
Lynetteholm

A new peninsula in Port of Copenhagen

Henrik Hostrup-Pedersen, Project director COWI Marine and foundation

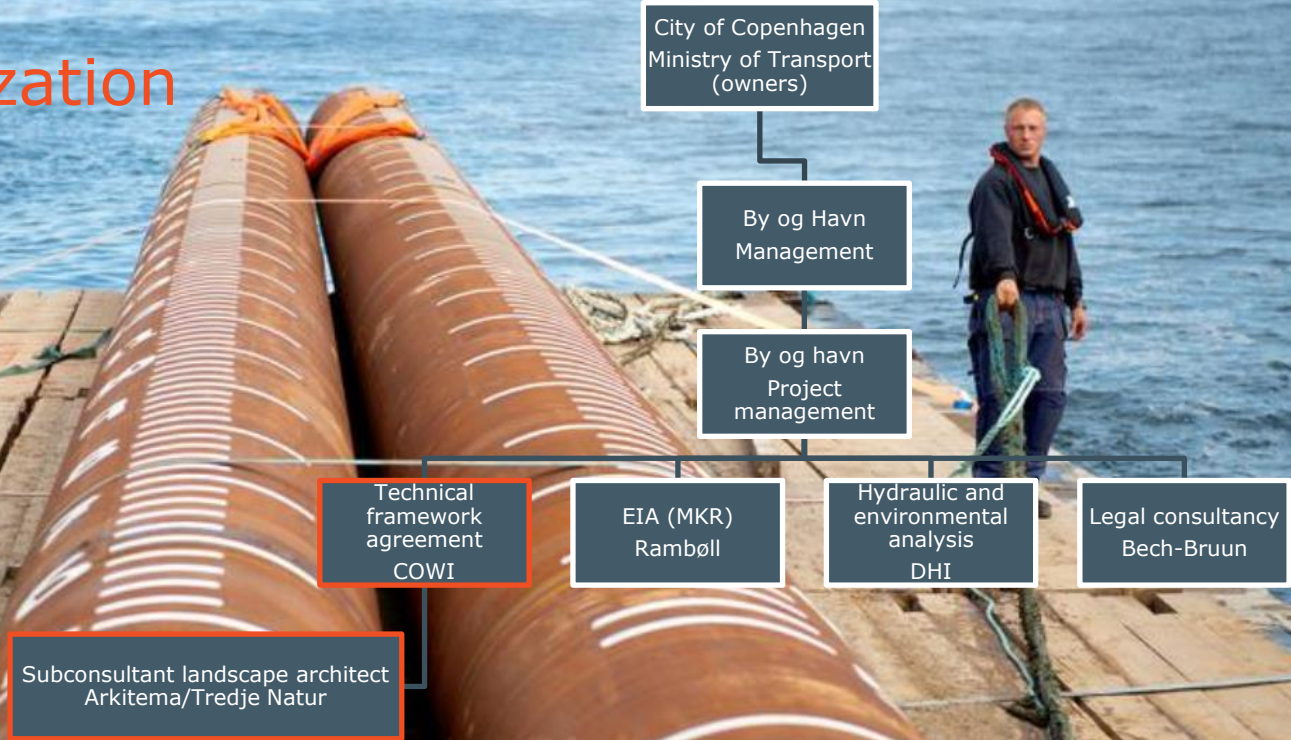
COWI | ARKITEMA | TREDJE NATUR

Overall project timeline & vision

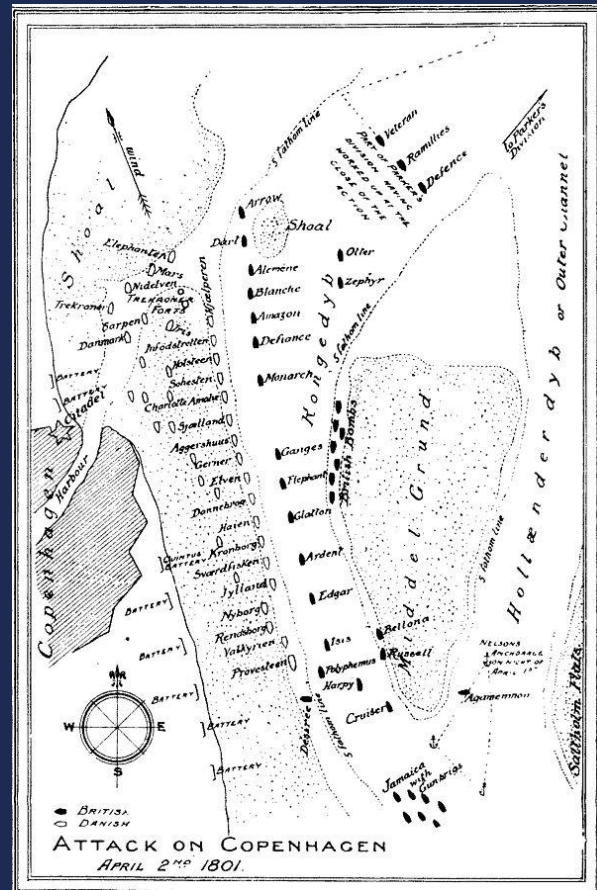
- **5. oct 2018:** Lynetteholm announced by the Prime Minister and the Mayor of Copenhagen
- **May 2019** Consultants/architects appointed
- **Xxxxx** VVM approval
- **4. june 2021** Approval of final project in the Danish parliament
- **Dec 2021** Construction start (contract E1)



Project organization



Historic area

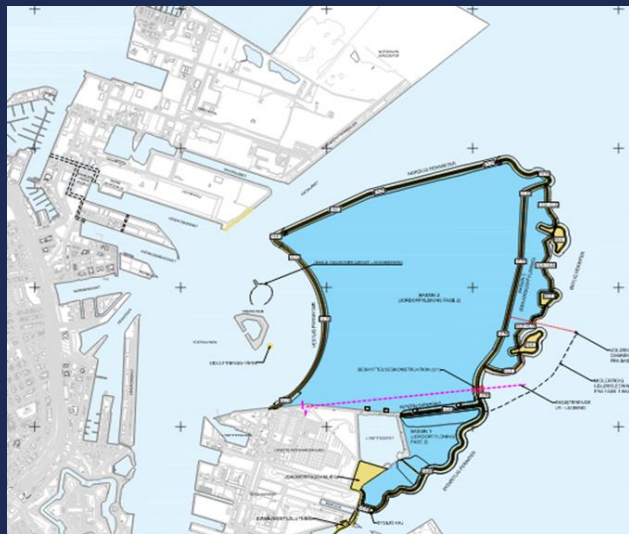


Project area before construction



Tre Kroner sea fortress

Final layout



Final layout – A view to the south



Key figures

Length of outer perimeter	7 km
Lynetteholm total area (reclaimed land)	275 ha (2.75km ²)
Lynetteholm coastal area	60 ha
Future urban development	215 ha
Soil deposit volume	approx. 40 mil. m ³
Average water depth	10m (perimeter)
Final terrain	+4.0mDVR

Design work and climate adaptation



Adaptation coastal design - concepts

Perimeter structure

Adaptive safety level, which can be adjusted over time based on updated information on sea level rise etc.

- 50 years life-time (2070)
- 100 YRP
- Consequence of exceeding design criteria relatively low

Urban development area

Robust safety level. Almost impossible to increase terrain level in fully developed urban areas.

- 180 years life-time (2200)
- 10.000 YRP flood level
- Consequence of exceeding design criteria very high

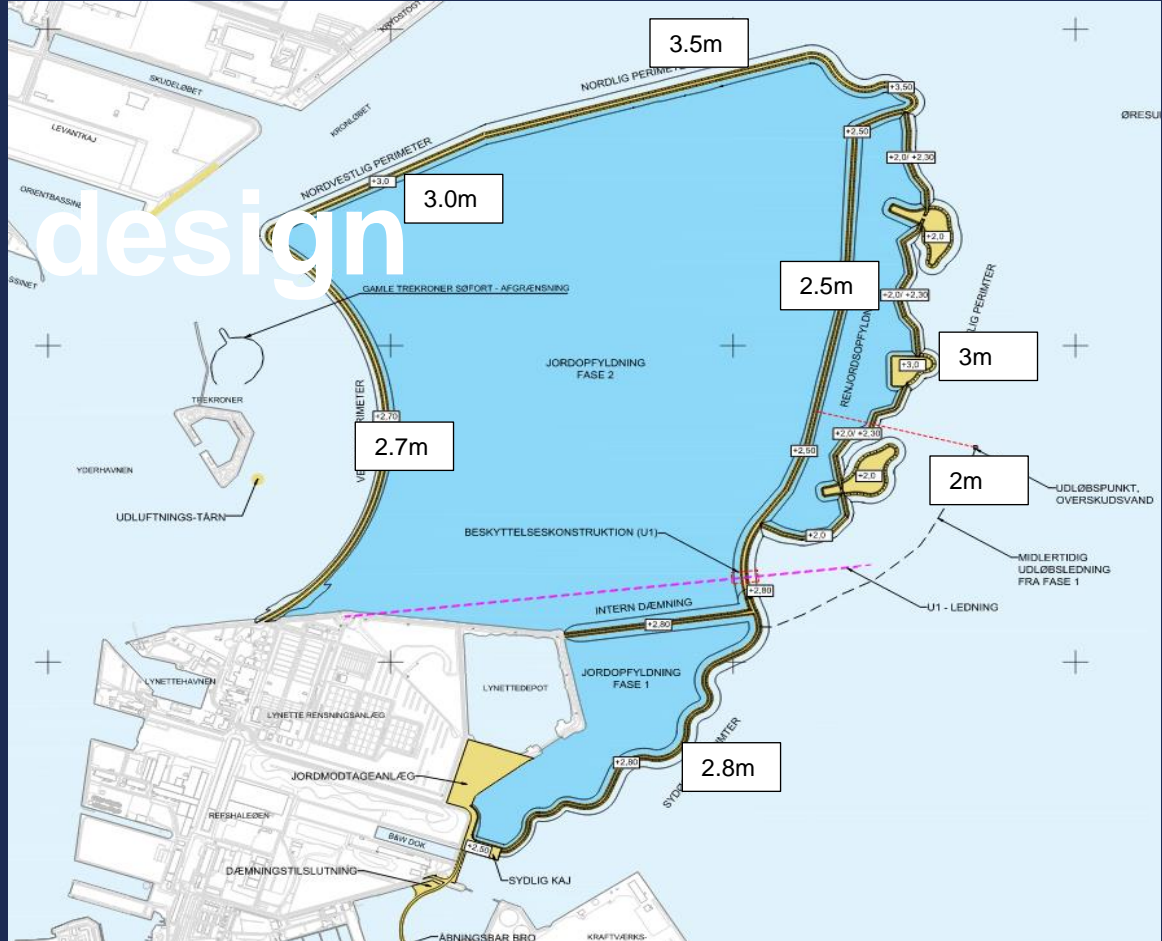
Developments phases in relation to safety concept

- Phases 1 and 2 will be filled up in ca. 2055.
- Urban development will be finished in ca. 2070.

Engineering design

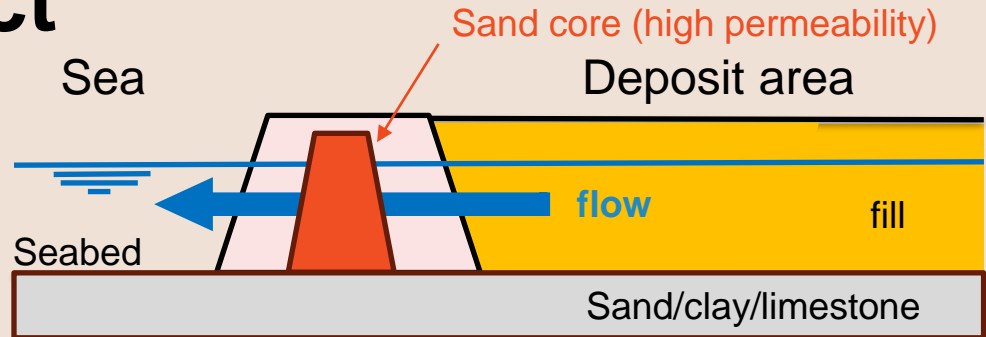
TYPE OF MAIN STRUCTURES

- Rock revetments
- Strongpoints
- Temporary revetment
- Beaches
- U1 protection structure

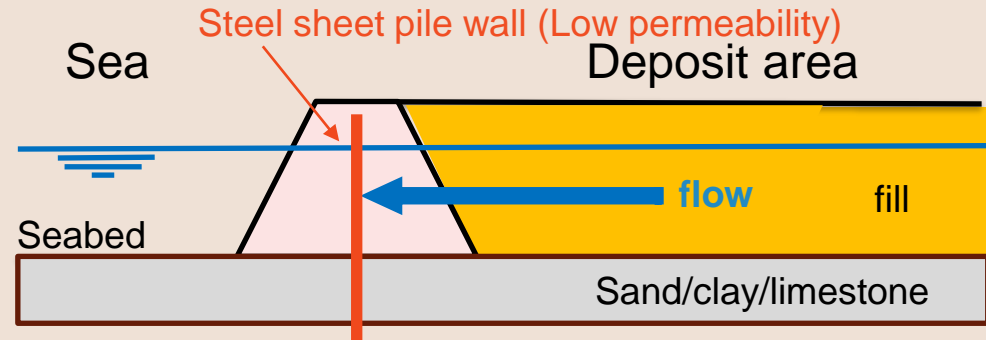


Environmental considerations driving the reclamation project

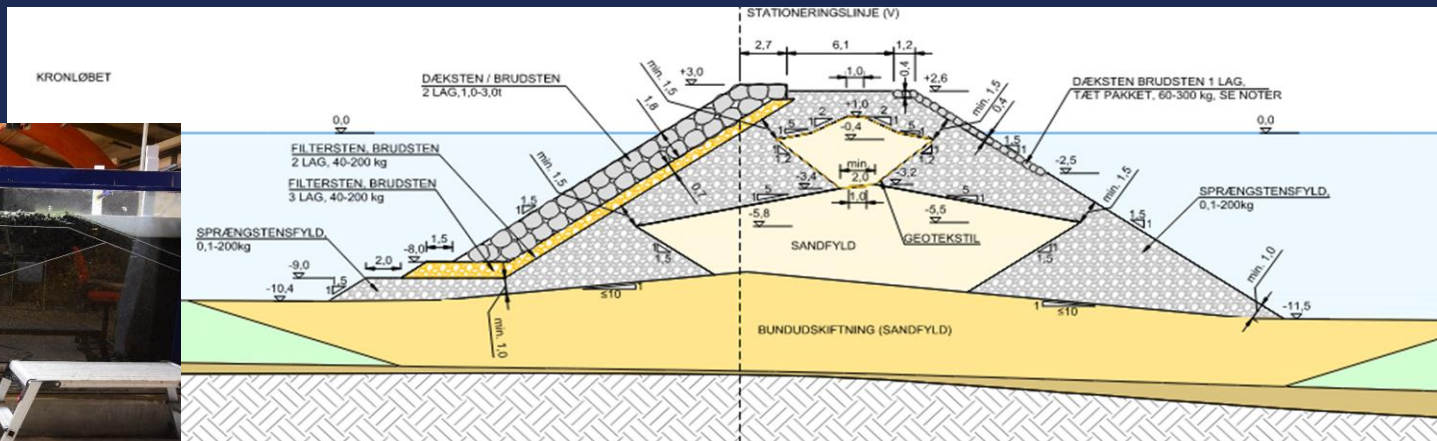
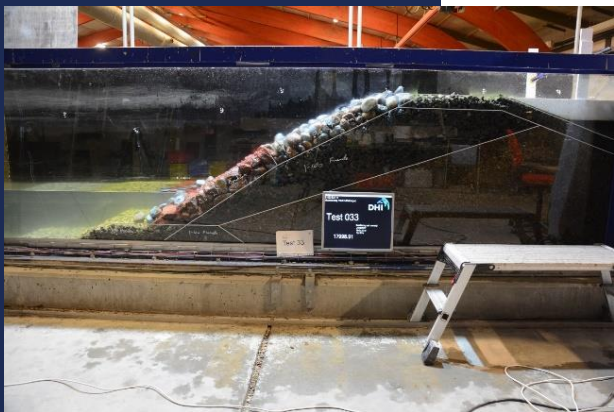
Concept: sand filter
“Nyttiggørelse” legislation
Solution :sand core



Concept: sheet pile wall
“Depot” legislation
Solution: Steel sheet pile wall



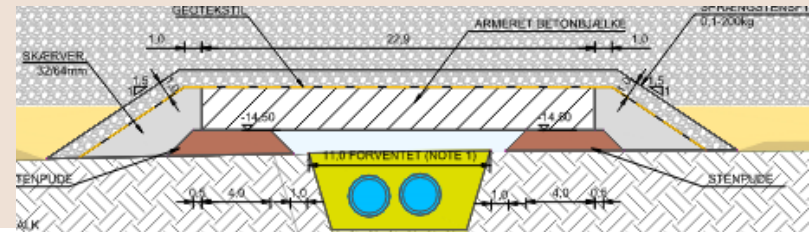
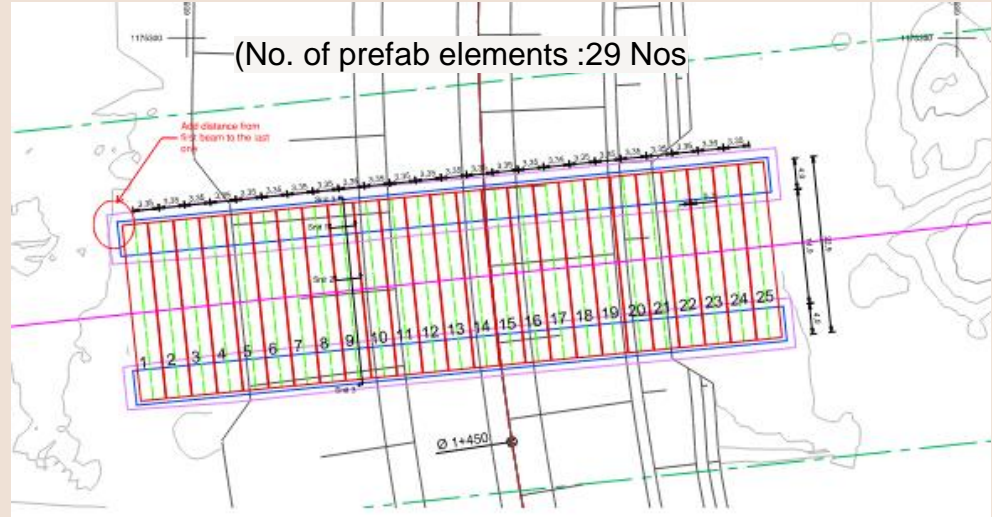
Typical revetment structure



Water depth	North: 8-13 m (Av. ~11 m)	East: 7-13 m (Av. ~9 m)	West: 4-10 m (Av. ~7 m)
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Protection structure at the U1 sewage line

- Perimeter is crossing the existing U1 sewage outfall (2xØ1800 concrete pipes) from 1977,
- Protection structure of U1 is necessary as no additional pressure/load is allowed on existing pipes.
- Precast reinforced concrete element (**260 ton**) to be placed on rock pads



(LxWxH= approx. 23mx2.79.25mx2.5m)

Investigations

- Geotechnical investigations
- Geophysical preinvestigations (UXO clearings)
- Marine-archelological preinvestigations
- Test driving sheet-piles and steel tubes
- Environmental (pre)investigations

Test driving



Geotechnical investigations

Large water depth and soft soil

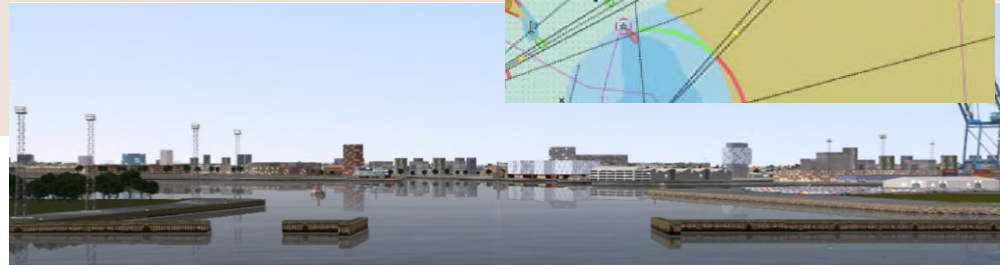
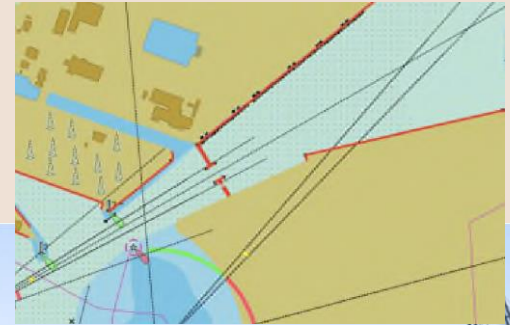
191 boreholes
301 CPTs



0 250 500 750 1,000 m

Navigation simulations

- 2 sets of simulations performed in FORCE full mission bridge simulator
- Simultaneous simulations with large vessel and pleasure crafts



Sustainability

Sustainability requirements (E2, E3, E4)

Main sustainability requirements:

- Baseline CO₂ footprint:
 - CO₂ footprint baseline (tender) to be a sub evaluation criteria.
 - CO₂ footprint baseline to include Life cycle phase A1-A5 (Production, transport and construction).
 - CO₂ footprint to be verified by an independent account/audit company (3x)
 - Penalty if CO₂ baseline is exceeded
- HVO diesel will not a be requirement
- Environmental management system (ISO 14001)
- Sustainability coordinator (during construction)
- Sustainable construction site (green accounting)
- CO₂ management plan during construction
- Sustainability is an evaluation criteria

Sub criteria	Weight
Sustainability	15 %
Key personnel and project organisation	15 %
Construction phase, cooperation, management and coordination	20 %
Price	50 %

Construction

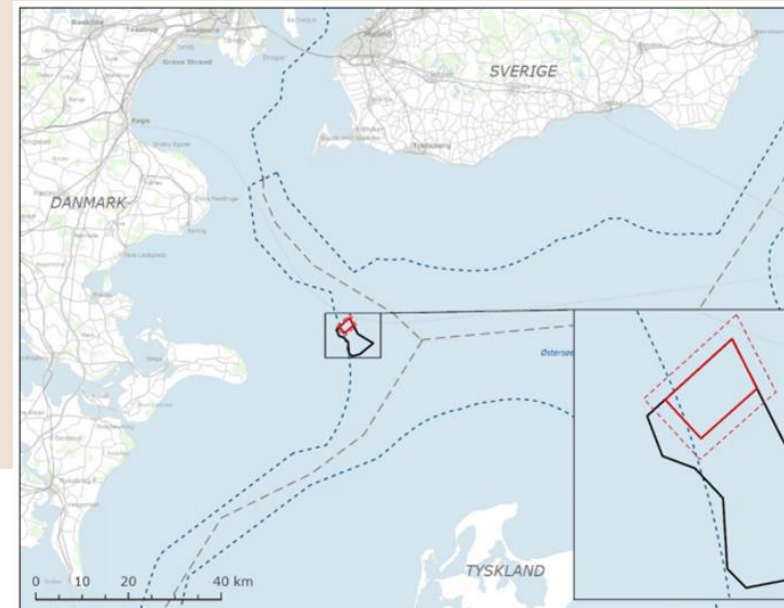
Estimated main quantities

	Unit	E1	E2	E3	E4	E5	Total
Perimeter length	m		1585 m	Permanent: 2140 m Temporary: 1745 m	1540 m		7000m
Water depth	m		8-13 m (Av. ~11 m)	7-13 m (Av. ~9 m)	4-10 m (Av. ~7 m)		
Dredging/deposit contaminated	m ³		160.000 m ³	170.000 m ³	70.000 m ³		400.000 m ³
Dredging/filling clean	m ³		500.000 m ³	650.000 m ³	125.000 m ³		1.275.000 m ³
Sand fill	m ³		930.000 m ³	1.500.000 m ³	310.000 m ³		2.740.000 m ³
Rock fill/filter/armour	m ³		480.000 m ³	900.000 m ³	190.000 m ³		1.570.000 m ³
Other works included in contracts		120m new quay wall		- U1 protection - Pumping station - Strongpoints*	- Utility line - Levantkaj - Trekroner breakwater		

Main construction works

- **Dredging works – sediment disposal**
 - Dredged contaminated sediment shall be shipped to soil deposit “Lynette depot”
 - Dredged clean sediment shall be placed in Lynetteholm Phase 1 area
- **Dredging works – Sand**
 - Sand to be reclaimed from Kriegers Flak
 - Sand to be used for soil improvement and sand core in all revetments
- **Rock works**
 - Rocks shall be delivered by the contractor or optional as a client’s supply

Location of Kriegers Flak reclamation area approx. 76 km (41 nm) from site



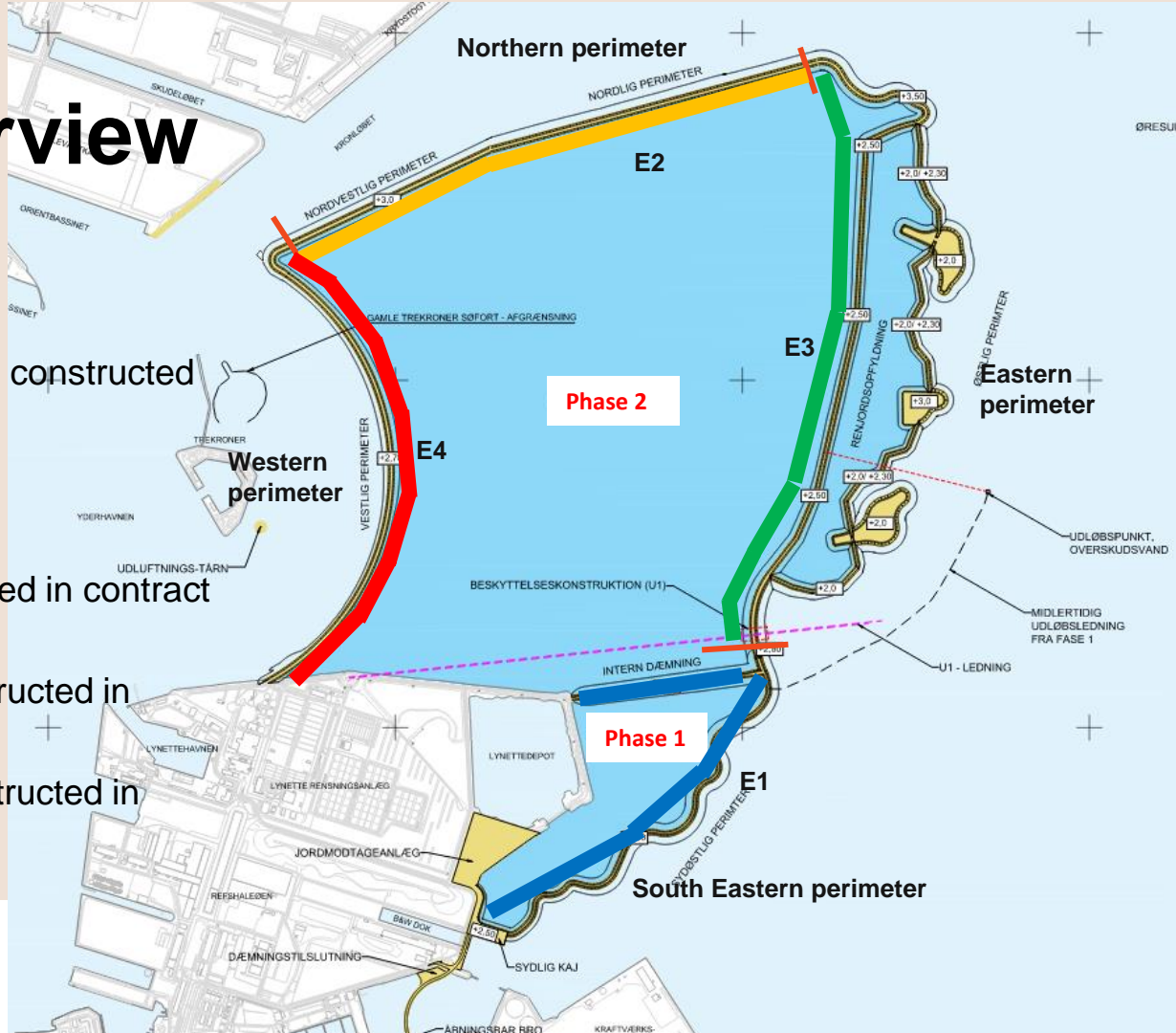
Contracts overview for perimeter

Phase 1 (Constructed)

- **E1:** South-eastern perimeter to be constructed in contract E1 2021-2023

Phase 2: (Under construction)

- **E2:** Northern quay to be constructed in contract E2 2024-26
- **E3:** Eastern perimeter to be constructed in contract E3 2023-2026
- **E4:** Western perimeter to be constructed in contract E4 2023-2026



Lynetteholm facts – budget and contracts

- > Landfill site with a capacity of approx. 40 million m³ (clean and moderately contaminated soil)
- > Total budget: MDKK 3,400 (MEUR 585)
- > Construction period: 2021-2026
- > The project has been split into seven contracts:
 - > Contracts E1-E4: **Marine and dredging works**: rock revetment, quay walls and dredging
 - > Contract E5 : **Preparation works**: Access road/bascule bridge/dam/landfill facility area)
 - > Contract E6 : **Building works** : Administration building for the landfill facility area
 - > Contract E7: **Coastal landscaping**



Construction schedule

Phase 1:
constructed and
delivered on time
April 2023

Phase 2: (delayed 1 year)
Construction ongoing.
Expected Construction:
Q4-2023 – Q2-2026

Construction of Lynetteholm (Q3-2024)



Phase deposit area from south



Phase 1 deposit area from North



Pieline laying in western perimeter

Construction of Lynetteholm (Q3-2024)



U1 protection beams



Rock works



Sand works

Thank you and Questions

