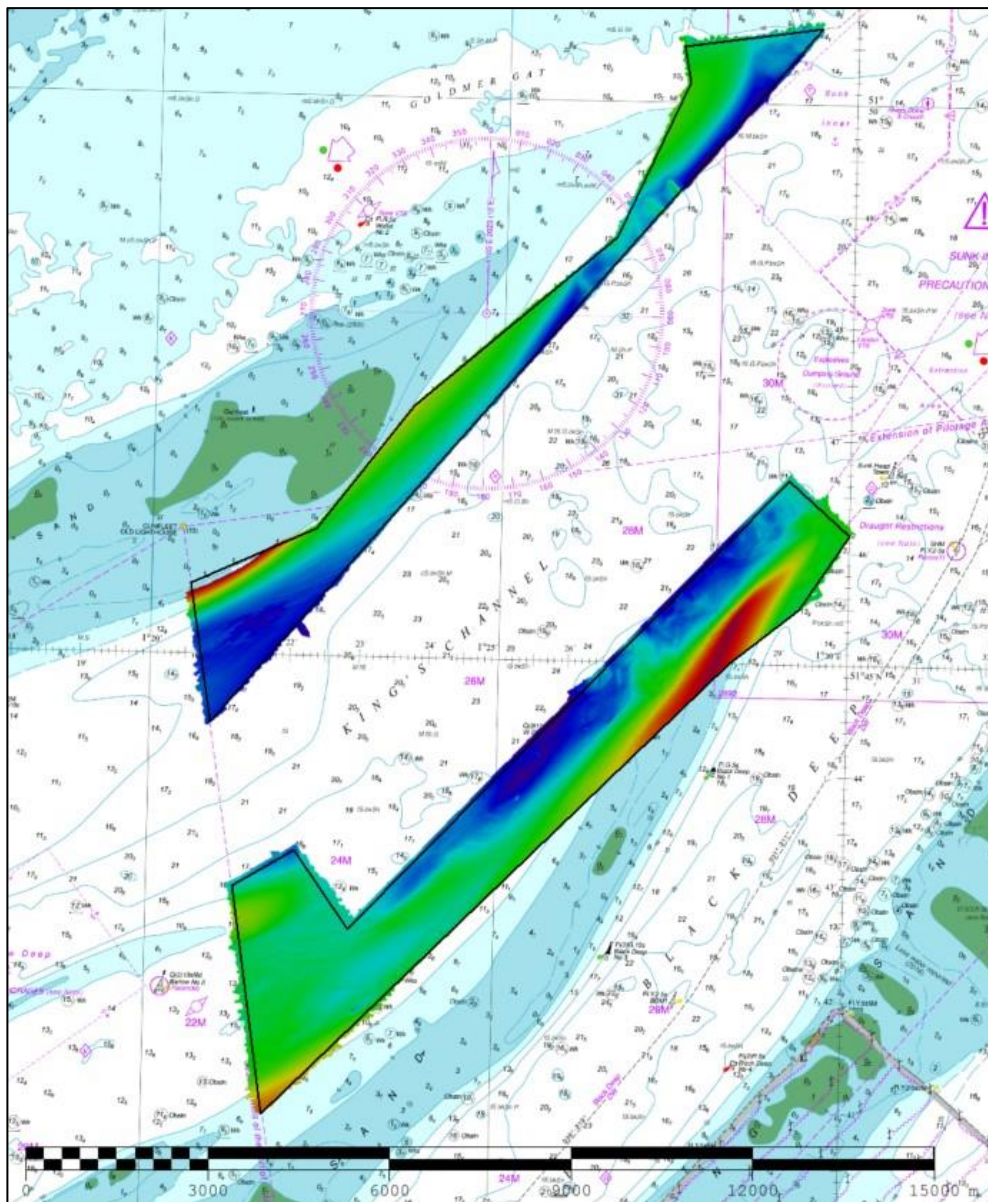




UK Hydrographic  
Office

## THAMES ESTUARY KINGS CHANNEL GUNFLEET FOCUSED AND KINGS CHANNEL SUNK SAND FOCUSED (TE7A & TE7B) 2024 ASSESSMENT

An assessment of the 2024 hydrographic survey of the area TE7A & TE7B: to monitor recent seabed movement; to identify any implications for shipping; and to make recommendations for future surveys.



## CONTENTS

|                                             |    |
|---------------------------------------------|----|
| 1. SUMMARY                                  | 1  |
| 2. LOCATION                                 | 2  |
| 3. REFERENCE SURVEY DETAIL                  | 4  |
| 4. NEW SURVEY DETAIL                        | 4  |
| 5. DESCRIPTION OF RECENT BATHYMETRIC CHANGE | 5  |
| 6. RECOMMENDATIONS FOR FUTURE SURVEYS       | 14 |

### Notes

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

# **KINGS CHANNEL GUNFLEET FOCUSED AND KINGS CHANNEL SUNK SAND FOCUSED TE7A & TE7B, 2024**

## **1. SUMMARY**

### **Changes Detected**

- 1.1 The least depth surveyed in area TE7A in the 2024 survey is 1m, it has shoaled by 5.7m since 2012. A significant depth of 11.8m over a wreck has been identified towards the north of the site, however the charted depth of 11.4m will be retained as there wasn't a full wreck investigation completed.
- 1.2 The least depth in area TE7B in the 2024 survey is 1.5m, it is part of the same shoal bank which has shifted northwards since 2012. A significant depth of 11.3m has been noted at the southern end of the site.
- 1.3 There has been some shoaling and sand bank expansion towards the south of Gunfleet Sands, however, overall depths have remained consistent in TE7A since 2012.
- 1.4 Sunk Head Sands in area TE7B has seen internal migration of the shoalest sandbank, however, the overall position has remained consistent since 2012. A shoal region towards the southwest has extended in a north easterly direction otherwise there has been minimal change.

### **Reasons for Continuing to Resurvey the Area**

- 1.5 AIS data (see Figure 11) indicates areas within the Kings Channel Thames Estuary have significant vessel movement, primarily those of draught 6m or less, to keep Black Deep clear for larger vessels.
- 1.6 Movement of sediment and changing depths around the northeast of Sunk Head Sands and shoals at the entrance to Barrow Deep, towards the south of Kings Channel in area TE7B, pose a hazard to deep draught vessels navigating the predominant vessel route.

### **Recommendations**

- 1.7 Consider amending the survey area for TE7A due to minimal vessel traffic in AIS data within the current focused survey area and minimal changes in the 5m contour over 12 years to the South of Gunfleet Sands. Sunk Inner Anchorage is not currently captured, consider including this in the focused area to verify the least depths within the Anchorage remain valid. AIS data indicates significant usage of anchorage area. Propose that these changes are put on hold until the full survey is completed in 12 years, so we have a better view of changes in the area.
- 1.8 TE7B should remain on the 12-year focused survey interval due to its proximity to the predominant AIS vessel route towards the south of Kings Channel through to Barrow Deep, as noted in the contour changes between the 2012 full survey and 2024 focused survey.
- 1.9 The southwest section of TE7B indicates changes to the 15m contour and depths with significant AIS vessel traffic into Barrow Deep. Consider extending the focused area northeast to encapsulate a controlling depth over a wreck within the main shipping channel.
- 1.10 Sunk Head Sands (TE7B) indicates minimal changes in depth in the 10m and 15m contours along bank extents and minimal AIS traffic, see Figure 11. Consider a change in extents of the focused survey along the northwest limits and further extension towards the north of the current area to capture a controlling depth over a wreck.



## 2. LOCATION

- 2.1 Survey interval at time of resurvey: 12 years Focused, with the Full area surveyed every 24 years.
- 2.2 Area Covered: 32.91 km<sup>2</sup>

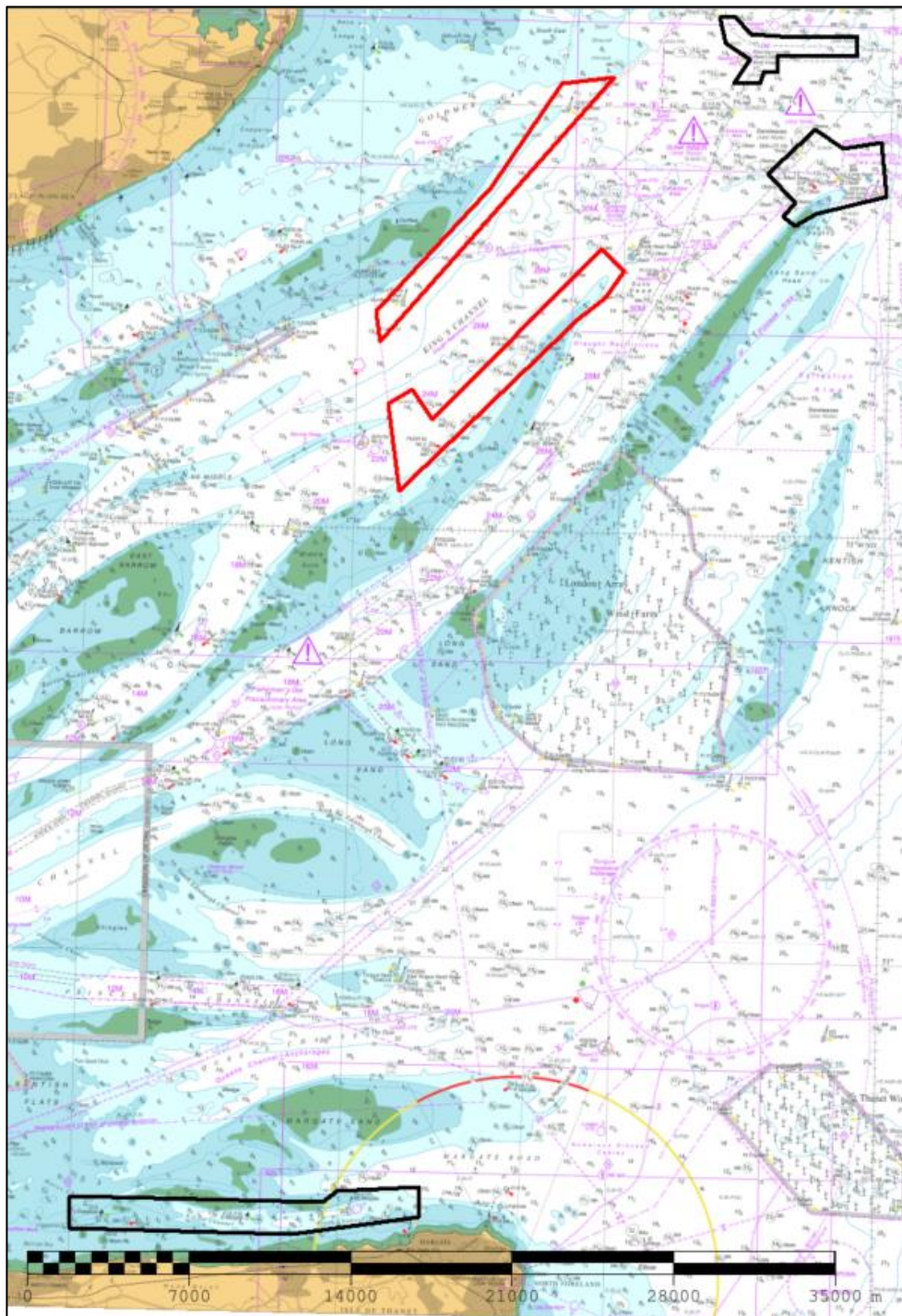


Figure 1: 2024 Thames Estuary Routine Resurvey areas overlaid on BA Charts 1183 with TE7A & TE7B in red

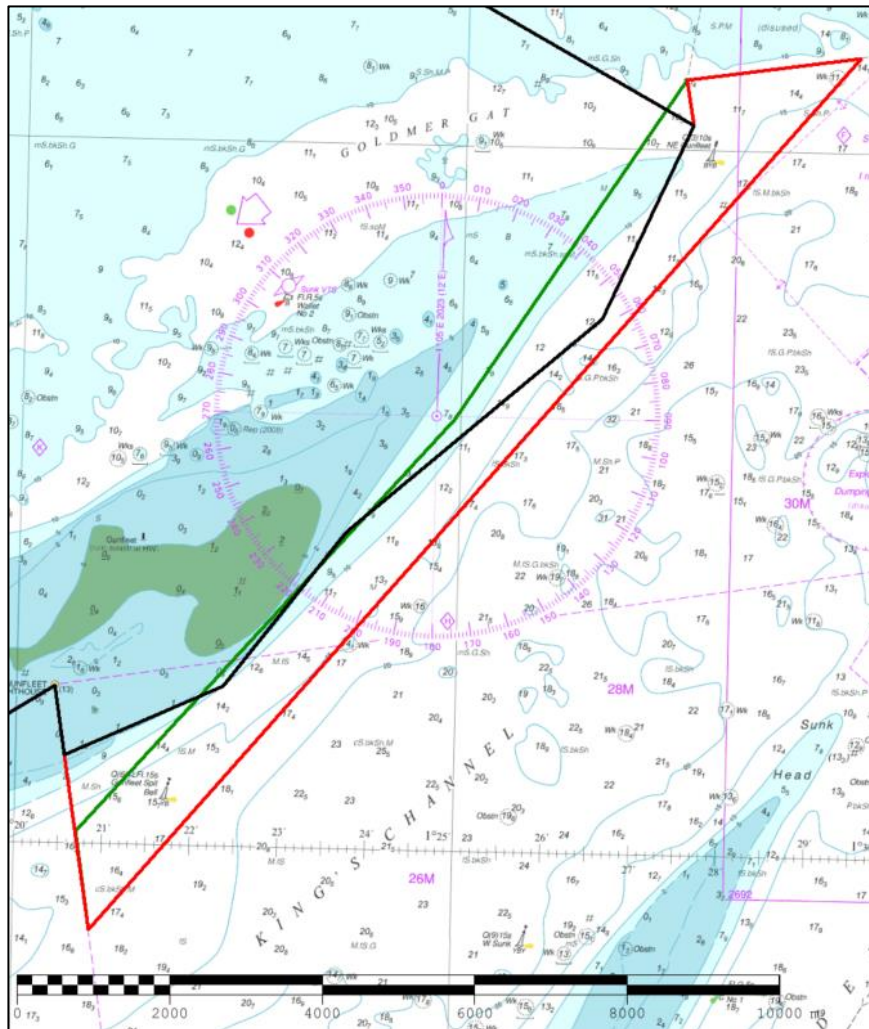


Figure 1b: 2024 TE7A one-off amended survey area (red) with HI1802 area (black) and original TE7A area (green) overlain on BA Chart 1975.



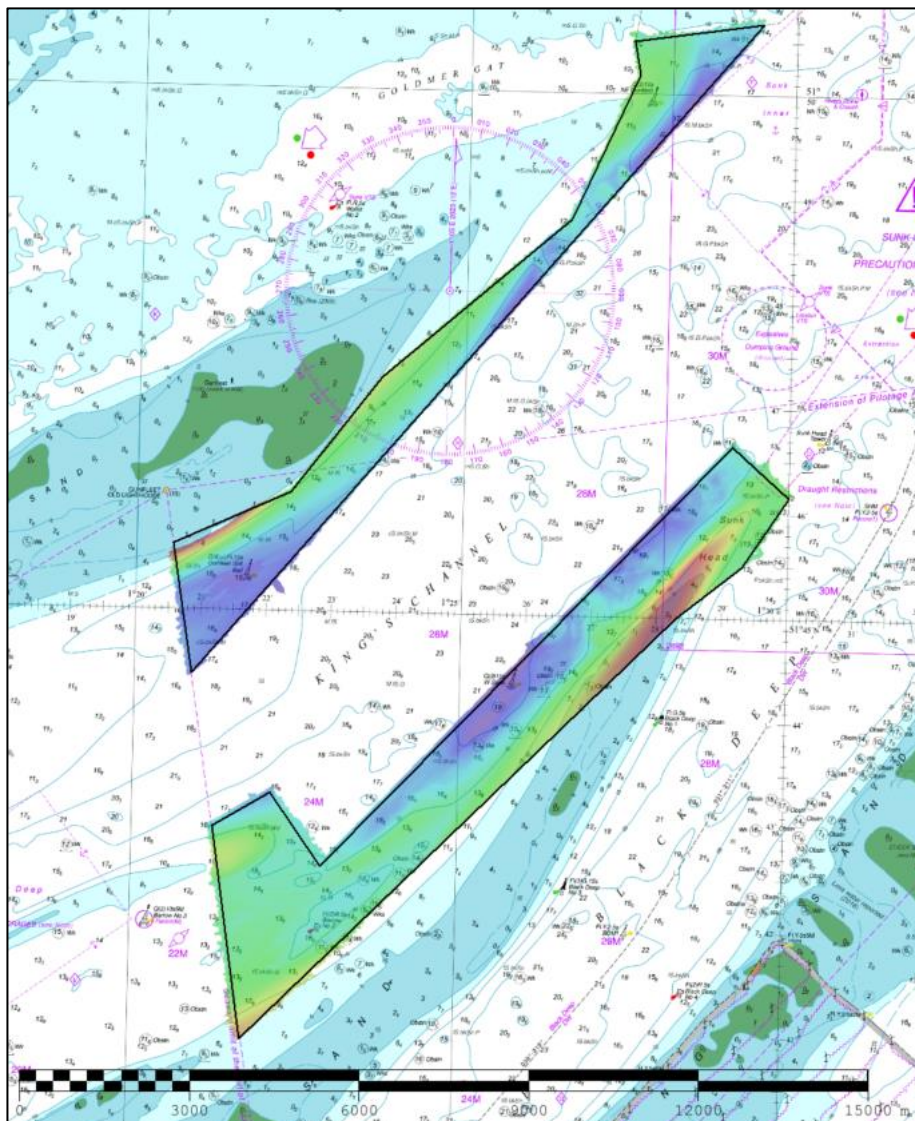


Figure 2: 2024 survey data overlaid on BA Chart 1975

### 3. REFERENCE SURVEY DETAIL

- 3.1 The previous full survey was conducted as part of the 2012 Routine Resurvey Programme, between October – December 2012, as part of HI1398 TE7 Full Kings Channel. Preceding that, the area was surveyed in 2000 as part of a focused check-line survey.
- 3.2 The Report of Survey for this survey is available upon request and the validated bathymetric surfaces are available to download from the Admiralty Marine Data Portal.

### 4. NEW SURVEY DETAIL

- 4.1 The latest focused survey is HI1863, surveyed between July – August 2024 as part of the 2024 Routine Resurvey Programme. The survey area for TE7A in 2024 has been amended on a one-off basis as part of the original area has been covered by CHP survey HI1802 during the same calendar year, see Figure 1b.
- 4.2 The Report of Survey for this survey is available upon request and the validated bathymetric surfaces are available to download from the Admiralty Marine Data Portal.

## 5. DESCRIPTION OF RECENT BATHYMETRIC CHANGE

### 5.1 Significant depths from the 2024 survey and shown in Figure 3:

- The least depth in area TE7A in the 2024 survey is 1m. It is located on the periphery of the survey limits at the southern edge of Gunfleet Sands. The depth has shoaled by 5.7m since 2012, indicating the sand bank has extended in a southerly direction.
- A shoal depth of 11.8m in area TE7A has been identified above a wreck at the northern extremities of the survey area. As there was not a full wreck investigation completed the 11.4m charted depth will be retained.
- The least depth in area TE7B in the 2024 survey is 1.5m. It is in the shoal bank region of Sunk Head Sands towards the north of the survey site. The depth has shifted as part of the main shoal bank from the 2012 survey, indicating a northerly migration.
- A significant depth of 11.3m has been noted in TE7B towards the south of the survey site. It indicates the extents of a shoal region marking the northern limits of the entrance to Barrow Deep and predominant shipping channel identified in Figure 11.
- There is another significant depth of 14.7m in TE7B at the far northern edge of the site. This has shoaled by 0.7m since the 2012 survey.

### 5.2 The difference surface in Figure 4 for area TE7A, shows there has been significant shoaling (>3m) in the south of the survey location along the edge of Gunfleet Sands since 2012. This shoaling indicates an increase in the southerly extents of the sand bank. The remainder of the area has shown minimal seabed variation.

### 5.3 Figure 5 indicates that there has been both shoaling and deepening since 2012 for area TE7B. The greatest shoaling (>5m) has occurred towards the north of Sunk Head Sands with corresponding deepening (>-5m) illustrating a northerly shift of the shoalest area of sandbank, however, the overall position remains the same. There has been significant shoaling of >1.5m in the south illustrating an increase in extents in a northeasterly direction of a shoal bank within Kings Channel.

### 5.4 Figures 6, 7 and 8 show the 5m, 10m and 15m contour movement between the 2012 and current 2024 survey for areas TE7A and TE7B:

- Towards the southern end of TE7A, the 5m and 10m contours have moved 120m and 145m south, respectively, indicating an expansion of Gunfleet Sands. Similar patterns of southeasterly movement in the 15m contour are also apparent throughout the entire area ranging from 50-100m, with greatest variation towards the south.
- There has been a 450m northwards and 250m easterly movement of the 5m contour in TE7B, indicating a migration of the shoalest area of Sunk Head Sands. However, there is minimal to no variation in the 10m and 15m contours highlighting no change in the overall extents of the sand bank since 2012. Figure 8 illustrates a 260m shift in the 15m contour towards the southwest of the site, depicting a northeasterly expansion of the shoal bank.

### 5.5 Despite some movement in the contours for TE7A and TE7B, the depths have remained consistent across both areas with the previous 2012 survey except for key depth variations highlighted in Figures 9 and 10. These significant differences can be attributed to the expansion and migration of shoal regions between 2012 and 2024.

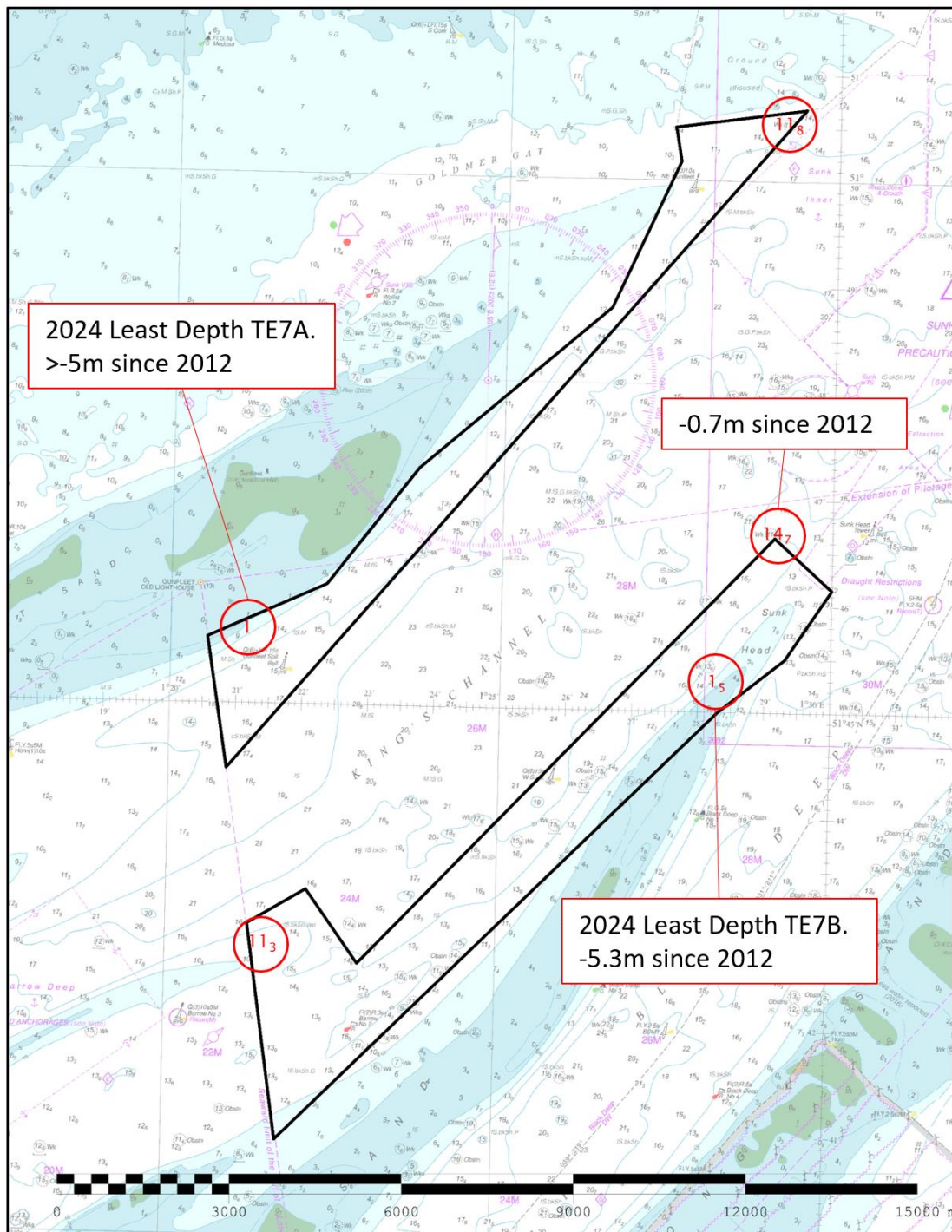


Figure 3: Controlling Depth sounding(s) highlighted, overlaid on BA Chart 1975



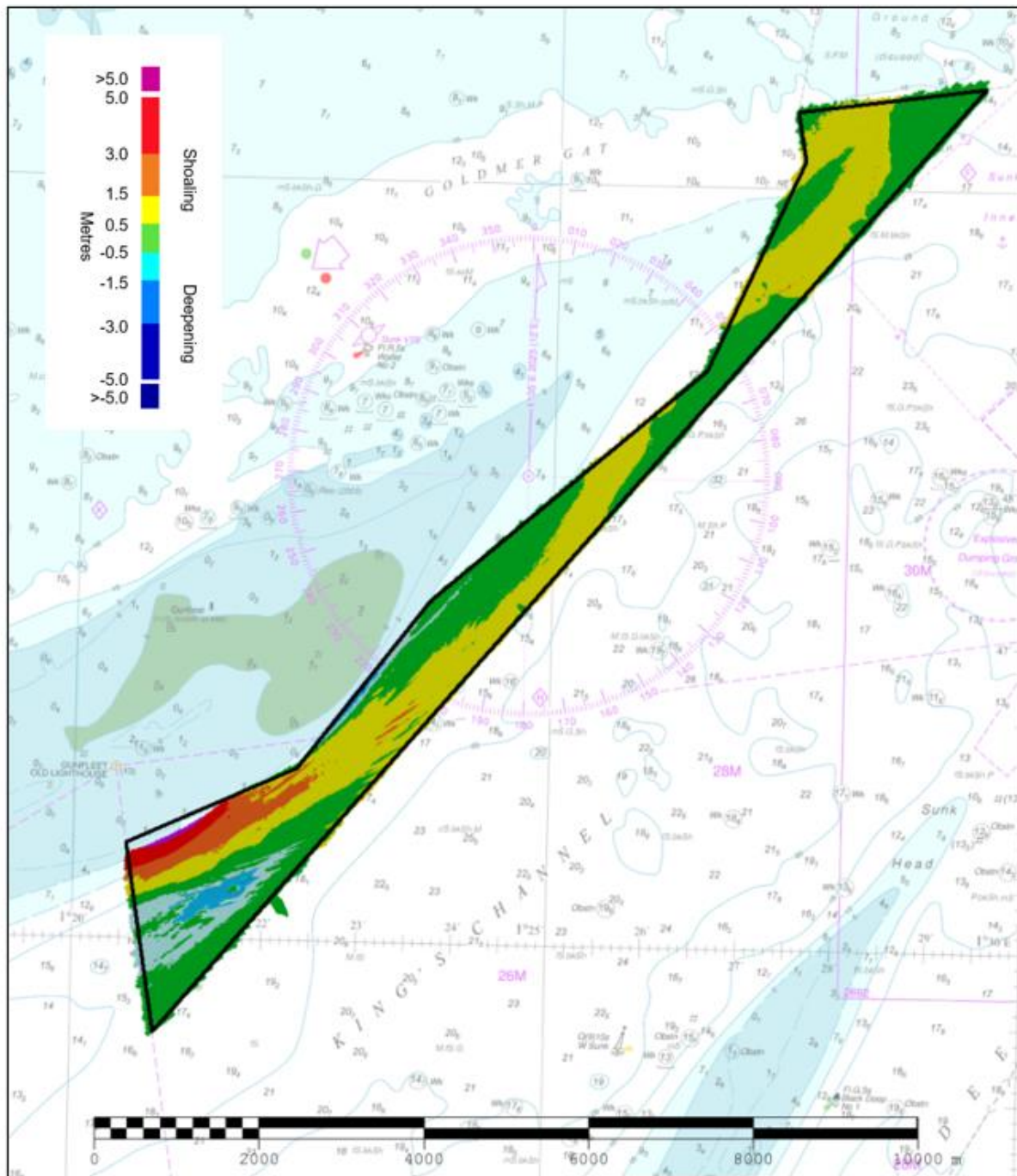


Figure 4: Difference surface showing bathymetric changes between the 2012 and 2024 surveys for area TE7A overlaid on BA Chart 1975.

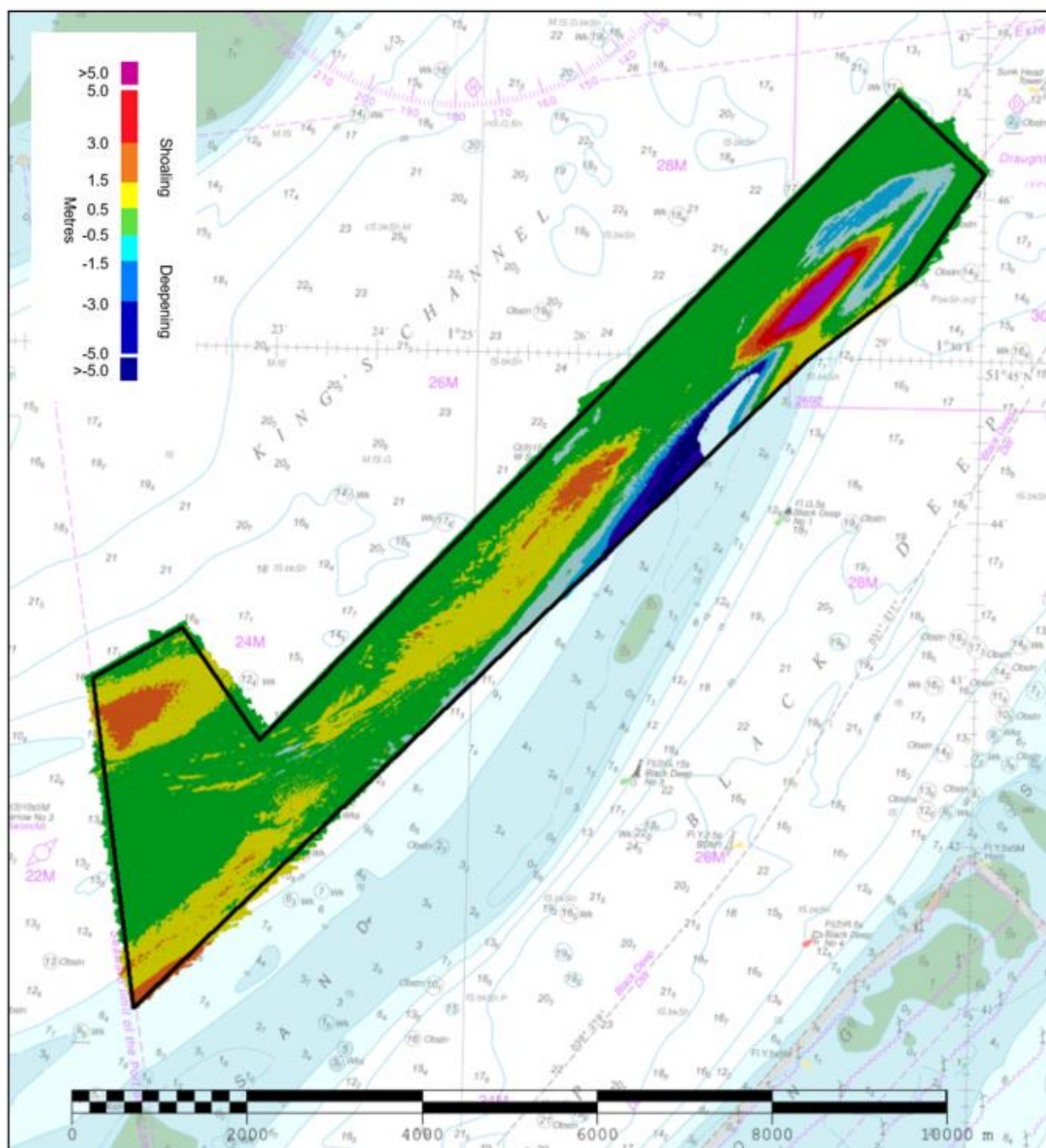


Figure 5: Difference surface showing bathymetric changes between the 2012 and 2024 surveys for area TE7B overlaid on BA Chart 1975.

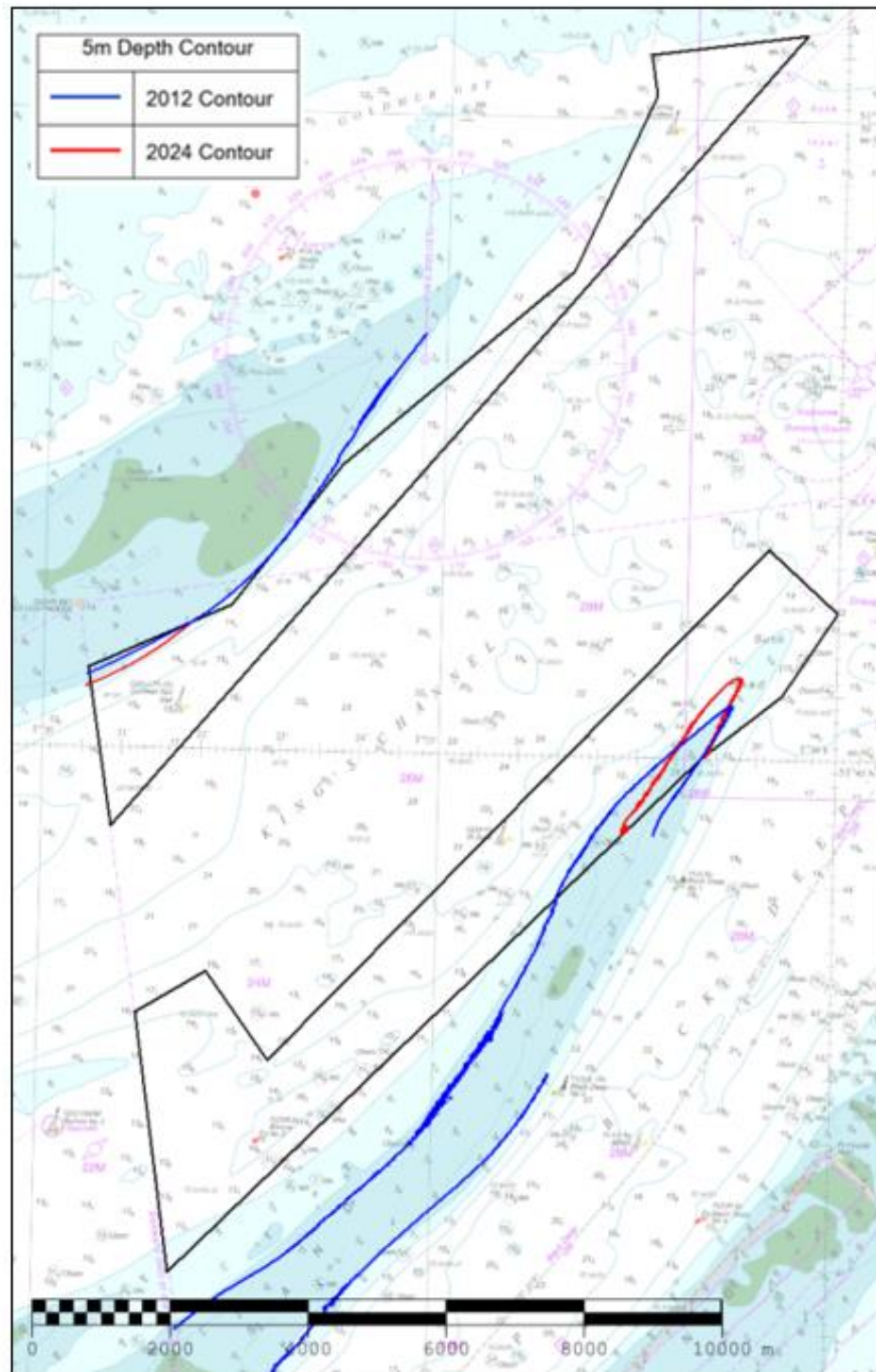


Figure 6: Contour plot showing changes in the 5m contour between 2024 (red) and 2012 (blue)



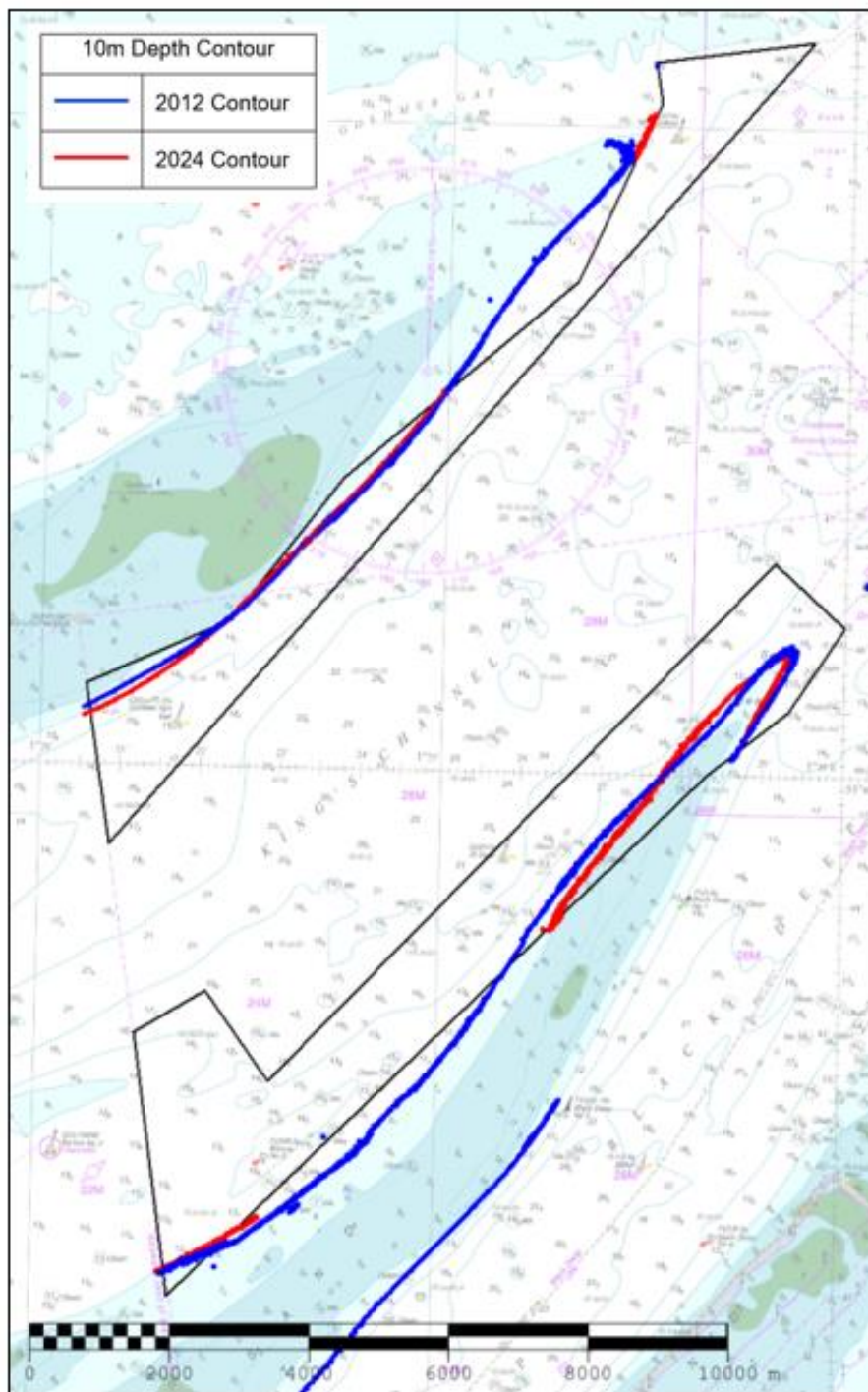


Figure 7: Contour plot showing changes in the 10m contour between 2024 (red) and 2012 (blue).

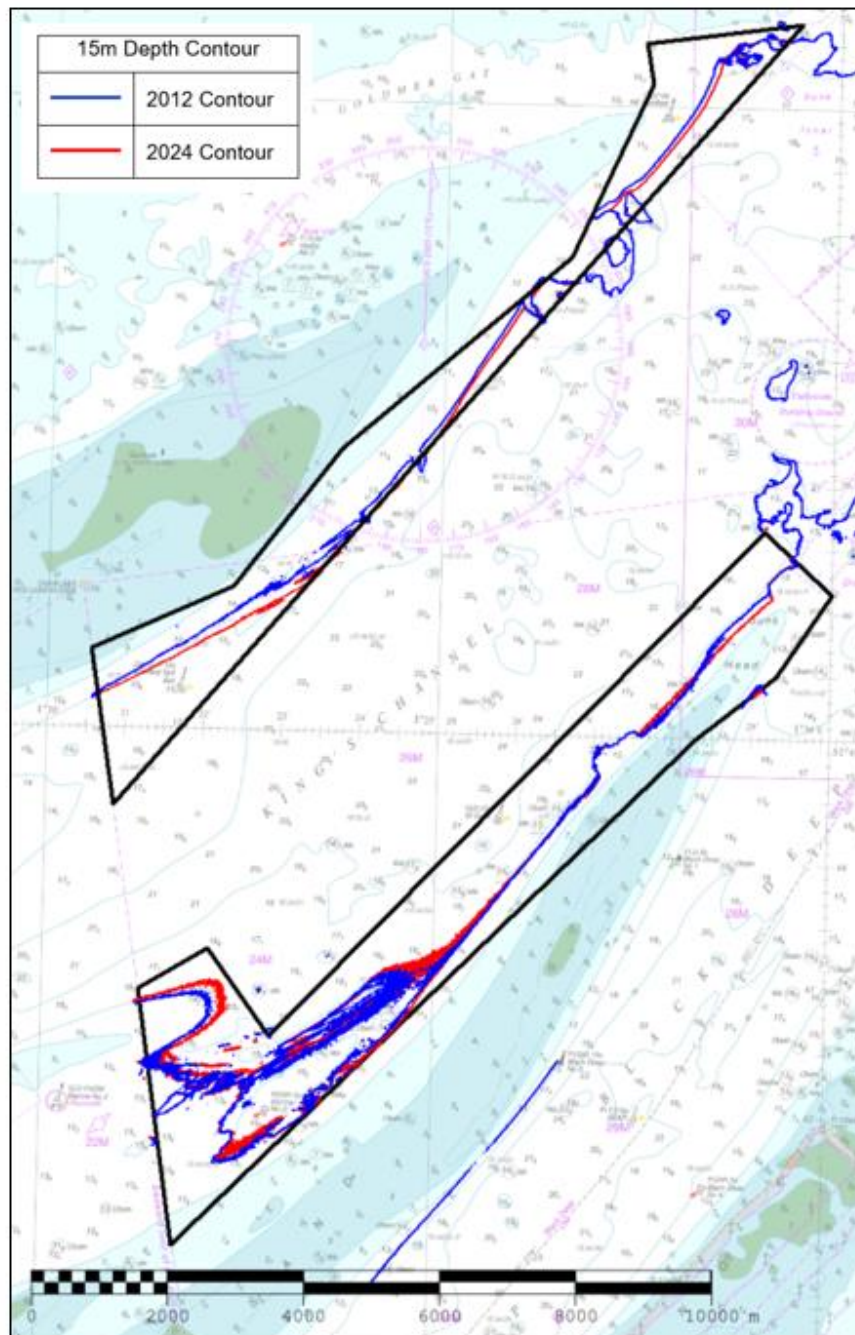


Figure 8: Contour plot showing changes in the 15m contour between 2024 (red) and 2012 (blue).

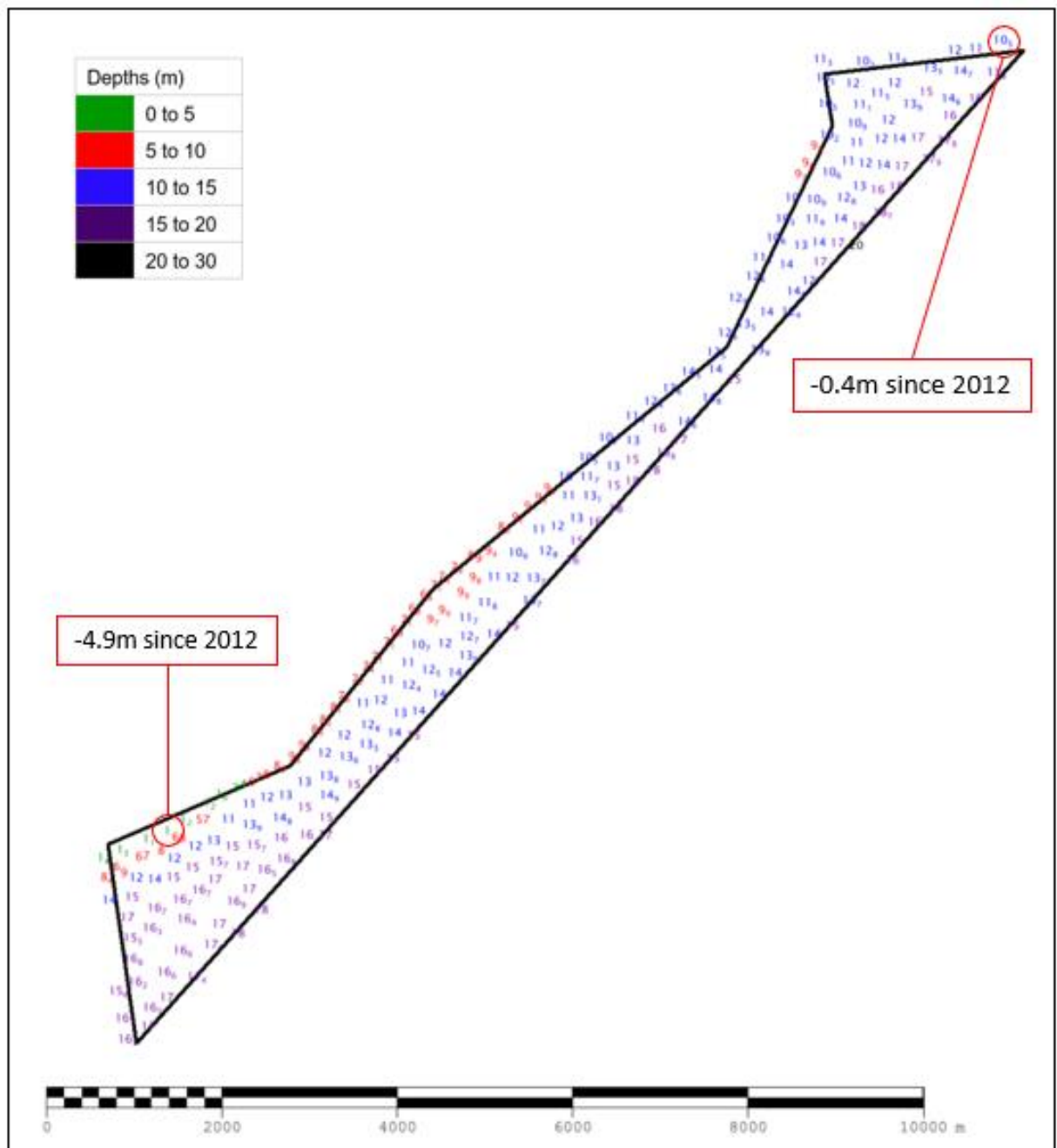


Figure 9: Colour banded depth plot from the 2024 survey of area TE7A with selected depth changes since the 2012 survey. Positive values (+) represent deepening. Negative values (-) represent shoaling.



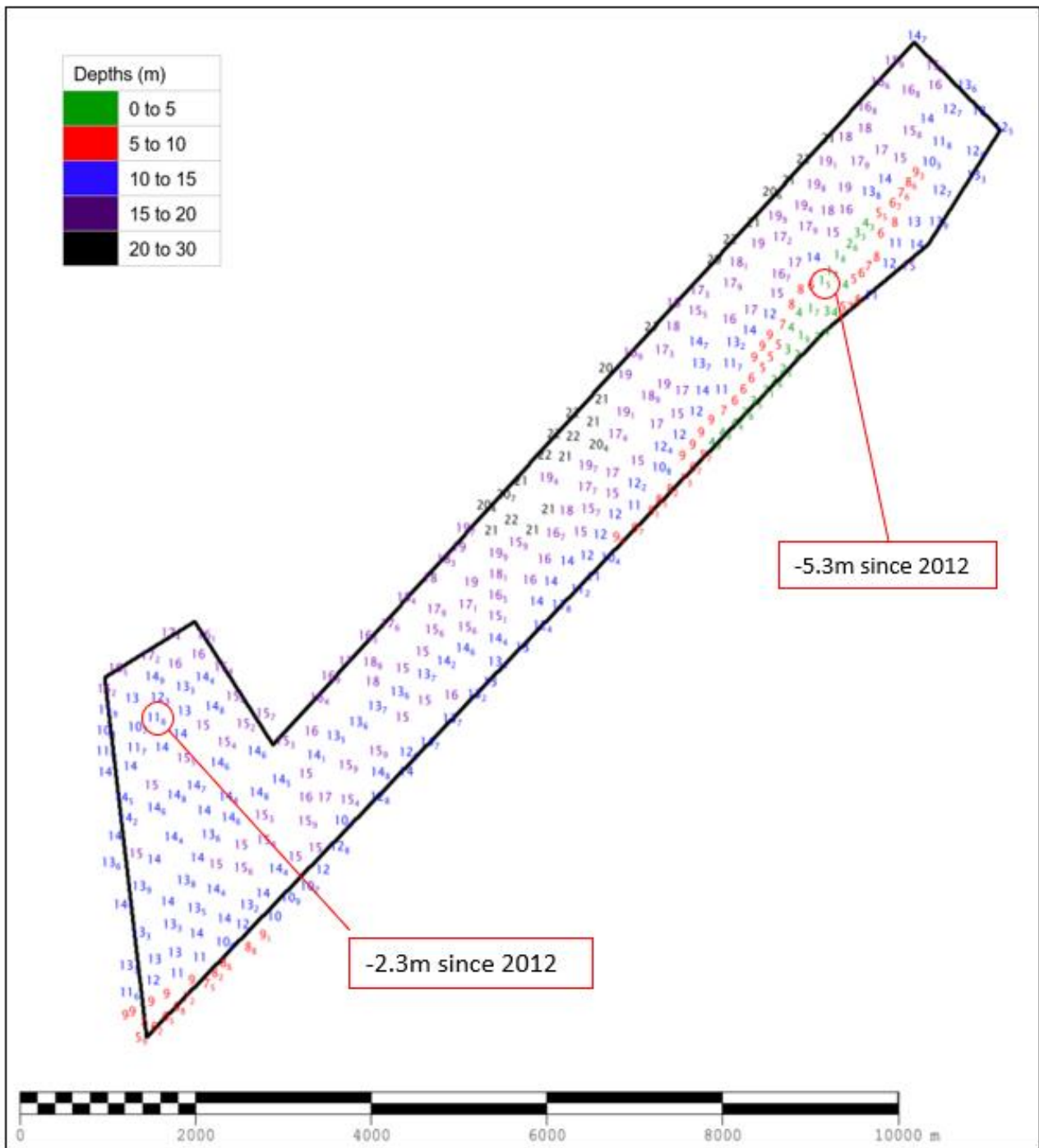


Figure 10: Colour banded depth plot from the 2024 survey of area TE7B with selected depth changes since the 2012 survey. Positive values (+) represent deepening. Negative values (-) represent shoaling.

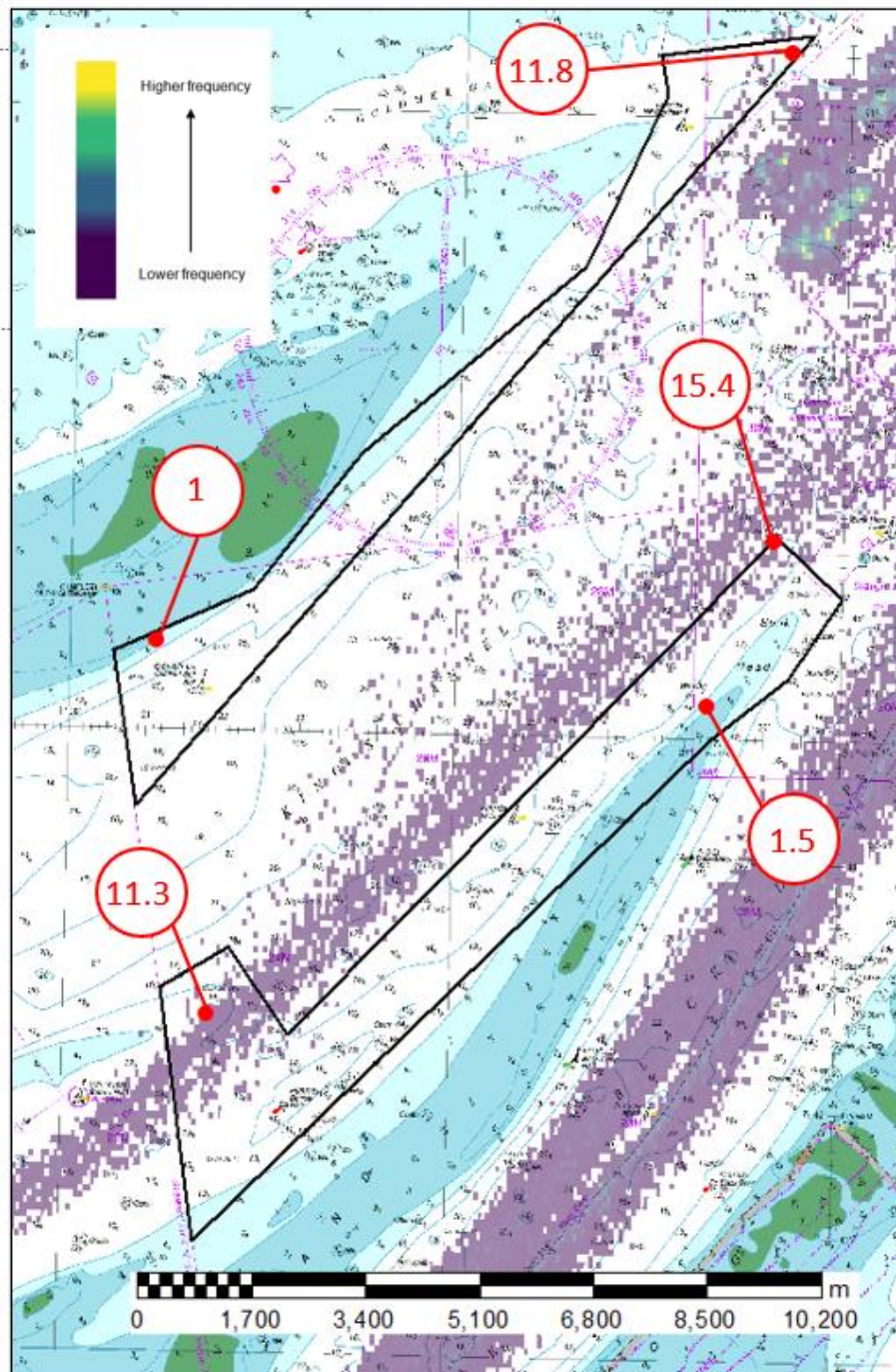


Figure 11: AIS ECDIS regulated annual tanker, passenger, and cargo vessel data from 2024 with Routine Resurvey area TE7A & TE7B and controlling depth soundings (m) overlaid on BA Chart 1975.

## 6. RECOMMENDATIONS FOR FUTURE SURVEYS

### Survey Interval

- 6.1 Given minimal changes to depths or contours in TE7A, in addition to little vessel traffic from AIS data within the focused area, consideration could be given to removing TE7A from the 12-year focused survey or changing to a checkline survey programme.
- 6.2 TE7B should remain on the 12-year focused survey interval due to its proximity to the predominant vessel route towards the South of Kings Channel through to Barrow Deep, where changes were noted in the contours between the 2012 full survey and 2024 focused survey.

## Survey Area

- 6.3 There are amendments to TE7A that could be considered; moving the extents north to capture the Sunk inner anchorage to the northeast of the current focused area, and extending the southwest corner to better capture the bank movement. The middle section could potentially be dropped due to minimal movement of the 5m contour in the last 12 years. See Figure 12 for suggested changes. However, it is recommended that these changes are put on hold until after the full survey in 12 years' time. This will provide a better basis to review movement in the area and the proposed limit changes can be adjusted before the next focused area in 24 years' time.
- 6.4 The southwest area of TE7B indicates changes to the 15m contour and depths, with significant AIS vessel traffic into Barrow Deep. Consider extending the focused area extents northeast to encapsulate a controlling depth over a wreck within the main shipping channel. See Figure 13.
- 6.5 Sunk Head Sands (TE7B) indicates minimal changes in depth in the 10m and 15m contours along bank extents, and minimal AIS traffic. Consider a change in extents to the TE7B focused survey along the northwest limits to capture a controlling depth over a wreck. Consider a further extension towards the north of the current area to capture another controlling depth over a wreck.
- 6.6 Note, as part of the 24-year full survey, an explosive dumping ground is positioned towards the northeast of the site. Due caution should be taken when surveying this location. Sound Velocity casts and sediment sampling should be excluded from this area.

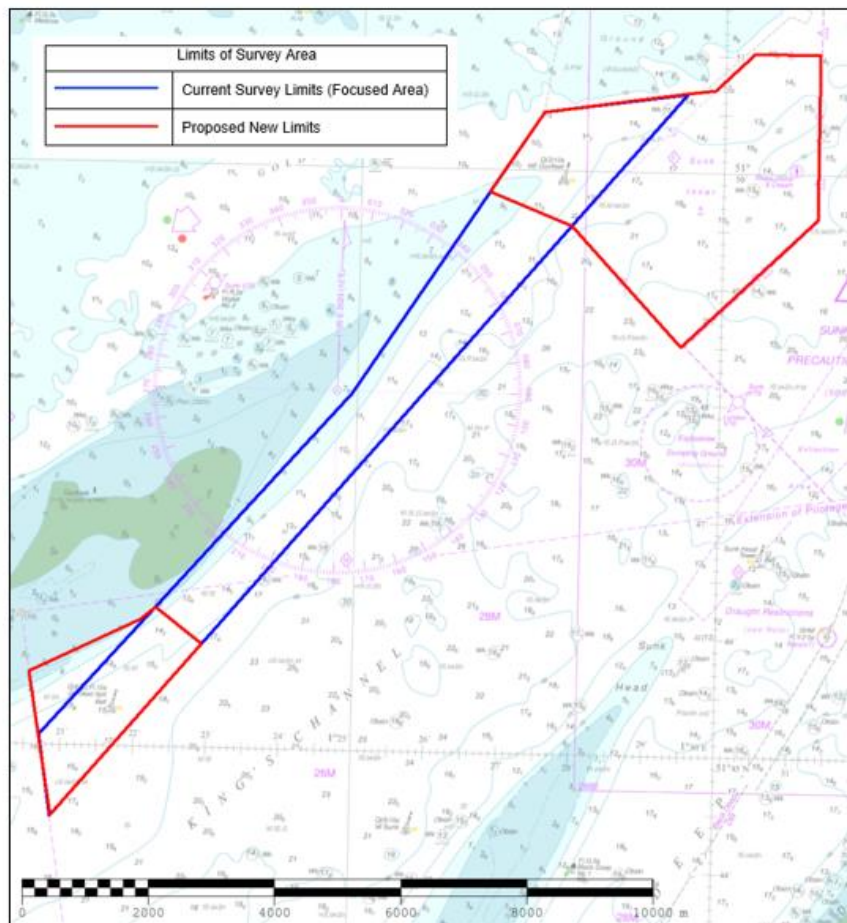


Figure 12: Recommended changes to survey limits of area TE7A ((traditional extents have been referenced as opposed to 2024 one-off change extents) into TE7A North & South



The coordinates of the recommended adjusted survey area limits for TE7A focused are shown below:

Current Limits:

TE7A (focused) total area: 14.8 km<sup>2</sup>

(note this is the usual focused area, not the one-off change for 2024)

Potential New Limits

TE7A (focused) total area: 18.05km<sup>2</sup>

TE7A North area: 13.96km<sup>2</sup>

TE7A South area: 4.09km<sup>2</sup>

| North Area |          |           |
|------------|----------|-----------|
|            | Latitude | Longitude |
| 1          | 51.825N  | 001.465E  |
| 2          | 51.808N  | 001.491E  |
| 3          | 51.827N  | 001.522E  |
| 4          | 51.851N  | 001.522E  |
| 5          | 51.850N  | 001.507E  |
| 6          | 51.845N  | 001.498E  |
| 7          | 51.845N  | 001.491E  |
| 8          | 51.842N  | 001.458E  |
| 9          | 51.830N  | 001.446E  |
| South Area |          |           |
|            | Latitude | Longitude |
| 1          | 51.765N  | 001.382E  |
| 2          | 51.740N  | 001.348E  |
| 3          | 51.760N  | 001.343E  |
| 4          | 51.768N  | 001.368E  |
| 5          | 51.770N  | 001.371E  |

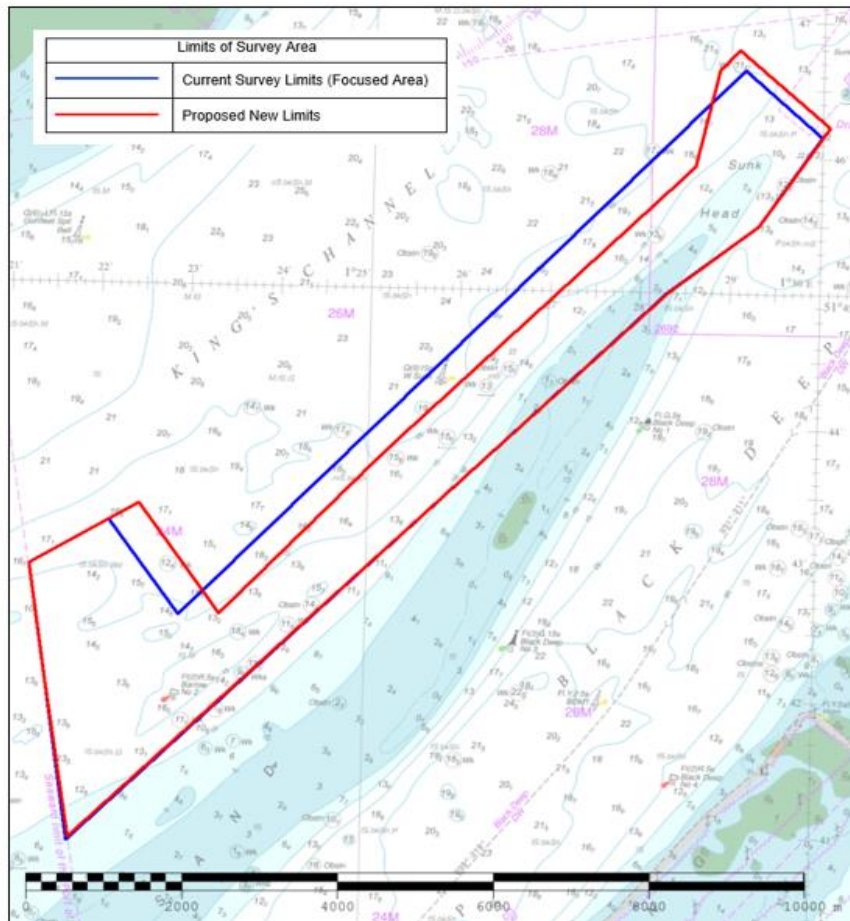


Figure 13: Recommended changes to survey limits of area TE7B

The coordinates of the recommended adjusted survey area limits for TE7B focused are shown below:

Current Limits:

TE7B (focused) total area: 20.5km<sup>2</sup>

Potential New Limits:

TE7B (focused) total area: 18.01km<sup>2</sup>

|    | Latitude | Longitude |
|----|----------|-----------|
| 1  | 51.716N  | 001.354E  |
| 2  | 51.723N  | 001.347E  |
| 3  | 51.712N  | 001.387E  |
| 4  | 51.710N  | 001.390E  |
| 5  | 51.730N  | 001.420E  |
| 6  | 51.766N  | 001.476E  |
| 7  | 51.777N  | 001.481E  |
| 8  | 51.780N  | 001.484E  |
| 9  | 51.771N  | 001.501E  |
| 10 | 51.758N  | 001.488E  |
| 11 | 51.750N  | 001.472E  |
| 12 | 51.682N  | 001.362E  |
| 13 | 51.702N  | 001.357E  |