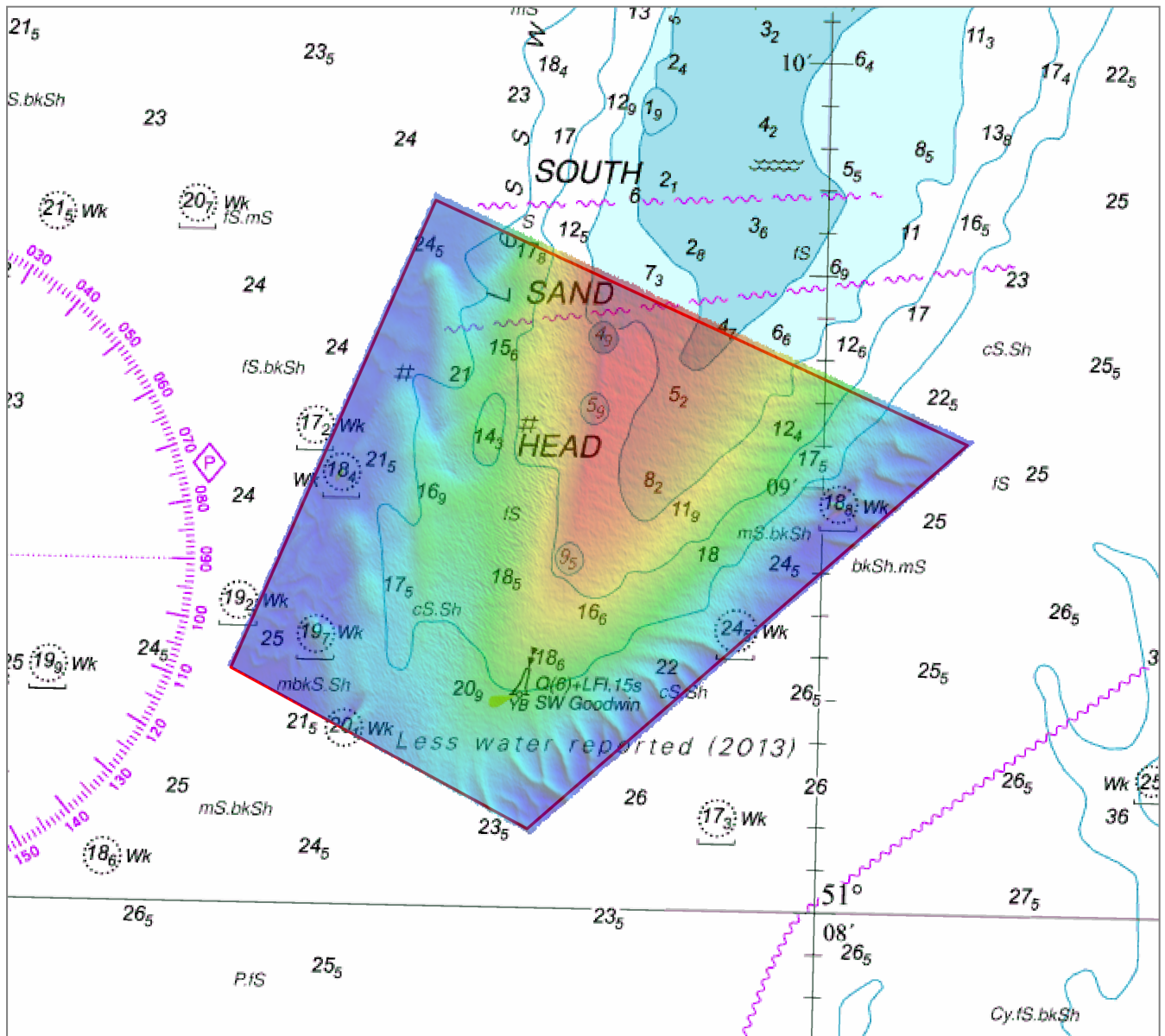




GOODWIN SANDS SOUTH SAND HEAD

ASSESSMENT ON THE ANALYSIS OF ROUTINE RESURVEY AREA GS1
FROM THE 2012 SURVEY



GOODWIN SANDS

SOUTH SAND HEAD

Assessment GS1/2012

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.

This material is protected by Crown Copyright. It may be downloaded from the UK Hydrographic Office's (UKHO) web site and printed in full for personal or non-commercial internal business use. Extracts may also be reproduced for personal or non-commercial internal business use on the condition that the UK Hydrographic Office is acknowledged as the publisher and the Crown is acknowledged as the copyright owner.

Applications for permission to reproduce the material for any other purpose (including any distribution of the material or extracts to third parties) can be made interactively on the UKHO's web site (www.ukho.gov.uk), by e-mail to intellectualproperty@ukho.gov.uk or in writing to Intellectual Property, UK Hydrographic Office, Admiralty Way, Taunton, Somerset, TA1 2DN.

CONTENTS

1	EXECUTIVE SUMMARY	3
2	INTRODUCTION	3
3	HISTORY	3
5	SHIPPING IN THE AREA	4
6	2009 SURVEY DETAILS	4
7	2012 SURVEY DETAILS	4
8	DESCRIPTION OF RECENT BATHYMETRIC CHANGE	4
9	IMPLICATIONS FOR SHIPPING	5
10	RECOMMENDATIONS FOR FUTURE SURVEYS	5

ANNEXES

A.	Area Specifications (Including Survey History)	6
B.	2012 Survey Data Overlaid on Chart 1828	7
C.	Shipping Routes	8
D.	2012 Survey Showing the Location of Cross Section Comparisons shown at Annex E	9
E.	Cross Section Comparisons	10
F.	Colour Banded Depth Plot from the 2009 Survey showing Selected Depths	11
G.	Colour Banded Depth Plot from the 2012 Survey showing Selected Depths	12
H.	Variability Plot showing Bathymetric Changes between the 2009 and 2012 Surveys and Charted Contours from the 2012 Survey	13
I.	Composite Diagram of the 10 metre Contour from the 2009 and 2012 Surveys	14
J.	Composite Diagram of the 15 metre Contour from the 2009 and 2012 Surveys	15
K.	Composite Diagram of the 20 metre Contour from the 2009 and 2012 Surveys	16
M.	Proposed Revised Limits	17

SOUTH SAND HEAD, 2012

1 EXECUTIVE SUMMARY

The Area and Recent Changes

- 1.1 Area GS1 covers the southern limit of Goodwin Sands and is currently surveyed every 3 years under the programme.
- 1.2 South Sand Head has undergone significant change since last surveyed, with the 10 metre contour extending south-westwards by 600 metres.
- 1.3 The southern limit of the bank is marked by SW Goodwin buoy, which lies just south of the 15 metre contour.

Reasons for Continuing to Resurvey the Area

- 1.4 South Sand Head forms the southern limit of the Goodwin Sands. Although avoided by shipping and marked by SW Goodwin buoy, the southern limit of the bank requires monitoring.

Recommendations

- 1.5 Considering the use of the area, the 3 year re-survey area should be revised to only cover the far southwest of South Sand Head. The area to the north should be transferred to GS4, which is fully surveyed every 12 years with intervening 3 year check-line surveys in this area run at 250 metre line spacing. The proposed new limits are shown at Annex L.

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 South Sand Head forms the southern limit of Goodwin Sands and extends towards the coastal routes that lie to the south and east of Goodwin Sands.
- 3.2 Between 1947 and 1968 surveys were generally conducted at two yearly intervals. Between 1969 and 1975 surveys were conducted annually. In 1976 the area was reviewed for these periods. Based largely on contour comparisons, it was considered that the bank had retained a very similar shape from 1958 to 1975 and proposed that future surveying should be conducted on open line spacing. Due to dredging operations close to the north of the area, it was thought that surveys should continue annually for the following two years.
- 3.3 A further examination in 1980, looking at 4 surveys conducted between 1976 and 1979, concluded that the area was more complex than originally thought. It recommended that normal line spacing should be used in future surveying, although extending the survey

period to 3 years. Since then the limits have been revised to take into account changes in the bank limits.

3.4 In addition to these Survey Analysis Reports and Assessment, several scientific papers dealing with the Goodwin Sands have been written, most notably by Cloet [1954].

3.5 Area details, including survey history, are at [Annex A](#).

4 DESCRIPTION OF THE AREA

4.1 Area GS1 covers South Sand Head, which forms the southern tip of South Calliper, which in turn forms the southern part of the Goodwin Sands. It covers an area 1.3 Sq NM (4.6 Sq Km). Sandwaves lie at the base of the bank, with ripples and mega-ripples overlying much of the bank. The general form of the bank is shown in [Annex B](#).

5 SHIPPING IN THE AREA

5.1 South Sand Head is avoided by shipping, as shown by the representation of the main shipping routes at [Annex C](#). The densest traffic in the region passes well to the south en-route to or from Dover. Shipping using Gull Stream, which lies to the northwest, passes to the west of the area. Some vessels pass south of SW Goodwin buoy, with vessels using the area to the north of GS1 as an anchorage area.

6 2009 SURVEY DETAILS

6.1 The full extent of the Goodwin Sands, up to the 2 metre contour, was surveyed from 23 July to 1 September, in conjunction with four Dover Strait areas. Weather in the area was generally good throughout the survey period, with slight to smooth sea states.

6.2 The survey was conducted using dual head Kongsberg Maritime EM3002D multibeam echosounders. The survey achieved IHO S44 Order 1a standard. Positioning was by Applanix POS/MV, combining GPS and inertial Measurement Unit data to produce the navigation solution. The survey is referred to the ITRF2000 Datum.

7 2012 SURVEY DETAILS

7.1 The main survey was conducted on 5 and 6 December, with wreck investigations carried out on 18 December. Sea states 3-4 were generally experienced while on site, although between 6 and 18 December fieldwork was not possible in this or other survey areas on several days due to weather conditions.

7.2 Survey data was acquired using a Kongsberg Maritime EM3000D multibeam echosounder system. The survey is referred to the European Terrestrial Reference Frame 1989 (ETRF89) Datum and met IHO S44 (Edition 5) Order 1a standards. The final dataset was in the form of a 1 metre gridded CUBE surface.

7.3 In both surveys, the Vertical Offshore Reference Frame (VORF) and GPS heighting were used to reduce depths to Chart.

8 DESCRIPTION OF RECENT BATHYMETRIC CHANGE

8.1 Colour banded depth plots of the 2009 and 2012 surveys are at [Annexes F](#) and [G](#). A variability plot showing the depth differences between the 2009 and 2012 surveys is at [Annex H](#). The variability plot shows the large changes that have occurred to the bank since last surveyed.

- 8.2 Comparison plots of the 10, 15 and 20 metre contours from the 2009 and 2012 surveys are at [Annexes I, J and K](#) respectively.
- 8.3 South Sand Head has undergone significant change since last surveyed. The 10 metre contour has extended south-westwards by 600 metres, while at the same time shifting to the west. Changes extend to the base of the bank beyond the 20 metre contour, which has migrated 400 metres. Changes that have occurred are shown in the variability plot, contour plots and cross-sections at [Annex D](#) and [E](#).
- 8.4 The southwest migration of the contour has been occurring since at least 2003, with the rate of migration over 3 years being 430 metres (2003-2006), 540 metres (2006-2009) and 600 metres (2009-2012), a migration of 1,570 metres over the 9 years. The expansion is shown in cross-section A-B (2003-2012) at [Annex E](#) and the 10 metre contour plot at [Annex I](#).

9 IMPLICATIONS FOR SHIPPING

- 9.1 Although the bank has undergone notable migration, it continues to be adequately marked by SW Goodwin buoy and lies away from the shipping routes. As such the changes have no direct impact on shipping.

10 RECOMMENDATIONS FOR FUTURE SURVEYS

- 10.1 Considering the use of the area, the 3 year re-survey area should be reduced to cover the far southwest of South Sand Head, a reduction in area of 54%. The area to the north should be transferred to GS4, which is fully surveyed every 12 years with intervening 3 year check-line surveys in this area (run as 250 metre spaced lines).
- 10.2 The proposed limits are shown in [Annex L](#) and the limits detailed below.

	Latitude	Longitude
1	51-09.20N	001-28.50E
2	51-08.80N	001-30.00E
3	51-08.20N	001-28.90E
4	51-08.40N	001-28.30E

AREA SPECIFICATIONS

(Including Survey History)

REGION: Goodwin Sands**NAME:** South Sand Head**AREA:** GS1

LIMITS: a) 51°09.78 N 1°31.20 E
 b) 51°08.43 N 1°29.80 E
 c) 51°08.23 N 1°27.60 E
 d) 51°10.23 N 1°28.90 E

AREA SIZE: 1.34 SQ NM (4.61 SQ KM)**SURVEY INTERVAL:** 3 yrs**PREVIOUS SURVEYS:** (conducted at 1:25,000 scale (not applicable to multibeam surveys))

Year	Survey	File Ref	Data	Year	Survey	File Ref	Data
1975	K7392	H4577/73		1991	M1777	HH090/511/01	s.t.d
1976	K7646	H4845/75		1994	M2308	HH090/630/01	s.d.
1977	K7742	H1934/76		1997	M2902	HH090/737/01	s.t.d.
1978	K8003	H1962/77		2000	M3448	HH090/893/01	s.d
1979	K8222	H1937/78	.	2003	M3930	HH090/1027/01	s.d
1980	K8552	H1938/78		2006	M4566	-	m
1981	K8629	H1951/80	s.t	2009	HI 1294	-	m
1985	K9655	H2342/84	s.	2012	HI 1399	-	m
1988	M1266	H6343/87	s.t.d				

KEY: t = seabed texture tracing, d = digital data, m = multibeam digital data

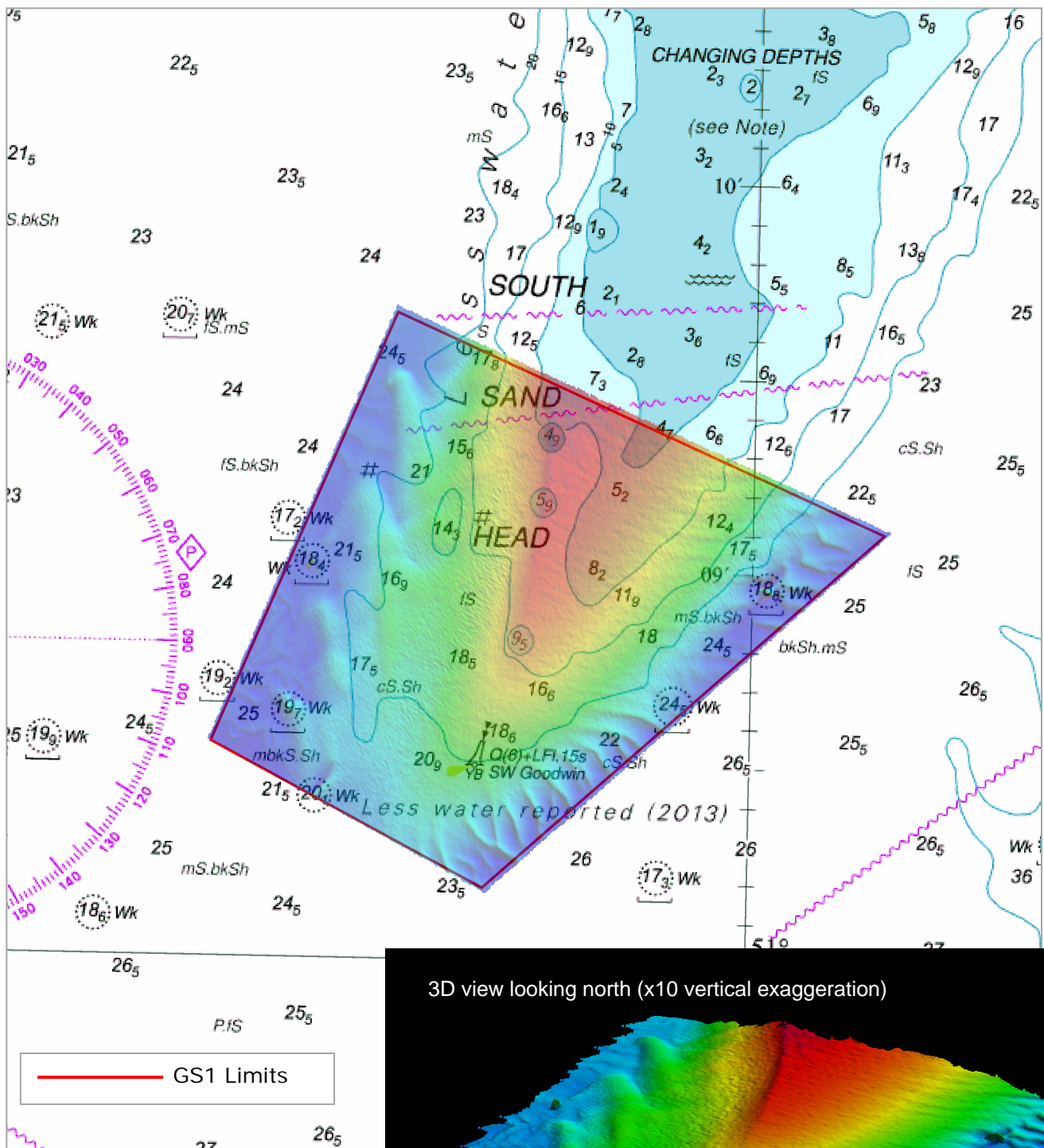
REPORTS: 1980 Latest survey included K8222 (H1934/76)
 1981 Latest survey included K8629 (H1934/81)
 1999 Latest survey included M2902 (HA145/010/019/01)

ASSESSMENTS: 2002 Assessment of the 2000 Survey
 2004 Assessment of the 2003 Survey

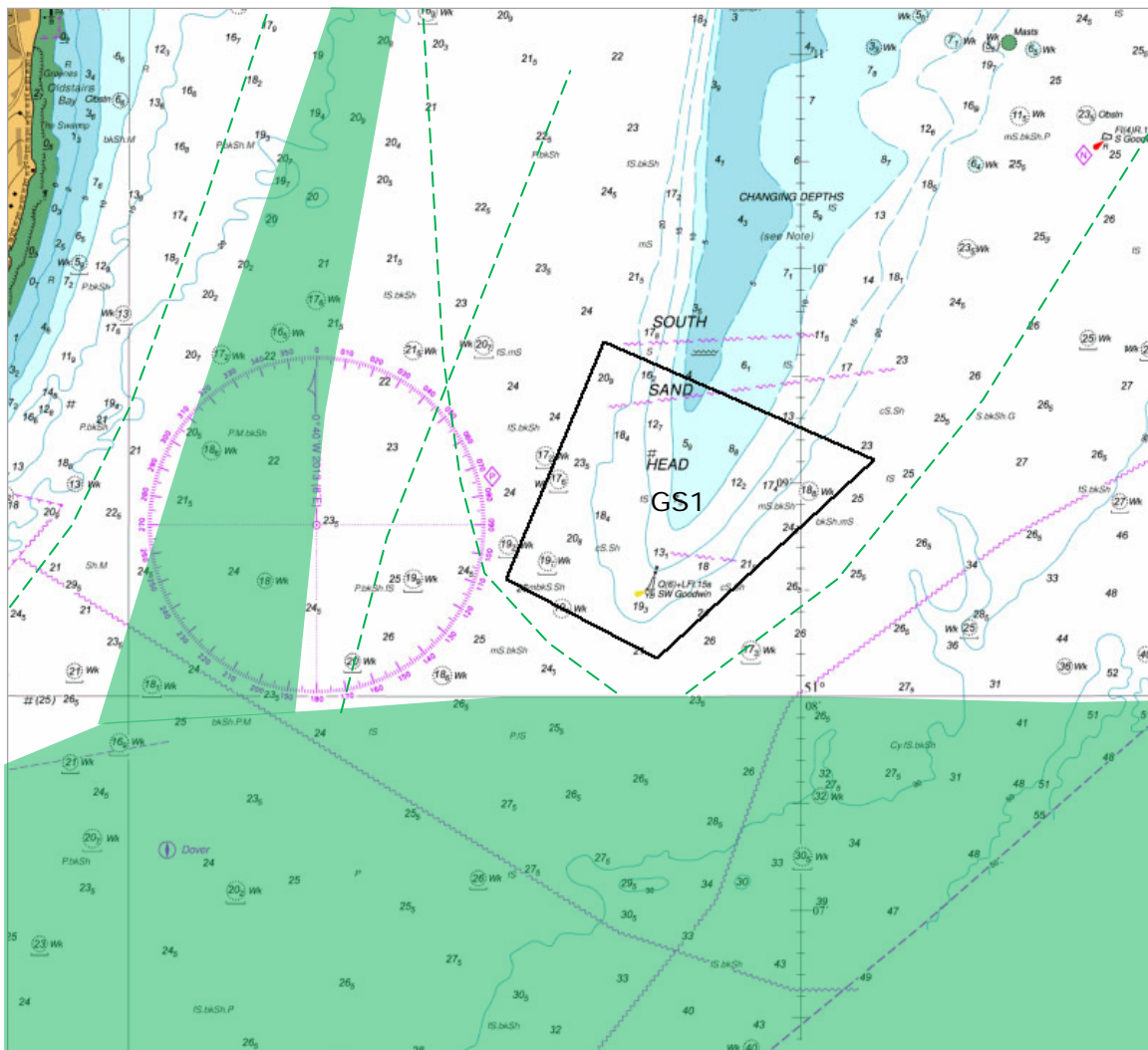
REMARKS: 1976 Report covering old area B (H1934/76)
 1980 New Area B established (HA3913/80)
 1999 Report changes area limits and identifier to GS1.

LARGEST SCALE CHART: BA 1828 (1:37,500)

2012 SURVEY DATA OVERLAID ON CHART 1828

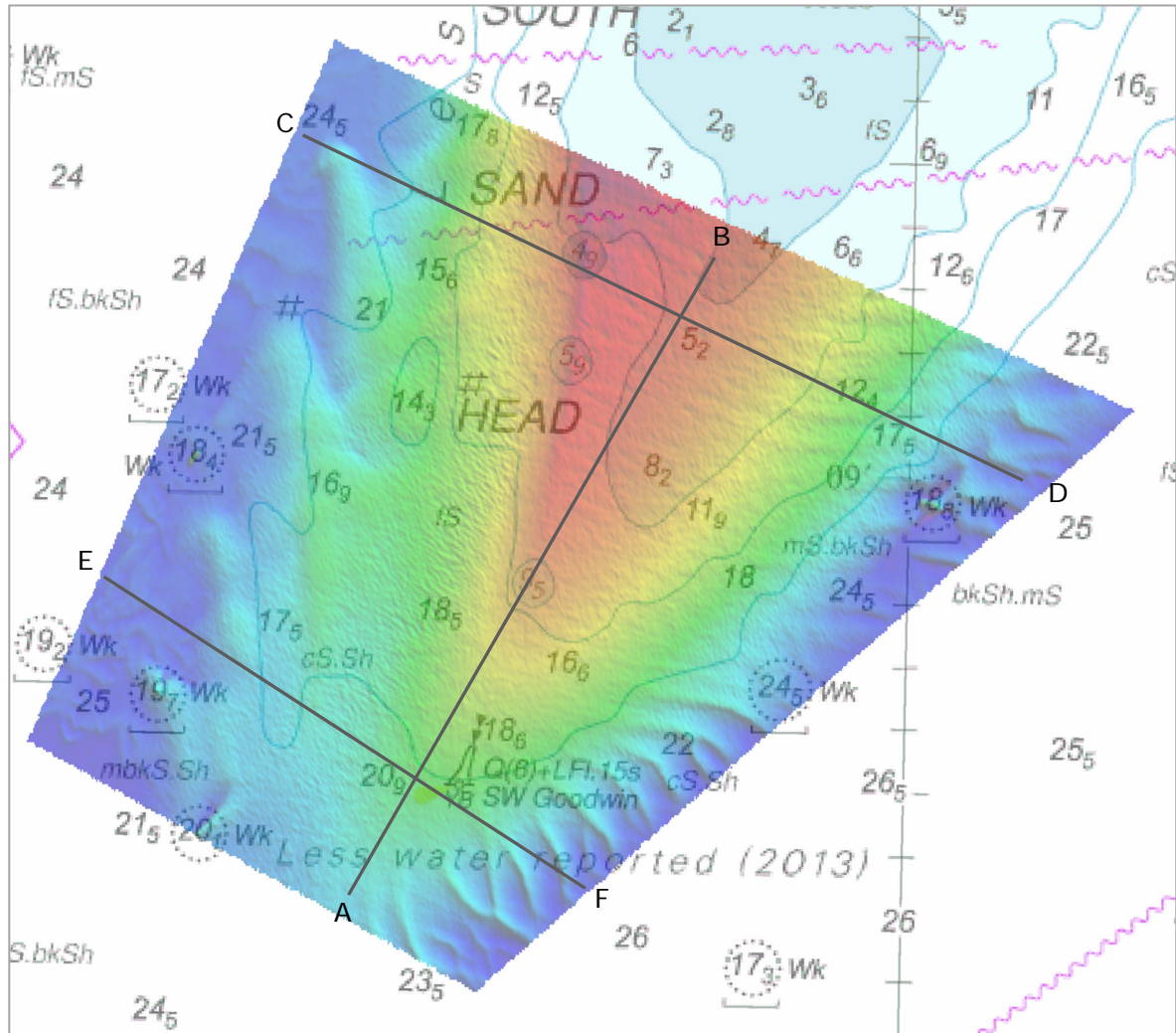


SHIPPING ROUTES



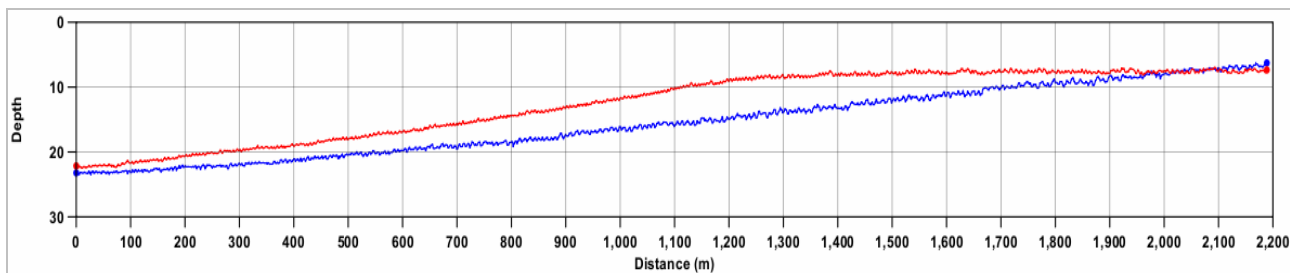
- Main traffic routes
- Lower density traffic

2012 SURVEY SHOWING THE LOCATION OF
CROSS SECTION COMPARISONS SHOWN AT ANNEX E

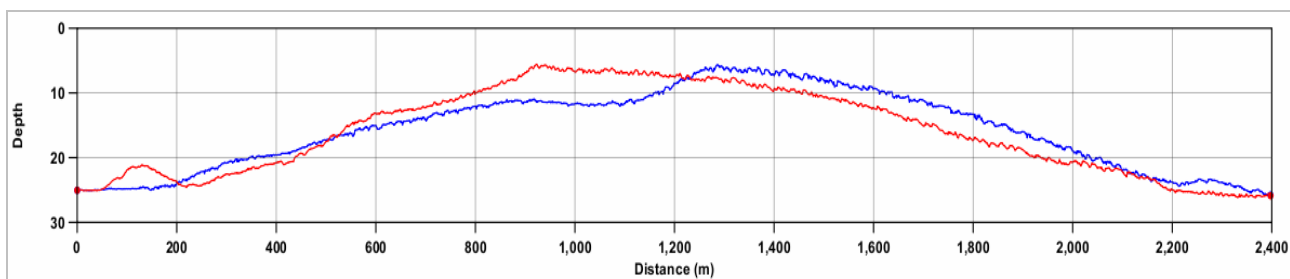


CROSS SECTION COMPARISONS

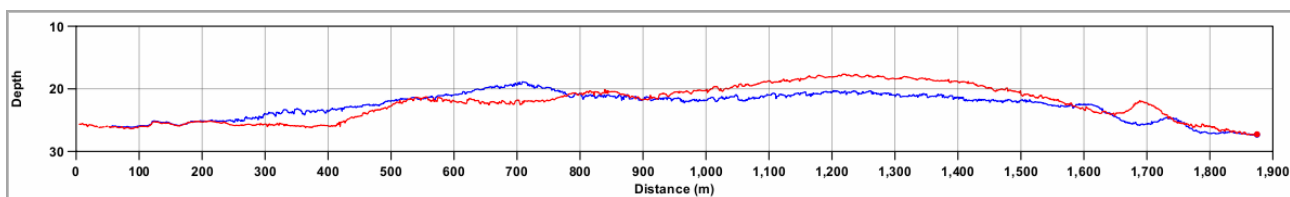
(See Annex D for locations)



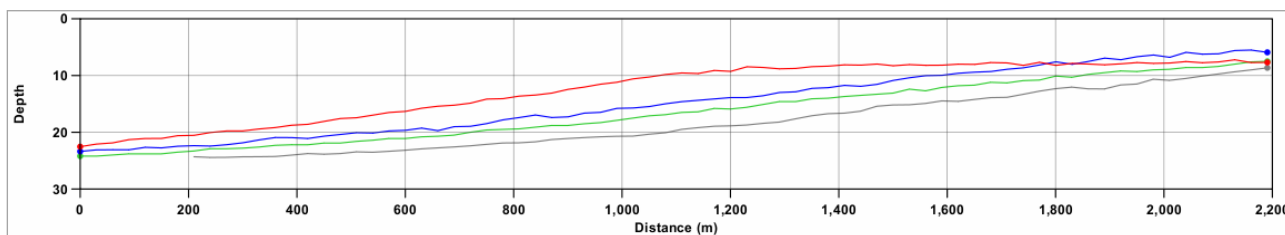
A Profile A-B B



C Profile C-D D



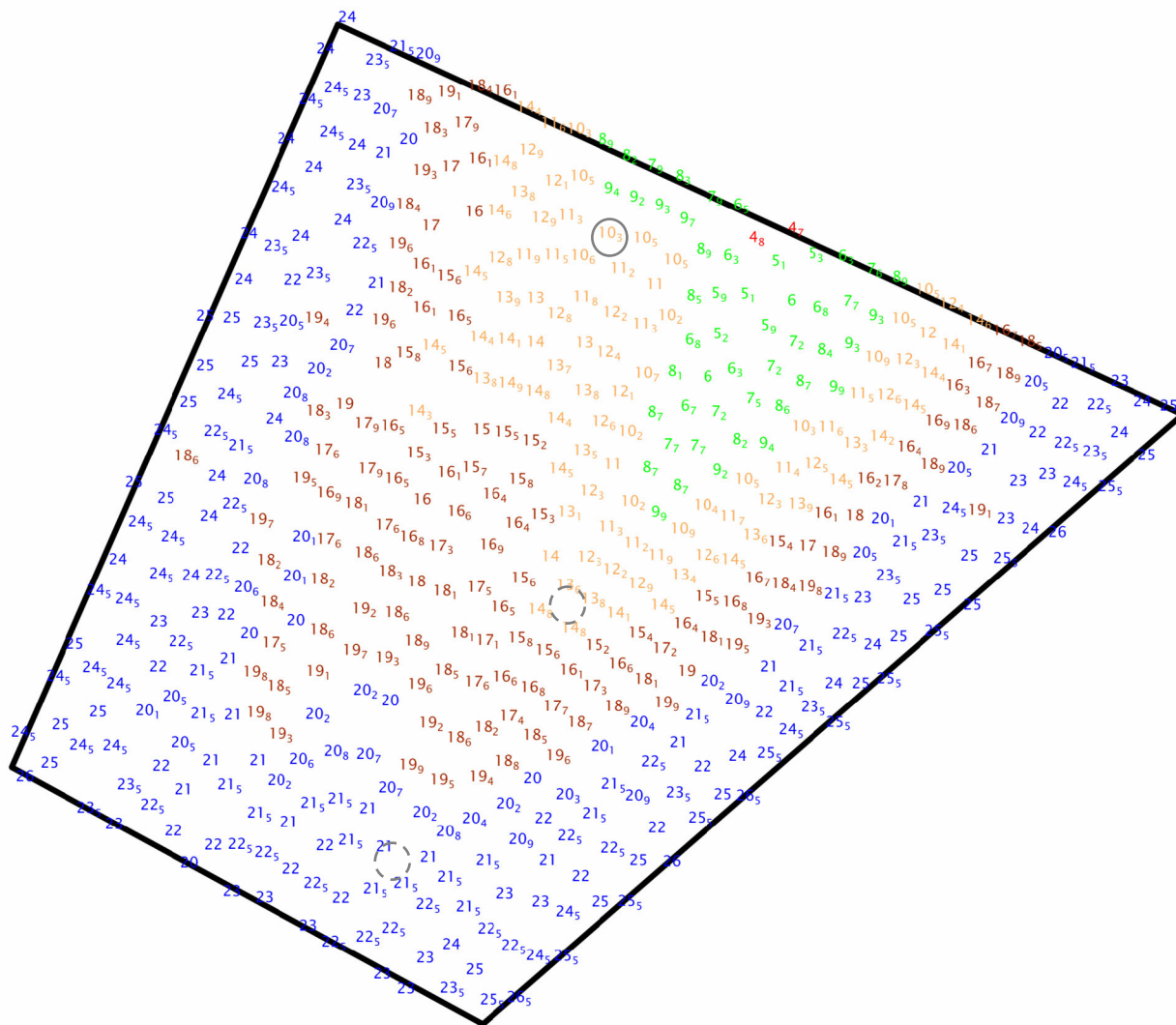
E Profile E-F F



A Profile A-B (2003-2012) B

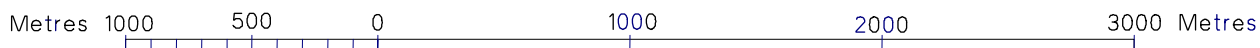
Year of Survey	
—	2012
—	2009
—	2006
—	2003

COLOUR BANDED DEPTH PLOT
 FROM THE 2009 SURVEY
 SHOWING SELECTED DEPTHS
 SCALE 1:20,000

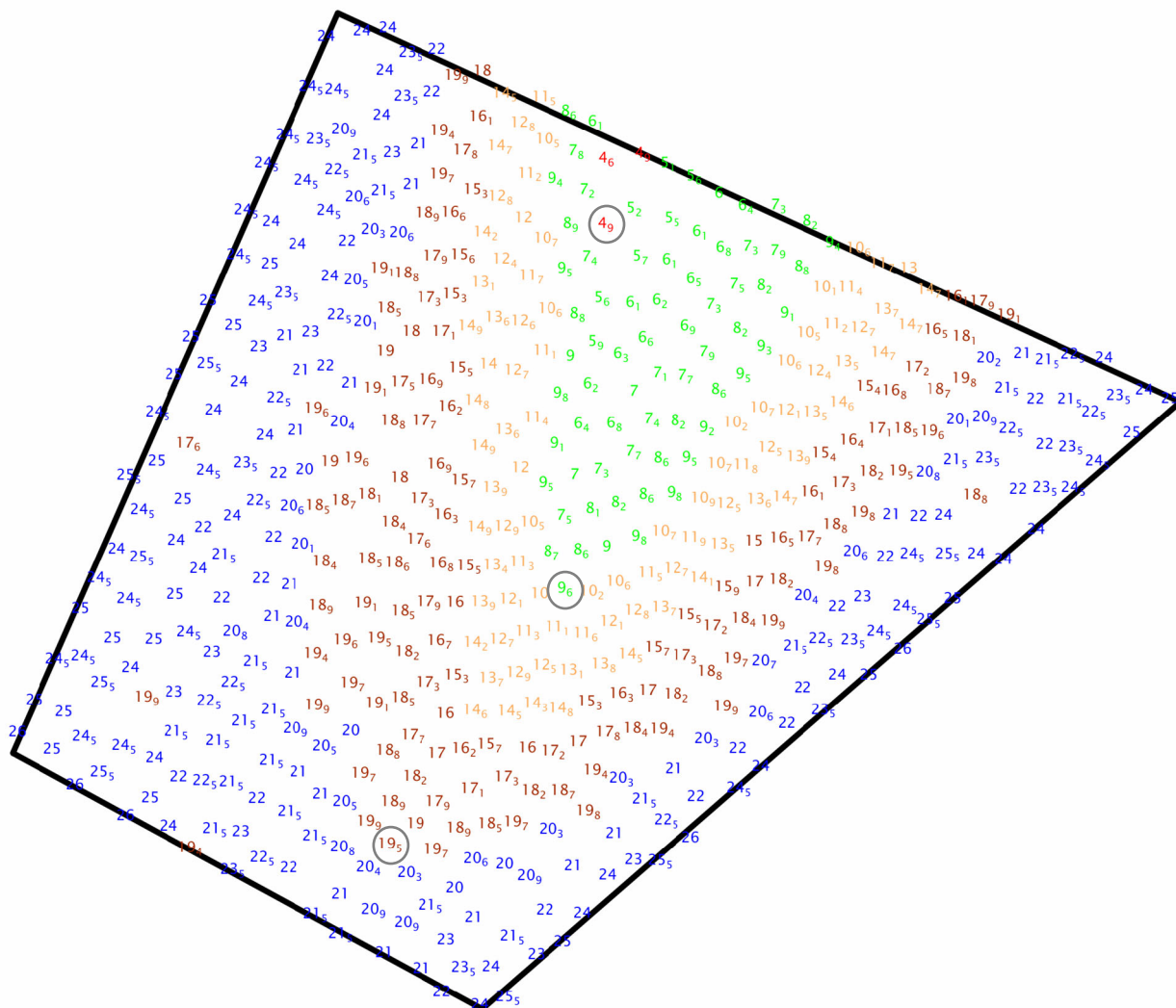


Depths in Metres	
	3.0 to 4.9
	5.0 to 9.9
	10.0 to 14.9
	15.0 to 19.9
	20.0 to 30.0

○ Selected depth comparisons

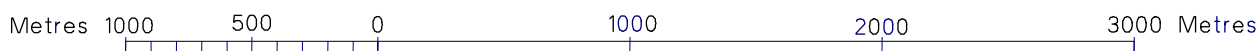


COLOUR BANDED DEPTH PLOT
 FROM THE 2012 SURVEY
 SHOWING SELECTED DEPTHS
 SCALE 1:20,000

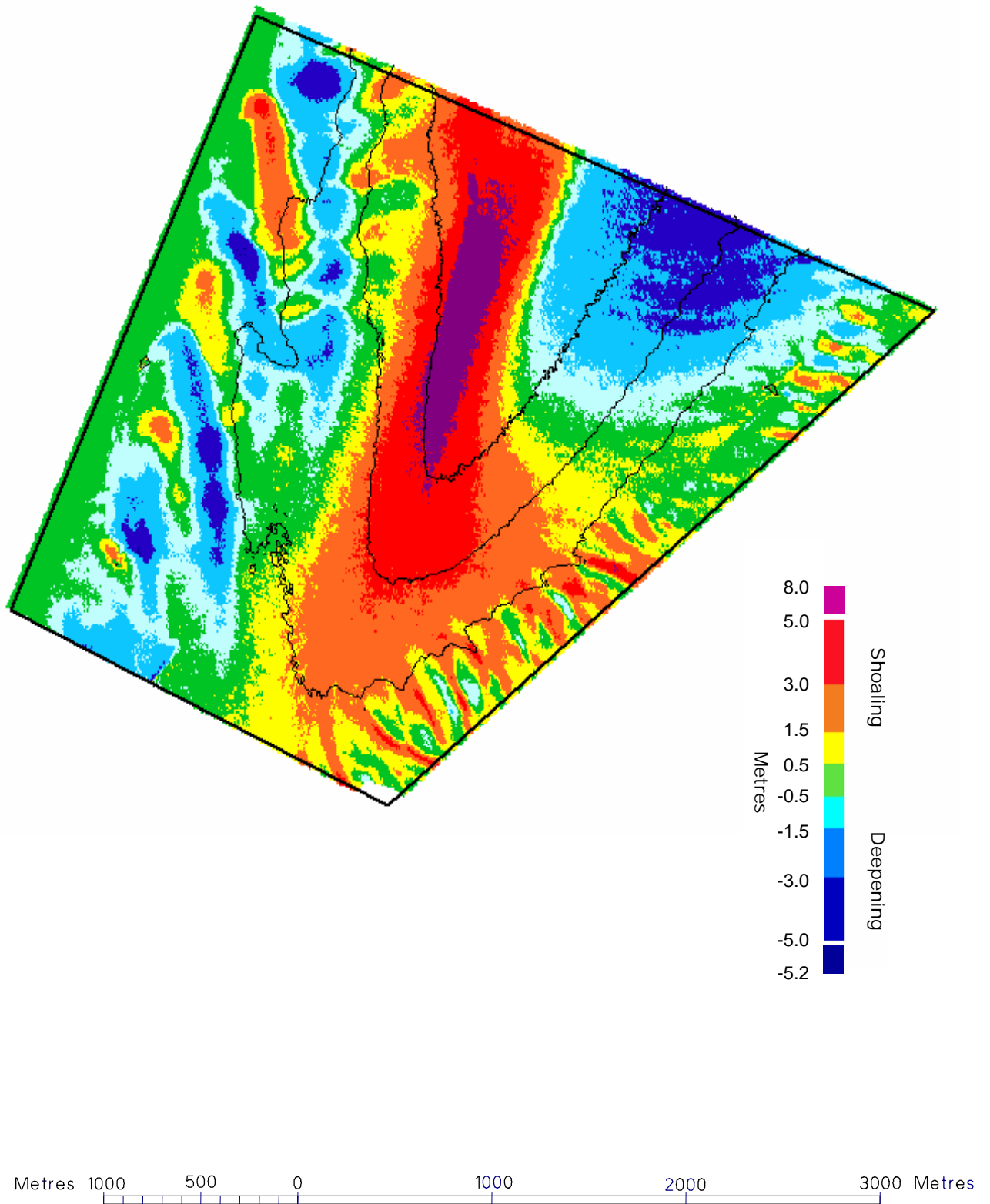


Depths in Metres	
	3.0 to 4.9
	5.0 to 9.9
	10.0 to 14.9
	15.0 to 19.9
	20.0 to 30.0

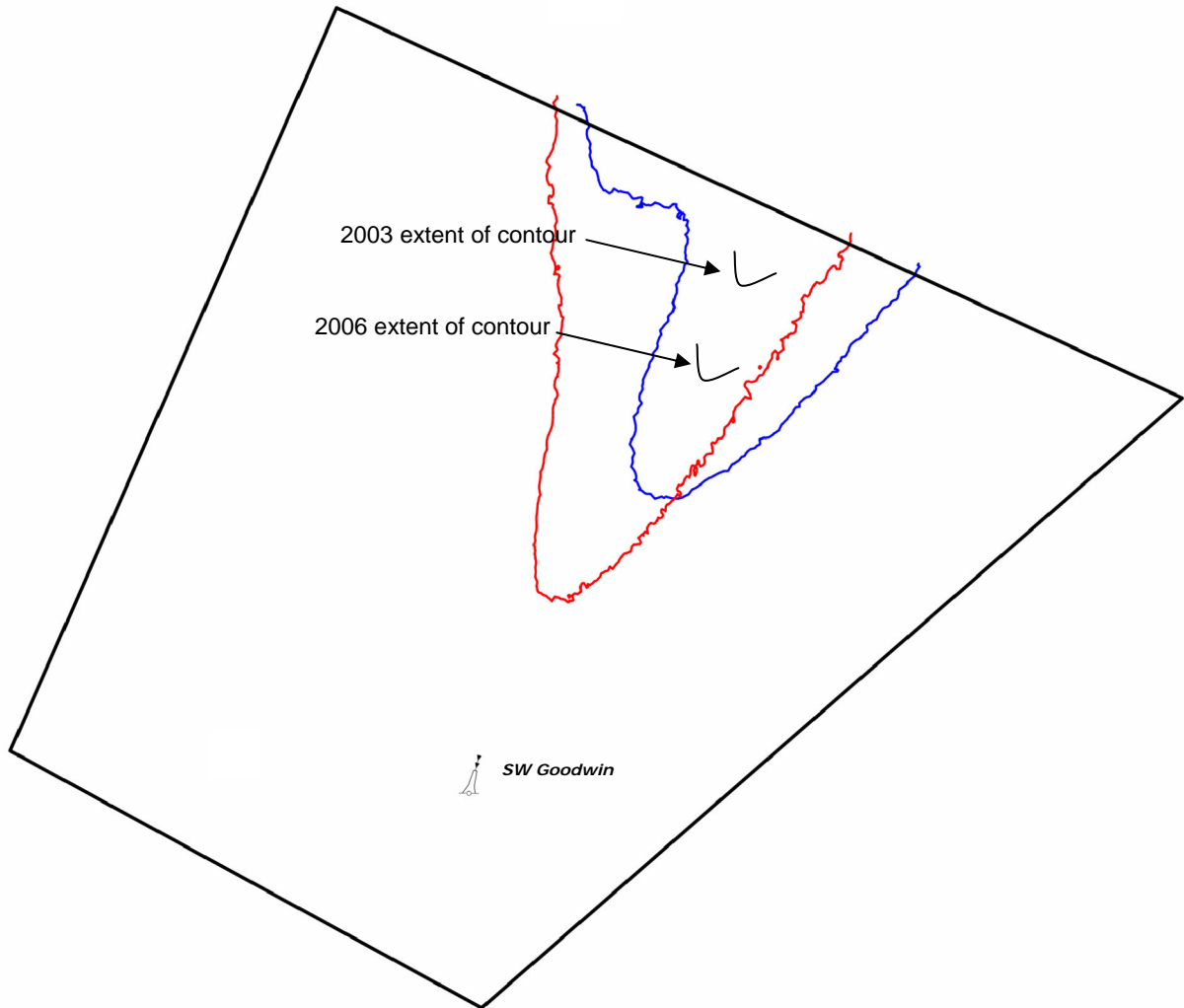
○ Selected depth comparisons





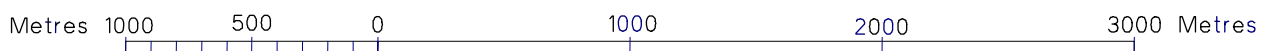
VARIABILITY PLOT SHOWING
BATHYMETRIC CHANGES BETWEEN THE 2009 AND 2012 SURVEYS
AND CHARTED CONTOURS FROM THE 2012 SURVEY
SCALE 1:20,000



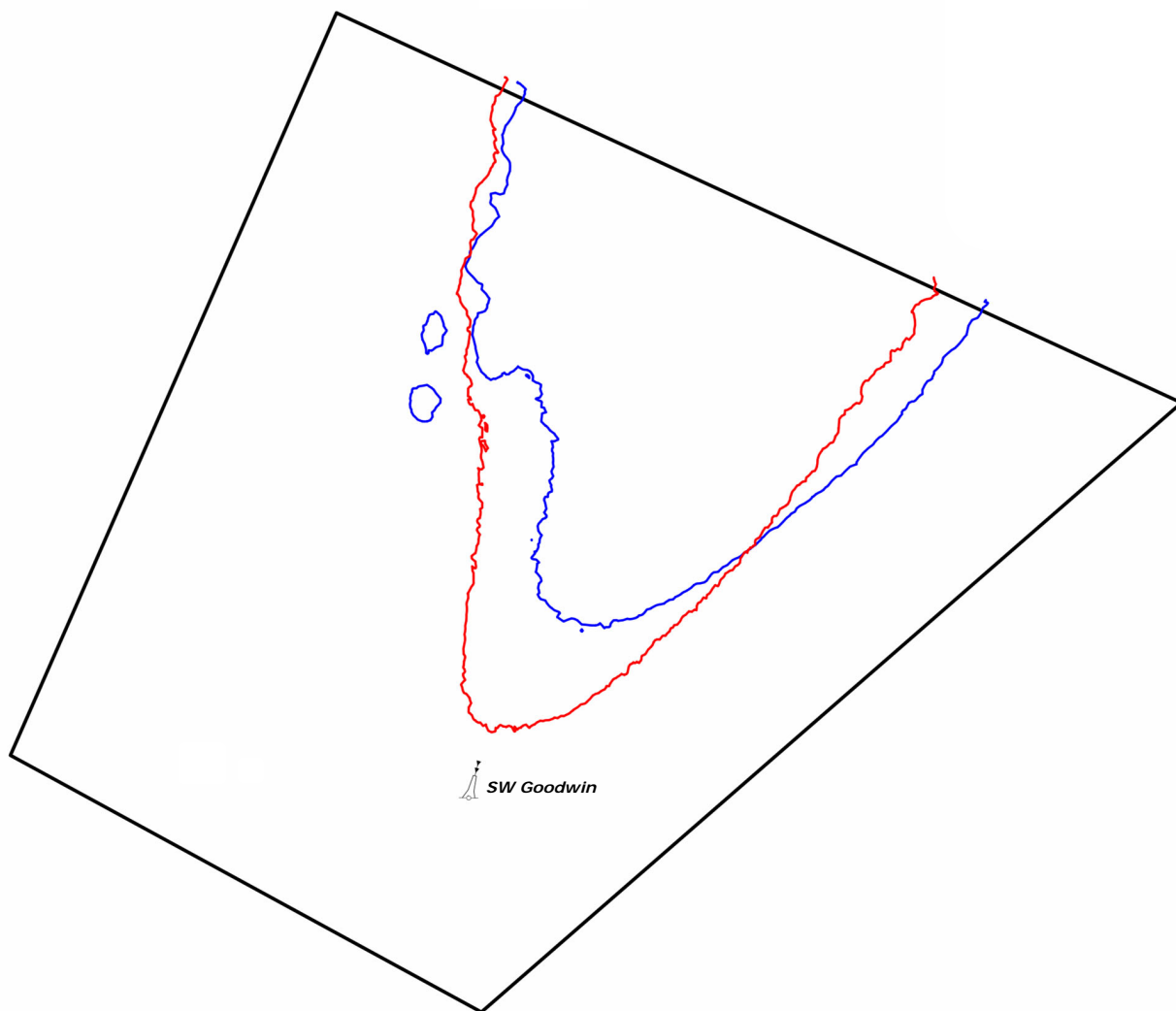
COMPOSITE DIAGRAM OF THE
 10 METRE CONTOUR FROM THE 2009 AND 2012 SURVEYS
 SCALE 1:20,000





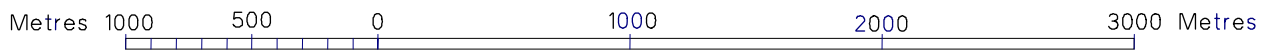
Year of Survey	
	2012
	2009



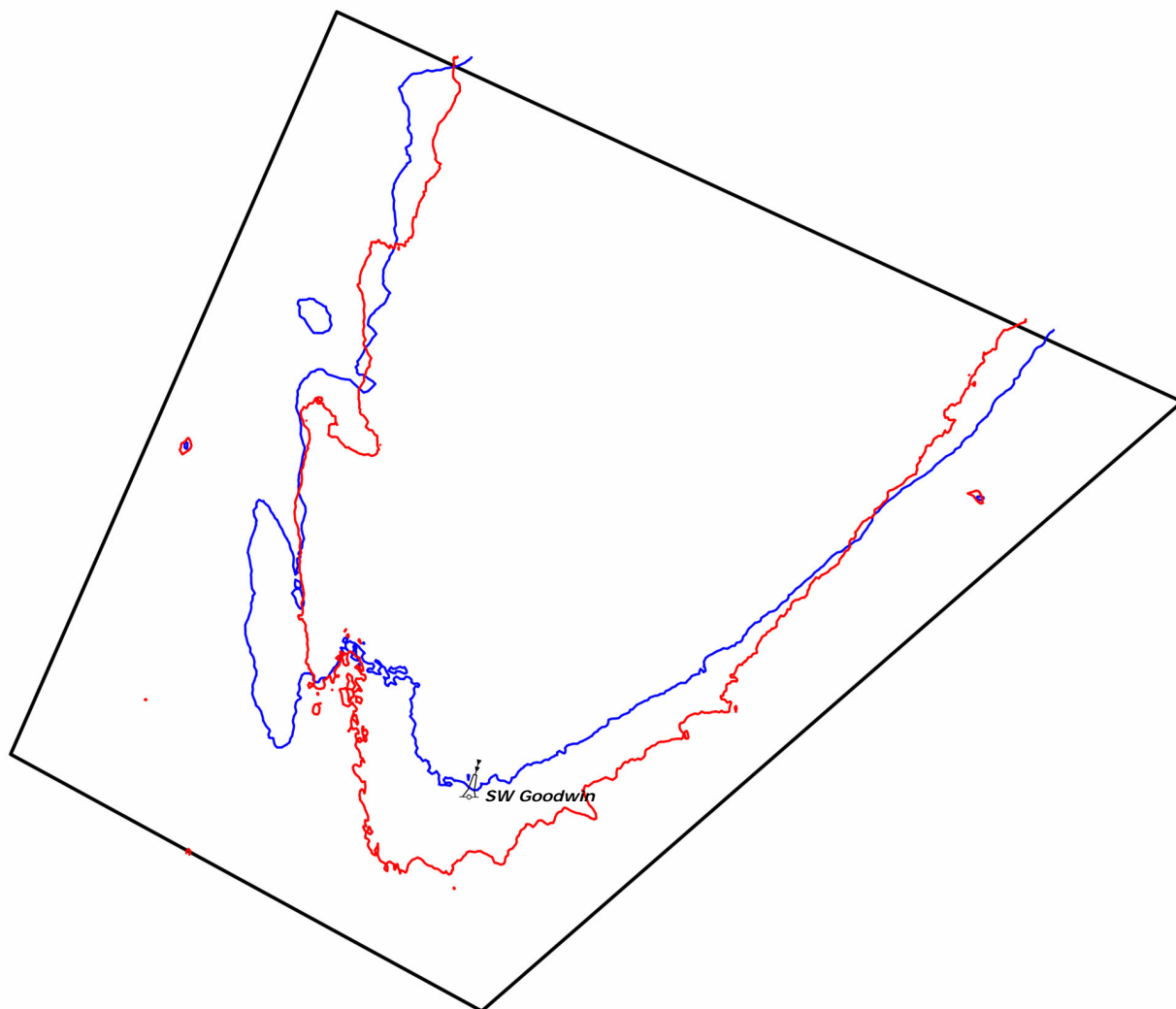
COMPOSITE DIAGRAM OF THE
 15 METRE CONTOUR FROM THE 2009 AND 2012 SURVEYS
 SCALE 1:20,000





Year of Survey	
	2012
	2009




COMPOSITE DIAGRAM OF THE
20 METRE CONTOUR FROM THE 2009 AND 2012 SURVEYS
SCALE 1:20,000

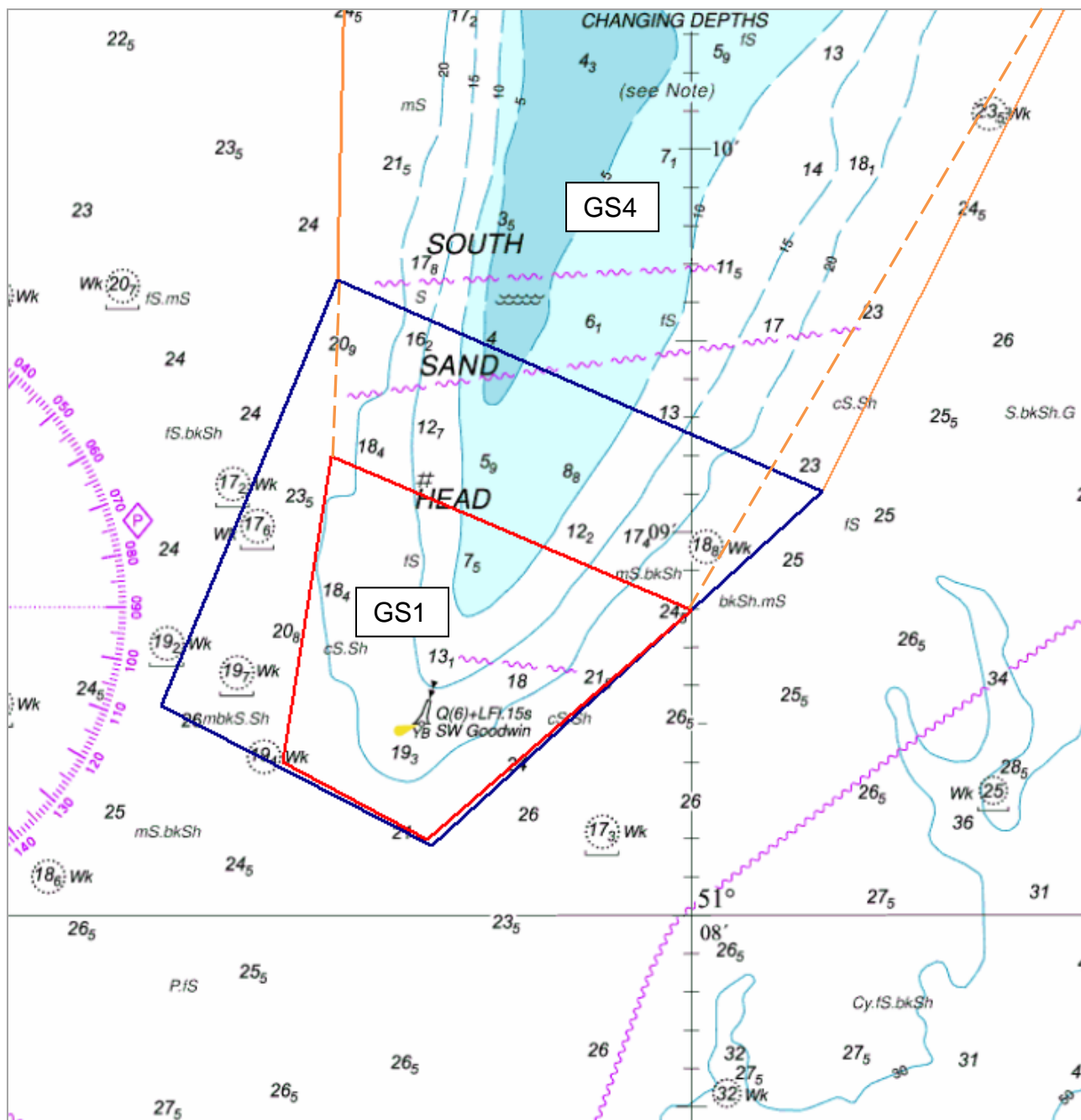


Year of Survey	
	2012
	2009

Metres 1000 500 0 1000 2000 3000 Metres



PROPOSED REVISED LIMITS



	Existing Limits for GS1
	Proposed Limits for GS1
	GS4 Limits