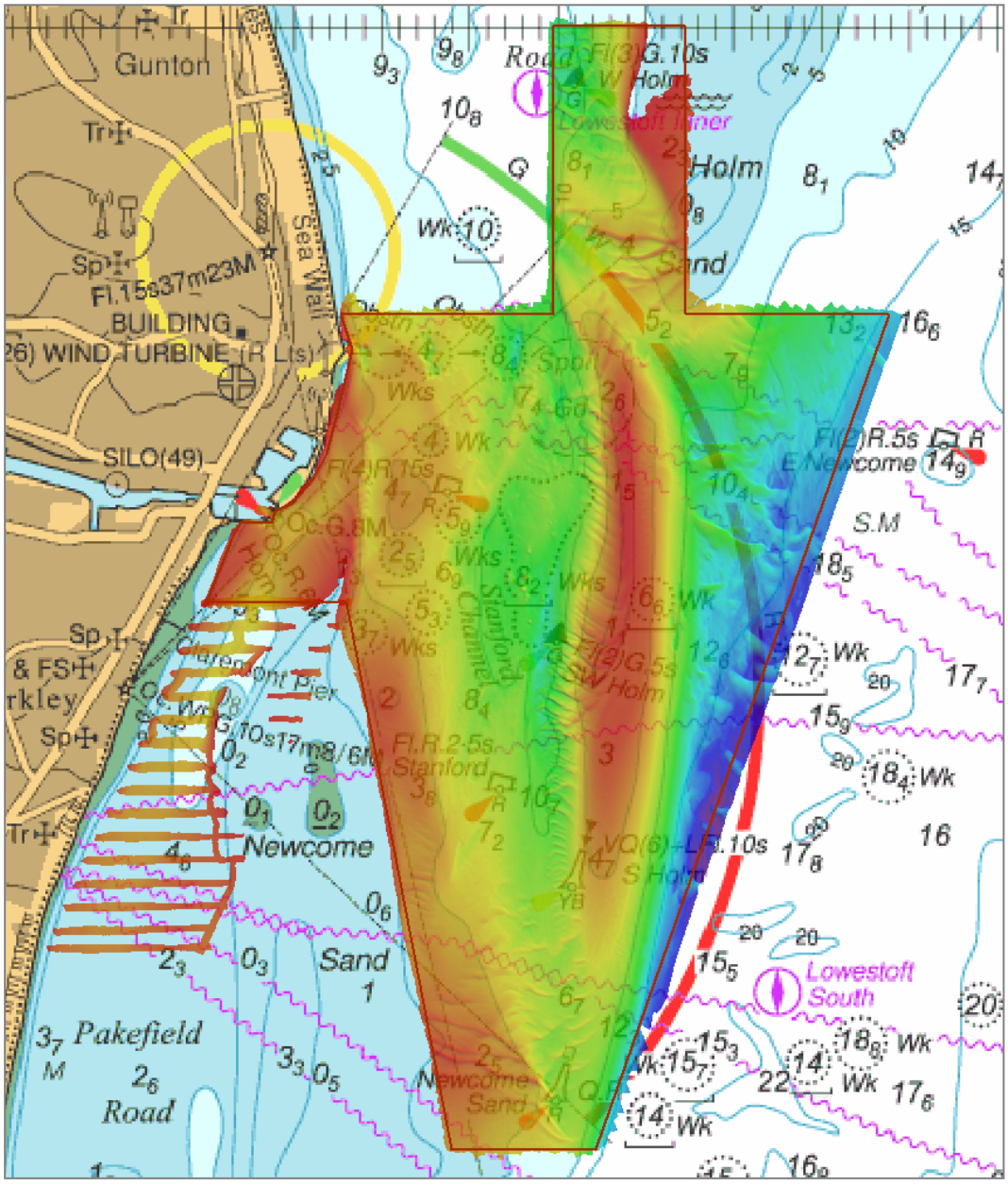
United Kingdom
Hydrographic Office

EAST ANGLIA

APPROACHES TO LOWESTOFT

ASSESSMENT ON THE ANALYSIS OF ROUTINE RESURVEY AREA EA10 FROM THE 2012 SURVEY



May 2013

EAST ANGLIA

APPROACHES TO LOWESTOFT

Assessment EA10/2012

An assessment of the 2012 hydrographic survey of the area: to monitor recent seabed movement; to identify any implications for shipping; and to make recommendations for future surveys.

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.

CONTENTS

ANNEXES

APPROACHES TO LOWESTOFT, 2012

1. EXECUTIVE SUMMARY

The Area and Recent Changes

1.1 The 2012 survey examined in this assessment was a full 3-year survey. The area was extended into the northern part of area EA12 to cover Lowestoft South Road and part of Pakefield Road, following reports of shoaling. Changes in that area have also been examined in this report.

1.2 Vessels up to 6 metres draught can normally berth in Lowestoft Inner Harbour, although vessels up to 6.5 metres can be accommodated subject to available tide and suitable weather conditions.

1.3 At the entrance to Stanford Channel, sandwaves have continued their long-term southeasterly migration. Separate to these changes, a general shoaling to the underlying ridge lying across the entrance has occurred in the south of the area.

1.4 The eastern side of Holm Sand has seen some accretion and a resulting eastward migration of the contours. In the north of the area, an ebb channel bisecting the bank has continued to develop.

1.5 The main part of Stanford Channel remains stable.

1.6 At the entrance to the Lowestoft final approach channel, a shoal ridge has migrated seawards.

1.7 Notable accretion has occurred on the western side of Newcome Sand since surveyed in 2002, with a narrowing of Lowestoft South Road.

1.8 Depths along the routes followed by shipping approaching Lowestoft remain broadly similar, but with shoaling at the entrance to the final approach channel.

Reasons for Continuing to Resurvey the Area

1.9 Stanford Channel provides a buoyed approach to the port of Lowestoft. The following areas require resurveying due to changes occurring -

- the shoal ridge and sandwaves at the entrance to Stanford Channel are of most concern and require annual surveying, along with the final approach to Lowestoft;
- the remainder of the approach is more stable, contains fewer mobile features and requires surveying less frequently;
- the adjacent banks of Newcome Sand and Holm Sand are outside the buoyed channel and require less frequent surveying.

Recommendations

1.10 The re-survey frequency of the northern part of Stanford Channel should be extended from 3 to 12 years and transferred to EA8.

1.11 The outer limit of EA10 should be realigned to take into account changes in the bank.

1.12 The re-survey frequency of 'The Ridge' outside Lowestoft should be reduced from 1 to 3 years by reducing the limits of Focused Area B.

1.13 The need for check-lines surveys of Lowestoft South Road should be reviewed after the full survey of the area due in 2014.

1.14 The recommended changes are shown in Annex N.

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 members of the Committee On Shipping Hydrography (COSH) through the UKHO website, before being 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).

3. HISTORY

3.1 EA10 is one of the routine resurvey areas of the East Anglian Routine Resurvey Programme, which covers the approaches to Great Yarmouth and Lowestoft. It was established in 1997 as an annual survey area, the area having previously been covered by a variety of resurvey schemes adapted to cover the changing banks and channels.

3.2 Following assessment of the 2001 survey, the area limits were revised to better focus on those areas of concern to shipping. The southwest part of the area was transferred to EA12, and the southern limit was extended to take account of sediment transport along Newcome Sand.

3.3 From 2004, annual surveying was restricted to the buoyed channel and approach to Lowestoft, with the whole area being fully surveyed every 3 years. In 2008 this was further restricted, with the relatively deep and stable areas of Stanford Channel removed from the annual programme.

3.4 Trinity House Lighthouse Service (THLS) also conducts multibeam surveys of Stanford Channel.

4. DESCRIPTION OF THE AREA

4.1 EA10 covers Stanford Channel and final approach to Lowestoft; the full area covers 4.3 SQ NM (14.75 SQ KM).

4.2 Stanford Channel effectively bisects EA10 and separates the shoal areas of Holm Sand and Newcome Sand. The channel provides the main approach route to Lowestoft Harbour from the south. It was buoyed and opened up to shipping in 1994, at which time the controlling depth across the entrance was 4.6 metres. At the same time, buoys marking Pakefield Road and Lowestoft South Road were discontinued. A ridge lies across the entrance to the channel and is overlaid with sandwaves. In the 2012 survey, a minimum depth of 6.0 metres was found over a sandwave close southeast of South Holm buoy.

4.3 Area specifications, including the survey history, are at Annex A.

5. SHIPPING IN THE AREA

5.1 Stanford Channel and North Roads are used by commercial vessels, with draughts up to 7 metres for passing coastal traffic and 6.5 metres for vessels calling at Lowestoft Harbour. The area is used extensively by leisure craft and wind farm vessels, with the port of Lowestoft being the operation and maintenance base for Greater Gabbard offshore wind farm.

5.2 Lowestoft South Road is predominantly used by leisure vessels on coastal passage with draughts of up to 3.5 metres. A generalised depiction of the main routes is shown at Annex B.

6. 2009 SURVEY DETAILS

6.1 The survey was conducted from 22 to 28 July, in conjunction with other areas, using a dual head Kongsberg Maritime EM3002D multibeam echosounder. Weather in the area was generally good with slight to smooth sea state.The survey achieved IHO S44 Order 1 standard and 100% seafloor cover was achieved up to the 2-metre contour.

6.2 Positioning was referred to ETRS89 Datum.

6.3 Depths were reduced to Chart Datum using GPS heights, with the ellipsoidal height to Chart Datum separation taken from the Vertical Offshore Reference Frame (VORF).

7. 2012 SURVEY DETAILS

7.1 The survey was conducted from 22 September to 6 October in conjunction with other East Anglia areas. Weather in the area was variable with sea states 2 to 4 experienced during survey work, with some time spent alongside due to weather.

7.2 The survey was conducted using a dual head Kongsberg Maritime EM3002D multibeam echosounder. The survey achieved IHO S44 Order 1a standard and 100% seafloor cover was achieved up to the 2 metre contour within EA10. Open spaced lines were run in the north of EA12 to monitor changes in the area.

7.3 Positioning was referred to the ERTS89 Datum.

7.4 Depths were reduced to Chart Datum using GPS heights, with the ellipsoidal height to Chart Datum separation taken from the Vertical Offshore Reference Frame (VORF).

7.5 A 1 metre CUBE surface formed the final deliverable.

7.6 The survey overlaid on chart 1535 is shown at Annex C.

8. DESCRIPTION OF RECENT BATHYMETRIC CHANGE

8.1 Cross-sections from the 2009 and 2012 surveys are at Annexes D and E. Colour banded depth plots of the 2009 and 2012 surveys are at Annexes F and G. A variability plot showing depth differences between the 2009 and 2012 surveys is at Annex H. Comparison plots of the 2, 5 and 10 metre contours from these surveys are at Annexes I, J and K respectively.

Final Approach to Lowestoft

8.2 The ridge in the final approach along the white sector of Kirkley light has shoaled slightly and migrated out towards Stanford Channel, as shown in the cross-section A-B at Annex E. This area is surveyed annually as a focused area.

8.3 Comparison of surveyed depths over 'The Ridge' since 1991 indicates a gradual long-term deepening of this low featureless shoal area, as shown in Figure 1.

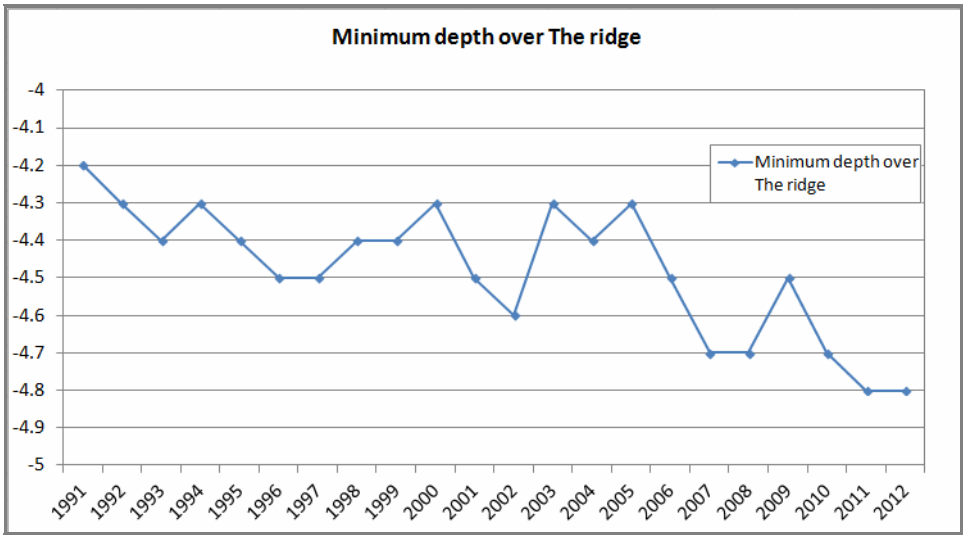


Figure 1: Minimum surveyed depths over The Ridge

Stanford Channel

8.4 Depths along Stanford Channel remain largely unchanged, but at the southern entrance mobile sandwaves provide variability in depths. The southern limit of Holm Sand has extended southwards towards South Holm buoy, as shown by migration of the 5 metre contour at Annex J and cross-section G-H at Annex E, which shows both a shoaling and seaward expansion. The southern migration of the 5 metre contour reflects an ongoing change which has seen the contour extend southwards by 1,100 metres over the last 10 years. The 10 metre contour at the entrance has moved seaward, as it has along much of the length of Holm Sand.

8.5 The area extending up into Lowestoft North Road is particularly stable, as shown in the variability plot at Annex L, which shows differences between the 2006 and 2012 surveys and Annex M, which shows differences between the 2000 and 2012 surveys.

Holm Sand

8.6 Depths over the main part of Holm Sand covered by EA10 remain broadly similar, with a minimum depth of 1.2 metres in the 2012 survey. In the north of the area, continued loss of sediment over the bank could potentially result in a new channel forming.

Lowestoft South Road

8.7 Check-lines run across Lowestoft South Road, following reported shoaling in the area, show the channel has narrowed since last surveyed due to Newcome Sand extending inshore, significantly reducing depths in the area. The 2 metre contour delimiting Newcome Sand has migrated shoreward by up to 200 metres over the 3 year survey period, as shown in cross-section I-J at Annex E, while the deeper part of Lowestoft South Road has seen a loss of sediment.

9. IMPLICATIONS FOR SHIPPING

9.1 Depths along the routes followed by shipping approaching Lowestoft remain broadly similar, but with slight shoaling at the entrance to the final approach channel. Ongoing changes in sandwaves and adjacent banks at the entrance to Stanford Channel and are of potential concern to shipping, in particular the bank and sandwaves close to South Holm buoy.

9.2 Continued migration of Newcome Sand, narrowing Lowestoft South Road further, would be of concern to leisure craft, given the shoal depths over the bank.

10. RECOMMENDATIONS FOR FUTURE SURVEYS

10.1 The area within Stanford Channel and towards Lowestoft North Road has been subject to little or no change over the last 12 years and is devoid of mobile bedforms. It is recommended that the resurvey frequency for much of this area is reduced from the current 3 years to 12 years and transferred to area EA 8 'The Roads' to the north.

10.2 The outer limit of EA10 should be re-aligned to take into account the seaward expansion of the southern part of Holm Sand in the south and removal of relatively deep water in the north.

10.3 The re-survey frequency of 'The Ridge', currently covered by Focused Area B, should be extended from 1 to 3 years due to its featureless nature and gradual long-term increase in depth.

10.4 The area of EA12 which covers Lowestoft South Road is undergoing rapid change and the 10 year survey frequency for the whole area is inappropriate for Lowestoft South Road. Area EA12 is due for re-surveying in 2014 and the need for continuing with more frequent check-line surveys of Lowestoft South Road should be considered during the analysis of that survey.

10.5 The proposed new limits for EA10 are shown at Annex N and listed below:

Proposed revision to the full 3 Year limits:

1	52.46668N	001.77947E
2	52.47927N	001.78299E
3	52.50000N	001.78300E
4	52.50000N	001.79550E
5	52.48333N	001.79550E
6	52.48330N	001.80838E
7	52.43515N	001.78910E
8	52.43500N	001.77333E
9	52.46667N	001.76333E
10	52.46667N	001.75000E
11	52.47033N	001.75250E
12	52.47133N	001.75338E
13	52.47129N	001.75628E
14	52.47196N	001.75658E
15	52.47244N	001.75821E
16	52.47384N	001.76021E
17	52.47830N	001.76229E
18	52.47844N	001.77024E
19	52.46670N	001.77032E

Proposed revision to 1 Year limits Focused Area B:

1	52.47650N	001.76350E
2	52.47650N	001.76645E
3	52.46665N	001.76645E
4	52.46667N	001.75550E
5	52.47120N	001.75550E

Focused Area A limits unchanged.

AREA SPECIFICATIONS

(Including Survey History)

REGION: East Anglia **NAME:** Approaches to Lowestoft **AREA:** EA10

SURVEY INTERVAL: 1 & 3 years

Area co-ordinates are referred to WGS84 Datum

LIMITS:

3 yr interval		
A	52°.48333N	1°.76283E
B	52°.48333N	1°.78300E
C	52°.50000N	1°.78300E
D	52°.50000N	1°.79550E
E	52°.48333N	1°.79550E
F	52°.48333N	1°.81483E
G	52°.43500N	1°.78700E
H	52°.43500N	1°.77333E
I	52°.46667N	1°.76333E
J	52°.46667N	1°.75000E
	to (A) via the 2m contour	

1 yr interval Area A Entrance to Stanford Channel		
A	52°.4560N	1°.7750E
B	52°.4560N	1°.7955E
C	52°.4350N	1°.7850E
D	52°.4350N	1°.7790E

1 yr interval Area B Final Approach to Lowestoft		
A	52°.4765N	1°.7635E
B	52°.4765N	1°.7705E
C	52°.4700N	1°.7705E
D	52°.4700N	1°.7653E
E	52°.4667N	1°.7653E
F	52°.4667N	1°.7555E
G	52°.4712N	1°.7555E
	to (A) via the 5m contour and Lowestoft entrance	

AREA SIZE: 1 yr interval: Area A: 0.58 SQ NM (2.00 SQ KM) Approx.
1 yr interval: Area B: 0.16 SQ NM (0.56 SQ KM) Approx.
3 yr interval: 4.3 SQ NM (14.75 SQ KM) Approx.

AREA SPECIFICATIONS

(Including Survey History)
(continued)

SURVEYS: (conducted at 1:25,000 scale (not applicable to multibeam surveys))

Year	Survey	File Ref	Data	Year	Survey	File Ref	Data
1994	M2261	HH090/624/01	s.d.	2004	M4158	HH091/076/01	m.*
1995	M2481	HH090/663/01	s.d.	2005	M4268	HH091/112/01	m.*
1996	M2613	HH090/688/01	s.d.	2006	M4528	SDRA 2006-379698	m.*
1997	M2814	HH090/735/01	s.d.	2007	M4654	SDRA 2007-007489	m.
1998	M3007	HH090/767/01	s.d.	2008	M4789	SDRA 2008-026404	m.*
1999	M3212	HH090/849/01	s.d.	2009	HI1292	SDRA 2009-29527	m.
2000	M3349	HH090/884/01	s.d.	2010	HI1338	SDRA 2010-213940	m.
2001	M3542	HH090/941/01	s.d.	2011	HI1367	SDRA 2011-106141	m.
2002	M3722	HH090/999/01	s.d.	2012	HI1397	SDRA 2012-117402	m.
2003	M3913	HH090/021/01	s.t.d.				

KEY: s = sonar sweep, t = seabed texture tracing, d = digital data, m = multibeam digital data, * focused survey

REPORTS: 1994 Latest survey included M2261 (HA145/02/03/04)

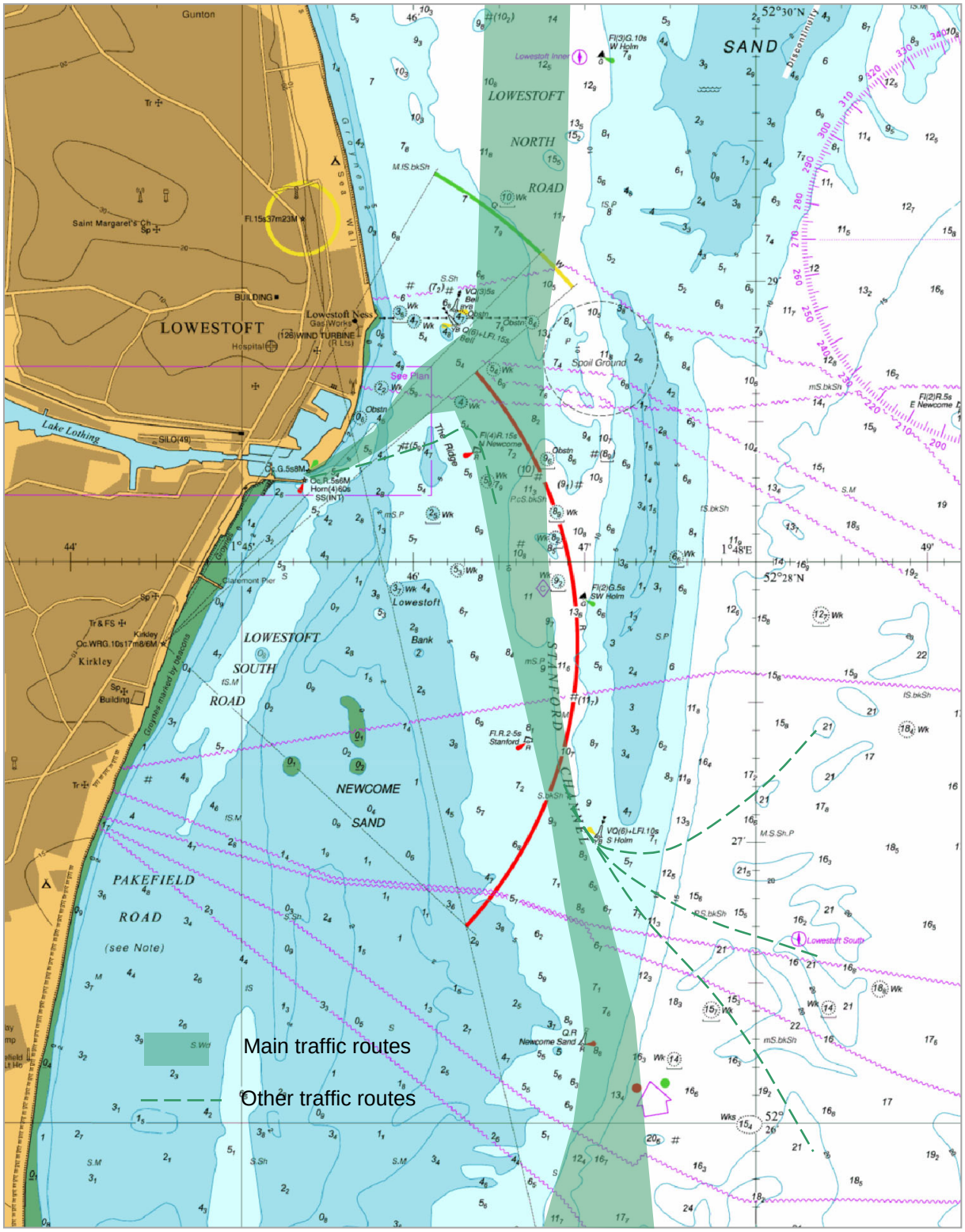
ASSESSMENTS:

1995	M2481 (HA145/02/003/05)	2006	M4268
1996	M2613 (HA145/010/004/01)	2006	M4528
1997	M2814 (HA145/010/004/01)	2007	M4654
1998	M3007 (HA145/010/004/01)	2008	M4789
1999	M3212 (HA145/010/033/01)	2009	HI1292
2000	M3349 (HA145/010/033/01)	2010	
2001	M3542 (HA145/010/065/01)	2011	
2003	M3722 (HA145/010/077/01)		
2004	M3913 (HA145/010/089/01)		
2005	M4158		

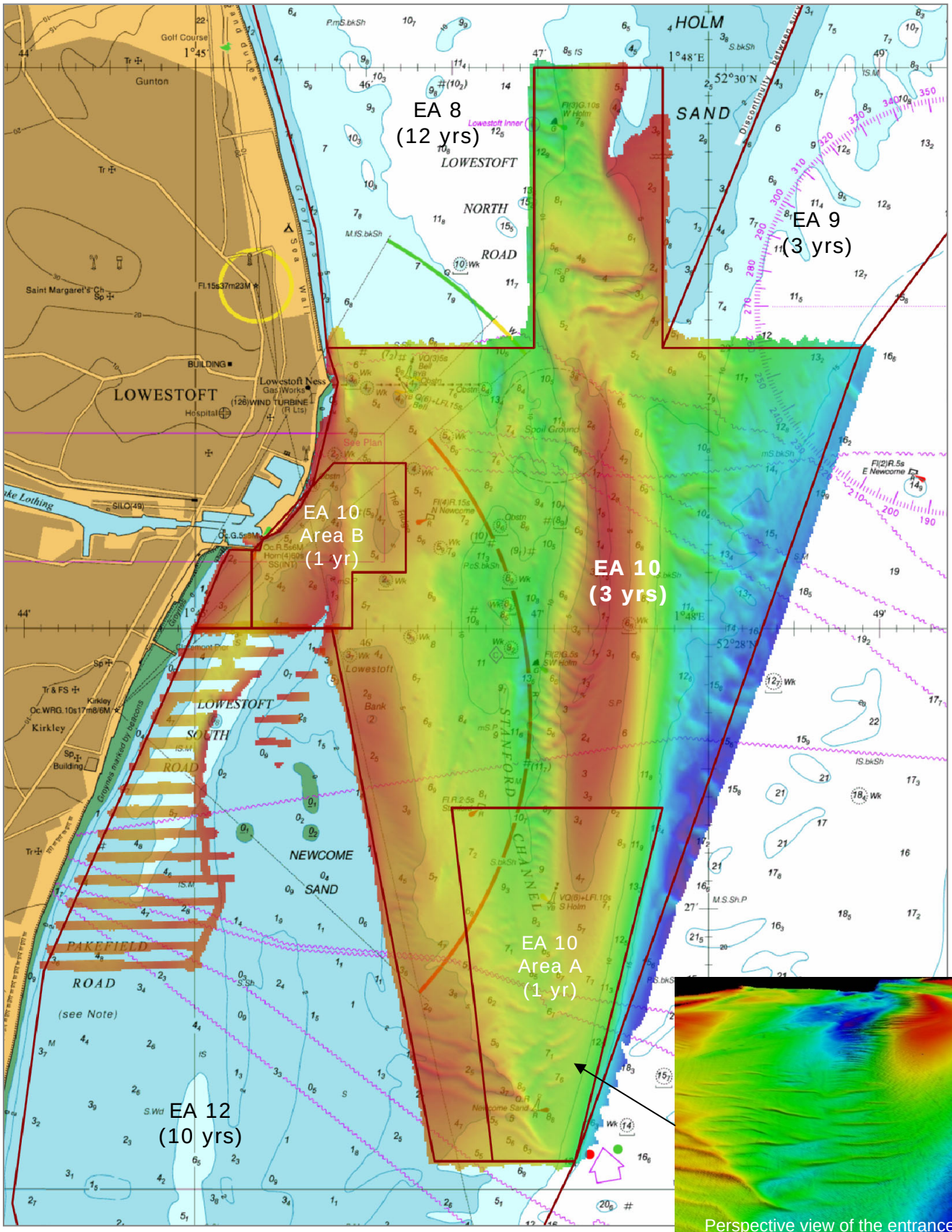
REMARKS: 1979 Report on old areas A and B (H1964/77)
1980 Area C1 established (H3912/80)
1993 Change of limits to include Newcome Sand up to the 10m line. Inshore of the 2m contour only to be surveyed every 3/6 years. Dept of Transport accepted recommendations on 15 Oct 93 (HA145/02/03/04)
1994 Report amends limits. Dept of Transport accepted recommendations Jul 95 (HA145/02/03/04).
1997 Limits amended. Identifier changed to EA10
2002 Limits revised, transferring Lowestoft South Road to EA12
2004 Introduction of focused annual surveys
2007 Revision of focused area (splitting into 3 sub areas)

LARGEST SCALE CHART: 1535 (1:25,000 & 1:6,250)

SHIPPING ROUTES



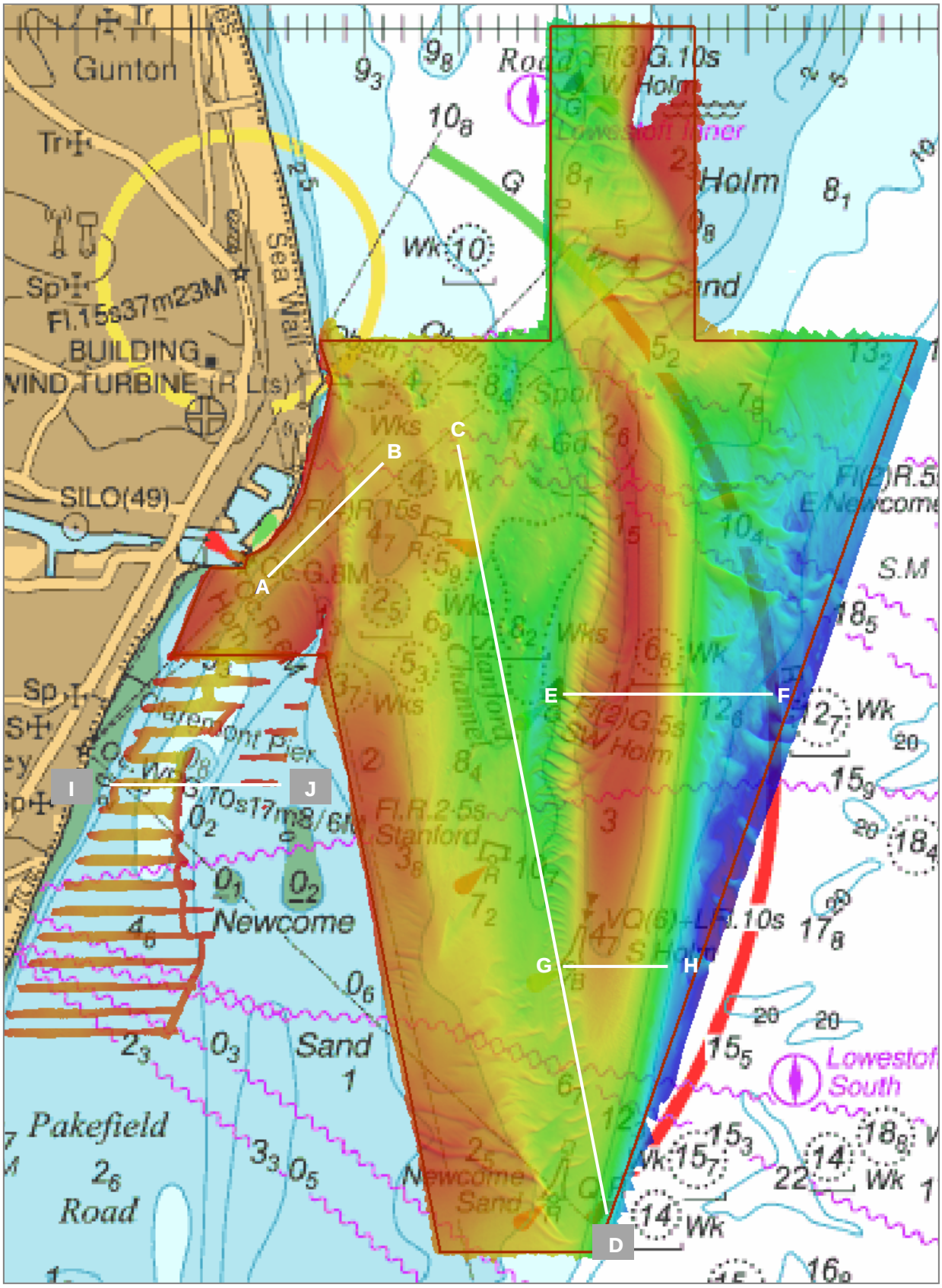
2012 SURVEY OVERLAID ON CHART 1535



SUN-ILLUMINATED VIEW OF THE 2012 SURVEY

AND

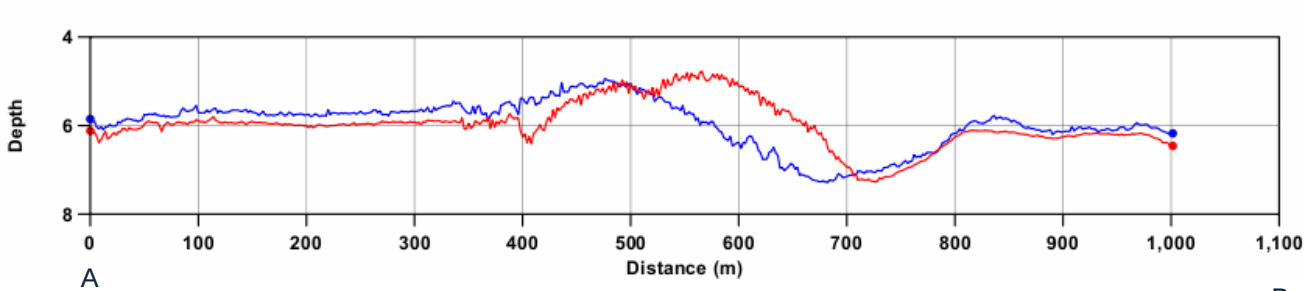
LOCATON OF CROSS-SECTIONS SHOWN AT ANNEX E



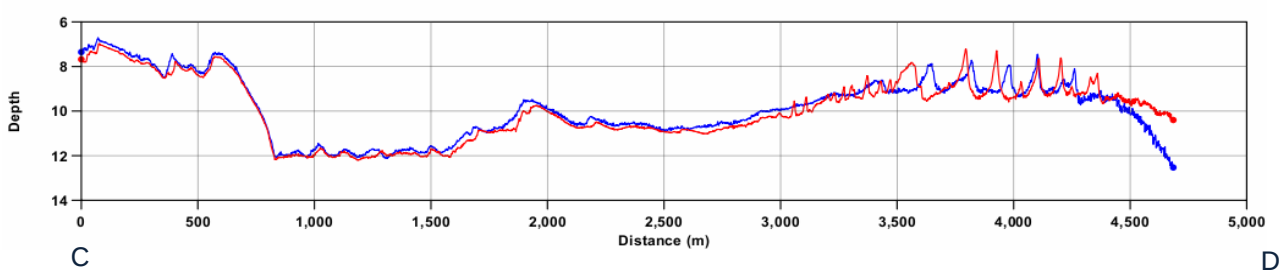
SURVEY CROSS-SECTIONS

(see Annex D for locations)

Blue = 2009 survey, Red = 2012 survey



A B



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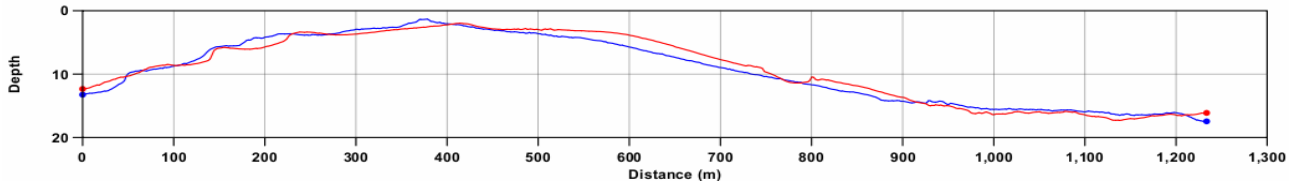
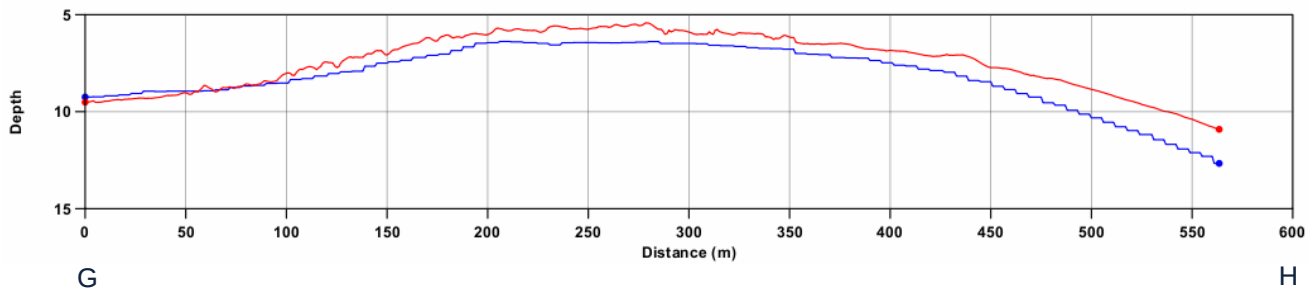
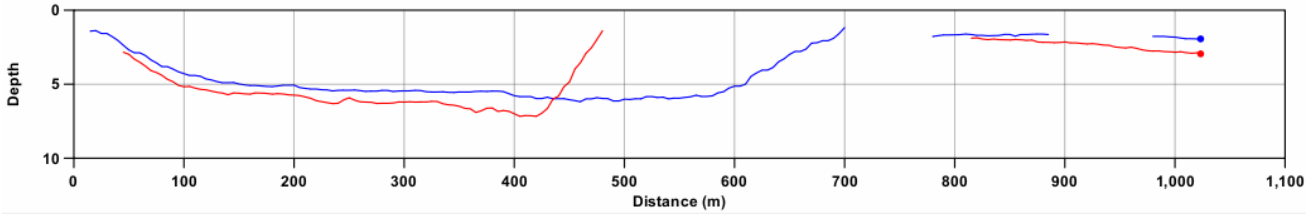


E F



G H



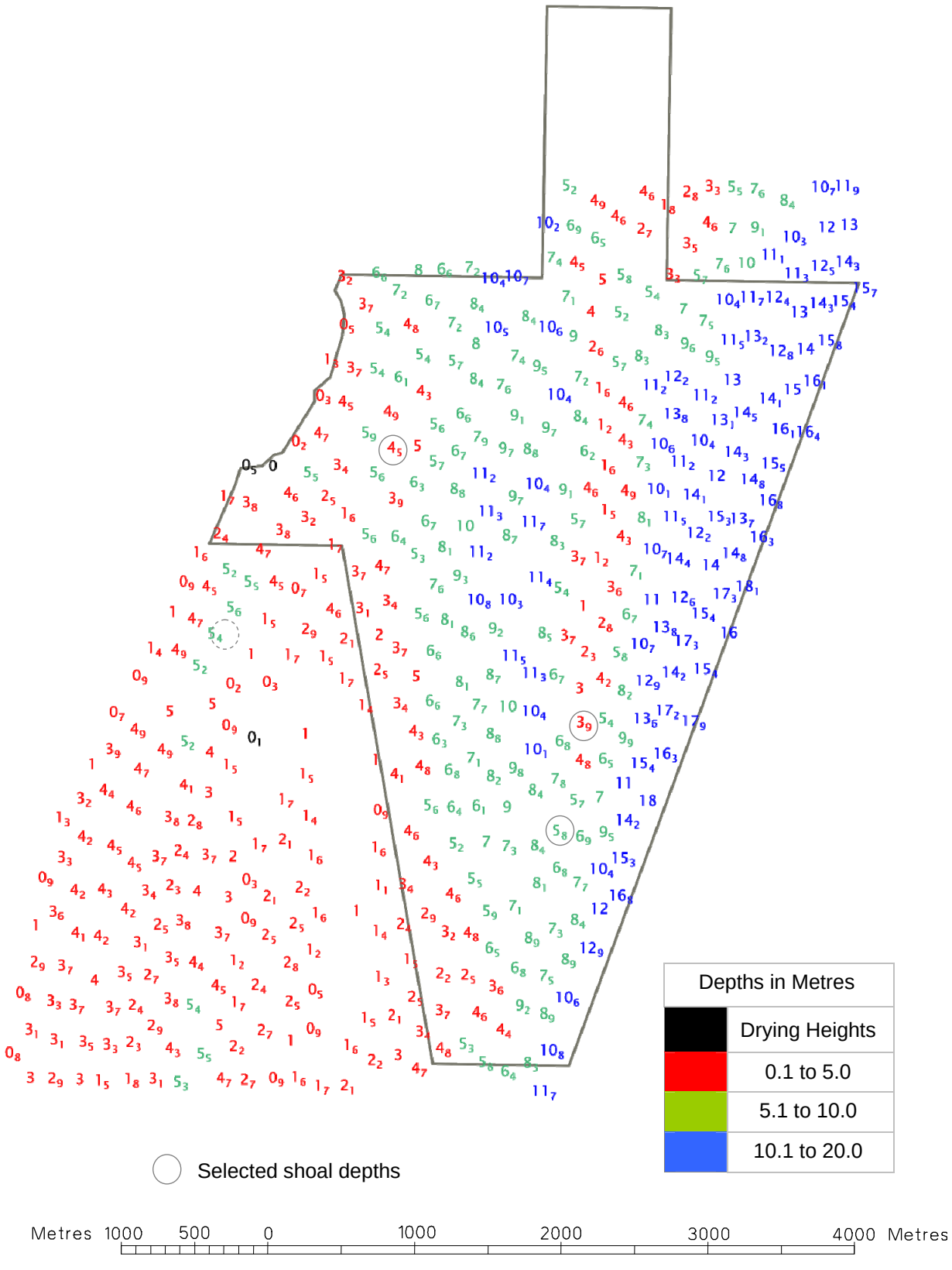
I J

COLOUR BANDED DEPTH PLOT

FROM THE 2009 SURVEY

SHOWING SELECTED DEPTHS

SCALE 1:40,000



COLOUR BANDED DEPTH PLOT

FROM THE 2012 SURVEY

SHOWING SELECTED DEPTHS

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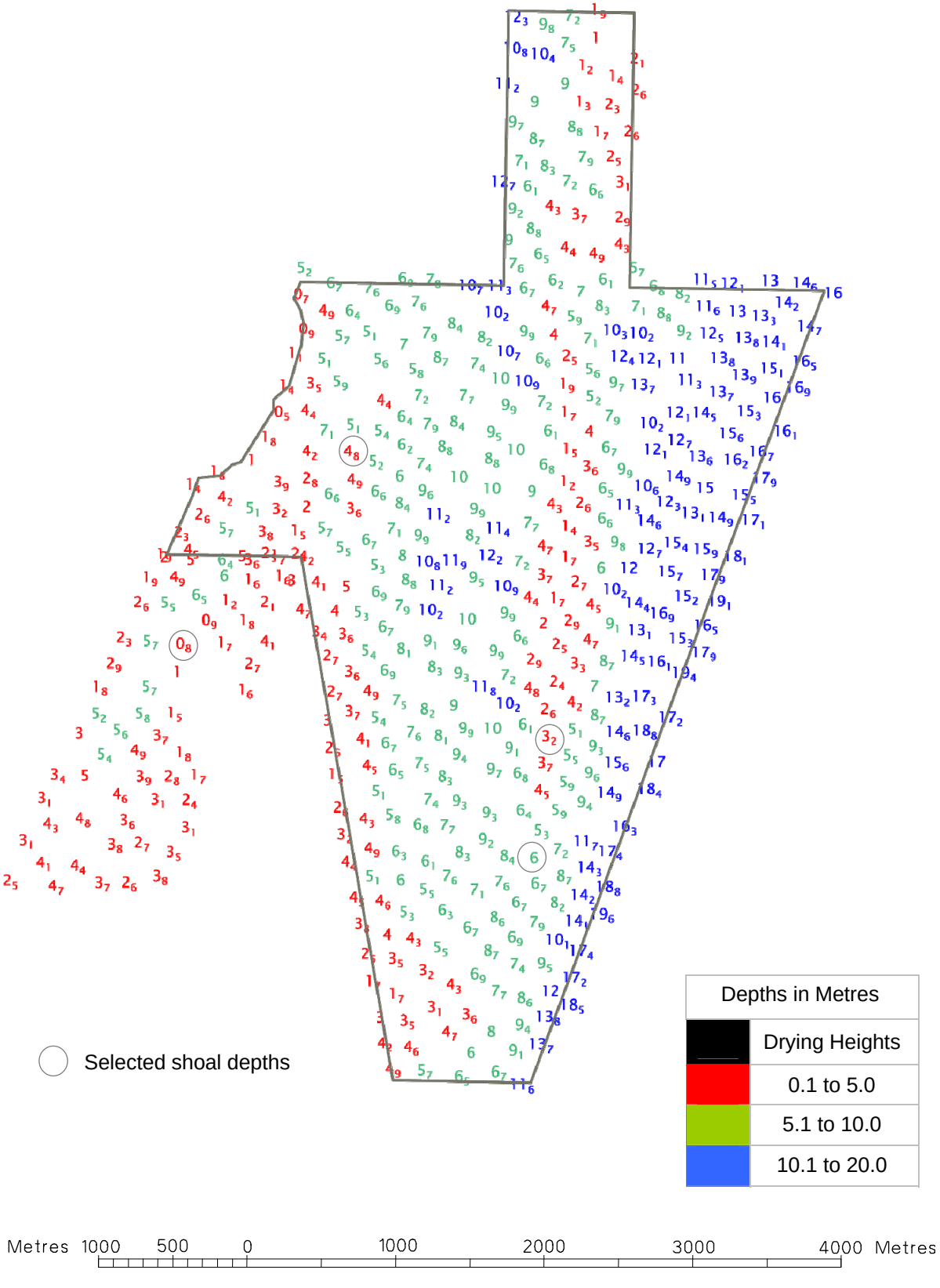
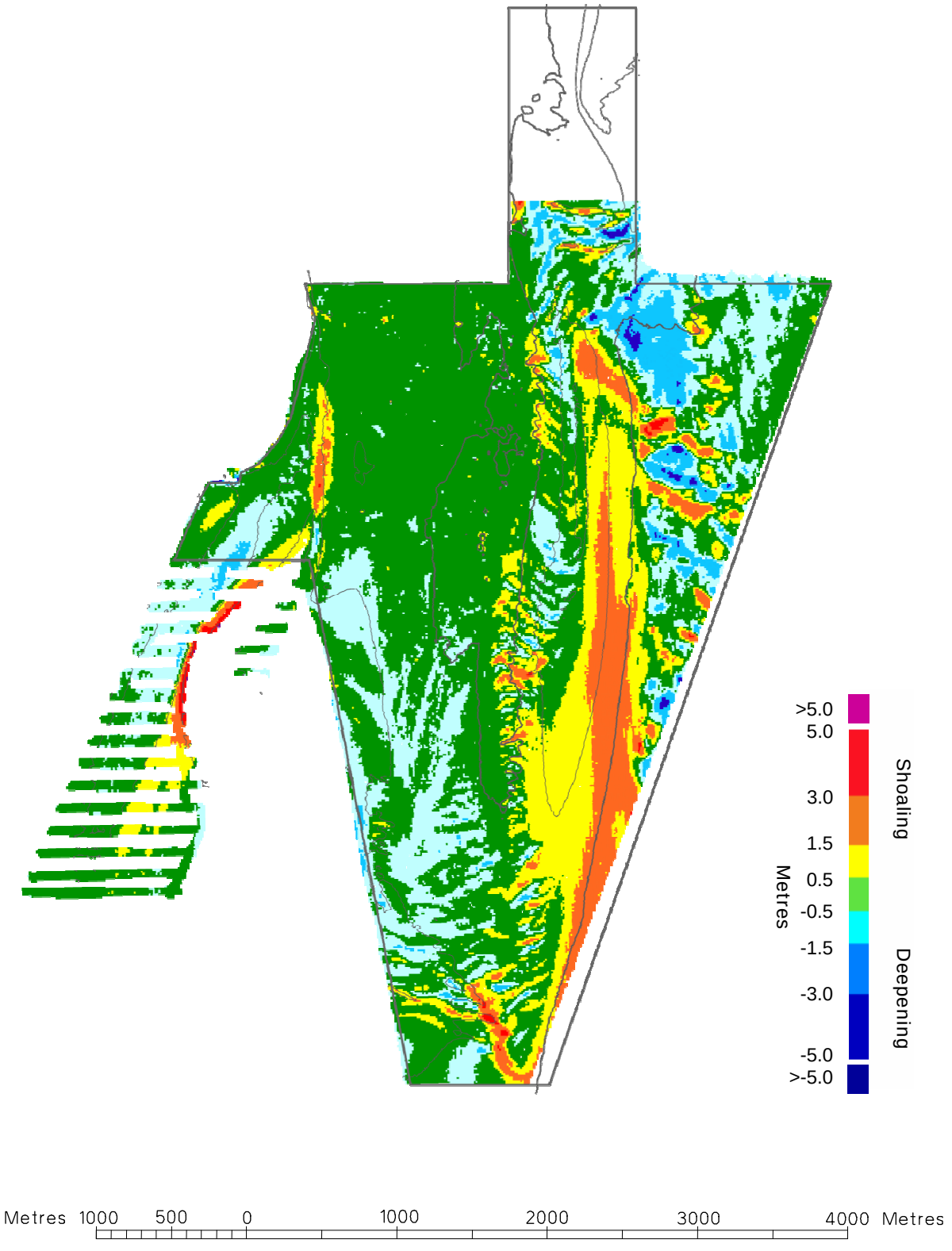
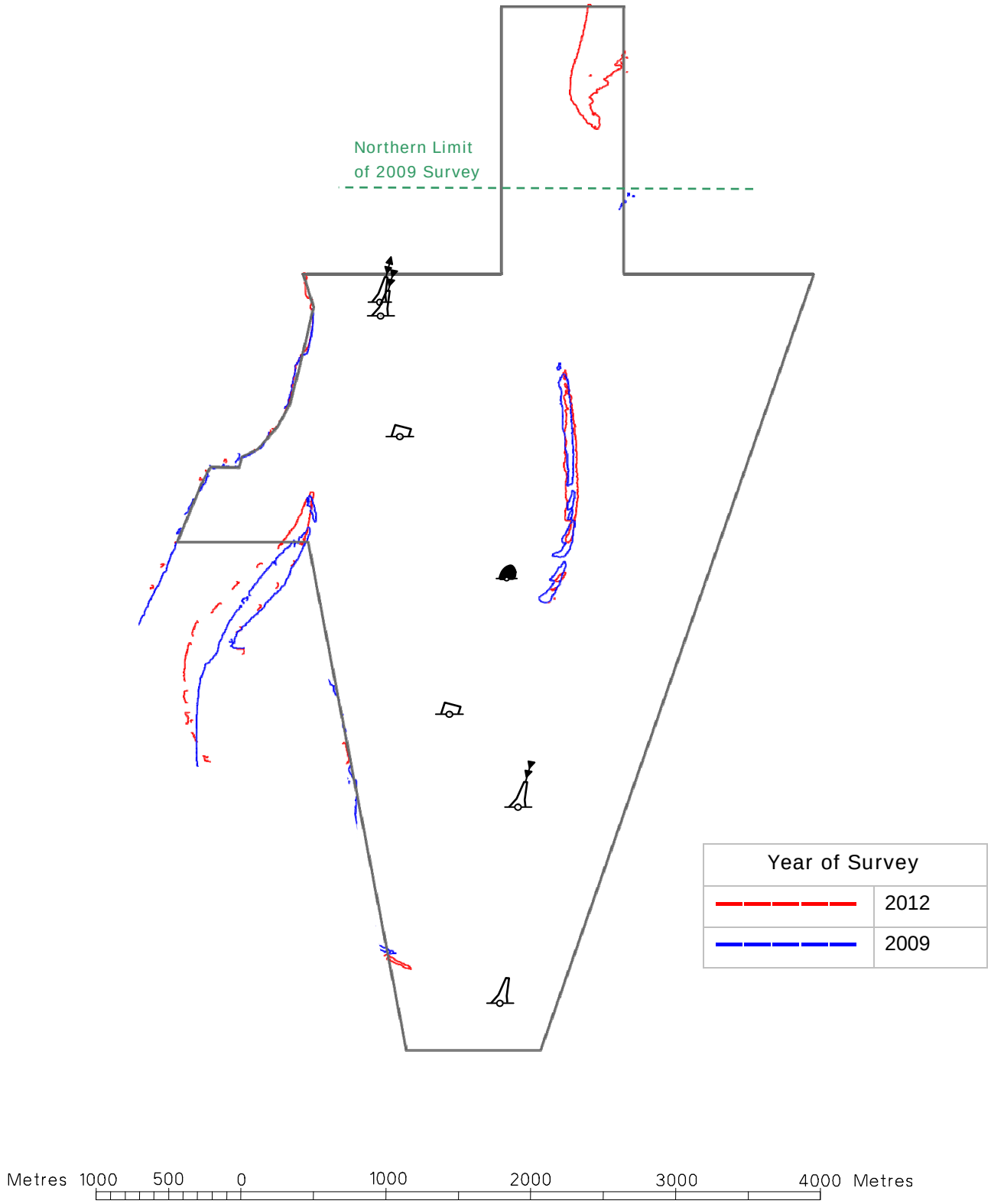


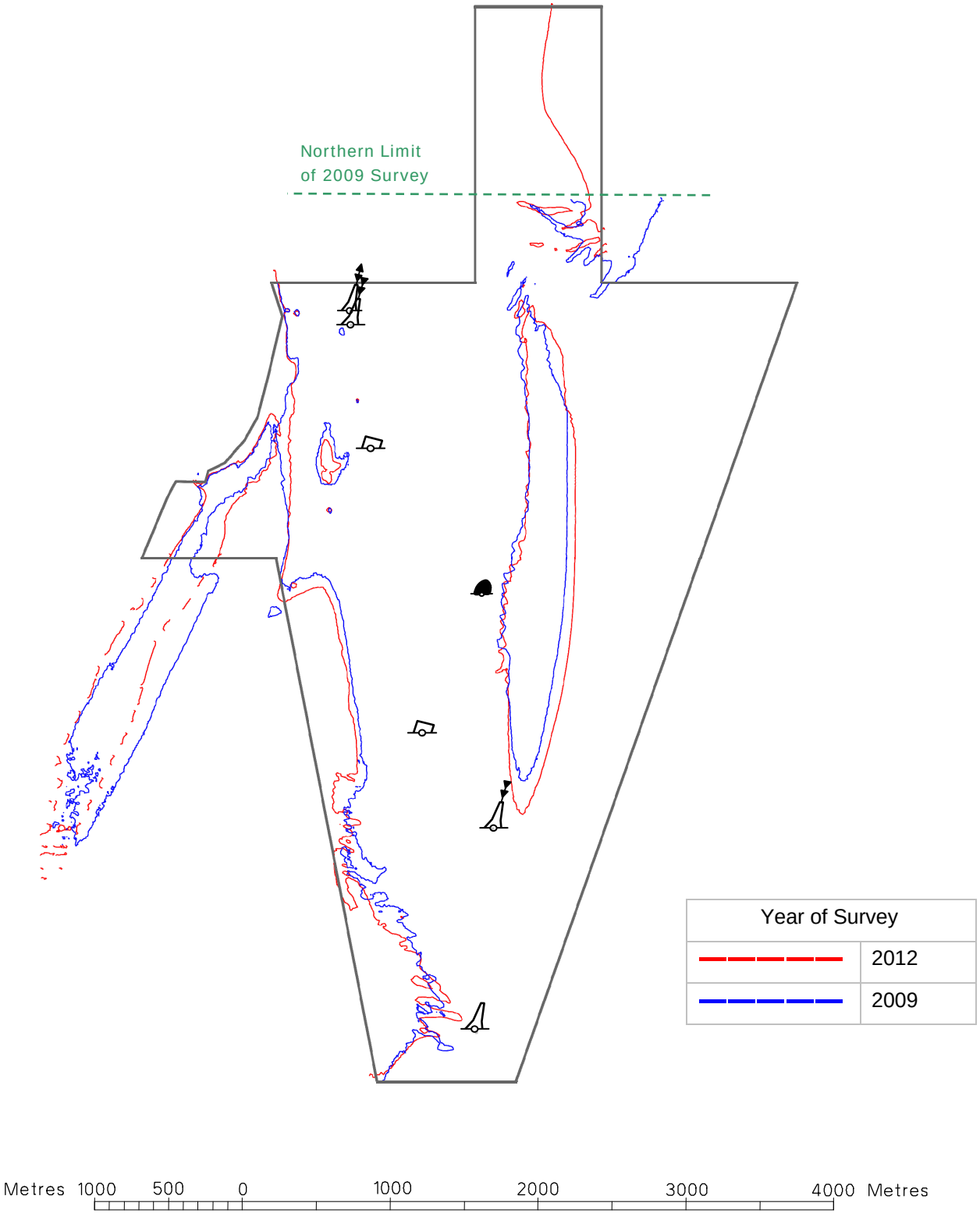
VARIABILITY PLOT SHOWING
BATHYMETRIC CHANGES BETWEEN THE 2009 AND 2012 SURVEYS
AND 2, 5 and 10 METRE CONTOURS FROM THE 2012 SURVEY
SCALE 1:40,000



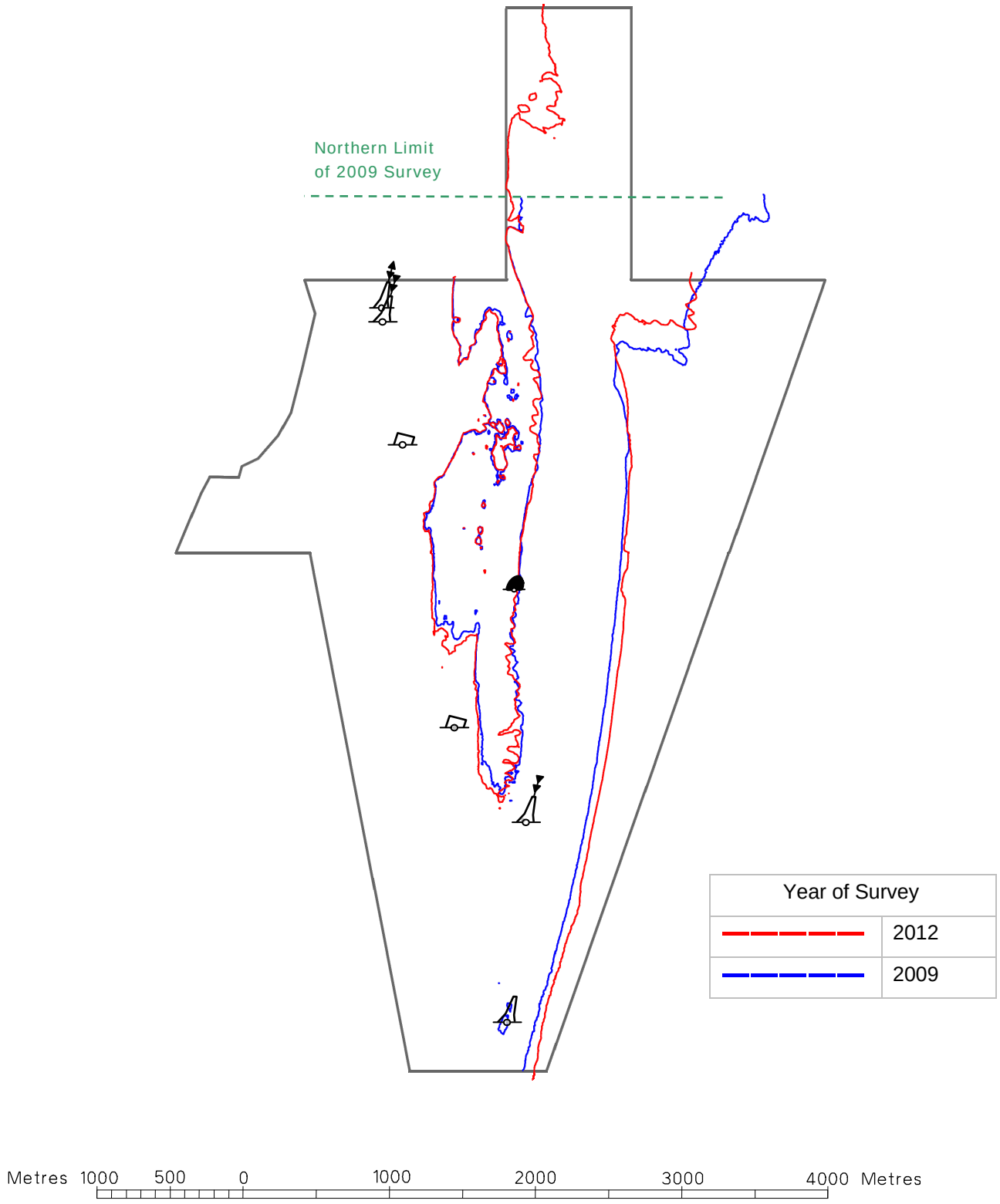
COMPOSITE DIAGRAM OF THE
2 METRE CONTOUR FROM THE 2009 AND 2012 SURVEYS
SCALE 1:40,000



COMPOSITE DIAGRAM OF THE
5 METRE CONTOUR FROM THE 2009 AND 2012 SURVEYS
SCALE 1:40,000



COMPOSITE DIAGRAM OF THE
10 METRE CONTOUR FROM THE 2009 AND 2012 SURVEYS
SCALE 1:40,000

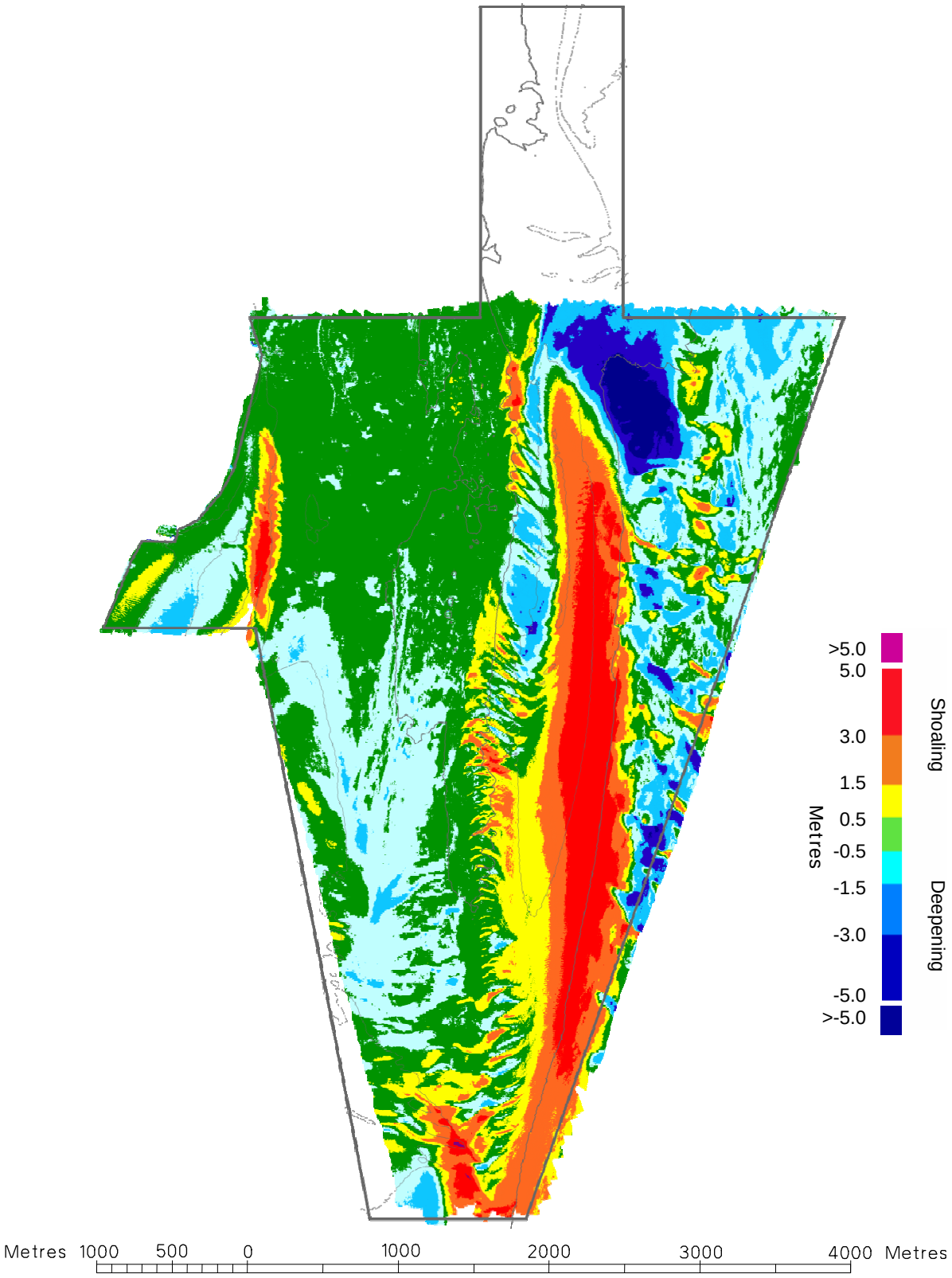


VARIABILITY PLOT SHOWING

BATHYMETRIC CHANGES BETWEEN THE 2006 AND 2012 SURVEYS

AND 2, 5 and 10 METRE CONTOURS FROM THE 2012 SURVEY

SCALE 1:40,000



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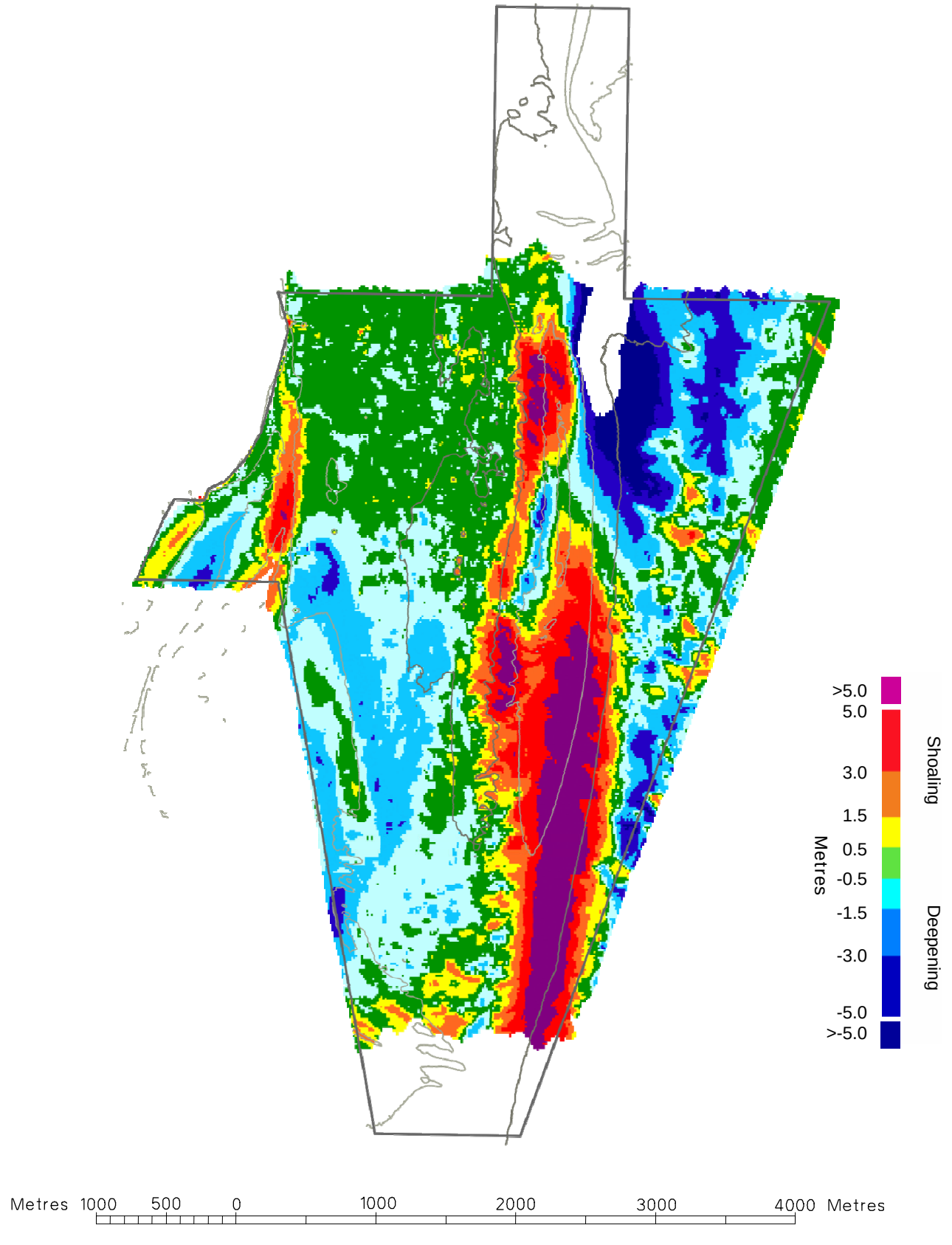
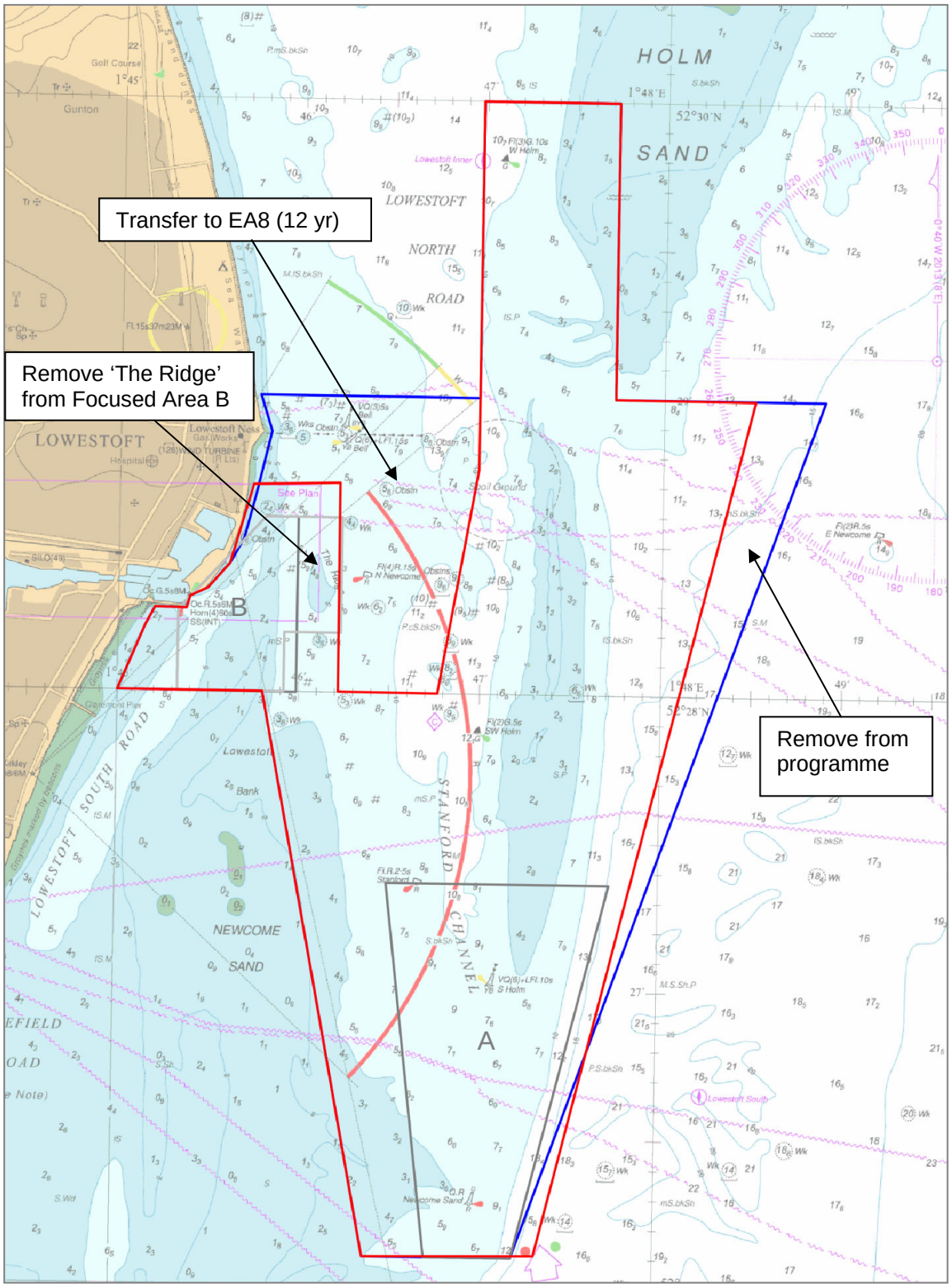
AND 2, 5 and 10 METRE CONTOURS FROM THE 2012 SURVEY
SCALE 1:40,000



PROPOSED REVISION TO AREA EA10



	Existing 3 Year Limits to be Revised
	Proposed 3 Year Limit
	Annual Focused Limits