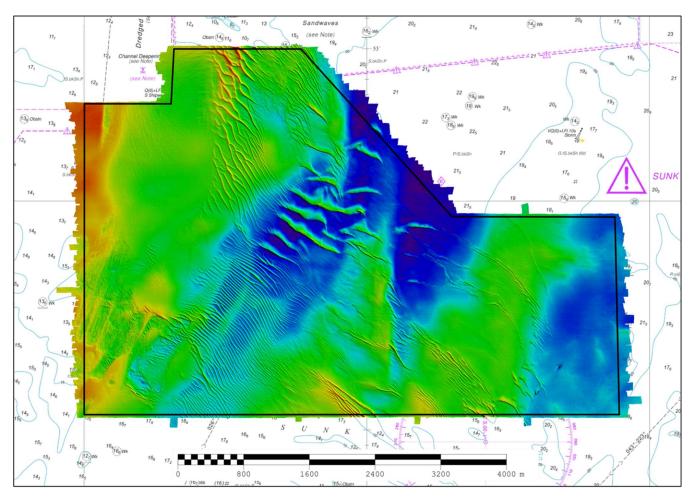


# THAMES ESTUARY SUNK FULL (TE3A) 2022 ASSESSMENT

An assessment of the 2022 hydrographic survey of the area TE3A: to monitor recent seabed movement; to identify any implications for shipping; and to make recommendations for future surveys.



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#### Notes

This Assessment is produced by the UK Hydrographic Office (UKHO) for the Maritime and Coastguard Agency (MCA). Analysis of the Routine Resurvey Areas forms part of the Civil Hydrography Programme and the reports are made available through the UKHO website and are presented to the Civil Hydrography Working Group. When approved, the recommendations are incorporated into the Routine Resurvey Programme. The report is governed by a Memorandum of Understanding between the DfT (including the MCA) and the MOD (including the UKHO).

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No analysis of shipping traffic has been included within this report due to no AIS data being supplied by MCA.

All depths are to Chart Datum, defined using the UKHO Vertical Offshore Reference Frame (VORF) Model.

## **TE3A SUNK FULL - 2022**

## 1. SUMMARY

# **Changes Detected**

- 1.1 The 2022 controlling depth of Harwich DWR is 15.8m (+0.2m deeper than 2021). The 2022 controlling depth of Sunk DWR is 16.6m (-0.1m shoaler than 2021).
- 1.2 Sandwave movement in the north of the survey area is migrating in a SW direction, consistent with previous surveys. Outside of the clusters of sandwaves, depths remain stable.
- 1.3 The greatest depth changes between the 2022 and 2021 survey are due to the sandwave migration.
- 1.4 The sediment movements of the main sandwave migration area are on a horizontal scale of 130-180m between the 2022 and 2019 surveys towards SW, in the direction of the Harwich DWR.

# Reasons for Continuing to Resurvey the Area

1.5 Depths in the area remain hazardous and changeable to deep draught vessels navigating the area. The cluster of sandwaves that appear to be moving most significantly is migrating from the north to the SW towards the charted Harwich Deep-Water Route, therefore continued monitoring is required.

## Recommendations

- 1.6 Sandwaves continue to migrate both in SW and NE directions, towards both Deep-Water Routes. Therefore the 3-year frequency for full surveys, with focused surveys in the intervening years, should be retained.
- 1.7 The full survey limits should be retained to ensure the location and depth of the mobile sandwaves are adequately charted. The focused survey limits have been extended to align with the eastern end of the full area, and to cover the 20m safety contour.

## 2. LOCATION

- 2.1 Survey interval at time of resurvey: 3 years for the Full area (1 year frequency for Focused survey every year in-between).
- 2.2 Area Covered: 22.2 km<sup>2</sup>

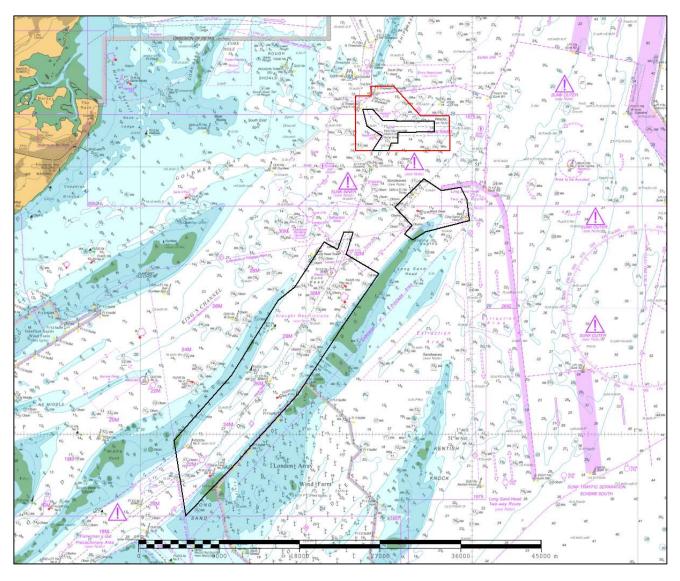


Figure 1: 2022 Thames Estuary Routine Resurvey areas overlaid on BA Chart 2692 with area TE3A Sunk Full in red with the 2021 TE3A Sunk Focused area inside in black

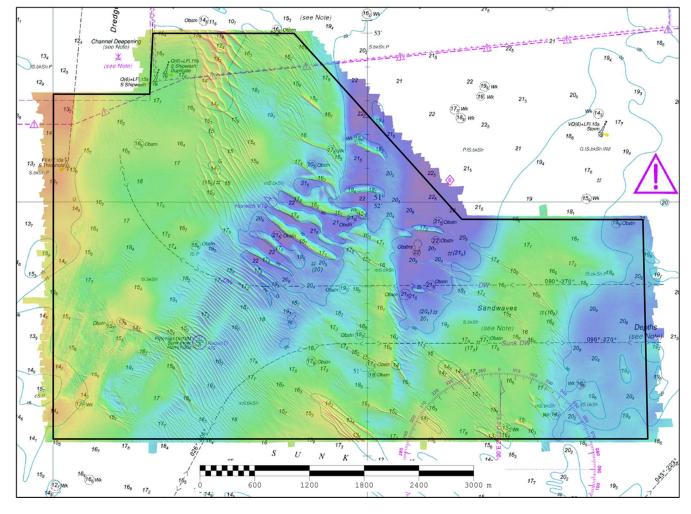


Figure 2: 2022 survey data overlaid on BA Chart 2692

# 3. REFERENCE SURVEY DETAIL

- 3.1 The previous focused surveys HI1739 and HI1691 were conducted as part of the 2021 and 2020 Routine Resurvey Programme in September 2021 and September 2020 respectively. The previous full survey HI1641 was conducted in August and September 2019.
- 3.2 The Report of Survey for this survey is available upon request from the UKHO and the validated bathymetric surfaces are available to download from the Admiralty Marine Data Portal.

# 4. NEW SURVEY DETAIL

- 4.1 HI1763 was surveyed between 1st-11th June 2022.
- 4.2 The Report of Survey for this survey is available upon request from the UKHO and the validated bathymetric surfaces are available to download from the Admiralty Marine Data Portal.

## 5. DESCRIPTION OF RECENT BATHYMETRIC CHANGE

- 5.1 Figure 3 shows the controlling depths for Harwich DWR and Sunk DWR. In 2022 the Harwich DWR controlling depth is 15.6m (15.8m in 2021 at approximately the same location) and the Sunk DWR controlling depth is 16.6m (16.7m in 2021). Note that approx. 100m NE of the 16.6m sounding along the Sunk DWR there is also a shoal sounding of 16.4m (marked in Fig. 7) but the sounding on the DWR itself has been shown in Fig. 3. Other critical soundings have been picked out in the sandwave area to the north of the Harwich DWR and show the changes due to the highly mobile seabed. Another sounding south of the Sunk DWR has also been highlighted, indicating a small shoal area.
- 5.2 The difference surfaces displayed on Figures 4, 5 & 6 show the movement of the sandwaves across the survey area between the 2019 and 2022 surveys. Sandwaves to the north of Harwich DWR have migrated SW towards the DWR, on a horizontal scale of 130-180m between the 2019 and 2022 surveys, while the sandwaves in the northernmost area of the full survey area migrated at a scale of ~50m NE.
- 5.3 A small patch of sandwaves to the south of Sunk DWR are migrating NE, also towards the DWR; these sandwaves are usually the least depth in the focused survey area (14.3m 2022, 14.2m 2021,14.5m 2020).
- 5.4 Figure 7 is a colour banded depth plot with selected differences between the 2022, 2021 and 2019 surveys. It highlights the shoaling on and alongside the DWRs and smaller year-on-year changes along these routes, consistent with previous years' data.
- 5.5 The greatest depth changes across the survey area are caused by the migration of the sandwaves in the north of the survey. The greatest changes in depth between 2021 and 2022 are -4.5m and +3.1m.

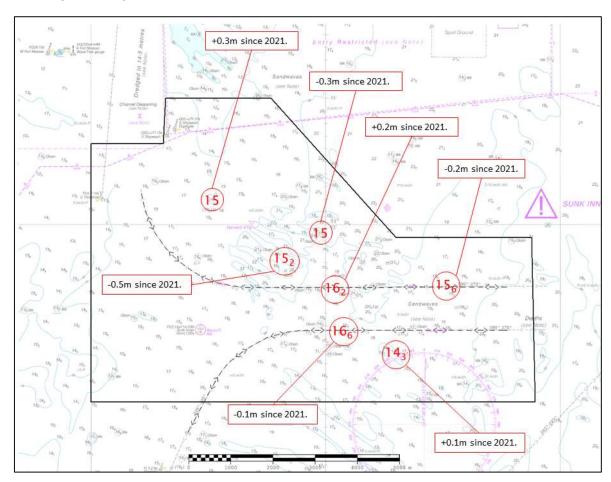


Figure 3: Controlling and significant depth soundings highlighted, overlaid on BA Chart 2692

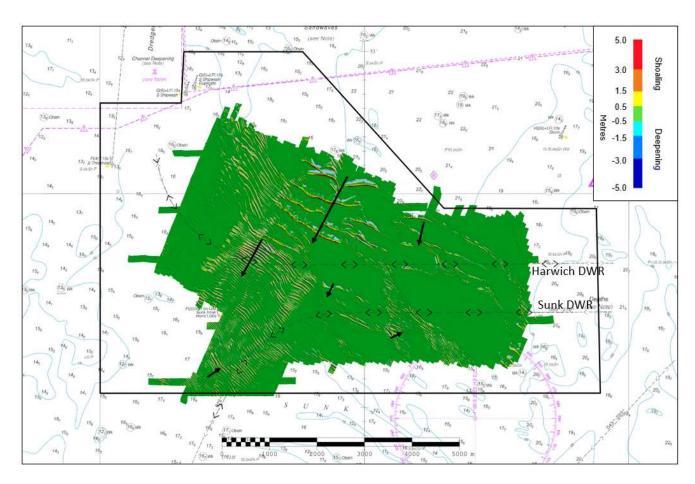


Figure 4: Difference surface showing bathymetric changes between the 2022 and 2021 surveys overlaid on BA Chart 2692 (Black arrows represent sandwave migration since 2021 survey)

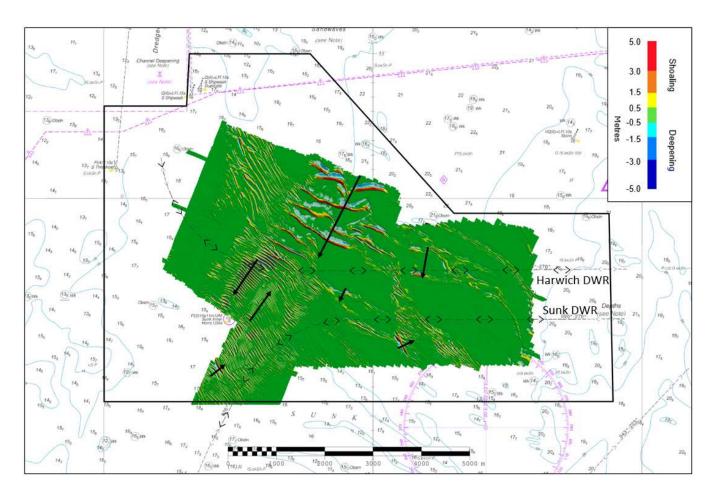


Figure 5: Difference surface showing bathymetric changes between the 2022 and 2020 surveys overlaid on BA Chart 2692 (Black arrows represent sandwave migration since 2020 survey)

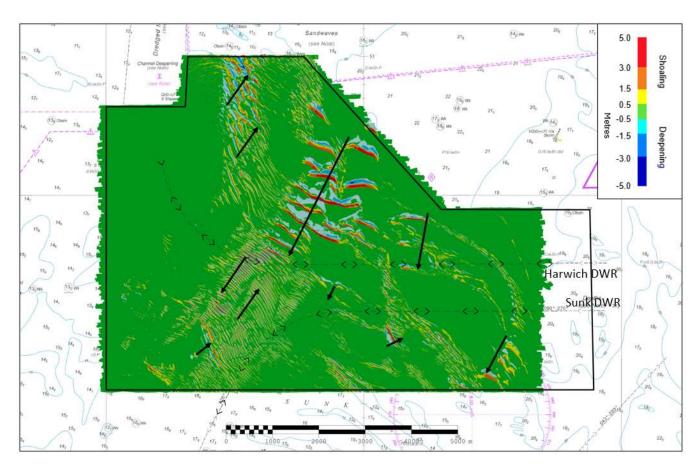


Figure 6: Difference surface showing bathymetric changes between the 2022 and 2019 surveys overlaid on BA Chart 2692 (Black arrows represent sandwave migration since 2019 survey)

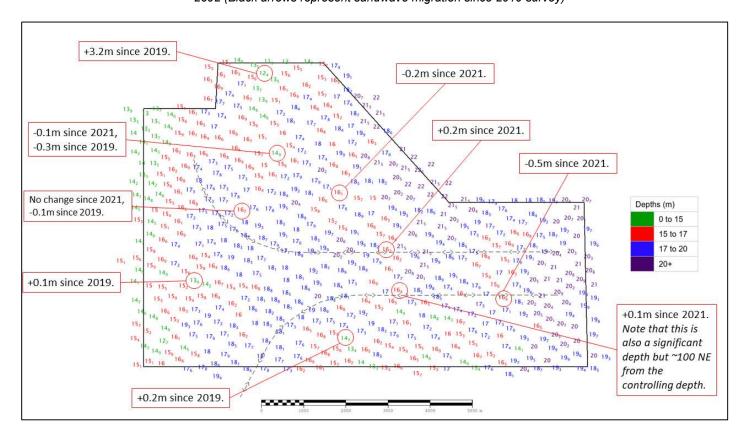


Figure 7: Colour banded depth plot from the 2022 survey with selected depth changes since the 2021 and 2019 surveys. Positive values (+) represent deepening. Negative values (-) represent shoaling.

## 6. RECOMMENDATIONS FOR FUTURE SURVEYS

# **Survey Interval**

6.1 Despite much of the survey area remaining consistent in the last year, there is obvious overall migration of sandwaves in both SW and NE directions, encroaching on both Deep-Water Routes. Therefore, the 3-year frequency for full surveys, with focused survey in the intervening years, should be retained.

# Survey Area

- 6.2 The full survey limits have been amended following discussion between MCA and Harwich port authority since CHWG 2022. The upper western corner has been trimmed to exclude areas that are frequently surveyed by Harwich. This is shown as the 'New Full Area Limits' polygon in green in Figure 8 below, and updated coordinates provided.
- 6.3 The focused area has been proposed to be extended to align with the eastern limits of the full area (covering the 20m safety contour). The focused area was altered after discussion at the CHWG (Civil Hydrographic Working Group) 2022, to exclude areas frequently surveyed by PLA (Port of London Authority). This was amended based on the survey polygons kindly provided by PLA to UKHO.

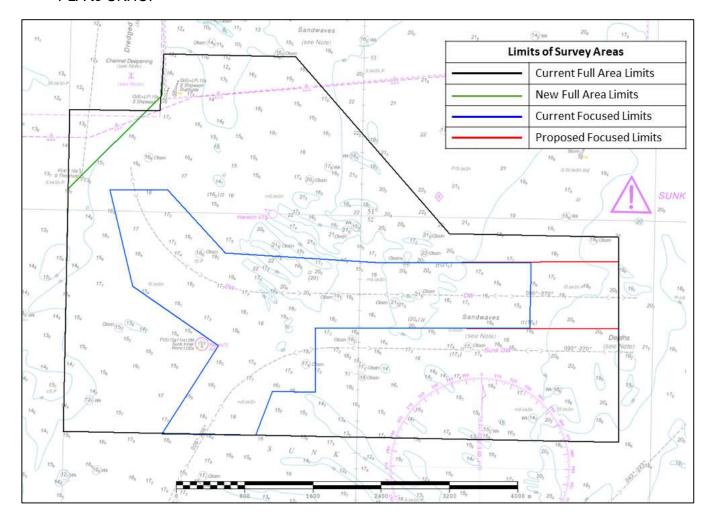


Figure 8: Proposed extension of the focused area to meet and align to the eastern limits of the full area in order to cover the 20m safety contour. Also included: alteration of upper western corner to full area.

Proposed total area: 6.64 km<sup>2</sup>

The coordinates of the recommended adjusted survey area limits for the annual TE3A focused area are shown below:

	Latitude	Longitude
1	51-51.528414N	001-33.678996E
2	51-52.136388N	001-33.428718E
3	51-52.139496N	001-34.019112E
4	51-51.748302N	001-34.619712E
5	51-51.707184N	001-36.230946E
6	51-51.742728N	001-38.636430E
7	51-51.318486N	001-38.650314E
8	51-51.288366N	001-35.550024E
9	51-50.880594N	001-35.565138E
10	51-50.880600N	001-35.127900E
11	51-50.598600N	001-34.965600E
12	51-50.598900N	001-34.008000E
13	51-51.162606N	001-34.568142E

New Full Area: 21.76 km<sup>2</sup>

The coordinates of the new TE3A full area with the amended upper western corner are shown below:

	Latitude	Longitude
1	51-52.138002N	001-33.000312E
2	51-52.738998N	001-33.940998E
3	51-52.999800N	001-33.949800E
4	51-52.999800N	001-35.298000E
5	51-51.900000N	001-36.900000E
6	51-51.897810N	001-38.629068E
7	51-50.600688N	001-38.673858E
8	51-50.599800N	001-33.000000E