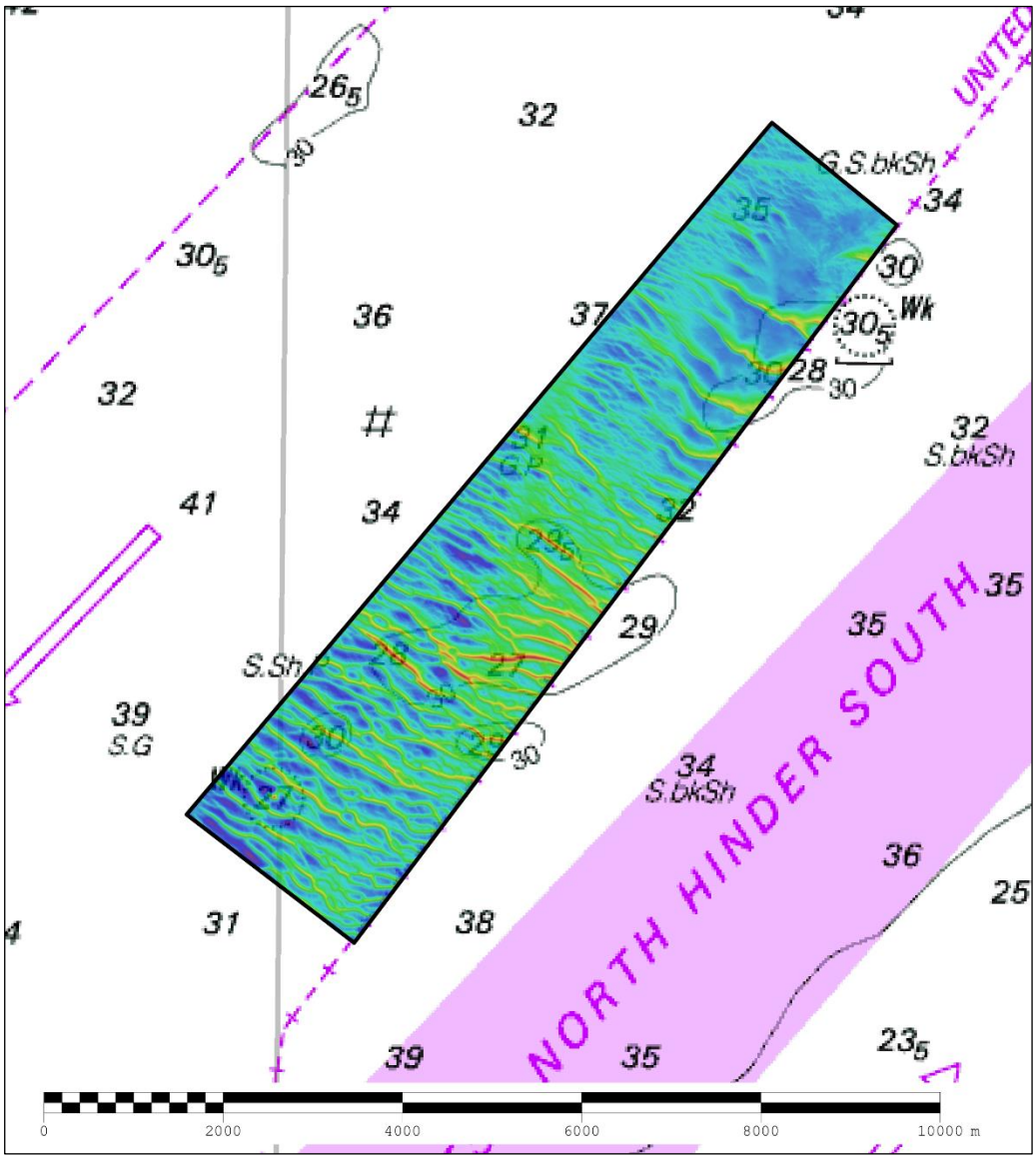
UK Hydrographic Office

Produced for: Maritime & Coastguard Agency

NOORD HINDER SOUTH (NH2)

ASSESSMENT NH2/2016 V2

An assessment of the 2016 hydrographic survey of the area: to monitor recent seabed movement; to identify any implications for shipping; and to make recommendations for future surveys.



CONTENTS

NOORD HINDER SOUTH, NH2, 2016

1. EXECUTIVE SUMMARY

The Area and Recent Changes

1.1 Noord Hinder South lies within the south-west bound lane of the Noord Hinder Traffic Separation Scheme (TSS) in the centre of the southern North Sea; and abuts the median line between the United Kingdom and Belgium. The area is surveyed every 12 years as part of the Routine Resurvey Program.

1.2 Sandwaves feature across the area, measuring up to 10m in height, and generally orientated in a north-west to south-east direction. The controlling depth in 2016 is 26.8m, located along a sandwave just south of the area's centre, which is 0.6m shallower then the 2007 survey.

1.3 AIS data for 2016 shows vessels with a registered draught up to 23.1m navigating through the area.

Reasons for Continuing to Resurvey the Area

1.4 The controlling depth in the area is close to the maximum draught of vessels navigating through the area, with the 2016 survey showing depths generally decreasing over the area.

Recommendations

1.5 Decreasing depths along larger sandwaves in the area support the continued monitoring of the area through the Routine Resurvey Programme at 12-year intervals.

1.6 Based on the limited migration of sandwaves in the area, current survey limits should be maintained for future surveys.

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 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.

3. AREA HISTORY

3.1 Summary of Surveys:

Year	Survey	Reference	Data	Year	Survey	Reference	Data
1999	M2830/6		s,d	2007	HI1159	SDRA 2007-002068	m
2000	M3415/6	HI895	s,d	2016	HI1523	SDRA 2016-181431	m

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
1999	In the initial assessment the area was designated DWR Area 7, designation changed to NH2 however area not formally adopted in to the Routine Resurvey Program.
2001	Following the survey in 2000 NH2 adopted in to Routine Resurvey Program with a 12 year resurvey interval next survey planned for 2012.
2010	Forward plan updated following CHWG, next survey of NH2 to occur in 2018.
2015	Forward plan updated following CHWG, brought forward survey of NH2 by 2 years (from 2018 to 2016) to better distribute annual survey effort and area limits reduced to United Kingdom and Belgium median line following Multibeam survey from Belgium HO (July 2011).

4. DESCRIPTION OF THE AREA

4.1 Noord Hinder South lies within the south-west bound lane of the Noord Hinder Traffic Separation Scheme (TSS) in the southern North Sea. The United Kingdom has the responsibility for surveying the area up to the median line separating United Kingdom and Belgium.

4.2 The Controlling depth in the area is 26.8m, which is located along a sandwave just south of the area's centre.

4.3 Sandwaves extend across the area, generally oriented 120°/300°, reach approximately 12m in height. The south of the area is generally covered by symmetrical sandwaves, whilst sandwaves in the north are generally asymmetrical, with their profile indicating southward migration.

4.4 Area Covered: 6.10 NM^2 (20.96 km^2) as shown in Figure 1 below.

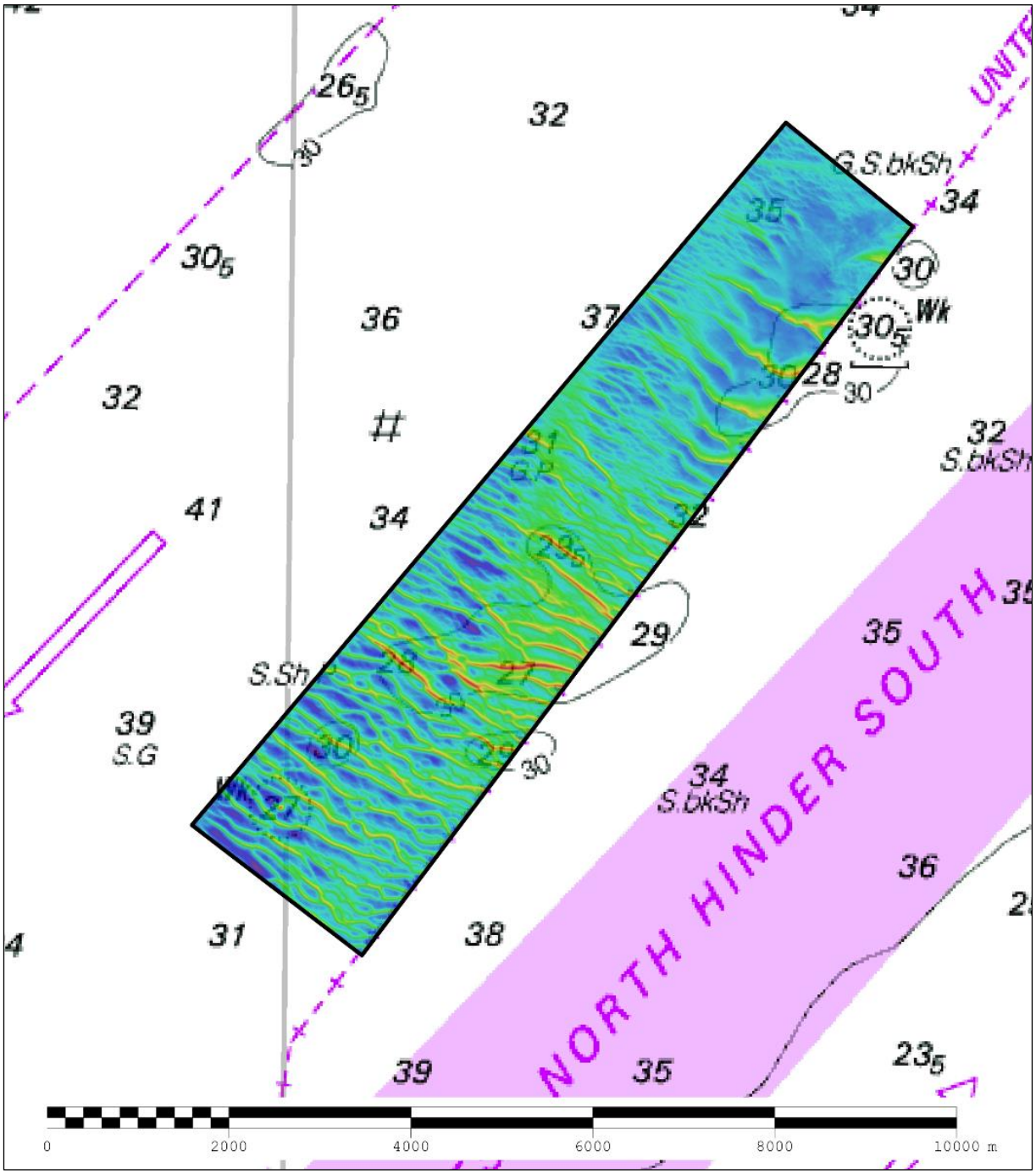


Figure 1 – 2016 survey data sun-illuminated view overlaid on BA Chart 1630

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

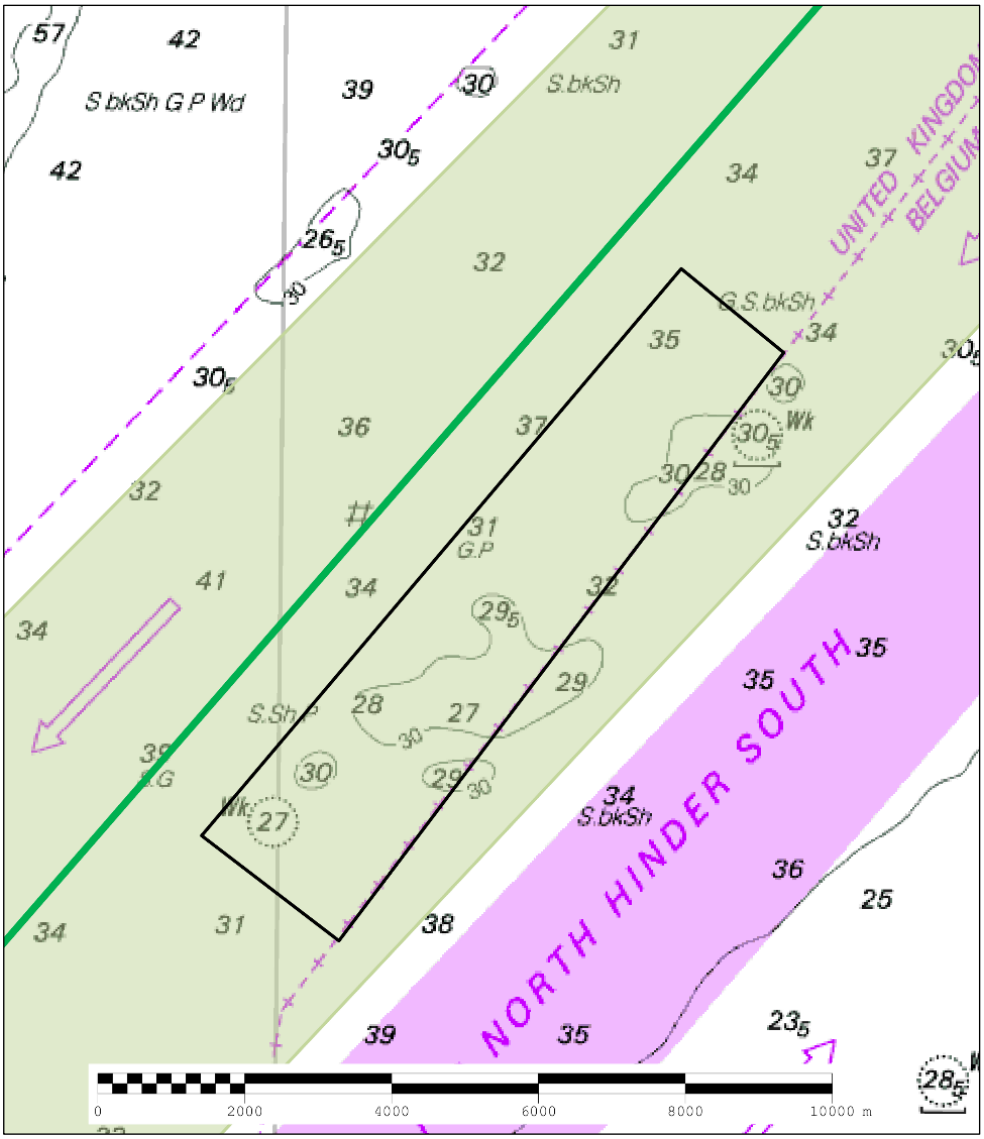
Point	Latitude (N)	Longitude (E)
A	51.62064	2.26222
B	51.63333	2.23500
C	51.70333	2.32833
D	51.69317	2.34868

4.6 Survey interval at time of resurvey: 12 yr

4.7 Largest scale chart: BA1630 (Scale 1:50,000)

5. SHIPPING IN THE AREA

5.1 Shipping data from satellite AIS data for 2016 of vessels larger then 2000GT shows the maximum draught vessel to transit through the area was 23.1m. The South Westerly Deep Draught Recommended Track (Admiralty Pilot) lies to the north-west of the NH2 survey area which comprises of a recommended track and a safety corridor extending 0.5 NM either side of the track.



	Deep Water Track
	Limits of survey Area
	Indicative shipping routes through area

Figure 2 – Indicative shipping routes overlaid on BA Chart 1630

6. REFERENCE SURVEY DETAIL

6.1 The last historical Routine Resurvey Program survey to be undertaken was a single beam survey carried out in 2000 under HI895. A more recent Hydrographic Instruction survey was undertaken in 2007 under HI1159, and has been used as the reference to compile this assessment. Survey operations were carried out between the 22nd March and 9th April 2007, with sea state ranging from smooth to rough (2-5). Periods of weather downtime were recorded on several days during survey operations.

6.2 The survey data was acquired using multibeam echosounder system. The primary reference position system used Differential GNSS. The survey is referred to the International Terrestrial Reference Frame 2000 (ITRF2000) datum.

6.3 The measured depths were reduced to Chart Datum using measured tidal data from Dover and adjusted using a tidal zone definition file in Caris HIPS. Since the final bathymetric surface stored in the database was a 2-metre resolution shoal depth true position surface. UKHO created a 1m resolution CUBE (Combined Uncertainty and Bathymetry Estimator) surface to remove the shoal bias that the original deliverable would introduce when assessing against the deliverable from the comparison survey.

6.4 The survey was validated by UKHO and met IHO S44 (4th Edition) Order 1 standards.

6.5 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.

7. COMPARISON SURVEY DETAIL

7.1 The latest survey undertaken as part of the CHP Routine Resurvey was in 2016 under HI1523. Survey operations were carried out from the 27th to 29th October, with sea state reported as slight to moderate (3-4). No weather down time was reported during the survey.

7.2 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 System 1989 (ETRS89) 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 below shows that sandwaves have migrated south-west by less than 30m of since 2007 in the central and southern parts of NH2. Many of the sandwaves in the area have however become amplified during the elapsed time since the data from HI1159 was acquired, as shown by the Profile Comparisons in Figures 4 and 5. The differing tidal reduction method used for the 2007 and 2016 surface has introduced some tidal artefacts into the surface, as visible along the western edge of the area.

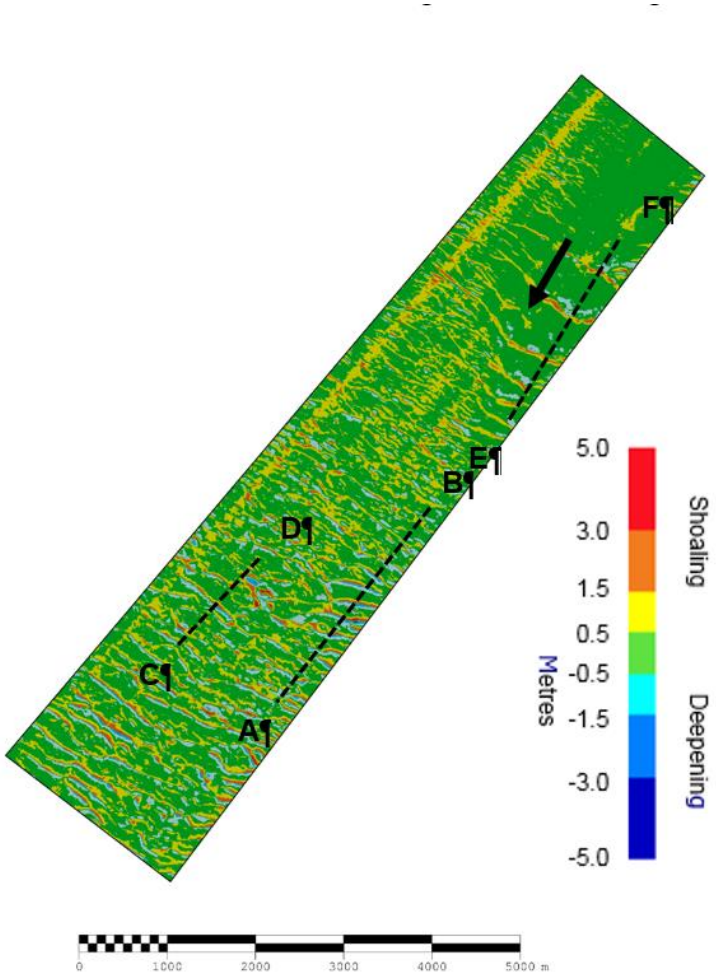
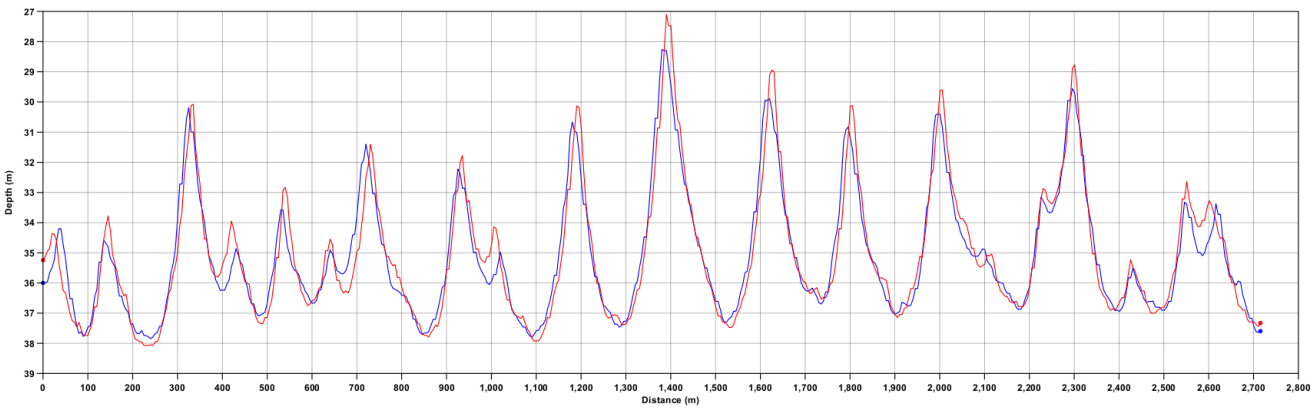
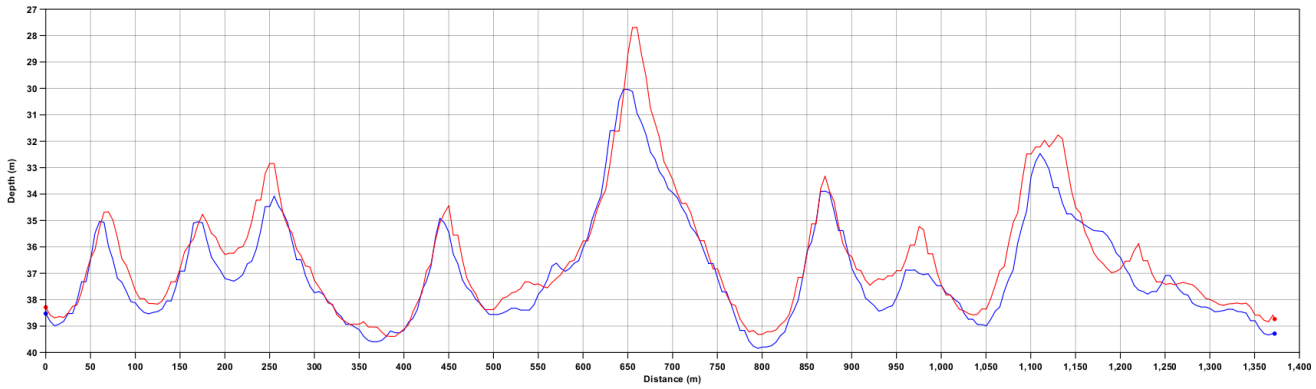


Figure 3 – Variability plot showing Bathymetric Changes between the 2007 and 2016 Surveys. Arrows indicate the general direction of sediment movement.



A **B**

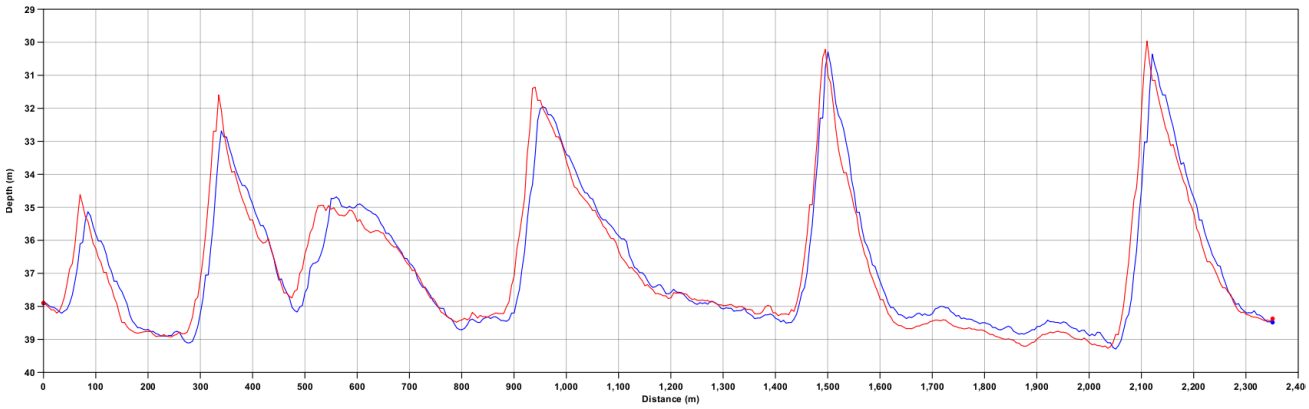
Figure 4 – Profile Comparison A-B (Blue = 2007, Red = 2016)



C **D**

Figure 5 – Profile Comparison C-D (Blue = 2007, Red = 2016)

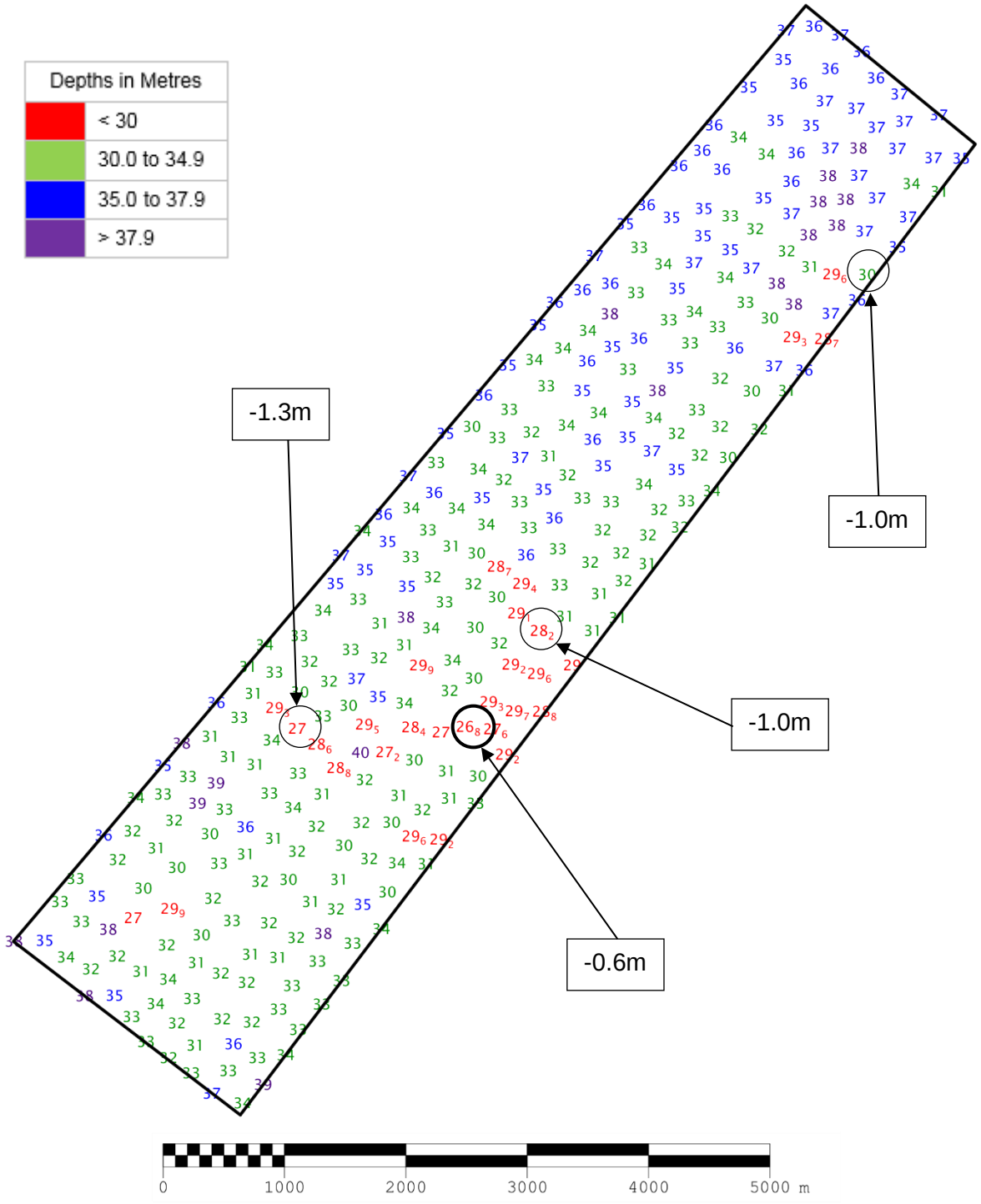
8.2 In the north of the area, sandwaves have migrated approximately 20m, as shown by profile E-F in figure 6 below.



E **F**

Figure 6 – Profile Comparison E-F (Blue = 2007, Red = 2016)

8.3 The Depth Plot shown in Figure 7 below highlights an area where depths have become shallower since the 2007 survey. The controlling depth for the NH2 area in 2016 has remained along the same sandwave as in 2007; however, the depth has decreased from 27.4m to 26.8m.



Depth changes indicated above are from the closest corresponding 2007 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.

Figure 7 – Depth Plot showing Sounding selection from the 2016 Survey, with significant changes from 2007 highlighted. The controlling depth over the area is circled in bold.

9. IMPLICATIONS FOR SHIPPING

9.1 Depths across the area remain deeper than the draught of shipping observed using the area. The minimum depth of 26.8m in the 2016 survey is 0.6m shallower than the 2007 survey, but 3.7m deeper than the largest vessel recorded navigating through the survey area.

10. RECOMMENDATIONS FOR FUTURE SURVEYS

10.1 Following the limited movement of sandwaves in the area, the current limits should be retained.

10.2 Due to the 0.6m decrease in depth over 9 years and the draught of vessels transiting the area the current resurvey period of 12 years should be retained.

10.3 Given the proximity of the controlling depth to the largest draught vessels navigating the area, Noord Hinder South should remain in the resurvey program.