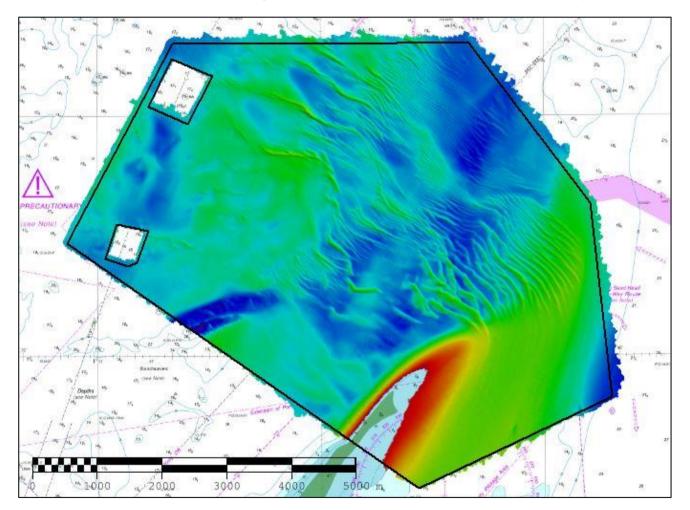


THAMES ESTUARY LONG SAND HEAD FULL (TE5) 2023 ASSESSMENT

An assessment of the 2023 hydrographic survey of the area TE5: 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.

TE5 LONG SAND HEAD, 2023

1. SUMMARY

Changes Detected

- 1.1 The Long Head Sand two-way route and Trinity DWR have seen the most change in seabed depth since the previous focused survey in 2022 and full survey in 2020 with change lessening as one moves north-western towards the Sunk DWR.
- 1.2 Controlling depths for the inward and outward paths of the Long Head Sand 2-Way Route have seen shoaling of up to 0.4m since 2022, 2m since 2020 and 2.9m since 2018. A new shoalest depth of 9.9m has been detected in the outbound track.
- 1.3 Controlling depths along the Trinity DWR have changed up to 0.3m shoaler since 2020 and 0.4m since 2018. Shoalest depths charted remain shoaler than or equal to those detected in this survey. There has been little change seen since the 2022 focused survey.
- 1.4 The controlling depth for Sunk DWR has not been included in this survey as it was previously agreed that regular Port of London Authority surveys sufficiently covered this area at a schedule of approximately every 4 months. Where depth is shoalest in this survey, it has changed by 0.1m and 0.2m shoaler than 2020 and 2018 respectively. However, this remains deeper than that which is charted.

Reasons for Continuing to Resurvey the Area

1.5 With three shipping routes passing through the area, the changeable depths and migrating sandwaves pose a significant threat to the high traffic of vessels navigating through. It is therefore critical that the area is regularly surveyed, particularly around Long Sand Head and Trinity DWR where change is most prominent.

Recommendations

- 1.6 With more frequent focused surveys existing for the Long Head Sand 2-Way Route and Trinity DWR, and the exclusion of the Sunk DWR Focused survey area, the current cycle for the full survey remains appropriate.
- 1.7 Since the limits were extended north-easterly after 2018, the current limits may stay unchanged. Future north-easterly extension of limits may be required if the shoalest point shows signs of moving beyond the current survey limits.
- 1.8 North-westerly limits currently require no adjustment but may require future consideration for reduction if key parts of the Sunk DWR are cut out in favour of Port of London Authority surveys year-on-year.

2. LOCATION

- 2.1 Survey interval at time of resurvey: 3 years for TE5 Long Sand Head Full survey. 1 year for combined Trinity DWR and Long Sand 2-Way Route Focused.
- 2.2 Area Covered: 38.42km²

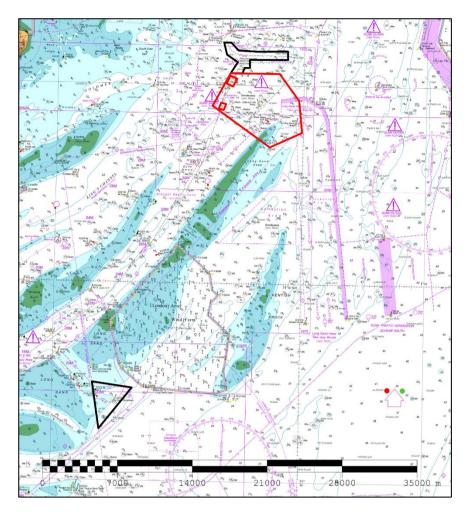


Figure 1: 2023 Thames Estuary Routine Resurvey areas overlaid on BA Chart 1183 with area TE5 in red.

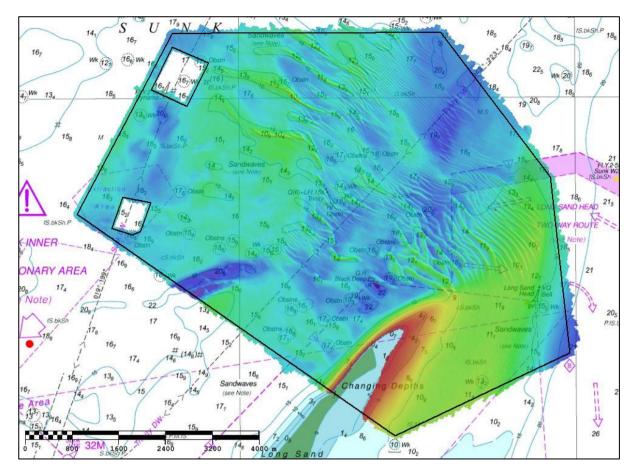


Figure 2: 2023 survey data overlaid on BA Chart 1975

3. REFERENCE SURVEY DETAIL

- 3.1 The previous full survey was conducted as part of the 2020 Routine Resurvey Programme between August and September 2020 as part of HI1692. Another full survey was conducted as part of the 2018 Routine Resurvey Programme between November and December as part of HI1615. Annual focused surveys have also conducted in the area, the latest of which was conducted in 2022 as part of HI1764.
- 3.2 Independent surveys are conducted by the Port of London Authority for the Sunk DWR as part of their own regular surveying practises (see Figure 3). Due to the recency, reliability, and quality of the data, it is deemed unnecessary to spend resources resurveying these areas. When merged with TE5 2023, a full image of the survey area is formed with data overlap.
- 3.3 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.

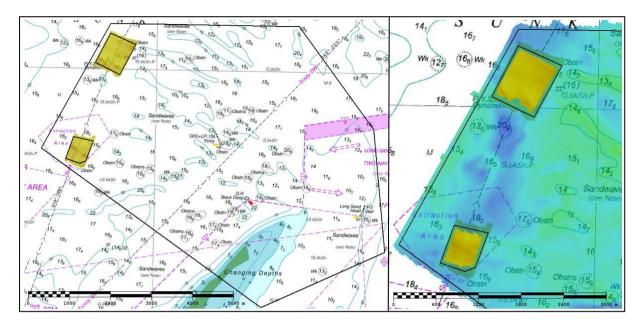


Figure 3. 2023 Port of London Authority survey data (coloured yellow/orange) overlaid on BA Chart 1975 (left) and 2023 TE5 Long Sand Head (zoomed, coloured blue/green) (right).

4. NEW SURVEY DETAIL

- 4.1 This latest full survey for TE5 Long Sand Head, as part of the 2023 Routine Resurvey Programme, was conducted in August 2023 as part of HI1832.
- 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 The areas around Long Sand Head and Trinity DWR have seen the most significant change due to a noticeable migration of sand waves and the bank itself in an east/north-easterly direction (see Figures 5-8).
- 5.2 Figure 4 shows the distribution of controlling depths in the area. The most significant depth changes are immediately apparent in the outbound and inbound tracks of the Long Sand Head 2-Way Route which have shoaled by up to 2m since the last full survey and 0.4m since the 2022 focused survey. A new shoalest point in the outbound route has been detected of 9.9m which suggests a possible shoaling of the sand wave crests themselves as well as a north-easterly migration. The controlling depth of 9.9m is well covered but several other sand wave peaks are now below 11m and about 0.6m shoaler than the charted depths across the route. Combined with the main 10m contour of Long Sand Head continuing to migrate N into the route, the continued usability of this route may be questioned should existing patterns continue.
- 5.3 Controlling depths within the Trinity DWR have seen lesser changes in depth but still a notable migration of sand waves when looking at Figures 5-7. The shoalest depth detected this year in the vicinity of Trinity DWR was 12.2m, a 0.1m shoaling from 2020's full survey but a 0.2m deepening since the 2022 focused survey. The shoalest depth found directly in the path, recurring year-on-year was 14m, which has shoaled 0.3m since 2020's survey but none since 2022's focused survey.
- 5.4 Due to the exclusion of two areas of the Sunk DWR, the controlling depth was not captured within the extraction area by this survey. Instead, the shoalest depth captured was 16.7m, a shoaling of 0.1m since the 2020 full survey but a deepening of 0.2m than the 2021 focused

survey. PLA also surveyed the southern-most section in August 2023 soon after this HI was collected. The critical depth found by the August 2023 PLA data was 15.2m, only 0.01m deeper than the shoal found in the 2021 Focused Survey of 15.19m very close by.

- 5.5 In general, the area has seen a greater change between 2023 data and 2020 data compared to 2020 data to 2018 data. Figures 6 and 7 also show an exponentially growing amount of change, which reflects the high mobility of the sand waves in the Long Sand Head area.
- 5.6 The contour plot in Figure 8 shows more clearly the outreach the sand waves have made this year. At most, the 15m depth contour has extended 331m north-eastwards since 2020.

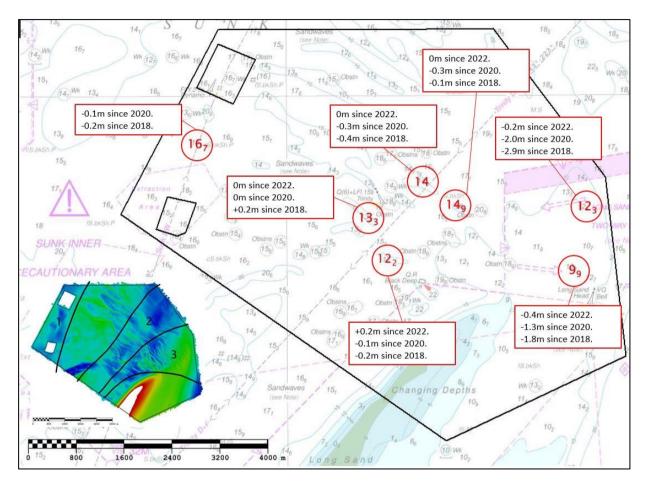


Figure 4: Controlling Depth sounding(s) highlighted, overlaid on BA Chart 1975

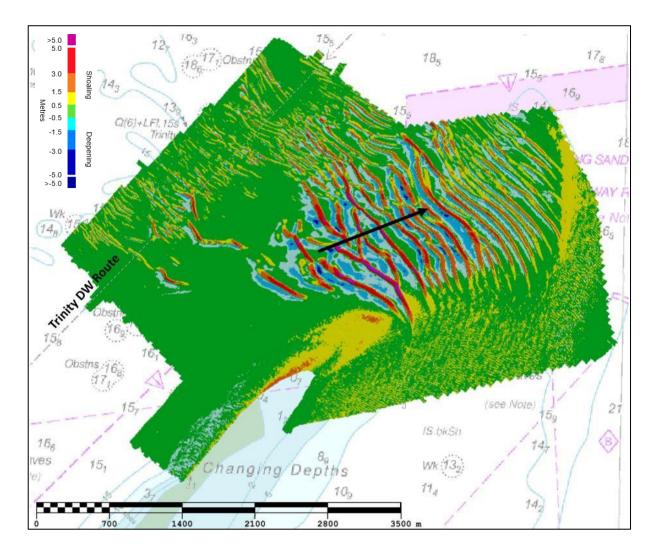


Figure 5: Difference surface showing bathymetric changes between the TE5 Long Sand Head Full 2023 and TE5A Long Sand Head Focused 2022 surveys overlaid on BA Chart 1975 (Black arrows represent sandwave migration since 2022 survey)

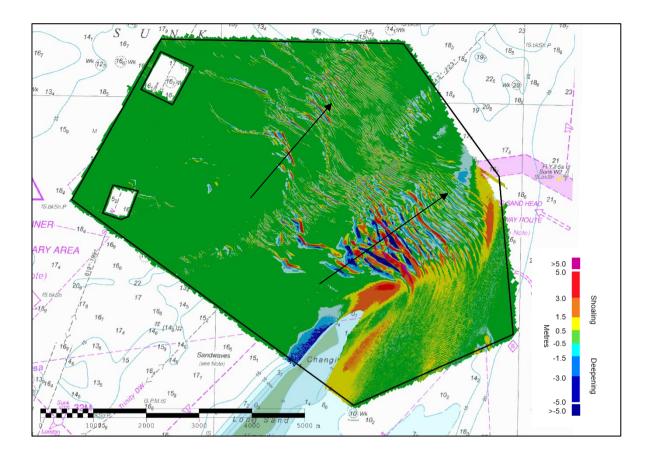


Figure 6: Difference surface showing bathymetric changes between the 2023 and 2020 surveys overlaid on BA Chart 1975 (Black arrows represent sandwave migration since 2020 survey)

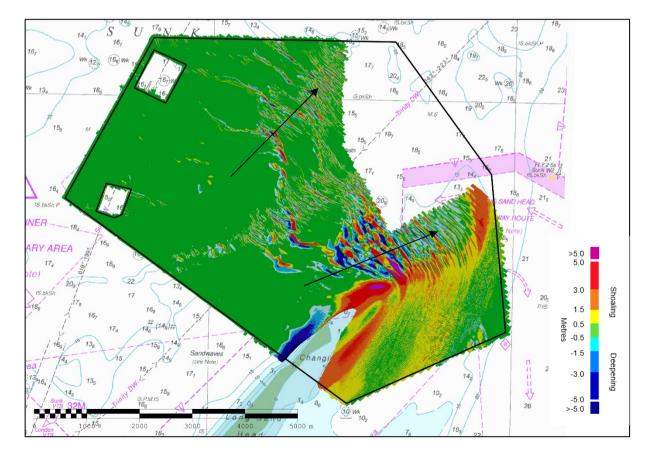


Figure 7: Difference surface showing bathymetric changes between the 2023 and 2018 surveys overlaid on BA Chart 1975 (Black arrows represent sandwave migration since 2018 survey)

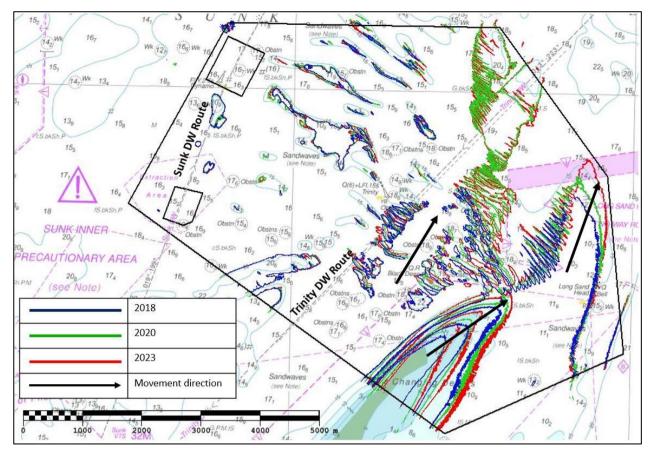


Figure 8: Contour plot showing changes in the 2m, 5m, 10m, 15m and 20m contours between 2023 (red), 2020 (green) and 2018 (blue). Black arrow represents feature migration.

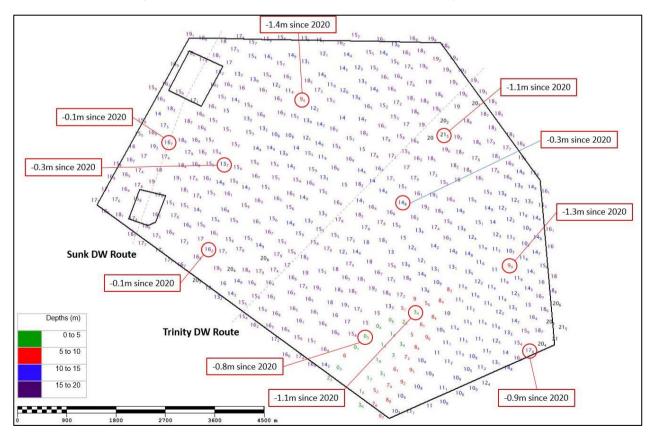


Figure 9: Colour banded depth plot from the 2023 survey with selected depth changes since the 2020 survey. Positive values (+) represent deepening. Negative values (-) represent shoaling.

6. RECOMMENDATIONS FOR FUTURE SURVEYS

Survey Interval

- 6.1 As the region continues to be mobile and therefore hazardously unpredictable to mariners, the 3-year interval remains suitable after being introduced in 2020. This comes suggested so long as regular yearly focused surveys are still conducted in the TE5A Long Sand Head area at a minimum.
- 6.2 The exclusion of the TE5B area remains appropriate so long as PLA maintain their regular surveys of the Sunk DWR. If there is indication that PLA may not survey this area, it is worth considering for possible re-inclusion of a focused survey on an annual or bi-annual basis as this has caused the controlling depth on the Sunk DWR to not be surveyed in this programme in this year's full survey.

Survey Area

- 6.3 In its current form, the TE5 Full Survey limits are sufficient for covering the Trinity DWR and Long Sand Head 2-Way Route and require no adjustment. If the new shoal depths in the Long Sand Head 2-Way Route persist and begin to move further east/north-east in the next three years, it may then be worth considering expanding the limits accordingly to ensure they're accounted for.
- 6.4 The limits in the Sunk DWR (north-western) region shall remain unchanged with the caveat that they may be adjusted ad-hoc to account for PLA surveys in that same year. If it is decided that the UKHO is confident that PLA will survey the area every year, it could be for future consideration that the limits are shrunk to exclude this area to save the need for yearly adjustments.