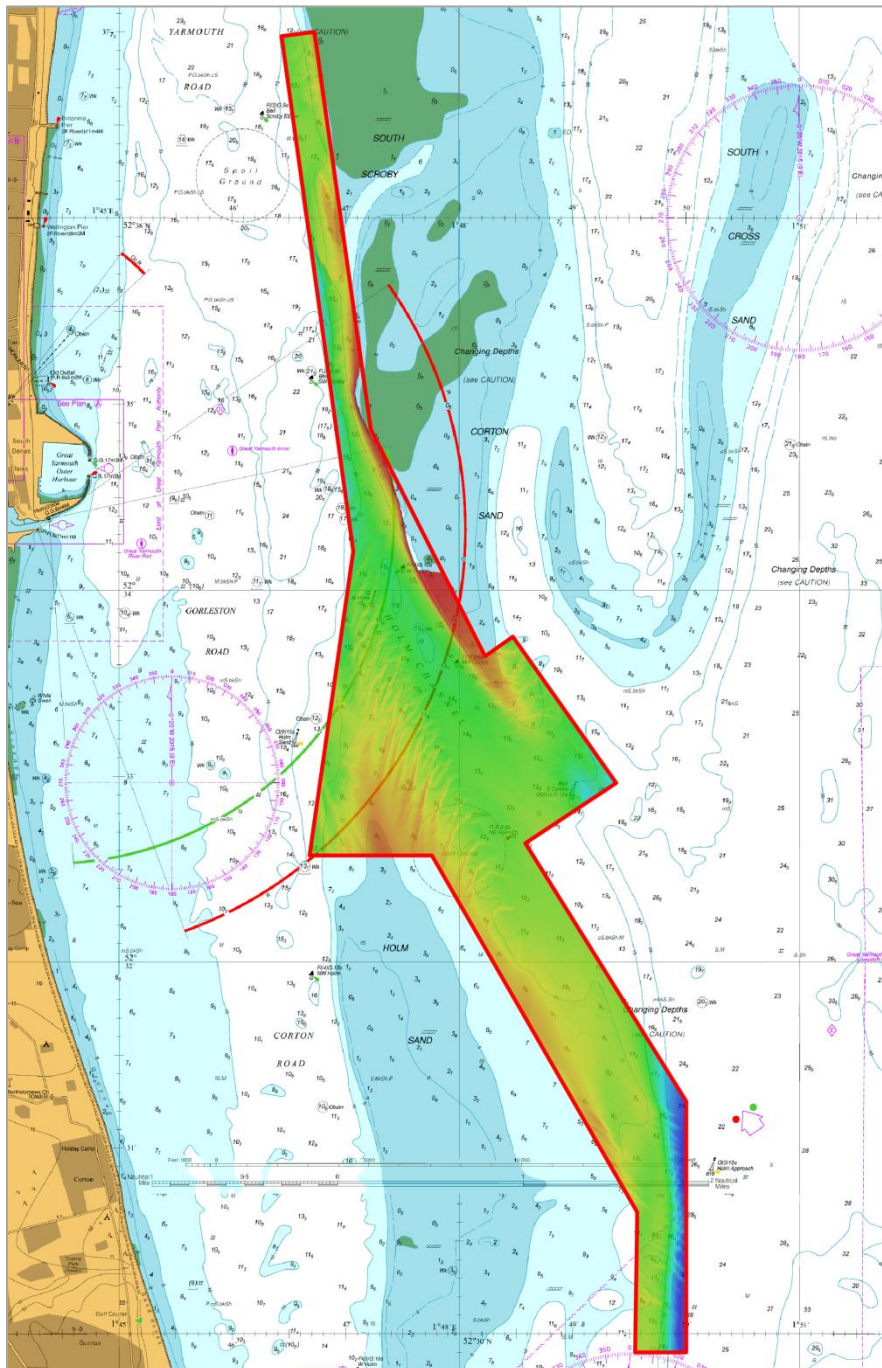




EAST ANGLIA HOLM CHANNEL

ASSESSMENT ON THE ANALYSIS OF ROUTINE RESURVEY FOCUSED AREA EA9 FROM THE 2015 SURVEY



ENGLAND – EAST ANGLIA
HOLM CHANNEL
Focused Area Assessment EA9/2015

An assessment of the 2015 hydrographic survey of the area: to monitor recent seabed movement; to identify any implications for shipping; and to make recommendations for future surveys.

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HOLM CHANNEL, EA9, 2015

1. INTRODUCTION

- 1.1. The full area of EA9 is surveyed every three years; within that area, a focused sub-area is surveyed annually. This focused area concentrates on the locations of greatest concern, taking into account sediment mobility, depth of water and draught of shipping using the areas.
- 1.2. This summary report looks at the latest survey and compares it against previous surveys. For more details on the area, including long-term changes, the more detailed report of the last full survey, conducted in 2014, should be consulted.

2. DESCRIPTION OF THE AREA

- 2.1. Area EA9 covers Holm Channel, which provides the main approach to Great Yarmouth, and the banks that delimit it. The focused area of EA9 covers the Northern and Eastern banks of Holm Sand, the Western Banks of Corton Sand and South Scroby and the main area of Holm Channel. The focused area covers 3.6 SQ NM (12.3 SQ KM) and the limits are shown at Annex C, including the 2015 survey overlaid on the largest scale charts of the area
- 2.2. Sediments in the area are mobile and subject to change. Migrating sandwaves lie along the northeast side of Holm Sand within Holm Channel.

3. 2014 SURVEY DETAILS

- 3.1. The 2014 survey was carried out from the 07th July to the 14th August. Sea states during surveys reported as varying between Smooth (2) to Moderate (4), with occasional short periods of bad weather causing survey operations to be halted.
- 3.2. Survey data was collected on board vessel *Wessex Explorer* using a Kongsberg EM3002D, with positioning via C&C technologies CNAV-3050 and 2050 GNSS receivers interfaced with a V5 Applanix POS MV 320E system for post processing of position and attitude data.
- 3.3. All survey data is referenced to International Terrestrial Reference Frame 2005 (ITRF05). Vertical data from post processed GPS heights together with the UKHO supplied Vertical Offshore Reference Frame (VORF) model were used to obtain depths reduced to Chart Datum.
- 3.4. The survey was validated by the UKHO and found to meet IHO S-44 (5th Edition) Order 1a Standard.

4. 2015 SURVEY DETAILS

- 4.1. The 2015 survey was conducted from the 4th October to the 10th October on board *FPV Morven*, however the onset of bad weather meant a long period of stand-by and finally recall of the survey vessel, with survey operations continuing from 26th November to the 1st December on another survey vessel *Wessex Explorer*. Sea states during surveys reported as slight to moderate (3-4).
- 4.2. Survey data was collected on board *FPV Morven* using a Kongsberg EM2040C, with positioning via C&C technologies CNAV-3050 receiver interfaced with a V5 Applanix POS MV 320E system for post processing of position and attitude data. Data collected on vessel *Wessex Explorer* using a Kongsberg EM3002D, with positioning via C&C technologies CNAV-2050 GNSS receiver interfaced with a V5 Applanix POS MV 320E system for post processing of position and attitude data.
- 4.3. All survey data is referenced to International Terrestrial Reference Frame 2005 (ITRF05). Vertical data from post processed GPS heights together with the UKHO supplied Vertical

Offshore Reference Frame (VORF) model were used to obtain depths reduced to Chart Datum.

- 4.4. The survey was validated by the UKHO and found to meet IHO S-44 (5th Edition) Order 1a Standard.
- 4.5. The 2015 survey data overlaid on charts 1534, Great Yarmouth and Approaches (1:25,000) and 1535, Lowestoft and Approaches (1:25,000) is shown at Annex C

5. DESCRIPTION OF RECENT BATHYMETRIC CHANGE

- 5.1. Since the 2014 survey, the depths at the seaward entrance to Holm channel have shoaled by between 0.5 to 1.5 metres with a minimum depth in 2015 of 11.3 metres. The magnitude of shoaling decreases towards Goleston Road and in the vicinity of Mid Corton Buoy the seabed is shown to be deepening since 2014 typically by 0.5 to 1 metre. As shown by the Variability Difference Plot in Annex G as well as in Profile E-F at Annex D.
- 5.2. The southern end of Corton Sand has migrated to the southwest. The 5 and 10-metre contours have moved 50 and 60 metres respectively, causing a shoaling of depths on the north eastern side of Holm Channel by up to 8.9 metres, as indicated by the selected soundings within the Colour Banded Depth Plots shown at Annexes E and F and in Profile A-B at Annex D.
- 5.3. Sediment on the Western side of South Scroby has migrated to the east, with the 10-metre contour moving up to 50 metres as seen at Annex I. This has caused depths to become deeper in this area by up to 4.9 metres as indicated in the selected soundings within the Colour Banded Depth Plots shown at Annexes E and F.
- 5.4. The sandwaves on the north end and eastern side of Holm Sand have migrated to the south east by between 20 to 40 metres while maintaining the same wavelength and height as the previous year's survey. This is indicated both in the 10-metre contour comparison at Annex I, as well as in Profile C-D at Annex D.

6. IMPLICATIONS FOR SHIPPING

- 6.1. Although there have been minor changes in depth across the area, these occur outside the buoyed channels and areas shown to be used by shipping, as shown at Annex B, and currently present no new concerns to vessels using the buoyed route through Holm Channel.

7. RECOMMENDATIONS FOR FUTURE SURVEYS

- 7.1. Within the focused area there is still notable sediment movement, some of which show encroachment into areas used by shipping, and therefore supports retention of the current area limits and continued annual focused survey frequency.

AREA SPECIFICATIONS
(Including Survey History)

REGION: East Anglia**NAME:** Holm Channel**AREA:** EA9**LIMITS (ETRS89 Datum):**

1yr Interval Focused Areas		
A	52°.61629N	1°.77388E
B	52°.61667N	1°.77870E
C	52°.58108N	1°.78700E
D	52°.56076N	1°.80378E
E	52°.56251N	1°.80786E
F	52°.54940N	1°.82305E
G	52°.54400N	1°.80970E
H	52°.52086N	1°.83333E
I	52°.49833N	1°.83333E
J	52°.49833N	1°.82583E
K	52°.51090N	1°.82614E
L	52°.54290N	1°.79597E
M	52°.54290N	1°.77800E
N	52°.57017N	1°.78442E

3yr Interval Full Area		
A	52°.61667N	001°.77870E
B	52°.58108N	001°.78700E
C	52°.56675N	001°.79902E
D	52°.56675N	001°.84372E
E	52°.54233N	001°.83333E
F	52°.49833N	001°.83333E
G	52°.48333N	001°.81483E
H	52°.48333N	001°.79550E
I	52°.50500N	001°.81000E
J	52°.54833N	001°.77333E
K	52°.59217N	001°.76667E
L	52°.61667N	001°.76667E

FULL AREA SIZE: 9.9 SQ NM (33.9 SQ KM)**FOCUSED AREA:** 3.6 SQ NM (12.3 SQ KM)**SURVEY INTERVAL:** Whole Area: 3 years, Focused Area: 1 year.**PREVIOUS SURVEYS:** (conducted at 1:25,000 scale (not applicable to multibeam surveys))

Year	Survey	File Ref	Data	Year	Survey	File Ref	Data
1995	M2469	HH090/662/01	s.t.d.	2006	M4527	HH091/163/01	m.
1996	M2612	HH090/687/01	s.d.	2007	M4633	HH091/220/01	m.
1997	M2801	HH090/733/01	s.d.	2008	M4788	HH091/260/01	m.
1998	M2996	HH090/766/01	s.d.	2009	HI1292	2009-29527	m.*
1999	M3207	HH090/848/01	s.t.d.	2010	HI1338	2010-213940	m.*
2000	M3339	HH090/883/01	s.d.	2011	HI1367	2011-106141	m.
2001	M3536	HH090/942/01	s.d.	2012	HI1397	2012-117402	m.*
2002	M3769	HH090/989/01	s.t.d.	2013	HI1432	2013-261940	m.*
2003	M3901	HH091/019/01	s.d.	2014	HI1458	2014-142852	m
2004	M4156	HH091/075/01	m	2015	HI1482	2015-83468	m.*
2005	M4267	HH091/111/01	m				

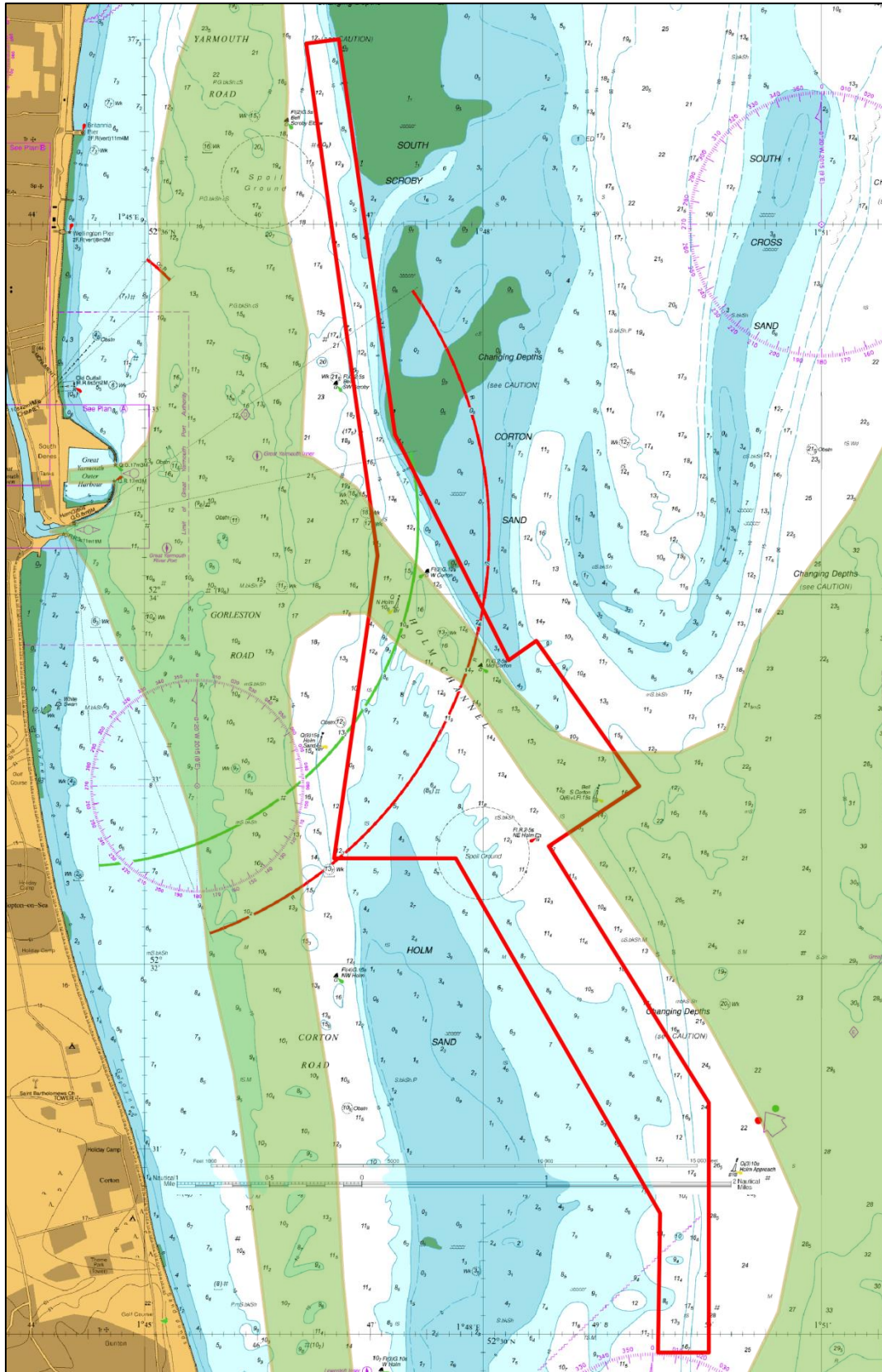
KEY: t = seabed texture tracing, d = digital data, s = sonar sweep, m = multibeam digital data,
* focused survey

Refer to 2001 Assessment for details of 1985 to 1994 surveys

REMARKS: 2011 Revised limits.
2014 Revised limits.

LARGEST SCALE CHART: 1534, Great Yarmouth and Approaches (1:25,000) and 1535, Lowestoft and Approaches (1:25,000)

SHIPPING ROUTES

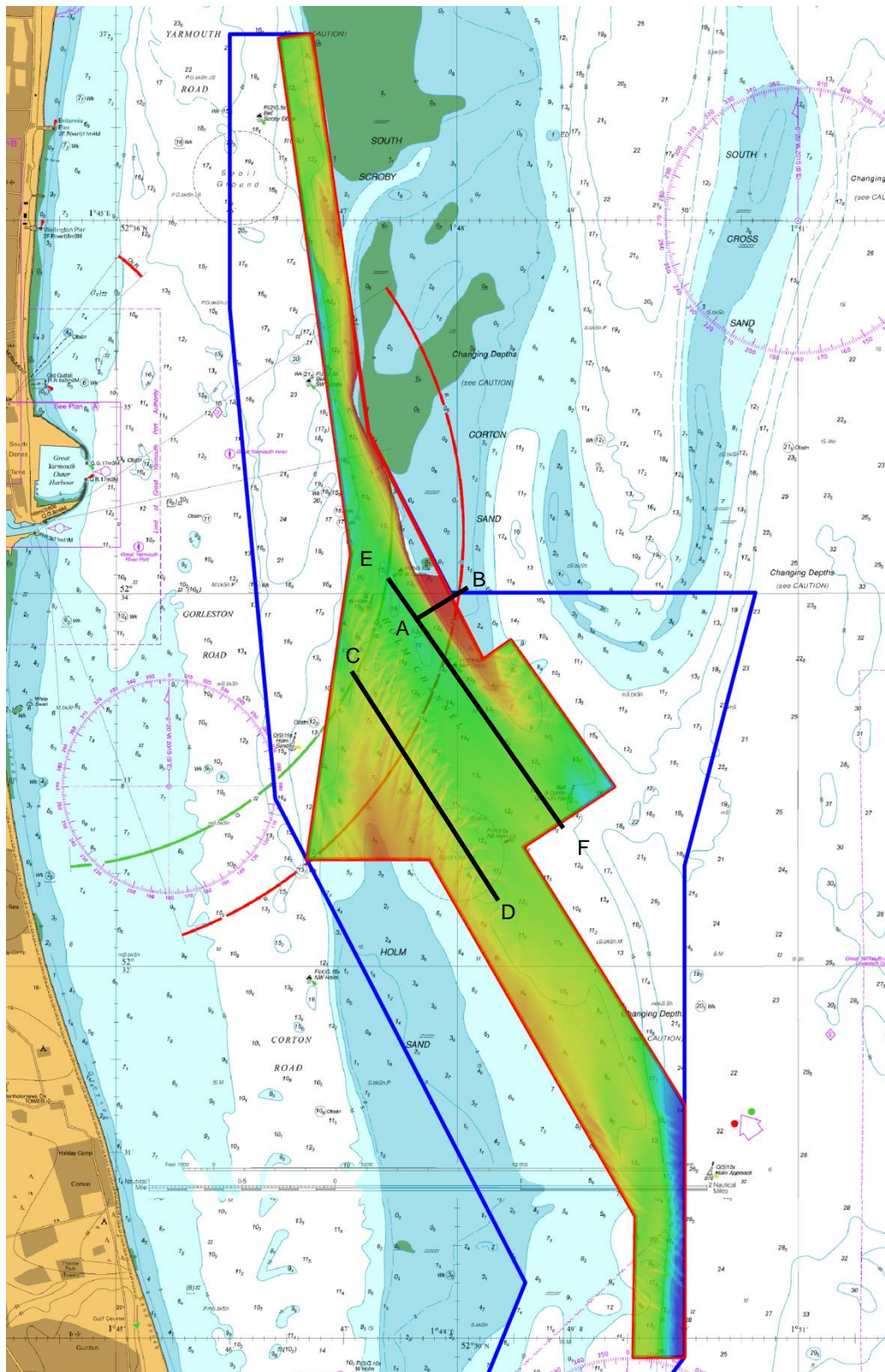


Note: Data from satellite AIS data for FY2015/2016 of vessels larger then 2000GT



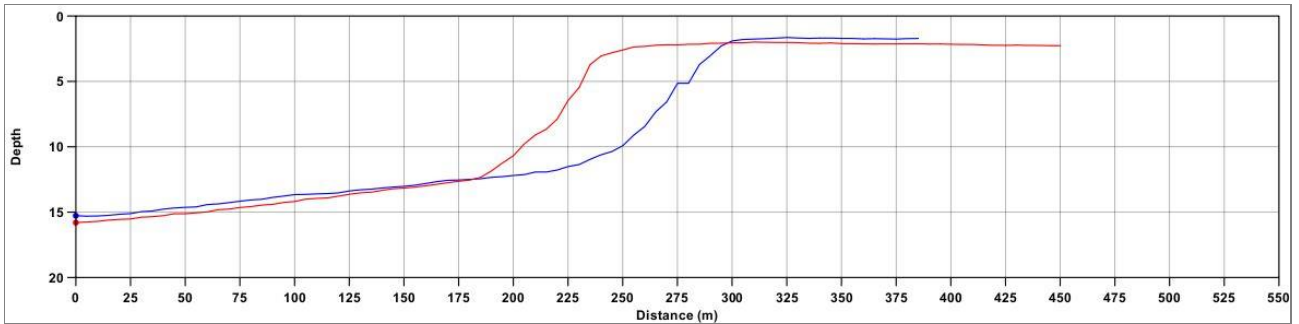
Indicative traffic routes

2015 SURVEY DATA OVERLAID ON CHARTS 1534 AND 1535
WITH LOCATION OF CROSS SECTION COMPARISONS
(Shown at Annex D)

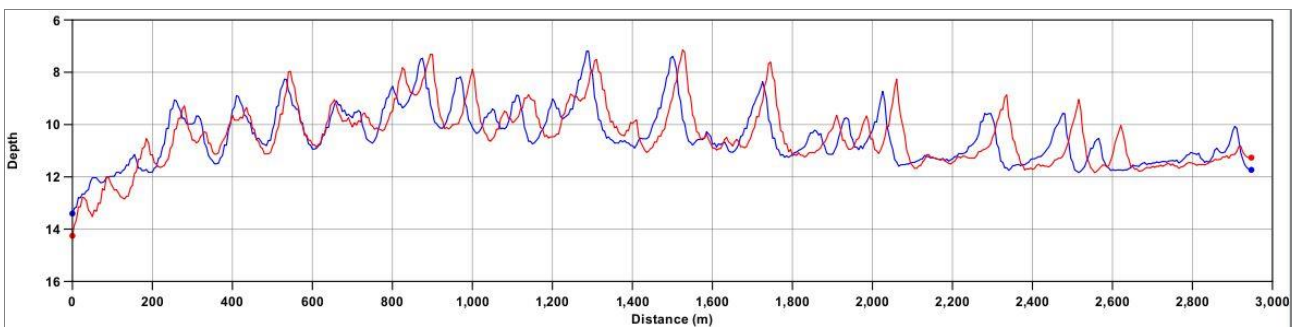


- EA9 Focused Area Limits
- EA9 Full Area Limits

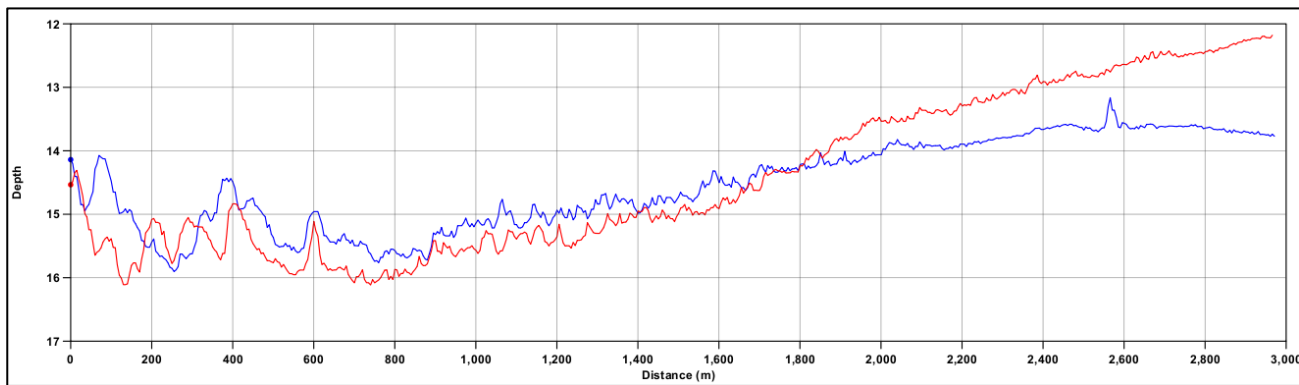
CROSS SECTION COMPARISONS FROM THE 2014 AND 2015 SURVEYS
 (See Annex C for Locations)





A Profile A-B B



C Profile C-D D

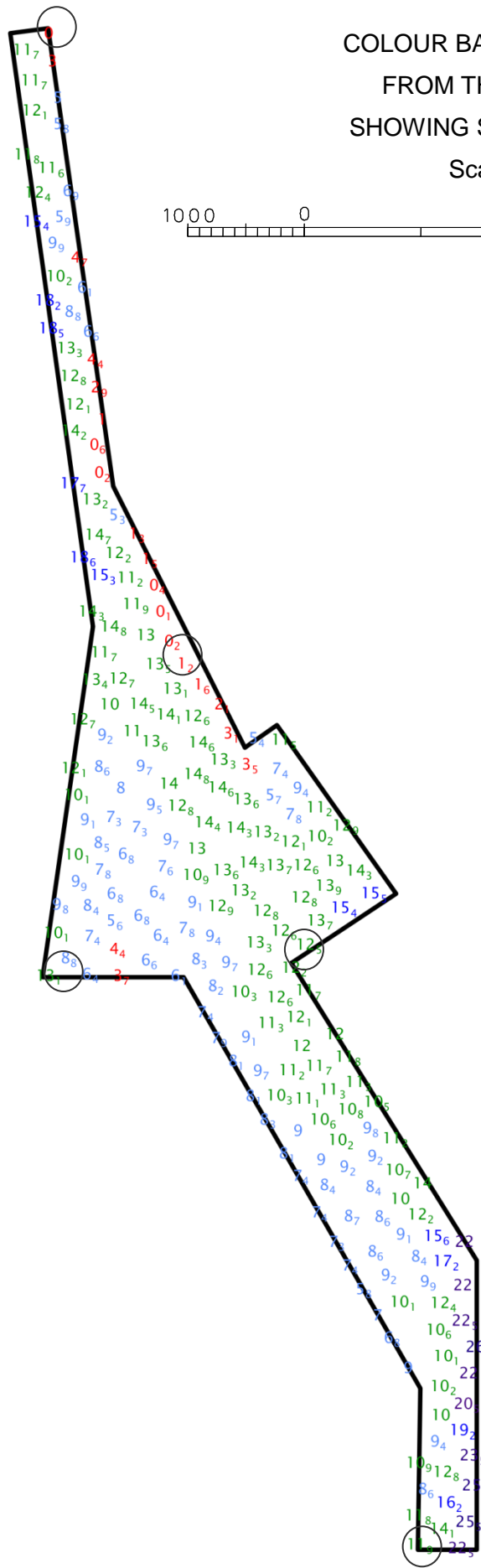
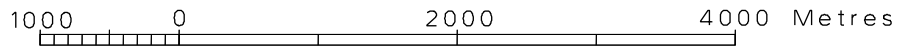


E Profile E-F F

	2015
	2014

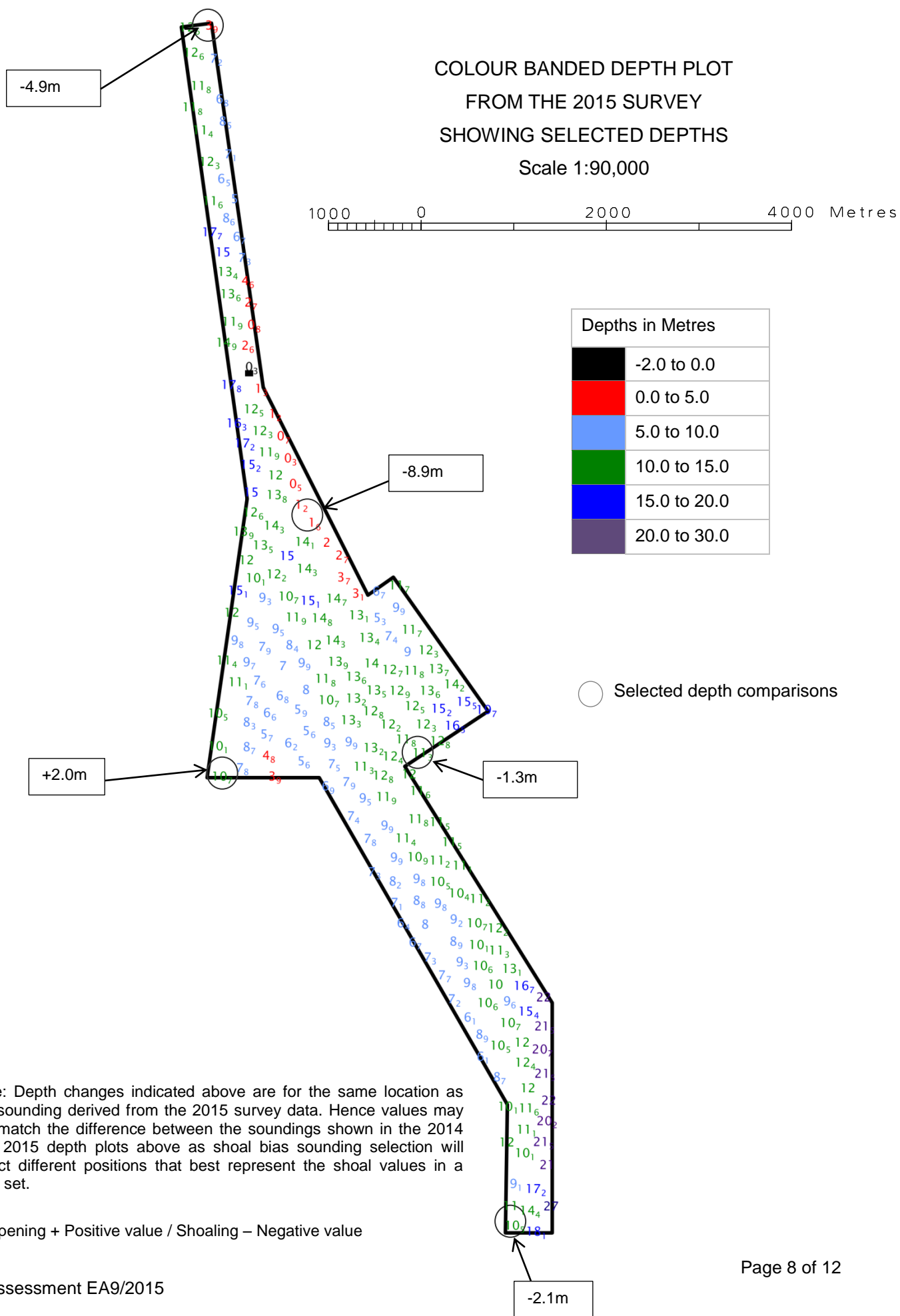
COLOUR BANDED DEPTH PLOT
FROM THE 2014 SURVEY
SHOWING SELECTED DEPTHS

Scale 1:90,000

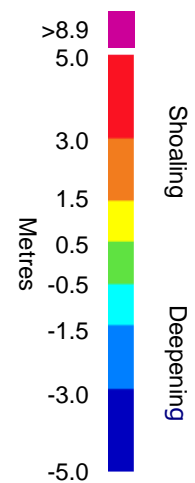
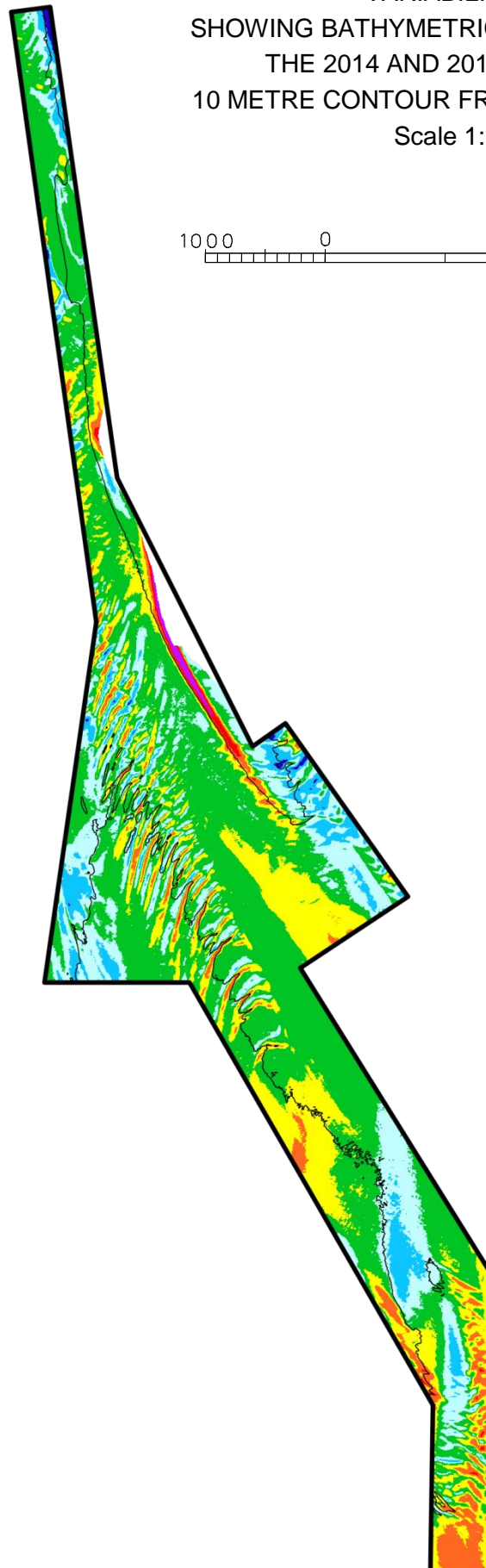
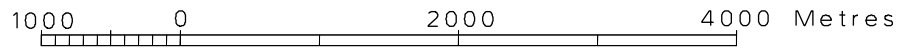


Depths in Metres	
	-2.0 to 0.0
	0.0 to 5.0
	5.0 to 10.0
	10.0 to 15.0
	15.0 to 20.0
	20.0 to 30.0

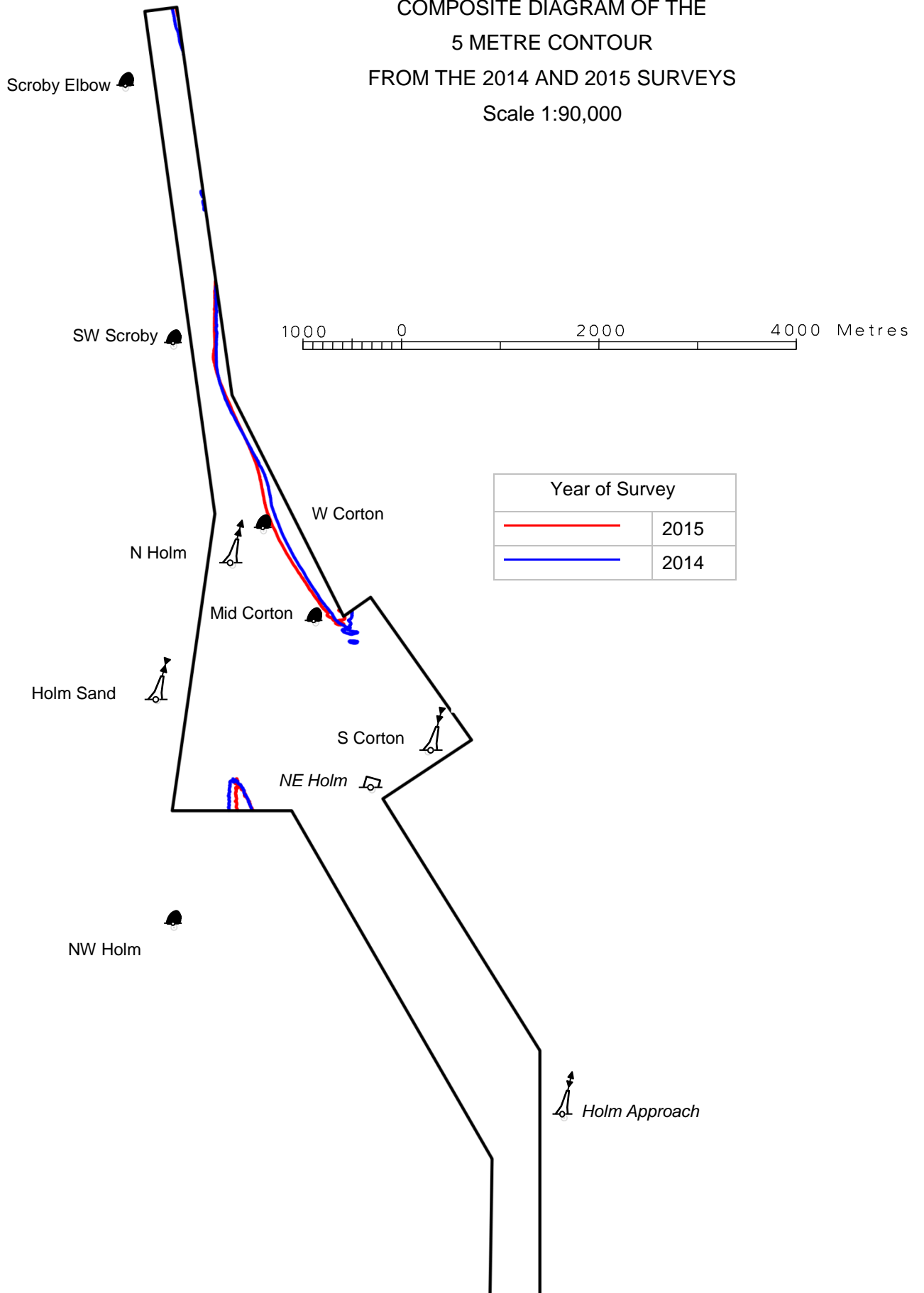
○ Selected depth comparisons



VARIABILITY PLOT
SHOWING BATHYMETRIC CHANGES BETWEEN
THE 2014 AND 2015 SURVEYS AND
10 METRE CONTOUR FROM THE 2015 SURVEY
Scale 1:90,000



COMPOSITE DIAGRAM OF THE
5 METRE CONTOUR
FROM THE 2014 AND 2015 SURVEYS
Scale 1:90,000



COMPOSITE DIAGRAM OF THE
10 METRE CONTOUR
FROM THE 2014 AND 2015 SURVEYS

Scale 1:90,000

