Fee
3.358.951 DKK

Project Category
Environmental assessments

#7 Affordable and clean energy

#14 Life below water

Offshore Wind Farm Hesselø, Denmark

Energinet has developed a plan for a new offshore wind farm in Kattegat, with a cable connection to the Northern part of Zealand. Before the project can begin, a pre study is necessary in order to determine the impacts on the environment, both in the ocean and on land. The plan for the offshore wind farm, Hesselø, is that it will include the wind turbines, transformer platform, cables, both sea- and land-cables, and expansions of a high-voltage station, along with a new one closer to the coast.

NIRAS has produced two separate sub reports for the environmental assessment, one was based on the environment in the ocean, and the other was based on the environmental impacts on land. The impact on the environment from the installation and operation of the wind turbines, transformer platform, and sea cable, was investigated form the following aspects: visually, noise, air safety, sailing conditions, hydrography, sediment, water quality, flora and fauna at the sea bottom, sea mammals, noise impact on sea animals, fish, birds, bats, air and climate, as well as fishing conditions amongst other. The visual impact from the wind turbines was investigated both at night and day, from North Zealand, Anholt and Kullen in Sweden. The cables are going through a Natura-2000 area and due to this it is necessary to include an environmental impact assessment of the area.

The establishment of more wind farms is in agreement with the Danish governments initiatives to include more green energy in Denmark, as well as the SDG of increasing access to green energy for everyone across the world.

Year
2020 - 2023

Customer
Energinet Eltransmission A/S

Contract Fee
13.743.975 DKK

Project Category
Wind energy

#7 Affordable and clean energy
#14 Life below water
#15 Life on land

Environmental Impact Assessment for Coastal Protection at Enø, Denmark

NIRAS has the total consultancy for Næstved Municipality in the establishment of new flood protection of large parts of the area at Enø and Lungshave. In that connection, NIRAS has contributed with making an environmental impact assessment, including making of the Natura 2000-impact assessment in the design for application, amongst other contributions. The scenic areas of Enø and Lungshave are covered by a Natura 2000-habitat site with several priority and non-priority open and marine habitat types. Additionally, there is a number of Annex IV-species as well as other protected habitat types and species present in the area. Moreover, the construction site for the suggested flood protection has areas of cultural heritage and several areas with soil contamination, emphasizing the complexity of the area.

NIRAS has made and adjusted a technical solution, securing Enø and Lungshave by the use of floodwalls and -barriers, earth dikes as well as revetments and beach nourishment. This is done alongside ensuring and protecting the particular vulnerable habitat types and species.

An environmental impact assessment and a Natura 2000-impact assessment for flood protection of the housing of Lungshave and Enø in Næstved Municipality have been a part of the foundation for the adaptation and shaping of the final project. Consultancy in regards to the environmental impacts and the EU habitat regulations has included the making and shaping of the content for the environmental impact assessment report, visualizations for the appearance of the project in the landscape, and preparation of a report on environmental impact assessment, including Natura 2000-impact assessment. As well as continuous adjustment of main proposal of the project and its alternatives.

Year
2020 - 2022

Customer
Næstved Municipality

Contract Fee
505.000 DKK

Project Category
Nature and surfacewater; Water environment

#13 Climate action #15 Life on land

Flood Protection of Hyllingeriis, Denmark

In its climate adaptation plan from 2014, Frederikssund Municipality has appointed an area around Hyllingeriis, Denmark, as in risk of flooding during events of high water level. With rising sea level and more frequent events of storm surge due to climate change, Frederikssund Municipality has requested the expertise of NIRAS to protect the area around Hyllingeriis against flooding. The area, located close by Roskilde Fjord, contains summer houses and a wastewater treatment plant.

NIRAS has made future-proof flood protection consisting of three earth dikes, two flood walls as well as an elevation of the road leading to the wastewater treatment plant. NIRAS has been in charge of the preliminary geotechnical investigations upon which the project is made. NIRAS' work is aligned with UN's sustainable development goal no. 13 on climate action, as the project contributes to making the area around Hyllingeriis more resilient in a changing climate, and thereby also ensuring peace of mind amongst local landowners.

Special for the project at Hyllingeriis is its location right by a Natura 2000-area: Roskilde Fjord and Jægerspris Nordskov, along which one of the two flood walls will be located. NIRAS has therefore made a screening assessment of the Natura 2000-area and further ensured cautious construction work of the protection measures. In that way, NIRAS has prevented substantial effects on the Natura 2000-area when flood protecting at Hyllingeriis. Furthermore, NIRAS has made the application for an Environmental Impact Assessment of the project. The considerations of nature and the environment are a part of NIRAS' work with the UN's sustainable development goals, among these no. 14 and 15: life below water and life on land.

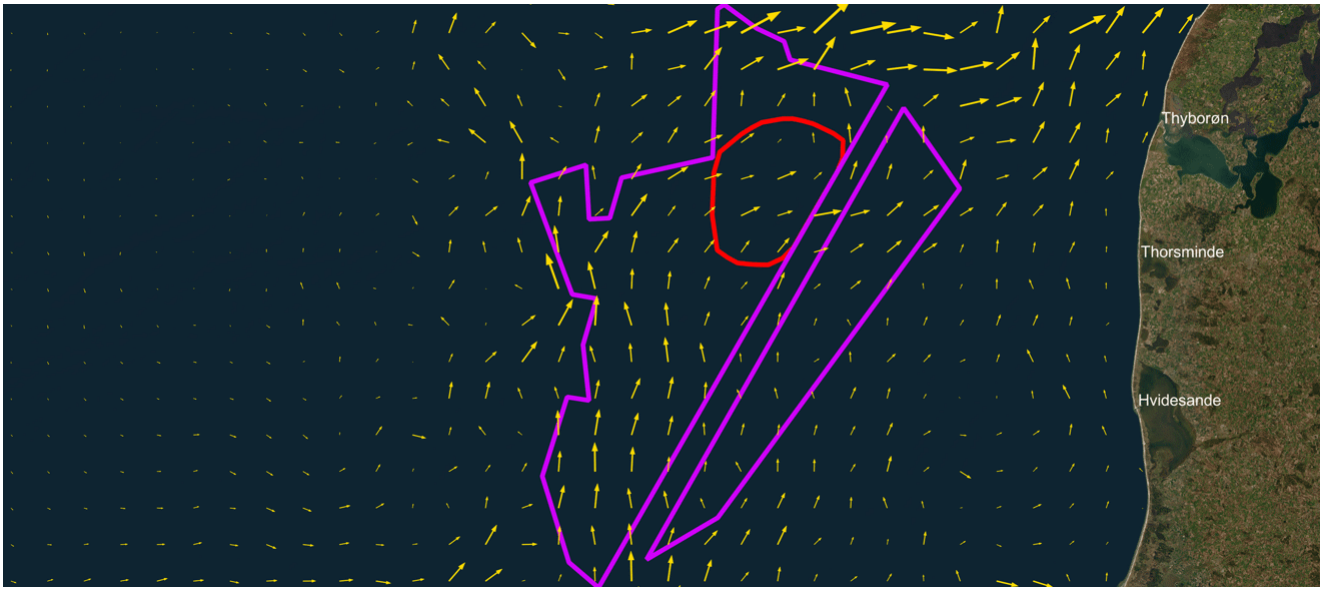
Year
2021 - 2022

Customer
Frederikssund Kommune - Teknik, Miljø og Erhverv

Contract Fee
460,000 DKK

Project Category
Harbours and Marine Structures

#13 Climate action #14 Life below water #15 Life on land



Energiø – Hydrodynamics and Sediment Dispersal, Denmark

The Energiø will be located in the Eastern part of the North sea of the coast of Jutland. Phase 1 of the project will consist of the island itself and 12 GW offshore wind, further Phase 2 will consist of Phase 1 plus an additional 28 GW offshore wind. Energinet decided to undertake a preliminary study of the impact on the marine environment during both the construction and operation phase.

The study will include models of changes in currents, wave conditions, sediment transport, seabed composition, and the overall transport of water due to the construction and operations of the island and the wind turbines. The sediment spill during the construction phase is modelled in MIKE 2D hydrodynamic model and MIKE Particle is used for the sediment. To estimate the pressure in the operation phase on the hydrodynamics and the dispersal of sediment three types of numerical models are used: a hydrodynamic model to simulate the water level and currents, a wave model to simulate the wave climate, and a sediment model to simulate the spread and deposit of the sediments dispersed due to the installation activities.

By installing offshore wind turbines in the ocean around Denmark NIRAS is working towards creating more sustainable and clean energy in the world. The purpose of Energiø is to supply Denmark and other European countries with clean and affordable energy. This is aligning with the SDG number 7, which is working to ensure affordable, reliable and clean energy to the world.

Year
2022 - 2023

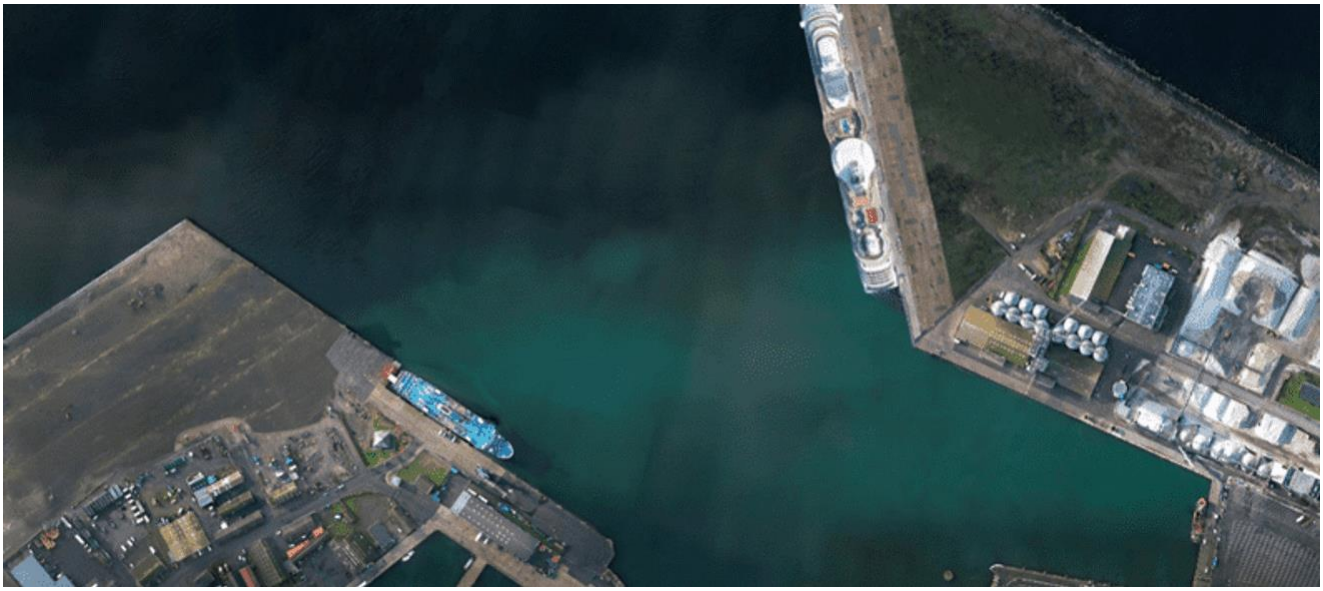
Customer
Energinet Eltransmission A/S

Contract Fee
642.920 DKK

Project Category
Wind energy

#7 Affordable and clean energy

#14 Life below water



Stage 4 Expansion of Rønne Port, Denmark

The Port of Rønne serves all ferry services to Bornholm from Denmark, Sweden, Germany and Poland, both catamaran and conventional ferries. For this reason, the expansion of the port is an important part of the growth of Bornholm. The expansion is carried out in four stages. Stage 1 (2018-2019) and Stage 2 (2021-2022) are both completed, Stage 3 is planned to be carried out simultaneously with Stage 4, and is treated in a separate design basis.

Stage 4 will include an approx. 330 m extension of the breakwater towards the lake and a final breakwater head in blasted rock for wave protection of the extended harbour, dredging to a depth of -11 m for the establishment of a swaying basin and access to the new Quay 37, establishment of a new 400 m long Quay 37 with associated rear area of approx. 1.5 ha in the West Harbour, and establishment of a new harbour area, approx. 2 ha, with associated stone throwing towards the harbour basin in the area between the old southern outer pier and inner pier.

There are several operational requirements in relation to the construction phase. These include the ferry operations being able to continue unhindered throughout the construction period in accordance with the applicable timetables. Other ships must also be taken into account and inconvenience must remain limited. In addition, there are requirements for the dimensioning of the port, as there are several types of ships that must be able to enter the port and dock at the quay, these include cruise ships, cargo ships, dry cargo ships, and catamarans. This includes, among other things, a water depth of -11m. NIRAS is the client consultant and assists the Port of Rønne with tender design for the EU tender as a turnkey contract.

Year
2022 - 2023

Customer
Rønne Havn A/S

Contract Fee
1,840,360 DKK

Project Category
Harbours and Marine Structures

#9 Industry, innovation and infrastructure

#11 Sustainable cities and communities

Storm Surge Protection and Climate Adaptation of Enø, Denmark

The low-lying connected islands of Enø and Lungshave near Karrebæksminde, have several times been flooded due to storm surge. The area is exposed to the sea from two sides and is therefore especially vulnerable to rising sea levels and more frequent events of storm surges.

On the request of Næstved Municipality, NIRAS is doing total consultancy on the project. In this context, NIRAS has performed a comprehensive study of the area and the complex issues that its inhabitants are facing. This includes registration and digitalisation of existing conditions, drone surveying of the terrain, geotechnical investigations and geomorphological assessment of the area. Based on the preliminary studies, NIRAS has made extensive GIS-analyses, assessed the chronic erosion along the seaside and reviewed the hydraulic conditions on all sides of the islands by analysing historical flooding and storm events as well as controlling meteorological scenarios. Additionally, NIRAS has applied its expertise in modelling of the wave impacts (MIKE LITDRIFT and LITPROF) and has set up the constructions as 3D models in CAD.

NIRAS has made a solution securing that Enø and Lungshave will be resilient in the future, in accordance with UN's Sustainable Development Goal no. 13 on Climate Action. The project area contains a Natura 2000 habitat area. NIRAS has therefore made the application for an EIA-screening and made the Environmental Impact Assessment, in order to protect the significant and preserved nature, which especially Enø offers. Thereby, the project works within the framework of UN's 14th and 15th Sustainable Development Goals: Life Below Water and Life on Land.

Year
2017 - 2020

Customer
Næstved Kommune

Contract Fee
2,175,000 DKK

Project Category
Harbours and Marine Structures

#11 Sustainable cities and communities
#13 Climate action
#14 Life below water
#15 Life on land