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
2. Vesterhav Nord
3. Sæby
4. Sejerø Bugt
5. Smålandsfarvandet
6. Rønne Banke

- OrdTek (UK)
- OrdTek (UK)
- NIRAS (DK)
- OrdTek (UK)
- OrdTek (UK)
- 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

Legend for Regional View
- Vesterhavet Syd Study Boundary
- WWI German Minelays
- WWII German Minelays
- German WWII KMA Mines
- WWII Axis Minefields

Kilometers

Consultant

Developer

Drawing Title

Vesterhavet Syd Offshore Wind Farm
WWI and WWII German Mines
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 1 – 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
05 Smålandsfarvandet – German and Danish Mine fields

Legend for Regional View

- NWP_UXO_AOI_2013-08-13
- WWII German Minelays
- WWII German Minelays
- WWII Danish Mines

Kilometers

0 5 10 20 30 40
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 skydettæraf
British Ground Mines WWII

Figure 5. Sketch of the English bottom mine A. Mk. 1 – 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