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NORTH SHIPWASH TE2A, 2016

1. EXECUTIVE SUMMARY

The Area and Recent Changes

- 1.1 Area TE2A covers a sandwave field at the entrance to Shipway, which forms a northern approach to the Harwich Haven ports.
- 1.2 The area is currently surveyed every 4 years.
- 1.3 The minimum depth provided in the 2016 survey within the limits of TE2A is 6.9m (compared to 7.7m in 2012), however this depth is indicated to be outside of the main routes used by shipping. The minimum depth within the main shipping route is 7.3m on a sandwave north of N Shipwash buoy. Controlling depths within the main shipping route have generally become shallower by up to 0.6m since 2012.
- 1.4 Sandwaves cover much of the 2016 survey area with a maximum amplitude of 6m, similar to the last survey in 2012. Sandwaves have opposing asymmetries and differing net sediment transport across the area. Sandwaves north of NE Bawdsey buoy have moved north-easterly by up to 70m, and sandwaves north of N Shipwash cardinal buoy have moved south-westerly by up to 70m.
- 1.5 Vessels with the deepest draught follow a route north of the N Shipwash cardinal buoy and south of the sandwave area in the middle of the survey area. AIS data indicates the largest registered draught of vessel to transit this route in 2016 was 13.5m, which is deeper than the minimum depth within the route used by shipping.

Reasons for Continuing to Resurvey the Area

- 1.6 The area covers a dynamic sandwave field providing controlling depths at the entrance to Shipway. Minimum depths and position of the sandwaves change over time and require resurveying to ensure the chart reflects these changes. Of particular concern is the sandwave area north of N Shipwash buoy which has continued a historical trend of becoming shallower and migrating further into the shipping route.
- 1.7 Shipway forms a potential exit route for deep draught vessels aborting their southern approach to the Harwich Haven ports. Use of this route is dependent on charted depths in Shipway and its northern approach.

Recommendations

- 1.8 The entrance to Shipway remains adequately marked by NE Bawdsey and N Shipwash buoys. The survey limits should remain the same and the frequency should remain as 4 years.

2. INTRODUCTION

- 2.1 This Assessment is produced by the United Kingdom Hydrographic Office (UKHO) for the Maritime and Coastguard Agency (MCA).
- 2.2 Analysis of the Routine Resurvey Areas forms part of the Civil Hydrography Programme and the reports are made available to all interested parties through the UKHO website and are presented to the Civil Hydrography Working Group. When approved, the recommendations are incorporated into the Routine Resurvey Programme.
- 2.3 The Admiralty Chart extracts, other graphics and tables in this Report are included for illustrative purposes only and are NOT TO BE USED FOR NAVIGATION.
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3. AREA HISTORY

3.1 Summary of Surveys:

Year	Survey	File Ref	Data	Year	Survey	File Ref	Data
1972	K6654			1996	M2625	HH090/689/01	s.d.
1972	K6655			1999	M3221	HH090/850/01	s.t.d.
1978	K8128			2002	M3730	HH090/992/01	s.t.d.
1981	K8860	H1940/80	s.t.	2005	M4327	HH091/114/01	m
1984	K9565	H2914/83	s.t.	2008	HI1262	RSDRA2008-26405	m
1987	M1083	H4027/86	s.t.	2012	HI1398	SDRA2012117404	m
1990	M1568	HH090/493/01	s.t.d.	2016	HI1522	2016-181430	m
1993	M2122	HH090/572/01	s.t.d.				

Key: s = sonar sweep, t = seabed texture tracing, d = digital data, m = multibeam digital data
Single-beam surveys (prior to 2004) conducted at 1:25,000 scale

3.2 Summary of historical recommendation enacted

Year	Remarks
1994	Report amended SW limit to include sandwaves in former area 2b. Survey interval unchanged. Dept of Transport accepted this recommendation on 27 June'94 (HA145/02/03/04-E10)
2002	Limits extended slightly to cover shoal depth.
2008	Considering the observed shoaling that has occurred over the sandwaves in the area and potential concern to shipping using the area, the area should continue to be resurveyed on a 3-year interval. The survey limits should remain unchanged.
2012	The survey frequency extended from 3 to 4 years, taking into account the historical shoaling by an average 0.32m over a 4-year period of the sandwave area 875m to the north of North Shipwash buoy. The survey limits revised to remove the southern area which, away from the buoyed North Ship Head, is devoid of significant sandwaves. The western limit should be extended slightly to cover the 10m contour at the northern end of Bawdsey Bank.

4. DESCRIPTION OF THE AREA

- 4.1 The area encompasses the northern entrance to Shipway, a shipping channel used by vessels approaching the Harwich Haven ports from the north and east. The channel is bounded by Bawdsey Bank to the west and Shipwash to the east, the northern extents of which are covered by area TE2A.
- 4.2 Much of the area is covered by sandwaves up to 6m in height, similar to the last survey in 2012. Dense sandwaves lie across Bawd Head at the northern end of Bawdsey Bank and across the northern end of Shipwash bank. Figure 3 shows the general distribution of sandwaves across the area. These sandwaves have opposing asymmetries across the area, indicating differing net sediment transport across the area.

4.3 Area Covered: 3.47 NM² (11.90 km²) as shown in Figure 1 below.

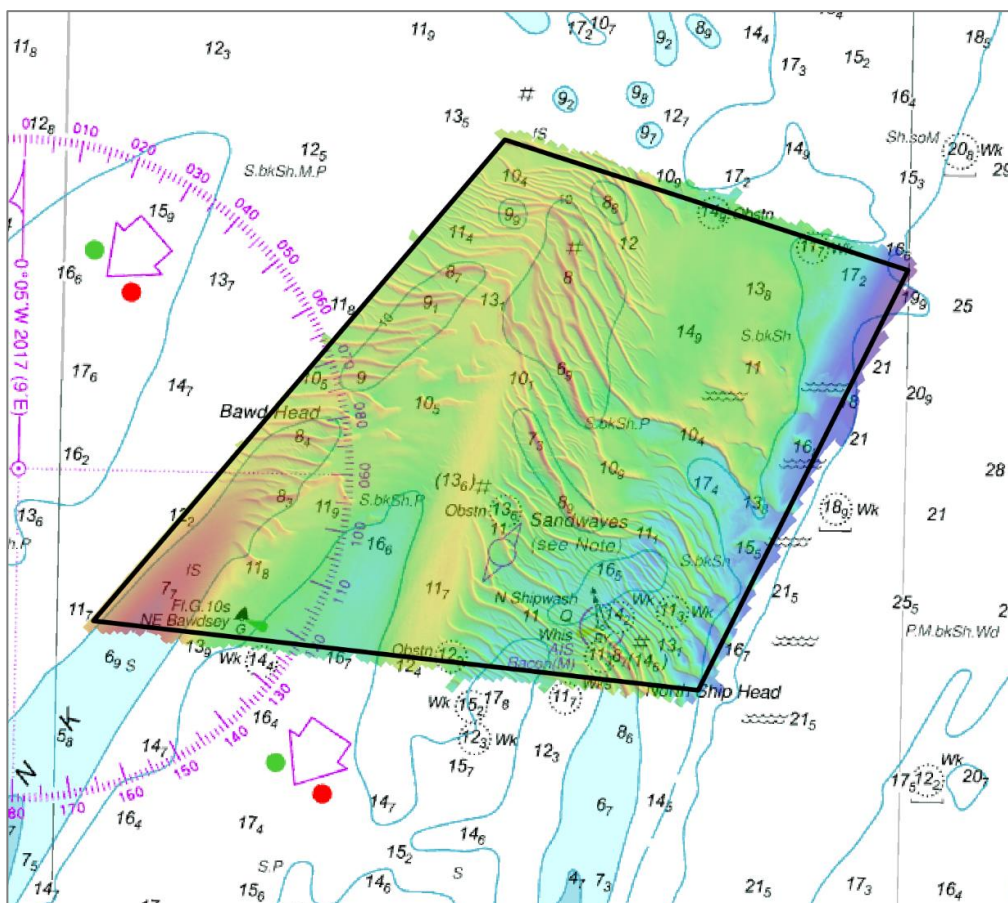


Figure 1 – HI1522 TE2A survey data sun-illuminated view overlaid on BA Chart 2052

4.4 The geographic limits at the time of resurvey are shown in the Table 1 below and coordinates are in Decimal Degrees referenced to WGS84:

Point	Latitude (N)	Longitude (E)
01	52.05833	1.62667
02	52.05083	1.66667
03	52.02500	1.64675
04	52.02853	1.58700
01	52.05833	1.62667

Table 1: HI1522 TE2A Survey Limits

4.5 Survey interval at time of resurvey: 4 years

4.6 Largest scale chart: BA2052 (Scale 1:50,000)

5. SHIPPING IN THE AREA

- 5.1 Shipping uses Shipwash channel as an approach / departure to and from the Harwich Haven ports. Figure 2 shows that most departing ships and those with the deepest draught follow a main shipping route bearing east towards Dutch and German ports immediately after passing north of N Shipwash buoy, although some continue in a northerly direction.
- 5.2 Shipping data from satellite AIS data for 2016 of vessels larger than 2000GT shows the vessel with the largest draught to transit through the survey area was a bulk carrier with a draught of 18.2m. However, 18.2m is the maximum draught when fully loaded and it was unlikely to have had maximum draught when it transited the TE2A survey area. Discounting the aforementioned vessel the registered draught of vessels that transit the main shipping route range from 10.2m to 13.5m.

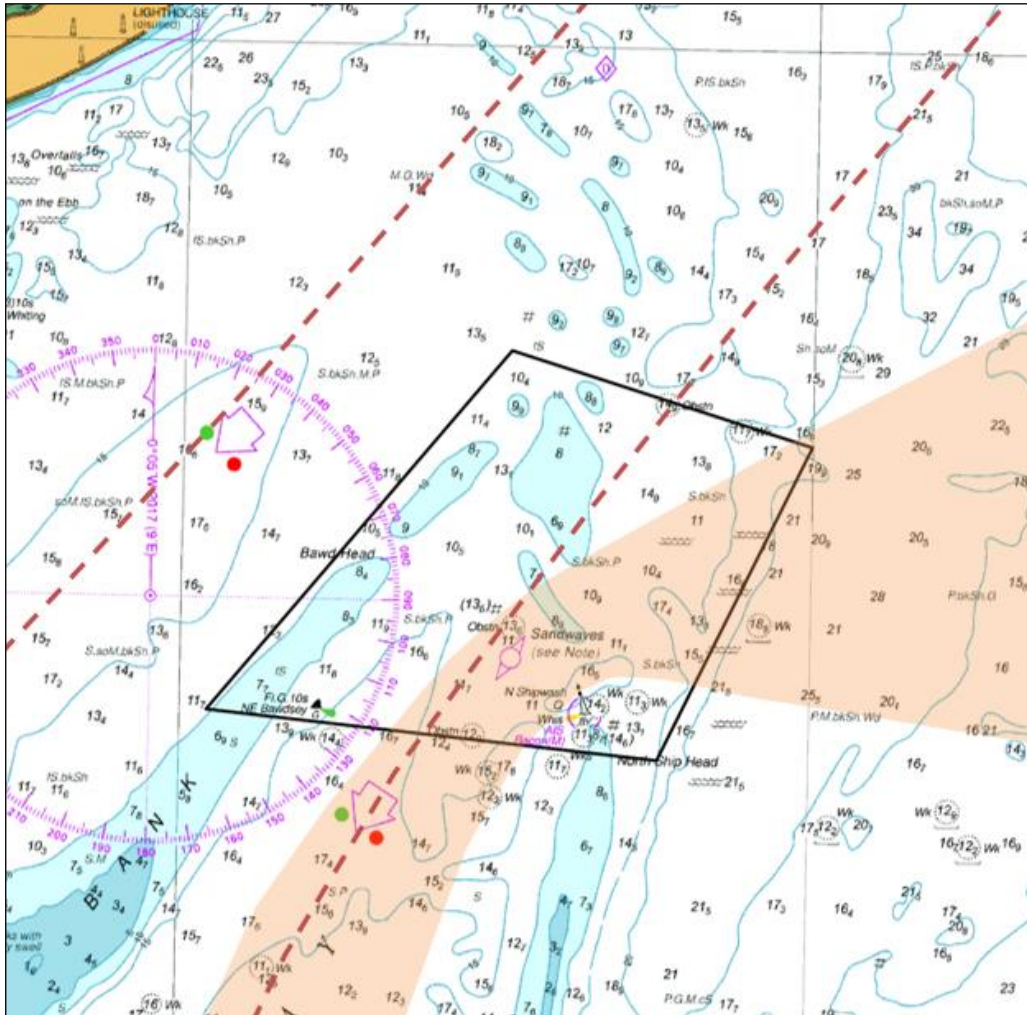





Figure 2 – Indicative shipping routes overlaid on BA Chart 2052

	Indicative shipping routes of vessels with <11m draught
	Lower density traffic route
	2016 Survey Area Limits

6. REFERENCE SURVEY DETAIL

- 6.1 The last historical Civil Hydrography Programme (CHP) Routine Resurvey of area TE2A, which has been used as the reference to compile this assessment, was Hydrographic Instruction (HI) 1398 which was gathered from the 6th to the 9th October 2012. Sea states 1 (smooth) – 2 (slight) were generally experienced during the period, but increased to sea state 4 (rough) towards the end of the survey.
- 6.2 The survey data was acquired using multibeam echosounder system. The primary reference position system used GNSS and was supplemented by a dynamic GNSS Precise Point measuring system. The survey is referred to the European Terrestrial Reference Frame 1989 (ETRF89) datum.
- 6.3 Observations from GNSS 3D positioning were combined with the UKHO Vertical Offshore Reference Frame (VORF) to reduce depths to Chart Datum. The final deliverable was a 1m resolution CUBE (Combined Uncertainty and Bathymetry Estimator) surface.
- 6.4 The survey was validated by UKHO and met IHO S44 (5th Edition) Order 1a standards.
- 6.5 The Report of Survey is available upon request from the UKHO and the validated bathymetric surfaces are available to download from INSPIRE portal and MEDIN Bathymetry Data Archive Centre.

7. COMPARISON SURVEY DETAIL

- 7.1 The latest survey undertaken as part of the CHP Routine Resurvey was in 2016 under HI1522. Area TE2A was surveyed from the 5th to the 7th September. sea states were reported during this period to be less than 1 (smooth) to 3 (moderate). Additional survey work was undertaken on the 26th October in sea states less than 1 (smooth) to 2 (slight), following a number of periods of weather down time.
- 7.2 The survey data was acquired using a multibeam echosounder system. The primary reference position system used GNSS and was supplemented by a dynamic GNSS Precise Point measuring system. The survey is referred to the European Terrestrial Reference Frame 1989 (ETRF89) datum.
- 7.3 Observations from GNSS 3D positioning were combined with the UKHO Vertical Offshore Reference Frame (VORF) to reduce depths to Chart Datum. The final deliverable was a 1m resolution CUBE (Combined Uncertainty and Bathymetry Estimator) surface.
- 7.4 The survey was validated by UKHO and met IHO S44 (5th Edition) Order 1a standards.
- 7.5 The Report of Survey for this survey is available upon request from the UKHO and the validated bathymetric surfaces are available to download from INSPIRE portal and MEDIN Bathymetry Data Archive Centre.

8. DESCRIPTION OF RECENT BATHYMETRIC CHANGE

8.1 The Variability Plot in Figure 3 shows that sandwaves have opposing asymmetries across the survey area. Sandwaves northeast of Bawd Head and the NE Bawdsey buoy have migrated in a north-easterly direction up to 70m between 2012 and 2016. Sandwaves north of N Shipwash buoy have migrated up to 70m in a south-westerly direction between 2012 and 2016. This sandwave area is continuing a historical trend of migrating southwest further into the main shipping route for large draught vessels, at a similar rate to its migration between 2008 and 2012.

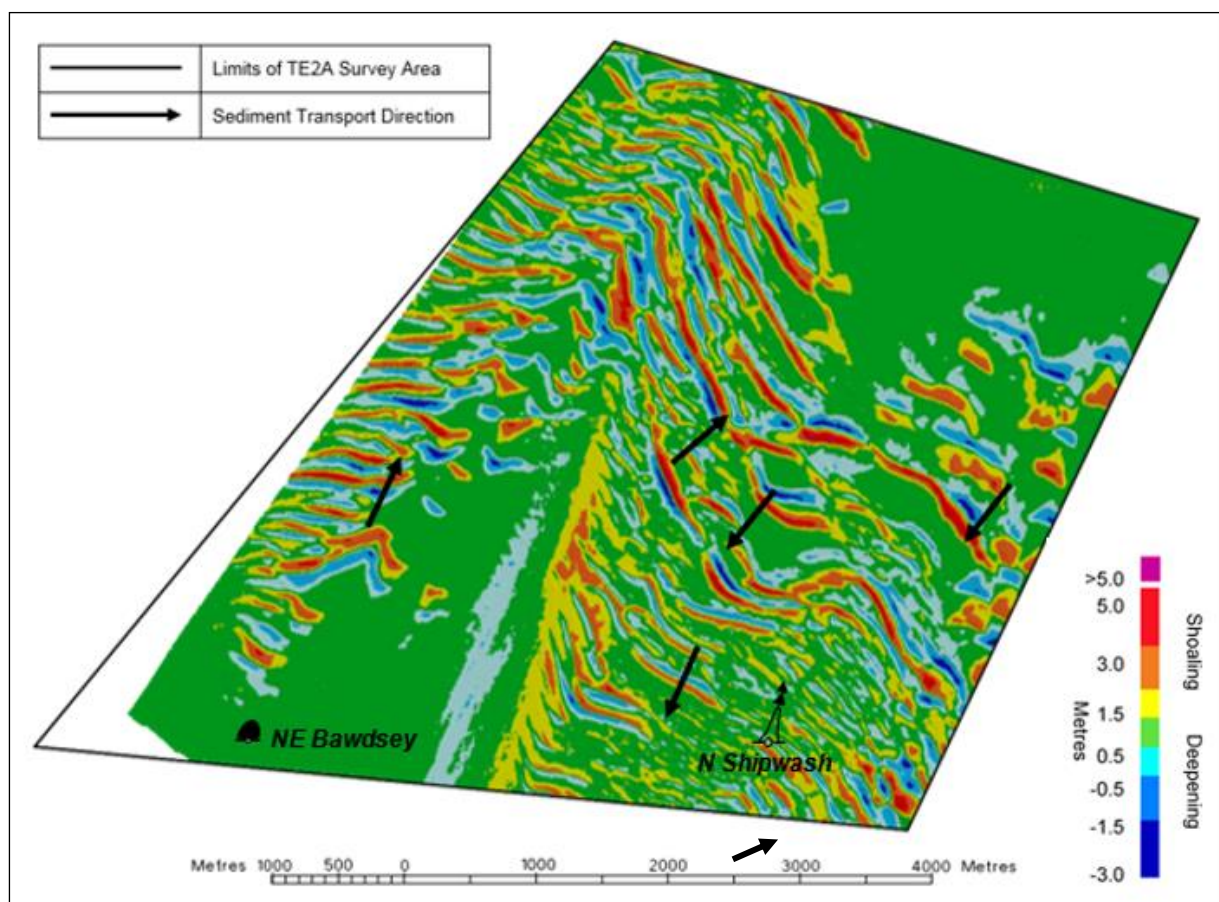


Figure 3 – Variability Plot showing Bathymetric Changes between the 2012 and 2016 Surveys

- 8.2 The colour-banded depth plot in Figures 4 shows that controlling depths throughout the survey area have become shallower since 2012. In 2016 the controlling depth in the survey area was 6.9m on the sandwave 1770m north of N Shipwash buoy, compared to 7.7m in 2012. This sandwave is approximately 400m northwest of the main shipping route highlighted in Figure 2.
- 8.3 Figure 4 shows that the controlling depth within the main shipping route is 7.3m (compared to 7.9m in 2012) on the sandwave approximately 1315m northwest of N Shipwash buoy.
- 8.4 In 2016 there is an apparent increased rate at which the seabed is becoming shallower. The 2012 Routine Resurvey report states that there has been historical shoaling by an average of 0.32m over a 4-year period of the sandwave area 875m to the north of the N Shipwash buoy. In 2016 over this same area sandwaves have shoaled by up to 0.6m since 2012.
- 8.5 The minimum depth on the sandwave area south of the N Shipwash buoy has shoaled from 9.1m in 2012 to 8.7m in 2016. The area has migrated slightly in a north-easterly direction by up to 30m, but not towards the main shipping route.

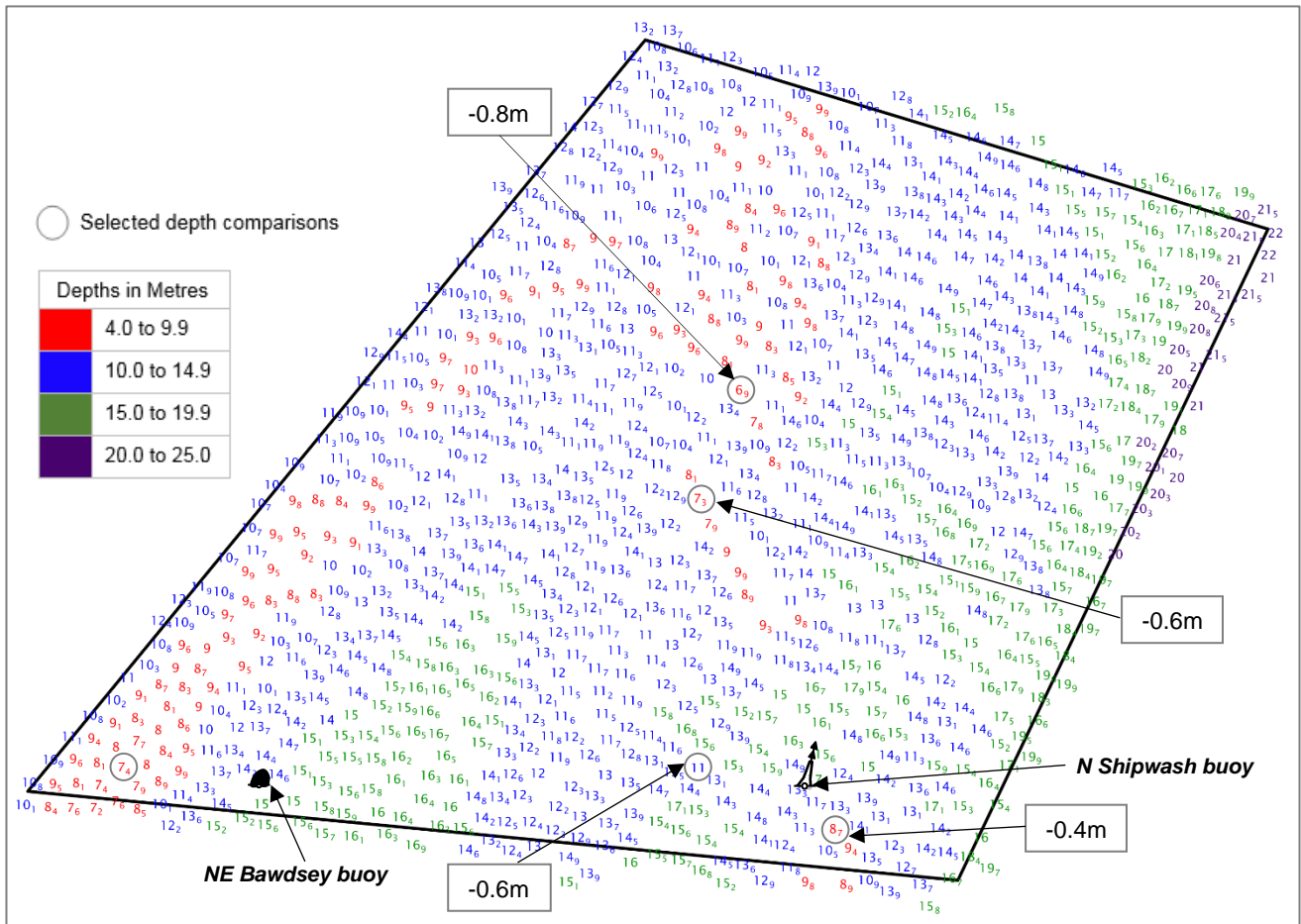


Figure 4 – Colour Banded Depth Plot showing selected depths from the 2016 Survey

Depth changes indicated above are from the closest corresponding 2012 sounding available. Hence depth differences will be from different positions from the 2016 sounding selection as an automatic shoal bias sounding selection tool has been utilised which produces a representation of the shoal values in a data set. Positive values (+) represent deepening. Negative values (-) represent seabed depths becoming shallower.

9. IMPLICATIONS FOR SHIPPING

- 9.1 Vessels with the deepest draught follow the main shipping route north of the N Shipwash buoy. Between 2012 and 2016 the controlling depths of sandwaves have shoaled by up 0.6m within the main shipping route, and up to 0.8m close to the route. The minimum depth within the route is 11m which is shallower or close to the registered draught of vessels transiting the area.
- 9.2 Sandwaves have continued to migrate southwest towards and further into the shipping route and therefore remain a concern to shipping with the largest draughts. However, the main shipping route remains adequately marked by NE Bawdsey and N Shipwash buoys with the minimum depth from the 2016 survey being adequately charted. A 'sandwave note' on the largest scale chart highlights the potential for depths to be less than charted in the entrance to Shipway.

10. RECOMMENDATIONS FOR FUTURE SURVEYS

- 10.1 The area should remain in the programme due to the changes in depth over the sandwaves within and close to the main shipping route in the southeast of the survey area. The limits as defined in Section 4 should remain unchanged and the survey frequency should remain as 4 years.