



CONFIDENTIAL

CSIR REPORT C/SEA 7609

KNYSNA LAGOON MODEL INVESTIGATION PART II APPENDIX

submitted to

**FISHERIES DEVELOPMENT CORPORATION
OF SOUTH AFRICA LIMITED**

**COASTAL ENGINEERING AND HYDRAULICS DIVISION
NATIONAL RESEARCH INSTITUTE FOR OCEANOLOGY
COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH**

CSIR REPORT C/SEA 7609

Stellenbosch, South Africa
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- F. 1 Knysna Lagoon - Depth contours at The Heads

A P P E N D I XA. Tide Levels

Tides were recorded at the following positions :

- (a) The Heads
- (b) Paarden Island
- (c) Belvidere
- (d) Red Bridge
- (e) Lagoonside

Tide readings were taken on 8th and 9th October 1974, (Neap tide) and 13th and 14th October 1974 (Spring tide) with approximately 12 hours of recordings per day.

Continuous readings were obtained at The Heads and Paarden Island while visual readings on tide staffs were made every 15 minutes at Lagoonside and every 10 minutes at Belvidere and Red Bridge. Refer to Appendix Figures A1 to A8.

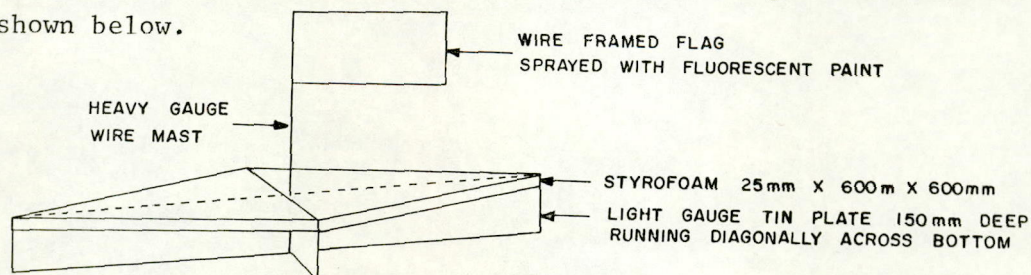
On the 23rd July 1975 and 3rd October 1975, tide levels were again recorded at The Heads as well as at the West and East sides of the causeway. Here again use was made of tide staffs at the causeway. The levels recorded on 23rd July 1975 at the causeway were not fixed in relation to a known datum but the levels on the West and East sides of the causeway are related to one another (see Appendix Figures A9 and A10). Levels recorded on the 3rd October 1975 were, however, related to the MSL datum (see Appendix Figures A11 and A12).

B. Current Measurements

Current velocities were measured at The Heads on 8th, 9th, 13th and 14th October 1974, along a line shown in Appendix Figure B1. Velocities were measured 2 m below the water surface and 2 m above the bottom in all cases. Ott current meters and the Plessey Direct Reading current meters were used for these measurements. All the current measurements are shown in Appendix Figures B2 to B11.

C. Flow patterns

Flow patterns were obtained by tracking drogue floats on 8th and 14th October 1974. A sketch of the drogues used is shown below.



The drogues were released at various locations and their positions determined every 15 minutes. Range finders located at two stations called "SLANG" and "VONK" were used to track the floats. All the data on flow patterns are presented in Appendix Figures C1 to C34.

D. Wind data

Wind data was recorded on the 8th, 9th, 13th and 14th October, 1974 at the jetty, Paarden Island, with a Lambrechts mechanical wind recorder, model 1482, type Woelfle. The recorder was positioned 7,4 m above ground level. The data is given in the form of hourly extractions shown in Appendix Figures D1 to D4.

A composite diagram indicating the wind speed and direction, tide levels and current velocities at The Heads as recorded on 13th October 1974 are also given in Appendix Figure D5.

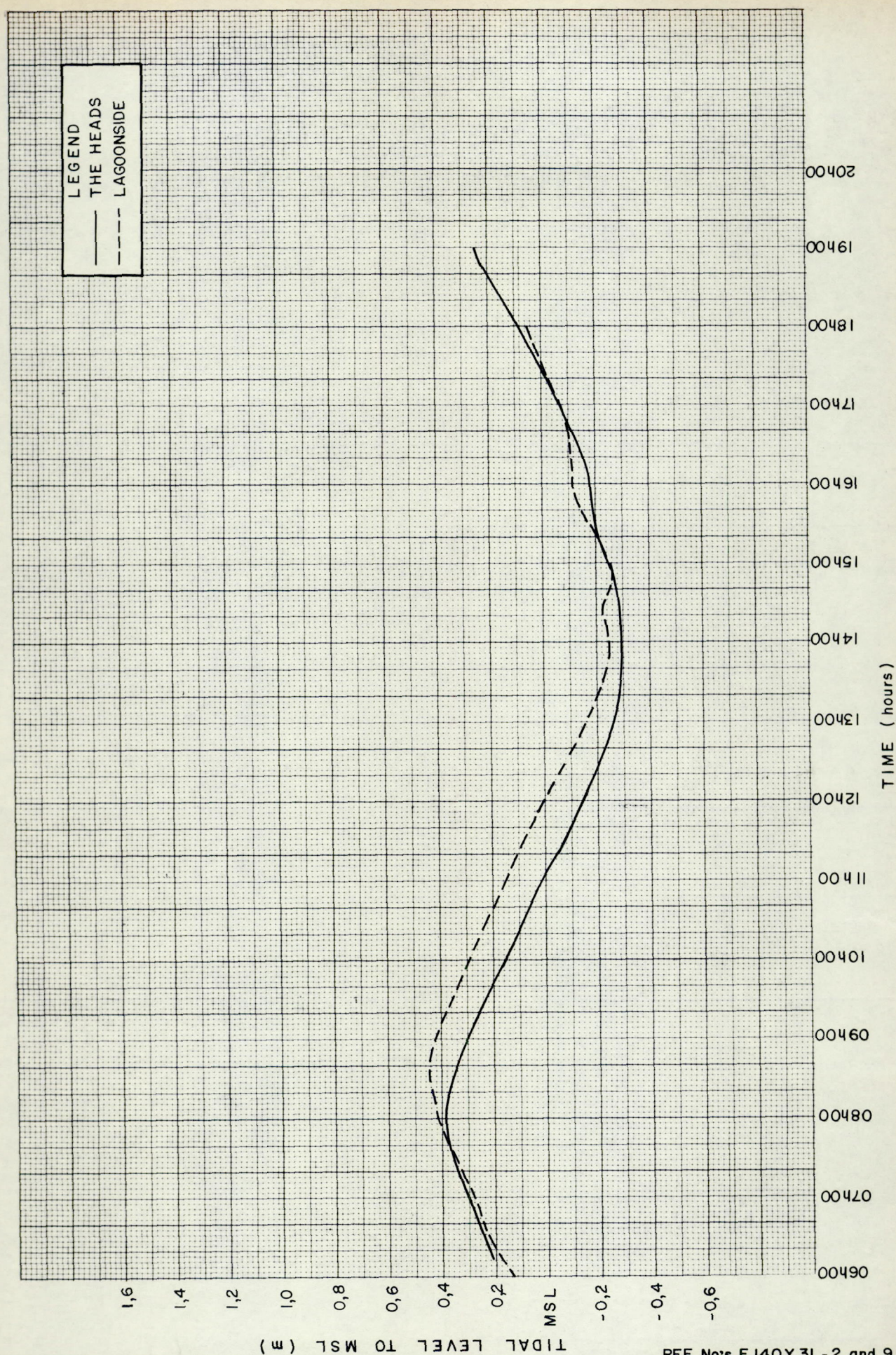
E. Survey of upper river section

To extend the model to the limit of the tidal reach, a survey of the Knysna River between Charlesford Rapids and Charlesford Farm Drift was carried out. Appendix Figure E1 illustrates the layout of this section.

F. Depth contours at The Heads

On the 1st October 1974 a set of depth sounding lines was run to ascertain the positions of the current metering stations in The Heads channel. The stations for the control of the depth soundings were established by tacheometry with reference to the light Beacon at The Heads and the rear Transit Beacon on Leasure Island.

The results of the survey is given in Appendix Figure F1.



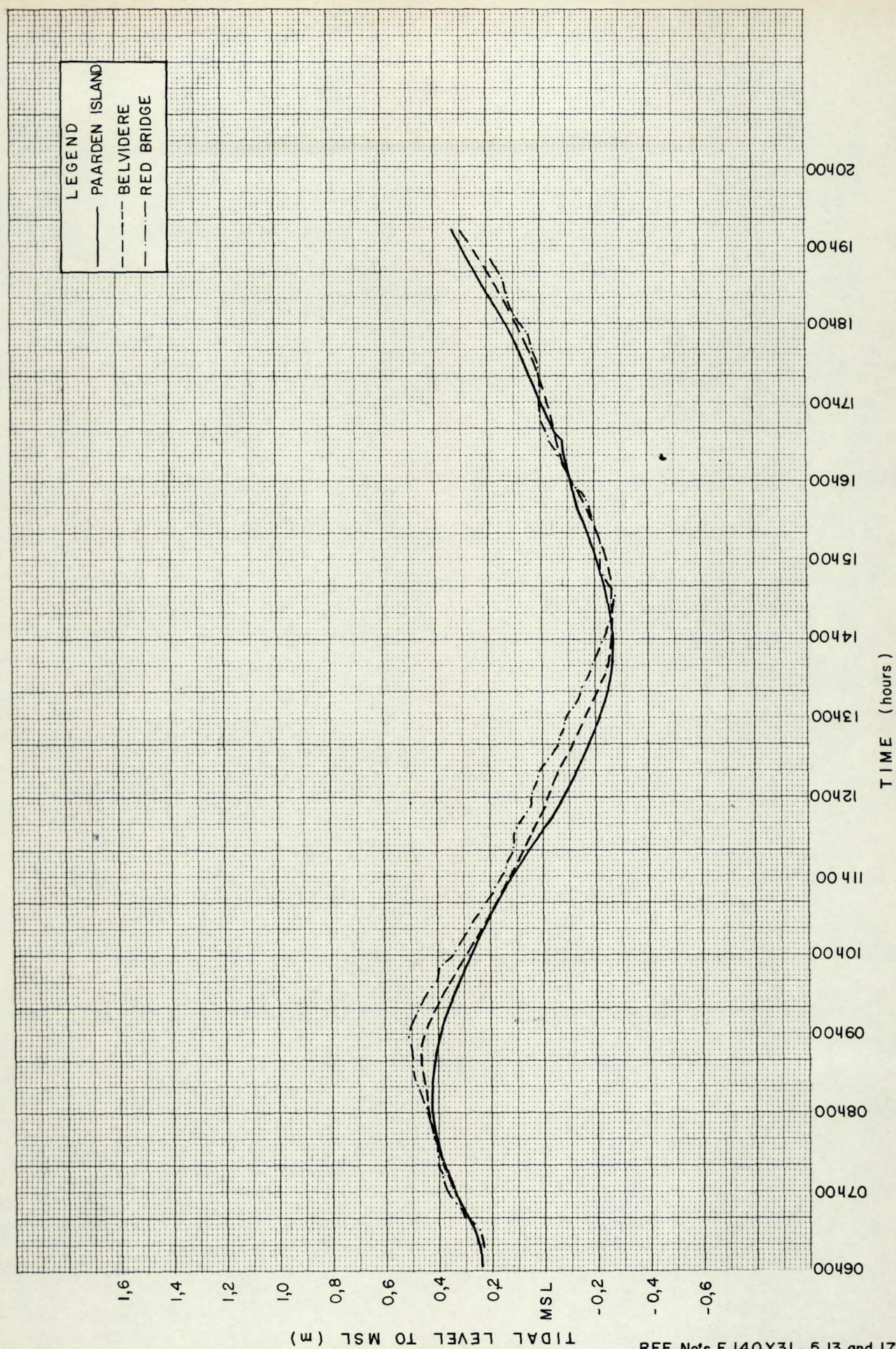
REF. No's F 140Y 31 - 2 and 9

KNYSNA LAGOON

PROTOTYPE TIDES RECORDED AT THE HEADS AND
 LAGOONSIDE ON 8/10/1974

APPENDIX
 FIGURE

A.1

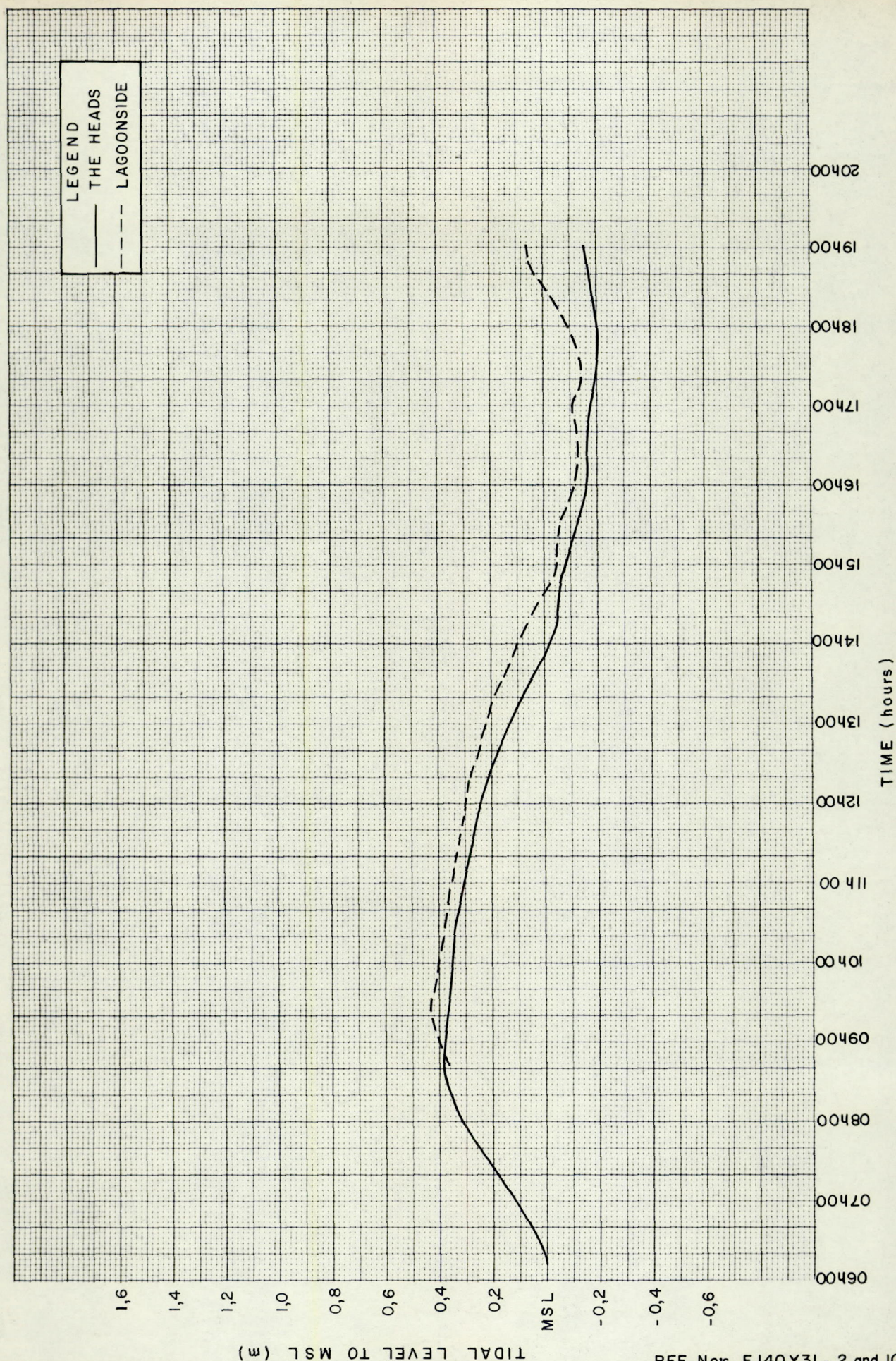


KNYSNA LAGOON

PROTOTYPE TIDES RECORDED AT PAARDEN ISLAND,
BELVIDERE AND RED BRIDGE ON 8/10/1974

APPENDIX
FIGURE

A.2



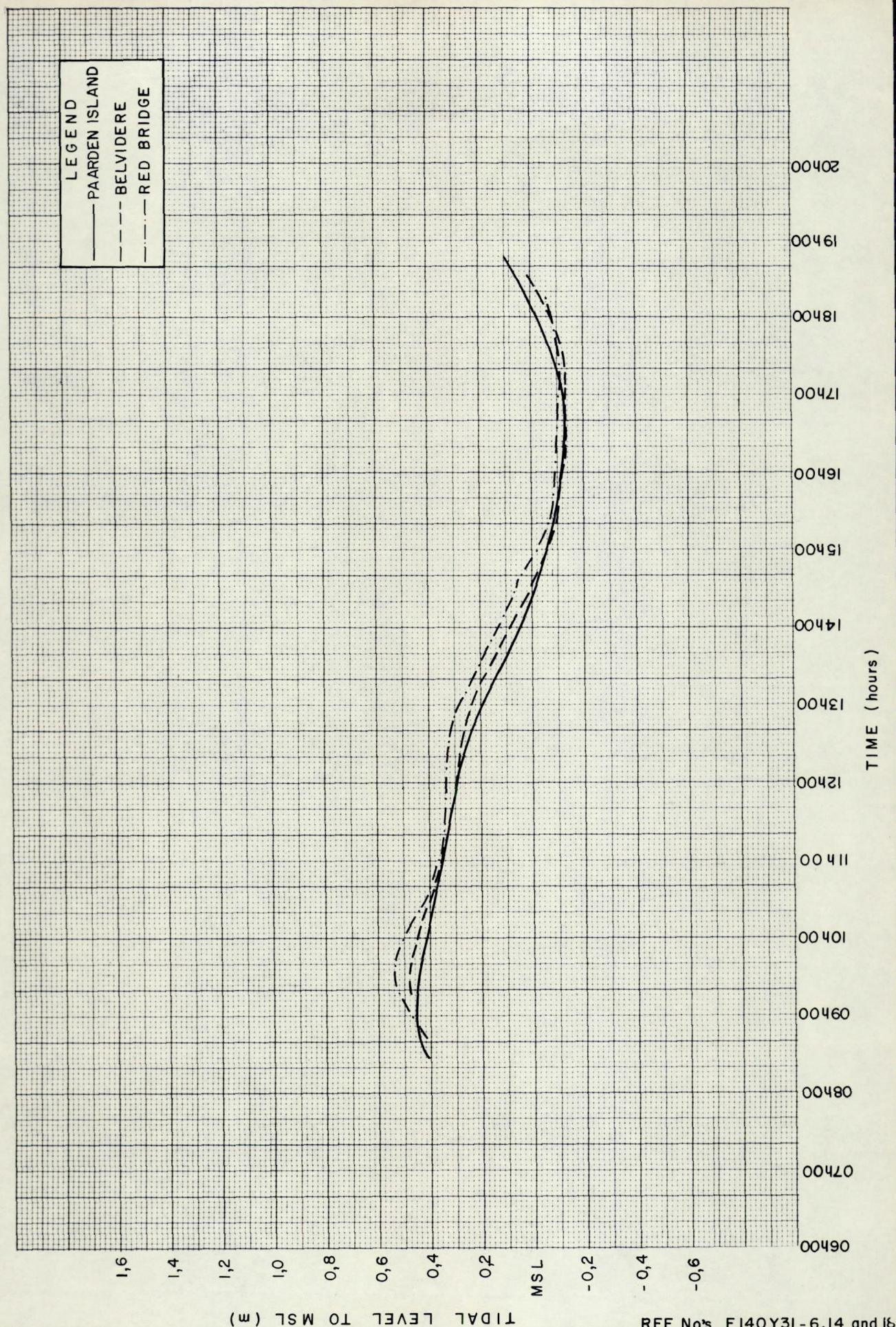
REF No's FI40Y31 - 2 and 10

KNYSNA LAGOON

PROTOTYPE TIDES RECORDED AT THE HEADS AND
 LAGOONSIDE ON 9/10/1974

APPENDIX
 FIGURE

A.3

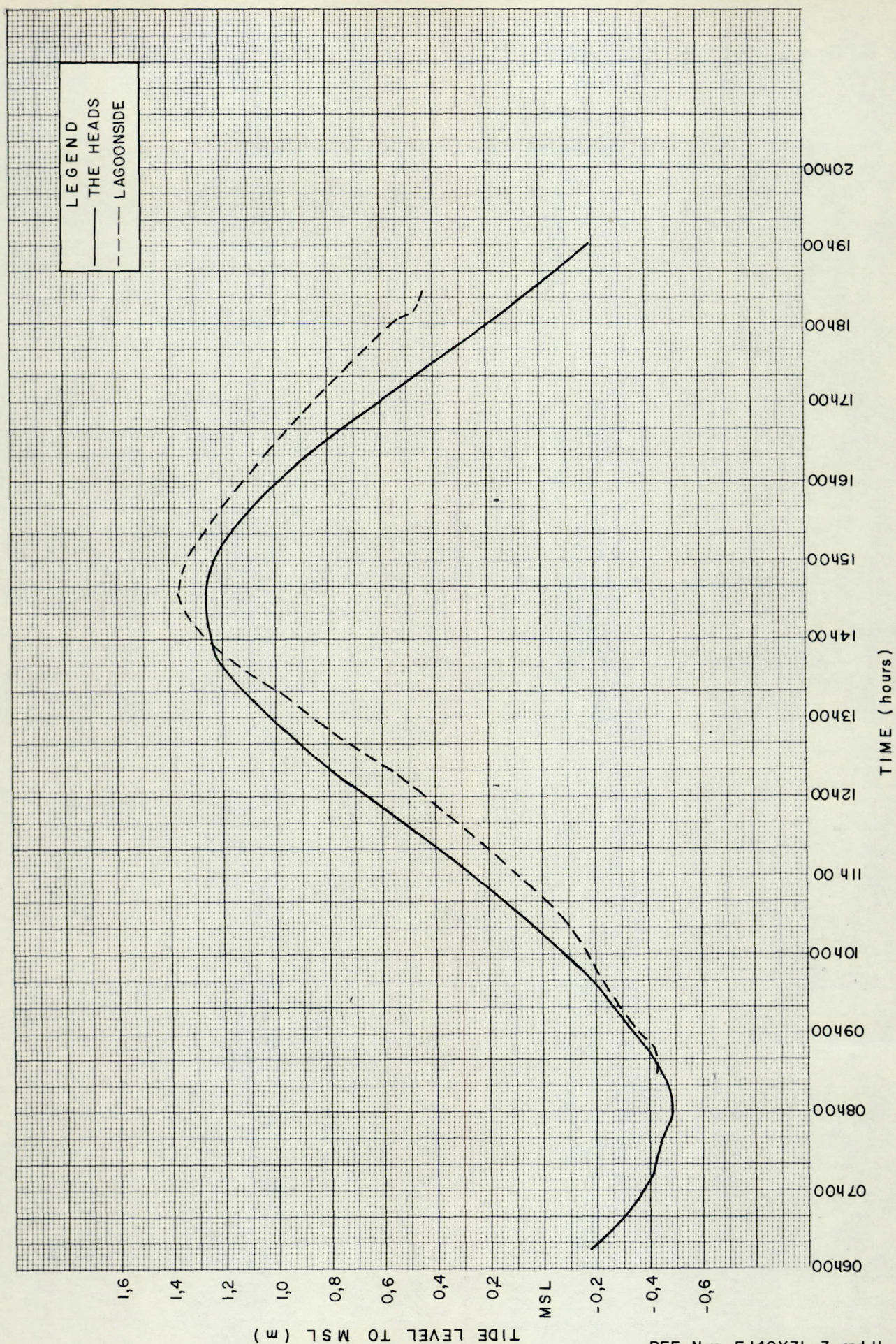


KNYSNA LAGOON

PROTOTYPES TIDES RECORDED AT PAARDEN ISLAND,
BELVIDERE AND RED BRIDGE ON 9/10/1974

APPENDIX
FIGURE

A.4



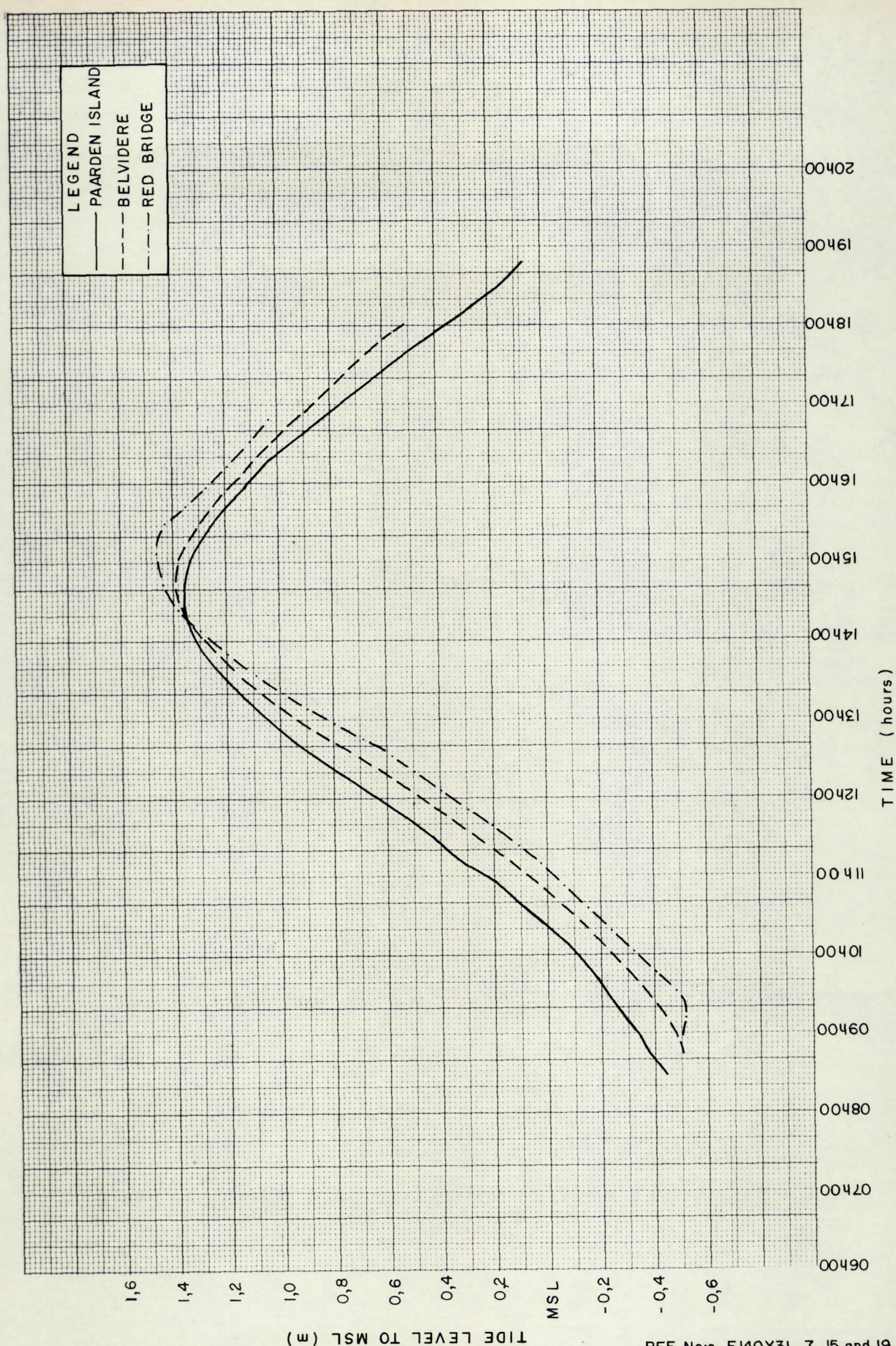
REF. No's F140Y31-3 and 11

KNYSNA LAGOON

PROTOTYPE TIDES RECORDED AT THE HEADS AND
LAGOON SIDE ON 13/10/1974

APPENDIX
FIGURE

A.5

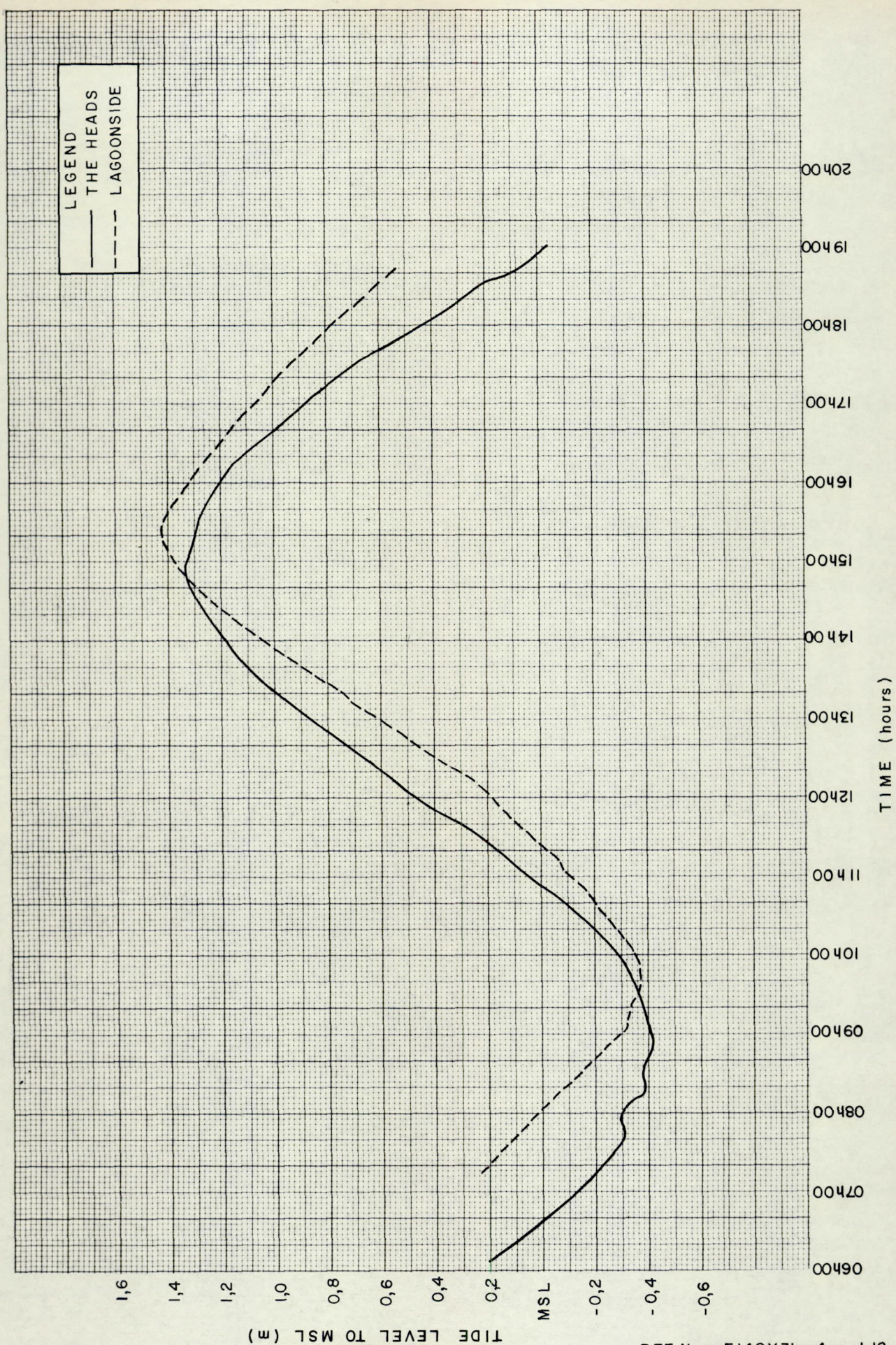


REF No's FI40Y31-7, 15 and 19

KNYSNA LAGOON

PROTOTYPE TIDES RECORDED AT PAARDEN ISLAND,
BELVIDERE AND RED BRIDGE ON 13/10/1974

APPENDIX
FIGURE
A.6



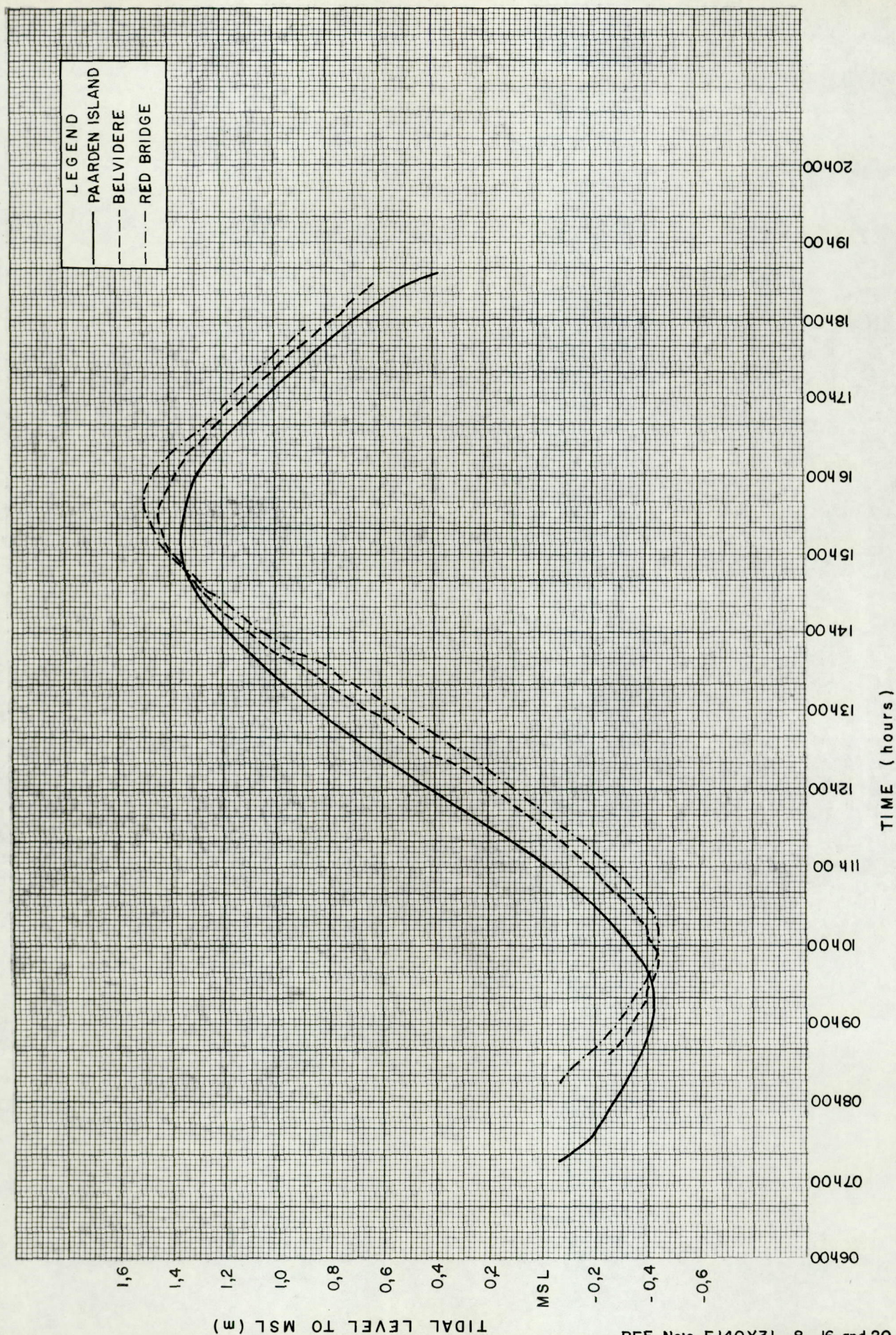
REF No's FI40Y3I - 4 and I2

KNYSNA LAGOON

PROTOTYPE TIDES RECORDED AT THE HEADS AND
LAGOONSIDE ON 14/10/1974

APPENDIX
FIGURE

A.7



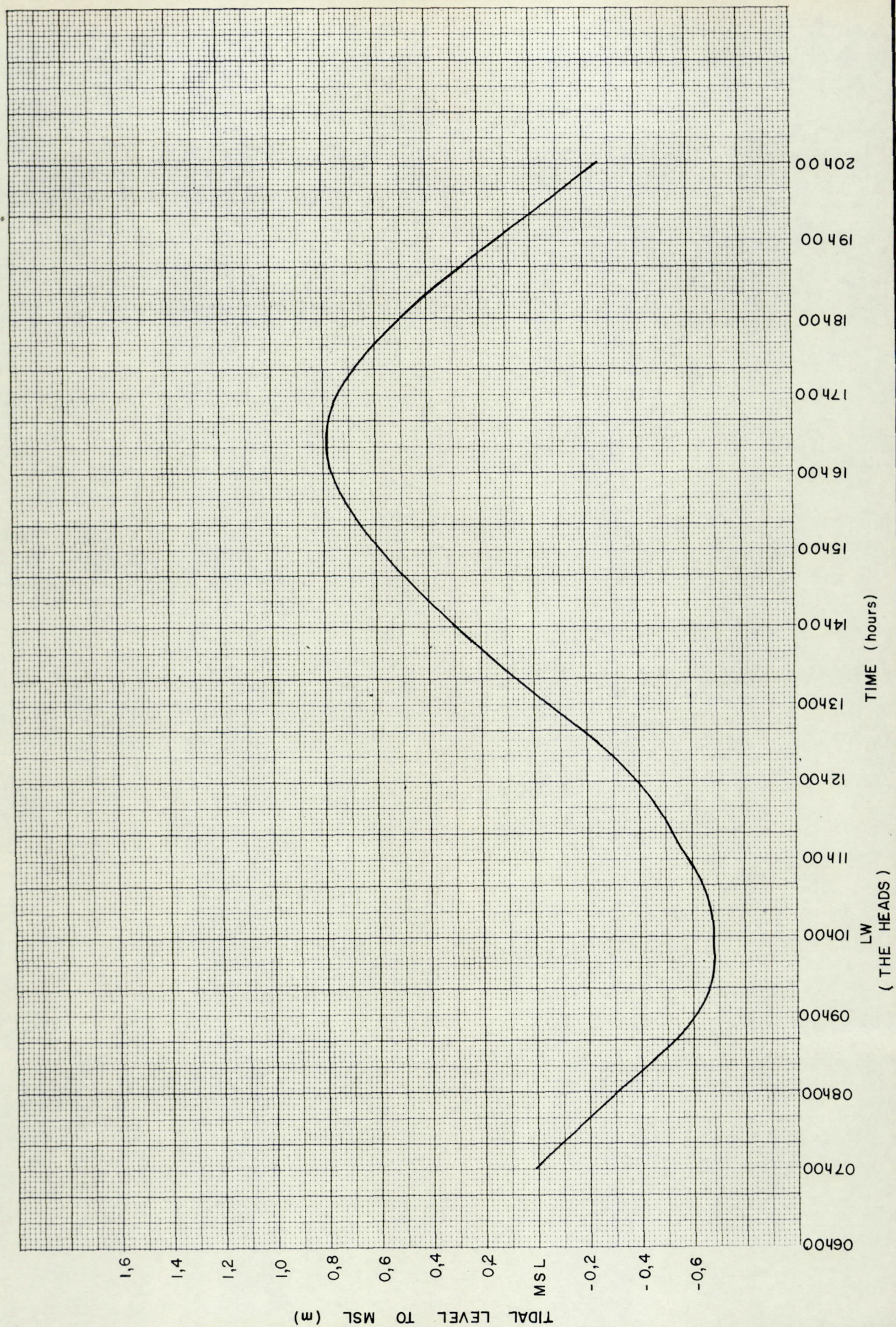
REF. No's F140Y31 -8, 16 and 20

KNYSNA LAGOON

PROTOTYPE TIDES RECORDED AT PAARDEN ISLAND,
BELVIDERE AND RED BRIDGE ON 14/10/1974

APPENDIX
FIGURE

A.8

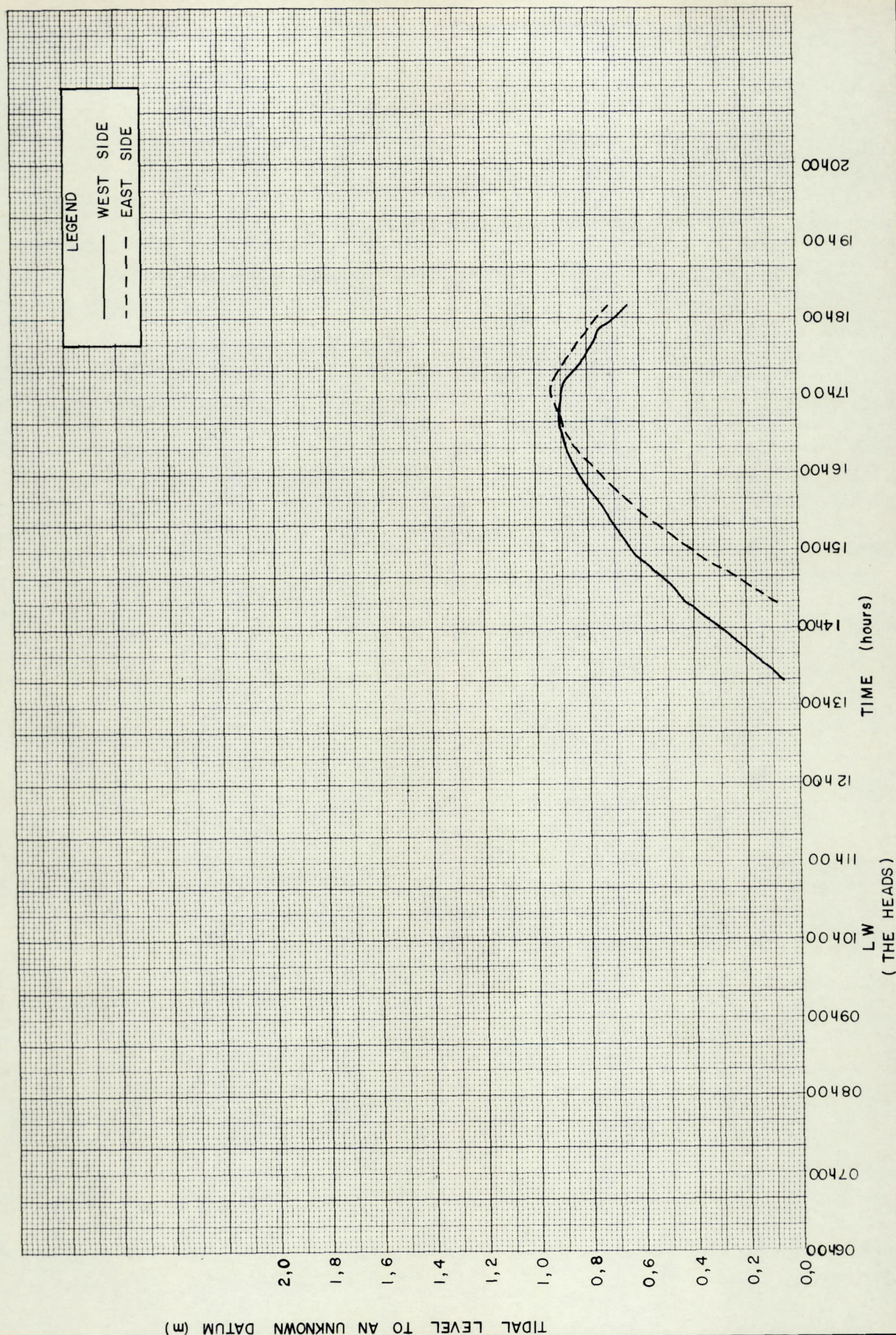


KNYSNA LAGOON

TIDE RECORDINGS AT 'THE HEADS' ON 23/7/1975

APPENDIX
FIGURE

A.9

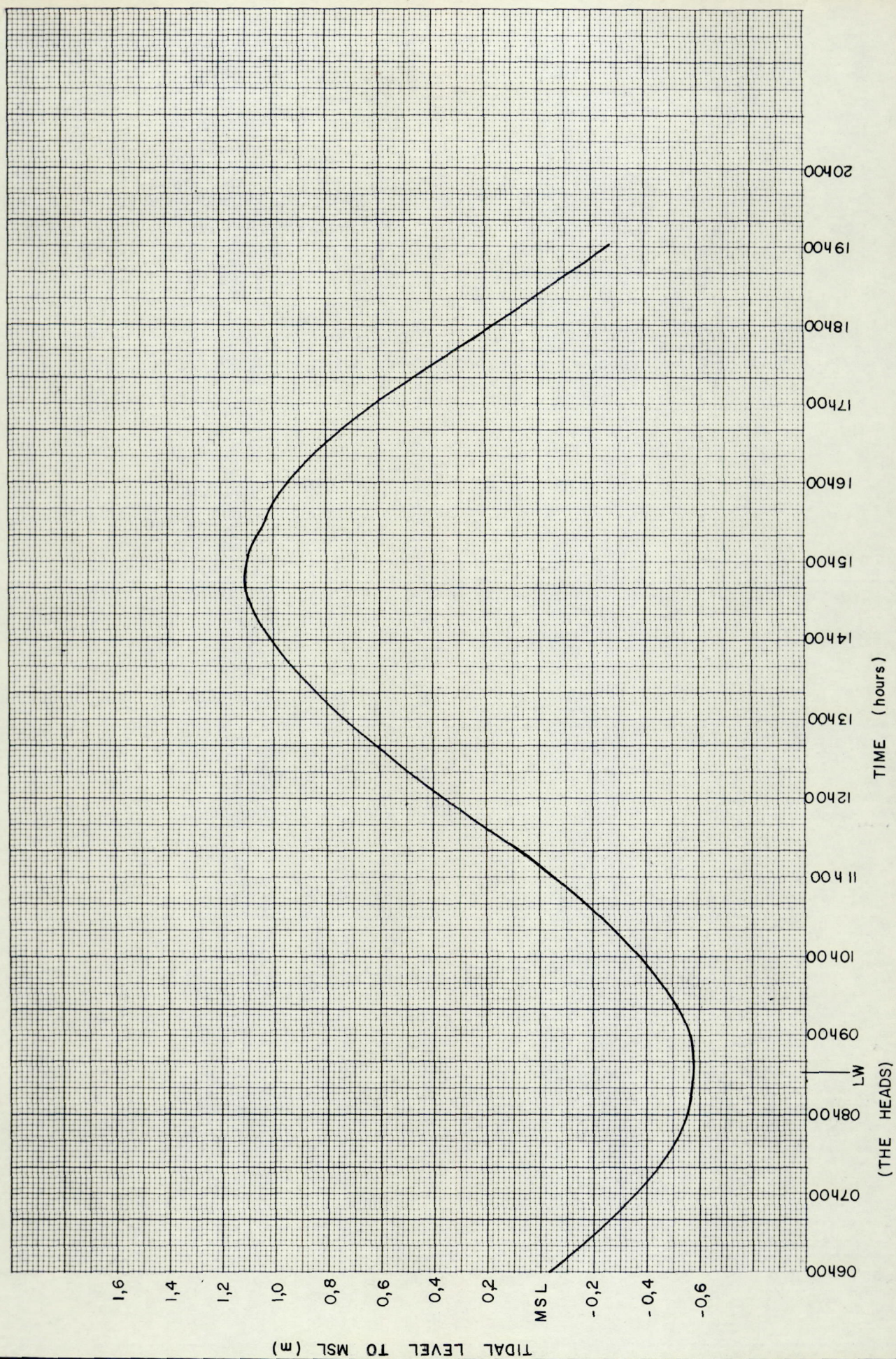


KNYSNA LAGOON

TIDES RECORDED AT THE CAUSEWAY ON 23/7/1975

APPENDIX
FIGURE

A.10

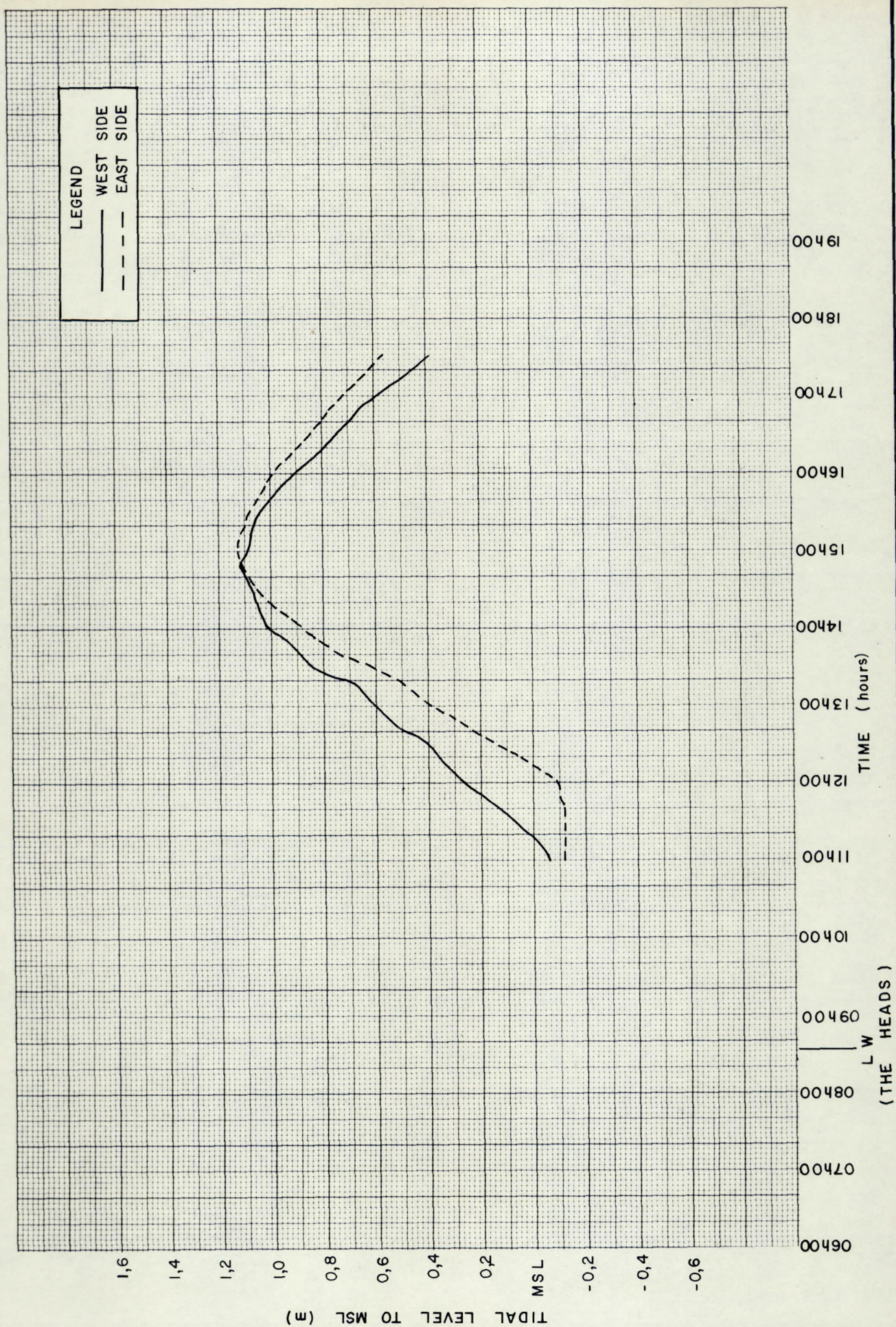


KNYSNA LAGOON

TIDE RECORDED AT 'THE HEADS' ON 3/10/1975

APPENDIX
FIGURE

A.11

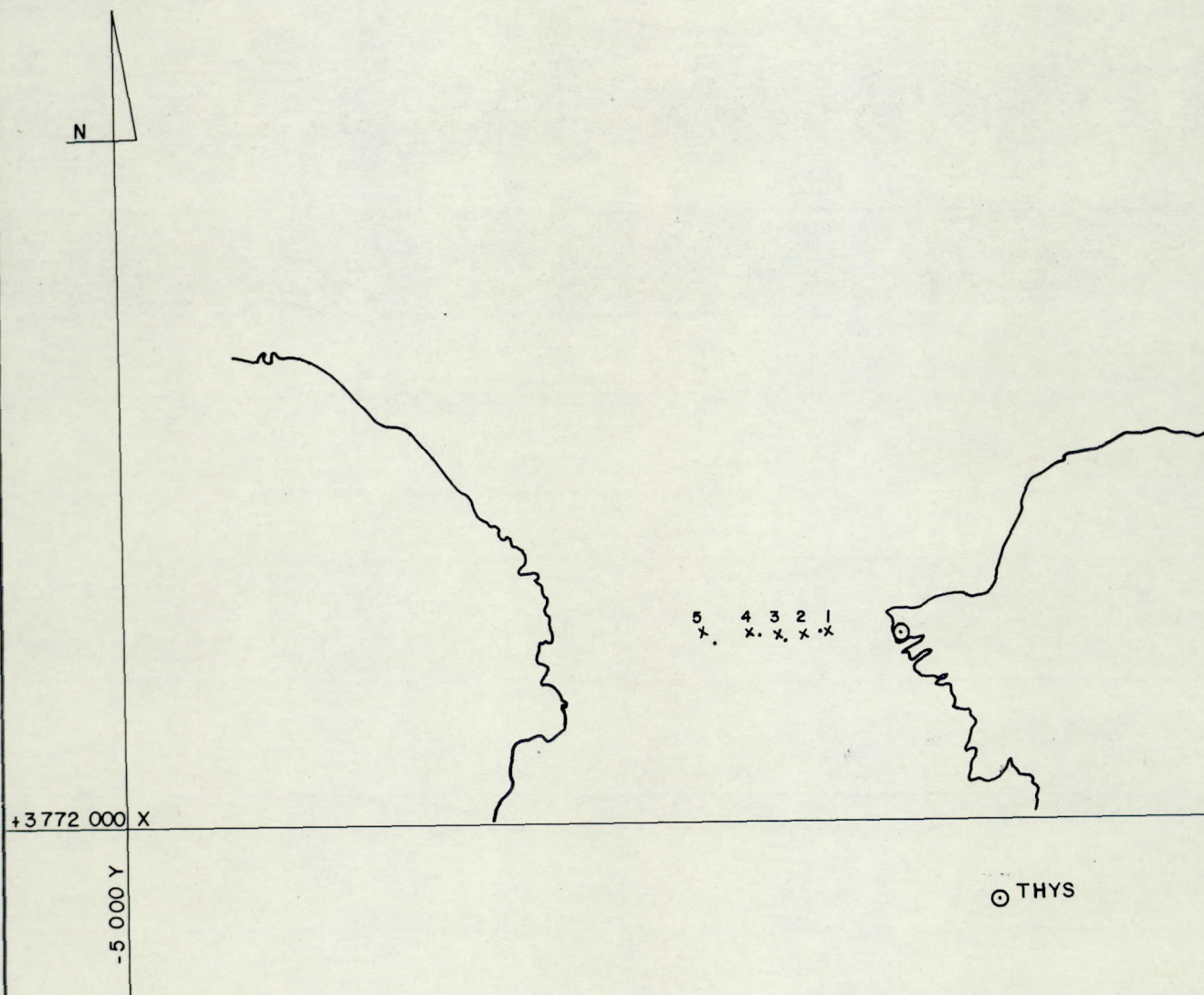


KNYSNA LAGOON

TIDES RECORDED AT THE CAUSEWAY ON 3/10/1975

APPENDIX
 FIGURE

A.12



x = BUOY POSITIONS MARKING CURRENT METERING STATIONS

• = POSITIONS OF BOATS OCCUPYING STATIONS 1,3,4 & 5 ON 13/10/1974

SCALE: 1 : 5 000

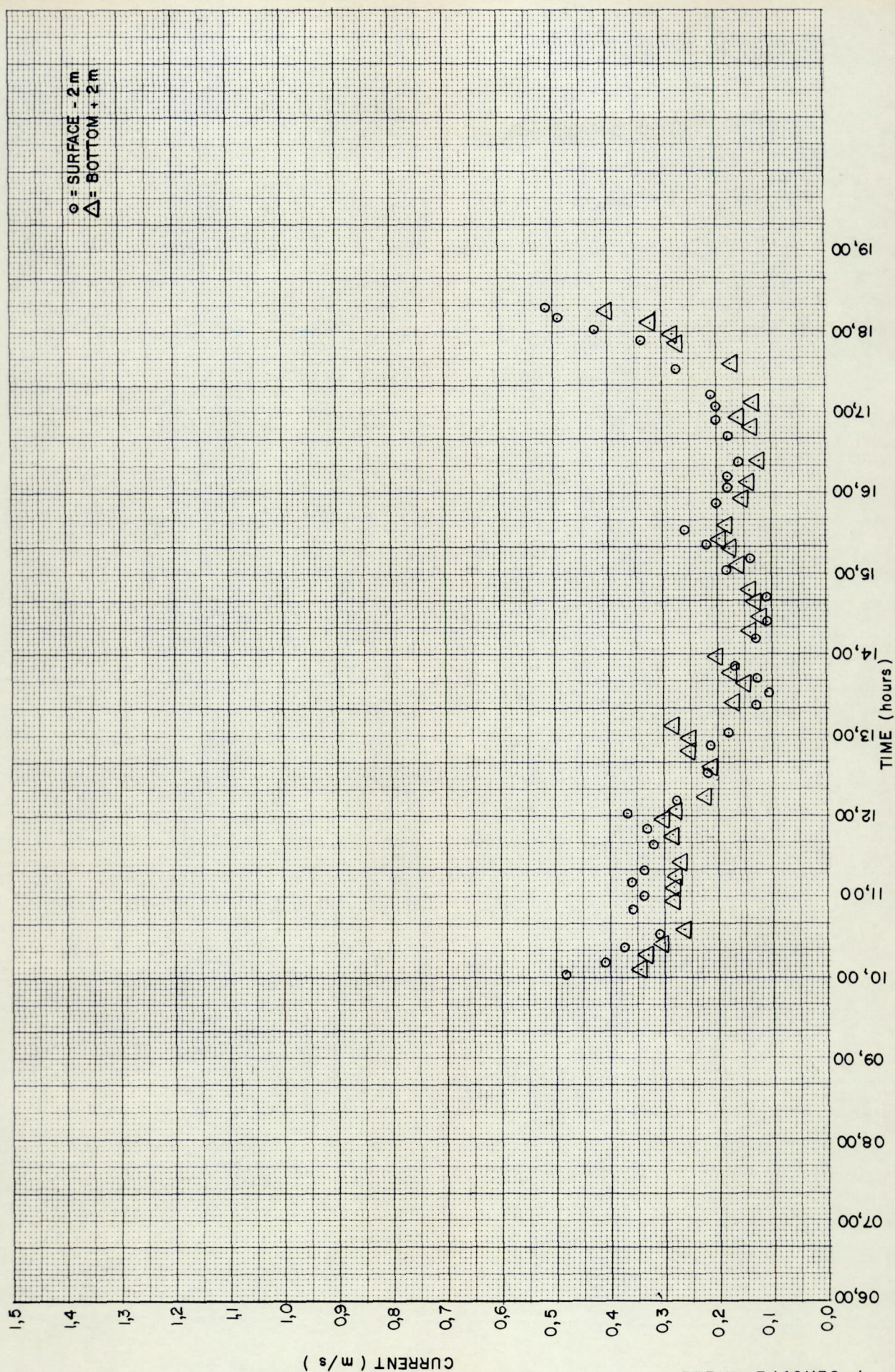
REFERENCE NO.: F 140X34

KNYSNA LAGOON

CURRENT METERING POSITIONS AT THE HEADS

APPENDIX
FIGURE

B.1



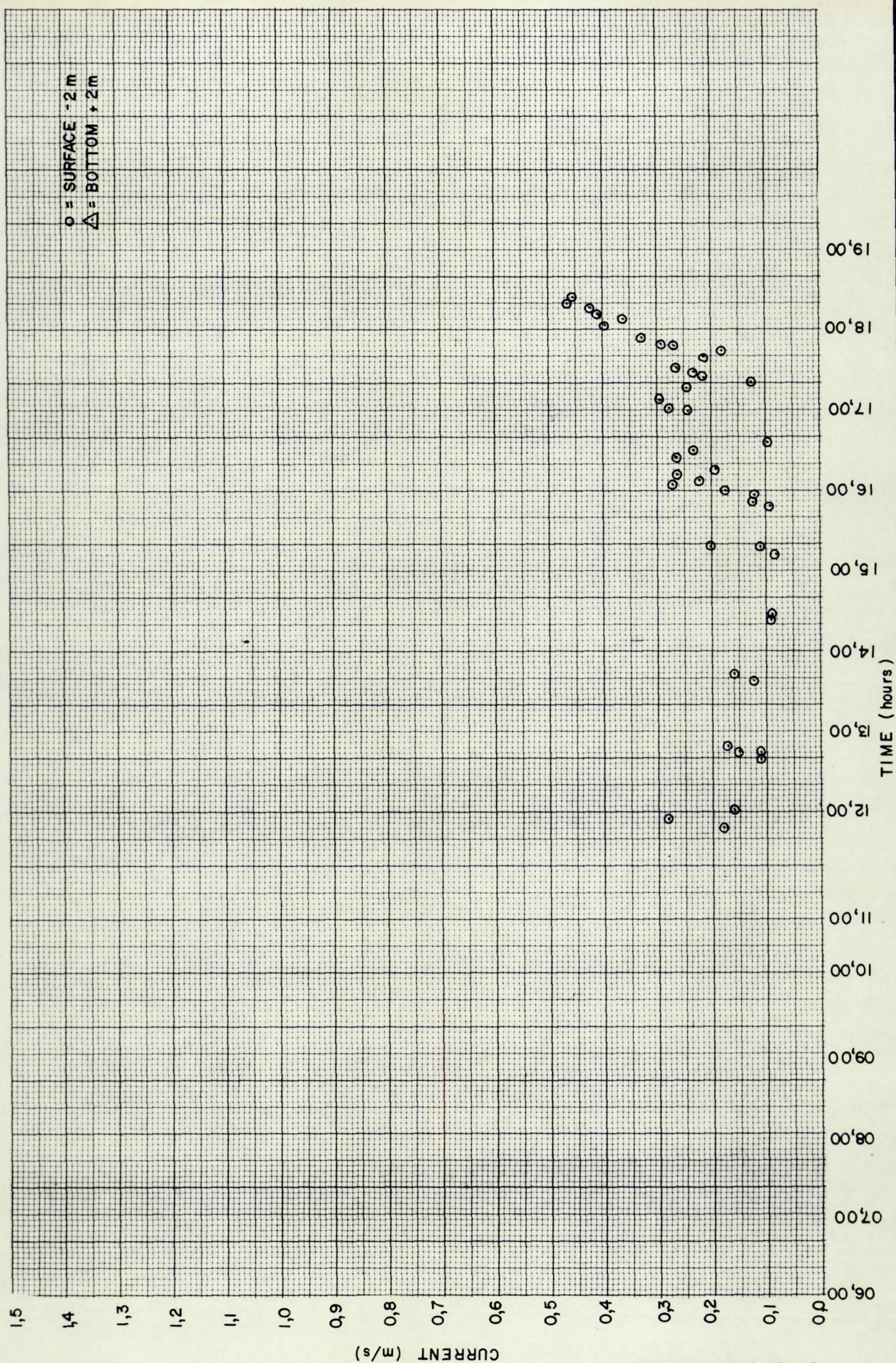
REF. No. F 140Y32 - 1

KNYSNA LAGOON

CURRENT MEASUREMENTS AT THE HEADS
 POSITION 2 ON 8/10/1974

APPENDIX
 FIGURE

B.2



REF. No. F140Y32-2

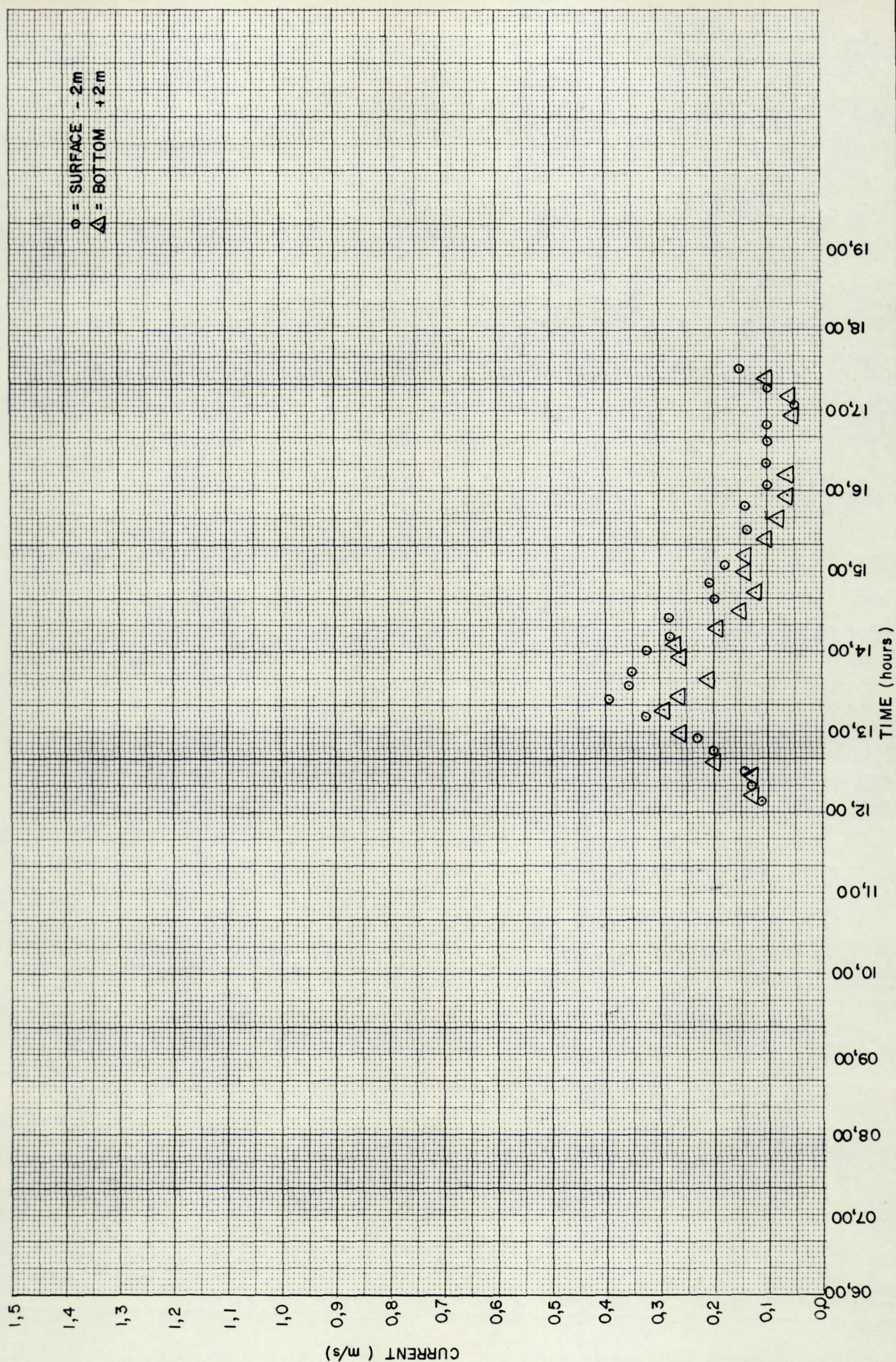
KNYSNA LAGOON

CURRENT MEASUREMENTS AT THE HEADS

POSITION 3 ON 8/10/1974

APPENDIX
FIGURE

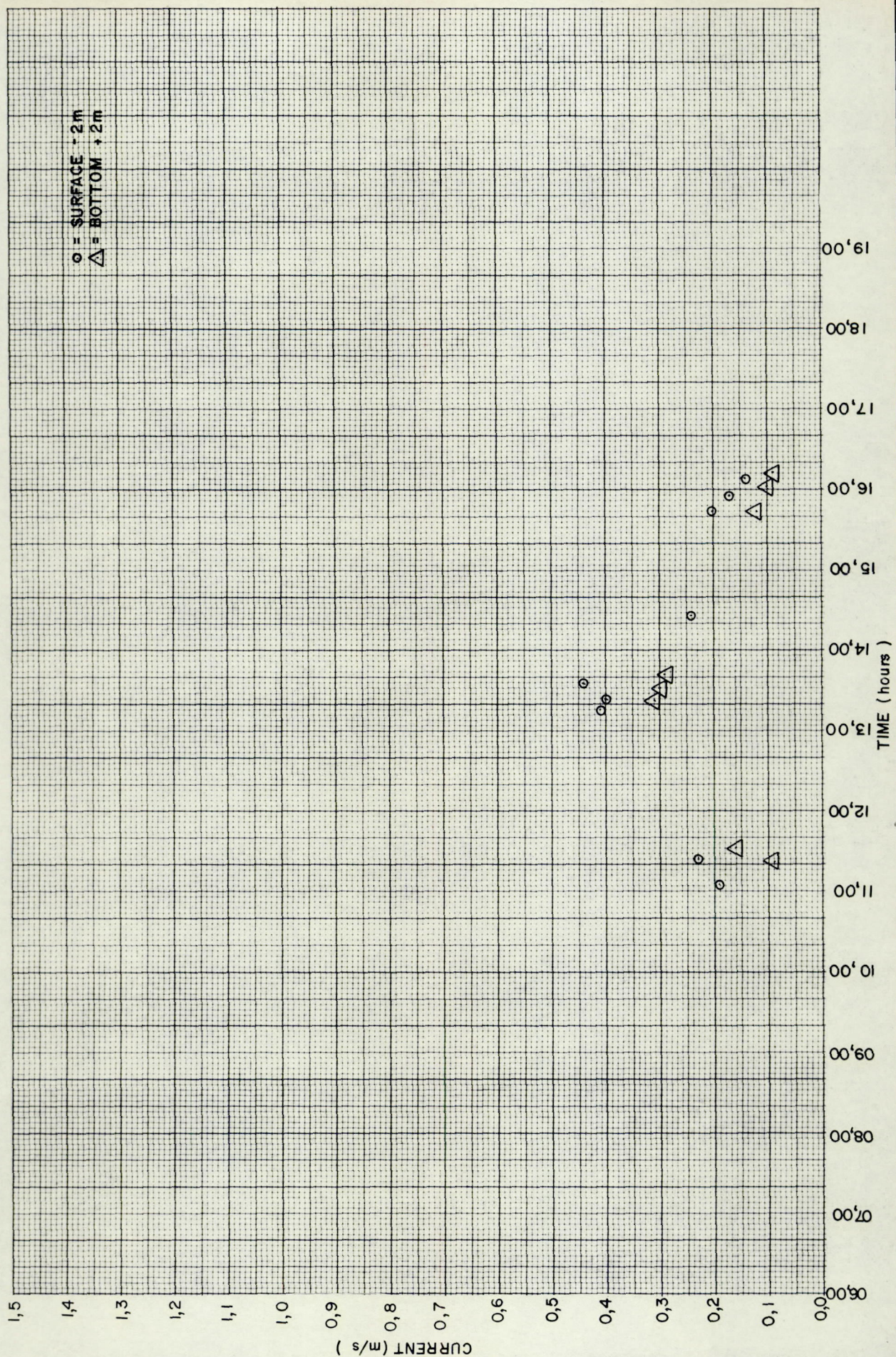
B.3



REF No. F140Y32 - 3

KNYSNA LAGOON
 CURRENT MEASUREMENTS AT THE HEADS
 POSITION I ON 9/10/1974

APPENDIX
 FIGURE
 B.4

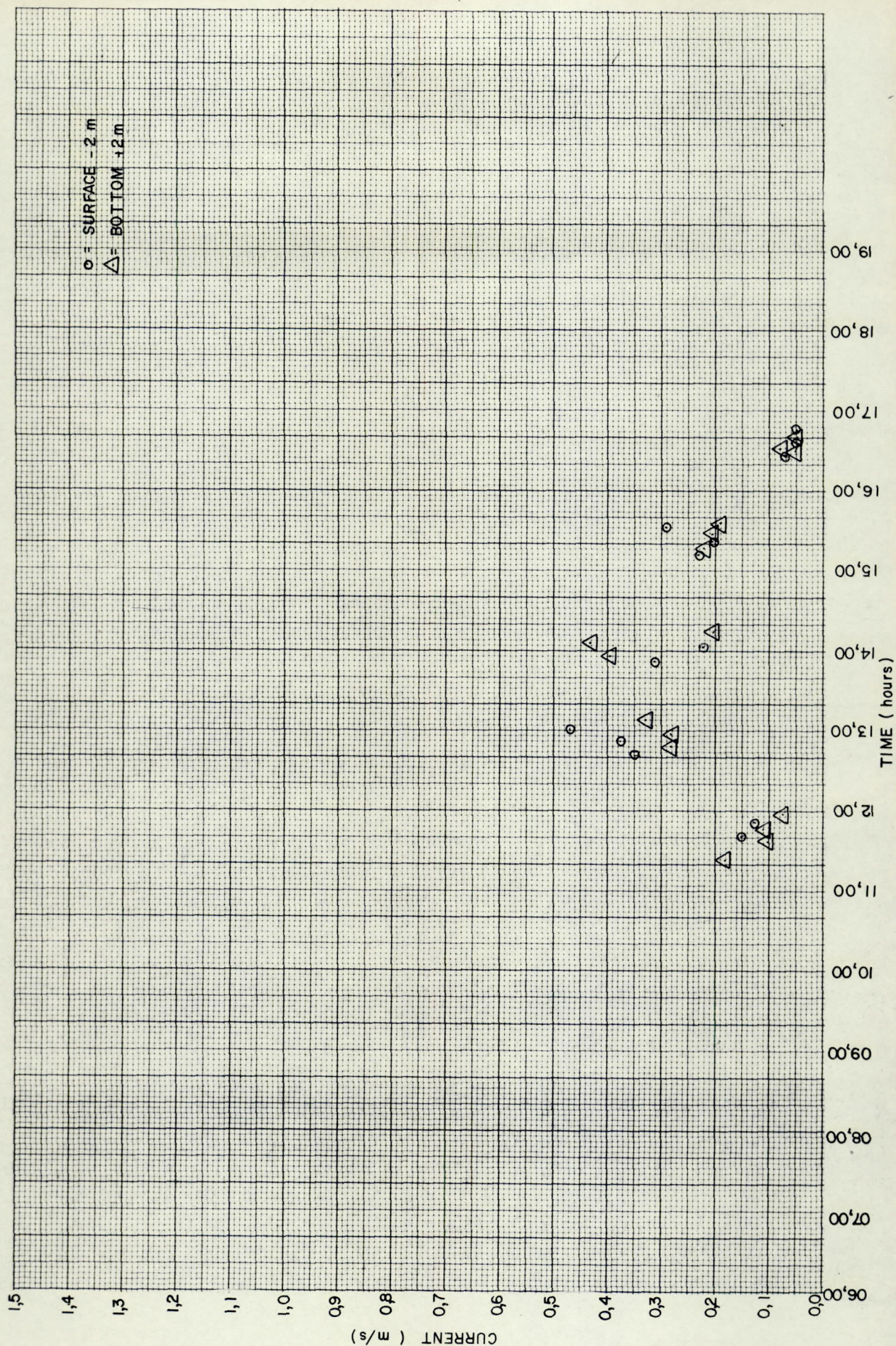


REF No. F140Y32 - 4

KNYSNA LAGOON
 CURRENT MEASUREMENTS AT THE HEADS
 POSITION 4 ON 9/10/1974

APPENDIX
 FIGURE

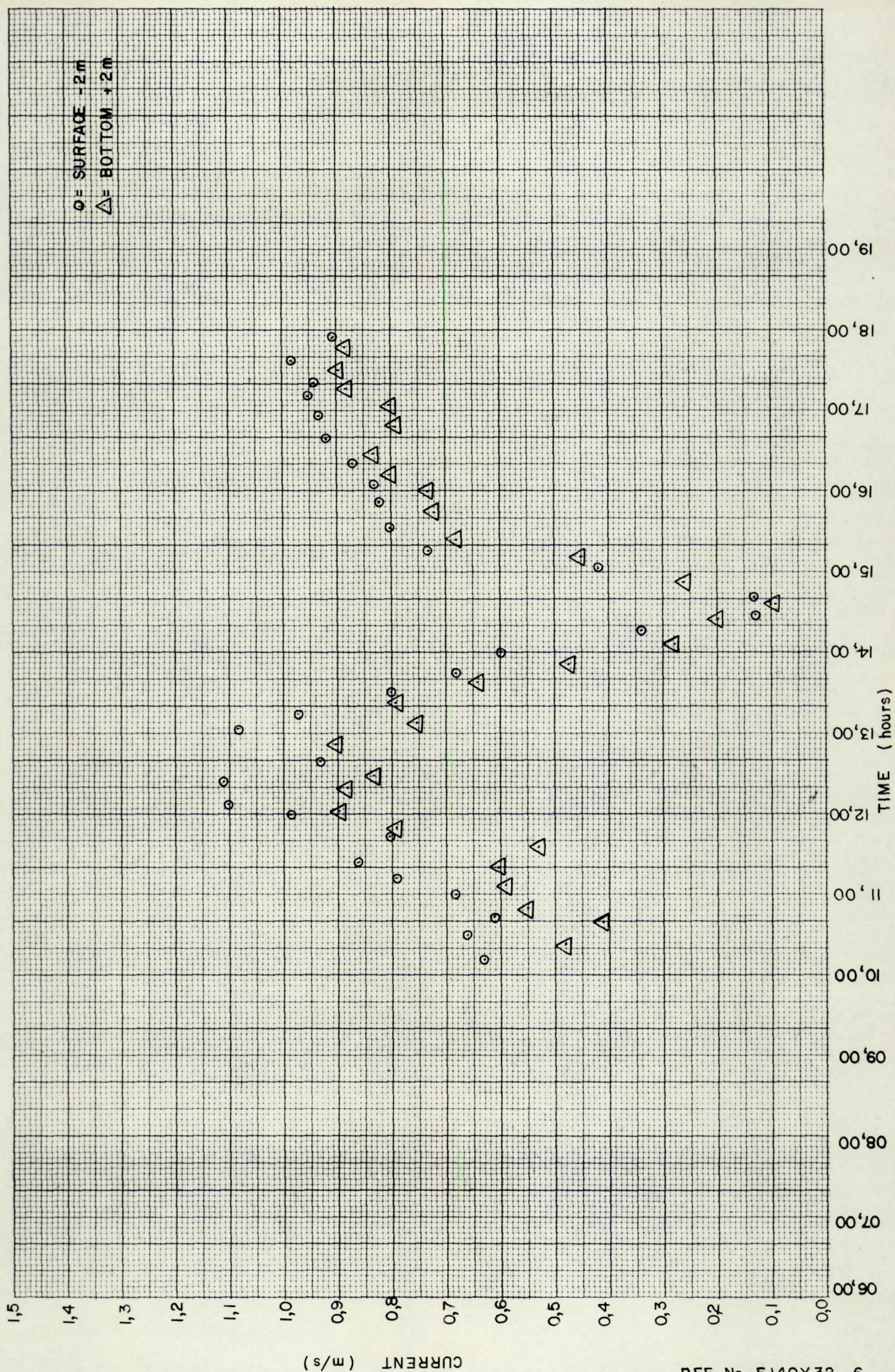
B.5



REF No. F140Y32 - 5

KNYSNA LAGOON
 CURRENT MEASUREMENTS AT THE HEADS
 POSITION 5 ON 9/10/1974

APPENDIX
 FIGURE
 B.6



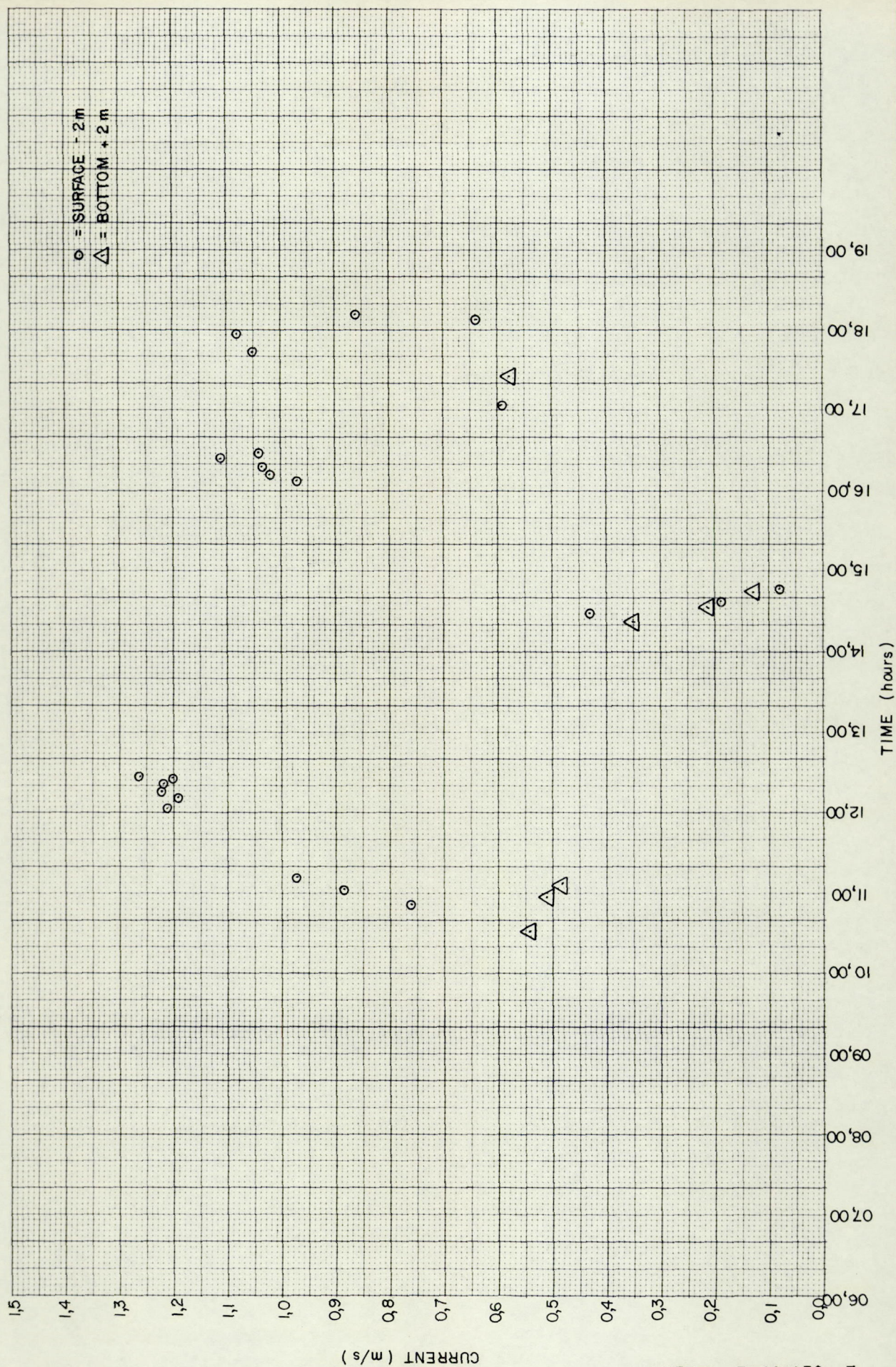
REF No. F140Y32 - 6

KNYSNA LAGOON

CURRENT MEASUREMENTS AT THE HEADS
 POSITION 1 ON 13/10/1974

APPENDIX
 FIGURE

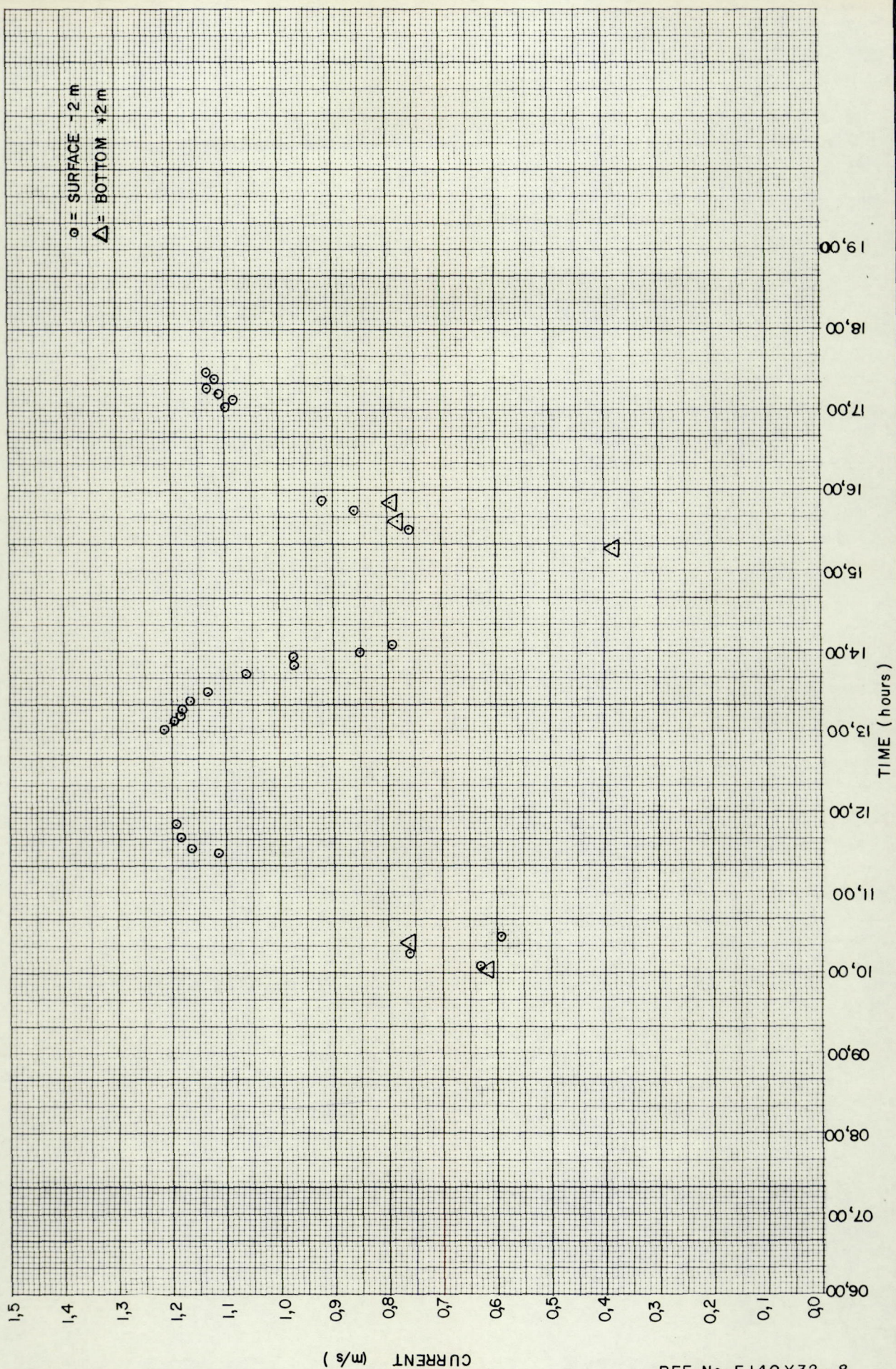
B.7



REF. No. FI 40 Y 32 - 7

KNYSNA LAGOON
 CURRENT MEASUREMENTS AT THE HEADS
 POSITION 3 ON 13 / 10 / 1974

APPENDIX
 FIGURE
 B.8



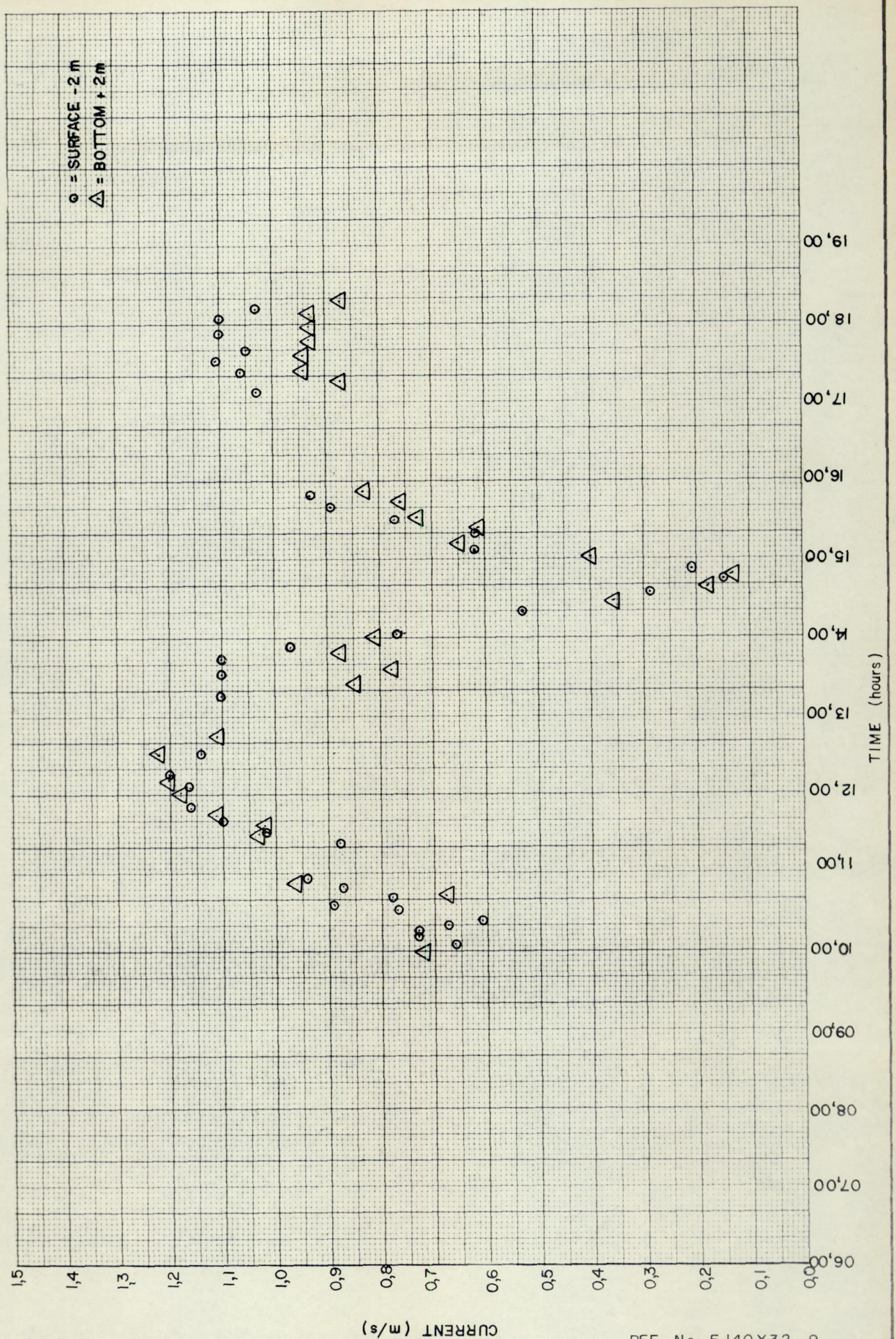
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KNYSNA LAGOON

CURRENT MEASUREMENTS AT THE HEADS
POSITION 4 ON 13/10/1974

APPENDIX
FIGURE

B.9



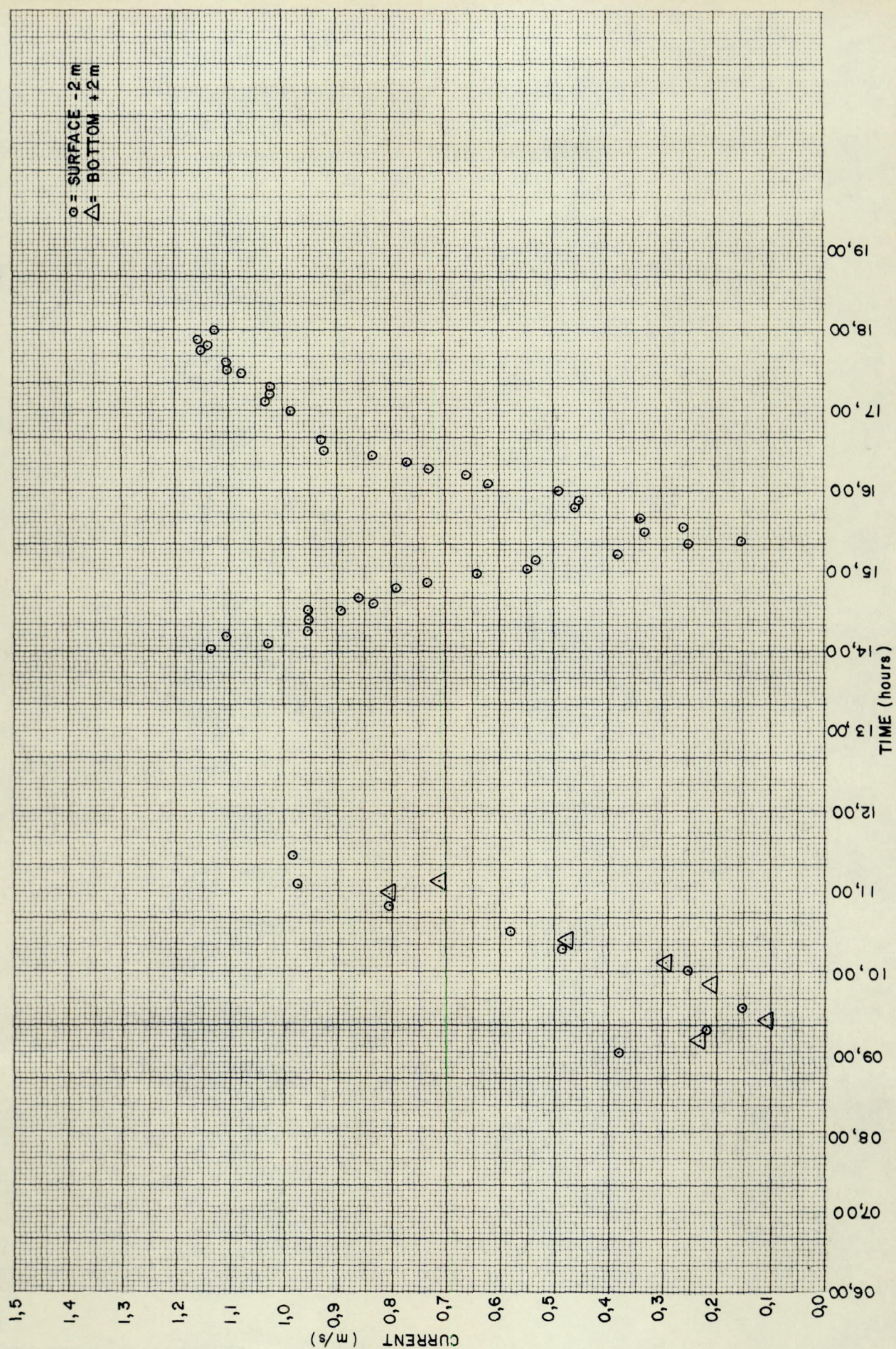
REF No. F140Y32-9

KNYSNA LAGOON

CURRENT MEASUREMENTS AT THE HEADS
POSITION 5 ON 13/10/1974

APPENDIX
FIGURE

B.10



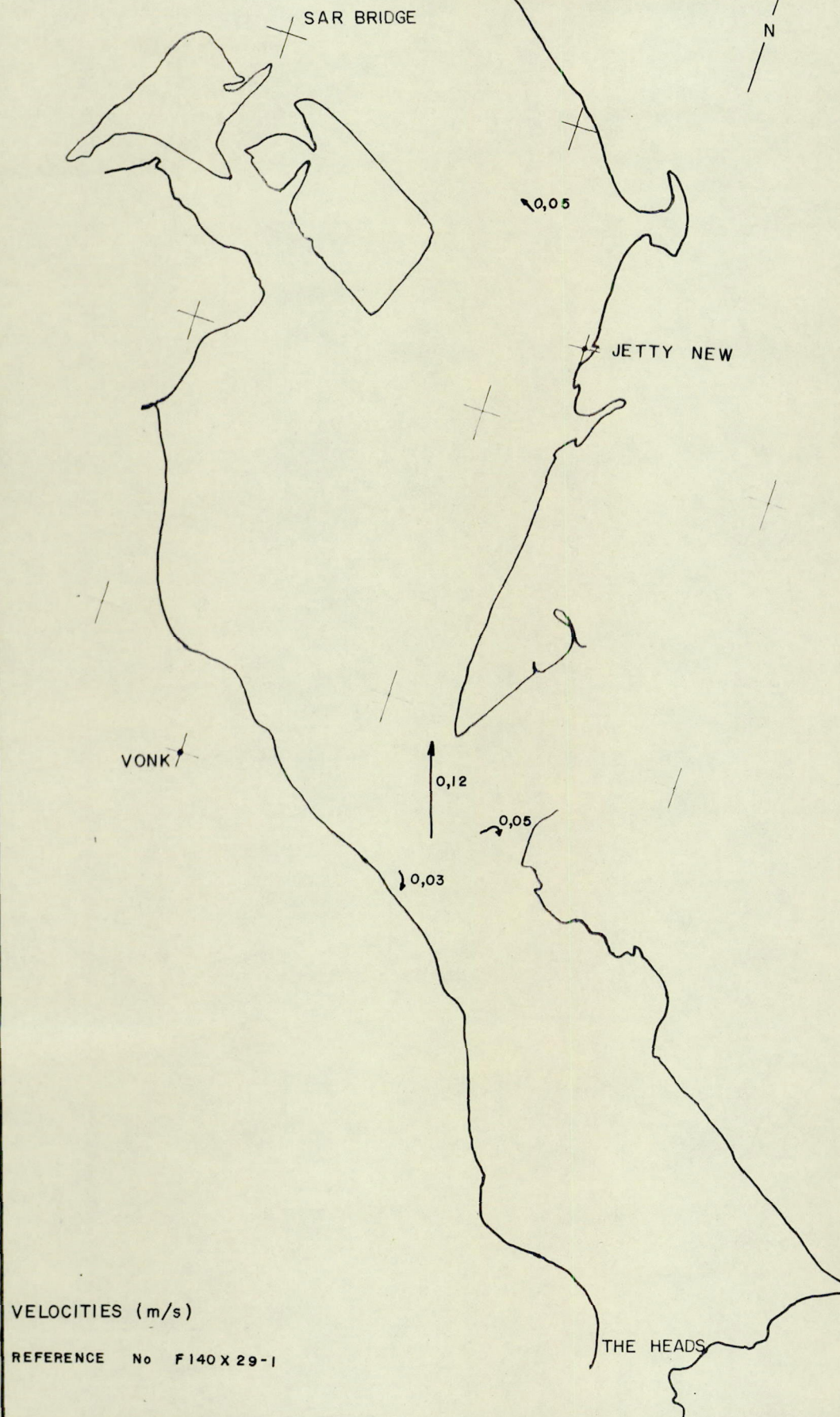
REF No F140Y32 - 10

KNYSNA LAGOON

CURRENT MEASUREMENTS AT THE HEADS
POSITION 2/3 ON 14/10/1974

APPENDIX
FIGURE

B.11



VELOCITIES (m/s)

REFERENCE No F140X29-1

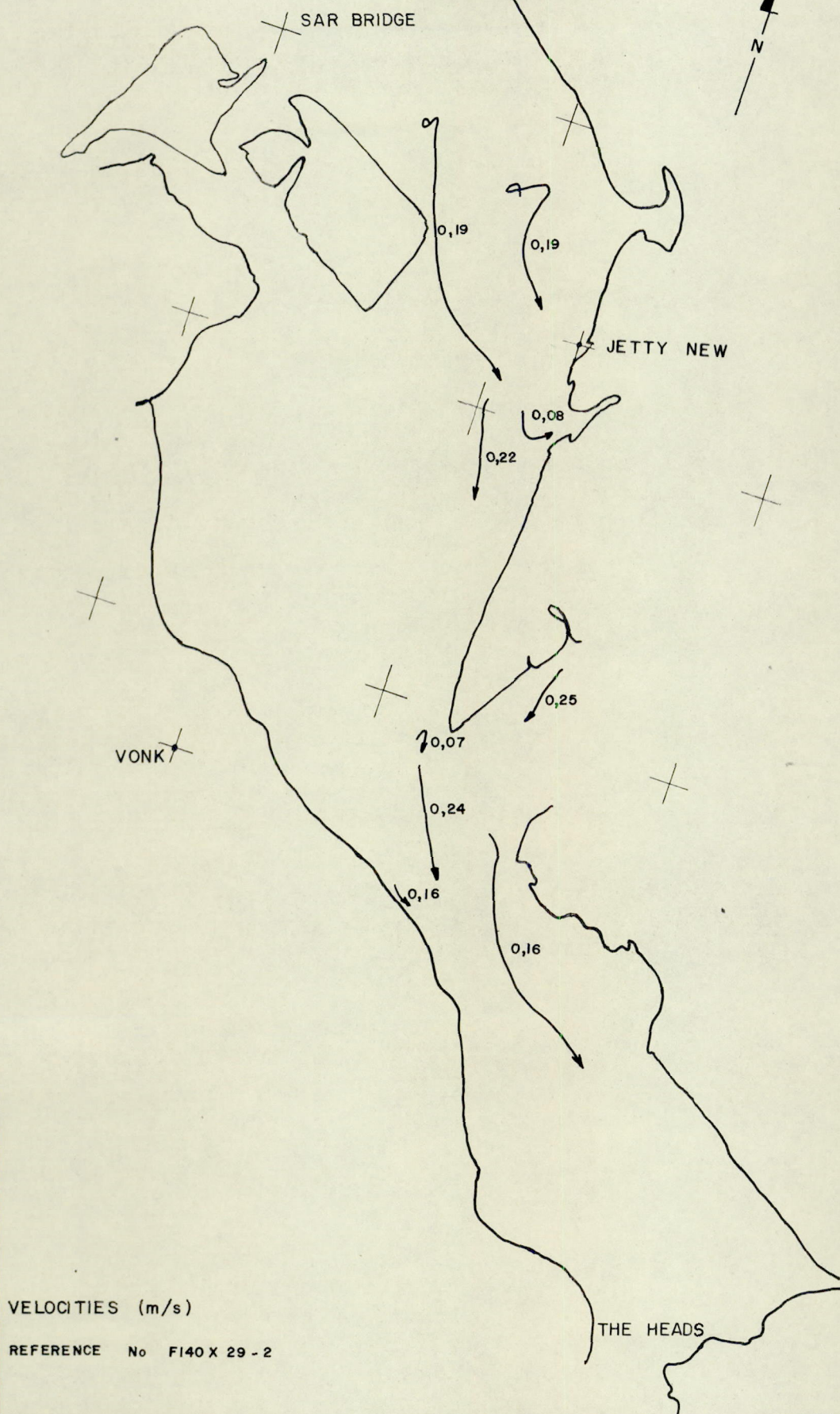
SCALE 1: 20 000

KNYSNA LAGOON

CURRENT TRACKING BETWEEN THE HEADS AND
SAR BRIDGE 8/10/1974 06h30-08h00

APPENDIX
FIGURE

C.1



VELOCITIES (m/s)

REFERENCE No FI40 X 29 - 2

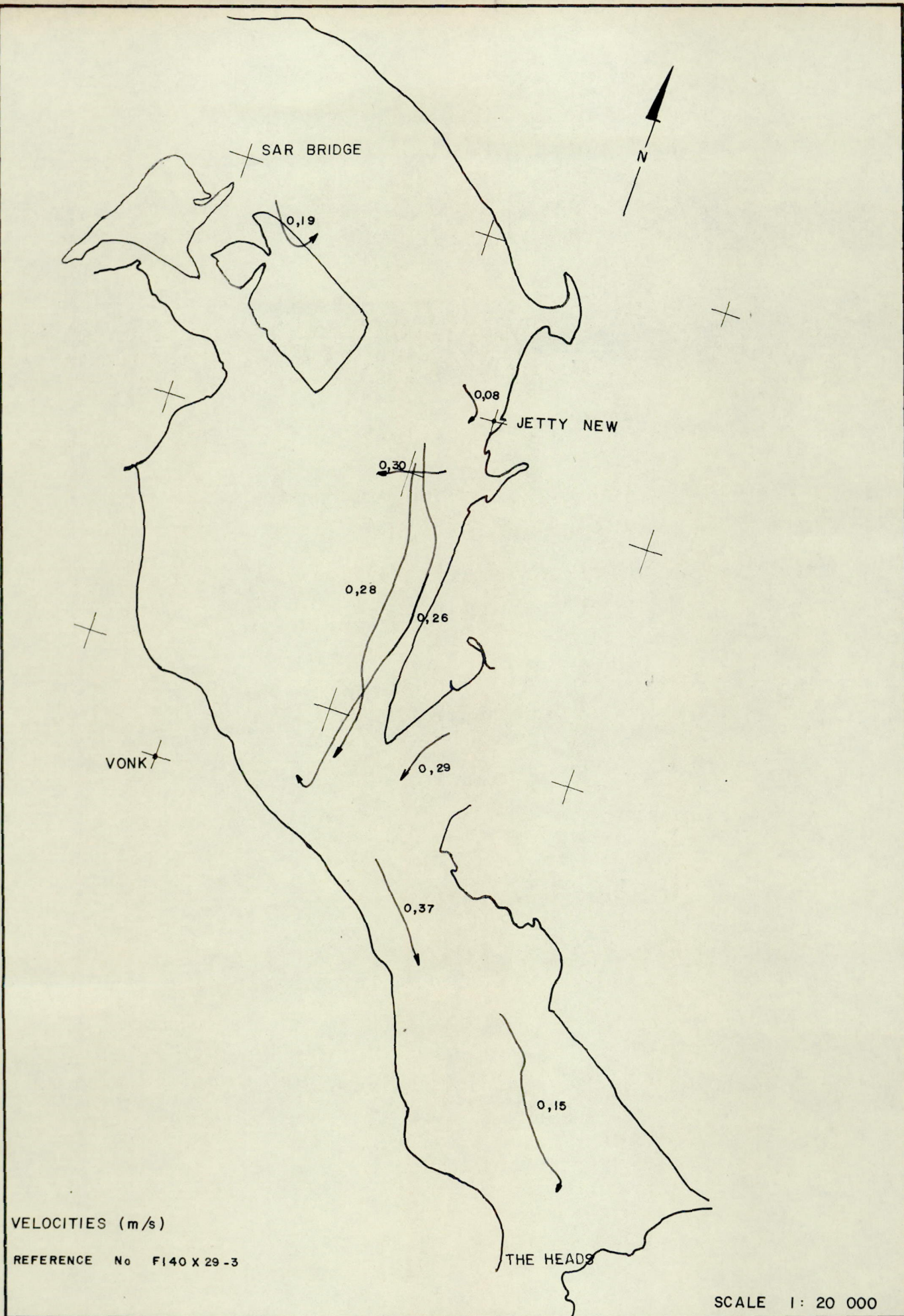
SCALE 1: 20 000

KNYSNA LAGOON

CURRENT TRACKING BETWEEN THE HEADS AND
SAR BRIDGE 8 / 10 / 1974 08 h 00 - 09 h 30

APPENDIX
FIGURE

C.2

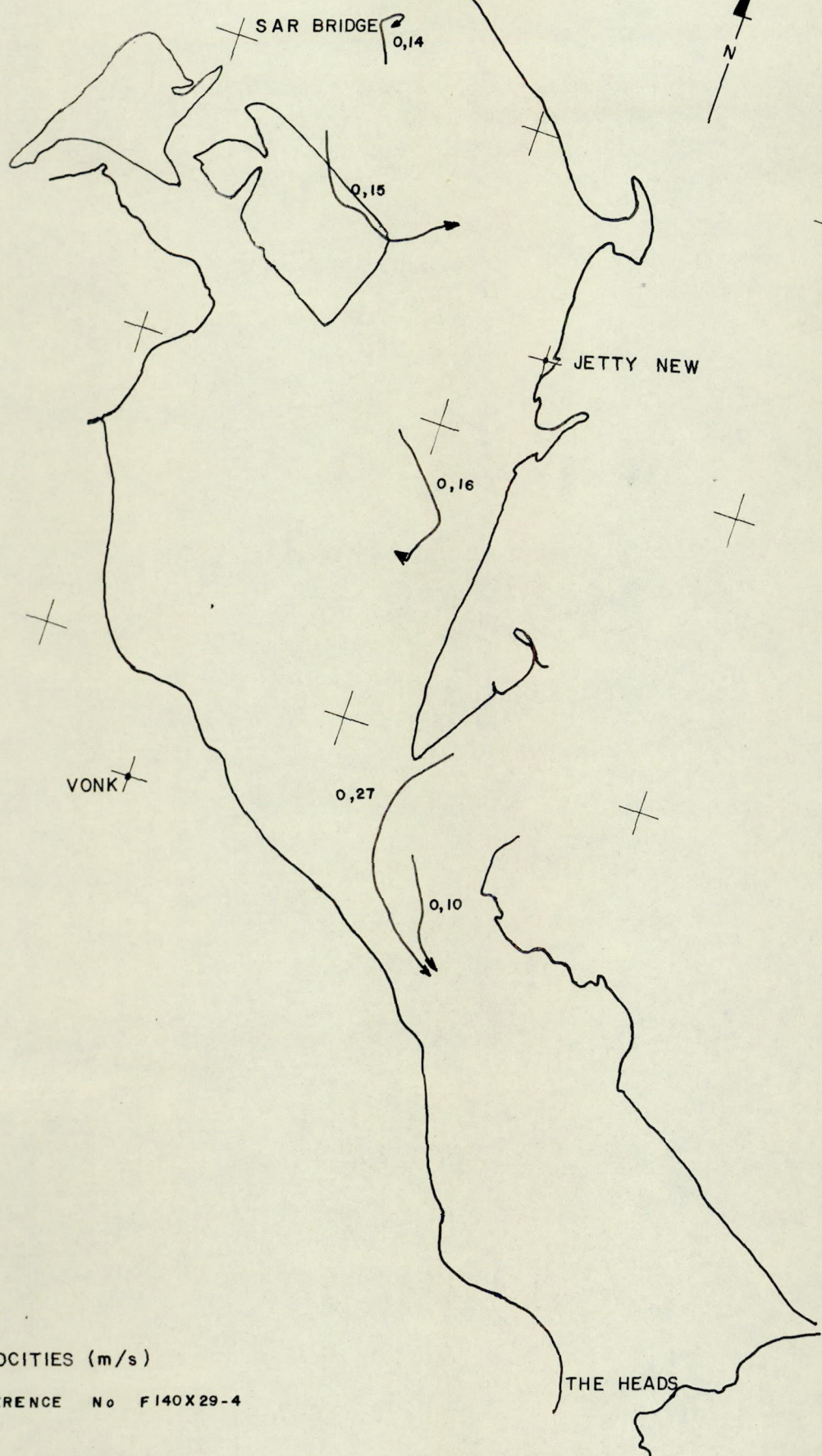


KNYSNA LAGOON

CURRENT TRACKING BETWEEN THE HEADS AND
SAR BRIDGE 8/10/1974 09h 30 - 11h 00

APPENDIX
FIGURE

C.3



VELOCITIES (m/s)

REFERENCE No F140X29-4

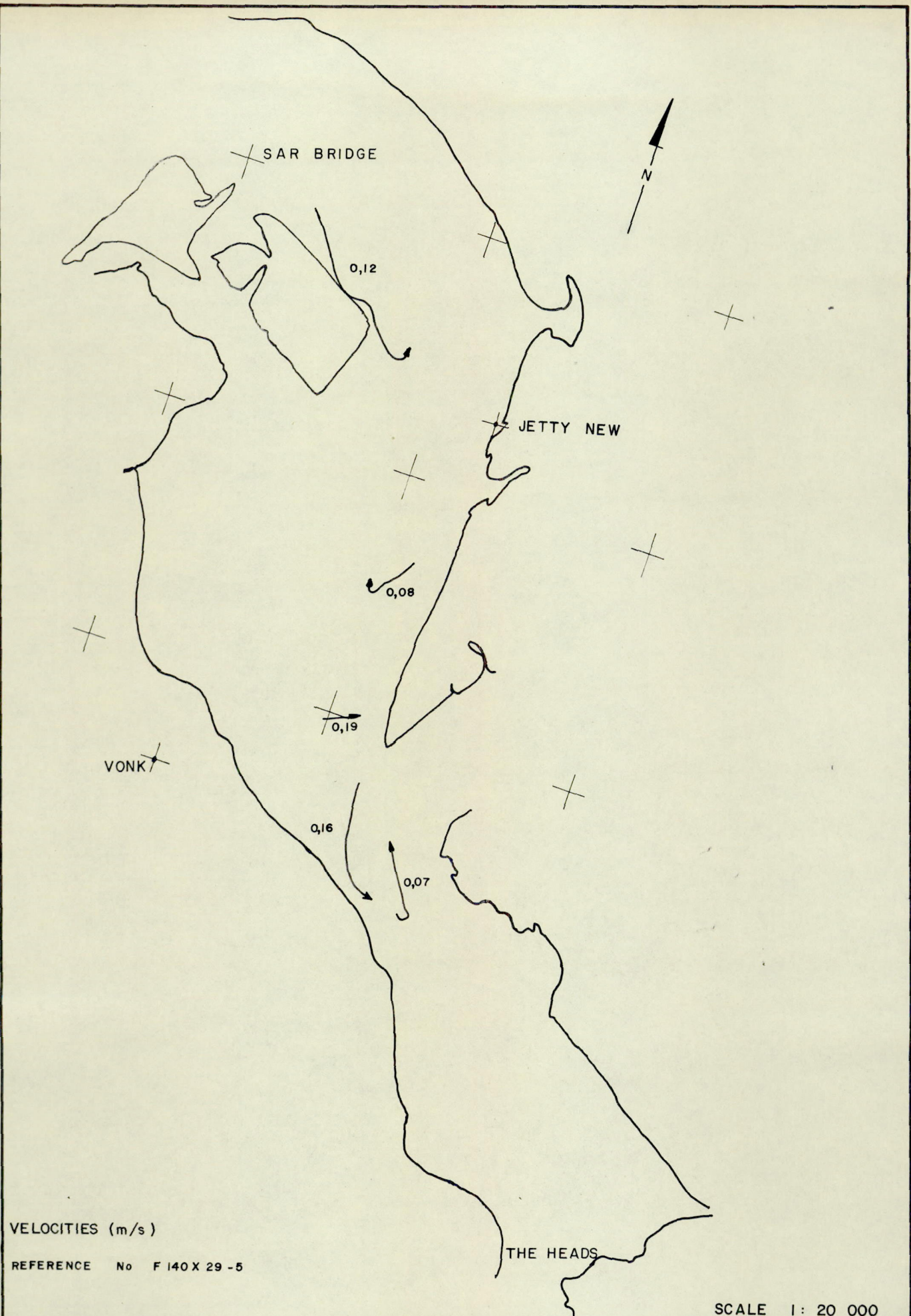
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KNYSNA LAGOON

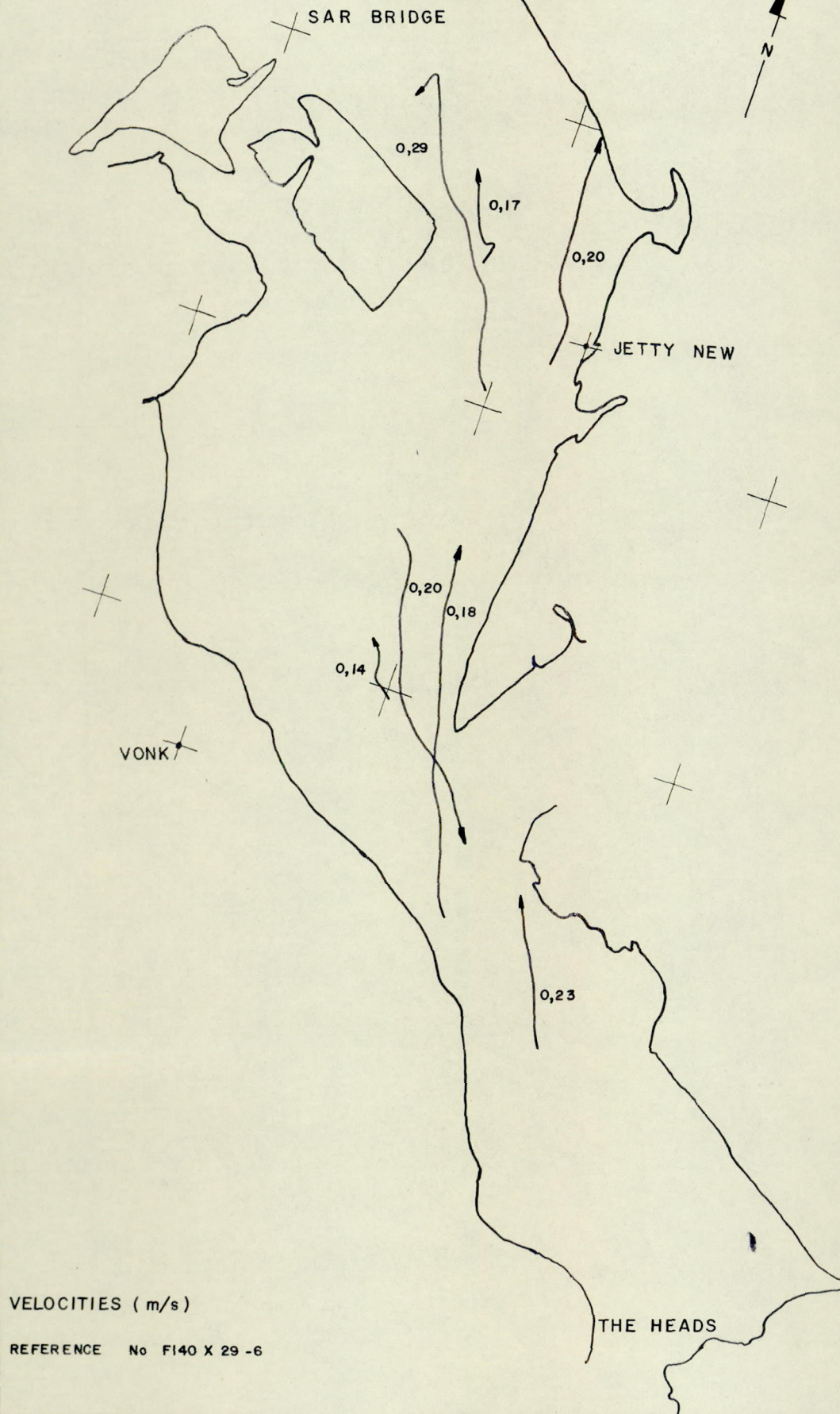
CURRENT TRACKING BETWEEN THE HEADS AND
SAR BRIDGE 8 / 10 / 1974 11 h 00 - 12 h 30

APPENDIX
FIGURE

C.4



KNYSNA LAGOON	APPENDIX FIGURE C.5
CURRENT TRACKING BETWEEN THE HEADS AND SAR BRIDGE 8 / 10 / 1974 12 h 30 - 14 h 00	



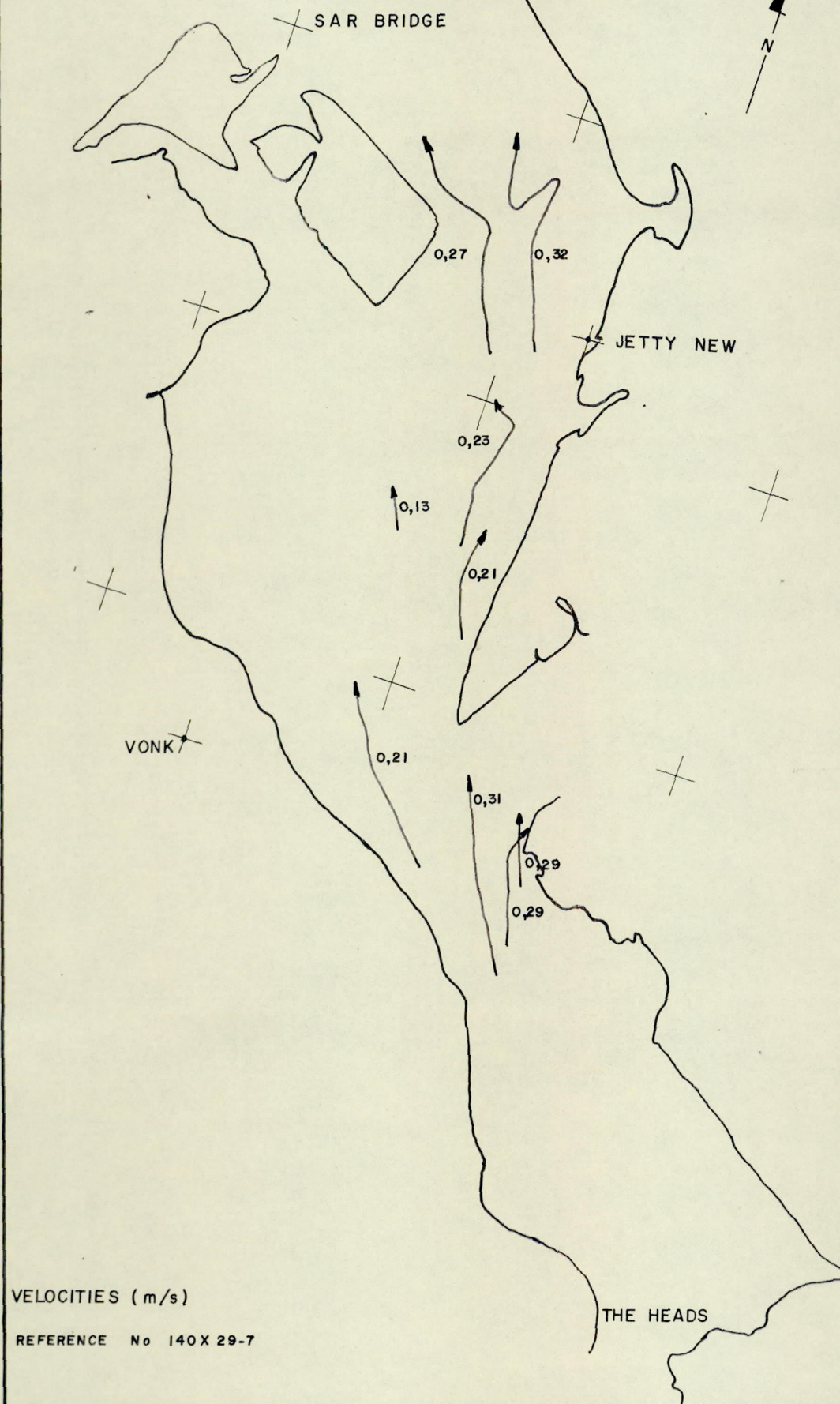
VELOCITIES (m/s)

REFERENCE No F140 X 29 -6

SCALE 1 : 20 000

KNYSNA LAGOON
 CURRENT TRACKING BETWEEN THE HEADS AND
 SAR BRIDGE 8 / 10 / 1974 14h 00 - 15h 30

APPENDIX
 FIGURE
 C.6

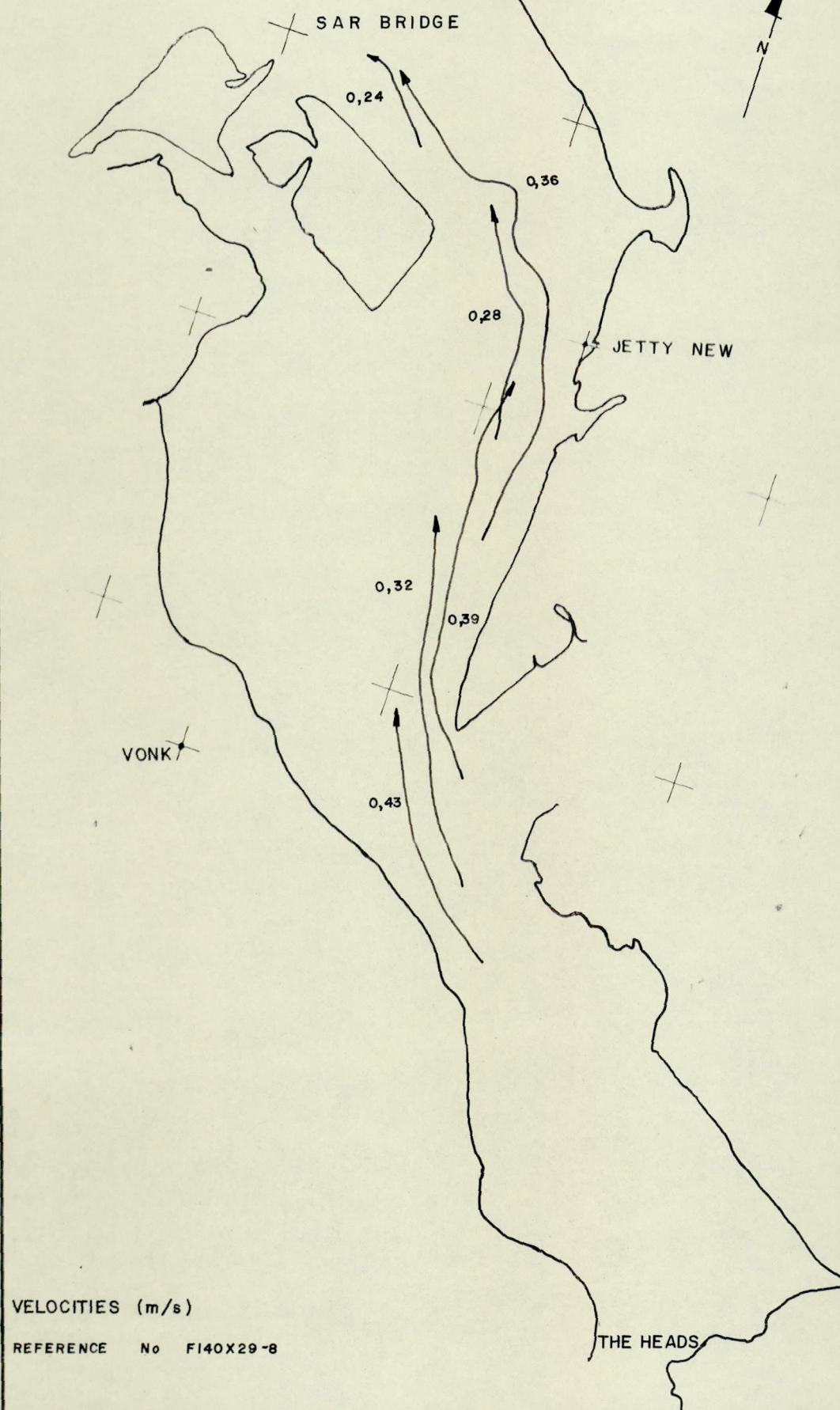


KNYSNA LAGOON

CURRENT TRACKING BETWEEN THE HEADS AND
SAR BRIDGE 8 / 10 / 1974 15h 30 - 17h 00

APPENDIX
FIGURE

C.7



VELOCITIES (m/s)

REFERENCE No F140X29-8

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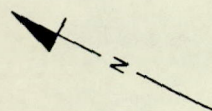
KNYSNA LAGOON

CURRENT TRACKING BETWEEN THE HEADS AND
SAR BRIDGE 8/10/1974 17h 00 - 18h 30

APPENDIX
FIGURE

C.8

JETTY
NEW X



0,08

SAR BRIDGE

0,13

0,17

0,15

0,16

0,08

X SLANG

VELOCITIES (m/s)

REFERENCE No F140X 30-1

BELVIDERE

SCALE 1 : 20 000

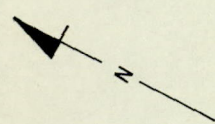
KNYSNA LAGOON

CURRENT TRACKING BETWEEN BELVIDERE AND
SAR BRIDGE 8/10/1974 06h 30 - 08h 00

APPENDIX
FIGURE

C.9

JETTY
NEW X



SAR BRIDGE

0,07

0,06

0,05

0,15

0,05

SLANG X

VELOCITIES (m/s)

REFERENCE No FI40X 30-2

BELVIDERE

SCALE 1:20 000

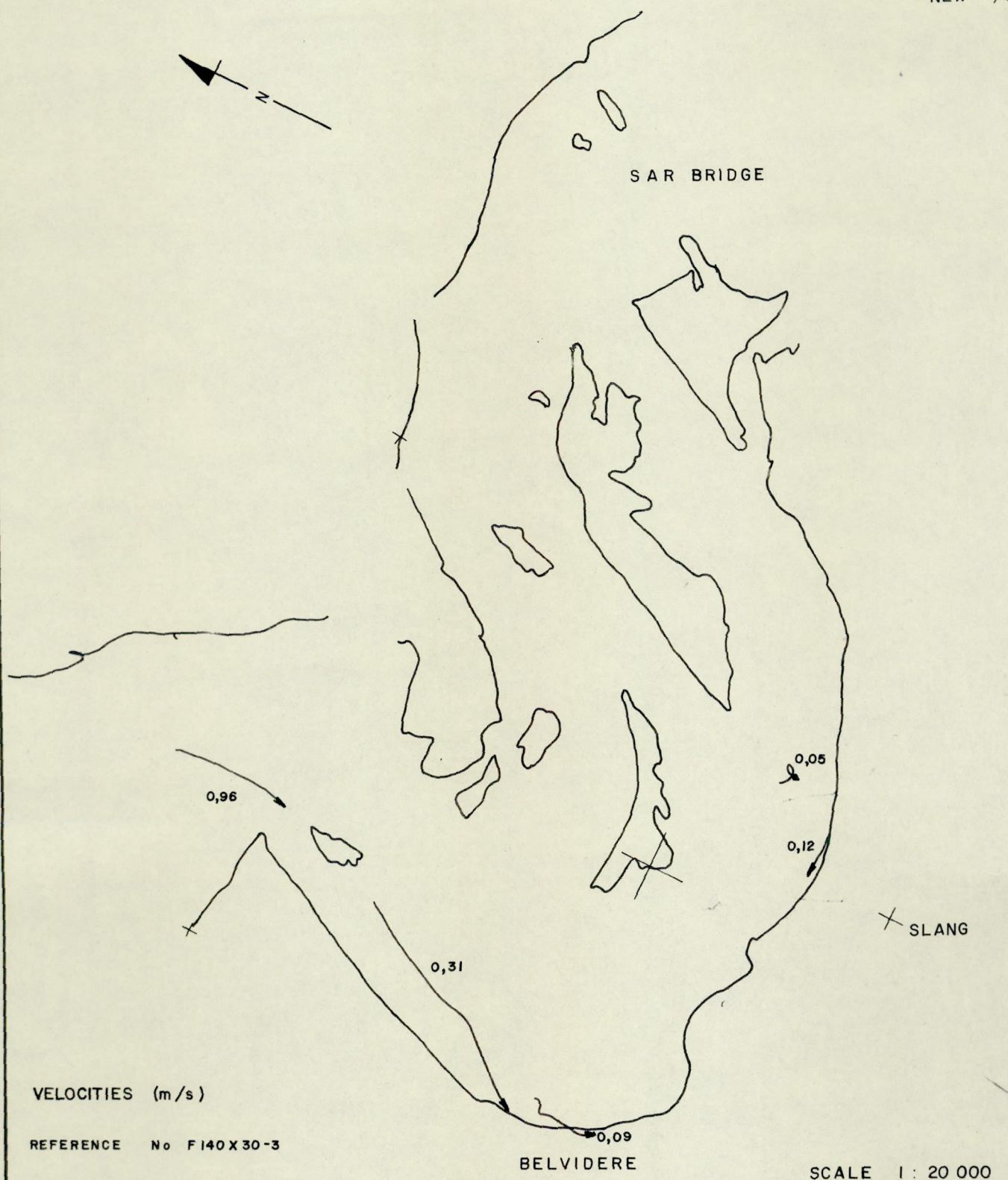
KNYSNA LAGOON

CURRENT TRACKING BETWEEN BELVIDERE AND
SAR BRIDGE 8 / 10 / 1974 08h 00 - 09h 30

APPENDIX
FIGURE

C.10

JETTY
NEW



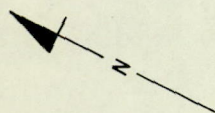
KNYSNA LAGOON

CURRENT TRACKING BETWEEN BELVIDERE AND
SAR BRIDGE 8 / 10 / 1974 09h 30 - 11h 00

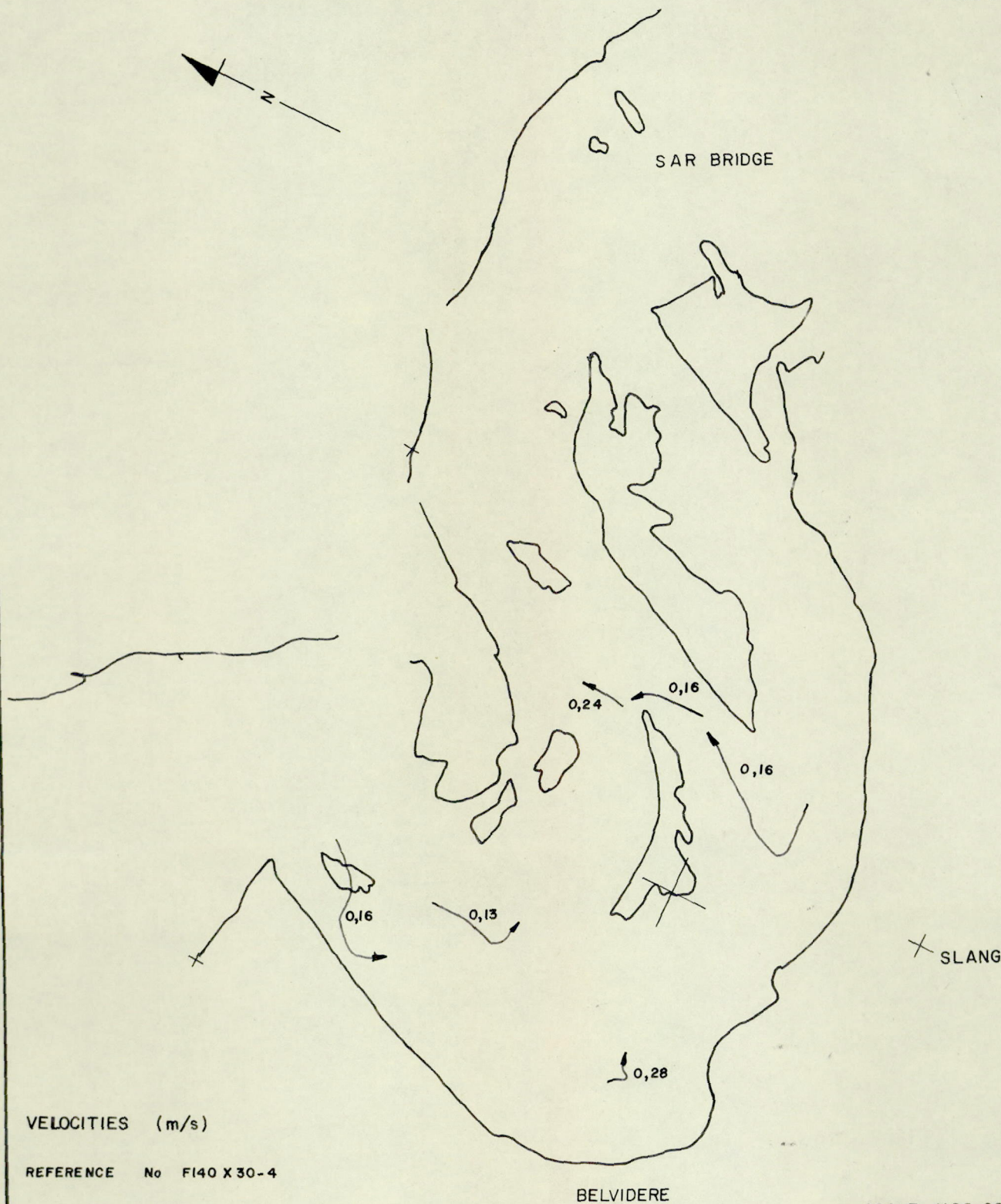
APPENDIX
FIGURE

C.11

JETTY
NEW X



SAR BRIDGE



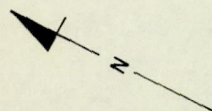
KNYSNA LAGOON

CURRENT TRACKING BETWEEN
SAR BRIDGE 8 / 10 / 1974

BELVIDERE AND
11h00-12h30

APPENDIX
FIGURE
C.12

JETTY
NEW X



SAR BRIDGE

0,10

0,14

0,15

0,15

X SLANG

VELOCITIES (m/s)

REFERENCE No F140X 30-5

BELVIDERE

SCALE 1 : 20 000

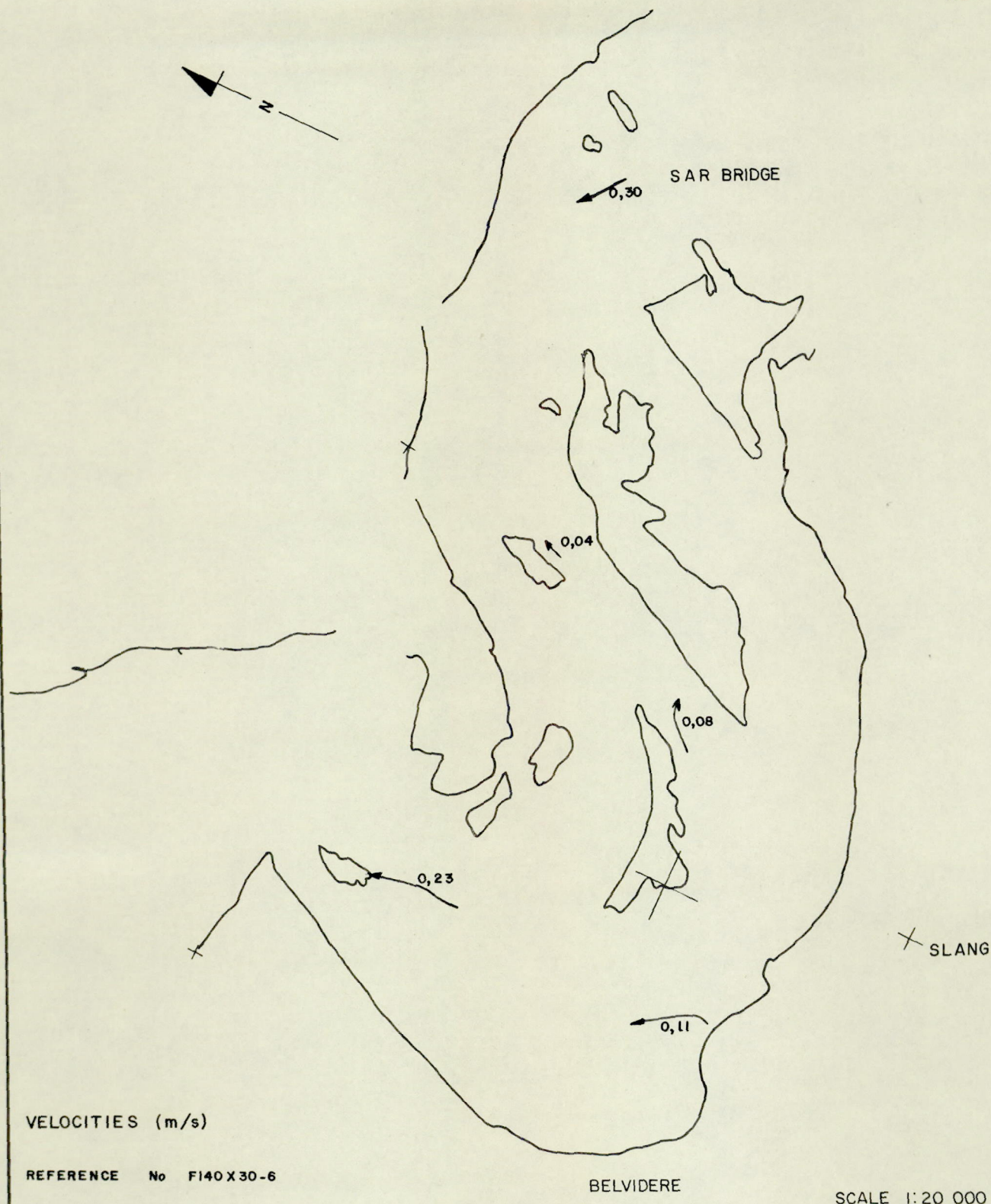
KNYSNA LAGOON

CURRENT TRACKING BETWEEN BELVIDERE AND
SAR BRIDGE 8/10/1974 12h 30 - 14h 00

APPENDIX
FIGURE

C.13

JETTY
NEW X



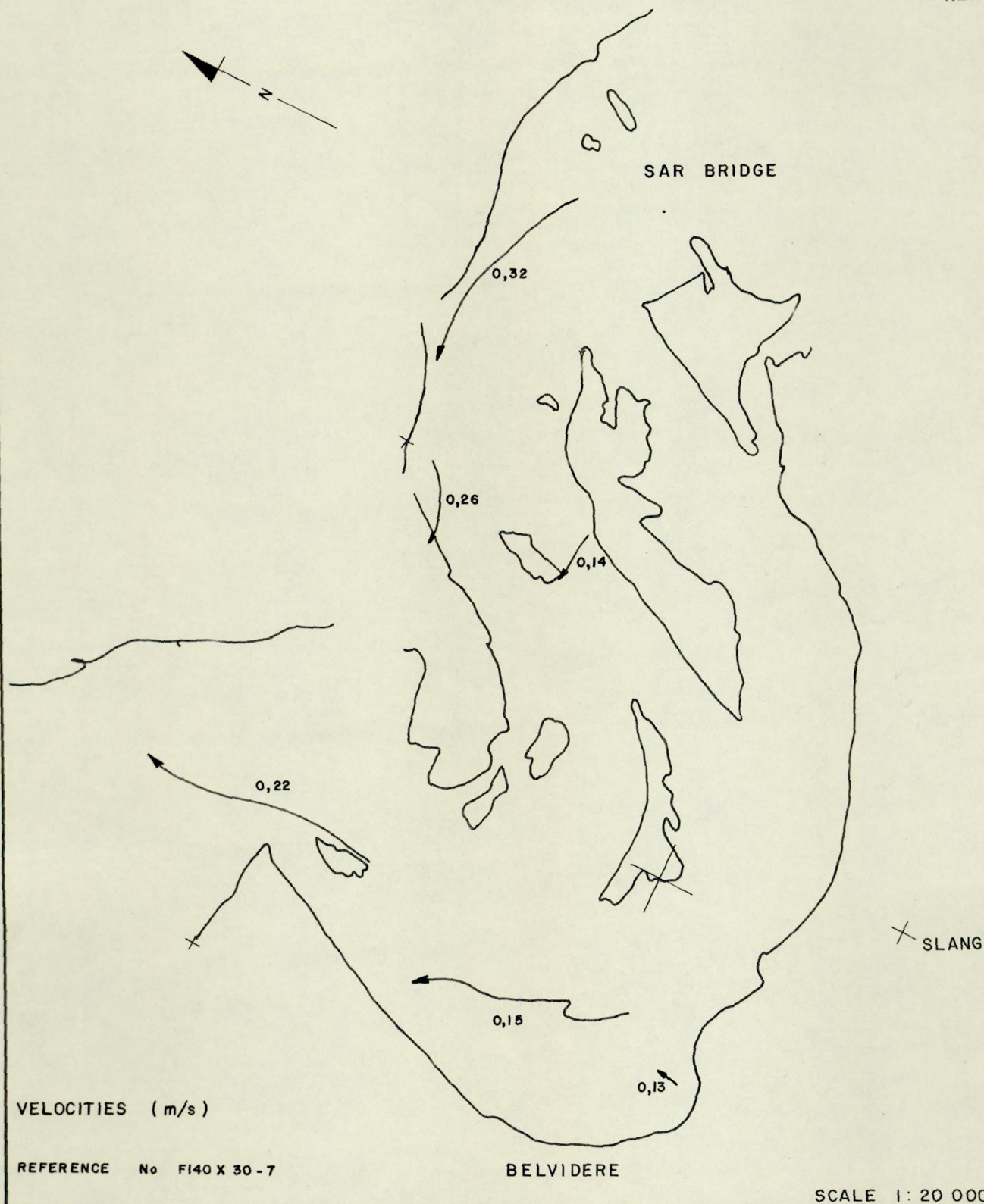
KNYSNA LAGOON

CURRENT TRACKING BETWEEN BELVIDERE AND
SAR BRIDGE 8 / 10 / 1974 14h 00 - 15h 30

APPENDIX
FIGURE

C.14

JETTY
NEW X



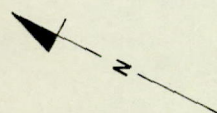
KNYSNA LAGOON

CURRENT TRACKING BETWEEN BELVIDERE AND
SAR BRIDGE 8 / 10 / 1974 15 h 30 - 17 h 00

APPENDIX
FIGURE

C.15

JETTY
NEW X



SAR BRIDGE

0,21

0,13

0,17

0,16

0,06

X SLANG

VELOCITIES (m/s)

REFERENCE No FI40X 30-8

BELVIDERE

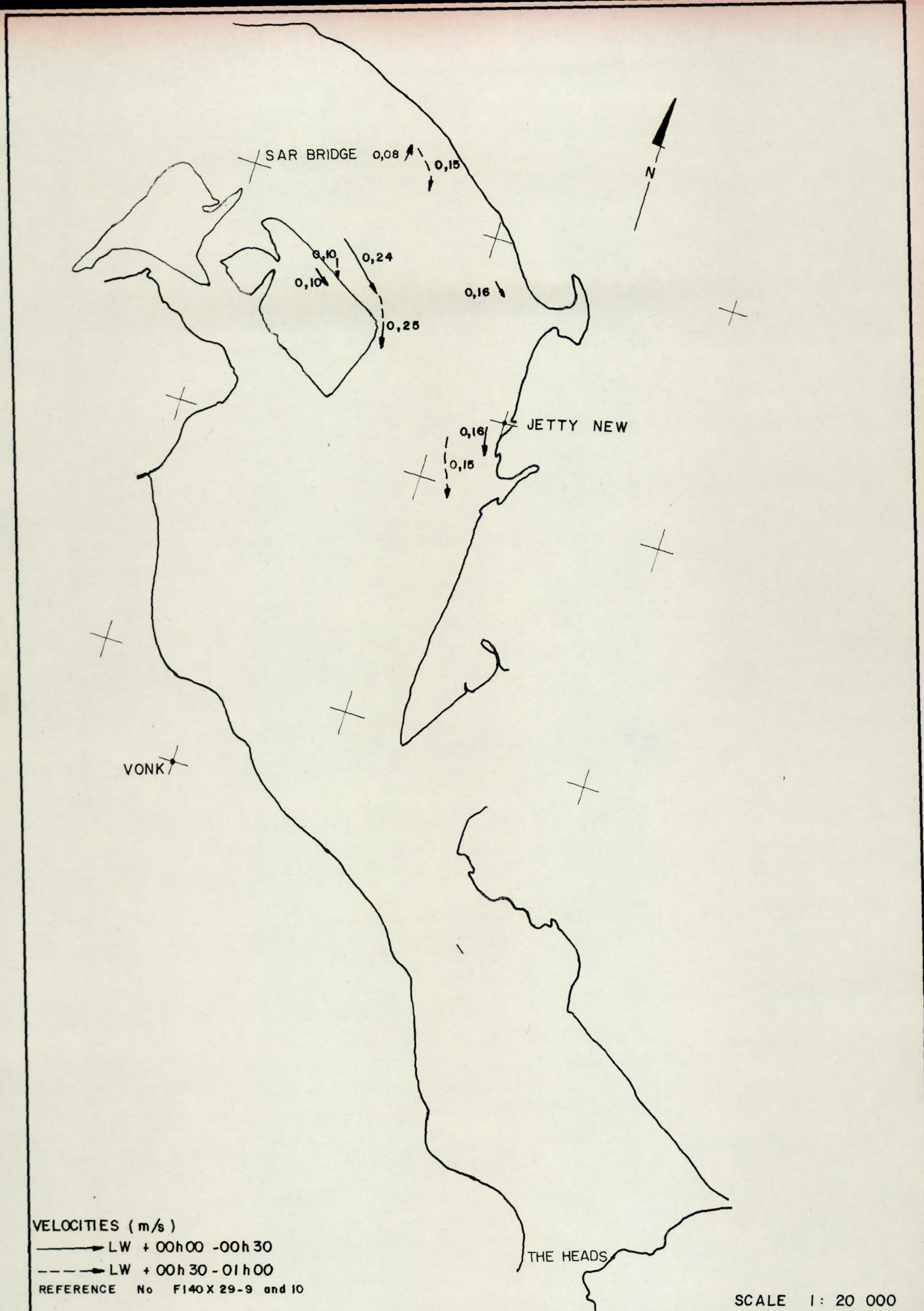
SCALE 1:20 000

KNYSNA LAGOON

CURRENT TRACKING BETWEEN BELVIDERE AND
SAR BRIDGE 8 / 10 / 1974 17h 00 - 18h 30

APPENDIX
FIGURE

C.16

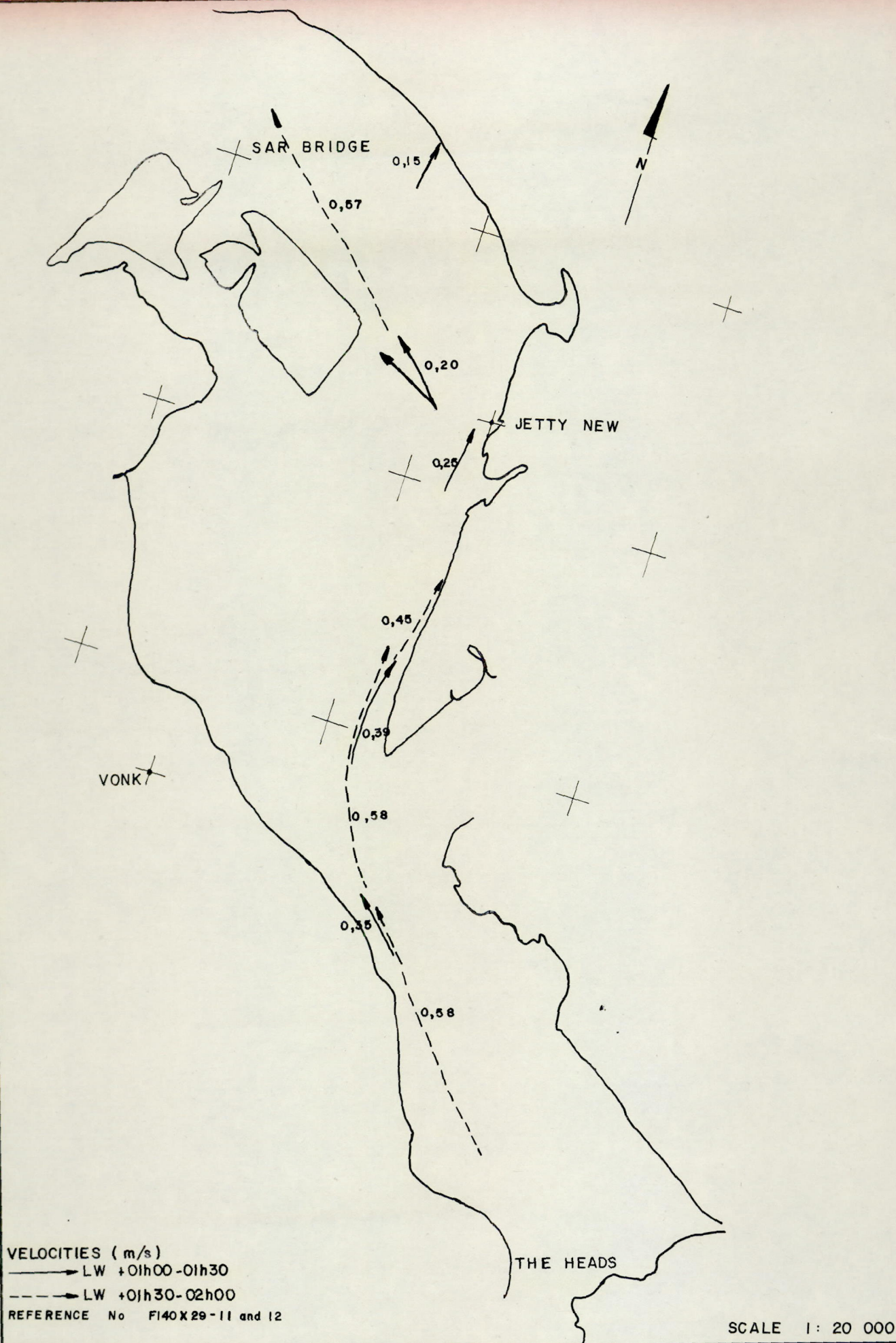


KNYSNA LAGOON

CURRENT TRACKING BETWEEN THE HEADS AND
SAR BRIDGE 14/10/1974 LW+00h00-01h00

APPENDIX
FIGURE

C.17

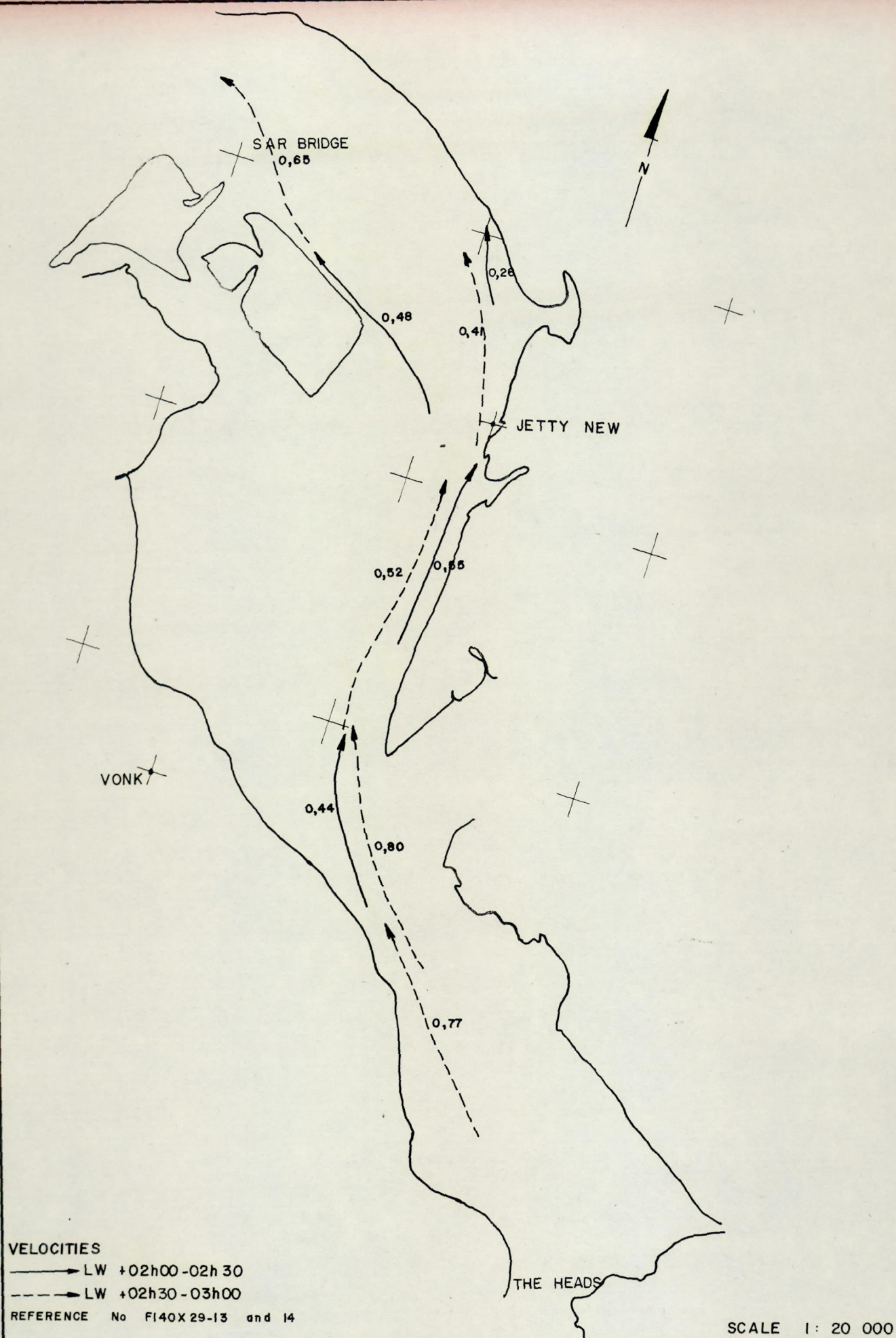


KNYSNA LAGOON

CURRENT TRACKING BETWEEN THE HEADS AND
SAR BRIDGE 14/10/1974 LW+01h00-02h00

APPENDIX
FIGURE

C.18



VELOCITIES

- LW +02h00-02h30
- - - -→ LW +02h30-03h00

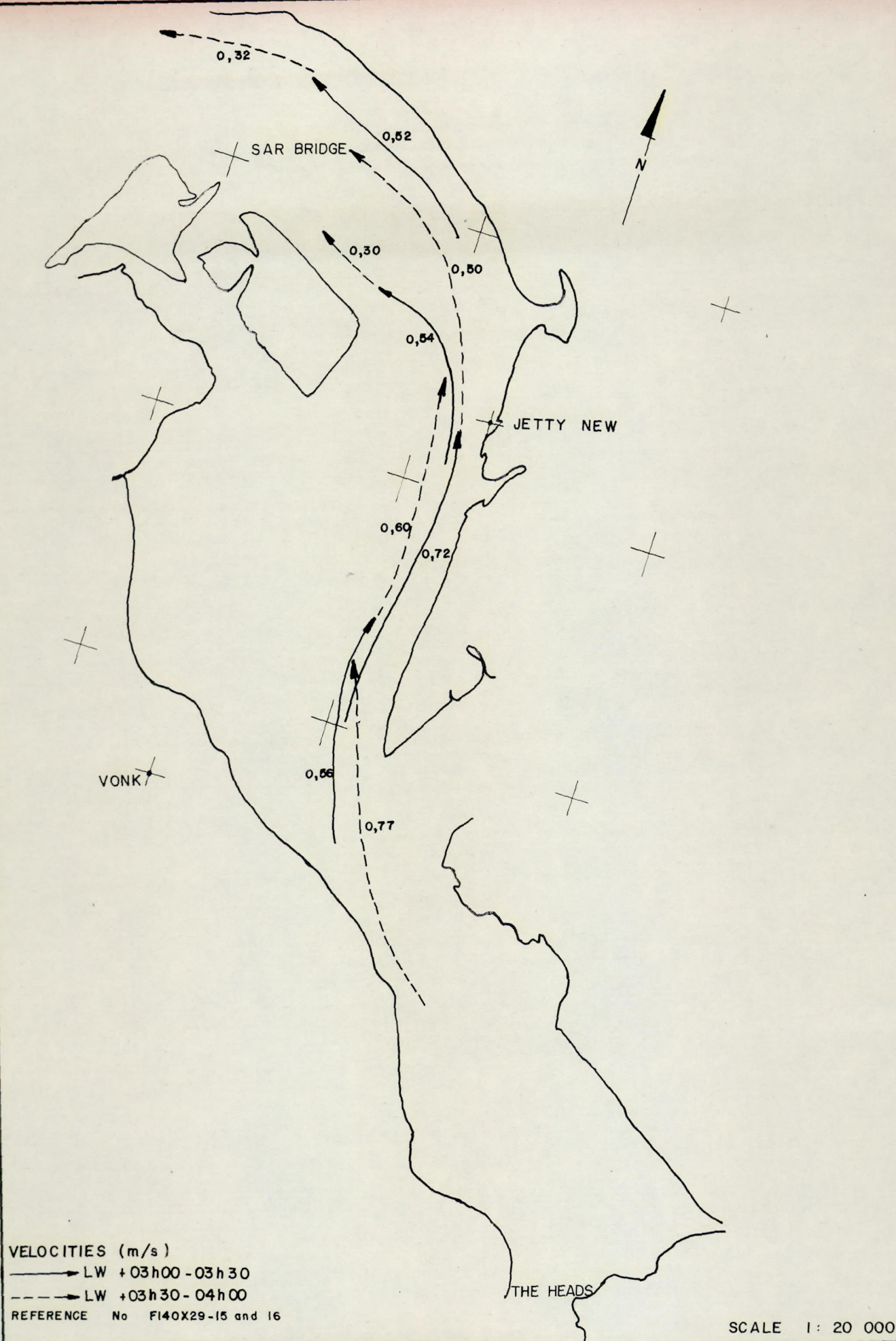
REFERENCE No F140X29-13 and 14

SCALE 1: 20 000

KNYSNA LAGOON

CURRENT TRACKING BETWEEN THE HEADS AND
SAR BRIDGE 14/10/1974 LW +02h00-03h00

APPENDIX
FIGURE
C.19

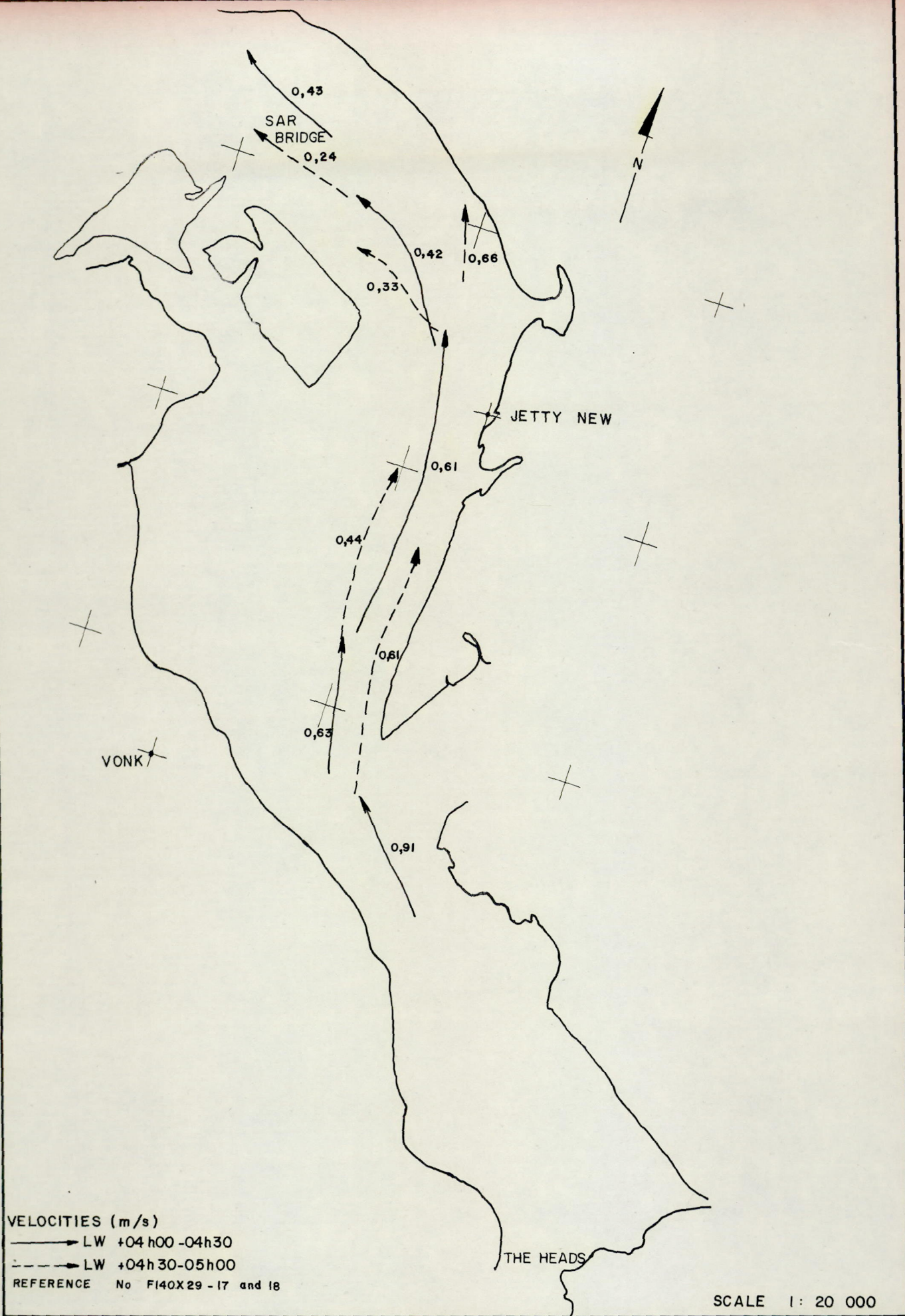


KNYSNA LAGOON

CURRENT TRACKING BETWEEN THE HEADS AND
SAR BRIDGE 14/10/1974 LW +03h00 - 04h00

APPENDIX
FIGURE

C.20

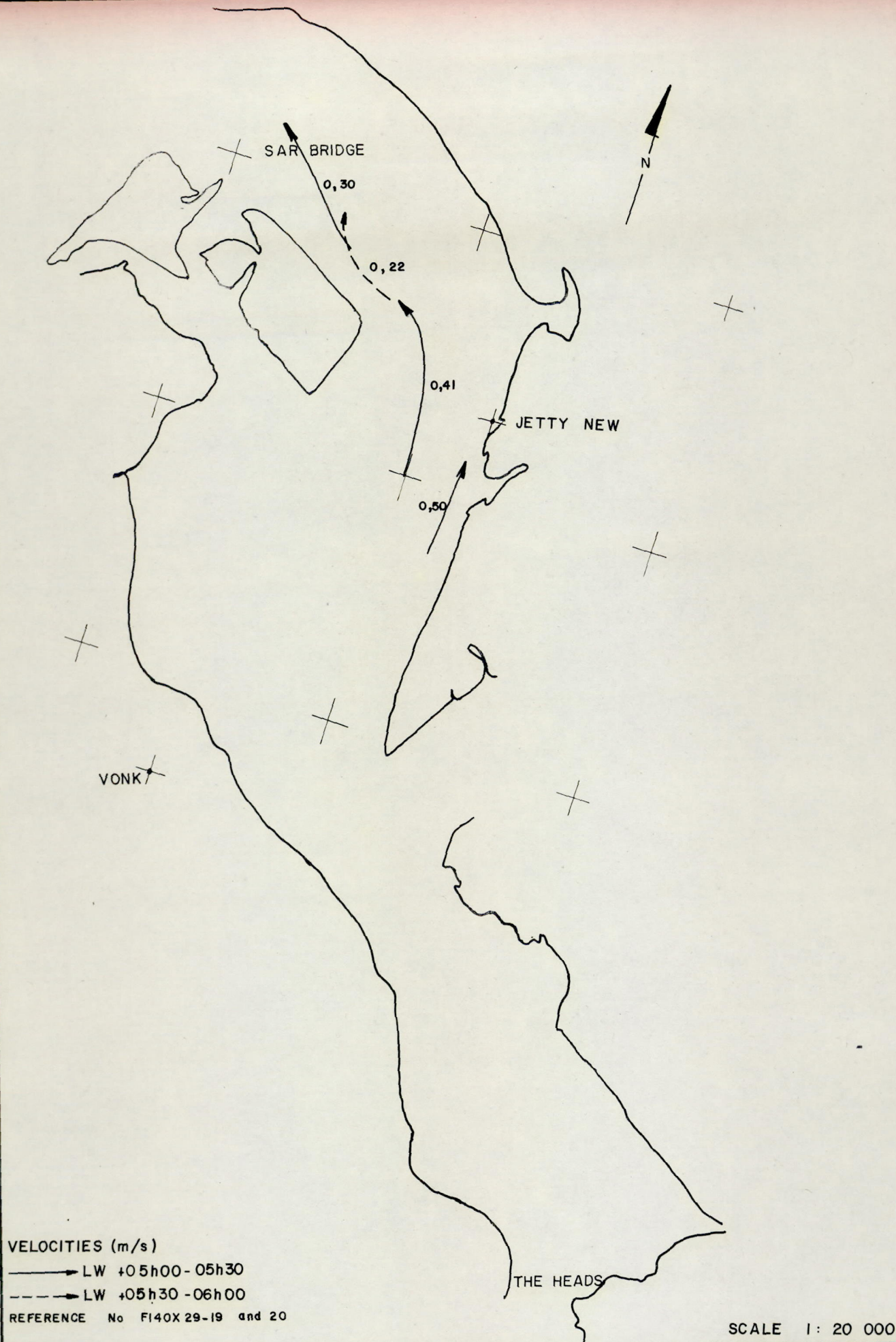


KNYSNA LAGOON

CURRENT TRACKING BETWEEN THE HEADS AND
SAR BRIDGE 14/10/1974 LW+04h 00 - 05h00

APPENDIX
FIGURE

C. 21

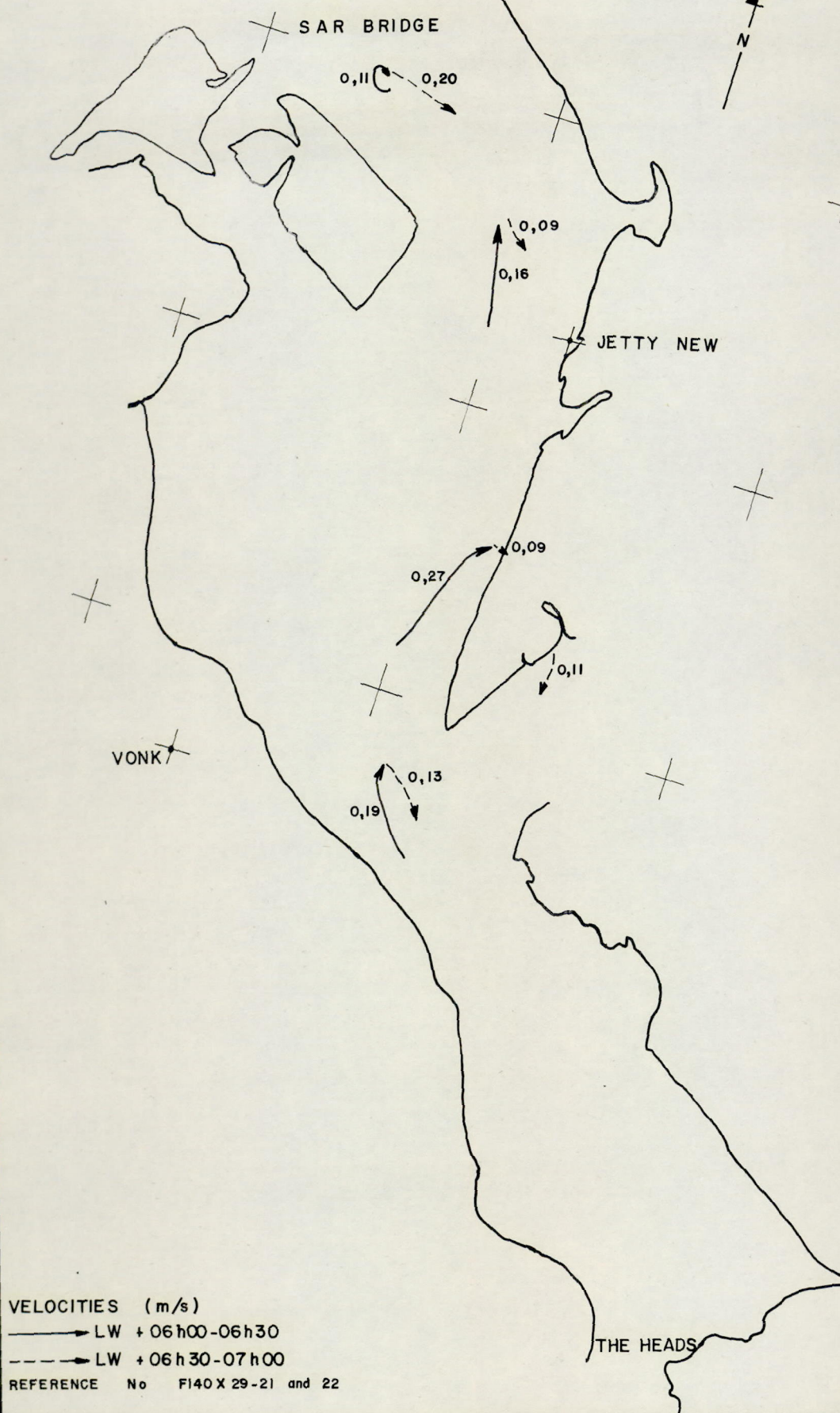


KNYSNA LAGOON

CURRENT TRACKING BETWEEN THE HEADS AND
SAR BRIDGE 14/10/1974 LW +05h00 - 06h00

APPENDIX
FIGURE

C.22

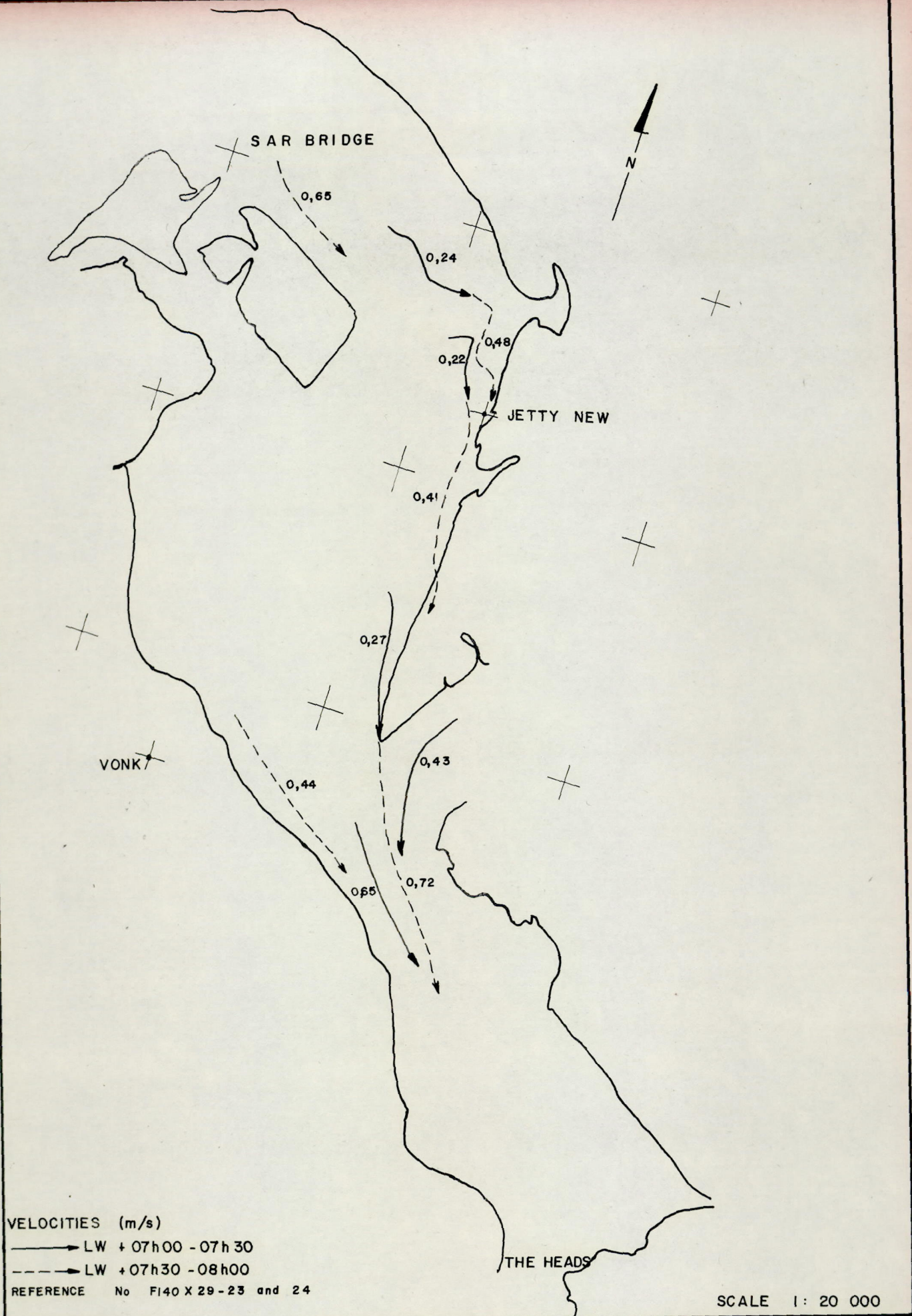


KNYSNA LAGOON

CURRENT TRACKING BETWEEN THE HEADS AND
SAR BRIDGE 14/10/1974 LW + 06h 00 - 07h 00

APPENDIX
FIGURE

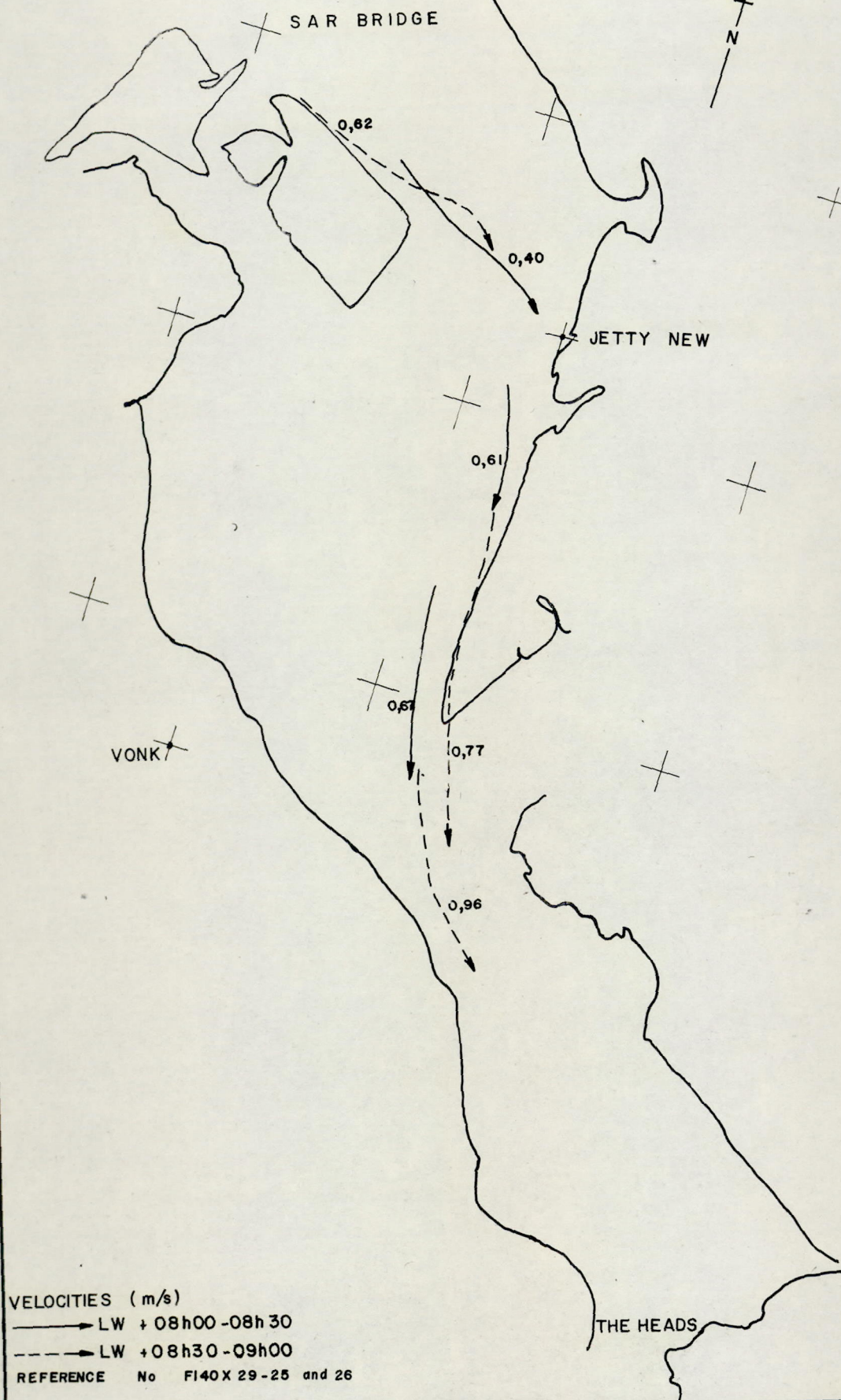
C.23



KNYSNA LAGOON

CURRENT TRACKING BETWEEN THE HEADS AND
SAR BRIDGE 14/10/1974 LW + 07h 00 - 08 h 00

APPENDIX
FIGURE
C.24



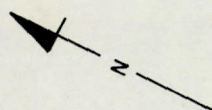
KNYSNA LAGOON

CURRENT TRACKING BETWEEN THE HEADS AND
SAR BRIDGE 14/10/1974 LW+08h00-09h00

APPENDIX
FIGURE

C.25

JETTY
NEW ✕



SAR BRIDGE

0,72

0,15

0,22

0,30

0,30

0,25

0,40

✕ SLANG

0,06

BELVIDERE

VELOCITIES (m/s)

—→ LW + 00h00 - 00h30

- - -→ LW + 00h30 - 01h00

REFERENCE No F140X30-9 and 10

SCALE 1: 20 000

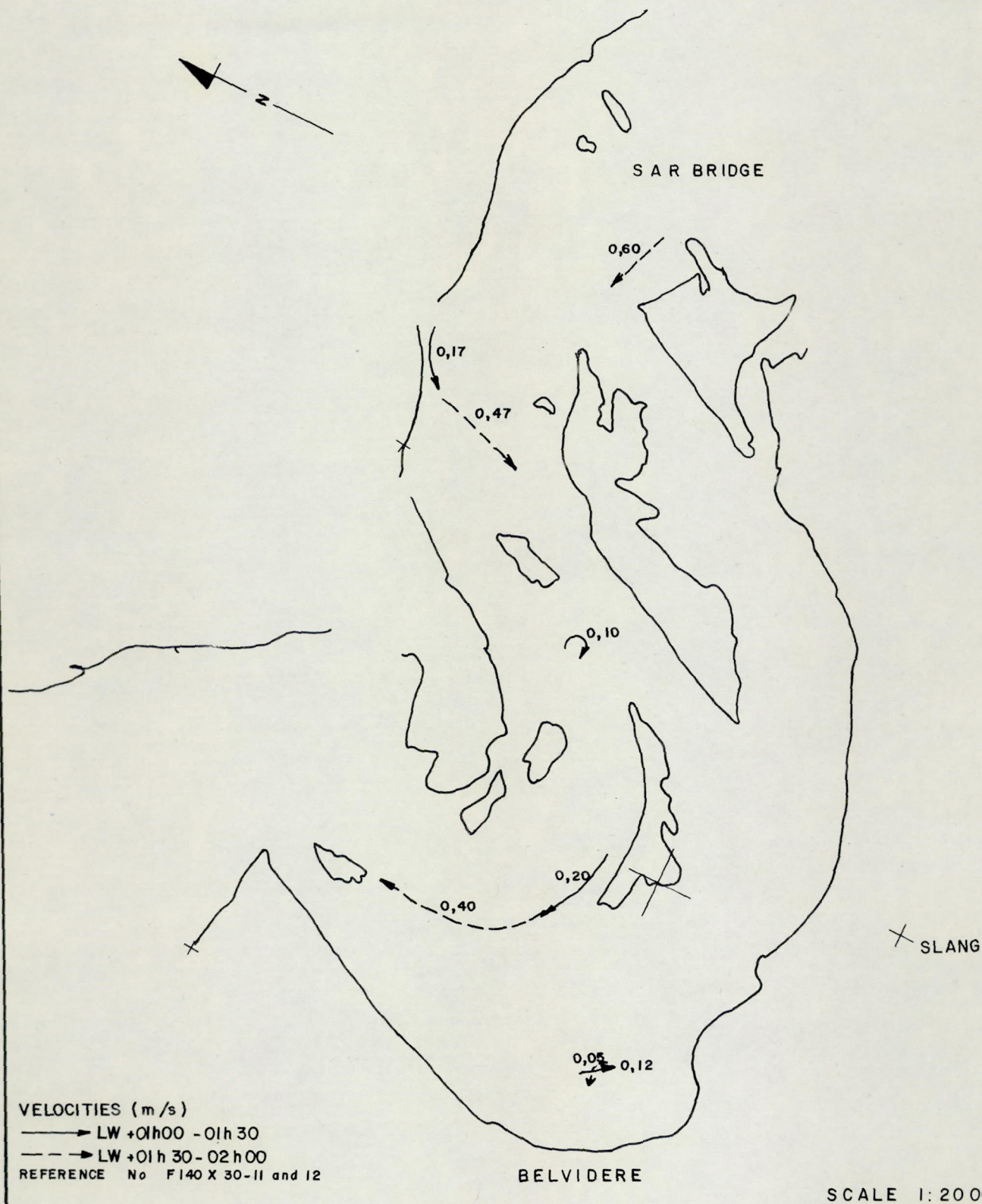
KNYSNA LAGOON

CURRENT TRACKING BETWEEN BELVIDERE AND
SAR BRIDGE 14/10/1974 LW + 00h00 - 01h00

APPENDIX
FIGURE

C.26

JETTY
NEW X



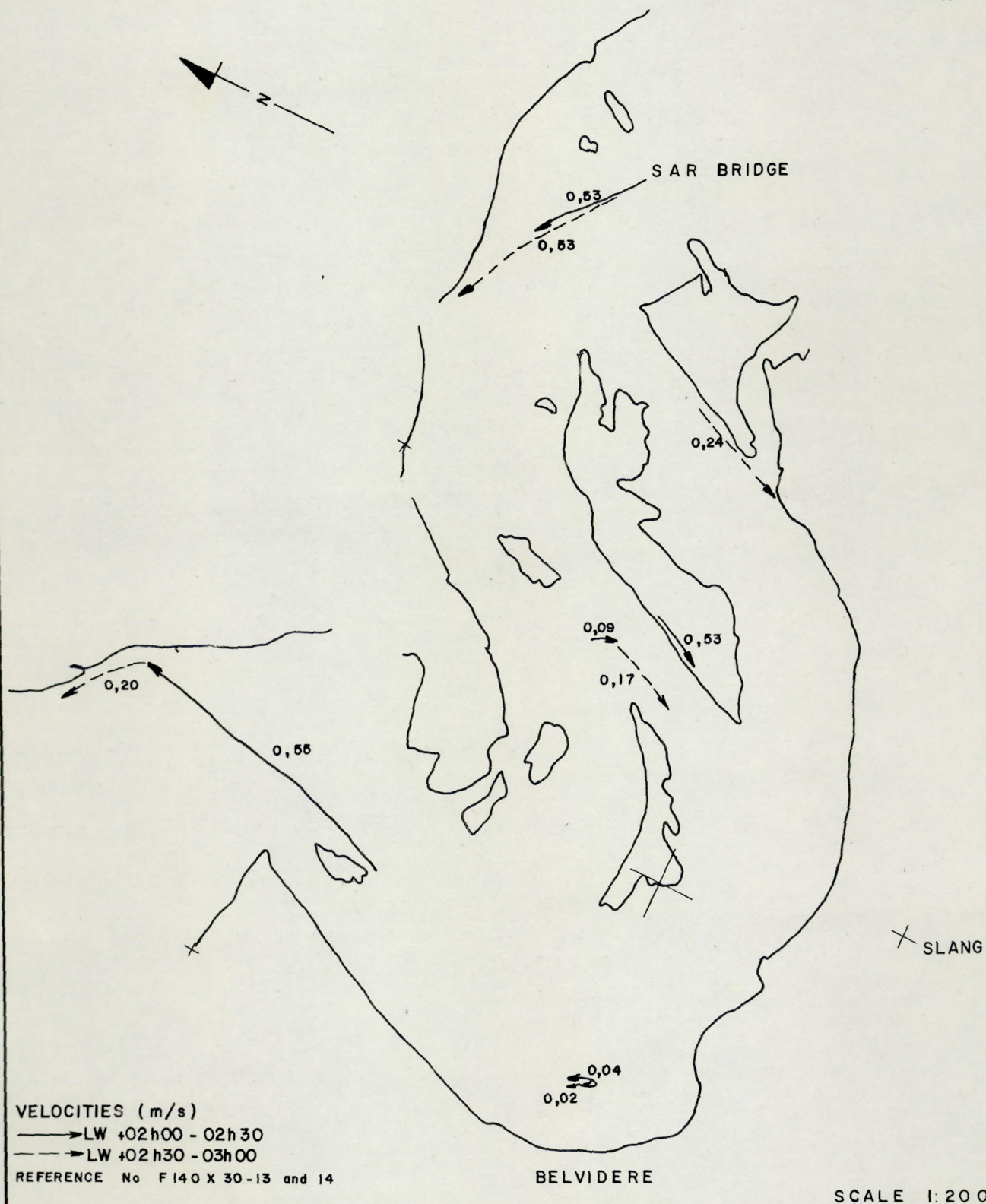
KNYSNA LAGOON

CURRENT TRACKING BETWEEN BELVIDERE AND
SAR BRIDGE 14/10/1974 LW + 01h 00 - 02h00

APPENDIX
FIGURE

C.27

JETTY
NEW



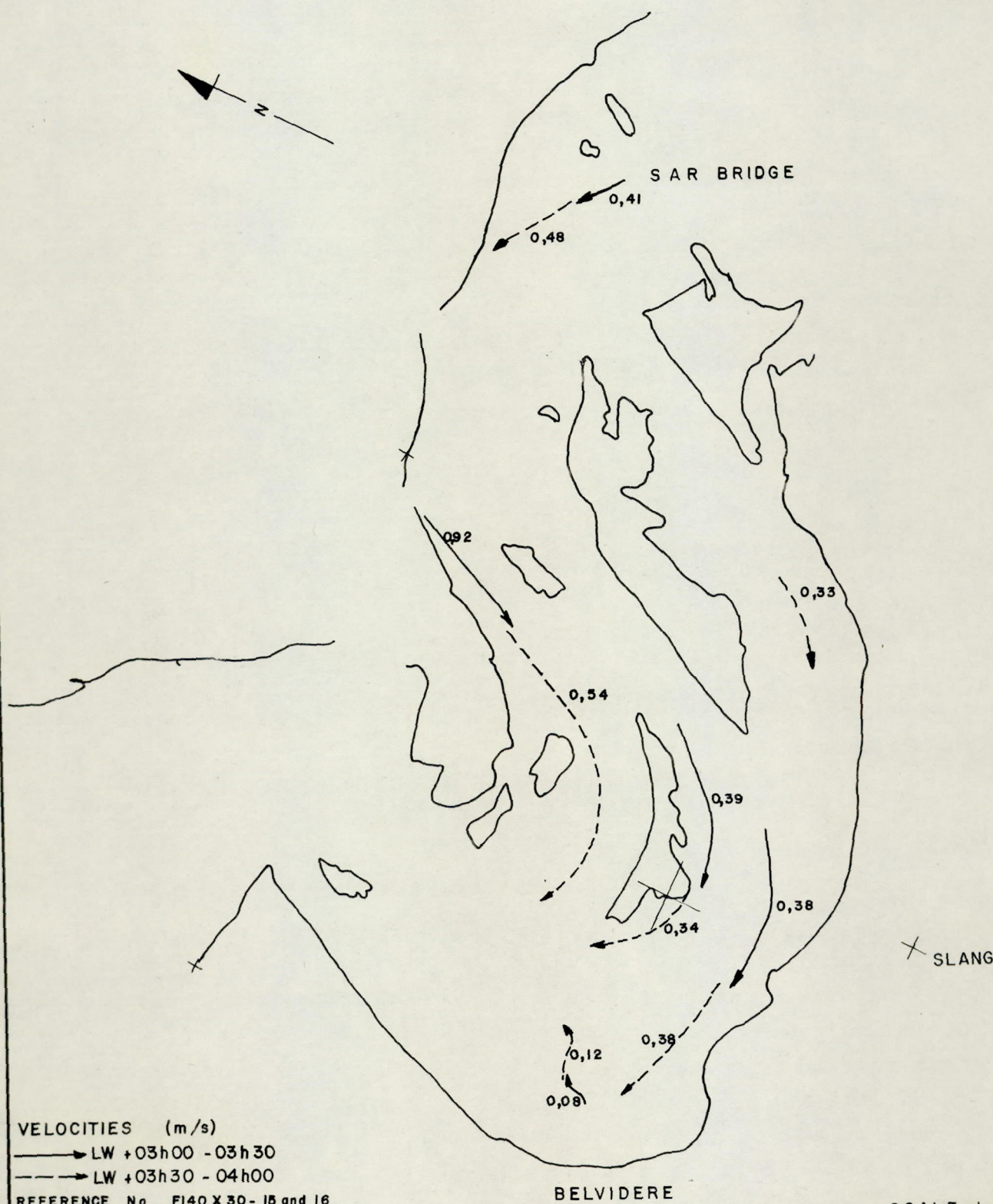
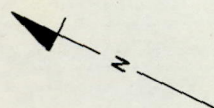
KNYSNA LAGOON

CURRENT TRACKING BETWEEN BELVIDERE AND
SAR BRIDGE 14/10/1974 LW+02h 00 - 03h 00

APPENDIX
FIGURE

C.28

JETTY
NEW ✕



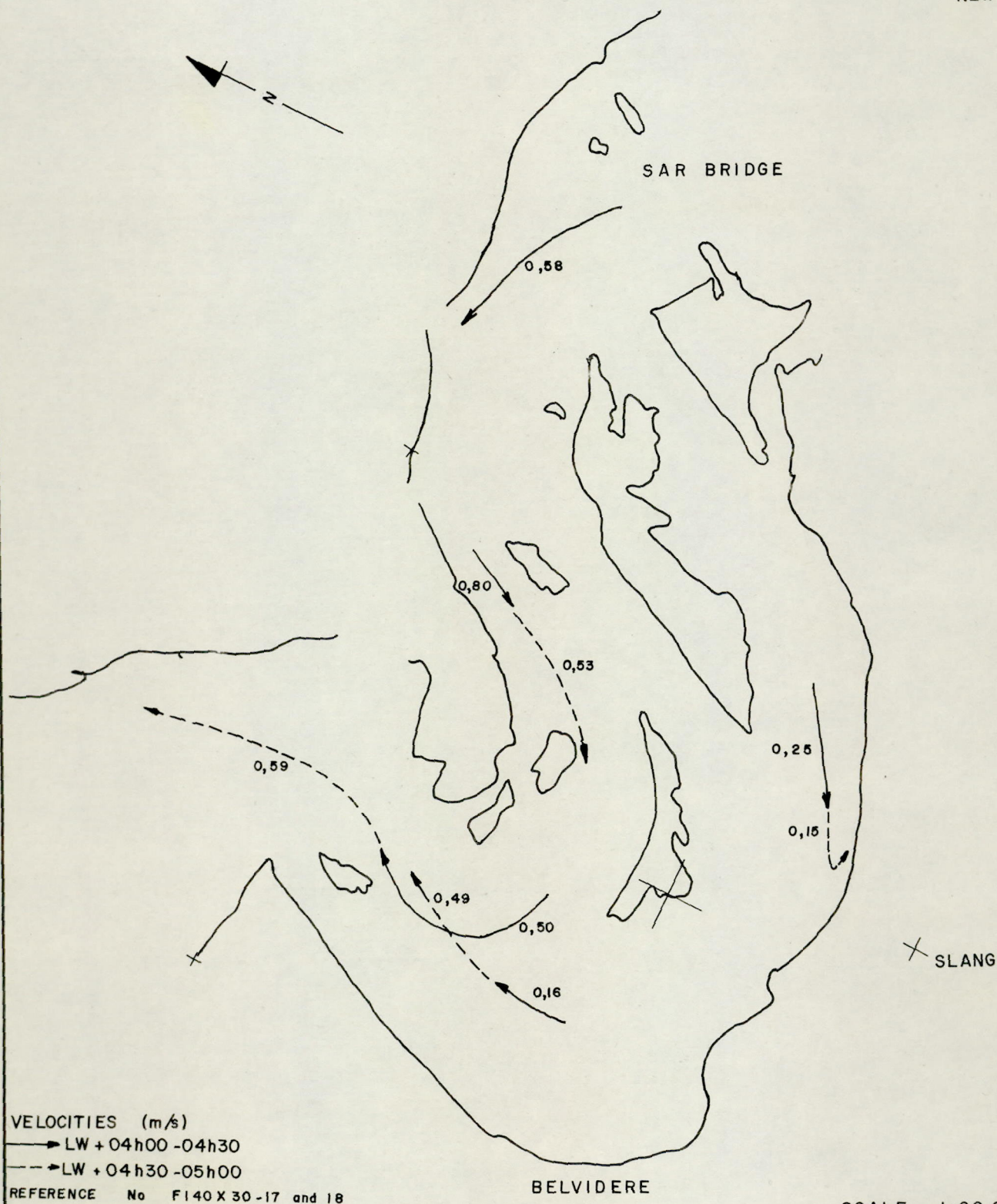
KNYSNA LAGOON

CURRENT TRACKING BETWEEN BELVIDERE AND
SAR BRIDGE 14/10/1974 LW +03h00 -04h 00

APPENDIX
FIGURE

C.29

JETTY
NEW X



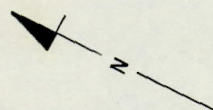
KNYSNA LAGOON

CURRENT TRACKING BETWEEN BELVIDERE AND
SAR BRIDGE 14 / 10 / 1974 LW+ 04h 00 - 05h 00

APPENDIX
FIGURE

C.30

JETTY
NEW X



SAR BRIDGE

0,26

0,78

0,11

0,15

0,53

0,30

0,22

0,10

SLANG X

VELOCITIES (m/s)

—→ LW +05h00-05h30

- - -→ LW +05h30-06h00

REFERENCE No FI40X30-19 and 20

BELVIDERE

SCALE 1:20 000

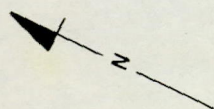
KNYSNA LAGOON

CURRENT TRACKING BETWEEN BELVIDERE AND
SAR BRIDGE 14 / 10 / 1974 LW +05h00 - 06h00

APPENDIX
FIGURE

C.31

JETTY
NEW X



SAR BRIDGE

0,25

0,05

0,25

0,18

0,15

0,13

0,08

X SLANG

VELOCITIES (m/s)

—→ LW +06h00 - 06h30

- - -→ LW +06h30 - 07h00

REFERENCE No FI40 X 30-21 and 22

BELVIDERE

SCALE 1:20000

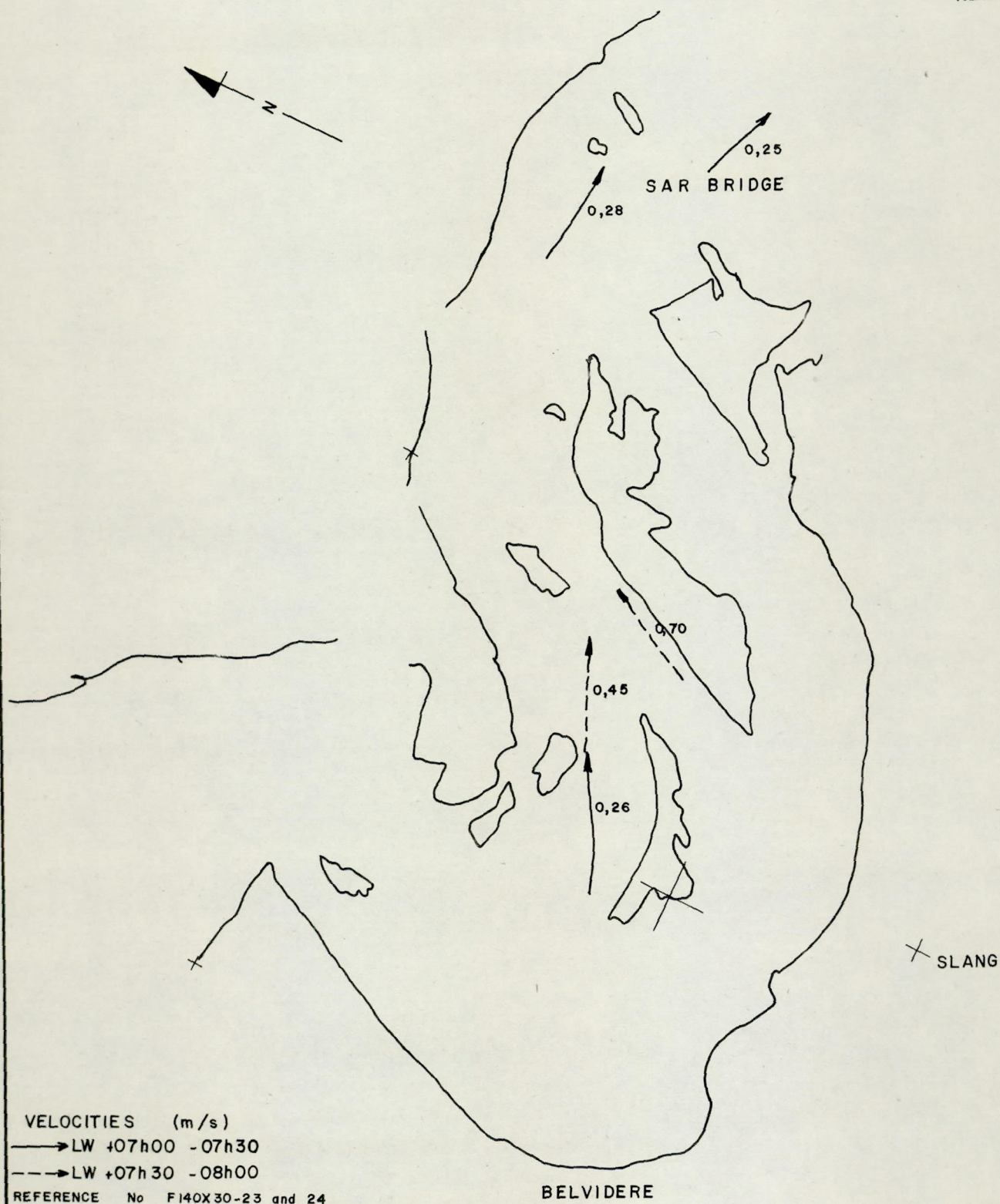
KNYSNA LAGOON

CURRENT TRACKING BETWEEN BELVIDERE AND
SAR BRIDGE 14 / 10 / 1974 LW +06h00 - 07h00

APPENDIX
FIGURE

C.32

JETTY
NEW X



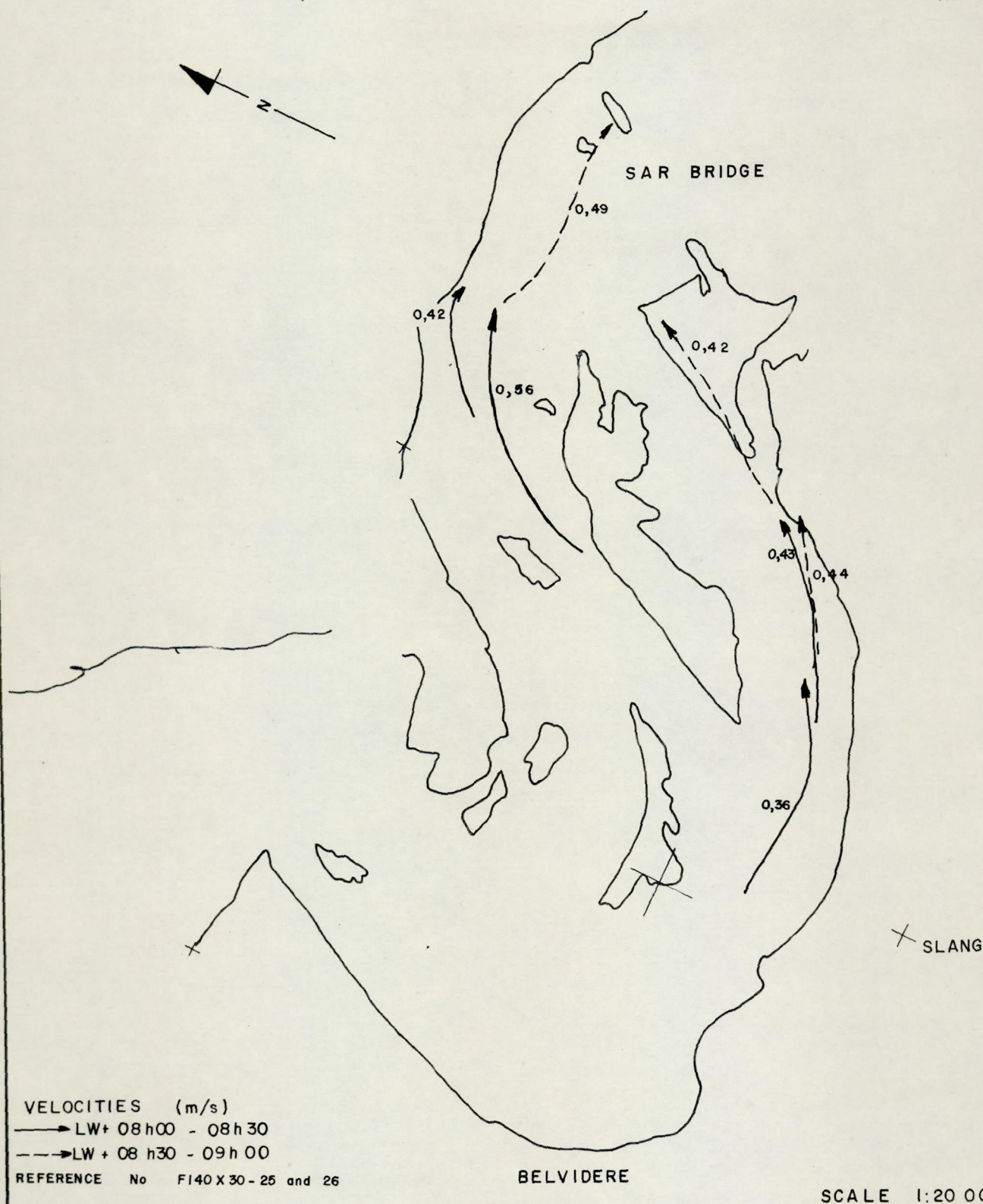
KNYSNA LAGOON

CURRENT TRACKING BETWEEN BELVIDERE AND
SAR BRIDGE 14 / 10 / 1974 LW +07h00 -08h 00

APPENDIX
FIGURE

C.33

JETTY
NEW ✕

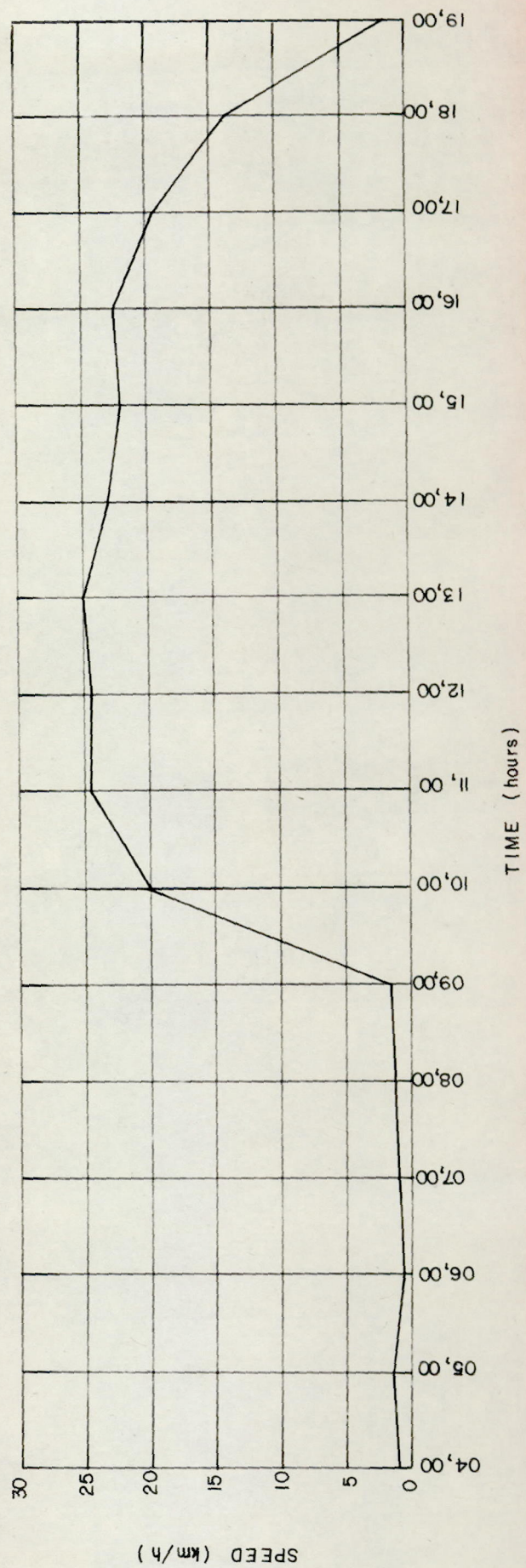
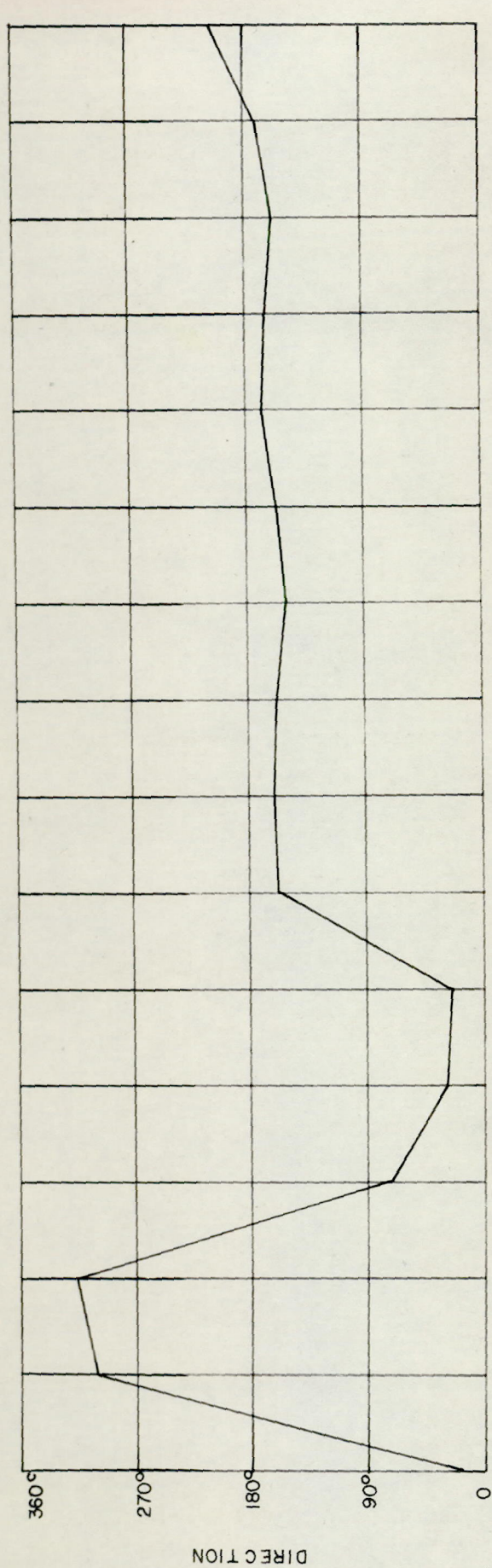


KNYSNA LAGOON

CURRENT TRACKING BETWEEN BELVIDERE AND
SAR BRIDGE 14/10/1974 LW+ 08h00-09h00

APPENDIX
FIGURE

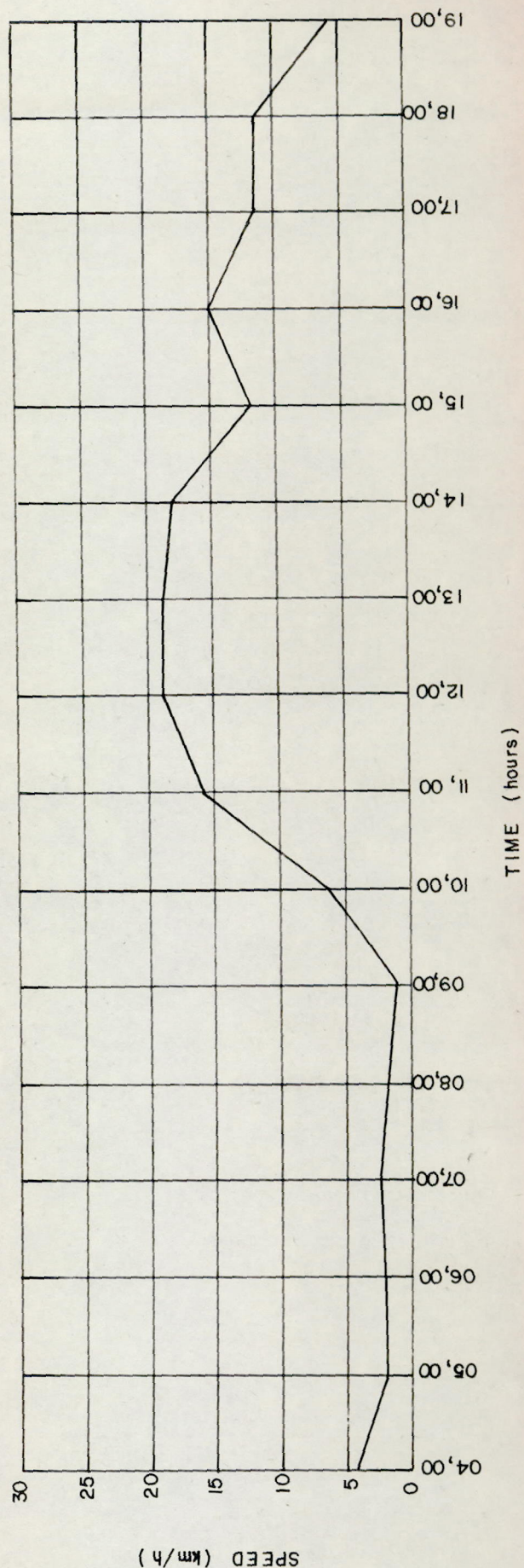
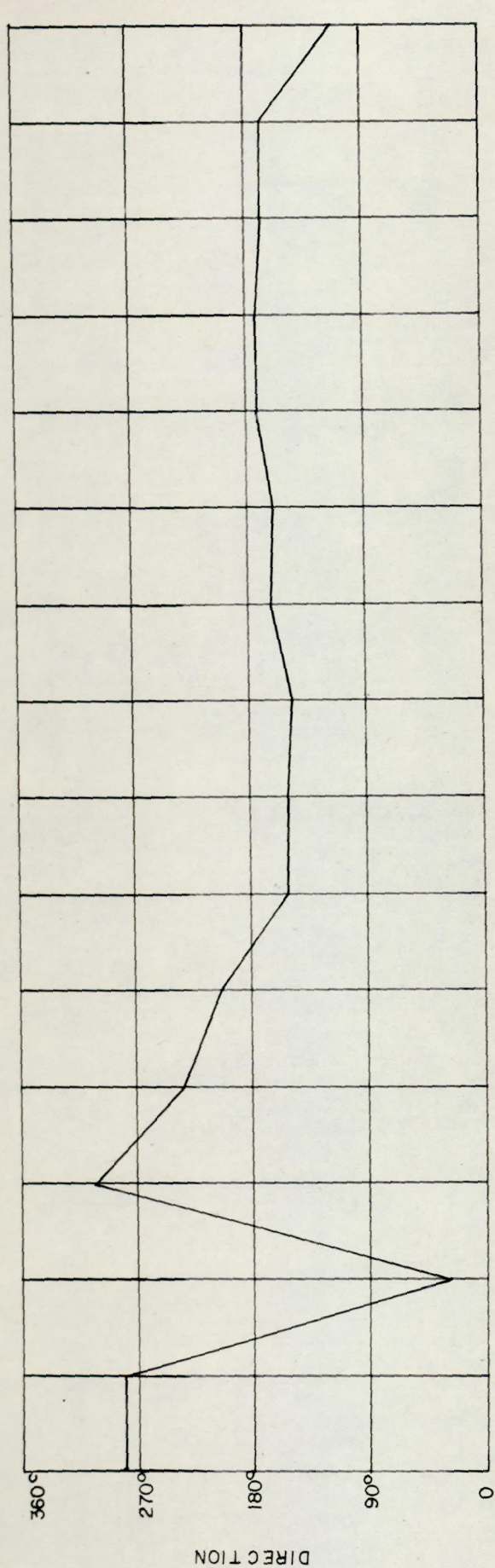
C.34



REF No. F 140Y37-1

KNYSNA LAGOON
WIND DATA 8/10/1974

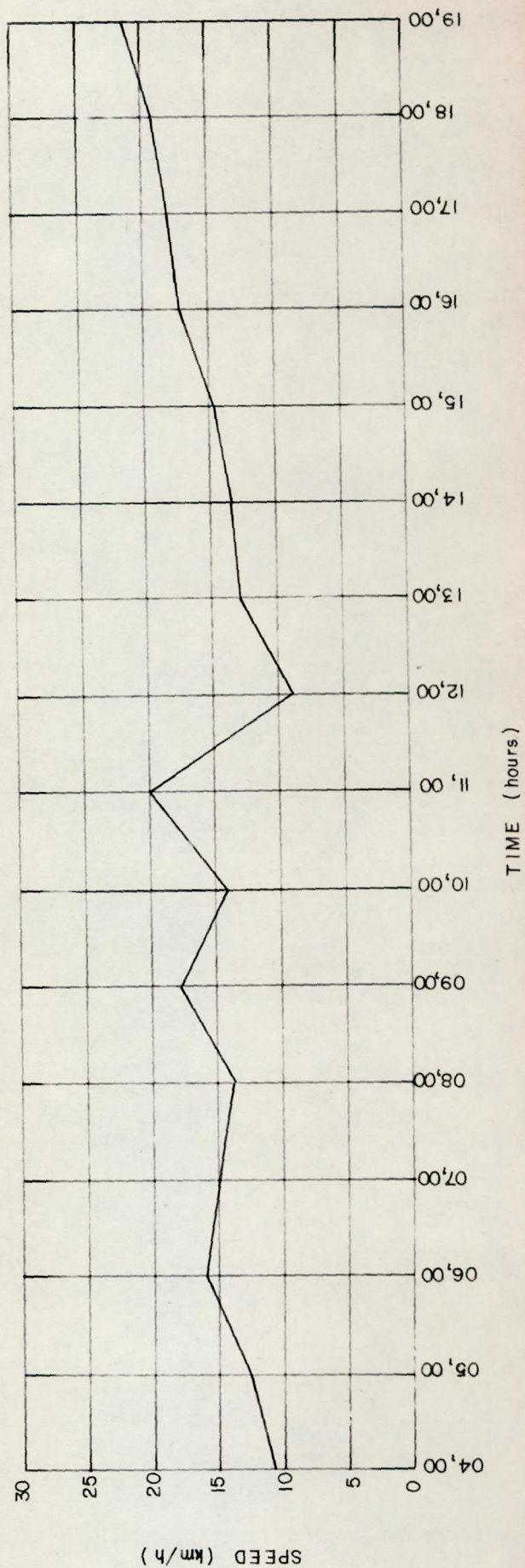
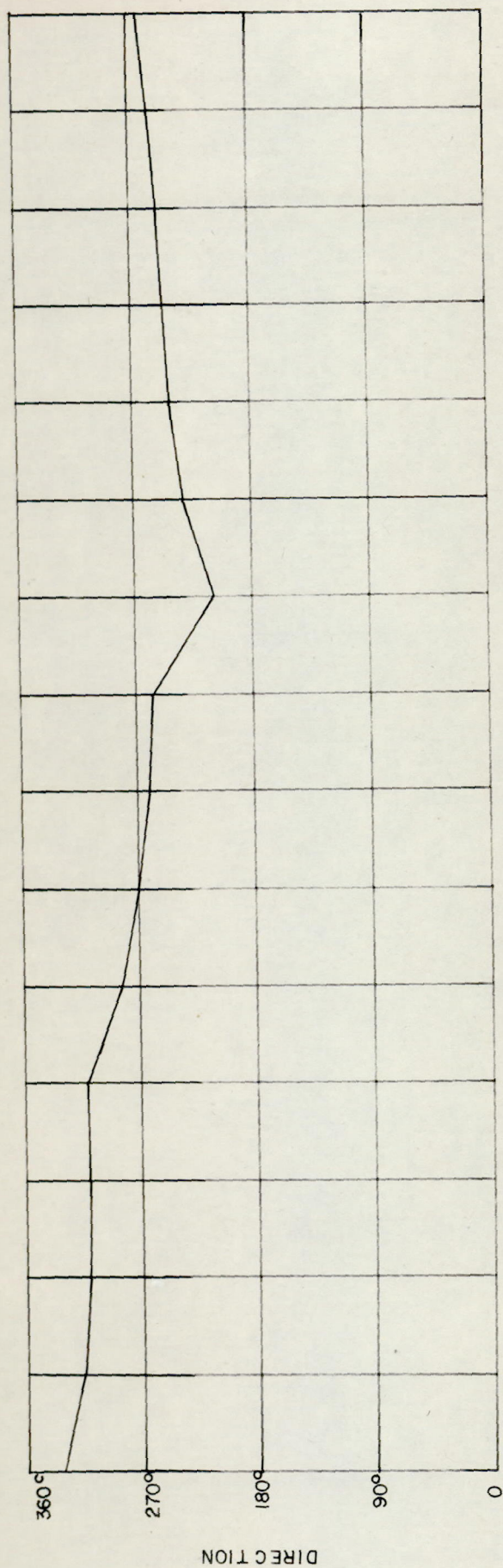
APPENDIX
FIGURE
D.1



REF. No. F140Y37 - 2

KNYSNA LAGOON
WIND DATA 9/10/1974

APPENDIX
FIGURE
D.2



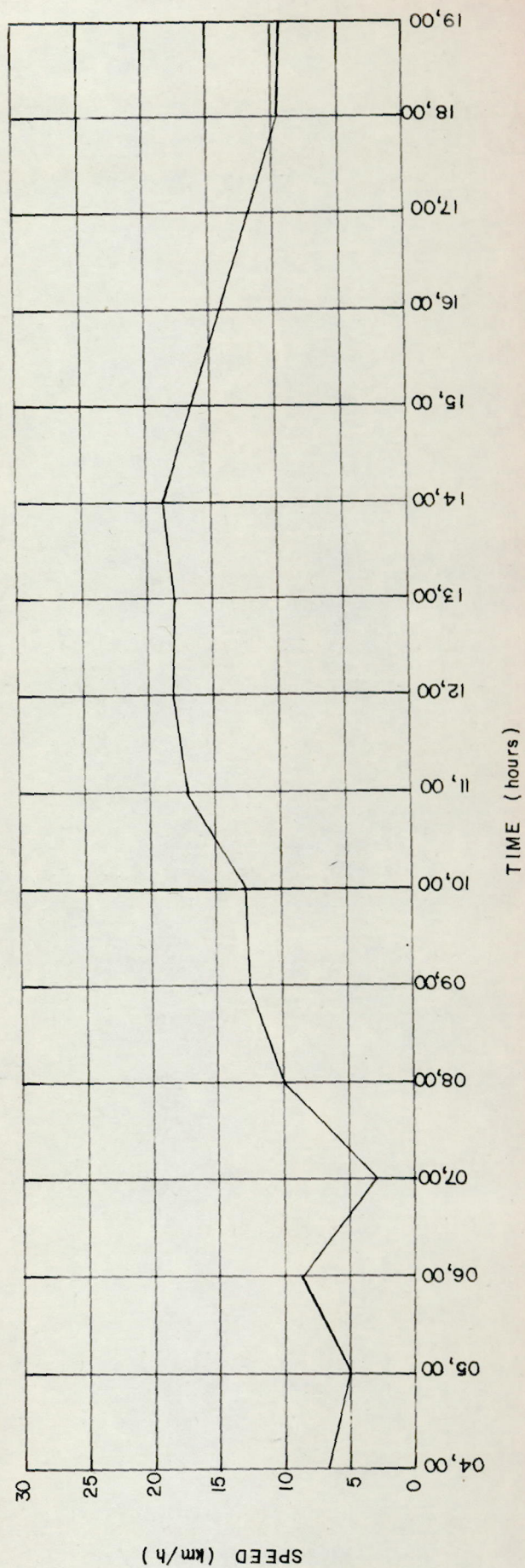
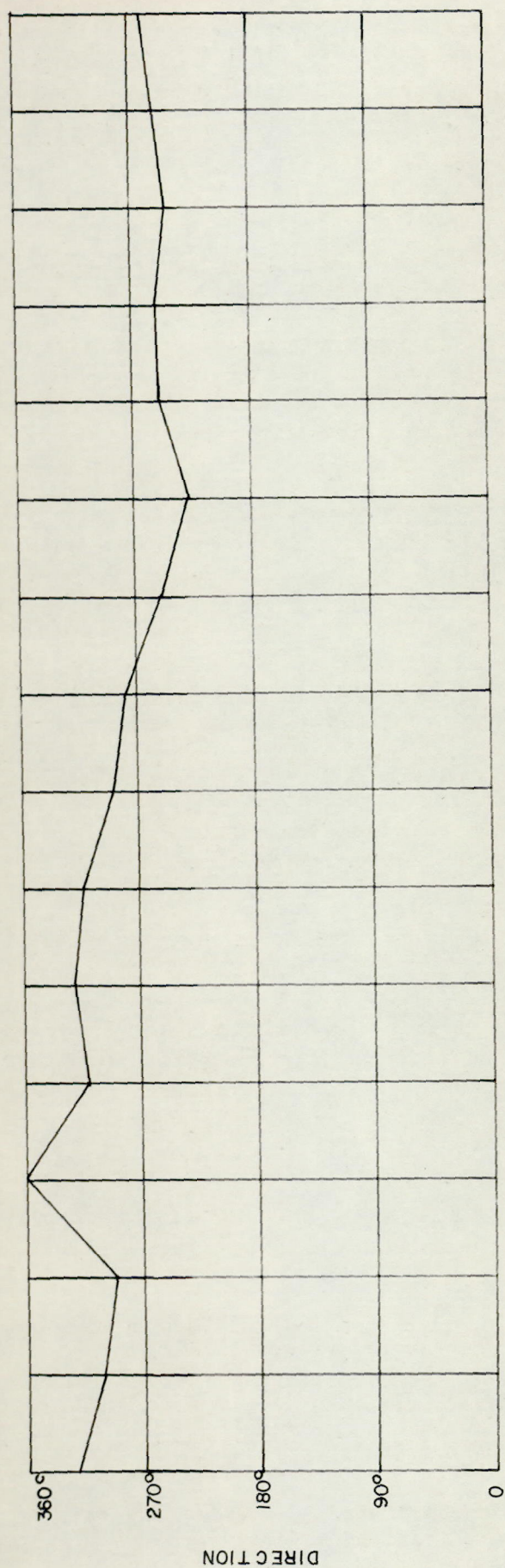
REF. No. F140Y37 - 3

KNYSNA LAGOON

WIND DATA 13/10/1974

APPENDIX
FIGURE

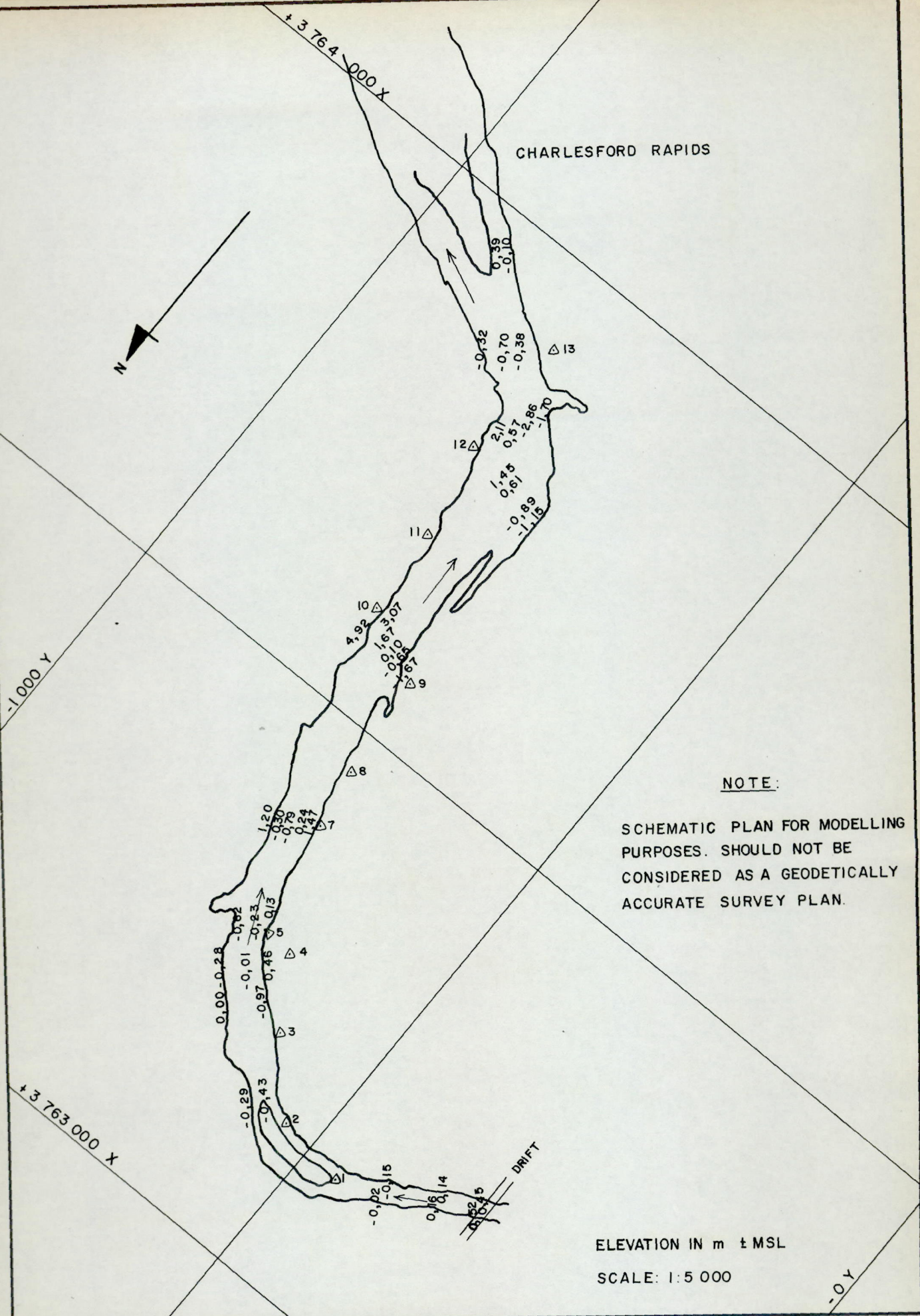
D.3



REF. No. F140Y37 - 4

KNYSNA LAGOON
WIND DATA 14/10/1974

APPENDIX
FIGURE
D.4

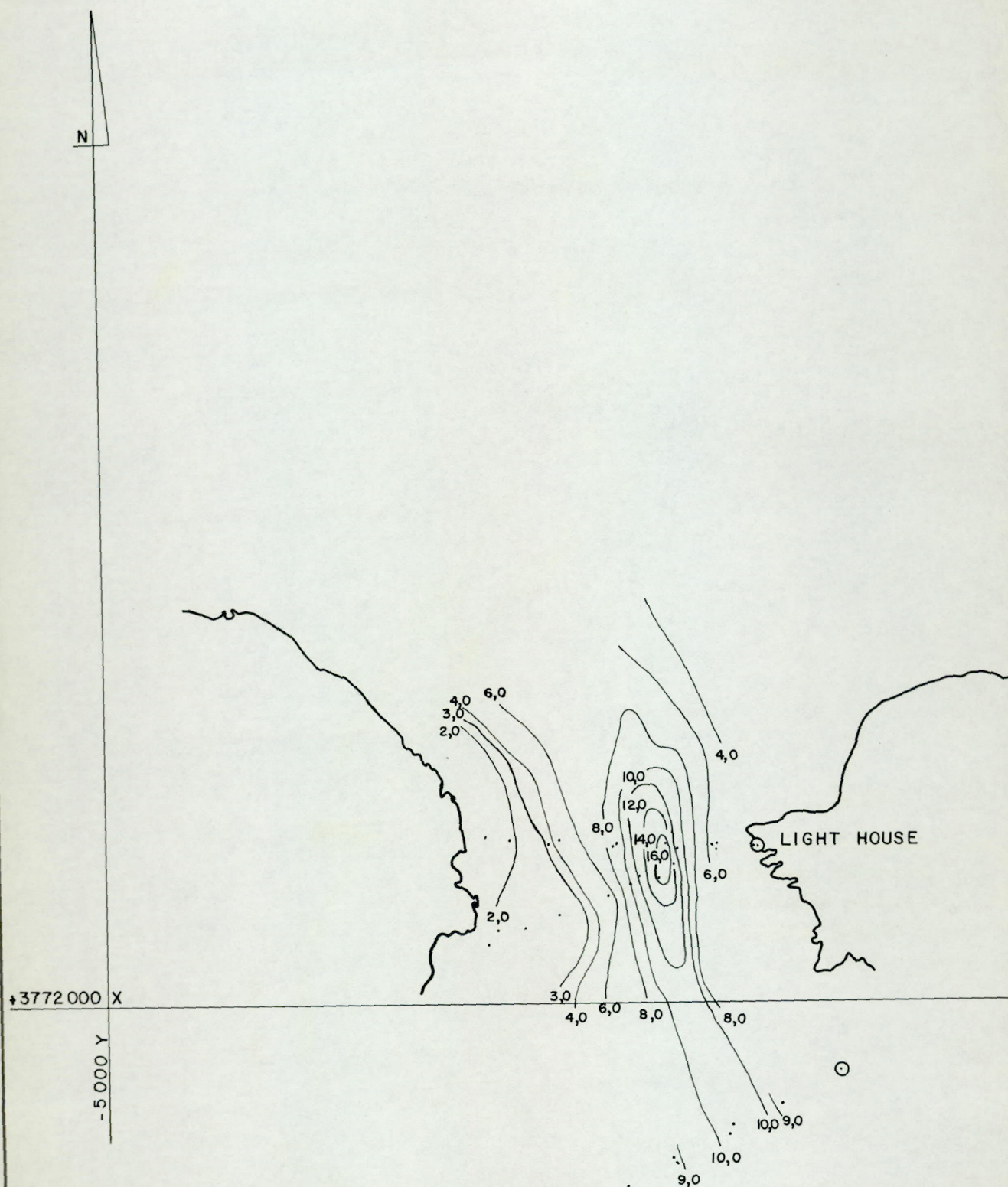


KNYSNA LAGOON

SURVEY CHARLESFORD RAPIDS TO CHARLESFORD
FARM DRIFT

APPENDIX
FIGURE

E.1



CONTOURS IN METRES BELOW MSL
SCALE: 1: 5 000

REFERENCE NO.: F140X33

KNYSNA LAGOON

DEPTH CONTOURS AT THE HEADS

APPENDIX
FIGURE

F.1