Danish Nearshore Windfams

Introduction to results from seabed investigations

UXO Conditions

Danish Energy Agency
2014-11-27

What is UXO?

- UXO is UnExploded Ordnances
- Pollution from military activities:
  - Sea mines, Torpedo’s, Bombs, Shells, Chemical dumpings, wrecks from airplanes and sunk navy vessels

Relevance for offshore wind farms

- UXO pollution affects marine construction projects
    - Safety
    - Insurrance conditions for subsea contractors
    - Project planning
    - Business case

- Mapping of UXO
    - UXO items located directly on or burried in the seabed.
    - We don’t have a UXO detector
    - Detailed high resolution geophysical surveys used for mitigation

UXO Desk studies

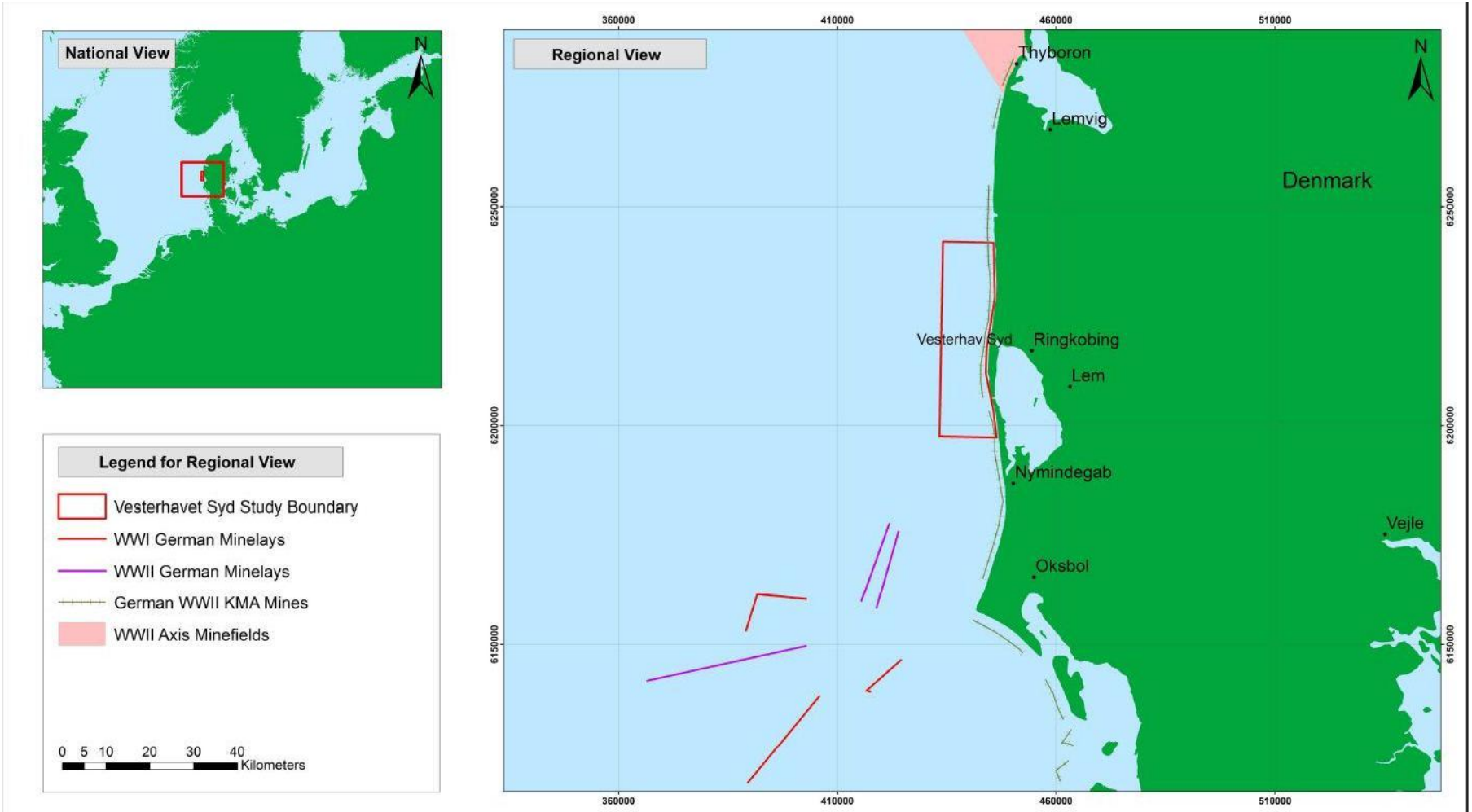
1.	Vesterhav Syd	• OrdTek (UK)
2.	Vesterhav Nord	• OrdTek (UK)
3.	Sæby	• NIRAS (DK)
4.	Sejerø Bugt	• OrdTek (UK)
5.	Smålandsfarvandet	• OrdTek (UK)
6.	Rønne Banke	• NIRAS (DK)

01 VESTERHAV SYD

Desk study summary:

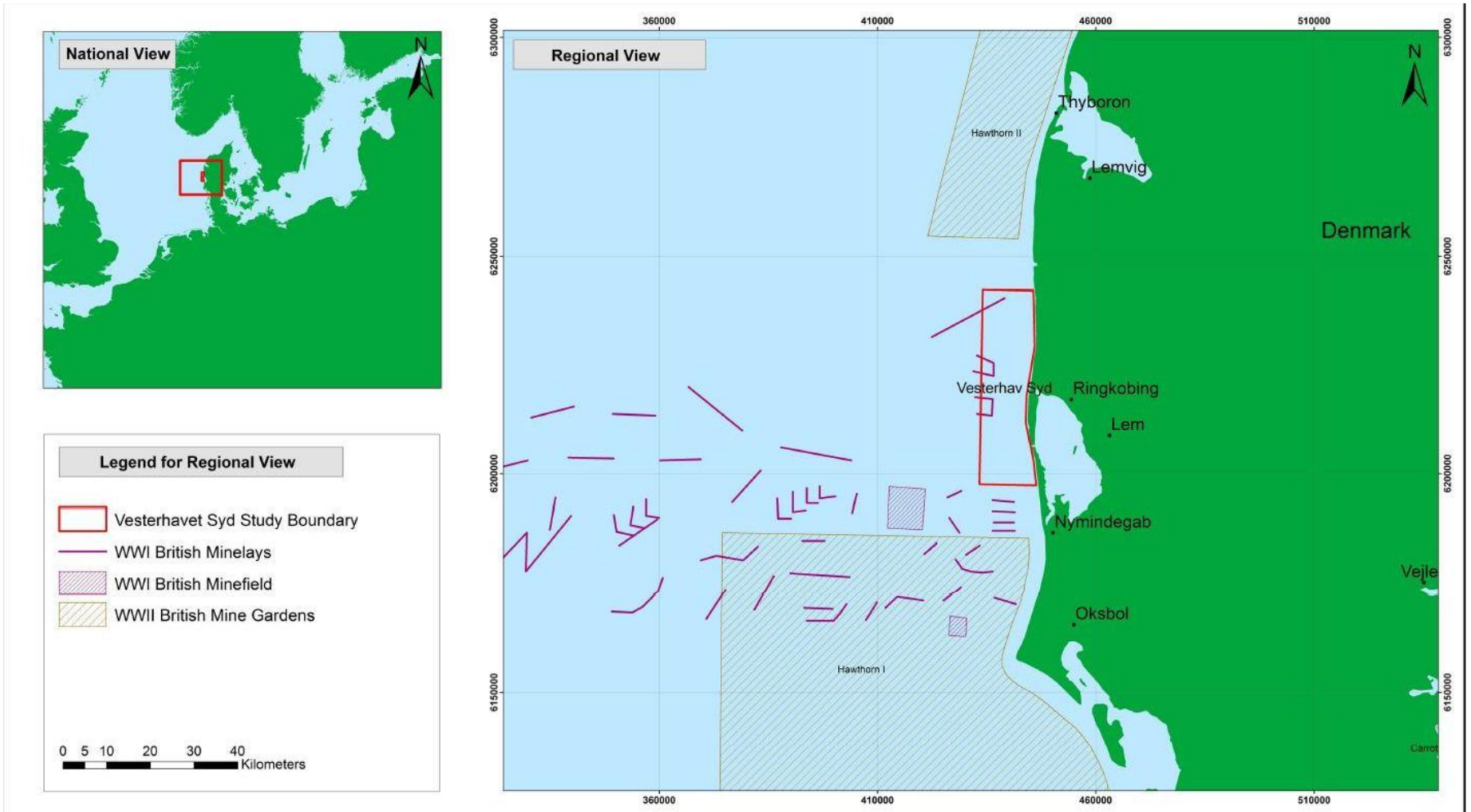
- German and British Buoyant mines from distant locations.
- UK WWII MK1-9 bottom mines, Hawthorn II located 15 km north of site
- Activities related to Kryle-Rigelnatter fort
- Multiple – but more diffuse – sources of potential pollution exist.
- KMA coastal anti-invasion. Restriction zone, 1 nautical mile from shore

01 VESTERHAV SYD – German mine fields

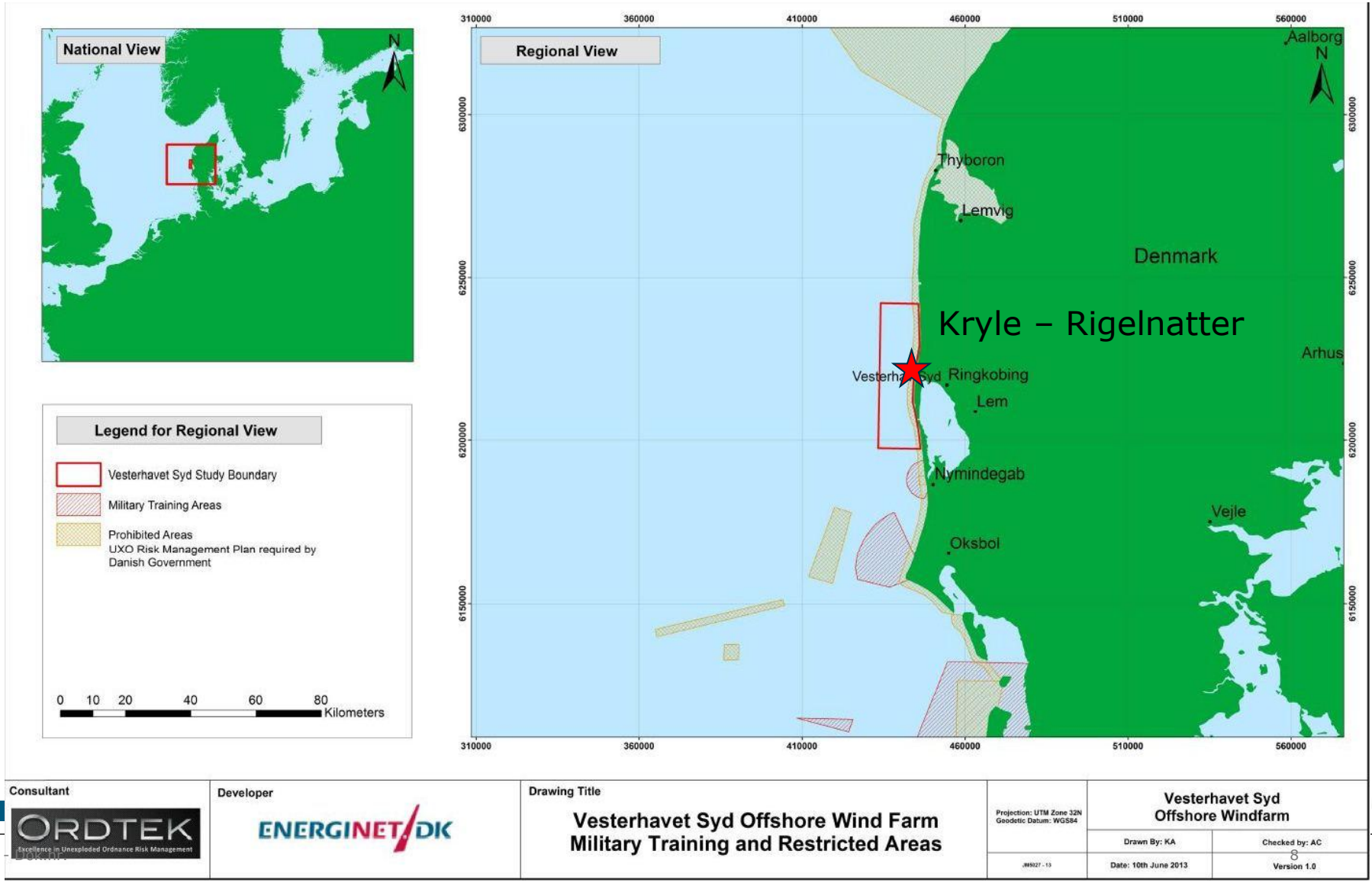


Consultant	Developer	Drawing Title		
ORDTEK Excellence in Unexploded Ordnance Risk Management	ENERGINET.DK	Vesterhavet Syd Offshore Wind Farm WWI and WWII German Mines	Projection: UTM Zone 32N Geodetic Datum: WGS84	Vesterhavet Syd Offshore Windfarm
			Drawn By: KA	Checked by: AC
			Date: 10th June 2013	Version 1.0

01 VESTERHAV SYD – British mine fields



01 VESTERHAV SYD – Firing Practice Areas

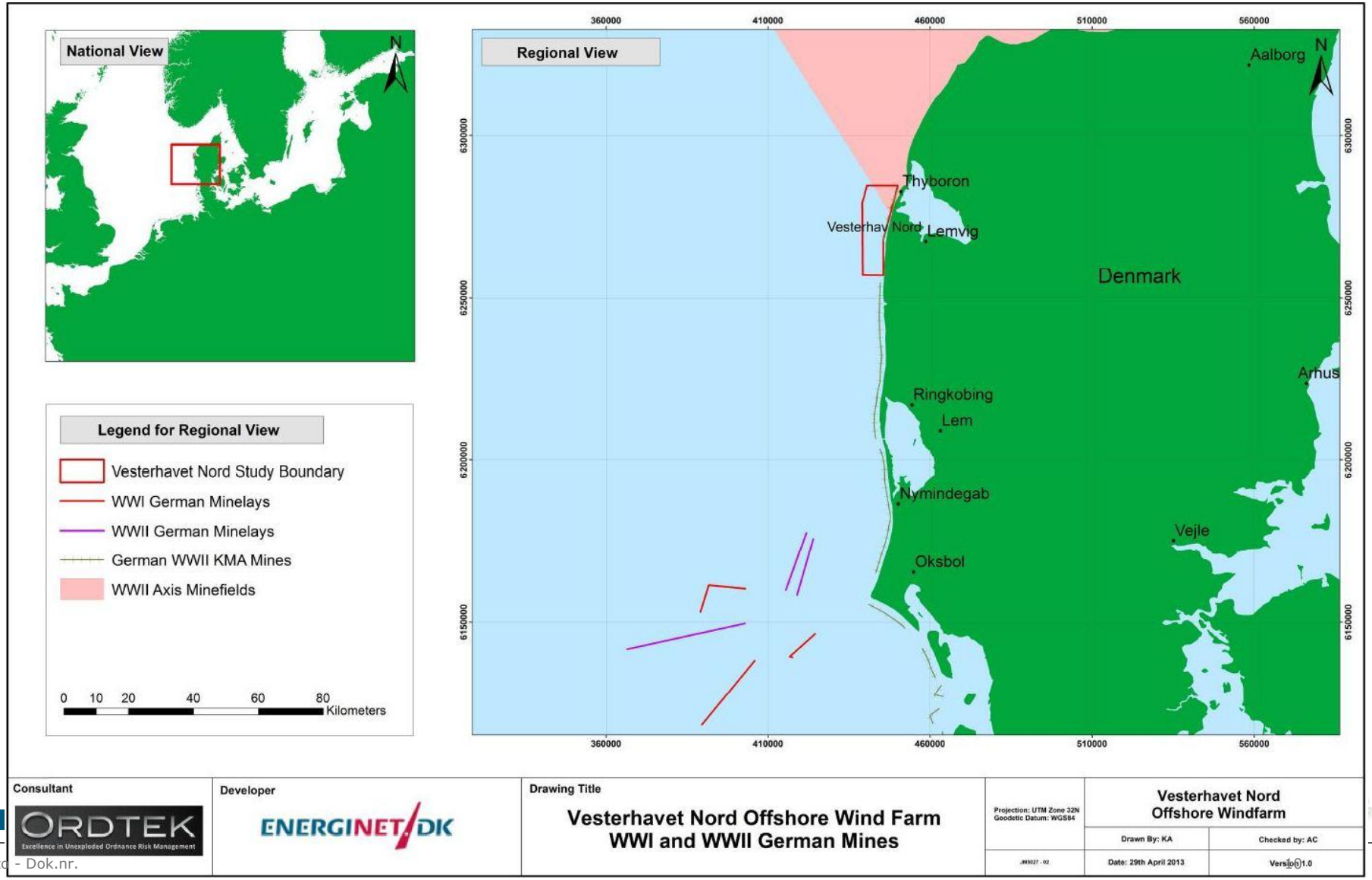


02 Vesterhav Nord

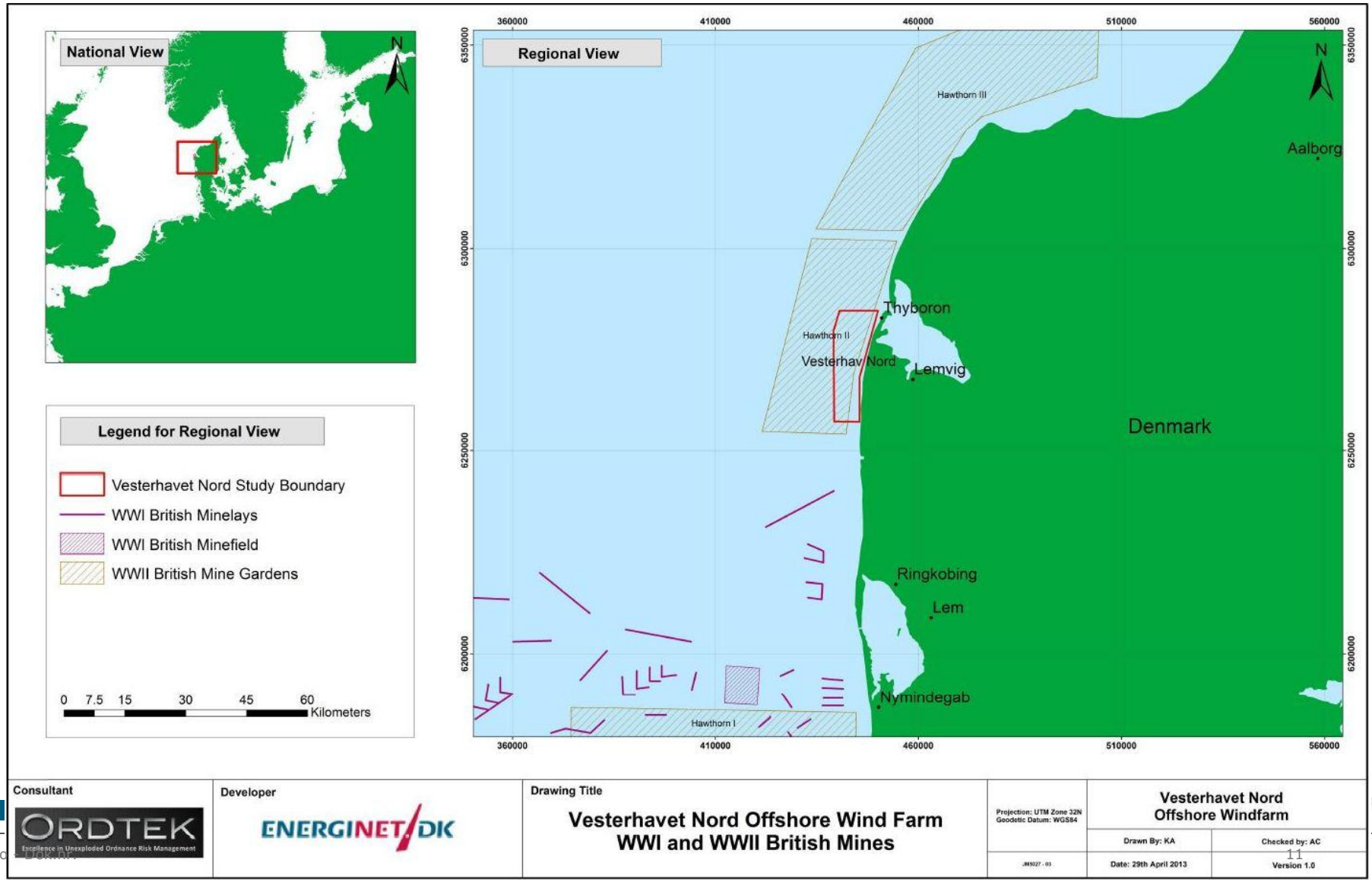
Desk study summary:

- UK WWII MK1-9 bottom mines, Hawthorn II: 25 deployed, 25 cleared
- German and British Buoyant mines from distant locations
- Multiple – but more diffuse – sources of potential pollution exist.
- KMA coastal anti-invasion. Restriction zone, 1 nautical mile from shore

02 Vesterhav Nord – German mine fields



02 Vesterhav Nord- British mine fields



03 Sæby

Desk study summary:

- UK WWII MK1-9 bottom mines Yewtree: 38 deployed – 44 recovered (Danish EOD).
- German WWII LMB bottom mine field in Aalbæk Bugt: 117 deployed – 91 recovered.
- Bangsbo fort, 18 km range, 15 cm guns

03 Sæby – German mine fields

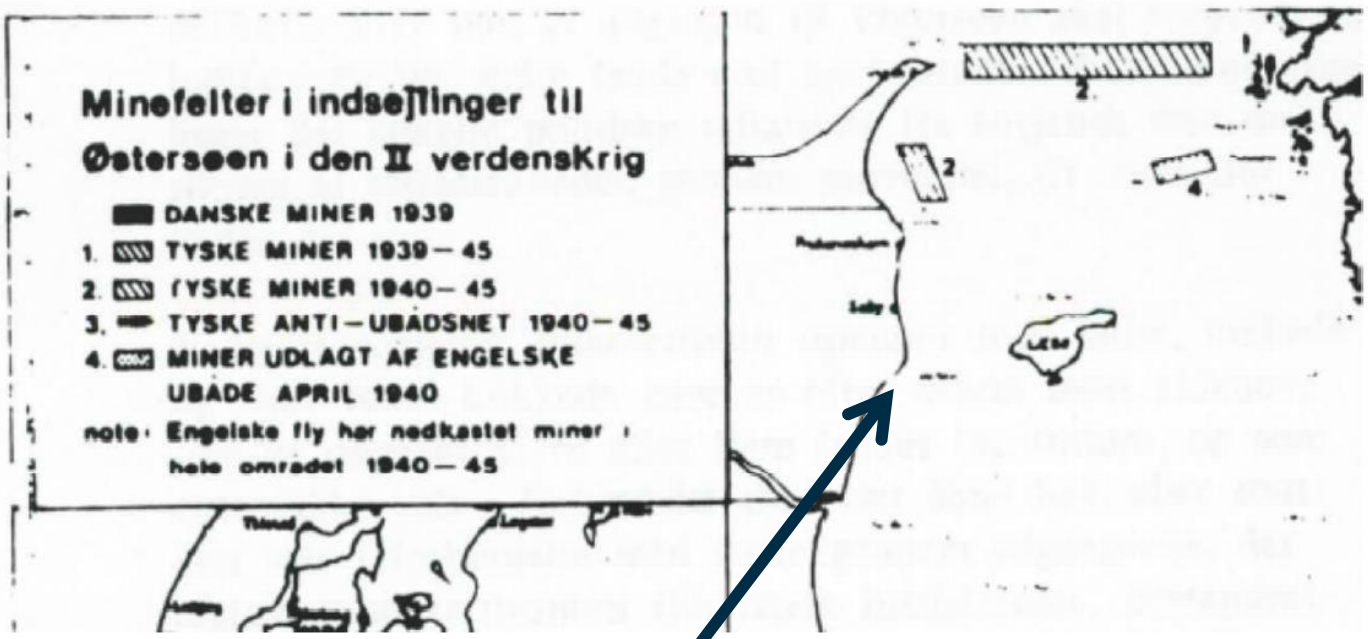
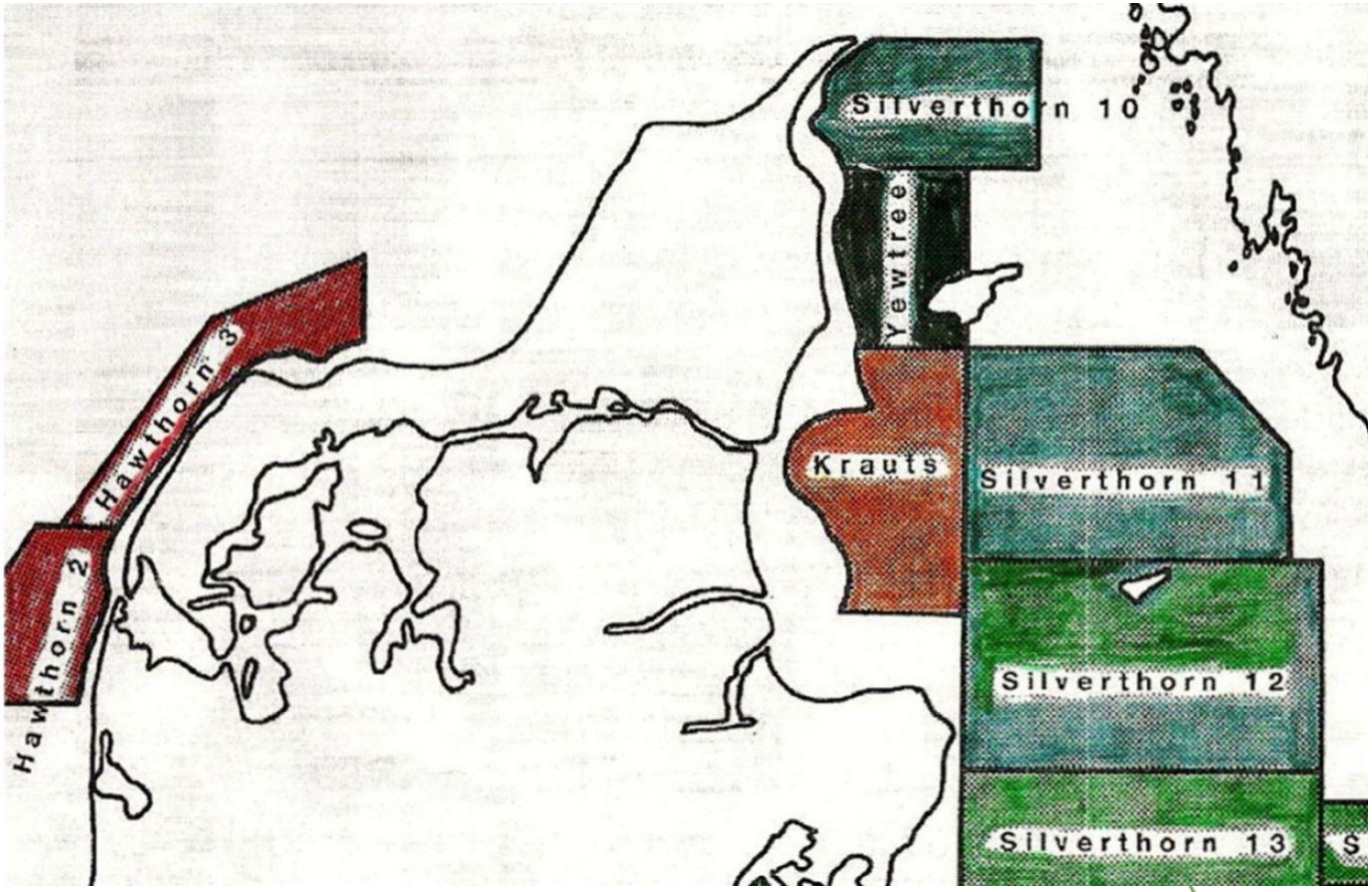


Figure 2. Positions of German minefields laid 1940 – 45. The mine field marked no. 2, Ålbæk Bay is approximately [illegible] – 8 km north of the Sæby NWF development area. Ministry of Foreign Affairs June 1973.

+ STENSNÆS Restriction zone

03 Sæby – British mine fields

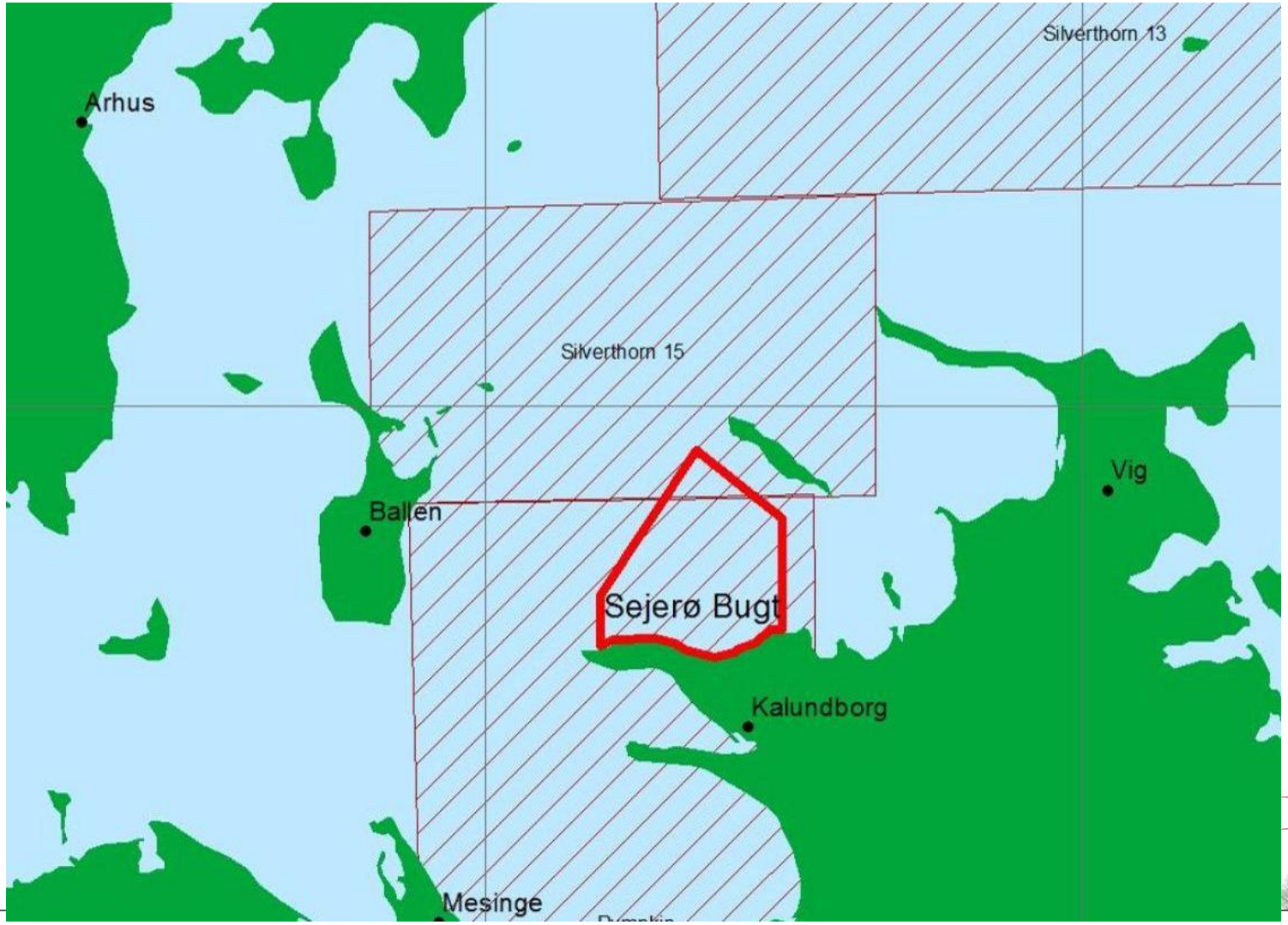


04 Sejerø Bugt

Desk study summary:

- UK WWII MK1-9 potential high density: 32 items identified 2013 by Danish EOD – 12 of them along existing power cable (Pumpkin and Silverthorn 15 coinciding with AOI).
- Multiple – but more diffuse – sources of potential pollution exist.
- Multiple other sources – but more diffuse – of potential pollution exist.

04 Sejerø Bugt – British mine fields

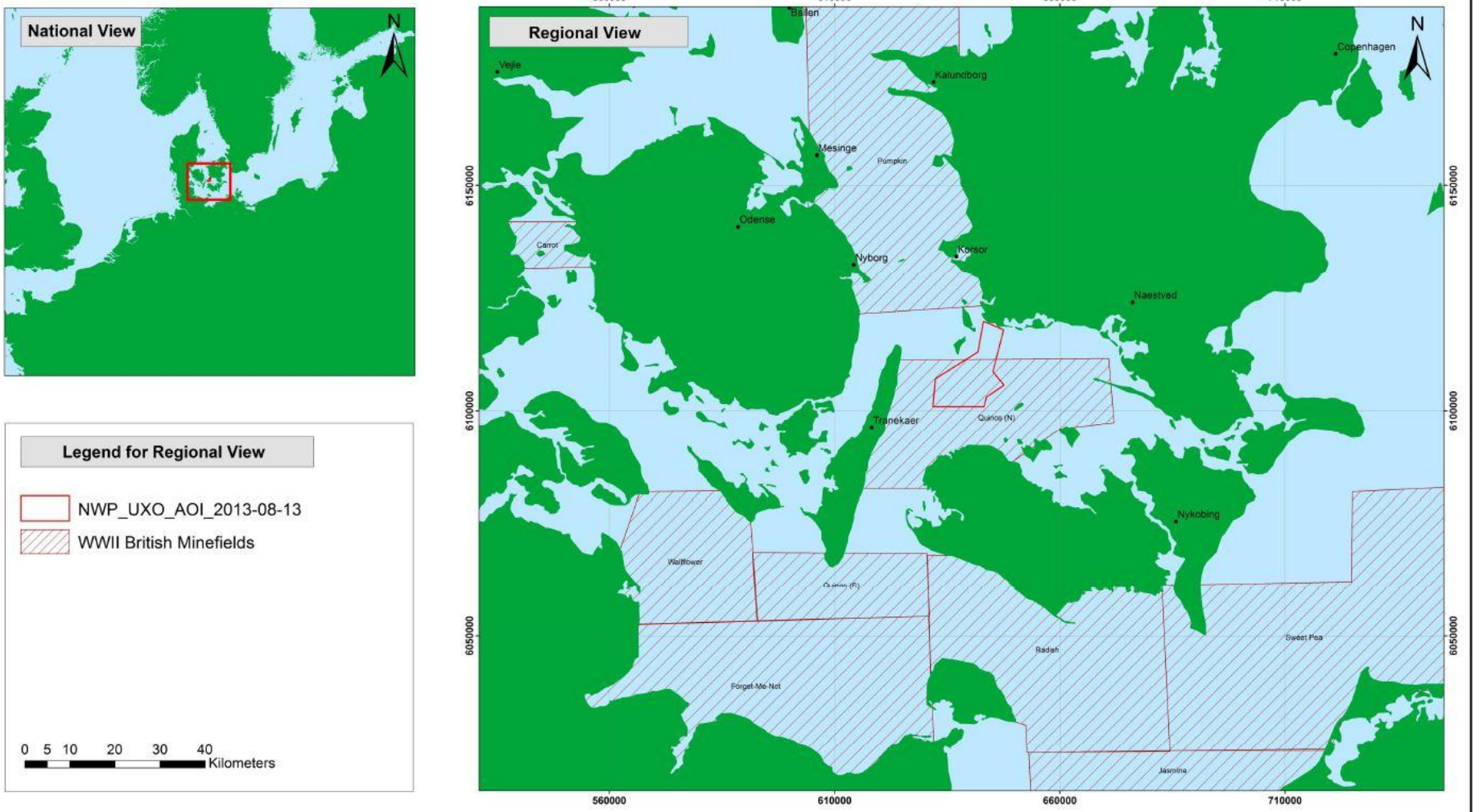


05 Smålandsfarvandet

Desk study summary:

- UK WWI MK1I-9, 6 items unaccounted (Quince (N) coinciding with AOI).
- German WWII buoyant mines in southern Langeland Belt: UMA and EMD mines.
- Some recordings of plane crashes
- Multiple other sources – but more diffuse – of potential pollution exist.

05 Smålandsfarvandet – British mine fields



Consultant

ORDTEK

Developer

ENERGINET.DK

Drawing Title

Smalandsfarvandet Offshore Wind Farm
British Mines

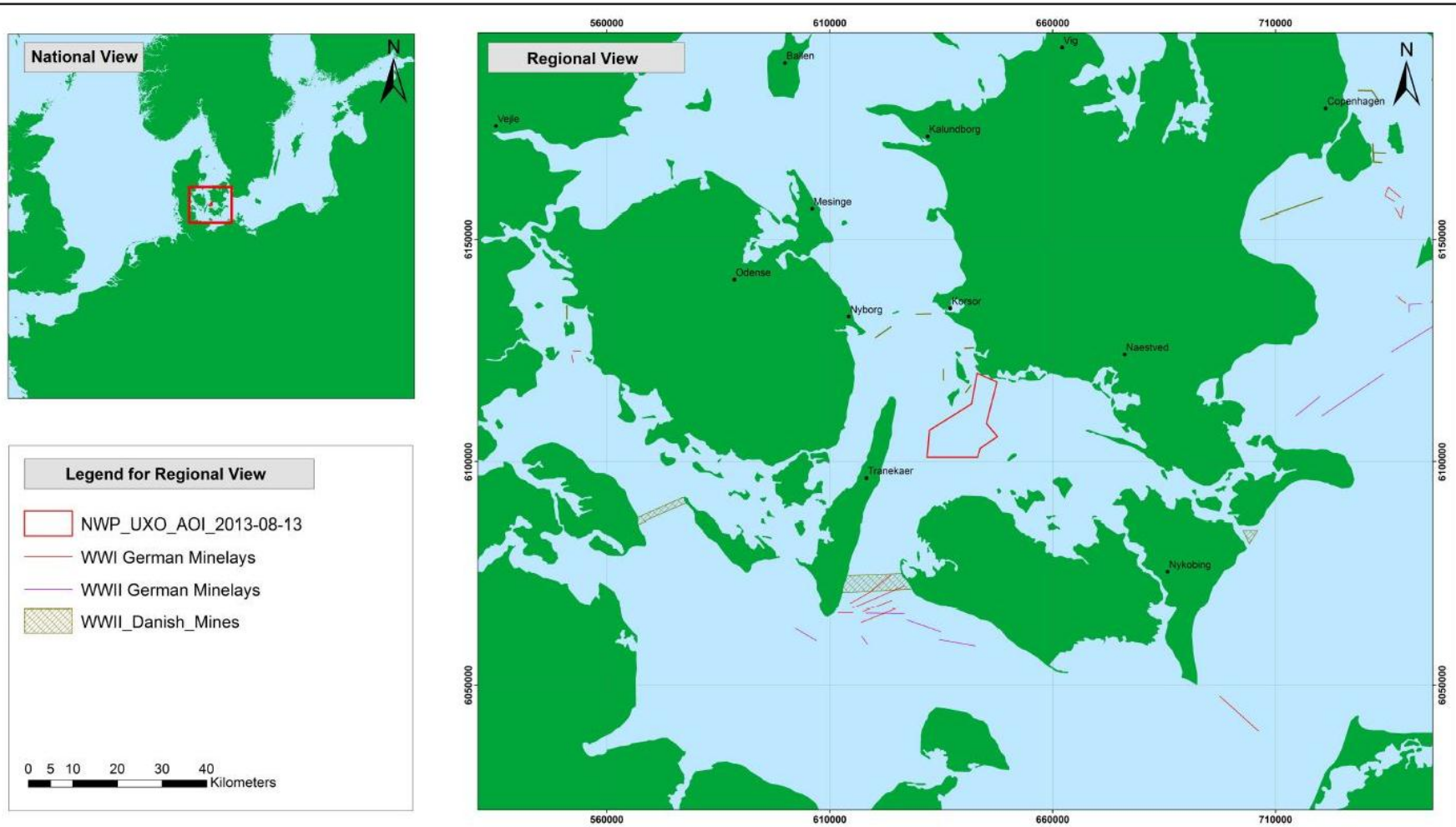
Projection: UTM Zone 32N
Geodetic Datum: WGS84

Smalandsfarvandet
Offshore Windfarm

Drawn By: KA

Checked by: AC

05 Smålandsfarvandet – German and Danish Mine mine fields

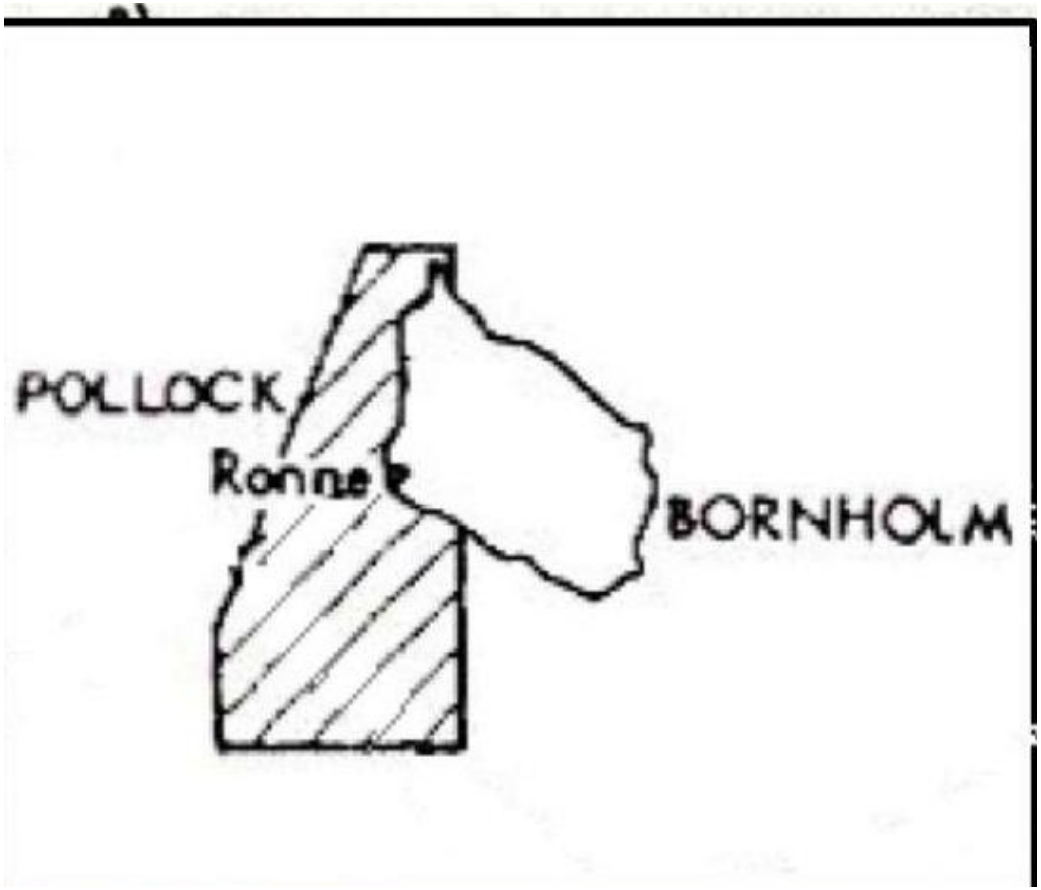


06 Rønne Banke

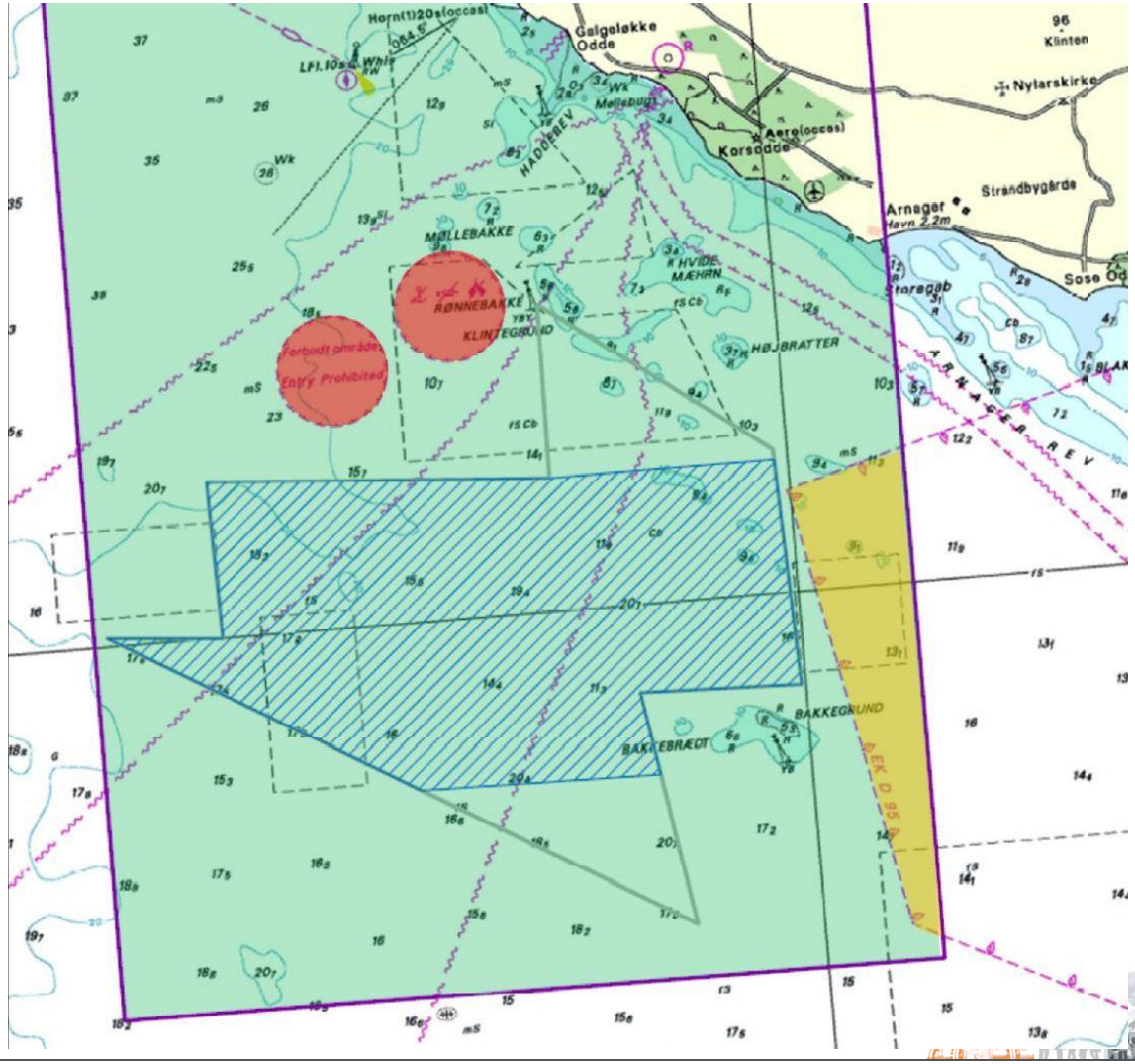
Desk study summary:

- Two Chemical dumping sites, verified and unverified north of OWF area
- UK WWII MK1-9 bottom mines (Pollock) coinciding with OWF area: 104 deployed, 17 mines disposed.
- Raghammer shooting practice area: Heavy tube-launched and artillery.

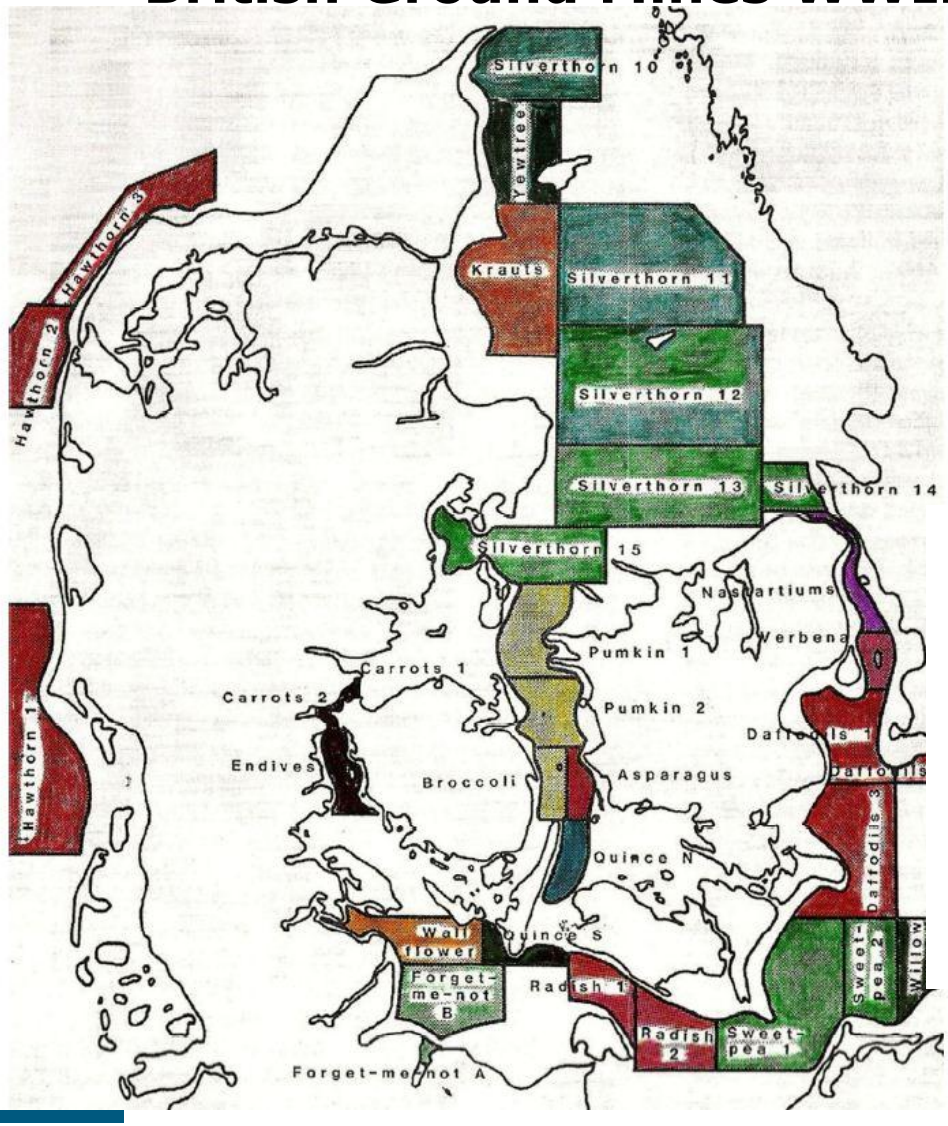
06 Rønne Banke – British mine fields



06 Rønne Banke – Kemiske og skydeterræn



British Ground Mines WWII



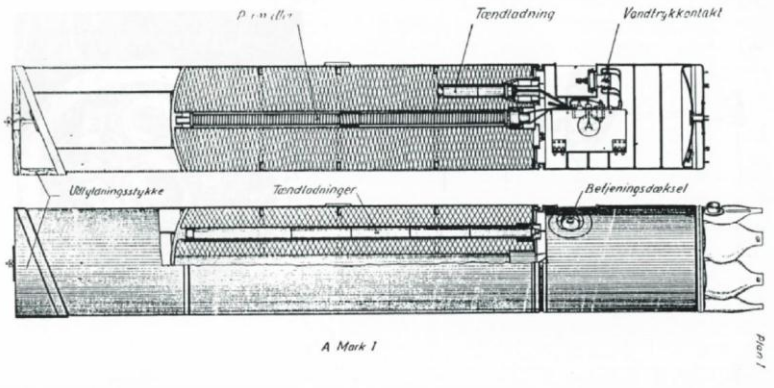


Figure 5. Sketch of the English bottom mine A. Mk. I – 4 (SOKPUB 645-559)

Conclusion

- Allmost all sites are affected by British ground mines from WWII
    - Can be detected with a magnetometer or observed directly on the seabed surface
- Chemical weapons only a threat for Rønne Banke
    - Consider to follow mitigation like local fishermen
- German LMB ground mines only a threat in very limited extent

- Risk management:
    - Formal requirements from Danish Maritime Authority
    - Strategy and Mitigation prepared by the developer – may need support from UXO consultant