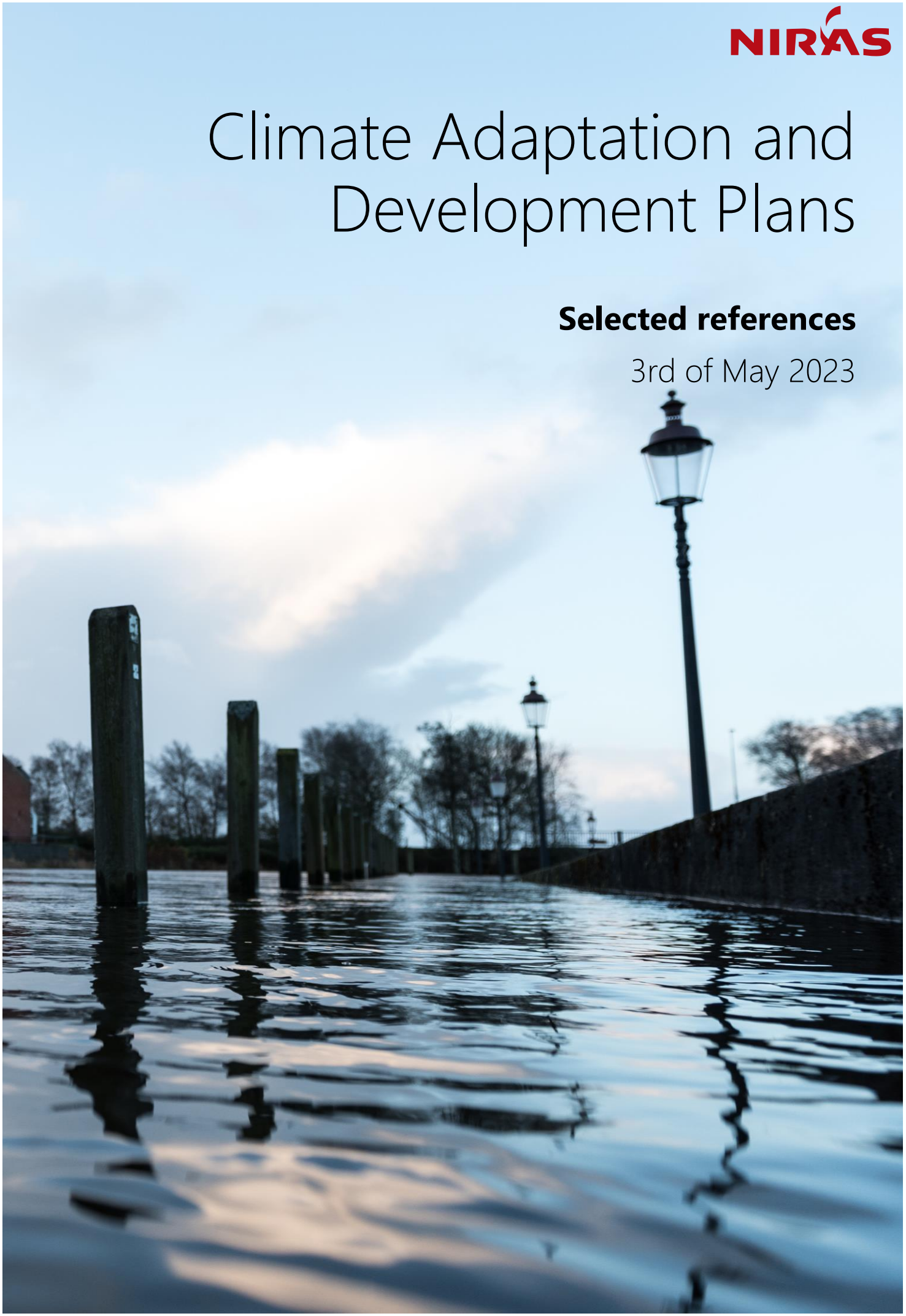
Climate Adaptation and Development Plans

Selected references

3rd of May 2023



NIRAS are experts in making holistic and sustainable answers to climate adaptation

Decision-making and development plans in an unknown future is highly challenging. The wide ranging effects of climate change demand innovative and dynamic solutions regarding urban development.

NIRAS has established a broad level of experience in climate adaptation and dynamic planning through the many projects we have made nationwide as well as internationally. Our projects are often done in collaboration with architects, ensuring holistic solutions in an urban area, thereby creating additional value.

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Optimized and tailored solutions

Projects regarding climate adaptation and development plans are often multidisciplinary and concern several stakeholders making it crucial to successfully manage and combine all interfaces involved. We enjoy applying our long experience and theoretical knowledge together with a creative solution-oriented mind, to find tailored solutions for each project in close collaboration with our clients and other stakeholders, meeting the client's individual requirements. Furthermore, we have extensive experience with stakeholder meetings and collaboration with authorities.

NIRAS stresses the importance of establishing a fundamental understanding of the natural environment and local conditions when developing sustainable solutions. We hold state-of-the-art numerical models, MIKE-software, GIS and 3D CAD software, which enable us to assist our clients in managing and monitoring as well as developing, optimizing and presenting our assessments and designs.

A wide range of services

We develop our projects based on a holistic perspective often including disciplines such as surveying, environment, master planning, landscape architecture and economics to form robust and integrated solutions that provide additional recreative value. Our in-house specialists cover all required disciplines and have decades of experience in solving complex challenges including:

- Storm water management and urban drainage
- Integrated coastal zone management plans (ICZM)
- Strategic planning of urban and harbour areas
- Dynamic adaptive policy pathways (DAPP)
- Waterfront development
- Sustainable solutions

Coastal Protection for Five Islands in the Maldives

Ministry of National Planning and Infrastructure has on behalf of the Government of Maldives engaged Riyan and NIRAS as a sub consult for conducting detailed investigations and Design development for Coastal Protection at M.Kolhufushi, M.Mulah, M.Dhiggaru, Buruni and Vandhoo in the Maldives. These are all settlements in remote atolls in the Maldives subject to erosion, flooding and are vulnerable to climate change and sea-level rise.

NIRAS has provided detailed coastal analysis regarding existing conditions of the five islands with regards to flooding and erosion. Based on the coastal analysis NIRAS has developed feasible concepts for coastal protection schemes with regards to flooding and erosion. The analysis forms the basis for a detailed numerical modelling study of waves, water levels and currents at the islands applying MIKE 21 SW and HD.

NIRAS has modelled 20 years of regional and local waves, water levels and currents around the Maldives to determine the local design parameters at each island. The focus is particularly on the technically challenging transformation of waves over steep coral reefs. The modelling includes the fully coupled waves and currents MIKE 21 model, that has high enough resolution to cover flow over complicated coral reefs. Furthermore, NIRAS has analyzed the littoral processes including annual littoral drift and stable shoreline orientations and cross-shore transport during storms at two of the islands applying LITPACK. Finally, NIRAS has analyzed the coastal processes and the complex hydrodynamics, suggested possible coastal protection solutions, carried out detailed numerical modeling of hydrodynamics and sediment transport, and provided design parameters for the design of the final coastal protection solution.

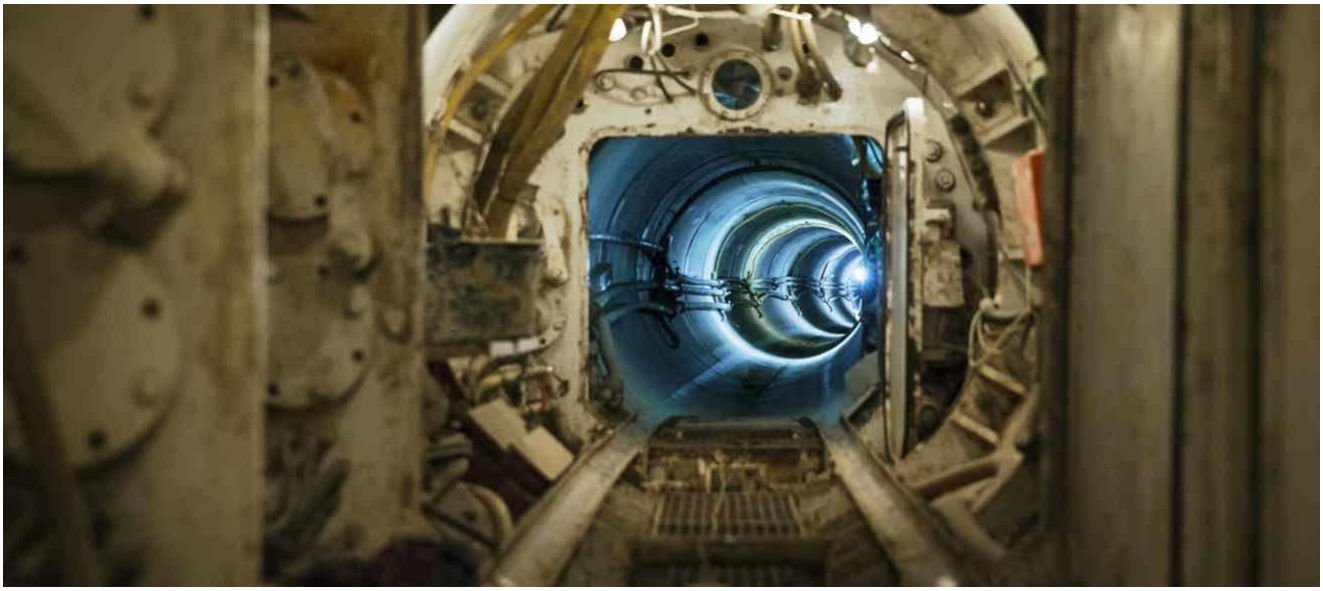
Year
2019 - 2020

Customer
Riyan Pte. Ltd

Contract Fee
84.000 EUR

Project Category
Harbours and Marine Structures

#13
Climate action



Valby Cloudburst Tunnel, Denmark

HOFOR is establishing a tunnel of Ø3,4m underneath Valby of a total of 2,4 km. The main goal is to secure the city against flooding from the sewage system during cloudburst. NIRAS is the main adviser on the project.

Valby cloudburst tunnel will run from the FLS-grounds just north of the railway area by the old Grønttorv, above the approach road Folehaven and with an outlet in Enghave Kanal in Valby Park – a complete distance of 2.400 m distributed over two tunnel stretches and four shafts.

The analysis phase and the sketch of the project is finished, here the hydraulic dimensioning is done and based on this the placement and shape of the necessary connecting constructions with the cloudburst valves, overflow functions and approach system. In spring 2023 the design phase is initialized.

With more frequent torrential rain and increased amount of everyday rain in the future, preventive measures are necessary to protect the city against flooding. The cloudburst tunnel will prepare the city for extreme cloudburst and at the same time the tunnel will also have a climate protection effect on the increased amounts of everyday rain, thus ensuring that the capacity of the sewage system is sufficient for the future.

Year
2020 - 2023

Customer
HOFOR A/S

Contract Fee
20.734.015 DKK

Project Category
Water environment

#11
Sustainable cities and communities

Screening of Protection Level for Flood Protection for Odense Municipality, Denmark

The coastal areas and some of the areas behind the coast along Odense Fjord and Odense Canal in Odense Municipality, are low-lying connected areas through which flooding can spread far into the land. Odense Municipality wishes to know to what protection level the individual areas and stretches of coast are protected today, in 50 years and in 80 years (year 2020, 2070 and 2100).

Furthermore, Odense Municipality wishes to know to which statistical protection level in year 2070 and 2100 the areas and stretches will be secured, provided that the terrain and flood protection measures are raised to a height of +2.5 m DVR90. A terrain-/crest height of +2.5 m DVR90 is in the latest climate adaptation plan determined as the goal for protection against sea water.

NIRAS has analysed the above using extensive GIS-analyses, making and evaluating of concurrent statistics of Odense Fjord, calculations of the hydraulic impact and the necessary crest height for all stretches for events with different return periods and different lifetimes (protection levels).

Furthermore, overall suggestions have been set up on how the areas can be protected to height +2.5 m DVR90 using different concept.

Year
2020 - 2020

Customer
Odense Kommune - By- og Kulturforvaltningen -Afd. Park og Vej

Contract Fee
74.950 DKK

Project Category
Harbours and Marine Structures

#13
Climate action

Integrated Coastal Zone Management Plan for the North Coast of Egypt

The Enhancing Climate Change Adaptation in the North Coast and Nile Delta Regions in Egypt Project (ECCADP) aims at supporting the adaptation efforts of Egypt in the North coast and in particular the Nile Delta which is identified by the Intergovern-mental Panel on Climate Change (IPCC) in its Fourth Assessment Report as one of the world's three "extremely" vulnerable deltas in the world.

The objective of the ECCADP is to reduce coastal flooding risks in Egypt's North Coast due to the combination of projected sea level rise and more frequent and intense extreme storm events.

Output 1 focuses on constructing 69 km of sand dune dikes at five vulnerable hotspots within the Nile Delta that were identified during an engineering scoping assessment and technical feasibility study.

Output 2 focuses on the development of a climate resilient Integrated Coastal Zone Management (ICZM) plan for the entire North Coast of Egypt, to manage long-term risks including climate change.

These outputs include, but not limited to, the following: Compilation, analysis and integration of existing information of the North Coastal zone in Egypt to Identify phys-ical, ecological and socio-economic aspects, key issues and management priorities. Awareness raising material to coastal stakeholders, including, governmental authori-ties, public agencies, private sec-tor, NGOs, society, etc. Assessment of the legal and institutional frameworks that govern the coastal zone in the North Coast in Egypt.

Year
2021 - 2024

Customer
UNDP Egypt

Contract Fee
2,841,146 USD

Partnership
DHI, Wageningen, EcoConServ

Project Category
Harbours and Marine Structures

#13
Climate action

Strategic Climate- and Urban Development Plan - Big Blue Skive, Denmark

NIRAS is together with LYTT Architecture making a DAPP-based strategic climate- and urban development plan for Skive Municipality. The project uses the visions of "Big Blue Skive", made by BIG Architects, as a foundation. Prior to the strategic work, an analysis is made of the area and the conditions that matter for the future development of the urban area, amongst other the existing water management and climate adaptation as well as the future risk of flooding from present day and 200 years into the future.

NIRAS has made a catalogue of ideas with possible solutions on climate adaptation on a short, medium and long time scale. It is ensured, that these solutions accounts for the actual conditions of the area, including requirements of the water quality in Karup Å and risk of washing out contamination. Furthermore, a catalogue of ideas for urban development is made, which includes themes such as transformation of areas, natural water retentions, connections between the city and the fjord. A process of citizen involvement is carried out, that includes both informing of possibilities on urban development and challenges. Moreover, the political system is continuously involved in the process together with relevant players such as Big Blue Forum.

A number of scenarios are set up for future climate proof urban development. A DAPP-based dynamic initiative map is made, identifying pathways of climate adaptation that matches the urban development scenarios. Subsequently, a multicriteria analysis of the individual climate adaptation pathways is carried out, which includes economic, social and environmental aspects. Finally, an action plan for integrated urban development and climate adaption of the project area in the future is made.

Year
2022 - 2022

Customer
Skive Kommune

Contract Fee
1.200.000 DKK

Partnership
LYTT Architecture

Project Category
Municipal development plans

Coastal and Mangrove Rehabilitation Study, Vietnam

The Vietnamese government has appointed NIRAS, GOPA and GFS to do a coastal rehabilitation study for the coastlines at Ca Mau and Kien Giang. A stretch of 650 km. During many years the coastline has receded and valuable mangrove habitats have been lost.

The project is located in a complicated cohesive environment in the Mekong Delta near the Mekong River outlet. The sedimentation in the area is partially governed by the decrease in sediment supply from the Mekong and thus the chosen solution should not only protect the coast and the mangroves but also preserve to more sediment and be functional when located on highly under-consolidated soil. To account for this using local customs for coastal protection is also required. It is thus a very complicated coastal zone management project.

The task is to do a coastal protection study and as part of this protect and extend the existing mangrove areas. Additionally, NIRAS is also doing flood protection of local villages and residence areas in the form of dikes.

The project is founded by KFW and also consist of a mangrove replanting, livelihood analysis, stakeholder interaction, knowledge transfer and training, and detailed design and supervision of construction of the selected scheme.

Year
2022

Customer
GOPA Gesellschaft für Organisation, Planung und Ausbildung mbH

Contract Fee
120.000 EUR

Project Category
Climate Change and Disaster Risk Management

#11 Sustainable cities and communities

#13 Climate action

Urban Development and Climate Protection of Grenaa, Denmark

NIRAS, LYTT and Norrøn architects have won the architectural competition for urban development and climate protection of Grenå City and Harbour. NIRAS, LYTT and Norrøn architects have prepared a new innovative proposal for urban development and climate protection and of Grenå City and Harbour. The main task was to protect the lower part of Grenå City and the harbour, and secondarily to tie the town and the harbour together better. Extensive user surveys and citizen involvement have been carried out in order to explore the needs of the inhabitants and port users. Subsequently, a thorough urban development and climate protection plan was drawn up.

The main measures in the climate protection of Grenå are a rear protection, which ensures that water coming from the harbour does not penetrate into the city. This protection consists of a multifunctional barrier and a high water gate. In addition, local safeguards are made at the port, where the port's buildings are either raised or secured individually. This applies, for example, to Grenå Marina and the Kattegat Center. Securing the Kattegat Center entails special challenges as the seals in the center are not allowed to escape during storm surges. Selected channels are introduced to break the flow paths of runoff and rainwater, and to expand the maritime environment.

NIRA's role in the project is to be an active participant in the creative process of development while also being a technical advisor on all technical disciplines. The project includes new innovative approaches to climate protection of the city; including redesign of parts of the harbour that reduces wave overwash and backwater at the same time, new solutions for parking, as well as a new way of creating a connection between the city and harbour.

Year
2022 - 2023

Customer
Lytt Architecture as

Contract Fee
630,000 DKK

Partner
LYTT; NORRØN

Project Category
Harbours and Marine Structures

#11 Sustainable cities and communities

#13 Climate action

Strategy Plan for Climate Protection of the Coastline in Nykøbing Falster, Denmark

Historically, Nykøbing has experienced several damaging floods from Guldborgsund, and the need for climate protection along the coastline and of the urban areas along the Tingsted River is therefore increasing. The climate protection of Nykøbing is part of the project "The Cities and the Rising Sea Level", where a number of municipalities develop and implement knowledge sharing in projects related to securing Danish cities against storm surges.

NIRAS has developed a plan for flood protection of Nykøbing Falster city. The plan includes proposals for a protection line against Guldborgsund, proposals for solving flood challenges along the Tingsted River, and proposals for reducing the risk of flooding during heavy rainfall.

The plan includes a specific proposal for the placement of flood protection structures such as dikes and flood walls. The plan also includes various alternatives for several sections of the project area as well as cost estimates for the stages. In addition, a proposal for the process for the further course has been developed, including official work, political decisions, surveys, and citizen involvement.

There is a significant need for flood protection of Nykøbing Falster city today, and with the implementation of NIRAS' strategic plan for climate protection of Nykøbing, the city and its citizens will be protected against a 100-year event equivalent to 2.5 meters above daily water level, which can subsequently be expanded to 3.0 meters.

Year
2022 - 2023

Customer
Guldborgsund Kommune

Contract Fee
317.292 DKK

Project Category
Harbours and Marine Structures; Surface water

#11 Sustainable cities and communities

#13 Climate action