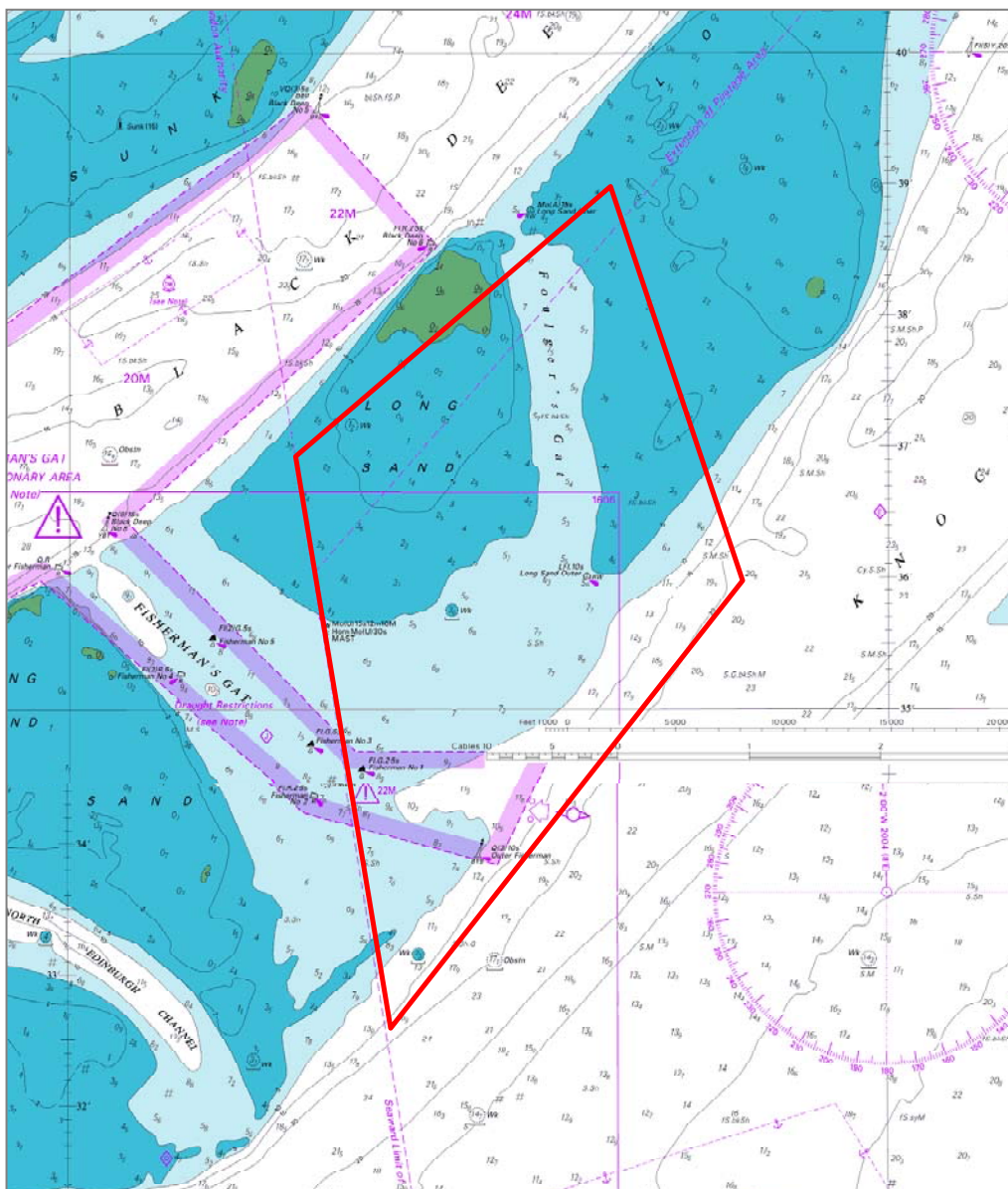




THE UNITED KINGDOM
HYDROGRAPHIC OFFICE

THAMES ESTUARY FISHERMAN'S GAT

ASSESSMENT ON THE ANALYSIS OF ROUTINE RESURVEY AREA TE19
FROM THE 2005 SURVEY





THE UNITED KINGDOM
HYDROGRAPHIC OFFICE

ENGLAND - THAMES ESTUARY

FISHERMAN'S GAT

Assessment TE19/2005

An assessment of the 2005 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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FISHERMAN'S GAT, 2005

1. EXECUTIVE SUMMARY

The Area and Recent Changes

- 1.1 TE19 was established in 2001, following the opening up of Fisherman's Gat to shipping. It covers the approaches to Fisherman's Gat and Foulger's Gat, a shallow channel used by leisure craft. Both channels provide access across Long Sand into Black Deep. Most of Fisherman's Gat lies to the west of TE19, within the Port of London Authority limits.
- 1.2 Most of the area is covered by megaripples and small sandwaves, with some featureless areas of seabed.
- 1.3 Part of the proposed London Array windfarm covers much of TE19, the first phase of which is due to be commission in 2008.
- 1.4 Foulger's Gat has a controlling depth of 8.3 metres, within the Port of London Authorities area of responsibility.
- 1.5 The greatest are of change is at the southern entrance to Foulger's Gat, where the bank on the eastern side has migrated westwards. The remainder of the area remains broadly similar to that surveyed in 2002.
- 1.6 The 2002 survey considered that the survey frequency should be extended to 12 years provided Trinity Light House Service monitored Foulger's Gat. This proposal has not been implemented.
- 1.7 There are plans to provide a route through the windfarm where it covers Foulger's Gat.

Reasons for Continuing to Resurvey the Area

- 1.8 Sediment along the eastern side of Foulger's Gat is particularly mobile and although a wide channel with depths of 3 metres or more is available, long term change may reduce depths in the channel or change its position.
- 1.9 The approach to Fisherman's Gat is generally stable and requires surveying less frequently.

Recommendations

- 1.10 The survey frequency is established at 12 years with reduced limits.
- 1.11 Foulger's Gat should continue to be surveyed every 3 years. The availability of windfarm surveys should be investigated prior to undertaking these surveys.
- 1.12 The 3 year survey limits should extend to fully cover the northern entrance to Foulger's Gat.

2. INTRODUCTION

- 2.1 This Assessment is produced by the United Kingdom Hydrographic Office (UKHO), on behalf of the Ministry of Defence (MOD), and for the Maritime and Coastguard Agency (MCA), on behalf of the Department for Transport (DfT).

- 2.2 It is funded as part of the Civil Hydrography Programme and is distributed to members of the Committee on Shipping Hydrography (COSH). When approved by the annual COSH meeting and endorsed by the Civil Hydrographic Review Committee (CHRC), 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 The area was originally covered by area TE11. This area is due to be fully surveyed every 24 years, with an intervening check line survey between the full surveys. Under this schedule, a check line survey of the area was to be conducted in 2002. It was recommended to the meeting of the Committee on Shipping Hydrography held on 11 October 2001, that the approaches to Fisherman's Gat be fully surveyed under a new area (TE19), as Fisherman's Gat had been opened up for navigation in 2000. The Assessment of the 2002 survey considered that the survey frequency should be extended to 12 years, provided Trinity House Lighthouse Service monitored Foulger's Gat. This proposal has not been implemented.
- 3.2 In the past, the Port of London Authority (PLA) survey area 209 has extended outside their limits to cover part of the current area, with the channel survey lines running out to just beyond Outer Fisherman buoy.
- 3.3 Further details of TE19 including the survey history are at [Annex A](#). Limits of the area are shown at [Annex B](#) and the 2005 survey data overlaid on chart 1183 is shown at [Annex C](#).

4. DESCRIPTION OF THE AREA

- 4.1 TE19 extends seawards from the PLA limit and covers the approach and entrance to Fisherman's Gat. This channel cuts across Long Sand and links Knock Deep to Black Deep. The area also extends to include parts of Long Sand and Knock Deep.
- 4.2 Most of Fisherman's Gat lies within the PLA limits, where responsibility for surveying rests with that authority. The area of critical depths is surveyed by the PLA every 4 months.
- 4.3 Foulger's Gat also falls within area TE19. This channel cuts across Long Sand and also links Knock Deep to Black Deep.
- 4.4 Much of the area is covered in megaripples and small sandwaves, although there are areas of featureless seabed. The small sandwaves tend to be found along the sides of the banks; a distinct ridge up to 1.5 metre in height runs along the bank to the southwest of Outer Fisherman buoy. An indication of net sediment transport in the area, based on sandwave asymmetry, is shown in [Annex E](#).
- 4.5 Part of the proposed London Array windfarm covers much of the area, including Foulger's Gat. The 271 turbine windfarm will be constructed in 4 phases, with the first phase being commissioned in 2008, subject to the necessary consents and licences.

5. SHIPPING IN THE AREA

- 5.1 Fisherman's Gat was opened up to shipping as a route though Long Sand, following the demise of North Edinburgh Channel as a buoyed route. Opened in 2000 with a

controlling depth of 7.4 metres, depths have since increased to 8.3 metres (January 2006). Controlling depths lie within the area of the turn around Fisherman buoys No. 1, 2 and 3. Shipping generally approaches Fisherman's Gat from within an arc, extending from south of Kentish Knock to the east, around to North East Spit buoy to the south-southeast.

- 5.2 During the survey shipping activity was light to moderate around the survey area.
- 5.3 Tongue Deep Water anchorage area lies to the south of the area. Fisherman's Gat forms part of Fisherman's Gat Precautionary Area, which extends into Black Deep.
- 5.4 Foulger's Gat, the entrance to which lies in the north of the area, is buoyed at either end. This channel is used by leisure craft crossing the outer Thames Estuary.
- 5.5 The COAST database v6.1, based on a 3.0 nautical mile radius centred on 51° 36'.2N 1° 25'.4E, shows an estimate of 536 vessels per year using Fisherman's Gat. All routes in the COAST report are identified as Thames – Zeebrugge and Sheerness-Baltic, traffic comprises mainly of Ro-Ro vessels. The breakdown of the total is shown in the following table. A diagrammatic representation of ships' tracks resulting from this search is at Annex B.

Type	DWT	Total
Merchant	< 1,500	0
	1,500 - 5,000	1
	5,000 - 15,000	42
	> 15,000	0
Container	< 5,000	0
	5,000 - 15,000	1
	15,000 - 40,000	6
	> 40,000	12
Ro-Ro	< 1,500	0
	1,500 - 5,000	18
	5,000 - 15,000	454
	15,000 - 40,000	2
	> 40,000	0
Total:		536

- 5.6 For vessels approaching the Thames Estuary from the south or east, the Fisherman's Gat route provides a saving of 20 miles and lower pilot charges when compared with the Sunk route to the north. The advantages of Fisherman's Gat over the Sunk route may lead to its increased use by vessels not constrained by draught and approaching from the south or east, some of which are still being routed via the Sunk.
- 5.7 The proposed London Array windfarm covers Foulger's Gat. The potential risk created by displacing recreational vessels into busier commercial shipping channels has been considered under the project and mitigated through the provision of a marked channel. This channel is shown at [Annex N](#). This is discussed further under section 9, Implications for Shipping.

6. 2002 SURVEY DETAILS

- 6.1 The survey was conducted between 18 September and 6 October, with sounding conducted between 19 September and 4 October.

- 6.2 Data gathering commenced 6 days before spring tides. Prior to commencing surveying, a transiting low pressure system created medium westerly and north-westerly winds. Winds during the survey period were predominantly medium to light, with the exception of 2 days, when surveying was curtailed due to adverse weather conditions.
- 6.3 Sonar and sounding lines were run at 62.5 metre intervals, generally in the direction of 046.7°/226.7°.
- 6.4 Positioning was by DGPS and the survey referred to the current equivalent of the World Geodetic System 1984 (WGS84) Datum for Europe, the European Terrestrial Reference System 1989 (ETRS89) Datum.
- 6.5 The assessed accuracy of depth measurements met the required standard. Details are as follows:

	Depth in metres		
	2	15	25
Combined Total Error (2σ)	0.33	0.33	0.33
Requirement (2σ)	0.50	0.52	0.55

- 6.6 The survey data was processed at a scale of 1:25,000.

7. 2005 SURVEY DETAILS

- 7.1 The survey was conducted between 11 June and 23 June. After laying the tide gauge and before beginning survey lines there was a period of relatively inclement weather which precluded the commencement of the survey. However, from 16 June onwards, high pressure dominated the area and produced excellent survey conditions.
- 7.2 This survey was conducted using a dual head Kongsberg Maritime EM3000D multibeam echosounder. The system forms 127 beams from each sonar head, giving a total of 254 beams. Survey lines were generally run at 55 metre intervals, with object detection criteria met with Side Scan Sonar. The survey was considered to have achieved IHO Order 1 Standard.
- 7.3 Positioning was by DGPS and the survey referred to the International Terrestrial Reference Framework 2000 (ITRF2000) Datum. The survey was considered to have achieved a horizontal accuracy of ±1.0 Metres (2σ).
- 7.4 The data was processed using Caris HIPS v5.4 and shoalest depths from 2 metre cells were extracted, retaining the observed depths in their true positions.
- 7.5 The assessed accuracy of depth measurements at nadir met the required standard. Details are as follows:

	Depth in metres		
	2	15	25
Combined Total Error (2σ)	0.13	0.15	0.18
Requirement (2σ)	0.50	0.52	0.55

- 7.6 A 3D view is also shown at [Annex D](#) and shows the main features of TE19. A sun illuminated view of the 2005 survey, showing the location of cross sections is at [Annex E](#) and the cross sections are shown at [Annex F](#).

8. DESCRIPTION OF RECENT BATHYMETRIC CHANGE

- 8.1 Colour banded depth plots of the 2002 and 2005 surveys are at [Annexes G](#) and [H](#) respectively.
- 8.2 A variability plot showing the depth differences between the 2002 and 2005 surveys is at [Annex I](#). Comparison plots of the 2, 5, 8 and 10 metre contours from these surveys are at [Annexes J, K, L](#) and [M](#) respectively.
- 8.3 The greatest area of change is at the southern entrance to Foulger's Gat, where the bank on the eastern side has migrated westwards. This has resulted in shoaling of around 2 metres in the area of Long Sand Outer buoy and to the north of it, with the 5 metre contour migrating by up to 350 metres over the 3 year period.
- 8.4 The remainder of the area remains broadly similar to that surveyed in 2002.

9. IMPLICATIONS FOR SHIPPING

- 9.1 Comparing the two surveys, there is little difference between depths in the approach and entrance to Fisherman's Gat. Considering the depth of water available, and that the controlling depth within Fisherman's Gat is currently 7.9 metres, changes that have occurred are of no direct concern to shipping.
- 9.2 The migration of the shoal area to the east of Foulger's Gat, which is used by leisure craft, is likely to impact on the depth of water available within the channel and on its position. However, there still remains a wide channel at the 3 metre contour level, with a minimum width of 1,300 metres in 2005. The development of the London Array windfarm will fix the route through Foulger's Gat. Should the position of the banks change significantly during the life of the windfarm, less water may become available along the route provided, although any impact on its use by leisure craft would depend on the magnitude of change.

10. RECOMMENDATIONS FOR FUTURE SURVEYS

- 10.1 The survey frequency for much of the area should be reduced to 12 years, with revised limits.
- 10.2 Foulger's Gat should continue to be surveyed every 3 years. The availability of windfarm surveys should be investigated prior to undertaking these surveys. There will be a bathymetric survey 3 to 6 months after construction and again 9 to 12 months after construction. Subsequent frequency will be determined based on the results of the first year.
- 10.3 The 3 year survey limit should extend northwards to fully cover the northern entrance to Foulger's Gat.
- 10.4 The proposed new limits are shown in [Annex O](#).

11. REFERENCES

11.1 Safetec Nordic AS, 2005: COAST Database v6.1.

11.2 United Kingdom Hydrographic Office, 2002: NP28 Dover Strait Pilot, Sixth Edition.

11.3 United Kingdom Hydrographic Office, 2002: Report of Survey, Knock Deep (M3849/3).

11.4 United Kingdom Hydrographic Office, 2005: Report of Survey, Fisherman's Gat (M4319).

11.5 Port of London Authority web site 2006: www.pla.co.uk

11.6 London Array web site 2006: www.londonarray.com

AREA SPECIFICATIONS

(Including Survey History)

REGION: Thames Estuary**NAME:** Fisherman's Gat**AREA:** TE19

LIMITS:

a) 51°39'.00 N 1°26'.60 E
 b) 51°36'.00 N 1°28'.20 E
 c) 51°32'.60 N 1°23'.90 E
 d) 51°36'.95 N 1°22'.75 E

Area co-ordinates are referred to WGS84Datum

AREA SIZE: 11.64 SQ NM (39.94 SQ KM)**SURVEY INTERVAL:** 3yr

Year	Survey	File Ref	Data	Year	Survey	File Ref	Data
1989	M1481	HH090/481/01	s.t.d	2005	M4319	HH090/119/01	m.
2002	M3849	HH/090/997/01	s.t.d				

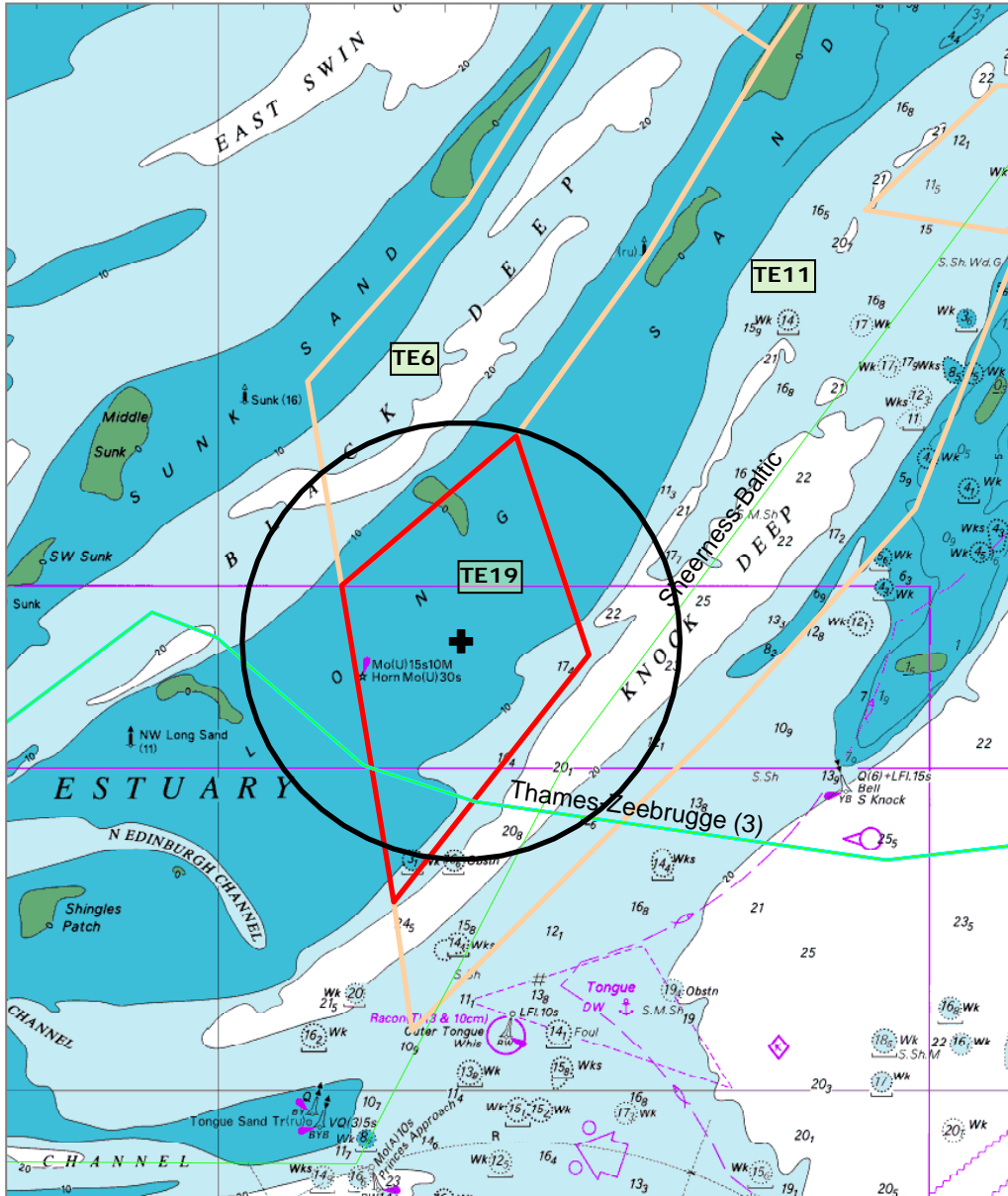
KEY: t = seabed texture tracing, d = digital data, m = multibeam digital data**REPORTS:** none**ASSESSMENTS:** 2002 M3849 (HA145/010/085/01)

REMARKS:

2001 Area TE 19 established from southern portion of TE 11, see COSH report 2001.
 2002 Survey limits revised.

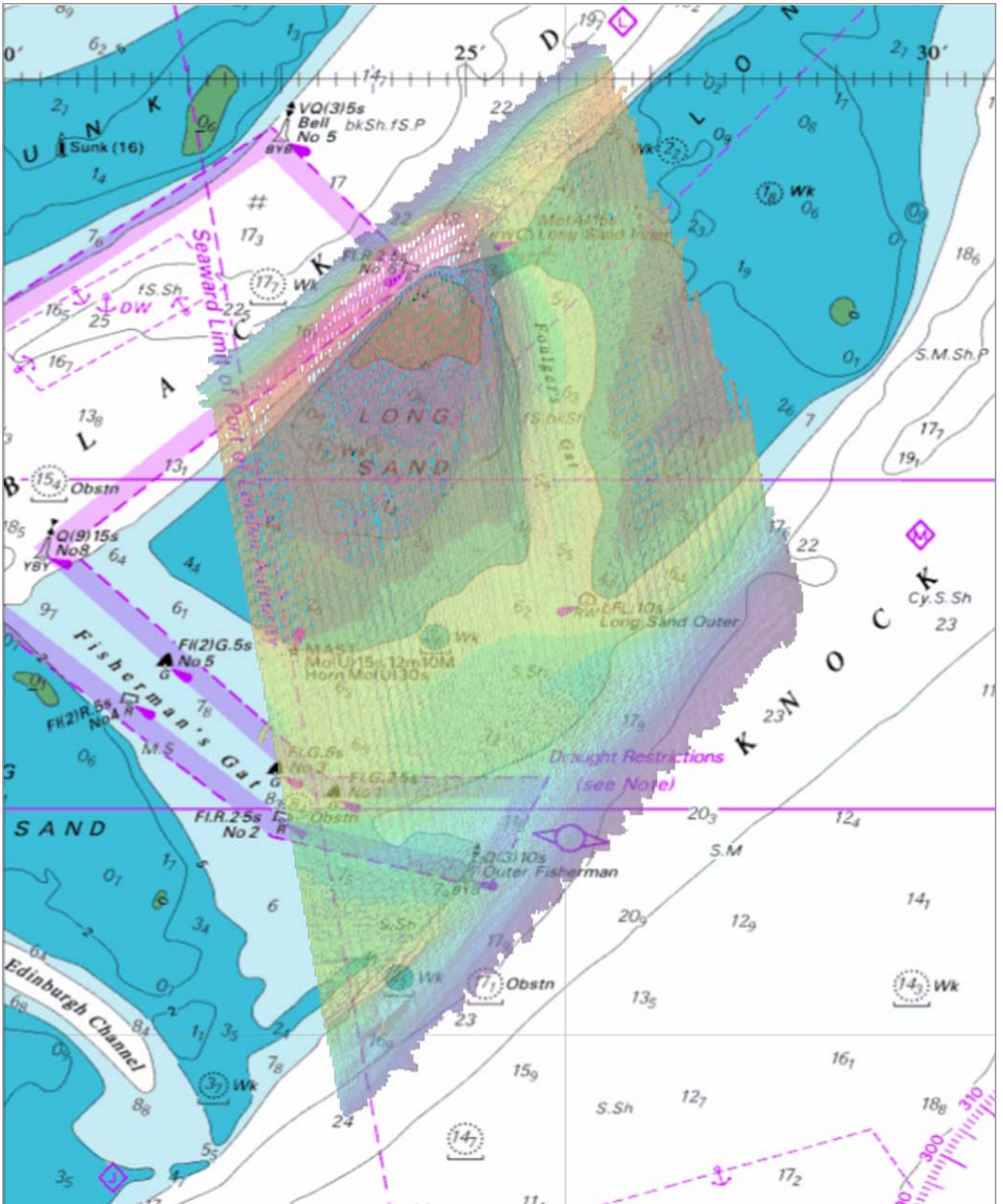
LARGEST SCALE CHARTS: BA 1606 (1:25,000) / 1975 & 1607 (1:50,000)

LOCATION PLOT
AND
DIAGRAMMATIC REPRESENTATION
OF SHIPS' TRACKS FROM COAST V6.1
Radius 3.0 nm: Centre 51° 36'.2N 1° 25'.4E



Key	
	Limit of area TE19
	Adjacent Routine Resurvey Areas
	All Routes

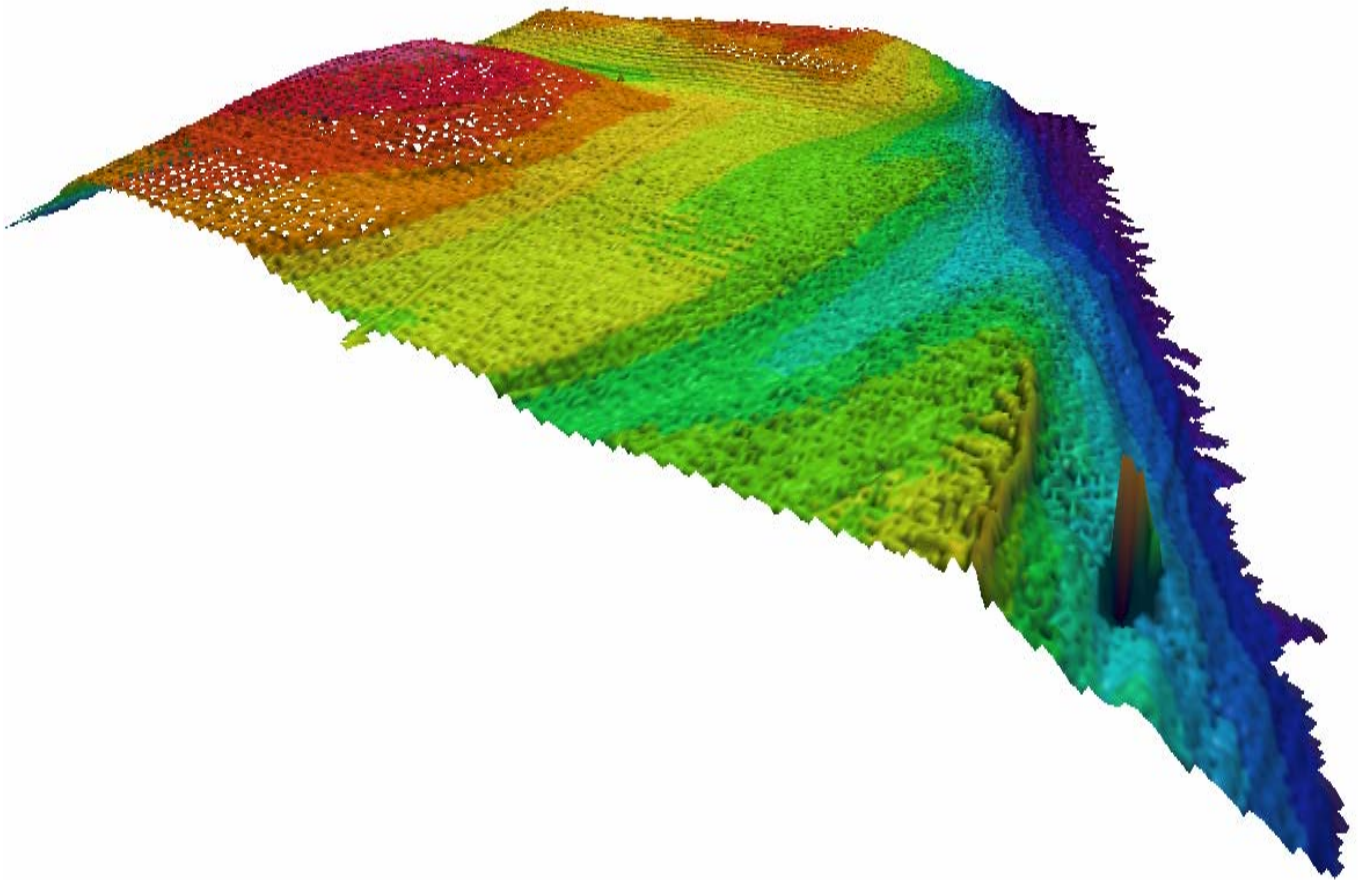
2005 SURVEY DATA OVERLAID ON CHART 1183



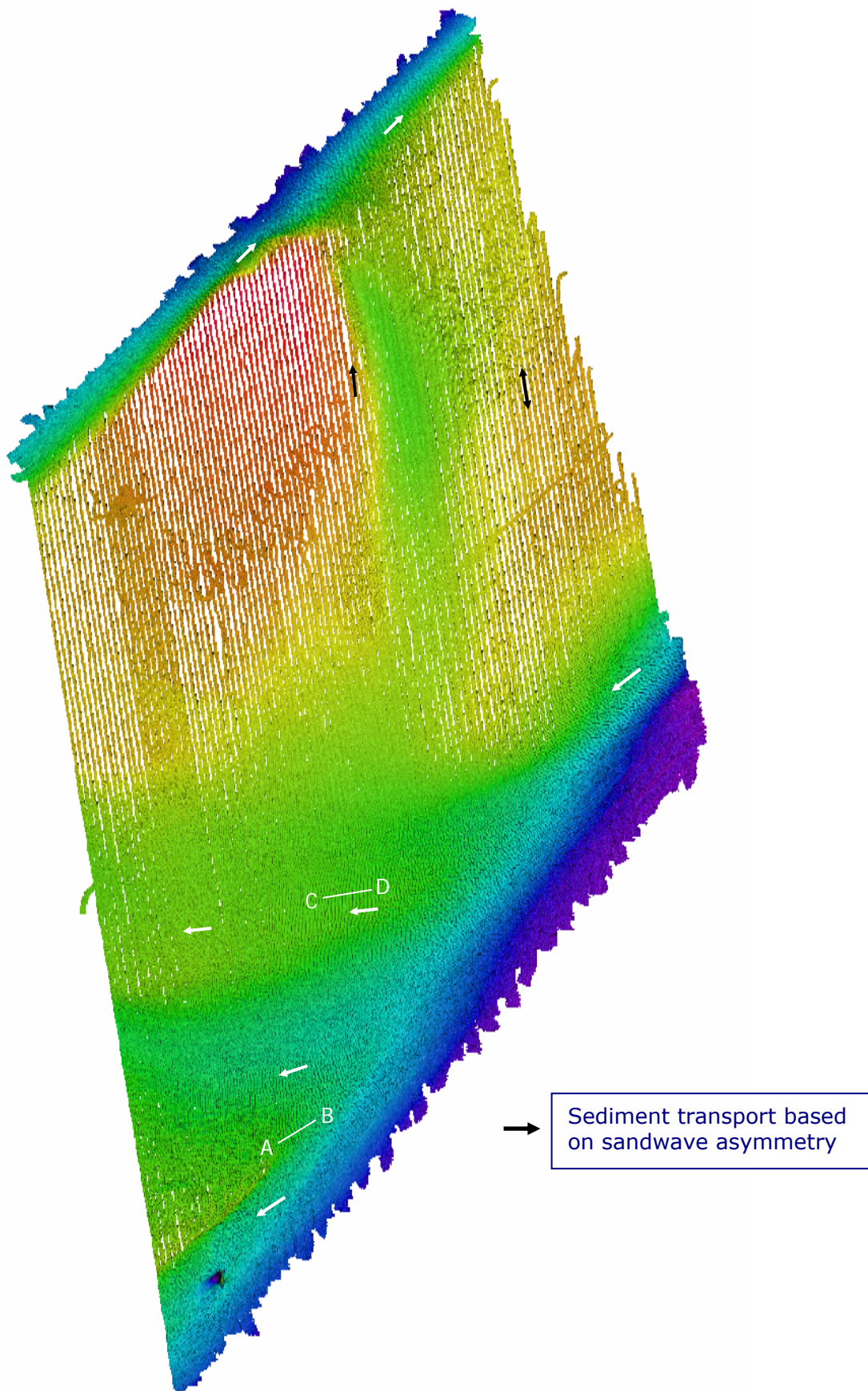
THREE DIMENSIONAL VIEW GENERATED FROM THE
2005 SURVEY DATA

Viewed from the Southwest

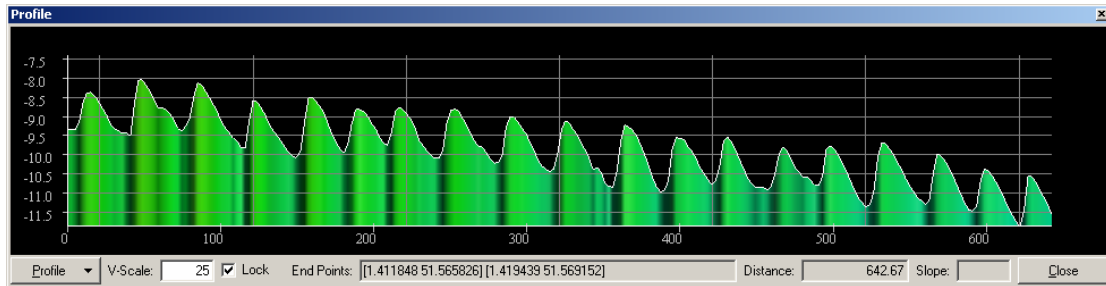
Vertical Exaggeration x25



SUN ILLUMINATED VIEW OF THE 2005 SURVEY
AND
LOCATON OF CROSS SECTIONS SHOWN AT ANNEX F



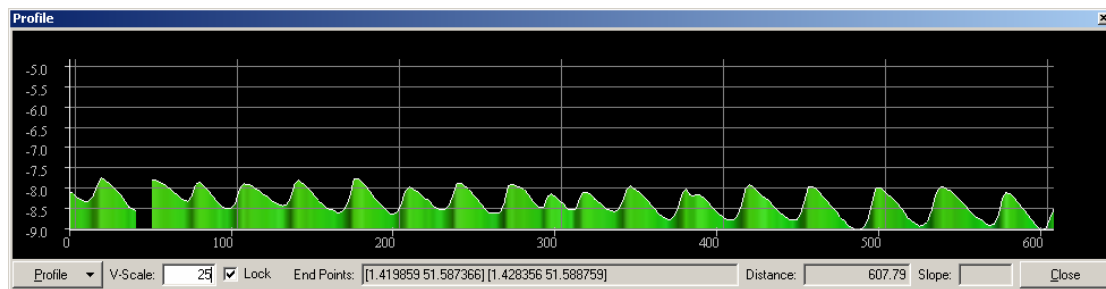
CROSS SECTIONS FROM THE 2005 SURVEY
 (See Annexe E for locations)
 25 x Vertical Exaggeration



A

Profile A-B

B

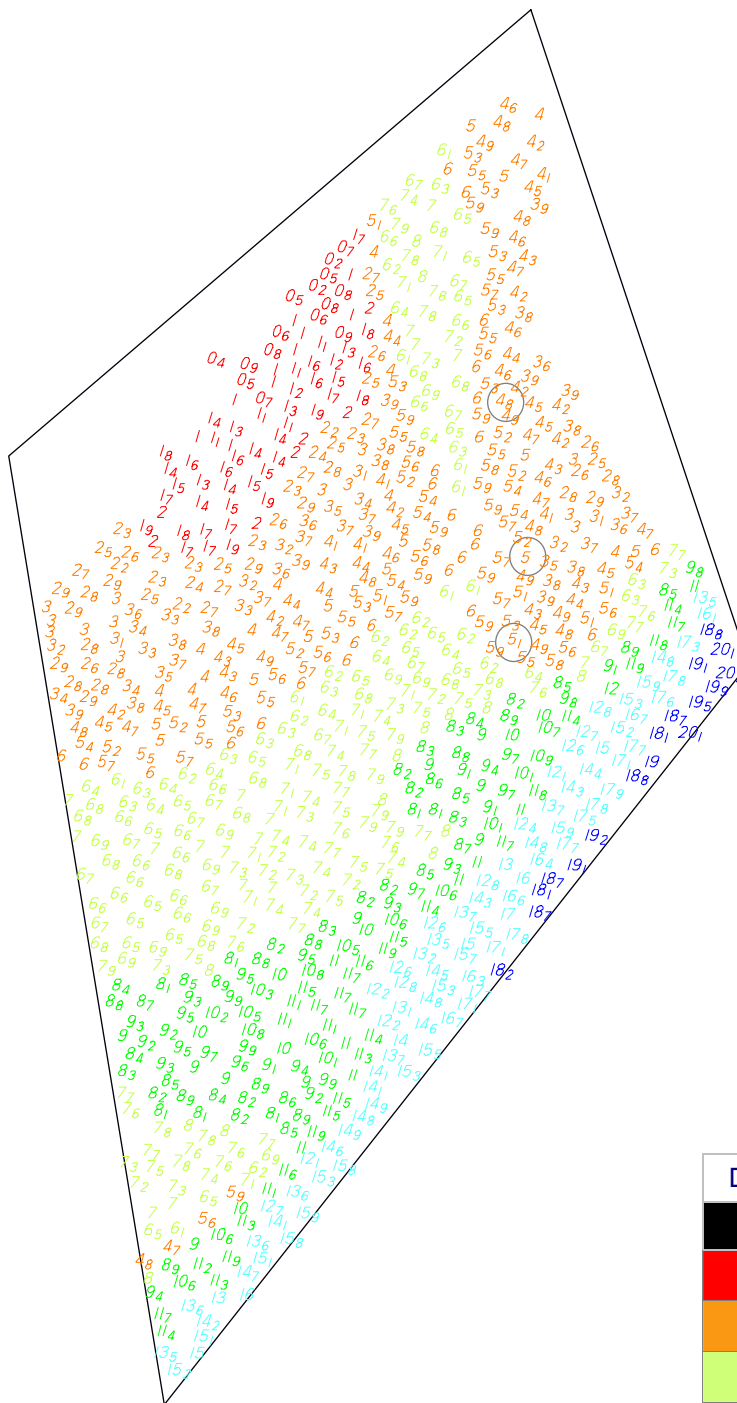


C







Profile C-D

D

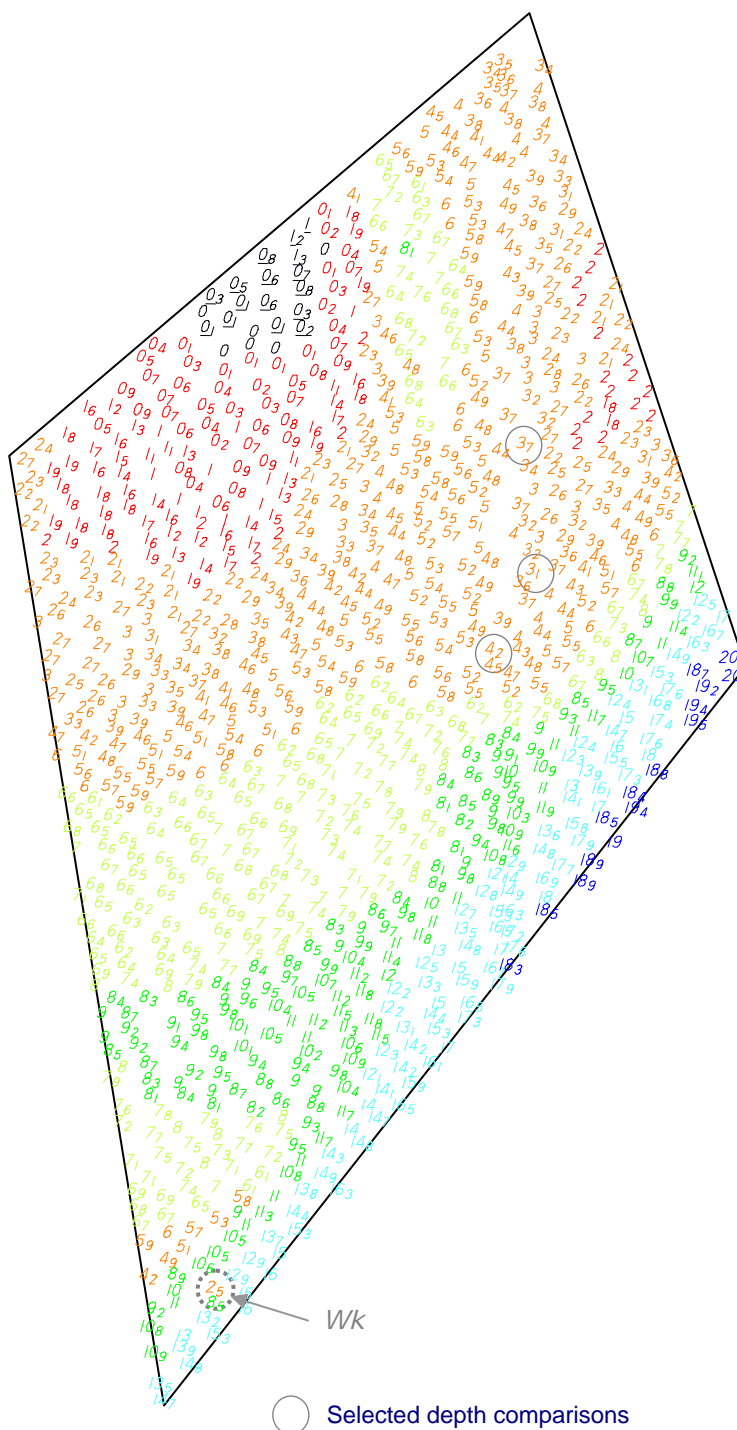
COLOUR BANDED DEPTH PLOT
 FROM THE 2002 SURVEY
 SHOWING SELECTED DEPTHS
 SCALE 1:65,000









○ Selected depth comparisons

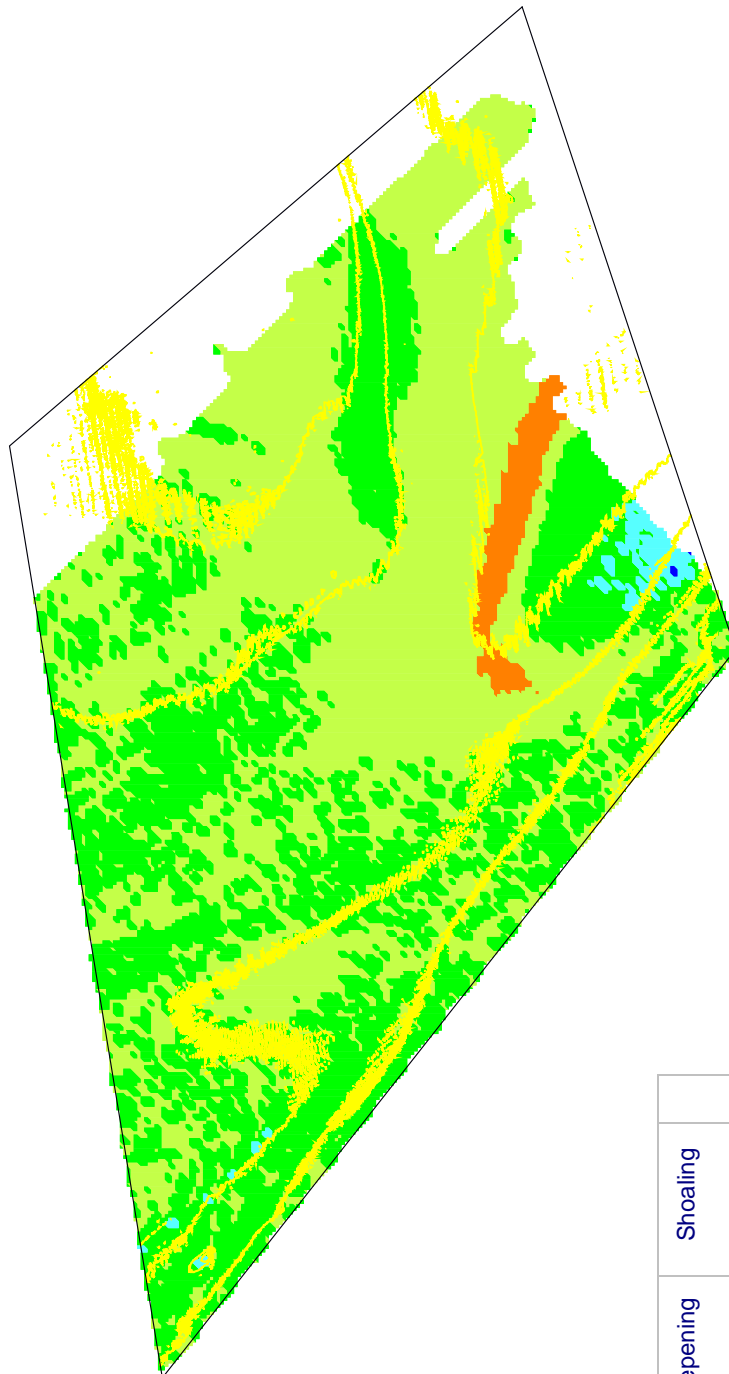
Depths in Metres	
	Drying Heights
	0.1 to 2.0
	2.1 to 6.0
	6.1 to 8.0
	8.1 to 12.0
	12.1 to 18.0
	18.1 to 25.0

COLOUR BANDED DEPTH PLOT
 FROM THE 2005 SURVEY
 SHOWING SELECTED DEPTHS
 SCALE 1:65,000

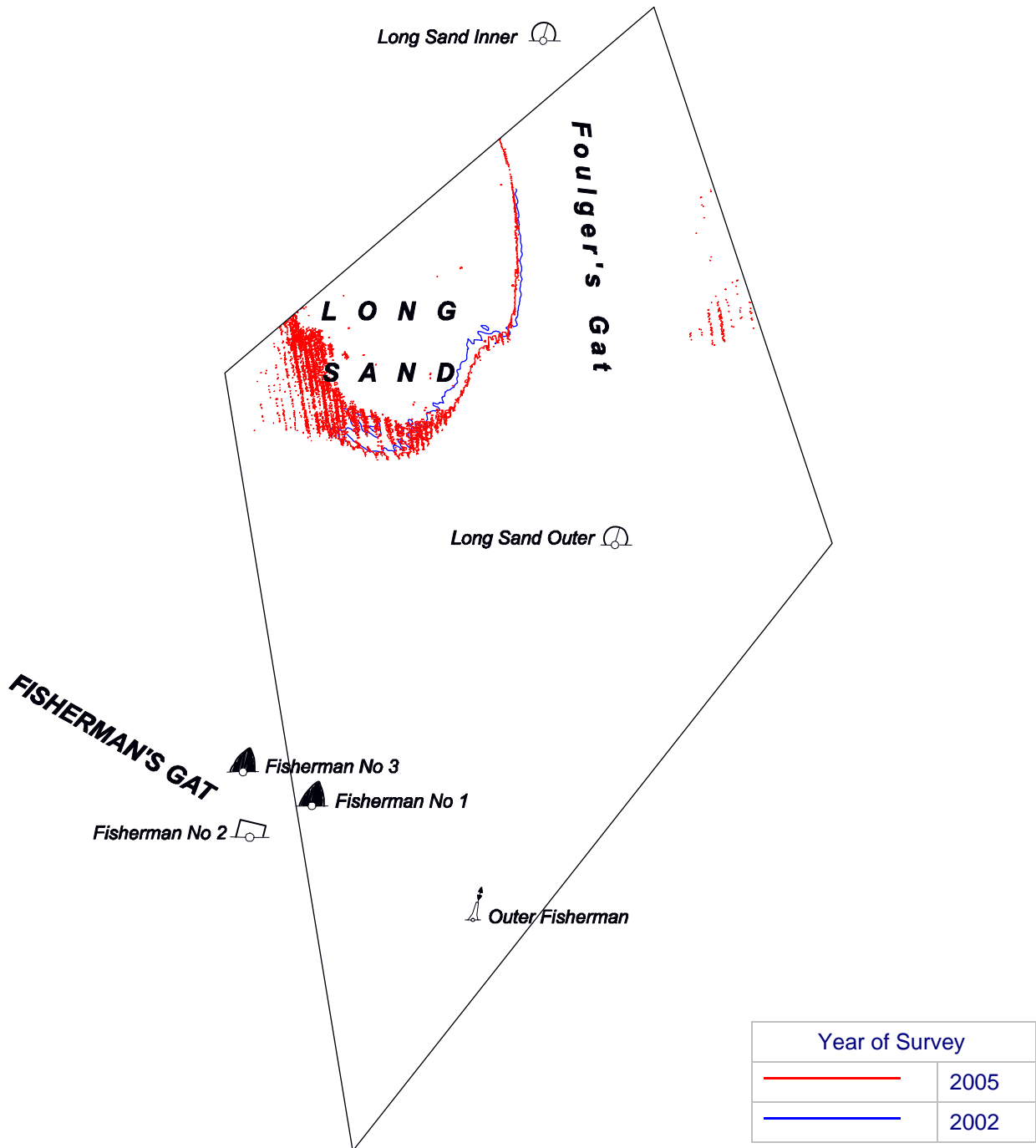


Depths in Metres	
	Drying Heights
	0.1 to 2.0
	2.1 to 6.0
	6.1 to 8.0
	8.1 to 12.0
	12.1 to 18.0
	18.1 to 25.0

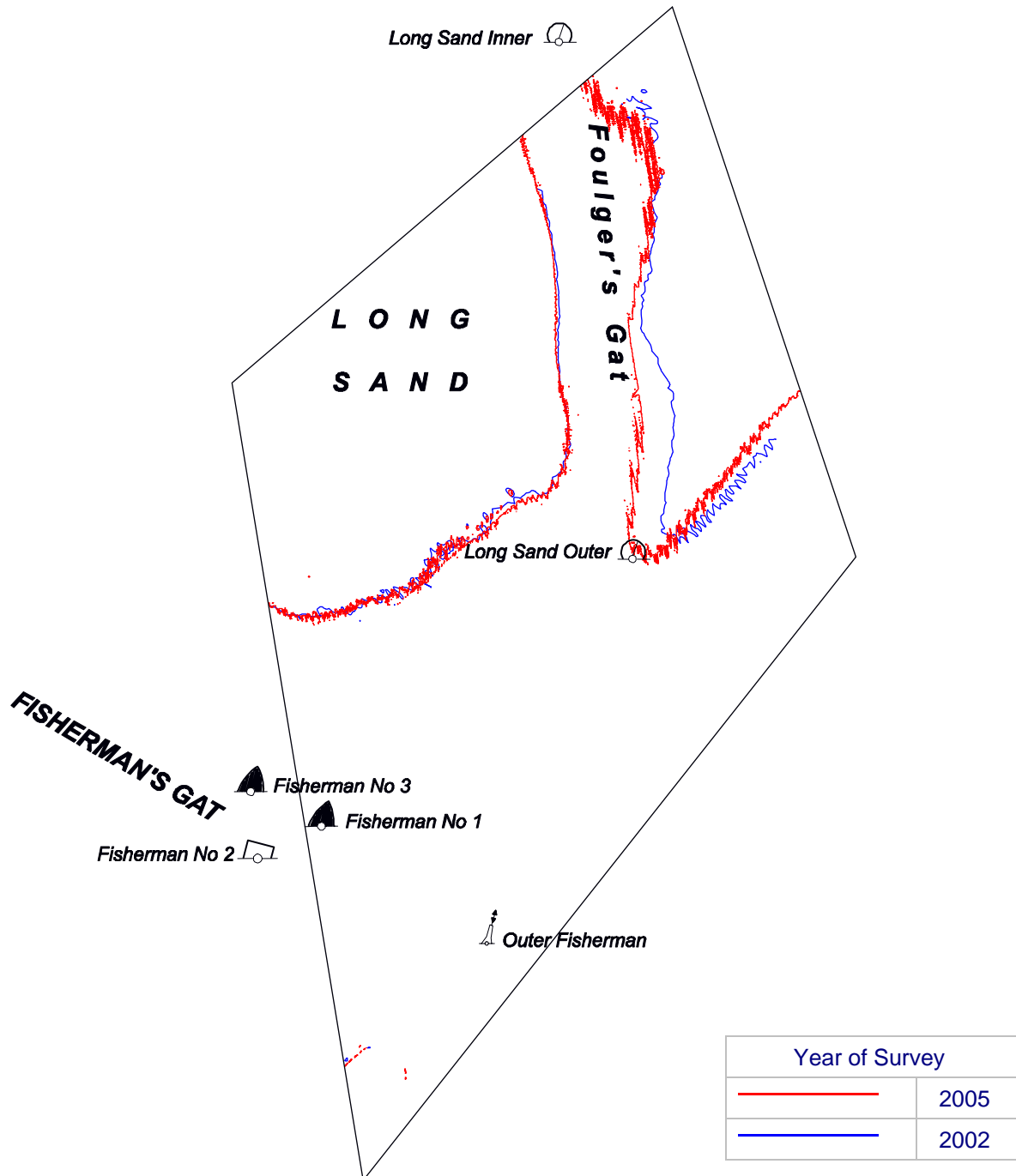
VARIABILITY PLOT SHOWING
BATHYMETRIC CHANGES BETWEEN THE 2002 AND 2005 SURVEY DATA
AND CHARTED CONTOURS FROM THE 2002 SURVEY
SCALE 1:65,000



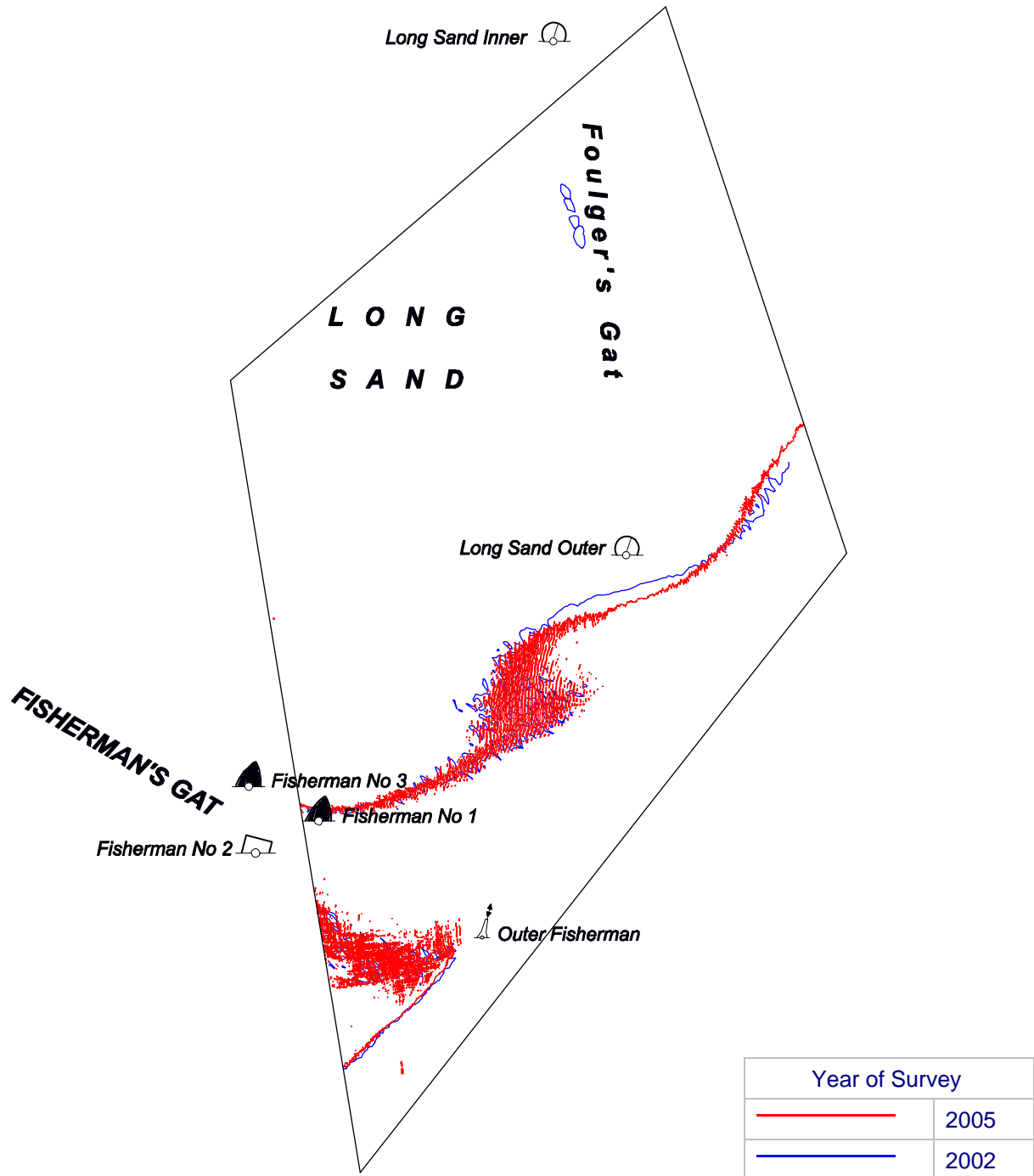
COMPOSITE DIAGRAM OF THE
 2 METRE CONTOUR FROM THE 2002 AND 2005 SURVEYS
 SCALE 1:65,000



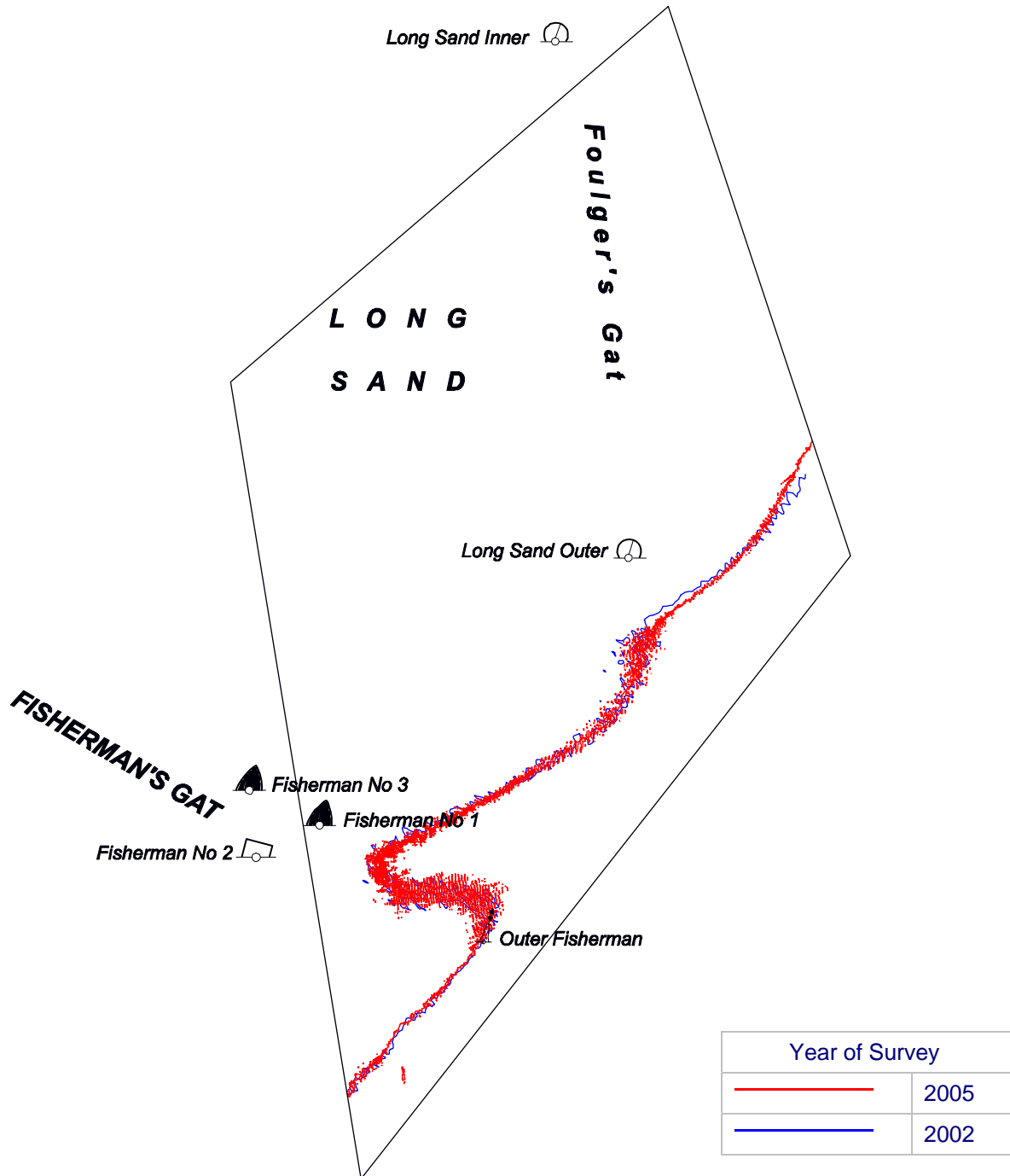
COMPOSITE DIAGRAM OF THE
5 METRE CONTOUR FROM THE 2002 AND 2005 SURVEYS
SCALE 1:65,000



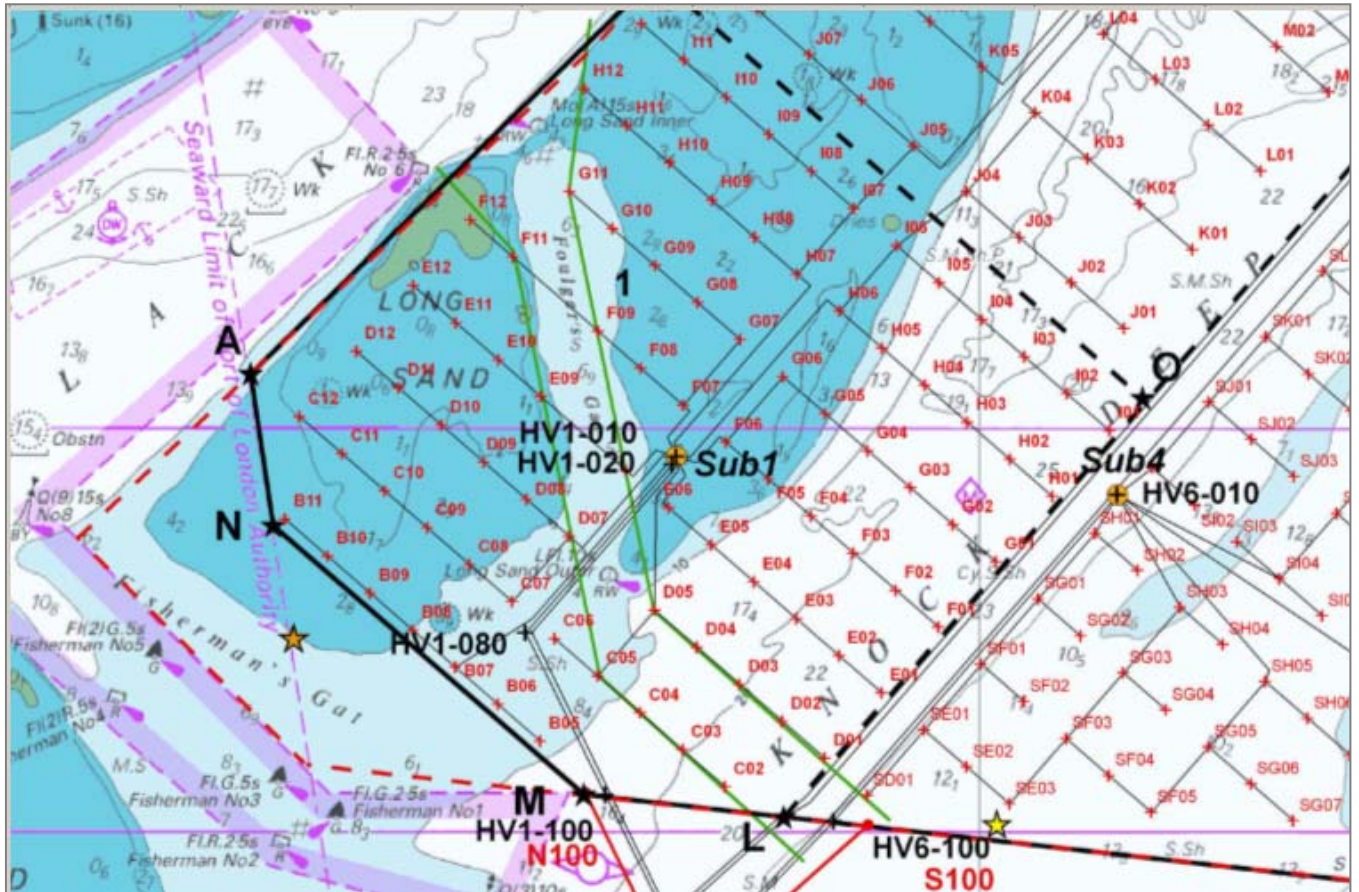
COMPOSITE DIAGRAM OF THE
8 METRE CONTOUR FROM THE 2002 AND 2005 SURVEYS
SCALE 1:65,000



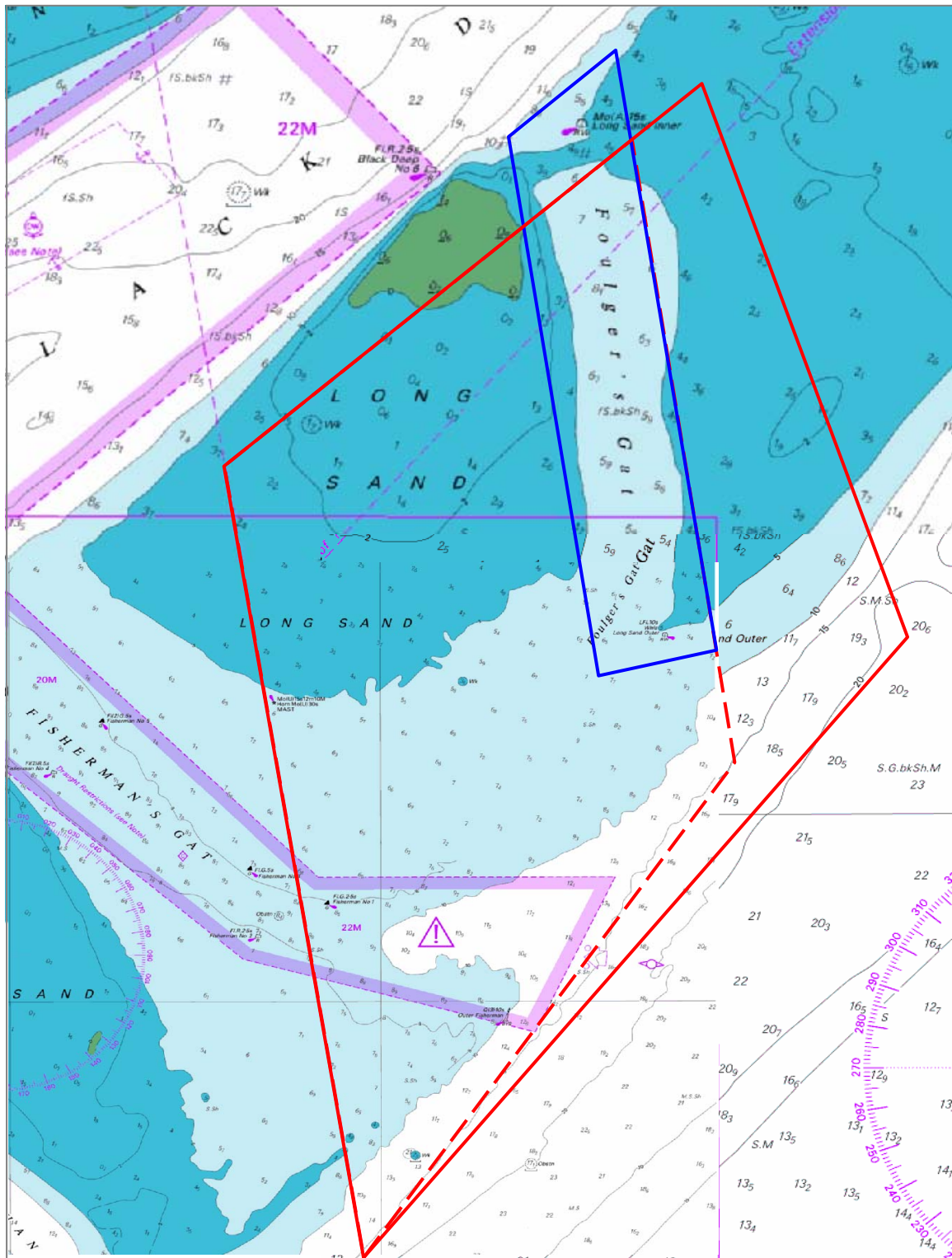
COMPOSITE DIAGRAM OF THE
 10 METRE CONTOUR FROM THE 2002 AND 2005 SURVEYS
 SCALE 1:65,000



PROPOSED LONDON ARRAY WINDFARM
(showing route through Foulger's Gat)



PROPOSED REVISED SCHEME FOR AREA TE19



Key	
	Existing Limits of TE19
	Proposed Limits of TE19
	Proposed Limits of 3 Year Area