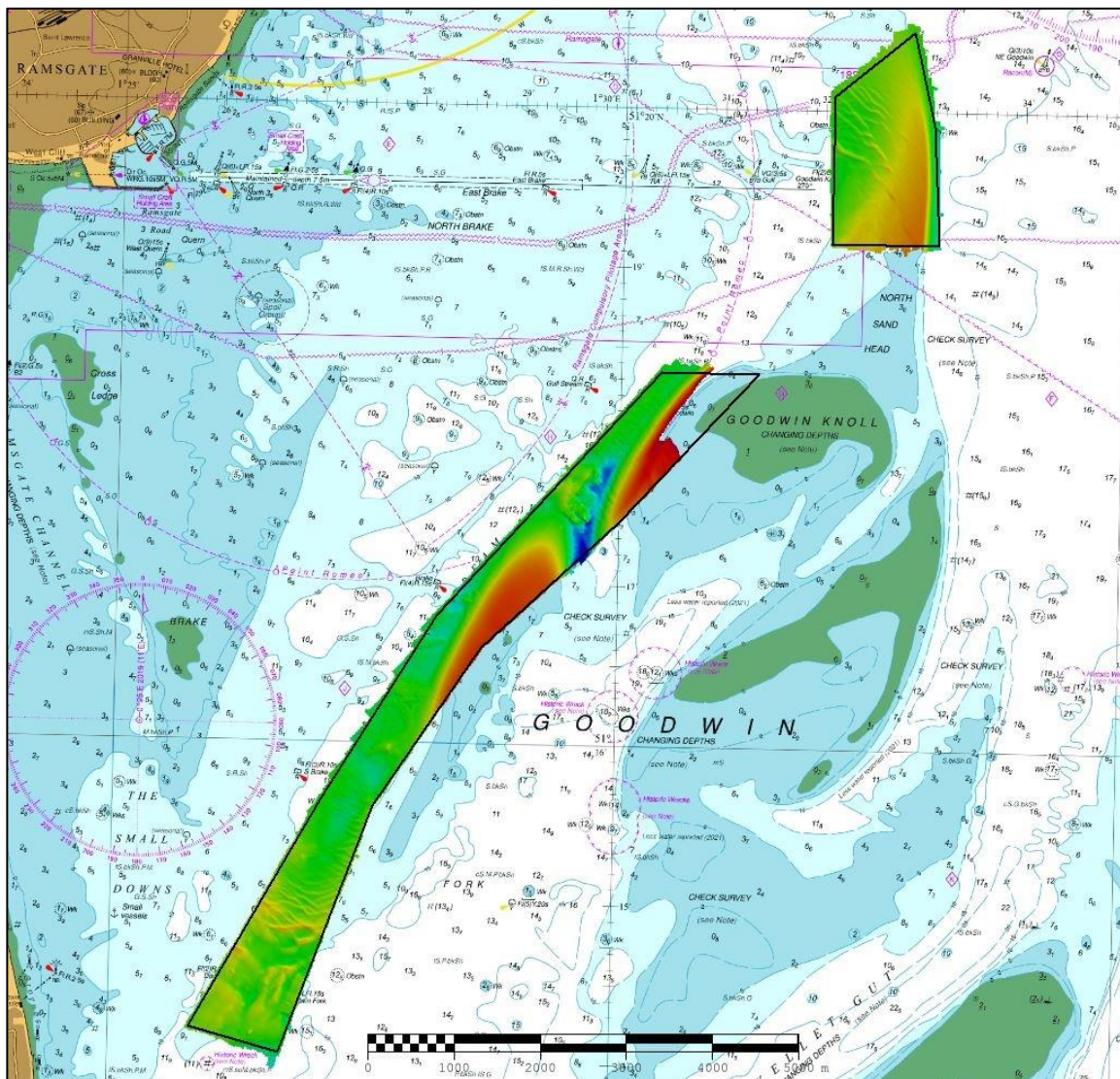




UK Hydrographic
Office

DOVER STRAIT - GOODWIN SANDS GULL STREAM FOCUSED (GS2A&B) 2021 ASSESSMENT

An assessment of the 2021 hydrographic survey of the areas GS2A and GS2B: 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 to 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).

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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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 VORF Model.

GS2 GULL STREAM FOCUSED & NORTH SAND HEAD FOCUSED, 2021

1. SUMMARY

Changes Detected

- 1.1 GS2A covers the Gull Stream to the west of Goodwin Knoll. Sandwaves in the southern end of the GS2A survey area have moved in a northerly direction since 2019 and the western extents of Goodwin Knoll have moved in a westerly direction, which is consistent with historic trends. Depth variations in GS2A are in the range of -13.65m to +6.04m.
- 1.2 This has caused significant shoaling in the central and northern parts of the GS2A area along the eastern edge of the channel, restricting the width of the Gull Stream passage regularly used by vessels.
- 1.3 GS2B covers the area north of North Sand Head. The least depth has shoaled slightly from 4.3m in 2019 to 4.1m in 2021. There has been little change in the northmost section of the survey area.
- 1.4 In the east of GS2B, sediment has migrated eastwards which is consistent with historic trends. There is also migration of sandwaves and scour in the north-west of the survey area in an east-north-easterly direction. The sand ridges have also slightly shoaled between 2019 and 2021.

Reasons for Continuing to Resurvey the Area

- 1.5 The continued migration of sediment and shoaling of controlling depths within the survey area presents a hazard to vessels transiting close to North Sand Head, in and out of Ramsgate Harbour and Gull Stream.

Recommendations

- 1.6 Given the location of the survey area, the focused survey interval should remain at 3 years and full survey at 6 years.
- 1.7 As the channel in GS2A has gradually shifted north-west, the entire area should be shifted to the north-west to align with current aids to navigation in the Gull Stream channel.
- 1.8 The eastern extent of the GS2B North Sand Head area should be extended eastwards to incorporate the wreck on the edge of the survey boundary and to monitor the eastward migration of sediment.

2. LOCATION

- 2.1 Survey interval at time of resurvey: 3 years (The full GS2 area is surveyed every 6 years with two focused areas covering GS2A and GS2B surveyed every 3 years).
- 2.2 Area Covered: 10.27 km²

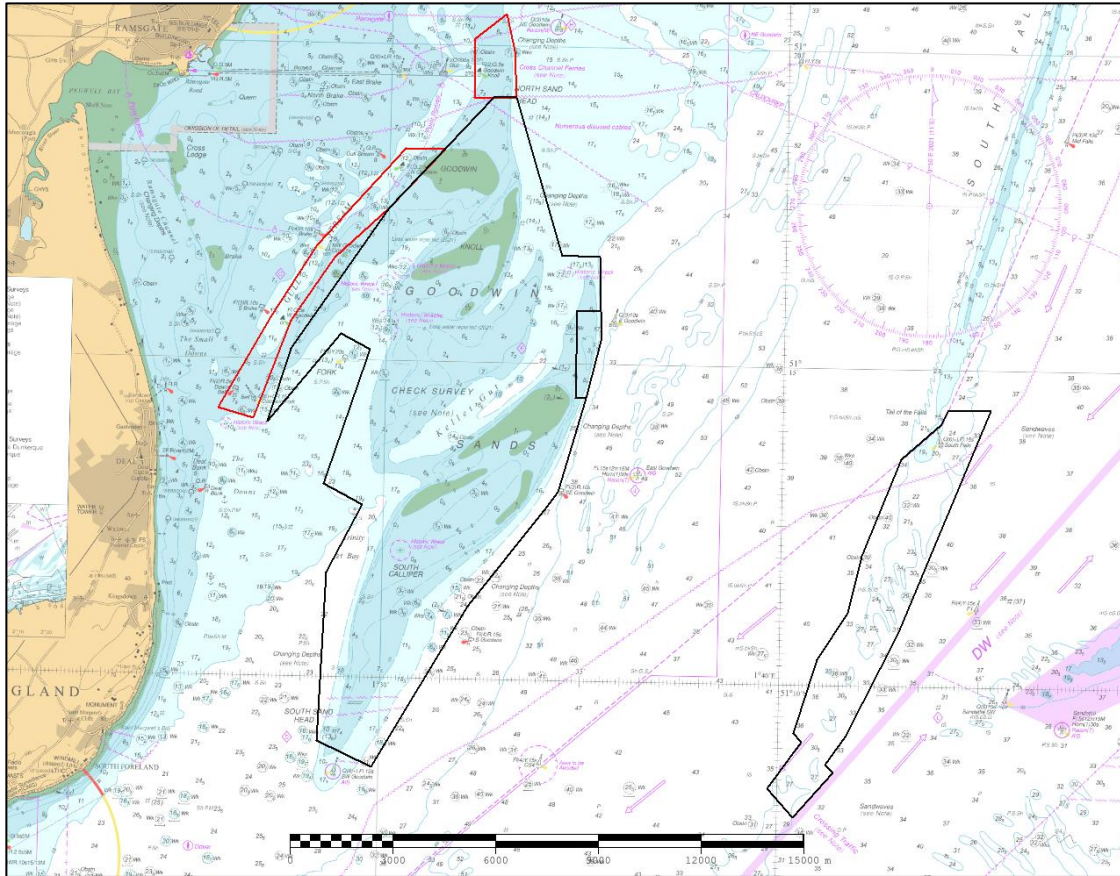


Figure 1: 2021 Dover Strait Routine Resurvey areas overlaid on BA Chart 0323_0 with areas GS2A and GS2B in red

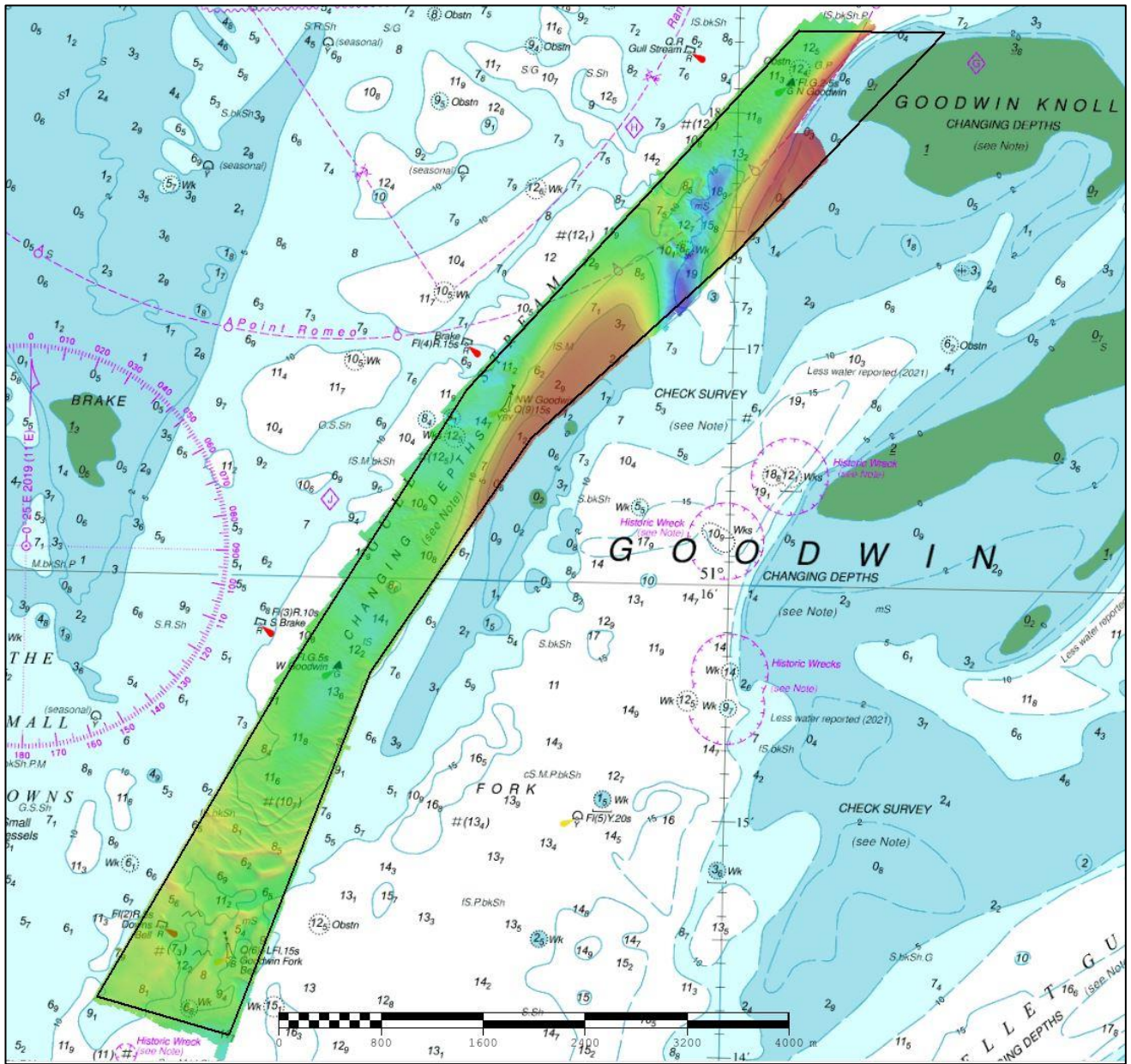


Figure 2: 2021 GS2A survey data overlaid on BA Chart 1823_0

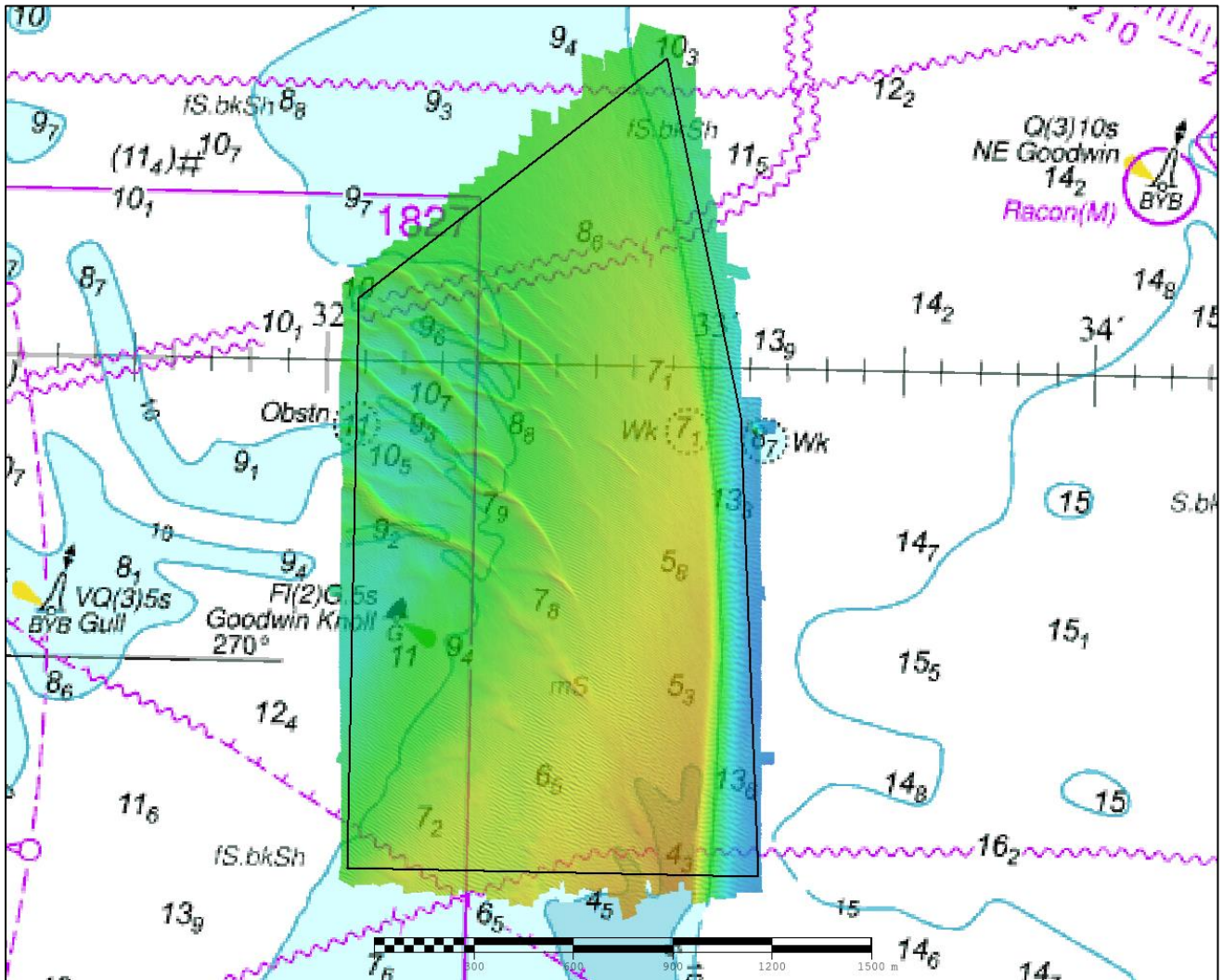


Figure 3: 2021 GS2B survey data overlaid on BA Chart 1823_0

3. REFERENCE SURVEY DETAIL

- 3.1 The previous focused surveys conducted within the Routine Resurvey Programme were conducted in January 2019 as part of HI1617 GS2A Gull Stream and HI1618 GS2B North Sand Head. The previous full survey was conducted in August and September 2015 as part of HI1484.
- 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 The latest focused survey from the 2021 Routine Resurvey Programme was conducted in August to September 2021 as part of HI1741.
- 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

GS2A

- 5.1 Significant depths from the 2021 survey can be seen in Figure 4, with the least depth of 0.0m located in the north of the survey on the northwest flank of Goodwin Knoll bank, which is 13.65m shoaler than in the same point in the 2015 survey. It is likely however that this depth is just the shoalest depth reached in the survey, and it is likely that to the east of this, there are yet shallower depths over the bank. The least depth is approximately 1.3km north-east from the least depth for the previous 2019 survey (0.3m).
- 5.2 The difference surfaces in Figures 5 and 6 all show significant shoaling in the north and centre of the survey due to the westerly migration of Goodwin Knoll into the Gull Stream. There is also migration of sandwaves and scour in the south-west of the survey area in a north-north-easterly direction. The westwards migration of the 10m contour can be seen more clearly in the contour plot of Figure 7. These migrations remain consistent with previous resurvey reports.
- 5.3 The largest differences within the survey area since 2019, shown in Figure 8, show a difference of 13.65m in the north-east associated with the migration of the bank westwards, resulting in the new least-depth position. The largest deepening since 2019 is +6.04m in the south, associated with sandwave migration. There is also significant deepening in the north between the two banks (+5.67m).
- 5.4 Figure 8 is a colour banded depth plot, with the above changes since the 2019 and 2015 surveys. Significant depths changes are associated with the migration of the bank and migration of sandwaves as the bedforms have changed position.

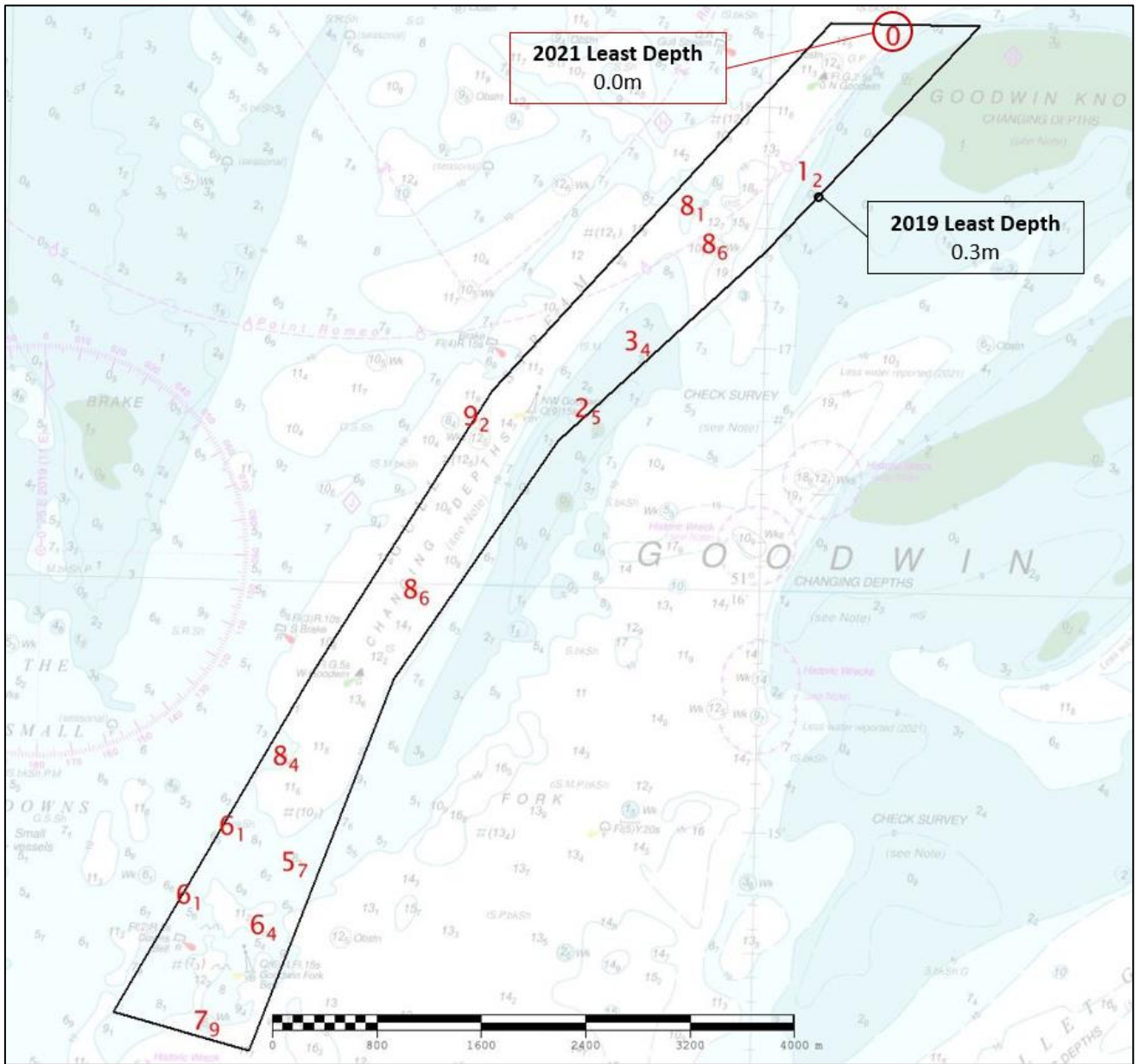


Figure 4: Significant depth soundings highlighted in GS2A, overlaid on BA Chart 1828-0

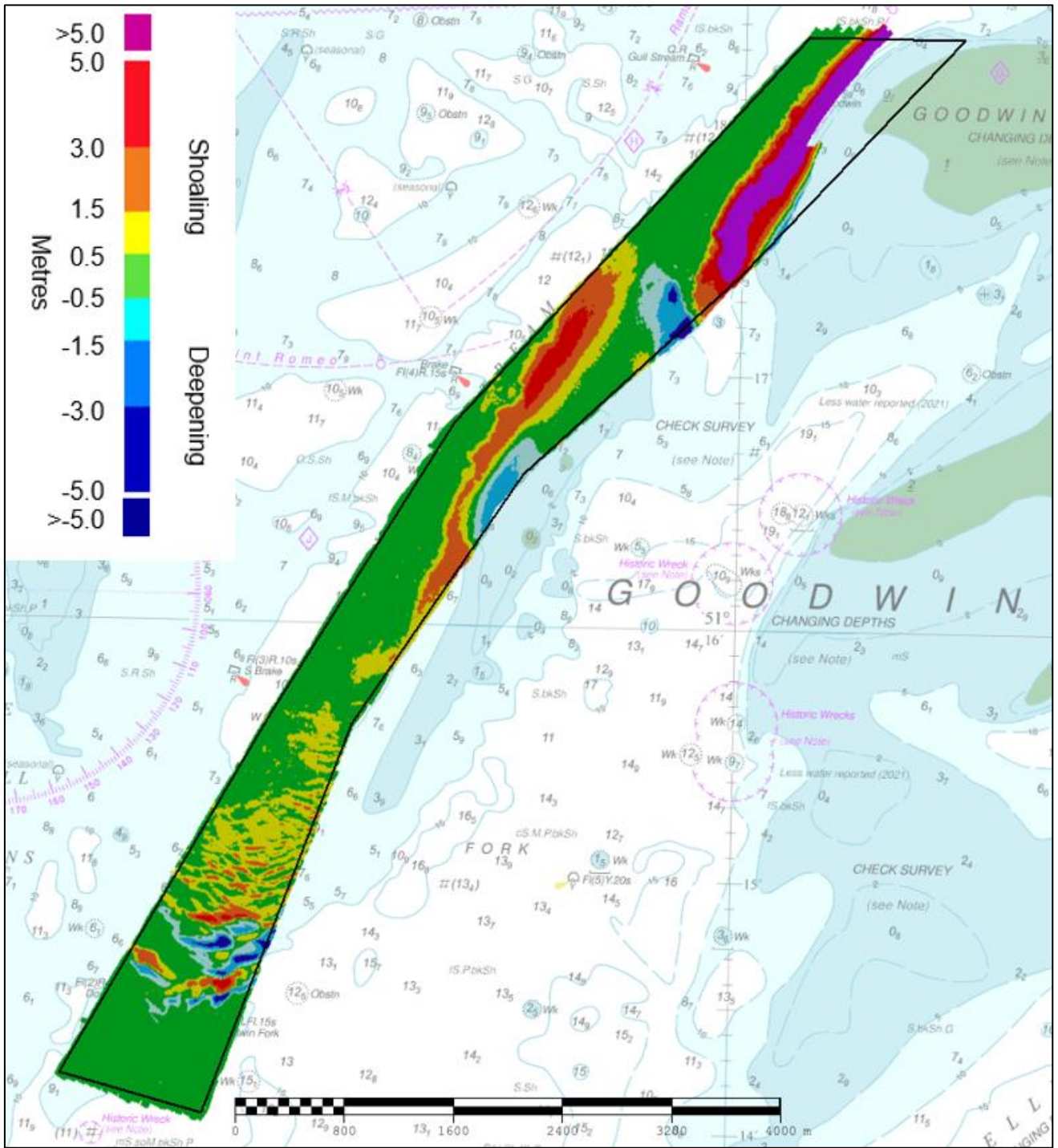


Figure 5: Difference surface showing bathymetric changes between the 2021 and 2019 GS2A surveys overlaid on BA Chart 1828-0

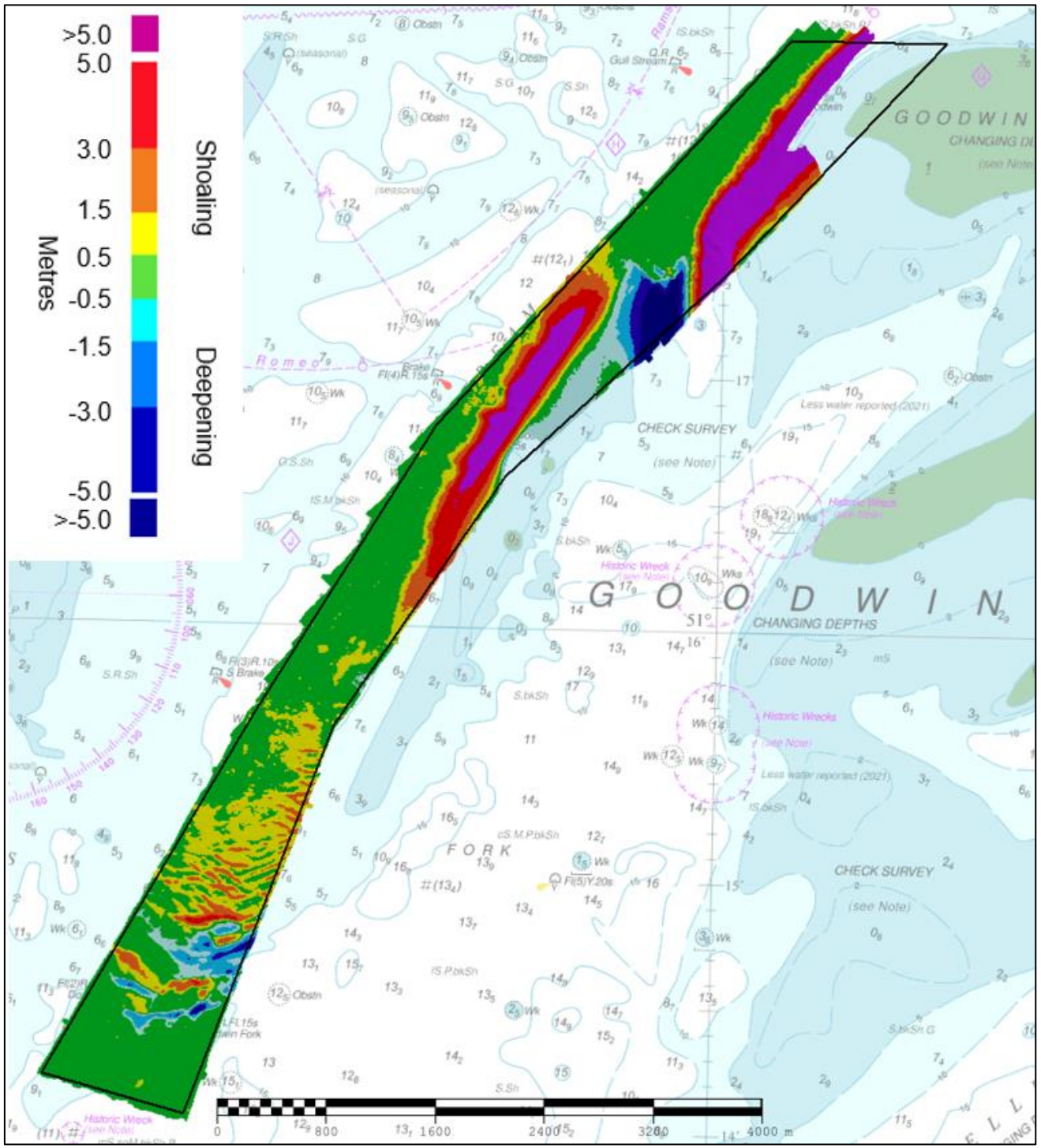


Figure 6: Difference surface showing bathymetric changes between the 2021 and 2015 GS2A surveys overlaid on BA Chart 1828-0

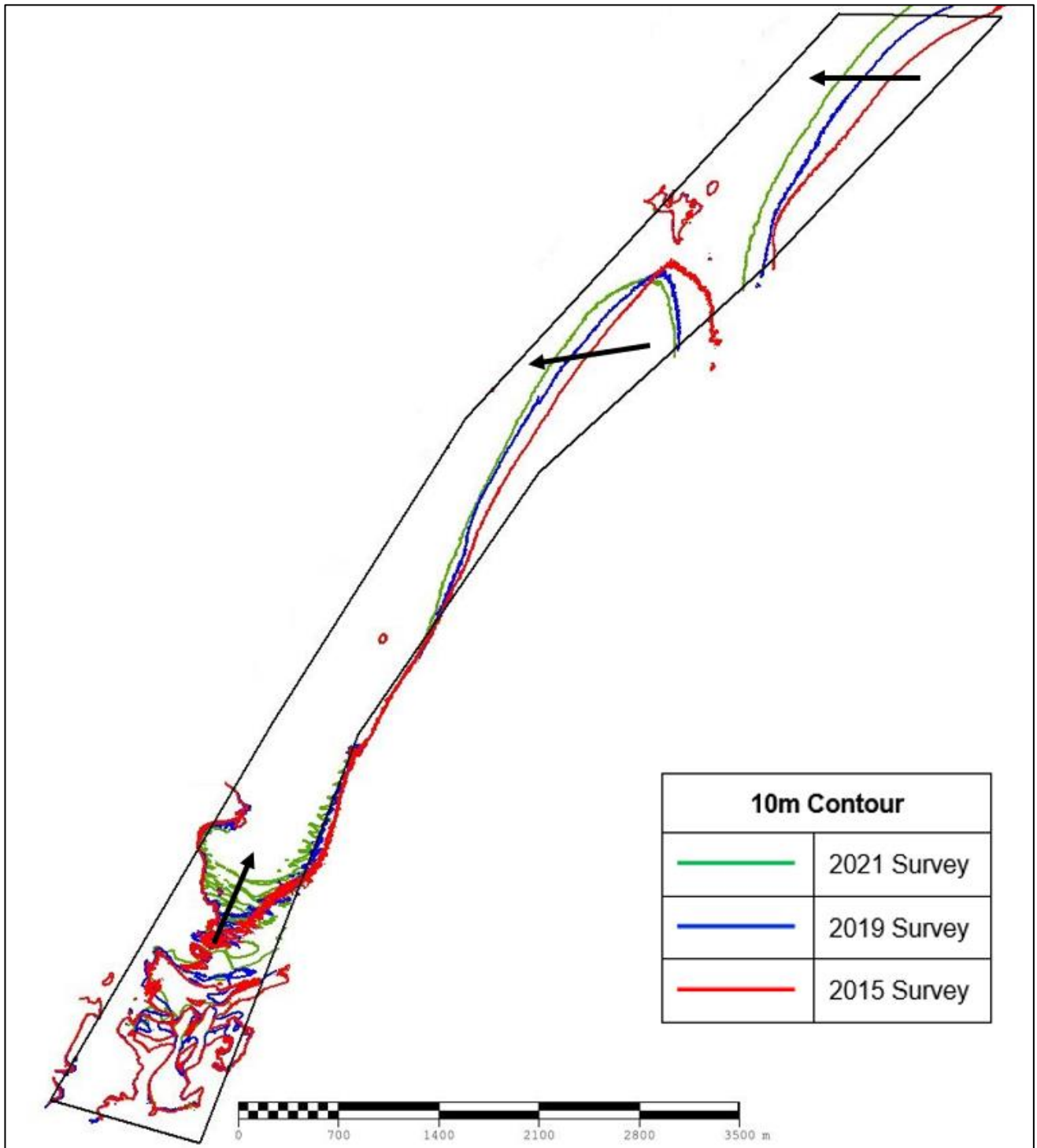


Figure 7: Contour plot showing changes in the 10m contours for survey area between 2021 (green), 2019 (blue) and 2015 (red). Black arrow represents the sandwave migration.

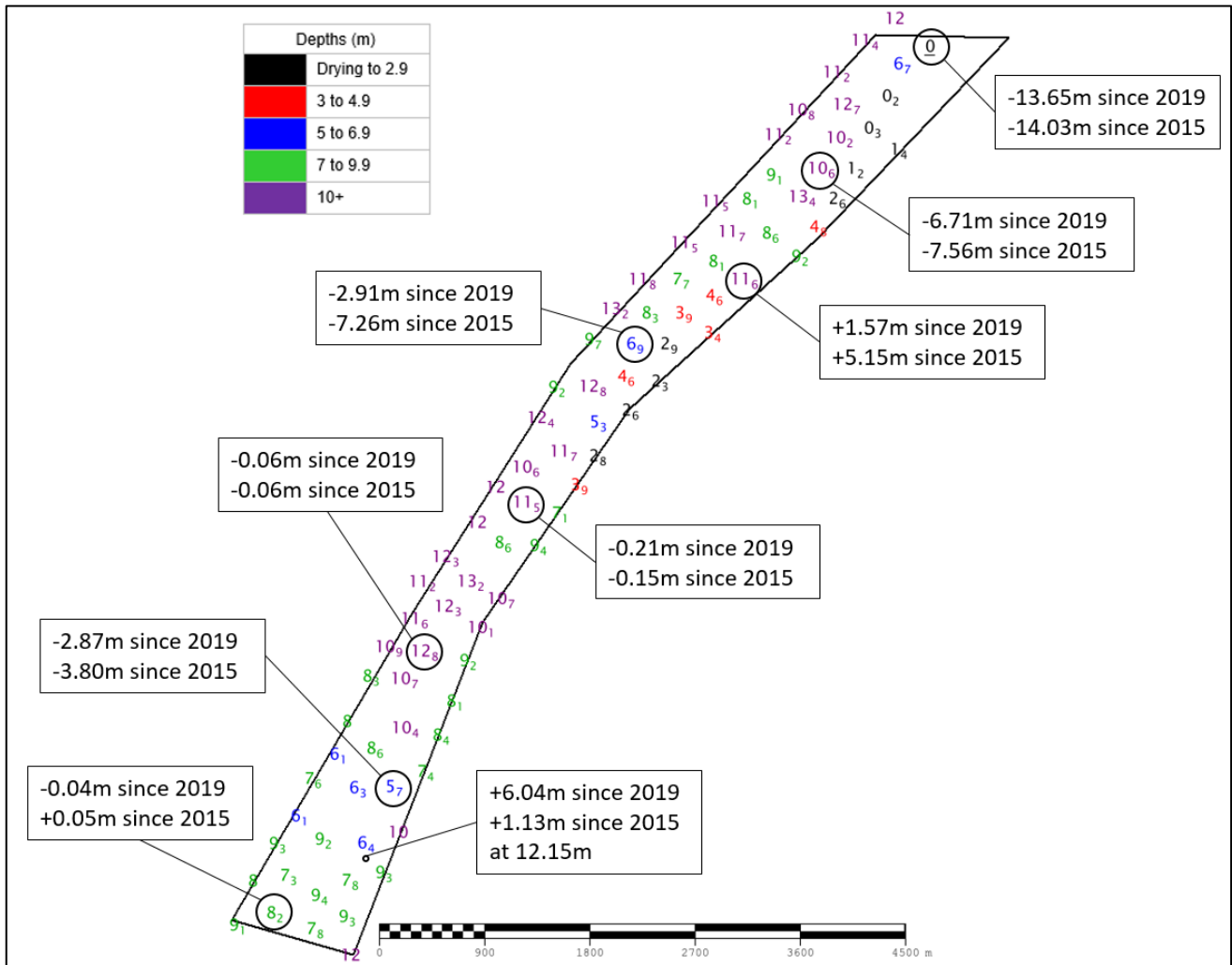


Figure 8: Colour banded depth plot from the 2021 GS2A survey with selected depth changes since the 2019 and 2015 surveys. Positive values (+) represent deepening. Negative values (-) represent shoaling.

GS2B

- 5.5 Significant depths from the 2021 survey can be seen in Figure 9, with the least depth of 4.1m, just outside the south-eastern boundary of the HI limits, which is at the northern end of North Sand Head. The least depth inside the survey limits is 4.3m, which is just inside the boundary to the north of the 4.1m depth. The least depth was 4.5m in 2015 and 4.8m in 2012, which shows there has been continued shoaling, and migration of the least depth southwards.
- 5.6 The difference surfaces in Figures 10 and 11 show that depths have remained similar in the north of the survey area since 2019, but there is shoaling along the eastern edge of the survey area due to the eastern migration of the bank. There is also migration of sandwaves and scour in the north-west of the survey area in an east-north-easterly direction. The eastern migration of the 10m contour can be seen more clearly in the contour plot of Figure 12.
- 5.7 The largest differences within the survey area since 2019, shown in Figure 13, show a difference of -3.48m (shoaling) in the northwest. These changes are related to the migration of the sandwaves in the area. The largest shoaling on the eastern bank is -2.80m since 2019 and -6.1m since 2015.
- 5.8 Figure 13 is a colour banded depth plot, with the above changes since the 2019 and 2015 surveys. Depth changes are associated with the migration of the bank eastwards and migration of sandwaves as the bedforms have changed position.

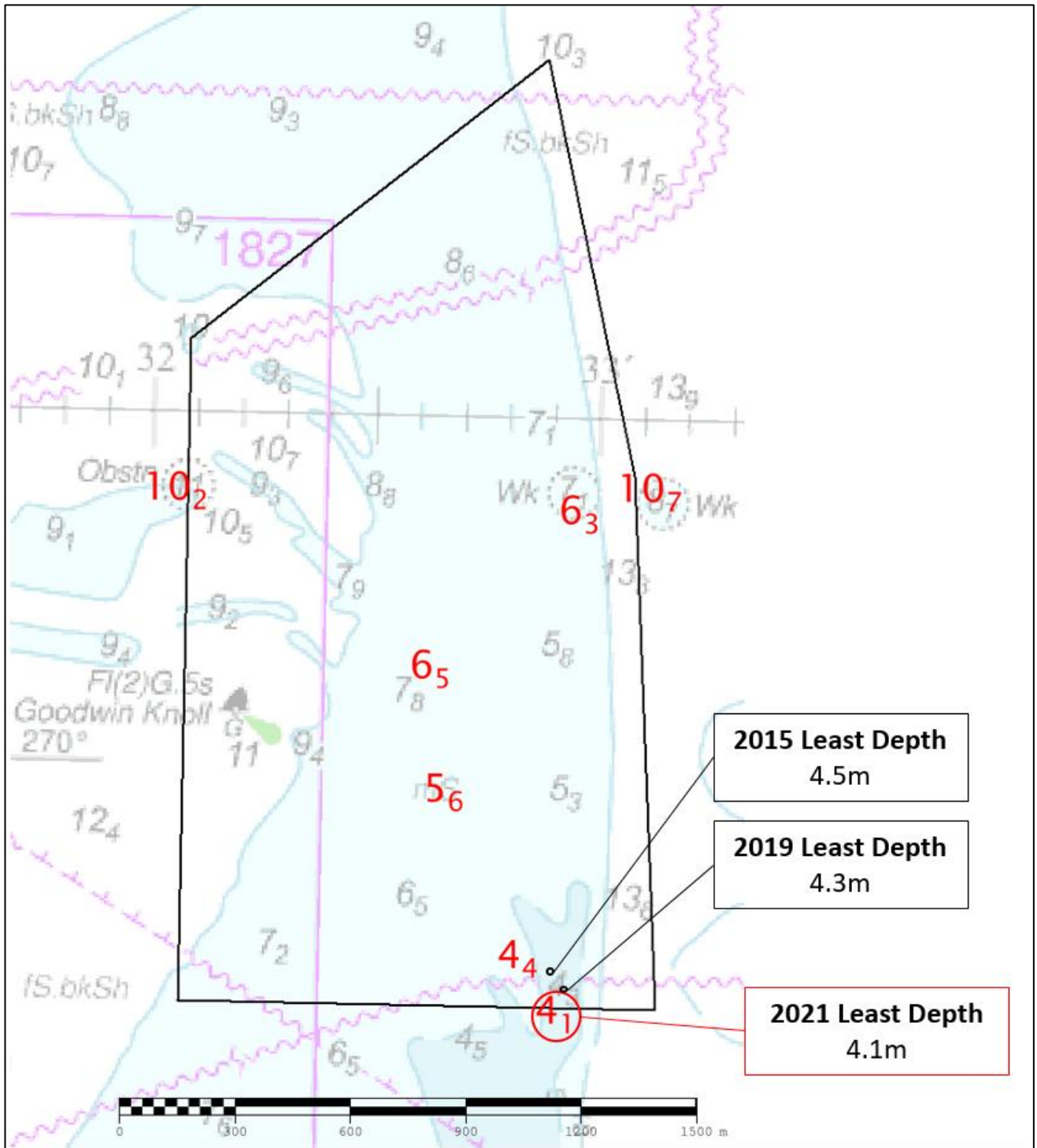


Figure 9: Significant depth soundings highlighted in GS2B, overlaid on BA Chart 1828-0

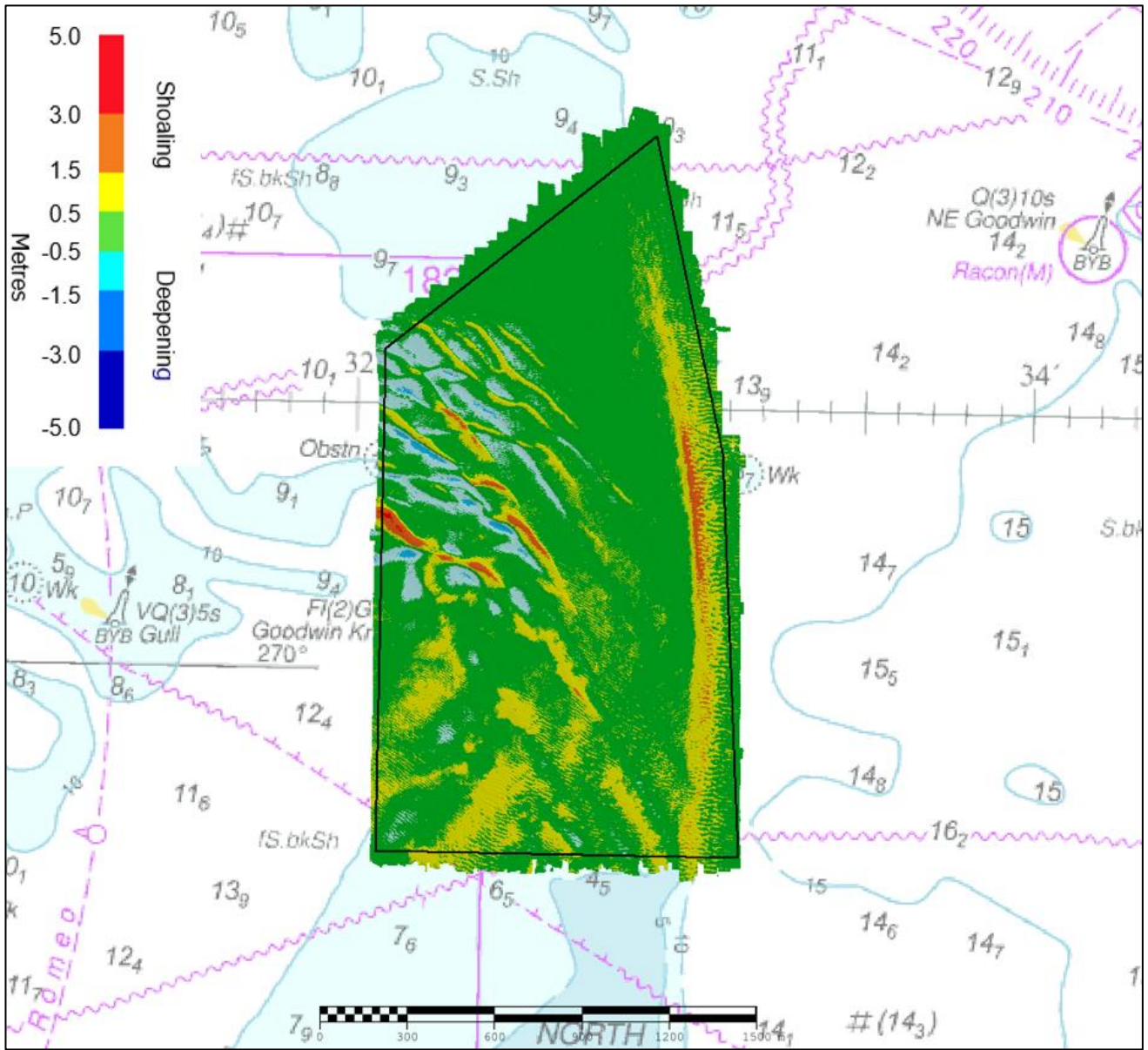


Figure 10: Difference surface showing bathymetric changes between the 2021 and 2019 GS2B surveys overlaid on BA Chart 1828-0

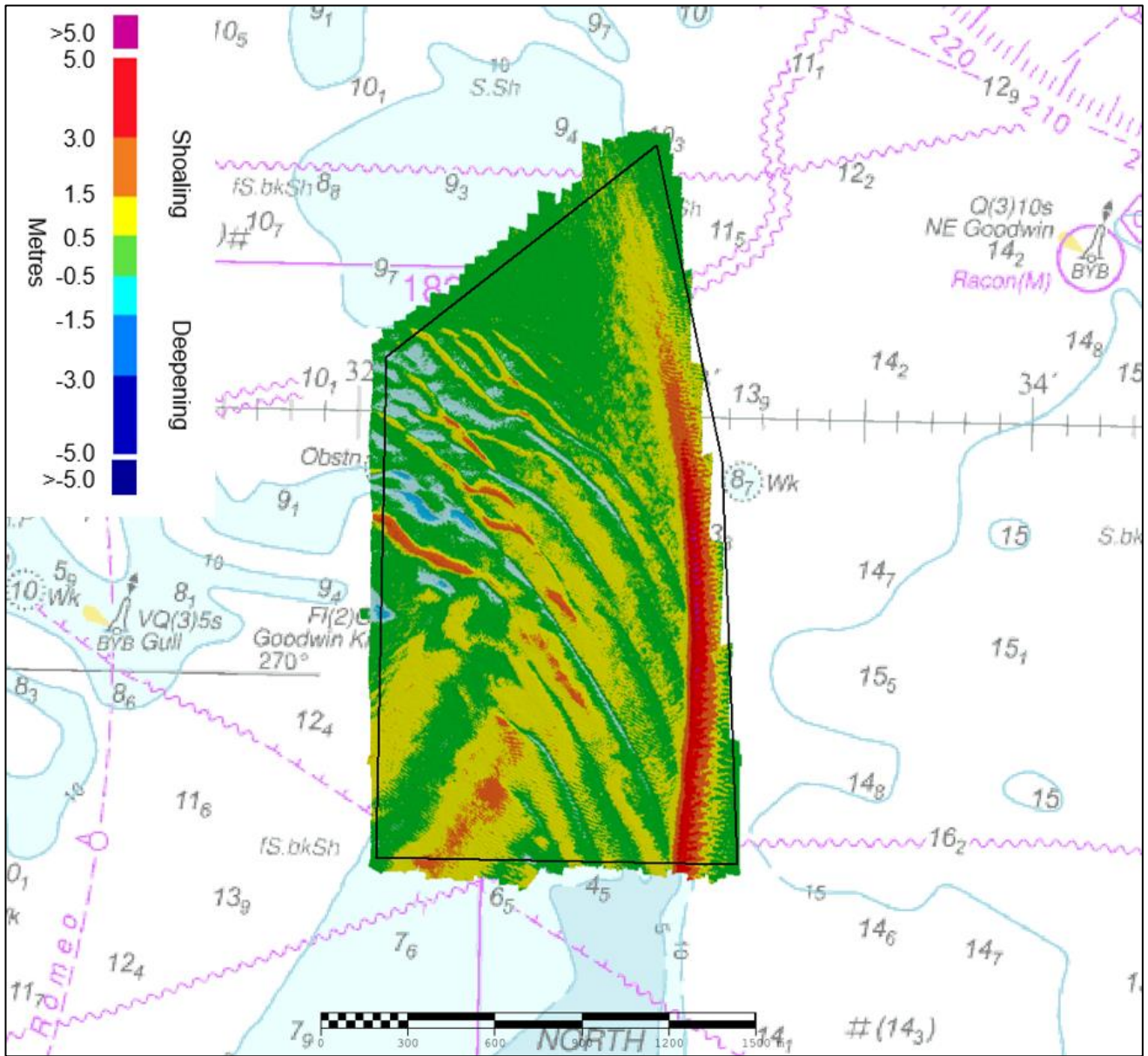


Figure 11: Difference surface showing bathymetric changes between the 2021 and 2015 GS2B surveys overlaid on BA Chart 1828-0

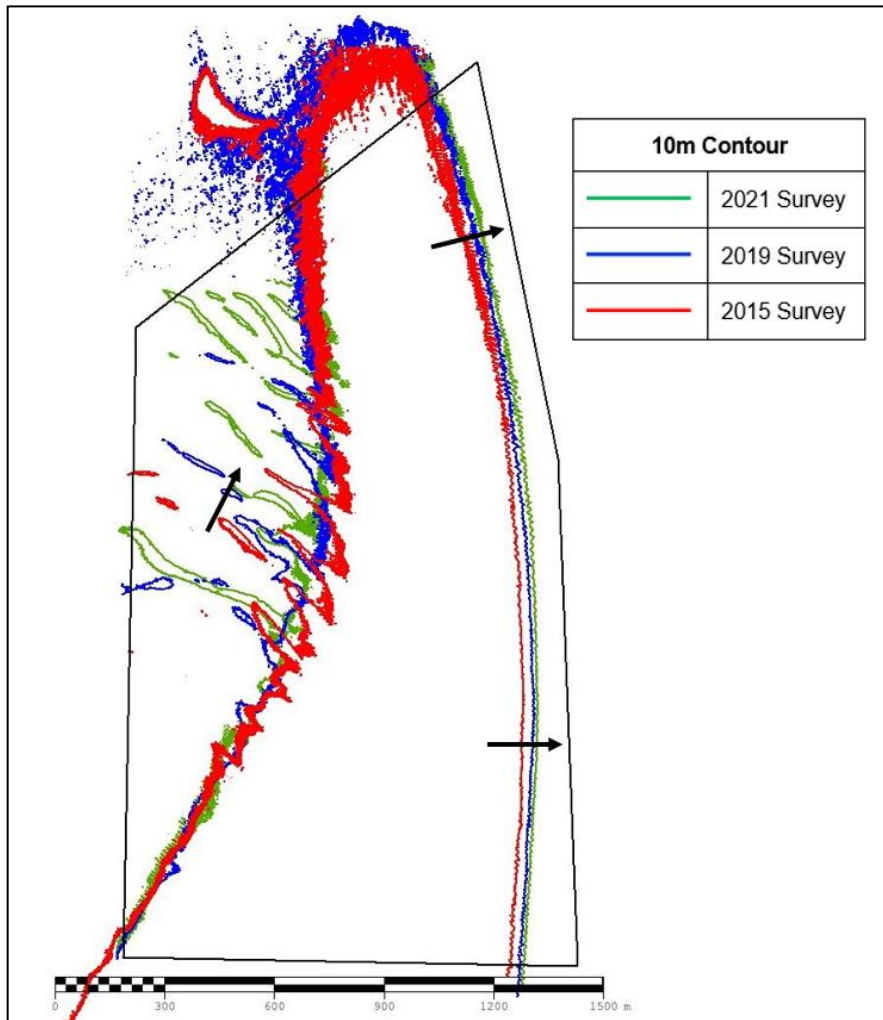


Figure 12: Contour plot showing changes in the 10m contours for survey area between 2021 (green), 2019 (blue) and 2015 (red). Black arrow represents the sandwave migration.

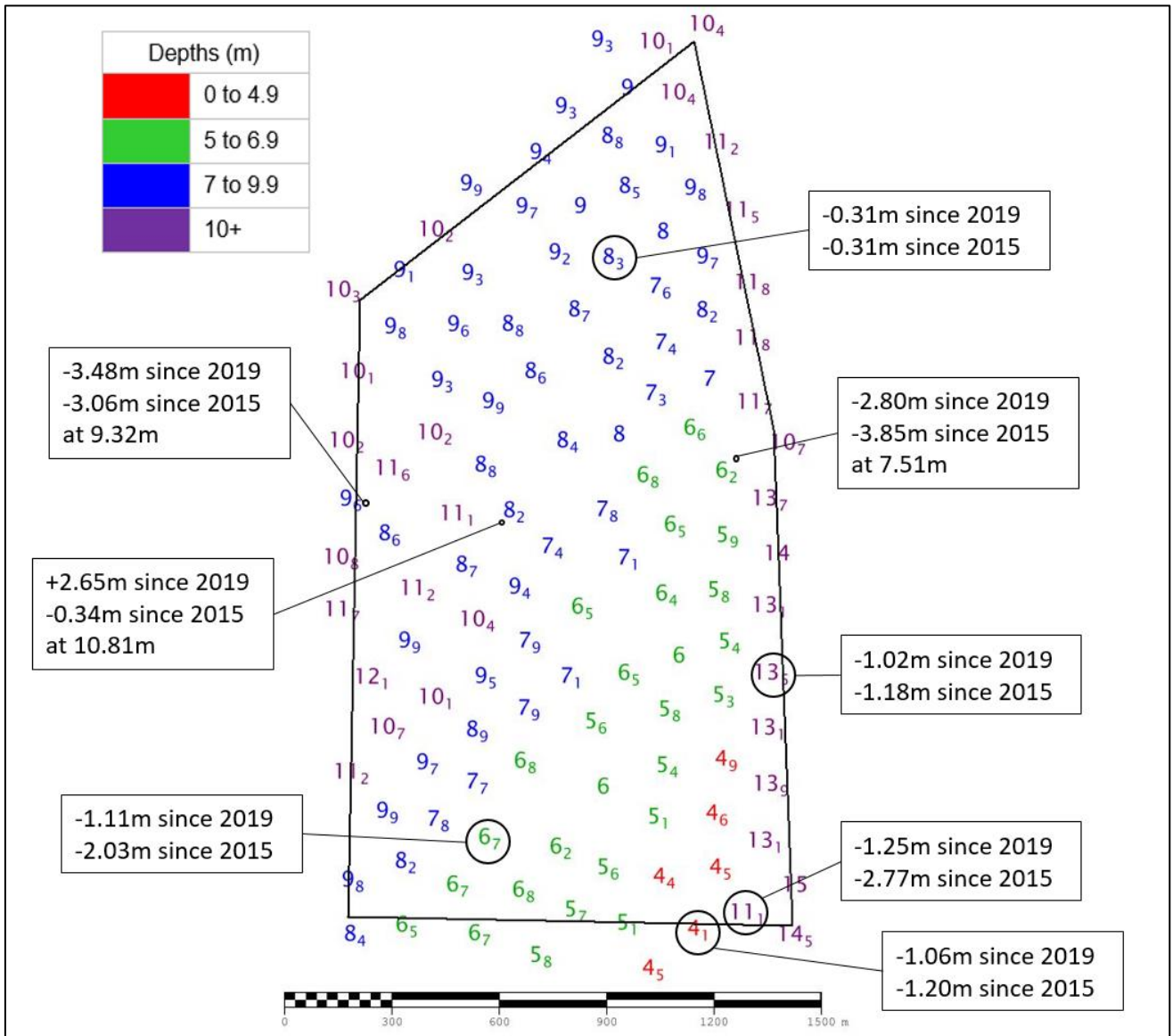


Figure 13: Colour banded depth plot from the 2021 GS2B survey with selected depth changes since the 2019 and 2015 surveys. Positive values (+) represent deepening. Negative values (-) represent shoaling.

6. RECOMMENDATIONS FOR FUTURE SURVEYS

Survey Interval

6.1 The continued migration of sediment and shoaling of controlling depths within GS2A and GS2B presents a hazard to vessels transiting close to North Sand Head, in and out of Ramsgate Harbour and Gull Stream. The migration of Goodwin Sands also requires ongoing monitoring, so it is recommended that the current 3 year focused and 6-year full survey intervals remain.

Survey Area

6.2 The previous RRS report, in 2019, recommended that the entire focused area of GS2A should be shifted to the north-west to align with current aids to navigation and as the channel has gradually shifted north-west. This recommendation was not implemented at that time. This area is still showing increasing migration of sediment of Goodwin Knoll into deeper areas of Gull Stream and needs to be monitored with enough coverage allowance to see any future seabed change.

Therefore, the westward extension of GS2A into the Gull Stream channel should take place as per the below diagram. The full area polygon will need to be updated to reflect these changes as well, if agreed

The proposed limit changes to GS2A are as follows:

Latitude	Longitude
51.282475N	001.468007E
51.305785N	001.494677E
51.305815N	001.517367E
51.289635N	001.497142E
51.276850N	001.476917E
51.259935N	001.459937E
51.234165N	001.445002E
51.236670N	001.430002E
51.262930N	001.446162E

Figure 14: Proposed new survey area coordinates of area GS2A (Total area 9.69 km²)

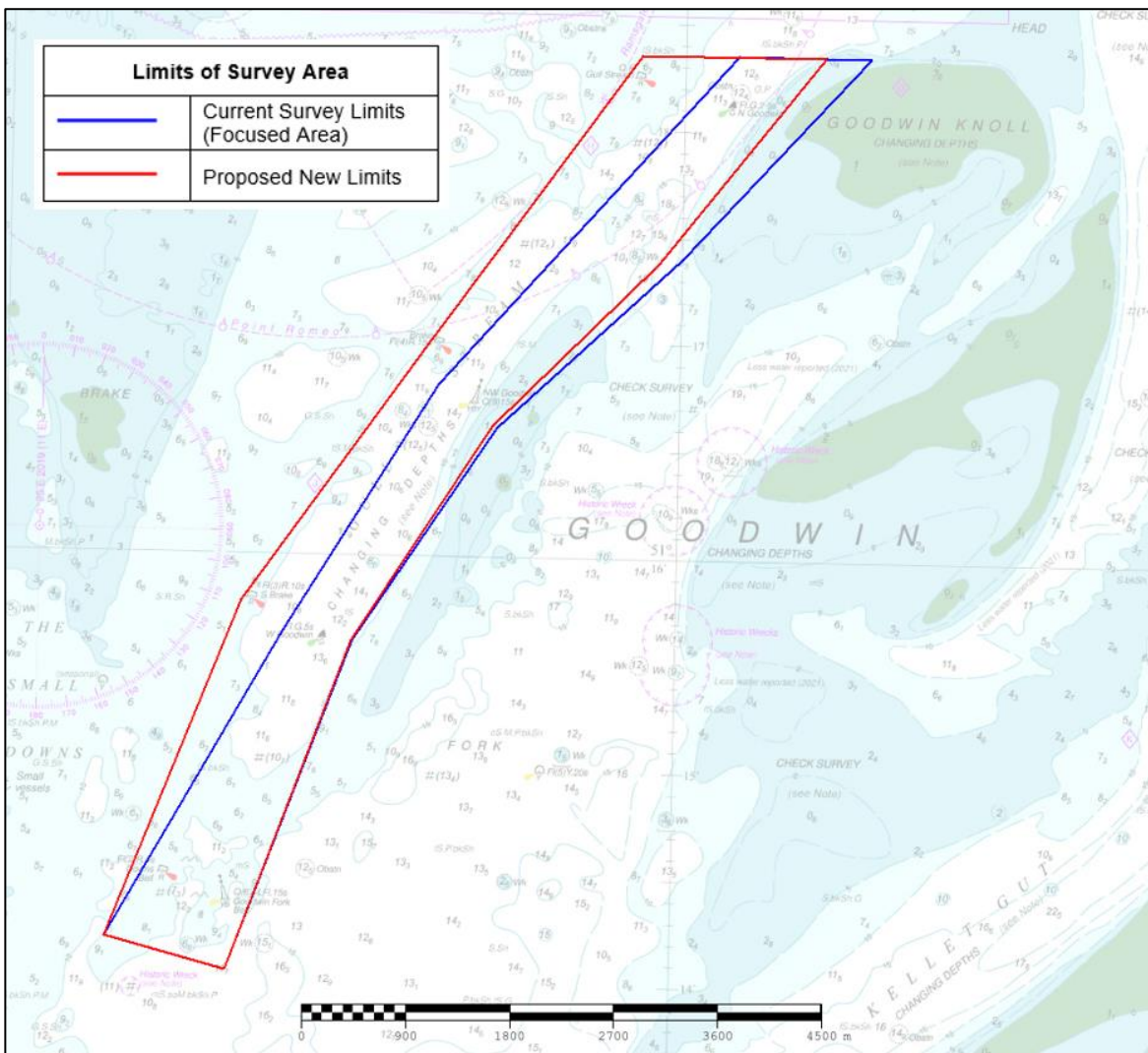


Figure 15: Proposed changes to survey limits of area GS2A

6.3 Following the analysis of the 2015 survey, it was recommended by UKHO to extend the limits of the GS2B survey north to encompass the extents of the 10m contour, which was migrating northwards and passing outside of the survey limits. These changes were agreed and completed. Following the 2019 survey, the recommendation was to remove the north-west section of the survey area as the difference plot showed the region was stable. This change cut off the top of the extending 10m contour, but as the change was agreed and completed after the 2019 CHWG in July, a recommendation following the 2021 survey to extend northwards to follow the 10m contour will not be made.

However, the 2019 analysis also suggested that the wreck close to the eastern edge of North Sand Head bank did not need to be included in an extension as it was investigated in 2018 as part of the Shallow Water programme of surveys. At the CHWG in July 2019, it was recommended by UKHO that the survey area should be extended eastwards. The northwest reduction to the area was accepted and completed, but the eastwards extension was not. It is recommended that this extension does take place as per the below diagram.

The least depth is now slightly outside the HI limits at the south-west of the survey boundary, but this falls in to the RRS area, GS4, to the south.

The proposed limit changes to GS2B are as follows:

Latitude	Longitude
51.341670N	001.547841E
51.331879N	001.553355E
51.319515N	001.553744E
51.319500N	001.534667E
51.334987N	001.534667E

Figure 16: Proposed new survey area coordinates of area GS2B (Total area 2.68 km²)

The full area polygon will need to be updated to reflect these changes as well, if agreed.

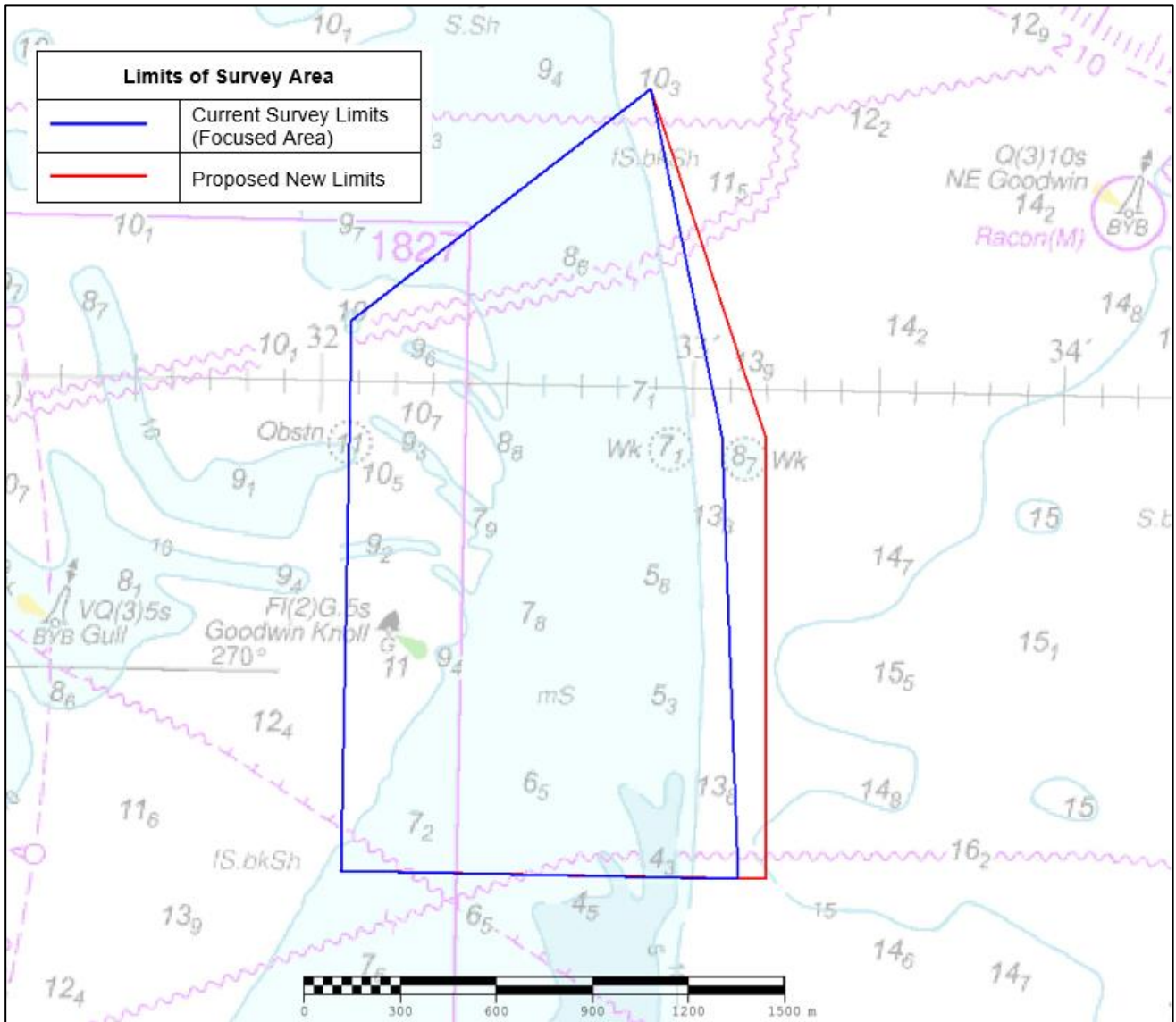


Figure 17: Proposed changes to survey limits of area GS2B