



**Programme of Requirements
Archaeological Assessment HKZ Phase III
based on geotechnical results**

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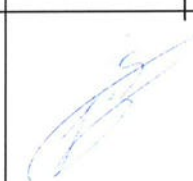
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Programme of Requirements

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Periplus Archeomare Project Number 16A033-01

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Table 1. Archaeological periods

Period	Date				
<i>New time</i>	1500	AD	-	date	
<i>Late middle ages</i>	1050	AD	-	1500	AD
<i>Early middle ages</i>	450	AD	-	1050	AD
<i>Roman times</i>	12	BC	-	450	AD
<i>Iron age</i>	800	BC	-	12	BC
<i>Bronze age</i>	2000	BC	-	800	BC
<i>Neolithic (New stone age)</i>	5300	BC	-	2000	BC
<i>Mesolithic (Middle stone age)</i>	8800	BC	-	4900	BC
<i>Paleolithic (Old stone age)</i>	300.000	BC	-	8800	BC

Table 2. Administrative details

Location	North Sea			
Windfarm Site	IV			
Project Title	Scope of Work Archaeological Assessment HKZ Phase III based on geotechnical results			
Chart	1801-01			
Coordinates Site IV				
Geodetic Datum: ETRS89	X-centre	578 261	Y-centre	5 799 347
Projection: UTM31N	X1	570 433	Y1	5 789 452
	X2	586 089	Y2	5 809 243
Depth (LAT)	Minimum	16.9 m		
	Maximum	24.0 m		
Area use	Shipping lane, fishing and recreation, sand extraction			
Area administrator	Department of Waterways and Public Works			
Authority	Ministry of Economic Affairs			
Advisor authority	Dutch Cultural Heritage Agency			
ARCHIS (CIS-code)	4032685100			
Periplus Archeomare – project code	16A033-01			
Period	November 2016 – May 2017			

1 Introduction

The Netherlands Enterprise Agency (RVO.nl) has assigned Periplus Archeomare B.V. to write a Programme of Requirements to assess the presence of prehistoric remains in Site IV of the Hollandse Kust Zuid Wind Farm Zone based on the available information of the geotechnical site investigation.

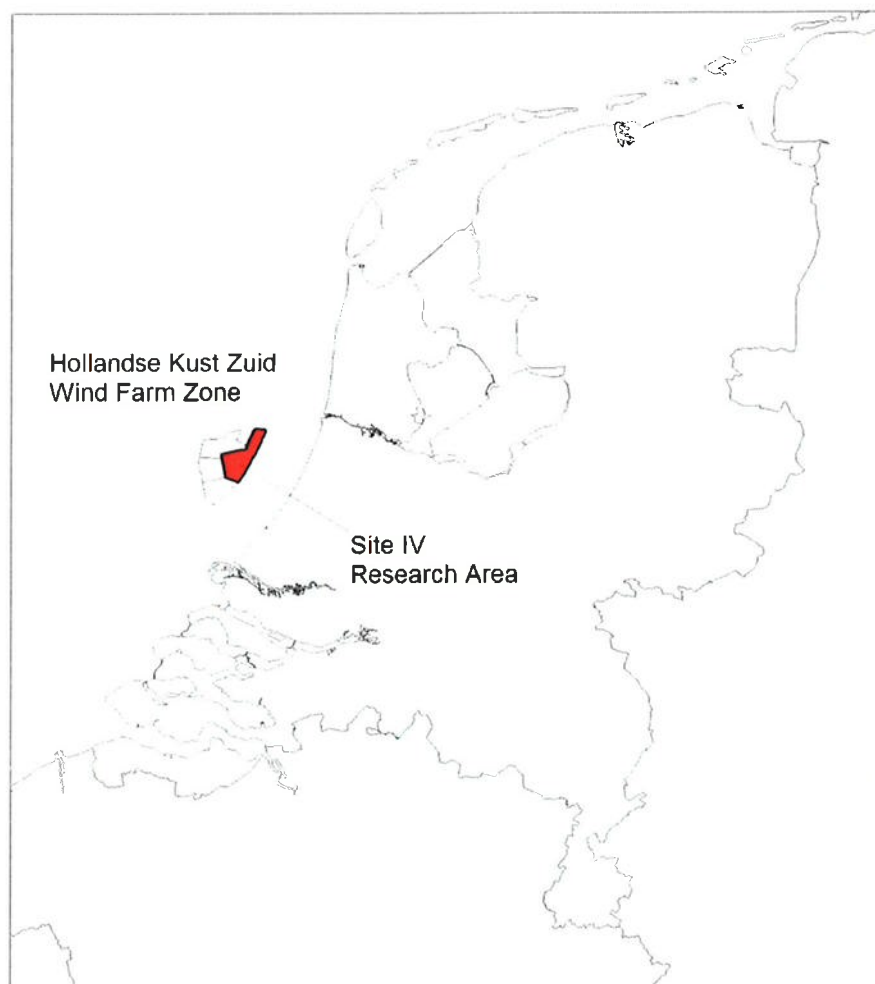


Figure 1. Location of the research area

1.1 Background

In 2013 more than 40 organizations and the Government entered into the Energy Agreement for Sustainable Growth (Energieakkoord voor Duurzame Groei). An important part of this agreement includes scaling up of offshore wind power development. The Ministry of Economic Affairs presented a road map outlining how the Government plans to achieve its offshore wind goals in accordance with the time line agreed upon in the Energy Agreement. The road map sets out a schedule of tenders offering 700 MW of development each year in the period 2015 – 2019. The Dutch Government has developed a systematic framework under which offshore wind farm zones are designated. Any location outside these wind farm zones is not eligible to receive a permit. Within the designated wind farm zones the government decides the specific sites where wind farms can be constructed using a so-called Wind Farm Site Decision ('Kavelbesluit').

This contains conditions for building and operating a wind farm on a specific site. The Dutch transmission system operator TenneT will be responsible for grid connection. Winners of the site development tenders will be granted a permit to build a wind farm according to the Offshore Wind Energy Act (Wet Windenergie op zee), a SDE+ grant and offered a grid connection to the main land. The Ministry provides all relevant site data, which can be used for the preparation of bids for these tenders. This Archaeological Assessment HKZ Phase III is part of the site data for Wind Farm Zone Hollandse Kust (zuid).

The Hollandse Kust (zuid) Wind Farm Zone has been subjected to an archaeological desk study (phase I) and an archaeological assessment (phase II) based on the geophysical data acquired to get insight in the geotechnical constraints inherent to the situation.

1.2 Previous research

Based on the desk study (phase I) and a recent publication of Deltares has been concluded that prehistoric remains were to be expected in Site I en II. This expectation has been tested by means of an assessment of seismic data acquired by Fugro Survey BV. The lithostratigraphic units which were identified during the desk study as potential containers for remains of prehistoric settlements have not been found or identified as such in the seismic data. Additional prospection for prehistoric remains in Site I and II is therefore not recommended.

The Brown Bank Member has been identified in Site I and IV. Within the Brown Bank Member occurring in Site IV zones have been mapped which could contain Middle Paleolithic remains. In fact little is known of the actual sediments present and the environment in which these sediments have been deposited. In the course of a geotechnical survey the sampling of sediments by drilling boreholes has been carried out. Tests on the samples are now in progress. In line with the Dutch 'AMZ-cycle' it is advised to analyze the borehole samples from an archaeological point of view. The research is limited to the zones within Site IV where archaeological remains from the Middle Paleolithic are expected at 13 to 22 meter beneath the seabed.

The Dutch Cultural Heritage Agency endorses the conclusions of the archaeological assessment. The Dutch government does not consider additional research necessary for the subsidy and license tender of HKZ I en II. However the Dutch Cultural Heritage Agency (RCE), the Ministry of Economic Affairs (EZ), the Department of Waterways and Public Works (Rijkswaterstaat) and Netherlands Enterprise Agency (RvO.nl) do believe that at this stage it is valuable to investigate if the stratigraphic sequence of (parts of) the Brown Bank Member in Wind Farm Site IV contains levels which indicate favorable conditions for human occupation in Middle Paleolithic times or archaeological levels containing indications of actual human presence.

1.3 Objective

The objective of the archaeological assessment (phase III) is to get a better insight in the likelihood that *in situ* remains of Middle Paleolithic camp sites could be present in the area.

To achieve this objective this assessment aims:

- a) to acquire information on the landscape evolving in time, and
- b) the opportunities this landscape could have offered for human occupation.

1.4 Research questions

The following research questions have been defined:

- Which type of sediments has been found in the borehole samples?
- What are the characteristics of these sediments in terms of composition, consistency, layering, sedimentary structures, carbon content, organic and (bio)clastic admixtures?
- Does the sequence contain:
 - a) erosive layer boundaries, or
 - b) Indications of long-term non-sedimentation such as palaeosols or horizons of ripened clay?
- What is the depositional environment of these sediments?
- Can, based on the composition and depositional environment of the sediments, different geogenetic units be distinguished?
- Do the deposits contain archaeological indicators such flint or bone artifacts/remains or charcoal?
 - If so:
 - What is the location, depth, lithostratigraphic and geogenetic context of the find(s)?
- Is additional research e.g. by means of the analysis of pollen, plant remains, shells or isotopes considered of value?

1.5 National Research Agenda Archaeology

In the Dutch National Research Agenda (Dutch: Nationale Onderzoeksagenda Archeologie (NOaA)) the following general research questions are included for the Middle Paleolithic period / North Sea area. For full text refer to NOaA¹.

1. ARCHAEOLOGICALLY POORLY KNOWN AREAS

- How and when were areas that currently lie below sea level being used by man, and how does this use relate to the land use we know from onshore sites? (NOaA question 6)

9. INHUMATION AND SEPULCHRAL MONUMENTS

- What are the characteristics and context of inhumations in Early Prehistoric times? (NOaA question 9)

10. THE EARLIEST OCCUPATION OF THE NETHERLANDS

- What are the origin, mobility and territory size of groups of Neanderthals and connections with other areas outside the Netherlands? (NOaA question 2)
- Where, in which period of time in the Pleistocene epoch and under which climatologically conditions resided early hominids in the Netherlands? (NOaA question 1)

22. MAN – MATERIAL CULTURE

- What are the characteristics and relevance of tools made of organic material within the material culture? (NOaA vraag 114)

¹ <https://archeologieinnederland.nl/bronnen-en-kaarten/nationale-onderzoeksagenda-archeologie-20>

2 Methodology

2.1 General approach

Fugro Survey BV has gathered a range of geophysical and geotechnical data in the course of the development of the HKZ Wind Farm Zone. Part of this data will be used for the assessment of the prehistoric landscape and the potential of archaeological remains from the Middle Paleolithic being present in the area.

The data involved are:

- Seismic data
- Borehole samples
- Cone Penetration Tests
- Reports

The offshore phase of the geotechnical investigation included geotechnical borehole drilling at WFS IV. Fugro Survey BV employed the geotechnical drilling vessel Gargano between 1 August 2016 and 9 September 2016 to complete the job. The samples taken were transported to shore to be analyzed and subjected to laboratory tests. The borehole descriptions and results of the laboratory tests have been presented in the Fugro Report No. N6196/07 (status: provisional) dated 16 September 2016.

This assessment is limited to data acquired to date by Fugro Survey BV. Prior to the start of the archaeological assessment all necessary data shall either be supplied by the client or directly by Fugro Survey BV. Detailed information on the composition, consistency, layering, sedimentary structures, carbon content, organic and (bio)clastic admixtures of the sediments present is needed to carry out this assessment.

Furthermore the character of layer boundaries (erosive versus non-erosive) and indications of secondary processes among which soil formation, decalcification and ripening, shall be included in the sample description to be of full use.

The borehole sample descriptions reported by Fugro Survey BV will be judged in order to determine if those descriptions suffice to answer the research questions posed and meet the objective set. If not so, the samples will be investigated by a Periplus geologist.² The additional observations made will be used to complete the reported descriptions with the information of interest.

The boreholes have been drilled at fifteen locations in WFS IV (see table 3; figure 2). The first part of the numbers of boreholes located close to one another are the same (e.g. HKZ4-BH01-SA and HKZ4-BH01-SC). That is why it appears in figure 2 only ten borehole locations can be distinguished.

Based on grid data of the Brown Bank Member this unit is expected to be encountered in the borehole samples taken at ten different locations. Four borehole locations (HKZ-BH01-SA.SZ and HKZ4-BH21-SA/SZ) plot within an area which is designated to possibly contain Middle Paleolithic remains. One borehole is located outside but relatively proximate to this area (HKZ-BH04-SA).

Primary focus shall be put on these five boreholes (HKZ-BH01-SA/SC, HKZ4-BH21-SA/SC and HKZ4-BH04-SA). The descriptions of the other samples will be looked into for reference purposes and to determine the lateral occurrence of the Brown Bank Member. Little is known about the stratigraphy and depositional environment of the Eemian sedimentary succession; occurrences of peat are considered very rare in the

² Job title in Dutch Archaeology Quality Standard: Senior Prospector.

Eemian of the central-western Netherlands.³ Therefore special interest will be put into occurrences of peat, if indeed present.

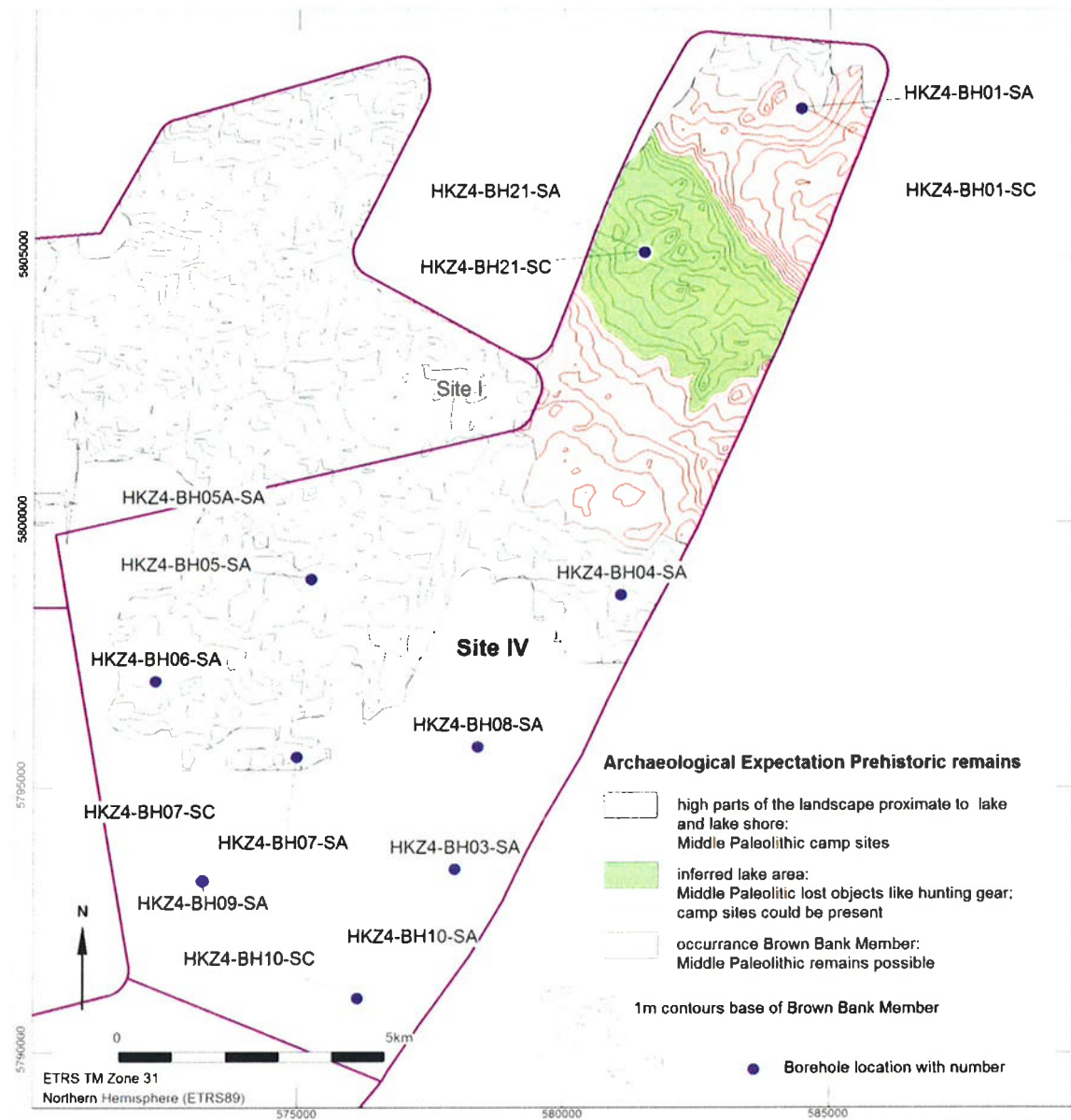


Figure 2. Borehole locations

Location	Easting m	Northing m	Depth mLAT	Drill Depth mSeabed
HKZ4-BH01-SA	584474	5807810	18.8	65.5
HKZ4-BH01-SC	584482	5807813	18.7	53.0
HKZ4-BH03-SA	577972	5793479	19.9	50.7

³ Gans 2000.

Location	Easting m	Northing m	Depth mLAT	Drill Depth mSeabed
HKZ4-BH04-SA	581097	5798654	20.7	65.0
HKZ4-BH05-SA	575266	5798956	21.5	2.8
HKZ4-BH05A-SA	575268	5798952	21.4	50.2
HKZ4-BH06-SA	572338	5797027	21.1	50.4
HKZ4-BH07-SA	574987	5795595	22.4	65.5
HKZ4-BH07-SC	574997	5795593	22.4	49.0
HKZ4-BH08-SA	578397	5795786	21.2	51.0
HKZ4-BH09-SA	573232	5793250	22.3	50.7
HKZ4-BH10-SA	576143	5791041	20.5	65.2
HKZ4-BH10-SC	576148	5791043	20.5	50.0
HKZ4-BH21-SA	581532	5805117	19.3	65.5
HKZ4-BH21-SC	581527	5805109	19.3	49.5

Table 3. Borehole numbers, locations and depths

2.2 Specialist works

Little is known of human occupation in Middle Paleolithic times. The prehistoric landscape is an important factor for human occupation. Specialist analysis can help to understand the land use by humans in early prehistoric times.

Depending on the outcome of the sample analysis sub-samples might be taken to determine:

- the development of vegetation by analysis of pollen and macro plant remains
- the animal species present by the analysis of fossils,
- the conditions sedimentation (fresh/brackish/salt water),
- the timing of deposition by eg OSL-dating,
- the climatic conditions in time.

Pollen analysis can be compared with Eemian pollen zonations known from literature.⁴

The analysis of these subsamples will be performed by specialists in the field of:

- palaeoecology
- archaeobotany
- archaeozoology
- fossil analysis (diatoms, dinoflagellates, foraminifers, mollusks)
- isotope analysis

The specialist words are not necessarily limited to research fields described above.

⁴ Zagwijn 1961.

2.3 Personnel

The research will be carried out in accordance with the Dutch Quality Standard, version 4.0. The personnel which can be employed is listed below.

Name	Background	Dutch Quality Standard title
Robert van Lil	Geologist	Senior Prospector
Sejer van den Brenk	Geologist	Senior Prospector
Eisse van den Oever	Geologist	Prospector (Trainee)

Table 4. Personnel available for this project

2.4 Schedule

The execution of sample analysis and reporting is scheduled for February until April 2017; a schedule for specialist works - if applicable - is to be agreed with client.

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