



Hollandse Kust (zuid) Wind Farm Zone Archaeological investigations

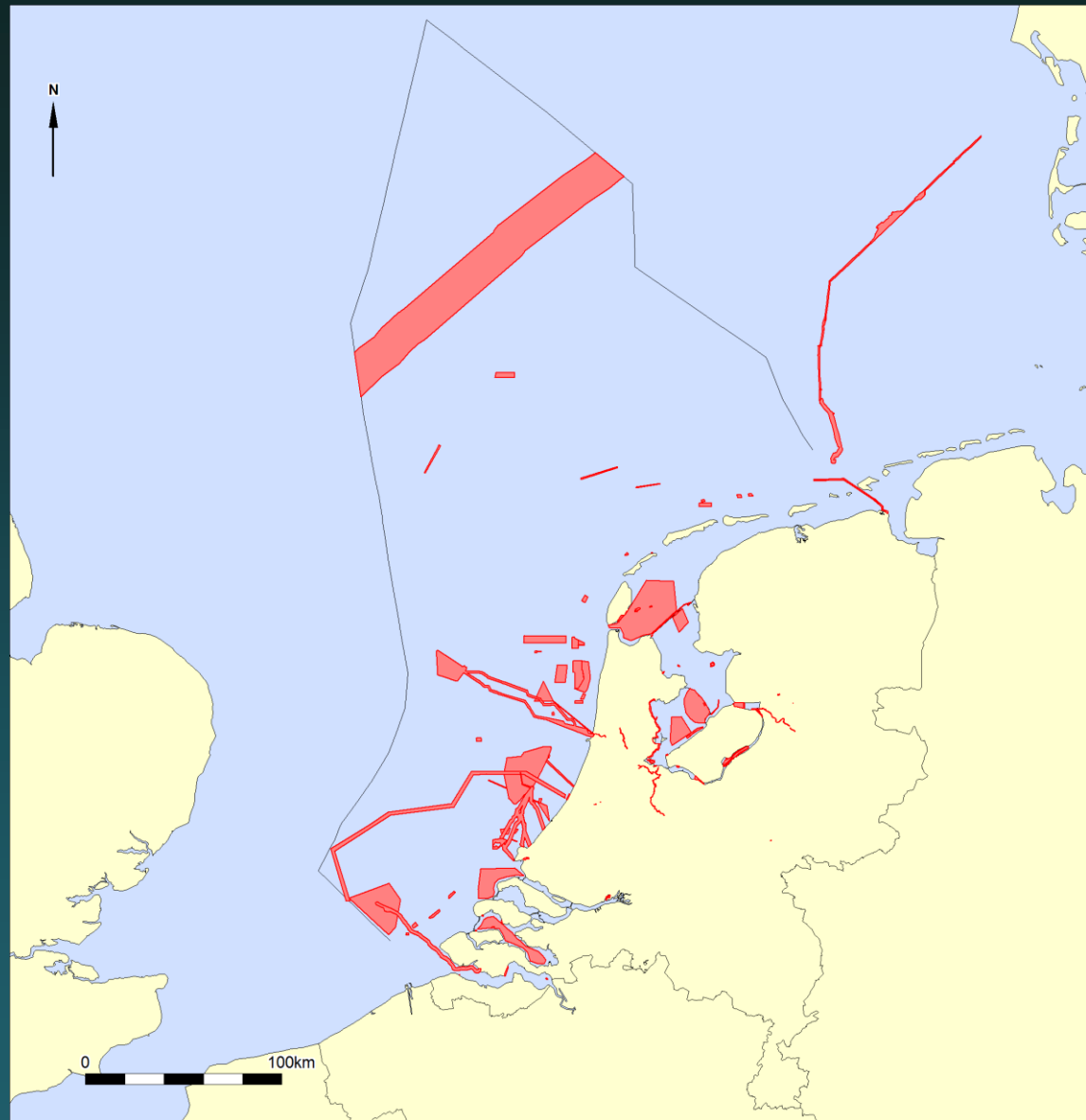
Company profile



Office in Amsterdam

Founded in 2005

> 200 projects



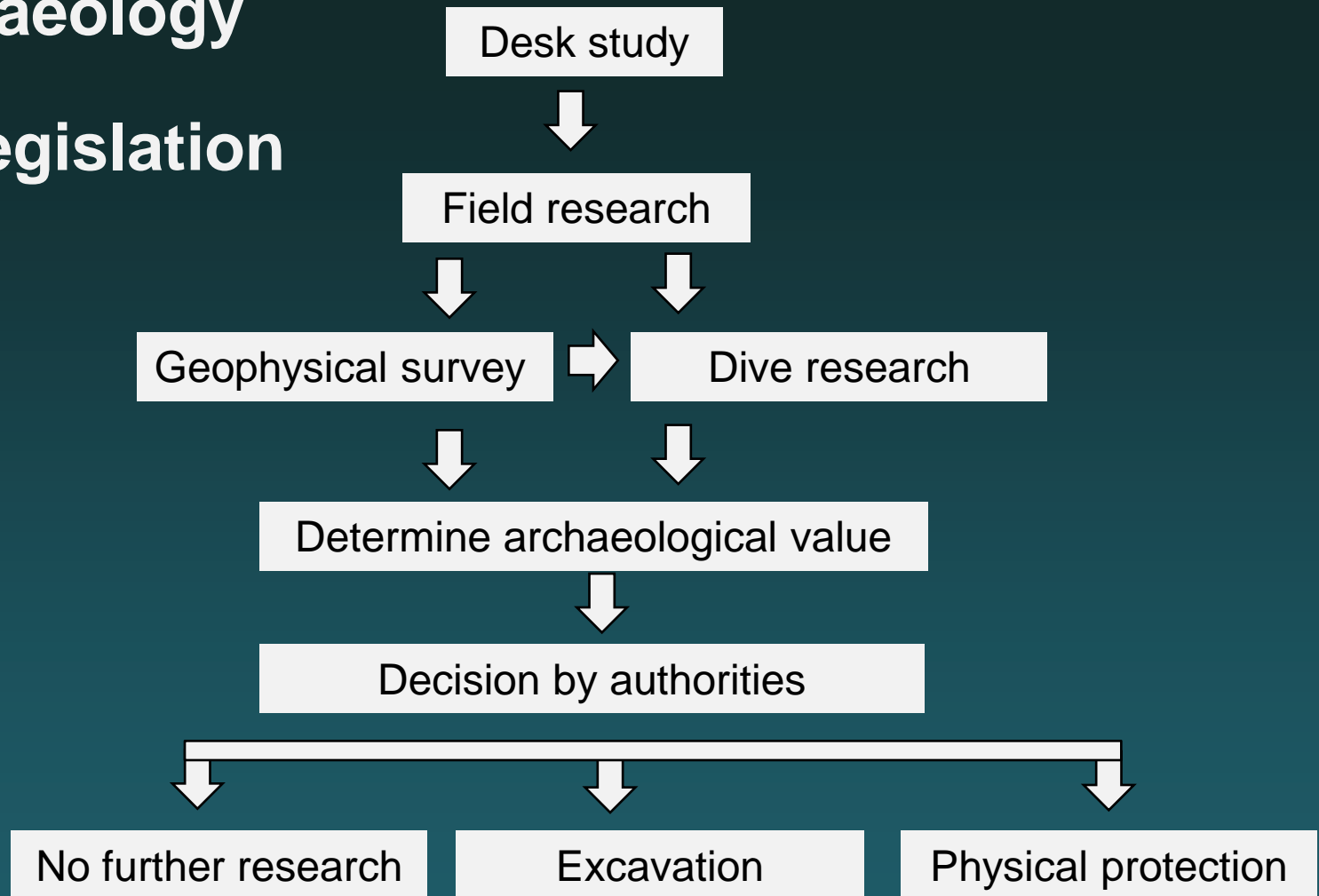
Introduction

- Archaeology and legislation
- Desk study
- Assessment geophysical survey
- Summary and conclusions

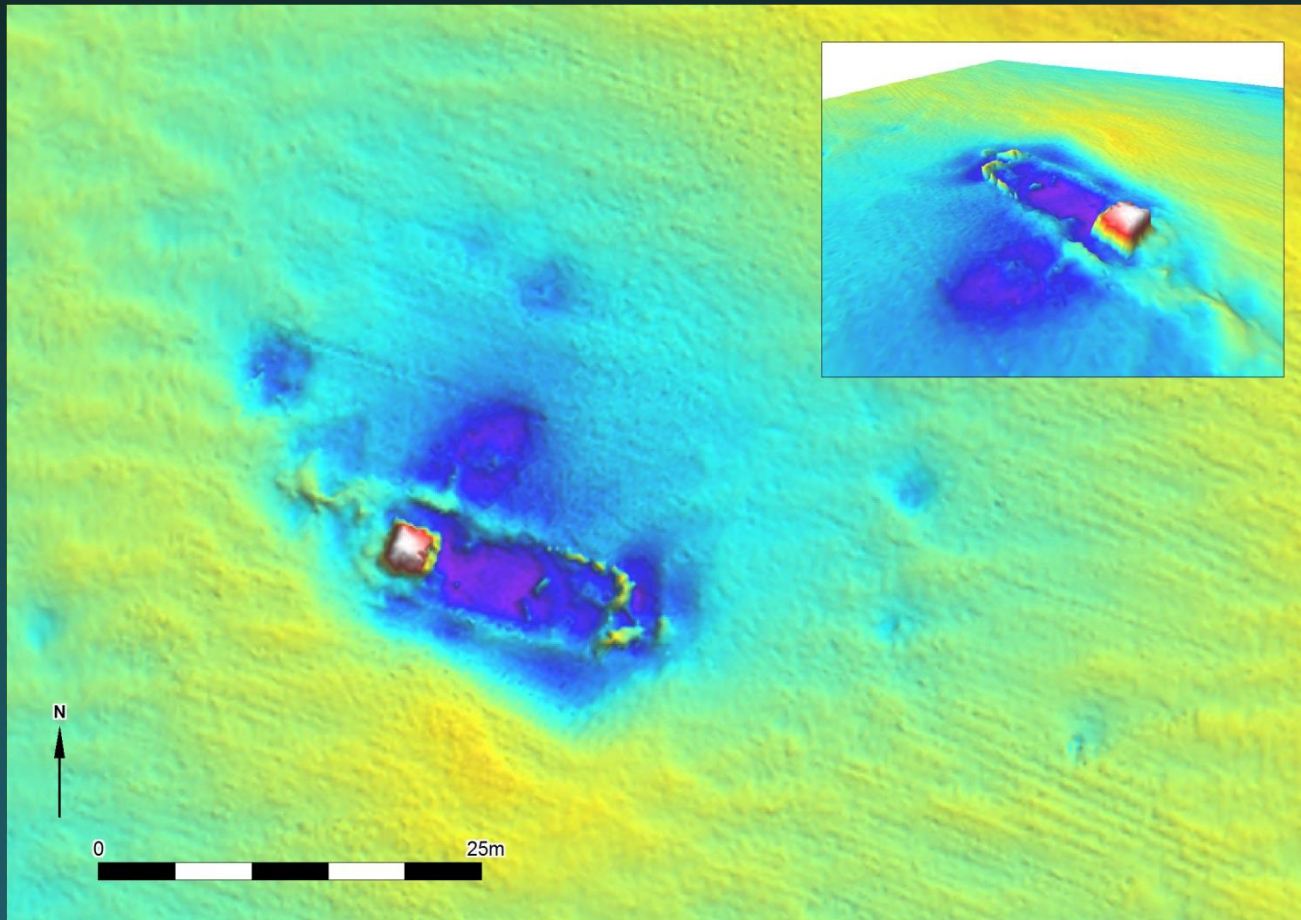
Archaeology and legislation

- Protection of archaeological heritage embedded in Dutch legislation: Heritage act (Erfgoedwet) 2016
- If (possible) remains are threatened by planned activities: avoid locations or obligation to conduct additional research

Archaeology and legislation

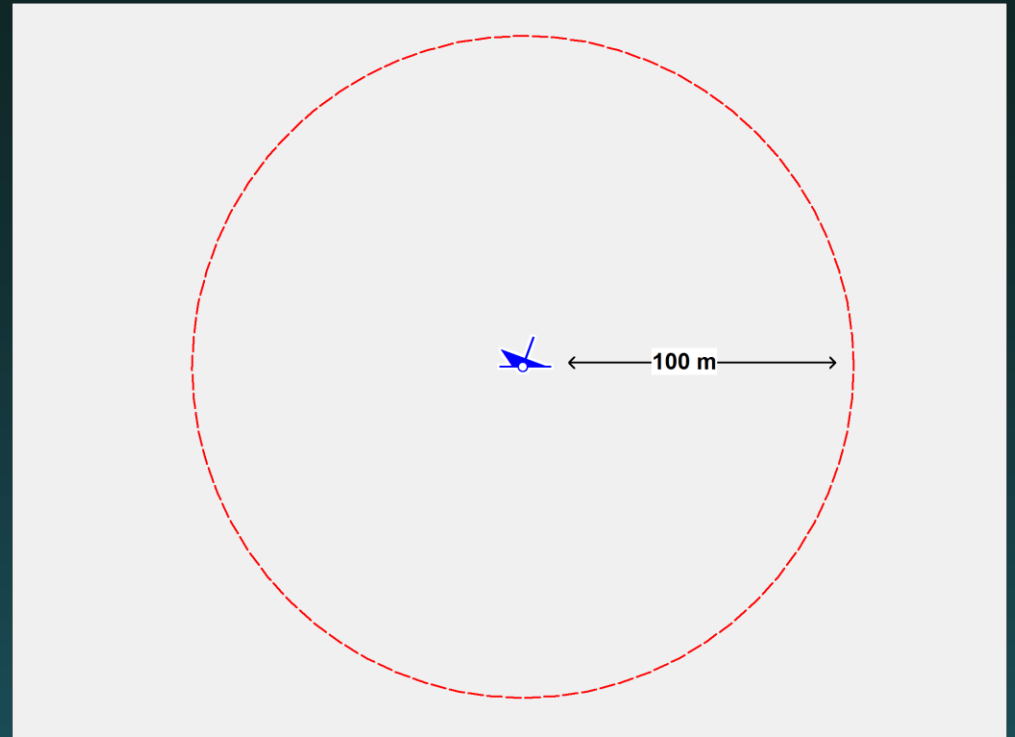


General example



Unidentified ship wreck → Assumption: archaeological value

General example



Recommendation:

Avoid location (including a bufferzone of 100m)

or

Prove that location has no archaeological value

(additional research)

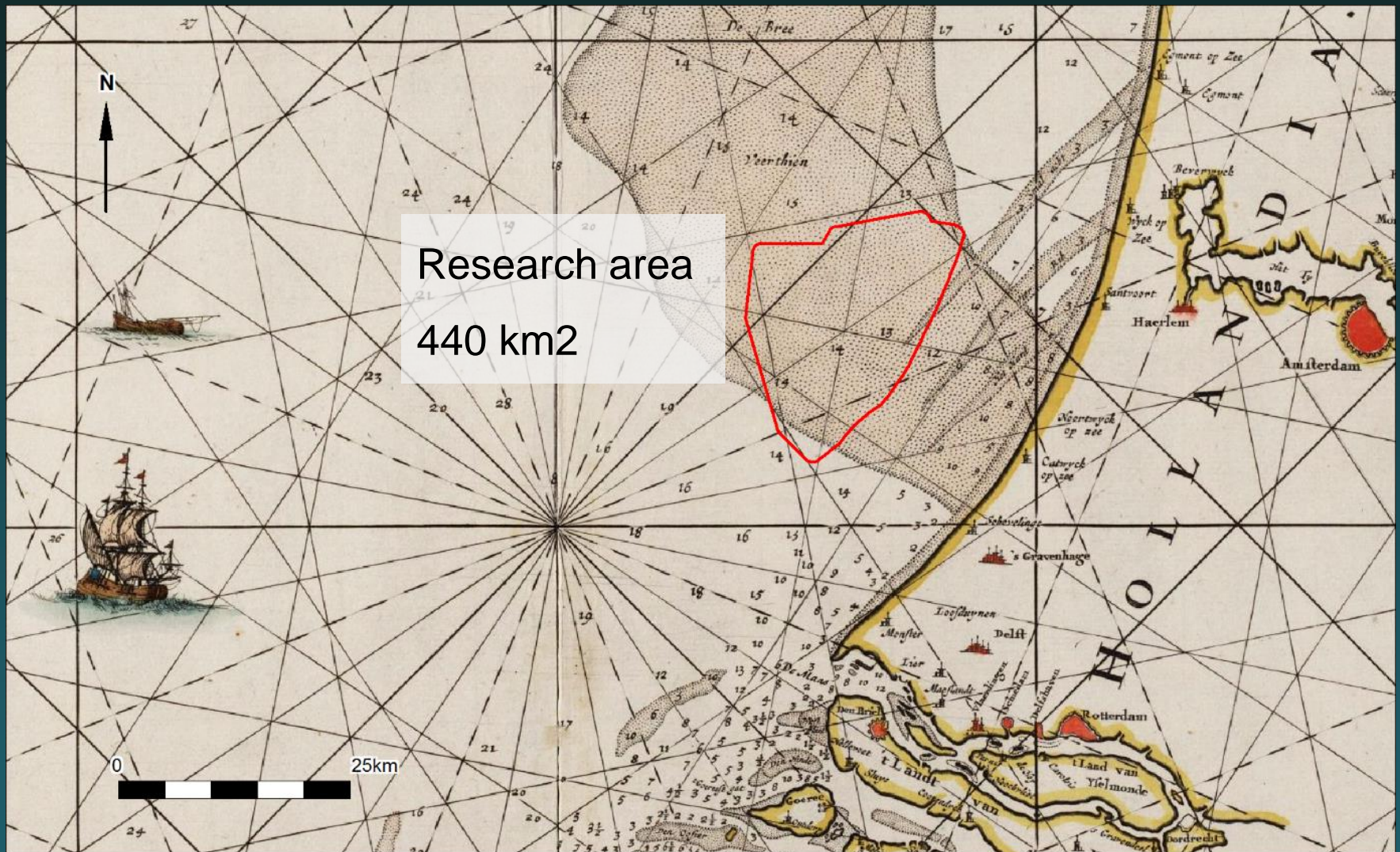
Archaeological Desk study 2015

Description of:

- current use of the area
- historical situation and possible disturbances
- known archaeological features and objects
- geological setting

Result: a specified archaeological expectation

Archaeological Desk study 2015



Bathymetry

Water depth

Min 16.9 m LAT
Max 27.4 m LAT
Avg. 21.5 m LAT

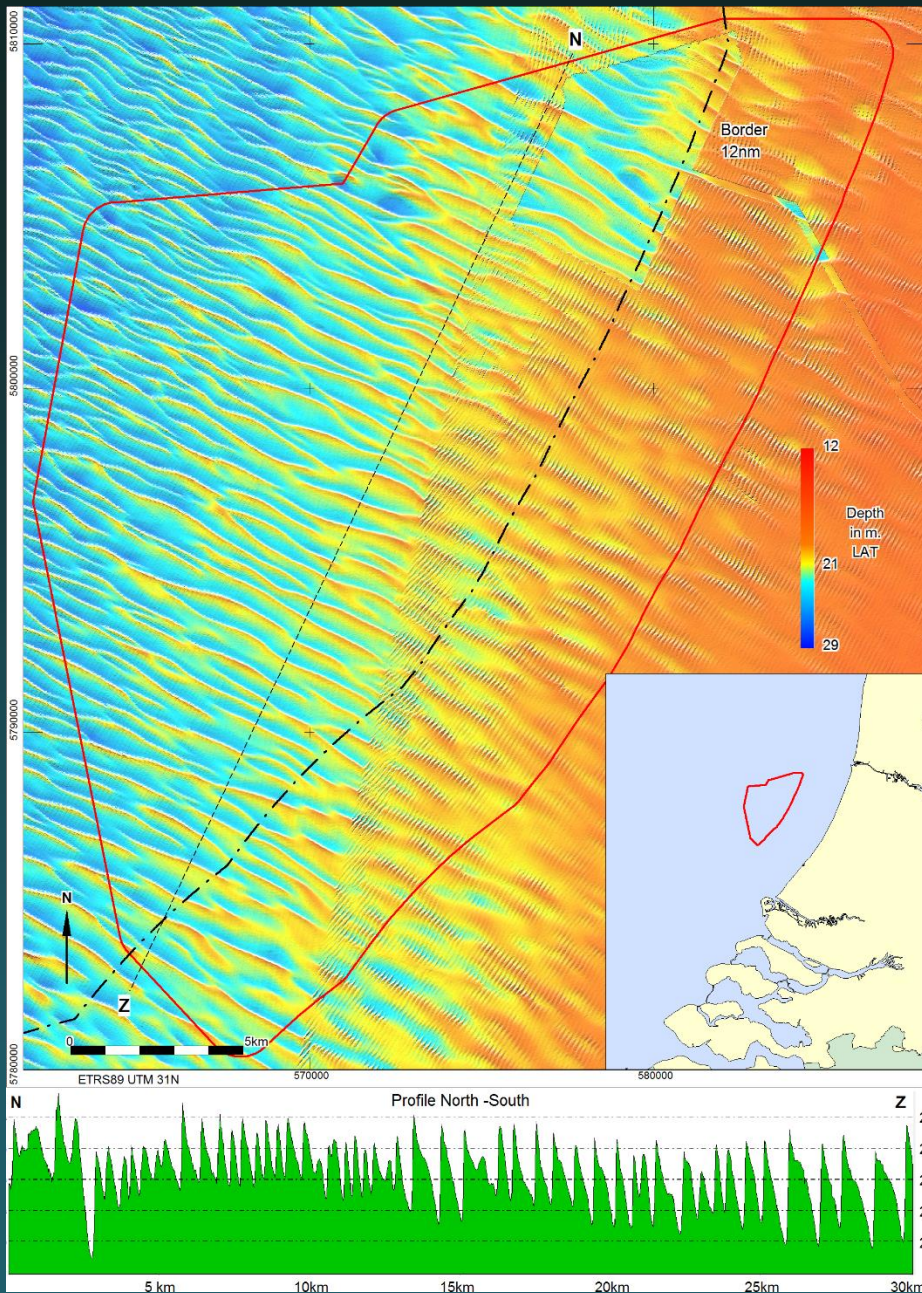
Morphology

Sand dunes

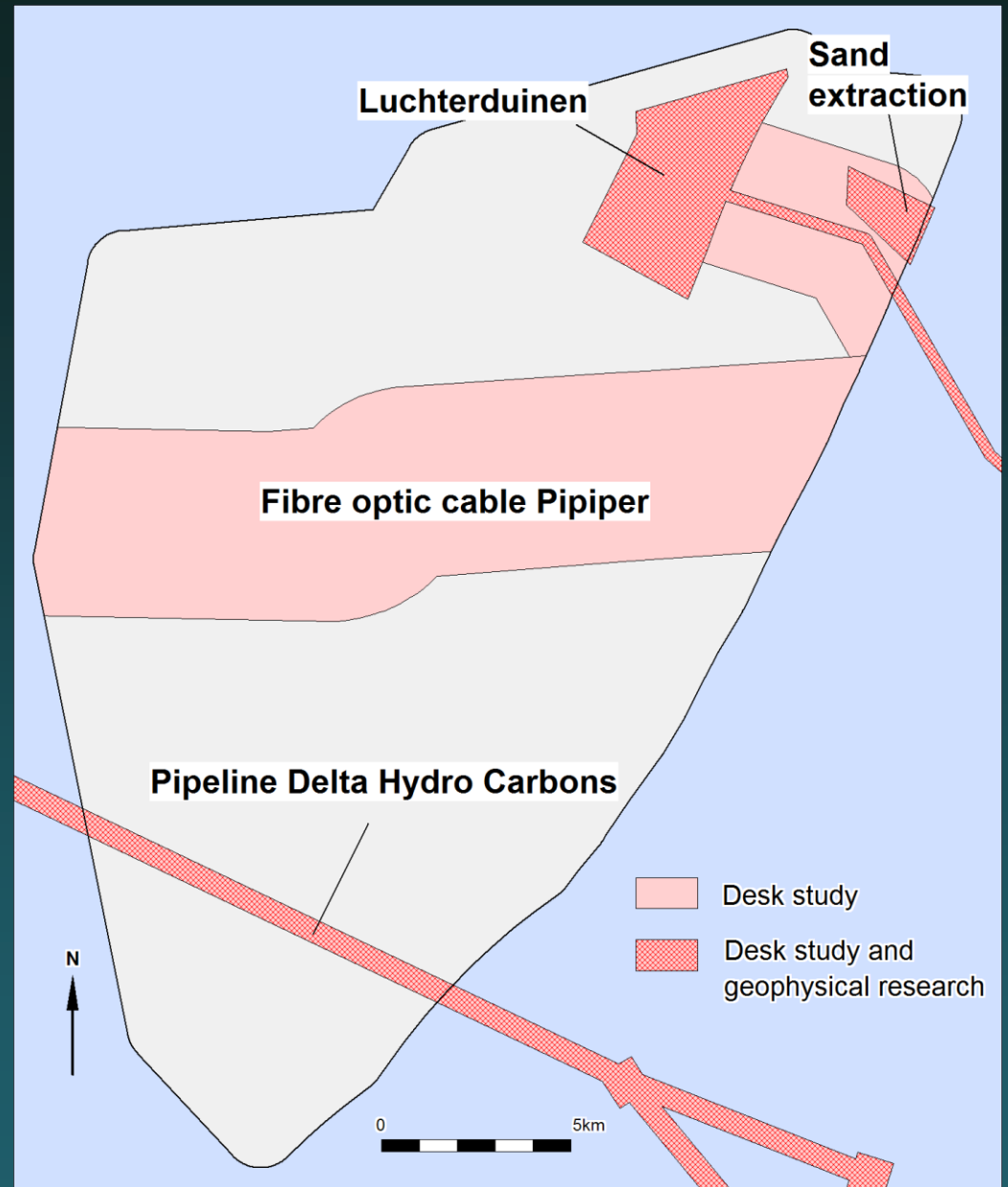
WNW – ESE orientation

Wavelength 500m, height 3m

Migration 2-4m NE direction

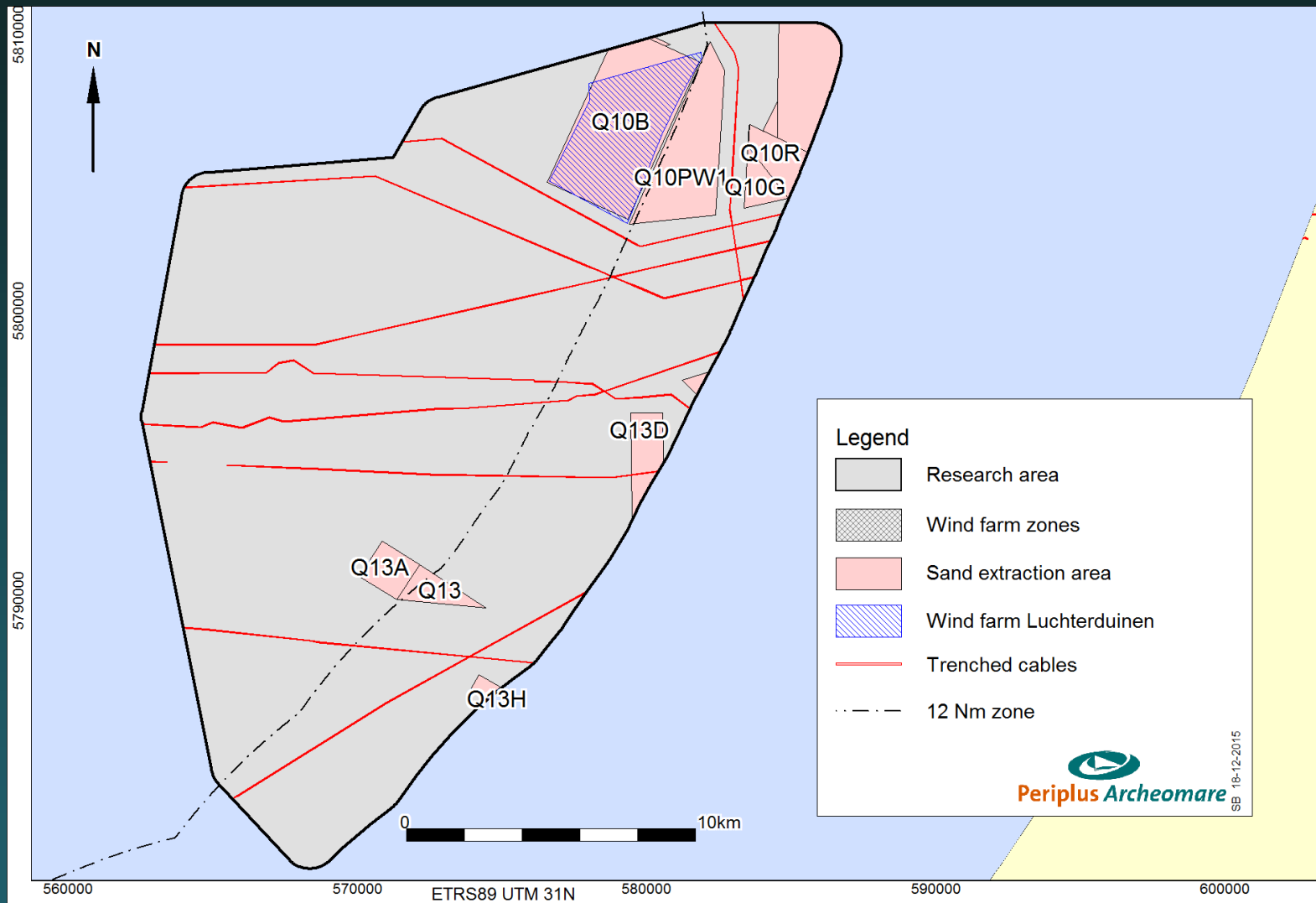


Previous research



All conducted by
Periplus Archeomare

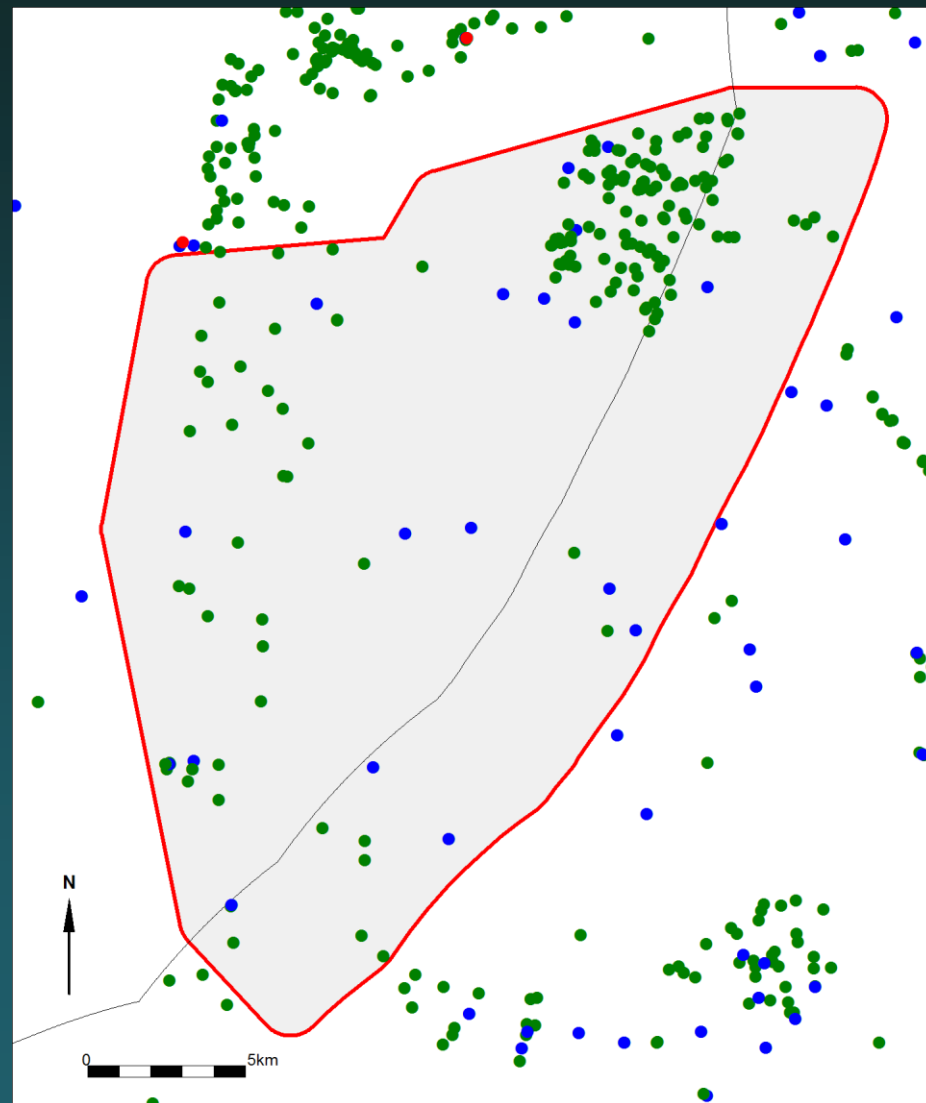
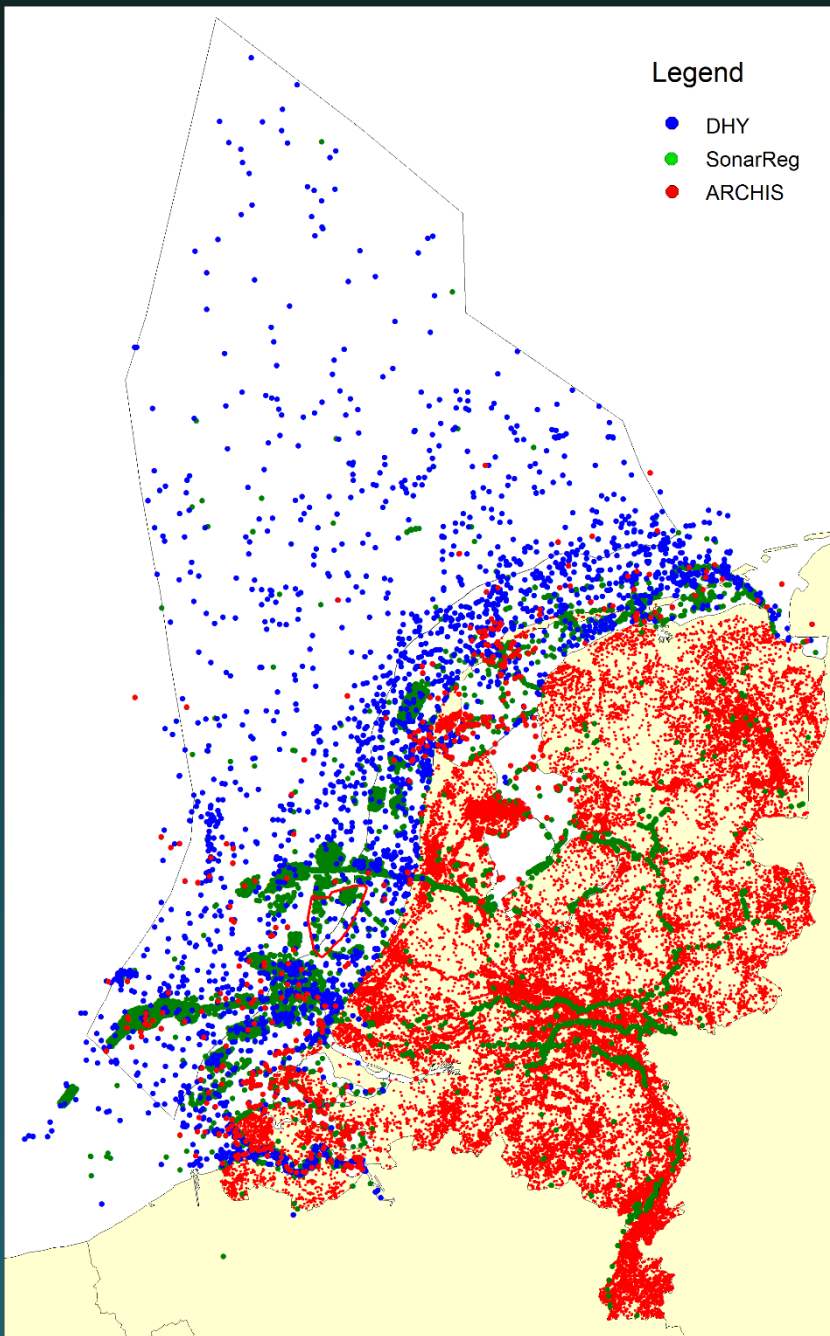
Known disturbances



Known wrecks and objects

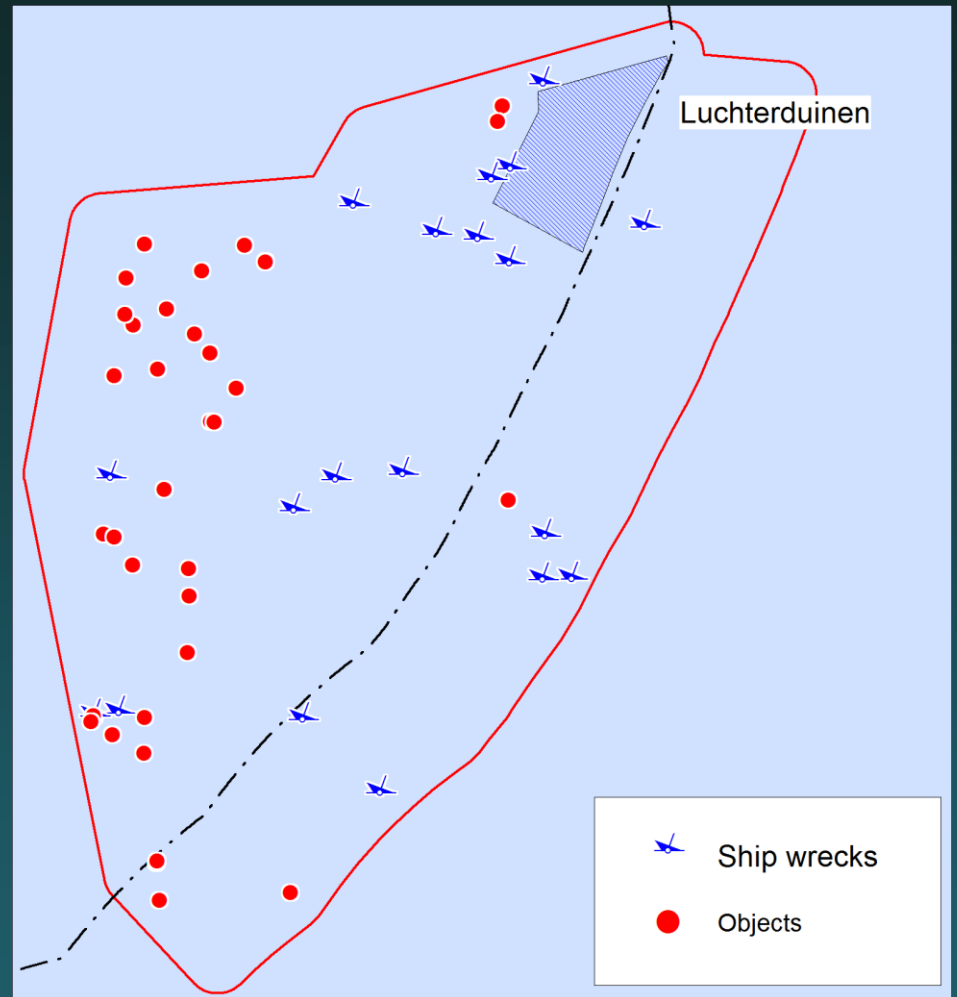
Sources:

- Ministry of Cultural Heritage: ARCHIS database
- Rijkswaterstaat: SonarReg92 database
- Dutch Hydrographic service: wrakkenregister
- Database Periplus Archeomare



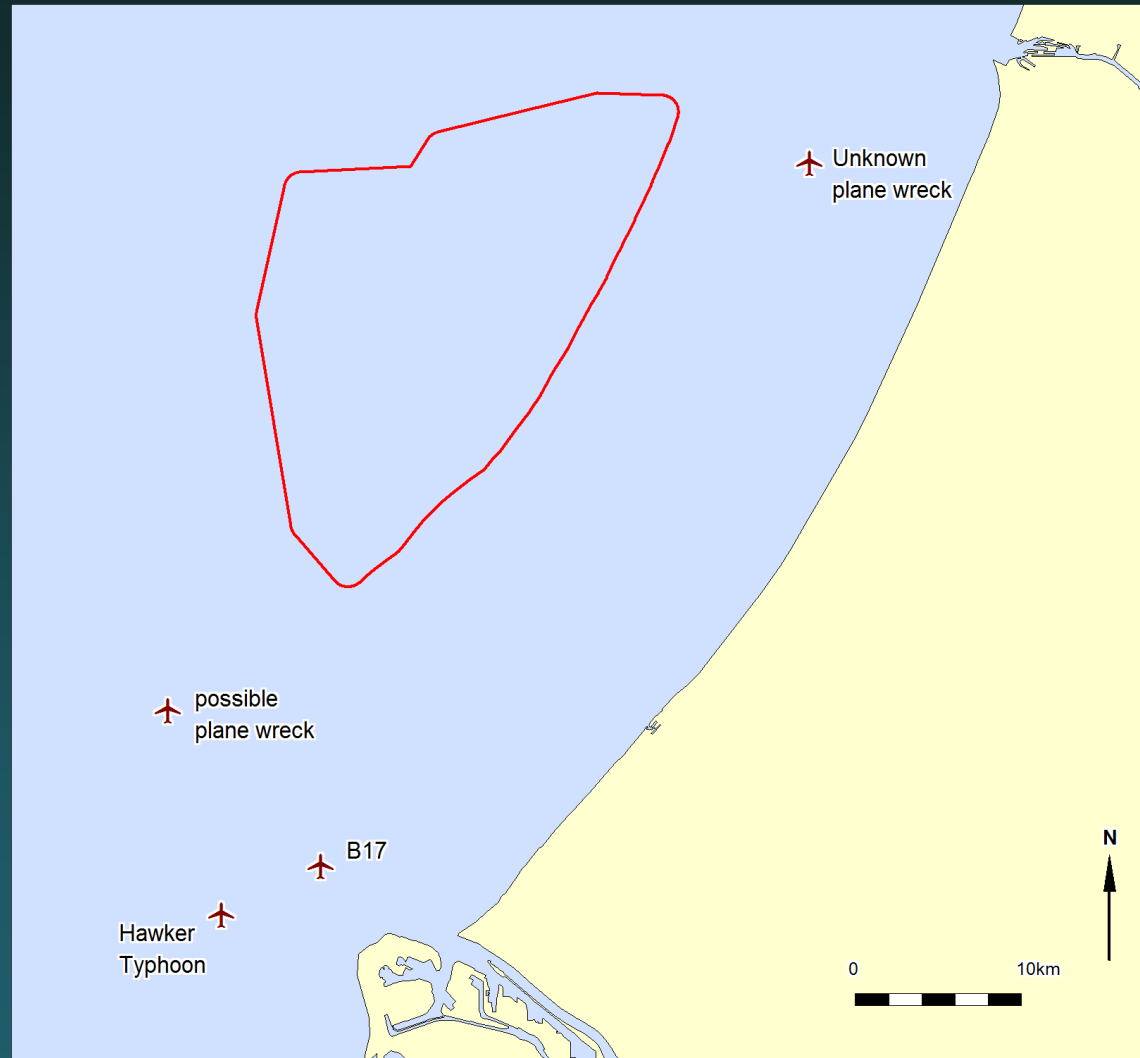
Known within research area

- 19 shipwrecks
- 30 other objects
- 24 of the 49 objects may have an archaeological value

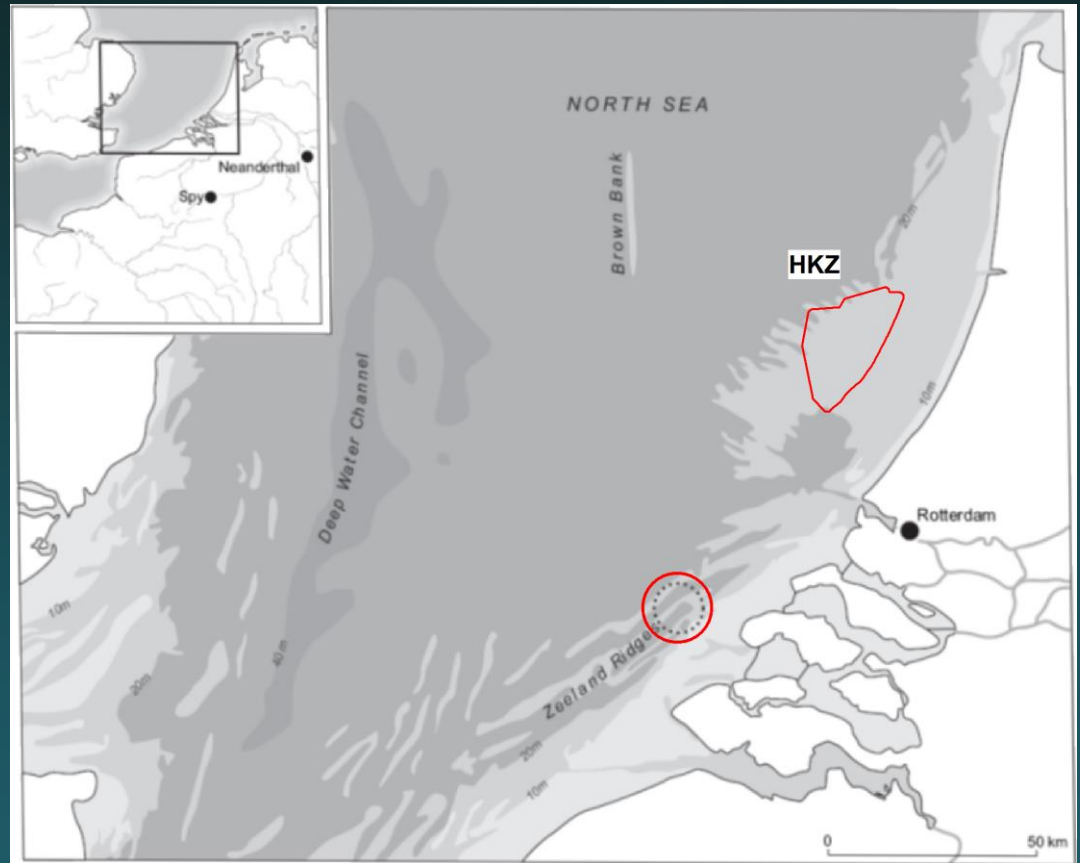


Plane wrecks WOII

More than
200 planes
still missing



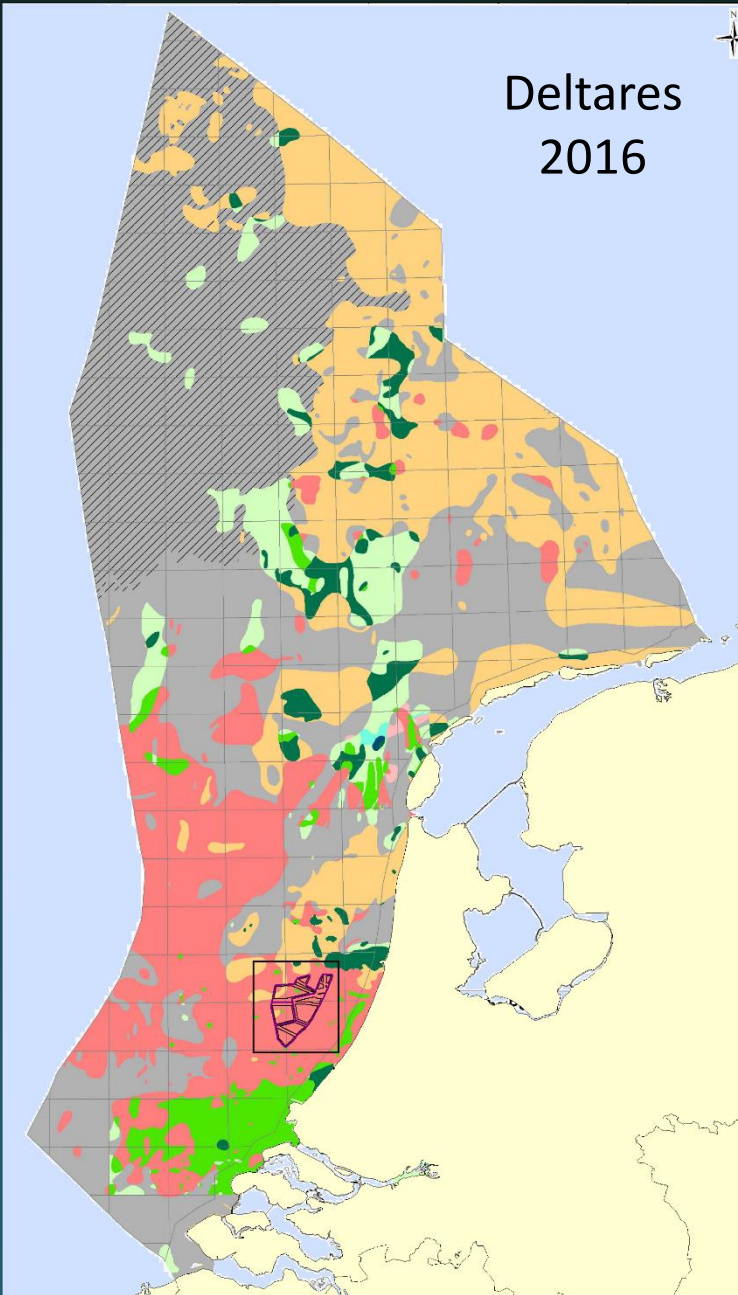
Drowned prehistoric landscapes



2009: The Zeeland Ridges Neanderthal

Deltares
2016

Expectation prehistory North Sea

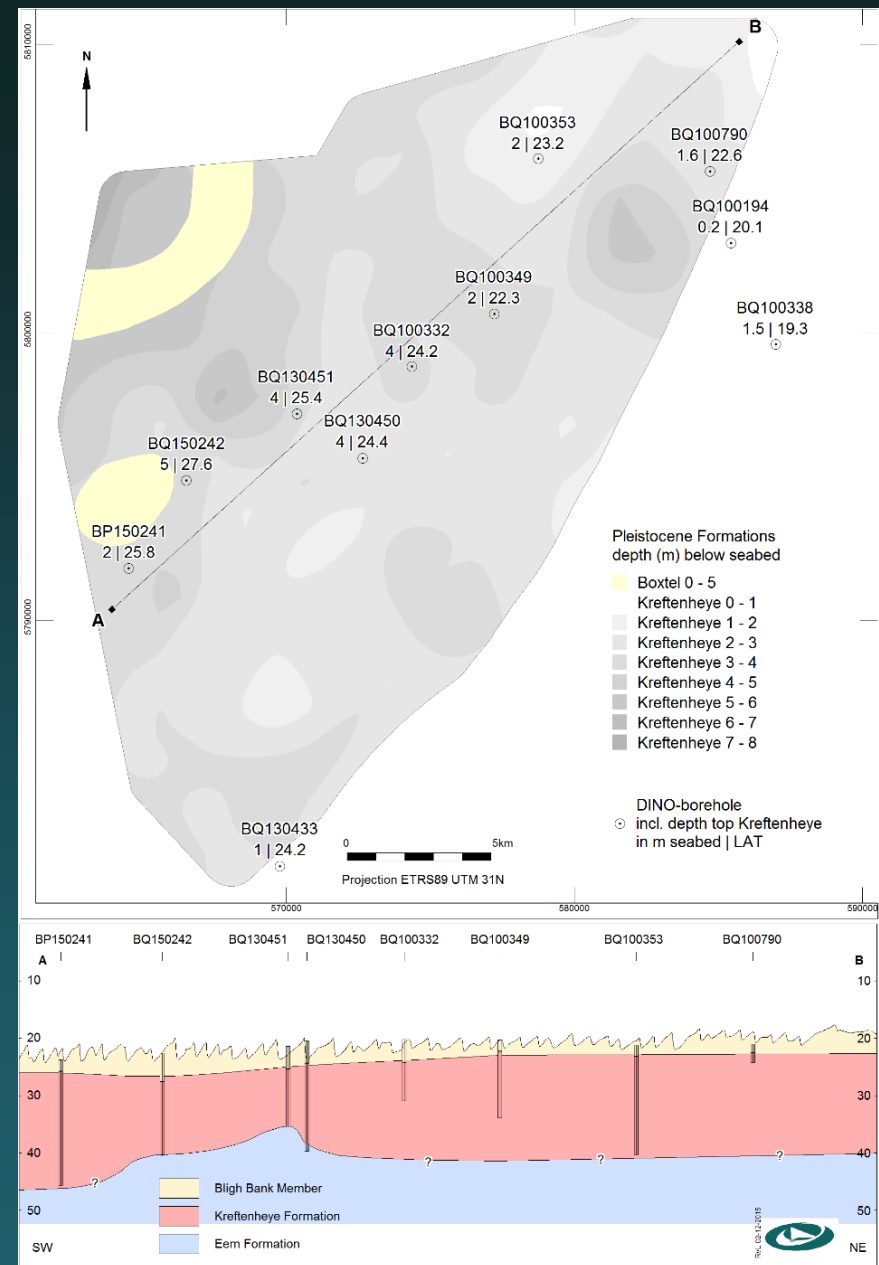


Archeologische Potentie Stap 4

-  Mogelijk potentieel op geomorfologische gronden
-  Geen prehistorische resten intact
-  Mesolithicum + Laat-Paleolithicum + Residuaire Midden-Paleolithicum
-  Mesolithicum + Laat-Paleolithicum
-  Mesolithicum + Midden-Paleolithicum
-  Mesolithicum + Residuaire Midden-Paleolithicum
-  Mesolithicum
-  Residuaire Mesolithicum + Laat-Paleolithicum
-  Laat-Paleolithicum
-  Midden-Paleolithicum
-  Residuaire Midden-Paleolithicum

Expected remains:
Camp sites, flint, nuts and
seeds, bone artifacts etc

Unit	Depth
Bligh Bank Member	0 - 5
Basal Peat Bed	0 - 5
Boxtel Formation	0 - 5
Kreftenheye	0 - 5
Eem Formation	10 - 20



Conclusions desk study

Facts:

- 19 ship wrecks known
- 30 various unknown objects
- Archaeological value 24 objects not yet established
- Mobile sand layer 0-5m thick covering prehistoric layers

High archaeological expectation for:

- Ship wrecks and WWII plane wrecks
- In situ buried prehistoric remains

Recommendations: geophysical survey

In order to map wrecks and confirm known locations:

- **Side scan sonar and magnetometer survey**

In order to map the prehistoric landscape:

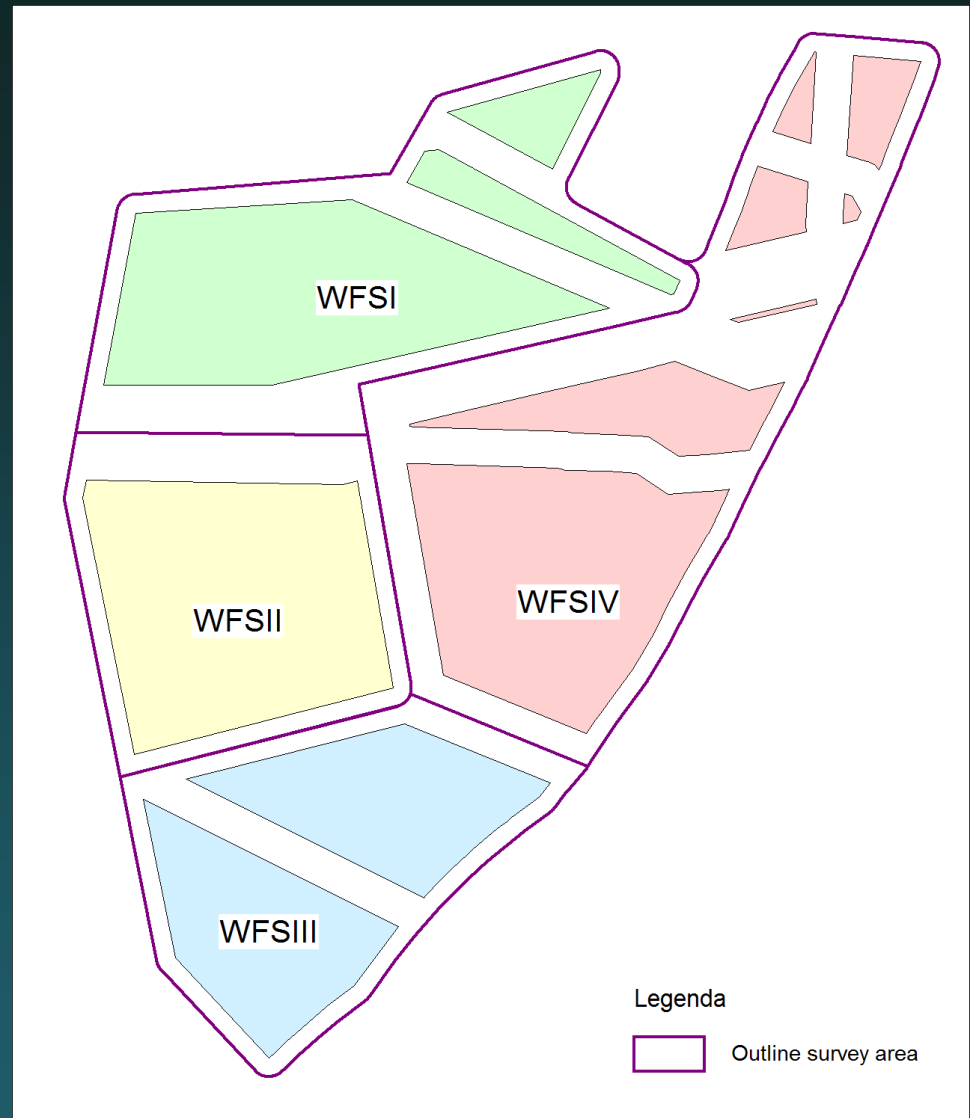
- **Subbottom profiling**

Geophysical survey

Fugro

March – April 2016

- sidescan sonar
- single beam echo sounder
- magnetometer
- multibeam echo sounder
- sub-bottom profiler; pinger
- ultra high resolution seismic

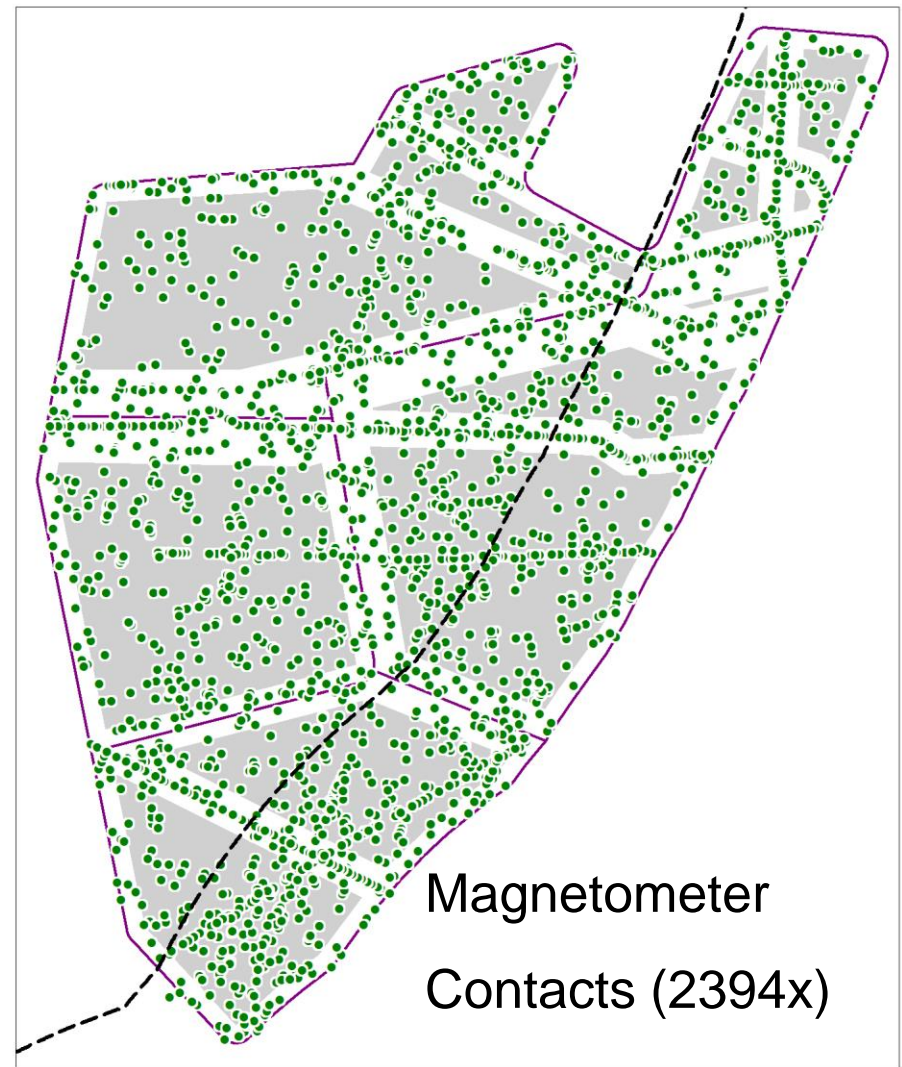
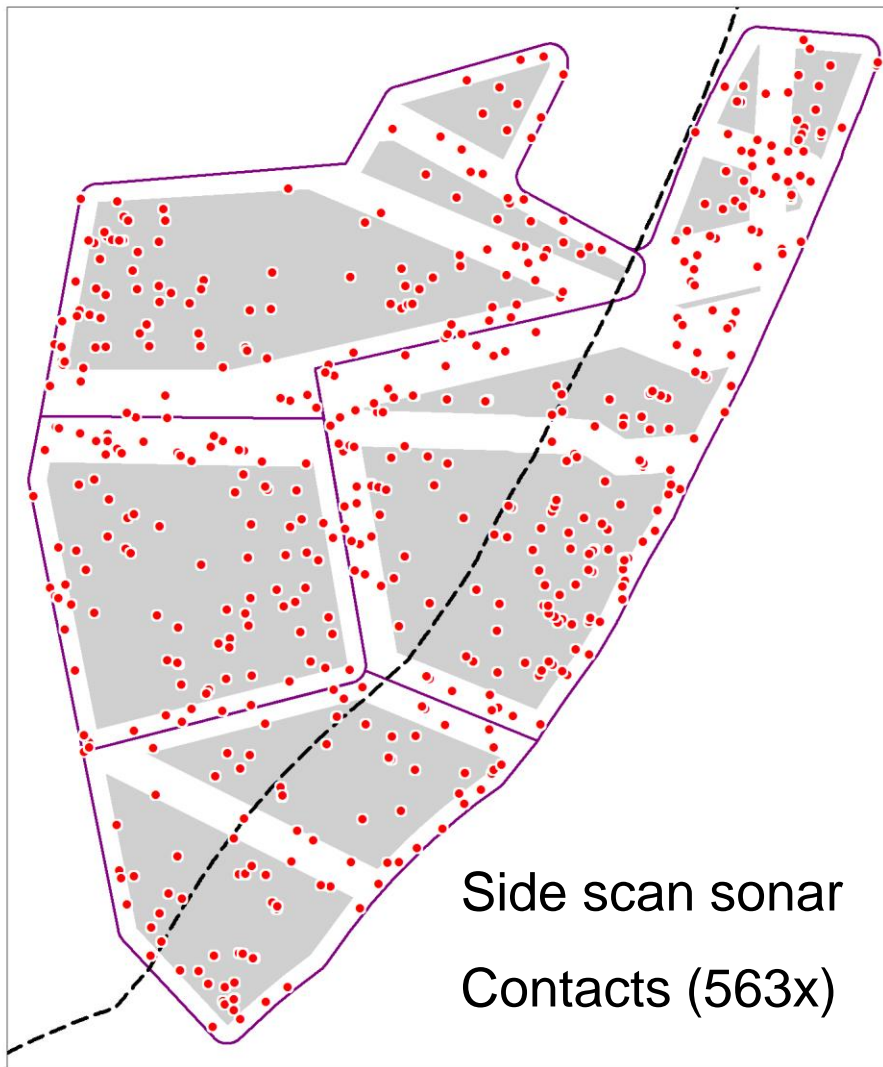


Assessment geophysical survey data

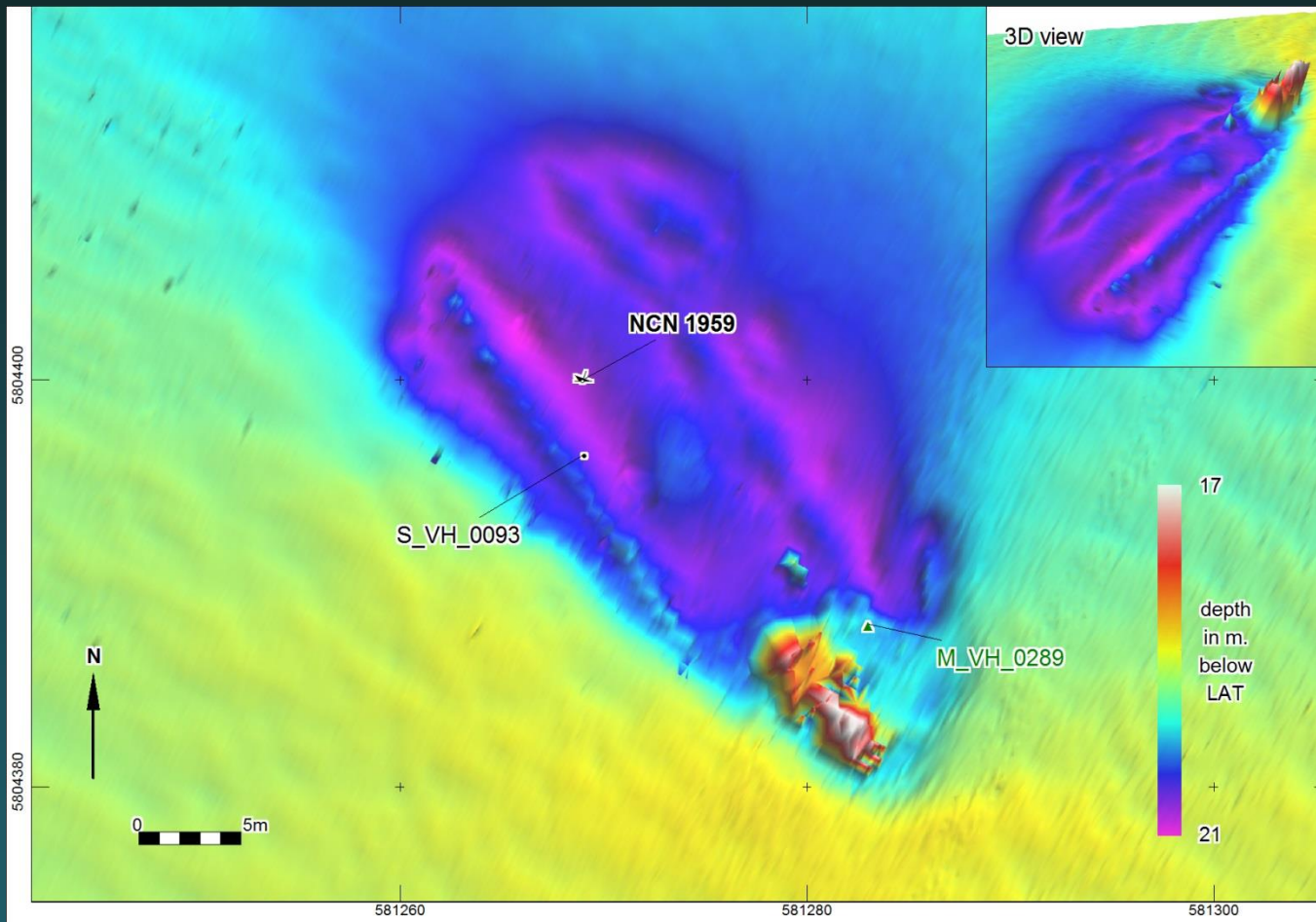
The goals set for this assessment were:

- To validate the locations of known wrecks and objects
- To assess the possible value of newly found contacts
- Assess the prehistoric landscape based on the seismic data

Results sonar & magnetometer



Verification known objects



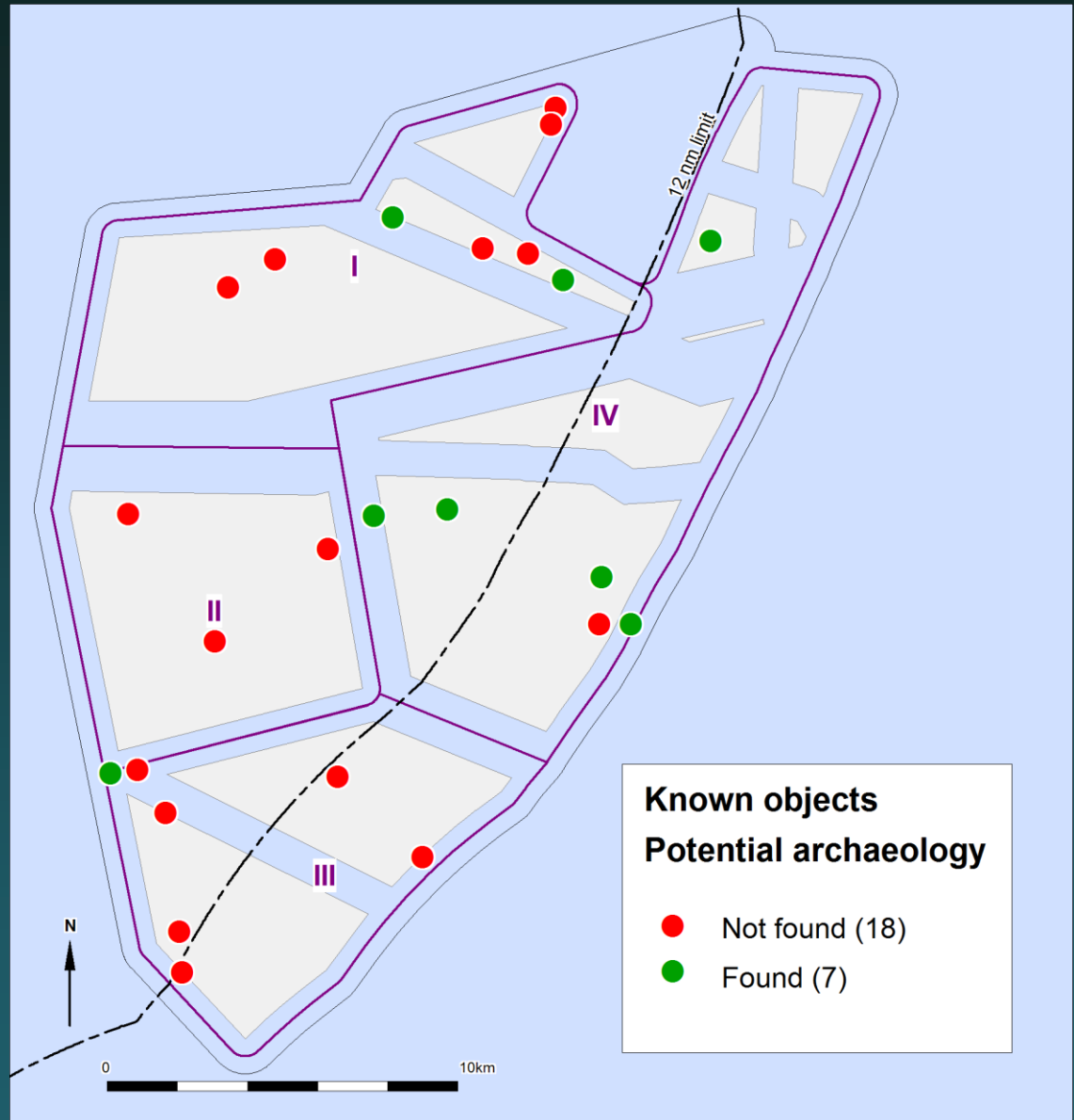
NCN 1959 Wreck known as 'Hamertjeswrak'

Results

Known Objects

Not found?

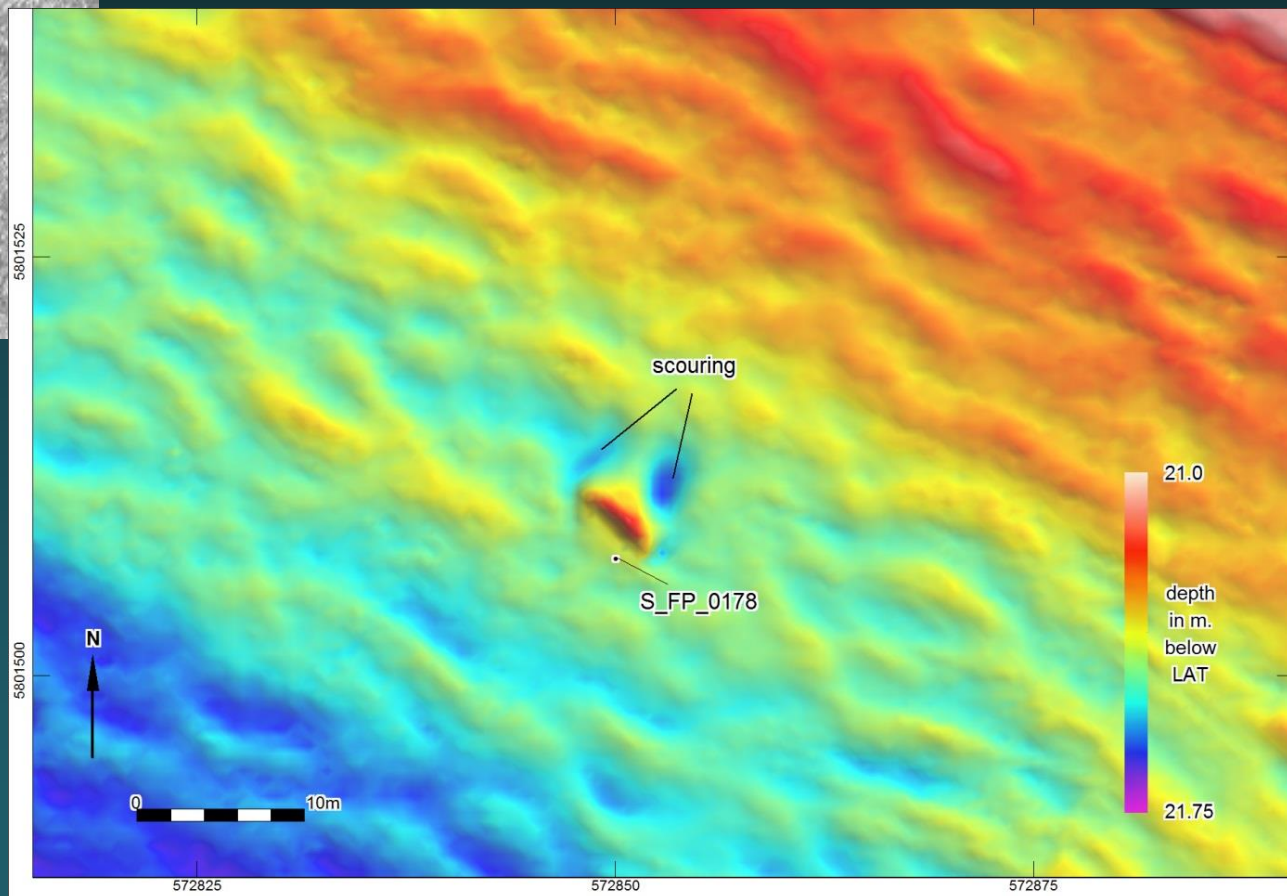
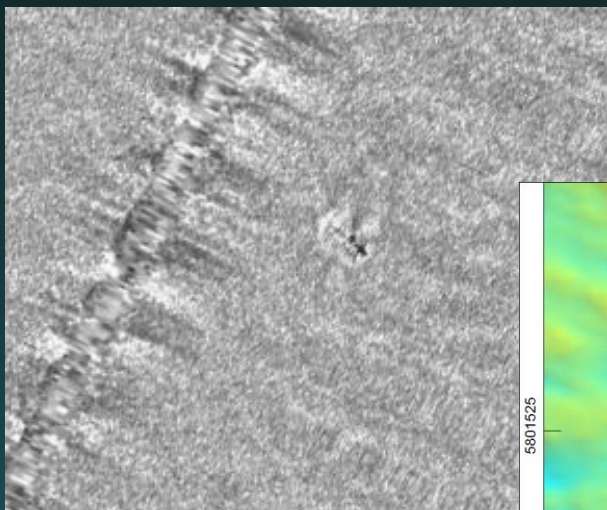
Probably covered
by sediment



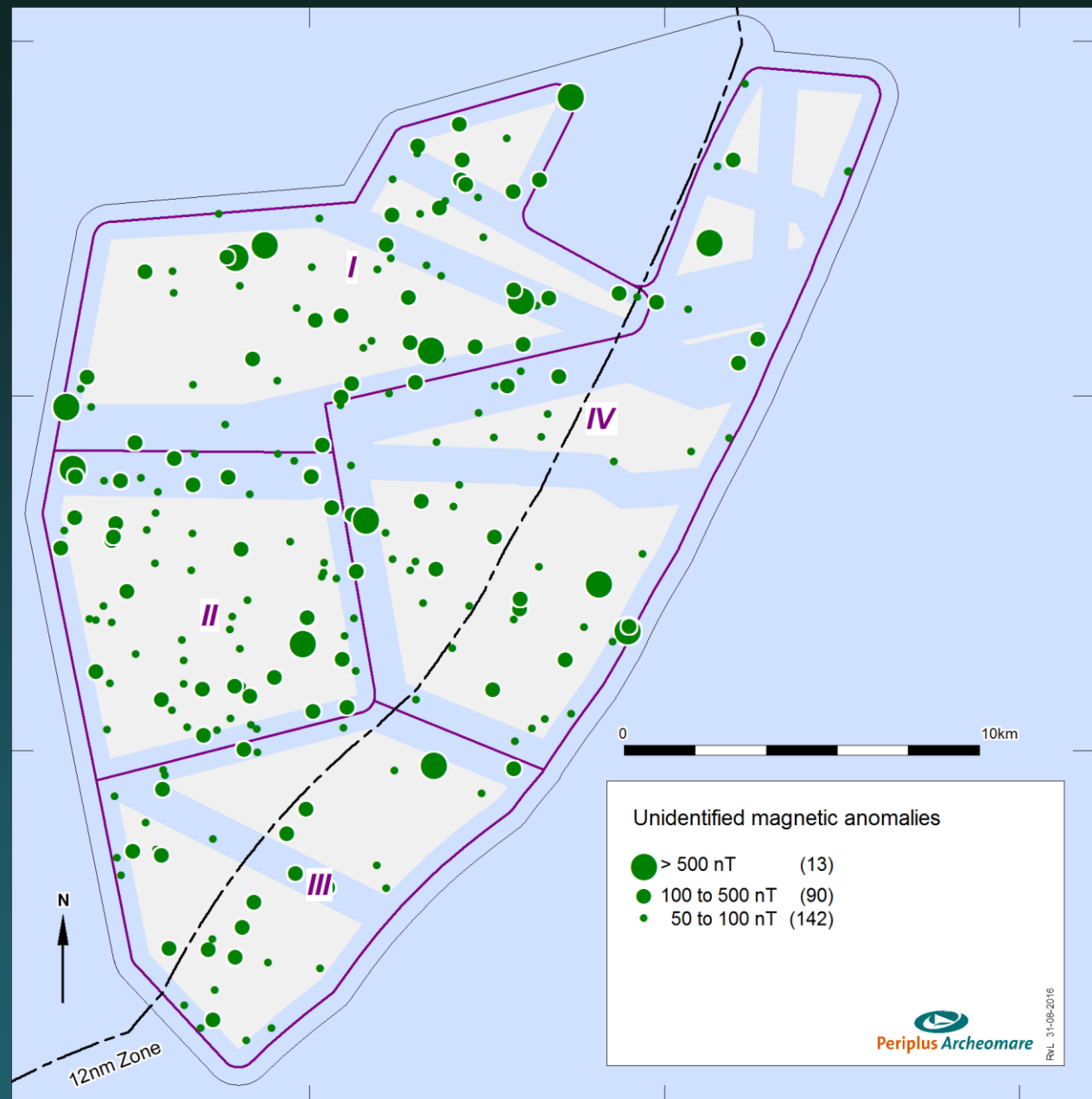
New objects

Example

Sonar contact S_FP_178, “debris”



Magnetic anomalies



Magnetic anomalies

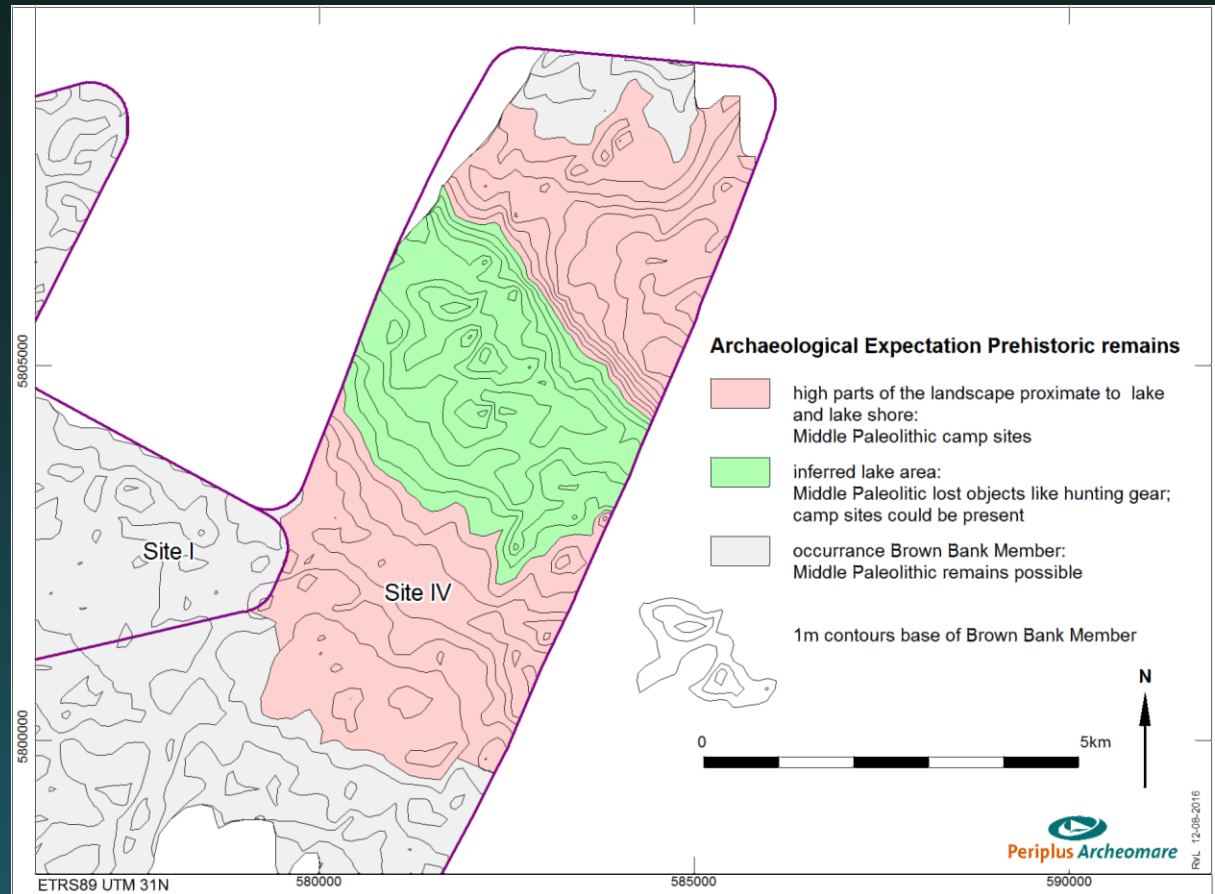
- 2394 contacts total
- 679 contacts related to pipeline or cable
- 32 contacts related to visible sonar contacts
- 245 unknown contacts > 50 nT

Objects with an archaeological expectation

	I	II	III	IV	Total
Known objects exposed at the seabed surface	-	-	-	5	5
Known objects covered by sediment found with magnetometer	1	-	-	1	2
Known objects not found, probably covered with sediments	7	4	6	1	18
Unknown objects found with side scan sonar	2	-	-	1	3
Total	10	4	6	8	28

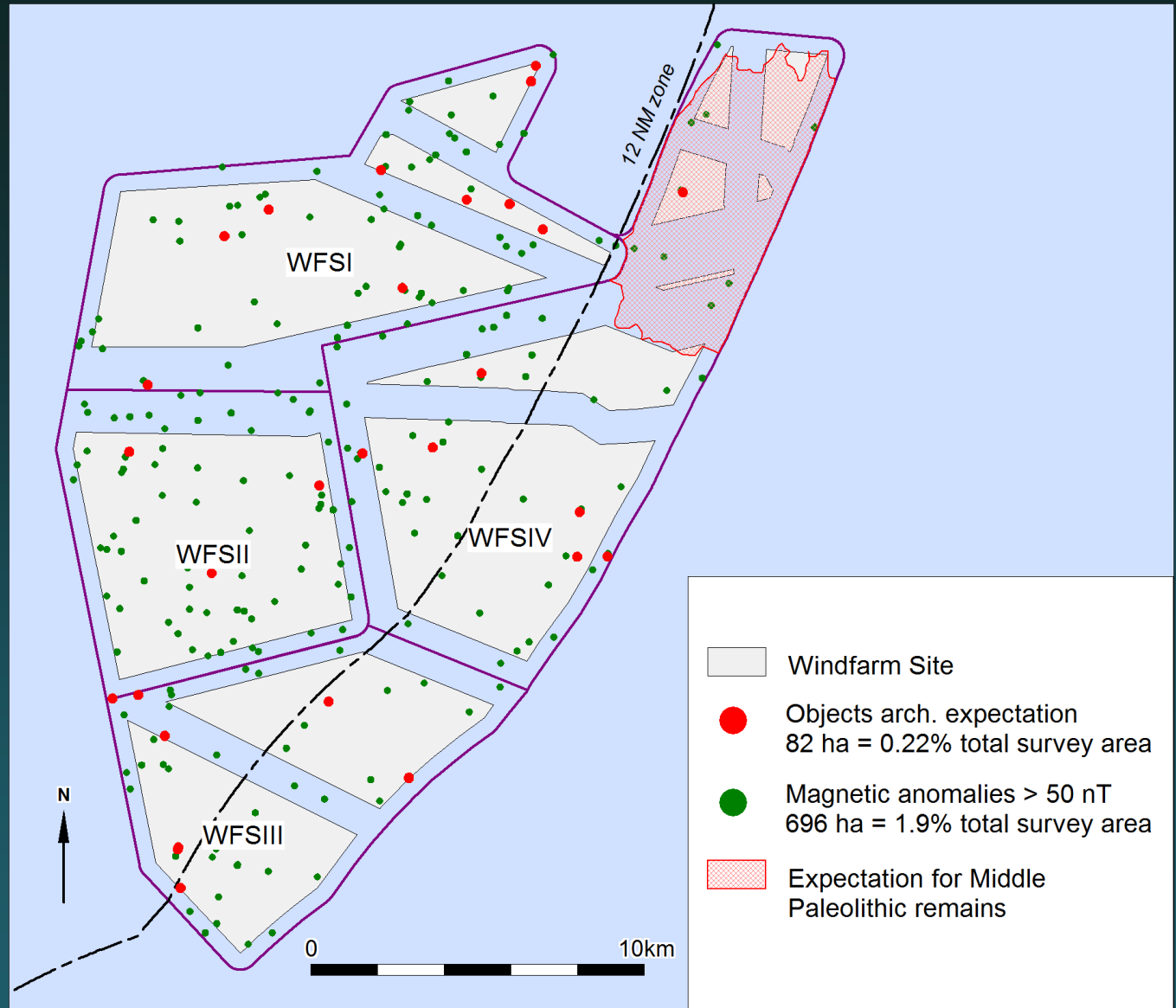
Plus 245 unknown objects from magnetometer !

Prehistory



Prehistoric (Middle Paleolithic) remains only expected within Site IV at 13 to 22 m below the seabed. Additional research based on geotechnical data will be carried out, results in spring 2017

Summary to scale



Recommendations

Avoid possible archeological locations (including a buffer zone of 100 meters)

Not feasible? → Additional research (divers) required

During construction: Unexpected find? Report to the authorities



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Thank you for your attention