Program of Requirements

Periplus Archeomare

Name project		
Location	**NCP**	**North Sea**
	Place	**North Sea (Dutch EEZ)**
	Toponym	**Hollandse Kust (west) Wind Farm Zone**
Project	**HKN WFZ – Archaeological Field Survey**	

Position within the Archaeological Process
Prospective Field Survey (Geophysical stage)

Authors			
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Authority Approval			
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Contents

1. Administrative data		
1	Project name	Hollandse Kust (west) - Archaeological Field Survey
2	Province	n.a.
3	Council	n.a.
4	Place	North Sea (NCP, Dutch EEZ)
5	Toponym	Wind Farm Zone Hollandse Kust (west)
6	Chart	1801-01
7	Coordinates research area (enveloping framework)	Geodetic datum: ETRS89/ Projection: UTM31N Centre E 548 230, N 5 834 717 IA_01 E 561 228, N 5 855 633 IA_03 E 556 461, N 5 830 656 IA_04 E 549 868, N 5 822 961 IA_05 E 549 138, N 5 822 251 IA_06 E 547 865, N 5 819 747 IA_07 E 536 955, N 5 814 611 IA_08 E 535 233, N 5 813 800 IA_09 E 537 289, N 5 826 953
8	ARCHIS-ozk zaaknr.	4636995100 (archaeological desk study)
9	Surface Area	Plan Area: 393 sq. km Research area desk study: 500 sq. km
10	Present use	Fishing, oil and gas E&P
11	Oceanographic Parameters	Tidal currents, salt water, depth varying between 20.1 and 34.4 meter LAT; average 28.1 meter LAT
12	Area Administrator	Department of Waterways and Public Works - Team Sea and Delta
13	Authorities	Netherlands Enterprise Agency (RVO) advised by the Cultural Heritage Agency (Rijksdienst voor Cultureel Erfgoed, RCE)

2. Motive	
Objective	The purpose of the archaeological assessment is to test the desk study based expectancy for archaeological remains in the area. The expectancy covers remains of shipping related objects (wrecks), airplanes from World War II and prehistoric settlements. The goals set for this assessment are: • To determine the historical or archaeological value of contacts found in the geophysical survey; • The validate the locations of known wrecks; • Assess the prehistoric landscape based on the seismic data.
Motive for this survey in relation to the activities planned	The activities planned comprise the installation of the offshore wind farm Hollandse Kust (west). Cables interconnecting the foundations and connecting the wind farm area to shore will be trenched into the seabed. These activities might introduce an effect to archaeological remains. Also after installation of the wind farm scouring around the monopoles can affect archeological remains. Based on this aim legislation (Erfgoedwet 2016) has been put in place which postulates that archaeological research shall be carried out in case a disturbance of the seabed is foreseen in the course of activities planned. The motive for the current survey stems from the aim to strive for *in situ* preservation of archaeological remains. The desk study summarizes that ship wrecks, World war II related objects and prehistoric landscapes are potentially under threat.
Selection Decision	The assessment of the survey data shall result in an advice with respect to potential further research in accordance with the criteria set by the Dutch Archaeological Quality Standard (in Dutch: KNA Waterbodems 4.1)[1]

[1] Dutch: Kwaliteitsnorm Nederlandse Archeologie Waterbodems (KNA-WB 4.1).

3. Previous research

Archaeological desk study

Contractor	Periplus Archeomare
Period	2018
Publication	Van Lil, R, R, S. van den Brenk and R. Cassée, Amsterdam 2018: Archaeological Desk study Hollandse Kust (west) Wind Farm Zone. Periplus Archeomare rapport 18A031-01 (in preparation)

Results

Within the investigated area of the wind farm zones there is a high expectation for the presence of (remains of) ship wrecks and WWII plane wrecks. Locally in situ remains of Paleolithic and Mesolithic camp sites might be present.

Shipwrecks
According to the NCN database a total of 22 ship wrecks are known in the area (refer to Appendix 2). Four ship wrecks have been identified and are not considered to be of archaeological value. The remaining 18 wrecks could be of archaeological value; further research is needed to determine if this is the case.

Plane wrecks
During World War II, many airplanes crashed into the North Sea. Several sources are ambiguous about the number of aircraft still missing, but estimates range into the hundreds. Remains are found regularly by fishermen or during sand extraction. No remains have been found yet in the vicinity of the research area, but they can be expected.

Prehistory
Remains of prehistoric camp sites and inhumations are expected in situ within the stacked sequence of buried Pleistocene and Early Holocene units. A summary of the archaeological expectancy is included as Attachment 3.

Ice-pushed ridges (Late Saalian)
Ice-pushed ridges are profound morphological phenomena in the prehistoric landscape. The ridge flanks formed preferred locations for the installation of camp sites. The formation of the ice-pushed ridges in the northern part and possibly also along the southeastern borders of the research area dates back to the Late Saalian. Therefore archaeological remains from the Middle Paleolithic (Neanderthaler sites), Late Paleolithic and Mesolithic can occur in the top of ridges. In the northern part of research area the unit is overlain by Holocene deposits. However, in areas where the Eemian and Boxtel Formations are subcropping the ice-pushed deposits (possibly) can be present underneath those units.

Within the sequence of ice-pushed (pre)Saalian river deposits Early and Middle Paleolithic flint artefacts can occur. Quarries in the onshore ice-pushed ridge of the Utrechtse Heuvelrug revealed artefacts of early hominids which are over 150.000 years old.[2]

Lagoons, lakes and fens (Early Weichselian)
Middle Paleolithic Neanderthaler camp sites are to be expected along the beaches of lagoons and shores of lakes and fens. The lithological context is formed by laminated humic clays (lakes and fens) and beach sands (lagoons) of the Brown Bank Member. Camp sites are expected to be intact and well preserved, especially when the remains are contained in a clayey context and covered by peat of the Woudenberg Formation and/or cover sands of the Wierden Member (Boxtel Formation)

The available geological information does not suffice to assess whether the Late Eemian to Early Weichselian facies of sandy lagoonal beaches and/or clayey shores of lakes and fens is present.
The ice-pushed river sands formed a ridge amidst the surrounding landscape, possibly alike the onshore equivalents in the Netherlands. The top of this ridge constitutes an archaeological level for

[2] Rhenen Industry.

remains of Neanderthaler sites, but also for Late Paleolithic and Mesolithic camp sites. In the north-eastern part of the research area the unit subcrops below the Bligh Bank Member. The change that the top of the ice-pushed ridge has been subject to erosion is considerable.

Cover sand landscape (Late Weichselian and Early Holocene)
The camp sites of Late Paleolithic and Mesolithic hunters and gatherers are found in a cover sand landscape with ridges and dunes and the valleys formed by small streams. Stream valleys offered fresh water, a large variety of plant species and ample opportunities for hunting. Camps were installed along the borders of those valleys. The remains of sites can be encountered in the context of sandy, loamy, clayey or peaty beak deposits of the Singraven Member. The lithological context of settlements found at the dunes and ridges is well sorted fine non-calcareous cover sand of the Wierden Member. Both Singraven and Wierden Member are part of the Boxtel Formation.

Late Paleolithic and Mesolithic remains are expected at two distinct levels within the cover sand sequence. The first is a paleosol found in between two cover sand layers Late Paleolithic remains of camp sites of reindeer hunters are to be expected. The paleosol is a charcoal rich layer called the Usselo Bed, which has been formed during the Bølling and Allerød interstadials. The second level is the top of the cover sand sequence. The sandy dunes and ridges often display a well-developed podzol, if not eroded.

Due to the low carbonate content presence of oxygen in the pores of the sand the preservation conditions for organic remains (wood, bone, etcetera) is a priori not so good in cover sands. The preservation of organic remains is therefore highly dependent on the timing of the water table rising above the archaeological level.

Site characteristics
The expected camp sites of hunters and gatherers are generally small (a few sqm), although larger settlements (up to approximately 2000 sqm) can occur in case the site repeatedly or for prolonged period of time was occupied. Sites are characterized by the presence of concentrations of charcoal, flint artifacts, bone remains, burnt seeds and nuts, natural stones and artifacts of bone or horn. Inhumations can occur. The density of finds (debris of flint processing) can vary from low to high.

Physical Quality
It is not known to what extent erosion has affected the integrity of the Pleistocene landscape and embedded remains of prehistoric settlements. The presence of the Basal Peat Bed and/or Velsen Bed provides an indication for an intact Pleistocene landscape, although it should be noted that erosion could have taken place prior to the deposition of peat and clay, leading to degradation or even annihilation of prehistoric remains. The ice-pushed ridges experienced even two full-marine periods which could have led to erosion: the Eemian and Holocene. If the *in situ* prehistoric remains did not suffer from erosion, the very rapid Early Holocene ‘drowning’ of the Pleistocene landscape and local deposition of a peat and/or clay cover offered perfect conditions for the conservation of both organic and inorganic remains. In this situation well-preserved sites of high physical quality can occur.

Occurrence and special distribution
The occurrence and spacial distribution of the Late Saalian ice pushed-ridges, Early Weichselian lagoons, lakes and fens and the Late Weichselian wind-blown dunes and stream valleys in the research area is not known. Surely the available Top Pleistocene map and paleogeographic maps provide an indication, but the actual situation can only be established through subbottom profiling, and (if needed) complemented with borehole sample analysis. The depth below the seabed of the Pleistocene landscape ranges from less than 4m in the northeastern part of the research are to nearly 16m locally in the southwestern part.

In accordance with the AMZ cycle it is advised to conduct a field investigation (in Dutch 'Inventariserend veldonderzoek opwaterfase') in order to test the archaeological expectancy in order to:

- map the locations of known and newly found wreck sites in detail, and
- map the buried prehistoric landscapes and obtain information on the integrity of archaeological levels.

In general, similar investigations carried out in the past consist of a geophysical survey with side scan sonar, magnetometer and subbottom profiler. The resulting data should be assessed after the general processing, interpretation and reporting has been performed by the survey contractor, if possible in combination with analysis of core samples. The archaeological assessment of the data has to be conducted by a geophysical specialist (KNA prospector Waterbodems).

The data quality expected from the surveys need to match the demands for this archaeological assessment. To ensure compatibility between the site investigation and the required quality for this assessment it was recommended to define a Program of requirements (In Dutch: 'Programma van Eisen') in accordance with the 'KNA' (the Dutch quality standards for archeological research), to be authorized by the competent authority.

4. Archaeological expectation based on preliminary investigations	
Maritime related finds	(Parts of) vessel construction, cargo, ballast materials, inventory and personal effects.
WWII related remains	Remains of ship wrecks, airplanes and conventional unexploded ordinance
Prehistory	Drowned prehistoric landscapes and related settlements (camp sites)

Goal and Research Questions	
4.1 Goal	The purpose of the archaeological assessment is to test the desk study based expectancy for archaeological remains in the area. The expectancy covers remains of shipping related objects (wrecks), airplanes from World War II and prehistoric settlements. The goals set for this assessment are: • To determine the historical or archaeological value of contacts found in the geophysical survey; • To validate the locations of known wrecks; • Assess the prehistoric landscape based on the seismic data.
4.2 Primary Question	Are any archaeological remains present within the Area of Interest and to what extent are these remains traceable?
4.3 Research Questions	With respect to side scan sonar, magnetometer and multibeam survey: • Are there any phenomena visible on the seabed? If so: • What is the description of these phenomena? • Do these phenomena have a man-made or natural origin? If these phenomena can be designated to be man-made: • What classification can be attached? If these phenomena can be classified as archaeological: • Is it possible to interpret the nature of the archaeological objects? If these phenomena can be identified as natural: • What is the nature of these natural phenomena? • Based on the acoustic image is it possible to designate zones of high, middle or low marine activity on the seabed? If so: • How can these zones be interpreted? General: • What is the relation between the observed objects and the topography of the seabed? Based on this relationship can risk-prone areas be marked selectively? • If no acoustic phenomena can be observed, are there any clues that this is a consequence of either natural erosion, sedimentation or

	human interference? With respect to subbottom profiler- and sampling: • Based on seismic profiles and geotechnical data is it possible to map the Pleistocene landscape? If so: • Can the expected buried Pleistocene units / landscapes be identified in the seismic data?* • What is the depth of the Pleistocene landscapes with respect to the present seabed? • Is the transition from the Pleistocene unit to the overlying Holocene unit gradual or instantaneous (erosive)? • Can zones be identified where prehistoric settlement remains can be expected? If so: • Could these expected settlement remains be effected by the installation of the cables based on their vertical position related to the seabed? • Are there any indications observed on the seismic profiles for the presence of buried (man-made) objects? If so: • Based on the presence of buried objects and its correlation with side scan sonar, magnetometer en multibeam data can something be said about the nature of these buried objects? * Note: discuss (at least) the following landscapes which are, based on the desk study findings, expected in the research area: - Ice-pushed ridges (Late Saalian) - Lagoons, lakes and fens (Early Weichselian) - Cover sand landscape (Late Weichselian to Early Holocene)
4.4 Restrictions	Investigation 'with restrictions' is not applicable (for explanation, see: memoRIA 2 en 6 (Dutch Inspection Agency for Archaeology).

5. Methodology and Techniques	
5.1 Methodology and Techniques: strategy	Generally the Dutch Archaeological Quality Standard (KNA wb 4.1) is applicable. For surface mapping the seabed of the area of interest is to be recorded fully covered by means of high-resolution side scan sonar and multibeam echosounder. For the mapping of ferro-metalic, buried or exposed objects a magnetometer is required. For the modelling of the subsurface a sub-bottom profiler is required. For the interpretation of the seismic profiles the results of the geotechnical sampling and CPT's are being used.
5.2 Methodology and Techniques: execution	For a standard inventory of the remains of airplanes, shipwrecks and maritime objects the following conditions are applicable: • Frequency of the Side Scan Sonar minimally at 400 kHz; • Maximum range setting of 50 meter for the side scan sonar; • A vessel track distance of maximally 40 meters is allowed to ensure at least 100% overlay between adjacent lines • A vessel track distance for the magnetometer of maximally 40 meter to ensure the detection of sizeable ferromagnetic (iron) wreck remains.

	For the reconstruction of the drowned prehistoric landscape the seismic profiles at least need to penetrate the seabed to the level of disturbance The survey vessel requires an accurate positioning system (preferably RTK). The possible offset between the GPS antennae and the survey equipment need to be verified through calibration relative to a fixed point of reference. Prior to and after the acquisition of data a sounding profile needs to be recorded to determine the velocity of sound in the water column. At a traveling speed of 4 knots the highest possible resolution of data is guaranteed. In order to meet the goals set for this stage of archaeological research, which comprises a refinement of the archaeological expectancy model and allocation of areas with a high archaeological expectancy, it is advised to discuss the survey operations with the survey contractor, the archaeological contractor and the RCE prior to the execution of the survey.

5.3 Restrictions	Due to the sizeable extent of the area of interest (>350 km^2) and its location at sea it is practically not achievable to hold on to the above mentioned conditions for this field investigation. Therefore the proposition is to adhere to the following minimal conditions: • Fully surface covering multibeam data set conform IHO (2008) norm *1A* • Fully surface covering side scan sonar records with a maximum vessel track distance of 100 meter and an overlap of minimally 100 % to ensure that all objects larger than 0.5 meter can be detected; • Provision of georeferenced side scan sonar images of all contacts; • Magnetometer records with a vessel track distance between adjacent survey lines of maximal 100 meter; • A number of representative seismic profiles throughout the area of investigation; • The vessel speed should not exceed 6 knots Positioning using RTK may not achievable at sea. The presence of shallow gas, i.e. related to peat in the Holocene sediments, can result in acoustic blanking of the seismic signal. As a result the Pleistocene landscape will not be visible at these locations. The presence of boulders can make it difficult to distinguish buried wreck remains, unless phenomena such as scouring on the seabed are observed, that provide additional information about the dimensions and nature of the buried object. Also results from the magnetometer can add to the interpretation of the buried object.

6. Analysis	
6.1 Processing and analysis of geophysical data	The (comprehensive) data set must be processed and analyzed in order to provide answers the research questions posed. Geophysical data shall be analyzed by an experienced geophysicist (KNA status prospector maritime archaeology). A senior prospector maritime archaeology or a senior maritime archaeologist evaluates the data analysis and the reported results, conclusions and the advice.
6.2 Limitations	None

7. Final product: reporting and depositing	
7.1 deliverables	A comprehensive report is part of the assignment. The final report shall be drawn up in accordance to KNA specification VS05wb. An English written report is to be delivered including a Dutch summary. The contractor produces a draft version of the report to the authority. The authority will review quality of the content of report delivered. Along with the final product a receipt of the delivery of documentation will be handed over by the receiving party. Along with the final report digital data carrier is delivered containing: • A listing of contacts of potential archaeological interest including positions and dimensions (in GIS format); • Images of all sonar and/or multibeam contacts of archaeological interest; • Digital maps of the interpreted magnetometer, side scan sonar data, subbottom profiler data; • Subbottom profiler data of archaeological interest. If during the survey results in additional information with respect to objects known from the NCN-database or if man-made objects are encountered which have not been found before, this information shall be delivered digitally in a standard format to the area administrator (Department of Waterways and Public Works - Team Sea and Delta).
7.2 Content final report	Refer to KNA VS05wb. For this project in particular side scan sonar, magnetometer, subbottom profiler and multibeam recordings play an important role in the interpretation of phenomena under water.
7.3 Publication and format of final report	The final report is issued by the contracting party. The report is part of the in house publication series of the contractor. The report is delivered to the Cultural Heritage Agency (digitally and analogue), the area administrator Department of Waterways and Public Works - Team Sea and Delta, the Royal Library and the digital archive DANS.
7.4 Deposition	Relevant results shall be registered in Archis within two months after completion of the standard report. Digital data will be handed over to the e-depot (www.edna.nl) within two years after completion of the field survey.
7.5 Limitations	None

8. Prerequisites	
8.1 Personnel	The survey must carried out or supervised by an archaeological company which is in the possession of a license to perform archaeological research in Dutch waters. The survey shall be supervised by a senior prospector maritime archaeology or a senior archaeologist with a solid background in analogues projects at sea. Both for field work as for the analysis and reporting an experienced project leader with specific knowledge of the area is required.
8.2 Lead-time field work	In consultation with company
8.3 Work conditions	In agreement with ARBO law.
8.4 Quality control, supervision, consultation and evaluation	The Netherlands Enterprise Agency (RVO) and the Cultural Heritage Agency (RCE) supervise the process of archaeological research. Solely RVO and RCE are entitled to change the Program of Requirements.
8.5 Selection Procedure during field work	n.a.
8.6 Field work period; deadline draft report	Field work: Last quarter 2018 Draft report: within 8 weeks after the field work
8.7 Procedure QC final	The Netherlands Enterprise Agency (RVO), the Cultural Heritage

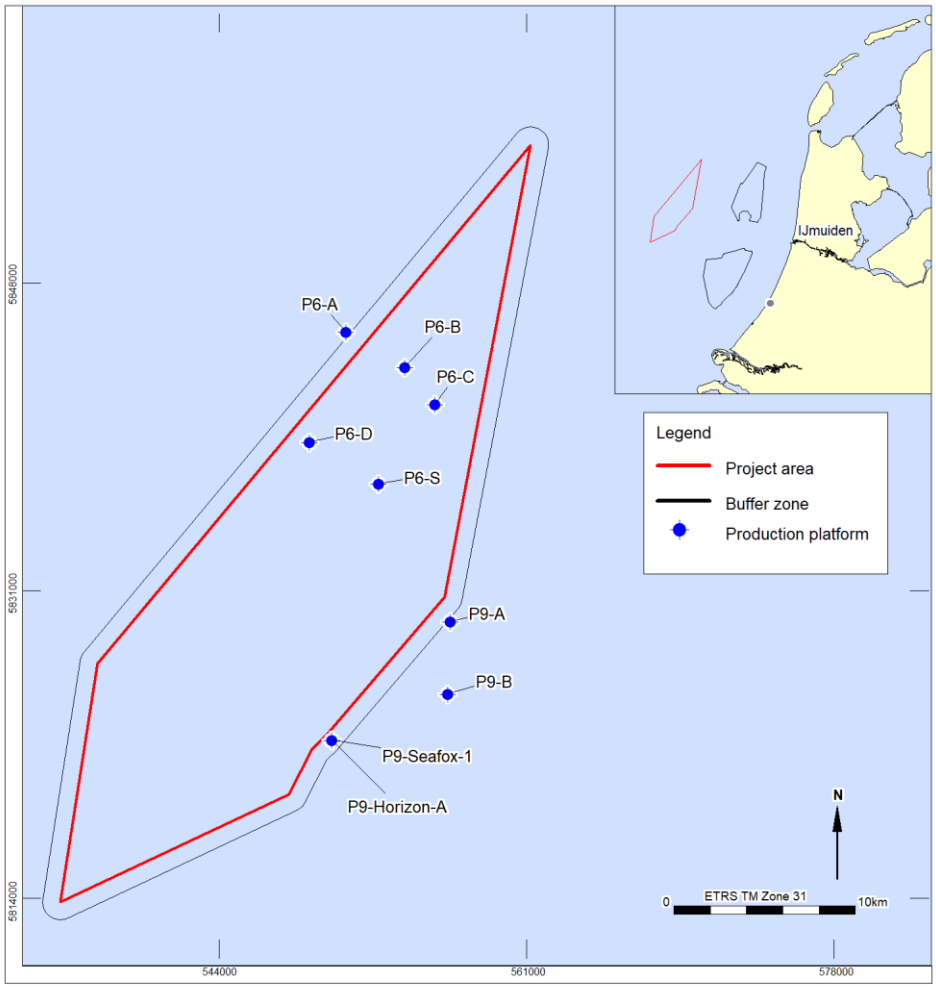
product by authorities	Agency and the company review quality of the content of the draft version of the report. After finalizing the survey the period of time applicable for the QC is agreed upon.

9. Change of plans	
9.1 Changes during field survey	In consultation with the survey company and authorities.
9.2 Procedure for change after completion of field survey	Not applicable.
9.3 Procedure for change during analysis, reporting or conservation	In consultation with the survey company and authorities.

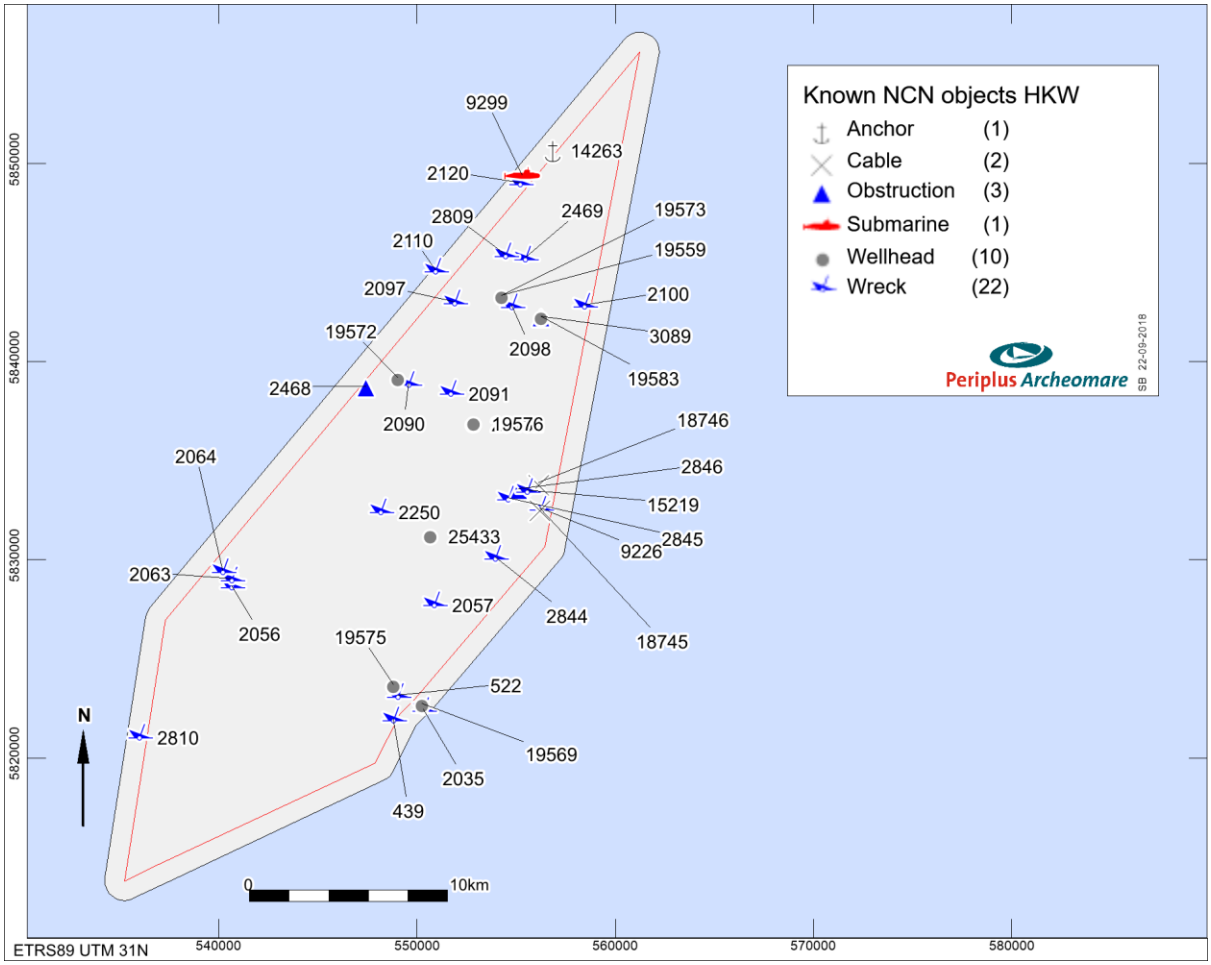
10. References

- Busschers, F.S., C.W. Dubelaar, J. Stafleu en D. Maljers, 2010: Lithological and sand grain-size variability in the three-dimensional GeoTOP model of Zuid-Holland, Delft.
- De Mulder, E. e.a., 2003: *De ondergrond van Nederland*, Groningen.
- Deeben, J., D.P. Hallewas & Th.J. Maarleveld, 2002: Predictive modelling in Archaeological Heritage Management of the Netherlands: the Indicative Map of Archaeological Values (2nd Generation), Berichten van de Rijksdienst voor het Oudheidkundig Bodemonderzoek 45, 9-56.
- Forzoni, A., Vermaas, T., Mesdag, C., Hijma, M., de Lange, G. and de Kleine, M., 2017. Geological study Hollandse Kunst (noord) Wind Farm Zone).
- Gaffney, V.L., K. Thomson en S. Fitch, 2005: The Archaeology and geomorphology of the North Sea, Kirkwall.
- Hessing, W.A.M., 2005: Het Nederlandse kustgebied, in: Bechert, T en W.J.H. Willems (red.), De Romeinse rijksgrens tussen Moezel en Noordzeekust, 89-102.
- Hijma, M., 2009: From river valley to estuary, The early-mid holocene transgression of the Rhine-Meuse valley, The Netherlands, Netherlands Geographical Studies 389, Utrecht.
- Huizer, J. en H.J.T. Weerts, 2003: Formatie van Maassluis, In: Lithostratigrafische Nomenclator van de Ondiepe Ondergrond, Geologische Dienst Nederland (DINOloket).
- IMAGO projectgroep, 2003: Eindrapportage IMAGO: Samenvatting en conclusies, RDIJ rapport 2003-13a.
- Kramer, E. e.a., 2003 (red.): Koningen van de Noordzee, 250-850, Leeuwarden / Nijmegen.
- Louwe Kooijmans, L.P., 1970-1971. *Mesolithic Bone and Antler Implements from the North Sea and from the Netherlands*.- Berichten van de Rijksdienst voor het Oudheidkundig Bodemonderzoek, 20-21: 69-70.
- Maarleveld, Th. J. en E.J. van Ginkel, 1990: Archeologie onder water, het verleden van een varend volk, Amsterdam.
- Maarleveld, TH.J. , Almere 1998: Archaeological heritage management in Dutch waters: exploratory studies.
- Rieu, R., van Heteren, S., van der Spek, J.F., and de Boer, P.L., 2005: Development and preservation of a Mid-holocene Tidal-Channel Network Offshore the Western Netherlands. Journal of Sedimentary Research, 75-3, p 409-419.
- Rijsdijk, K.F, S. Passchier, H.J.T. Weerts, C. Laban, R.J.W. van Leeuwen & J.H.J. Ebbing, 2005: Revised Upper Cenozoic stratigraphy of the Dutch sector of the North Sea Basin: towards an integrated lithostratigraphic, seismostratigraphic and allostratigraphic approach. Netherlands Journal of Geoscience 84-2, p 129-146
- Schüttenhelm, R.T.E.and Laban, C. 2005. Heavy minerals, provenance and large scale dynamics of seabed sands in the Southern North Sea
- Thal, J., Socko, L., Feldmann, S, Brock, J. P. (2018). Geological Desk Study for the Hollandse Kust (west) Wind Farm Zone. Arcadis Nederland B.V. and Geo-Engineering.org GmbH, 180017. Netherlands Enterprise Agency. (RVO.nl).
- Van den Brenk, S., B.E.J.M. van Mierlo en W.B. Waldus, 2008. Archeologisch bureauonderzoek aanleg windturbinepark Tromp-Binnen en kabelroutes naar de Nederlandse kust. Periplus Archeomare rapport 08A014
- Van Lil, R. & S. van den Brenk, 2013. Archeologisch bureauonderzoek en inventariserend veldonderzoek zandwingebied Q05 Zeewaarts. Periplus Archeomare rapport 13A029-R04
- Van Lil, R. , S. van den Brenk and R. Cassée, in preparation. Archaeological Desk Study Hollandse Kust (west) Wind Farm Zone. Periplus Archeomare rapport 08A031-01.
- Van Lil, R. en van den Brenk, S., 2014. Windturbinepark Q4 en kabelroute naar de Nederlandse kust. Periplus Archeomare rapport 14A021
- Verhart, L., 2005: Een verdronken land. Mesolithische vondsten uit de Noordzee, in: Louwe Kooijmans, L.P. e.a. (red.), de Prehistorie van Nederland, 157-160.
- Vonhögen-Peeters, L.M., S. van Heteren and J.H.M. Peeters, 2016. Indicatief model van het archeologische potentieel van de Noordzeebodem. Deltares rapport 209133-00.

Appendix 1. Location map



Appendix 2. Known objects in the research area (from archaeological desk study)



NCN	Nlhono	Type_contact	R95	Easting	Northing	Survey_datum	Description
439	3444	Wreck	5	548806	5821993	20080509	Wreck yacht Regina, 13x3x2 meter, sunk 01-05-2008 after collission
522	5	Wreck	25	549026	5823162	20140908	Wreck DHY 522. Duikteam Zeester: Wreck of coastvessel, sunk 1980, standing right up, superstructure is gone, close by platform
2035	2221	Wreck	500	550310	5822477	20090409	Wreck DHY 2221. Unknown small wreck found 1959, not confirmed since
2056	2247	Wreck	25	540651	5828702	20140908	Wreck DHY 2247. Duikteam Zeester: "Paaswrak 1", close to the Brown bank
2057	2248	Wreck	25	550864	5827791	20140908	Wreck DHY 2248. Duikteam Zeester: Wreck Dutsch fishingtrawler Stellendam 4, sunk 1969
2063	2255	Wreck	20	540648	5829062	20070811	Wreck DHY 2255, Unknown wreck found 1970
2064	2256	Wreck	25	540173	5829482	20140908	Wreck DHY 2256. Duikteam Zeester: Norwegian cargoship Biaritz from 1920, sunk 1940
2090	2283	Wreck	1000	549558	5838909	-	Wreck DHY 2283. Unknown wreck found 1946
2091	2284	Wreck	5	551689	5838477	20140907	Distributed remains of wreck DHY 2284
2097	2291	Wreck	500	551880	5843043	-	Wreck DHY 2291 Unknown wreck found

NCN	Nlhono	Type_contact	R95	Easting	Northing	Survey_datum	Description
							1961
2098	2292	Wreck	25	554776	5842849	20070811	Wreck DHY 2292. Duikteam Zeester: Boezemwrak close to platform
2100	2294	Wreck	1000	558429	5842871	-	Wreck DHY 2294. Mast reported 1898, not confirmed since
2110	2304	Wreck	1000	550906	5844640	-	Wreck DHY 2304. Wreck reported 1946, not confimed since
2120	2315	Wreck	25	555194	5849035	20140907	Wreck DHY 2315. Duikteam Zeester: Submarine Doris
2250	2468	Wreck	100	548152	5832498	20070811	Wreck DHY 2468. Unknown wreck reported 1984
2468	2849	Obstruction	10	547407	5838757	20070811	Foul ground
2469	2852	Wreck	5	555440	5845241	20140907	Wreck debris
2809	3427	Wreck	5	554452	5845413	20140907	Wreck DHY 3427. Unknown wreck reported with sonar 1997
2810	3428	Wreck	50	535978	5821107	20140908	Distributed remains of wreck
2844	3498	Wreck	50	553958	5830158	20081129	Wreck DHY 3498
2845	3499	Wreck	50	554572	5833117	20140908	Wreck DHY 3500. Wreck debris reported 2014
2846	3500	Obstruction	5	555128	5833583	19971015	Manmade object. RWS ROV images available
3089	-	Obstruction	5	556255	5842276	15-10-97	Manmade object, probably wellhead. RWS SR 1016
9226	-	Wreck	5	556213	5832620	-	Wooden wreckremains, discovered in 2002. ARCHIS wng 47163
9299	-	Submarine	1	555298	5849442	-	French submarine Doris, sunk mei 1940, cannon salvaged in 2003. ARCHIS wng 48181
14263	-	Anchor	5	556822	5850739	13-10-00	Anchor and chain, length 82 m. RWS Sr 11072
15219	-	Wreck	5	555554	5833512	16-10-92	Norwegian cargo vessel Nordfrakt, sunk 25-10-1992, dimensions 76x12x2m. RWS SR 11968
25432	100543	Wellhead	5	552819	5836933	-	Wellhead P06-S-01
25433	100650	Wellhead	5	550669	5831259	-	Wellhead P09-07
25434	100875	Wellhead	5	552838	5836933	-	Wellhead P06-10
18745	-	Cable	5	556203	5832620	01-01-02	Piece of cable. RWS SR 1042, survey 2002
18746	-	Cable	5	556113	5833907	18-04-02	Piece of cable. RWS SR 1043, survey 2002
19559	100403	Wellhead	5	554262	5843360	-	Wellhead P06-03
19569	100507	Wellhead	5	550241	5822755	-	Wellhead P09-HORIZON-A-08-SIDETRACK1
19572	100761	Wellhead	5	549013	5839202	-	Wellhead P06-D-01
19573	100534	Wellhead	5	554269	5843354	-	Wellhead P06-B-04, same location as NCN 19559
19575	100417	Wellhead	5	548797	5823713	-	Wellhead P09-02
19576	100617	Wellhead	5	552845	5836956	-	Wellhead P06-S-01, same location as NCN 25432
19583	100409	Wellhead	5	556266	5842284	-	Possible Wellhead P06-01

Appendix 3. Summary of archaeological expectancy (prehistory)

Formation	Member / Bed	Lithology	Age	Arch. Expectancy*	Period
Southern Bight	Bligh bank	sand	Holocene	I, IV	Historical periods
Naaldwijk	Wormer	clay and sand		I	
	Velsen	humic clay	Early Holocene	II	Mesolithic
Nieuwkoop	Basal Peat	peat		II	
Boxtel	Singraven	sand, loam, clay and peat	Weichselian and Early Holocene	II and III	Late Paleolithic and Mesolithic
	Wierden	fine sand		III	
Eem	Brown Bank	clay	Eemian and Early Weichselian	II and III	Middle Paleolithic
		sand and clay	Eemian	IV	
Yarmouth Roads (ice-pushed)		sand and clay	Saalian ice-push event of Pre-Elsterian river sands	II, III and IV	Early Paleolithic to Mesolithic
Drente	Uitdam	sand, silt and clay	Saalian	II and III	Middle Paleolithic
	Schaarsbergen	sand		II	
	Gieten	gravelly clay, loam, and sand with cobbles and boulders		III	

*

Archaeological Expectancy	
I	Ship wrecks and shipping related objects; air planes from World War II
II	Lost or dumped objects including flint and bone hunting gear, fish weir, fish traps and dugout boats
III	Camp sites and inhumations
IV	Artefacts in reworked context