

AREAL EXTENT OF INTENSE RAINFALL IN HONG KONG 1979 TO 1995

GEO REPORT No. 62

A.W. Malone

**GEOTECHNICAL ENGINEERING OFFICE
CIVIL ENGINEERING DEPARTMENT
THE GOVERNMENT OF THE HONG KONG
SPECIAL ADMINISTRATIVE REGION**

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**This report was originally produced in June 1996
as GEO Technical Note No. TN 3/96**

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First published, July 1997

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101 Princess Margaret Road,
Homantin, Kowloon,
Hong Kong.

This publication is available from:

Government Publications Centre,
Ground Floor, Low Block,
Queensway Government Offices,
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Overseas orders should be placed with:

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188 Lockhart Road, Wan Chai,
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Price in Hong Kong: HK\$43

Price overseas: US\$8.5 (including surface postage)

An additional bank charge of **HK\$50** or **US\$6.50** is required per cheque made in currencies other than Hong Kong dollars.

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PREFACE

In keeping with our policy of releasing information of general technical interest, we make available some of our internal reports in a series of publications termed the GEO Report series. The reports in this series, of which this is one, are selected from a wide range of reports produced by the staff of the Office and our consultants. A charge is made to cover the cost of printing.

The Geotechnical Engineering Office also publishes guidance documents and presents the results of research work of general interest in GEO Publications. These publications and the GEO Reports may be obtained from the Government's Information Services Department. Information on how to purchase these publications is given on the last page of this report.

A handwritten signature in black ink, appearing to read 'A.W. Malone', with a stylized flourish at the end.

A.W. Malone
Principal Government Geotechnical Engineer
July 1997

FOREWORD

This report presents maps showing the areal extent of intense rainfall in the Territory as recorded on the GEO & Royal Observatory automatic raingauges between 1979 and 1995.

The maps presented here will enable the reader to draw conclusions about the geographical factors which may affect the areal extent of intense rainfall. Due allowance for geographical factors may be appropriate in geotechnical control, slope assessment and research into landslip occurrence.



A.W. Malone
Principal Government Geotechnical Engineer

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1. INTRODUCTION

The purpose of this report is to make readily available maps showing the areal extent of intense rainfall in the Territory as recorded by the GEO and Royal Observatory automatic raingauges between 1979 and 1995. Intense rainfall as used here means rainfall with an intensity greater than 70 mm in 60 minutes (rolling). It should be noted that this is a less severe criterion than 70 mm in a clock hour.

Certain areas of the territory appear to be especially prone to intense rainfall. The geotechnical implications of this phenomenon deserve further consideration.

Research into aspects of rainfall, including areal distribution of intense rain, will doubtless continue for some time into the future. Meanwhile, the maps presented here will enable the reader to draw conclusions about the geographical factors which may affect the areal extent of intense rainfall. Due allowance for geographical factors may be appropriate in geotechnical control, slope assessment and research into landslip occurrence.

2. LIST OF STORMS WITH INTENSE RAINFALL IN THE YEARS 1979 to 1995

A list of storms with intense rainfall in the years 1979 to 1995 is given in Table 1. A total of 71 events is recorded. In the table, the estimated area of intense rainfall in km², the number of landslides recorded and the number of clock hours each with an intense rainfall greater than 70 mm are given.

The areal extent of intense rainfall in the Territory for the 71 events as recorded on the GEO and Royal Observatory automatic raingauges are shown in Figures 1 to 71.

3. ACKNOWLEDGEMENTS

Dr Jerasak Premchitt and his technical staff had kindly provided the data in Table 1 and the figures were expertly drafted by Mr C.K. Tse and his colleagues in the Drafting Unit of the Special Projects Division.

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Table 1 - List of Storms with Intense Rainfall in the Years 1979 to 1995 (Sheet 1 of 2)

Date (YYMMDD)	Estimated Area, km ² with >70 mm/60 min	No. of landslides	No. of clock hours each with >70 mm/60 min	Figure No.
790513	6.0	0	1	1
790802	41.0	0	1	2
790925	5.5	0	1	3
800713	6.5	0	1	4
800807	7.0	0	1	5
810831	4.0	0	1	6
820529	47.5	551 F	1	7
820816	37.0	138 F	1	8
830408	9.0	0	1	9
830512	10.0	0	1	10
830520	4.0	0	1	11
830617	81.5	155	2	12
830822/23	33.0	0	1	13
830903	8.5	0	1	14
830909	4.0	0	1	15
830924	27.5	0	1	16
840616	23.0	8	1	17
850625	5.0	31	1	18
850708	2.0	6	1	19
850709	31.0	7	1	20
850718	2.0	0	1	21
850819	2.0	1	1	22
860511	38.5	19	2	23
860606	32.0	35	1	24
860703	1.0	5	1	25
860731	1.5	1	1	26
860604	5.5	2	1	27
860823	4.0	2	1	28
870317	21.5	14	1	29
870522	21.5	15	1	30
870730	13.1	111	2	31
880719	11.5	41	1	32
880809	4.5	0	1	33
890422	8.5	1	1	34
890502	20.5	120	3	35
890805	2.5	1	1	36
900601	6.5	5	1	37
900608	5.5	2	1	38
900630	6.0	16	1	39
910430	4.5	0	1	40

Table 1 - List of Storms with Intense Rainfall in the Years 1979 to 1995 (Sheet 2 of 2)

Date (YYMMDD)	Estimated Area, km ² with >70 mm/60 min	No. of landslides	No. of clock hours each with >70 mm/60 min	Figure No.
910814	8.0	5	1	41
910904	19.0	0	1	42
920406	6.5	6	1	43
920508	158.5	350 F	2	44
920619	11.5	2	1	45
930501	33.0	21	1	46
930611	22.5	19	1	47
930616	187.0	108 F	1	48
930722	1.5	0	1	49
930731	3.5	0	1	50
930914	5.5	0	1	51
931014	5.5	6	1	52
931105	67.5	372	4	53
940503	14.0	0	1	54
940619	20.0	11	1	55
940712	38.5	5	1	56
940722	104.8	69 F	2	57
940806	38.7	21 F	1	58
940810	23.5	10	1	59
940910	13.0	2	2	60
940920	7.5	0	1	61
950419	4.0	2	1	62
950614	11.0	0	1	63
950618	6.0	3	1	64
950712	10.0	3	1	65
950731	6.5	0	1	66
950805	5.5	3	1	67
950813	115.6	123 F	2	68
950824	7.0	3	1	69
950916	3.5	0	1	70
951005	36.3	17	1	71

- Notes :
- (1) Intense rainfall as used here means greater than 70mm in 60 minutes (rolling); this is a less severe criterion than 70mm in a clock hour.
 - (2) F means a fatal landslide occurred.
 - (3) The only known fatal landslide (1984-1995 inclusive) not indicated in this table occurred on 21.5.89.
 - (4) The numbers of landslides are those reported for the given dates.
 - (5) Coverage of the raingauge system was limited in the period before 1984.

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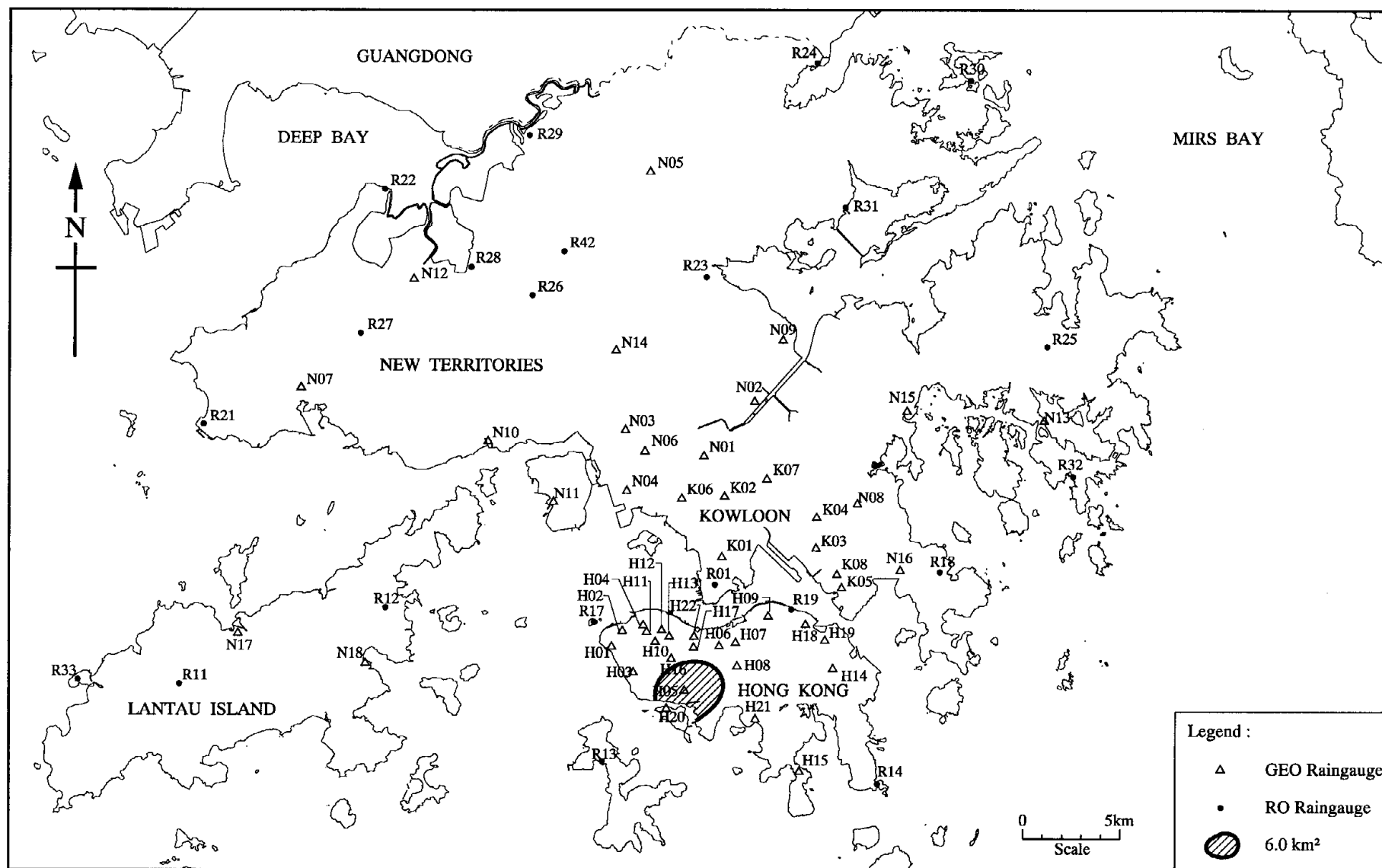


Figure 1 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 13.5.79

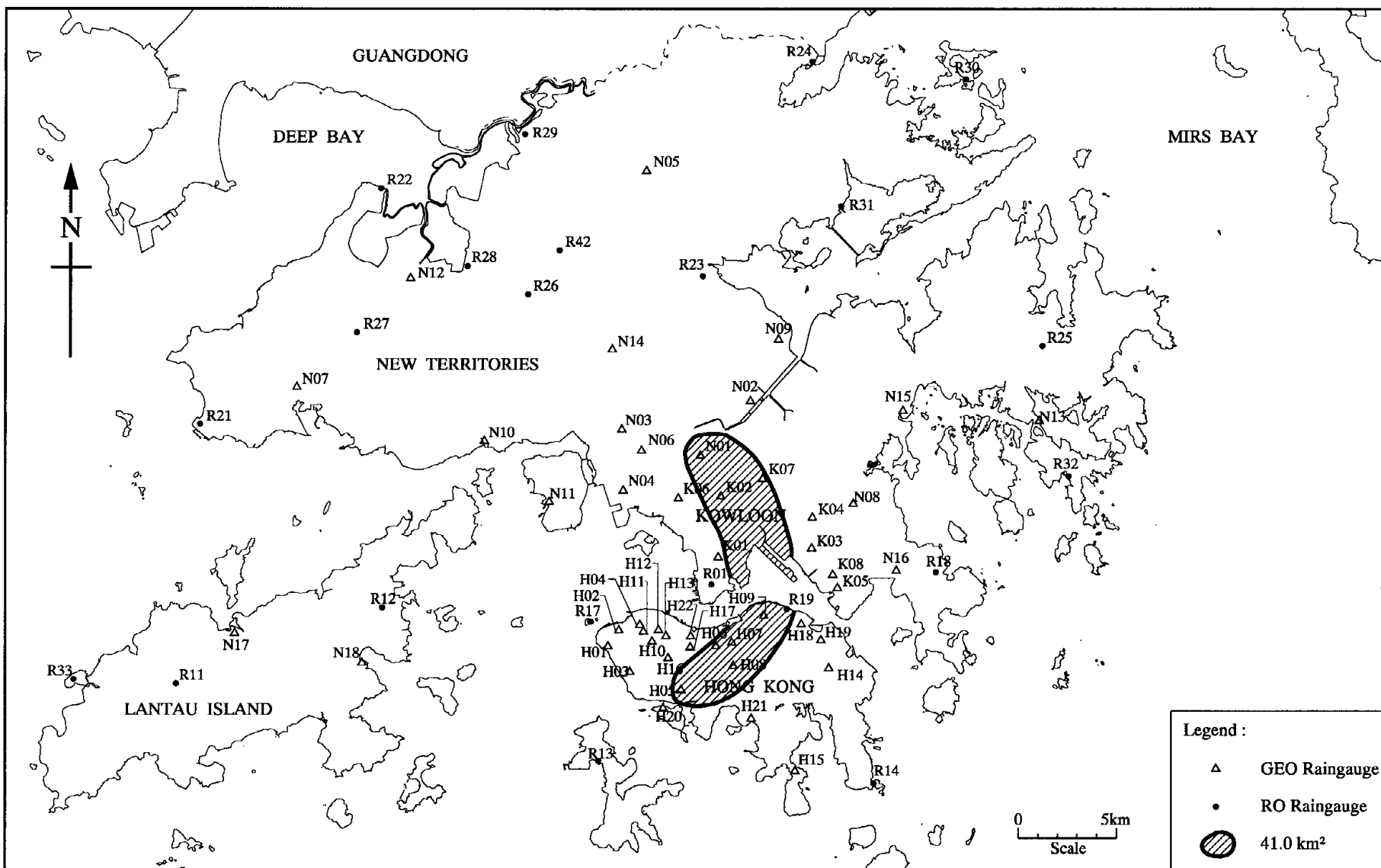


Figure 2 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 2.8.79

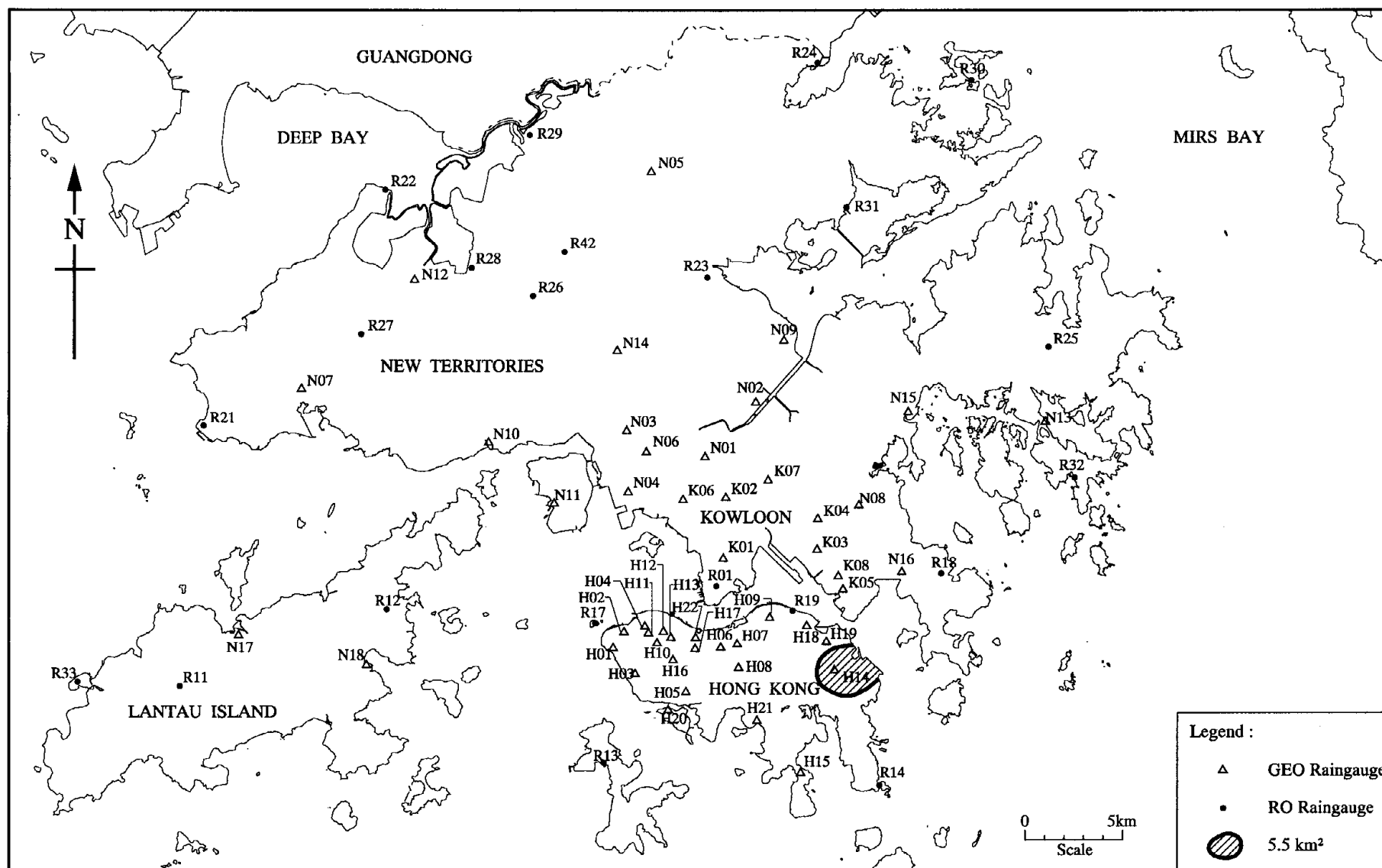


Figure 3 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 25.9.79

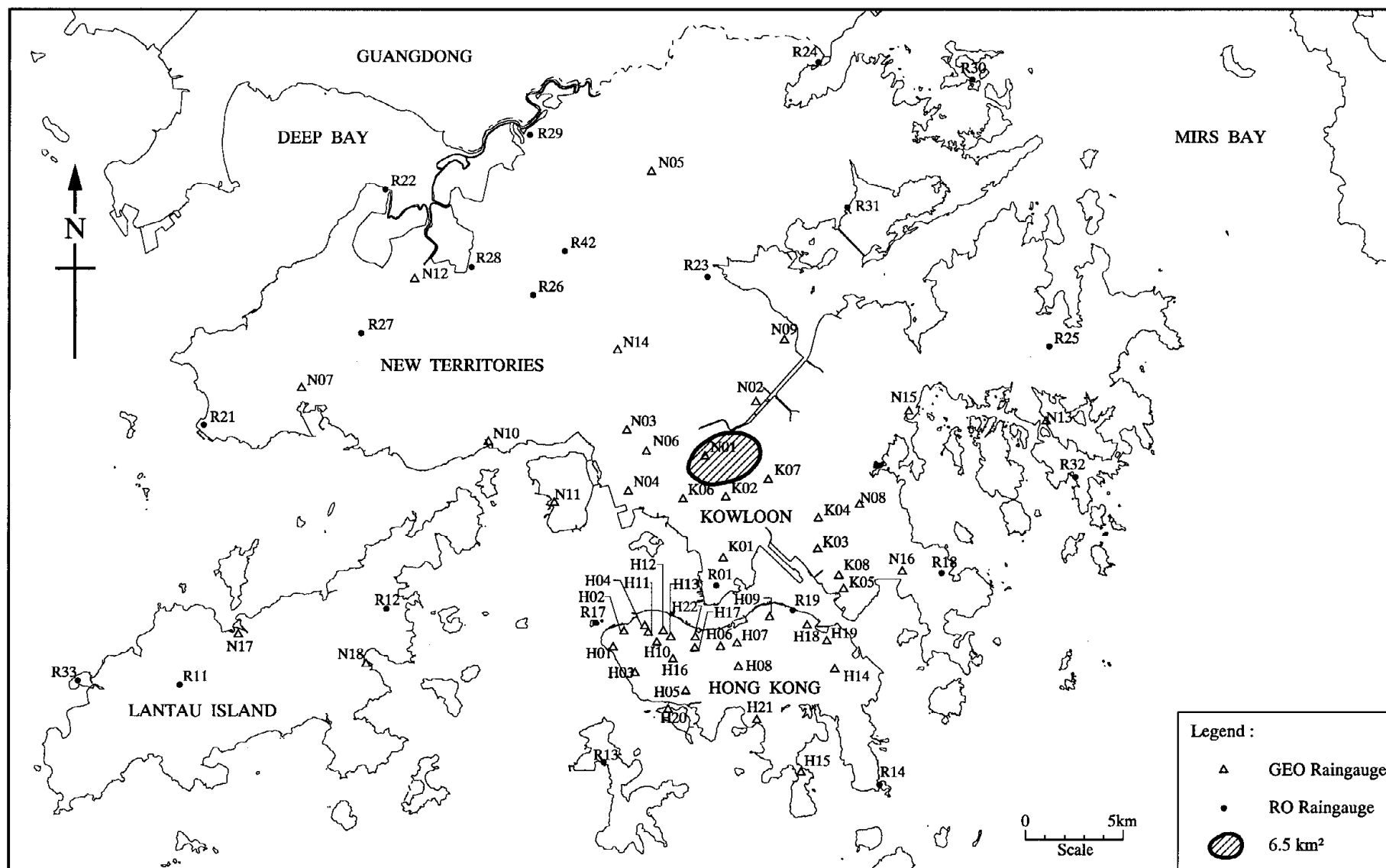


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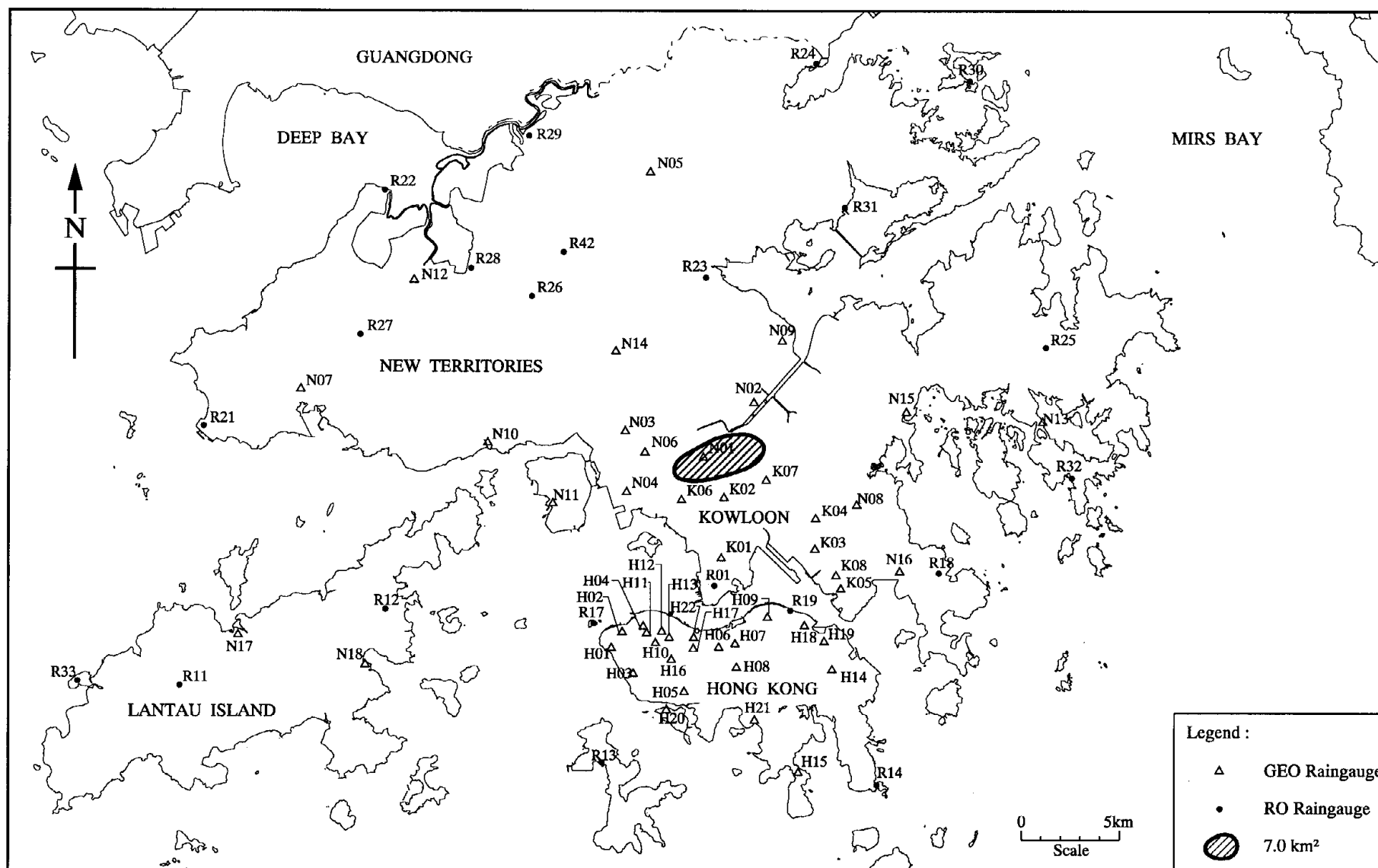


Figure 5 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 7.8.80

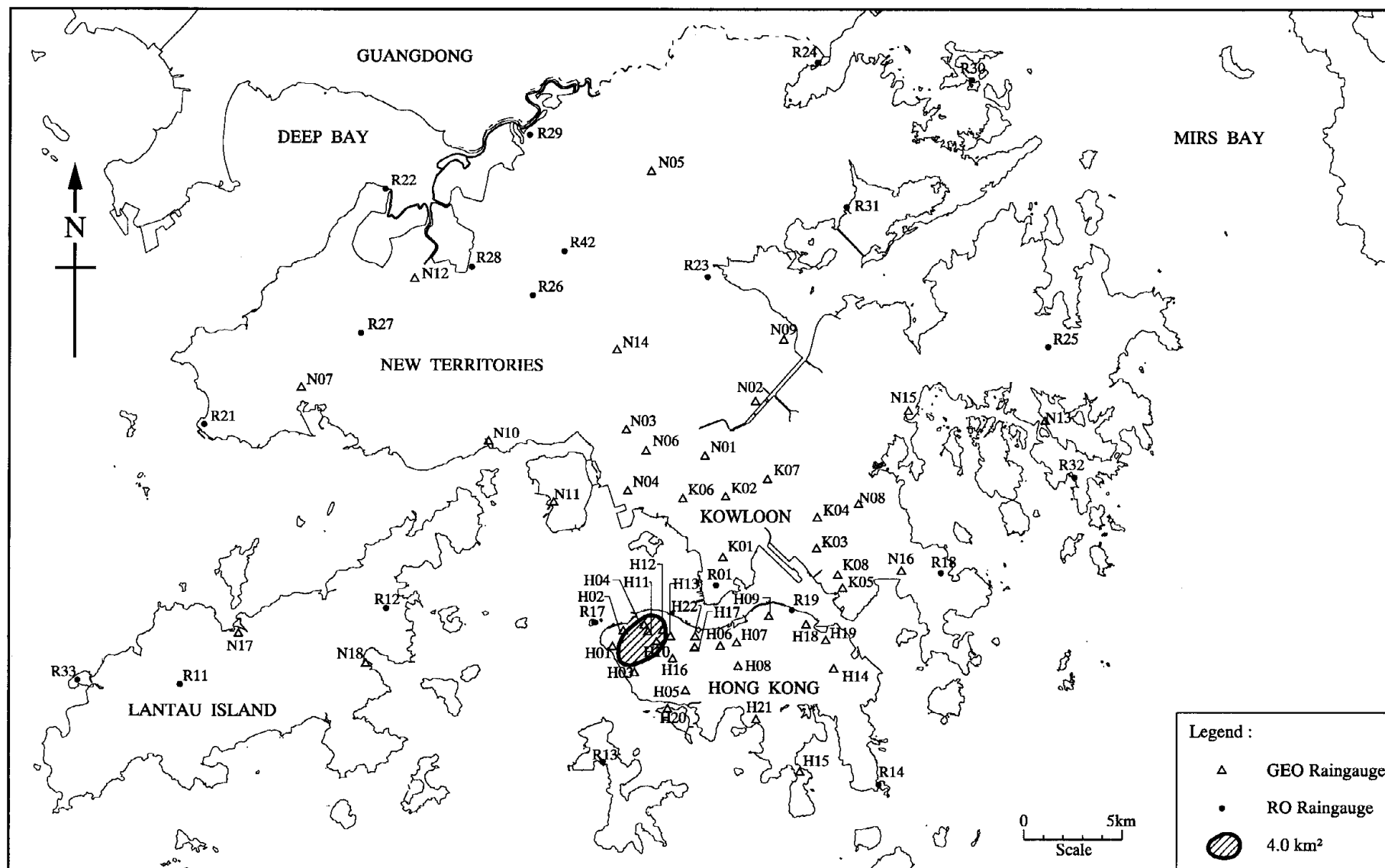


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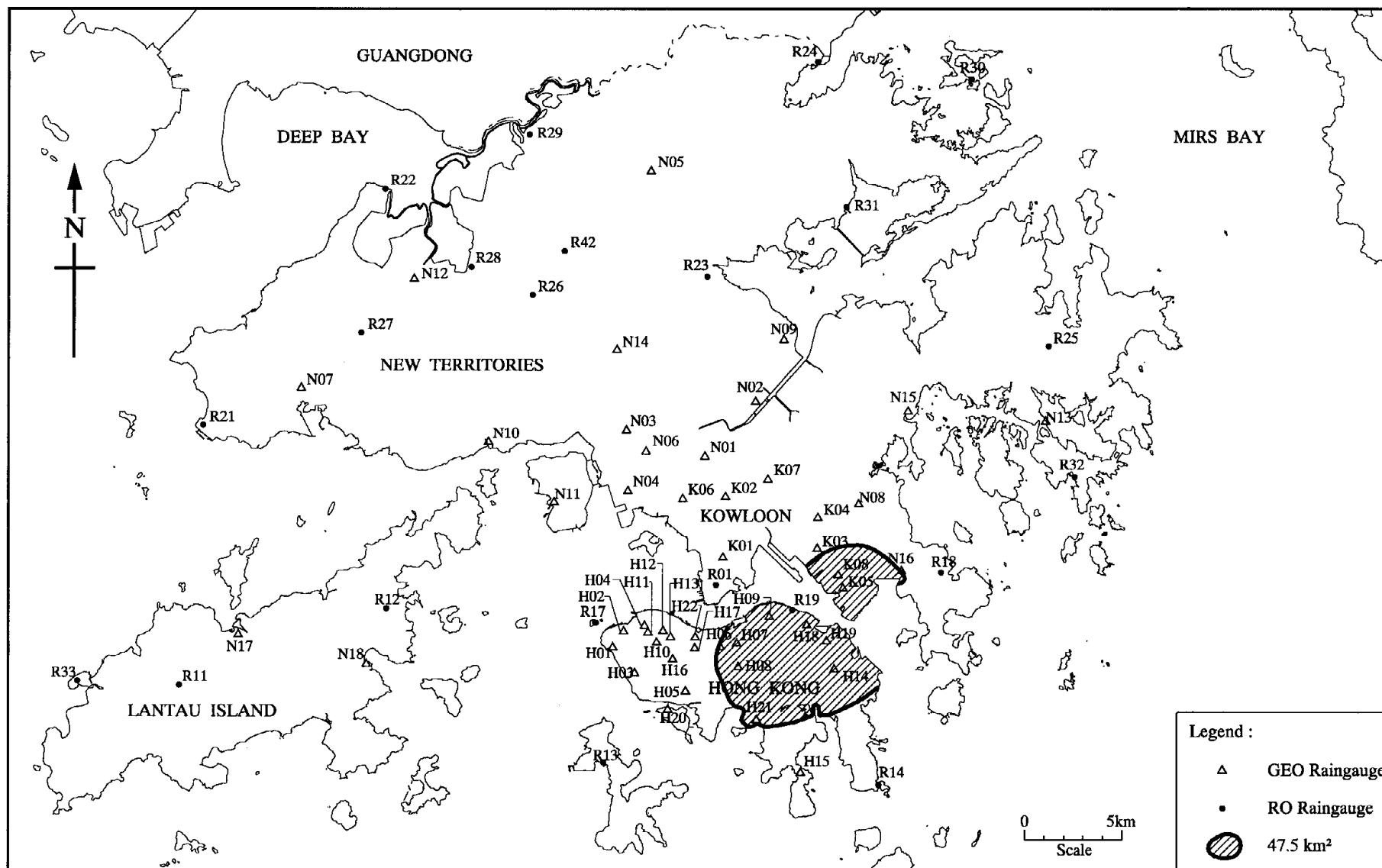


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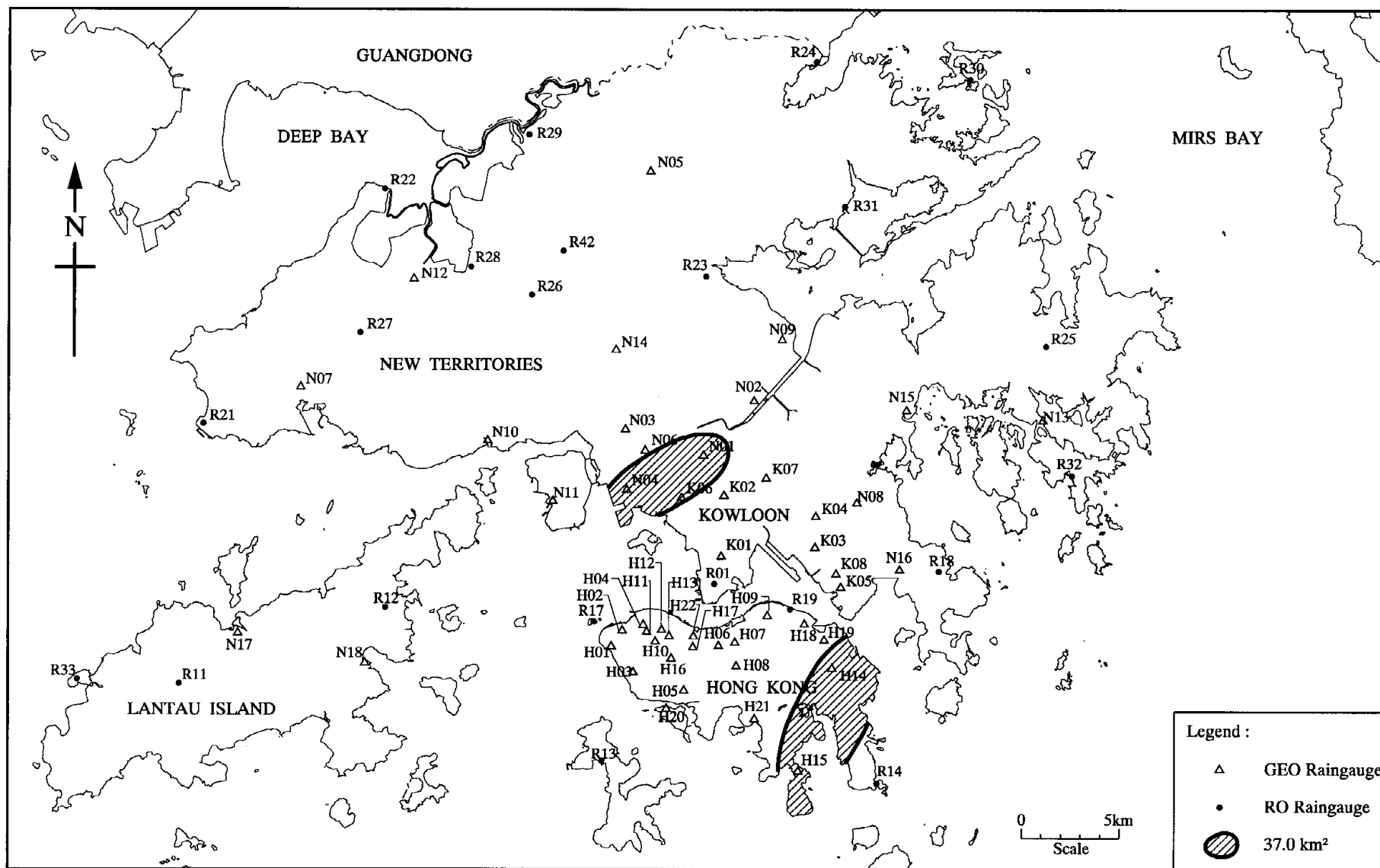


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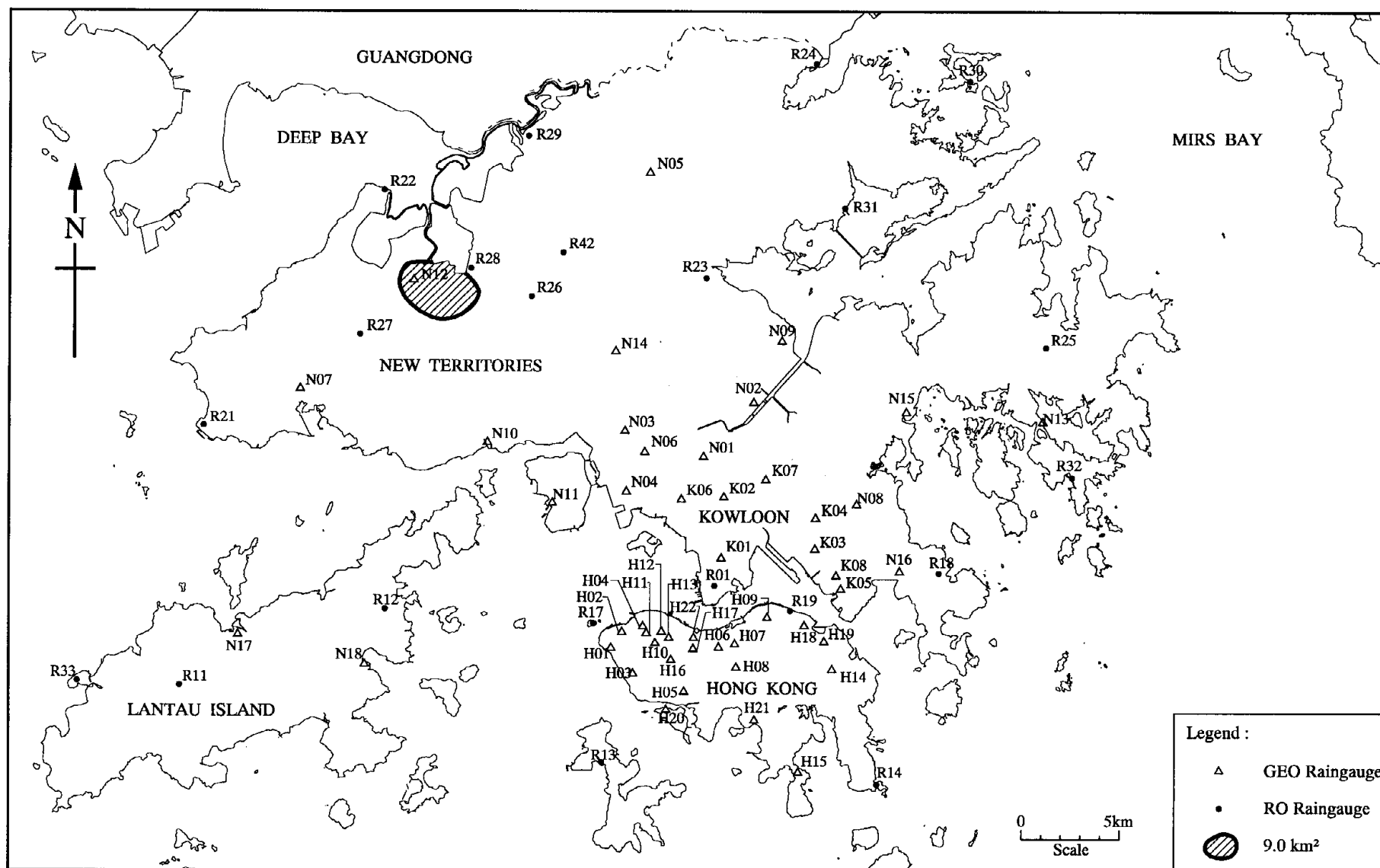


Figure 9 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 8.4.83

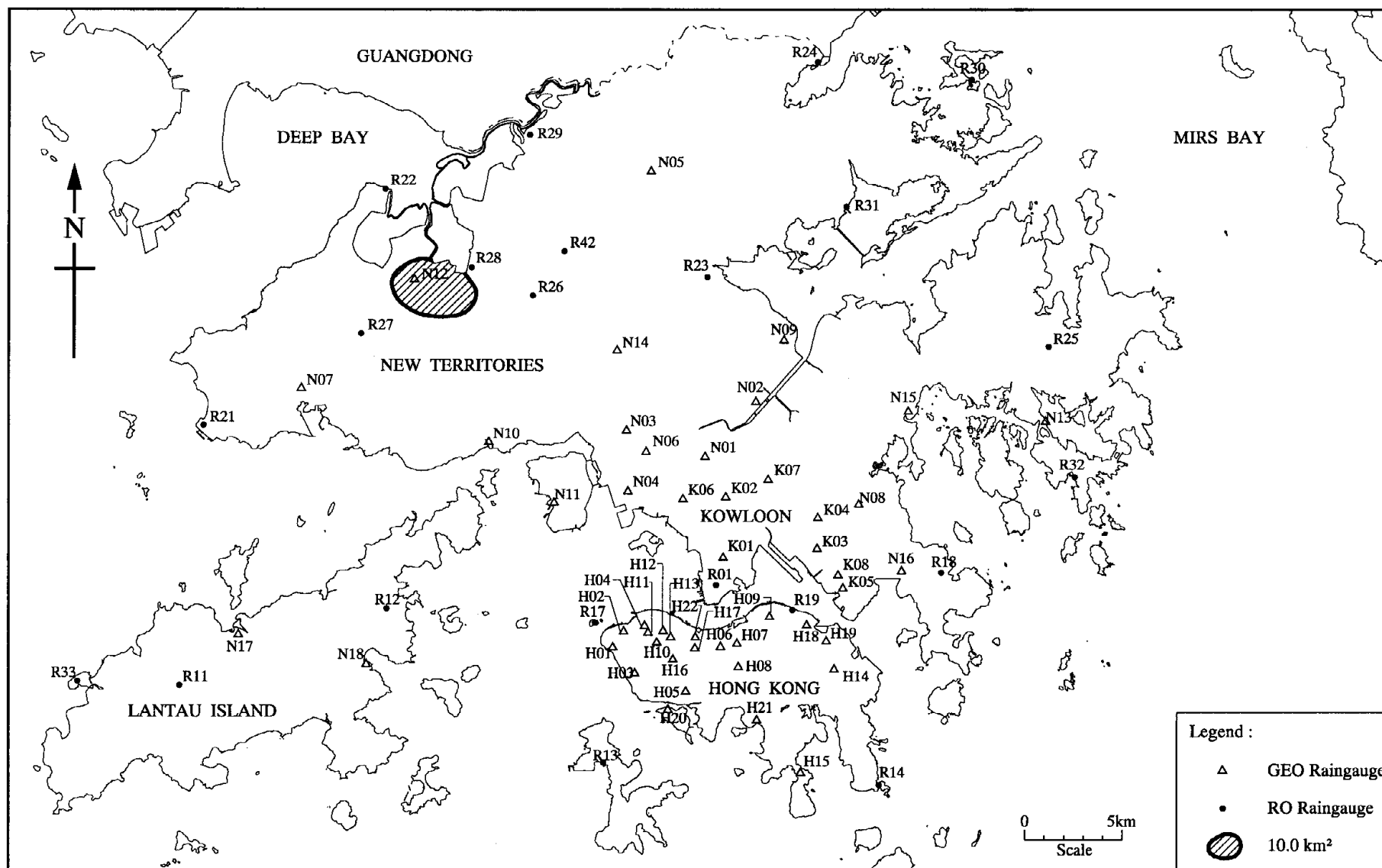


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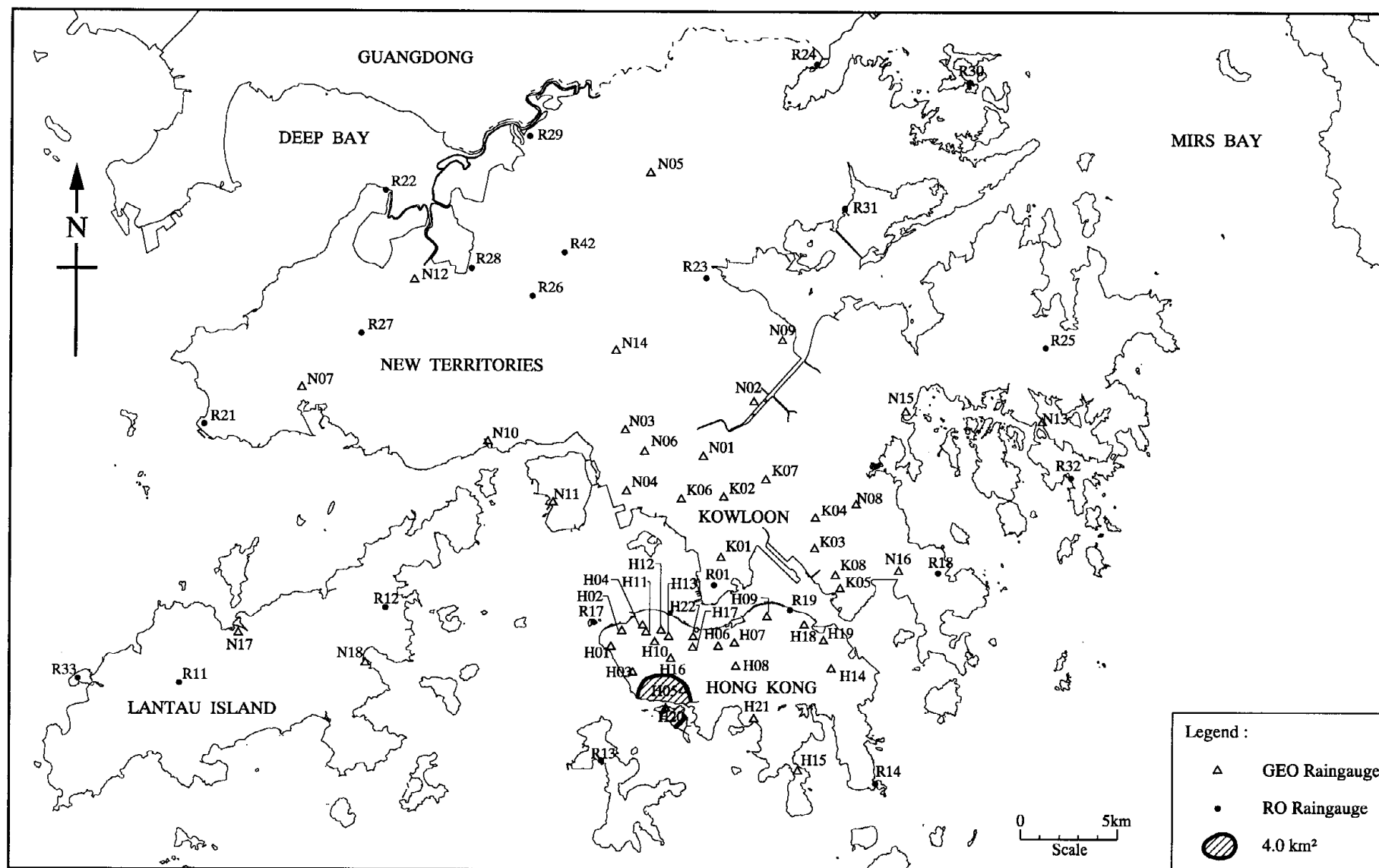


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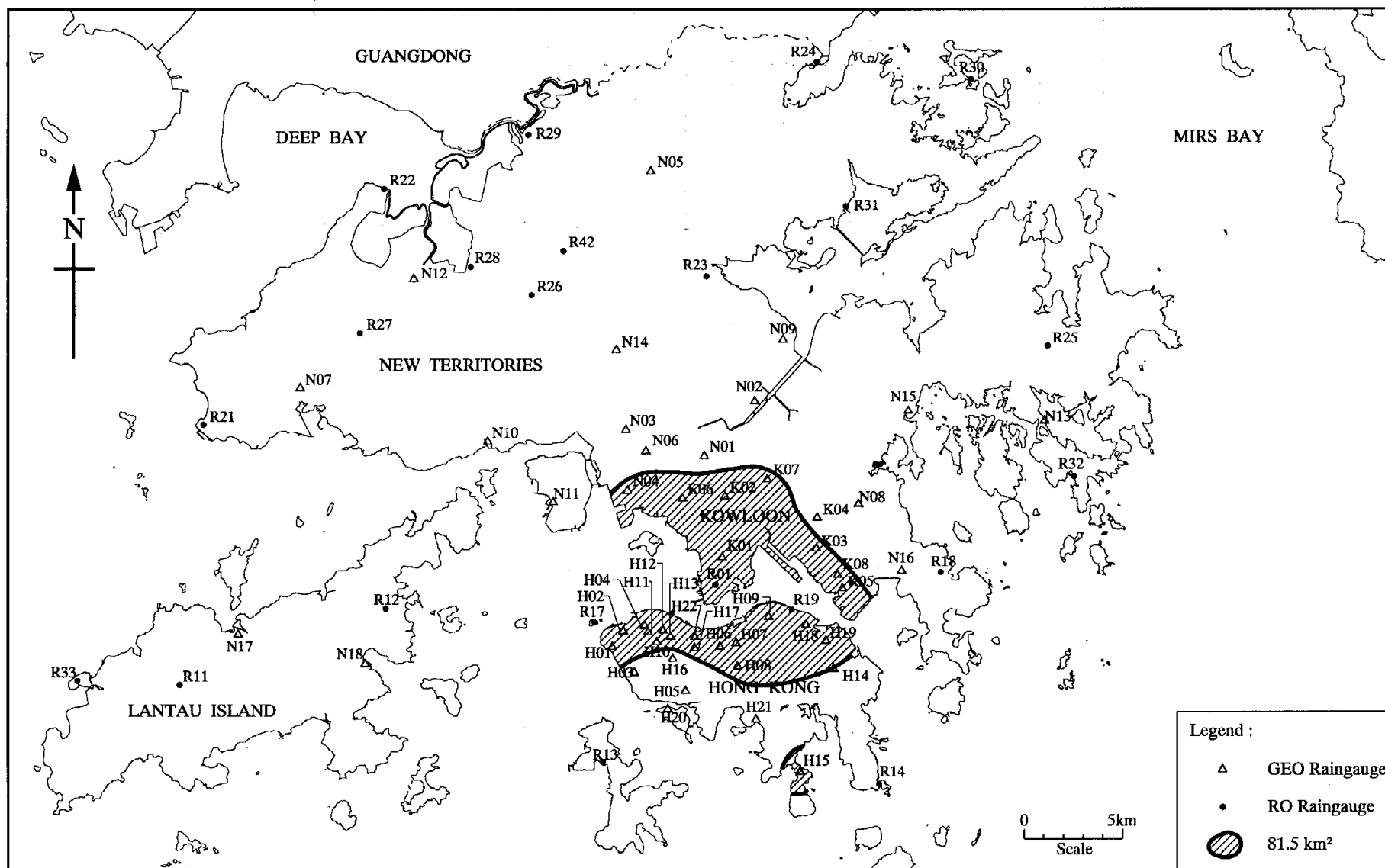


Figure 12 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 17.6.83

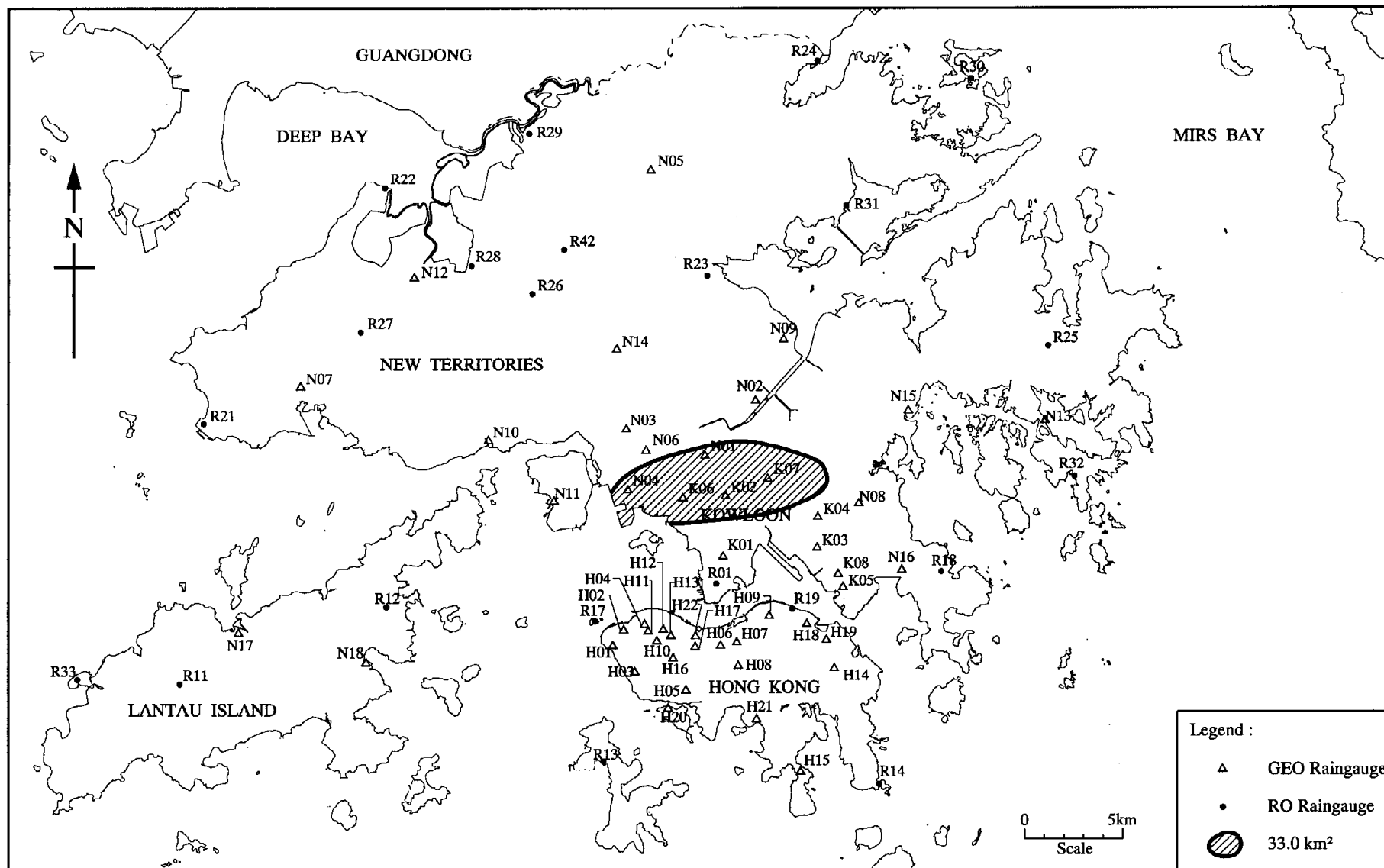


Figure 13 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 22.8.83 & 23.8.83

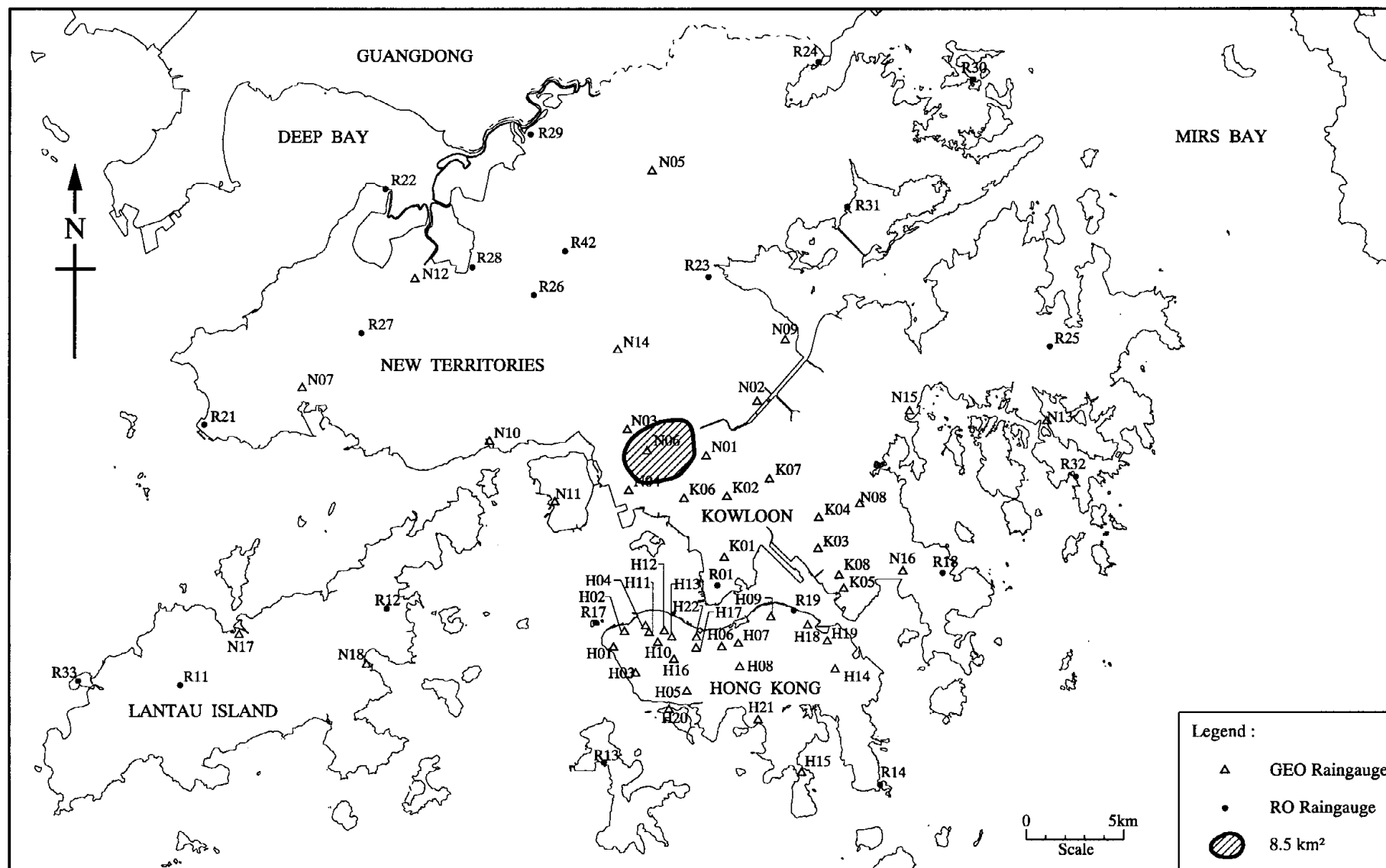


Figure 14 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 3.9.83

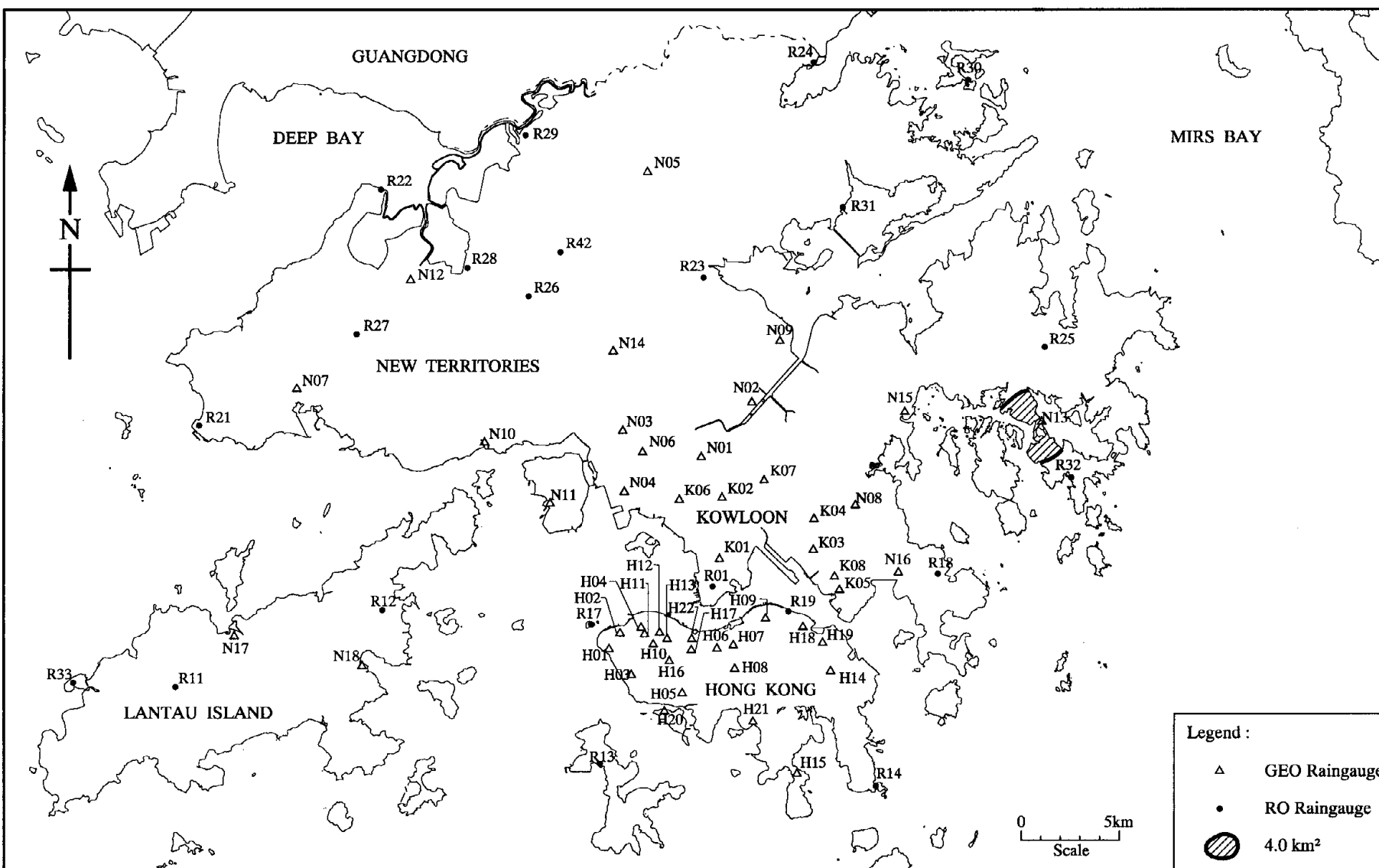


Figure 15 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 9.9.83

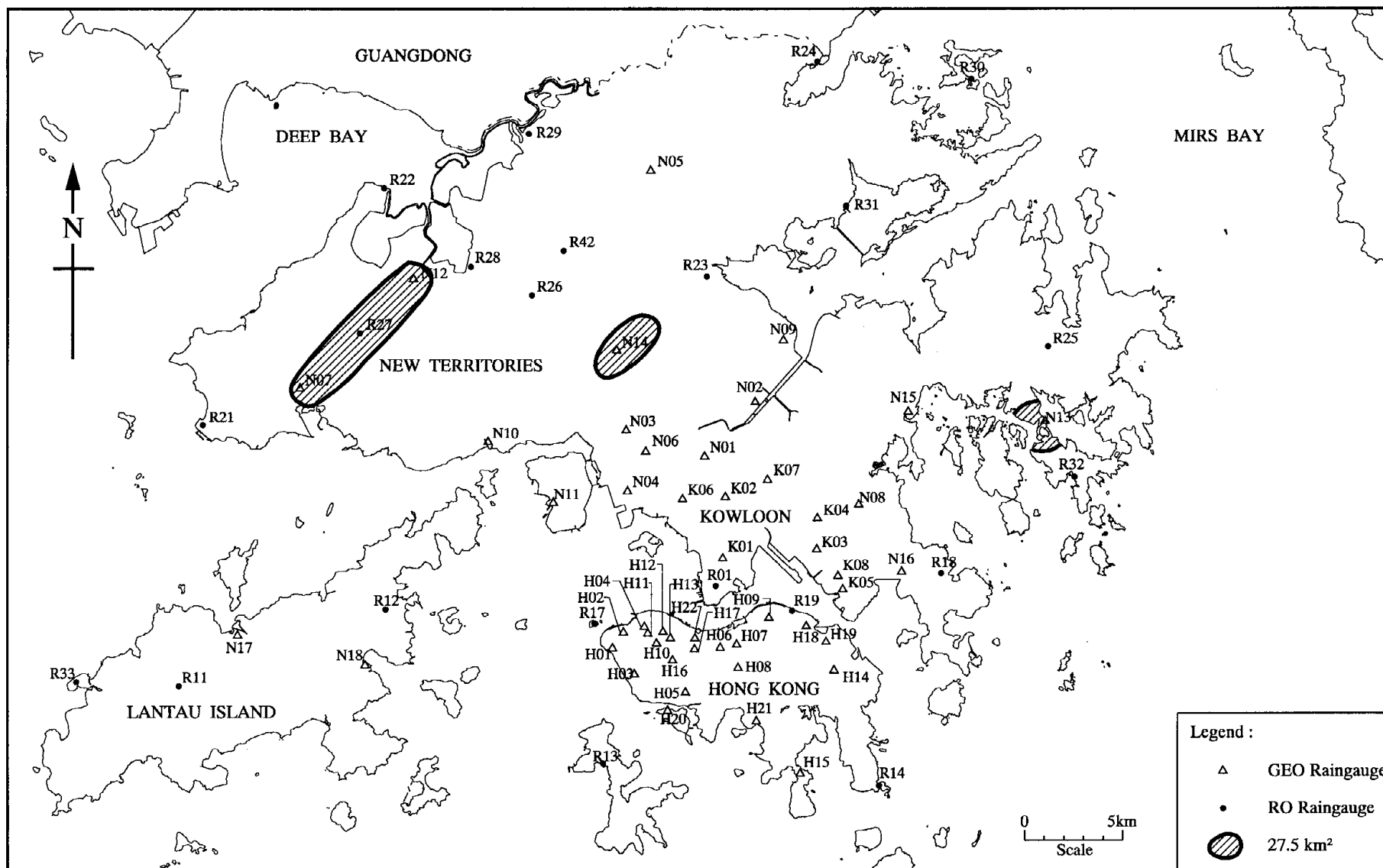


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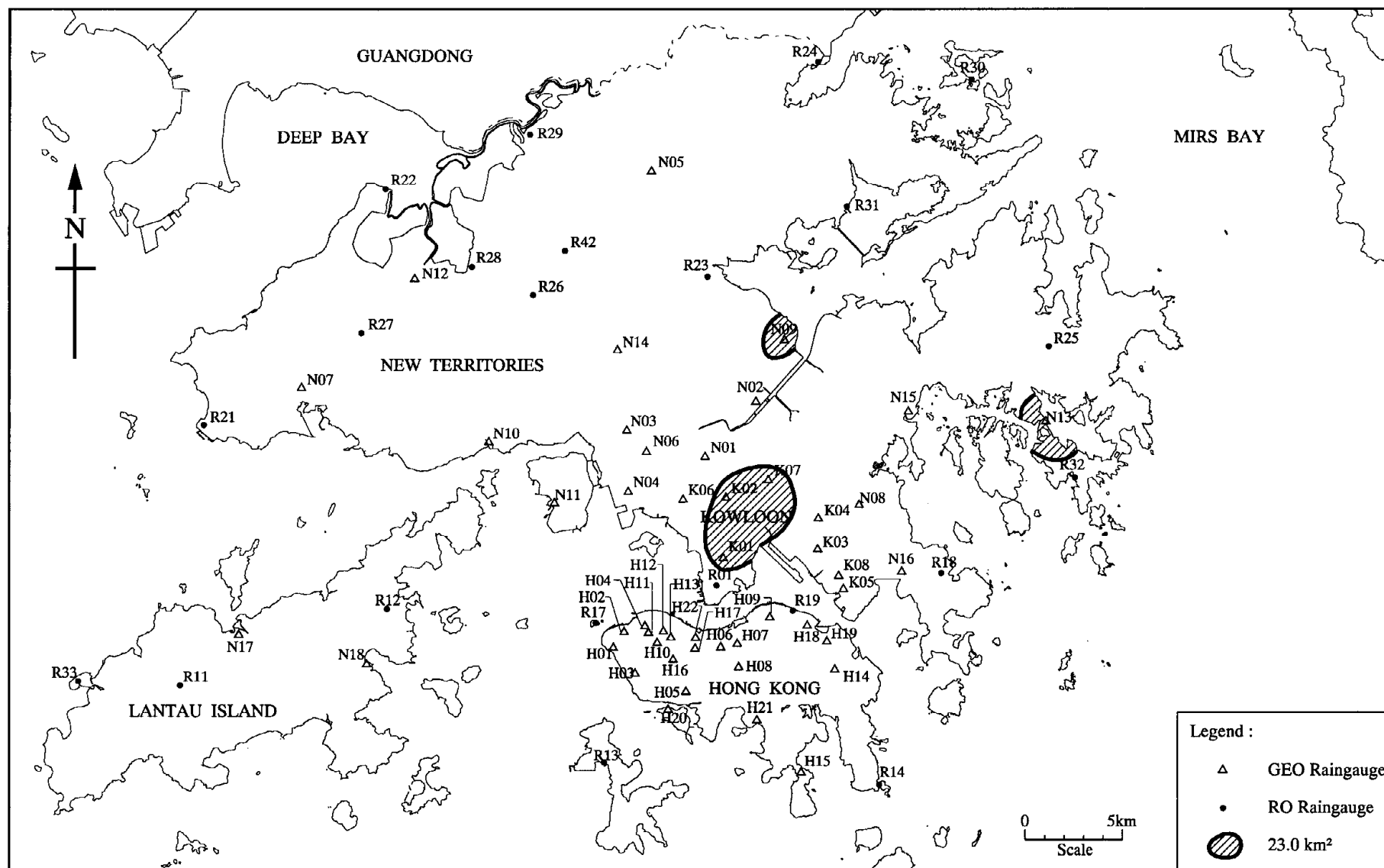


Figure 17 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 16.6.84

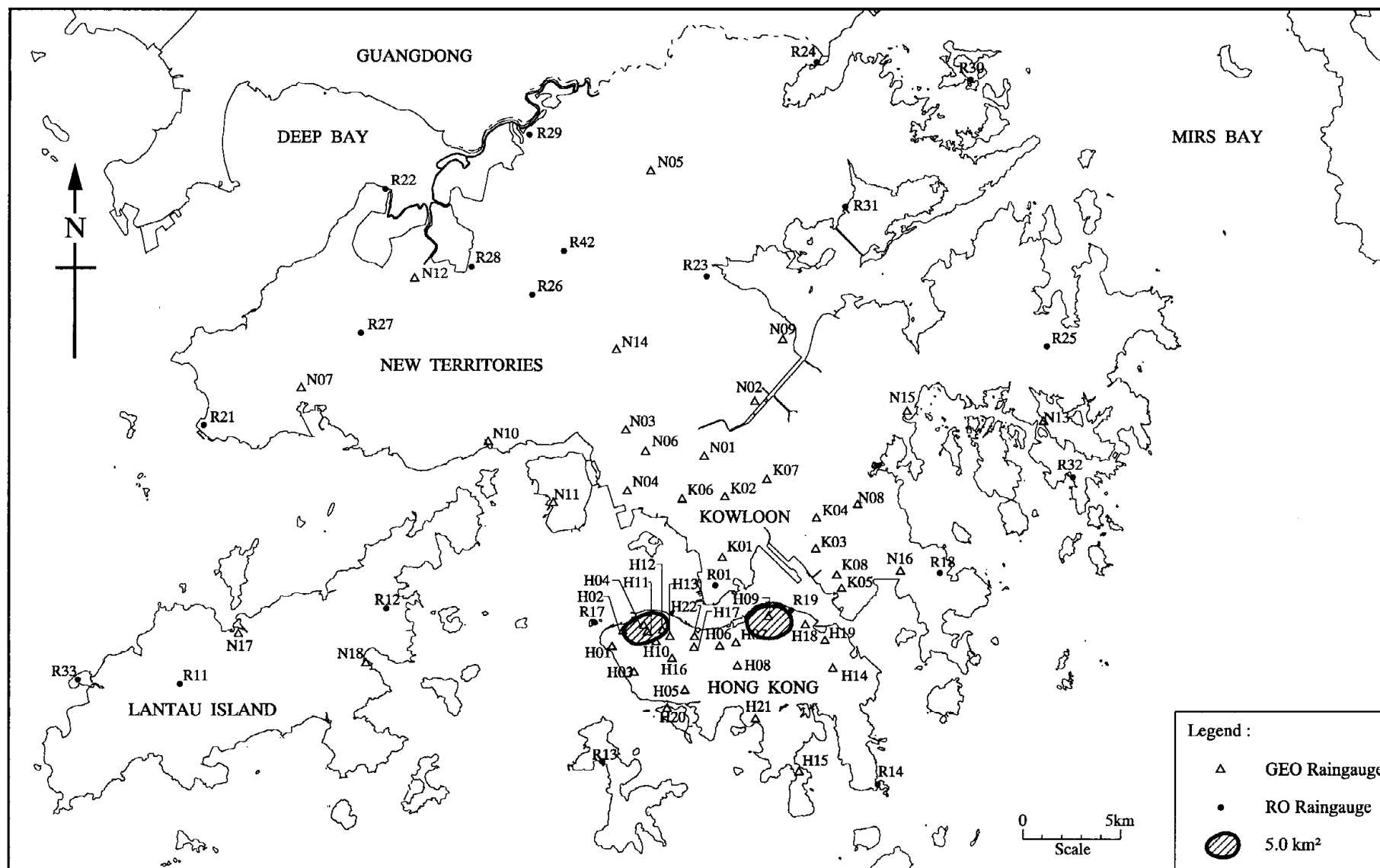


Figure 18 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 25.6.85

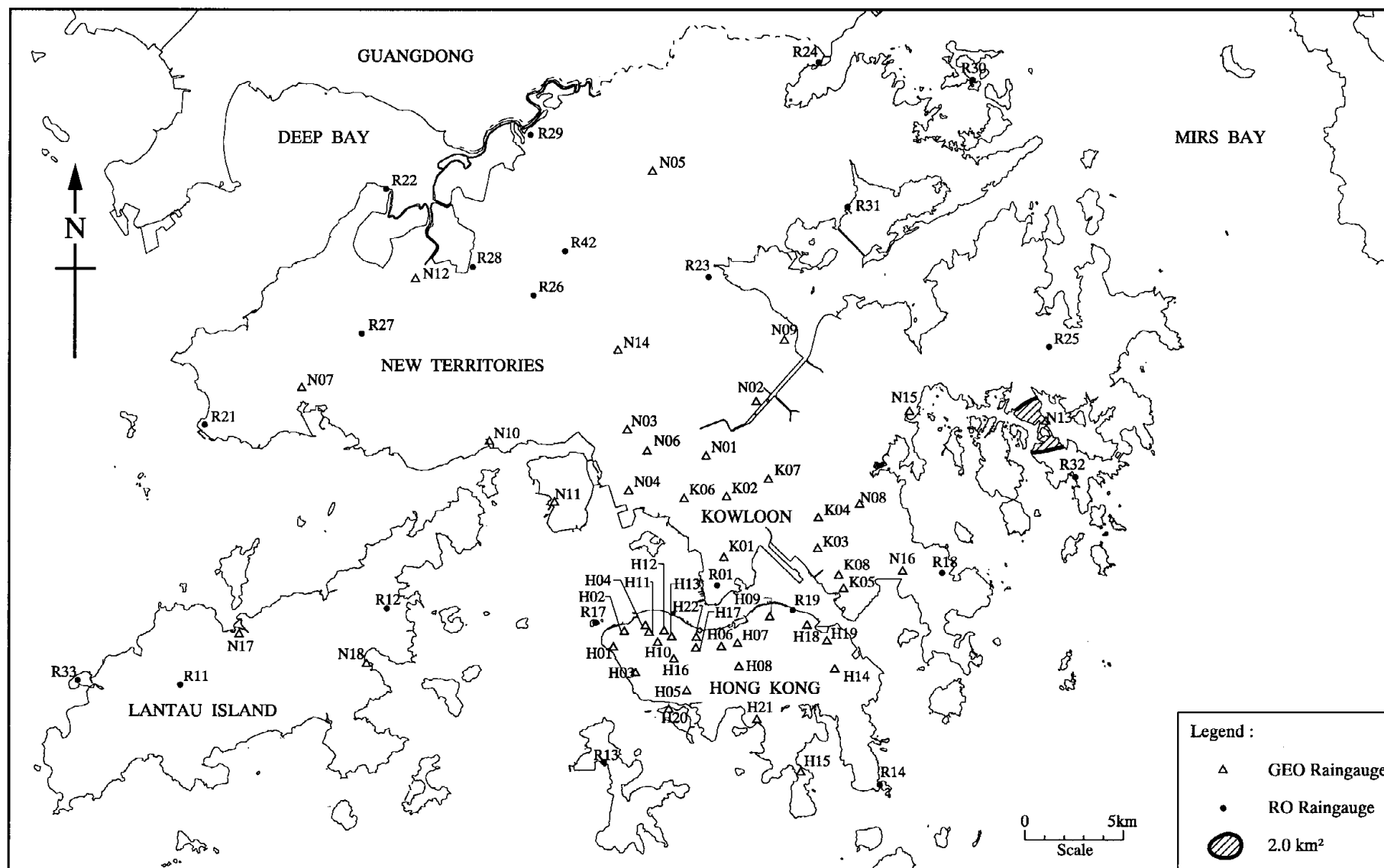


Figure 19 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 8.7.85

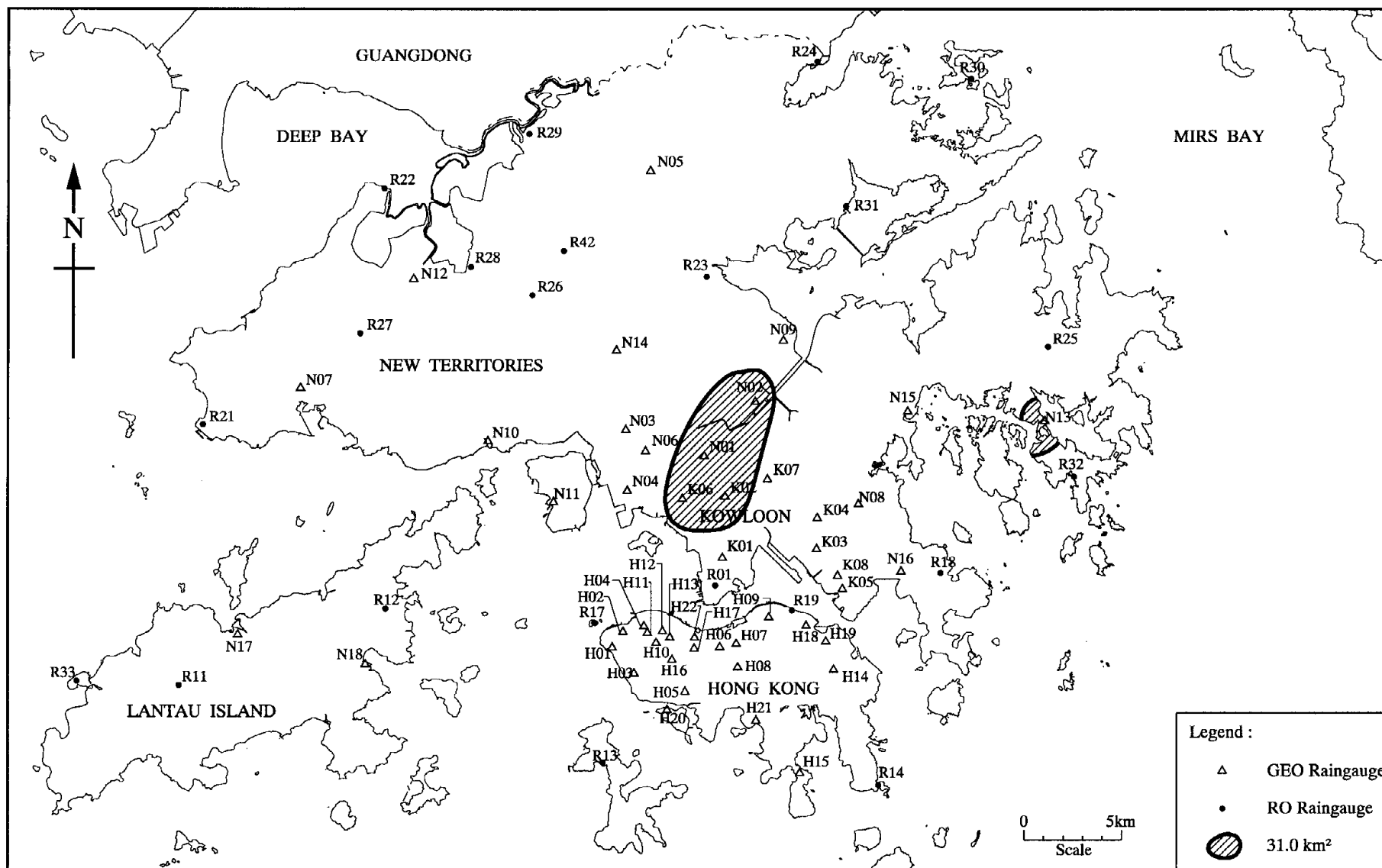


Figure 20 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 9.7.85

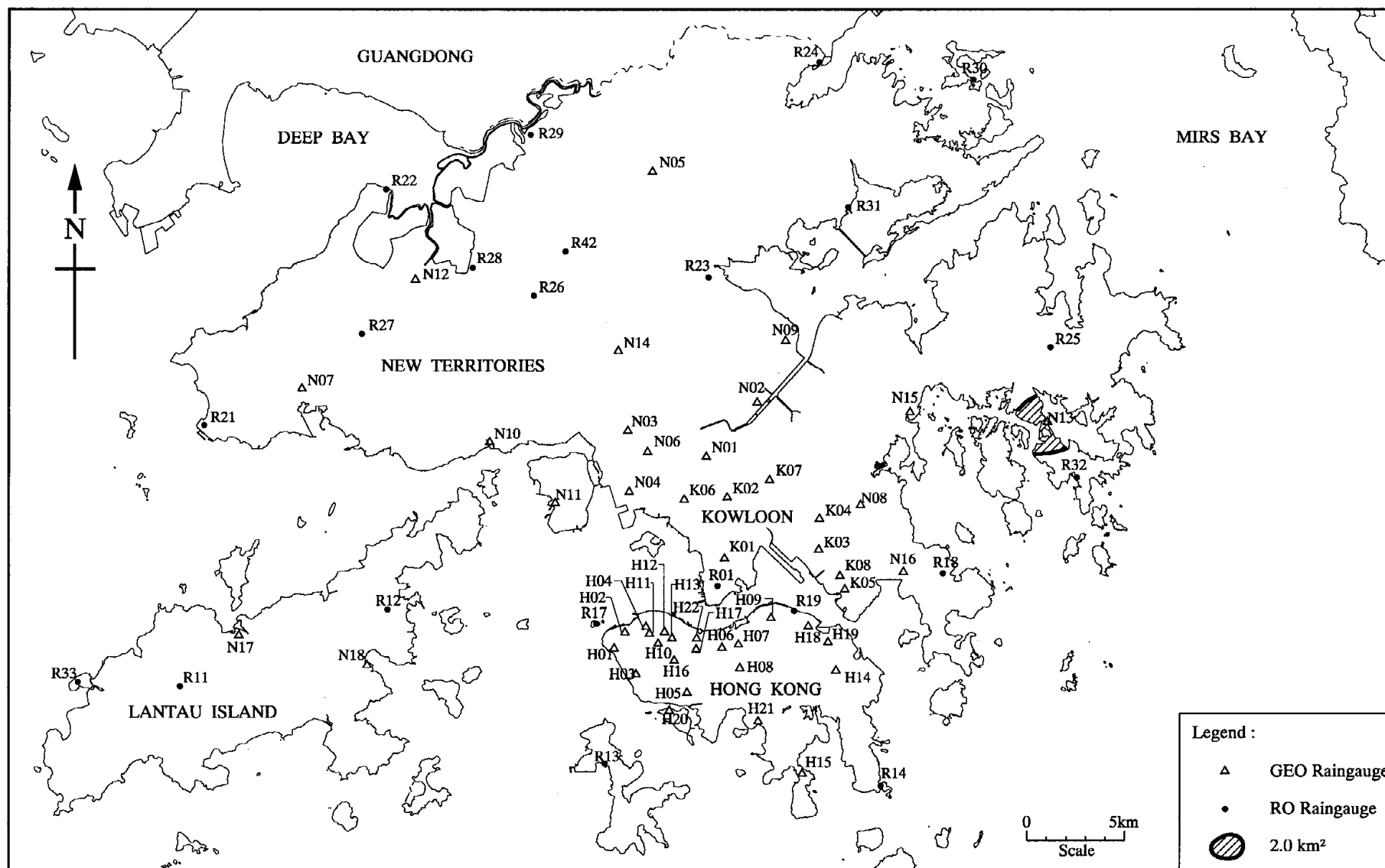


Figure 21 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 18.7.85

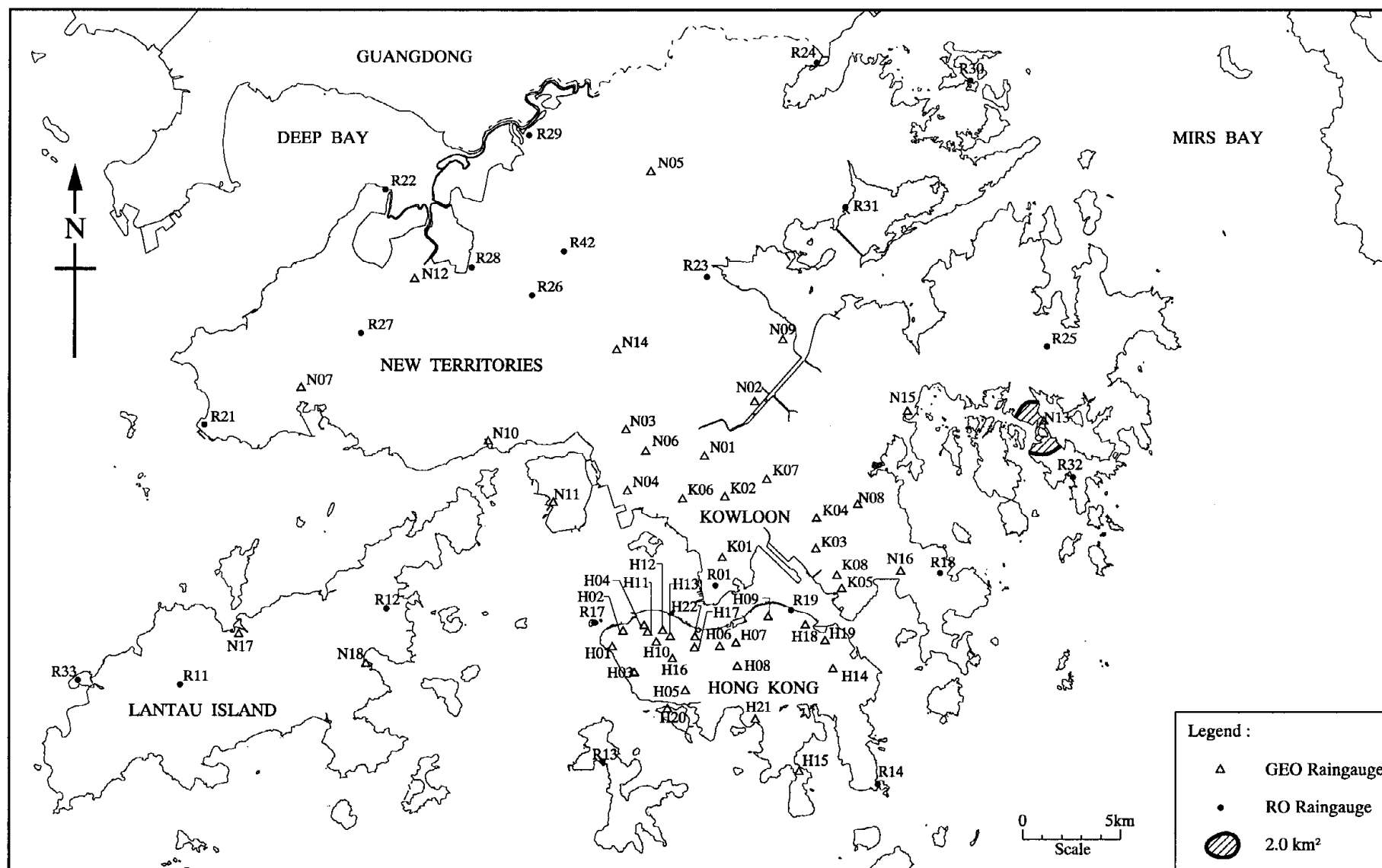


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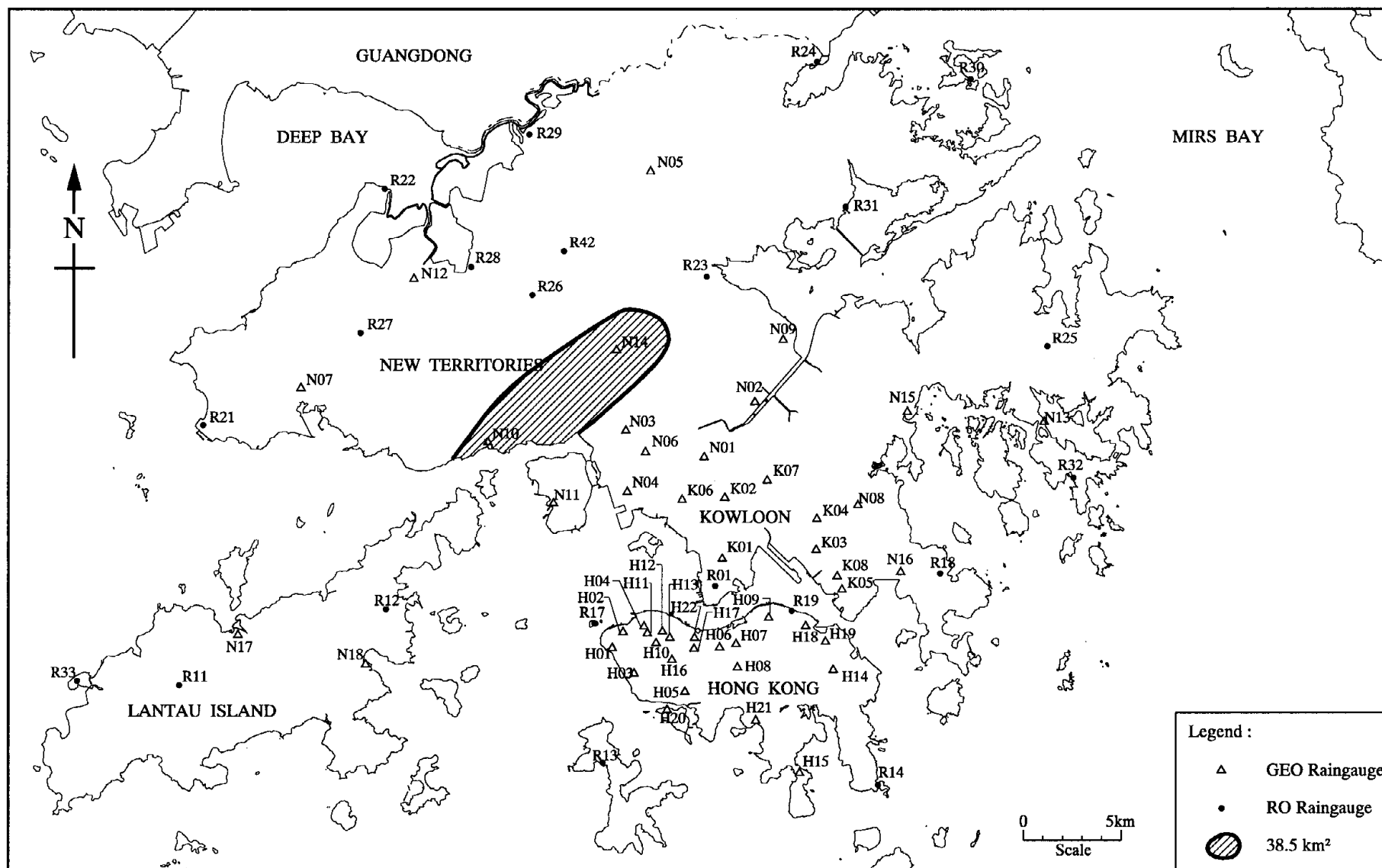


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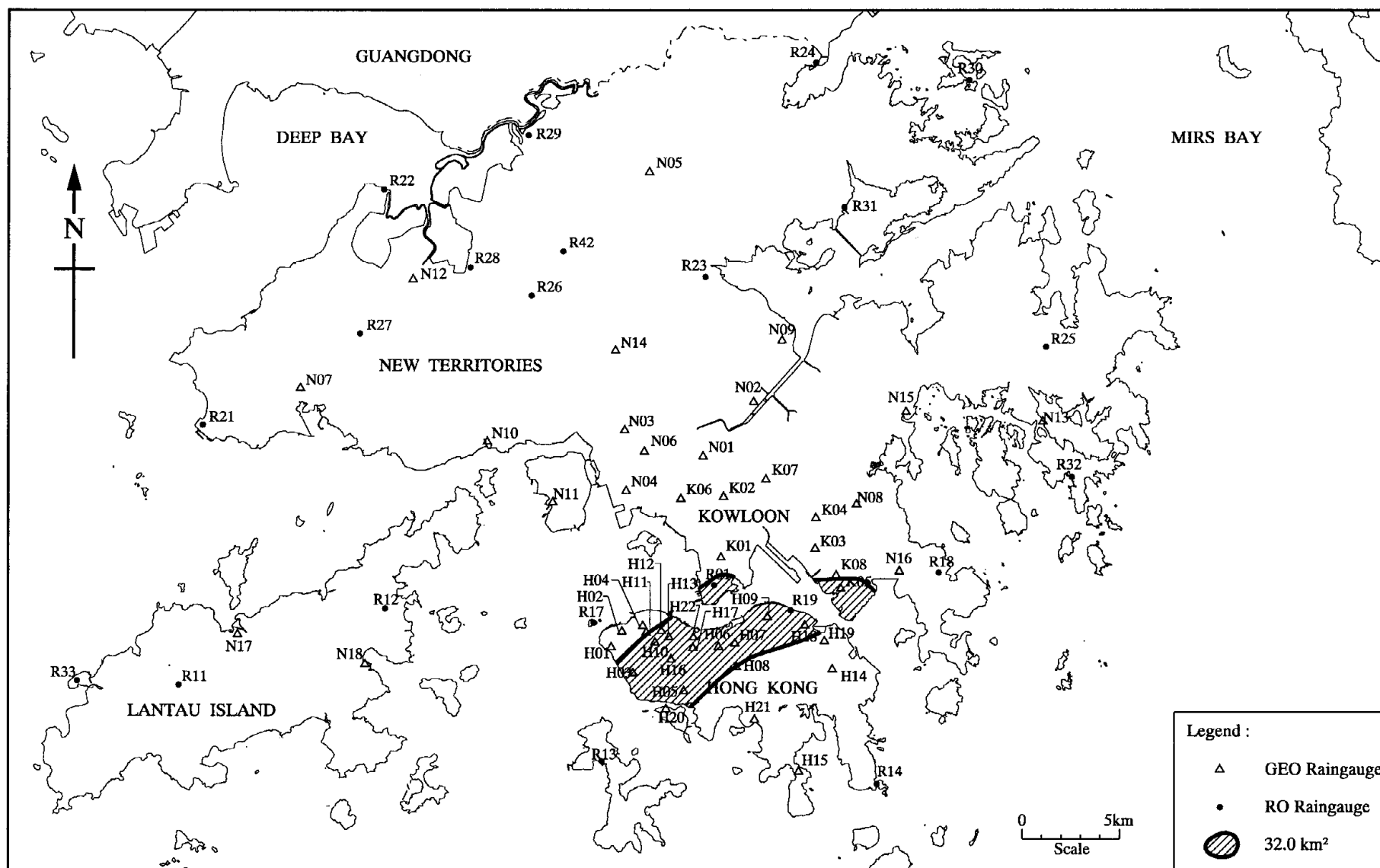


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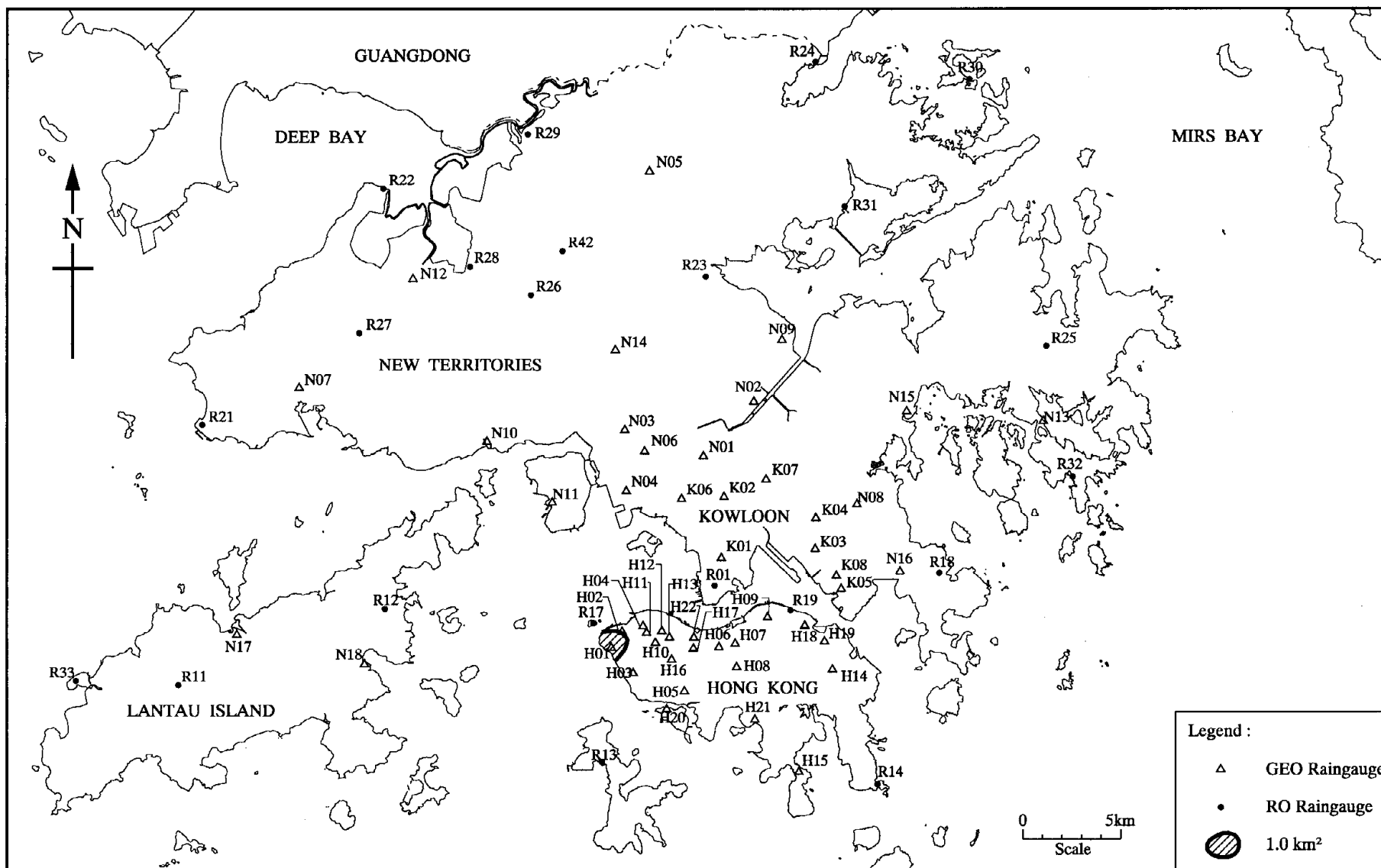


Figure 25 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 3.7.86

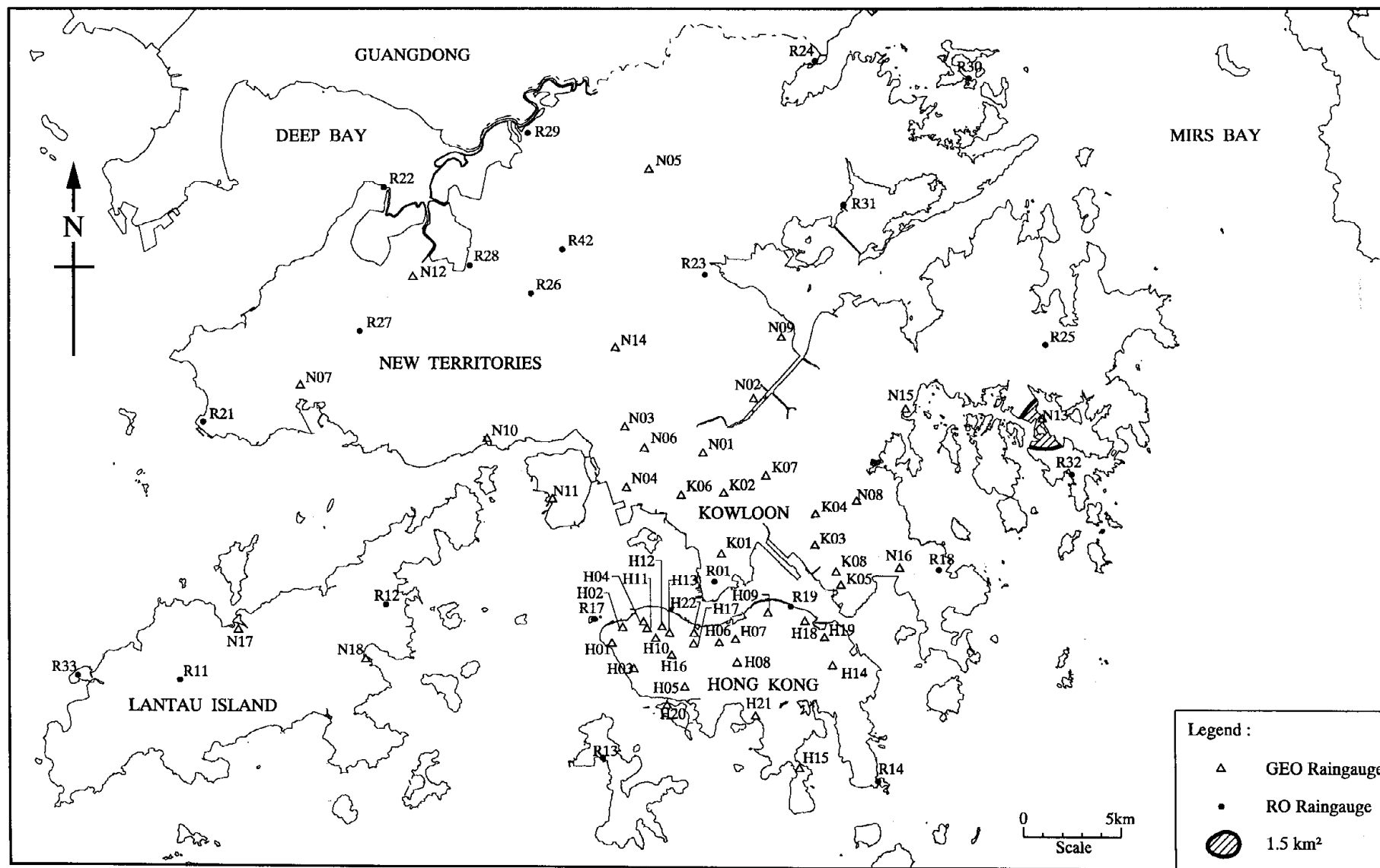


Figure 26 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 31.7.86

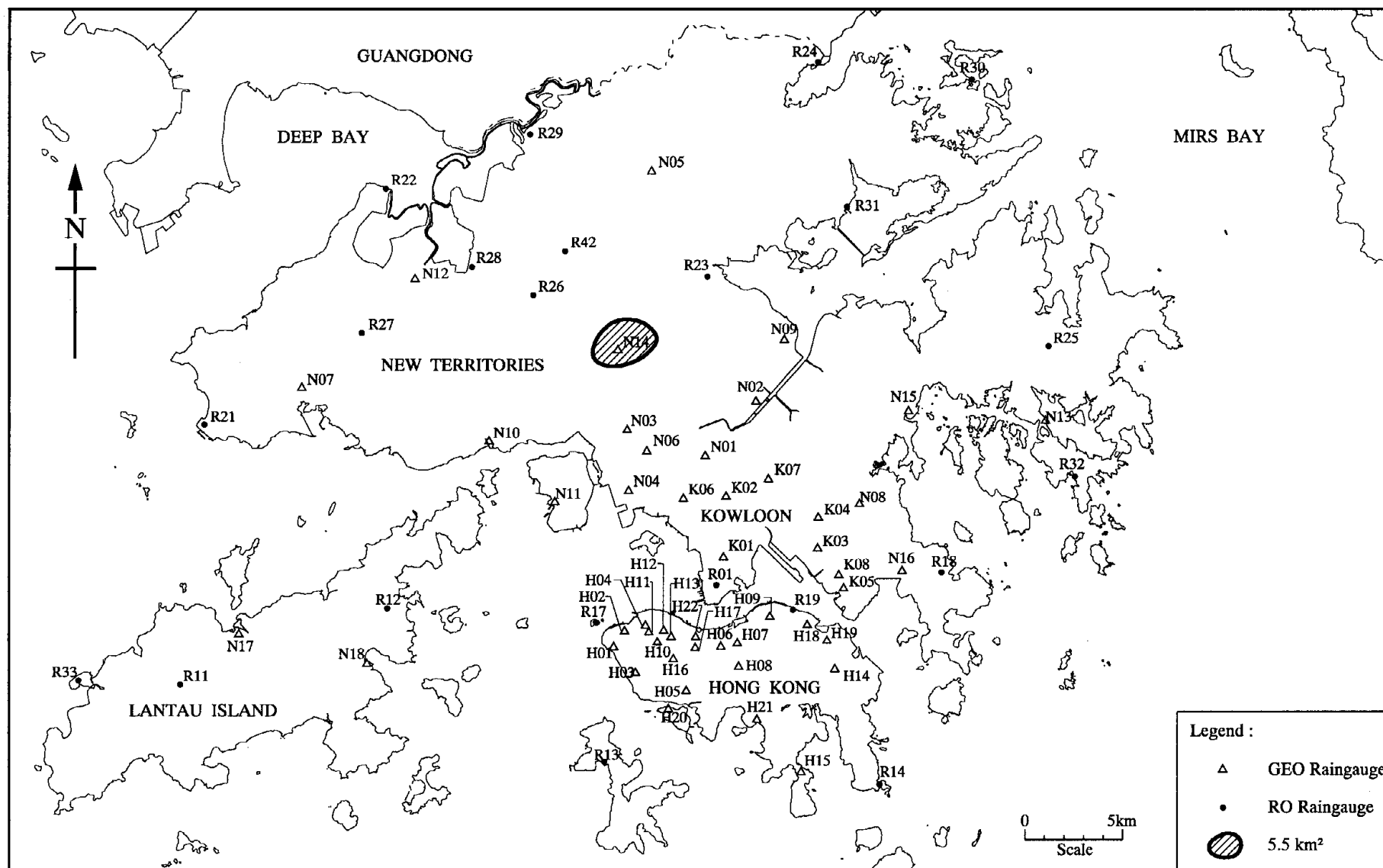


Figure 27 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 4.6.86

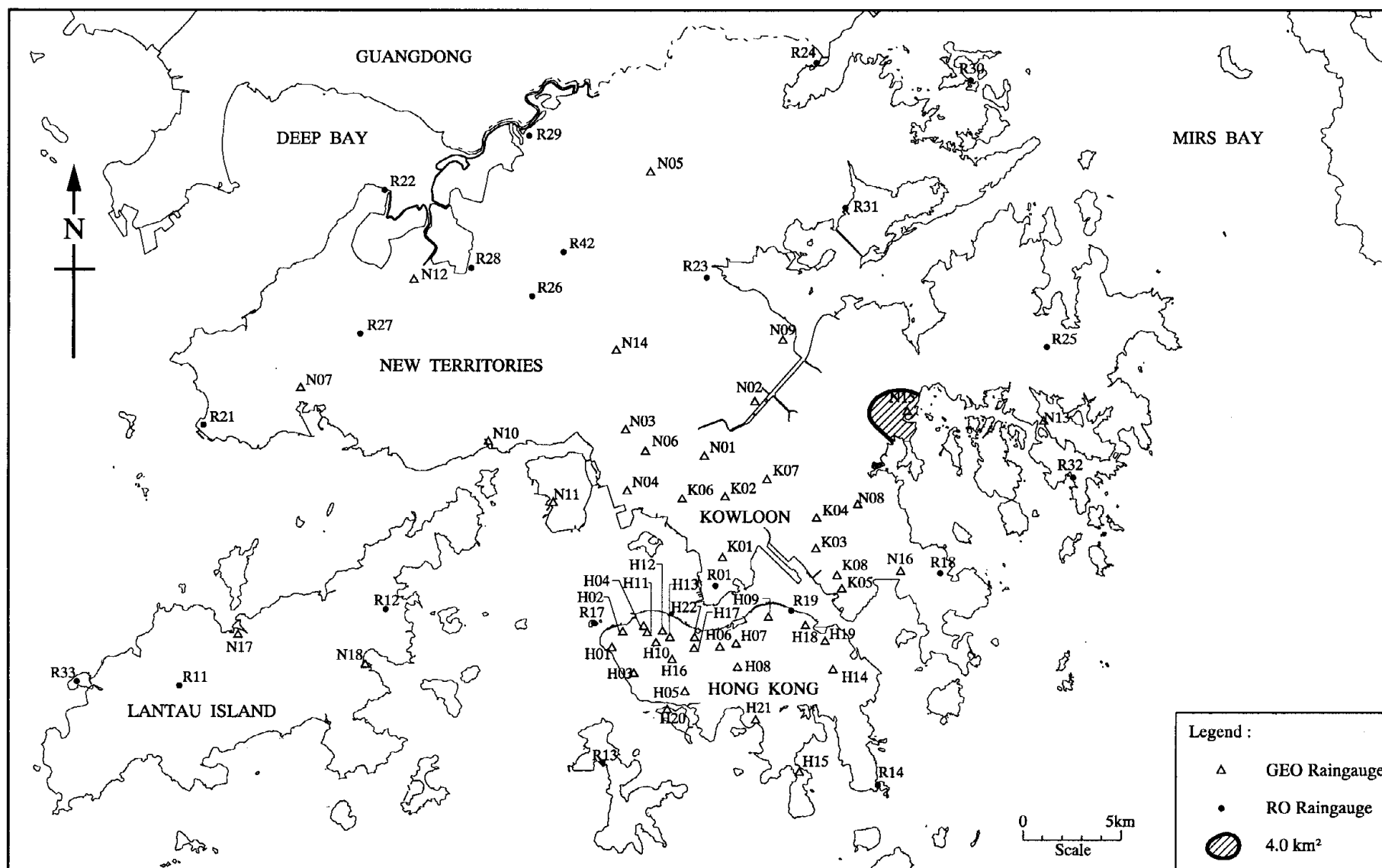


Figure 28 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 23.8.86

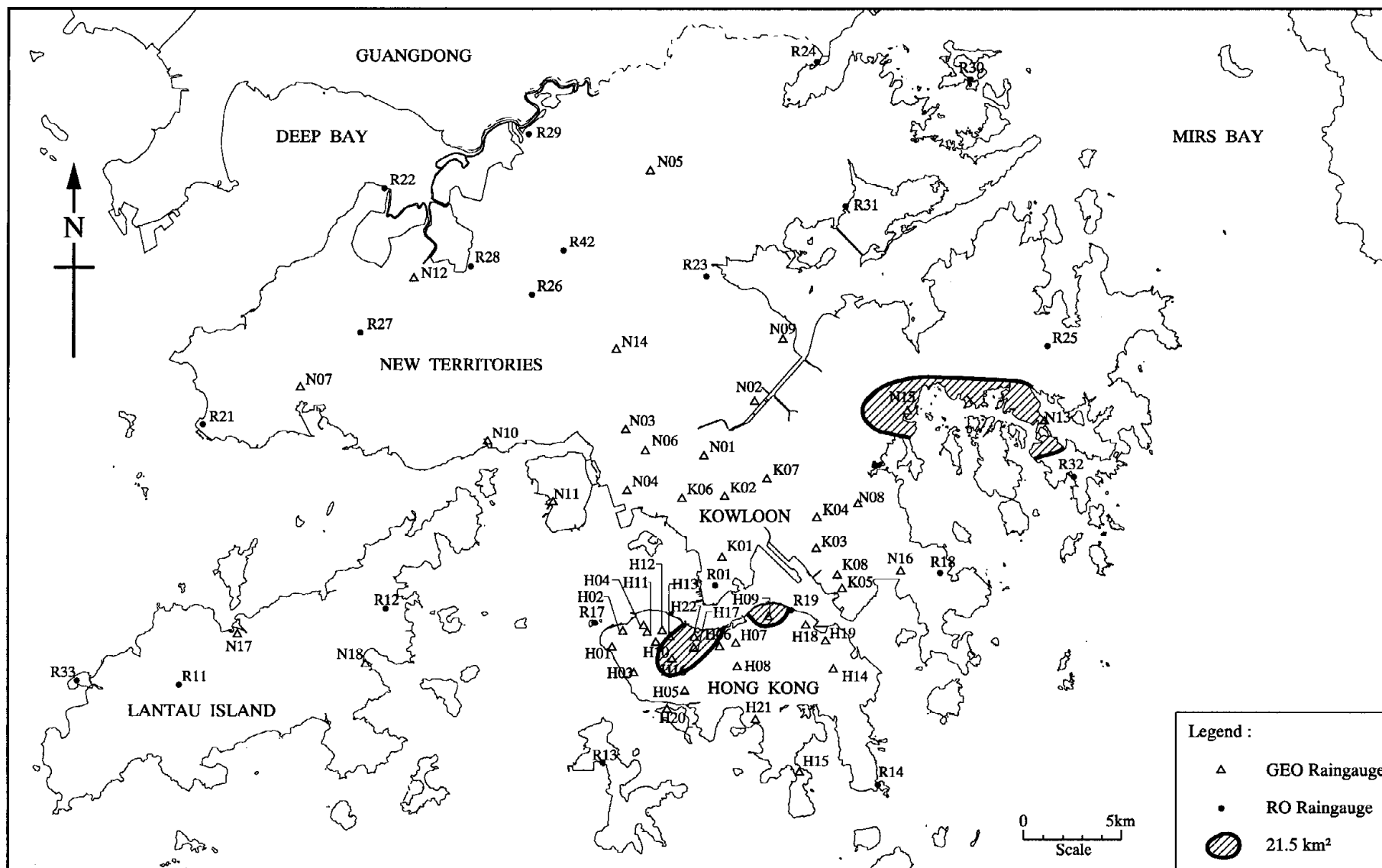


Figure 29 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 17.3.87

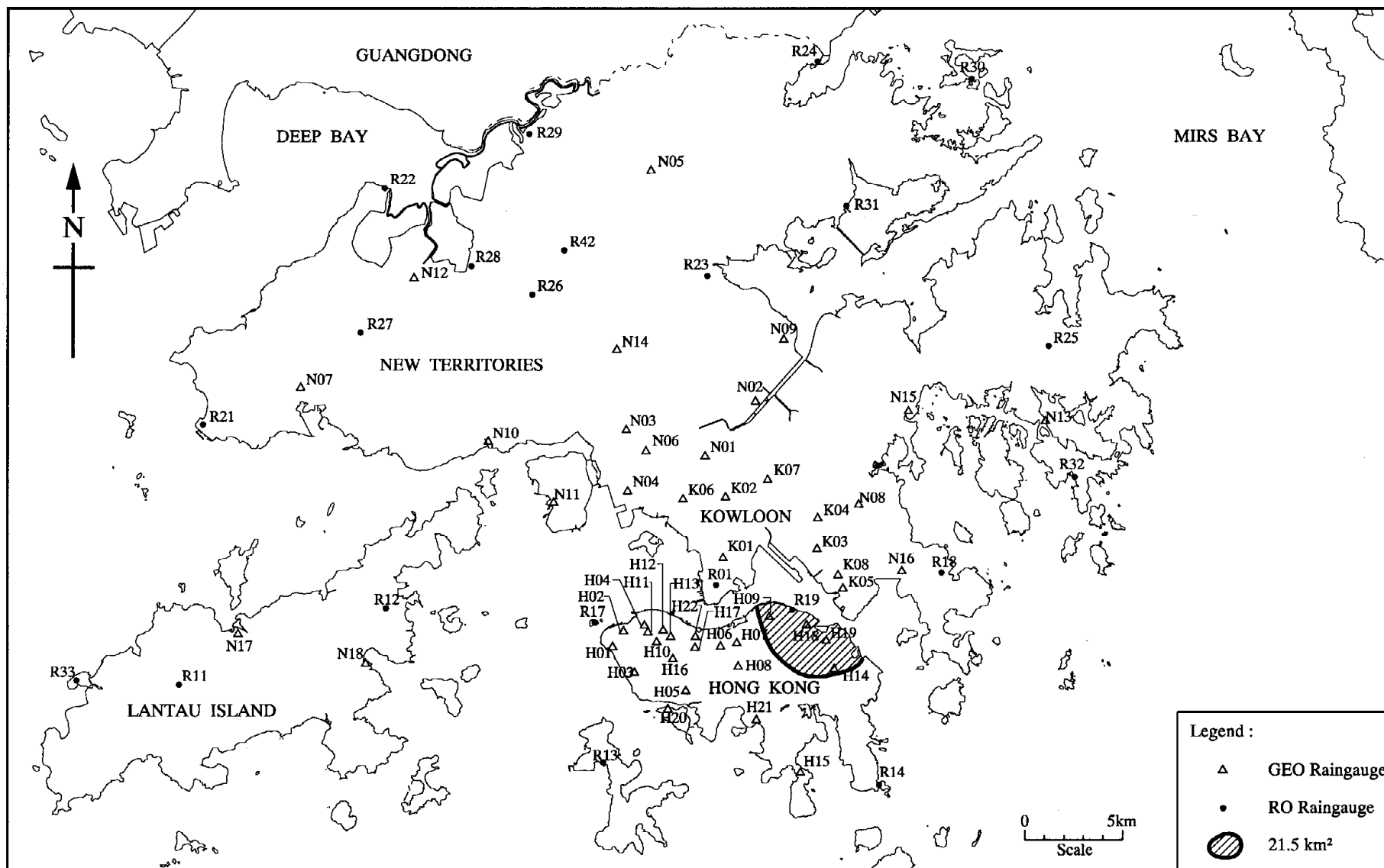


Figure 30 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 22.5.87

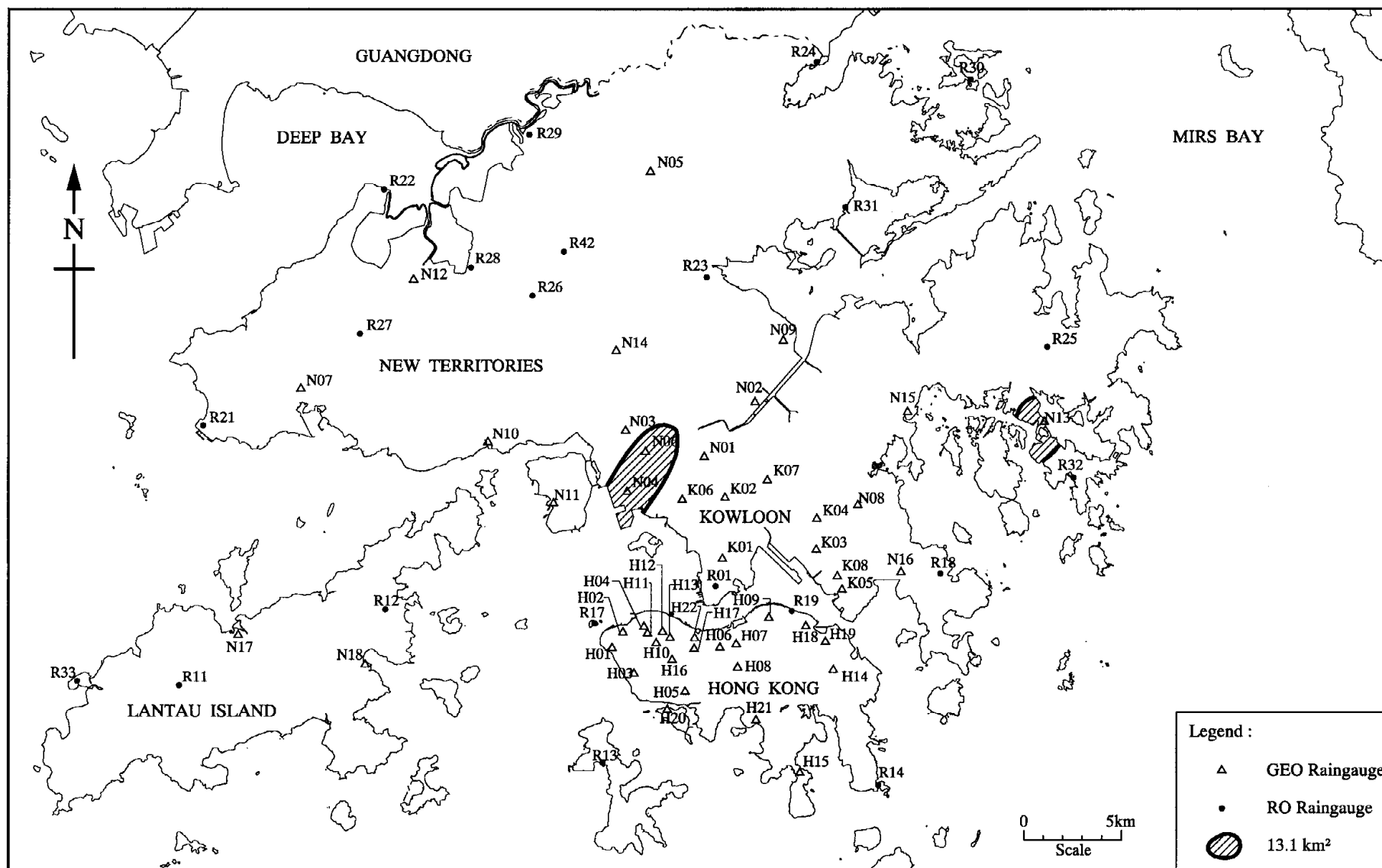


Figure 31 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 30.7.87

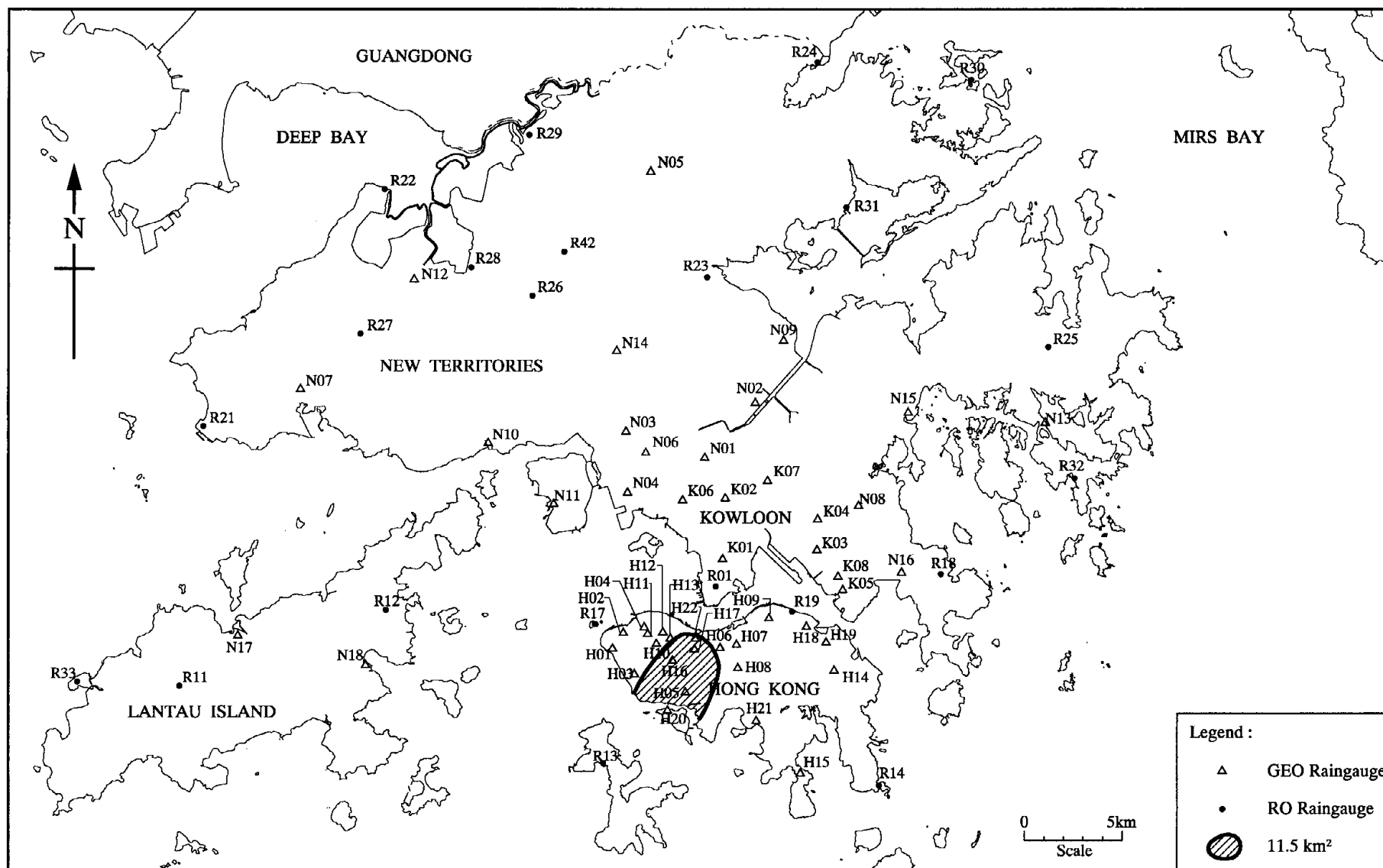


Figure 32 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 19.7.88

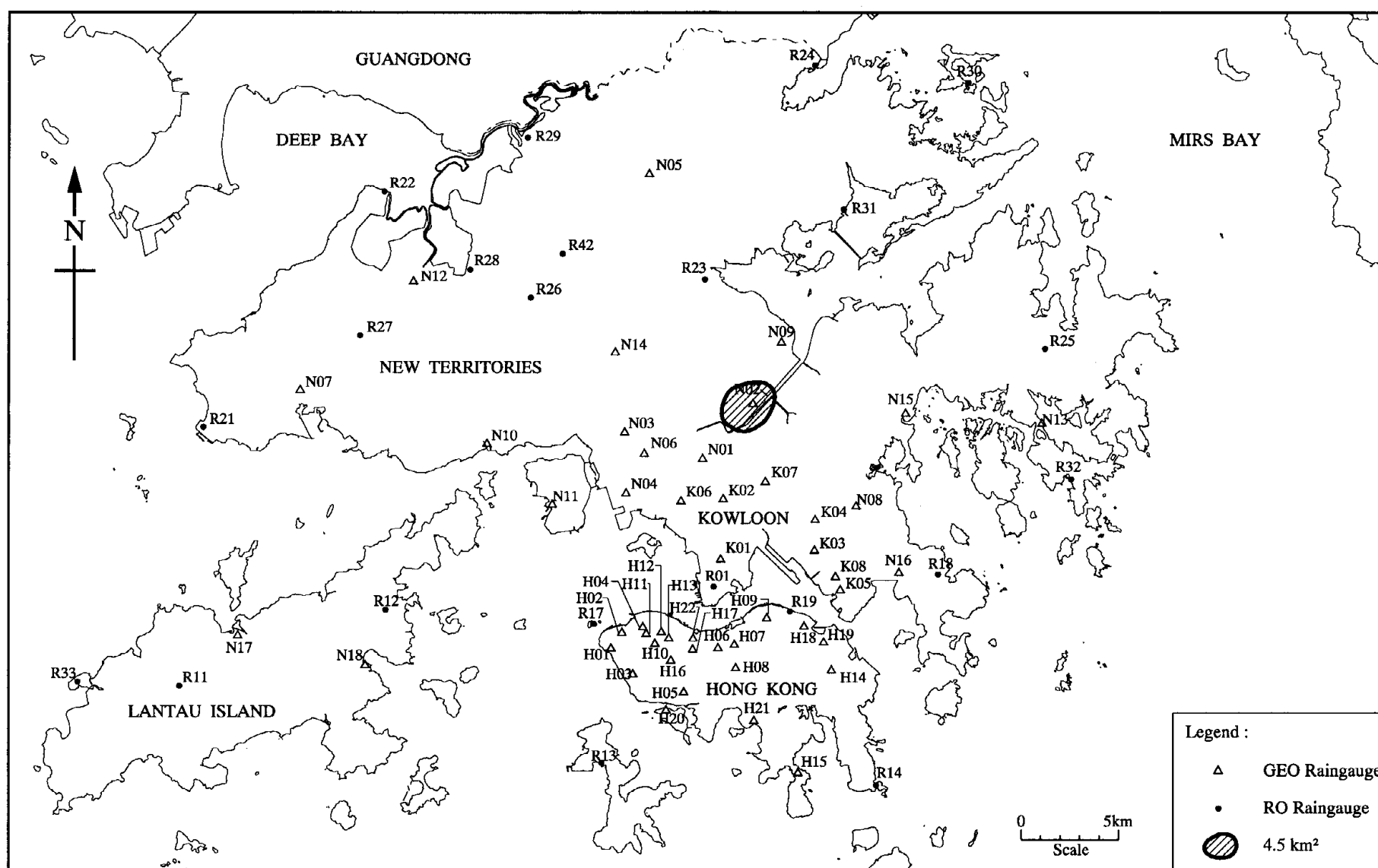


Figure 33 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 9.8.88

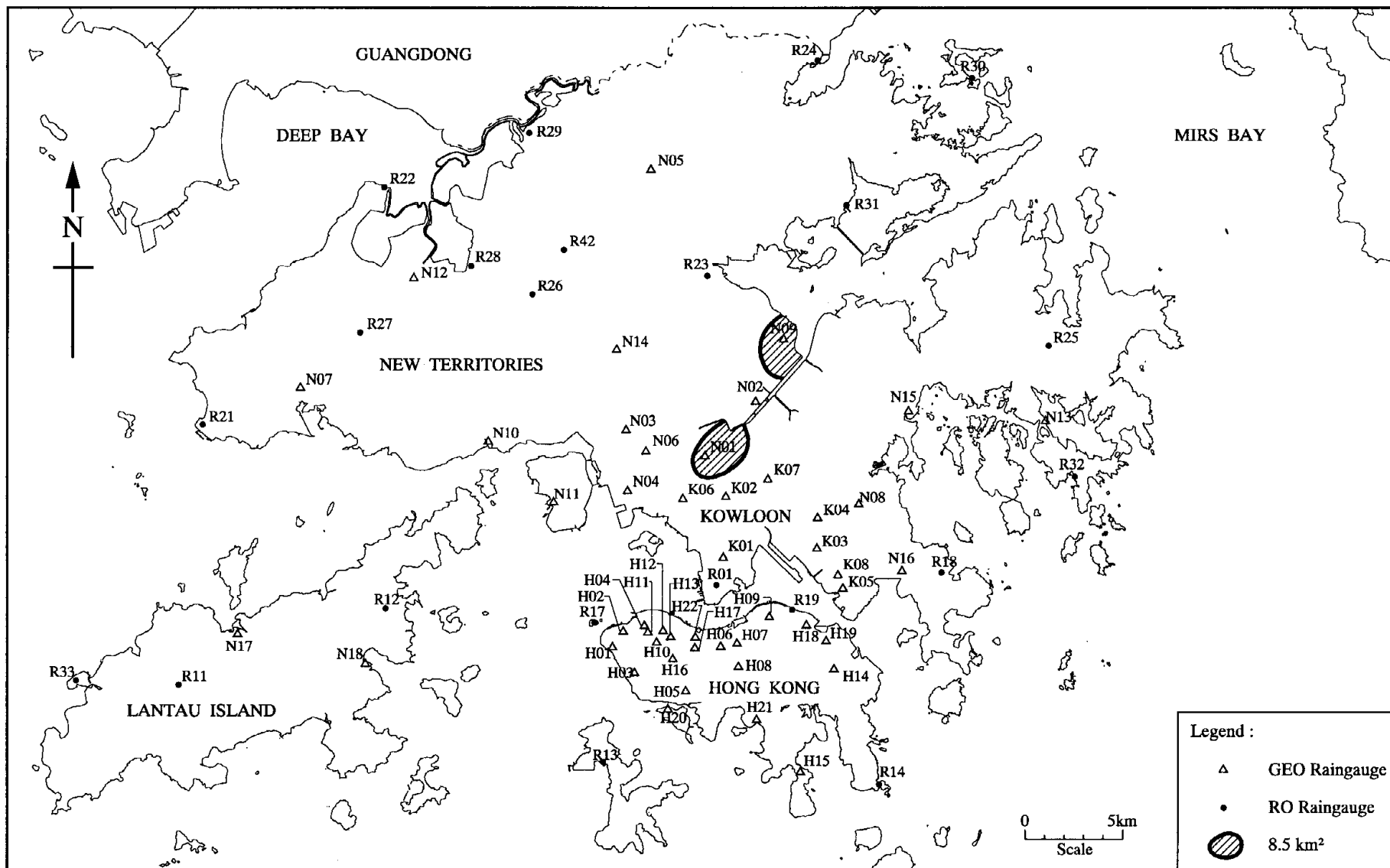


Figure 34 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 22.4.89

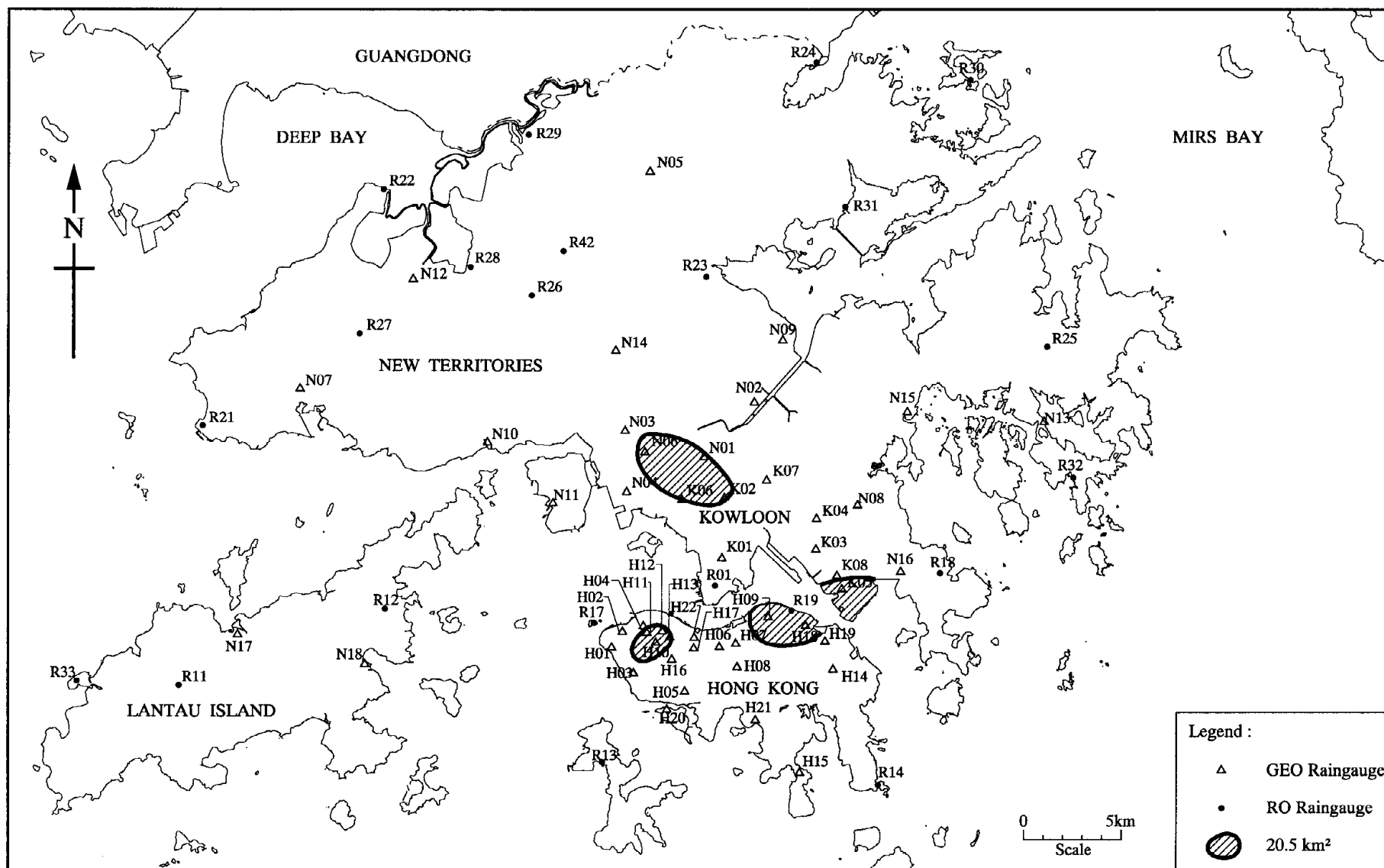


Figure 35 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 2.5.89

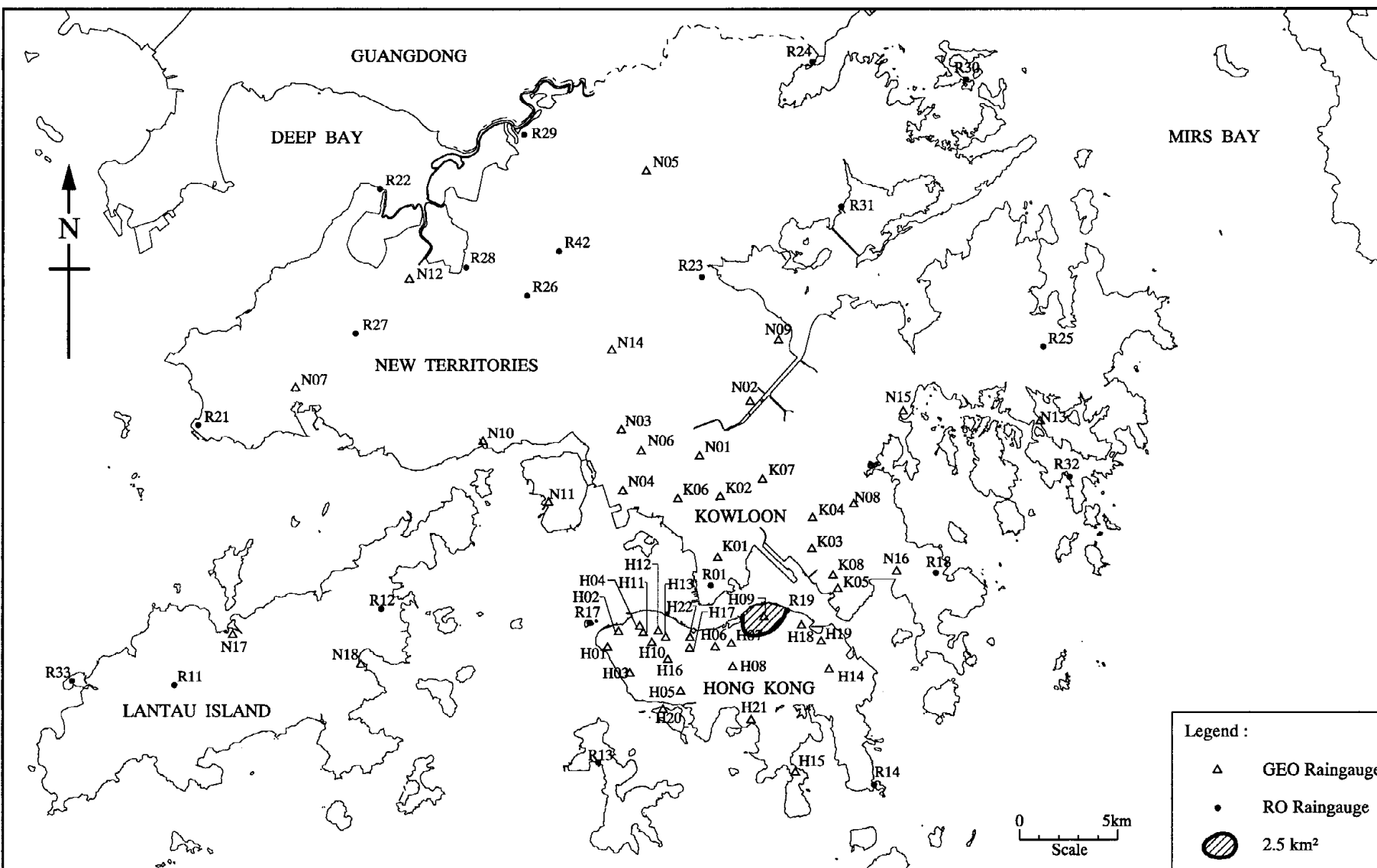


Figure 36 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 5.8.89

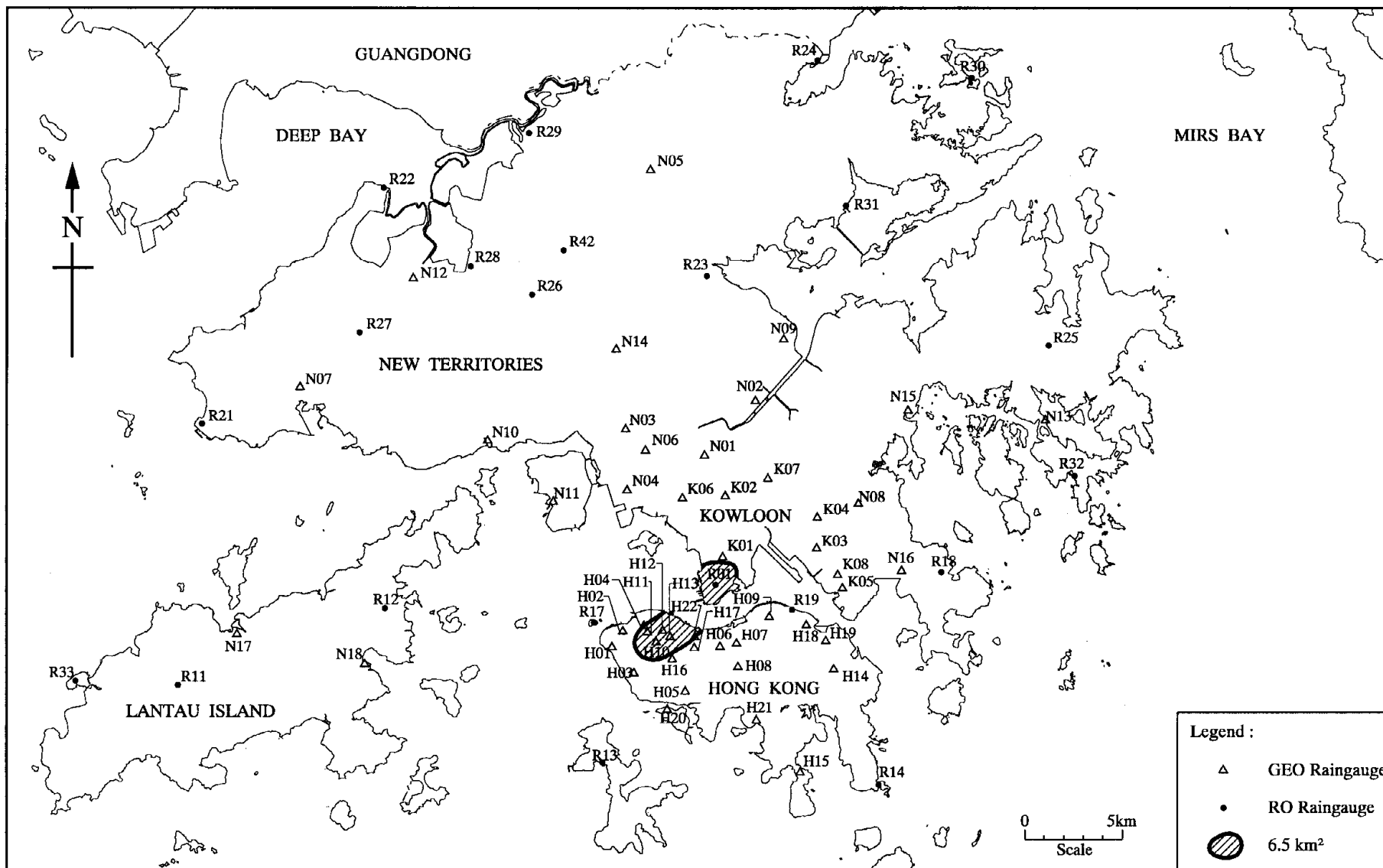


Figure 37 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 1.6.90

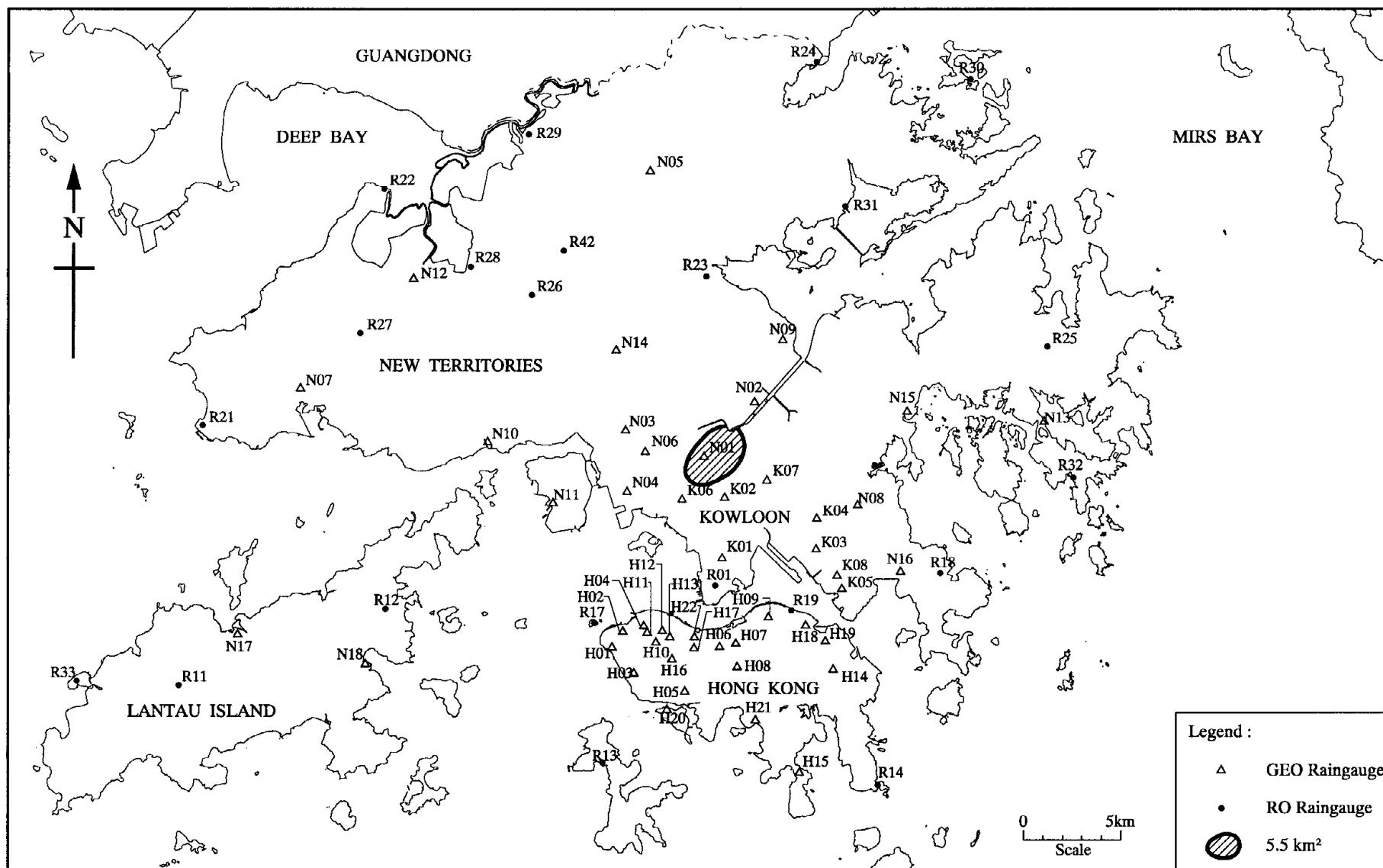


Figure 38 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 8.6.90

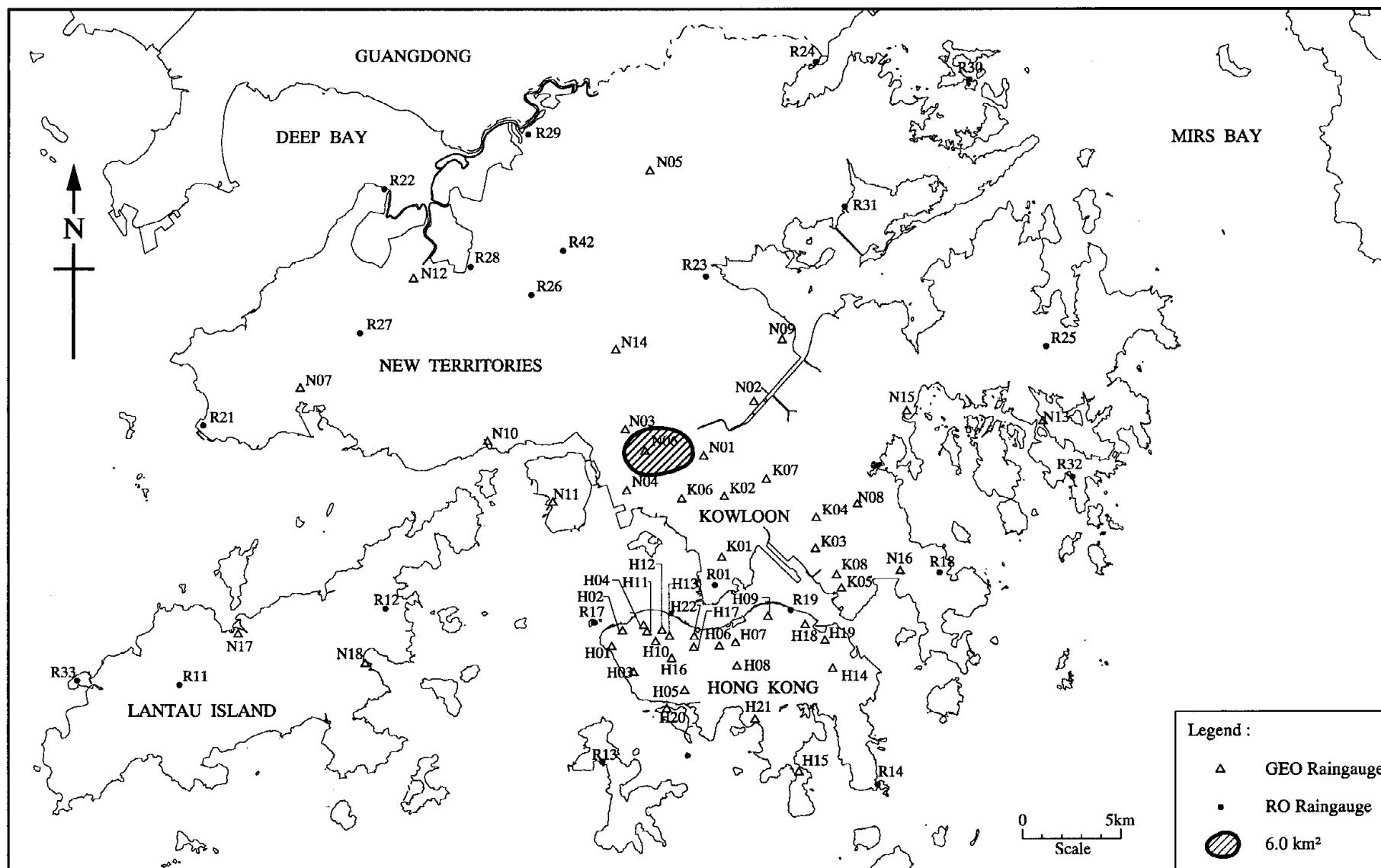


Figure 39 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 30.6.90

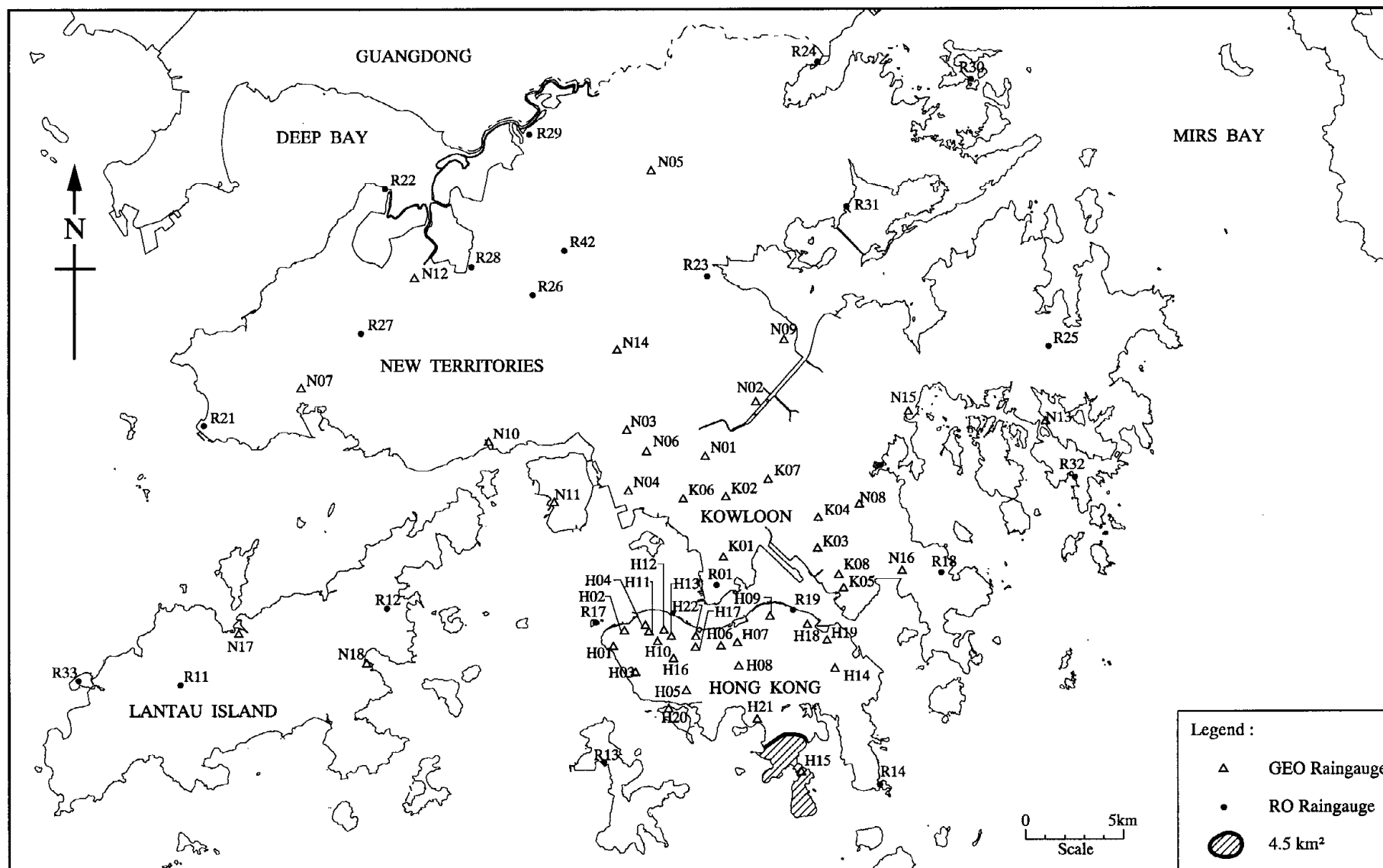


Figure 40 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 30.4.91

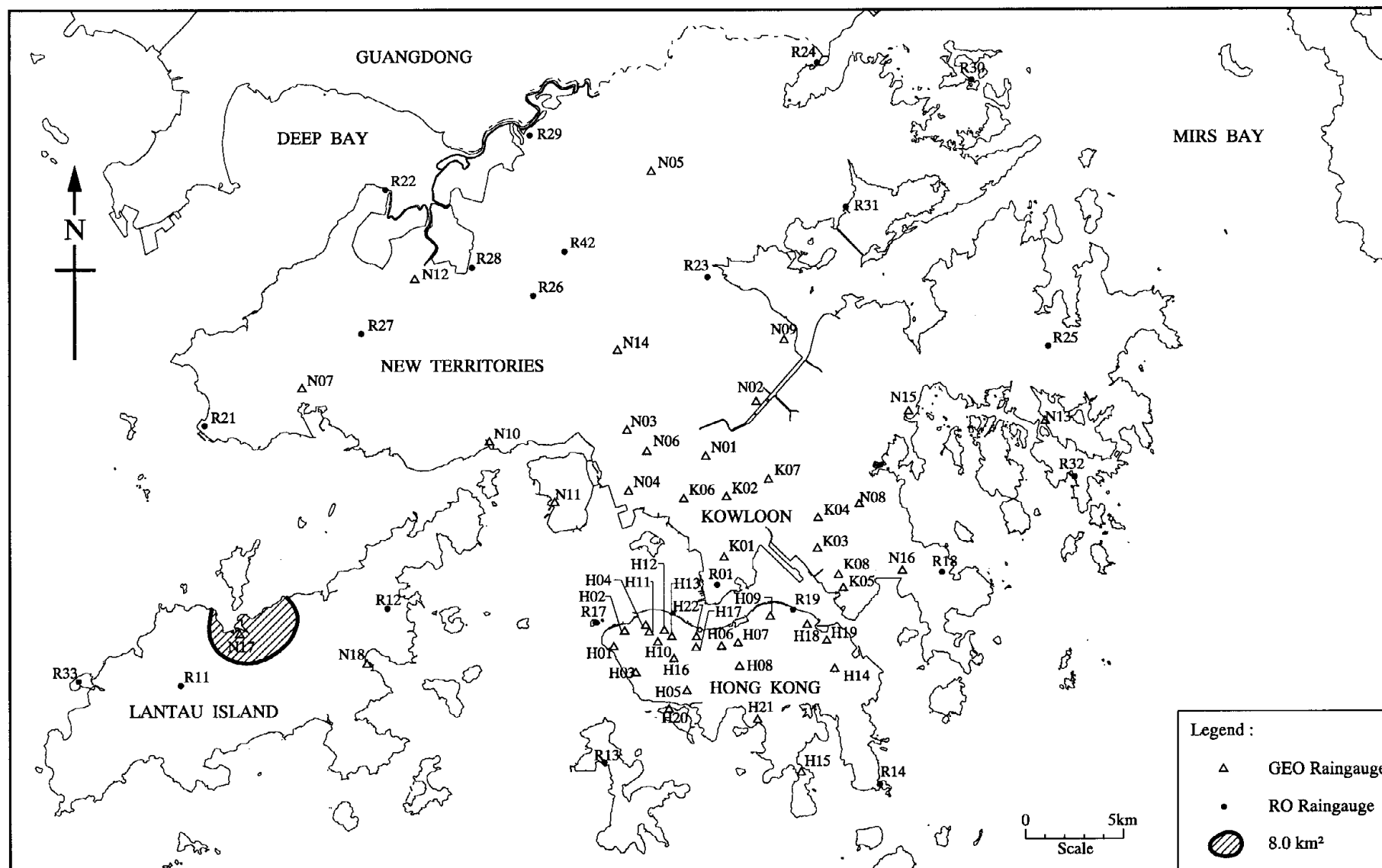


Figure 41 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 14.8.91

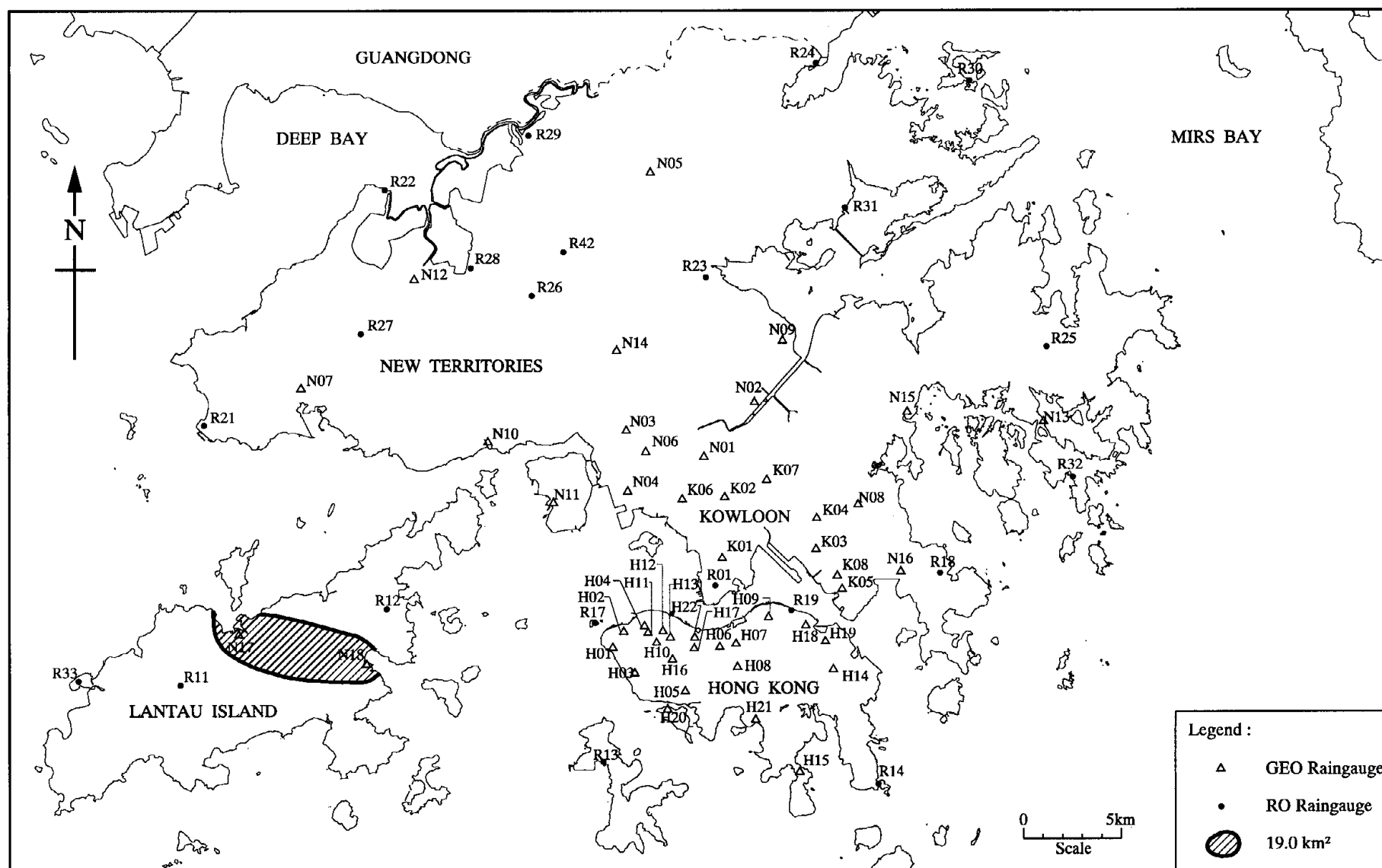


Figure 42 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 4.9.91

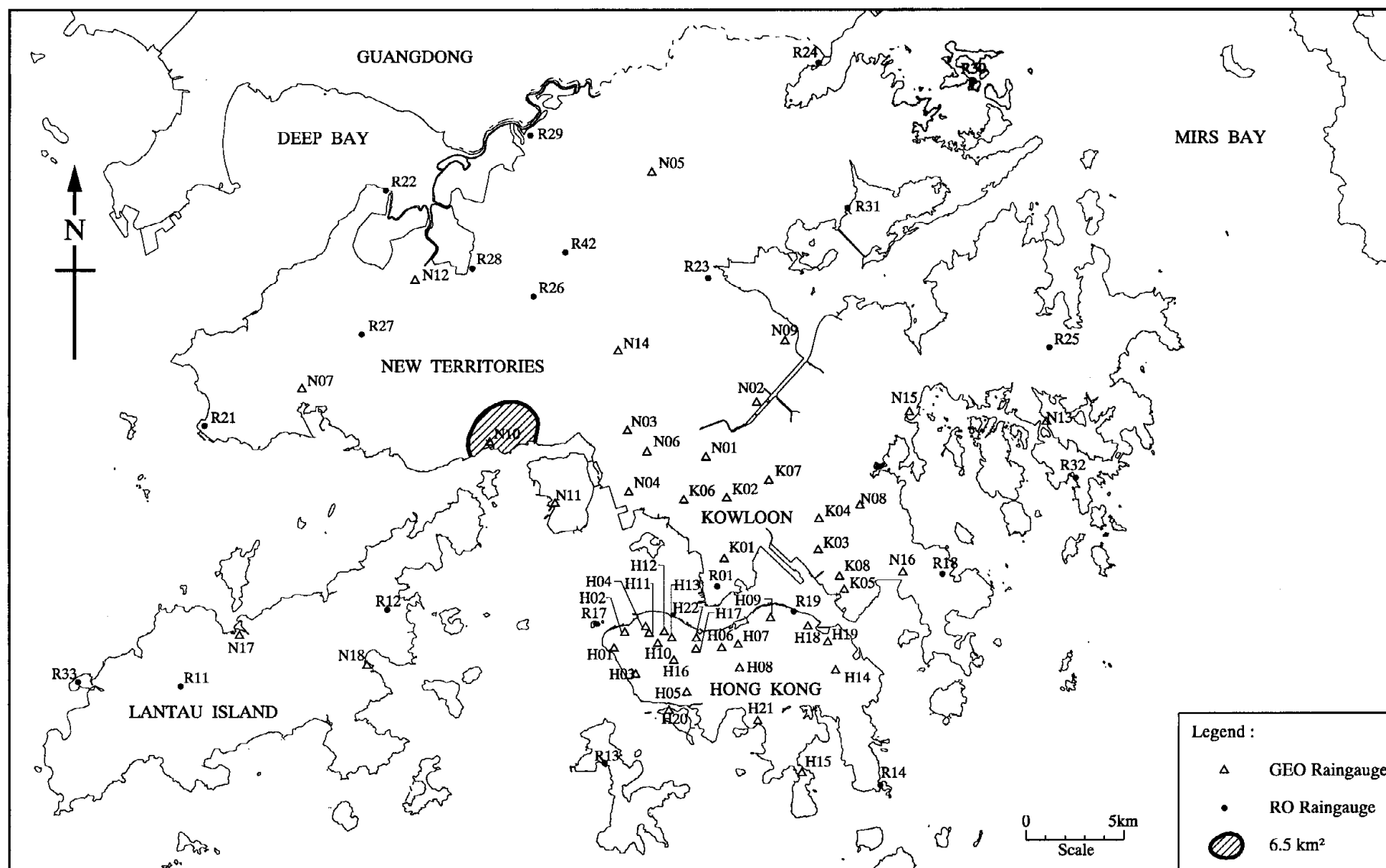


Figure 43 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 6.4.92

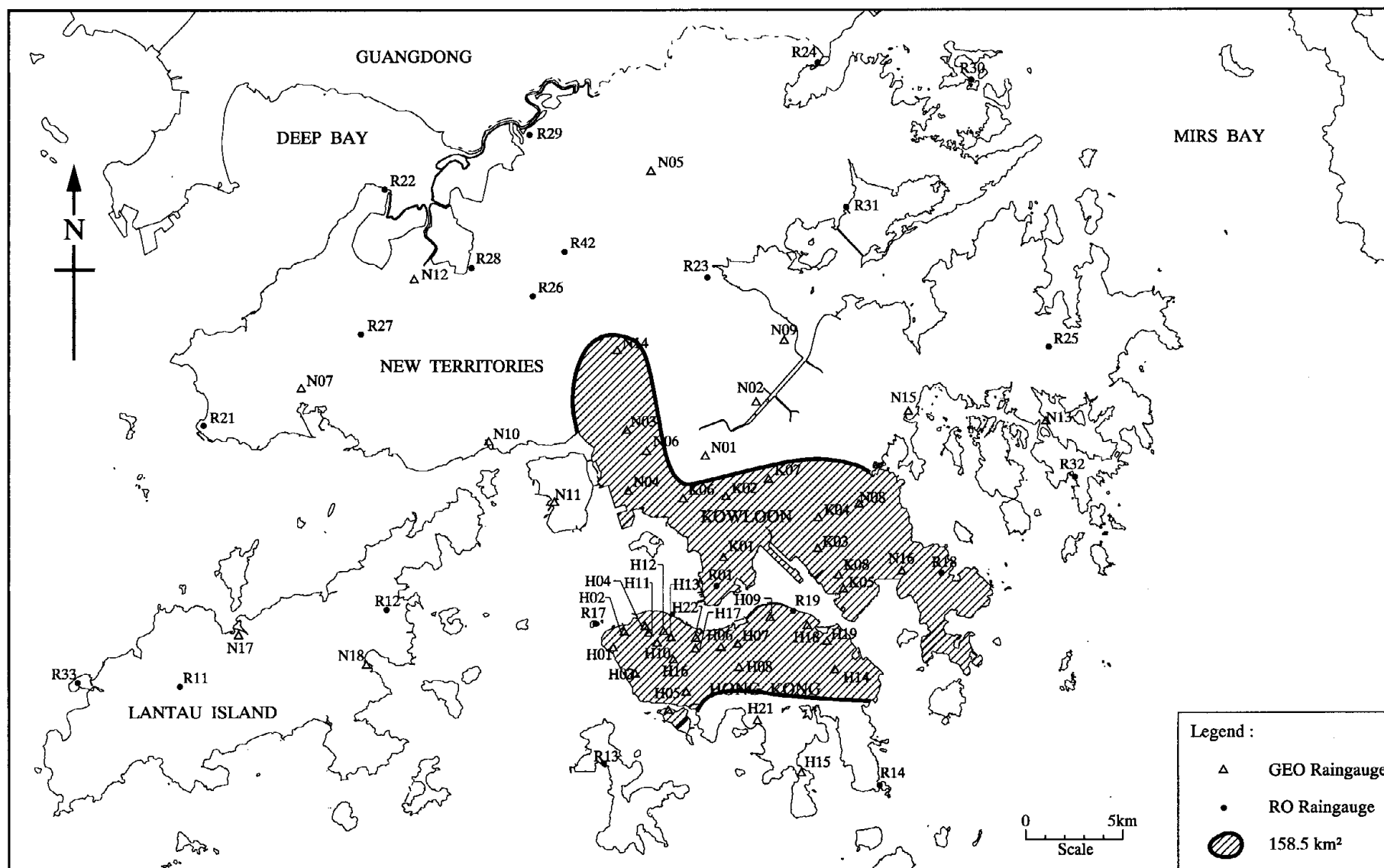


Figure 44 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 8.5.92

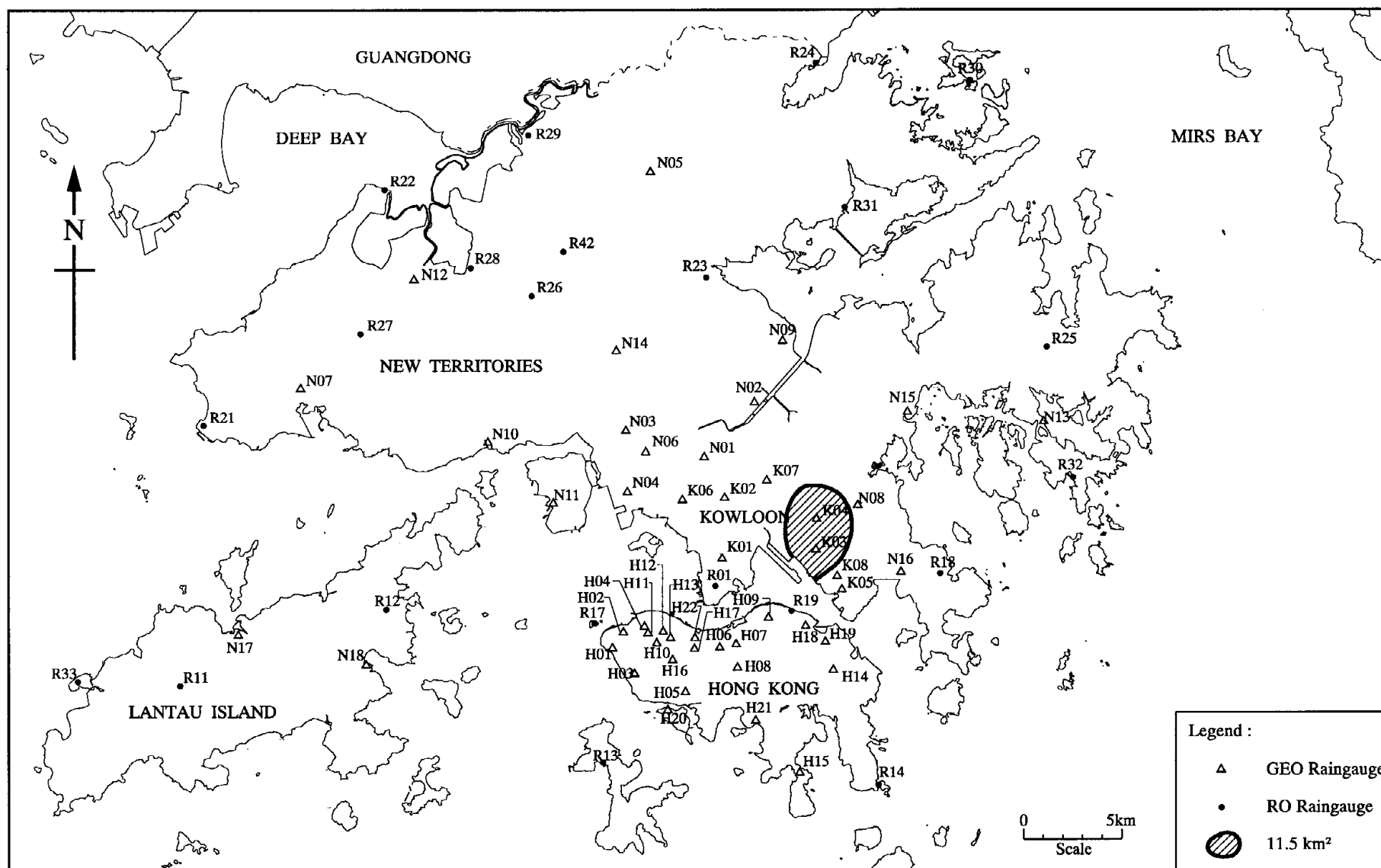


Figure 45 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 19.6.92

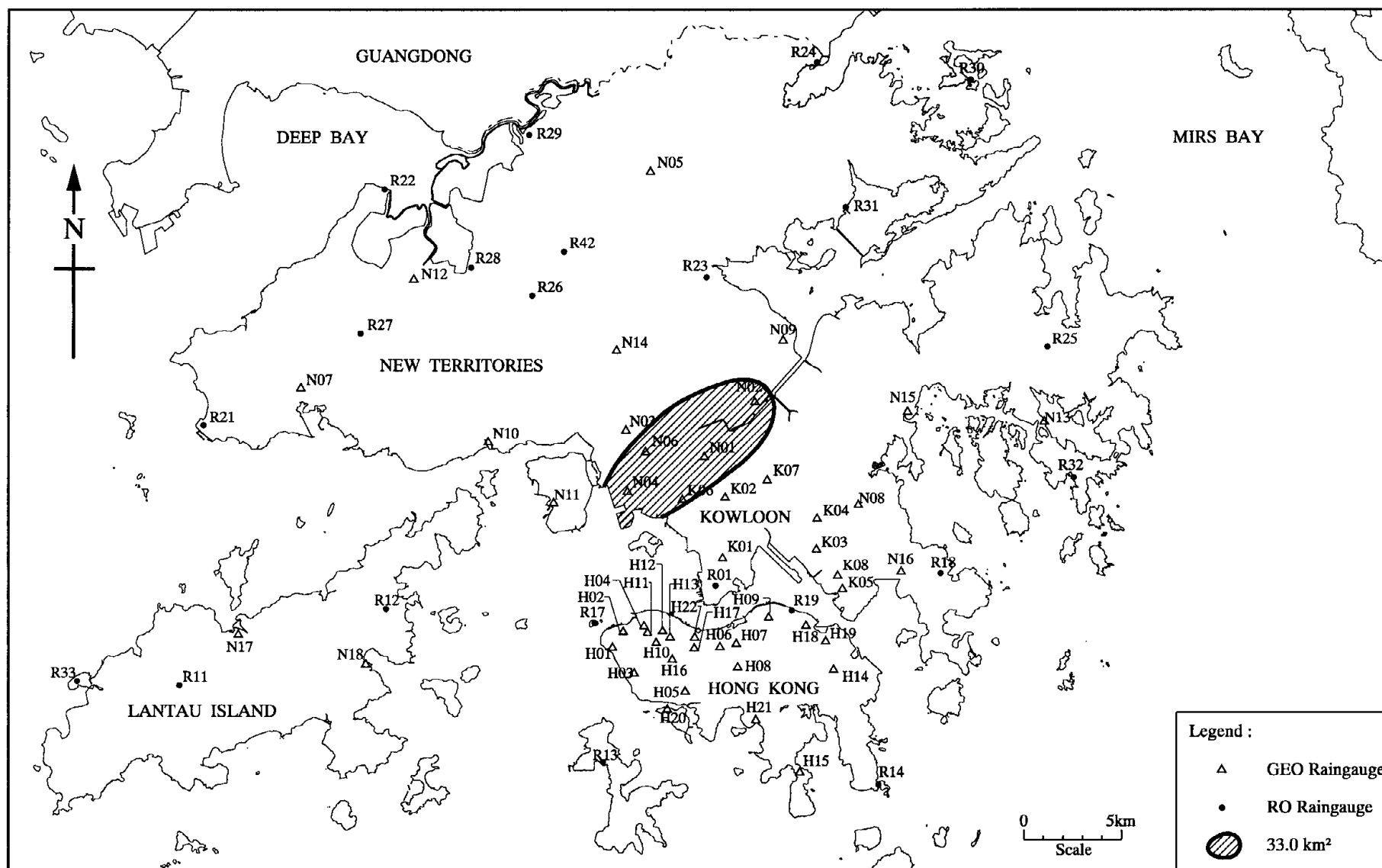


Figure 46 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 1.5.93

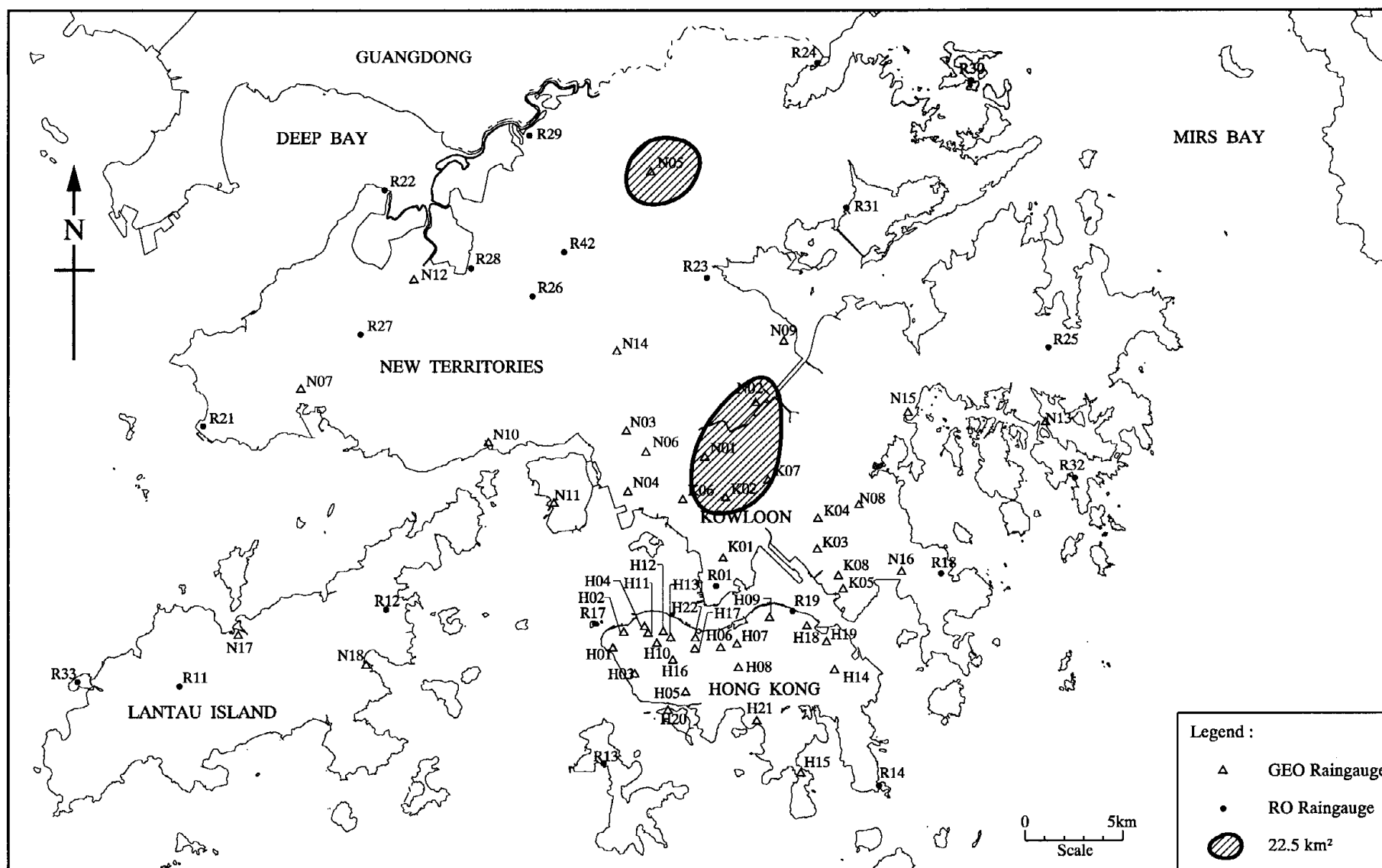


Figure 47 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 11.6.93

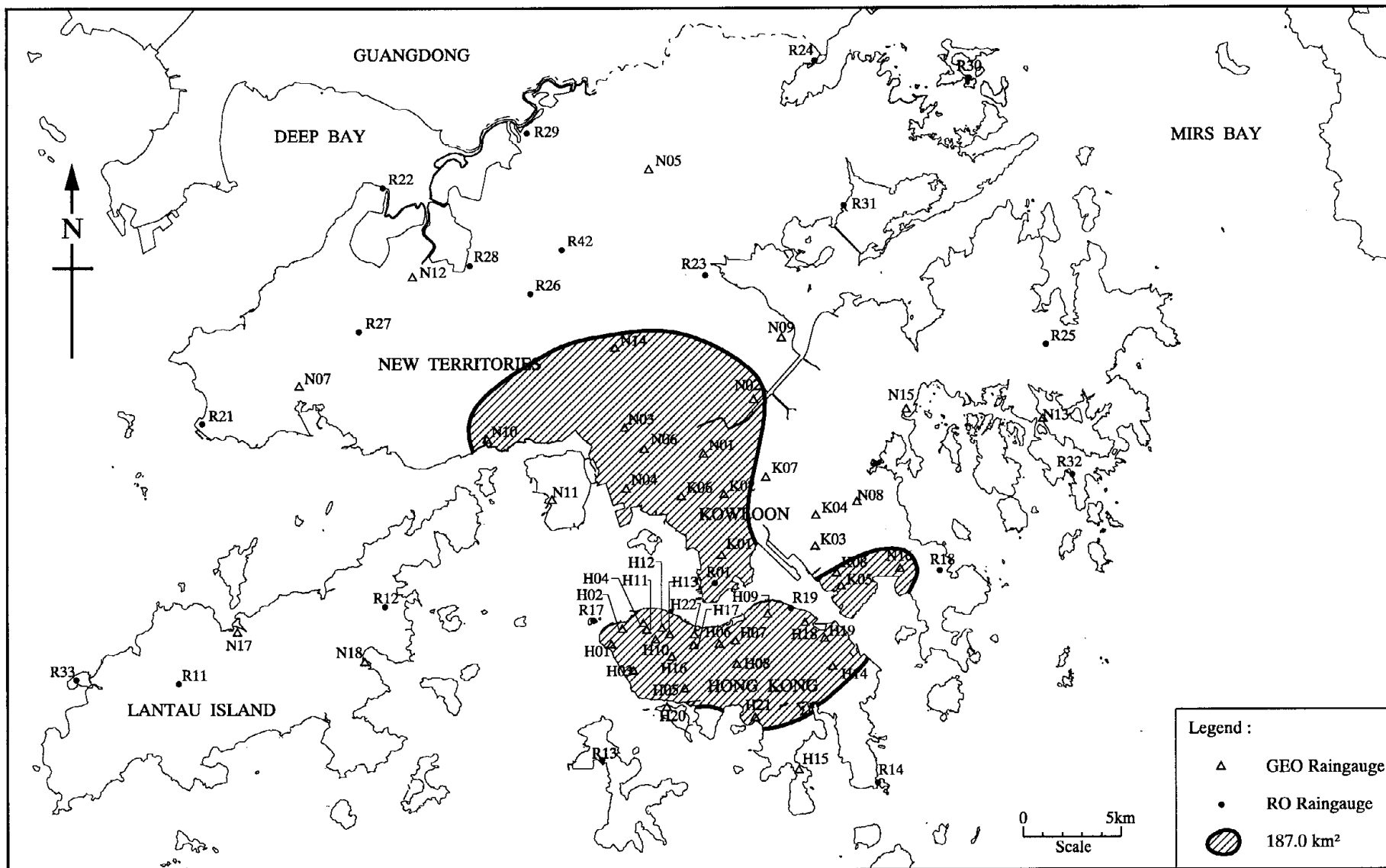


Figure 48 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 16.6.93

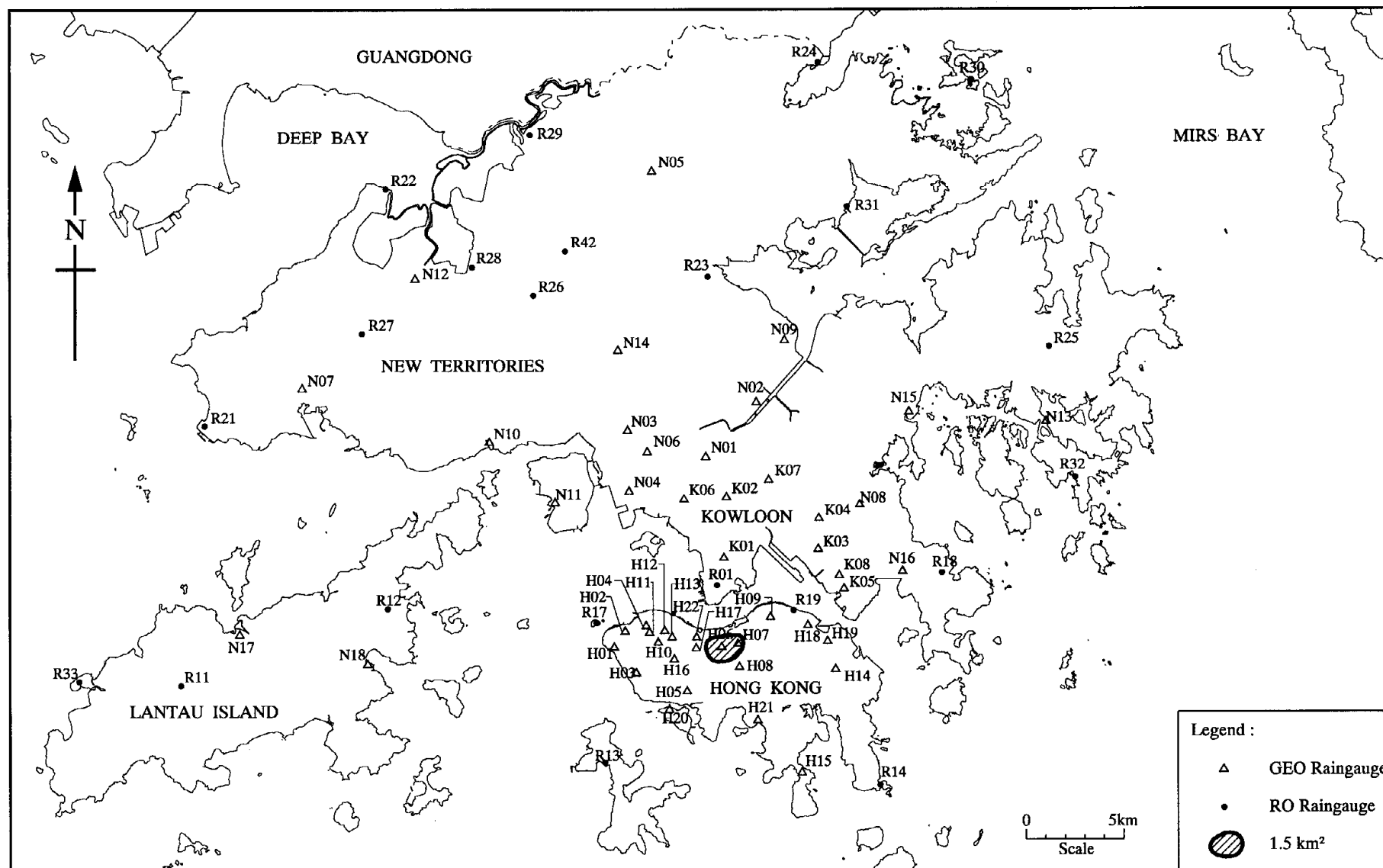


Figure 49 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 22.7.93

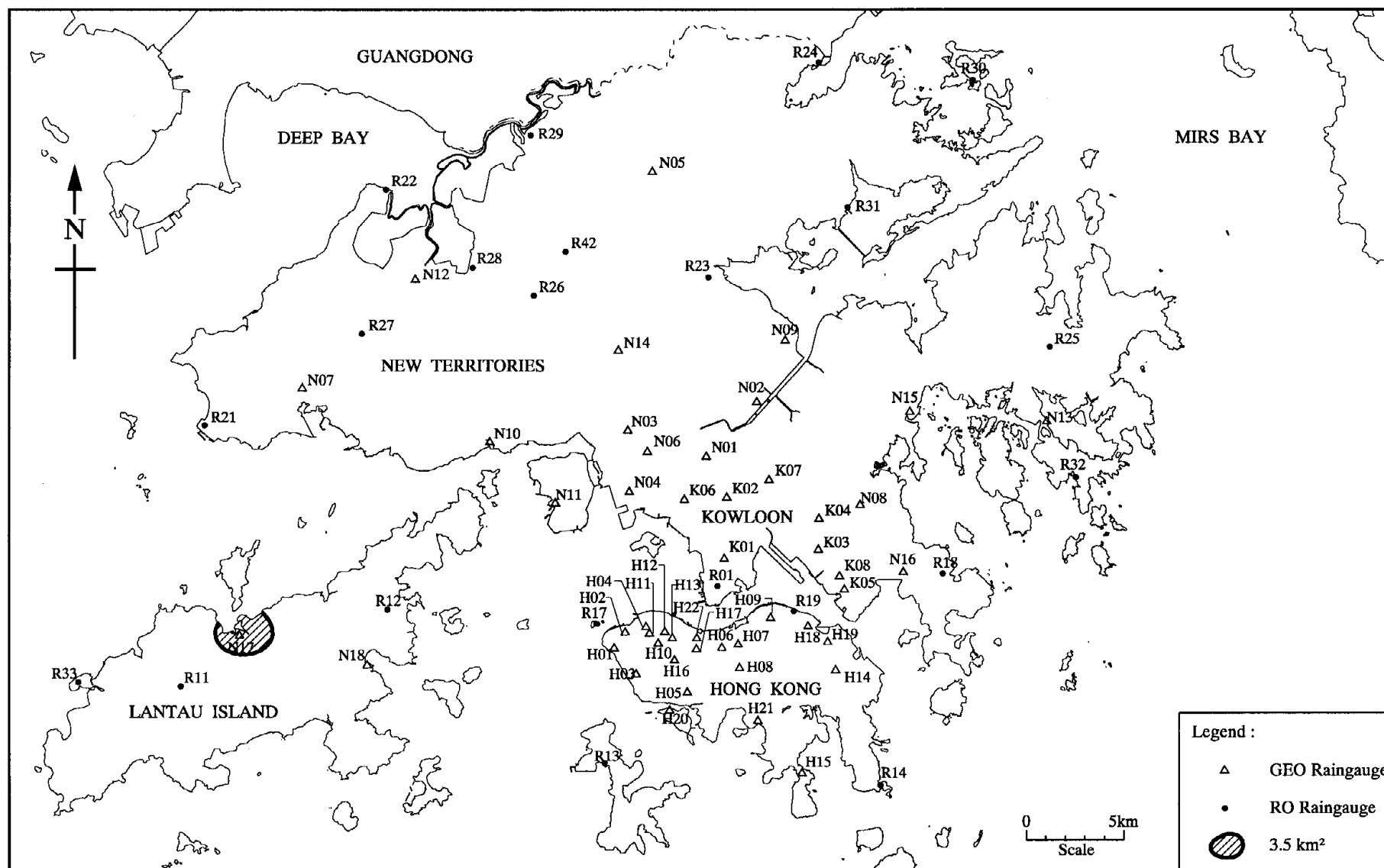


Figure 50 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 31.7.93

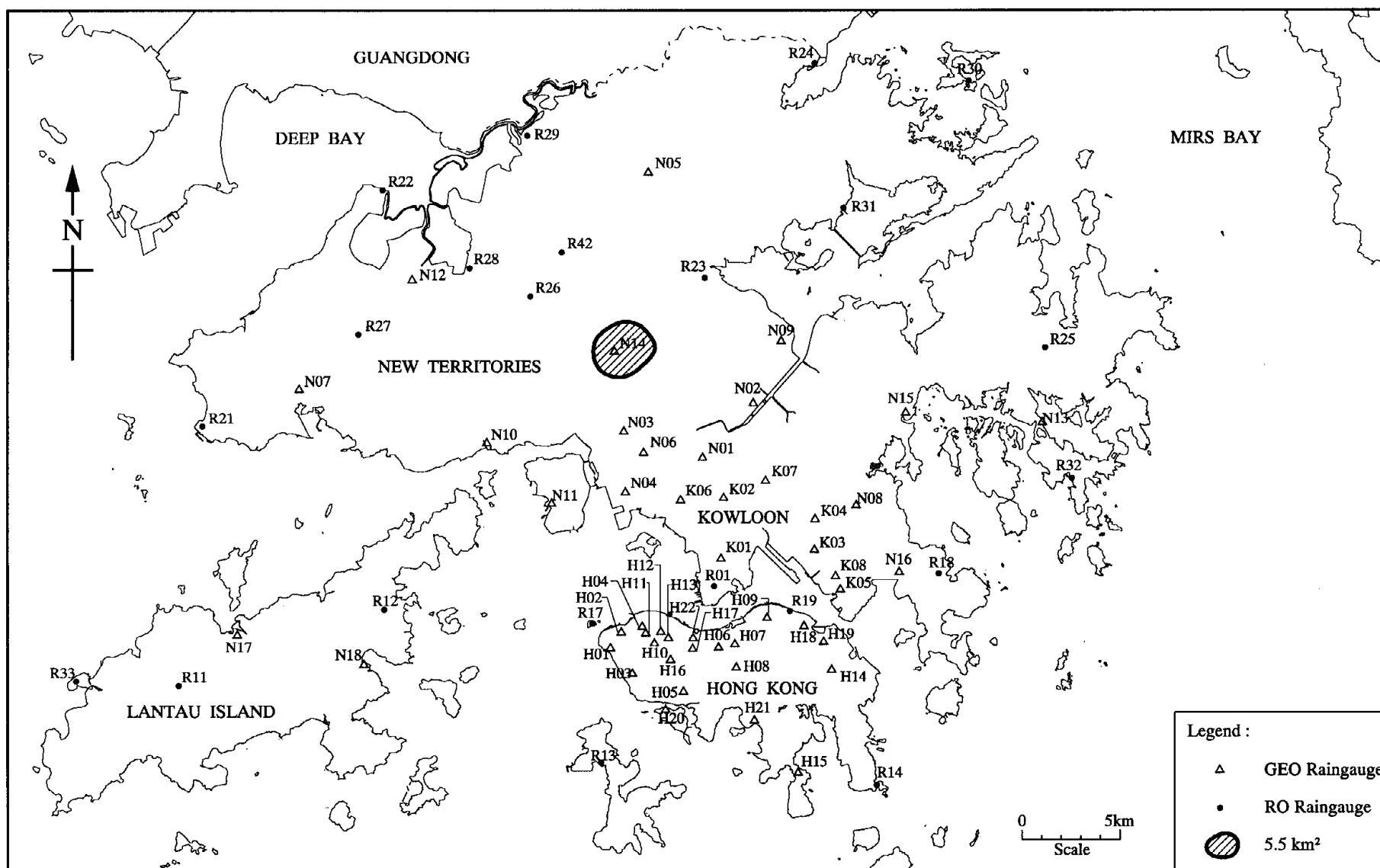


Figure 51 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 14.9.93

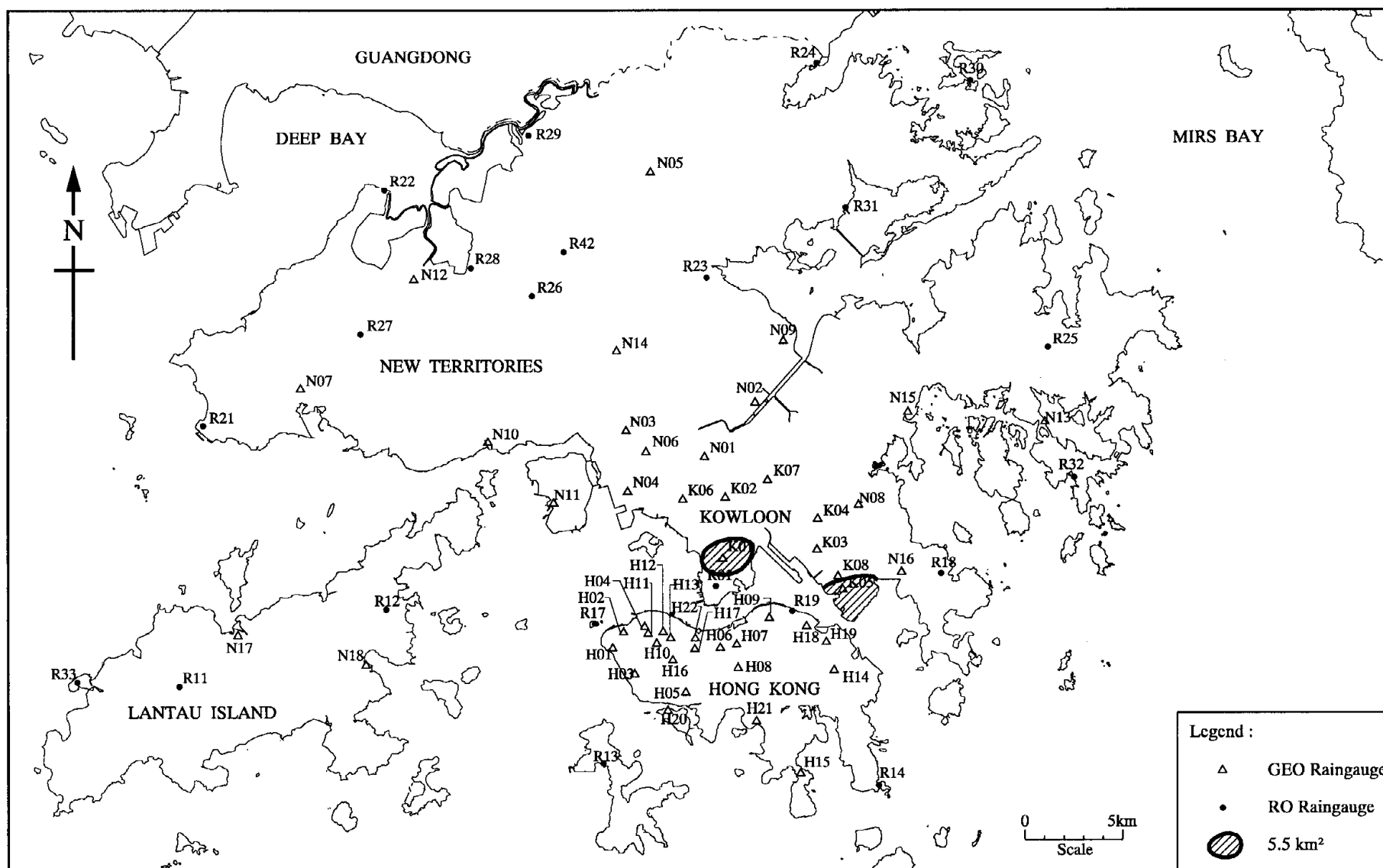


Figure 52 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 14.10.93

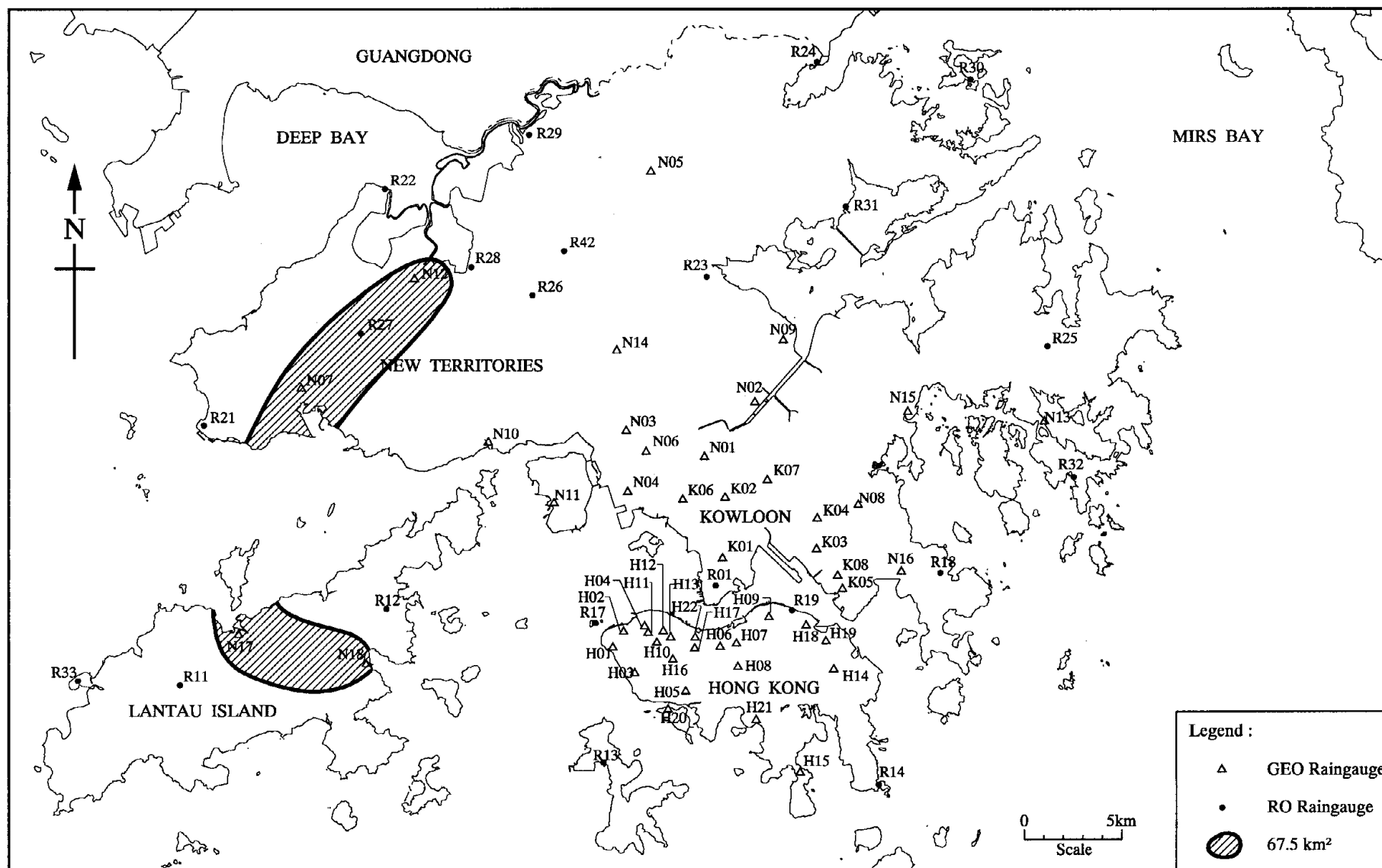


Figure 53 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 5.11.93

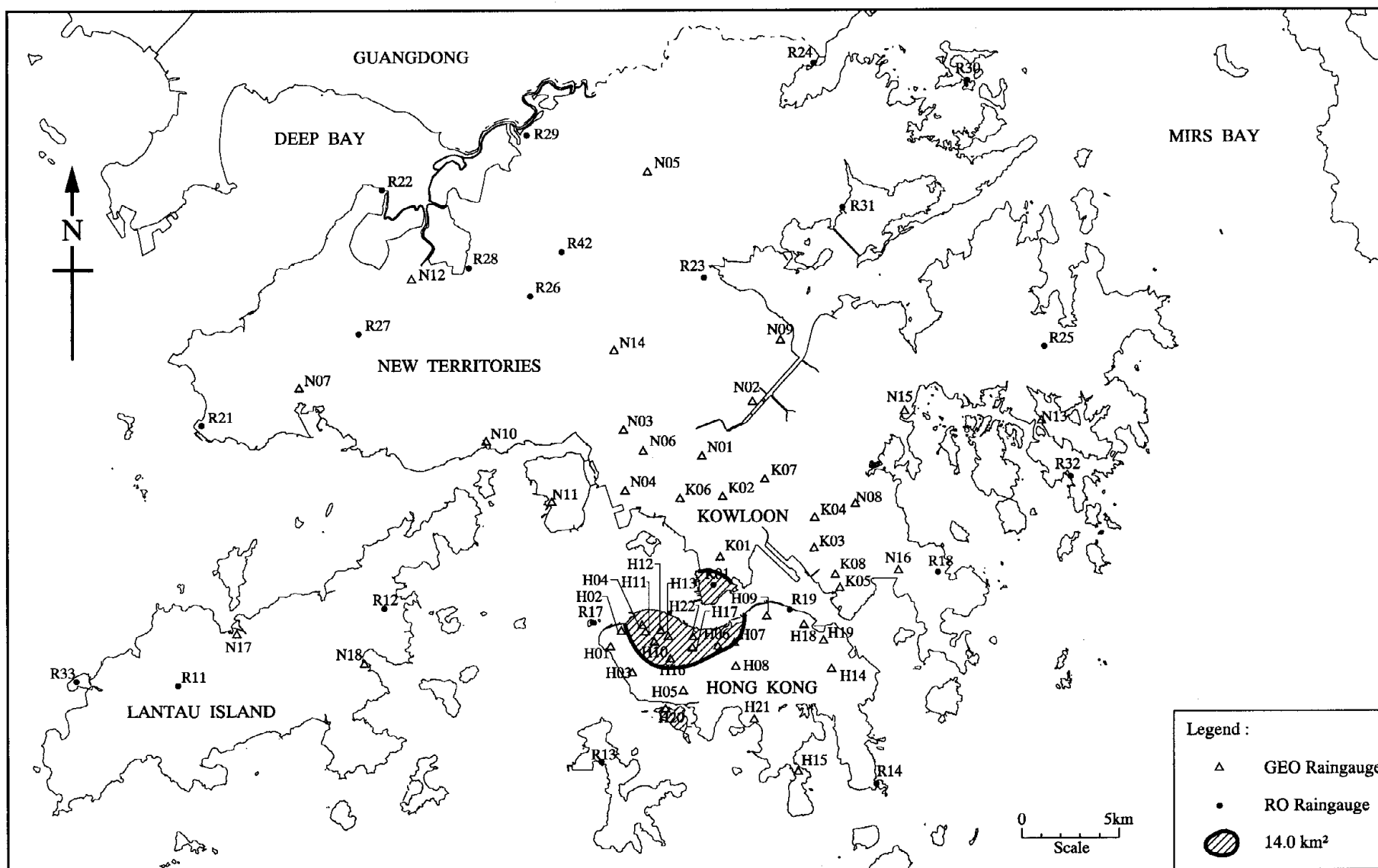


Figure 54 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 3.5.94

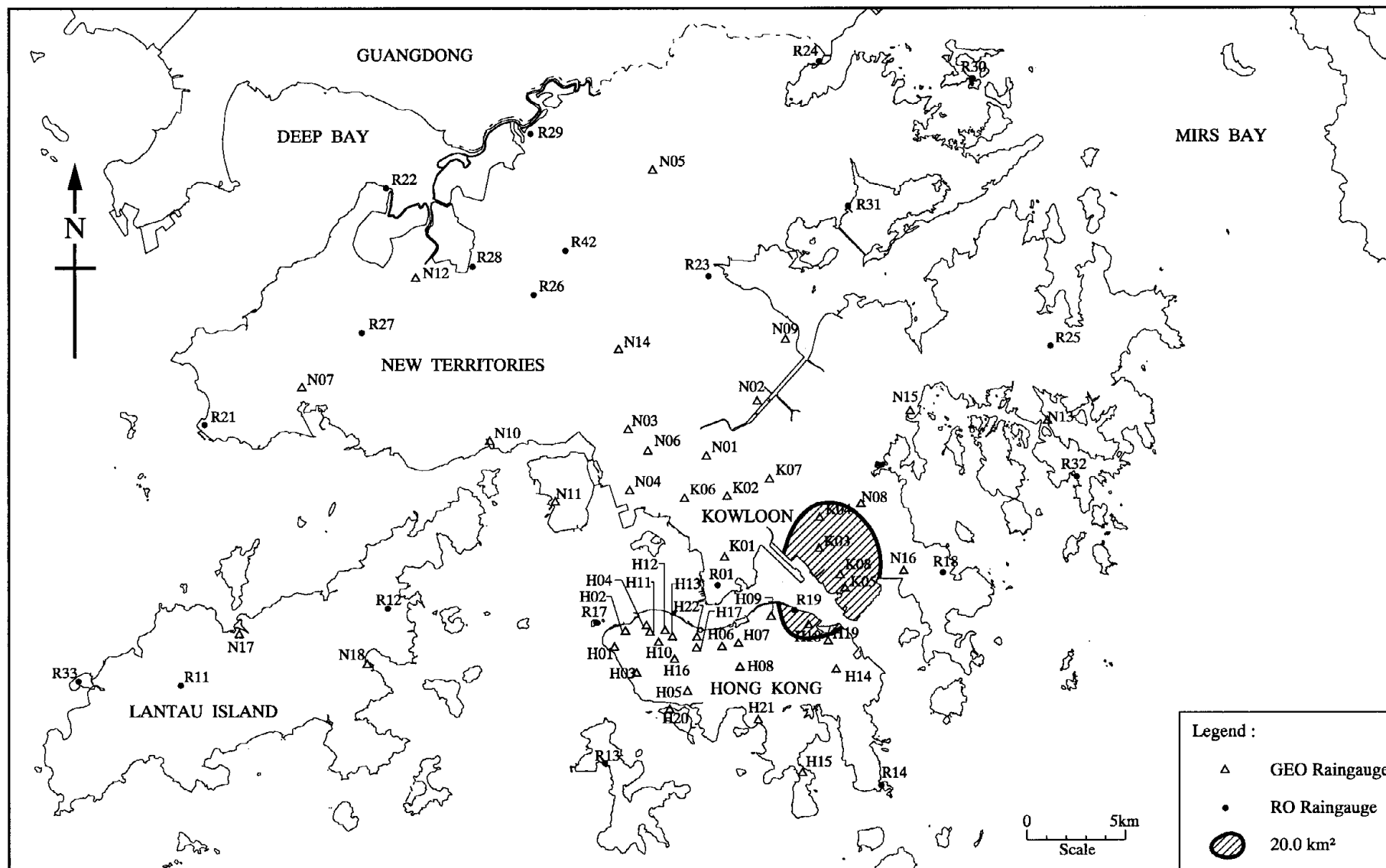


Figure 55 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 19.6.94

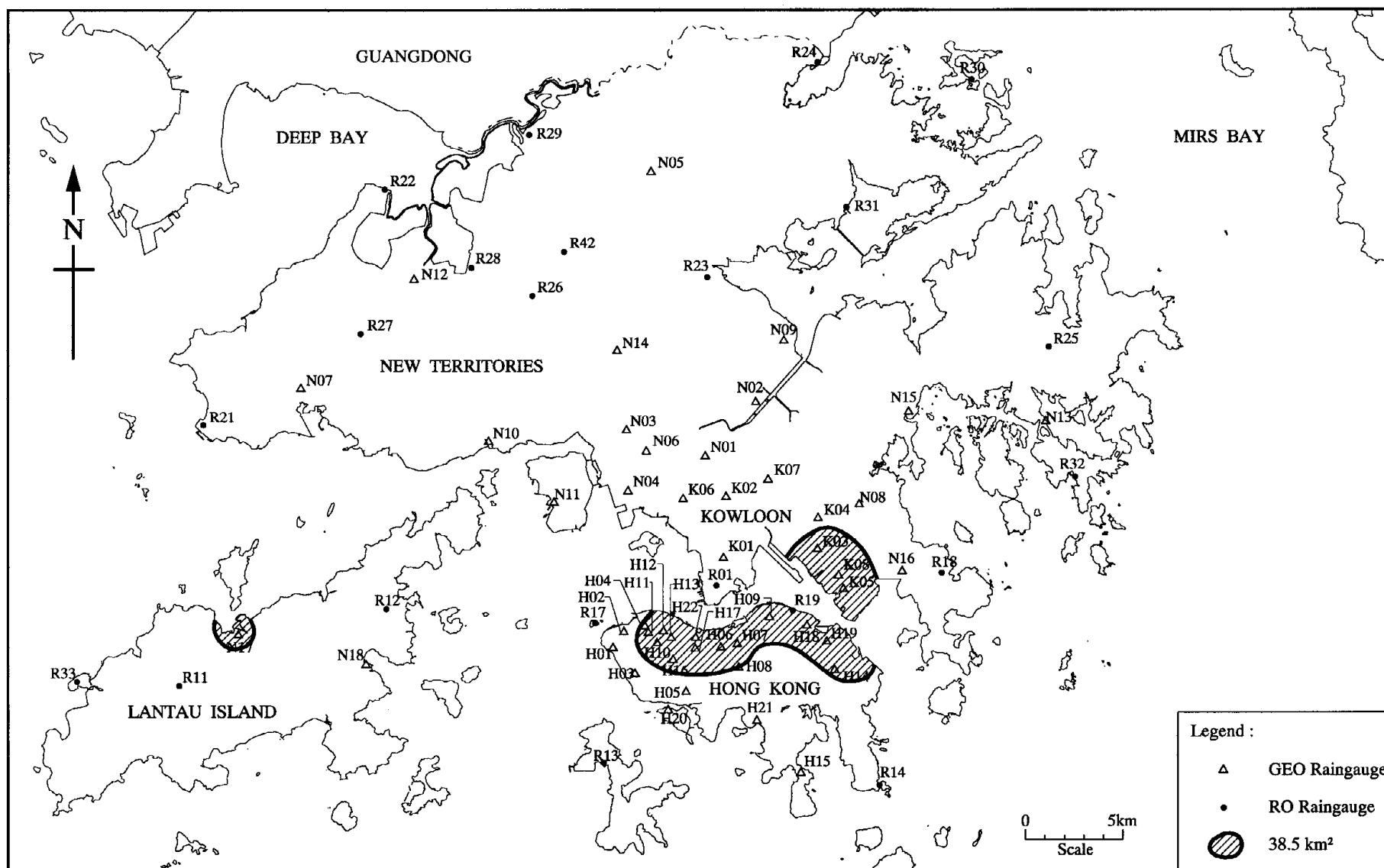


Figure 56 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 12.7.94

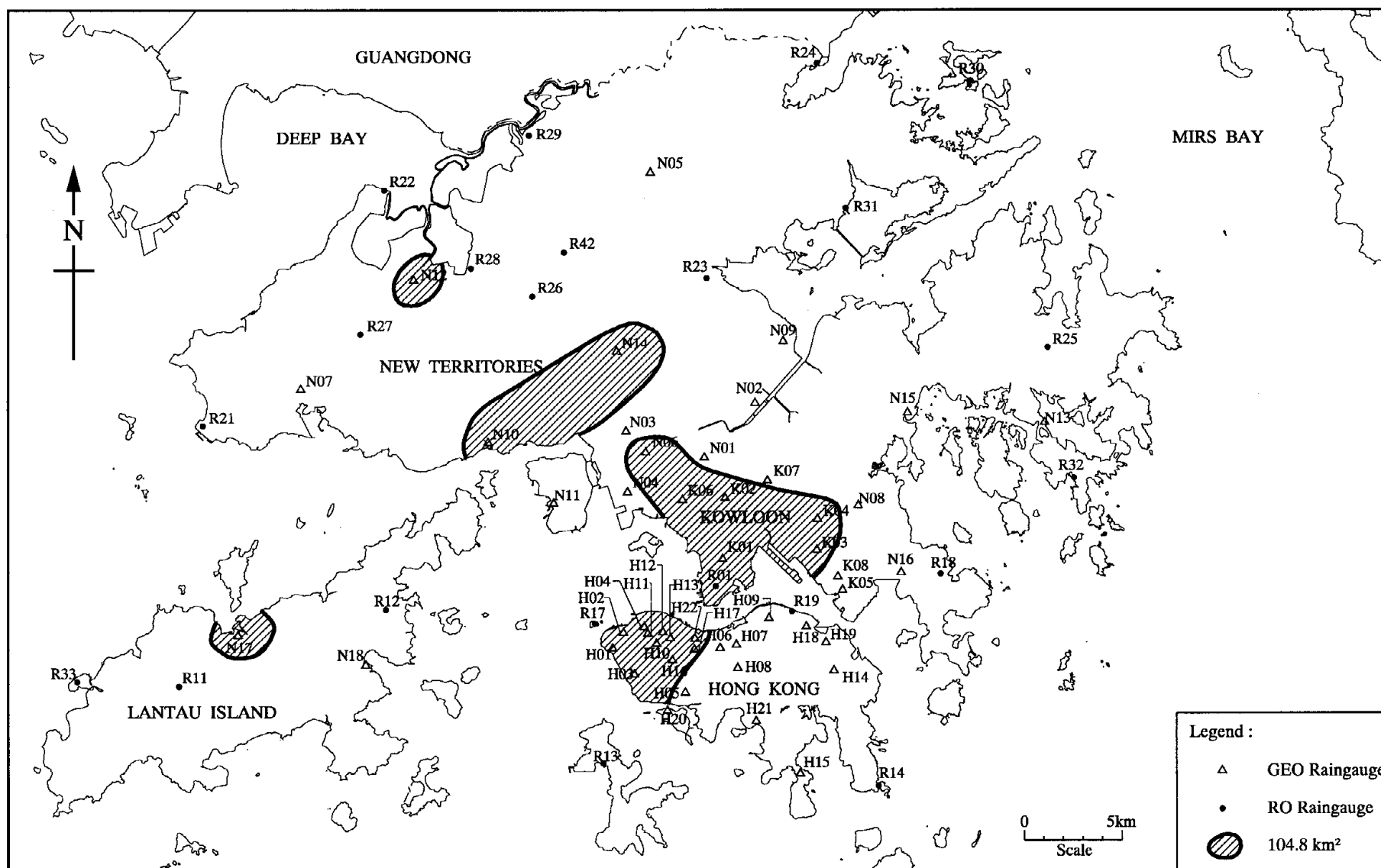


Figure 57 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 22.7.94

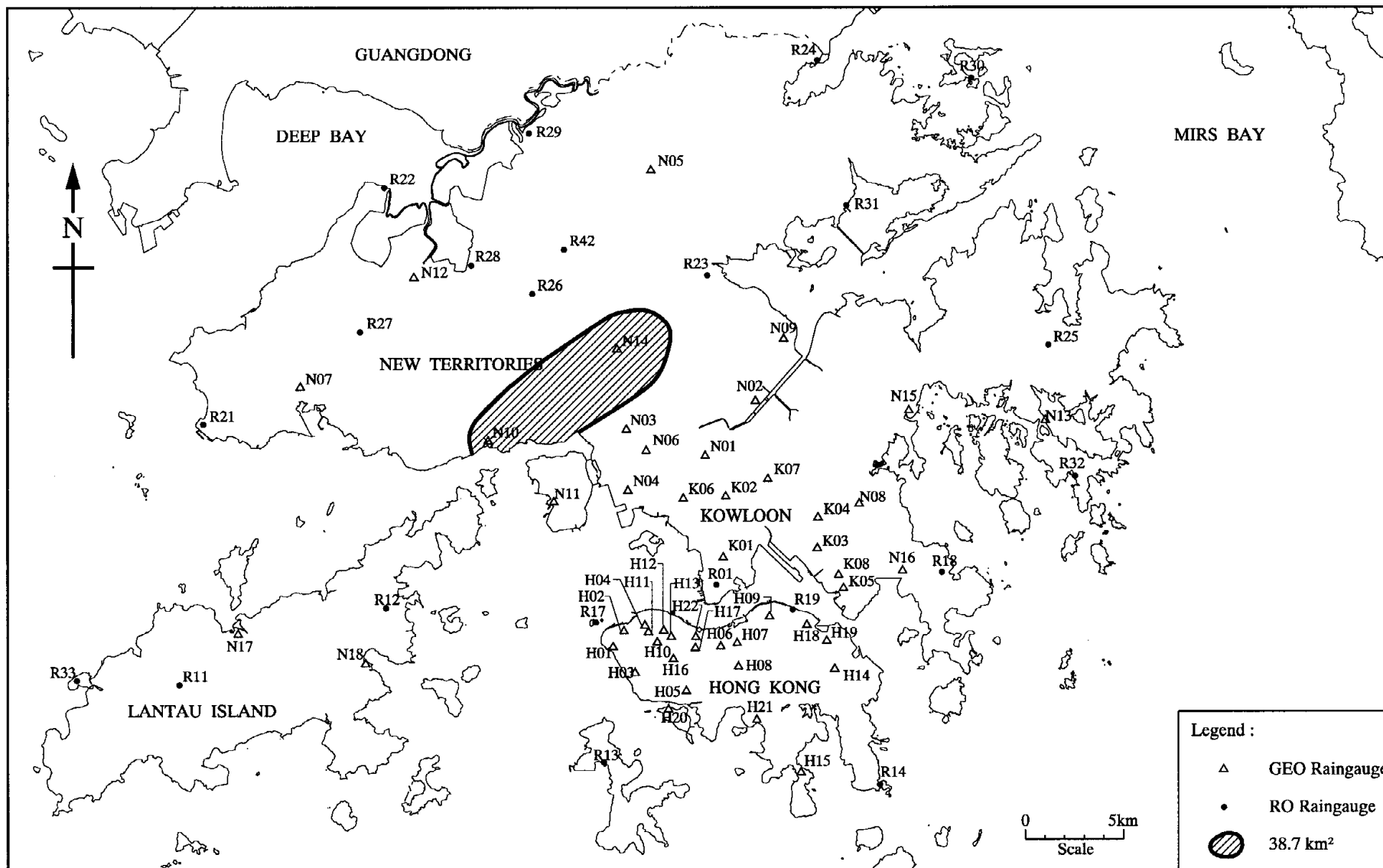


Figure 58 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 6.8.94

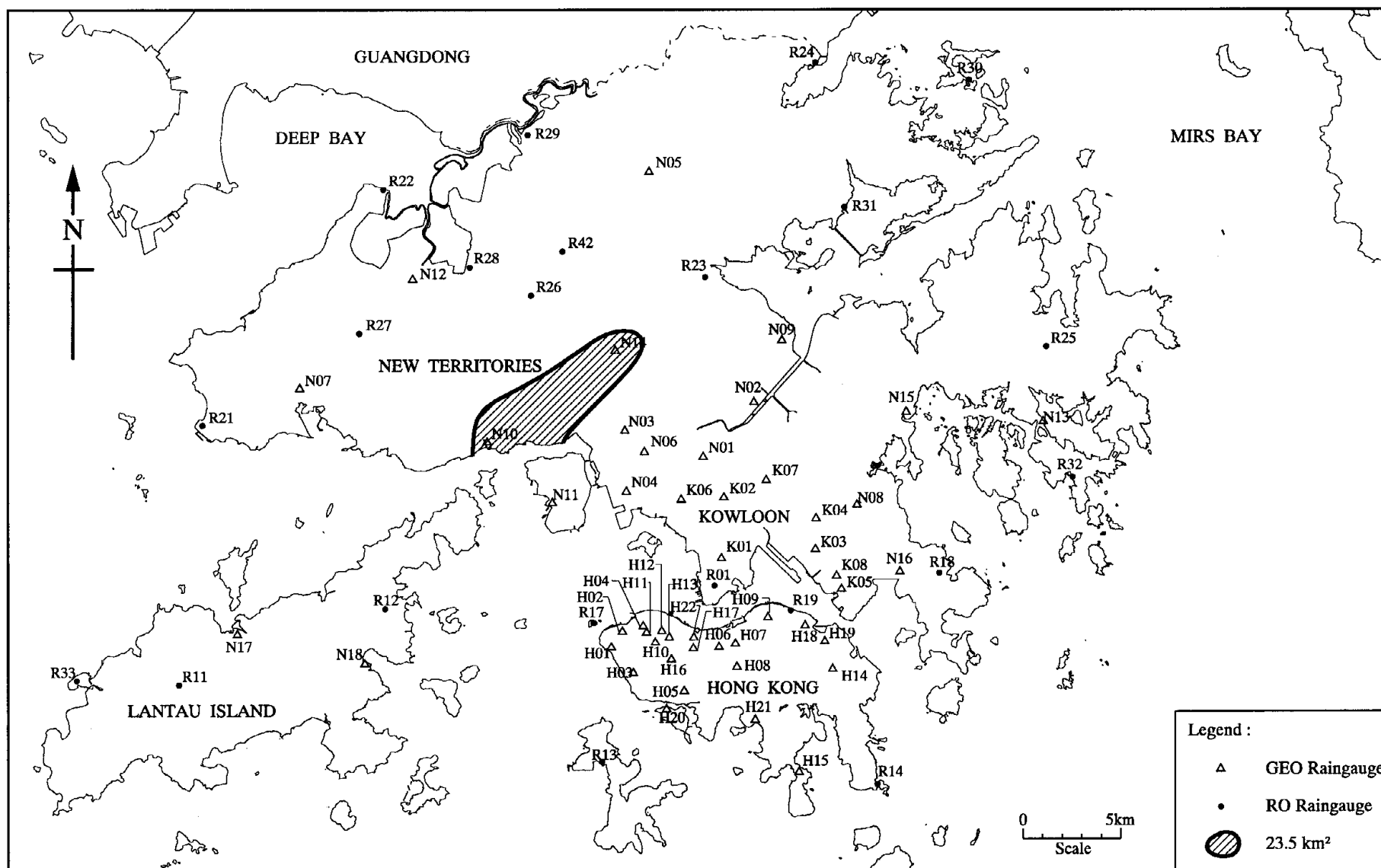


Figure 59 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 10.8.94

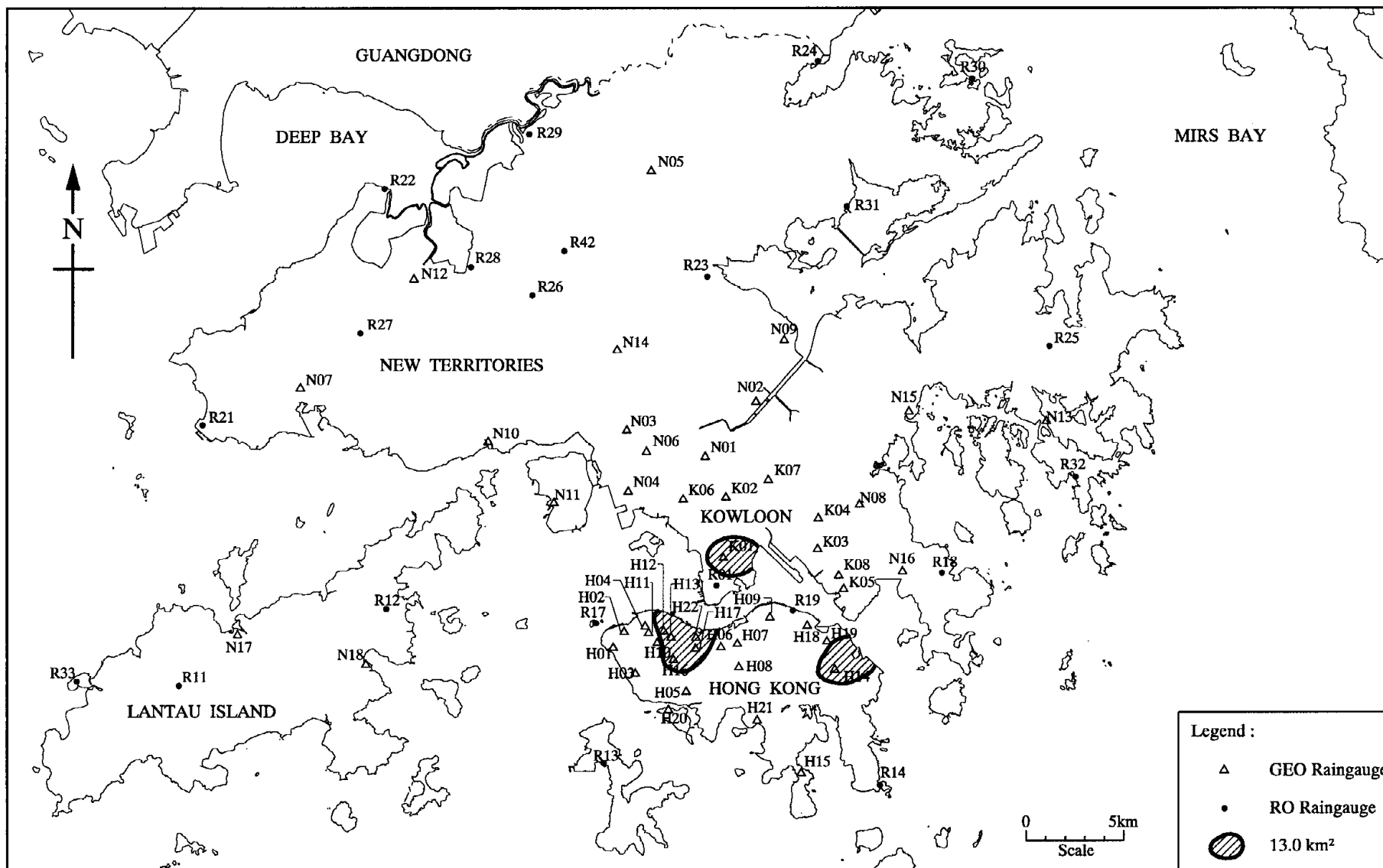


Figure 60 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 10.9.94

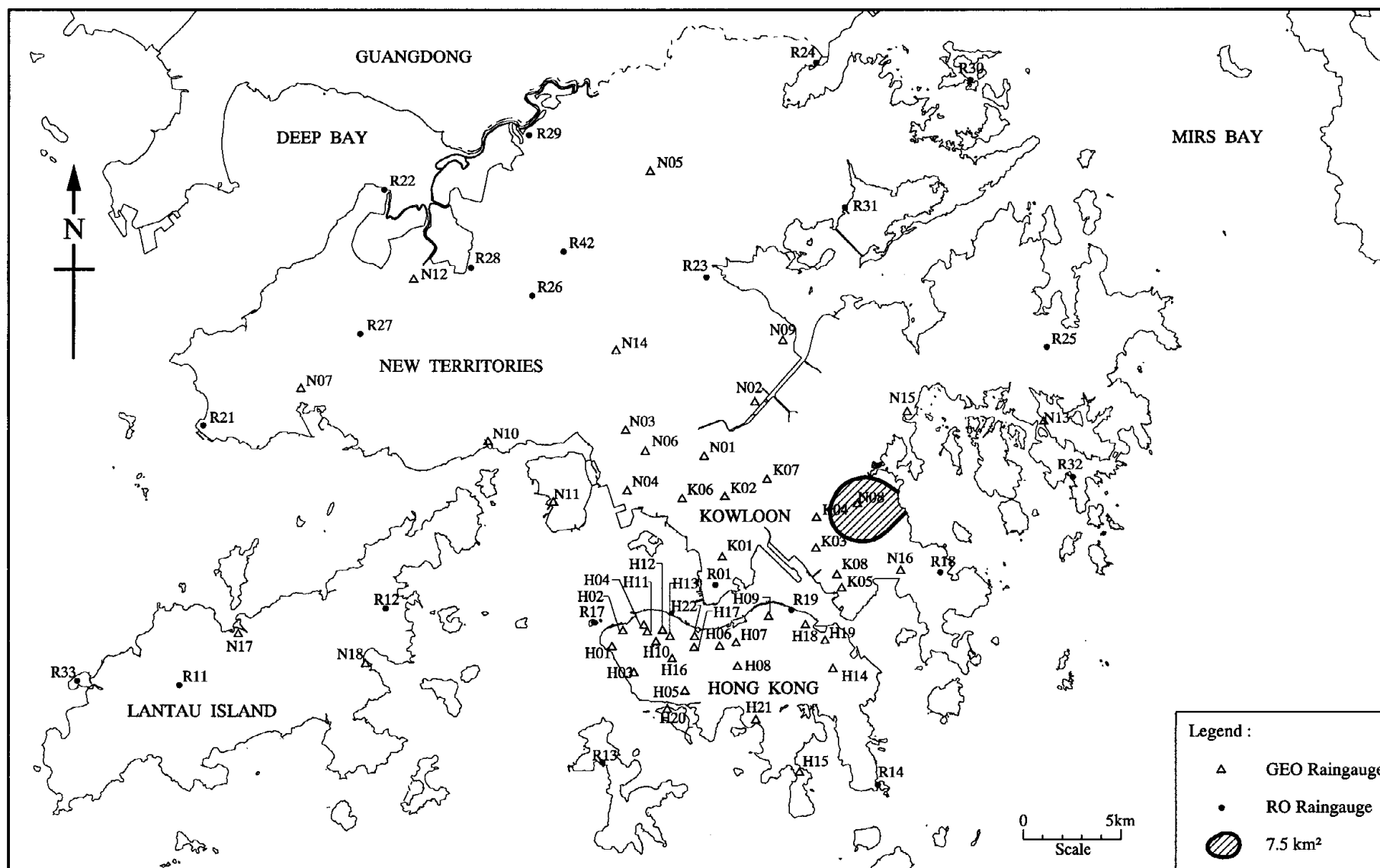


Figure 61 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 20.9.94

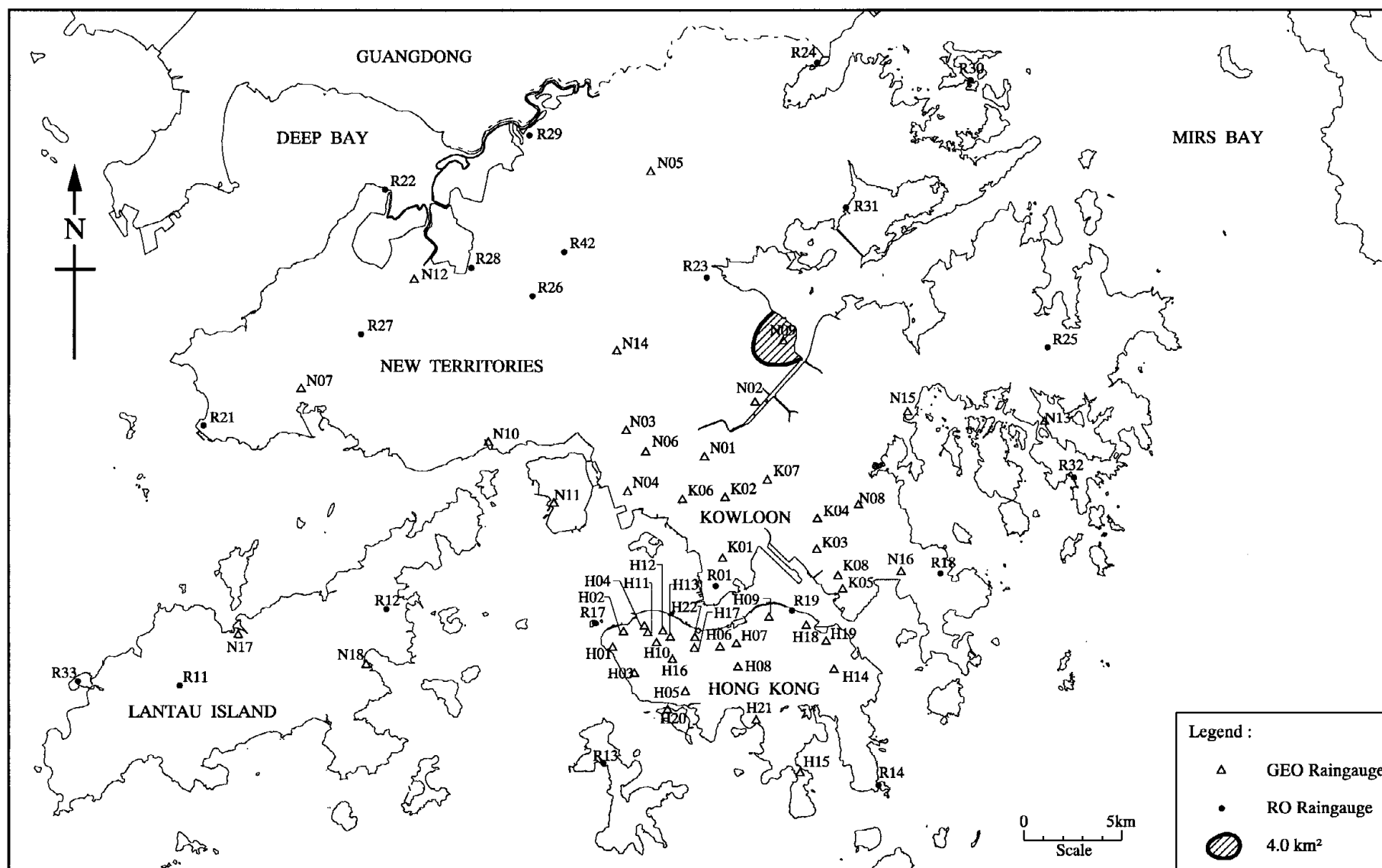


Figure 62 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 19.4.95

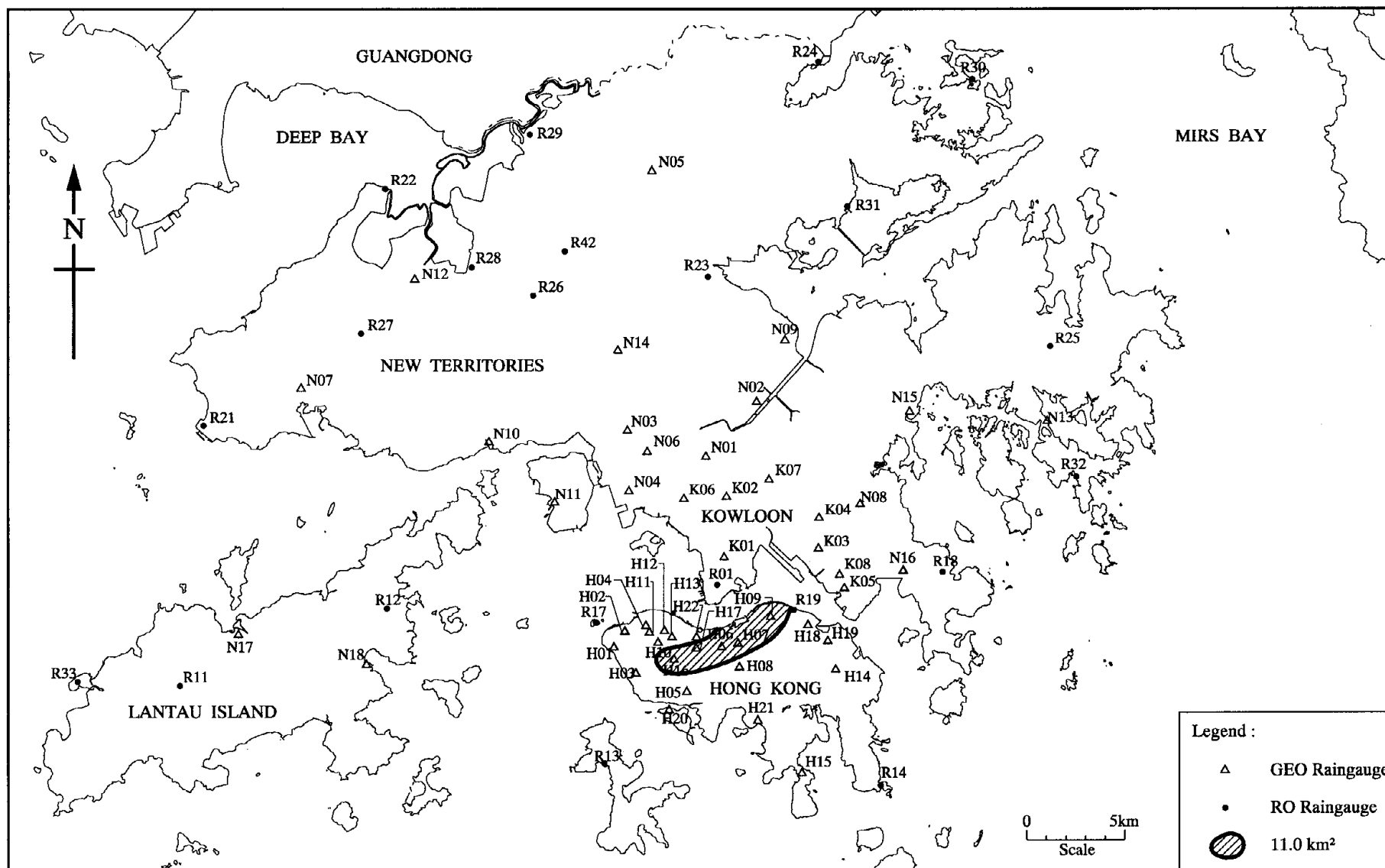


Figure 63 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 14.6.95

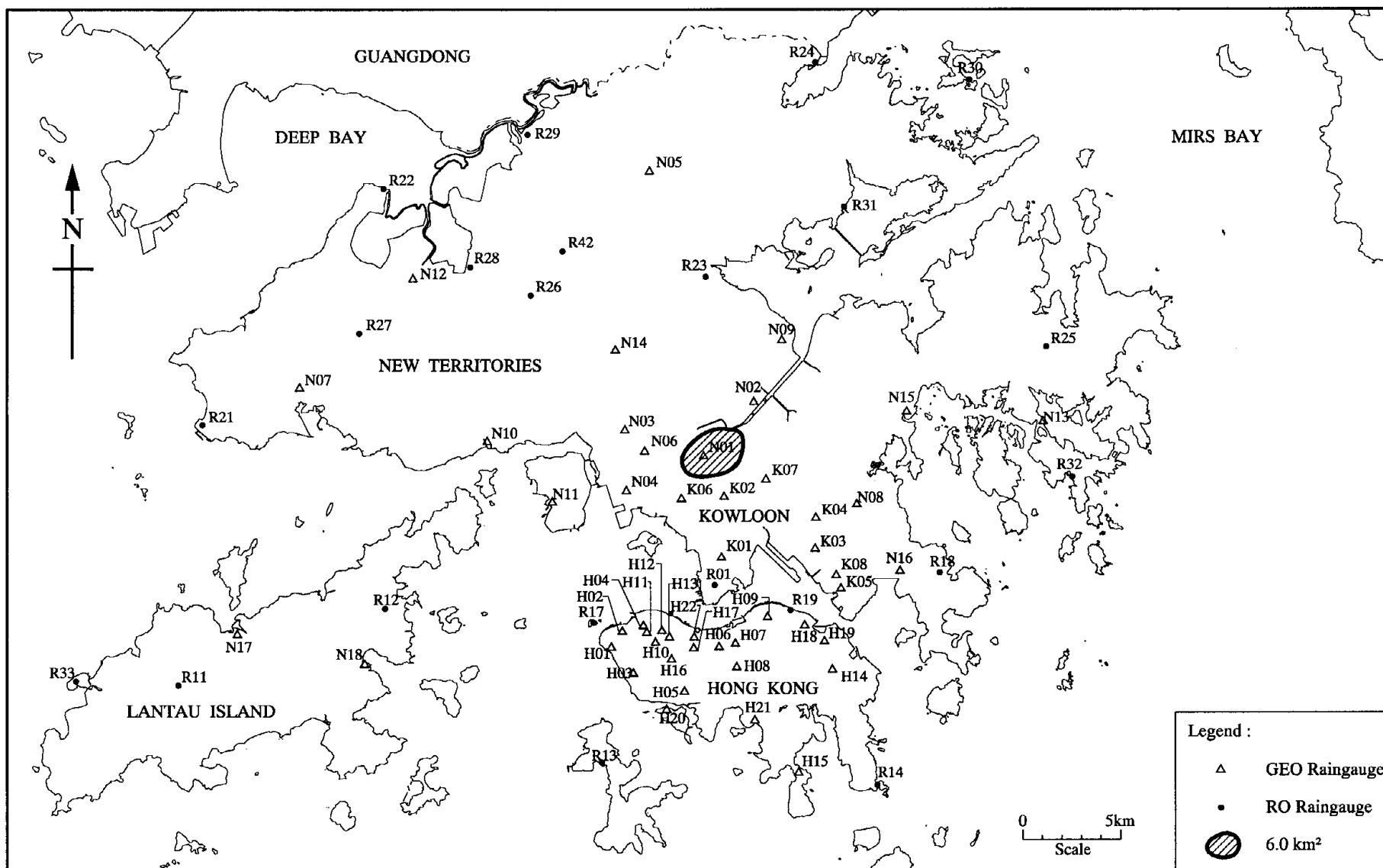


Figure 64 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 18.6.95

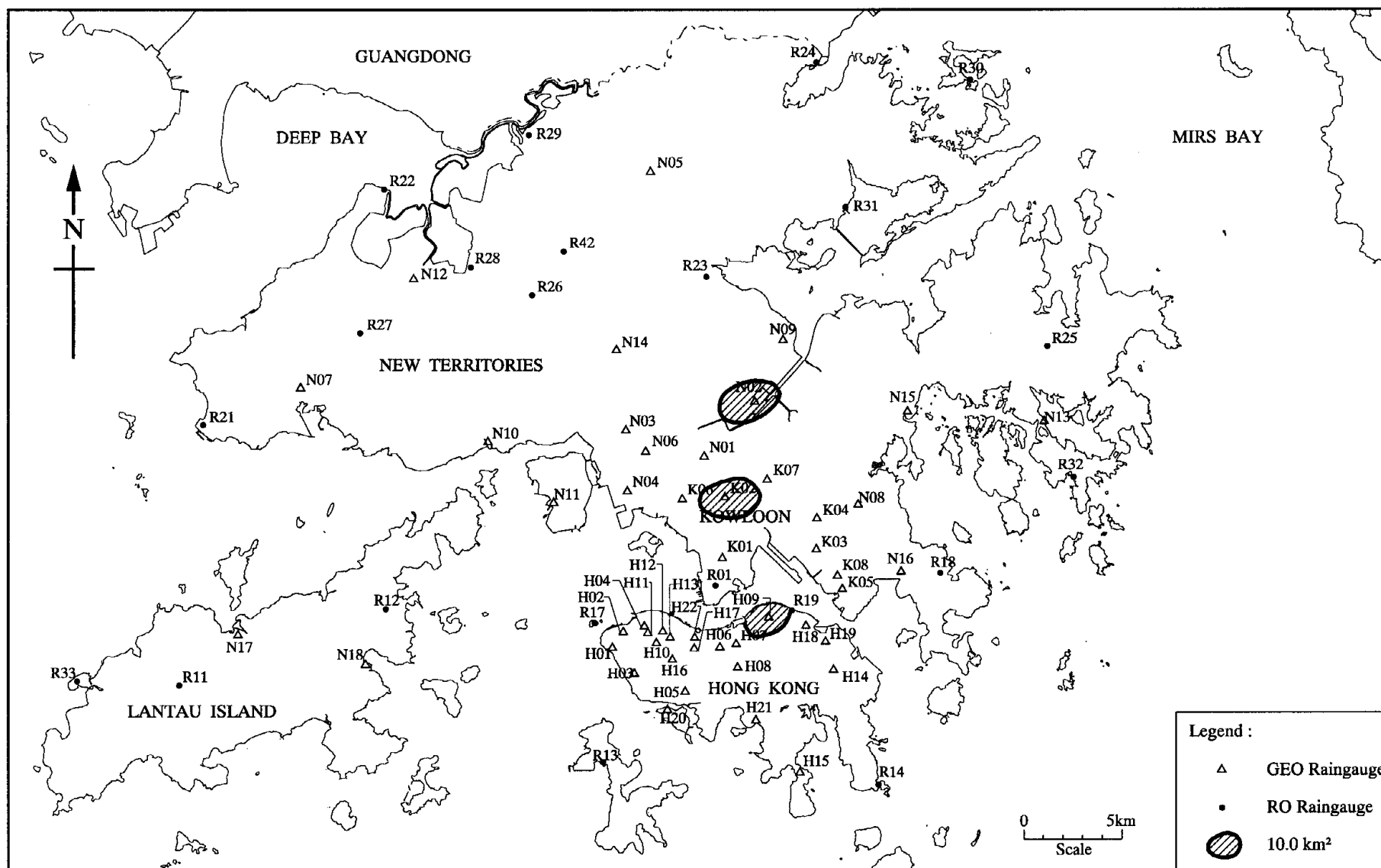


Figure 65 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 12.7.95

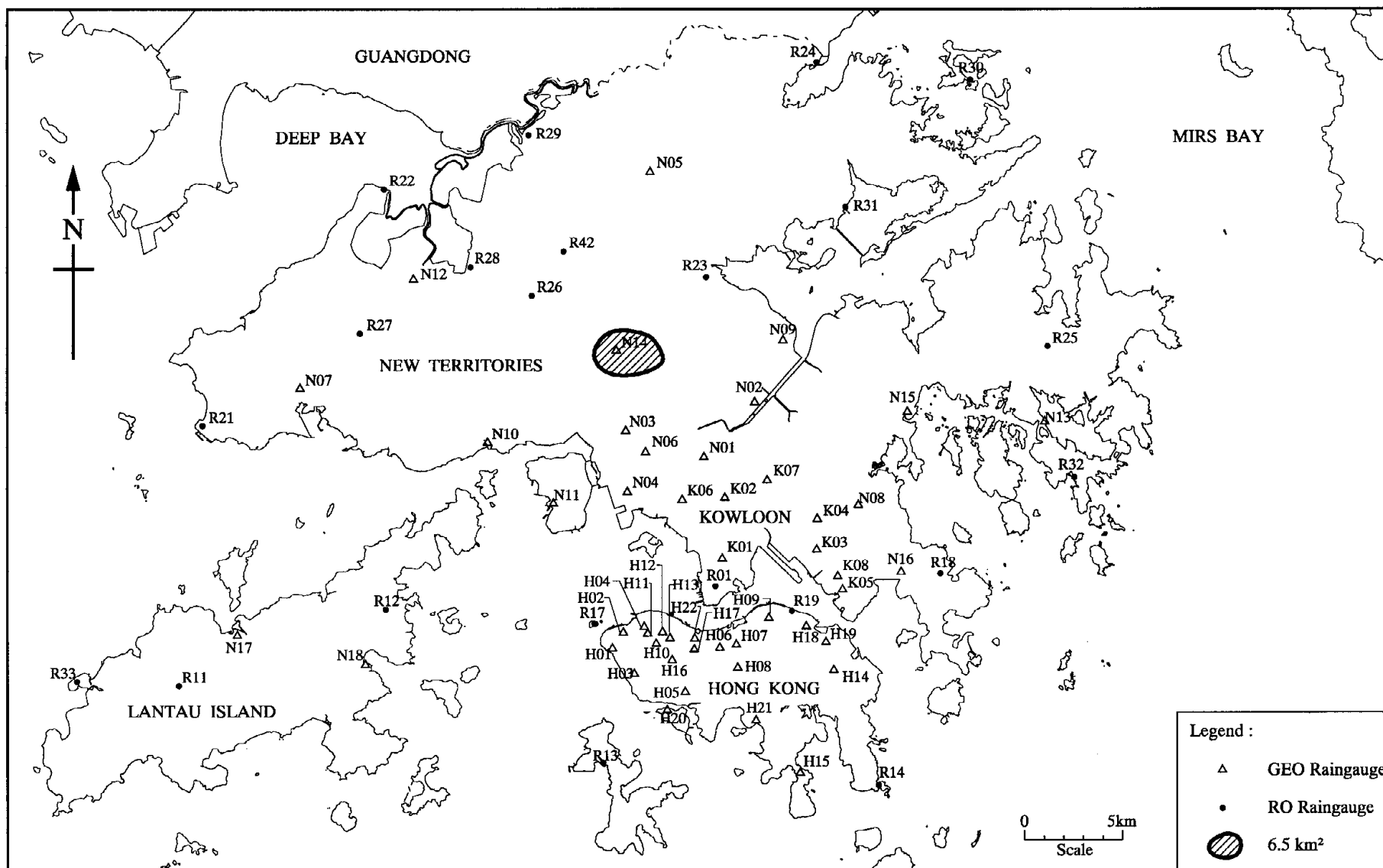


Figure 66 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 31.7.95

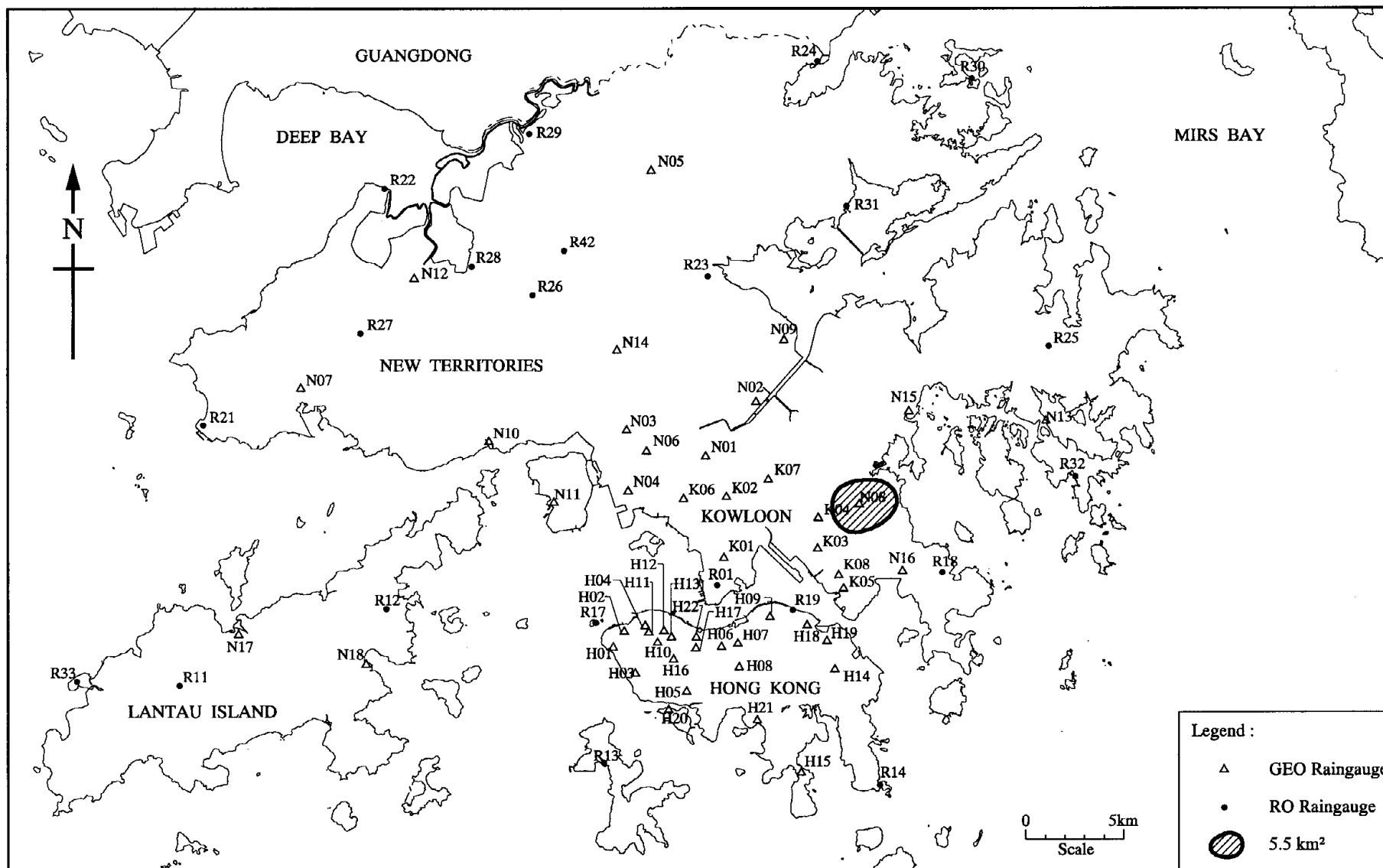


Figure 67 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 5.8.95

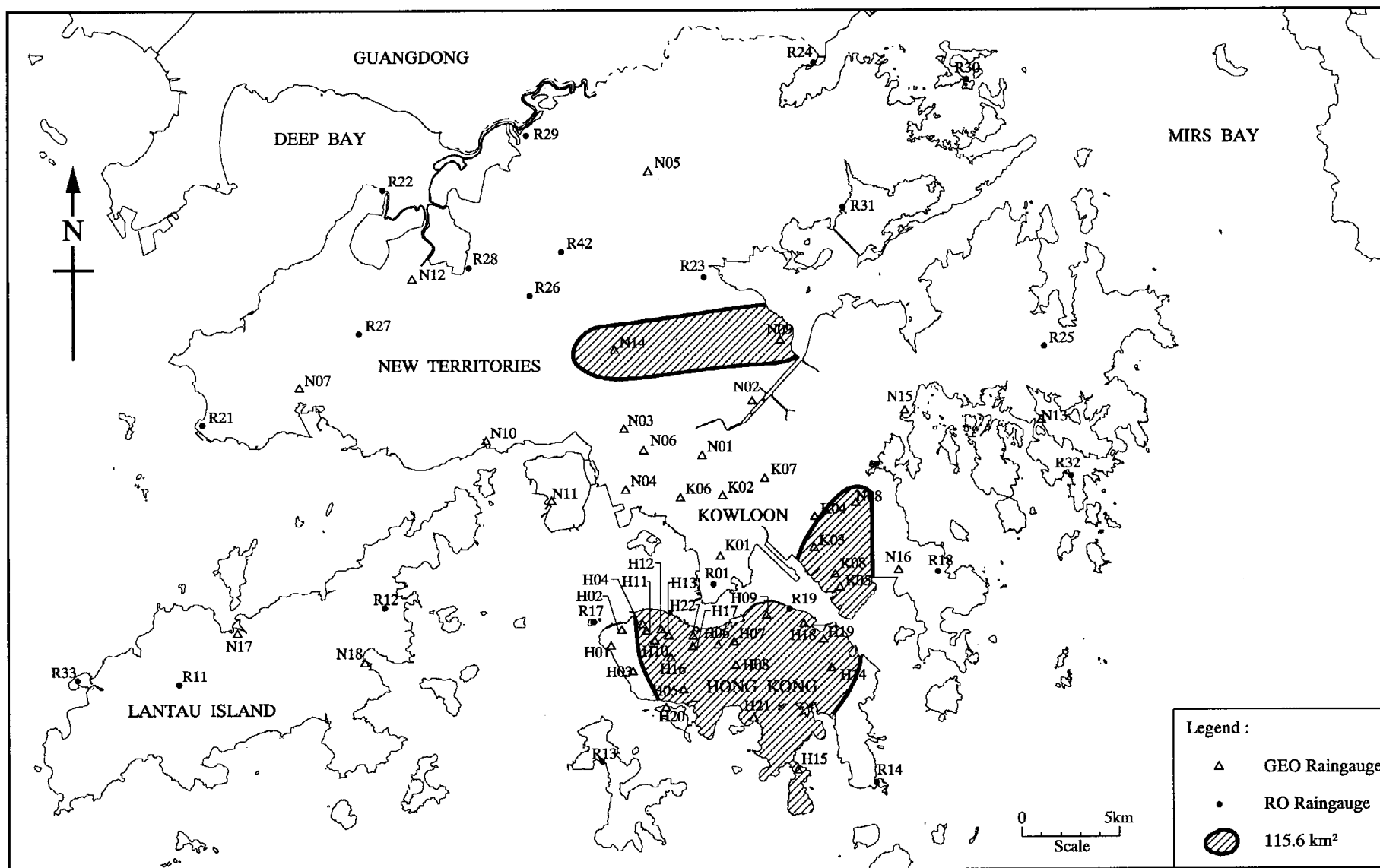


Figure 68 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 13.8.95

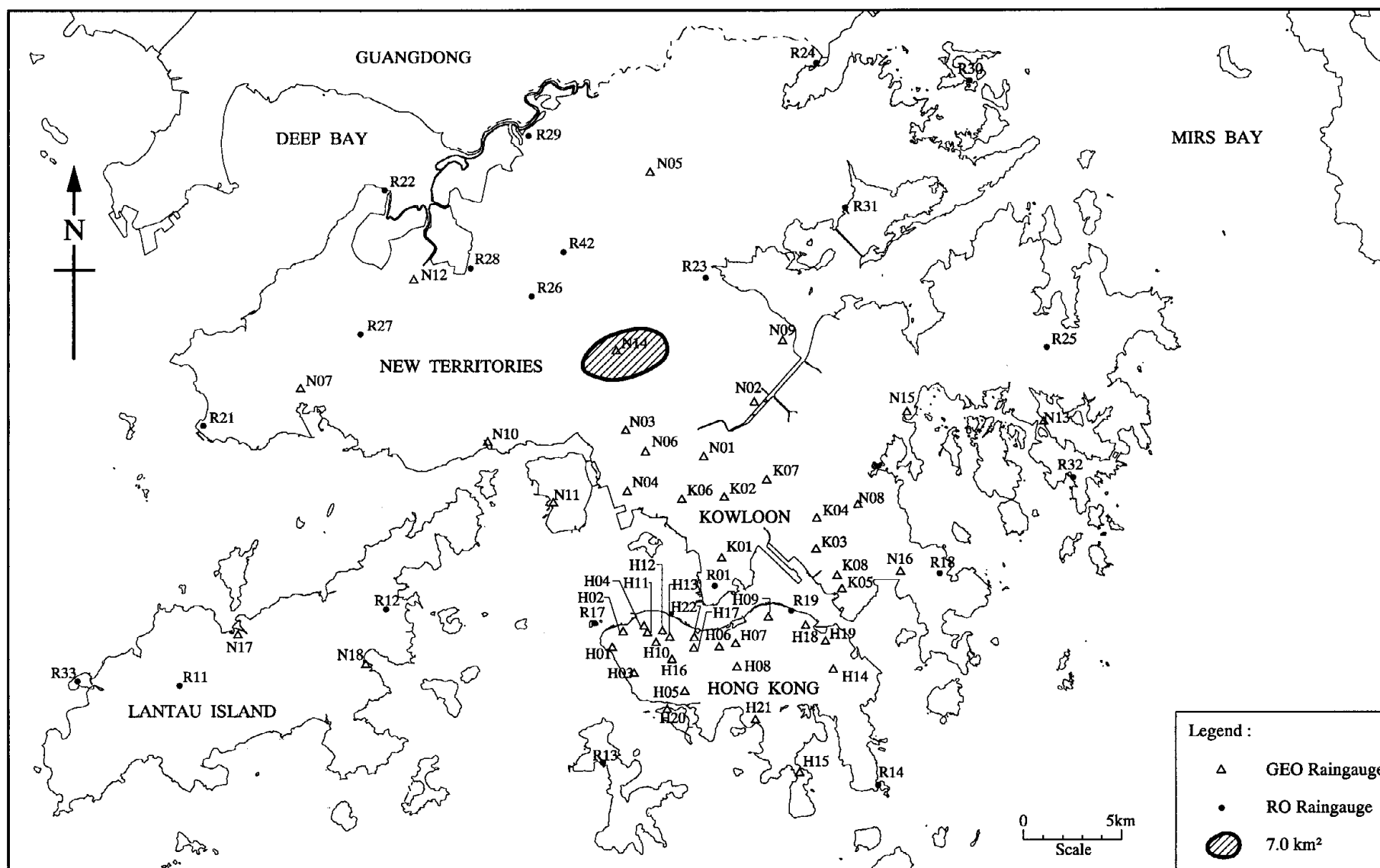


Figure 69 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 24.8.95

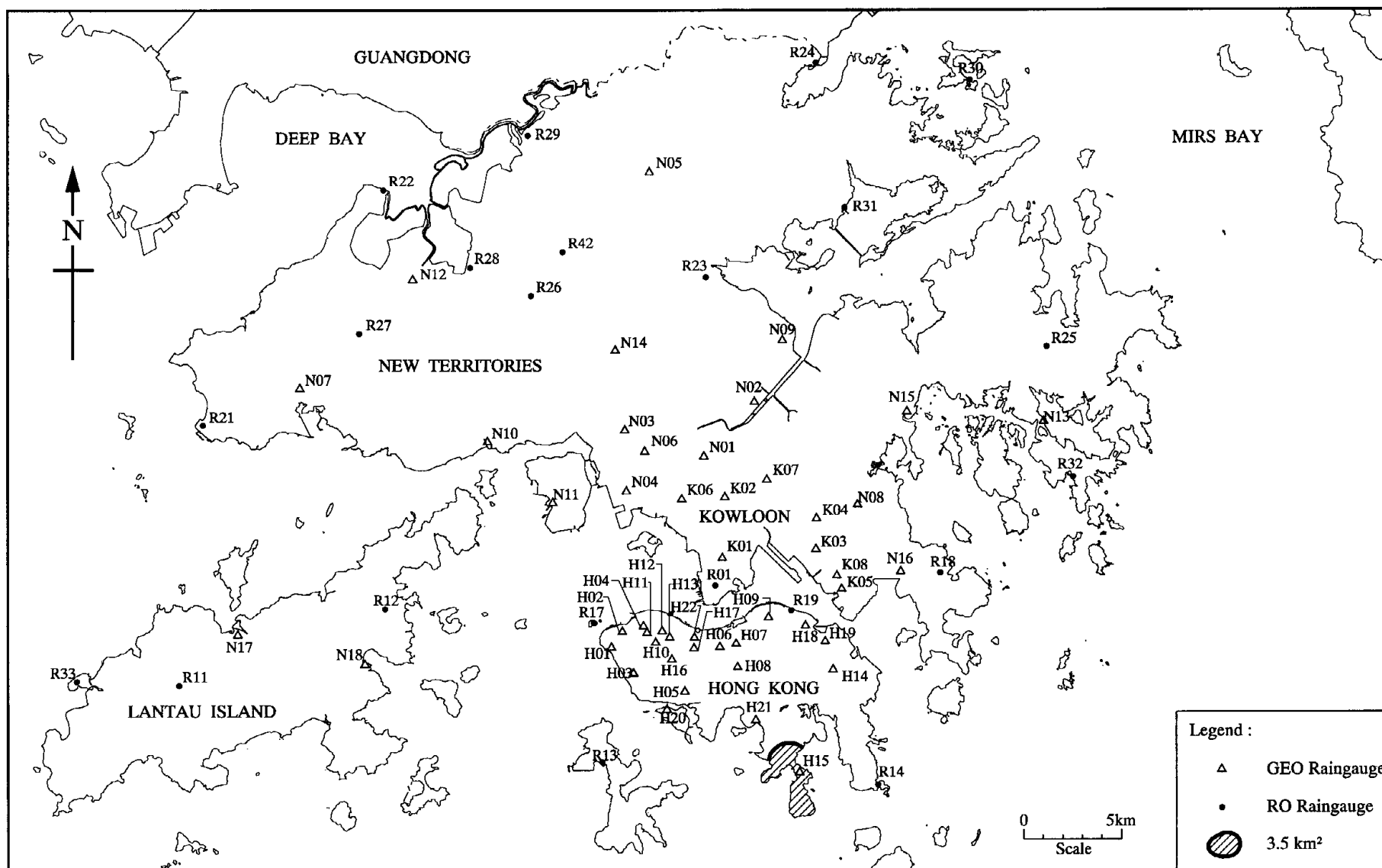


Figure 70 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 16.9.95

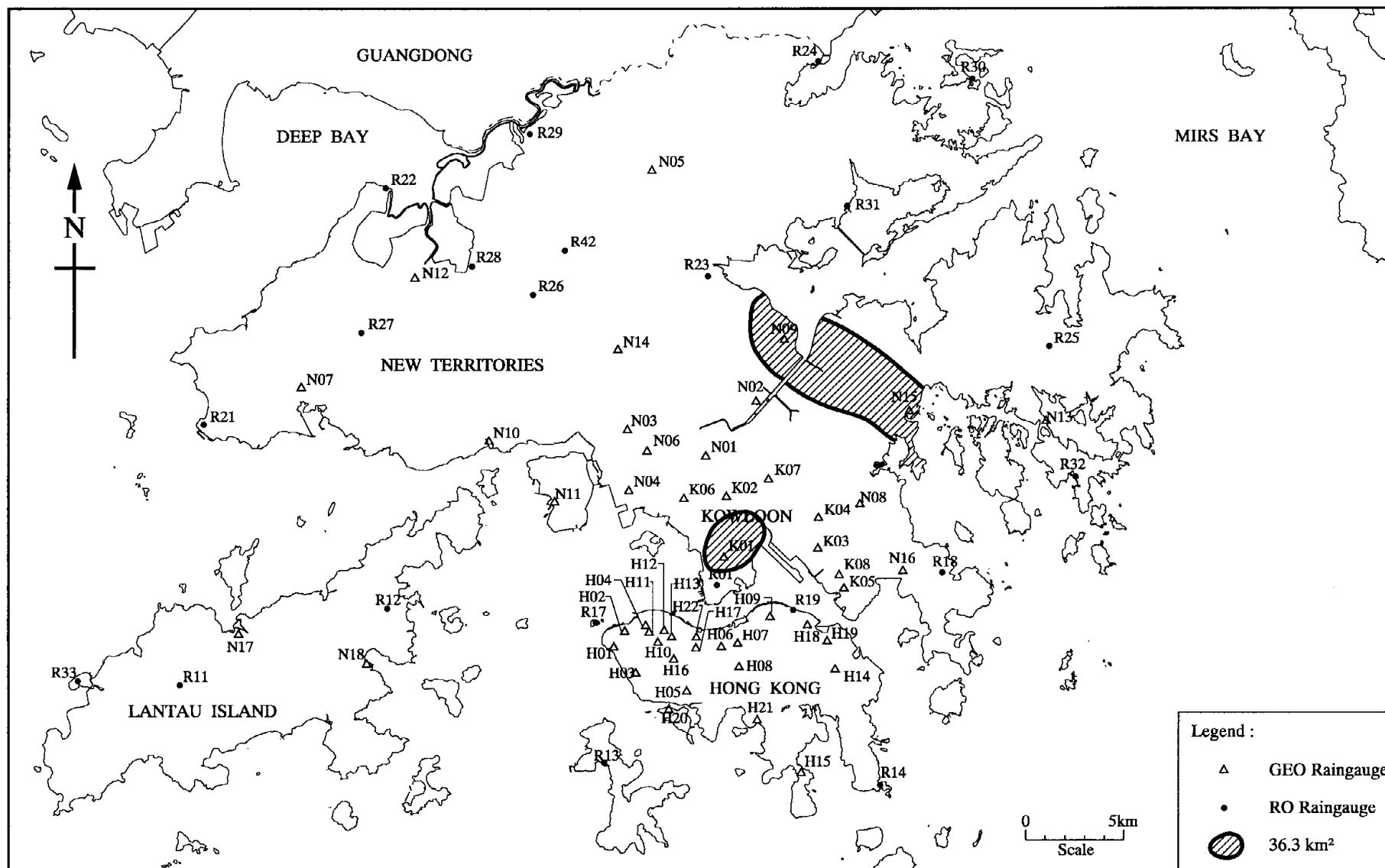


Figure 71 - Areal Extent of Intense Rainfall (Rainfall Intensity > 70 mm in 60 min) in the Territory on 5.10.95