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Goodwin Sands and the Downs: Multi-Beam Surveys of the Designated Wrecks

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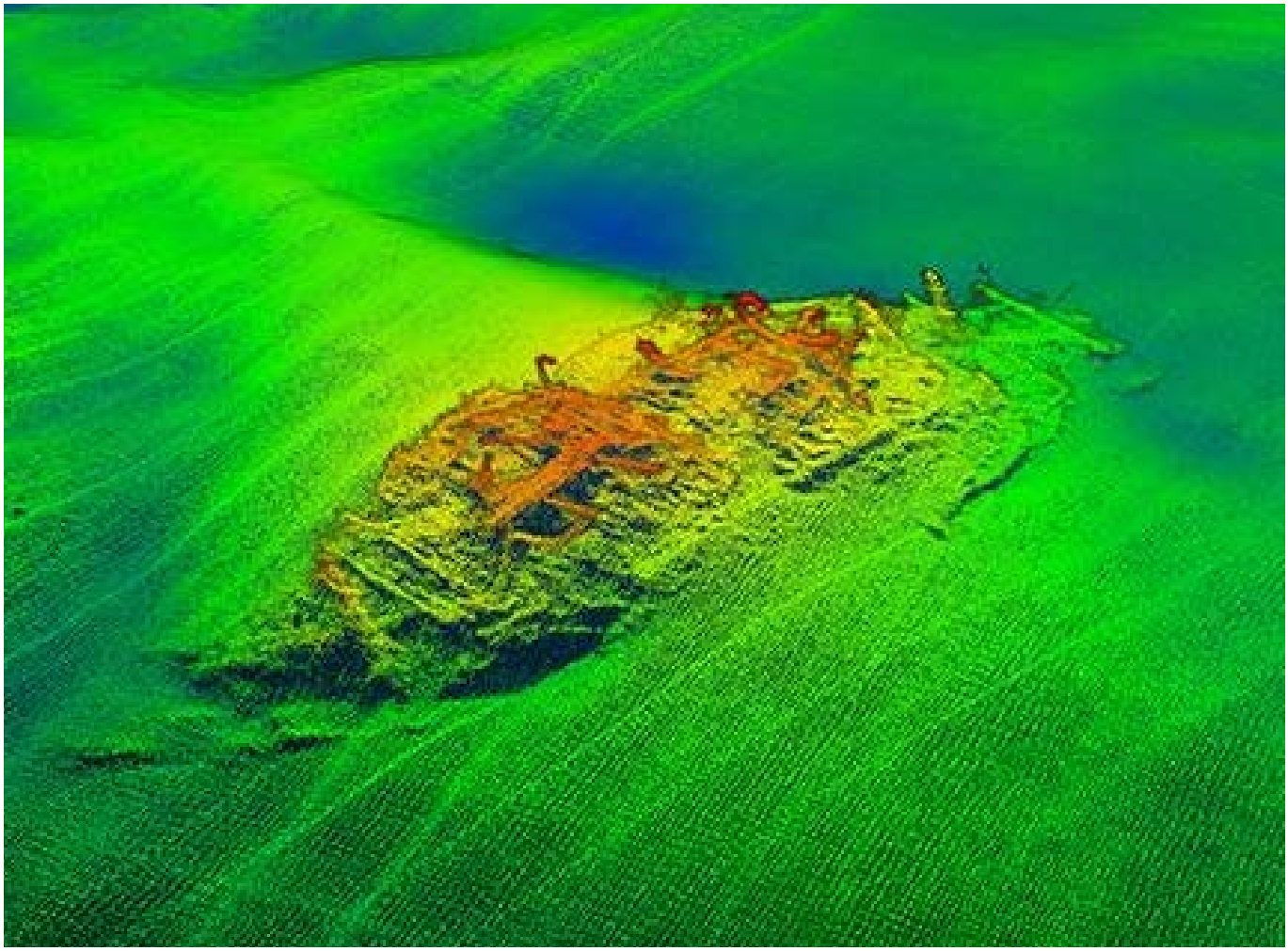

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Multi-Beam Surveys of the Designated Wrecks on the Goodwin Sands and the Downs

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SUMMARY

In 2017 Pascoe Archaeology was commissioned by Historic England to conduct a multi-beam echo sounder survey (MBES) over six designated sites and one undesignated site in the Goodwin Sands and The Downs region. The six designated sites were the *Northumberland*, *Stirling Castle*, *Restoration*, *Rooswijk*, and *Admiral Gardner* on the Goodwin Sands and GAD 8 in The Downs. GAD 23, also known as the 'Bowsprit Wreck', was the undesignated site in the Goodwin Sands.

The surveys were conducted between the 13–16 March 2017 by a collaborative team including Pascoe Archaeology, MSDS Marine and Swathe Services. The survey vessel, *Predator*, was provided by Predator Charters Marine Ltd, skippered and crewed by Daniel Poppy and Ben Appleton. High resolution MBES data was collected over each site except for the *Admiral Gardner*. It was not possible to conduct a survey over the *Admiral Gardner* because of the lack of water over the site.

The MBES datasets have identified some notable, and in some cases dramatic, changes over the sites of the *Rooswijk*, *Stirling Castle*, *Northumberland* and GAD 23, which highlights the dynamics of the Goodwin Sands. In short: the *Stirling Castle* appears to be covering up with a large bank of sand encroaching from the east; the *Northumberland*, which has been understood to be buried since 2011, is uncovering with an exposed wreck mound 33m long and 18m wide; the *Rooswijk*'s West site (main site) is more exposed but the East site has almost entirely been covered by a sand wave. A new potential gun site has also been identified between 55 and 101 metres northeast of the designated area, which could be associated with the *Rooswijk*. GAD 23, the 'Bowsprit Wreck' has changed dramatically with further reductions in surrounding sediments and the collapse of the bow, which once stood intact. Little change has occurred on the cannon site, known as GAD 8, and the site of the *Restoration* remains buried.

CONTRIBUTORS

Pascoe Archaeology Services

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The author gratefully acknowledges the funding received from Historic England, without it this project would not have been possible. The assistance provided by Alison James was most gratefully received. The author would also like to thank Robert Peacock for sharing his knowledge of the sites and the Goodwin Sands. Also, Philippa Naylor from Historic England for participating in the survey.

The fieldwork was carried out by Mark James of MSDS Marine, Mark Gray and Matthew King of Swathe Services, Rodrigo Ortiz-Vazquez and supervised by Dan Pascoe of Pascoe Archaeology. The survey vessel, *Predator* of Predator Marine was skippered by Daniel Poppy and crewed by Benn Appleton. The results of the survey were processed by Mark James of MSDS Marine and Swathe Services. The results were interpreted and this report has been written by Dan Pascoe and illustration produced by Mark James.

DATE OF PROJECT REPORT
July 2017

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1 INTRODUCTION

1.1.1 This report has been prepared by Pascoe Archaeology (PA) for Historic England (HE). It constitutes a Project Report for the multi-beam echo sounder survey (MBES) of six designated sites and one undesignated site in the Goodwin Sands and Downs region.

1.1.2 The programme of work was conducted in accordance with the Project Design agreed by HE. MBES work took place over four days between 13–16 March 2017. The MBES were conducted by MSDS Marine and Swath Services (SS) while PA supervised and oversaw survey operations.

1.1.3 Following the fieldwork MSDS Marine and SS processed the results of the data collected. PA used the processed data to interpret the archaeological remains exposed on the seabed for each of the sites that form the basis of this report.

1.1.4 In addition, PA has used first-hand knowledge of several of the sites to identify exposed archaeological features visible on the current MBES. Also, comparisons have been made with previous MBES conducted by the Archaeological Diving Unit Survey (ADUS) and TrenDive.

2 PROJECT AIMS AND OBJECTIVES

2.1 Project Aim

2.1.1 To conduct a high resolution MBES of all six designated wreck sites within the Goodwin Sands and the Downs (*Northumberland*, *Stirling Castle*, *Restoration*, *Admiral Gardner*, *Rooswijk* and GAD 8) and one undesignated site (GAD 23). These surveys aim to provide the most up to date bathymetric data to help define the current extent of each of the sites, which will be a benefit to future management strategies. The surveys will aim to inform HE's Heritage at Risk assessment for 2017 and subsequent responses which might allow the sites to stay off the register.

2.2 Project Objectives

2.2.1 The following objectives of the project are as follows:

To acquire and interpret high-resolution MBES data over the designated wrecks of the *Northumberland*, *Stirling Castle*, *Restoration*, *Rooswijk*, *Admiral Gardner*, GAD 8;

- To acquire and interpret high-resolution MBES data over the undesignated site of GAD 23;
- Where possible compare datasets from different years in order to identify changes occurring over the sites.
- Where possible use first-hand knowledge of the site to help identify exposed archaeological features visible in the current MBES survey data;
- Establish the current extent and exposure of each of the sites to ensure the correct areas are protected;
- Provide accurate, georeferenced bathymetric maps of the surface remains of each of the sites.
- This survey affords HE the opportunity to attain a consistent level of quality and reliable survey data, which may become useful to assess broader changes in sedimentary processes in this region. This in turn may well demonstrate, through subsequent and consistent monitoring, where sands are considered to be growing and working in an anti-clockwise direction, in line with two main principle interpretations of sediment transport processes for the sand bank areas (Cloet 1954; Kenyon and Cooper 2005).

- The bathymetric maps of the sites can all potentially be used for future visualisation wreck tours thus providing the building blocks for a virtual tour, which will open access to the sites to more than just the diving community.

3 METHODOLOGY

3.1 Positioning and Motion

3.1.1 Positioning and motion for the MBES was controlled using an Applanix POS MV WaveMaster with real time RTK corrections. The Applanix system with RTK corrections produces positional accuracy of >0.1m, roll and pitch to 0.02°, heading to 0.03° and heave to 2cm or 2%. Where required, the position data was post-processed in POSPac to improve absolute accuracy.

3.2 Multi-Beam Echo-Sounder Survey

3.2.1 An R2Sonic 2024 with Ultra High Resolution (UHR) mode MBES was used for the collection of multi-beam bathymetry data. The 2024 offered an excellent combination of resolution, ease of use and size and weight, making it an ideal system for short, high resolution surveys undertaken on vessels of opportunity.

3.2.2 At 450 kHz the 2024 has a beam width of 0.9° x 0.45° reducing to 0.6° x 0.3° when in 700 kHz UHR mode. The 2024 has a real time user selectable swath sector of 10° to 160° and a range resolution of up to 1.25cm. These features ensure high resolution, high density data collection the parameters of which can be adjusted in real time to ensure optimum esonification of the seabed and any features of potential archaeological interest.

3.2.3 The MBES was mobilised onto the survey vessel with the use of rigid metal frame incorporating the Inertial Measurement Unit (IMU) and the antennae. By mounting the MBES, the IMU and the antennae on the same rigid frame, common errors associated with vessels of opportunity–such as offset errors and hull flex–are reduced to a minimum. Prior to data collection a patch test was undertaken to determine any offsets between the MBES, the IMU and heading sensor. Offset corrections were then applied to the dataset to ensure minimal errors in the positioning and overlap of the data. MBES data was collected by running predetermined lines based on the depth of water to achieve a data overlap of 50%. The deeper the water, the wider the coverage at a fixed swath sector; although beam footprint will increase and data density will decrease. The data recorded was displayed in real time, as such online QC took place and lines were re-run or filled in where required.

3.2.4 Sound velocity was recorded continuously at the MBES head with a Valeport Mini Sound Velocity Sensor (SVS) and at intervals through the water column with a Valeport Sound Velocity Profiler (SVP). Sound velocity measurements are required, and applied to the MBES data, in order to correct errors that may be created due to variations in the speed of sound through the water column. All line planning and MBES data collection will be undertaken in HyPack HySweep or QPS Qinsy. Following data collection, patch test and tide corrections were applied within HyPack HySweep or QPS Qinsy and the data

exported as individual lines in XYZ format. The lines of data were cleaned in various programs–including HySweep, Fledermaus and Cloud Compare–to remove noise, data artefact and unwanted features such as fish.

3.2.5 Once the data was cleaned the lines were imported into software, including Fledermaus and Cloud Compare, where the data was visualised and effects such as shading applied to help highlight potential anthropogenic features.

4 PROJECT RESULTS

4.1 Introduction

4.1.1 Four days of MBES surveys were conducted over five designated sites and one undesignated site on the Goodwin Sands and The Downs from the 13–16 March 2017. These sites included the *Northumberland*, *Stirling Castle*, *Restoration*, *Rooswijk* and GAD 23 on the Goodwin Sands and GAD 8 in The Downs. There was insufficient depth of water to conduct a survey over the *Admiral Gardner*, meaning the site is totally buried under a great depth of sand.

4.2 The *Rooswijk*

4.2.1 The *Rooswijk* is the wreck of a Dutch East Indiaman lost in January 1740. She lies on the Goodwin Sands southeast of the North Sands Head and northeast of the Kellet Gut. The exact position is 51º16.443'N 001º34.537'E with a designated area with a 150m radius (WA 2012).

4.2.2 Within the 150m designated area there are three known sites relating to the remains of the *Rooswijk*. These are the West site (Main site), East site and the North site (Figures 1–7). The West site is the main body of the wreck consisting of a wreck mound 27m long by 24m wide (Figures 1–3). The East site, believed to be the impact site, has almost entirely been covered by a bank of sand, apart from an anchor (Figures 4–5). There is also a debris trail between the East and West sites, which includes an anchor. The North site is a large scatter of concreted barrels covering an area of 19 x 13m with a debris trail heading south for roughly a further 20m (Figures 6–7).

4.2.3 In addition, the 2017 survey has identified a further site 55m northeast of the designated area (Figures 8–9). This site consists of up to nine linear shaped anomalies between 2–2.6m in length that, due to the size and shape, have a good potential to be guns/cannons. The cluster of potential guns extends 53m to the northeast. Due to the close proximity to the *Rooswijk* and the lack of guns observed on the West site (Main site) there is a possibility that this new site could be associated with the *Rooswijk*. It will therefore be treated as potentially part of the *Rooswijk* and included in the interpretation and analysis of the 2017 survey data.

West site (Main site)

4.2.4 The West site consists of a wreck mound 27m long by 24m wide at its widest,14m wide across its centre and orientated southeast–northwest (Figures 1–2). There are numerous exposed features, including anchors, guns, structure and cargo. There are also several features exposed lying outside the main mound. Knowledge gained from previous investigations and artefactual evidence recovered suggests that the remains of the bow are towards the southeast and the stern of the vessel towards the northwest.

4.2.5 Analysis of the 2017 MBES survey data shows that the site is generally more exposed than it was in the 2016 survey data. There are a greater number of exposed archaeological features and features which were exposed previously are both more pronounced and extensive.

4.2.6 At the northwest end of the wreck-mound are two guns (labelled guns 3&4 from 2005 investigations), directly north of these is a roughly 7 x 7m area of exposed features (Area 1) consisting of a several linear features orientated in north–south and east–west directions. These could represent both exposed guns as well as timber structures and are consistent with some of the observations made in this area during the 2016 investigations. During this time two guns flush with the seabed and part of a possible shot locker, enclosed by timber structures, were found. From the 2017 MBES data it now appears that there is a far greater exposure of features compared with both the 2016 MBES data and diving observations.

4.2.7 Six metres east of Area 1 is a T-shaped feature (Area 2), across the top of the T it is 5.1m long by 1.5m wide and the upright of the T is 4.7m long by 1.7m wide. In the 2016 MBES data only a 1.4 x 1.2m section was exposed, therefore this area has exposed significantly since the 2016 survey. It is uncertain what the whole feature could represent but it is known from the 2016 investigations this is partly concreted cargo.

4.2.8 Four metres south of Area 2 is an exposed section of structure (Area 3). The identification of this structure is known from Wessex Archaeology diving inspections in 2011 (WA 2012) and was confirmed during the 2016 diving investigations. It consists of a section of the hull including a gunport, frames, knee, inner and outer planking (WA 2012). The 2017 MBES data shows this feature is now 2.8m long by 2.3m wide. Exposure has increased on the northeast side by 1.3m and the overall appearance is much more pronounced than recorded on the 2016 MBES data.

4.2.9 Five metres south of Area 3 is a rectangular feature which is approximately 1.4m long and 0.7m wide and this is also the highest point of the wreck mound. This feature was observed during the 2016 diving investigations and is the concreted remains of a large box.

4.2.10 At the very southeast end of the wreck mound there is the clear shape of an anchor, including flukes and shank. There are in fact two anchors one on top of the other. Besides the western fluke is a rectangular feature, this is a cut stone block.

4.2.11 Between the anchors and the rectangular feature is a long linear feature 4.6m in length. This feature is barely visible in the 2016 MBES data, so exposure has increased significantly in this area. It is possible this feature is structural as timber frames were observed in this area during the 2016 diving investigations.

4.2.12 On the western side of the wreck mound there are two main features. Feature 1 is roughly 6m long by 2m wide. This was identified during the 2016 diving investigations as strips of concreted iron. Feature 2 is 3.7m long by 1.2m wide and this was a combination of strips of iron and timber structure.

Features off the wreck mound

4.2.13 Nine metres south of the anchors is an anomaly that has the appearance of a partly exposed anchor (Figure 3). The shape is consistent with one exposed fluke and the shaft. The shaft is 3.4m long and the length of the fluke from the crown is 1.6m. If it is an anchor it is a smaller type than the ones on the main wreck mound.

4.2.14 Six and half metres southeast of the anchors on the main wreck mound is a circular anomaly (Figure 3). It has a diameter of 1.5m.

4.2.15 7.5 metres SSW of the top of Feature 2 is an area 3.8 x 3m of exposed material but it is not possible to identify what it may be.

4.2.16 27 metres southwest of the top of Feature 2 is an isolated anomaly with a distinct scour around it. The anomaly is 1.5x 1.2m and the scour is approximately 1m wide.

East site

4.2.17 The East site has changed dramatically since the 2016 MB survey. In the 2016 survey it was possible to identify a scatter of small rectangular anomalies. These were known to be the cut stone blocks the *Rooswijk* was carrying as part of the cargo. In addition, an area of concretion consisting of strips of iron and a single anchor was visible at the southern limit of the site. A large bank of sand was encroaching from the north which, in 2016, was 29m north of the anchor.

4.2.18 The 2017 MBES survey has identified that the large bank of sand has migrated southwards covering the entire site with the exception of the anchor. The edge of the bank of sand is now only 4.5m away from the crown end of the anchor. It has therefore advanced approximately 24.5m since the last survey in 2016 (Figures 4–5).

North site

4.2.19 The North site consists of a scatter of small anomalies, many of which have been identified as concreted barrels. They cover an area roughly 19 x 15m. In addition, there appears to be a debris trail extending a further 20m south (Figures 6–7).

4.2.20 Compared with the previous survey there appears to be a slight reduction in sand over the site as the seabed is flatter and anomalies more pronounced.

Gun site

4.2.21 Northeast of the edge of the designated area is a scatter of nine linear anomalies. The closest of the anomalies is 55m from the edge of the designated area and the furthest is 101m (Figures 8–9). These linear anomalies range in length from 2–2.6m and are roughly 0.4–0.5m wide. There is no obvious evidence of any ship's structure in or around these linear anomalies. There are, however, a small number of other rough shaped anomalies but nothing to suggest significant sections of ship structure exposed or potentially lying just beneath the surface. For example, there are no mounds that may suggest buried material.

4.2.22 Due to the sizes and shape of the anomalies it is highly possible that they are guns. The lack of any exposed evidence of ship's structure or mounds to suggest potential buried material would indicate this is a potential site of jettisoned material rather than a final wrecking position.

4.2.23 This area was less exposed during the 2016 survey as it is only possible to clearly make out one of the possible guns and a very slight impression of two others. This demonstrates how the seabed has changed between surveys and how a relatively small reduction in sediments can expose a significant number of archaeological features.

4.2.24 As mentioned above, nine potential guns have been identified in the 2017 data and three of these can be seen in the 2016 data. Figure 9 has the potential guns circled and their exposed dimensions and orientations are listed below.

Gun	Survey Year	Length (m)	Width (m)	Orientation
1	2016 and 2017	2.3	0.5	NW/SE
2	2017	2.4	0.5	NW/SE
3	2017	2.5	0.5	NNE/SSW
4	2017	2.0	0.4	NE/SW
5	2017	2.4	0.5	NE/SW
6	2017	2.4	0.4	ENE/WSW
7	2017	2.6	0.5	NW/SE
8	2016 and 2017	2.6 (from 2016 data)	0.4	NNE/SSW
9	2016 and 2017	2.5	0.4	NNE/SSW

4.3 The *Northumberland*

4.3.1 The *Northumberland* was a third-rate Man of war of 70 guns built in 1679 in Bristol. She was lost on the 27th November 1703 during the Great Storm. The wreck lies at a chartered depth of 14m 9.5km southeast of Ramsgate on

the Goodwin Sands between North Sands and South Sands Head. The exact position is 51º15.4802'N 001º30.0161'E WGS 84 with a designated area with a 300m radius.

4.3.2 The 2017 MBES survey has revealed that the site consists of a wreck mound 33m long by 18m wide. The mound is orientated northwest–southeast. The site lies directly on sand waves that are orientated in a northeast–southwest direction. A comparison of the site against the ADUS 2005 MBES identifies that the length of exposed material in 2005 extended 50m on a northwest/ southeast axis and the main wreck mound was 20m wide (Pascoe *et al* 2015,134). This suggests that there are still currently extensive areas of buried material. From comparing the two datasets buried material is likely to be found at the west and southeast areas of the site.

4.3.3 There was a 15m by 5m area of exposed material at the west area of the site which is evident in the 2005 MBES data but not present in the current MBES data. Also present in the 2005 data was an 8m section of lower hull structure consisting of the keel, floor timbers, futtocks and ceiling planking a few metres southwest of a large upstanding concretion (Pascoe *et al* 2015,135). This appears to be predominantly buried at present but the presence of a slight sloping mound suggests it is close to the surface. The large upstanding concretion appears to be more pronounced in the current data, with a deeper scour around it than observed in the 2005 data. Should this scour increase to the south and southwest then it will potentially uncover the lower hull structure which is present in the 2005 data.

4.3.4 The 2017 MBES data shows there is a greater slope to the mound on the west side which extends from the northern limits to the southern limits of the site. There is also a distinct scour on the east side of the mound that extends 30m to the north. The mound flattens out to the north (Figures 10–12). There is also a potential for buried archaeological material around the north as many of the guns previously observed on the site were found along the northern parts of the site (Pascoe *et al* 2015, 134).

4.3.5 There is a large upstanding feature 3m long by 2m wide by 2m high. This is the highest point of the wreck and is part of a large concretion thought to be the forward shot locker (Pascoe *et al* 2015, 134). Therefore, the southeast end of the site is believed to be the forward end with the stern towards the northwest end. The upstanding feature has a distinct scour around its base on the southern side. To the north it appears to be part of a much larger area of exposed features which roughly covers an area of 10 x 8m (Figures 10–12).

4.3.6 There are several linear features exposed on the mound that represent probable guns. There are at least a possible three at the northwest end of the wreck. The most northerly linear feature is 3.1m long and 0.51m wide and orientated northeast–southwest. Just below it is another which is 2.9m long and 0.4m wide and orientated roughly east–west. Less than two metres east is another which is 2.7m long and roughly 0.4m wide and orientated east–

west (Figures 11–12). These dimensions and the orientation of the guns are a close match to the three most northerly guns recorded on a 1993 sketch plan of the site, guns R15, R24 and R23 (Pascoe *et al* 2015, 135). The recorded lengths of these guns are as follows R14:2.9m; R24: 2.9m; and R23: 2.7m.

4.3.7 Roughly five metres south are two more linear features lying side by side. These are shorter at 2.5m and 2.1m long with an approximate width of 0.4m. A further 1.9m south is another linear feature emerging from the sand, 1.8m in length. If these are guns they are probably only partially exposed (Figures 11–12).

4.3.8 From the centre of the mound to the highest point of the wreck at the southeast end the exposed features are less discernible. However, the extent of material suggests there are significant features emerging from the sand that represents structures and/or large artefacts from the ship.

4.3.9 At present, greatest exposure is occurring on the west side and the southern point of the mound. However, studying the surrounding seabed topography there is also a threat from further exposure coming from the north as well as the west.

4.3.10 The 2017 MBES data shows that the site lies 40m east of a contour in the seabed which is orientated north to south. This contour marks a change in depth of the seabed. The seabed west of the contour is relatively flat but deeper than the seabed to the east of the contour. Twenty-eight metres northwest of the site is another edge where the seabed deepens to the north. The site, therefore, lies close to two edges which, should they migrate towards the site, mean exposure of the wreck is likely to increase.

4.3.11 317m to the west of the *Northumberland* is another exposed wreck which lies on a sandy seabed. This wreck is not significantly deeper than the *Northumberland* but the 2017 data identifies it to be significantly exposed. It identifies the risk to the site of the *Northumberland* should the edge of the sand bank continue to migrate eastwards (Figure 10).

4.3.12 The *Northumberland* has been known to be completely buried for several years since 2011. Therefore, the exposure of the wreck demonstrates this part of the Goodwin Sands has changed significantly in recent years.

4.3.13 The appearance of a distinct wreck-mound suggests there is a significant depth of stratigraphy encapsulating substantial buried remains of the wreck of the *Northumberland*. The comparisons made with the ADUS 2005 MBES data shows there are significant parts still buried but potentially close to the current surface of the seabed. Therefore, if the surrounding seabed sediments continue to reduce then greater areas of the site will uncover.

4.4 The *Stirling Castle*

4.4.1 The *Stirling Castle* was a third-rate Man of War of 70 guns built at Deptford in 1679. She was wrecked on the 27th November 1703 during the Great Storm. The wreck lies at a chartered depth of 18m, 8.5km southeast of Ramsgate at the south end of the North Sands Head. The exact position is 50º16.426'N 001º30.516'E WGS 84 and the wreck has a designated area with a 300m radius (WA 2009).

4.4.2 The current wreck-mound and exposed debris is 33m long by 14m at it widest point. It is orientated east–west. The bow of the *Stirling Castle* is at the west end and the stern at the east end. The site is situated on a seabed of sand waves that are orientated in a northeast–southwest direction. The current MBES results have been compared with MBES results within the TrenDive report from Imaging the *Stirling Castle*: A High-Resolution Swath Bathymetry Survey of the *Stirling Castle* project (Tendive 2016). In general, the whole site appears to be experiencing an increase in sedimentation rather than erosion (Figures 13–15). This is most evident along north side of the site, extending from roughly the crown of an anchor 23m aft (east) towards the remains of the stern. This increase in sedimentation has covered previously exposed guns and structure. An increase in sedimentation but to a lesser extent has also occurred on the south side. In general, the seabed appears to be building up around the site as opposed to the collapse of archaeological features. These observations concur with the TrenDive report which states '*A surface comparison between 2002 and 2015 shows a significant increase in the seabed level to the east of the site and in general around the whole site……. It also implies that the overall wreck mound is not decreasing in height but that the seabed is rising up to it.*' (TrenDive 2016).

4.4.3 A large bank of sand associated with the southeast corner of the Goodwins knoll appears to be encroaching from the east. The migration of this sand bank towards the site is causing sedimentation extending from the east end and along the northern side of the site. This has covered much of the starboard side remains of the *Stirling Castle*. Due to the advance of this sand bank there was insufficient depth of water to survey the southeast third of the designated area (Figures 13–15).

4.4.4 The southern side, or port side, of the site has a more defined slope with six linear features that match the location of guns from previous site plans (WA 2010). There is a large anchor exposed at the west end of the site with a gun lying next to it on the south side of its shank. There are a further five possible guns lying exposed or partially exposed extending towards the stern (Figure 14–15).

4.4.5 There is an area of debris six metres west of the anchor but it is not clearly discernable. In general, it is very difficult to make out any structural features or areas of coherent structure. This is due to the increased sedimentation on the site.

Additional sites within the designated area.

4.4.6 There is another site 120m west of the *Stirling Castle*. It is 19m long and 7.7m wide at its widest. It is orientated NNW/SSE and it ends with a point at its northern end. There is debris 4m west of the southern end of the site. The site looks distinctly boat shaped in the 2017MB data and could be another wreck. (Figure 13).

4.4.7 There is a linear feature 100m WSW of the *Stirling Castle* and 31m southeast of site 1. It is 7.2m long and 1.2m wide at the southern end and 0.8m wide at the northern end. It is orientated northwest–southeast (Figure 13).

4.4.8 There is another feature 160m WSW of the *Stirling Castle* and 49m southwest of site 1. The feature is 5.5m long and 2.4m wide across its northern side.

4.4.9 There is small mound-like feature 193m NNE of the *Stirling Castle*. The feature appears predominantly buried but stands out because it has caused a wave in the seabed that is orientated in east–west as opposed to northeast to southwest.

4.4.10 Another linear feature can be found 254m NNE of the *Stirling Castle*. It appears in two parts, or is partly buried in the middle, and is orientated east–west. The total length of the feature is 19m with a slight scour along the southern edge from east–west.

4.5 The *Restoration*

4.5.1 The *Restoration* was a third-rate Man of War of 70 guns built in 1678 at Harwich. She wrecked on the 27th November 1703 during the Great Storm. The wreck lies at a chart depth of 14m, 9.5km southeast of Ramsgate on the Goodwin Sands between the North Sands and South Sands Head and 280 m north of the *Northumberland*. The exact position is 51º15.6302'N 01º30.0262'E WGS84 with a designated area with a 300m radius (WA 2006).

4.5.2 Previous geophysical surveys were conducted on the site by WA in 2008 as part of the South East of England Designated Wrecks Marine geophysical survey project and the ADUS in 2005 as part of the Rapid Archaeological Site Surveying and Evaluation (RASSE) project. The surveys revealed two mounds roughly 100m apart, known as the south and north mounds. It is thought one of these mounds could represent another Great Storm wreck, the *Mary*. However, at present there no conclusive evidence. Comparisons between the two surveys showed little change and therefore the two mounds appeared relatively stable (WA 2009, 8).

4.5.3 Like the wreck of the *Northumberland*, the *Restoration* has been buried since *c.* 2011 (Pers com Robert Peacock). The 2017 MBES data shows that there are no exposed features of the *Restoration* and therefore at the time

of the survey it was still buried (Figure 16). However, as with the site of the *Northumberland* the *Restoration* is close to a contour that runs north to south. Should this contour migrate eastwards then site might uncover.

4.6 The *Admiral Gardner*

4.6.1 The *Admiral Gardner* was an 813-ton English East Indiaman built at Blackwall in 1797 and wrecked on the 25th January 1809. She lies 15km SSE of Ramsgate on the Goodwin Sands, on the east side of South Sand Head. The exact position is 51º12.0305'N 001º30.4563'E WGS 84. The site has a designated area with a radius of 300m.

4.6.2 It was not possible to undertake a MBES survey because there was a sand bank at the location of the wreck. This sand bank was in fact above water when we arrived and therefore demonstrated that the *Admiral Gardner* was buried beneath several metres of sand.

4.7 GAD 8

4.7.1 The site is currently unidentified but it represents the wreck of an armed wooden sailing vessel dated to between 1650 and 1750. Previous site investigations have identified seven cast iron guns, a central concretion mound and a section of coherent ship's structure exposed on the seabed (WA 2011). The wreck lies at a charted depth of 11m, 10km south of Ramsgate in 'The Downs'. The exact position is 51º13.9716'N 001º26.0090'E WGS84 and has a designated area with a 50m radius.

4.7.2 The 2017 MBES survey shows the site is currently 39m long by 18m wide at its widest. The site is orientated north–south. Despite the overall spread of material there are not a vast number of exposed features. The majority of the features that are exposed are fairly low lying (Figure 17–18).

4.7.3 There are four linear features that match the positions of four of a total of seven guns, which have been recorded on a WA site plan (WA 2011). Three of these are towards the south end of the site. Gun 1 is 2.2m long and orientated NNE/SSW. It is lying almost flush with the seabed, therefore apparently partially buried. Gun 2 is 2.7m long and orientated northeast–southwest. It appears slightly raised above the seabed with a shallow scour along its north side. Gun 3 is 2.5m long and orientated east–west and is lying flat on the seabed. The fourth gun is 4.5m north of an upstanding feature, which is the highest point of the wreck. Gun 4 is 2.2m long and orientated NNW/SSE. It appears slightly raised at its northern end and has a scour along its east side and south end (Figure 18).

4.7.4 Close to the centre of the site is a feature that is upstanding by 0.75m. It is approximately 2.5 x 2.5m. This has been identified during previous investigations on the site as a concretion mound of possible concreted shot (WA 2011). There is a shallow scour which extends 6m north from the

concretion mound to another feature which is slightly raised above the general seabed. This feature has an edge 5m long and orientated northeast–southwest. Immediately beyond the edge of the feature is a mound-like feature with an area of sedimentation extending 8.8m to the north. The identification of a distinct edge to this feature could represent a possible section of ship's structure (Figure 18).

4.7.5 Also identified on the 2017 MBES survey are two anomalies outside the main wreck site. The first is a linear anomaly 31.5m south of the central concretion mound. It is 1.3m long and approximately 0.4m wide and appears almost flush with the seabed (Figure 17). The second anomaly is 46.7m west of the central concretion mound. It is circular with a diameter of 1m and it has a shallow scour around its northern edges (Figure 17).

4.8 GAD 23

4.8.1 GAD 23 is also known as the Bowsprit Wreck due to the fact that when it was first surveyed it was very intact, still with its bowsprit attached. It lies at a charted depth of 18m, 8.5km southeast of Ramsgate on the Goodwin Sands, southwest of the south end of North Sand Head. The exact position is 51º 16.113'N 001º 29.583'E WGS84. The 2017 MBES data shows it is in a deeper channel between the edges of two shallower contours, one 110m to the east and the other 270m to the northwest. There is a build-up of sand on the northern side of the site and to a lesser extent on the south side but this is considerably less than seen in the 2006 ADUS MBES data. Except for the localised areas of sedimentation, the surrounding seabed is fairly flat and at a greater depth than the wreck. This suggests that the site is currently vulnerable to further exposure.

4.8.2 At present, it is still unidentified but previous archaeological investigations revealed that it is the remains of a merchant wooden sailing vessel carrying a cargo of coal. Ship's equipment present, and its design and construction, suggest that it dates to around the 19th century (WA 2012).

4.8.3 The 2017 MBES survey shows the site is 43m long by 14m wide approximately east–west. The highest point of the wreck is at 15m and the deepest along a scour at the east end of the site is at 19m (Figures 19–22). Comparing the condition of the site with the 2006 ADUS MBES data, and diving experience on the site from 2011, indicate that it has experienced significant changes.

4.8.4 The layout of the wreck site is still clearly discernible. The remains of the bow are at the west end and the stern at the east. The remains of the starboard side can be seen protruding from the sand from the bow to the stern and the port side is more fractured with the cargo of coal spilling out from amidships. The stern area appears more exposed with a long horizontal timber, possibly a transom extending across the aft end of the wreck (Figures 20–22). This was not visible in the 2006 ADUS MBES data.

4.8.5 The bow of the wreck was very intact during assessment dives on the site conducted by WA as part of the 2011 PWA diving contract. The sides of the hull survived up to the level of the knighthead and hawse timbers and extended aft 10m on the port and continued several metres until buried in the starboard side. The deck of the bow had survived with the ship's pump brake windlass still in-situ on the deck. Through holes and gaps on the deck and in the sides of the hull it was possible to see the cargo of coal contained within (WA 2012).

4.8.6 The 2017 MBES survey has revealed that the bow has broken and collapsed outwards and now lies on the seabed. At least a 10m section of the port side and a 5m section of the starboard bow has collapsed. As the height of the wreck has reduced greatly this is allowing the scour pit below the bow to fill in. The windlass has also collapsed and has slumped down to the port side. A 4m section of the deck immediately behind the windlass has dropped. This has left a 5m section of deck, including deck beams, hanging unsupported extending back towards amidships. The MB data shows extremely clearly the remains of deck beams extending out across the wreck with the cargo of coal spilling out through the port side (Figures 20–22). A combination of the weight of coal and sand within the wreck and the loss of surrounding sediments has caused the port side to bulge and eventually collapse.

4.8.7 Although currently there is greater sedimentation on the starboard side of the wreck this appears to have reduced compared to the 2006 ADUS MB data and observations made in 2011. Much of the starboard side was buried in 2006 by a large sand wave. This has reduced, exposing up to 1m of the hull 10m forward and 16m aft of amidships.

4.8.8 Overall the site has deteriorated greatly with the collapse of the bow and port side. Exposure has increased all over the site due to the general drop in sediment. This can clearly be seen with the appearance of more structures across the whole site such as the deck beams extending across the wreck and the exposure of stern structures.

4.8.9 Roughly forward of amidships on the starboard side the side of the hull appears to have bulged outwards breaking away from the deck structure. The 2017 MB data shows over a metre gap between the ends of the deck beams and the side of the hull

4.9 Discussion

4.9.1 In general, the 2017 MBES survey has identified some significant changes over several of the sites. It has demonstrated how dynamic and fluid the Goodwin Sands are. There is a real necessity to undertake geophysical surveys on these sites on a regular basis to record the changes that are occurring season by season. Through this it is possible to see the direction of migration of sand waves and sand banks that will impact the sites either through burial or exposure. Having the ability to predict when a site will

cover up or expose is extremely useful in the management of these sites. Three consecutive surveys on the *Rooswijk* and two in three years on the *Stirling Castle* have tracked the changes to the sites and movement of the surrounding seabed. This allows one to quantify how much a sand bank has moved and how it might impact the sites. The MBES surveys are a perfect site monitoring tool for recording of whole sites and different datasets can be quickly compared to identify changes occurring.

4.9.2 There have been noteworthy changes occurring on the sites of the *Rooswijk*, both inside and outside the designated area. The MBES survey have identified that the West site (Main site) has experienced a reduction in sediments and significant features are more exposed than previously seen in the 2016 MBES. This is most notable in the northern area of the site, directly north of guns 3 & 4. From observing several edges of wooden boxes/chests during September 2016 diving investigations it is highly likely with the result of further reductions in the seabed that a greater number of vulnerable artefacts and features have become exposed and at risk.

4.9.3 The East site has been impacted by a large bank of sand which has migrated 24.5m southwards covering all but the anchor. The site is now almost completely buried and stable but will uncover again in the not too distant future, when the sand bank passes over. The North site has not changed significantly since 2016 but a large scatter of objects remain exposed.

4.9.4 Of great interest is the identification of a potential gun site northeast of the edge of the designated area. Considering the *Rooswijk* was armed with 30 guns and so few have been seen on the West site, there is a potential that this new site could be related to the *Rooswijk*. Should these guns originate from the *Rooswijk* then it would change the current understanding of the wrecking event. It is therefore important to investigate this site more closely and this will be conducted as part of a sub project of the main 2017 excavation of the *Rooswijk*. If this site is found to be related to the *Rooswijk* then increasing the designated area to protect it should be considered.

4.9.5 The MBES surveys have identified a dramatic change over the *Northumberland*. In 2011 the site became completely buried as a large bank of sand migrated over the site (Pascoe *et al* 2015, 142). This sand has now moved on and the wreck is uncovering once again. A noticeable wreck mound has now appeared with several exposed archaeological features, including several guns. The site lies at an apex in the sands with the edges of a sandbank to the west and northeast. The most concerning factor for the future stability of the site is understanding where the edges of the sand banks are going to migrate and how rapidly. Should the trend continue and these edges migrate towards the site then the *Northumberland* will uncover further. The site would benefit from a closer visual investigation to understand exactly what archaeological features are exposed, and a follow up MBES to quantify the rate at which the surrounding sands are moving and to confirm in which direction.

4.9.6 Although there are still areas of buried remains on the *Northumberland* they could be close to the surface and therefore, under threat should seabed levels continue to reduce. Monitoring seabed levels should continue through further MBES surveys and diver monitoring.

4.9.7 The *Stirling Castle* appears to be reaching a period of equilibrium with the surrounding seabed as the wreck mound becomes less pronounced, due to increased sedimentation. There is a large bank of sand migrating towards the site from the east. The current location and the depth of the sand hindered the survey of the southeast third of the designated area; it was too shallow for the survey vessel to travel across and it was possible to see waves breaking over the sand bank. If that wall of sand continues to migrate westwards then it will engulf the site under several metres of sand. A follow up survey in 2018 would be beneficial to see how far the sand bank has moved and whether it has in fact covered the *Stirling Castle*.

4.9.8 Although the *Stirling Castle* is covering up the MBES survey identified a sizeable site 120m west. Due to the relatively intact nature of the *Stirling Castle* this site is unlikely to be part of it but it would be worth investigating to identify what it is.

4.9.9 The *Restoration* is currently buried with no archaeological features exposed. However, this could change if the edge of the sands migrates eastwards. Once again, a follow up survey in 2018 would be beneficial in understanding the migration of the sand bank.

4.9.10 The *Admiral Gardner* is currently, and has been for several years, buried under a large sand bank. It was not even possible to pass over the site with the survey vessel because there was no water over the sands. Due the current buried nature of the site the *Admiral Gardner* is under no threat from natural processes.

4.9.11 GAD 8 is in an area of The Downs where seabed movements are less dynamic. It is situated on a flat sandy seabed which has changed little since previous investigations. This site appears relatively stable but would benefit from more detailed investigations to understand current exposed features.

4.9.12 The undesignated site of GAD 23 has experienced dramatic change. The continued exposure of the site and reductions in seabed sediments since 2006 has resulted in the collapse and degradation of substantial sections of the wreck. Considering it is a wooden wreck it is still in remarkable condition but that condition is most definitely on the decline.

4.9.13 Further reductions in surrounding seabed sediments have uncovered previously buried sections of the wreck on the starboard side and at the stern. The site would benefit from diver investigations to record those newly exposed areas of the wreck before they deteriorate any further and are eventually lost.

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6 APPENDIX I: THE *ROOSWIJK*

Wreck/Site Name	*Rooswijk*													
NHLE Entry No.	**EH Region**		**Restricted Area**		**Principal Land Use**									
1000085	Southeast		150m		Coastland 1									
Latitude (WGS84)	51°16.443'N													
Longitude	001°34.537'E													
Class Listing	**Period**				**Status**									
Dutch East Indiaman	Post medieval				Protection of Wrecks Act 1973									
Licensee	**Nominated Archaeologist**				**Principal Ownership Category**									
Yes	Yes				The Dutch Government									
Seabed Owner	**Navigational Administrative Responsibility**													
The Crown Estate	Nil													
Environmental Designations														
Nil														
Seabed Sediment					**Energy**									
Slightly sandy gravel					High									
Survival														
Good														
Overall Condition	**Condition Trend**				**Principal Vulnerability**									
Extensive significant problems	Declining				Mechanical degradation Biological decay Seabed erosion									
Amenity Value: visibility														
Substantial above bed structural remains which are highly visible and 'legible' without further information														
Amenity Value: physical accessibility					**Amenity Value: intellectual accessibility**									
Restricted (C)														
Management Action	An excavation has been agreed													
Management Prescription	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**
													X	
Notes:														

The *Rooswijk* is the wreck of a Dutch East Indiaman lost in January 1740. She lies on the Goodwin Sands southeast of the North Sands Head and northeast of the Kellet Gut.
As mentioned above the *Rooswijk* has extensive areas of exposed and vulnerable archaeological material. This material includes sections of coherent ship's structure, ordnance and much of the cargo including complete wooden boxes. This material is extremely vulnerable to natural erosion and potentially diver interference. In addition, the 2017 MBES identified a potential gun site 55m to 101m northeast of the current designated area. The close proximity to the edge of the designated circle and the fact that material from the *Rooswijk* is not restricted to one site demonstrates the potential for this new site to belong to the *Rooswijk*.
It would be recommended that this new site is diver ground-truthed to determine whether the

material present is consistent with the material found on the other sites within the designated area. For example, if the exposed objects are guns do they match the guns found on the west site? If the material from this new site is consistent with the *Rooswijk* then increasing the size of the designated circle to encompass the new site should be considered. Due to the extent and variety of exposed material across all of the sites within the designated area risk is assessed as **High**			
Data Source	2017 MBES	**Date & Initials**	27/05/2017
Date of previous assessment:		Has an ecological survey been undertaken? No	

7 APPENDIX II: THE *NORTHUMBERLAND*

Wreck/Site Name	*Northumberland*		
NHLE Entry No.	**EH Region**	**Restricted Area**	**Principal Land Use**
1000058	Southeast	300m	Coastland 1
Latitude (WGS84)	51°15.4802'N		
Longitude	001°30.0161'E		
Class Listing	**Period**	**Status**	
Third-rate Man of War	Post Medieval	Protection of Wrecks Act 1973	
Licensee	**Nominated Archaeologist**	**Principal Ownership Category**	
Yes	Yes	MOD	
Seabed Owner	**Navigational Administrative Responsibility**		
The Crown Estate	Nil		
Environmental Designations			
Nil			
Seabed Sediment		**Energy**	
Slightly gravely sand		High	
Survival			
Good			
Overall Condition	**Condition Trend**	**Principal Vulnerability**	
Generally unsatisfactory	Declining	Mechanical degradation Seabed erosion Biological decay	
Amenity Value: visibility			
Substantial above-bed structural remains which are highly visible and 'legible' without further information.			
Amenity Value: physical accessibility		**Amenity Value: intellectual accessibility**	
Restricted (C)		Developed interpretative scheme at the Ramsgate Maritime Museum.	

Management Action	Action to be identified/agreed													
Management Prescription	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**
		X						X			X	X		

Notes:

The *Northumberland* was a third-rate Man of war of 70 guns built in 1679 in Bristol. She was lost on the 27th November 1703 during the Great Storm. The wreck lies at a chartered depth of 14m 9.5km southeast of Ramsgate on the Goodwin Sands between North Sands and South Sands Head.

Since 2011 up until relatively recently the wreck has been buried beneath a large sand bank. The 2017 MBES has revealed that this sand bank has moved dramatically exposing the wreck once again. Exposed material covers an area currently 33m long by 18m wide. There appear to be several gun-like features visible as well other features which could be exposed structures and other ship's objects.

At present greatest exposure is occurring on the west side and the southern point of the wreck

mound. However, studying the surrounding seabed topography there is also a threat from further exposure coming from the north as well as the west. The 2017 MB data shows that site lies 40m east of a contour in the seabed which is orientated north to south. This contour marks a change in depth of the seabed. The seabed west of the contour is relatively flat but deeper than the seabed to the east of the contour. Twenty-eight metres northwest of the site is another edge where the seabed deepens to the north. The site therefore lies close to two edges which, should they migrate towards the site, increases the likelihood of further wreck exposure.
There is currently no management plan for the site.

Due to the fact the *Northumberland* is experiencing a period of seabed erosion via the migration of a sand bank away from the site and as a result archaeological material is vulnerable to biological and physical decay risk is assessed as: **High**

Data Source	2017 MBES	**Date & Initials**	27/05/2017 DP
Date of previous assessment:		Has an ecological survey been undertaken? No	

8 APPENDIX III: THE *STIRLING CASTLE*

Wreck/Site Name	*Stirling Castle*													
NHLE Entry No.	**EH Region**		**Restricted Area**		**Principal Land Use**									
1000056	Southeast		300m		Coastland 1									
Latitude (WGS84)	50º16.426'N													
Longitude	001º30.516'E													
Class Listing	**Period**				**Status**									
Third-rate Man of War	Post Medieval				Protection of Wrecks Act 1973									
Licensee	**Nominated Archaeologist**				**Principal Ownership Category**									
Yes	Yes				Private (Trust)									
Seabed Owner	**Navigational Administrative Responsibility**													
Crown Estate	Nil													
Environmental Designations														
Nil														
Seabed Sediment			**Energy**											
Slightly gravelly sand			High											
Survival														
Good														
Overall Condition	**Condition Trend**				**Principal Vulnerability**									
Generally satisfactory with minor localised problems	Declining				Mechanical degradation Biological decay									
Amenity Value: visibility														
Substantial above bed structural remains which are highly visible and 'legible' without further information, although this could change to Limited above bed structural remains and finds scatter in the near future.														
Amenity Value: physical accessibility							**Amenity Value: intellectual accessibility**							
Restricted (C)							Developed interpretative scheme							
Management Action	Action to be identified/agreed													
Management Prescription	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**
	X							X						X
Notes:														
The *Stirling Castle* was a third-rate Man of War of 70 guns built at Deptford in 1679. She was wrecked on the 27th November 1703 during the Great Storm. The wreck lies at a chartered depth of 18m, 8.5km southeast of Ramsgate at the south end of the North Sands Head. Currently the site appears to be covering up with a significantly less distinctive wreck mound than previously seen. Currently the wreck mound is 33m long by 14m wide with a 2m variable height across the site. In general sedimentation has increased throughout the site with the greatest occurring along the north side (starboard side) and east end (stern). As a result there are less structural remains visible. The most prominent features appear to be large iron objects such as one of the ship's anchors towards the west end and up to 6 guns present on south side (port side) of the site. There is a large bank of sand associated with the eastern edge of the Goodwin Knoll sand bank encroaching from the east. The migration of this sand bank														

westwards towards the site is the cause of the increased sedimentation on the wreck. Should the migration of this sand bank continue in a westward direction then the site of the *Stirling Castle* will continue to cover up. A management plan was agreed and implemented in 2008 but due to the results from the current MBES this may wish to be updated. As the site is experiencing a period of deposition of sediments rather than erosion but there are still notable archaeological features visible and vulnerable to physical and biological decay. Risk is assessed as **Medium**.			
Data Source	2017 MBES	**Date & Initials**	29/05/2017 DP
Date of previous assessment:		Has an ecological survey been undertaken? No	

9 APPENDIX IV: THE *RESTORATION*

Wreck/Site Name	*Restoration*													
NHLE Entry No.	**EH Region**			**Restricted Area**				**Principal Land Use**						
1000057	Southeast			300m radius				Coastline 1						
Latitude (WGS84)	51°15.6302'N													
Longitude	01°30.0262'E													
Class Listing	**Period**							**Status**						
Third-rate Man of War	Post medieval							Protection of Wrecks Act 1973						
Licensee	**Nominated Archaeologist**							**Principal Ownership Category**						
Yes	Yes							The MOD						
Seabed Owner	**Navigational Administrative Responsibility**													
The Crown Estate	Nil													
Environmental Designations														
Nil														
Seabed Sediment								**Energy**						
Slightly sandy gravel								High						
Survival														
Not fully understood														
Overall Condition	**Condition Trend**							**Principal Vulnerability**						
Optimal	Stable							Seabed erosion						
Amenity Value: visibility														
Not visible.														
Amenity Value: physical accessibility								**Amenity Value: intellectual accessibility**						
Restricted (C)								Limited interpretation at the Ramsgate Maritime museum						
Management Action	No action required (routine monitoring by Licensee/Archaeological contractor													
Management Prescription	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**
													X	
Notes:														
The *Restoration* was a third-rate Man of War of 70 guns built in 1678 at Harwich. She wrecked on the 27th November 1703 during the Great Storm. The wreck lies at a chart depth of 14m, 9.5km southeast of Ramsgate on the Goodwin Sands between the North Sands and South Sands Head and 280 m north of the *Northumberland*. The 2017 MBES data has revealed that the site is buried with no archaeological remains exposed. However, geophysical survey and monitoring should continue as the nearby site of the *Northumberland* is uncovering. Regular geophysical surveys over the site will build up an understanding of the movement and migration of the seabed in and around the site. This will help determine if the site is likely to expose as is the case for the *Northumberland*. Currently there is no management plan for the site. As the site is currently buried risk is assessed as **Low**													

Data Source	2017 MBES	**Date & Initials**	27/05/2017 DP
Date of previous assessment:		Has an ecological survey been undertaken? No	

10 APPENDIX V: THE *ADMIRAL GARDNER*

Wreck/Site Name	*Admiral Gardner*													
NHLE Entry No.	**EH Region**			**Restricted Area**			**Principal Land Use**							
1000062	Southeast			300m radius										
Latitude (WGS84)	51°12.0305'N													
Longitude	001°30.4563'E													
Class Listing	**Period**						**Status**							
English East Indiaman	Post medieval						Protection of Wrecks Act 1973							
Licensee	**Nominated Archaeologist**						**Principal Ownership Category**							
Yes	Yes						British Government							
Seabed Owner	**Navigational Administrative Responsibility**													
Crown Estate	Nil													
Environmental Designations														
Nil														
Seabed Sediment							**Energy**							
Slightly sandy seabed							High							
Survival														
Good														
Overall Condition	**Condition Trend**						**Principal Vulnerability**							
Optimal	Stable						Seabed erosion							
Amenity Value: visibility														
Not visible														
Amenity Value: physical accessibility							**Amenity Value: intellectual accessibility**							
Restricted (C)							No interpretation							
Management Action	No action required (routine monitoring by Licensee/Archaeological contractor													
Management Prescription	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**
													X	
Notes:														
The *Admiral Gardner* was an 813-ton English East Indiaman built at Blackwall in 1797 and wrecked on the 25th January 1809. She lies 15km SSE of Ramsgate on the Goodwin sands, on the east side of South Sand Head. The site is currently buried under many metres of sand and has been for several years. It is not possible to even travel over the site in a vessel due to insufficient depth of water. Due to the site being buried risk is assessed as **Low**														
Data Source	NA						**Date & Initials**			27/05/2017 DP				
Date of previous assessment:							Has an ecological survey been undertaken? No							

11 APPENDIX V1: GAD 8

Wreck/Site Name	GAD 8													
NHLE Entry No.	**EH Region**			**Restricted Area**			**Principal Land Use**							
1401982	Southeast			50m radius			Coastland 1							
Latitude (WGS84)	51°13.9716'N													
Longitude	001°26.0090'E													
Class Listing	**Period**						**Status**							
Armed wooden vessel	Post Medieval						Protection of Wrecks Act 1973							
Licensee	**Nominated Archaeologist**						**Principal Ownership Category**							
Yes	Yes						Unknown							
Seabed Owner	**Navigational Administrative Responsibility**													
Crown Estate	Nil													
Environmental Designations														
Nil														
Seabed Sediment				**Energy**										
Slightly sandy gravel				High										
Survival														
Not fully understood														
Overall Condition	**Condition Trend**			**Principal Vulnerability**										
Generally satisfactory with minor localised problems	Stable			Mechanical degradation										
Amenity Value: visibility														
Limited above bed structural remains and finds scatter with limited visibility and only 'legible' with further interpretative information														
Amenity Value: physical accessibility				**Amenity Value: intellectual accessibility**										
Restricted (C)				No interpretation										
Management Action	Action to be identified/agreed													
Management Prescription	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**
	X							X						
Notes:														
The site is currently unidentified but it represents the wreck of an armed wooden sailing vessel dated to between 1650 and 1750. Previous site investigations have identified exposed on the seabed seven cast iron guns, a central concretion mound and a section of coherent ship's structure. The wreck lies at a charted depth of 11m, 10km south of Ramsgate in 'The Downs'. The 2017 MB survey shows the site is currently 39m long by 18m wide at its widest. It is located on a flat seabed at a charted depth of 11m and it is orientated north–south. Despite the overall spread of material there are not a vast number of exposed features. Many features which are exposed are fairly low-lying. Much of the exposed material is concreted iron ordnance and a possible shot mound, as such their condition is relatively stable. From previous descriptions of the wreck site (WA 2011) little appears to have changed, which also identifies that the site is in a relative stable condition. There is no current management plan for the site.														

Due to the stability of the site risk is assessed as **Low**			
Data Source	2017 MBES	**Date & Initials**	27/05/2017 DP
Date of previous assessment:		Has an ecological survey been undertaken? No	

12 APPENDIX VII: GAD 23

Wreck/Site Name	GAD 23		
NHLE Entry No.	**EH Region**	**Restricted Area**	**Principal Land Use**
	Southeast	NA	Coastland 1
Latitude (WGS84)	51° 16.113'N		
Longitude	001° 29.583'E		
Class Listing	**Period**	**Status**	
Wooden merchant sailing vessel	Post medieval	Undesignated	
Licensee	**Nominated Archaeologist**	**Principal Ownership Category**	
NA	NA	Unknown	
Seabed Owner	**Navigational Administrative Responsibility**		
Crown Estate	Nil		
Environmental Designations			
Nil			
Seabed Sediment	**Energy**		
Slightly sand gravel	High		
Survival			
Very good			
Overall Condition	**Condition Trend**	**Principal Vulnerability**	
Extensive and significant problems	Declining	Mechanical degradation Biological decay Seabed erosion	
Amenity Value: visibility			
Substantial above bed structural remains which are highly visible and 'legible' without further information			
Amenity Value: physical accessibility	**Amenity Value: intellectual accessibility**		
Full. No restrictions on access	No interpretation		

Management Action														
Management Prescription	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**

Notes:

GAD 23, also known as the Bowsprit Wreck due to when it was first surveyed it was a very intact wreck, still with its bowsprit attached. It lies at a charted depth of 18m, 8.5km southeast of Ramsgate on the Goodwin Sands, southwest of the south end of North Sand Head.
Much of the wreck is exposed from bow to stern with the layout of the vessel clearly discernible. Much of the vessel's deck furniture and machinery is visible. The fractures in the hull and deck have exposed the vessel's cargo of coal. A comparison of the current MBES data with previous 2006 ADUS surveys and WA diving assessment have identified that the wreck has deteriorated significantly. The bow of the wreck, which was relatively intact in 2011, has collapsed and broken away. This has caused areas of the deck either to collapse or to be left hanging unsupported. A general reduction in seabed sediments over the whole site has

collapsed and broken away. This has caused areas of the deck either to collapse or to be left hanging unsupported. A general reduction in seabed sediments over the whole site has exposed greater areas of the starboard side and the stern structures as well deck structures over the whole wreck.
When the wreck was surveyed in 2006 by the ADUS it was relatively intact and much of the starboard side and stern area were buried. Continued exposure and further loss of seabed sediments on and around the wreck have left it extremely vulnerable to physical and biological degradation. This has been the cause of the wreck sites' deterioration.
There is no current management plan for the site

Due to the continued exposure of the wreck and loss of seabed sediments risk is assessed as **High**

Data Source	MBES 2017	**Date & Initials**	27/05/2017
Date of previous assessment:		Has an ecological survey been undertaken? No	

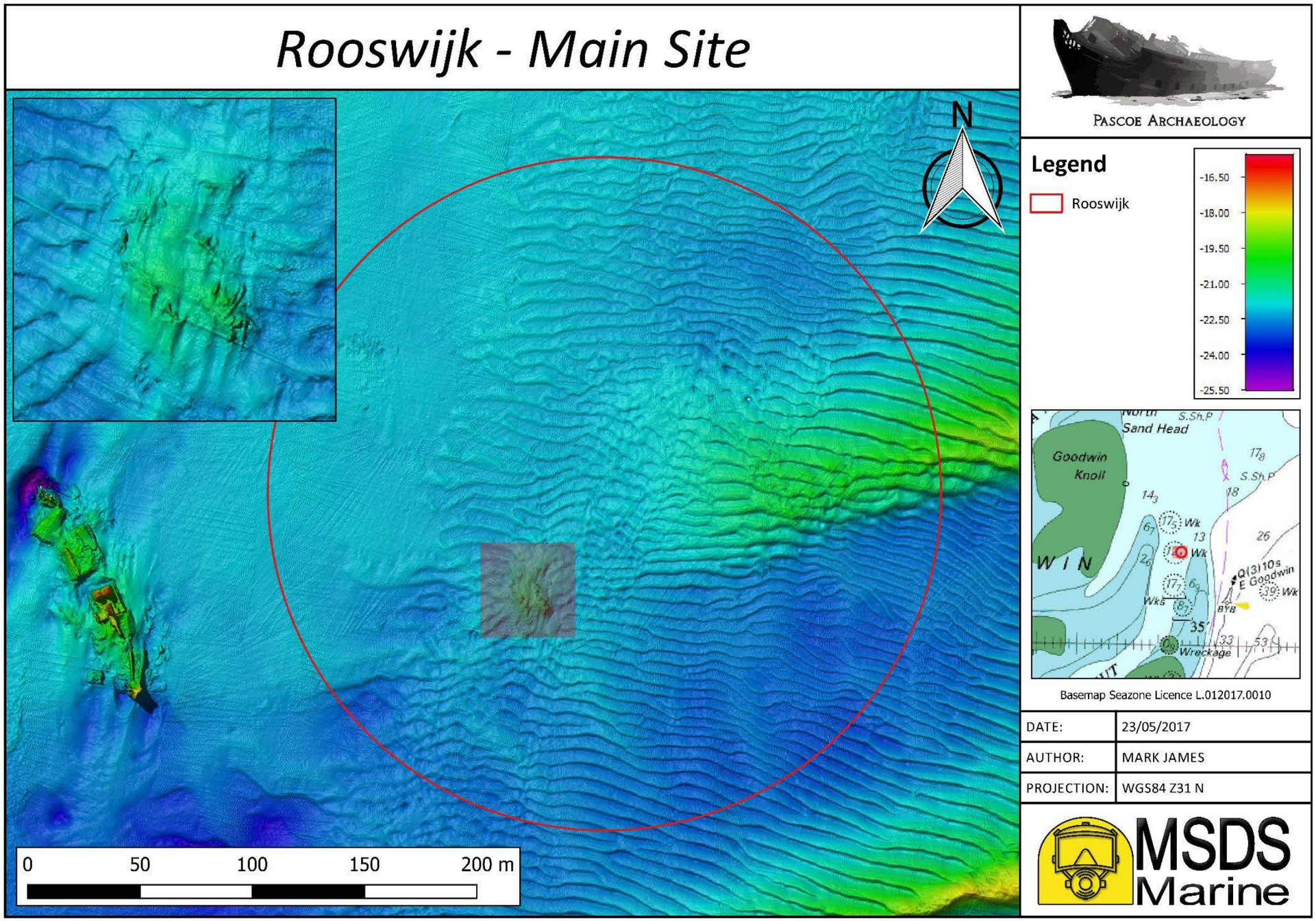


Fig. 1: *Rooswijk* West site (Main site) in relation to the designated area.

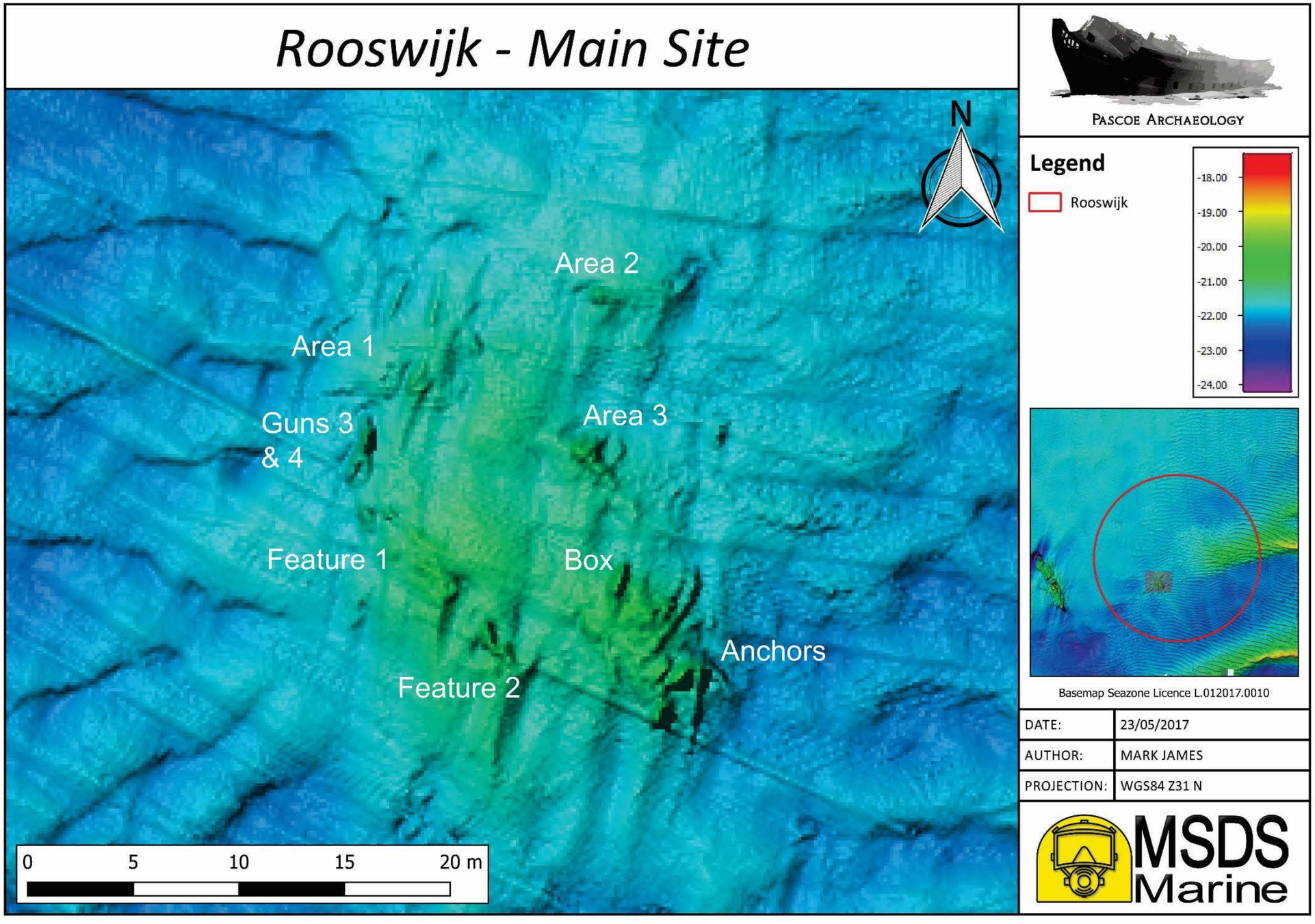


Fig. 2: Close-up of *Rooswijk* West site (Main site).

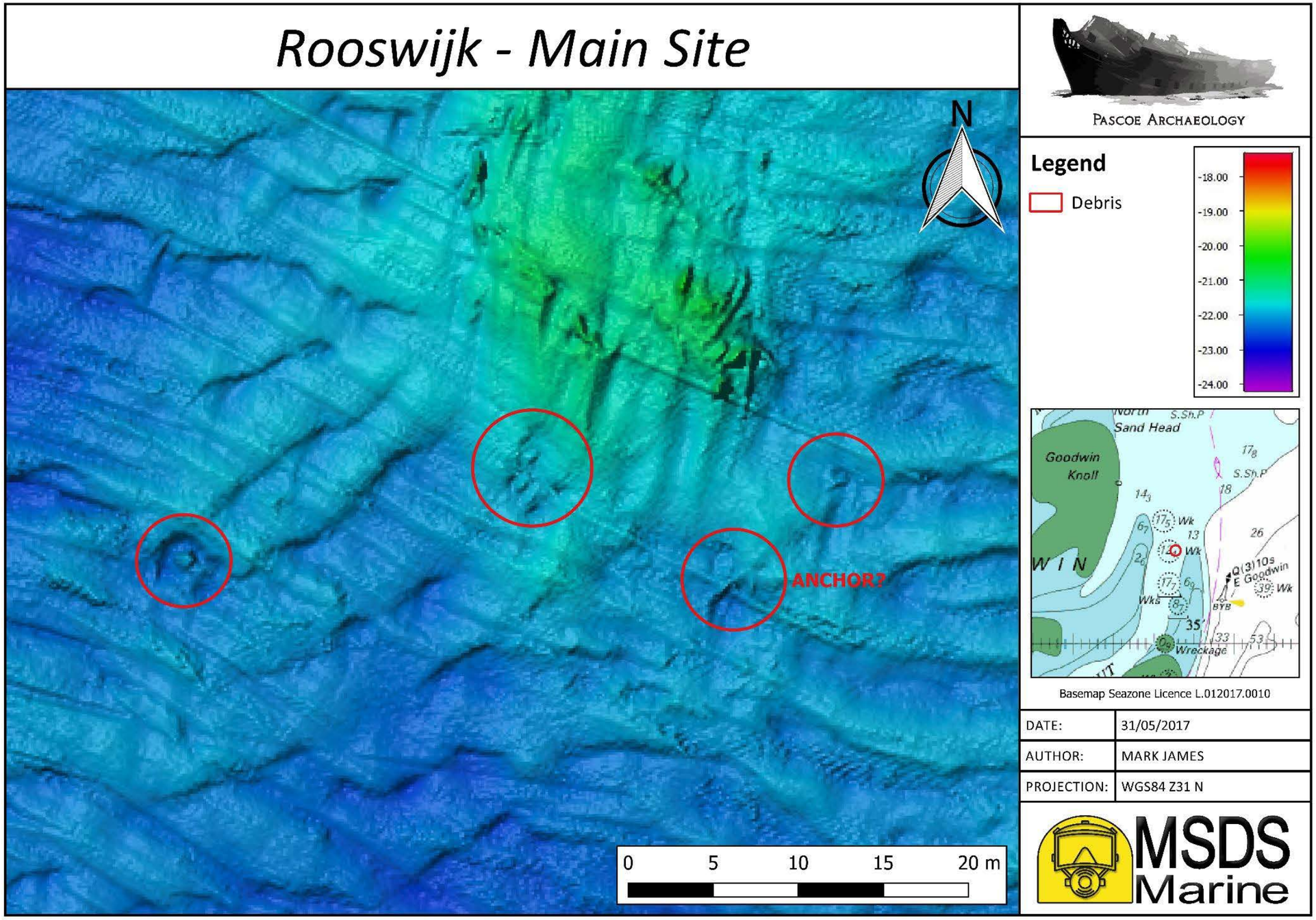


Fig. 3: Features off the main wreck mound

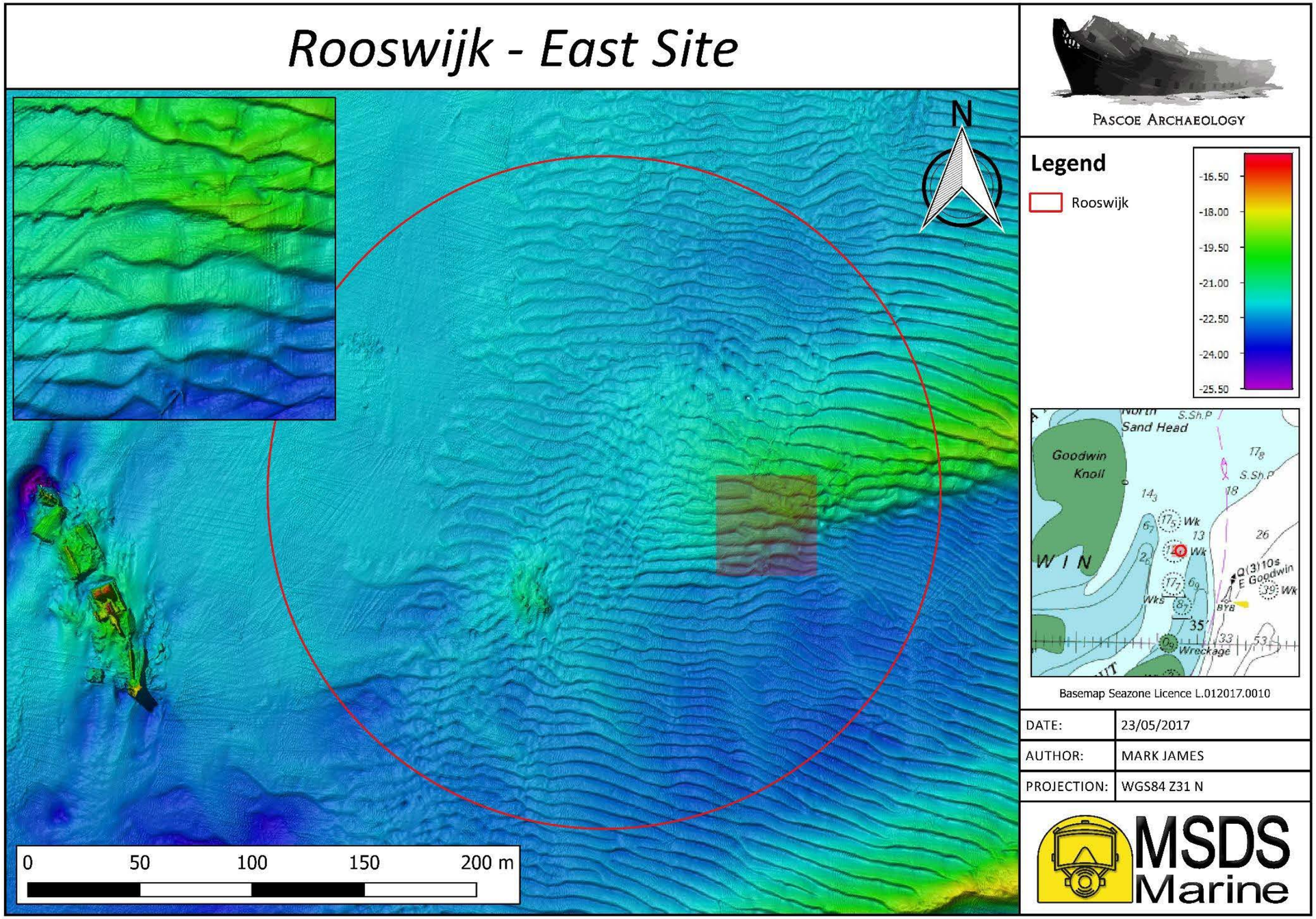


Fig. 4: *Rooswijk* East site in relation to the designated area.

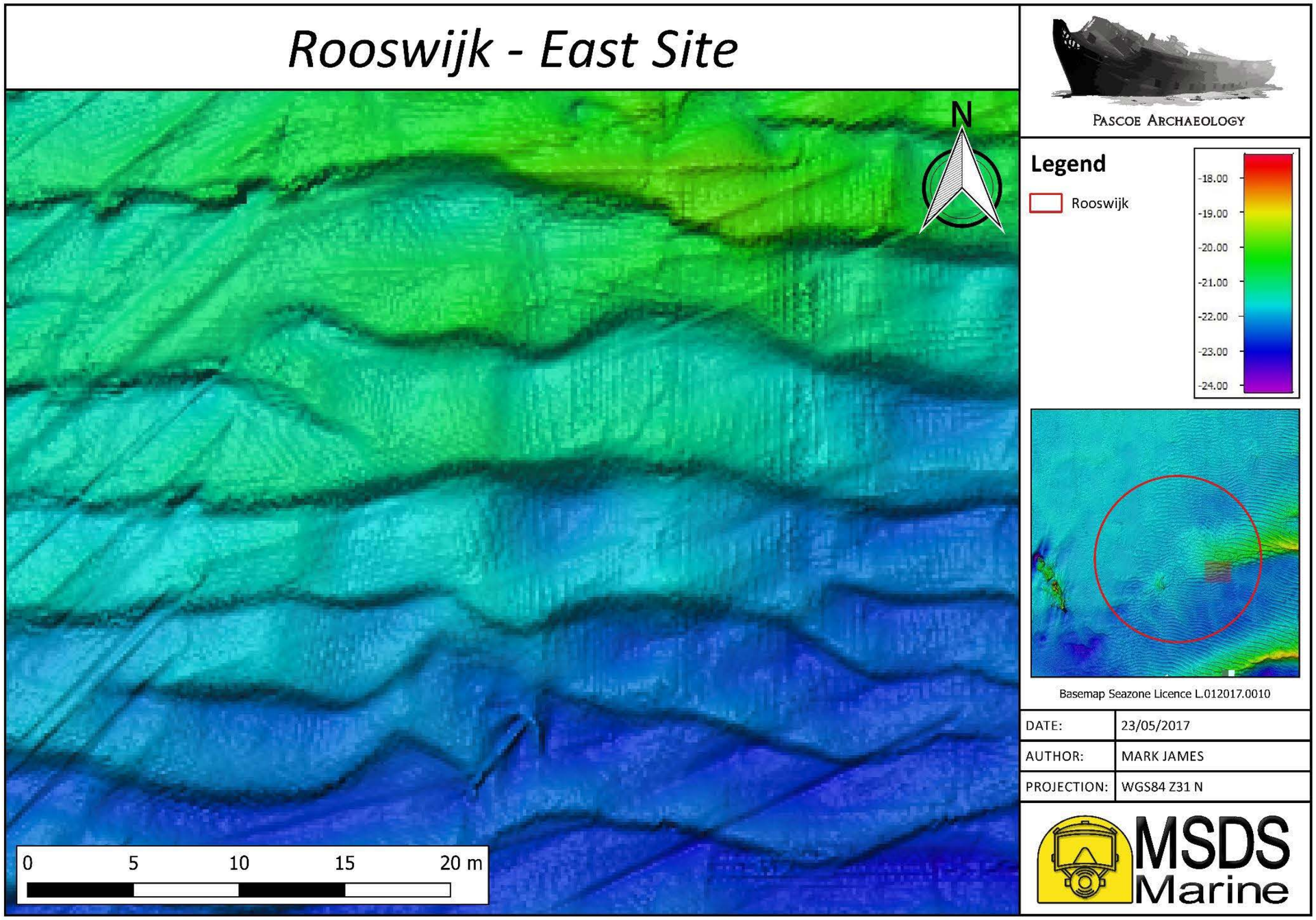


Fig. 5: The only exposed feature on the East site is an anchor.

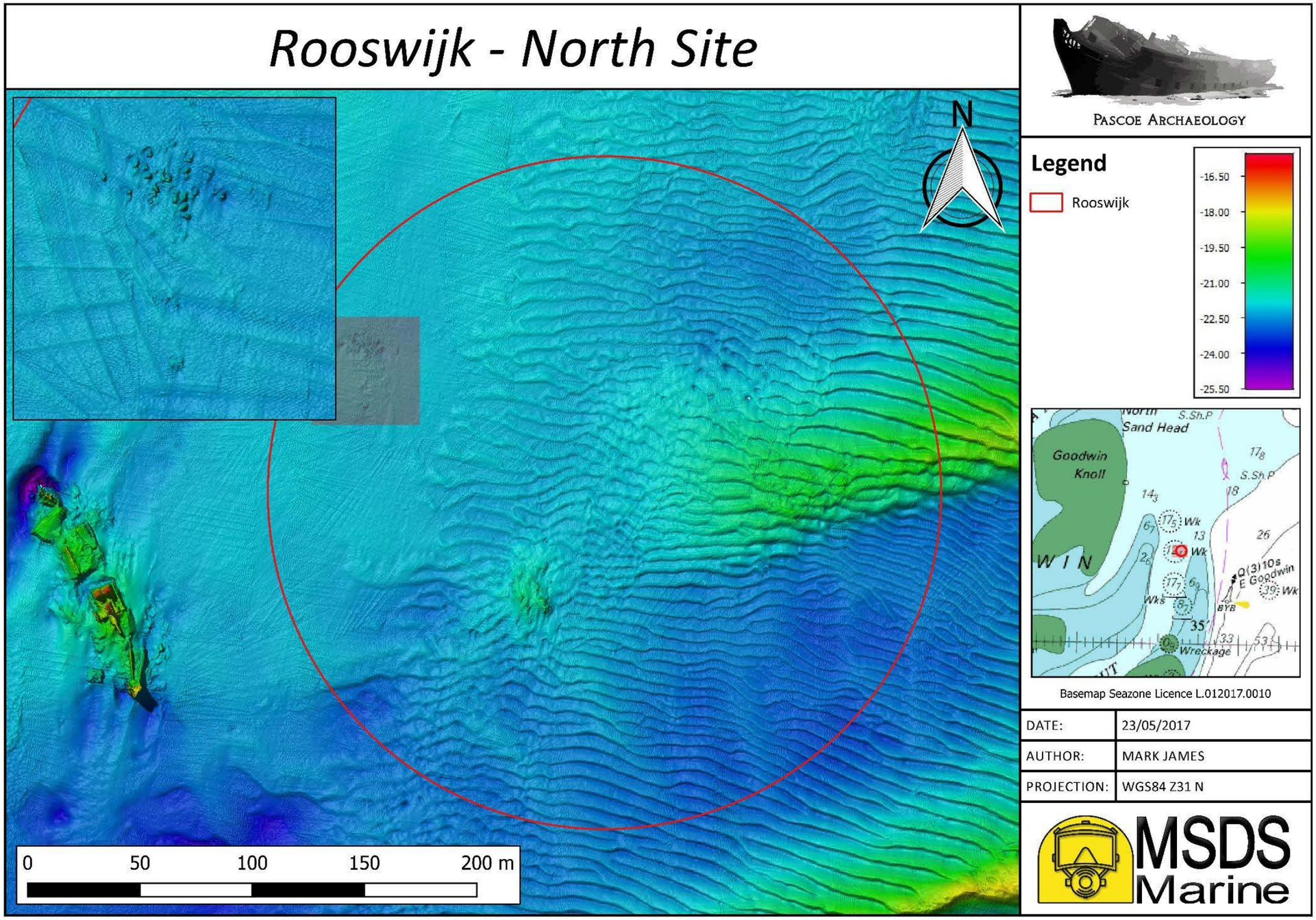


Fig. 6: *Rooswijk* North site in relation to designated area.

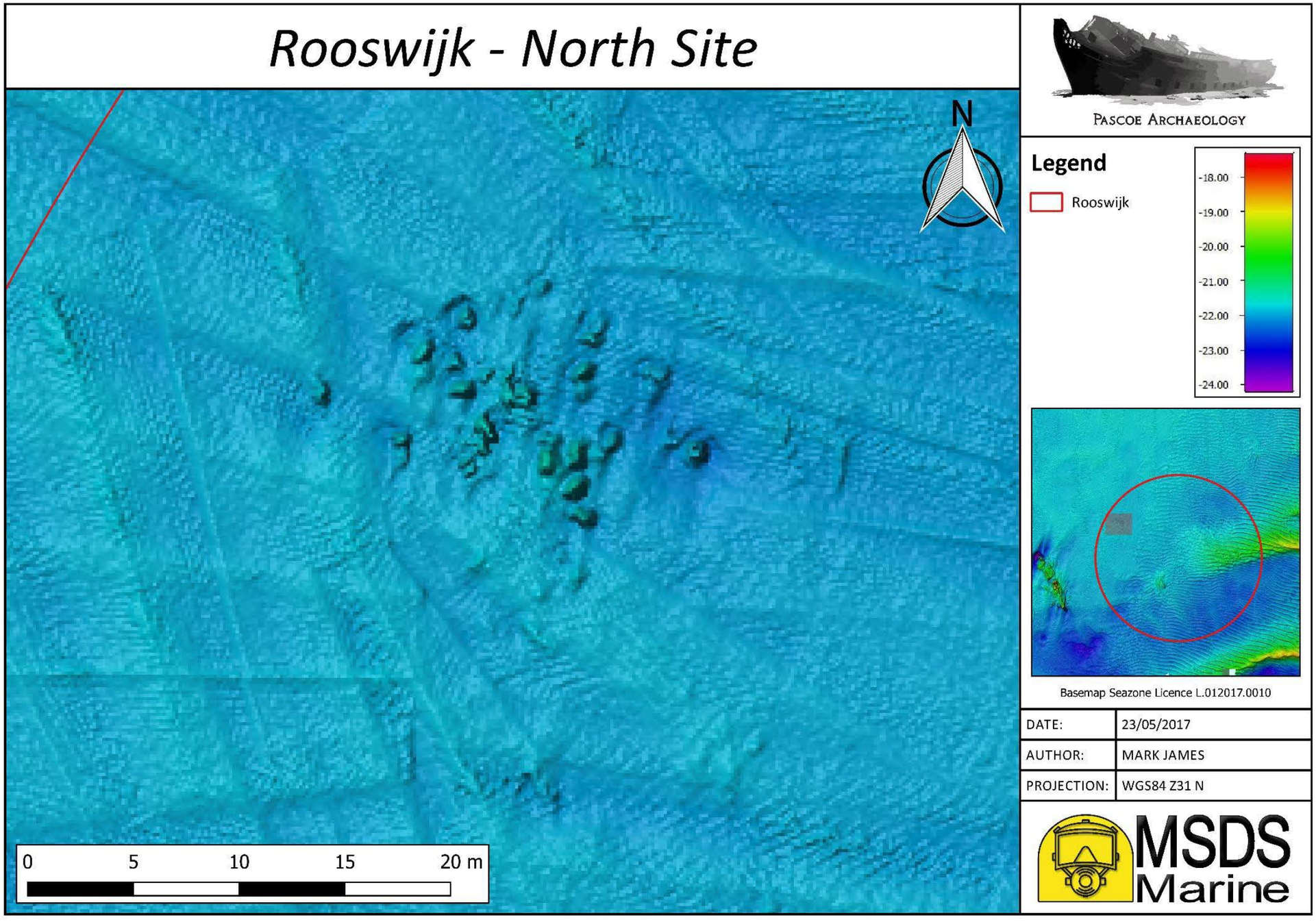


Fig. 7: Close-up North site.

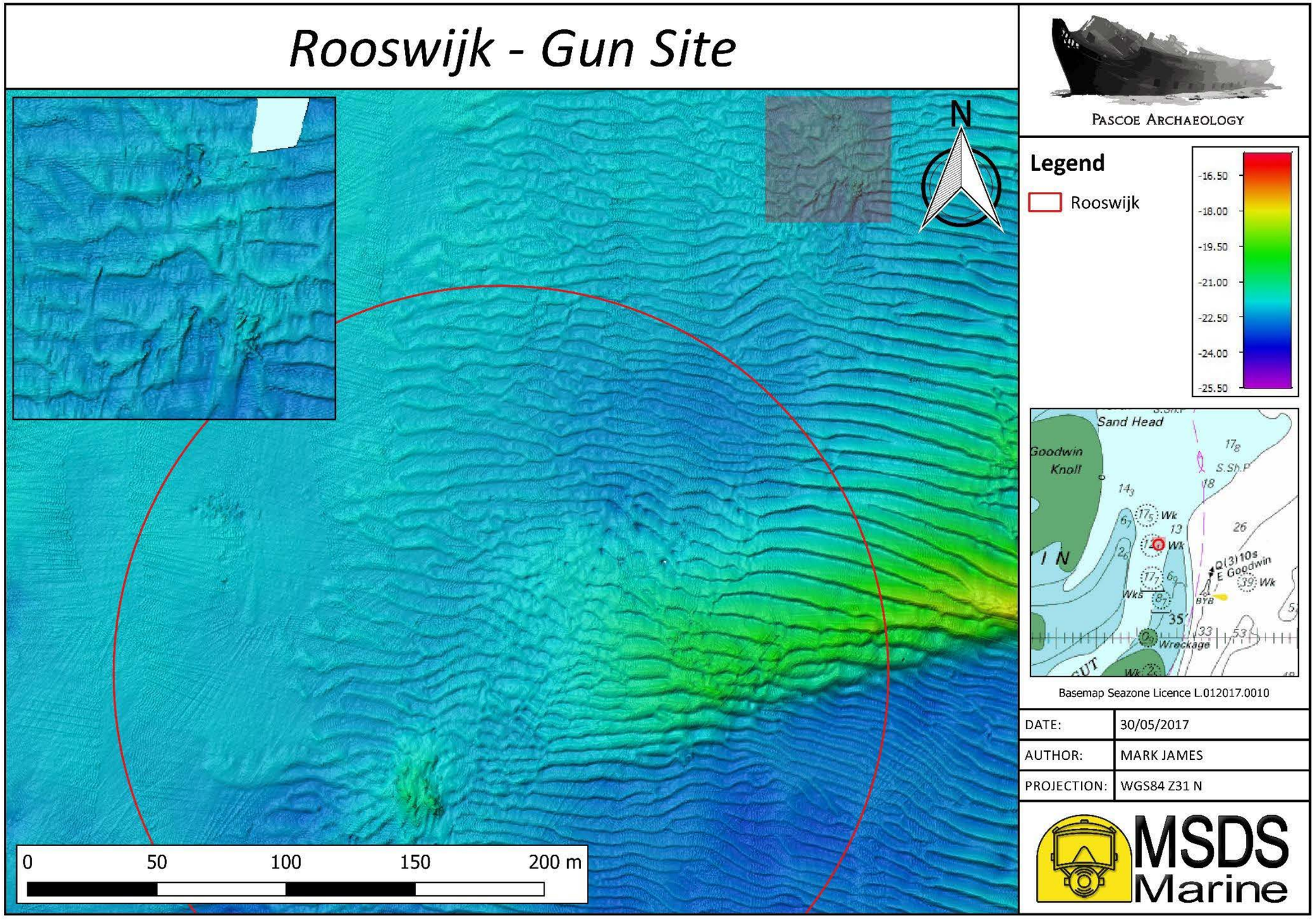
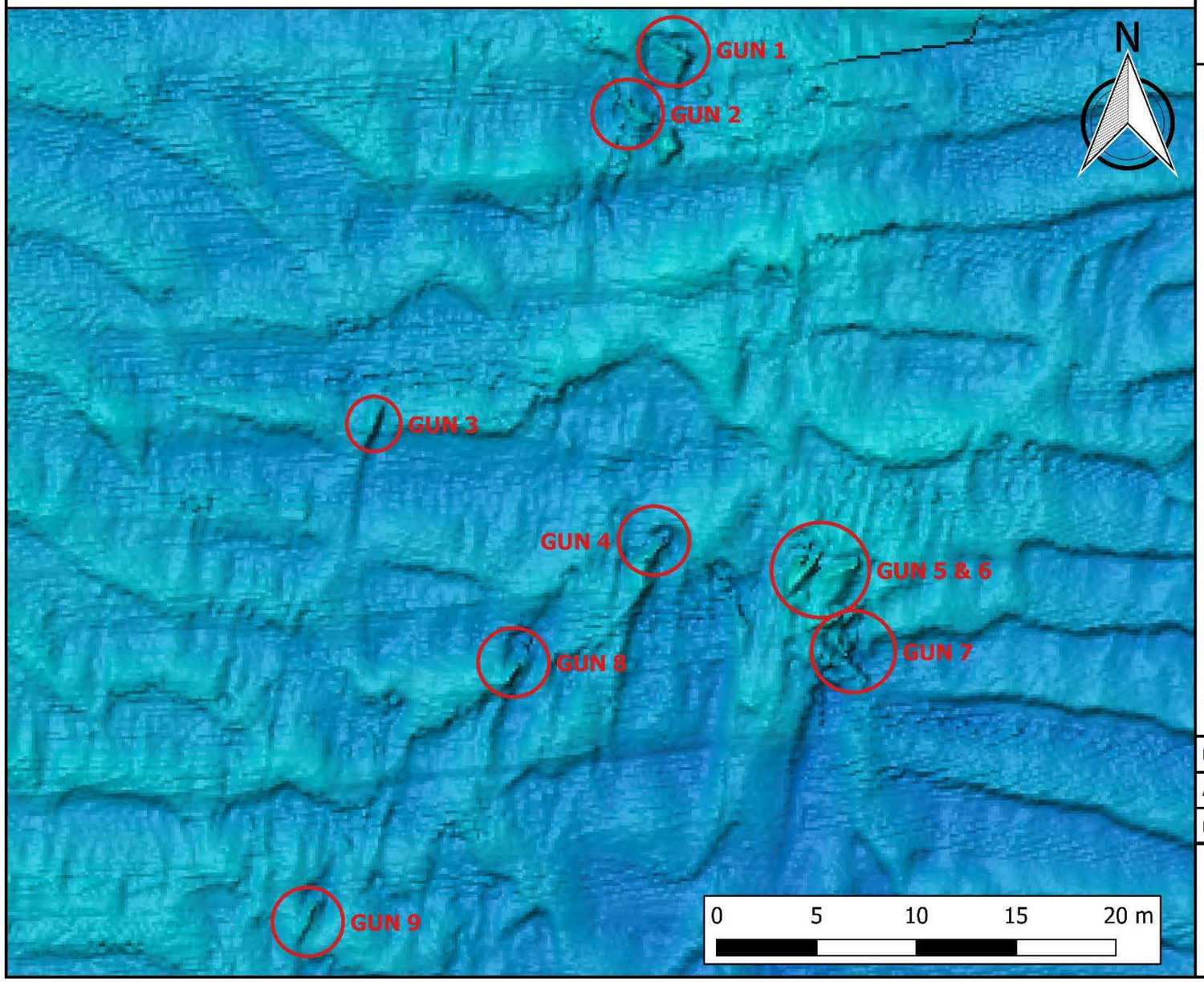


Fig. 8: Gun site in relation to the designated area.

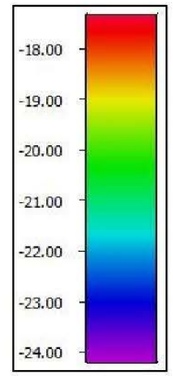
Rooswijk - Gun Site



PASCOE ARCHAEOLOGY

Legend

Potential guns



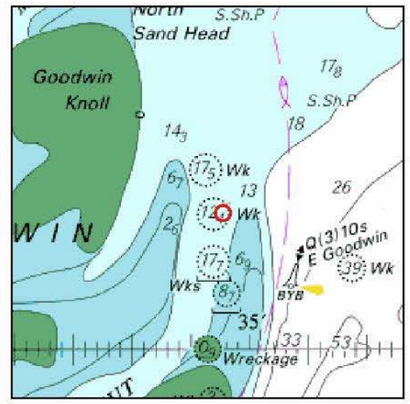


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Fig. 9: Close-up of Gun site showing 9 potential guns.

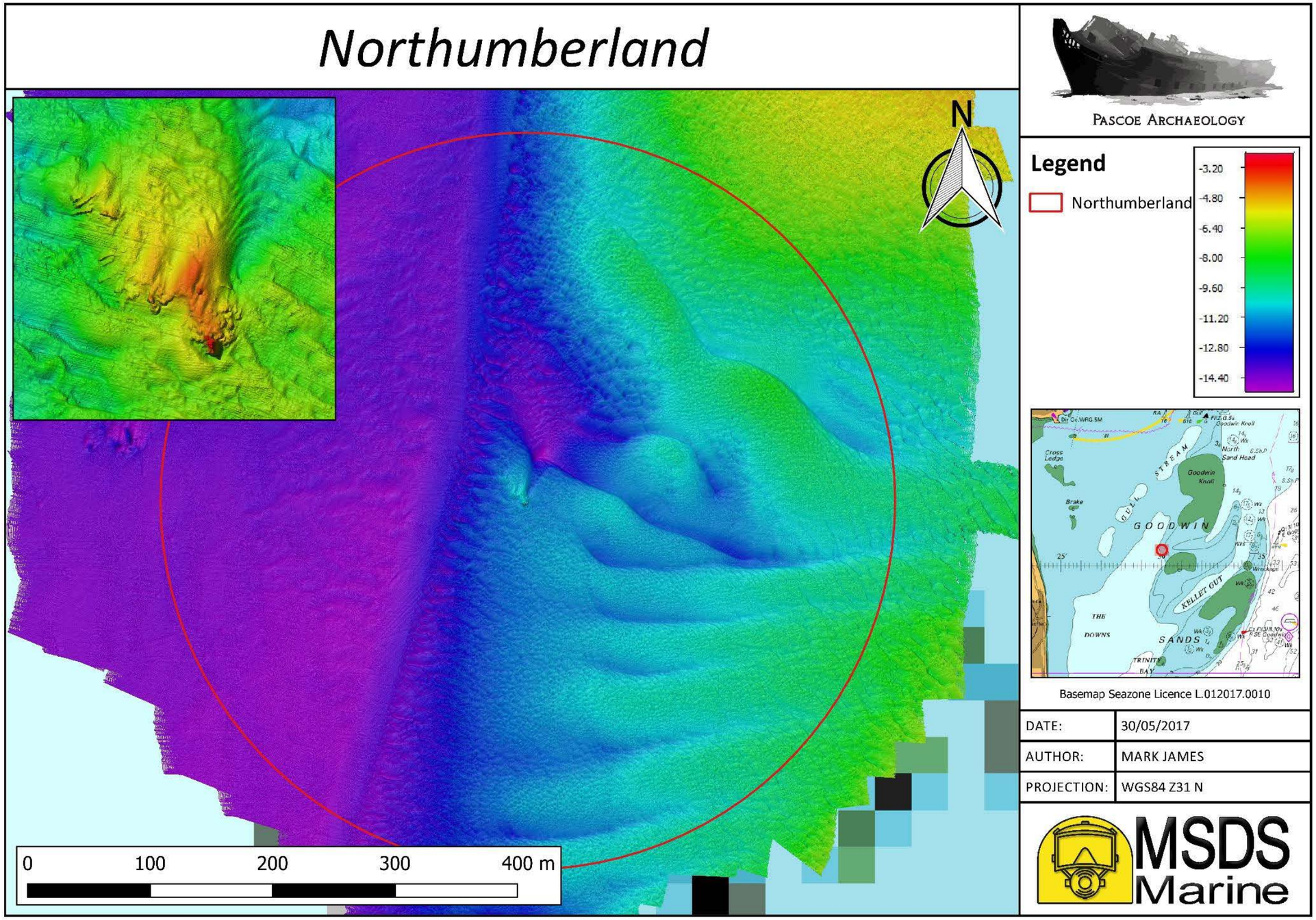
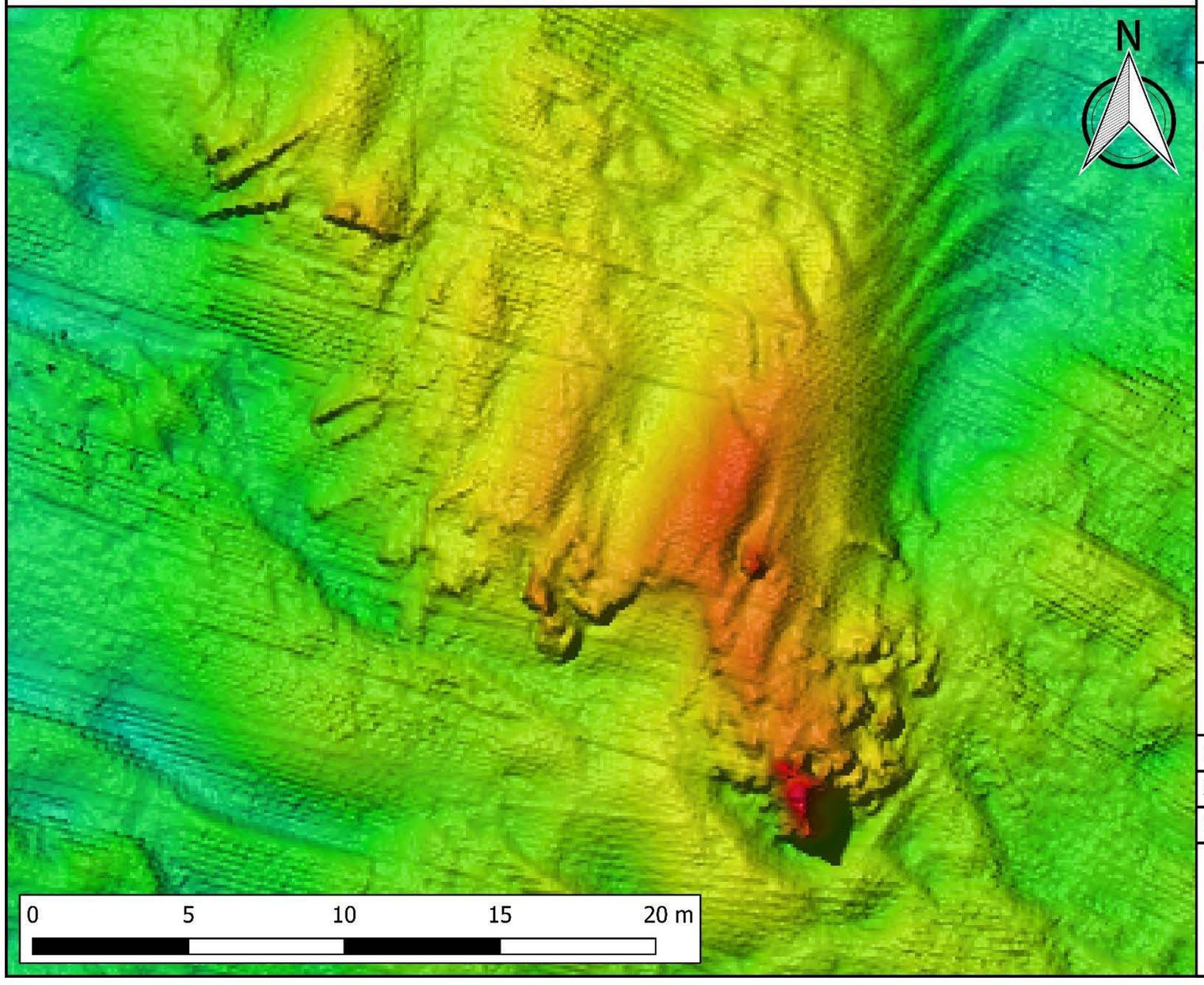


Fig. 10: The *Northumberland* and designated area.

Northumberland



PASCOE ARCHAEOLOGY

Legend

Northumberland

-10.80
-11.40
-12.00
-12.60
-13.20
-13.80
-14.40
-15.00

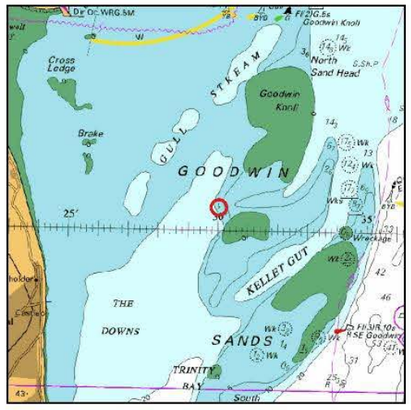


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Fig. 11: Close-up of the Northumberland wreck mound.

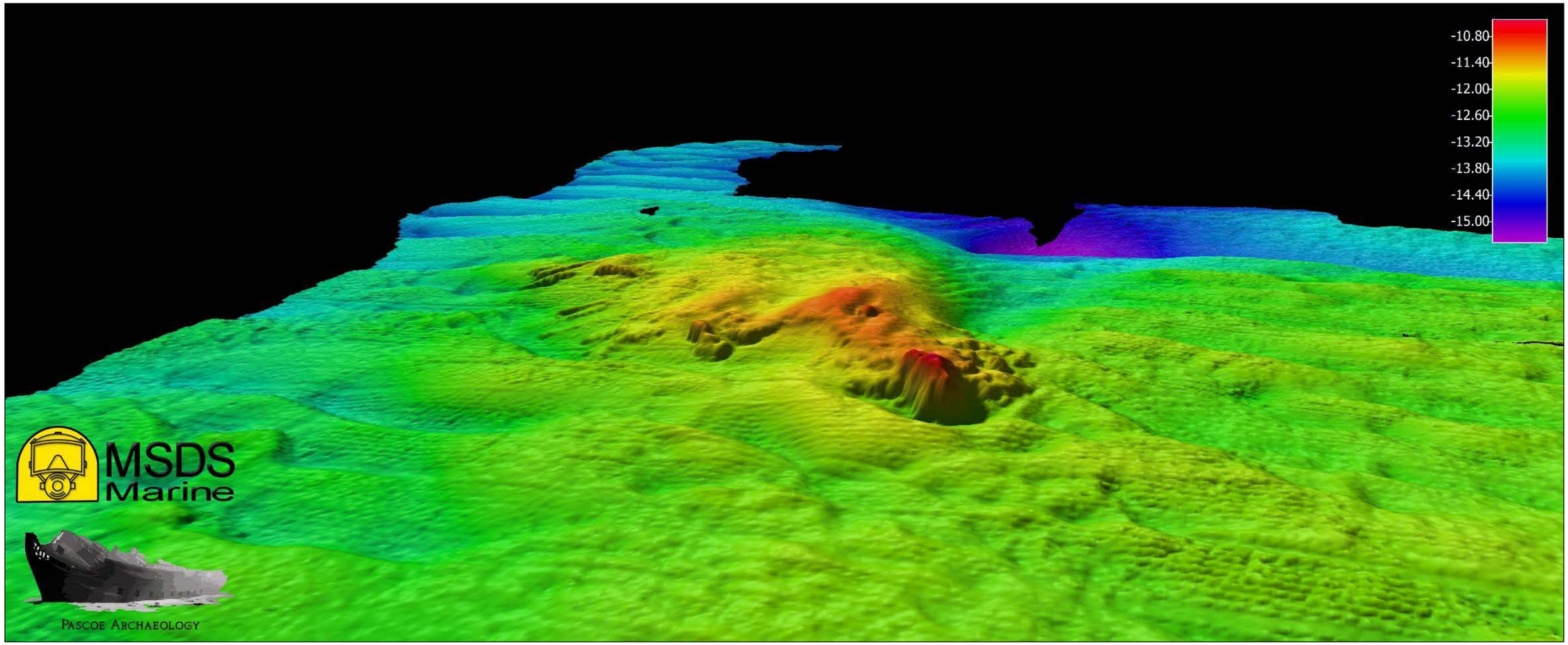

Fig. 12: Side elevation of the Northumberland site looking north. Large upstanding feature in the foreground and possible guns in the middle and north of the site.

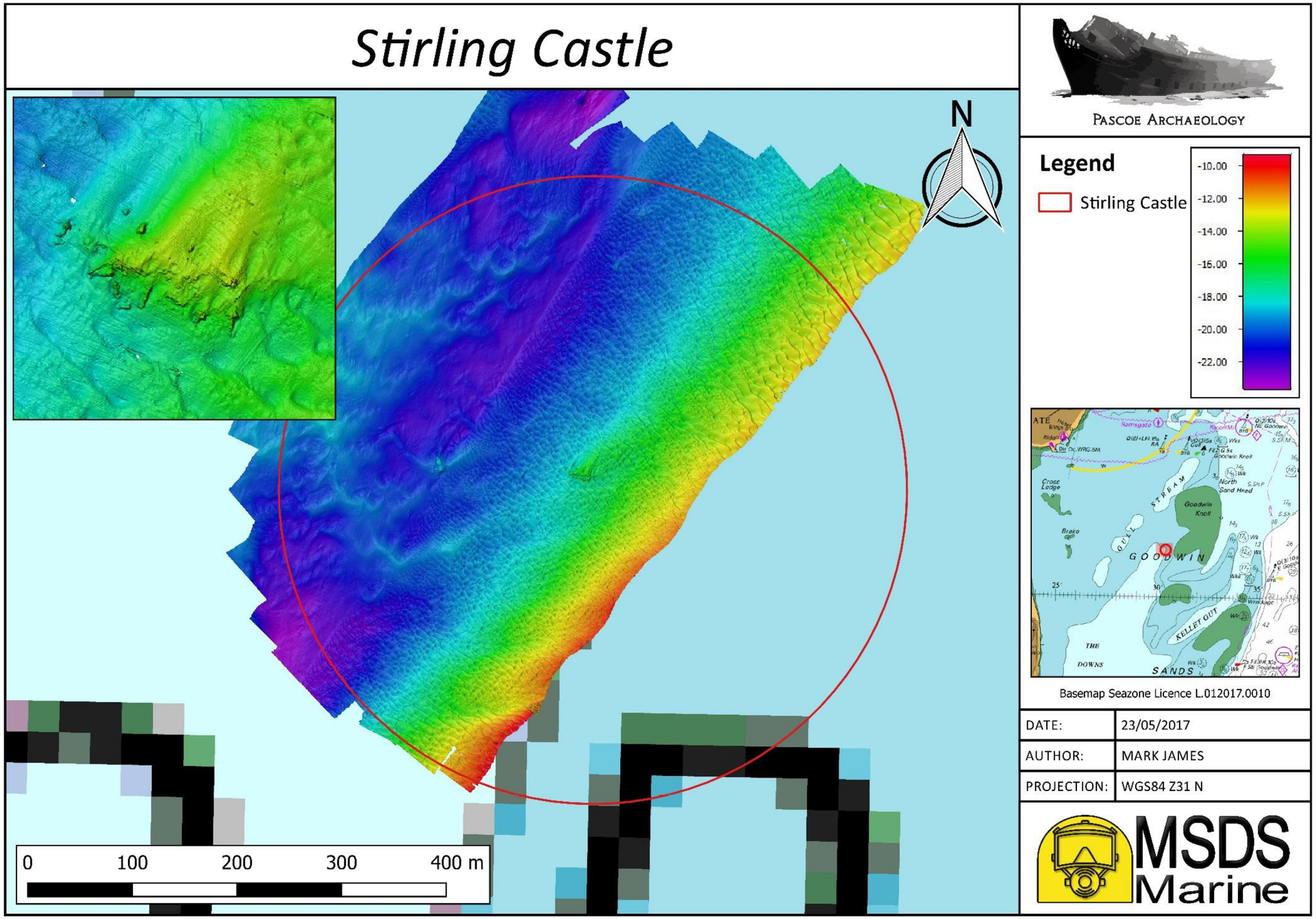

Fig. 13: The *Stirling Castle* and the designated area.

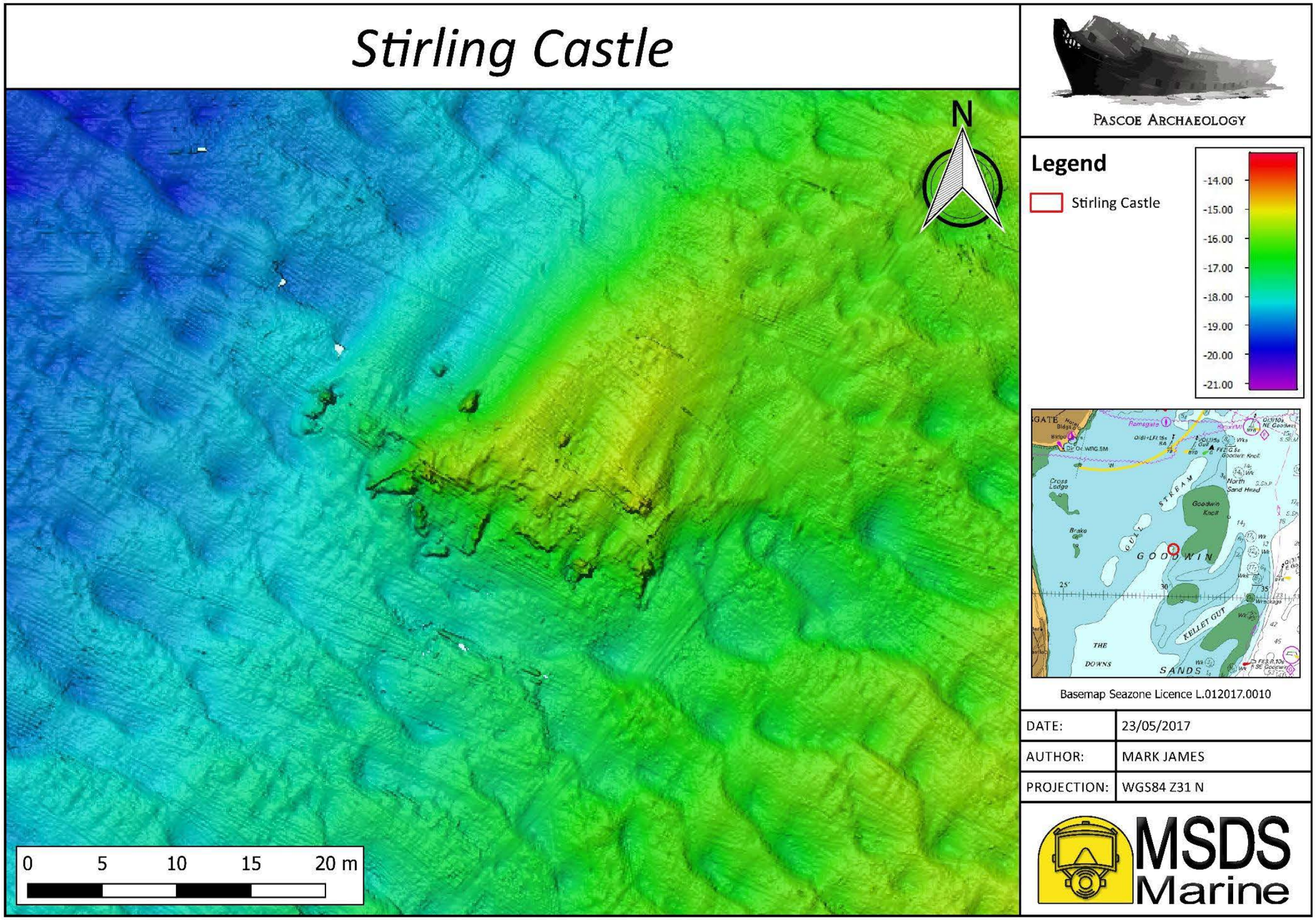

Fig. 14: The main wreck mound of the *Stirling Castle*.

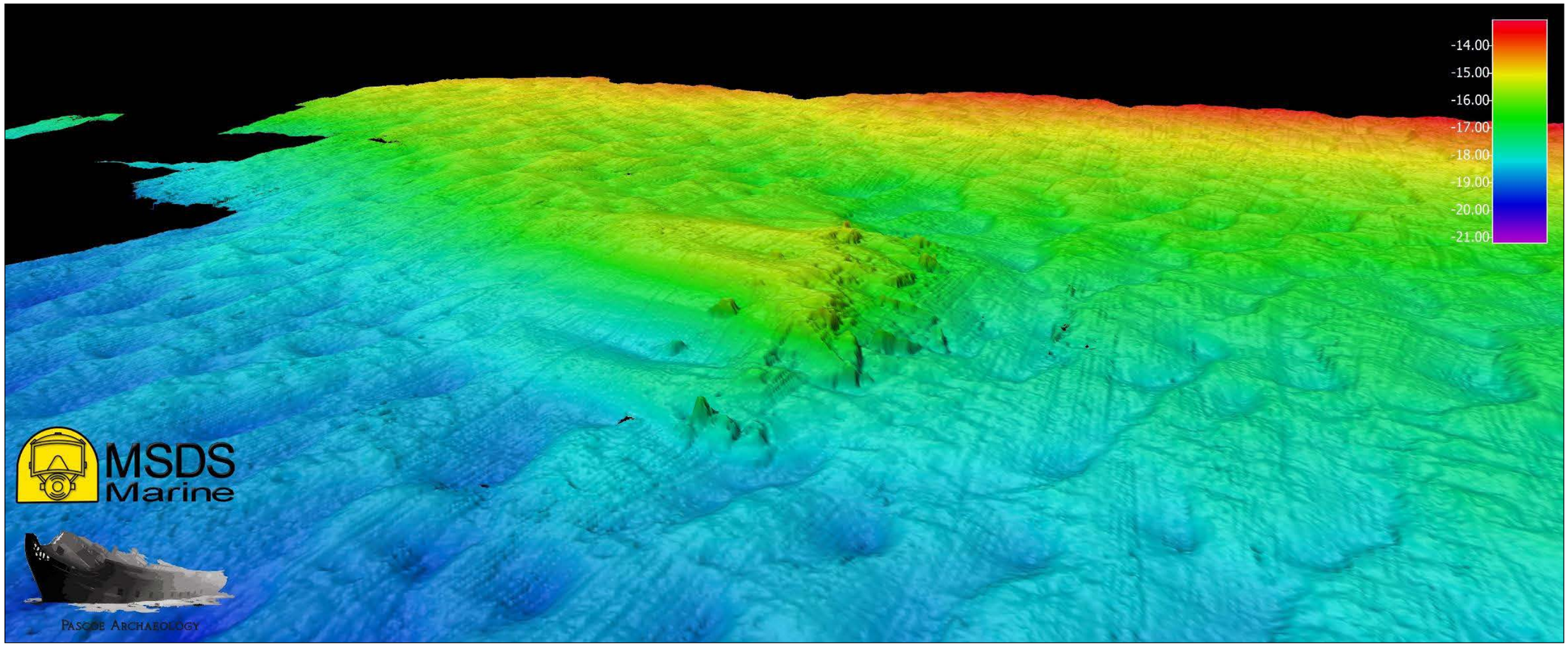

Fig. 15: Side elevation of the *Stirling Castle* site looking east towards the advancing sand bank.

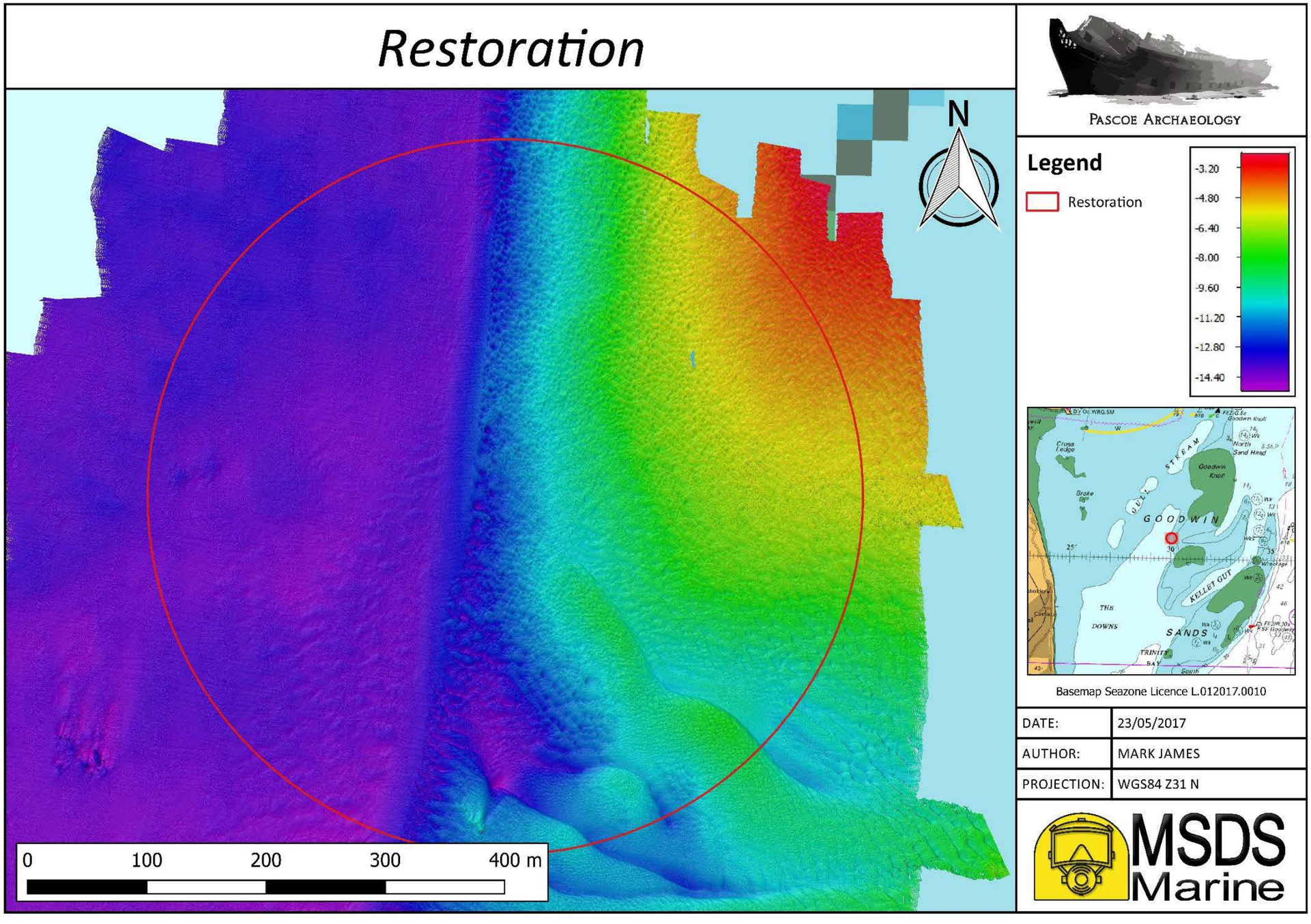

Fig. 16: No exposed wreck at the location of the *Restoration*. The *Northumberland* can be seen 280m to the south.

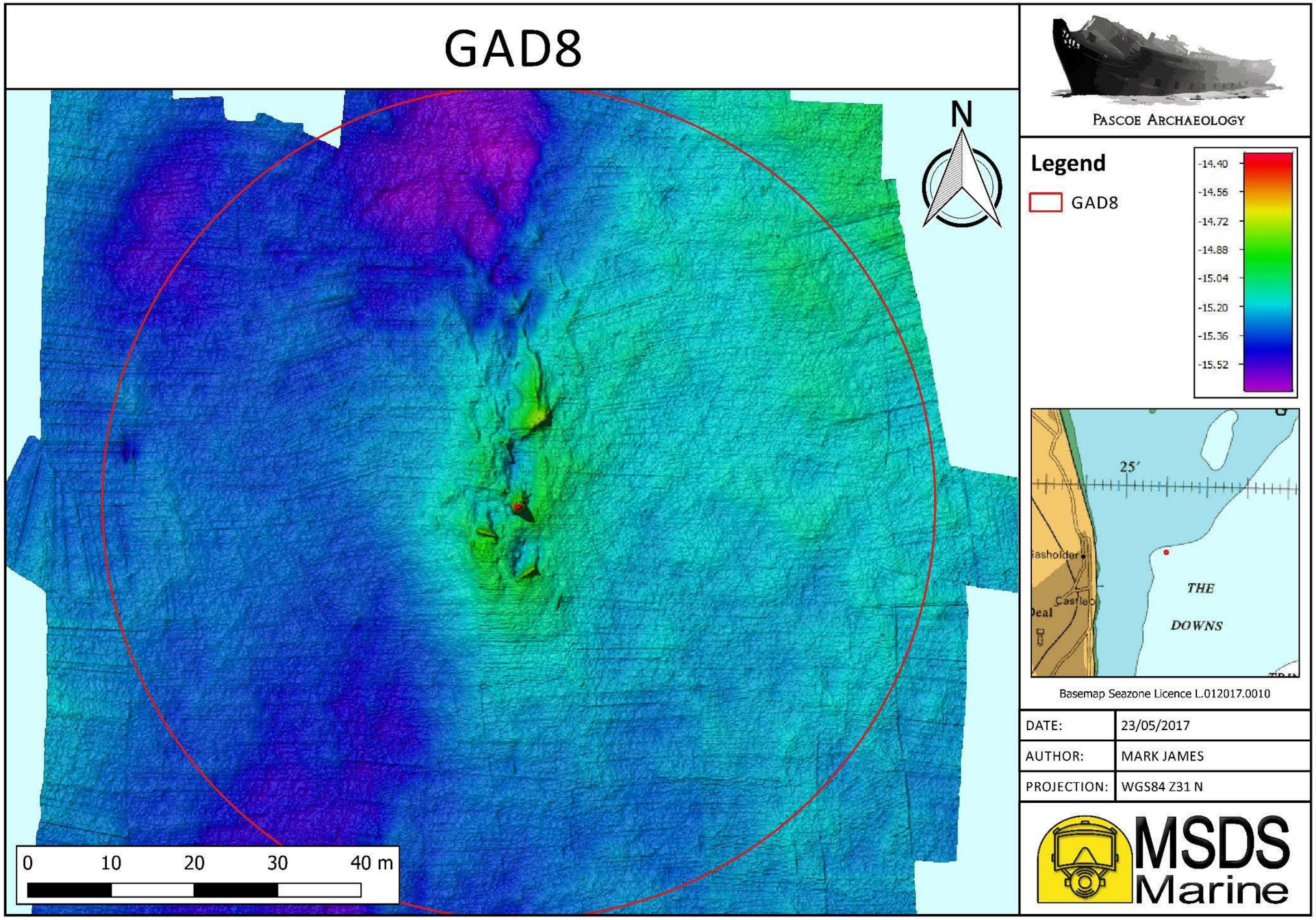

Fig. 17: GAD 8 and the designated area.

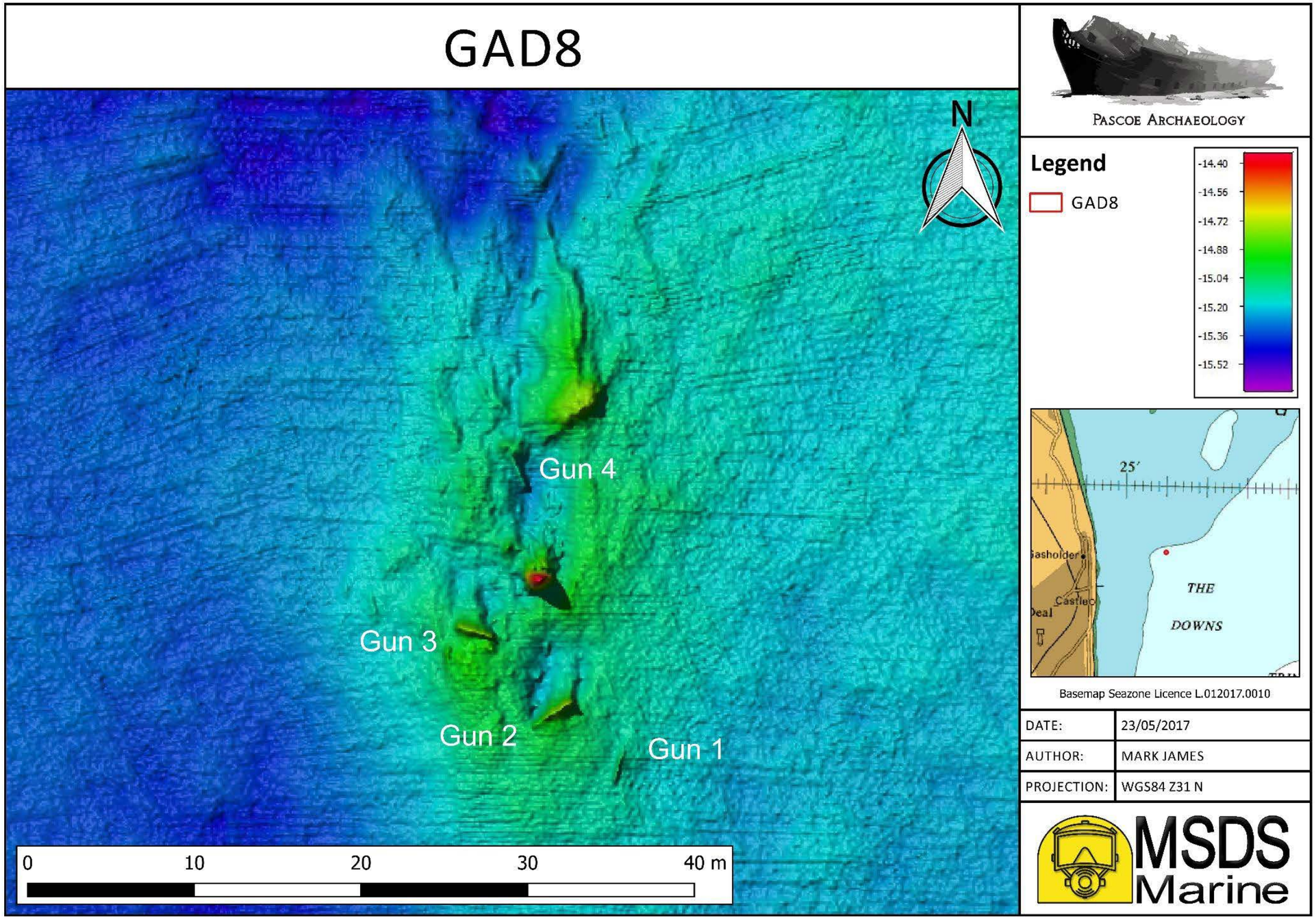

Fig. 18: Close-up of GAD 8.

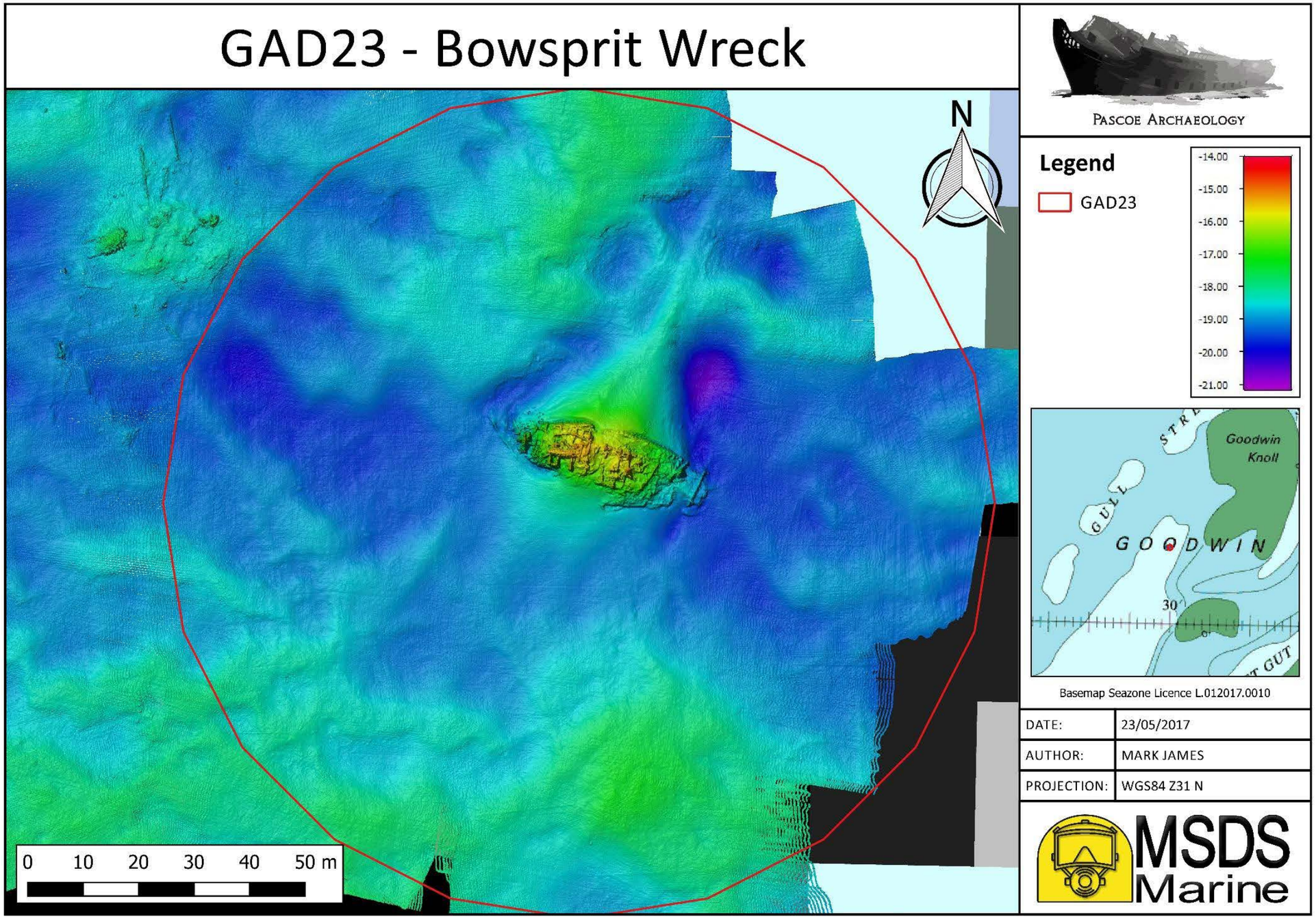

Fig. 19: GAD 23 and surrounding area.

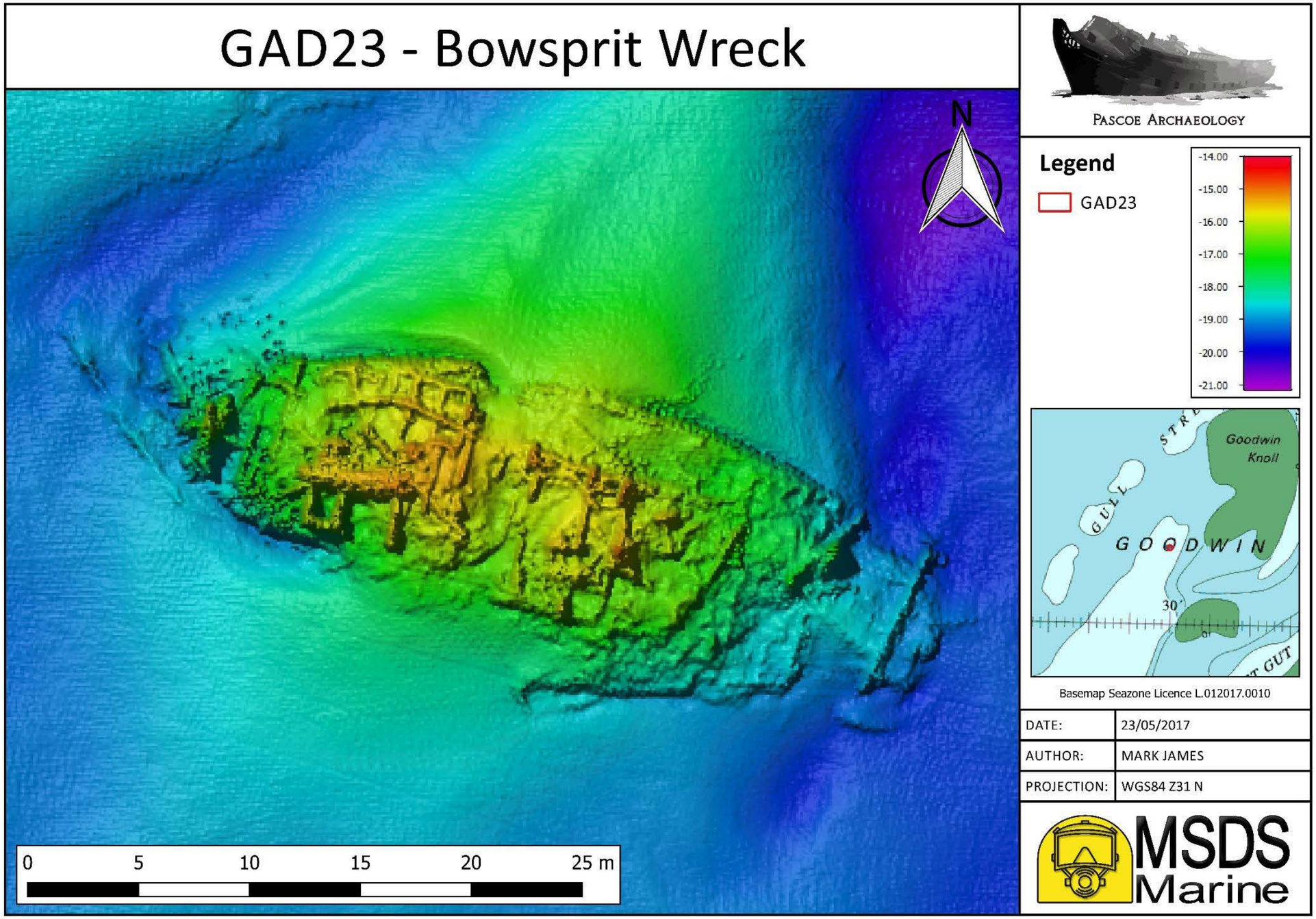

Fig. 20: Close-up of GAD 23.

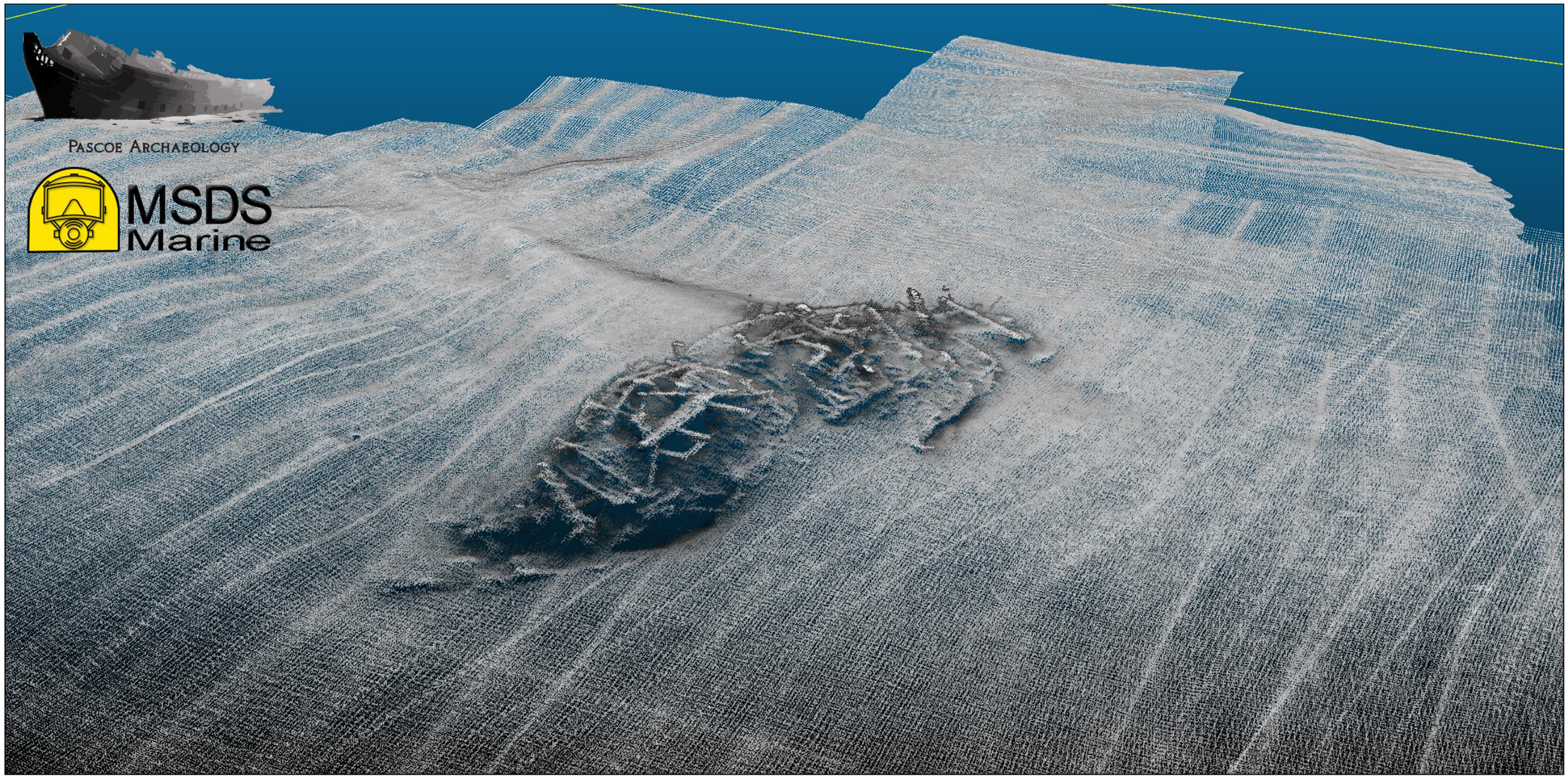

Fig. 21: Side elevation of GAD 23 site looking at the collapsed bow in the foreground and unsupported deck beams, aft towards amidships.

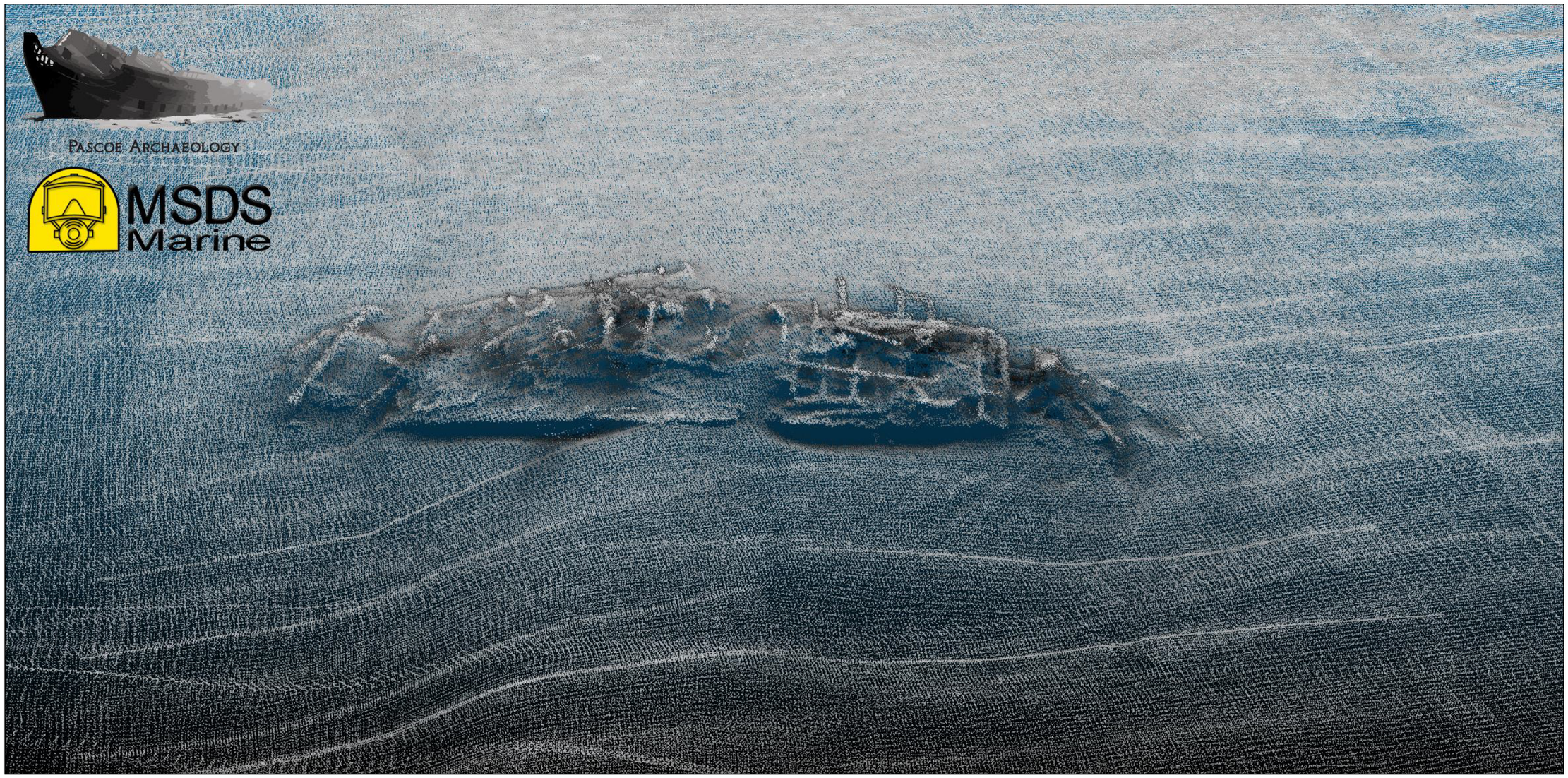

Fig. 22: Side elevation of GAD 23 site looking at the starboard side, the bow is to the right and stern to the left.

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