

MITIGATION OF GROUNDWATER CRISIS AND  
LAND SUBSIDENCE IN BANGKOK PROJECT ( MGL PROJECT )

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**REPORT NO. 2**

**HYDROGRAPHS OF PIEZOMETRIC LEVELS**  
**OF**  
**GROUNDWATER IN BANGKOK AND ADJACENT PROVINCES**

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DEPARTMENT OF MINERAL RESOURCES, MINISTRY OF INDUSTRY  
BANGKOK , THAILAND  
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## PREFACE

Following the Cabinet approval of the remedial measures for mitigation of the groundwater crisis and land subsidence in Bangkok, the Department of Mineral Resources in October 1985 set up a project on Mitigation of Groundwater Crisis and Land Subsidence in Bangkok Metropolitan Area, known as the MGL Project. The project is financed from the annual national budget allocated for groundwater monitoring and management in Bangkok and its vicinity. The duration of the project is planned until the year 2000.

The groundwater crisis is demonstrated by a continuous decline of piezometric levels with no sign of recovery, caused by many years of over-pumping of the groundwater from aquifers. As a result, salt-water intrusion and land subsidence are common phenomena known to have occurred in many large cities as a result of over-pumping the groundwater. These include Venice, Mexico City, Tokyo and Jakarta, as well as Bangkok.

The objectives of the groundwater monitoring programme for the MGL Project are:

(1) To study the behaviour of aquifers on piezometric levels in response to staged control of groundwater use in Bangkok, Nonthaburi and Samut Prakan, and to define the extent and magnitude of the groundwater crisis and the state of water quality;

(2) To determine the effect of pumping on water levels and water quality in industrial areas of the provinces adjacent to Bangkok, where groundwater is heavily developed.

(3) to predict future response of the aquifer system to various future pumping schemes by mathematical model study for the purpose of groundwater management.

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## **INTRODUCTION**

This report is a Report No.2 of the MGL Project publication. It presents hydrographs of piezometric levels from 1978 to 1993 of groundwater from monitoring wells in Bangkok and adjacent provinces. Data on well drilling records, including well depth, size, static water level at the time of wells completion and well logs, with description of lithology and geophysical logs can be obtained from the MGL Project Report No.1. Location of the monitoring wells posted on maps in grid system and chemical analyses of the well waters are also shown in the previous report.

## **GROUNDWATER MONITORING IN BANGKOK**

Groundwater monitoring in Bangkok has been conducted since 1965. The initial programme was to collect information on the natural background level, the current state and long-term trend of groundwater quantity and quality. The programme was first focussed on the studies of hydrogeology and characteristics of the aquifer systems, including the changes in piezometric levels and water quality.

Data on well drilling and development of the government and privately owned wells, as well as available previous data, were also collected and analysed and borehole geophysical logs were studied for lithology and preparation of hydrogeological profiles of the Bangkok strata. As a result of these studies, many groundwater maps and reports have been published. The piezometric level maps periodically published by the Department of Mineral Resources have indicated a rapid decline of water levels in the three major aquifers in Bangkok. Water samples, periodically collected from existing public water supply wells and newly constructed private and public wells, were analysed and inferior water quality in some areas were observed (Ramnarong, 1991)

## GROUNDWATER MONITORING NETWORK

The groundwater monitoring network in Bangkok was first established in 1978 under the comprehensive study programme on groundwater and land subsidence. The network consisted of 60 monitoring wells and was aimed at monitoring piezometric levels and water quality in three aquifers: the Phra Pradaeng (100 m zone), the Nakhon Luang (150 m zone); and the Nonthaburi (200 m zone). Intensity of the monitoring wells were planned based on: the degree of criticalness of the areas; the rates of decline of the piezometric levels; and land subsidence. Wells are located throughout the areas influenced by heavy pumping in the Bangkok Metropolis.

After the MGL Project was set up in 1985, a number of the 258 monitoring wells were designed to be installed over 5,600 sq.km. of the study area. Of the total 258 monitoring wells, 82 wells were equipped with continuous water-level recorders. In the other wells the piezometric levels are measured monthly. Water samples are collected yearly for chemical and physical analyses.

### HYDROGRAPHS OF PIEZOMETRIC LEVELS

The hydrographs of piezometric levels of 258 monitoring wells from 103 stations shown in this report are processed from field data obtained from continuous recording and monthly measurements of piezometric levels. The 103 stations consist of 71 complete stations of three monitoring wells penetrating the three different aquifers, 24 stations of two monitoring wells and 21 stations of one monitoring well. Number of the monitoring wells in each station is shown in Table 1 and location of the groundwater stations in Figure 1. Figures 2-104 are hydrographs of piezometric levels showing the groundwater level changes at station numbers 01-103.

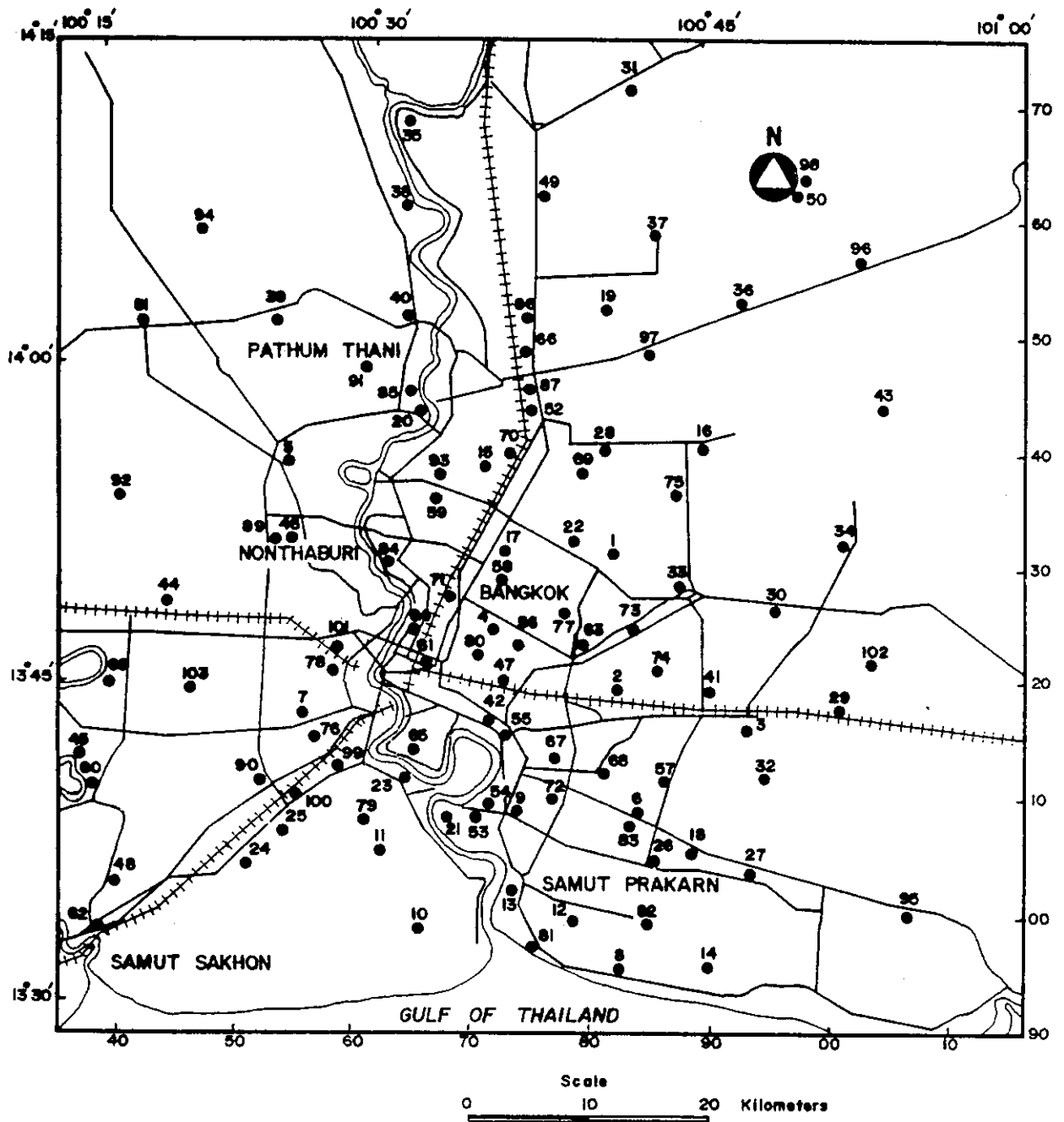


Figure 1. Location of the groundwater monitoring stations in Bangkok and adjacent provinces

Table 1. Monitoring Well Stations and Number

Station	Well No.	Station	Well No.
01	PD 08, NL 62, NB 05	26	PD 12, NL 37, NB 29
02	PD 05, NL 11, NB 08	27	PD 11, NL 43, NB 18
03	PD 38, NL 03, NB 09	28	NB 16
04	PD 07	29	PD 14, NL 81, NB 78
05	PD 55, NL 05, NB 04	30	PD 15, NL 84, NB 83
06	PD 03	31	PD 75, NL 13, NB 75
07	PD 06, NB 01	32	PD 13
08	PD 02, NL 55, NB 49	33	PD 40, NL 16, NB 46
09	PD 09	34	PD 85, NL 15, NB 82
10	PD 01, NL 67, NB 53	35	PD 68, NL 12, NB 69
11	PD 77, NL 04, NB 76	36	PD 72, NL 14, NB 73
12	PD 39, NL 50, NB 10, NB 41	37	PD 67, NL 76, NB 67
13	PD 22, NL 10, NB 30	38	PD 74, NL 78, NB 13
14	PD 78, NL 01, NB 77	39	PD 59, NL 71, NB 15
15	NB 03	40	PD 47, NL 65, NB 14
16	PD 51, NL 07, NB 07	41	PD 33, NL 47, NB 17
17	PD 28, NB 11	42	NL 17
18	NL 02	43	PD 64, NL 22
19	PD 42, NL 08, NB 06	44	PD 53, NL 68, NB 20
20	NL 09	45	NL 19
21	PD 46, NB 02	46	NL 20
22	PD 26, NL 06, NB 36	47	NL 25
23	PD 10	48	PD 52, NL 24, NB 60
24	PD 62, NL 18, NB 66	49	PD 76, NL 23, NB 52
25	PD 09	50	NL 21

Station	Well NO.	Station	Well No.
51	PD 58, NL 72, NB 19	78	PD 82, NL 57, NB 50
52	NL 26, NB 21	79	NL 58, NB 54
53	PD 16, NL 27, NB 31	80	PD 44, NL 59, NB 55
54	NL 28	81	PD 43, NL 60, NB 48
55	PD 24, NL 29, NB 22	82	PD 79, NL 61, NB 56
56	PD 20, NL 35, NB 23	83	NL 63, NB 57
57	PD 29, NL 30, NB 39	84	PD 45, NL 64, NB 58
58	NL 31	85	PD 48, NB 59
59	NL 41, NB 24	86	PD 65, NL 66, NB 67
60	PD 18, NL 32, NB 25	87	PD 49
61	PD 17, NL 34, NB 27	88	PD 54, NL 69, NB 61
62	PD 19, NL 33, NB 26	89	PD 56, NB 63
63	PD 21, NL 36, NB 28	90	PD 57, NL 70, NB 62
64	PD 25, NL 39, NB 32	91	PD 60, NL 74, NB 64
65	PD 23, NL 38, NB 33	92	PD 61, NL 73, NB 65
66	PD 50, NL 40, NB 34	93	PD 63
67	PD 27, NL 42, NB 35	94	PD 66, NL 75, NB 68
68	PD 30, NL 44, NB 37	95	PD 69, NL 77, NB 71
69	PD 32, NL 45, NB 38	96	PD 70, NL 79, NB 70
70	PD 31, NL 46, NB 40	97	PD 71, NL 80, NB 72
71	PD 34, NL 48, NB 42	98	PD 73, NB 74
72	PD 35, NL 49, NB 43	99	PD 80, NL 82, NB 79
73	PD 37, NL 51, NB 44	100	NL 86, NB 80
74	PD 36, NL 52, NB 45	101	PD 83, NL 83, NB 81
75	PD 84, NB 47, NL 54	102	PD 86, NL 85, NB 84
76	NL 53	103	PD 81, NL 87, NB 85
77	PD 41, NL 56, NB 51		

## GROUNDWATER LEVELS OF BANGKOK AND ADJACENT AREAS

The initial groundwater levels in Bangkok were very close to the ground surface and some wells were said to be artesian flowing. Since the large scale groundwater development in 1954, the groundwater levels started to decline. In 1959, the piezometric levels in wells tapping the Nakhon Luang aquifer at Sukumwit 65 near the eastern suburbs of Bangkok, were 4 meters from land surface, 5 meters at Sukumwit 23, 10 meters at Soi Chompon-Lad Phrao and the deepest in central Bangkok measured 12 meters at Wat Suthat. Several local cones of depression developed in area of heavy pumpage. By 1969, the deepest water level in central Bangkok was 24 meters from land surface; and in the eastern suburbs the water level was 12 meters at Phrakanong and 9 meters at Bangna. Small cones of depression coalesced to develop a single cone which was larger and deeper than those identified in 1959. The annual rate of water level decline during 1959-1969 was 1.2 meters in central Bangkok and 0.8 meter in the eastern suburbs (Ramnarong and Buapeng, 1991).

After 1967, heavy utilisation of groundwater started in the eastern Bangkok, more and more wells were installed in government and private sectors, and hence, more data on water well drilling and piezometric levels were obtained. By 1974, the lowest water levels in wells tapping Nakhon Luang aquifer in central Bangkok and eastern suburbs were 30 meters below land surface, and the same level was measured in a well tapping Phra Pradaeng aquifer (Ramnarong and Buapeng, 1991). Annual rates of water level decline in the Nakhon Luang aquifer during 1969-1974 were 3.6 meters in the eastern part of Bangkok and 1-2 meters in the central part. Table 2 lists the piezometric levels in Phra Pradaeng aquifer and annual rates of decline since 1959, and Table 3 shows the lowest piezometric levels in Nakhon Luang aquifer and its annual rates of decline.

Table 2. Lowest Piezometric Levels in Phra Pradaeng Aquifer and Annual Rates of Decline (after Ramnarong and Euapeng, 1991).

Year	Lowest Water Level (m)	Years Between	Annual Rate of Decline
1969	18	1969-1974	2.4
1974	30		
1979	40	1974-1979	2.0
1982	46	1979-1982	2.0

Table 3. Lowest Piezometric Levels in Nakhon Luang Aquifer and Annual Rates of Decline (after Ramnarong, 1983).

Year	Lowest Water Level (m)		Year Between	Annual Rate of Decline (m)	
	Central Bangkok	Eastern Bangkok		Central Bangkok	Eastern Bangkok
1959	12	4	1959-1969	1.2	0.8
1969	24	12			
1974	30	30	1969-1974	1.2	3.6
1979	49	49	1974-1979	3.8	3.8
1982	50	53	1979-1982	0.3	1.3

During 1954-1974, most wells were pumped from the Nakhon Luang and Phra Pradaeng aquifers. A 10-inch diameter well could be pumped at a rate of 200 cubic meters per hour. After 1974, with demand for higher yield increasing and yield of groundwater from the two aquifers decreasing, many wells were installed in the Deeper Nonthaburi aquifer. A Metropolitan Waterworks Authority well, with screen intervals in the Nakhon Luang and Nonthaburi aquifers, could be pumped at a rate of 300 cubic meters per hour.

In 1979, the water level was more than 40 meters below the land surface in the Phra Pradaeng aquifer, 49 meters in the Nakhon Luang aquifer and 46 meters in the Nonthaburi aquifer. Many cones of depression developed in areas of heavy pumpage.

Water-level declines were greatest in several intense cones of pumping drawdown in the Nakhon Luang and Nonthaburi aquifers in central, and eastern Bangkok. Increased groundwater development for industrial purposes, in the Samut Sakhon Province southwest of Bangkok, caused decline of water levels and some cones of depression were developed. Similar trends of water-level decline in the Nakhon Luang and Nonthaburi aquifers were observed, and the two aquifers were said to be "leaky"

By 1982, the lowest water levels in Phra Pradaeng aquifer in eastern Bangkok were 46 meters below the land surface with a 2 meter average annual rate of decline from 1979 to 1982. The lowest water levels in the Nakhon Luang aquifer went down to 50 meters in central Bangkok and 53 meters in the eastern suburbs.

The water levels in the Nakhon Luang aquifer declined 38 meters in central Bangkok and 49 meters in the eastern suburbs from 1959 to 1982. A decline of 28 meters was also observed in the Phra Pradaeng aquifer from 1969 to 1982 (Ramnarong and Buapeng, 1992).

It is obvious that at early stages of groundwater development for public supply, the water level was observed to be deeper in central Bangkok than in the eastern suburbs. Since 1969, the declining trend has reversed. Population and industrial growth have spread rapidly to the eastern part of Bangkok, and demand for water has increased accordingly. To meet the water requirements of this growing area, groundwater has been pumped in large quantity without any control, since it is the only source of water supply; this resulted in the higher rates of water-level decline.

#### RECOVERIES OF THE GROUNDWATER LEVELS

The implementation of the Remedial Measures on Mitigation of Groundwater Crisis and Land Subsidence in Bangkok became effective in 1983, which together with the 1985 step to charge groundwater fees from

users, had a marked effect on the groundwater pumpage in Bangkok and directly affected the water levels. The 53.5% decrease of MWA pumpage, mainly in the central part of Bangkok in critical zone no.2 and some parts of critical zone no.1 from 1982 to 1986, had caused a net decrease of the total pumpage in the control areas of the Remedial Measures by 13%. As a result, by mid 1983, the water-levels began to respond to the decrease in groundwater withdrawal as observed in the the rapid recovery of water levels in the three aquifers, as illustrated in hydrographs of water levels in the monitoring wells located at the central and eastern suburbs of Bangkok.

In central Bangkok, the public supply produced from surface water source replaced much of the groundwater pumpage resulting in an abrupt rise of the groundwater levels. For the Nakhon Luang aquifer, monitoring well NL17 (station 42) at the Bangkok Planetorium, Phra Kanong district, exhibited a level rise of 9 meters in 3.5 years, from 42 meters below land surface in mid 1983 to about 33 meters by the end of 1986.

The water level in monitoring well NL25 (station 47) at Wat Kunnathi Ruttharam, Huai Kwang district, located in critical zone no.1, was recorded at 54 meters in early 1981 and a recovery trend was observed. By 1986, the water level was as high as 37 meters from land surface, a recovery of 17 meters in 5 years.

In the eastern suburbs of Bangkok at the Bang Kapi district, the water levels continued to decline until early 1984 when public water supply the area, after which a recovery of water levels was observed. In well NL11 (station 2) tapping Nakhon Luang aquifer at the Bangkok Golf Course, Hua Mark, the water levels rose from 52 meters below land surface in early 1984 to 43 meters below land surface in early 1986, fluctuated from early 1986 to early 1987, then a steep decline was observed throughout the year. In well NL10 (station 13) at the Samut Prakarn Provincial Hall, the water level recovery of 5 meters was observed from early 1985 to early 1987, then the 1.2 meters decline was measured in 1987. Similar trends of water-level rise were also observed in wells PD5 and NB8 (station 2) tapping the Phra Pradaeng and Nonthaburi aquifers respectively, and located at the same well field of NL11.

From the hydrographs of water-levels in monitoring wells, it is obvious that the year 1985 represented a maximum rise in water levels in every aquifer. Water-level recovery, as high as 6.5 meters, occurred in well NL11 and well NB8 in 1985. Well NB11 (station 17) tapping the Nonthaburi aquifer at Wat Bang Bua, in the Bang Khen district north of Bangkok, an area reached by a supply of piped water earlier than in the eastern suburbs, which resulted in a rise of water level in the well from early 1983 to early 1987, then a decline was observed.

The water levels in Phra Pradaeng aquifer in well PD7 (station 4) at Phibun Uppatham School, Lad Phrao, exhibited a steep rise from mid-1983 through the end of 1986. Since most wells along the Lad Phrao road of the Bang Kapi district pumped water from the Nakhon Luang and the Nonthaburi aquifers, and are located at some distance from the center of the steep cone of depression of the Phra Pradaeng aquifer in the Phra Pradaeng district, the water levels rose to 23.5 meters from land surface by the end of 1986.

Although the groundwater crisis in the critical zones no.1 and no.2 have been improved, in the outskirts of Bangkok water levels continued to decline, particularly in Nakhon Luang aquifer in the Bang Pli district on the eastern part of Bangkok, and in the Samut Sakhon province on the southwestern part of Bangkok, where housing development and industrial activity have been growing. Station 18 shows a hydrograph of water levels in well NL2 at the Phun Charoen Wittaya School, Bang Pli district, in which a continuous decline of water levels was observed until mid 1984, rose one meter by the end of 1986, and declined steeply again in 1987. Station 48 shows a continuous declining trend of water levels since recording commenced in 1980 in well NL24 at Wat Bang Ping, Muang Samut Sakhon. Water levels in well NL24 decreased from 27.3 meters in mid 1980 to 43 meters by early 1993, an average annual decline of 1.2 meters.

Average water levels in the critical zones no.1 and no.2 during 1983-1986 showed a general cessation of the downward trend noted in prior years. This marked change in water level trend had a significant beneficial effect on the rate of land subsidence.

## DOWN TRENDS OF WATER LEVELS

Water-level recovery in the critical zones was observed from 1980 to 1986, however, water-levels have declined since the beginning of the 1987. The hydrographs of almost every wells show the water-level decline since early 1987. The reason for the declining water-level phenomena was the increased total pumpage. Groundwater extraction for public supply in 1987 by MWA, instead of decreasing as in the prior years, increased 7.1% from the rate of pumping in 1986. The private pumpage in the control areas in the 4 provinces (Bangkok, Samut Prakan, Nonthaburi and Pathumthani) in 1987 increased from 1986. Thus, the total pumpage in 1987 was increased from the rate of extraction in 1986. As a result, the water levels in the three aquifers began to respond to the increased pumpage and a rapid decline of water levels in most wells was observed.

From 1986 to 1987, the Phra Pradaeng aquifer, the water levels declined 1-1.5-meters in Bangkok and its suburbs. For the Nakhon Luang aquifer, a slight decline of water levels was observed in central Bangkok at DMR's compound-Phayathai district, and a slight increase in water levels was noted in Phrakanong and Lad Phrao. The decline of water levels during the same period in the eastern suburbs at the Poo Chao Saming Prai industrial area was 2.4 meters; even heavier 2.6 meter declines of water levels were observed in Muang Samut Sakhon and 4 meters in the Krathum Ban district. The water levels in the Nonthaburi aquifer showed similar trends to those in the Nakhon Luang aquifer due to their "leaky" behavior. In central Bangkok, water levels in the Nonthaburi aquifer were slightly declined to slightly increased, declined 1-2 meters in eastern Bangkok, and a heavy decline in the ranging from 2.2 to 3.8 meters, was observed in the Samut Sakhon industrial area in 1987.

The present rates of groundwater extraction in the outskirts of Bangkok such as Lam Lukka, Lat Krabang, Min Buri, Bang Pli, some districts of Samut Sakhon and Pathum Thani, where no surface water supply existed and more large wells were being drilled for industrial use, is excessive. Consequently, the piezometric levels particularly in the Nakhon Luang aquifer dropped significantly. The piezometric levels in monitoring well NL7 (station 16) of Wat Nang Khan Chantri, Lam Lukka measured in May 1994,

was 58.55 meters below land surface, in monitoring well NL84 (station 30) at Wat Mai Lomnok Khwaek, Min Buri, was 61.30 meters, and in monitoring well NL33 (station 62) at Samut Sakhon Provincial Hall, the piezometric level was 70.15 meters.

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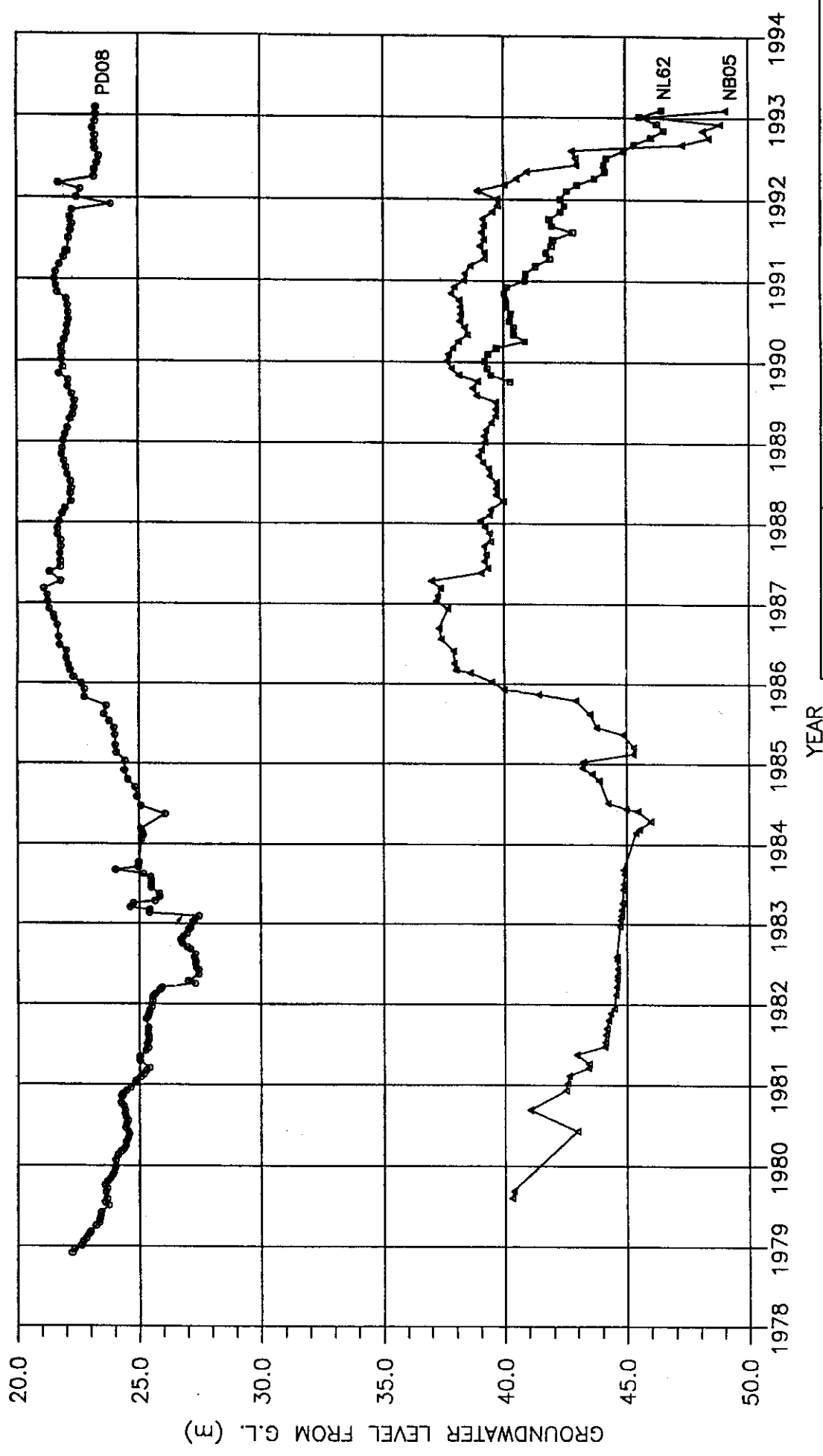


Figure.2 GROUNDWATER LEVEL CHANGES AT STATION NO. 01

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

LOCATION : Wat Khu Bon  
 Tambon : Bang Chan  
 Amphoe : Min Buri  
 Changwat : Bangkok  
 UTM Grid : 810318

SCREEN DEPTH

PD08 : 90.0-96.0m  
 NL62 : 154.0-160.0m  
 NB05 : 183.0-189.0m

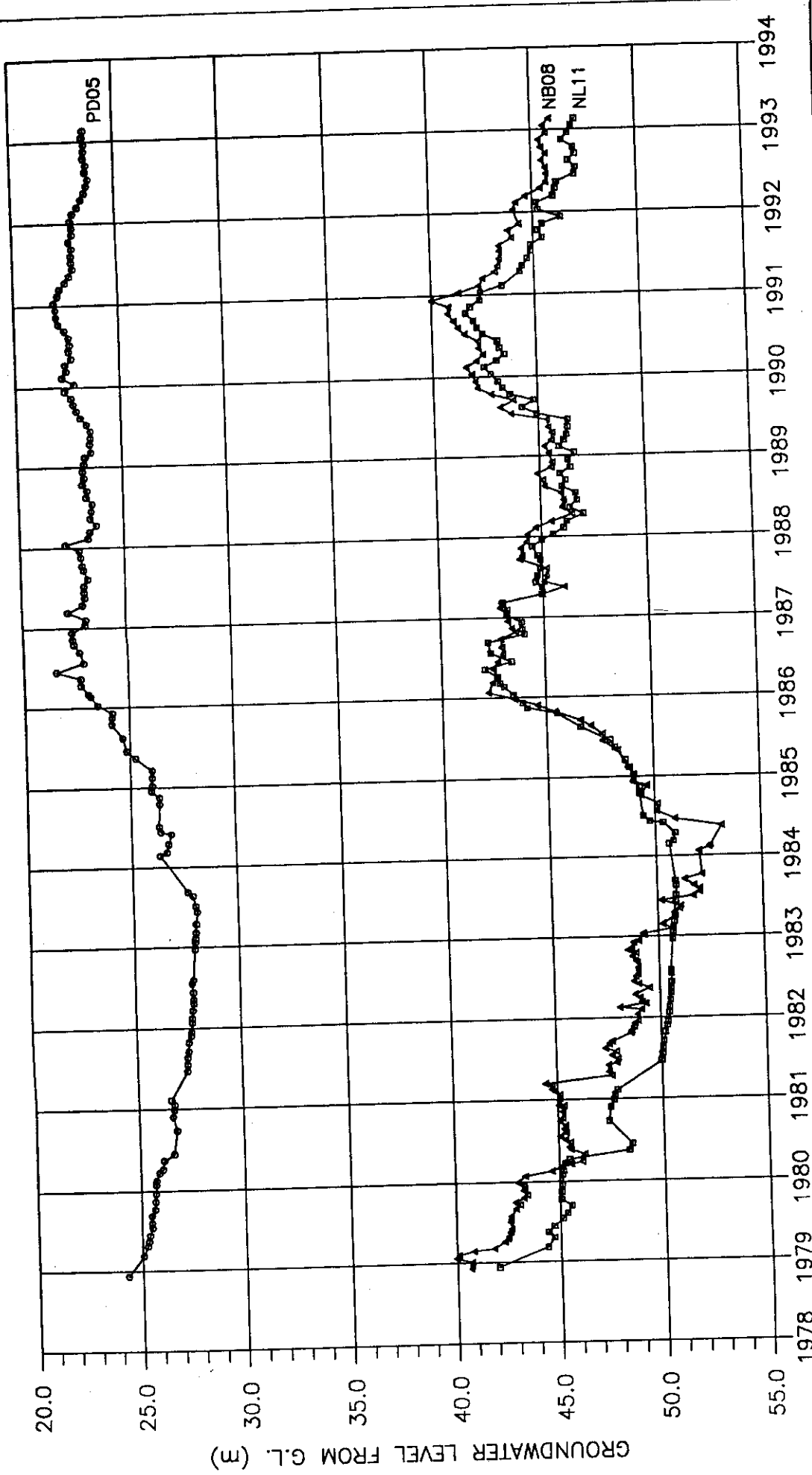


Figure. 3

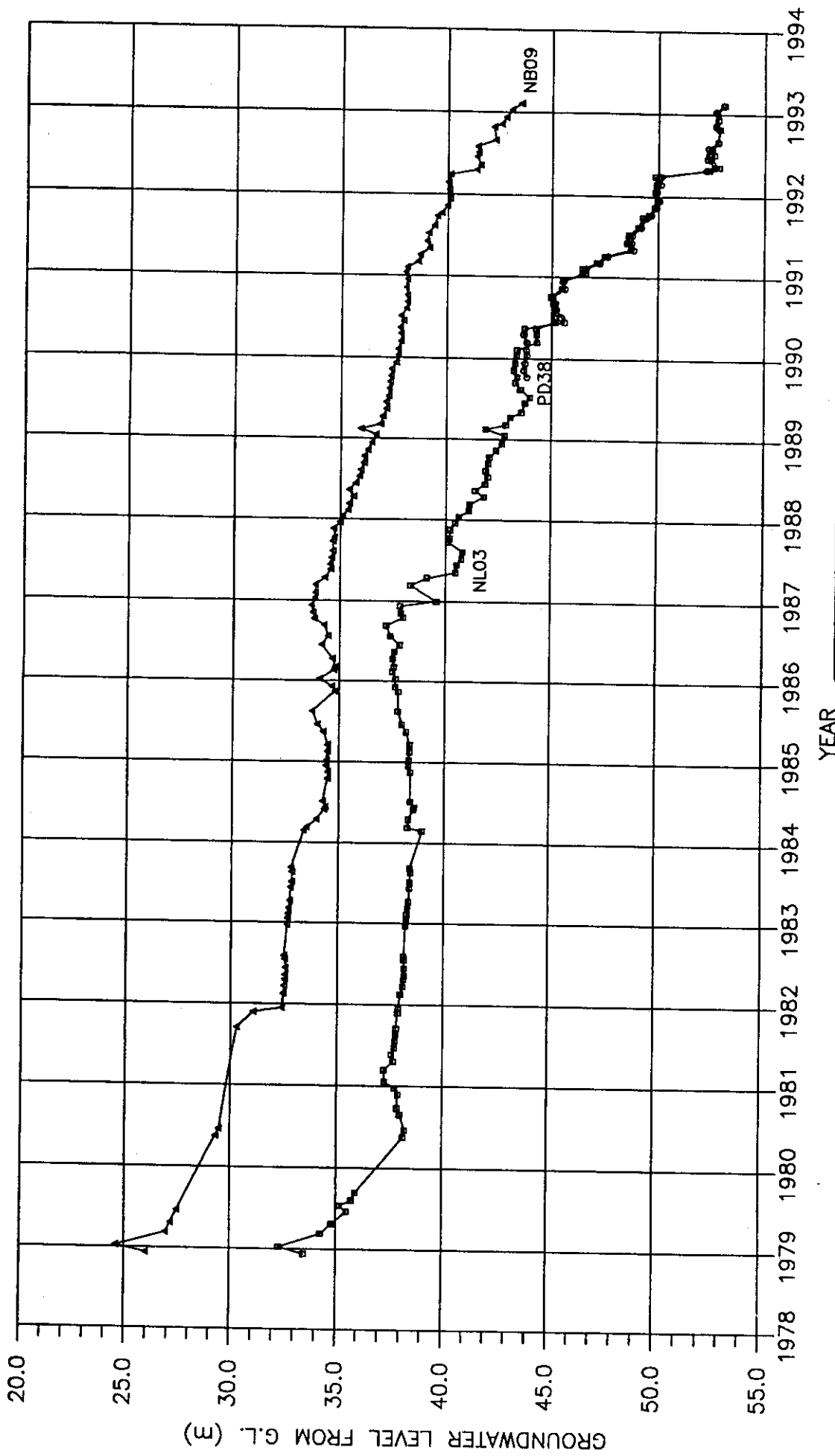
GROUNDWATER LEVEL CHANGES  
AT STATION No. 02

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE  
IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

LOCATION : Bangkok Golf Course  
 Tambon : Hua Mak  
 Amphoe : Bang Kapi  
 Changwat : Bangkok  
 UTM Grid : 801199

SCREEN DEPTH  
 PD05 : 91.5-97.5m  
 NL11 : 129.0-135.0m  
 NB08 : 180.0-186.0m



YEAR

SCREEN DEPTH  
 PD38 : 103.0-109.0m  
 NLO3 : 144.0-150.0m  
 NB09 : 186.3-192.3m

LOCATION : Wat Hua Khu Wanaram  
 Tambon : Sisa Charokhe Noi  
 Amphoe : Bang Phli  
 Changwat : Samut Prakan  
 UTM Grid : 936156

Figure. 4 GROUNDWATER LEVEL CHANGES AT STATION No. 03

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

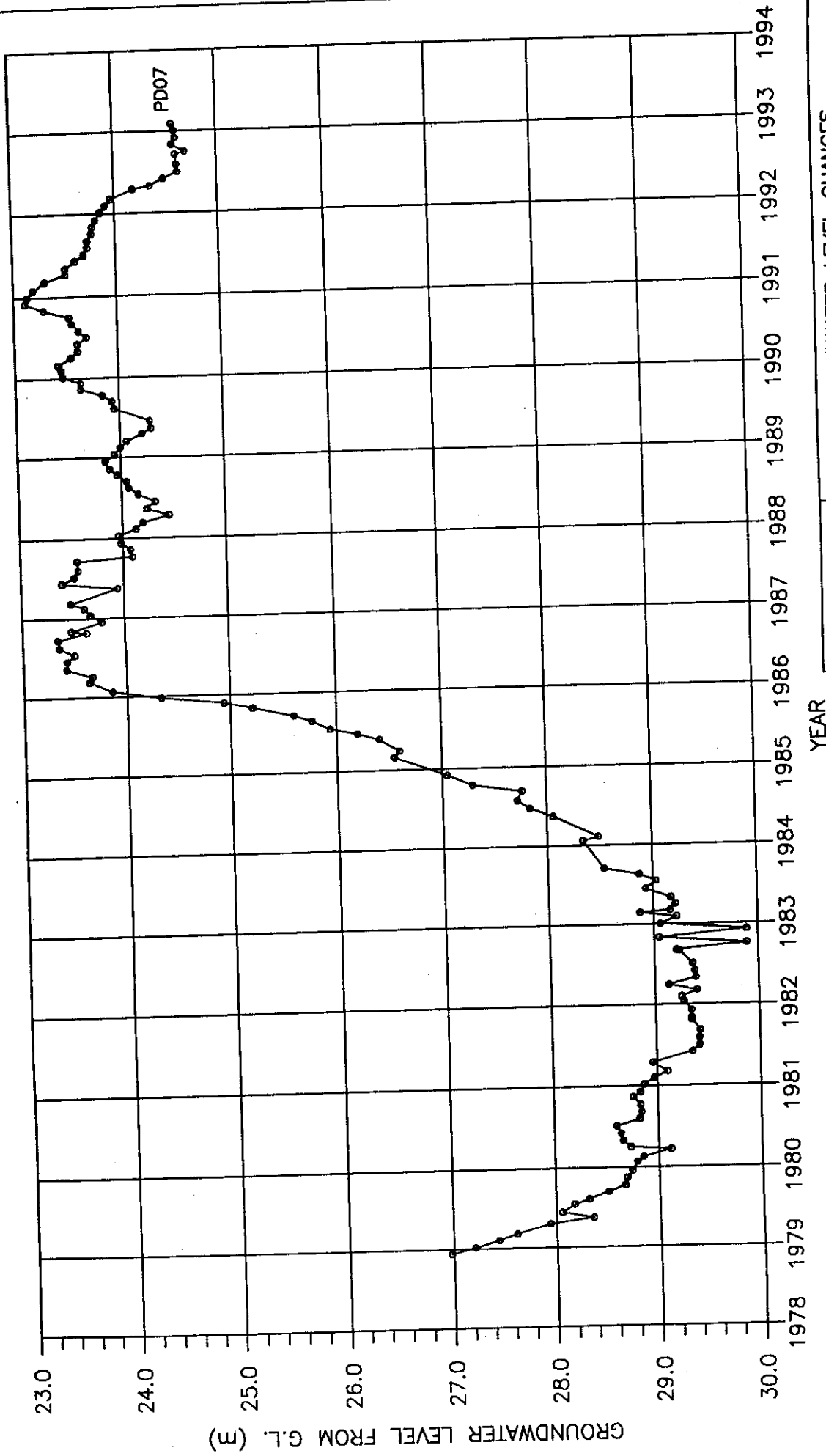


Figure. 5 GROUNDWATER LEVEL CHANGES AT STATION No. 04

LOCATION : Phibun Uppatham School  
 Tambon : Lat Phrao  
 Amphoe : Bang Kapi  
 Changwat : Bangkok  
 UTM Grid : 721255

SCREEN DEPTH PD07 : 92.1 - 98.1 m

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

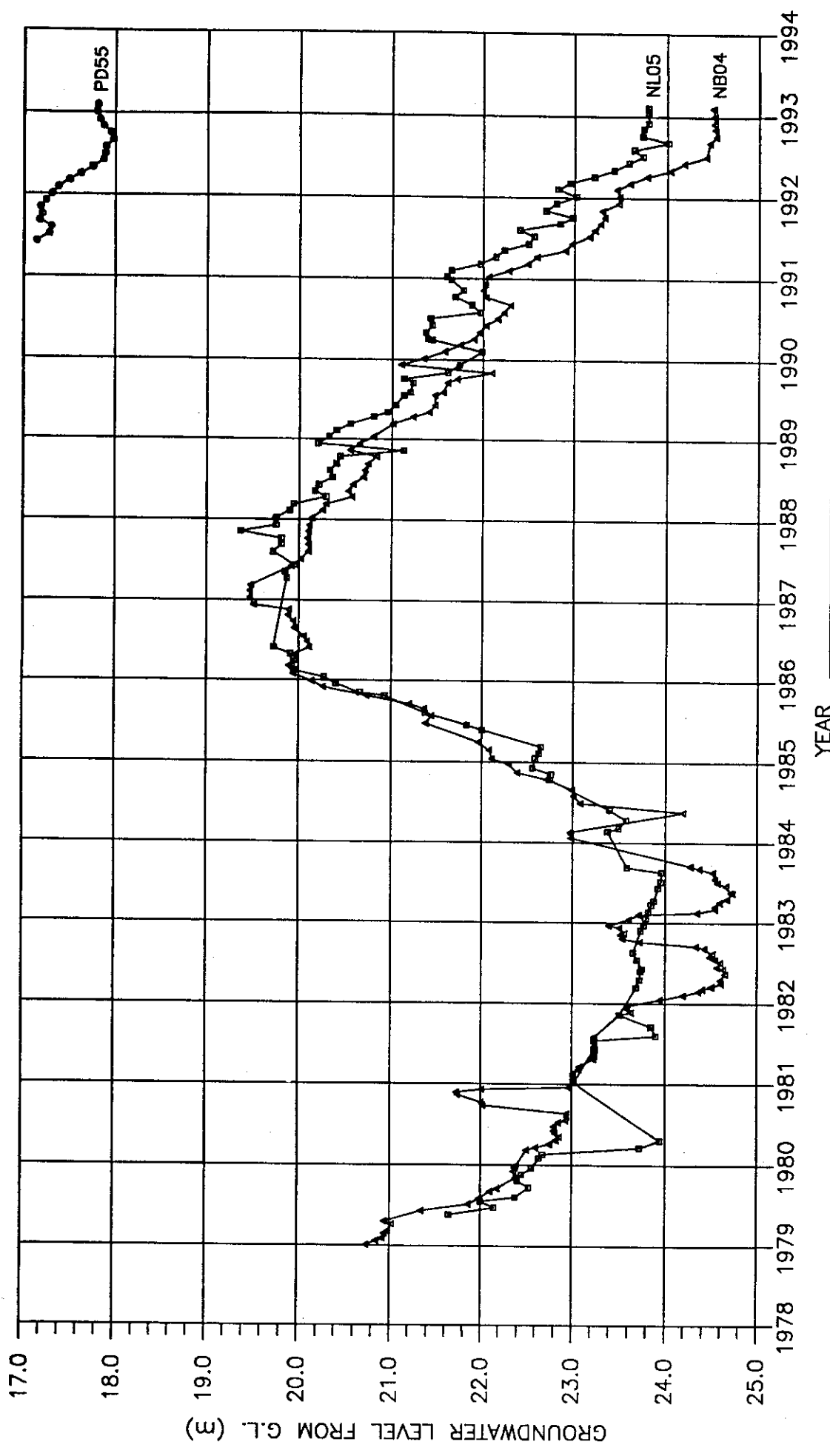


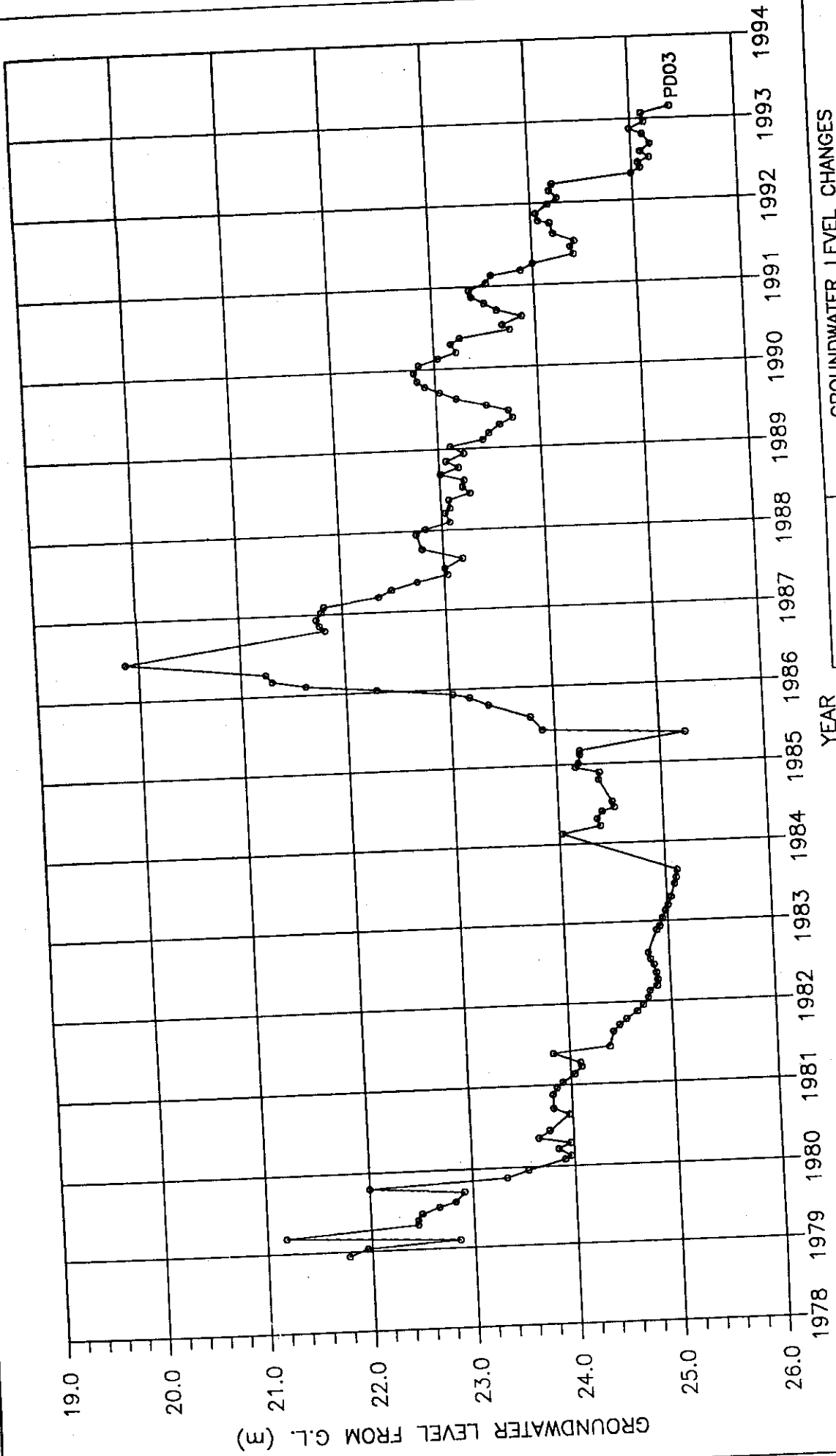
Figure. 6 GROUNDWATER LEVEL CHANGES AT STATION No. 05

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

LOCATION : Wat Lahan Tambon : Sano Loi Amphoe : Bang Bua Thong Changwat : Nonthaburi UTM Grid : 543385

SCREEN DEPTH : PD55 : 98.0-104.0m NL05 : 168.0-174.0m NB04 : 213.0-219.0m



YEAR

SCREEN DEPTH

PD03 : 79.5 - 85.5 m

LOCATION : Wat Khlong Salut  
 Tambon : Bang Phli Yai  
 Amphoe : Bang Phli  
 Changwat : Samut Prakan  
 UTM Grid : 838092

Figure. 7 GROUNDWATER LEVEL CHANGES AT STATION No. 06

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

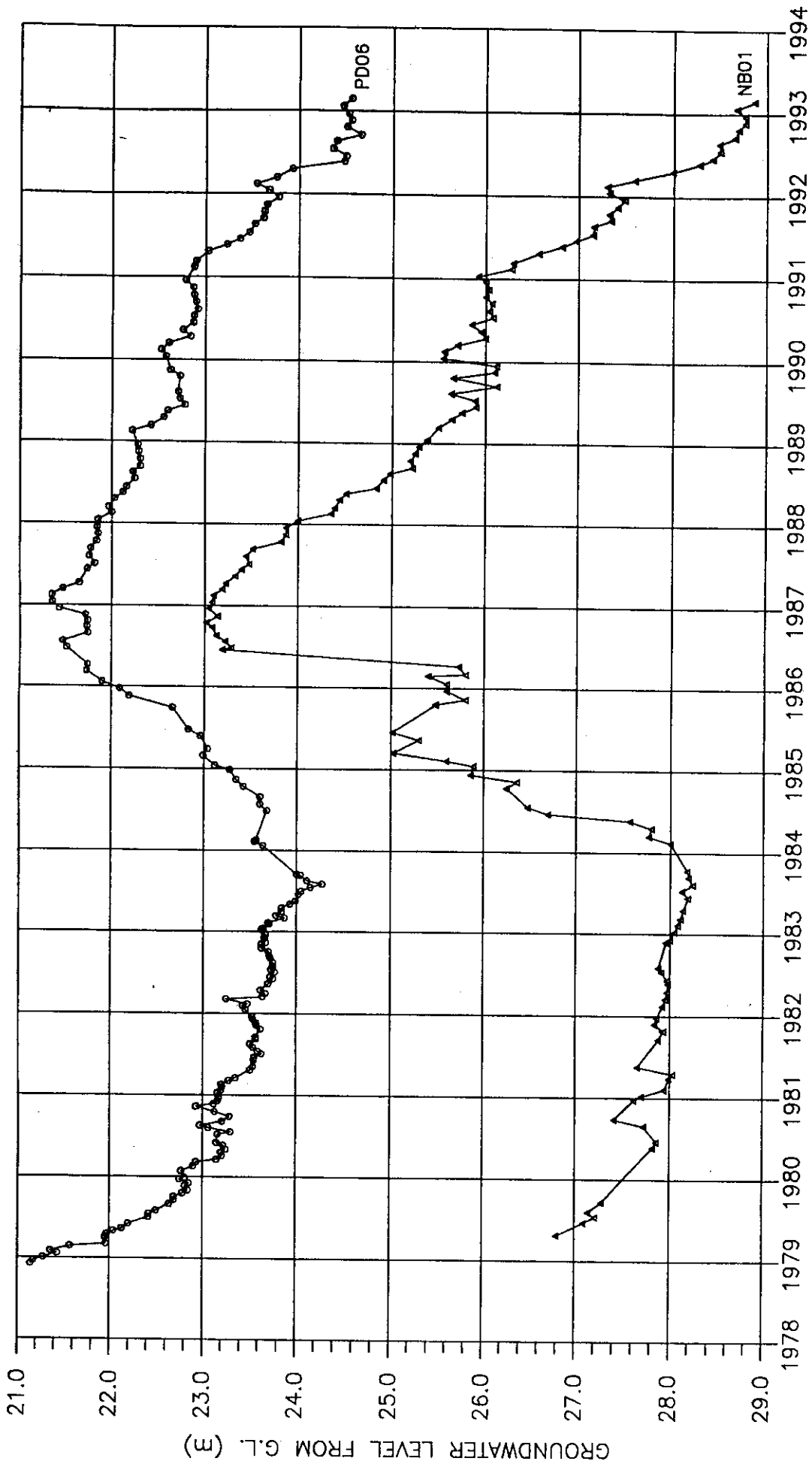


Figure. 8

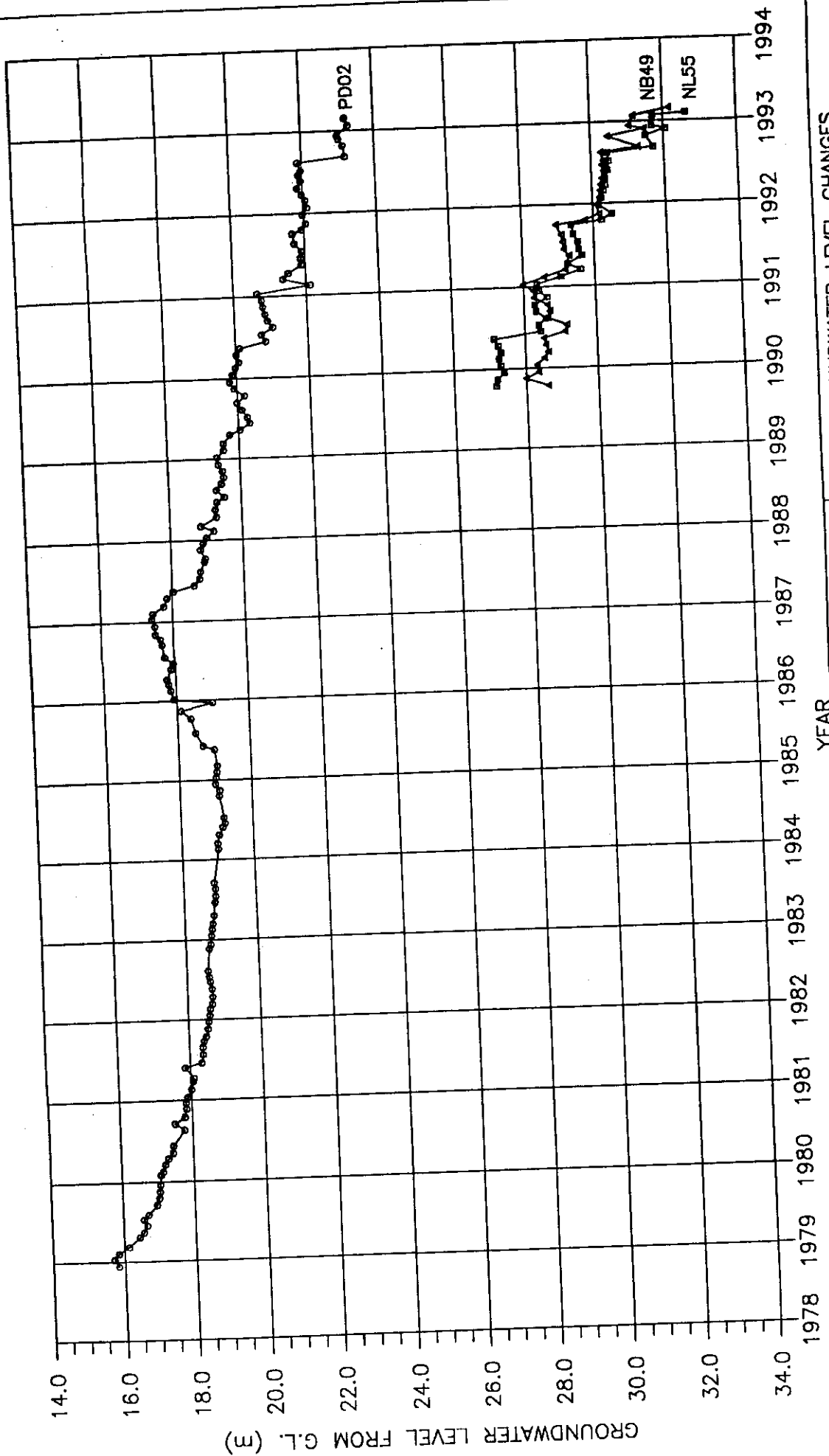
GROUNDWATER LEVEL CHANGES  
AT STATION No. 07

SCREEN DEPTH  
PD06 : 88.6 - 94.6m  
NB01 : 192.6 - 198.6m

LOCATION : Wat Chan Pradittharam  
Tambon : Bang Duan  
Amphoe : Phasi Charoen  
Changwat : Bangkok  
UTM Grid : 562168

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE  
IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES



LOCATION : Wat Tamru  
 Tambon : Bang Pu Mai  
 Amphoe : Muang Samut Prakan  
 Changwat : Samut Prakan  
 UTM Grid : 825947

SCREEN DEPTH  
 PD02 : 87.1-93.1m  
 NL55 : 151.0-157.0m  
 NB49 : 196.0-202.0m

Figure.9 GROUNDWATER LEVEL CHANGES AT STATION No. 08

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE  
 IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)  
 DEPARTMENT OF MINERAL RESOURCES

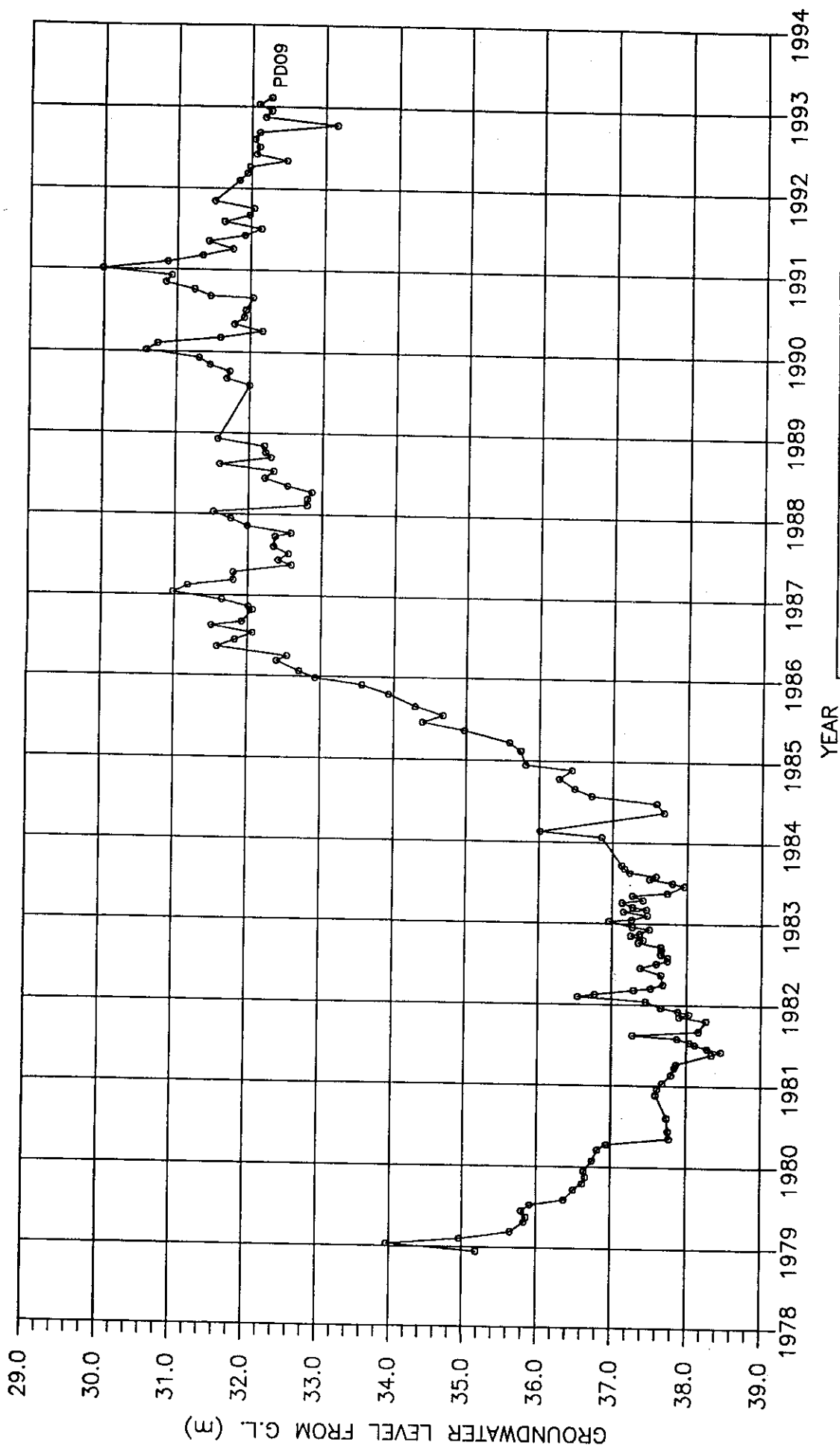


Figure.10 GROUNDWATER LEVEL CHANGES AT STATION No. 09

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

LOCATION : Wat Dan Samrong  
 Tambon : Samrong Nua  
 Amphoe : Muang Samut Prakan  
 Changwat : Samut Prakan  
 UTM Grid : 733090

SCREEN DEPTH PD09 : 96.0-102.0 m

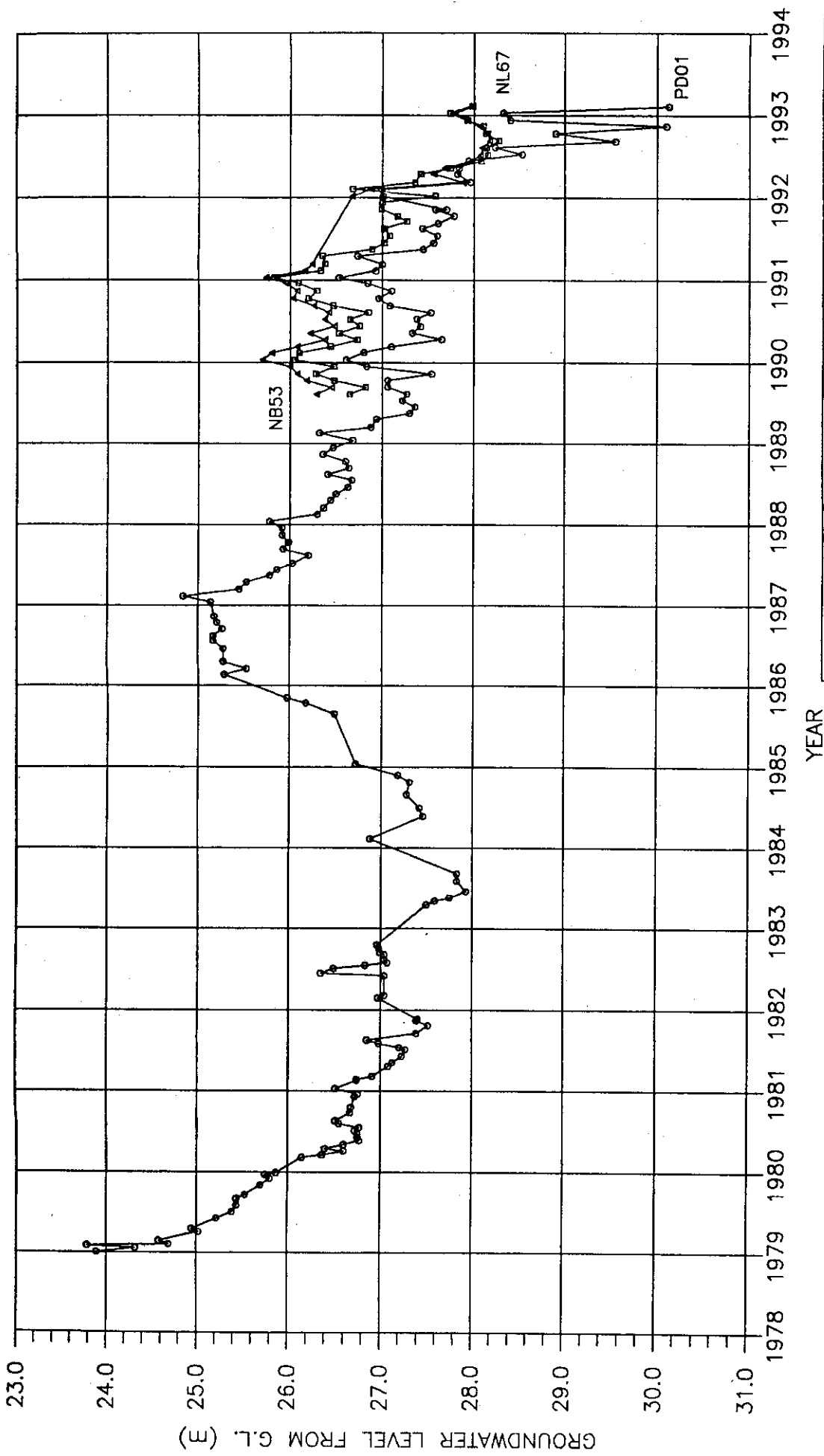


Figure. 11 GROUNDWATER LEVEL CHANGES AT STATION No. 10

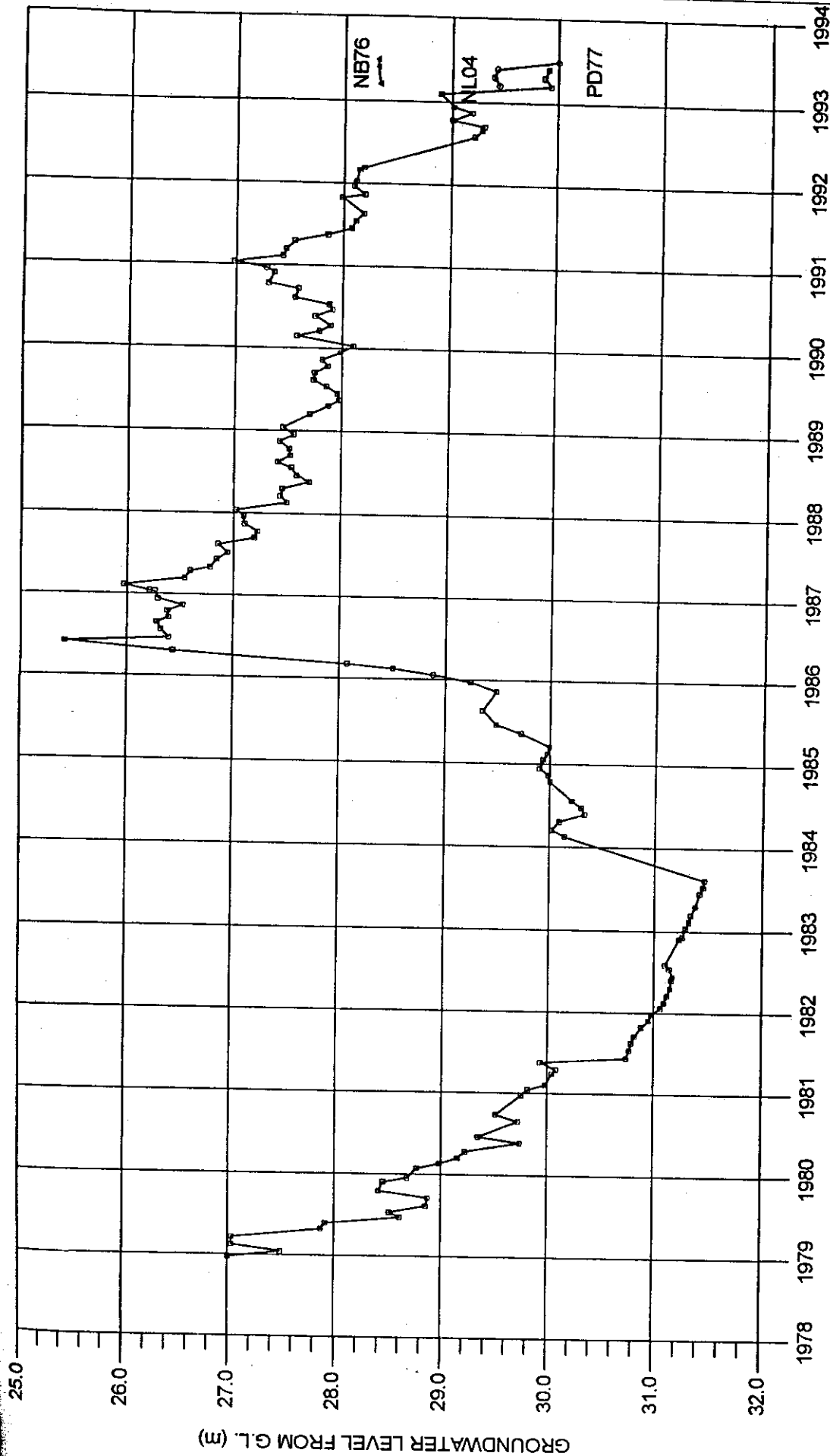
MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

LOCATION : Wat Khu Sang  
 Tambon : Nai Khlong Bang Pla Kot  
 Amphoe : Phra Samut Chedian  
 Changwat : Samut Prakan  
 UTM Grid : 660007

SCREEN DEPTH  
 PD01 : 97.7-103.7m  
 NL55 : 130.0-136.0m  
 NB49 : 178.0-184.0m

YEAR



LOCATION : Wat Thung Khru  
 Tambon : Thung Khru  
 Amphoe : Rat Burana  
 Changwat : Bangkok  
 UTM Grid : 636058

SCREEN DEPTH  
 PD77 : 88.0-94.0m  
 NL04 : 149.6-155.6m  
 NB76 : 210.0-216.0m

YEAR

Figure. 12 GROUNDWATER LEVEL CHANGES AT STATION No. 11

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

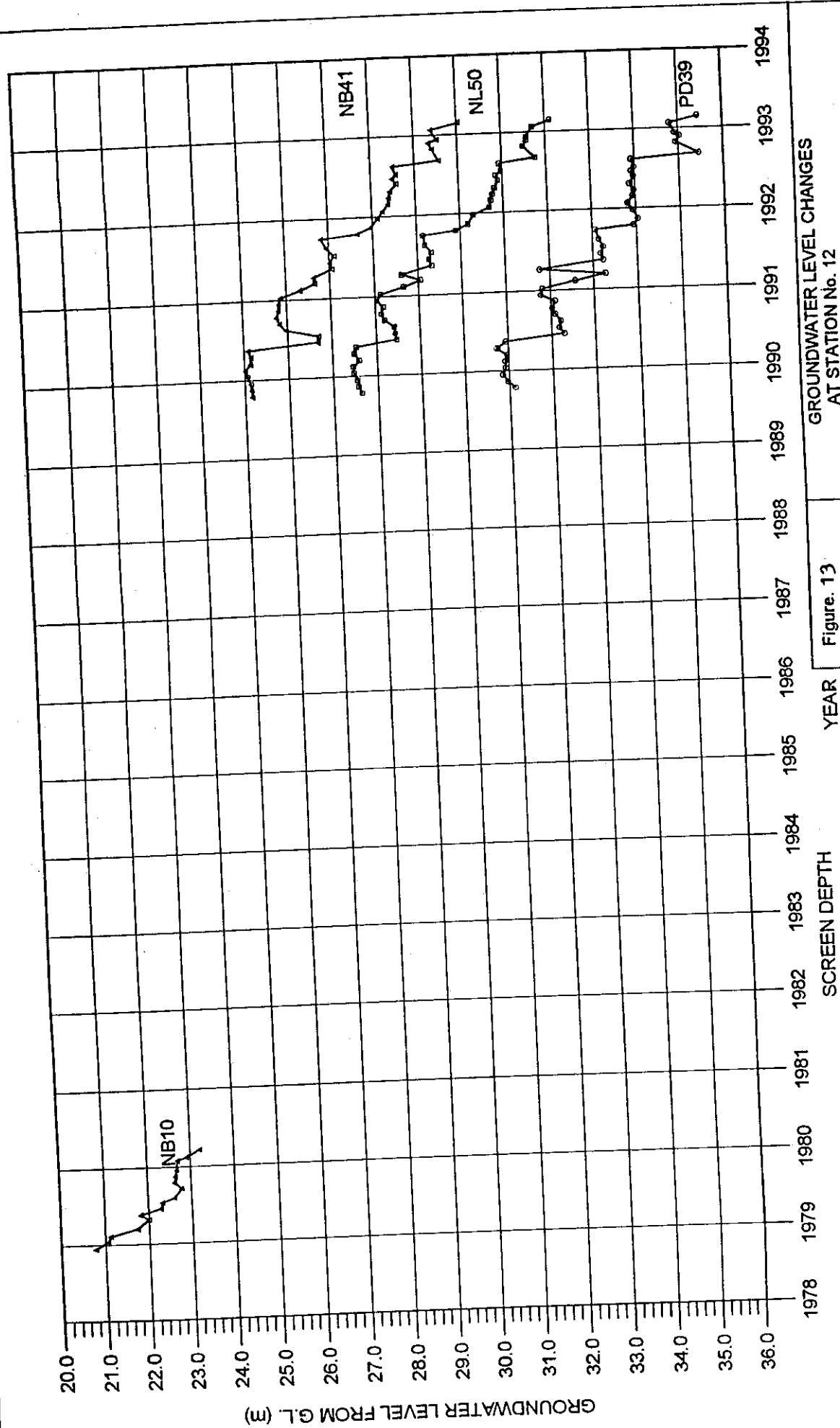
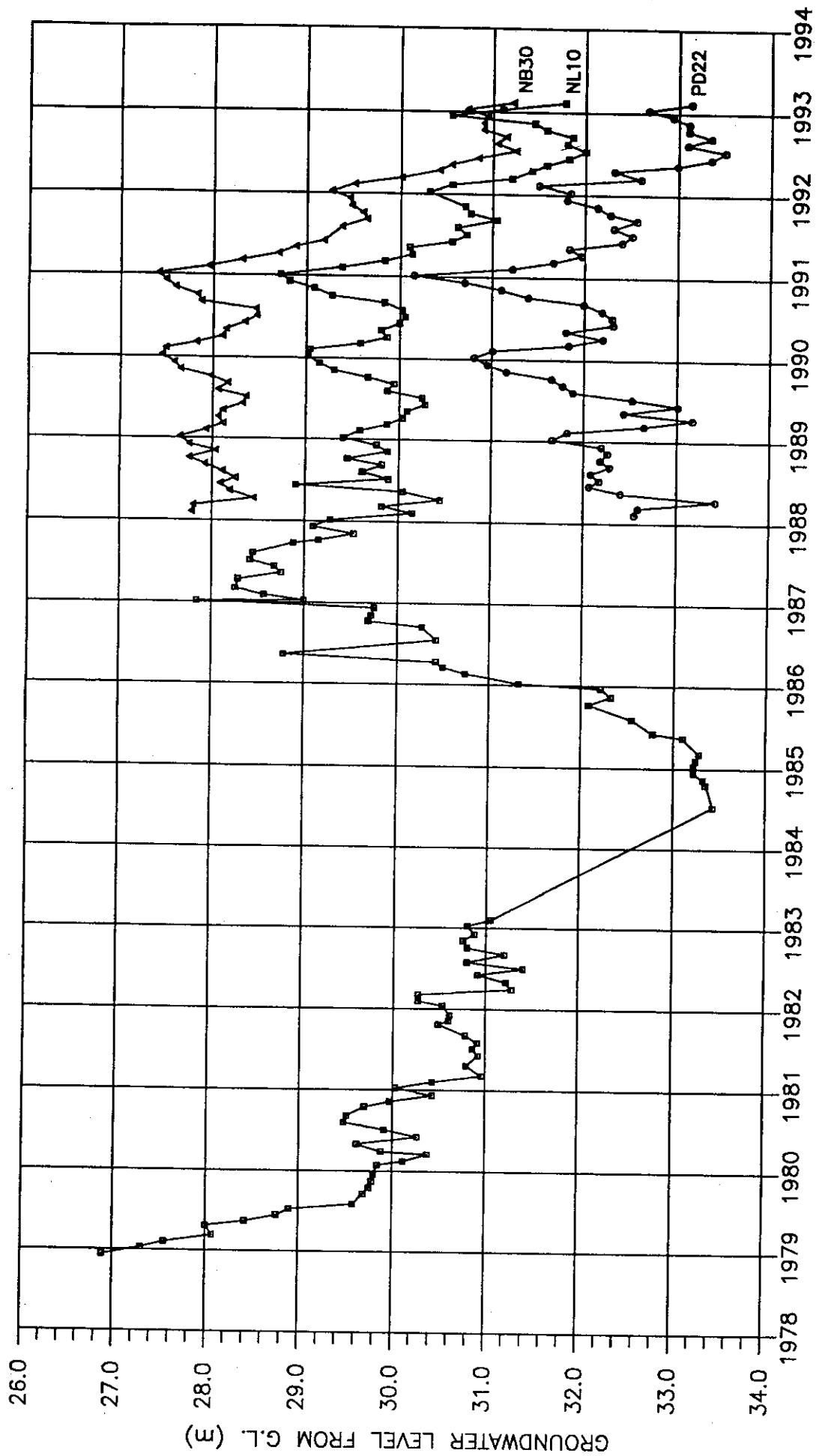


Figure. 13  
GROUNDWATER LEVEL CHANGES  
AT STATION No. 12

LOCATION : Wat Phraek Sa  
 Tambon : Phraek Sa  
 Amphoe : Muang Samut Prakan  
 Changwat : Samut Prakan  
 UTM Grid : 777007

PD39 : 126.0-132.0m  
 NL50 : 168.0-174.0m  
 NB10 : 195.35-201.35m  
 NB41 : 212.0-218.0m

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE  
 IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)  
 DEPARTMENT OF MINERAL RESOURCES



YEAR

SCREEN DEPTH

PD22 : 133.0-139.0m  
 NL10 : 170.9-176.9m  
 NB41 : 208.0-214.0m

LOCATION : Provincial Hall  
 Tambon : Pak Nam  
 Amphoe : Muang Samut Prakan  
 Changwat : Samut Prakan  
 UTM Grid : 731039

Figure 14 GROUNDWATER LEVEL CHANGES AT STATION No. 13

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

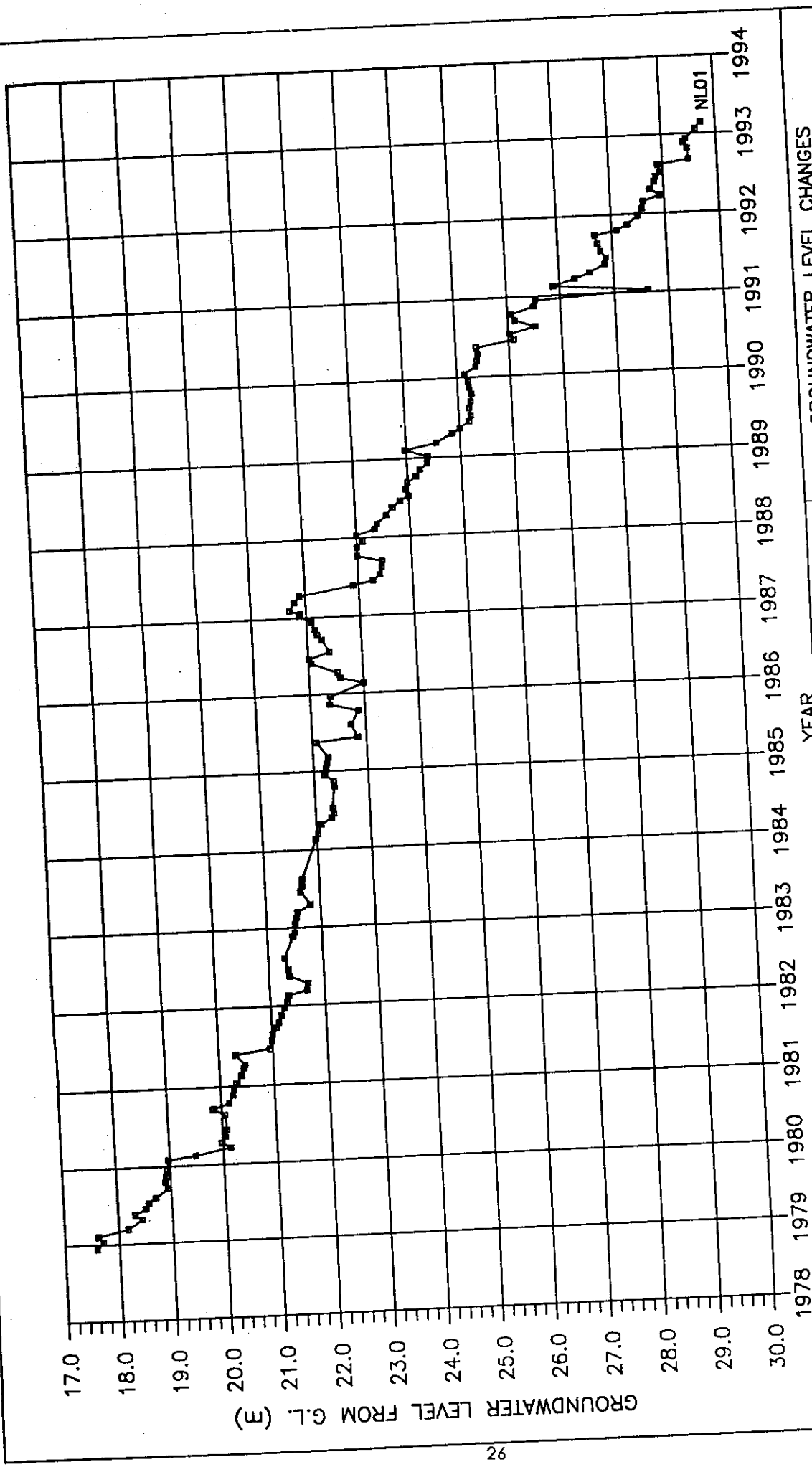


Figure.15 GROUNDWATER LEVEL CHANGES AT STATION No. 14

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

SCREEN DEPTH  
 NL01 : 140.0-146.0m.

LOCATION : Aeronautical Station  
 Tambon : Bang Pu Mai  
 Amphoe : Muang Samut Prakan  
 Changwat : Samut Prakan  
 UTM Grid : 906949

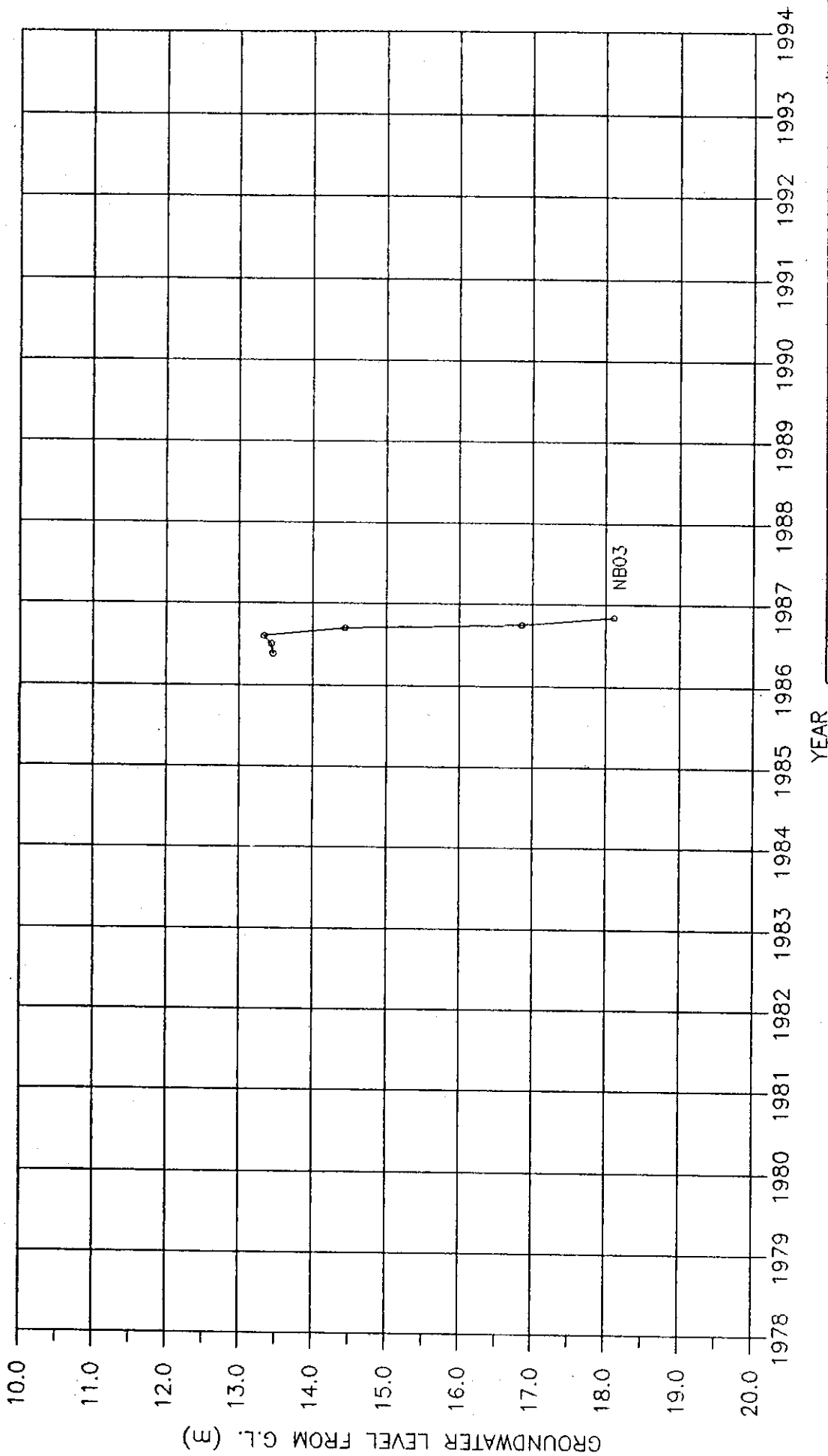


Figure.16 GROUNDWATER LEVEL CHANGES AT STATION No. 15

LOCATION : Wat Weru Wanaram  
 Tambon : Thung Song Hong  
 Amphoe : Bang Khen  
 Changwat : Bangkok  
 UTM Grid : 697386

SCREEN DEPTH  
 NB03 : 204.5-210.5m

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

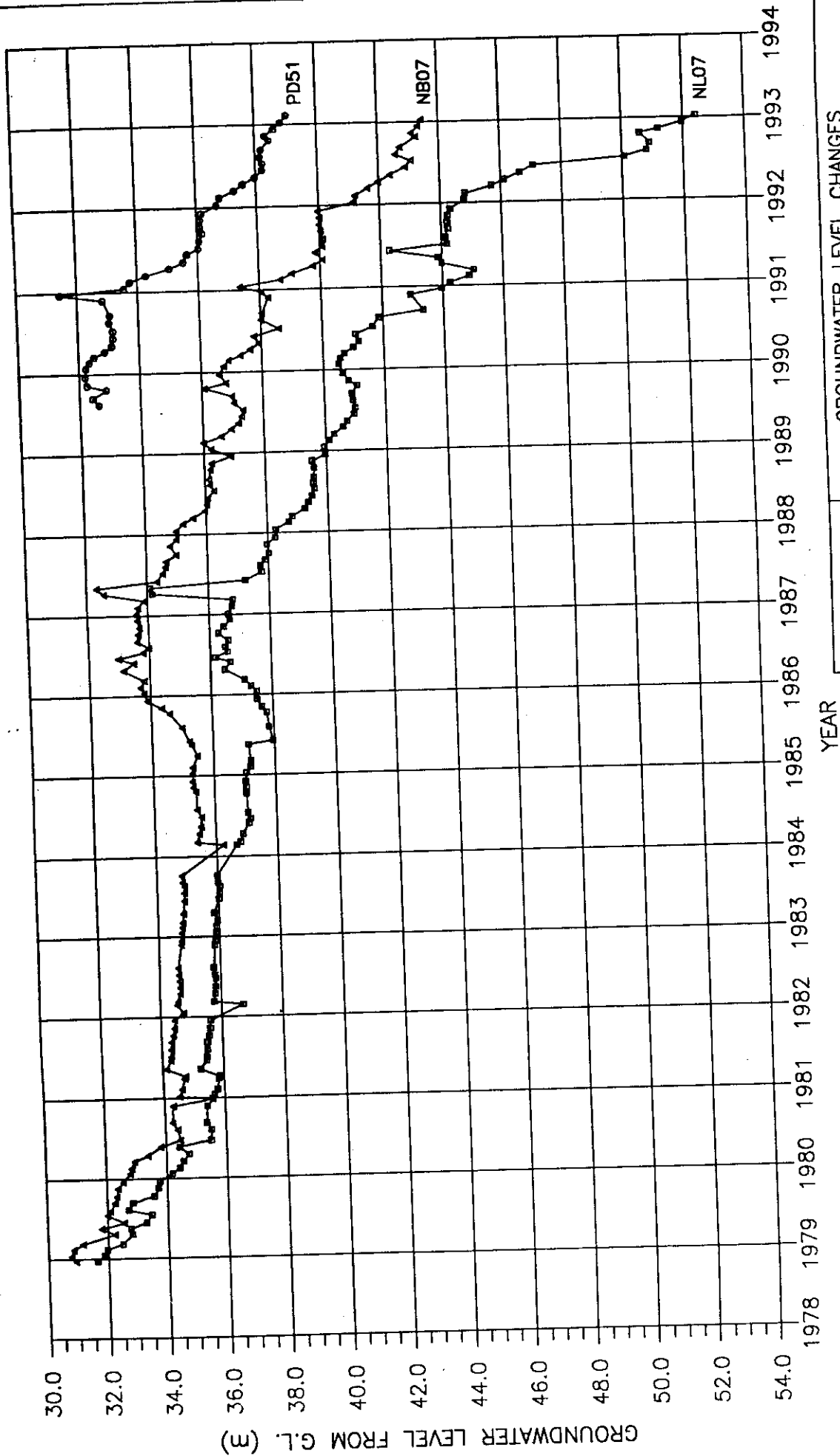


Figure.17

YEAR

SCREEN DEPTH

LOCATION : Wat Nang Khan Chantri

Tambon : Bung Kham Phroi

Amphoe : Lam Luk Ka

Changwat : Pathum Thani

UTM Grid : 891407

PD51 : 109.0-115.0m

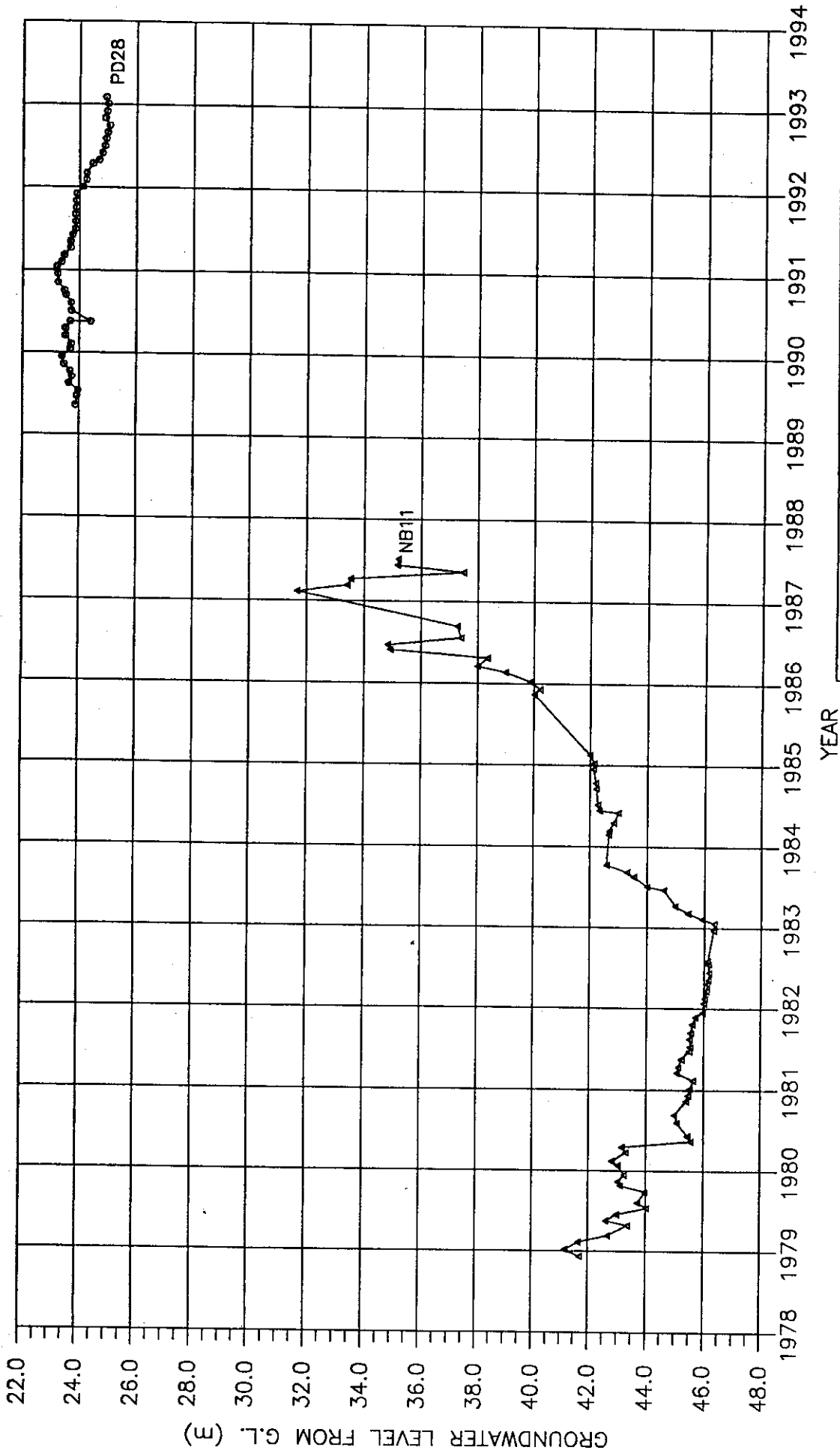
NL07 : 140.5-146.5m

NB07 : 171.0-177.0m

GROUNDWATER LEVEL CHANGES  
AT STATION No. 16

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE  
IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES



LOCATION : Wat Bang Bua  
 Tambon : Anusawari  
 Amphoe : Bang Khen  
 Changwat : Bangkok  
 UTM Grid : 719319

SCREEN DEPTH  
 PD28 : 94.0-100.0m  
 NB11 : 186.2-192.2m

Figure.18 GROUNDWATER LEVEL CHANGES AT STATION No. 17

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

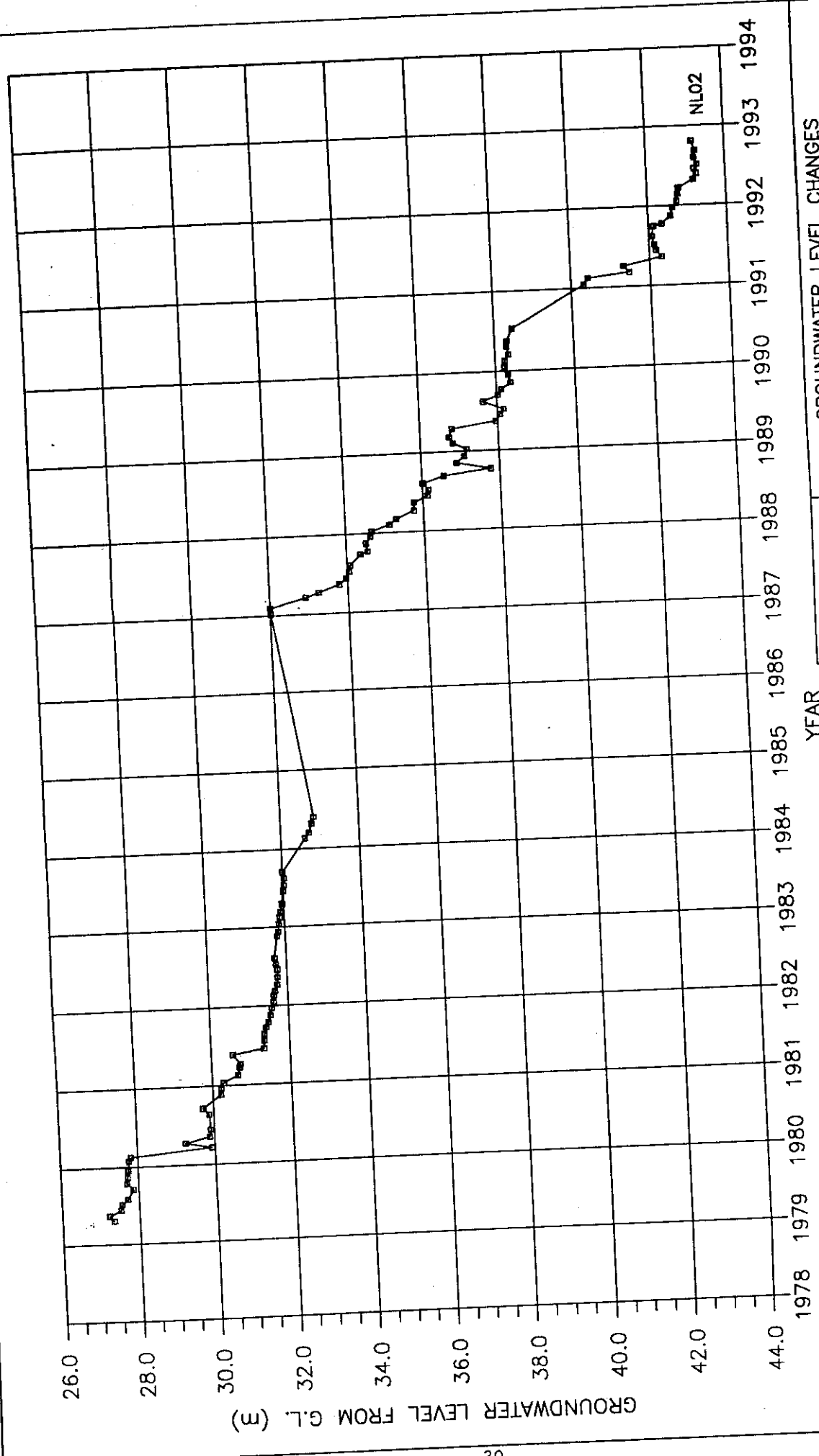


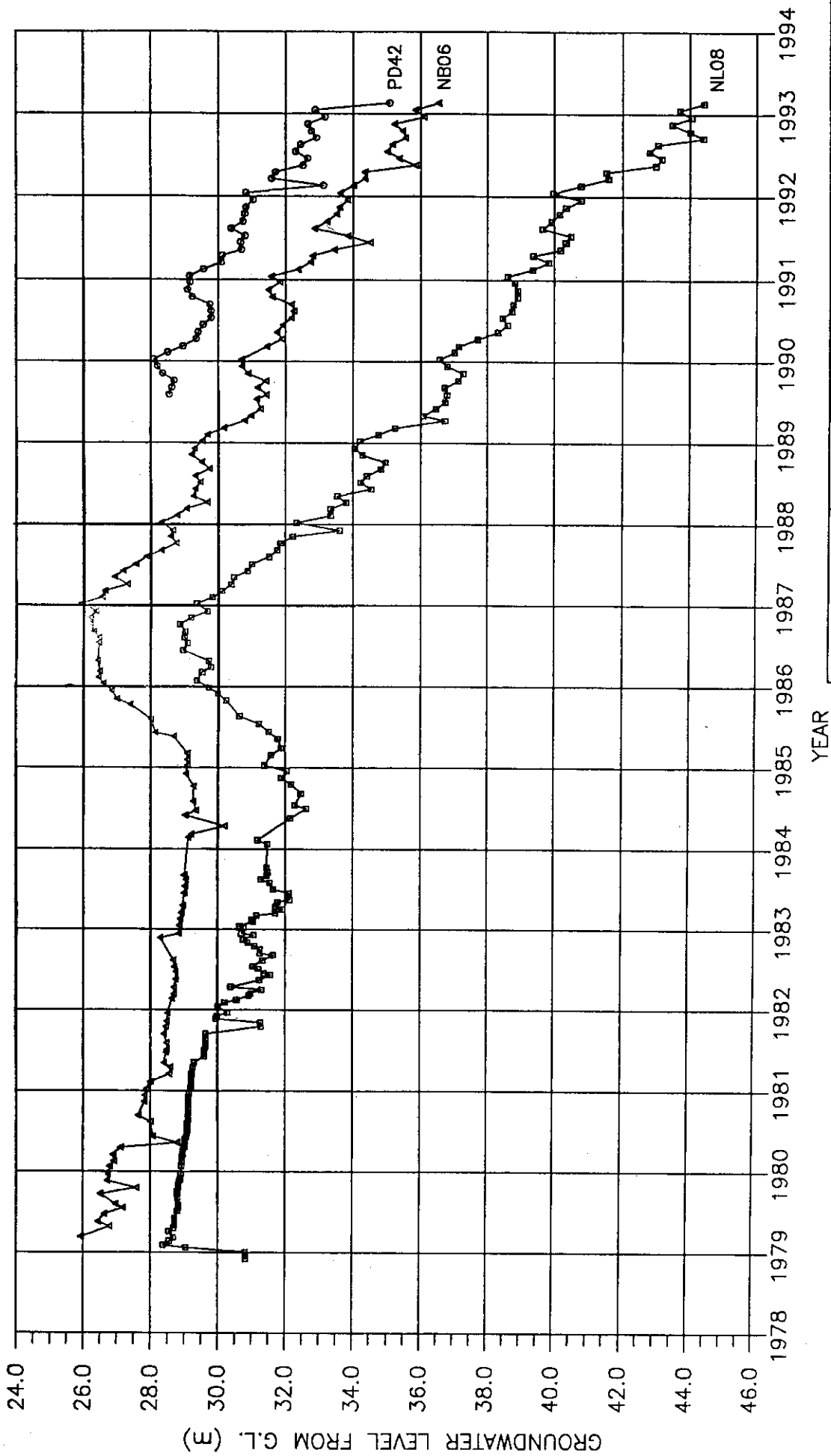
Figure.19 GROUNDWATER LEVEL CHANGES AT STATION No. 18

LOCATION : Phun Charoen School  
 Tambon : Bang Chalong  
 Amphoe : Bang Phli  
 Changwat : Samut Prakan  
 UTM Grid : 888056

SCREEN DEPTH  
 NL02 : 140.0-146.0 m

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE  
 IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES



LOCATION : Wat Kla Cha-um  
 Tambon : Khlong Song  
 Amphoe : Khlong Luang  
 Changwat : Pathum Thani  
 UTM Grid : 778520

SCREEN DEPTH  
 PD42 : 107. 0-113. 0m  
 NL08 : 122. 3-128. 3m  
 NB06 : 186. 2-192. 2m

Figure.20  
 GROUNDWATER LEVEL CHANGES  
 AT STATION No. 19

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDIENCE  
 IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

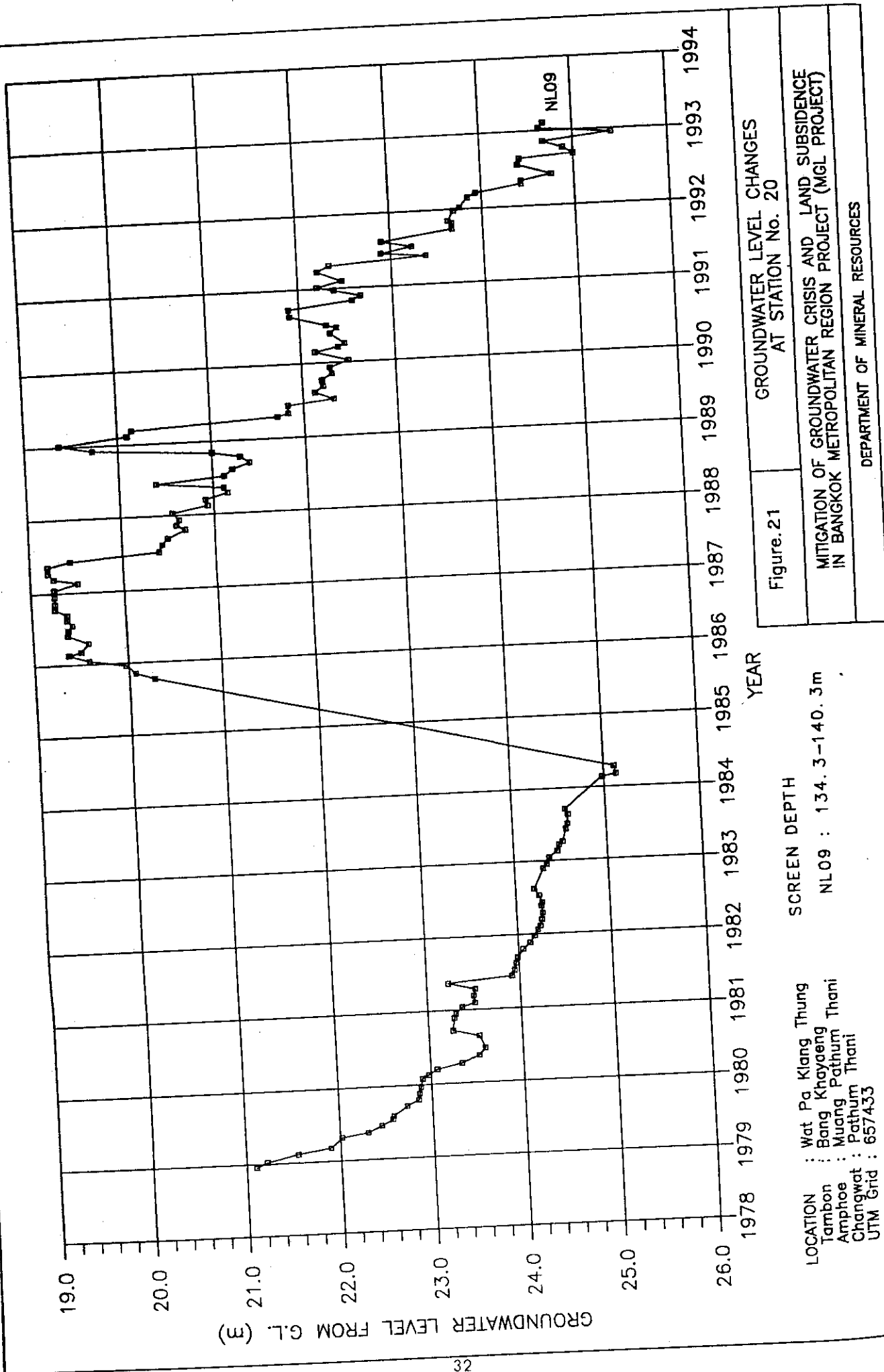


Figure. 21

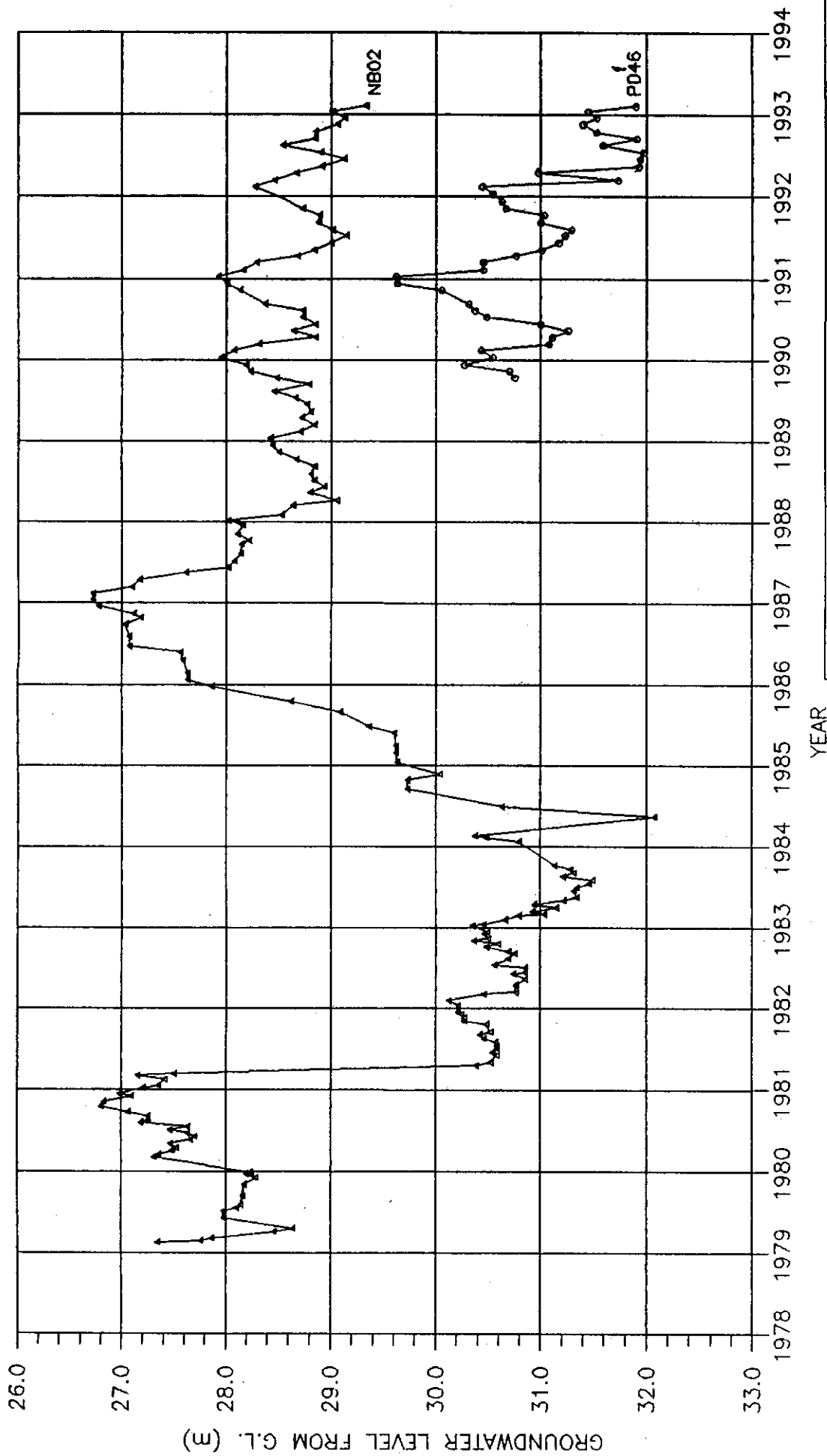
GROUNDWATER LEVEL CHANGES  
AT STATION No. 20

LOCATION : Wat Pa Klang Thung  
 Tambon : Bang Khayaeng  
 Amphoe : Muang Pathum Thani  
 Changwat : Pathum Thani  
 UTM Grid : 657433

SCREEN DEPTH  
 NLO9 : 134.3-140.3m

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE  
 IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES



YEAR

LOCATION : Wat Bang Ya Phraek  
 Tambon : Bang Ya Phraek  
 Amphoe : Phra Pradaeng  
 Changwat : Samut Sakhon  
 UTM Grid : 673085

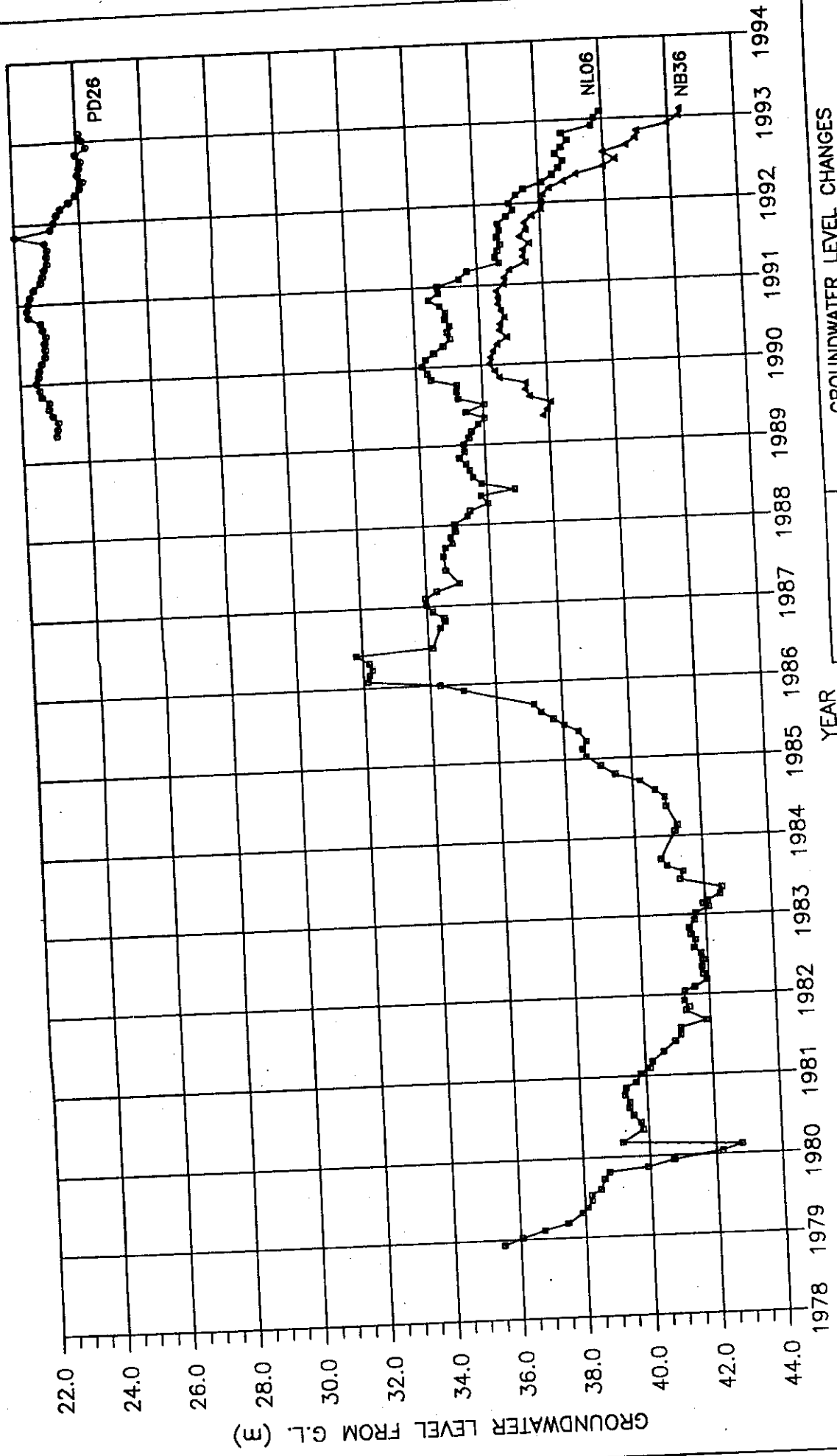
SCREEN DEPTH

PD46 : 107.0-113.0m  
 NB02 : 177.0-183.0m

Figure.22 GROUNDWATER LEVEL CHANGES AT STATION No. 21

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES



LOCATION : Wat Siri Phong Thammit  
 Tambon : Tha Raeng  
 Amphoe : Bang Khen  
 Changwat : Bangkok  
 UTM Grid : 777328

SCREEN DEPTH  
 PD26 : 91.0 - 97.0m  
 NL06 : 125.2 - 131.2m  
 NB36 : 220.0 - 226.0m

Figure.23 GROUNDWATER LEVEL CHANGES AT STATION No. 22  
 MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)  
 DEPARTMENT OF MINERAL RESOURCES

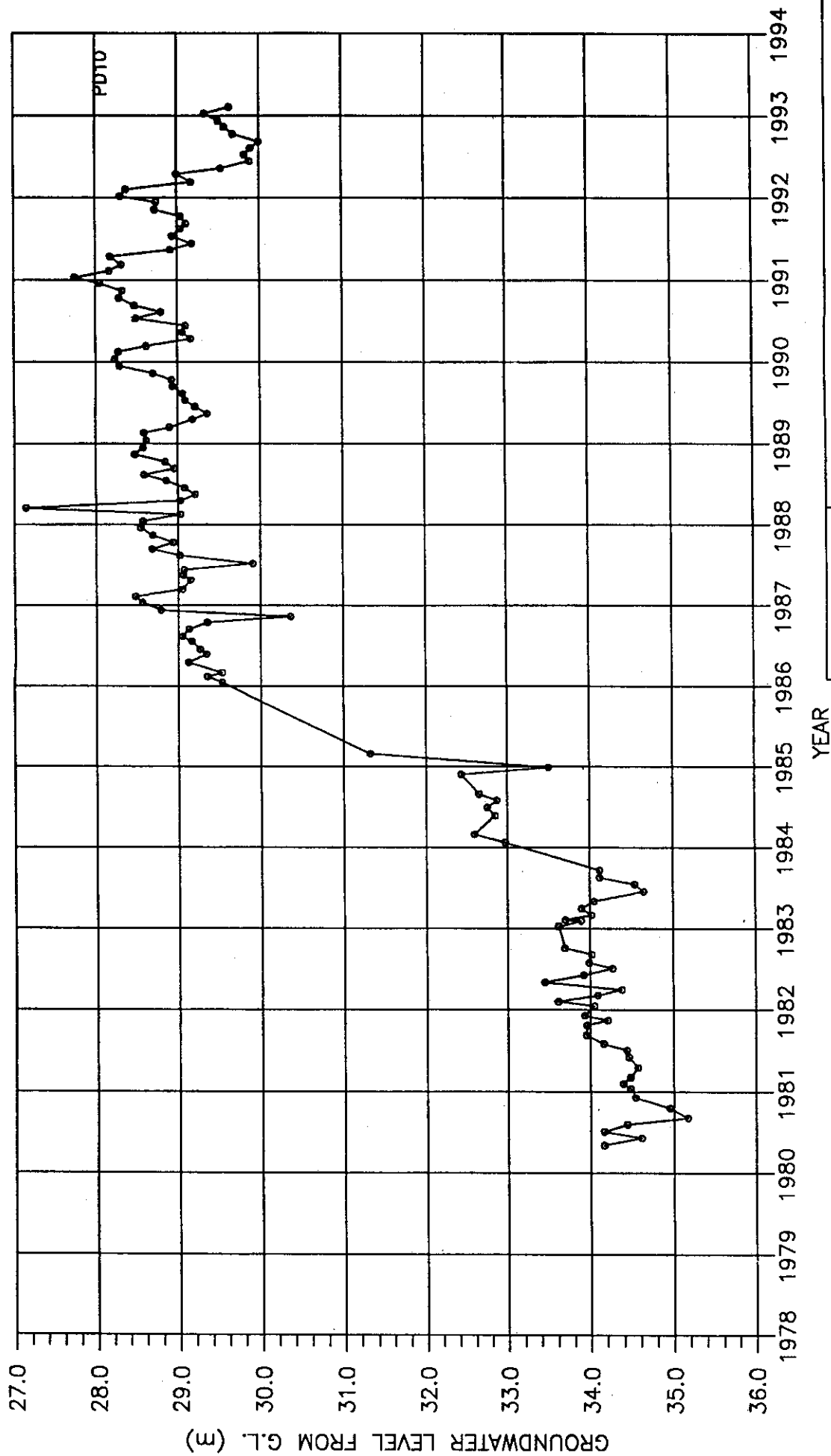


Figure.24

GROUNDWATER LEVEL CHANGES  
AT STATION No. 23

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE  
IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

YEAR

SCREEN DEPTH

PD10 : 82.6 - 88.6m

LOCATION : Wat Ruak  
 Tambon : Bang Phuang  
 Amphoe : Phra Pradaeng  
 Changwat : Samut Prakan  
 UTM Grid : 643112

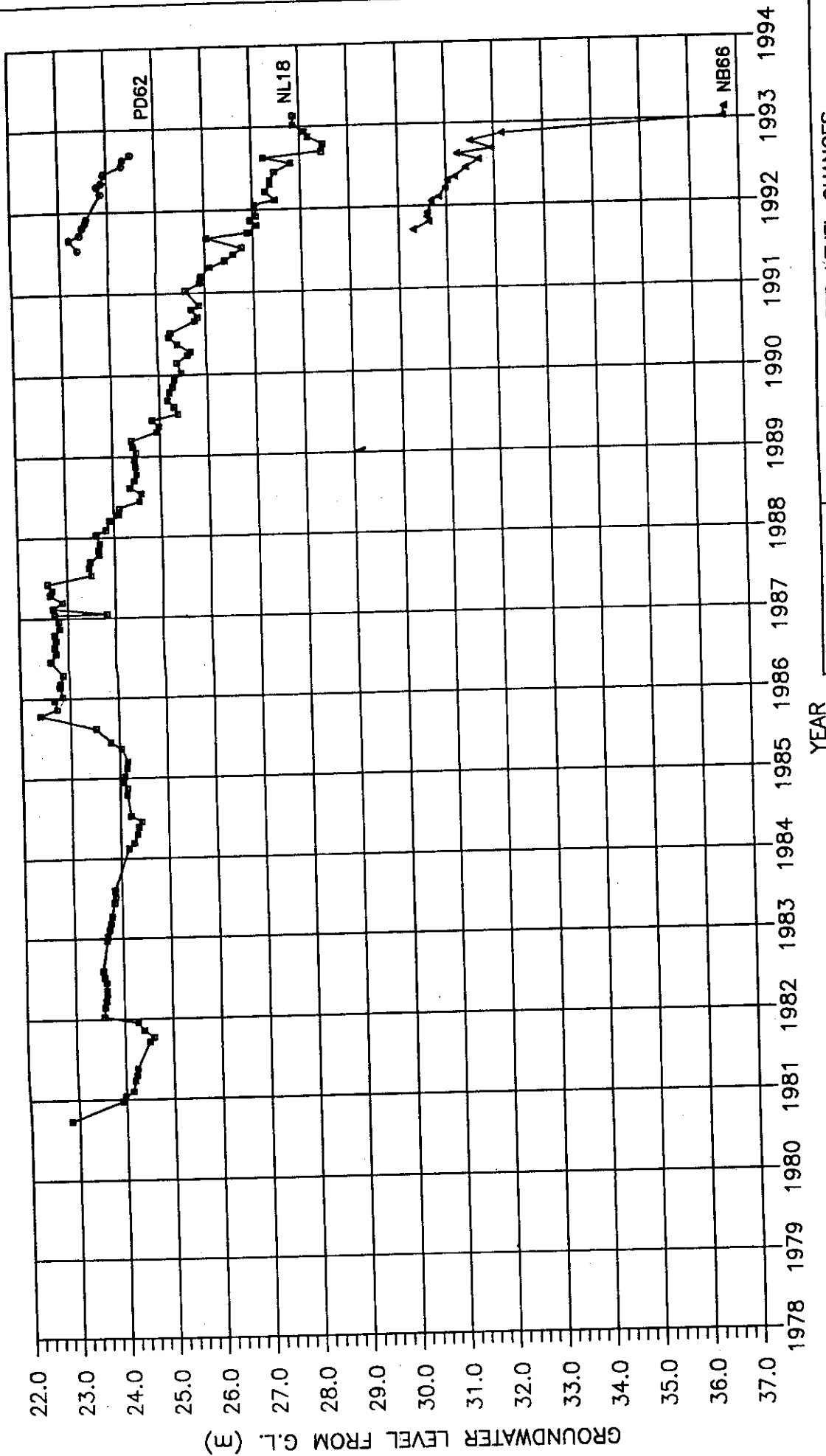


Figure. 25 GROUNDWATER LEVEL CHANGES AT STATION No. 24

LOCATION : Wat Phromma Rangsi  
 Tambon : Samae Dam  
 Amphoe : Bang Khun Thian  
 Changwat : Bangkok  
 UTM Grid : 498048

SCREEN DEPTH  
 PD62 : 95.0-101.0m  
 NL18 : 164.7-170.7m  
 NB66 : 208.0-214.0m

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE  
 IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

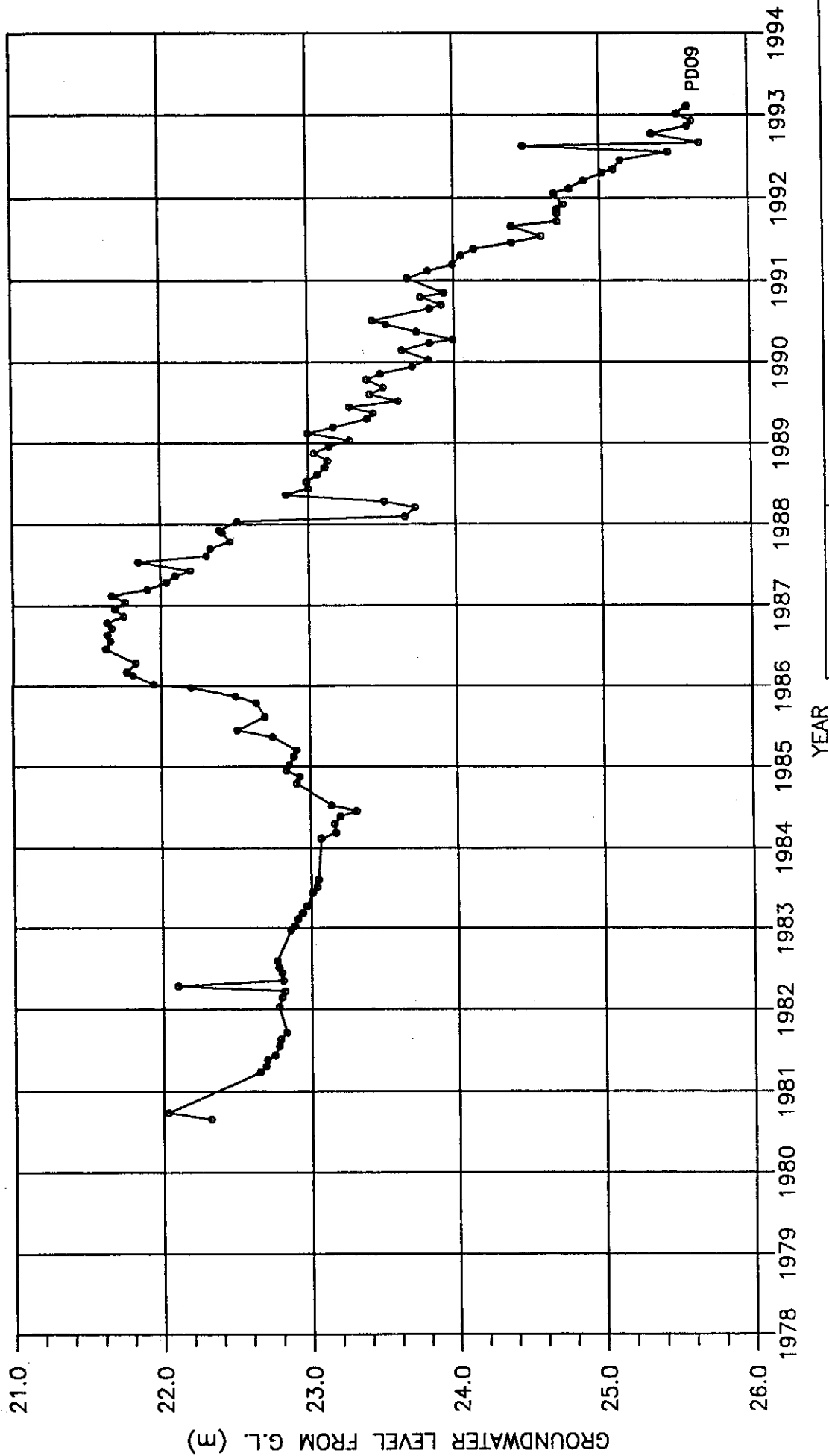


Figure. 26 GROUNDWATER LEVEL CHANGES AT STATION No. 25

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

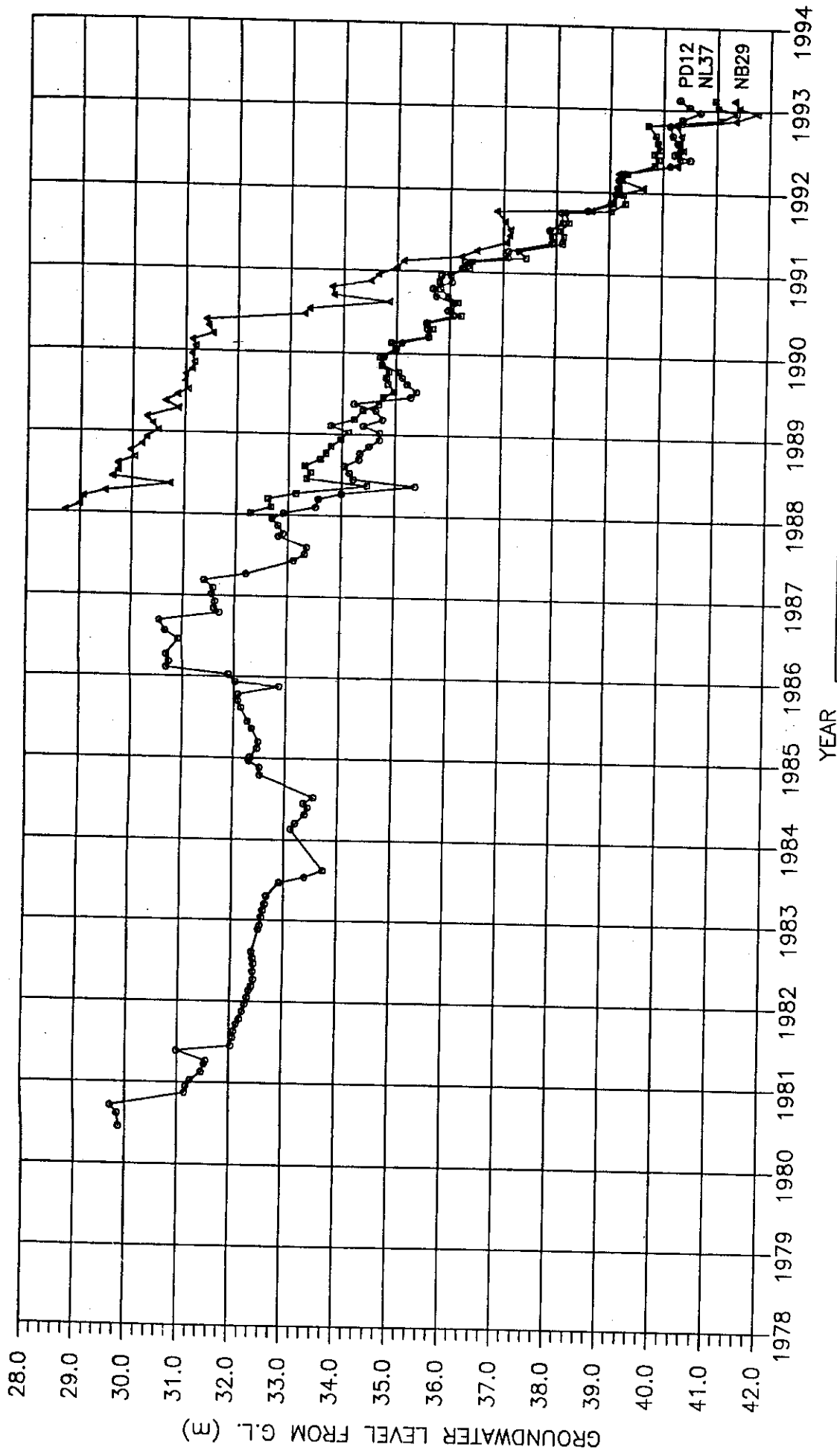
DEPARTMENT OF MINERAL RESOURCES

YEAR

SCREEN DEPTH

PD09 : 103.8-109.8m

LOCATION : Wat Sakae Ngam  
 Tambon : Samae Dam  
 Amphoe : Bang Khun Thian  
 Changwat : Bangkok  
 UTM Grid : 539072



LOCATION : Wat Bang Phli Yai Klang  
 Tambon : Bang Phli Yai  
 Amphoe : Bang Phli  
 Changwat : Samut Prakan  
 UTM Grid : 847047

SCREEN DEPTH  
 PD12 : 106.8-112.8m  
 NL37 : 154.0-160.0m  
 NB29 : 202.0-208.0m

Figure.27

GROUNDWATER LEVEL CHANGES  
 AT STATION No. 26

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE  
 IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

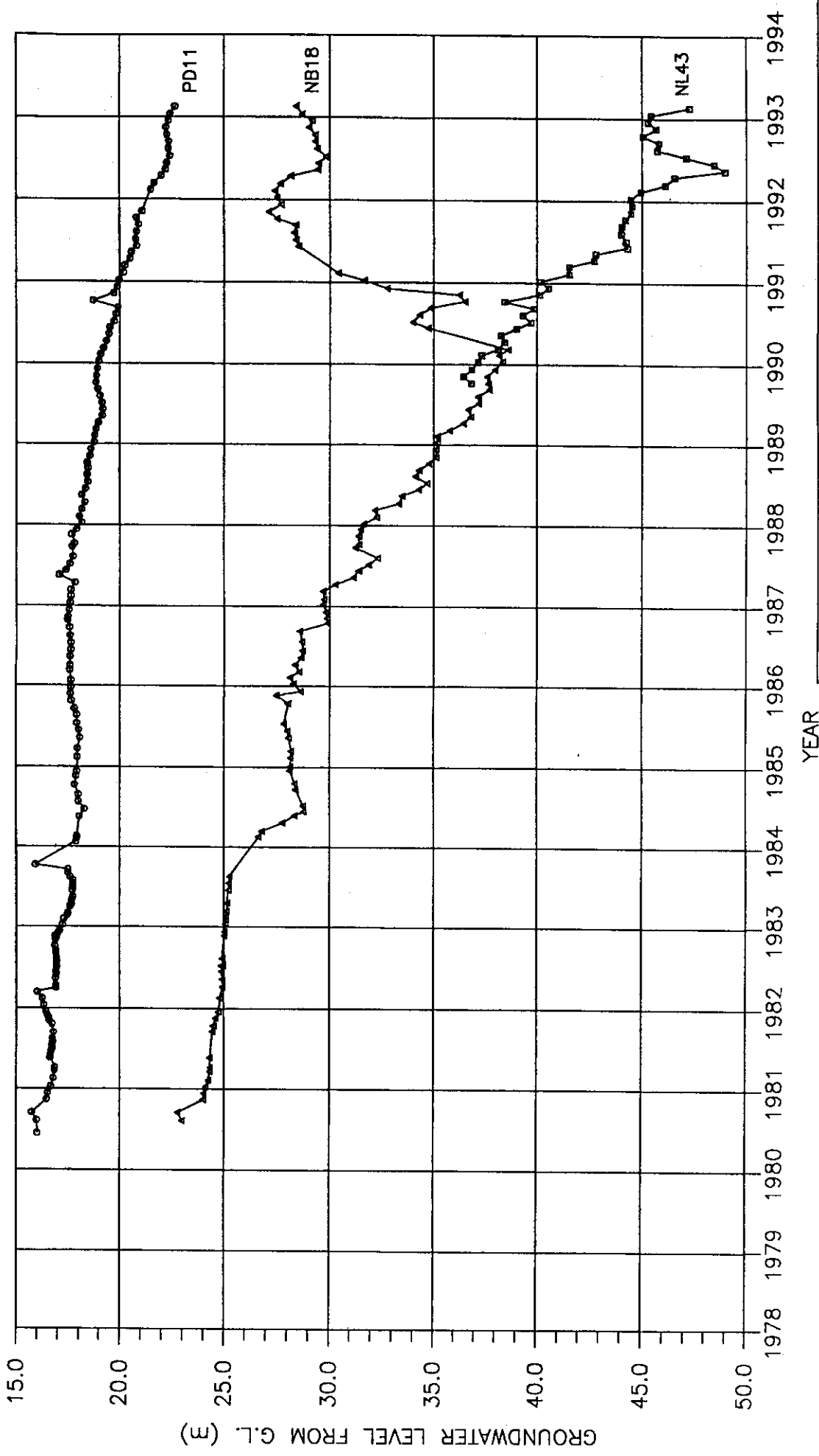


Figure.28 GROUNDWATER LEVEL CHANGES AT STATION No. 27

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

LOCATION : Wat Mongkhon Nimit  
 Tambon : Bang Sao Thong  
 Amphoe : Bang Phli  
 Changwat : Samut Prakan  
 UTM Grid : 938029

SCREEN DEPTH  
 PD11 : 70.3-76.3 m  
 NL37 : 151.0-157.0 m  
 NB29 : 180.0-186.0 m

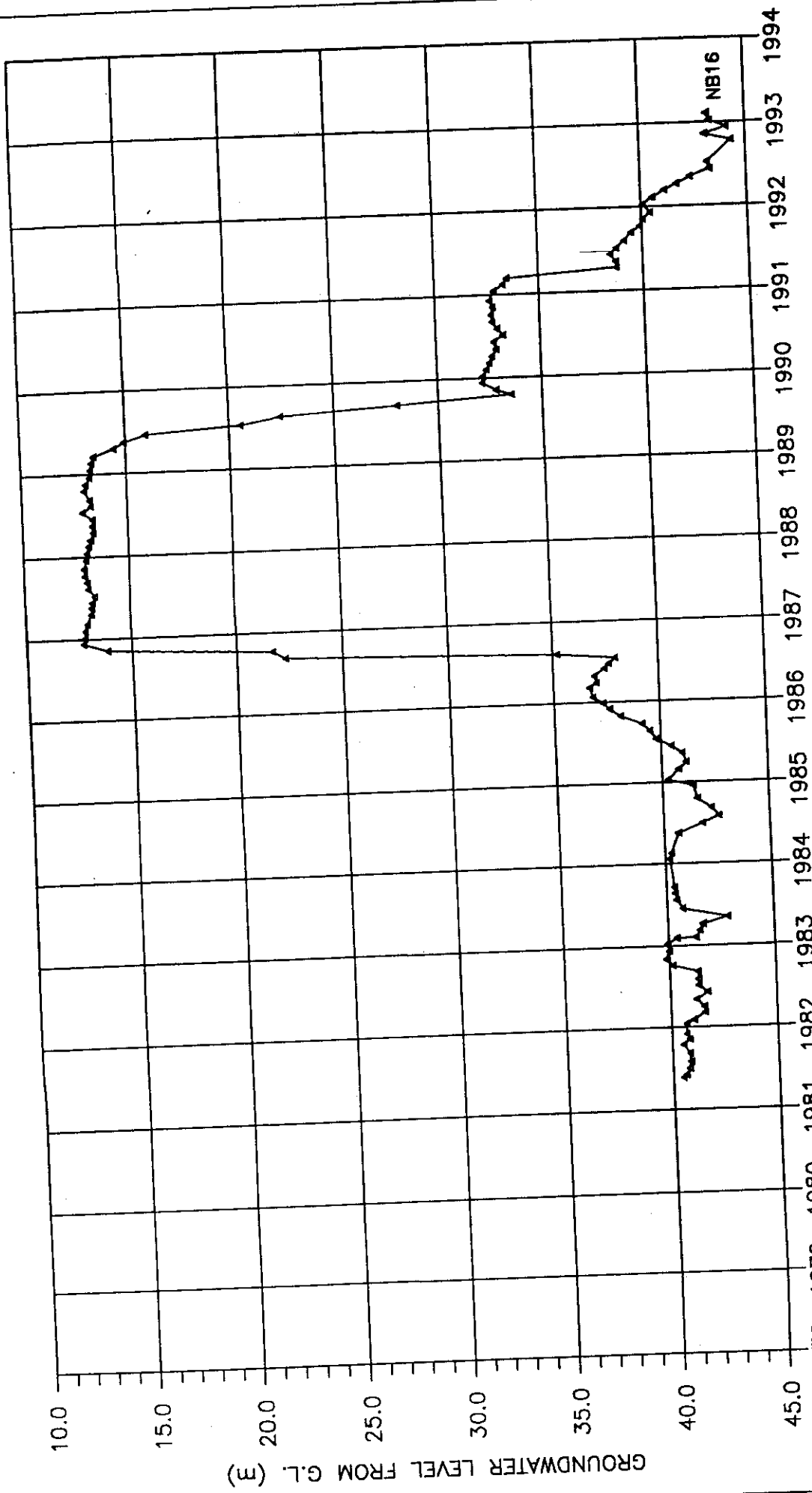


Figure.29 GROUNDWATER LEVEL CHANGES AT STATION No. 28

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

YEAR

SCREEN DEPTH

NB16 : 195.0-201.0m.

LOCATION : Wat Sai Mai  
 Tambon : Khu Khot  
 Amphoe : Lum Luk Ka  
 Changwat : Pathum Thani  
 UTM Grid : 796405

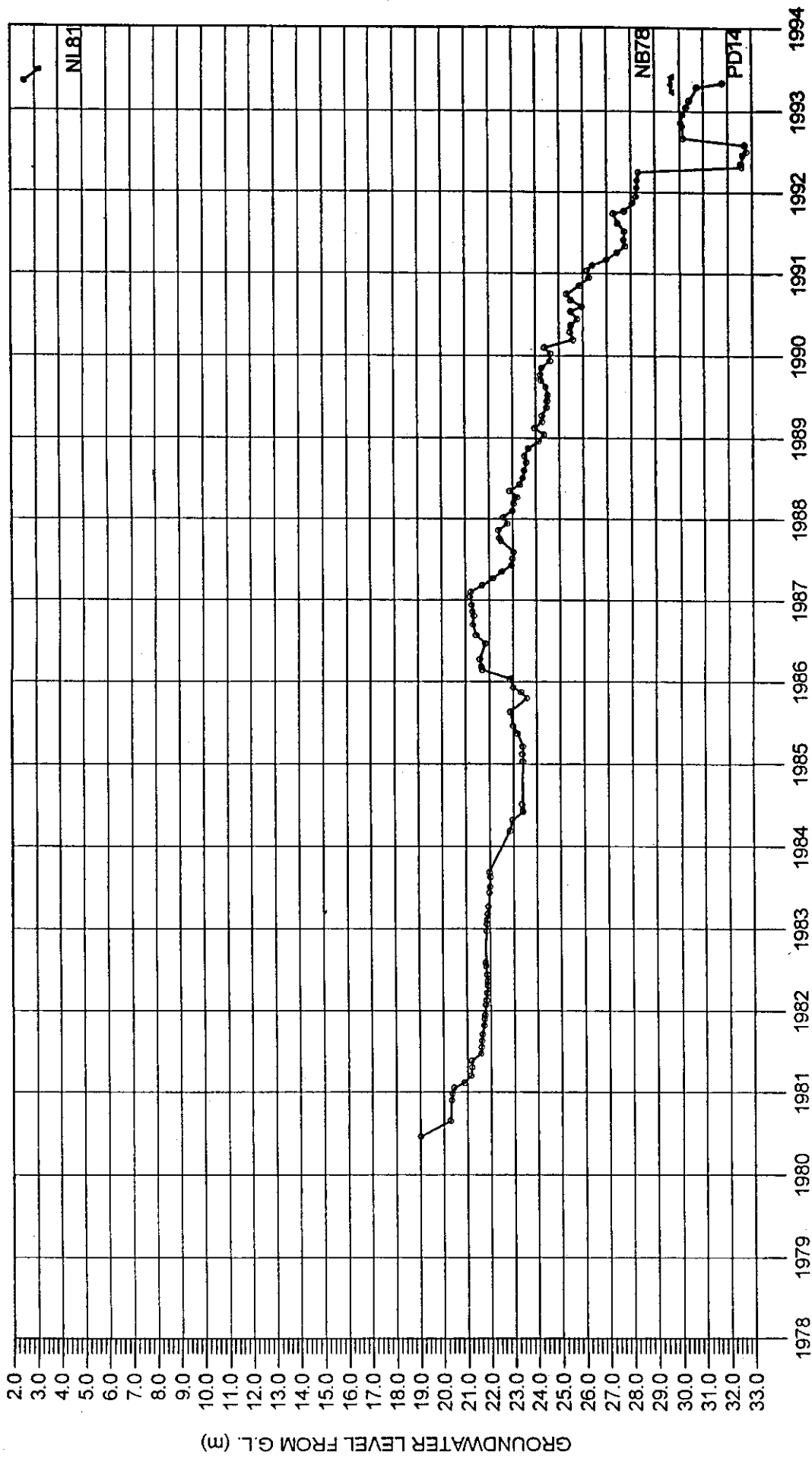


Figure. 30  
GROUNDWATER LEVEL CHANGES  
AT STATION No. 29

LOCATION : Wat Ratcha Kosa  
 Tambon : Khun Thong  
 Amphoe : Lat Krabang  
 Changwat : Bangkok  
 UTM Grid : 005150

SCREEN DEPTH  
 PD14 : 91.0-97.0m  
 NL81 : 152.0-158.0m  
 NB78 : 205.0-211.0m

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE  
 IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

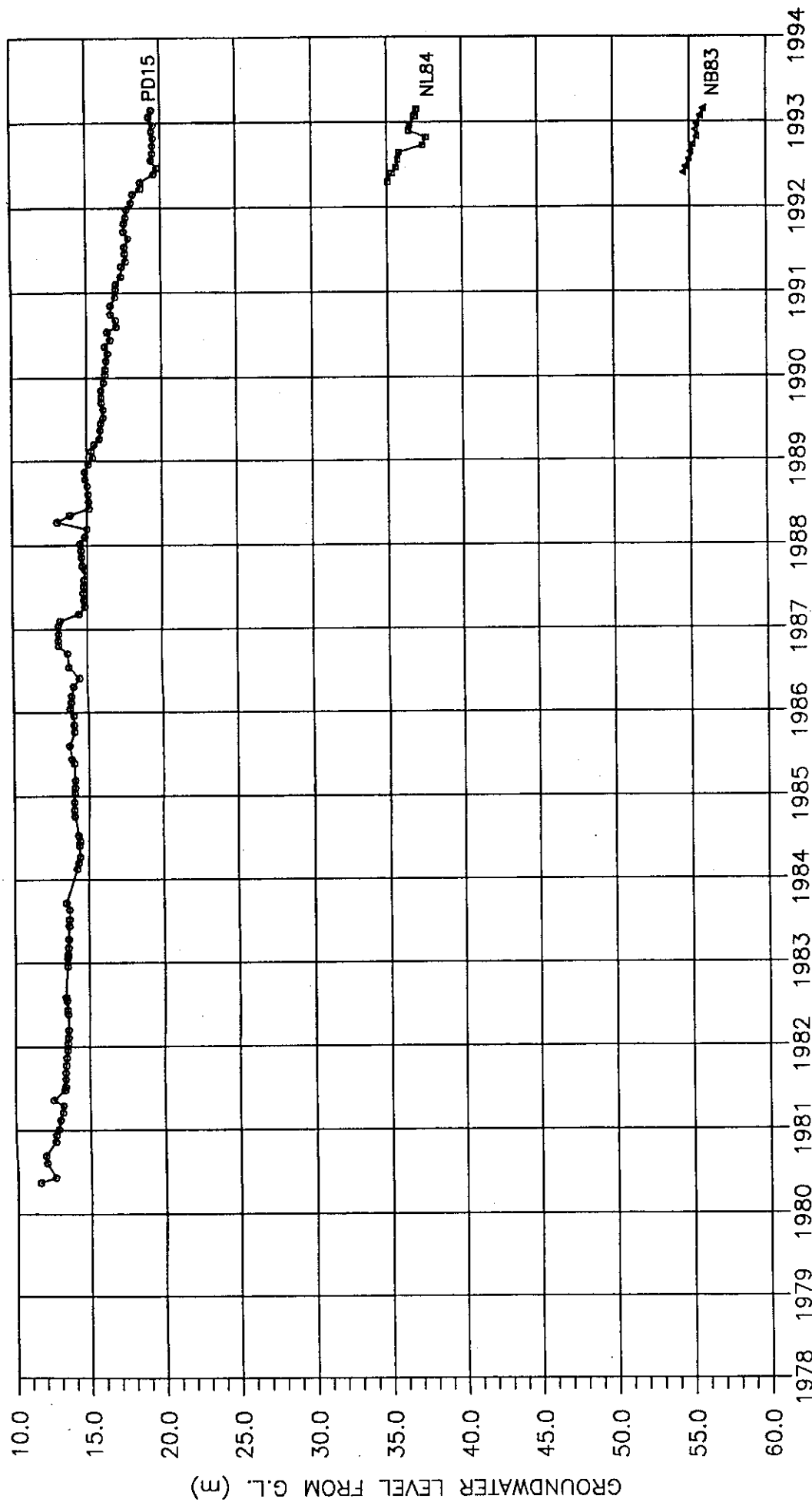


Figure. 31

GROUNDWATER LEVEL CHANGES  
AT STATION No. 30

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE  
IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

LOCATION : Wat Mai Lam Nok Khwaek  
 Tambon : Saen Saep  
 Amphoe : Min Buri  
 Changwat : Bangkok  
 UTM Grid : 956260

SCREEN DEPTH  
 PD15 : 79.4 - 85.4 m  
 NL84 : 144.0 - 150.0 m  
 NB83 : 204.0 - 210.0 m

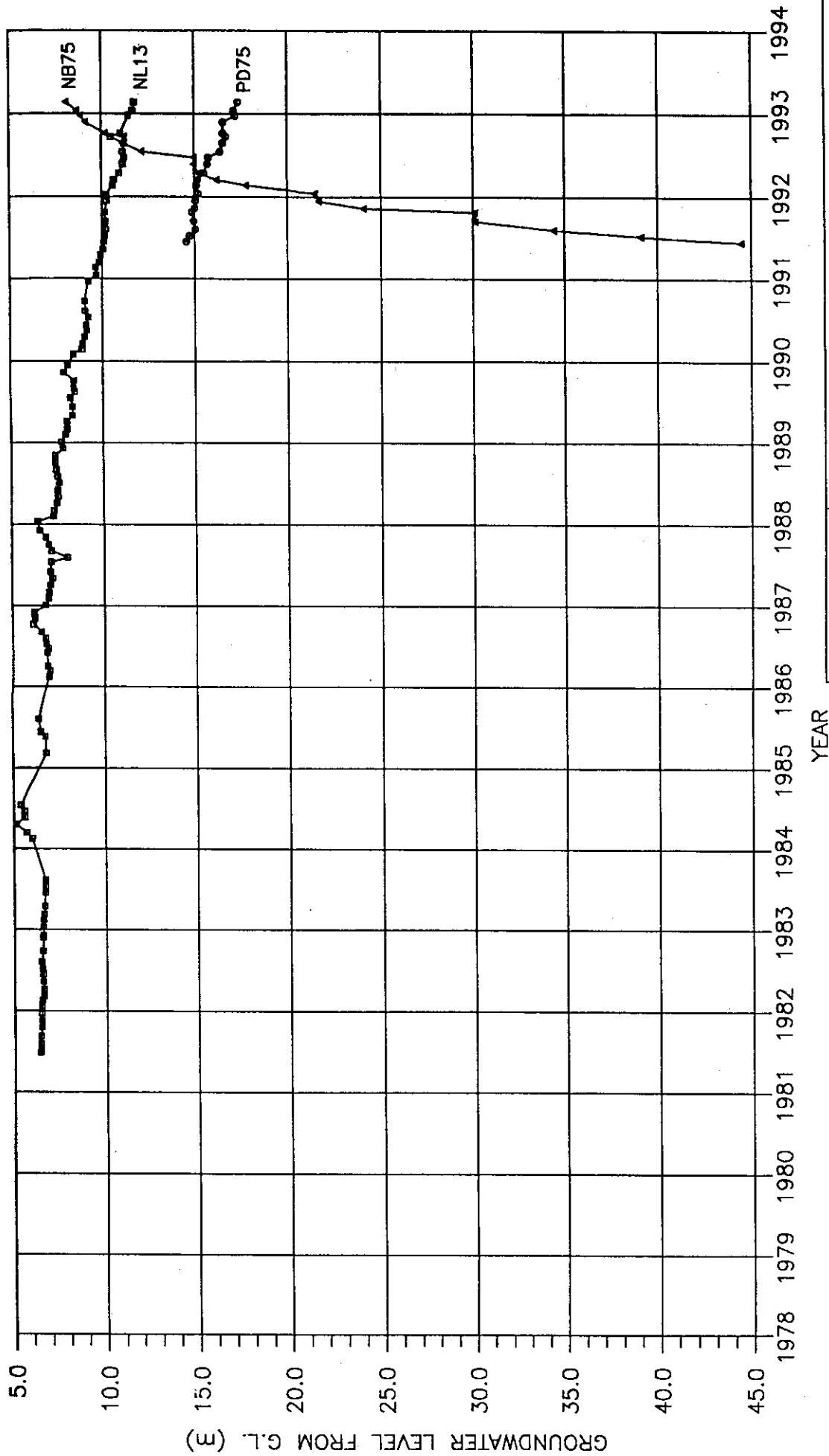


Figure.32 GROUNDWATER LEVEL CHANGES AT STATION No. 31

LOCATION : Wat Lat Sai  
 Tambon : Lam Sai  
 Amphoe : Wang Noi  
 Changwat : Phra Nakhon Si Ayutthaya  
 UTM Grid : 819714

SCREEN DEPTH  
 PD75 : 110.0-116.0m  
 NL13 : 155.0-161.0m  
 NB75 : 220.0-226.0m

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

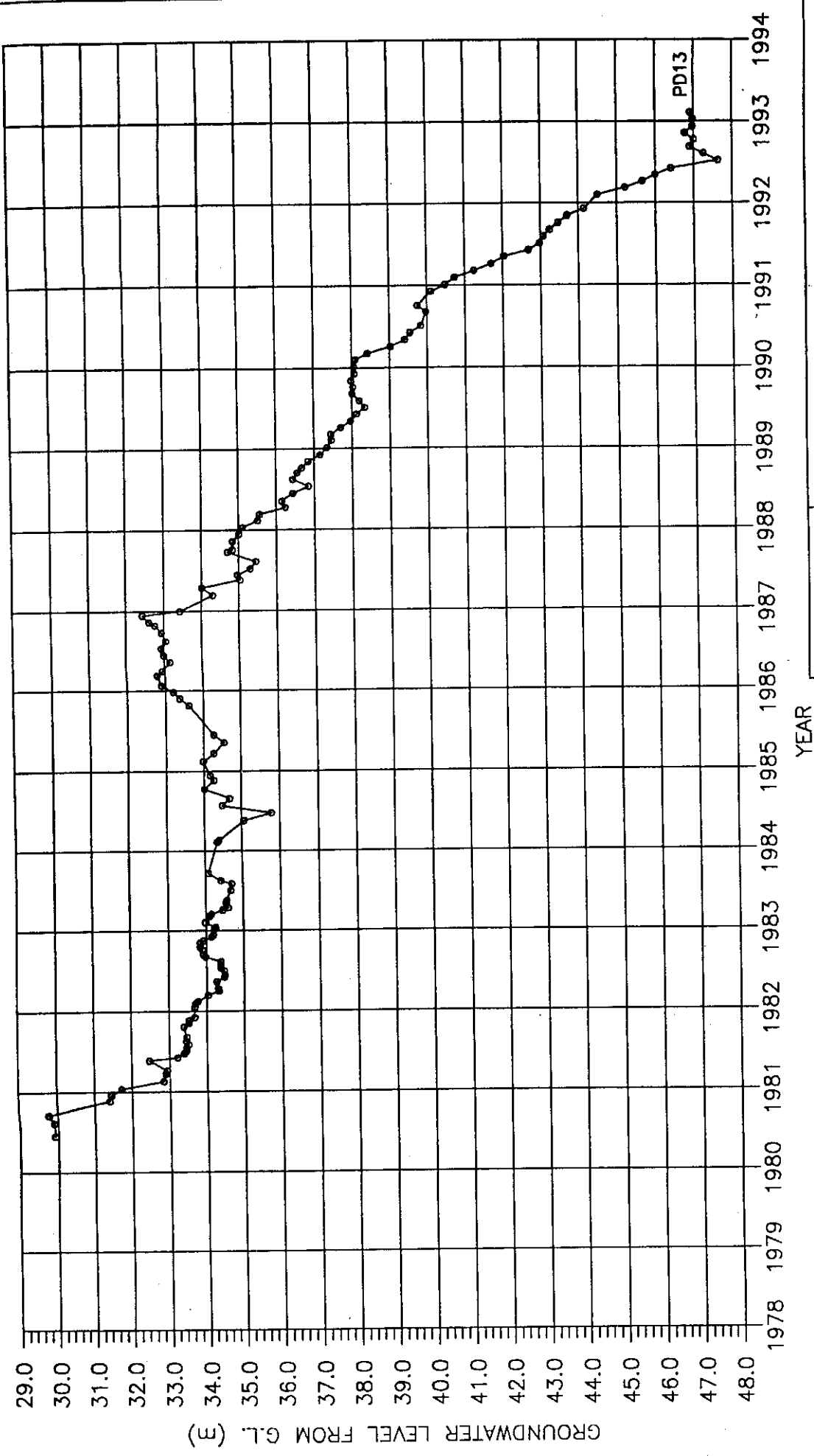


Figure. 33 GROUNDWATER LEVEL CHANGES AT STATION No. 32

LOCATION : Wat Si Wari Noi  
 Tambon : Sisa Chorakhe Yai  
 Amphoe : Bang Phli  
 Changwat : Samut Prakan  
 UTM Grid : 950116

SCREEN DEPTH  
 PD13 : 110.0-116.0m

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE  
 IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

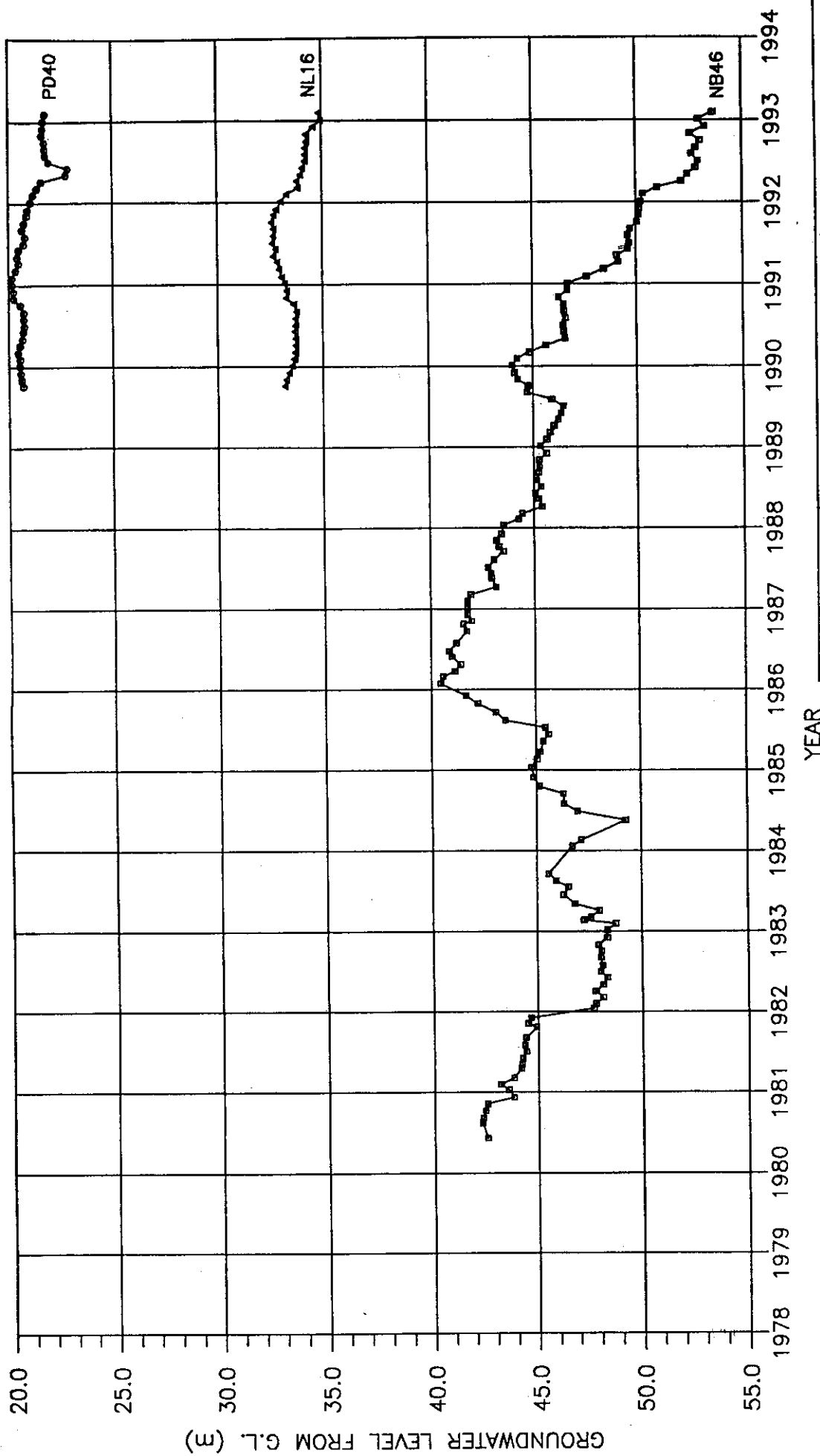


Figure.34 GROUNDWATER LEVEL CHANGES AT STATION No. 33

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

LOCATION : Wat Saen Suk  
 Tambon : Min Buri  
 Amphoe : Min Buri  
 Changwat : Bangkok  
 UTM Grid : 887280

SCREEN DEPTH  
 PD40 : 67.0-73.0m  
 NL16 : 131.1-137.1m  
 NB46 : 208.0-214.0m

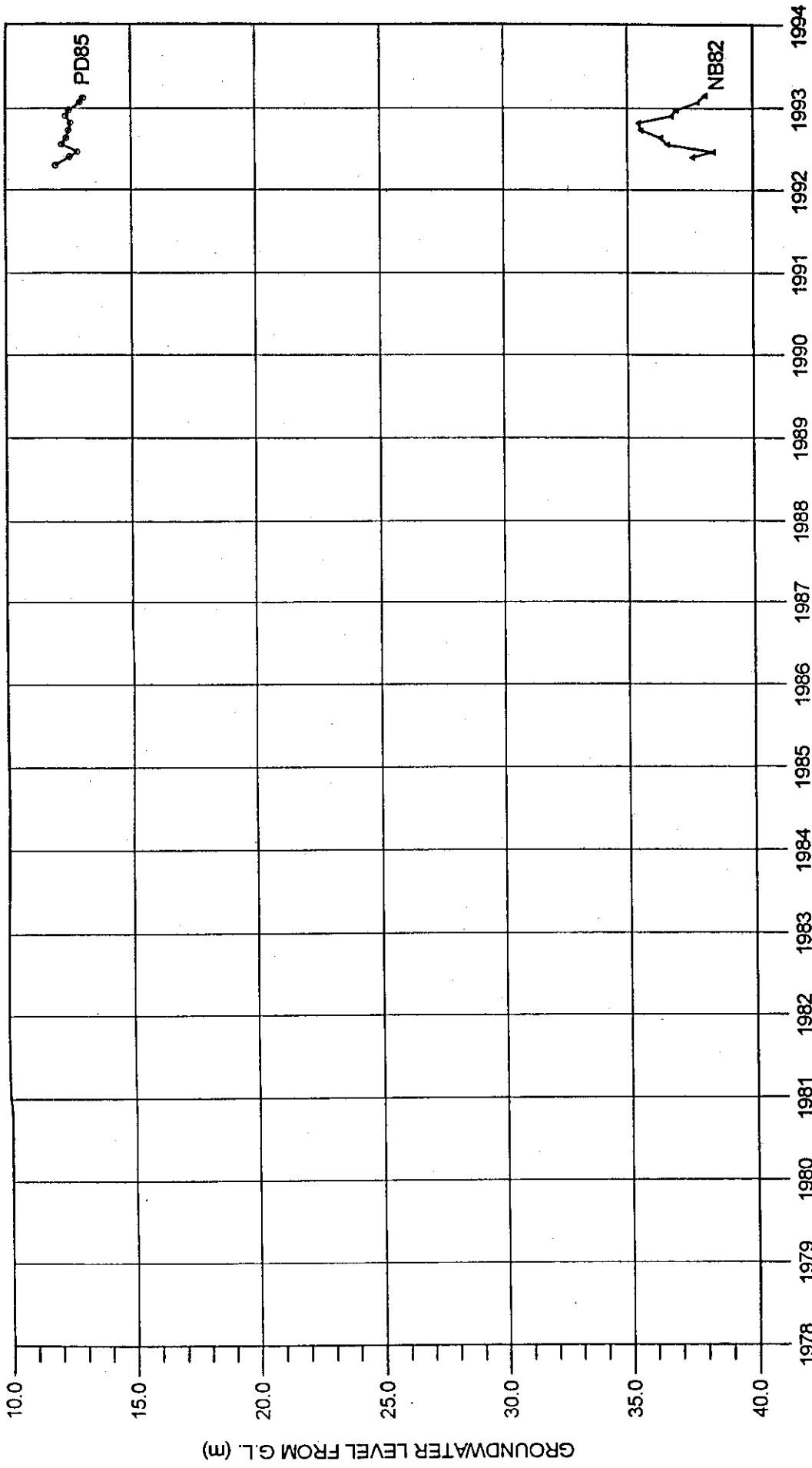


Figure. 35 GROUNDWATER LEVEL CHANGES AT STATION No. 34

LOCATION : Wat Phakdi Noraset  
 Tambon : Krathum Rai  
 Amphoe : Nong Chok  
 Changwat : Bangkok  
 UTM Grid : 014323

SCREEN DEPTH  
 PD85 : 70.0-76.0m  
 NL15 : 146.0-152.0m  
 NB82 : 204.0-210.0m

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE  
 IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

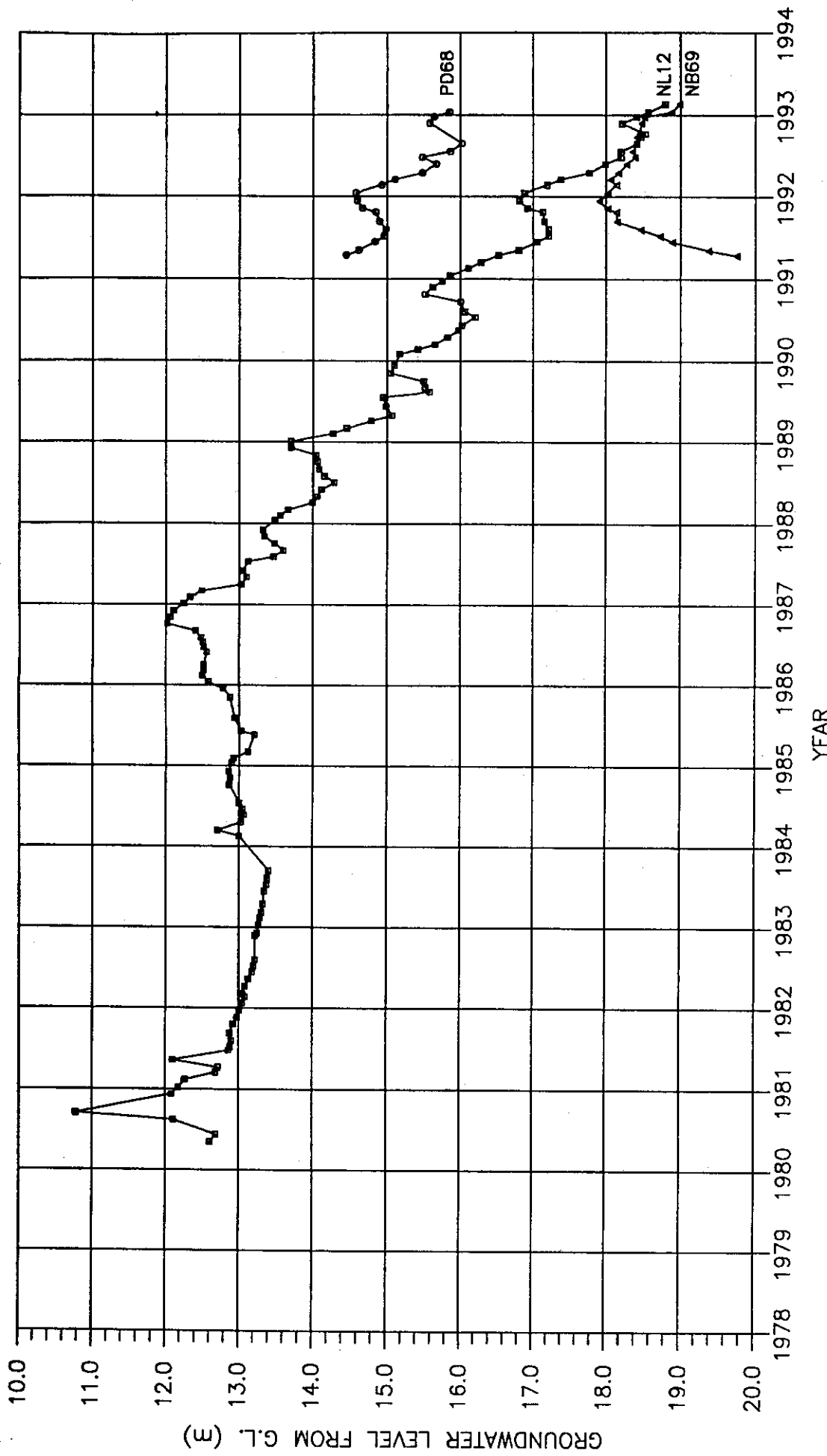


Figure. 36

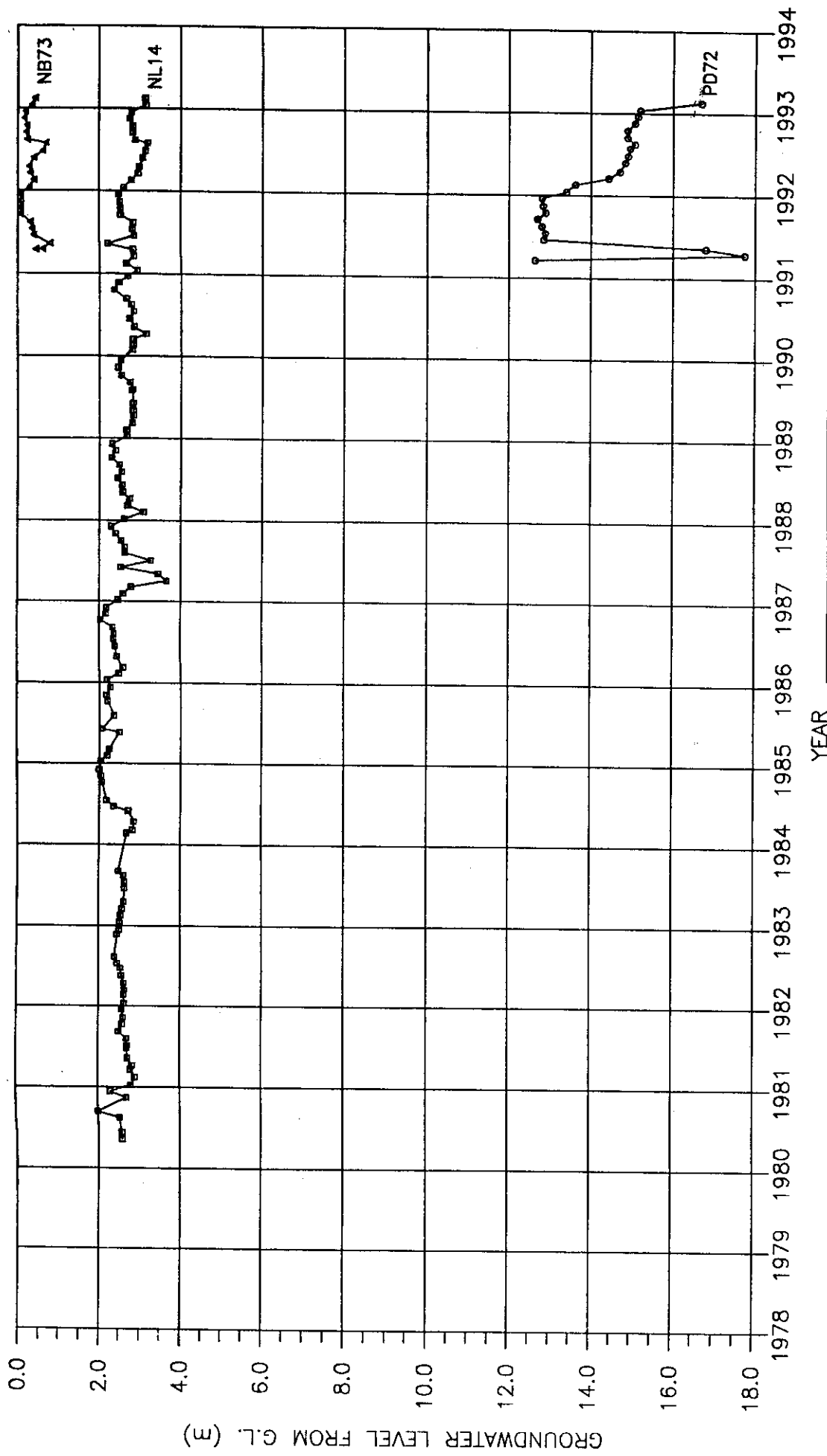
GROUNDWATER LEVEL CHANGES  
AT STATION No. 35

LOCATION : Wat Bot Somphon Chai  
 Tambon : Ratcha Khram  
 Amphoe : Bang Sai  
 Changwat : Phra Nakhon Si Ayutthaya  
 UTM Grid : 652696

SCREEN DEPTH  
 PD68 : 89.0 - 95.0m  
 NL12 : 143.0 - 149.0m  
 NB69 : 217.0 - 223.0m

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE  
 IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES



YEAR

LOCATION : Wat Aiyikaram  
 Tambon : lam Phak Kut  
 Amphoe : Thanyaburi  
 Changwat : Pathum Thani  
 UTM Grid : 941529

SCREEN DEPTH

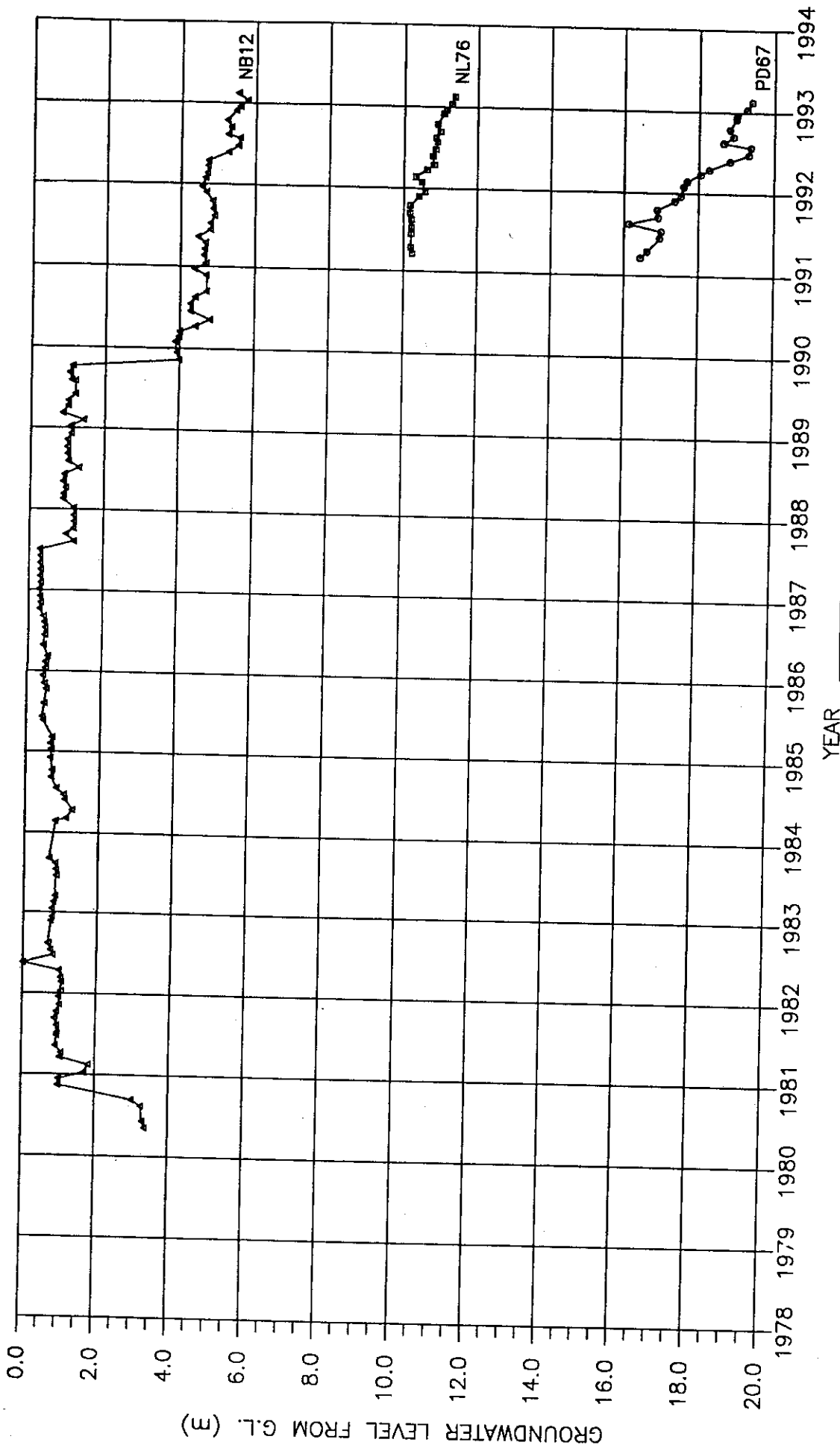
PD72 : 104.0-110.0m  
 NL14 : 128.3-134.3m  
 NB73 : 211.0-217.0m

Figure. 37 GROUNDWATER LEVEL CHANGES AT STATION No. 36

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

0.0



LOCATION : Wat Phalahan  
 Tambon : Khlong Hok  
 Amphoe : Khlong Luang  
 Changwat : Pathum Thani  
 UTM Grid : 872806

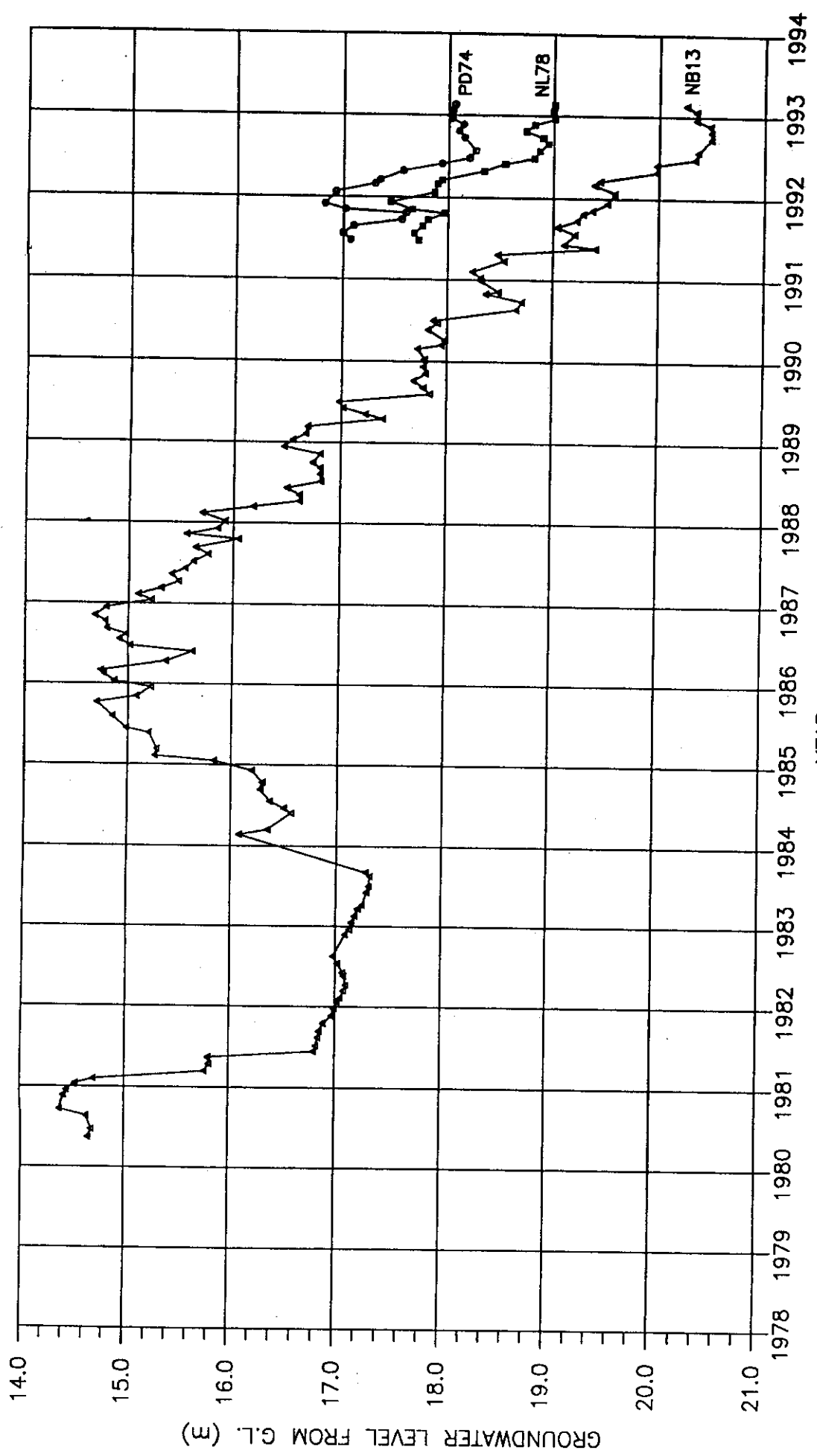
SCREEN DEPTH  
 PD67 : 89.0 - 95.0m  
 NL76 : 147.0 - 153.0m  
 NB12 : 180.0 - 186.0m

Figure.38

GROUNDWATER LEVEL CHANGES  
 AT STATION No. 37

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE  
 IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES



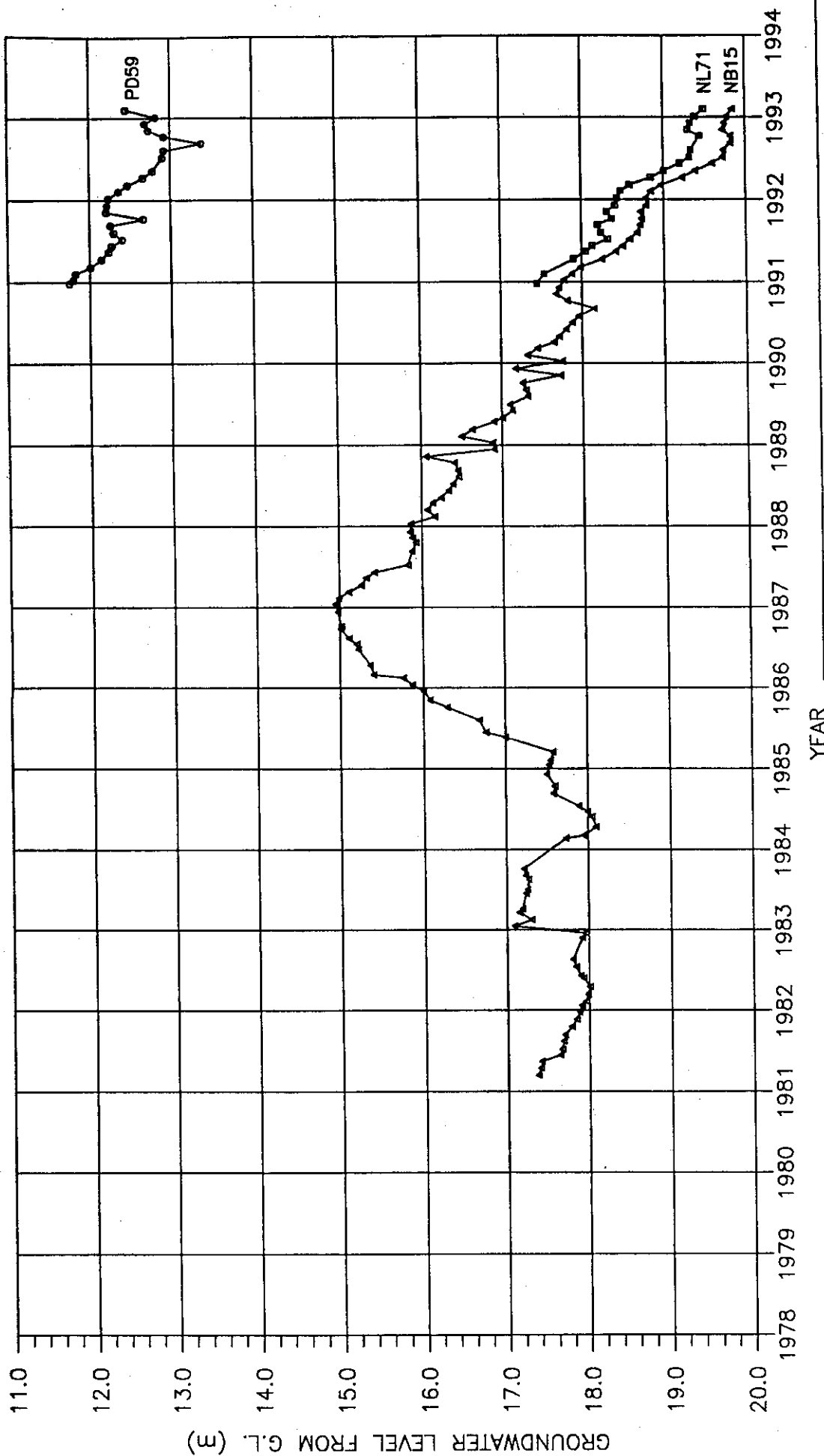
LOCATION : Wat Pa Kha  
 Tambon : Khok Chang  
 Amphoe : Bang Sai  
 Changwat : Phra Nakhon Si Ayutthaya  
 UTM Grid : 639624

SCREEN DEPTH  
 PD74 : 109.0-115.0m  
 NL78 : 164.0-170.0m  
 NB13 : 177.0-180.0m  
 186.0-189.0m

Figure. 39 GROUNDWATER LEVEL CHANGES AT STATION No. 38

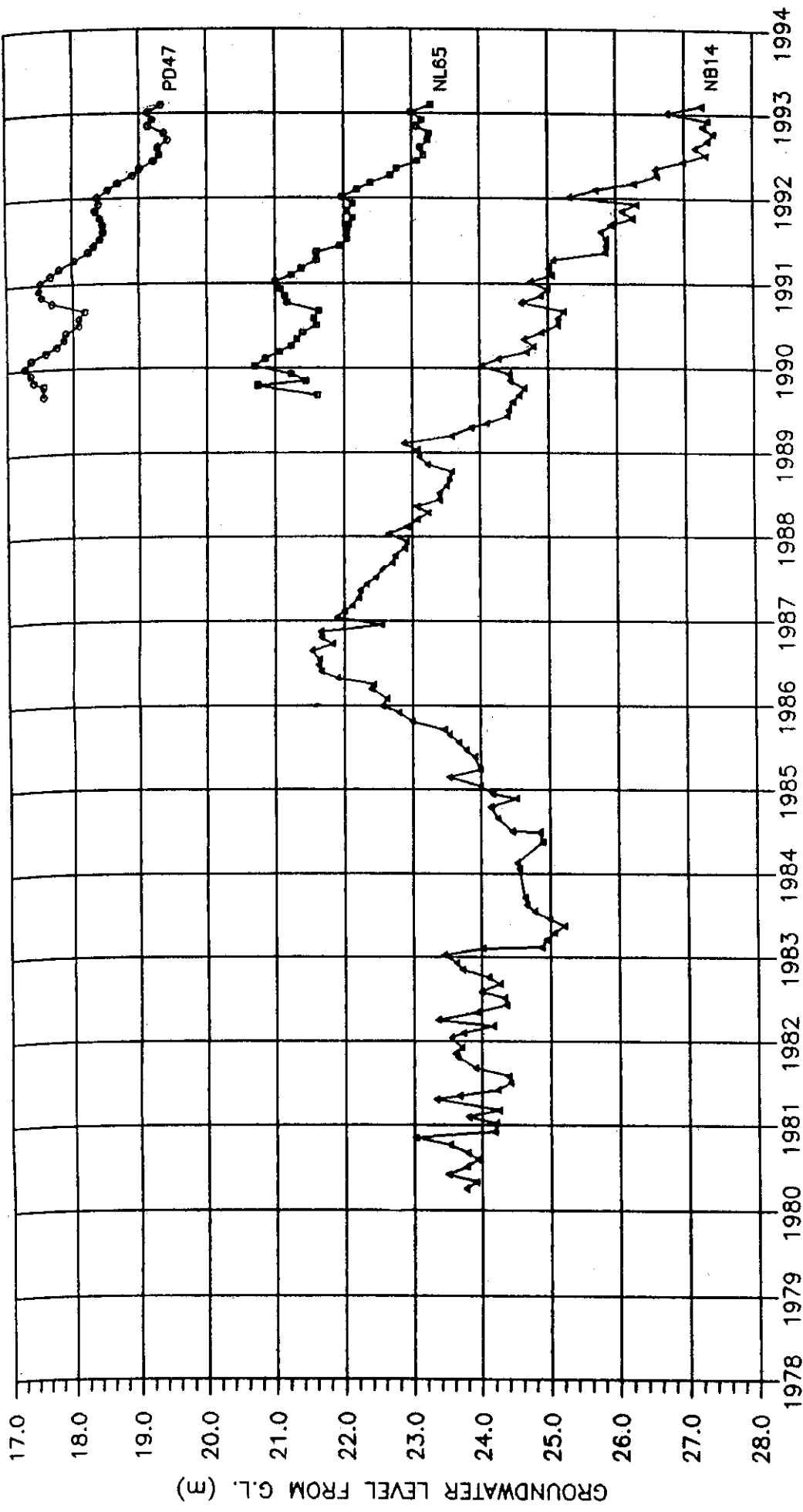
MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE  
 IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES



LOCATION : Wat Bua Kaeo Keson  
 Tambon : Rahaeng  
 Amphoe : Lat Lum Kaeo  
 Changwat : Pathum Thani  
 UTM Grid : 538523

Figure. 40 GROUNDWATER LEVEL CHANGES AT STATION No. 39  
 MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)  
 DEPARTMENT OF MINERAL RESOURCES



YEAR

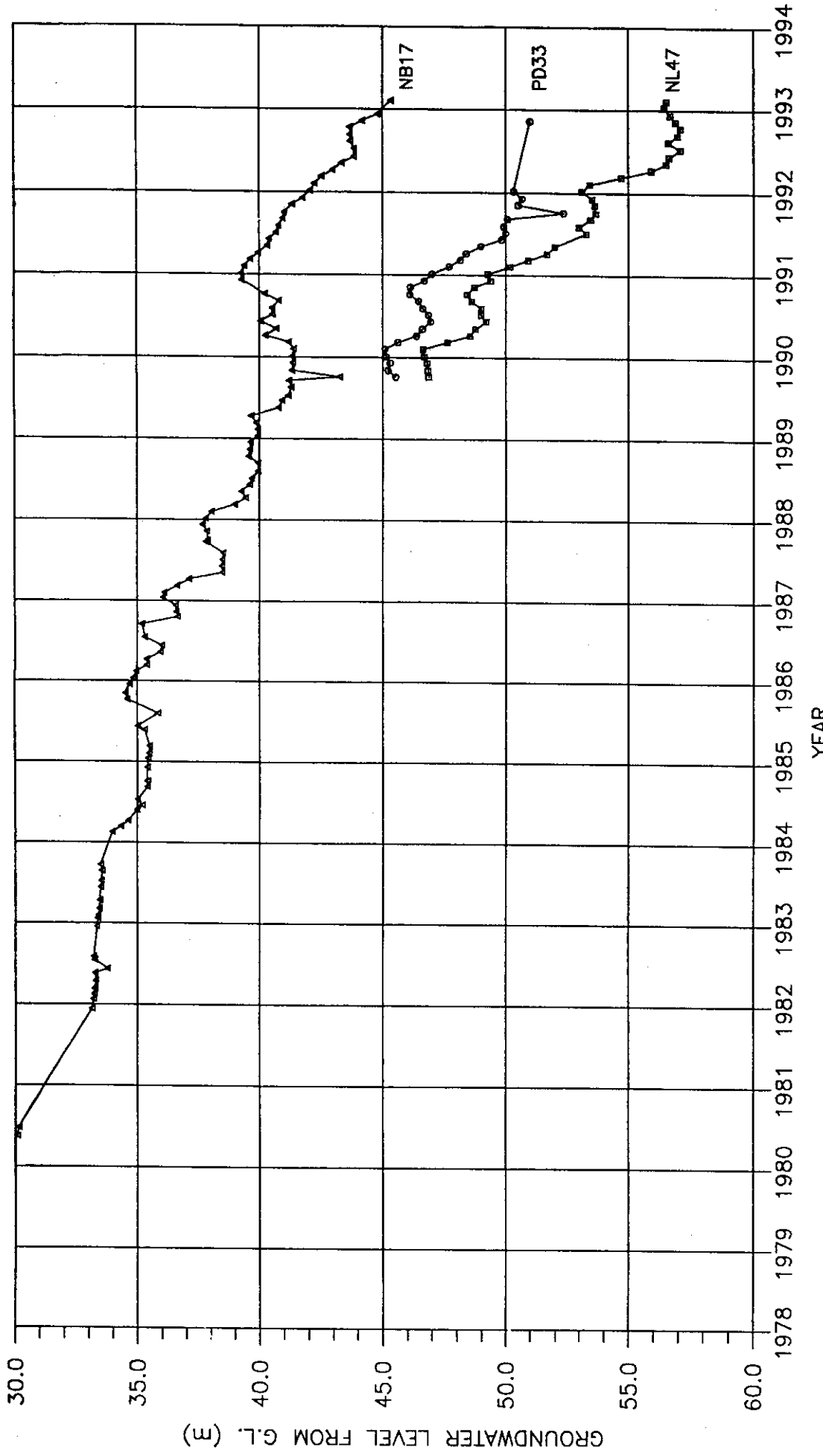
Figure.41 GROUNDWATER LEVEL CHANGES AT STATION No. 40

LOCATION : Provincial Hall  
 Tambon : Bang Prak  
 Amphoe : Muang Pathum Thani  
 Changwat : Pathum Thani  
 UTM Grid : 659503

SCREEN DEPTH  
 PD47 : 98.0-104.0m  
 NL65 : 143.0-149.0m  
 NB14 : 198.3-204.3m

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES



LOCATION : Wat Bamrung Run  
 Tambon : Khlong Sam Prawet  
 Amphoe : Lat Krabang  
 Changwat : Bangkok  
 UTM Grid : 901198

SCREEN DEPTH  
 PD33 : 104.0-110.0m  
 NL47 : 147.0-153.0m  
 NB17 : 183.0-189.0m

Figure. 42 GROUNDWATER LEVEL CHANGES AT STATION No. 41

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

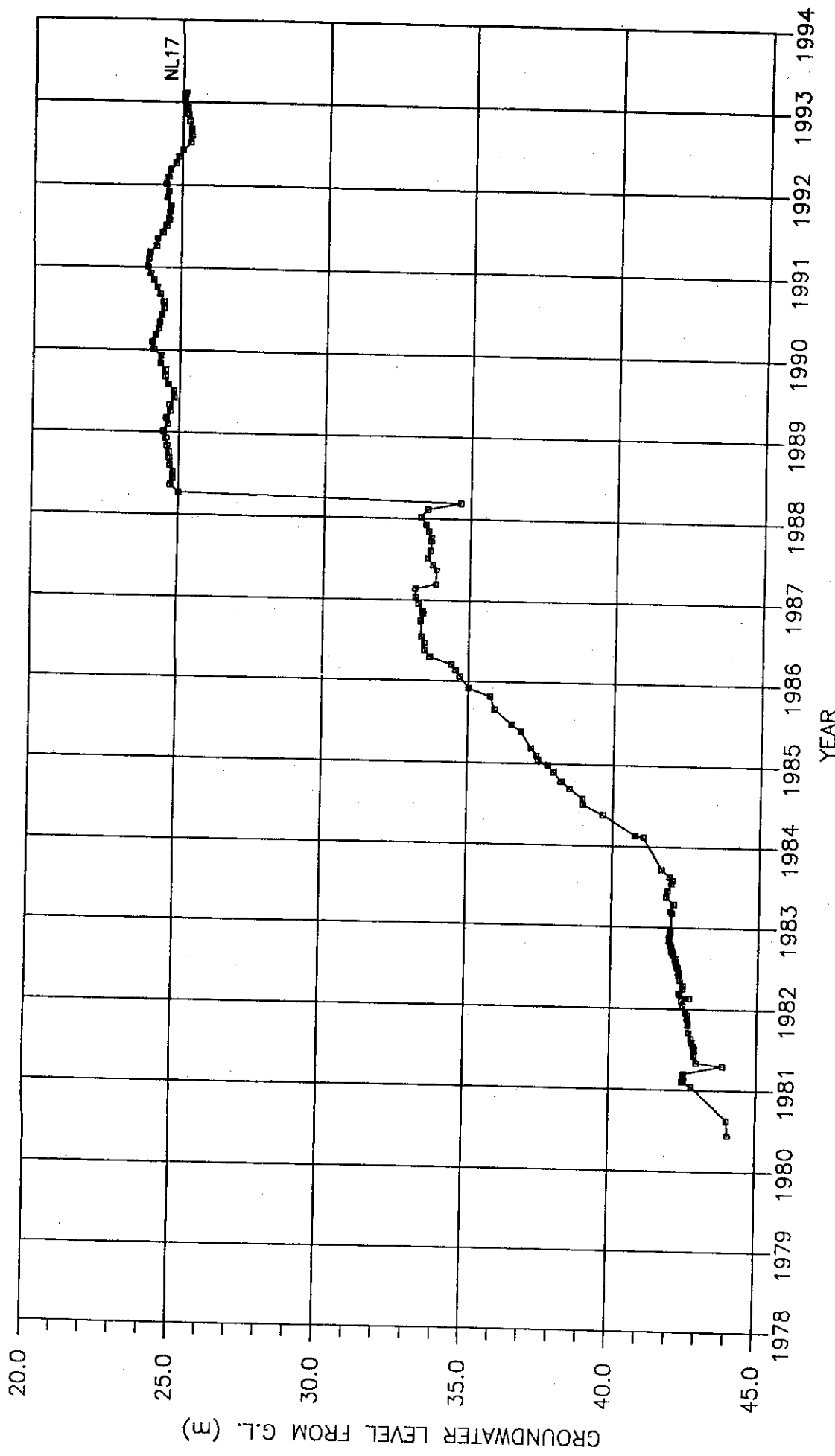


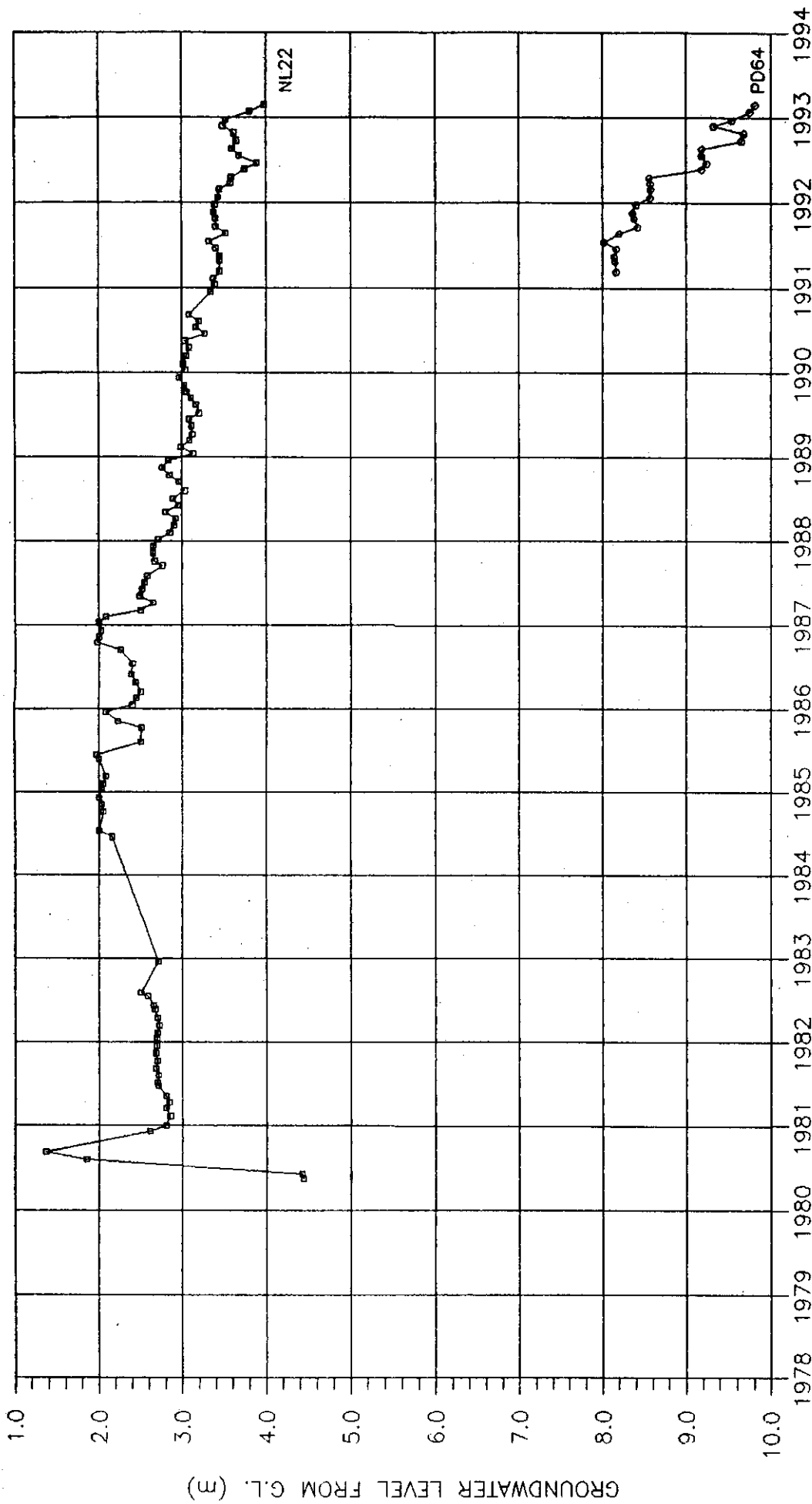
Figure 43 GROUNDWATER LEVEL CHANGES AT STATION No. 42

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

LOCATION : Bangkok Planetorium  
 Tambon : Phra Khanong  
 Amphoe : Phra Khanong  
 Changwat : Bangkok  
 UTM Grid : 710174

SCREEN DEPTH  
 NL17 : 134.3--140.3m



YEAR

LOCATION : Wat Phut Udom  
 Tambon : Phut Udom  
 Amphoe : Lam Luk Ka  
 Changwat : Pathum Thani  
 UTM Grid : 042435

SCREEN DEPTH

PD64 : 97.0-103.0m  
 NL22 : 116.0-122.0m

Figure. 44 GROUNDWATER LEVEL CHANGES AT STATION No. 43

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

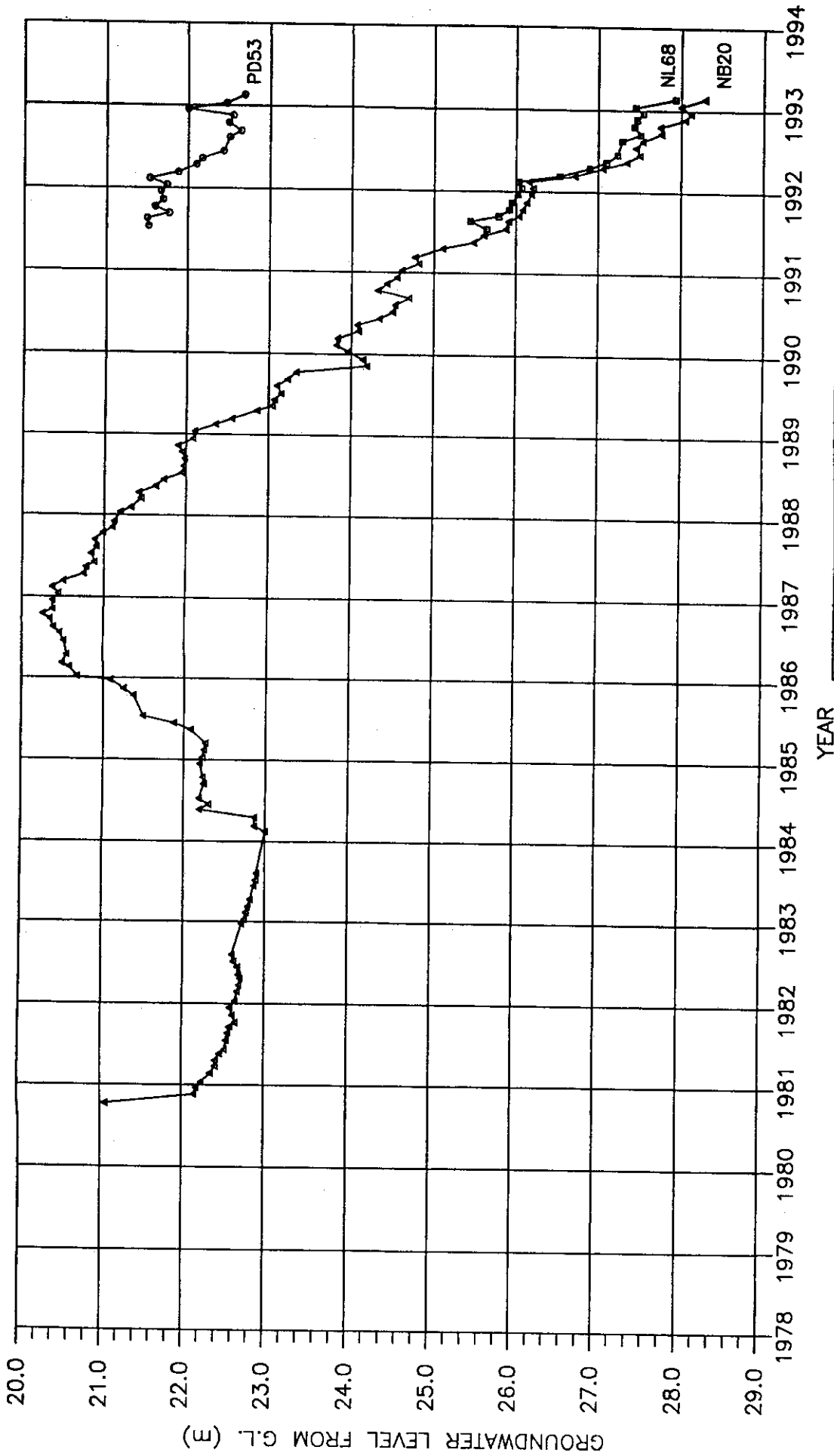


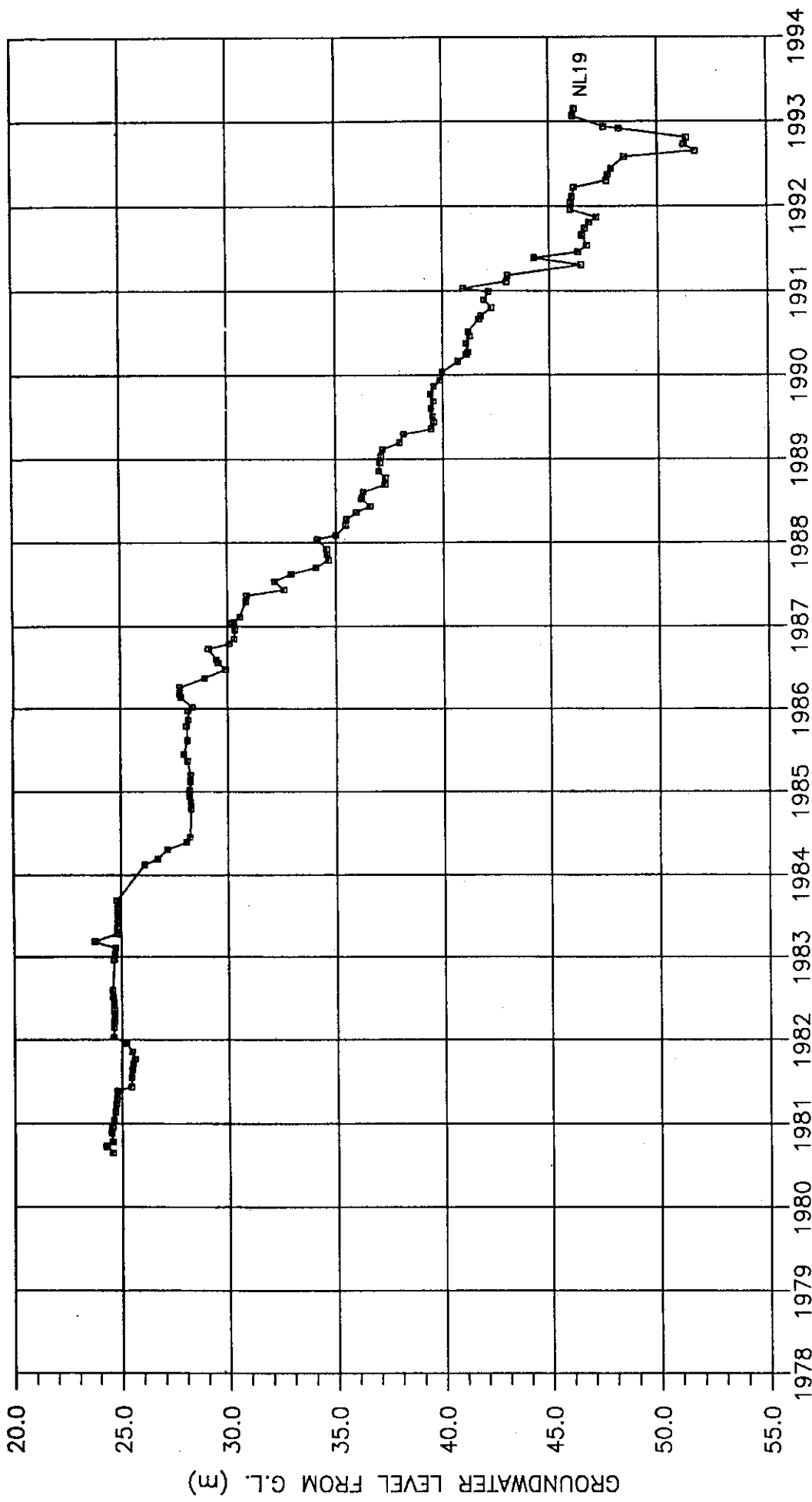
Figure. 45 GROUNDWATER LEVEL CHANGES AT STATION No. 44

LOCATION : Wat Salawan  
 Tambon : Sala Ya  
 Amphoe : Nakhon Chaisi  
 Changwat : Nakhon Pathom  
 UTM Grid : 434265

SCREEN DEPTH  
 PD53 : 92.0 - 98.0 m  
 NL68 : 152.0 - 158.0 m  
 NB20 : 189.2 - 195.2 m

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES



YEAR

LOCATION : Wat Om Yai  
 Tambon : Om Yai  
 Amphoe : Sam Phram  
 Changwat : Nakhon Pathom  
 UTM Grid : 367131

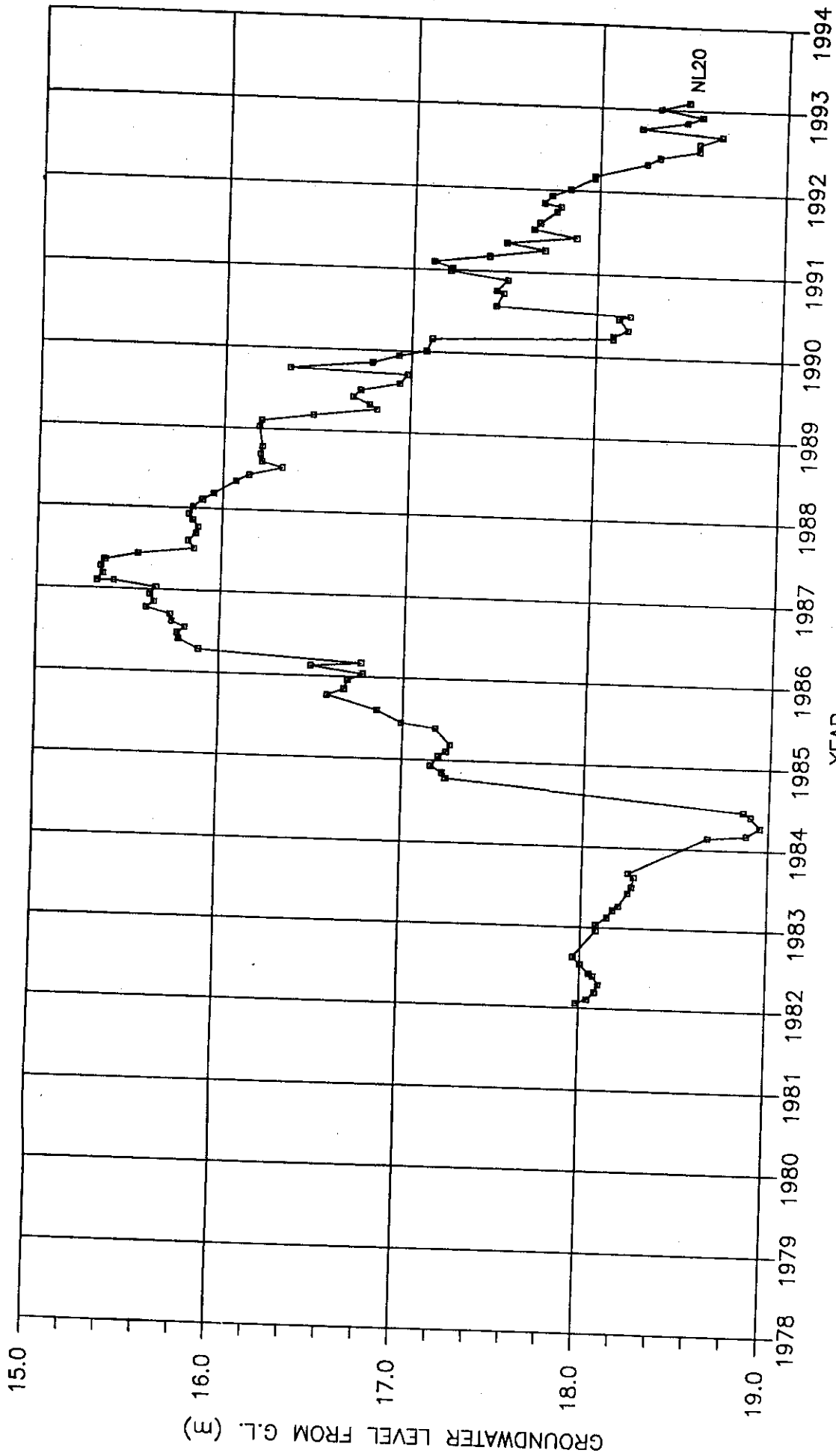
SCREEN DEPTH

NL19 : 123.0-129.0m

Figure.46 GROUNDWATER LEVEL CHANGES AT STATION No. 45

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES



LOCATION : Wat Sakae  
 Tambon : Bang Len  
 Amphoe : Bang Yai  
 Changwat : Nonthaburi  
 UTM Grid : 549316

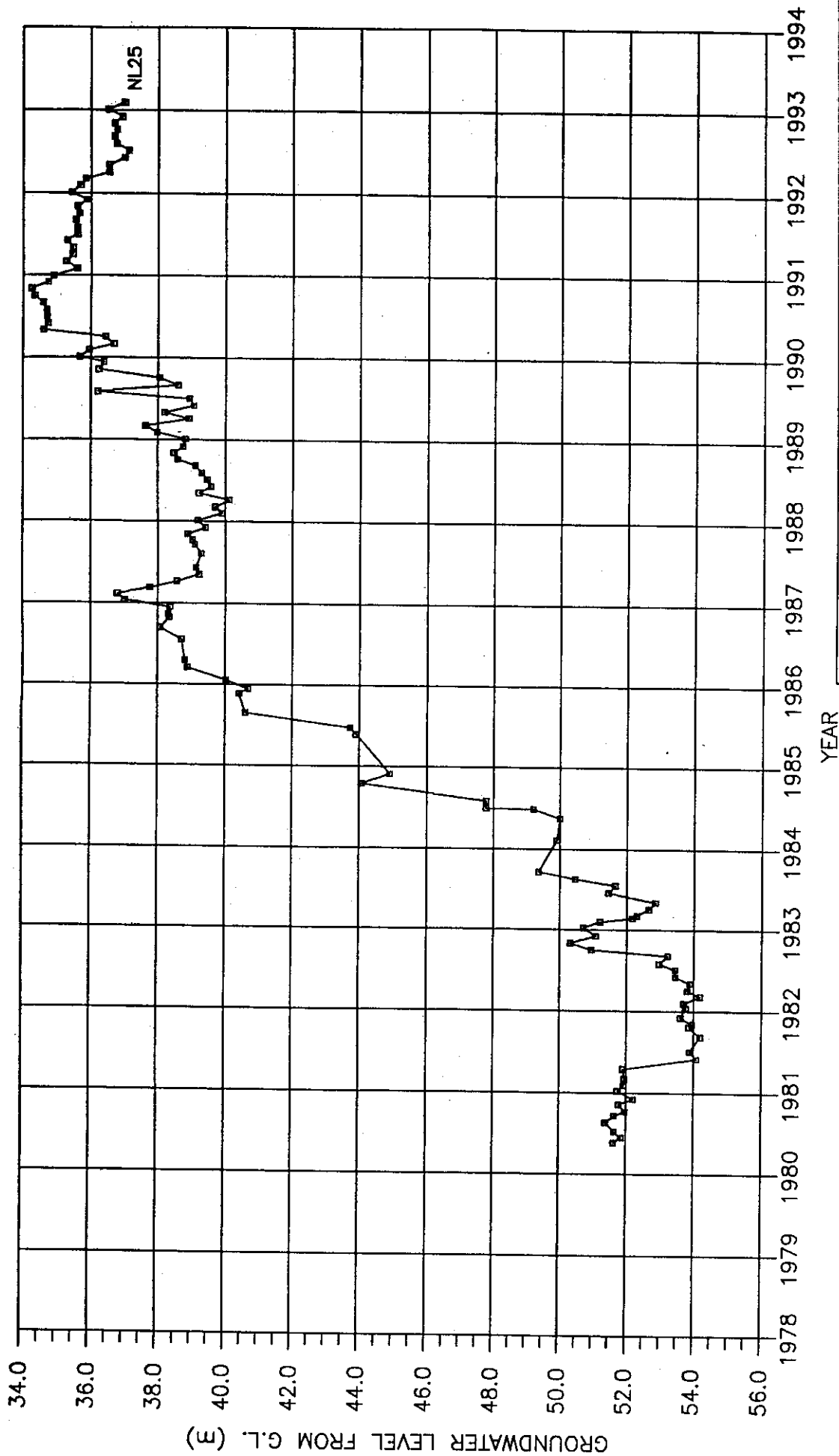
SCREEN DEPTH  
 NL20 : 131.0-137.0m

Figure.47

GROUNDWATER LEVEL CHANGES  
 AT STATION No. 46

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE  
 IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES



LOCATION : Wat Kunnathi Ruttharam  
 Tambon : Huai Khwang  
 Amphoe : Huai Khwang  
 Changwat : Bangkok  
 UTM Grid : 701235

SCREEN DEPTH  
 NL25 : 152.0-158.0m

Figure. 48  
 GROUNDWATER LEVEL CHANGES  
 AT STATION No. 47

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE  
 IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

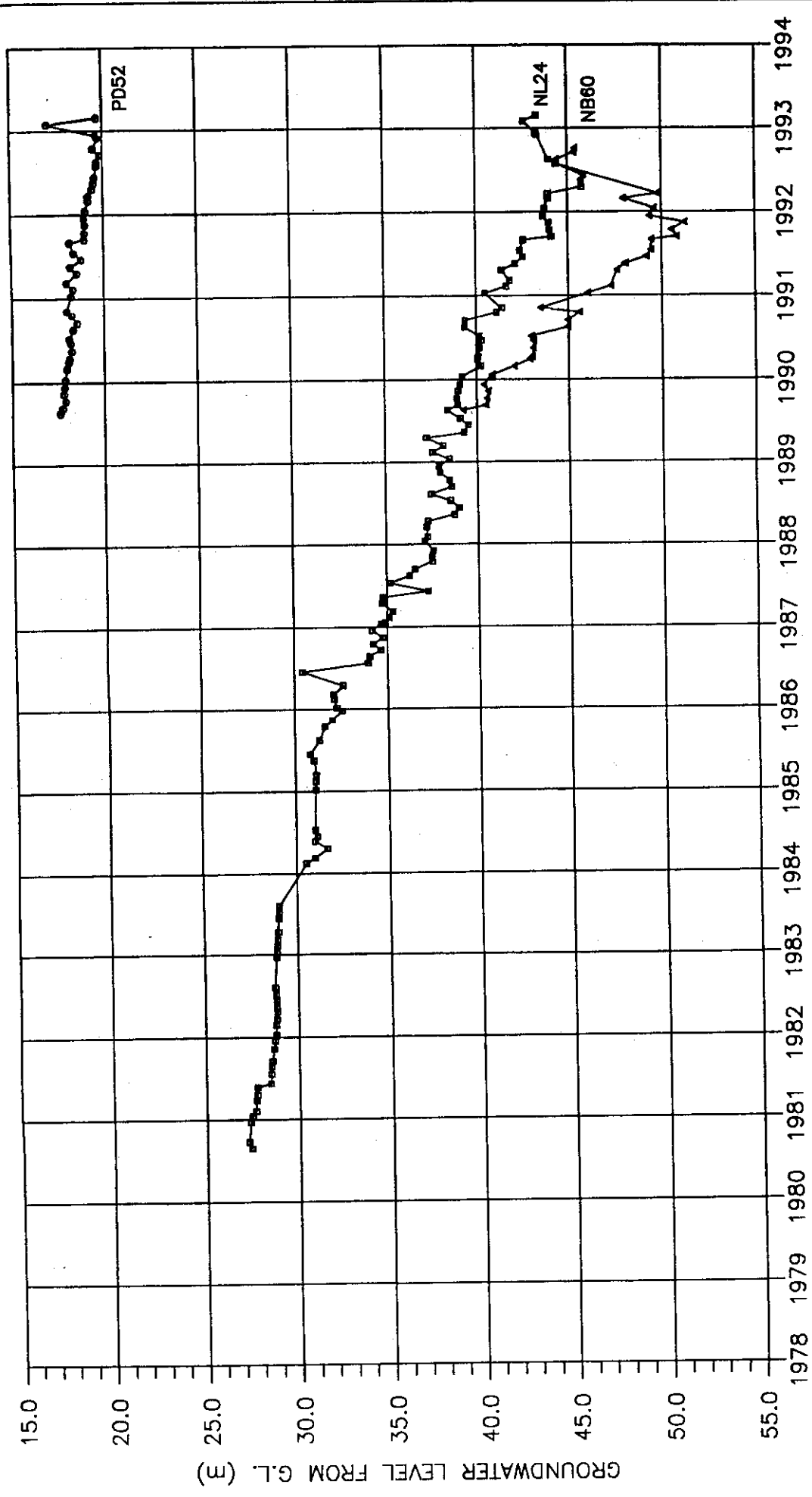


Figure 49 GROUNDWATER LEVEL CHANGES AT STATION No. 48

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

LOCATION : Wat Bang Ping  
 Tambon : Na Di  
 Amphoe : Muang Samut Sakhon  
 Changwat : Samut Sakhon  
 UTM Grid : 395034

SCREEN DEPTH :  
 PD52 : 77.0 - 83.0 m  
 NL24 : 134.0 - 140.0 m  
 NB60 : 221.0 - 227.0 m

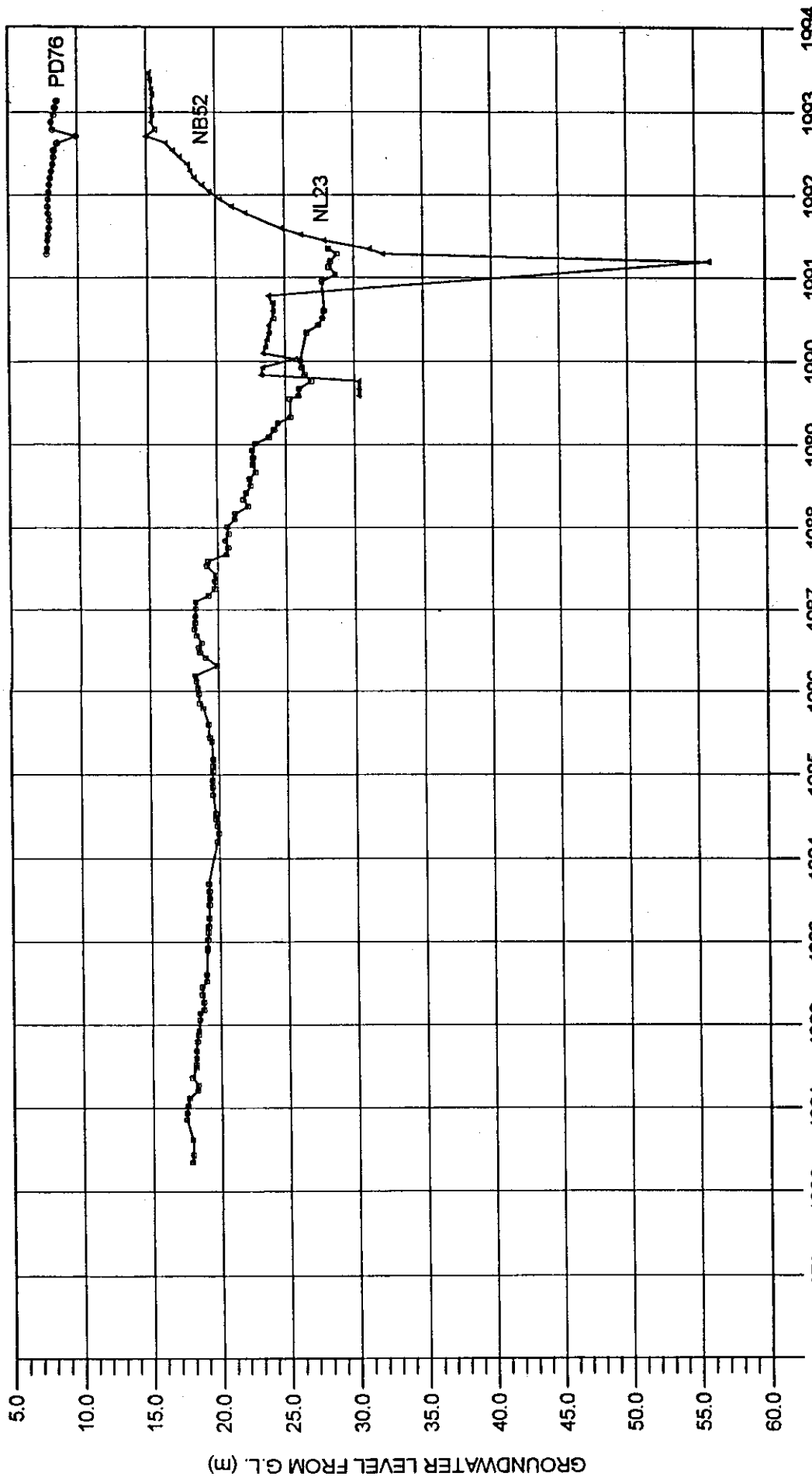
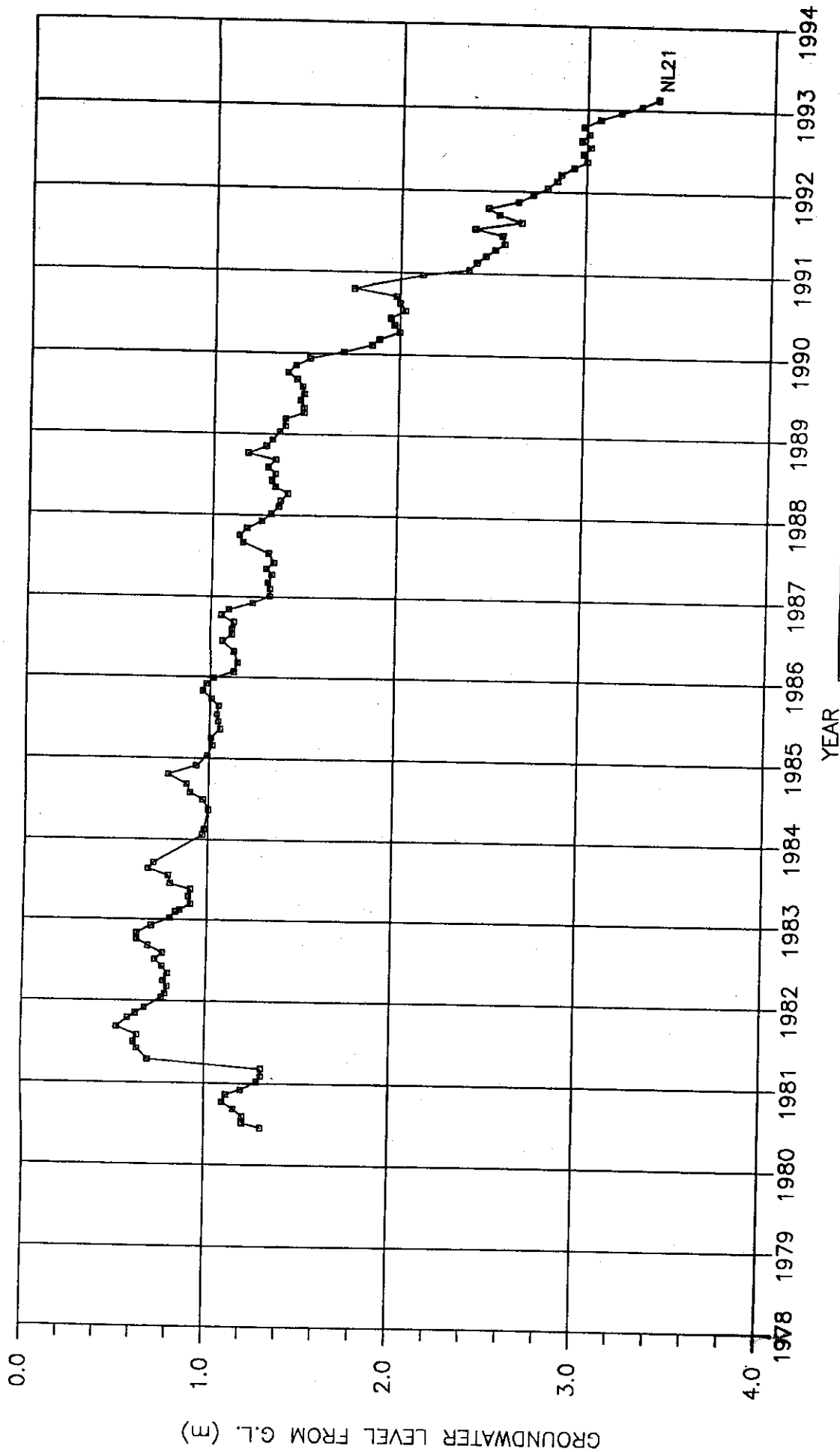


Figure. 50 GROUNDWATER LEVEL CHANGES AT STATION No. 49

LOCATION : Wat Khun Ying Som Chin  
 Tambon : Khlong Nung  
 Amphoe : Khlong Luang  
 Changwat : Pathum Thani  
 UTM Grid : 751622

SCREEN DEPTH  
 PD76 : 71.0-77.0m  
 NL23 : 144.0-150.0m  
 NB52 : 192.0-198.0m

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE  
 IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)  
 DEPARTMENT OF MINERAL RESOURCES



YEAR

LOCATION : Wat Bung Ba Praphasawat  
 Tambon : Bung Ba  
 Amphoe : Nong Sue  
 Changwat : Pathum Thani  
 UTM Grid : 971628

SCREEN DEPTH  
 NL21 : 125.0-131.0m

Figure. 51 GROUNDWATER LEVEL CHANGES AT STATION No. 50

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

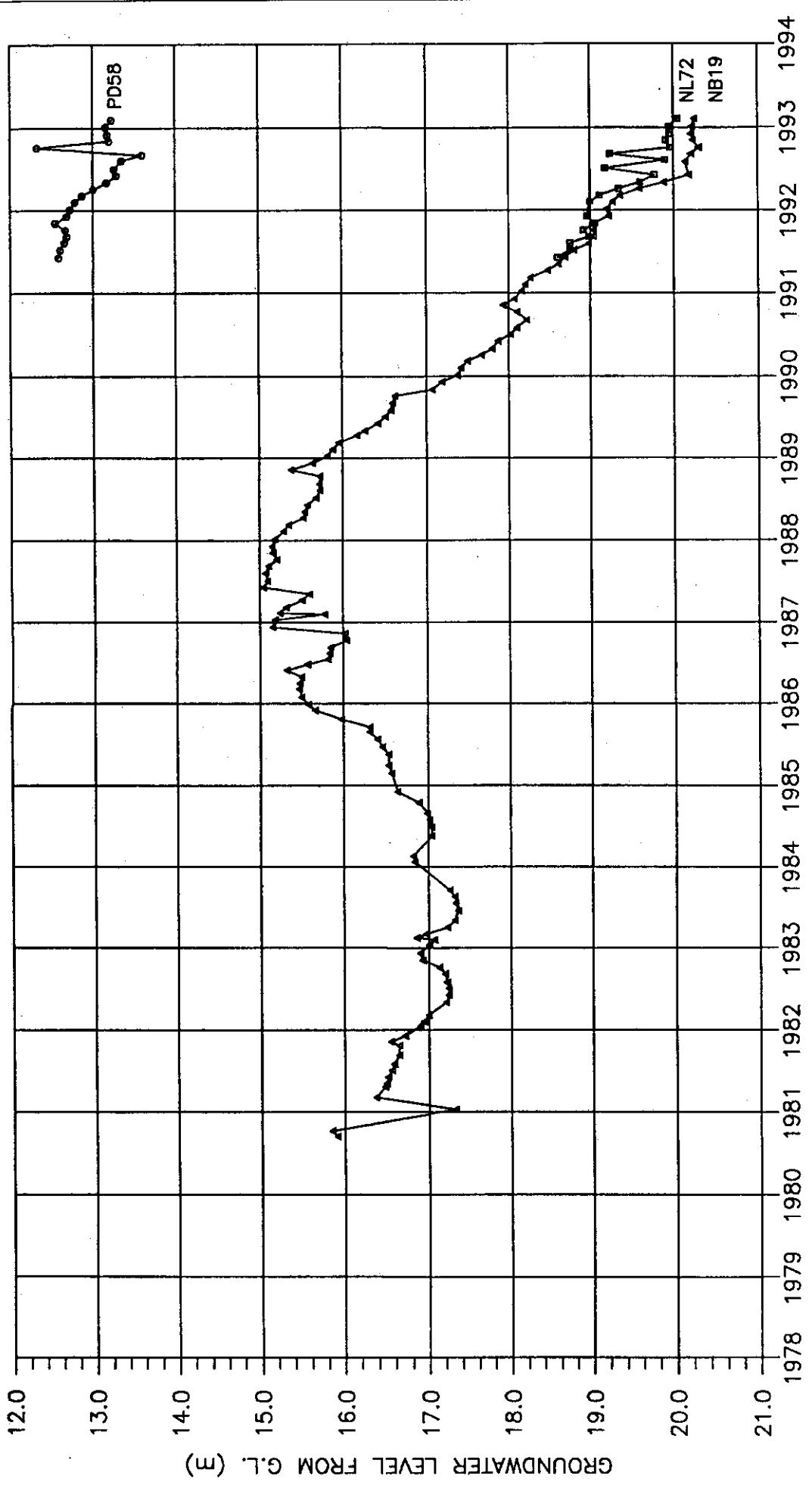


Figure.52

GROUNDWATER LEVEL CHANGES  
AT STATION No. 51

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE  
IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

LOCATION : Wat Sai Yai  
 Tambon : Sai Noi  
 Amphoe : Sai Noi  
 Changwat : Nonthaburi  
 UTM Grid : 419454

SCREEN DEPTH :

PD58 : 94.0-100.0m  
 NL72 : 149.0-155.0m  
 NB19 : 204.0-210.0m

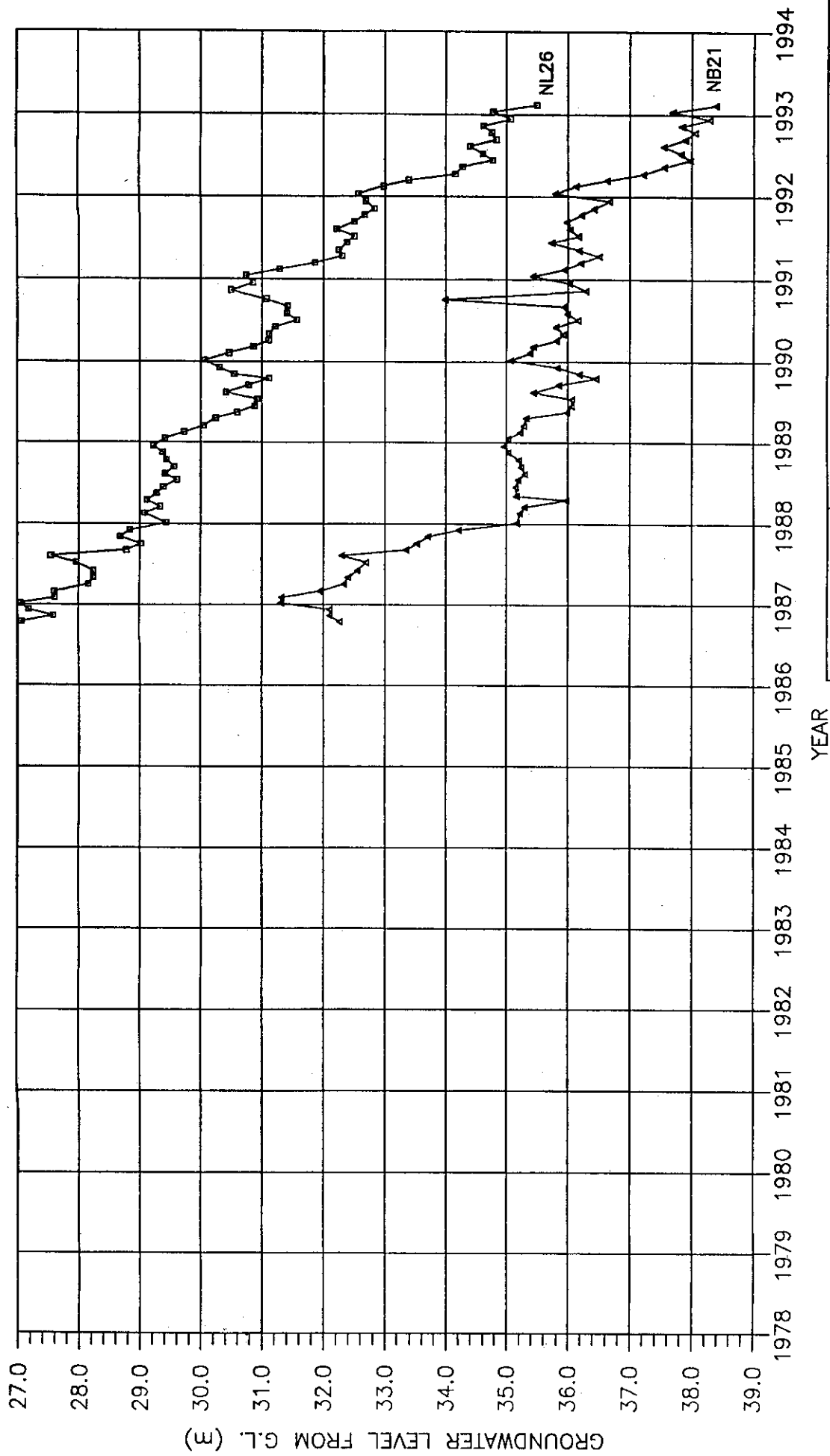


Figure.53 GROUNDWATER LEVEL CHANGES AT STATION No. 52

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

LOCATION : Wat Prayun Thammaram  
 Tambon : Khu Khot  
 Amphoe : Lam Luk Ka  
 Changwat : Pathum Thani  
 UTM Grid : 743438

SCREEN DEPTH  
 NL26 : 145.0-151.0 m  
 NB21 : 187.0-193.0 m

YEAR

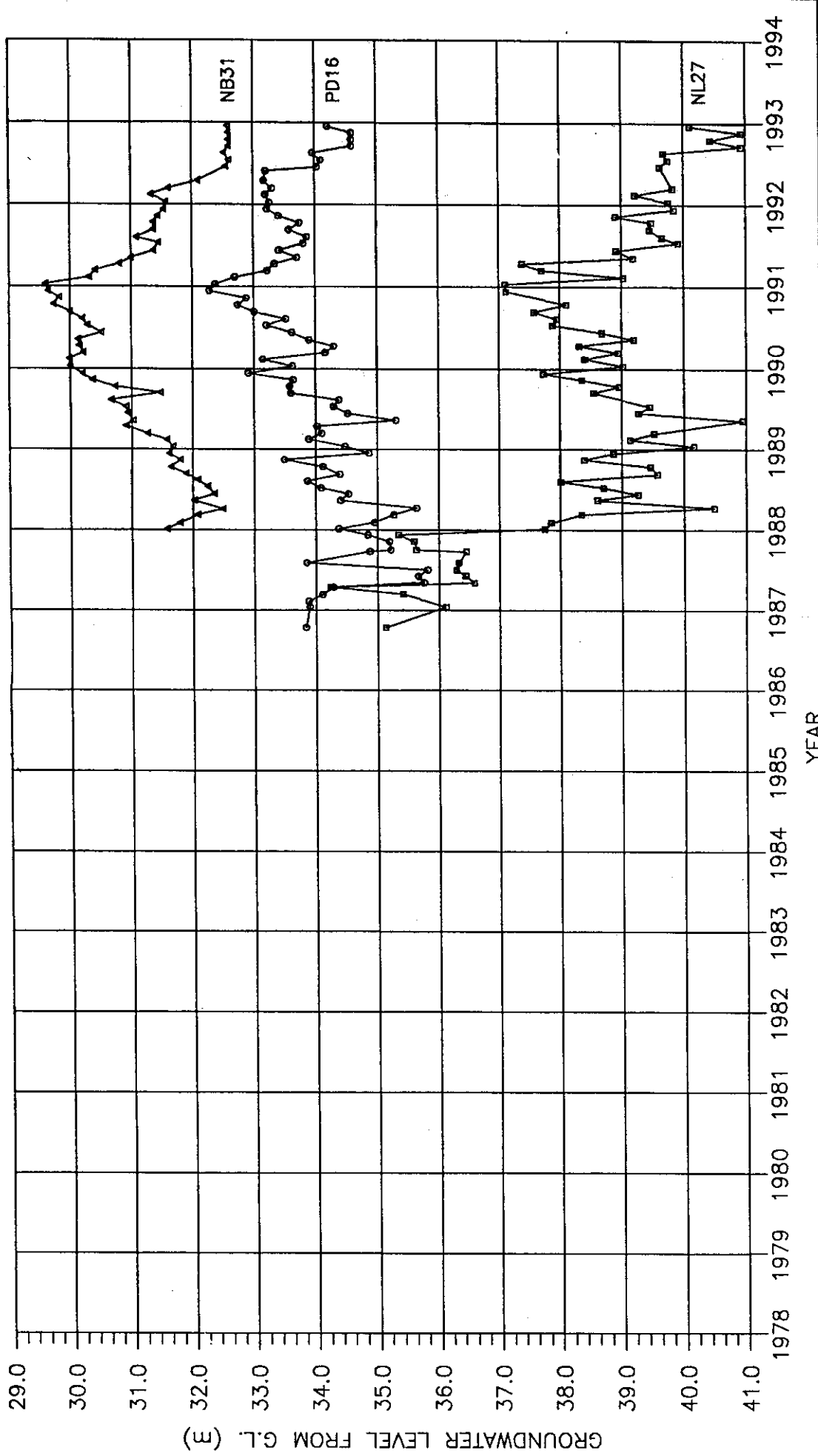


Figure. 54 GROUNDWATER LEVEL CHANGES AT STATION No. 53

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

LOCATION : Pig Quarantine Station  
 Tambon : Samrong Tai  
 Amphoe : Phra Pradaeng  
 Changwat : Samut Prakan  
 UTM Grid : 704091

SCREEN DEPTH  
 PD16 : 92.0 - 98.0 m  
 NL27 : 138.0 - 144.0 m  
 NB31 : 200.0 - 206.0 m

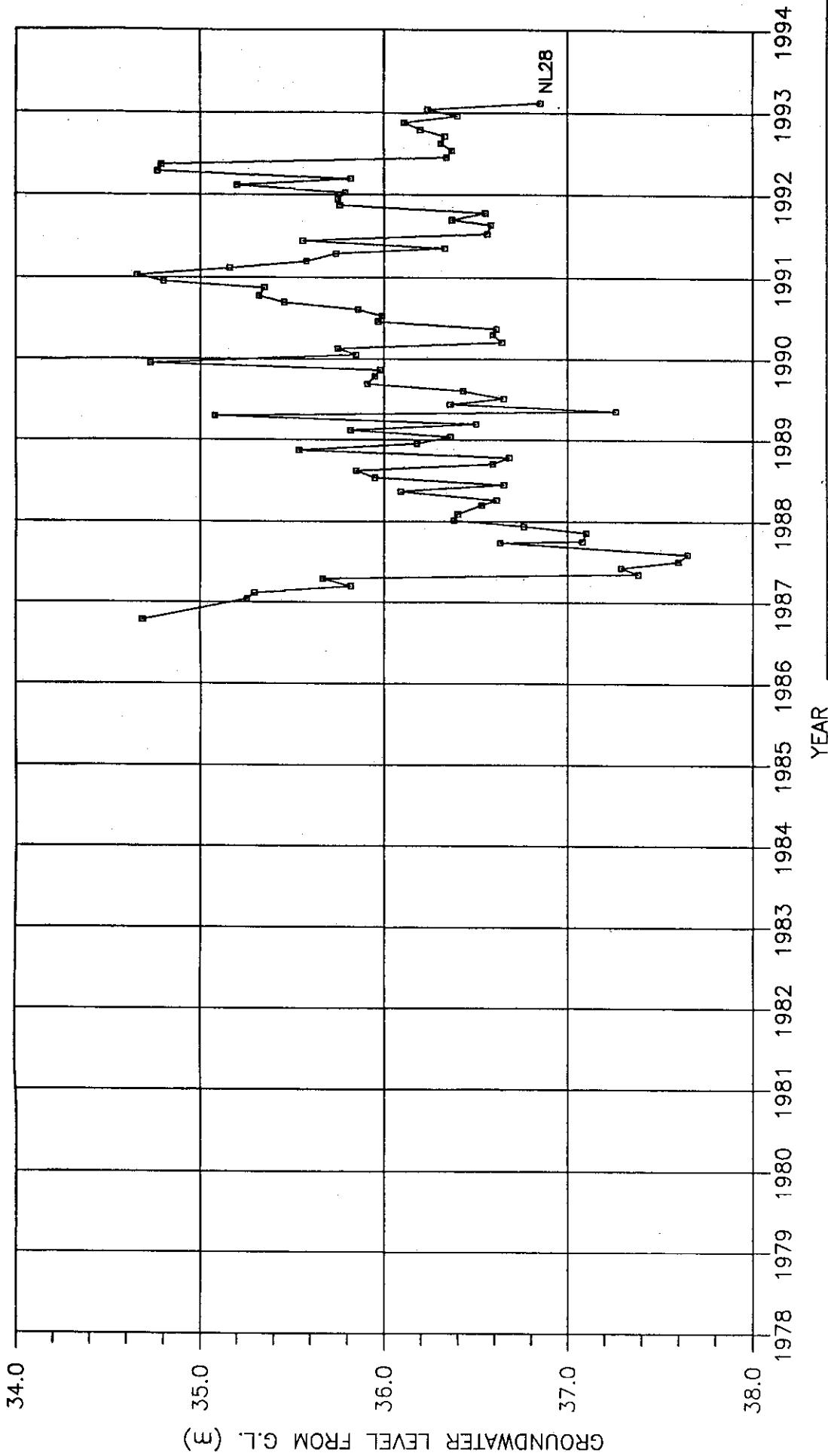


Figure.55 GROUNDWATER LEVEL CHANGES AT STATION No. 54

LOCATION : Wat Mahawang  
 Tambon : Samrong Tai  
 Amphoe : Phra Pradaeng  
 Changwat : Samut Sakhon  
 UTM Grid : 714094

SCREEN DEPTH  
 NL28 : 134.0-140.0m

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

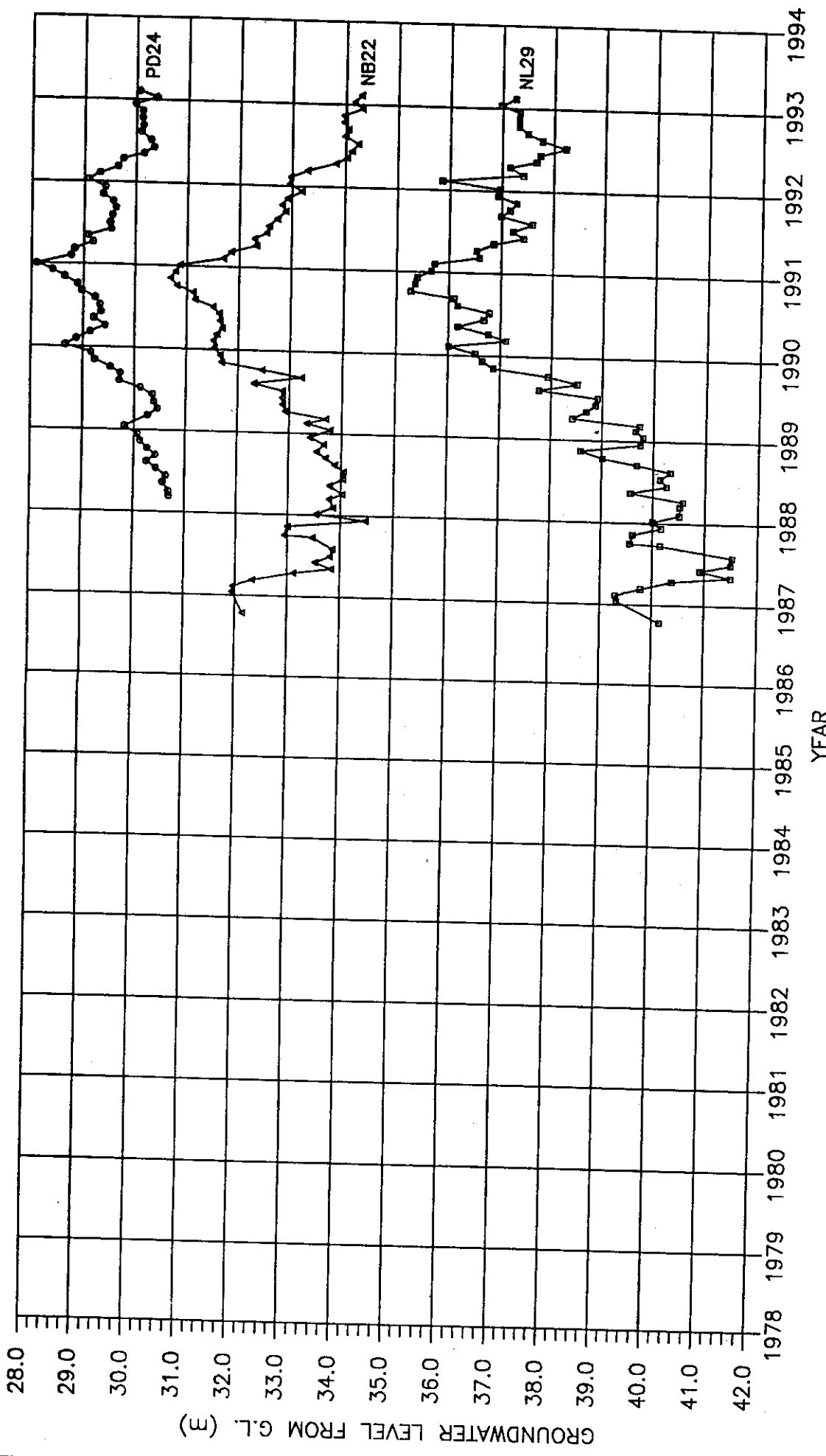


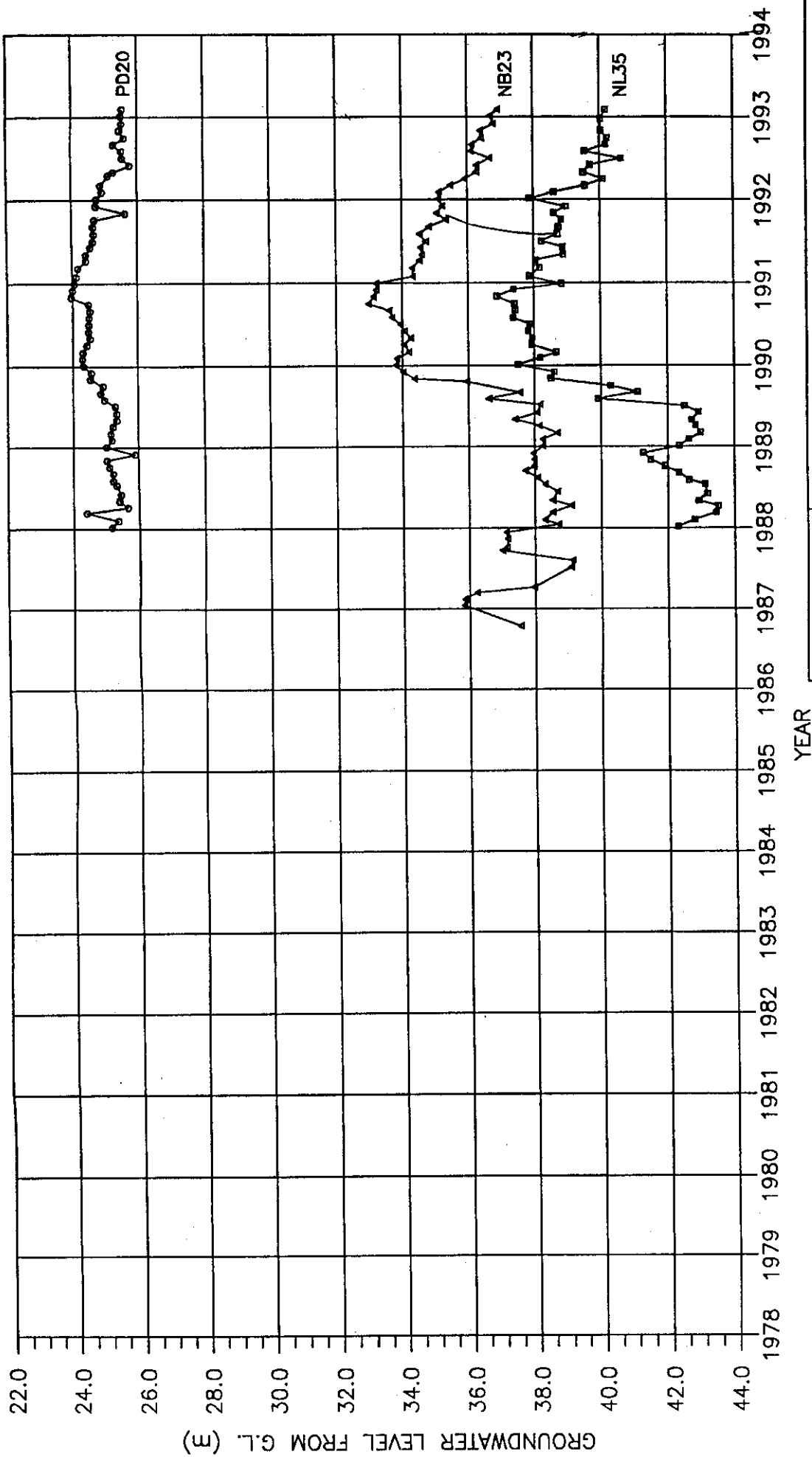
Figure. 56 GROUNDWATER LEVEL CHANGES AT STATION No. 55

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

LOCATION : Flood Control Station  
 Tambon : Phra Khanong  
 Amphoe : Bangkok  
 Changwat : Bangkok  
 UTM Grid : 728158

SCREEN DEPTH  
 PD24 : 103.0-109.0m  
 NL29 : 155.0-161.0m  
 NB22 : 215.0-221.0m



LOCATION : Wat Sarnakhi  
 Tambon : Bang Kapi  
 Amphoe : Bangkok  
 Changwat : Bangkok  
 UTM Grid : 733240

SCREEN DEPTH  
 PD20 : 90.0 - 96.0m  
 NL35 : 159.0 - 165.0m  
 NB23 : 212.0 - 218.0m

Figure. 57 GROUNDWATER LEVEL CHANGES AT STATION No. 56

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

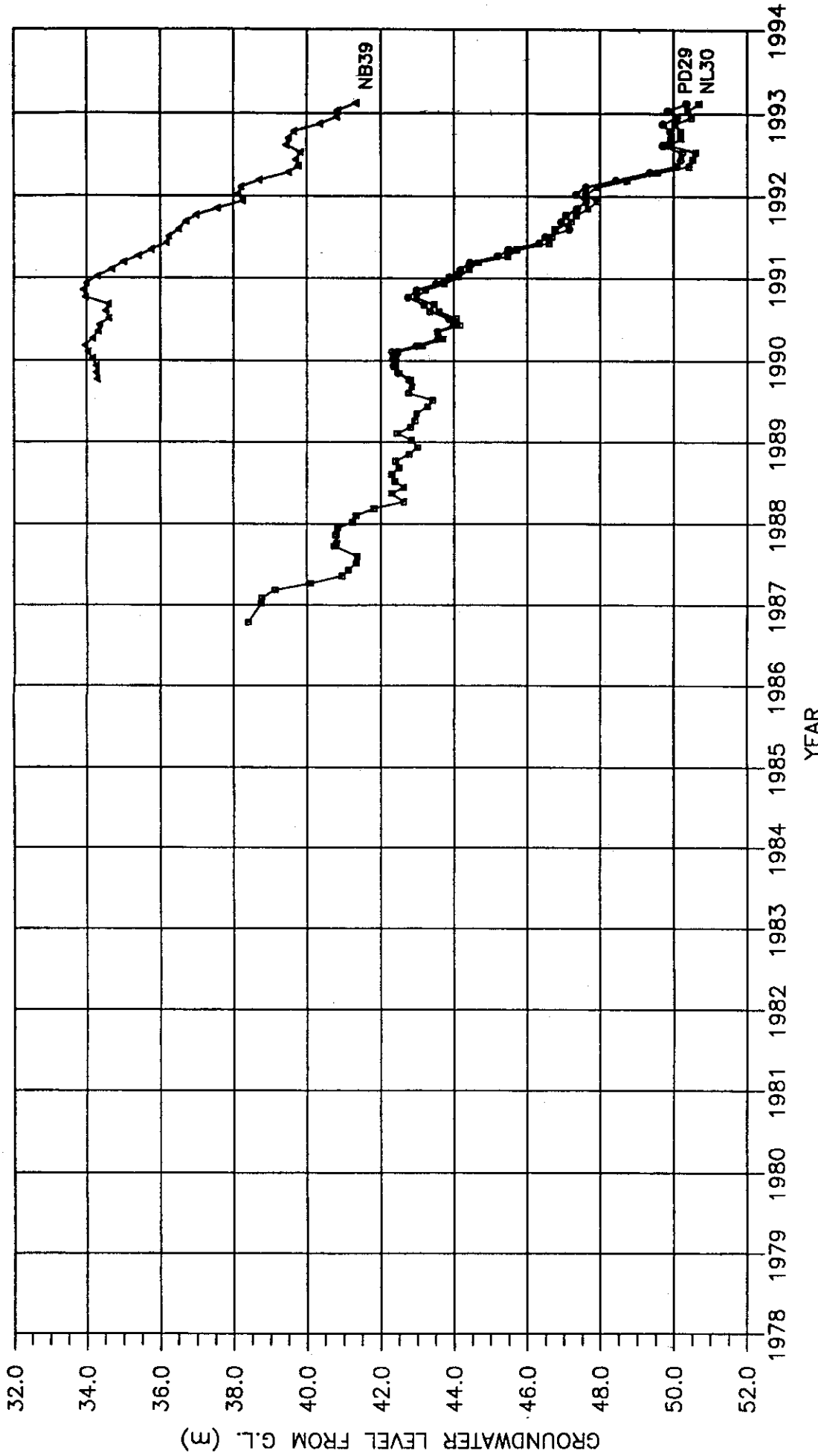


Figure. 58 GROUNDWATER LEVEL CHANGES AT STATION No. 57

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

LOCATION : Wat King Kaeo  
 Tambon : Racha Thewa  
 Amphoe : Bang Phli  
 Changwat : Samut Prakan  
 UTM Grid : 861122

SCREEN DEPTH  
 PD29 : 104.0-110.0m  
 NL30 : 143.0-149.0m  
 NB39 : 189.0-195.0m

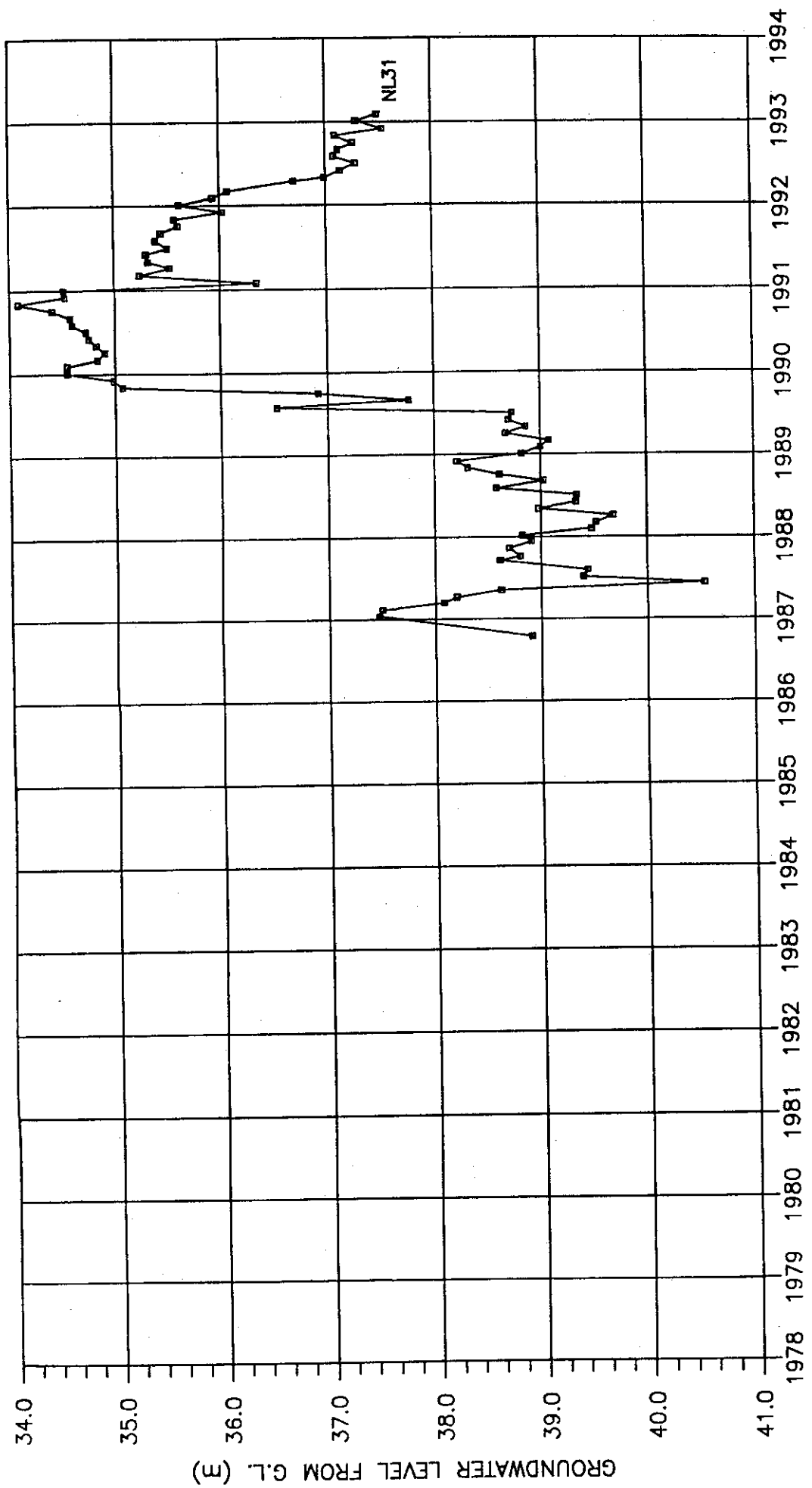


Figure.59 GROUNDWATER LEVEL CHANGES AT STATION No. 58

LOCATION : Wat Sirikamalawat  
 Tambon : Lat Phrao  
 Amphoe : Bang Kapi  
 Changwat : Bangkok  
 UTM Grid : 722289

SCREEN DEPTH  
 NL31 : 160.0-166.0m

DEPARTMENT OF MINERAL RESOURCES

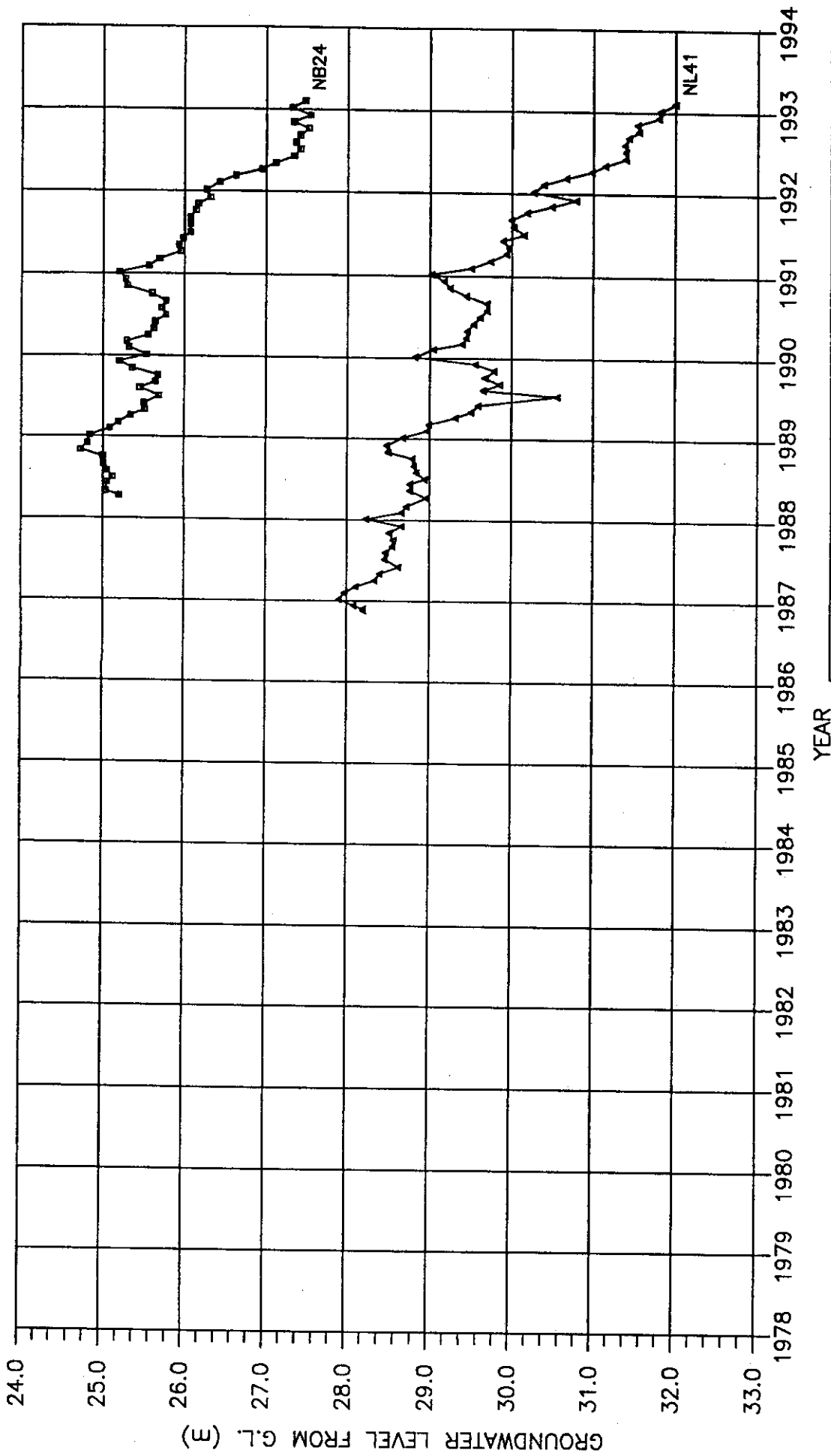


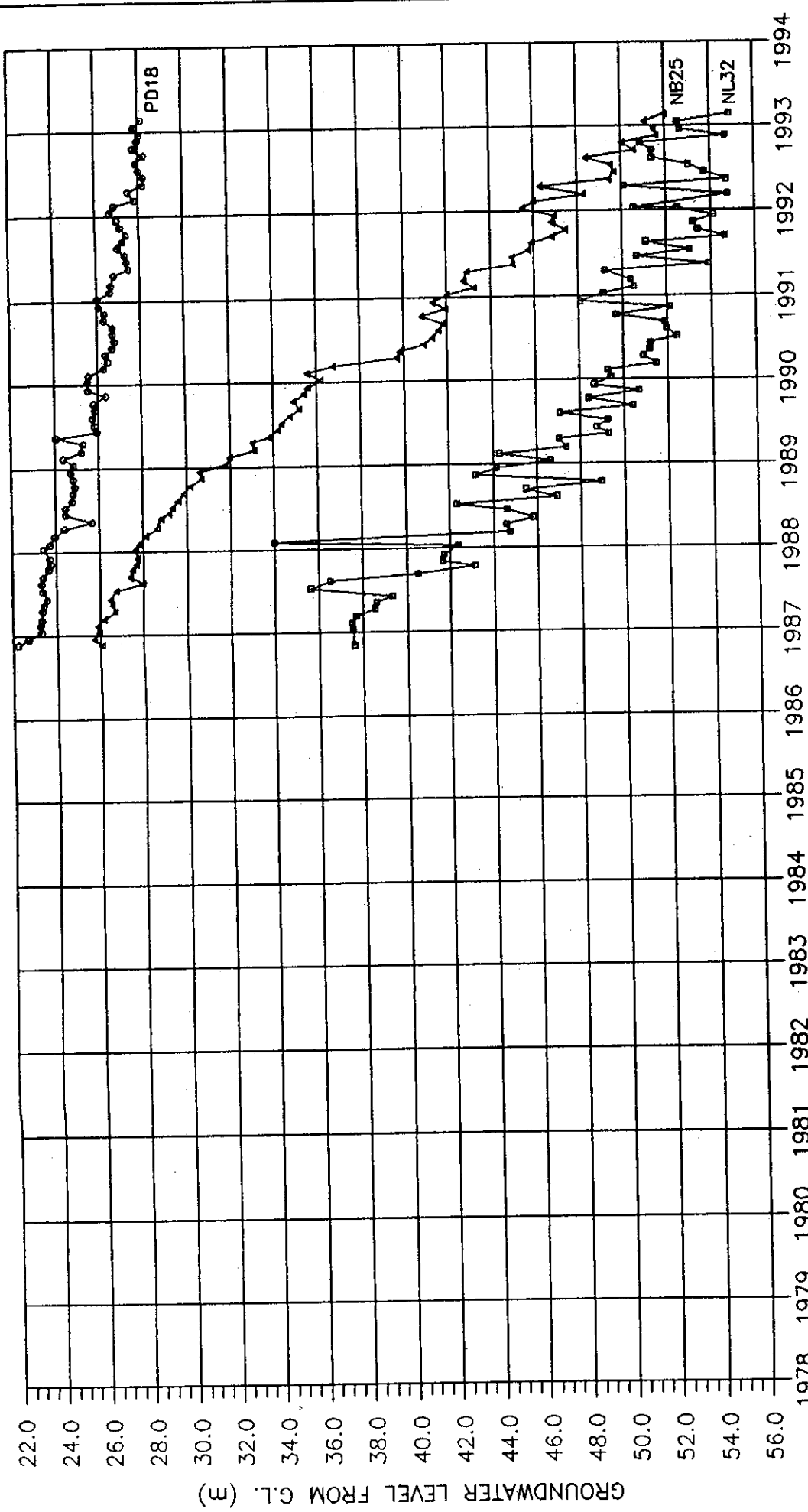
Figure.60 GROUNDWATER LEVEL CHANGES AT STATION No. 59

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

LOCATION : Khlong Klua School  
 Tambon : Pak Kret  
 Amphoe : Pak Kret  
 Changwat : Nonthaburi  
 UTM Grid : 668368

SCREEN DEPTH  
 NL41 : 144.0-150.0m  
 NB24 : 196.0-202.0m



YEAR

SCREEN DEPTH

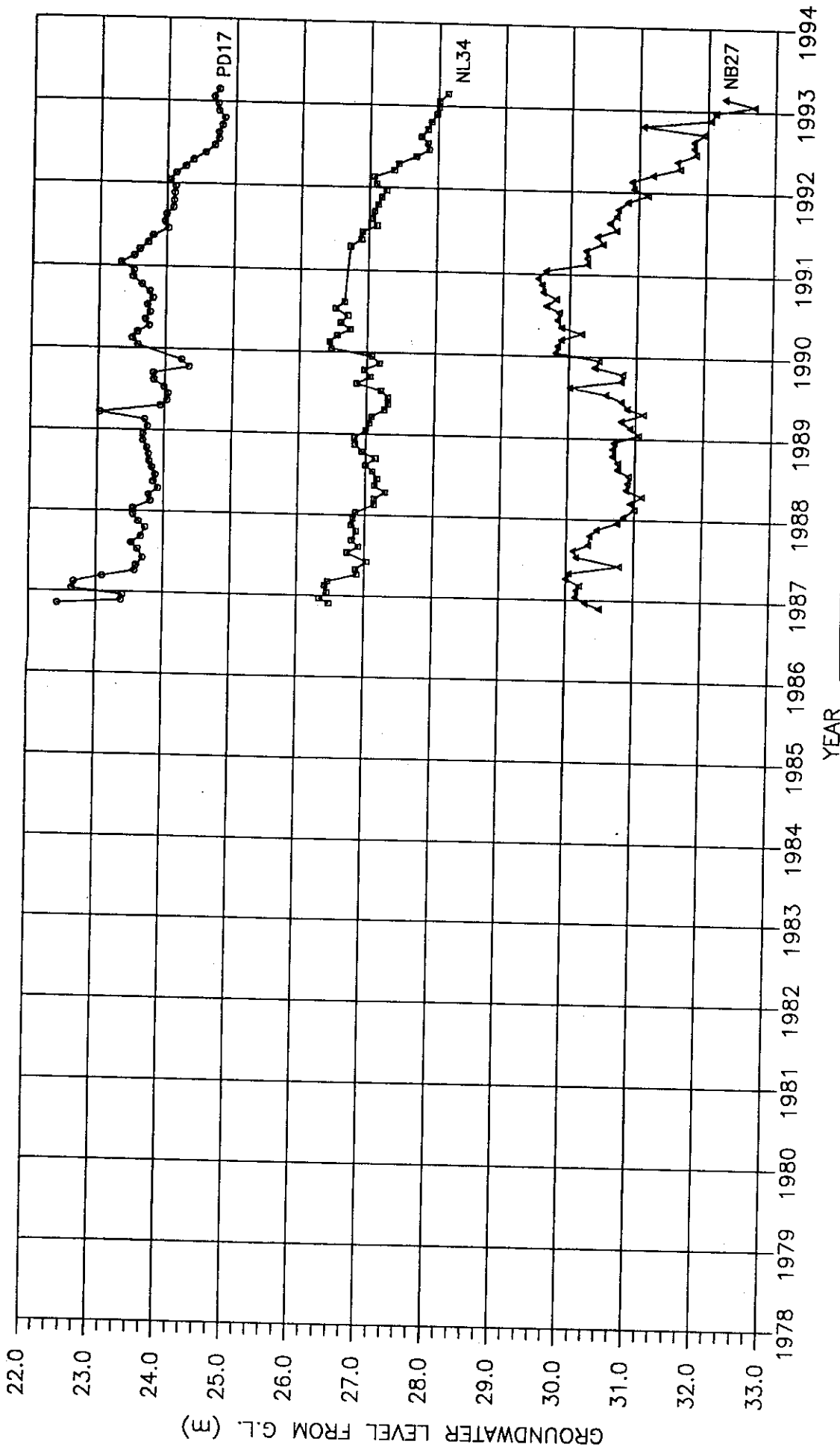
PD18 : 83.0-89.0m  
 NL32 : 147.0-153.0m  
 NB25 : 210.0-216.0m

LOCATION : Wat Nang Sao  
 Tambon : Tha Mai  
 Amphoe : Krathum Baen  
 Changwat : Samut Prakan  
 UTM Grid : 375110

Figure. 61 GROUNDWATER LEVEL CHANGES AT STATION No. 60

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES



SCREEN DEPTH  
 PD17 : 84.0 - 90.0m  
 NL34 : 131.0 - 137.0m  
 NB27 : 190.0 - 196.0m

LOCATION : DMR  
 Tambon : Thung Phaya Thai  
 Amphoe : Phaya Thai  
 Changwat : Bangkok  
 UTM Grid : 654218

Figure. 62 GROUNDWATER LEVEL CHANGES AT STATION No. 61

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

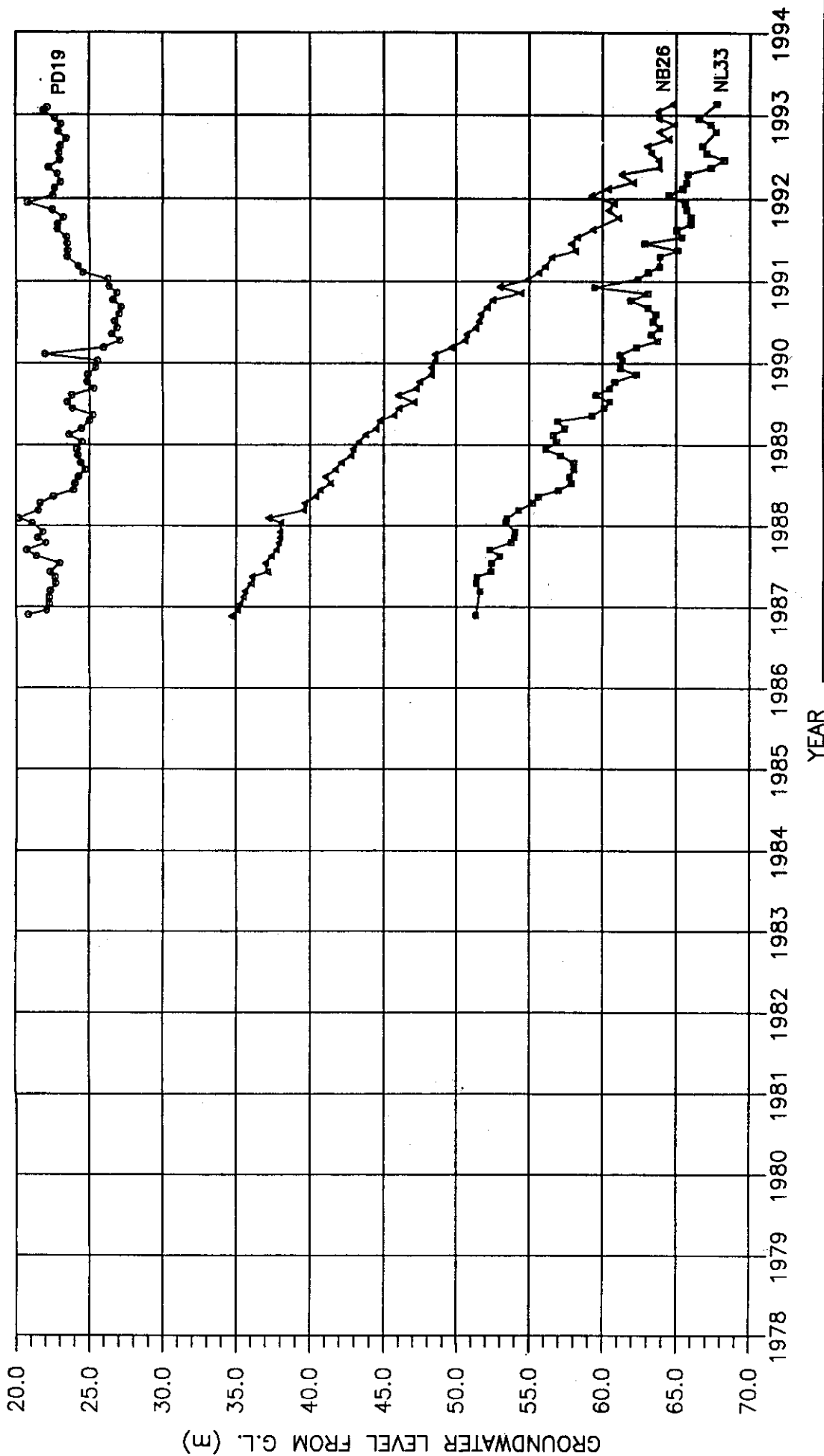


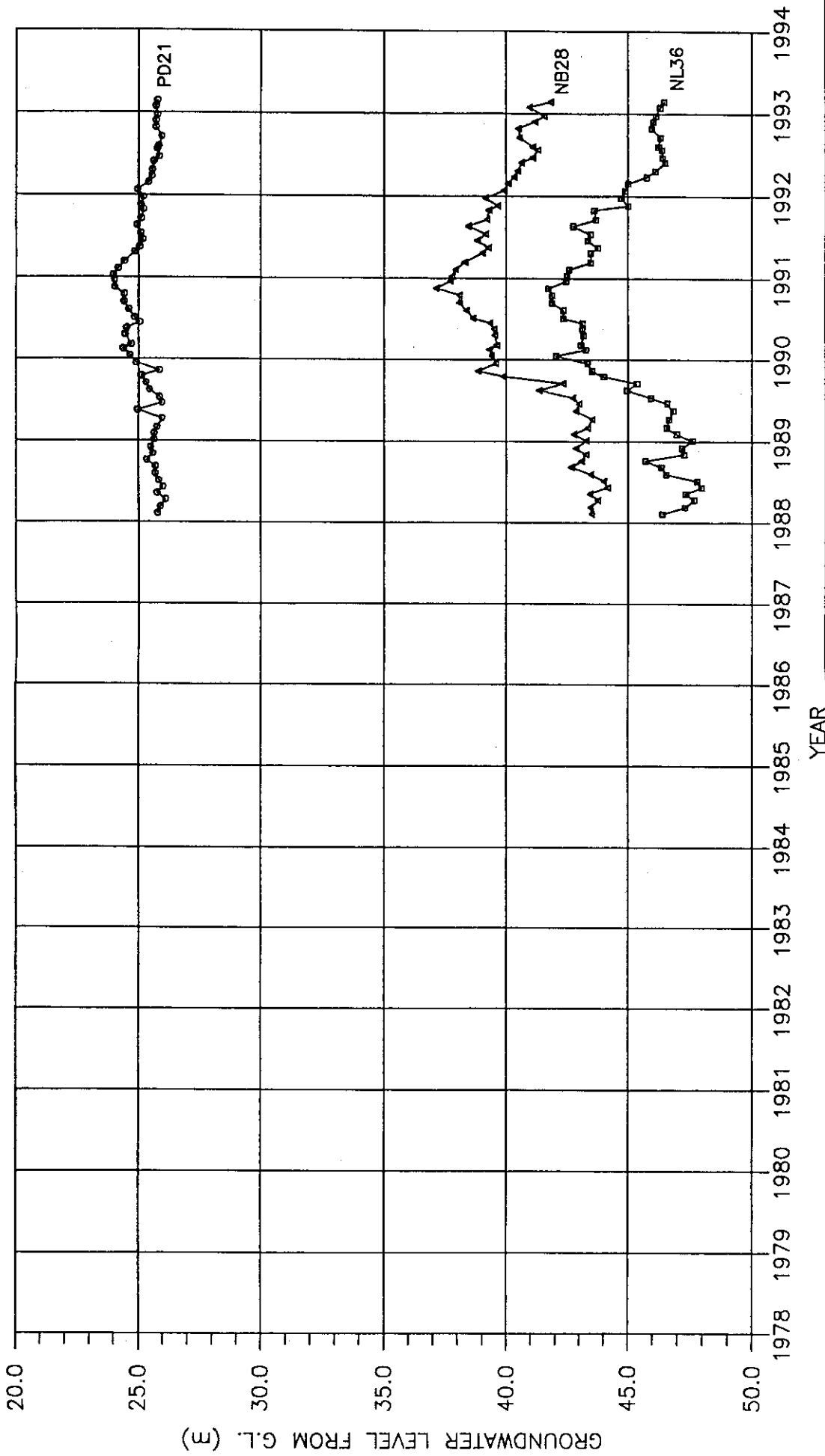
Figure. 63 GROUNDWATER LEVEL CHANGES AT STATION No. 62

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

LOCATION : Provincial Hall  
 Tambon : Mahachai  
 Amphoe : Muang Samut Prakan  
 Changwat : Samut Prakan  
 UTM Grid : 383978

SCREEN DEPTH  
 PD19 : 93.0 - 99.0 m  
 NL33 : 160.0 - 166.0 m  
 NB26 : 202.0 - 208.0 m



LOCATION : National Housing Authority  
 Tambon : Khlong Chan  
 Amphoe : Bang Kapi  
 Changwat : Bangkok  
 UTM Grid : 788227

SCREEN DEPTH  
 PD21 : 103.0-109.0m  
 NL36 : 157.0-163.0m  
 NB28 : 211.0-217.0m

Figure.64 GROUNDWATER LEVEL CHANGES AT STATION No. 63  
 MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

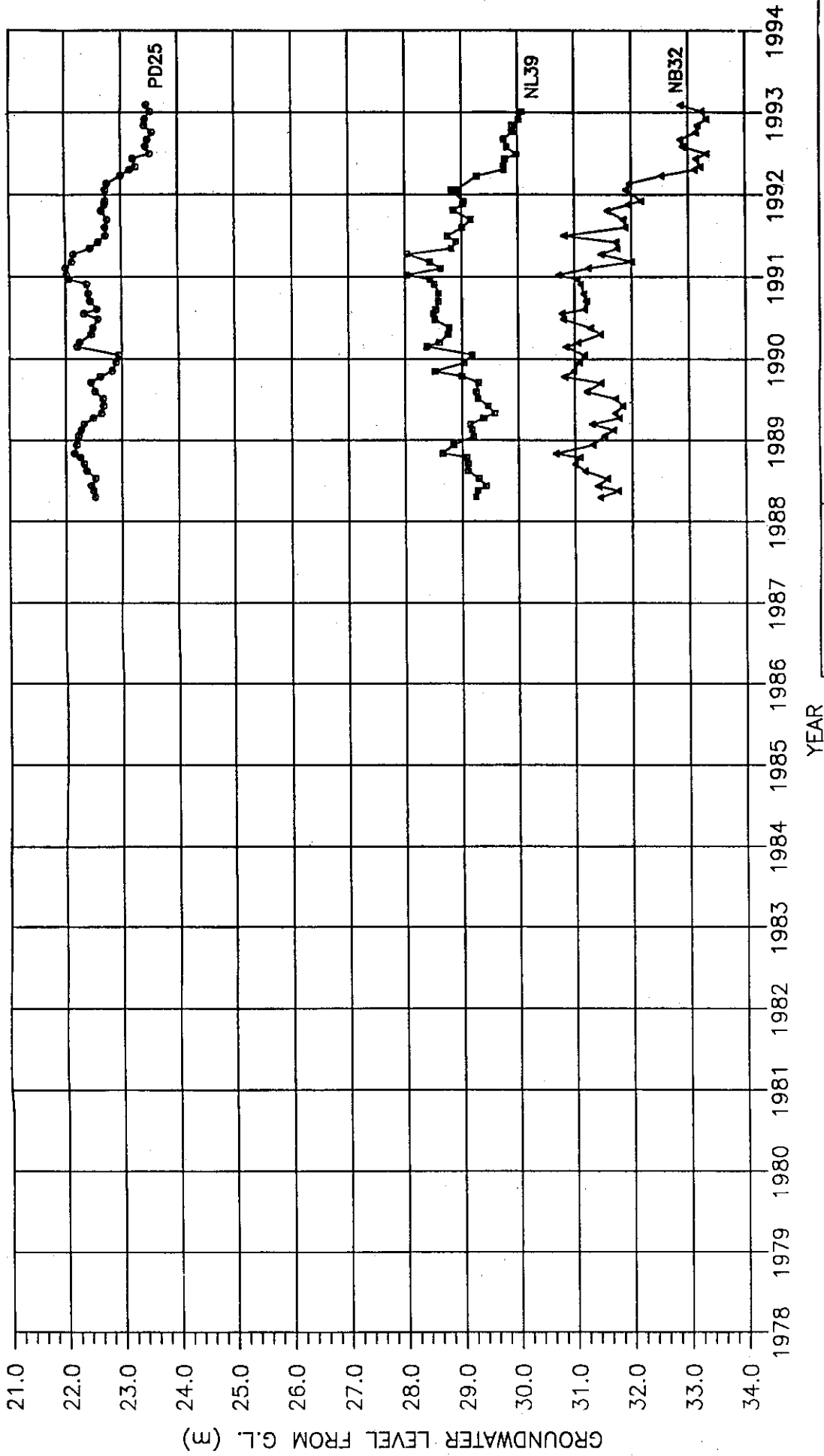


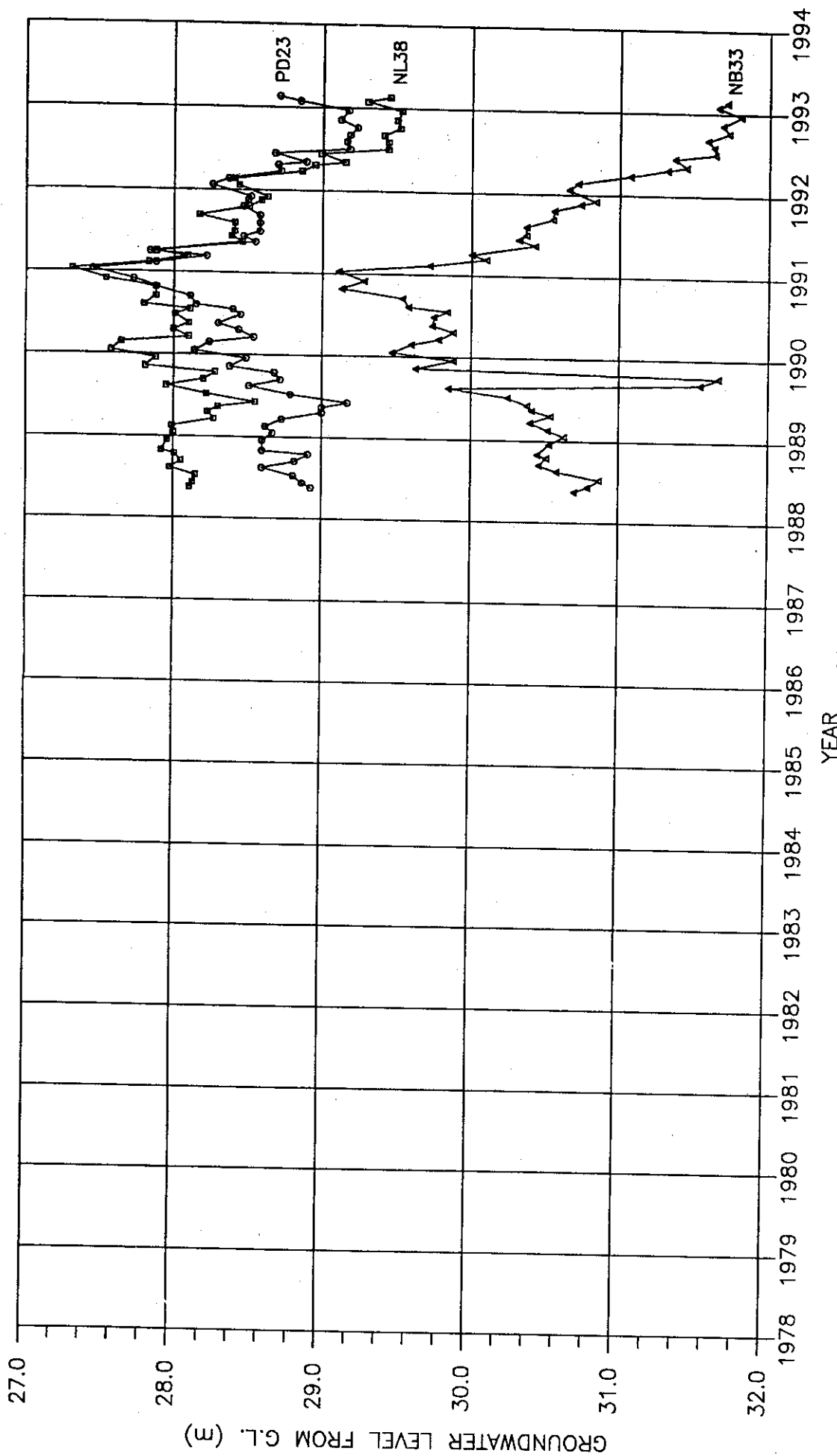
Figure.65 GROUNDWATER LEVEL CHANGES AT STATION No. 64

LOCATION : Wat Kaeo Fa Chula Mani  
 Tambon : Thanon Nakhon Chaisi  
 Amphoe : Dusit  
 Changwat : Bangkok  
 UTM Grid : 645257

SCREEN DEPTH  
 PD25 : 94.0-100.0m  
 NL39 : 168.0-174.0m  
 NB32 : 192.0-198.0m

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES



LOCATION : Mahamek Electrical Substation  
 Tambon : Chong Nonsi  
 Amphoe : Yan Nawa  
 Changwat : Bangkok  
 UTM Grid : 659148

SCREEN DEPTH  
 PD23 : 114.0-120.0m  
 NL38 : 150.0-156.0m  
 NB33 : 211.0-217.0m

Figure. 66 GROUNDWATER LEVEL CHANGES AT STATION No. 65

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

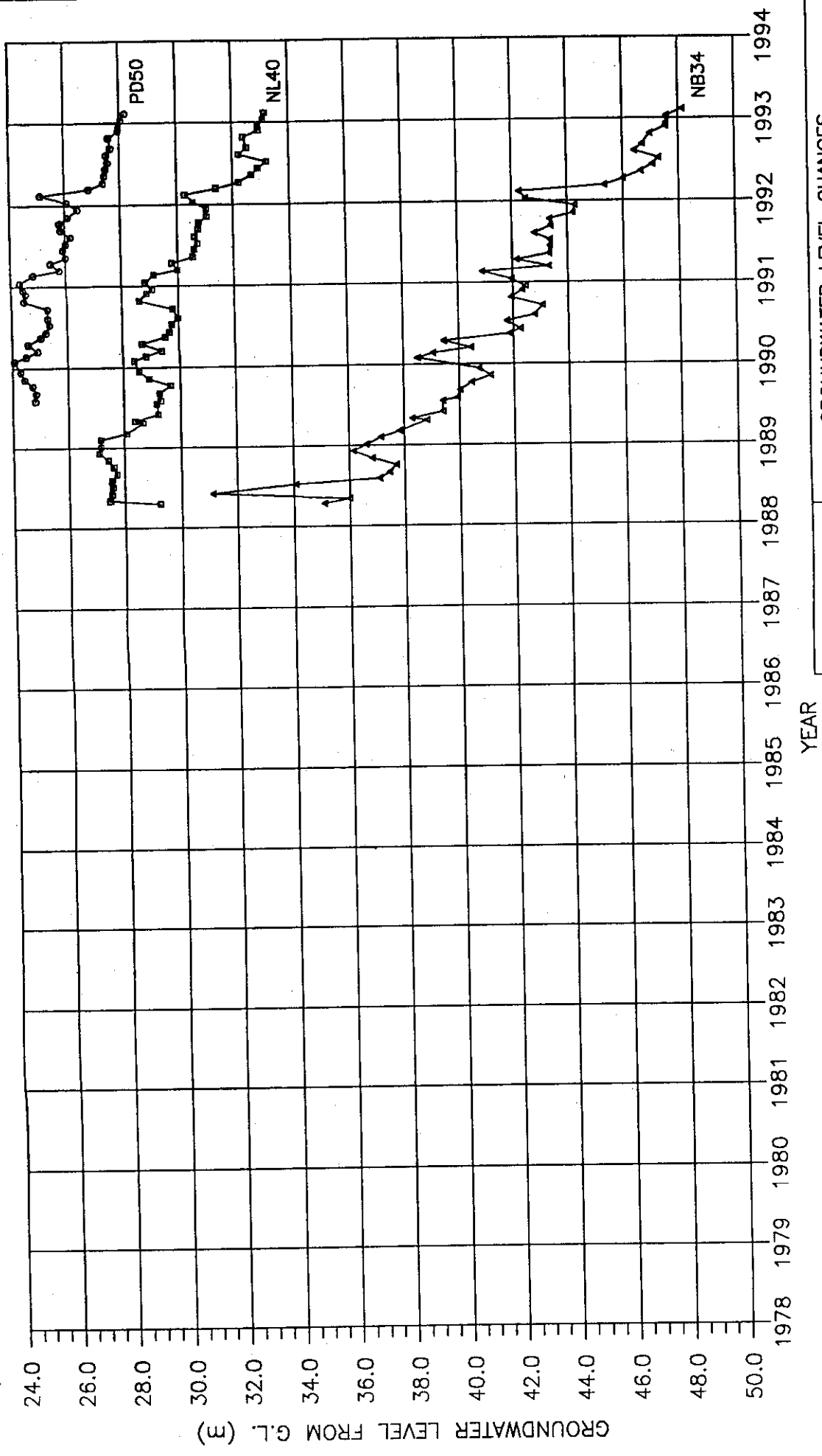


Figure. 67 GROUNDWATER LEVEL CHANGES AT STATION No. 66

LOCATION : Bunkhum Rat Bamrung Scho  
 Tambon : Khlong Nung  
 Amphoe : Khlong Luang  
 Changwat : Pathum Thani  
 UTM Grid : 742491

SCREEN DEPTH  
 PD50 : 92.0 - 98.0m  
 NL40 : 133.0 - 139.0m  
 NB34 : 183.0 - 189.0m

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE  
 IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

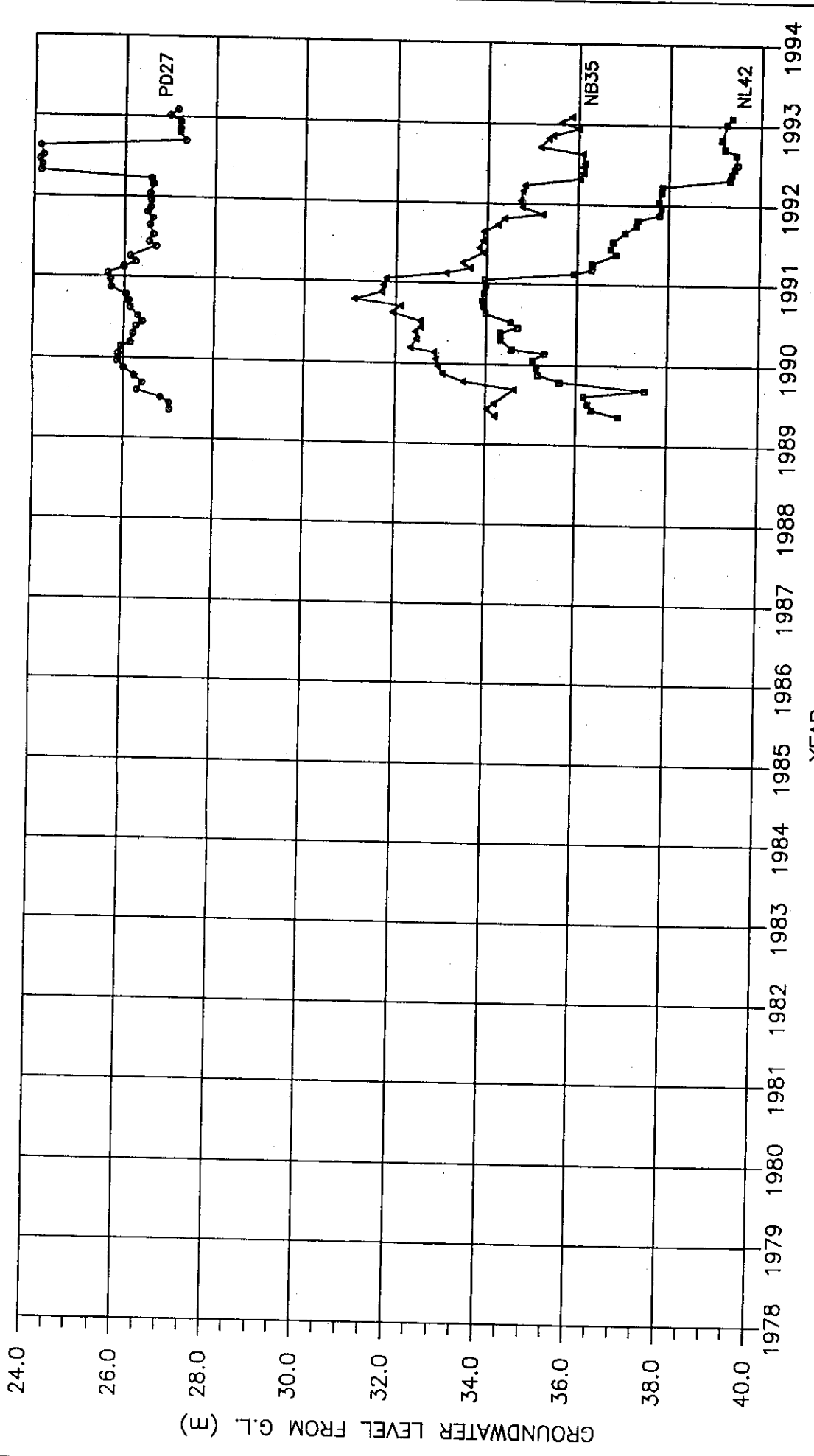


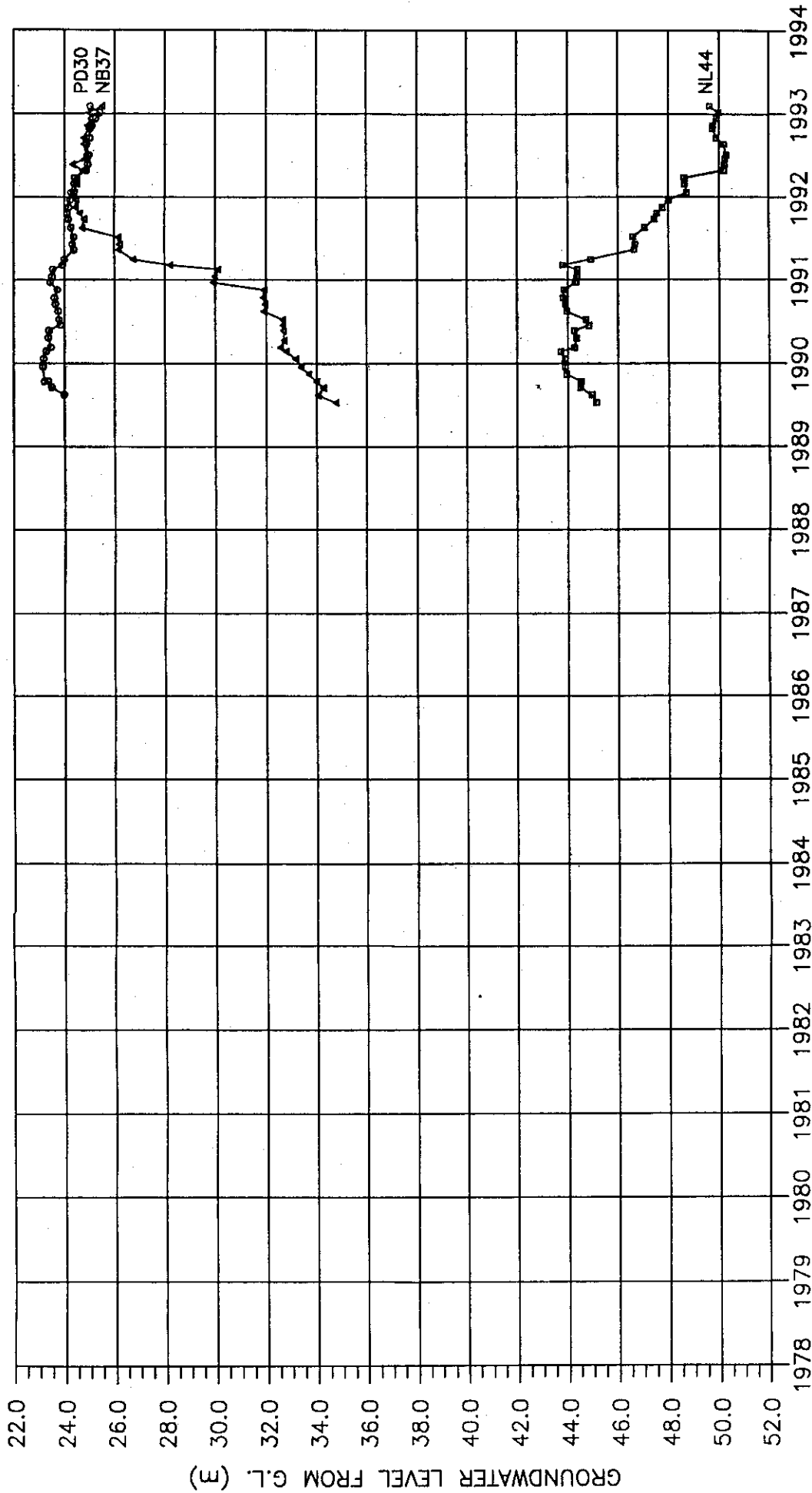
Figure. 68 GROUNDWATER LEVEL CHANGES AT STATION No. 67

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

LOCATION : Wat Wachiratham Sathit  
 Tambon : Bang Chak  
 Amphoe : Phra Khanong  
 Changwat : Bangkok  
 UTM Grid : 772139

SCREEN DEPTH  
 PD27 : 78.0-84.0m  
 NL42 : 172.0-178.0m  
 NB35 : 208.0-214.0m,



YEAR

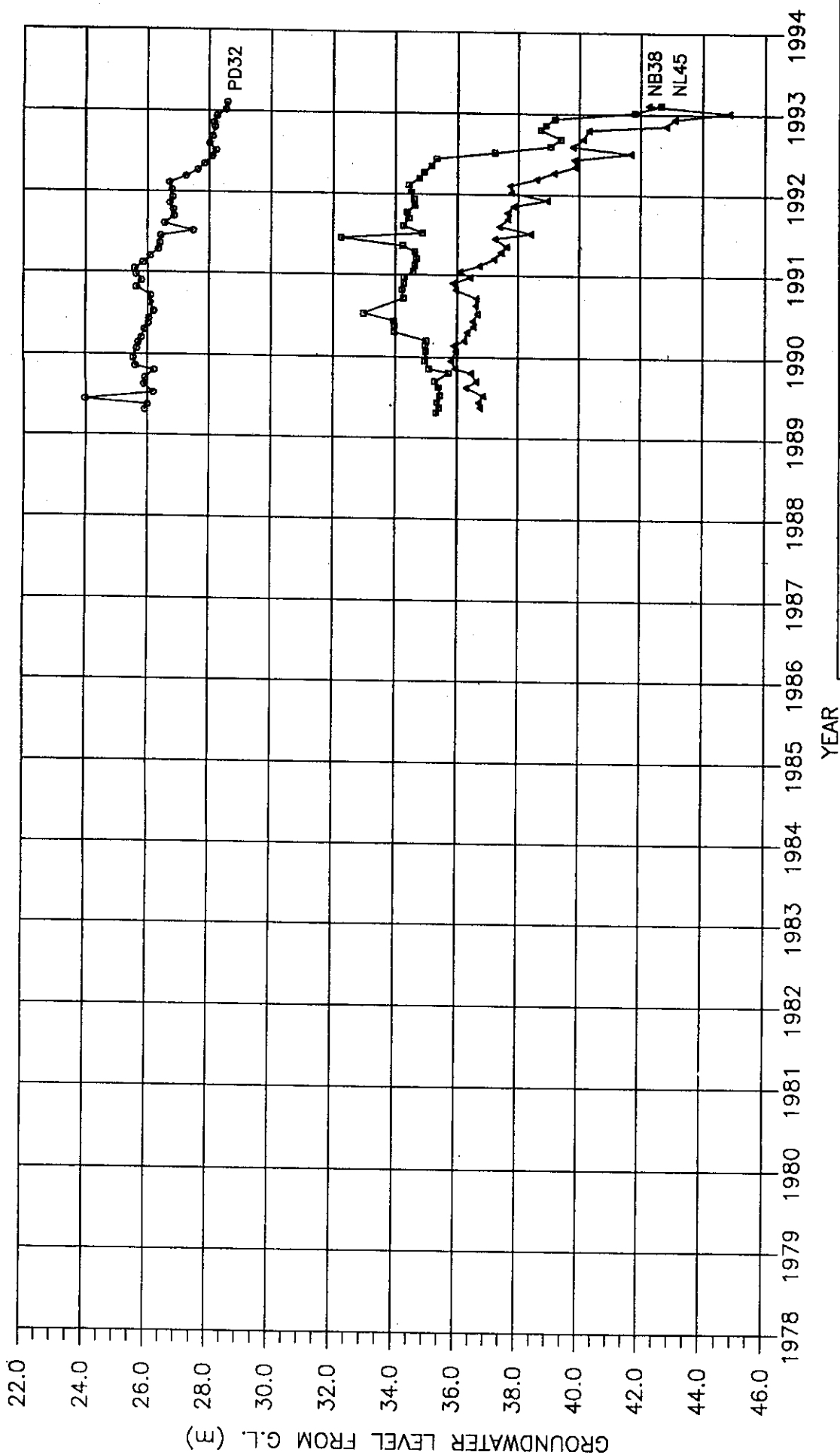
LOCATION : Wat Thung Lan Na  
 Tambon : Phra Khanong  
 Amphoe : Bangkok  
 Changwat : Bangkok  
 UTM Grid : 822126

SCREEN DEPTH  
 PD30 : 77.0 - 83.0m  
 NL44 : 126.0 - 132.0m  
 NB37 : 209.0 - 215.0m

Figure. 69 GROUNDWATER LEVEL CHANGES AT STATION No. 68

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES



YEAR

Figure.70 GROUNDWATER LEVEL CHANGES AT STATION No. 69

LOCATION : Wat Ko Suwannaram  
 Tambon : Khlong Thanon  
 Amphoe : Bang Khen  
 Changwat : Bangkok  
 UTM Grid : 768379

SCREEN DEPTH  
 PD32 : 102.0-108.0m  
 NL45 : 163.0-169.0m  
 NB38 : 189.0-195.0m.

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

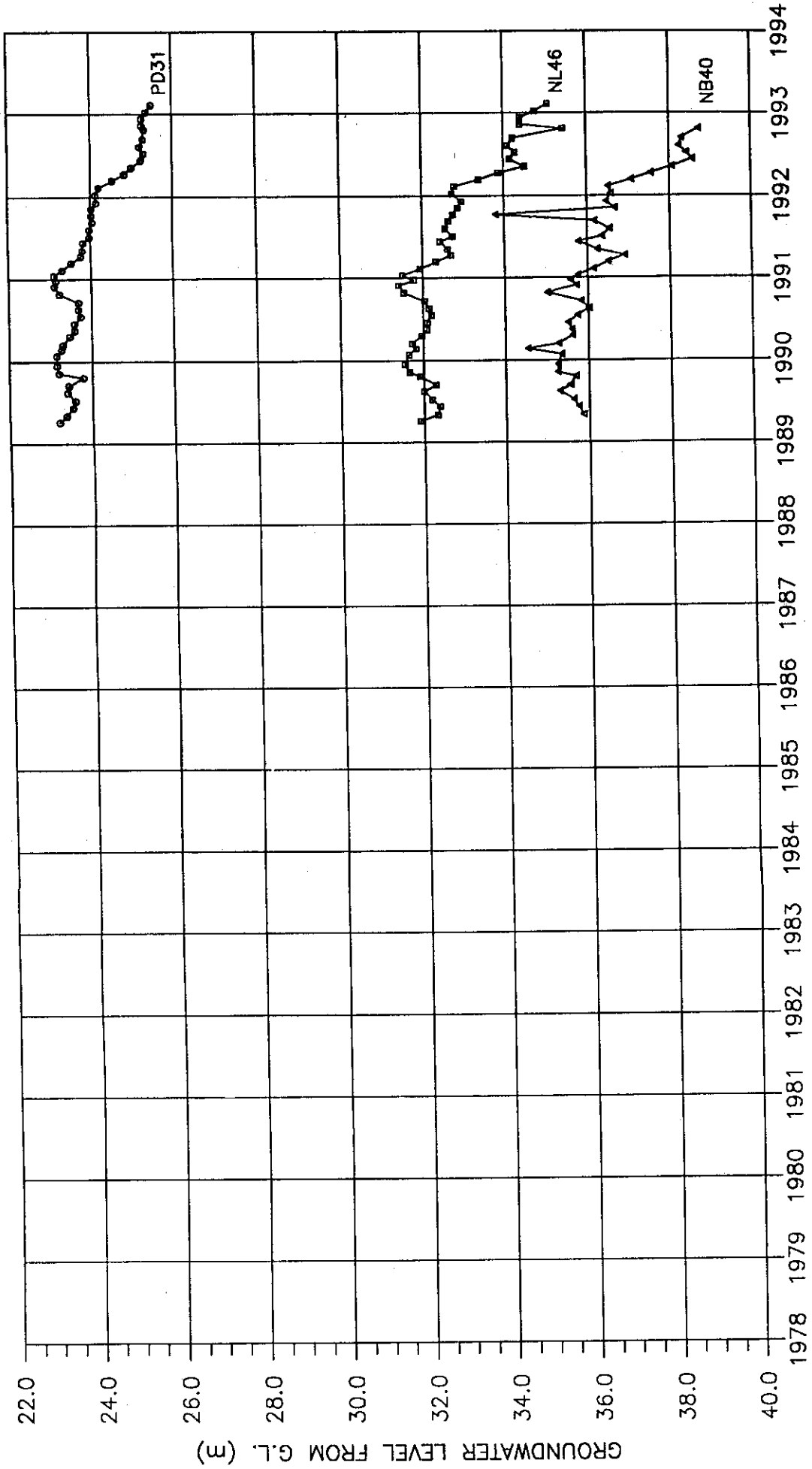


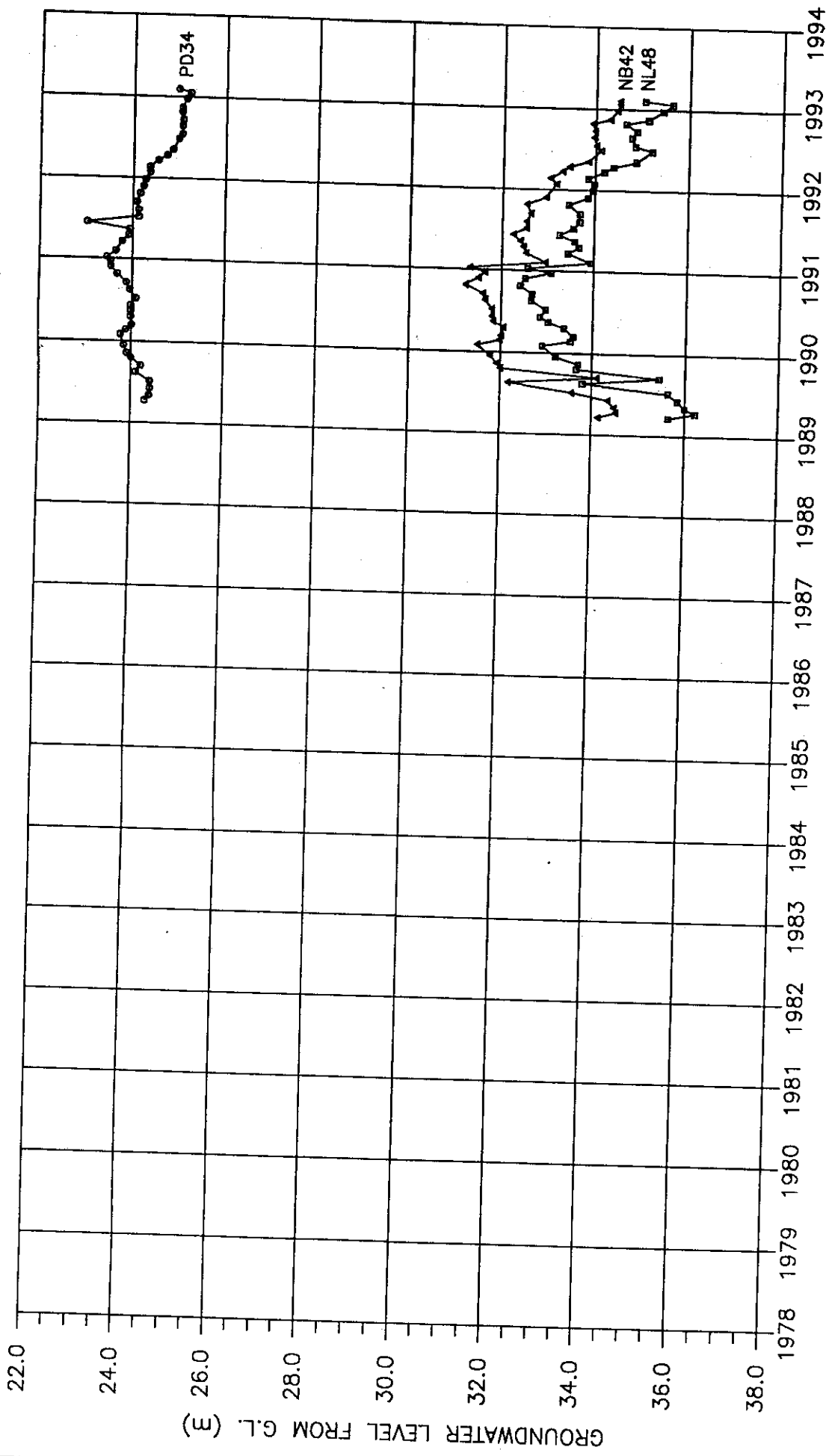
Figure. 71 GROUNDWATER LEVEL CHANGES AT STATION No. 70

SCREEN DEPTH  
 PD31 : 101.0-107.0m  
 NL46 : 150.0-156.0m  
 NB40 : 190.0-196.0m

LOCATION : Wat Don Muang  
 Tambon : Talat Bang Khen  
 Amphoe : Bang Khen  
 Changwat : Bangkok  
 UTM Grid : 733394

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES



LOCATION : Chatuchak Park  
 Tambon : Lat Phrao  
 Amphoe : Bang Khen  
 Changwat : Bangkok  
 UTM Grid : 686271

SCREEN DEPTH  
 PD34 : 113.0-119.0m  
 NL48 : 160.0-166.0m  
 NB42 : 214.0-220.0m

Figure.72 GROUNDWATER LEVEL CHANGES AT STATION No. 71

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

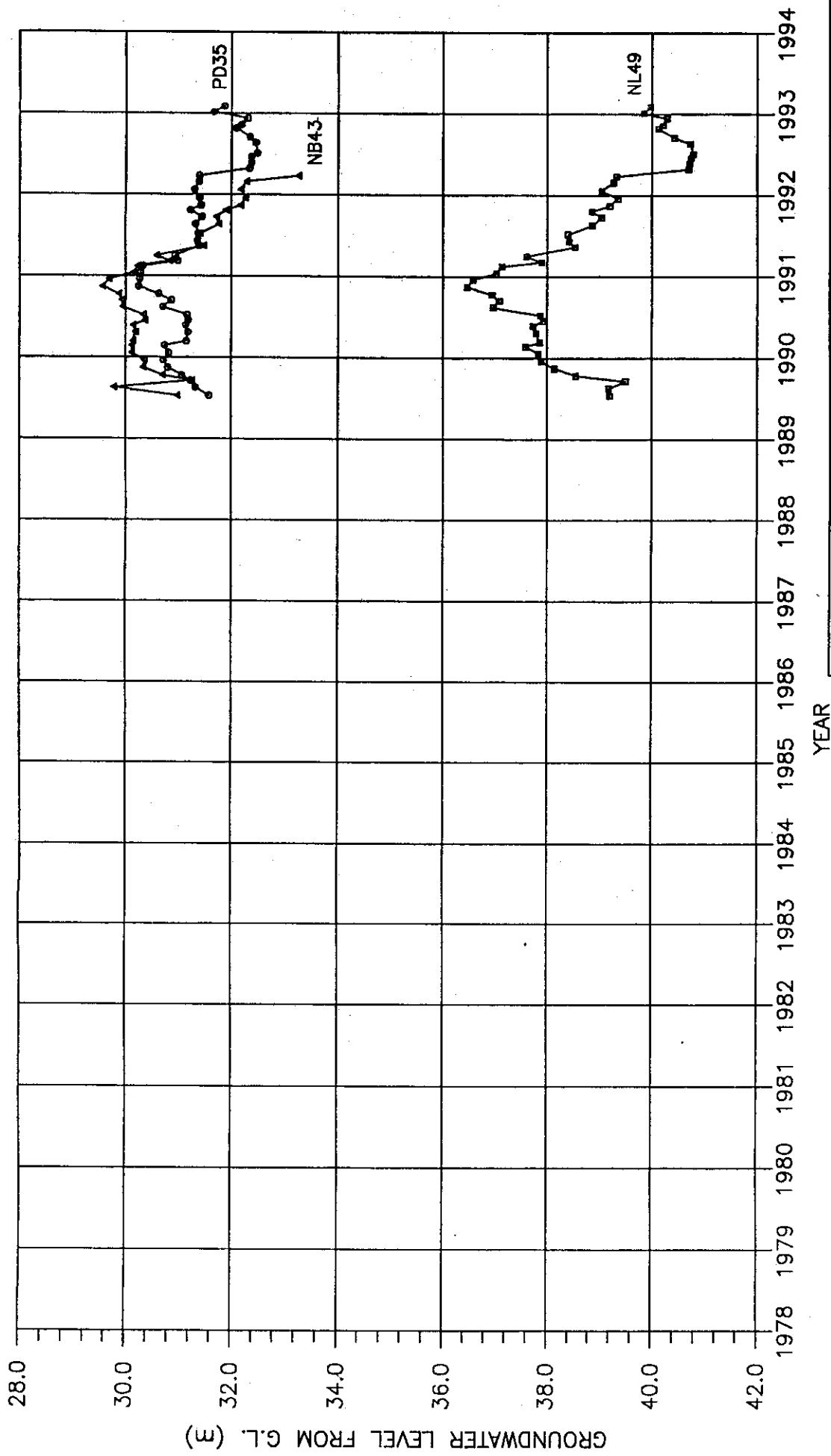


Figure.73 GROUNDWATER LEVEL CHANGES AT STATION No. 72

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

YEAR

SCREEN DEPTH

PD35 : 105.0-111.0m  
 NL49 : 144.0-150.0m  
 NB43 : 212.0-218.0m

LOCATION : Wat Phong Phloi  
 Tambon : Bang Na  
 Amphoe : Phra Khanong  
 Changwat : Bangkok  
 UTM Grid : 767097

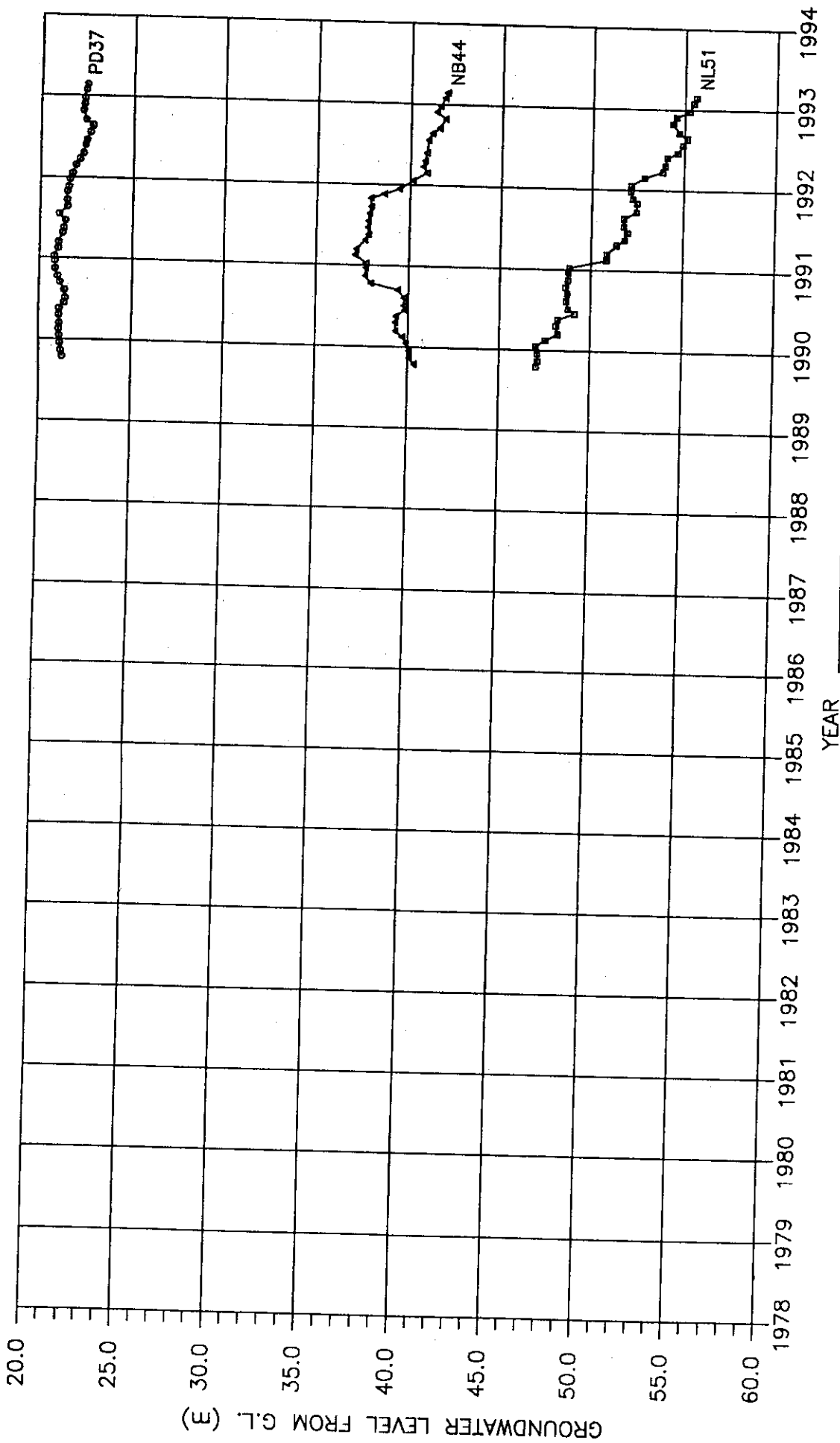


Figure. 74 GROUNDWATER LEVEL CHANGES AT STATION No. 73

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

LOCATION : Wat Bamphen Nua  
 Tambon : Min Buri  
 Amphoe : Bangkok  
 Changwat : Bangkok  
 UTM Grid : 852262

SCREEN DEPTH  
 PD37 : 85.0 - 91.0m  
 NL51 : 149.0 - 155.0m  
 NB44 : 217.0 - 223.0m

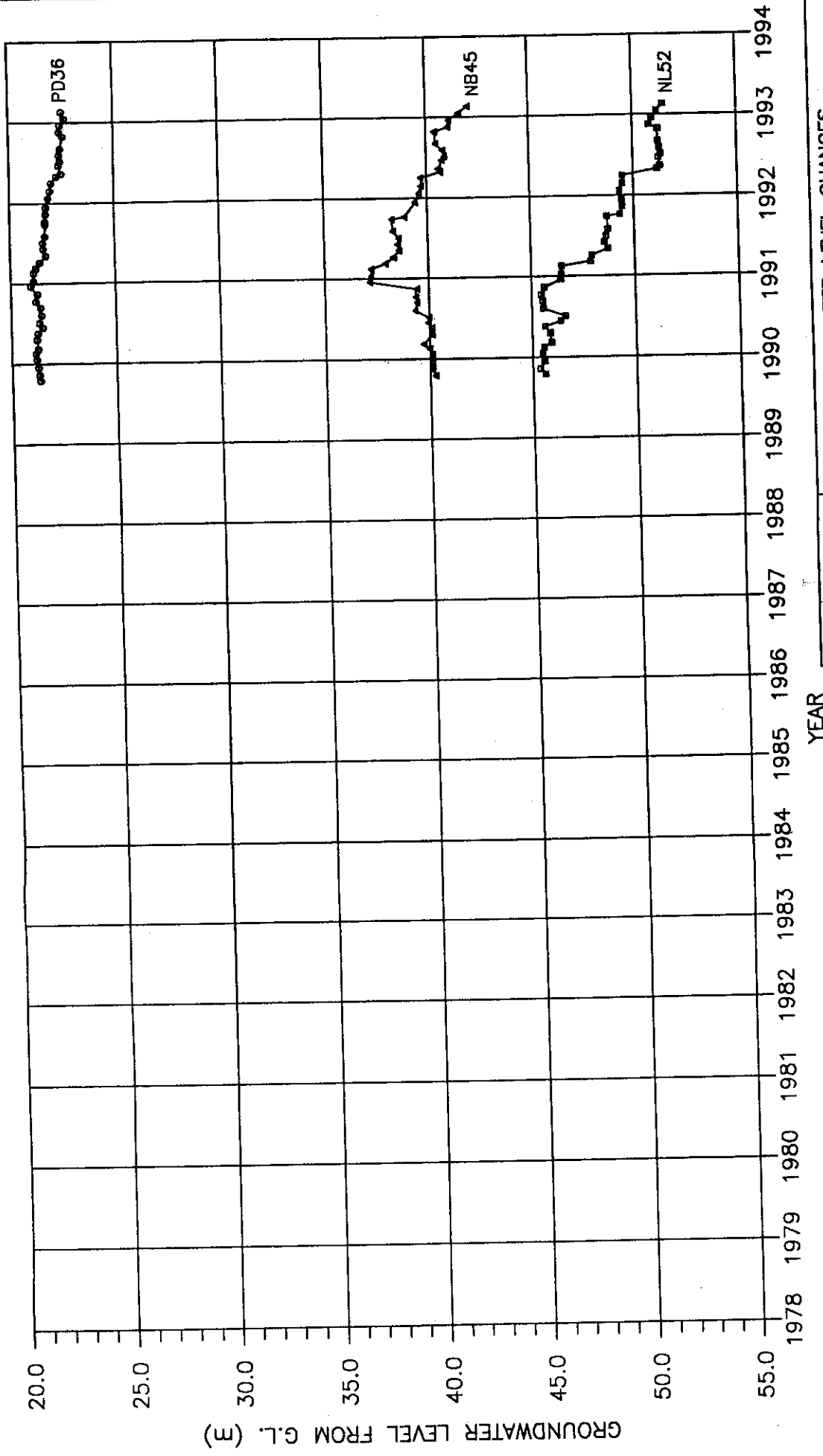


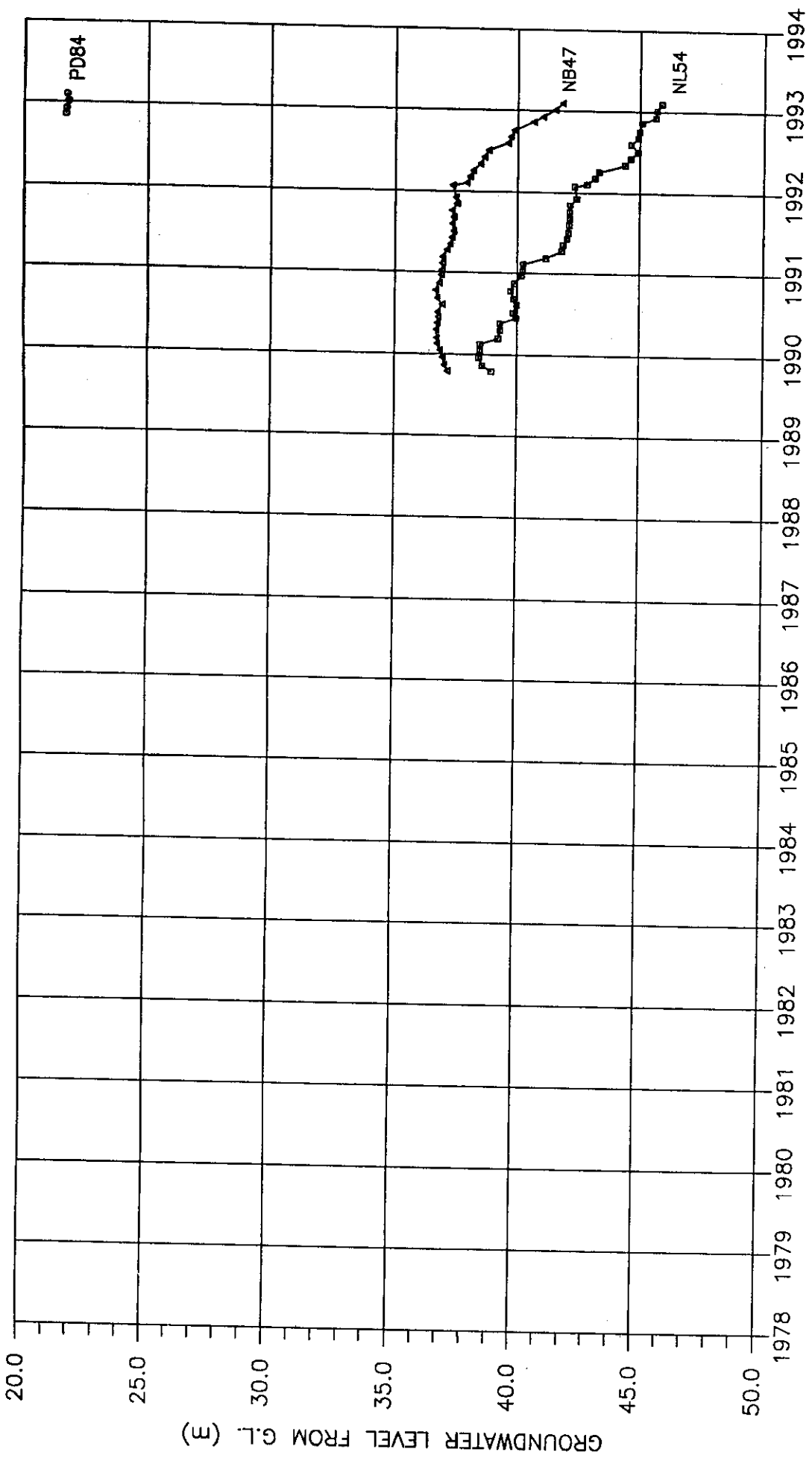
Figure. 75 GROUNDWATER LEVEL CHANGES AT STATION No. 74

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

LOCATION : Wat Lat Bua Khao  
 Tambon : Prawet  
 Amphoe : Phra Khanong  
 Changwat : Bangkok  
 UTM Grid : 838212

SCREEN DEPTH  
 PD36 : 90.0 - 96.0m  
 NL52 : 151.0 - 157.0m  
 NB45 : 195.0 - 201.0m



SCREEN DEPTH  
 PD84 : 152.0-158.0 m  
 NL54 : 200.0-203.0 m  
 NB47 : 225.0-228.0 m.

LOCATION : Wat Paen Thong Sopharam  
 Tambon : Sam Wa Tawan Tok  
 Amphoe : Min Buri  
 Changwat : Bangkok  
 UTM Grid : 858354

Figure. 76 GROUNDWATER LEVEL CHANGES AT STATION No. 75

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

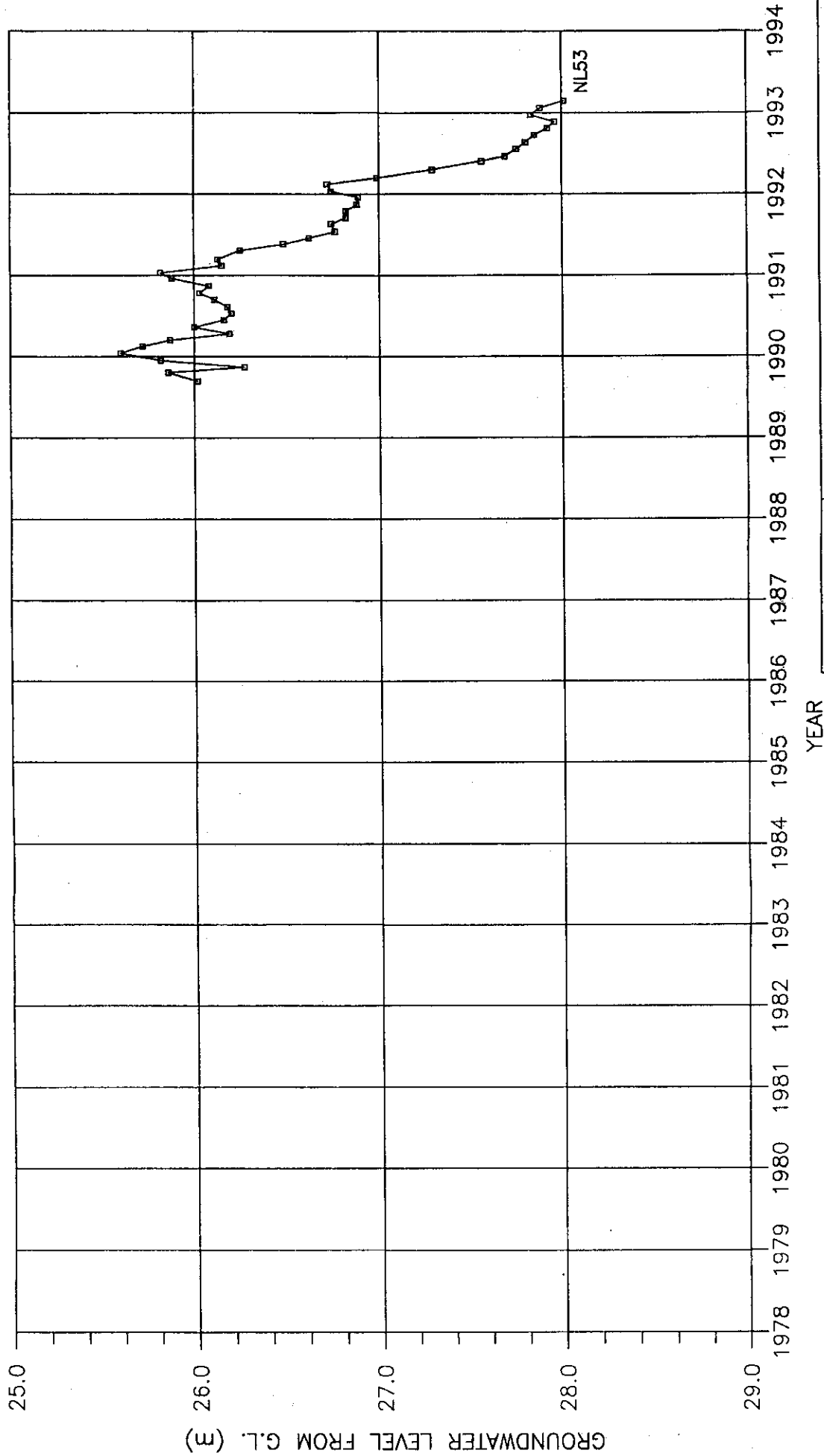


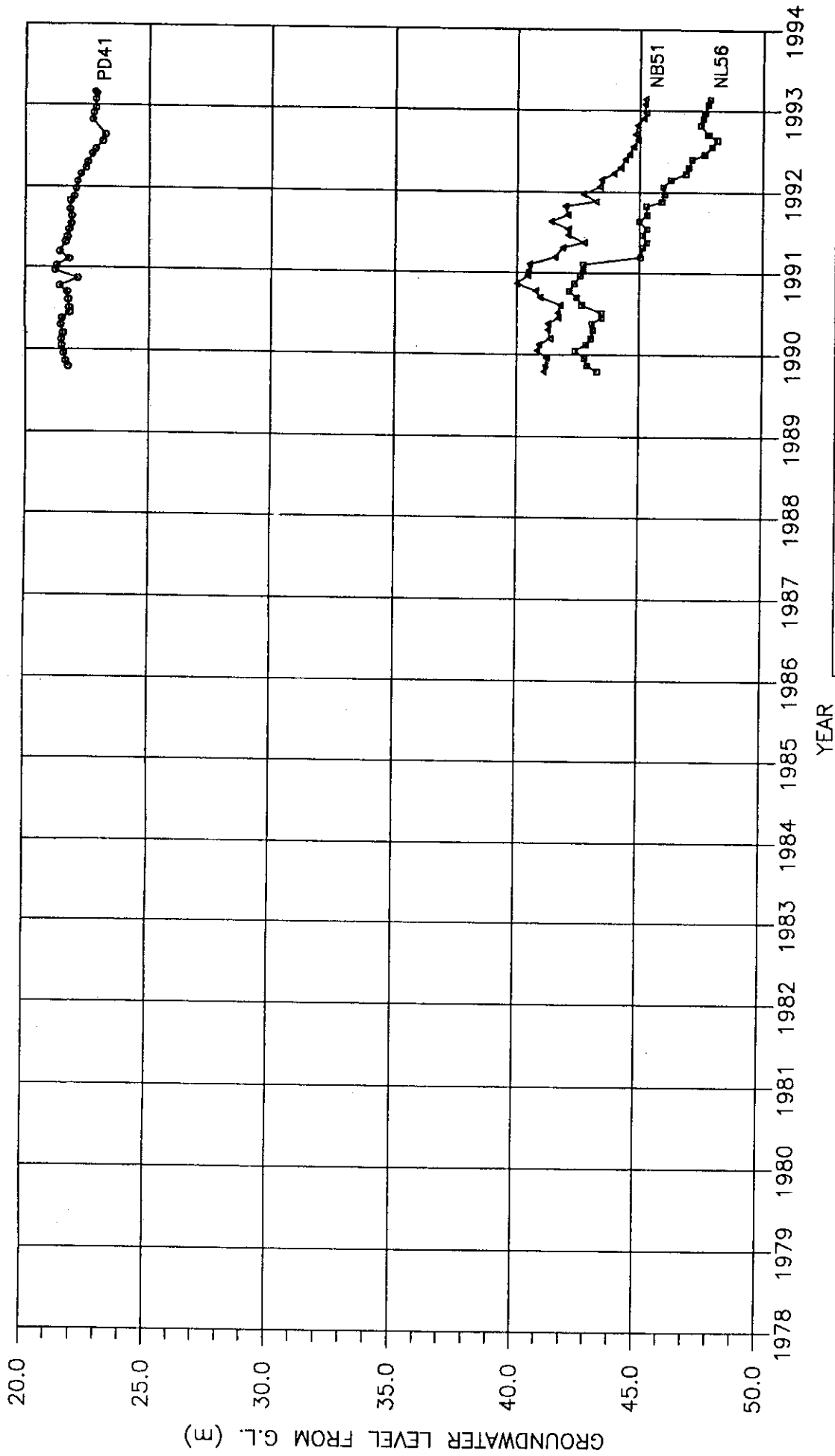
Figure. 77 GROUNDWATER LEVEL CHANGES AT STATION No. 76

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

LOCATION : Wat Kho Non  
 Tambon : Bang Wa  
 Amphoe : Phasi Charoen  
 Changwat : Bangkok  
 UTM Grid : 576162

SCREEN DEPTH  
 NL53 : 147.0-153.0 m



LOCATION : Praphat Witthaya School  
 Tambon : Khlong Kum  
 Amphoe : Bang Kapi  
 Changwat : Bangkok  
 UTM Grid : 794259

SCREEN DEPTH  
 PD41 : 79.0 - 85.0 m  
 NL56 : 161.0 - 167.0 m  
 NB51 : 214.0 - 220.0 m

Figure.78 GROUNDWATER LEVEL CHANGES AT STATION No. 77

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

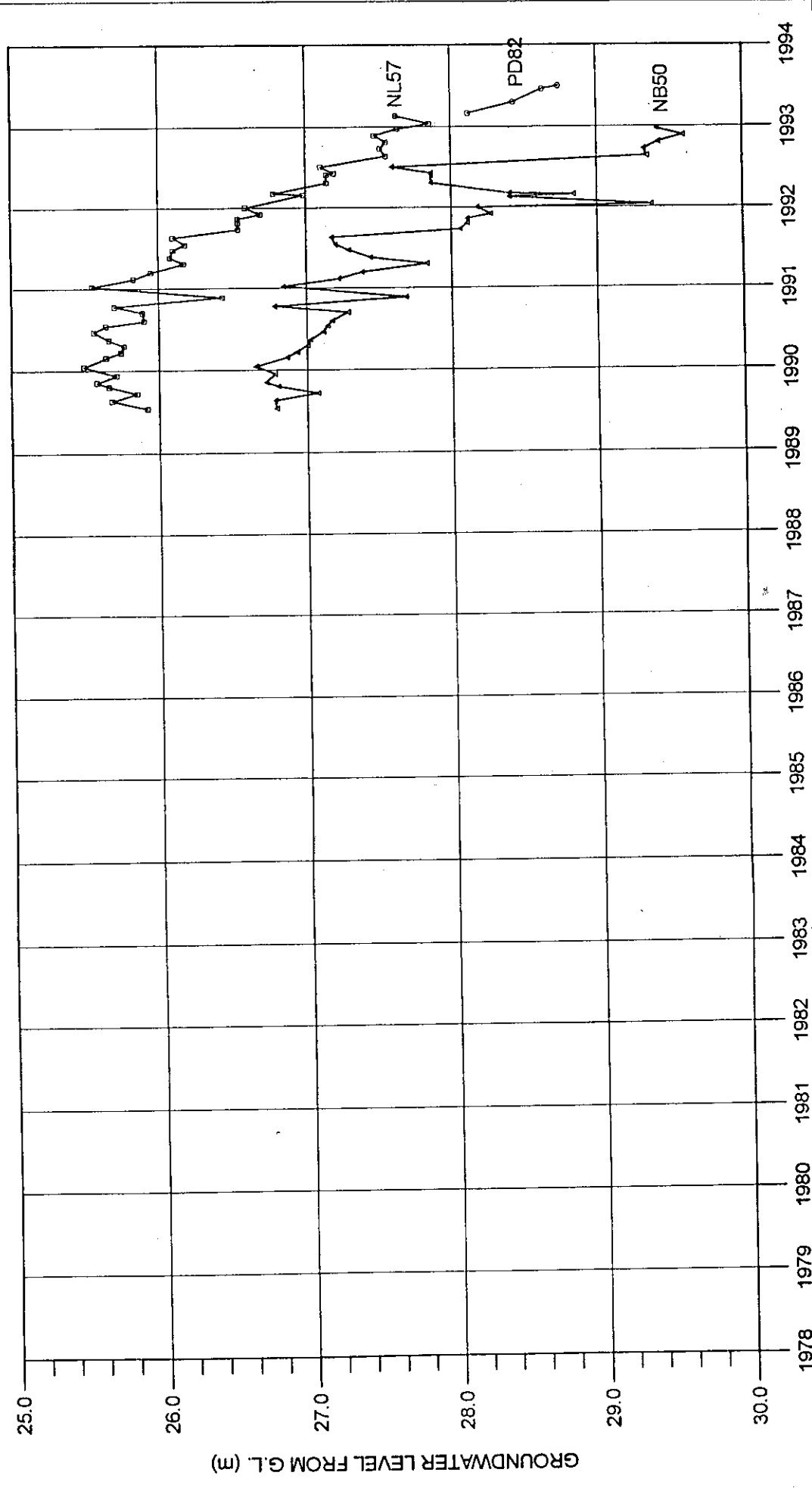


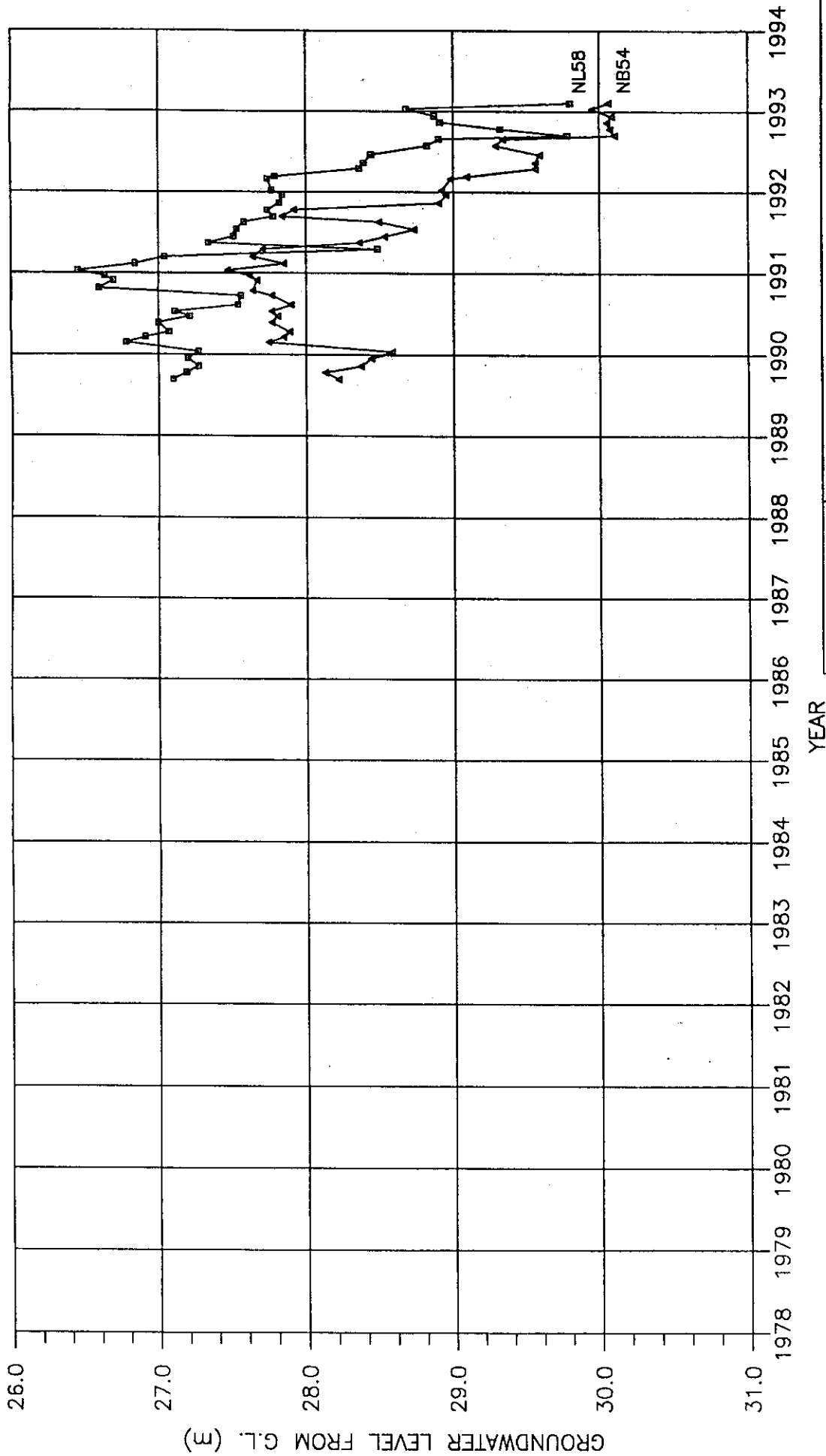
Figure. 79 GROUNDWATER LEVEL CHANGES AT STATION No. 78

LOCATION : Wat Chaiyathit  
 Tambon : Bang Khunsi  
 Amphoe : Bangkok Noi  
 Changwat : Bangkok  
 UTM Grid : 576214

SCREEN DEPTH  
 PD82 : 90.0- 96.0m  
 NL57 : 156.0-162.0m  
 NB50 : 220.0-226.0m

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES



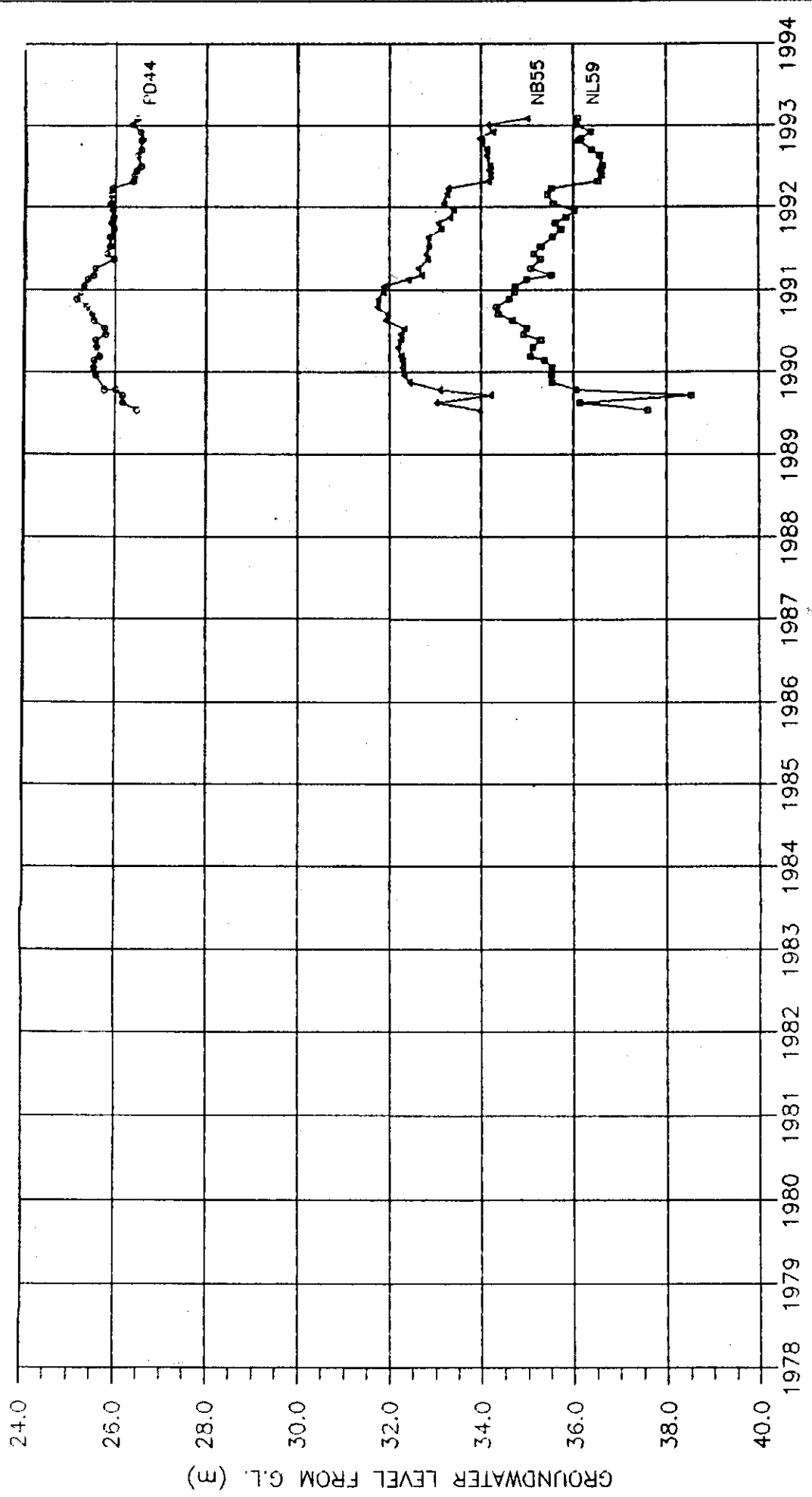
LOCATION : Itsalam Wittayalai School  
 Tambon : Thung Khru  
 Amphoe : Rat Burana  
 Changwat : Bangkok  
 UTM Grid : 629075

SCREEN DEPTH  
 NL58 : 162.0-168.0m  
 NB54 : 203.0-209.0m

Figure. 80 GROUNDWATER LEVEL CHANGES AT STATION No. 79

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES



LOCATION : 11th Channel T.V. Station  
 Tambon : Bang Kapi  
 Amphoe : Huar Khwang  
 Changwat : Bangkok  
 UTM Grid : 713198

SCREEN DEPTH  
 PD44 : 97.0-103.0m  
 NL59 : 160.0-166.0m  
 NB55 : 206.0-212.0m

Figure- 81 GROUNDWATER LEVEL CHANGES AT STATION No. 80

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

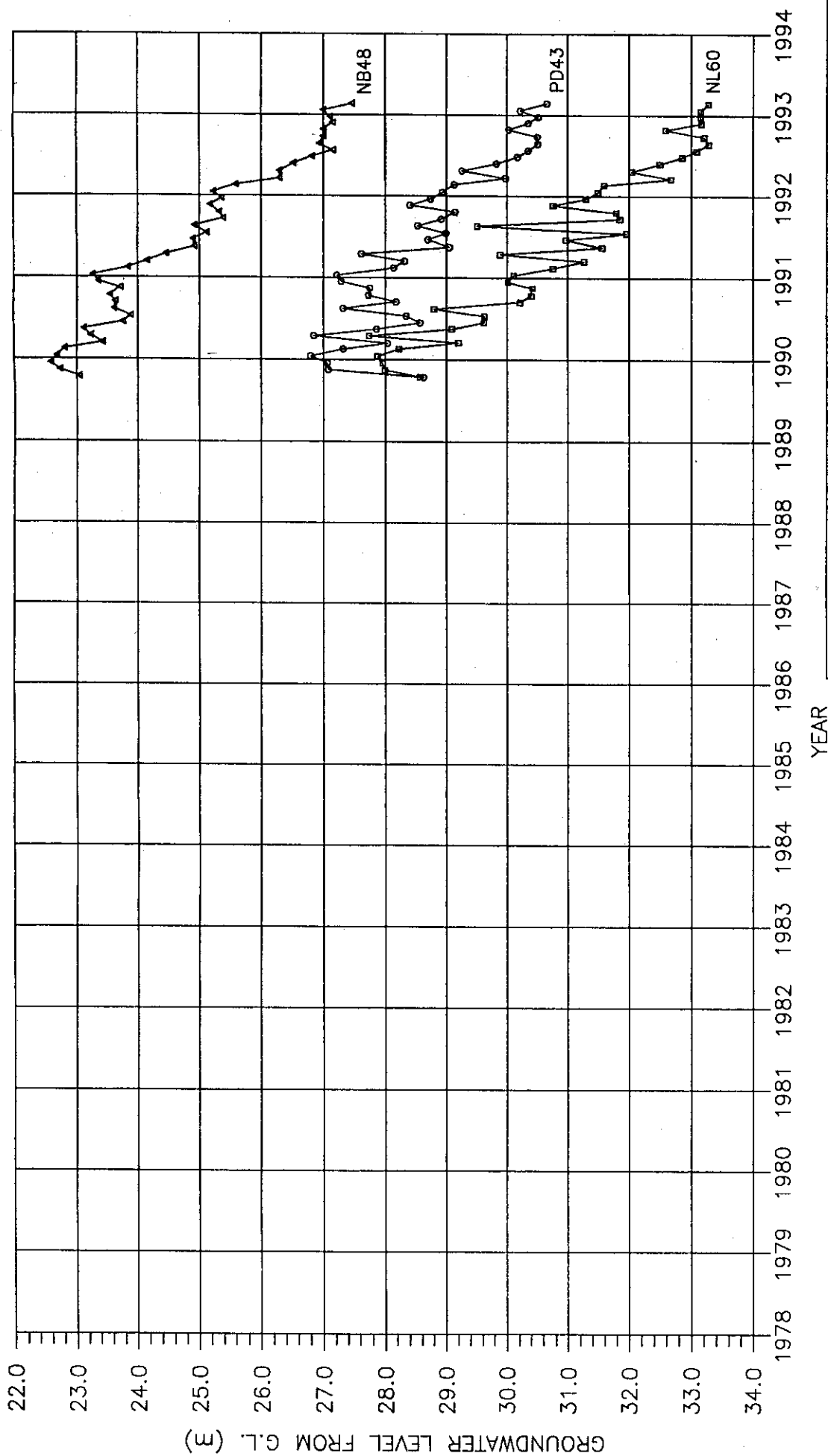


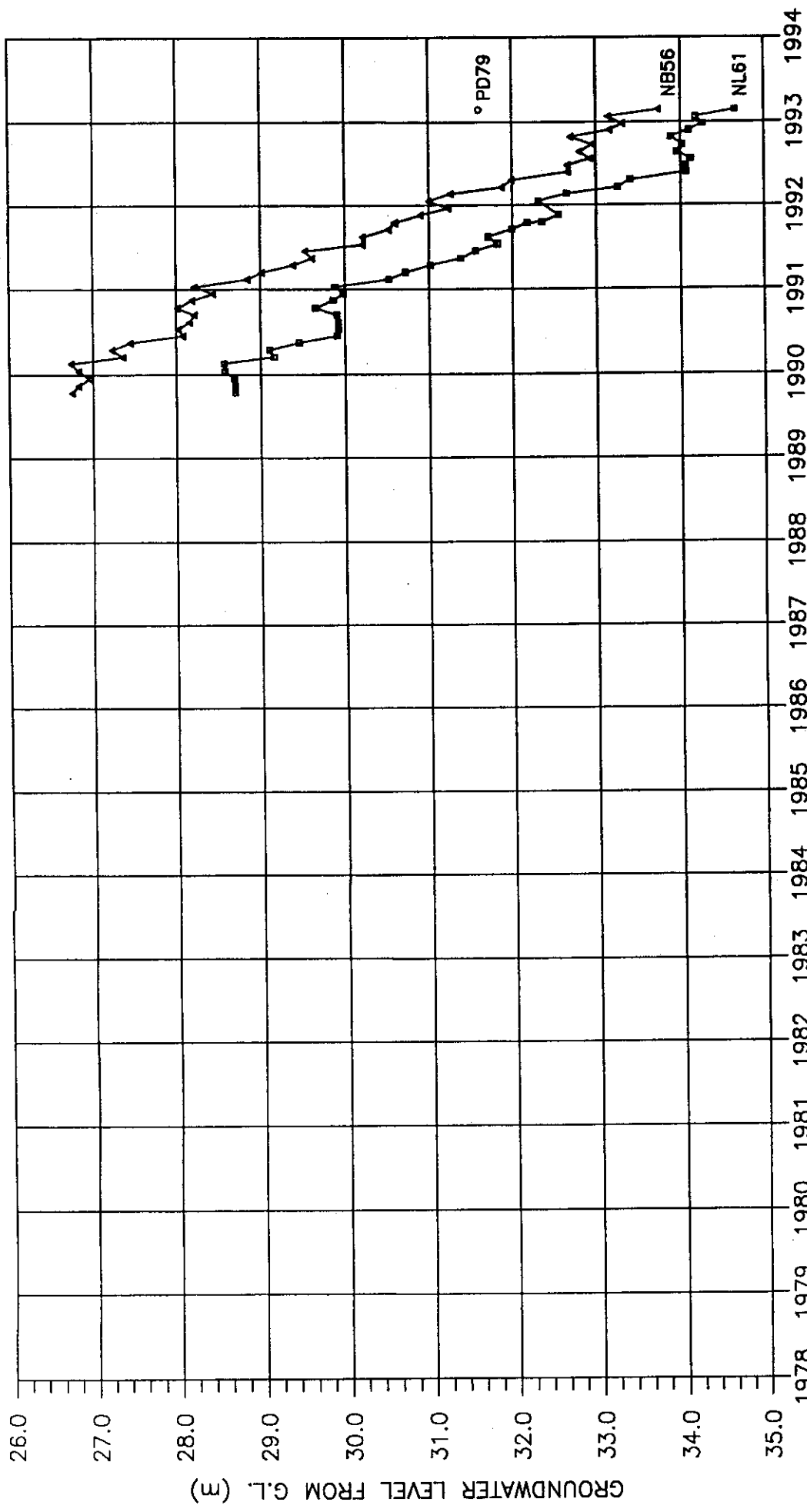
Figure. 82 GROUNDWATER LEVEL CHANGES AT STATION No. 81

LOCATION : Wat Sip Song Thanwaram  
 Tambon : Bang Pu Mai  
 Amphoe : Muang Samut Prakan  
 Changwat : Samut Prakan  
 UTM Grid : 762966

SCREEN DEPTH  
 PD43 : 89.0 - 95.0 m  
 NL60 : 131.0 - 137.0 m  
 NB48 : 206.0 - 212.0 m

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES



YEAR

Figure. 83 GROUNDWATER LEVEL CHANGES AT STATION No. 82

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

LOCATION : Wat Noi Suwannaram  
 Tambon : —  
 Amphoe : Bang Phli  
 Changwat : Samut Prakan  
 UTM Grid : 825993

SCREEN DEPTH  
 PD79 : 150.0 m  
 NL61 : 156.0 m  
 NB56 : 207.0 m

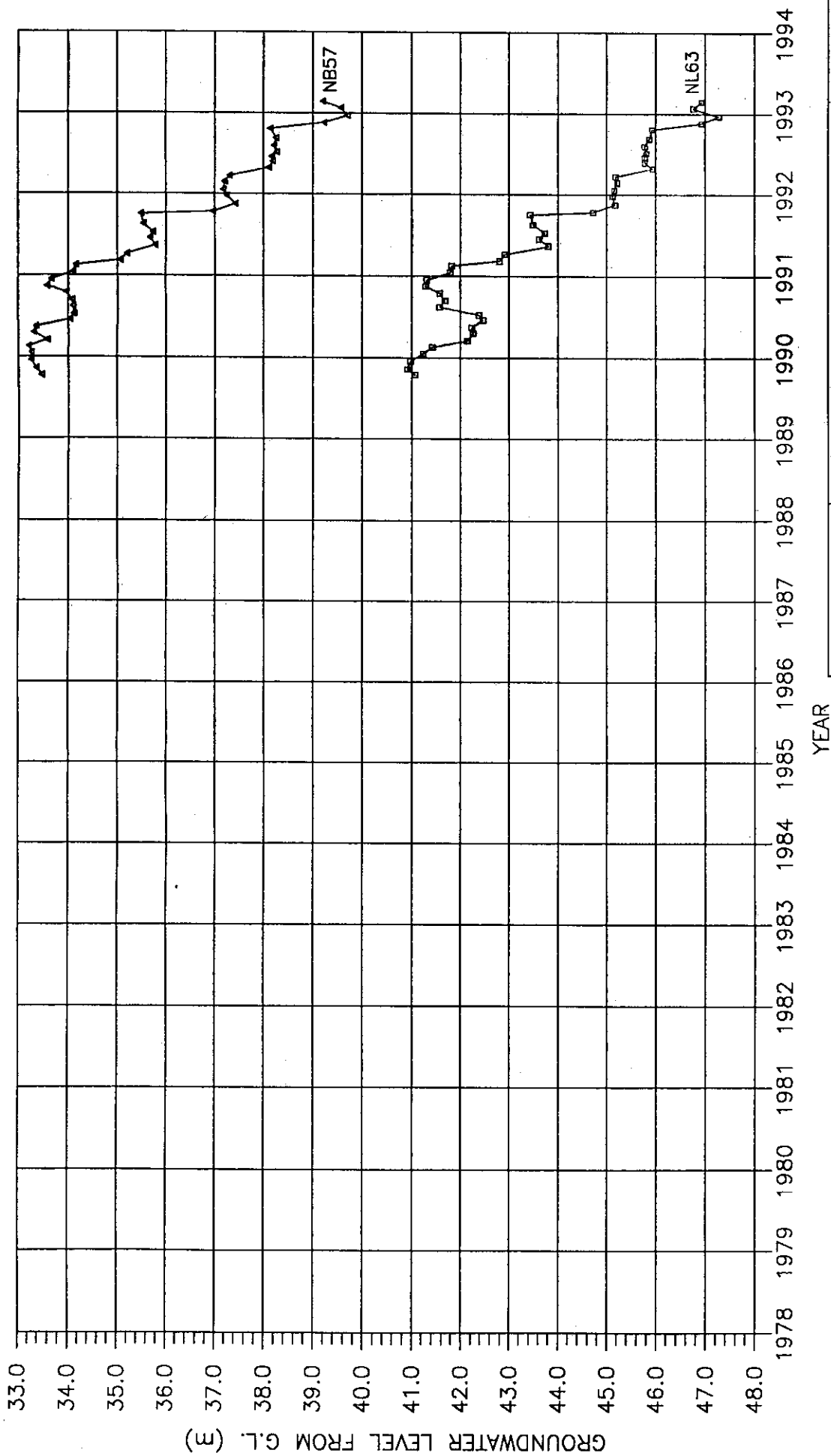


Figure. 84. GROUNDWATER LEVEL CHANGES AT STATION No. 83

LOCATION : Bang Phli Switching Office  
 Tambon : -  
 Amphoe : Bang Phli  
 Changwat : Samut Prakan  
 UTM Grid : 837085

SCREEN DEPTH  
 NL63 : 131.0-137.0m  
 NB57 : 195.0-201.0m.

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

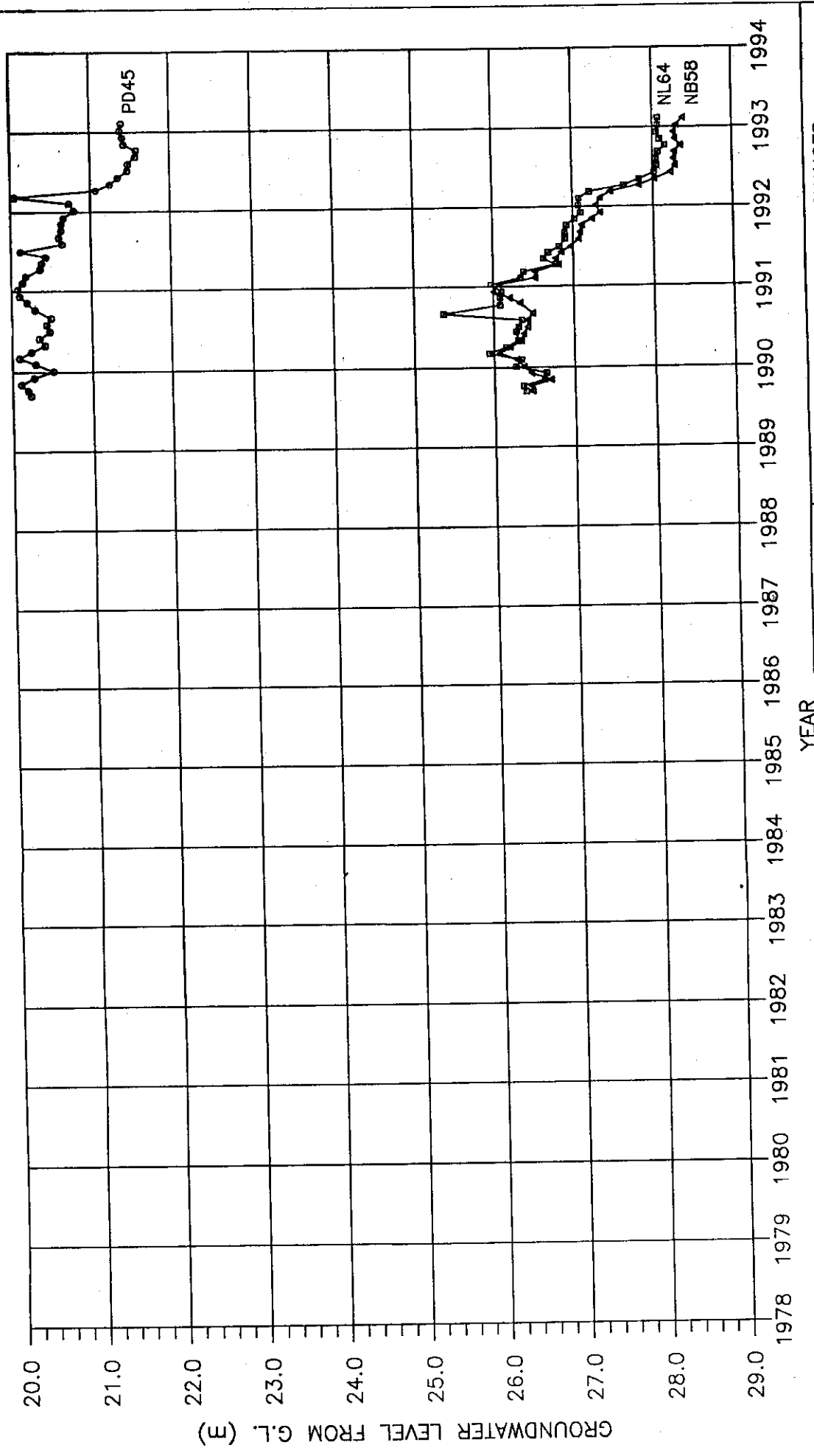


Figure. 85 GROUNDWATER LEVEL CHANGES AT STATION No. 84

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

LOCATION : Wat Bang Phraek Nua  
 Tambon : Suan Yai  
 Amphoe : Muang Nonthaburi  
 Changwat : Nonthaburi  
 UTM Grid : 619315

SCREEN DEPTH  
 PD45 : 92.0 - 98.0m  
 NL64 : 159.0 - 165.0m  
 NB58 : 201.0 - 207.0m

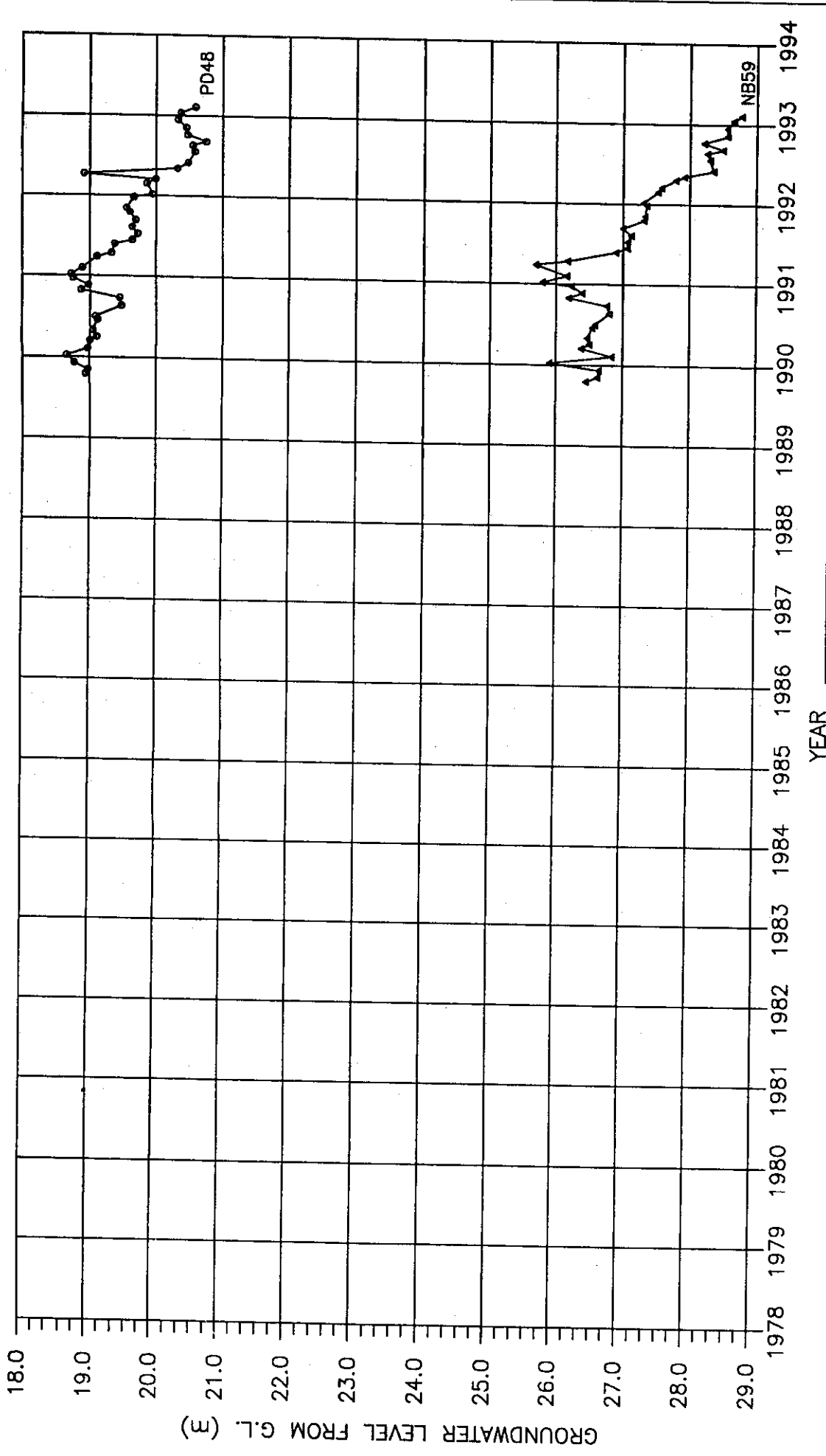


Figure.86 GROUNDWATER LEVEL CHANGES AT STATION No. 85

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

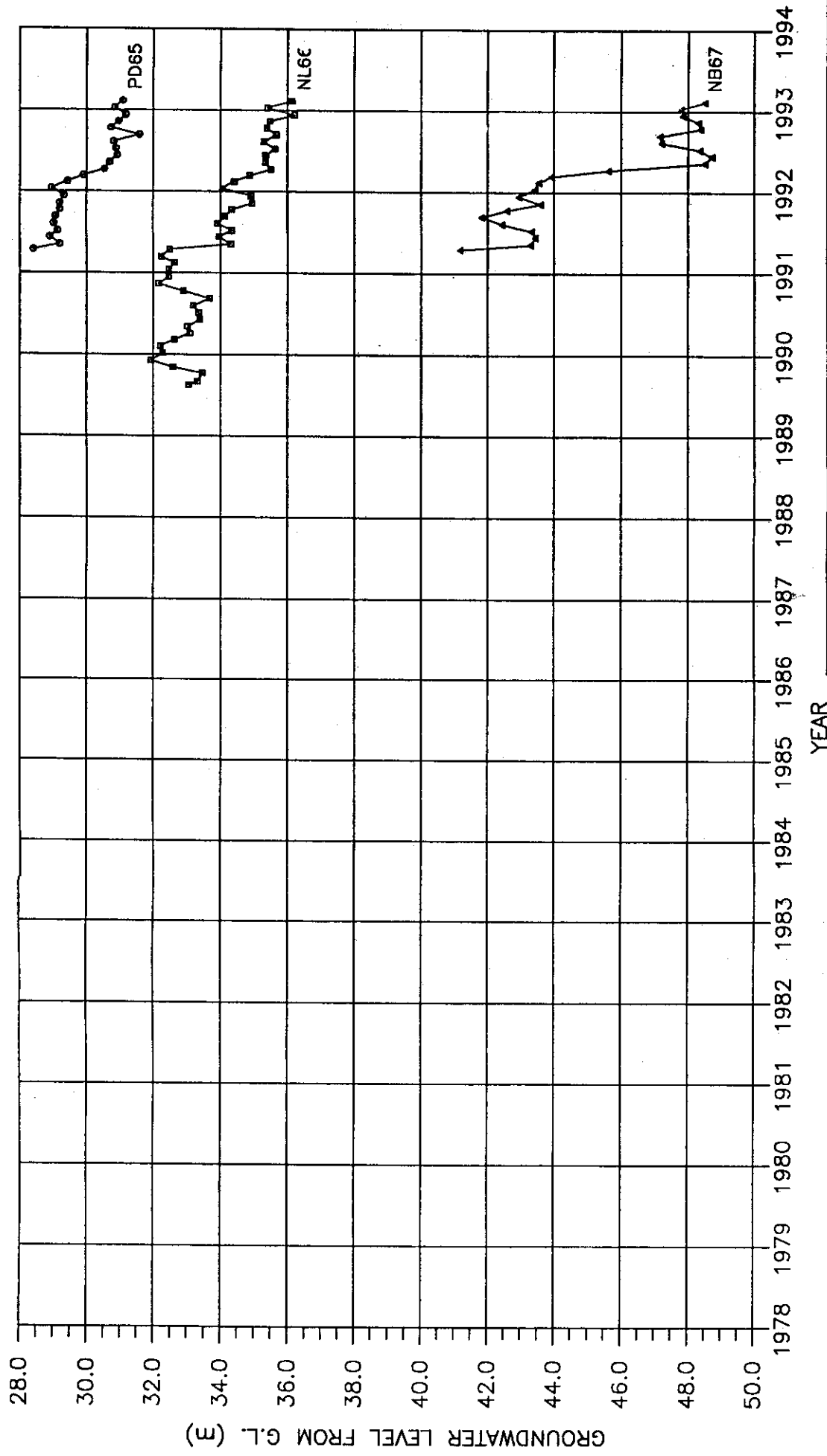
LOCATION : Wat Chinwanaram Worawihan SCREEN DEPTH

Tambon : Bang Khayaeng PD48 : 86.0-92.0m

Amphoe : Muang Pathum Thani NB59 : 208.0-214.0m

Changwat : Pathum Thani

UTM Grid : 658442



LOCATION : Rangsit Switching Office  
 Tambon : Khlong Luang  
 Amphoe : Pathum Thani  
 Changwat : Pathum Thani  
 UTM Grid : 748521

SCREEN DEPTH  
 PD65 : 106.0-112.0m  
 NL66 : 156.0-162.0m  
 NB67 : 217.0-223.0m

Figure. 87 GROUNDWATER LEVEL CHANGES AT STATION No. 86

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)  
 DEPARTMENT OF MINERAL RESOURCES

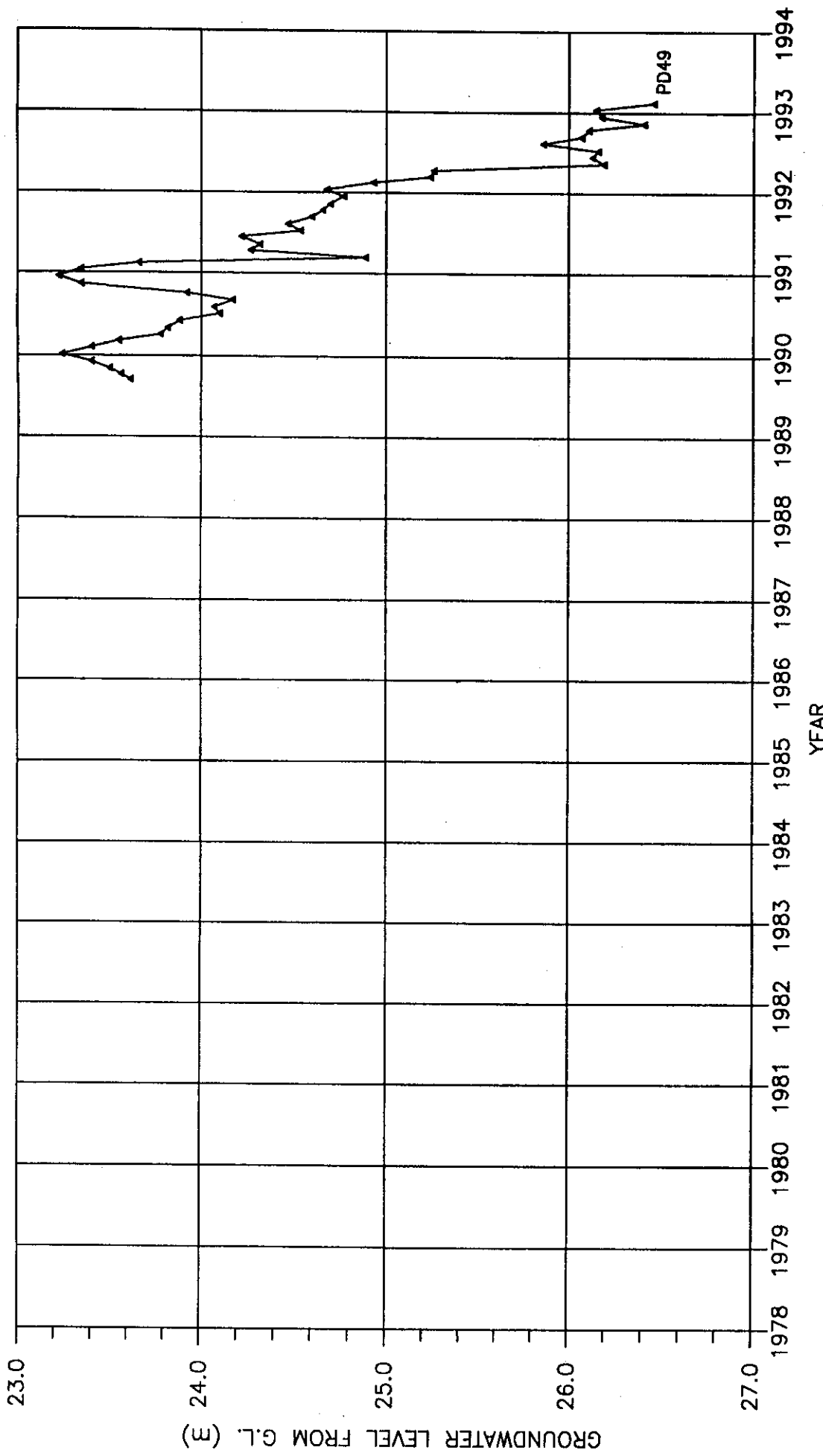


Figure. 88 GROUNDWATER LEVEL CHANGES AT STATION No. 87

LOCATION : Agriculture College  
 Tambon : Khu Khot  
 Amphoe : Lam Luk Ka  
 Changwat : Pathum Thani  
 UTM Grid : 745458

SCREEN DEPTH  
 PD49 : 99.0-105.0m.

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

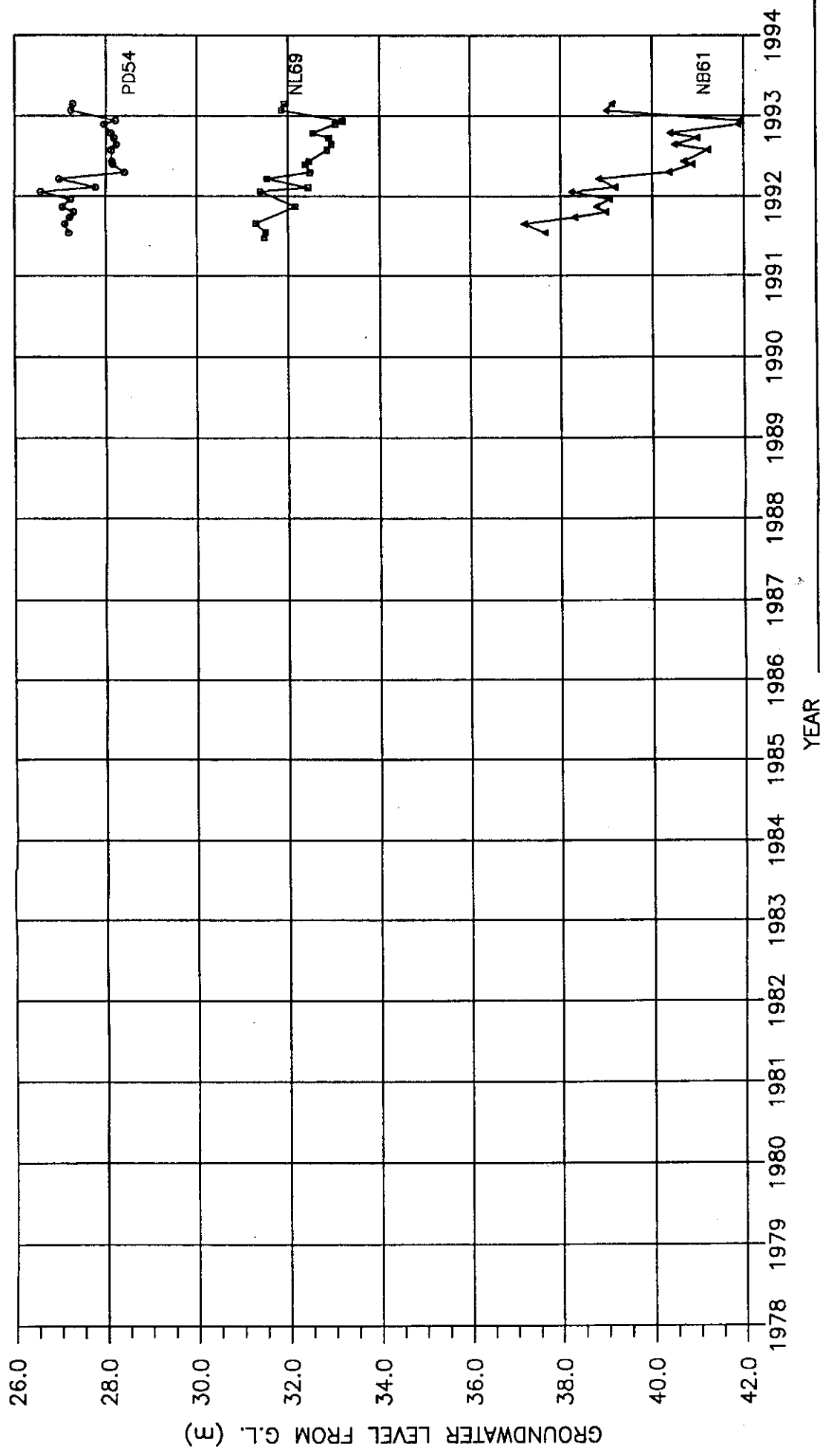


Figure. 89 GROUNDWATER LEVEL CHANGES AT STATION No. 88

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

LOCATION : Wat Tha Phut  
 Tambon : Rai Khing  
 Amphoe : Sam Phran  
 Changwat : Nakhon Pathum  
 UTM Grid : 383199

SCREEN DEPTH  
 PD54 : 86.0 - 92.0m  
 NL69 : 145.0 - 151.0m  
 NB61 : 186.0 - 192.0m

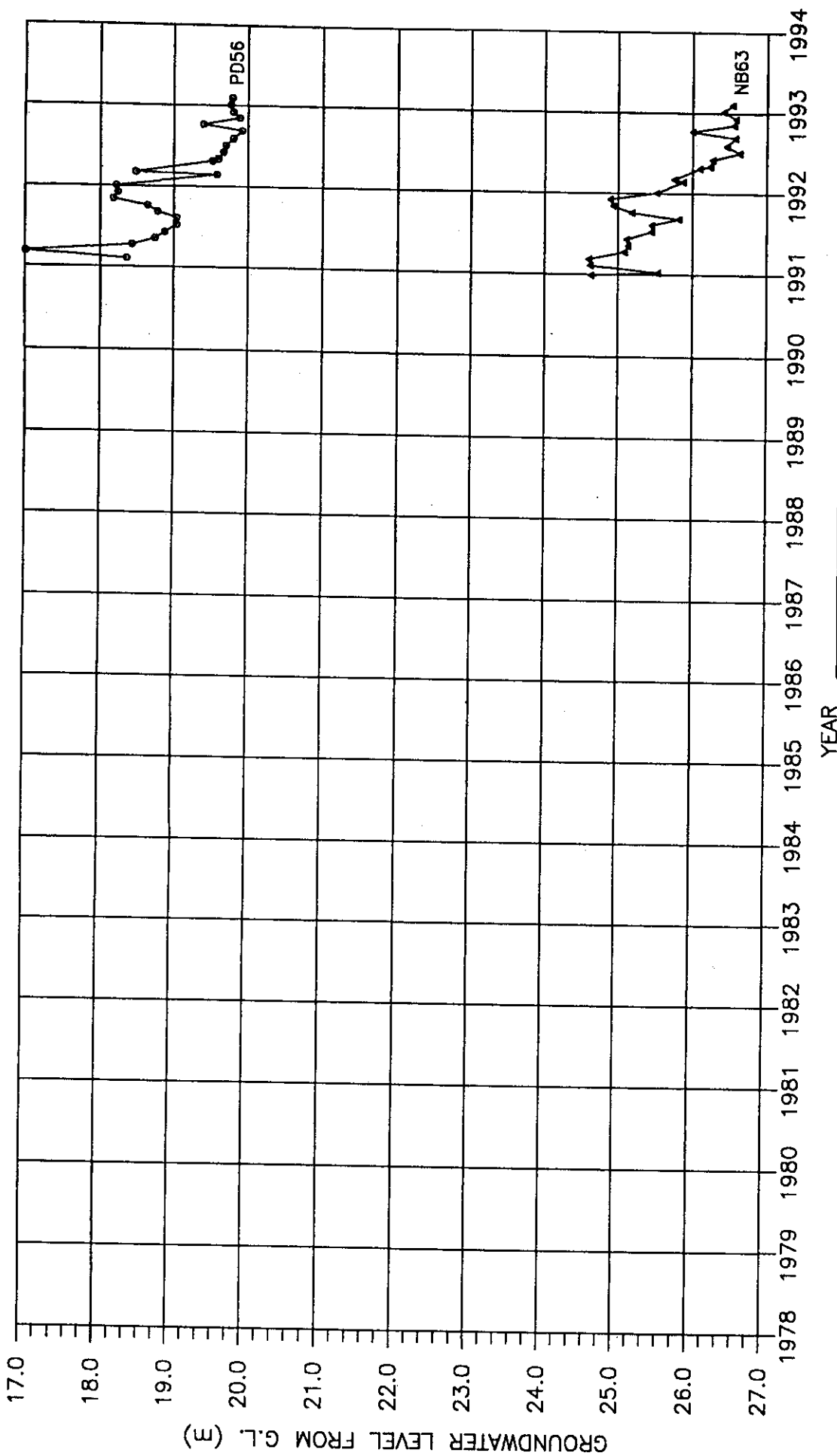


Figure.90 GROUNDWATER LEVEL CHANGES AT STATION No. 89

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

LOCATION : Wat Phikun Ngoen  
 Tambon : Bang Muang  
 Amphoe : Bang Yai  
 Changwat : Nonthaburi  
 UTM Grid : 541312

SCREEN DEPTH  
 PD56 : 91.0-97.0m  
 NB63 : 215.0-221.0m

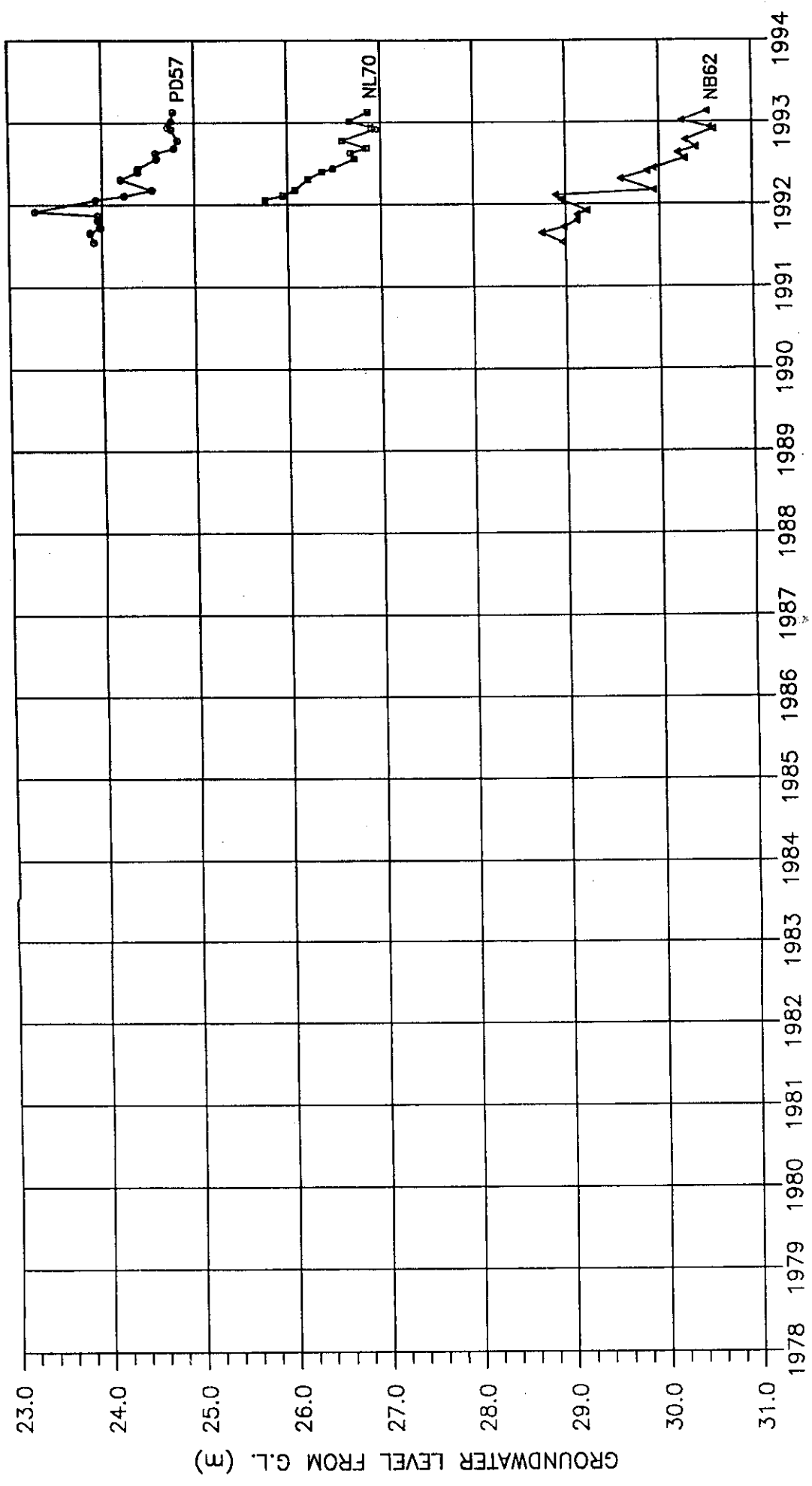


Figure. 91 GROUNDWATER LEVEL CHANGES AT STATION No. 90

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

LOCATION : Wat Ninsukharam  
 Tambon : Bang Bon  
 Amphoe : Bang Khun Thian  
 Changwat : Bangkok  
 UTM Grid : 521118

SCREEN DEPTH  
 PD57 : 70.0 - 76.0 m  
 NL70 : 134.0 - 140.0 m  
 NB62 : 219.0 - 225.0 m

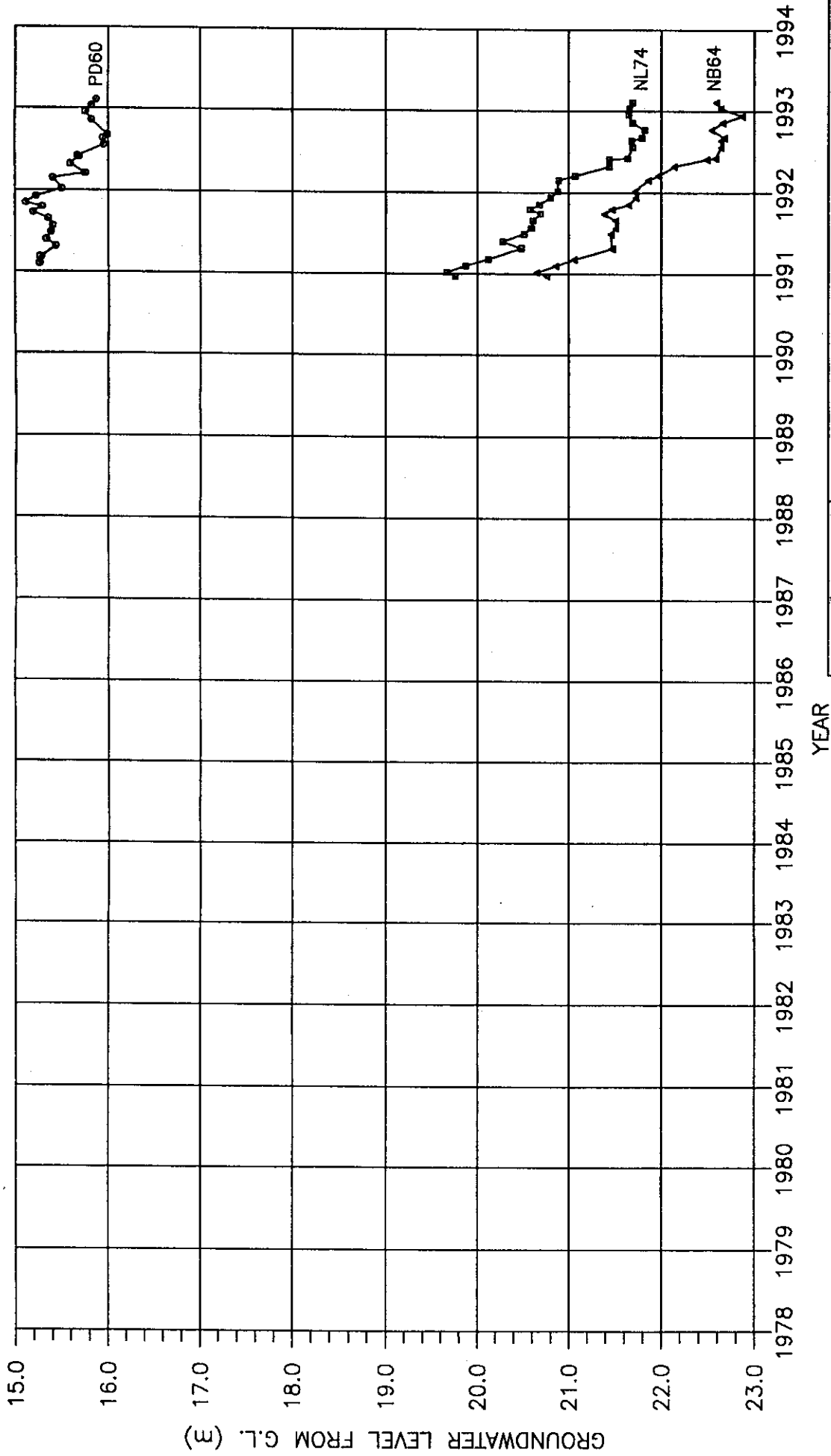


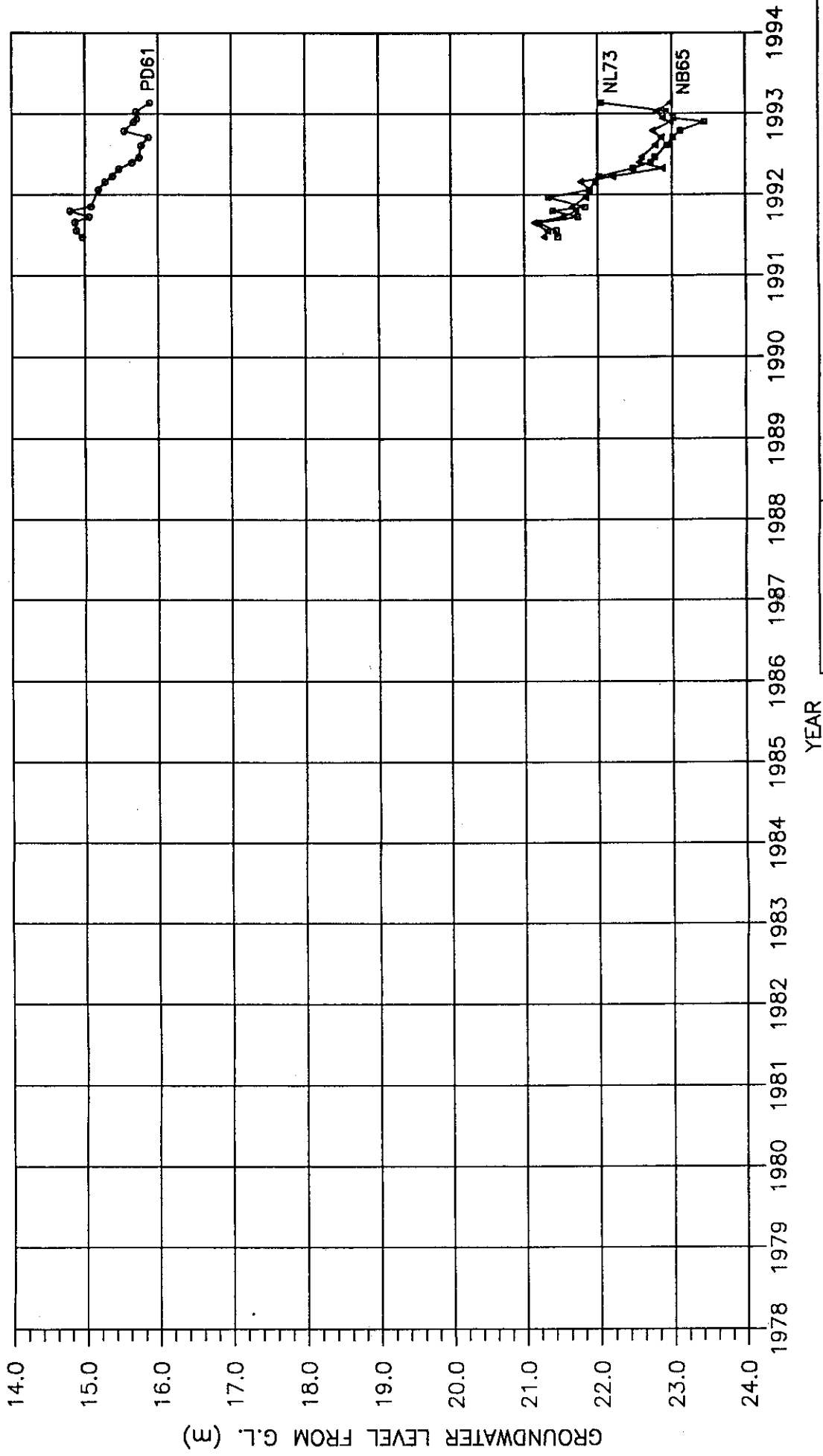
Figure. 92 GROUNDWATER LEVEL CHANGES AT STATION No. 91

LOCATION : Wat Phrai Fa  
 Tambon : Bang Dua  
 Amphoe : Muang Pathum Thani  
 Changwat : Pathum Thani  
 UTM Grid : 605478

SCREEN DEPTH  
 PD60 : 104.0-110.0m  
 NL74 : 153.3-159.3m  
 NB64 : 204.0-210.0m

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE  
 IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES



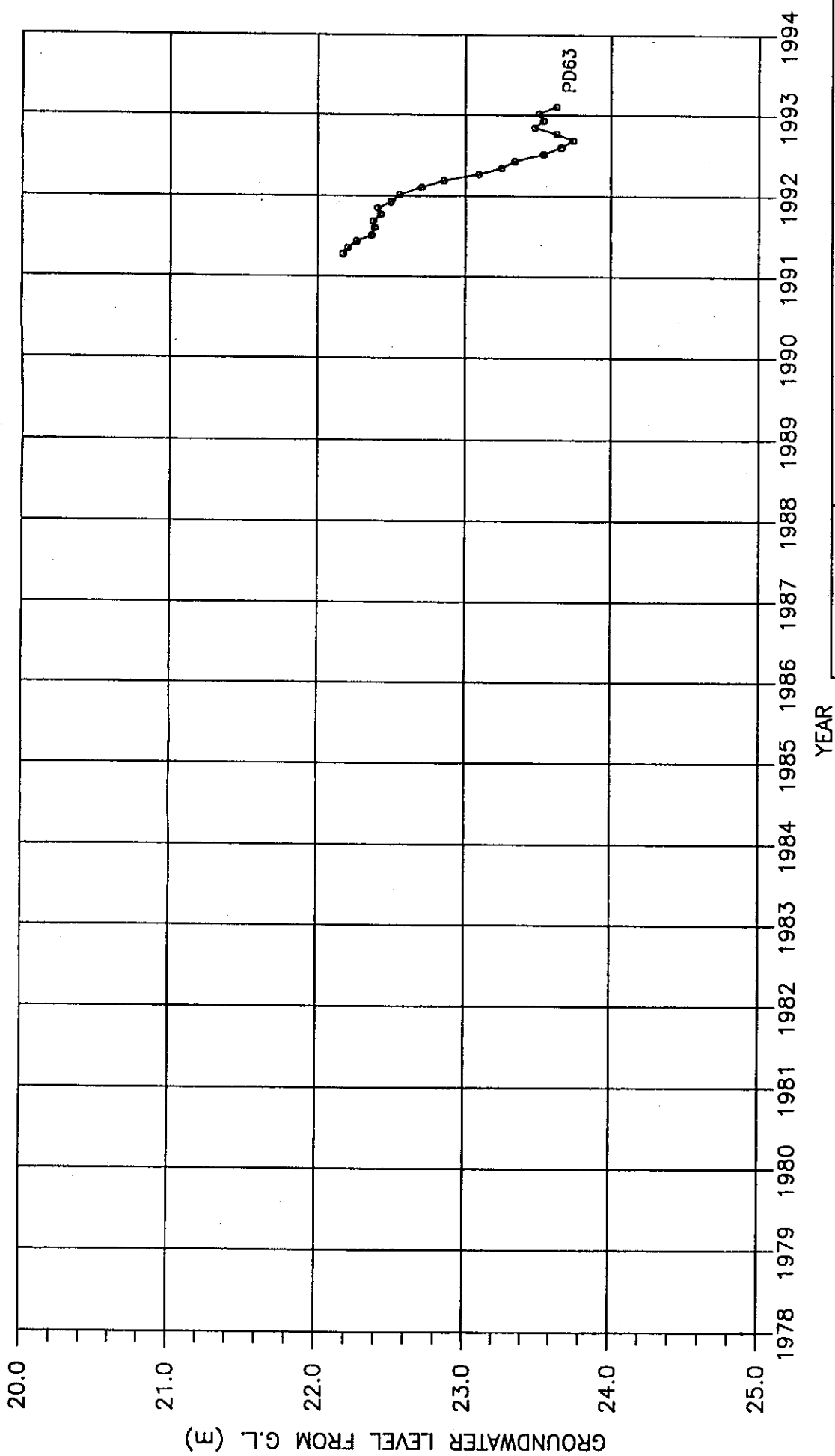
LOCATION : Limkun Watthana School  
 Tambon : Sai Noi  
 Amphoe : Nonthaburi  
 Changwat : Nonthaburi  
 UTM Grid : 40S347

SCREEN DEPTH  
 PD61 : 95.0-101.0m  
 NL73 : 159.0-165.0m  
 NB65 : 212.0-218.0m

Figure. 93 GROUNDWATER LEVEL CHANGES AT STATION No. 92

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES



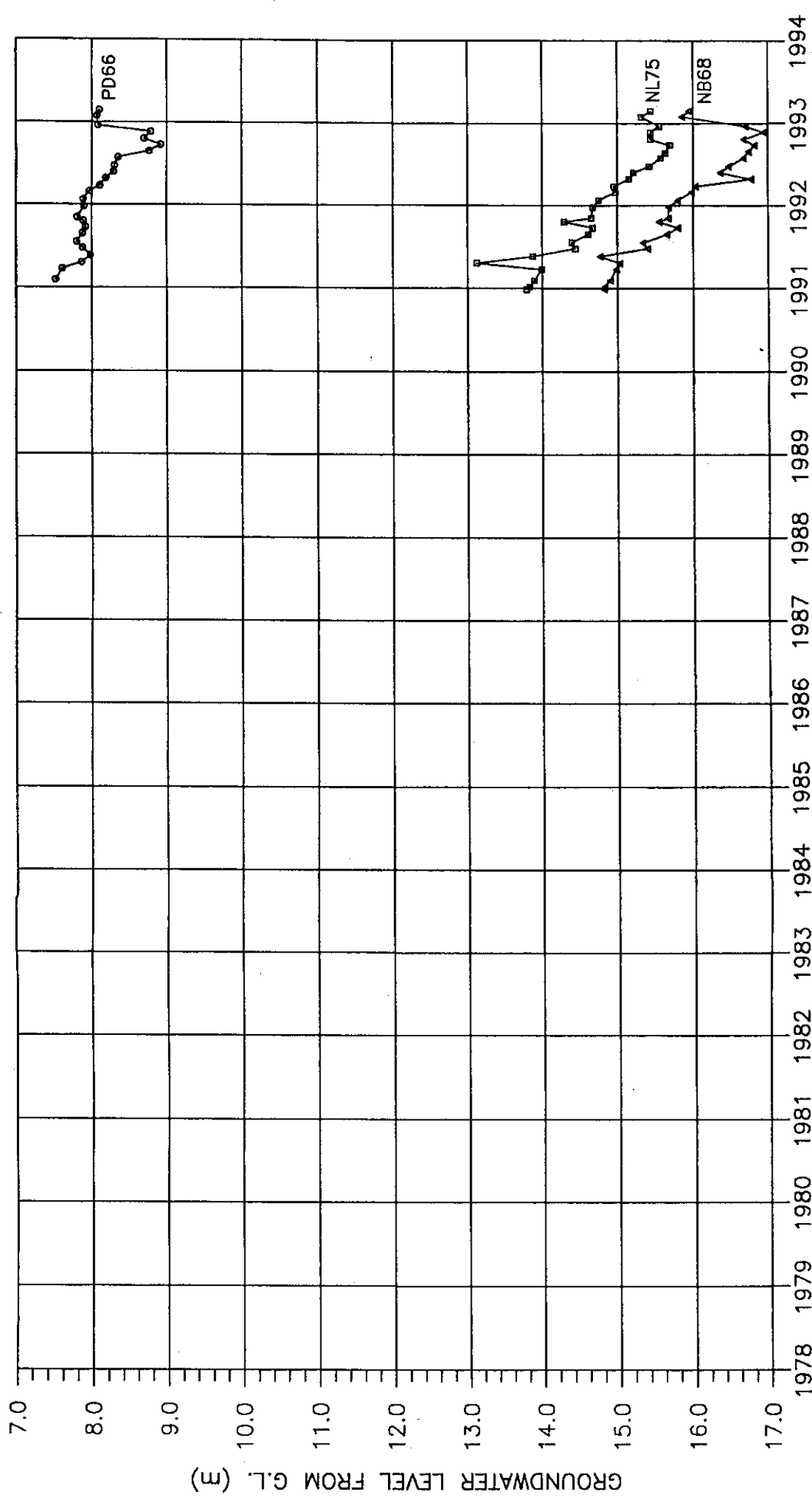
LOCATION : Wat Phasuk  
 Tambon : Pak Kret  
 Amphoe : Pak Kret  
 Changwat : Nonthaburi  
 UTM Grid : 668379

SCREEN DEPTH  
 PD63 : 101.0-107.0m.

Figure. 94 GROUNDWATER LEVEL CHANGES AT STATION No. 93

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES



YEAR

SCREEN DEPTH

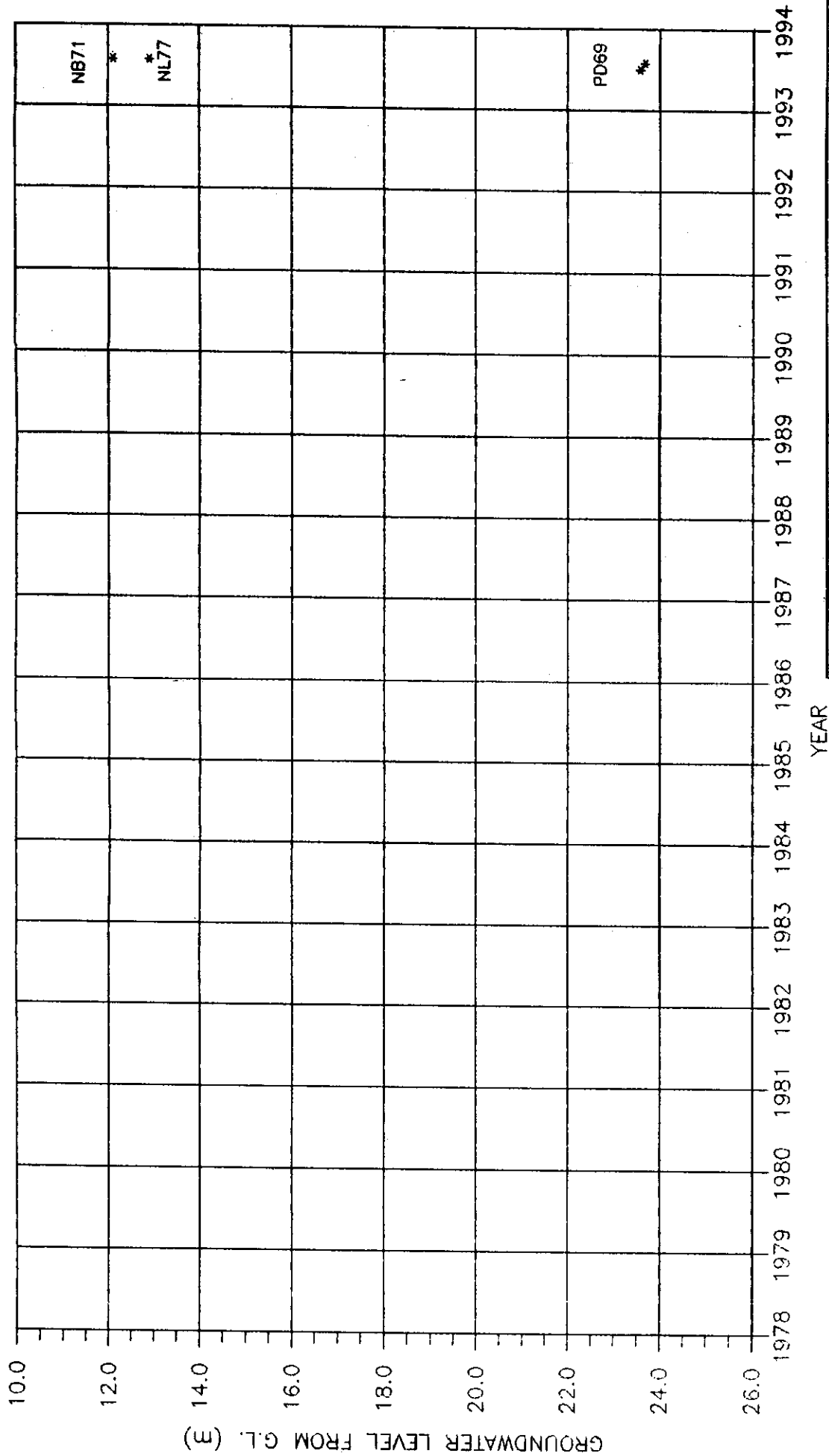
PD66 : 81.0 - 87.0m  
 NL75 : 144.0 - 150.0m  
 NB68 : 220.0 - 226.0m

LOCATION : Wat Lak Khong  
 Tambon : Rat Niyon  
 Amphoe : Sai Noi  
 Changwat : Nonthaburi  
 UTM Grid : 451594

Figure. 95 GROUNDWATER LEVEL CHANGES AT STATION No. 94

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES



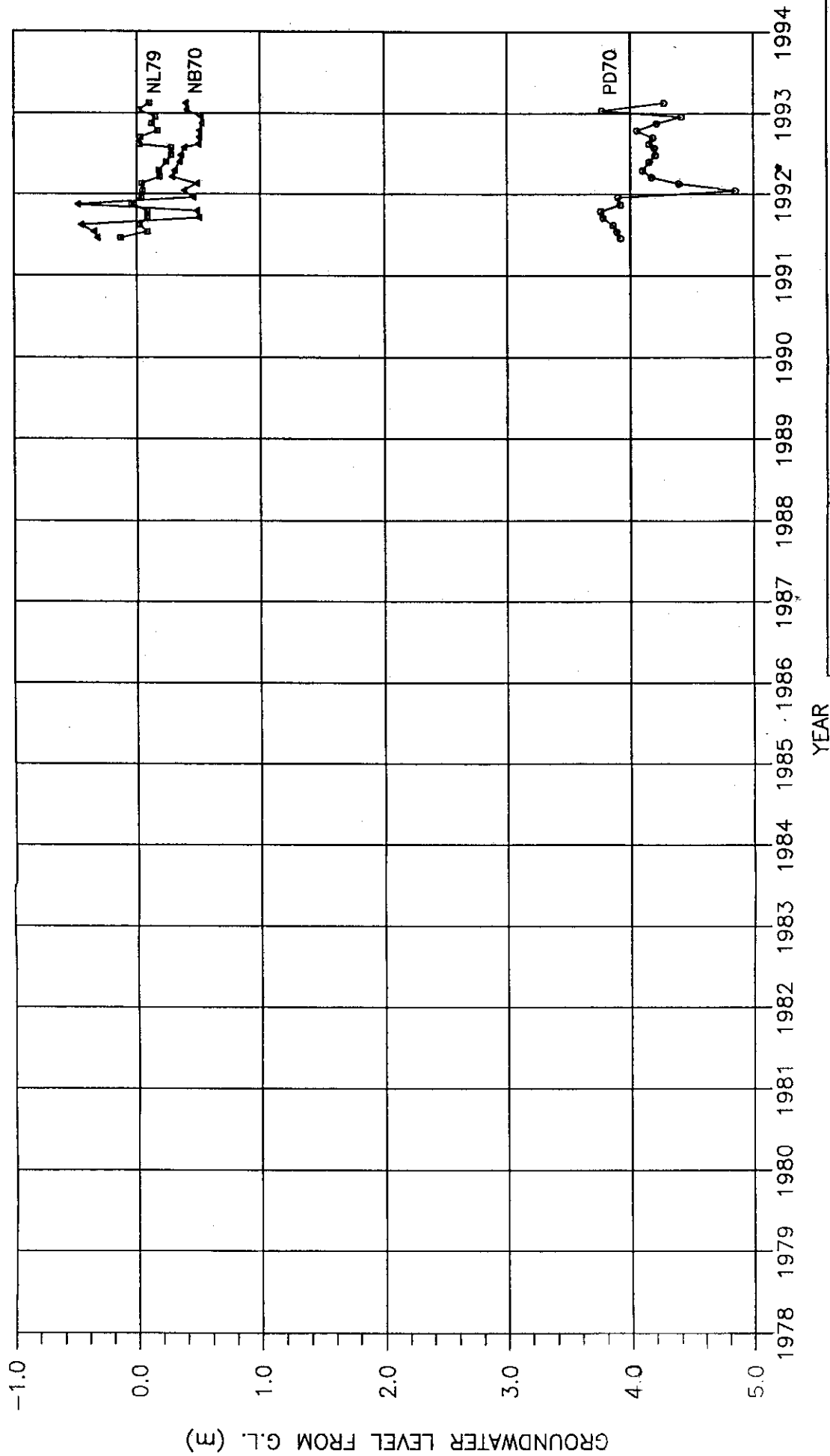
LOCATION : Wat Bang Phli Noi  
 Tambon : Bang Phli Noi  
 Amphoe : Bang Bo  
 Changwat : Samut Prakan  
 UTM Grid : 059009

SCREEN DEPTH  
 PD69 : 101.0 - 107.0 m  
 NL77 : 153.0 - 159.0 m  
 NB71 : 183.0 - 189.0 m

Figure. 96 GROUNDWATER LEVEL CHANGES AT STATION No. 95

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

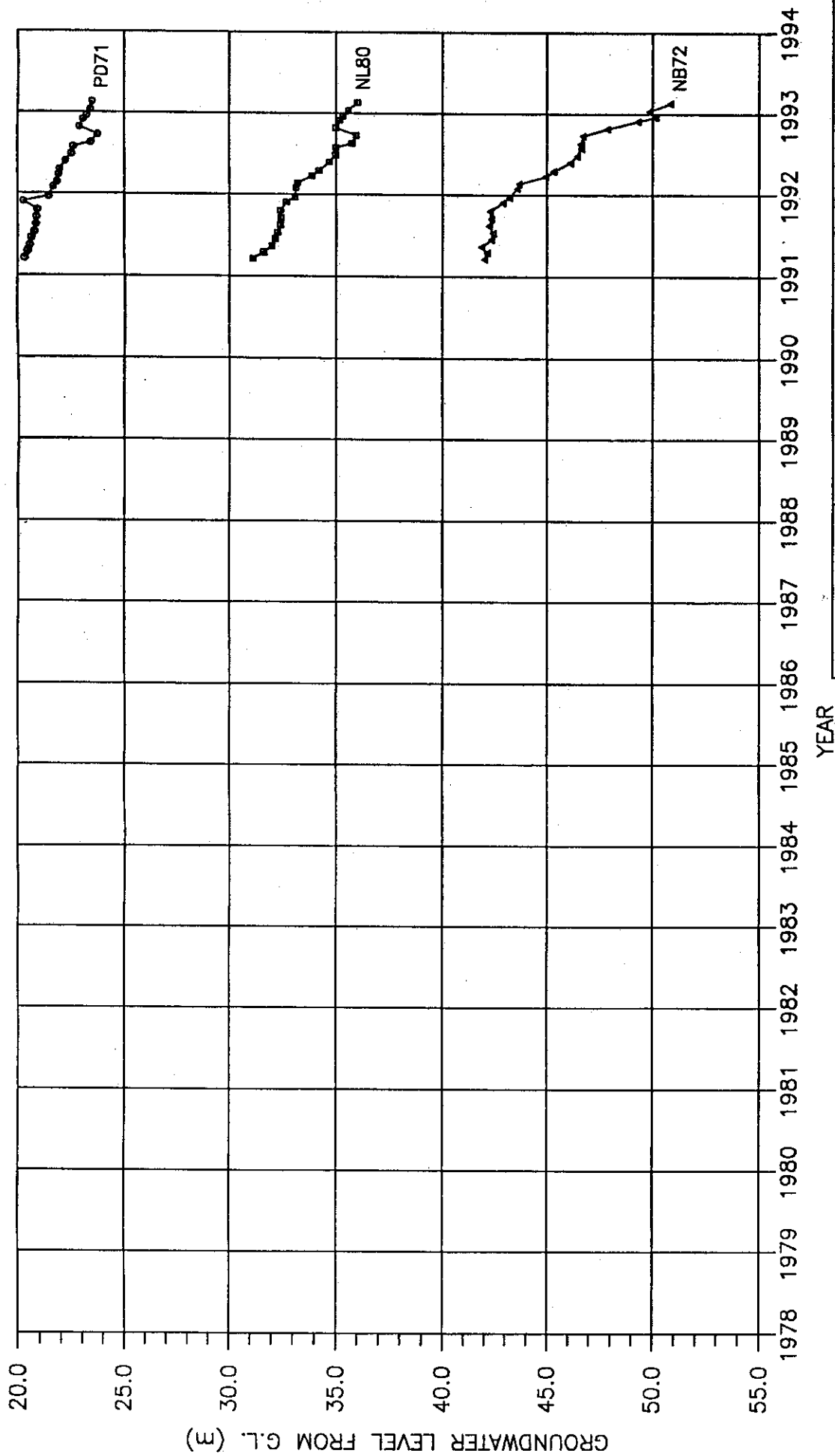
DEPARTMENT OF MINERAL RESOURCES



LOCATION : Wat Pichit Pittayaram  
 Tambon : Bung Nam Rak  
 Amphoe : Thanyaburi  
 Changwat : Pathum Thani  
 UTM Grid : 046568

SCREEN DEPTH  
 PD70 : 108.0-114.0 m  
 NL79 : 165.0-171.0 m  
 NB70 : 198.0-204.0 m

Figure. 97 GROUNDWATER LEVEL CHANGES AT STATION No. 96  
 MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)  
 DEPARTMENT OF MINERAL RESOURCES



LOCATION : Wat Mun Chindaram  
 Tambon : Bung Yrtho  
 Amphoe : Thanyaburi  
 Changwat : Pathum Thani  
 UTM Grid : 849489

SCREEN DEPTH

PD71 : 84.0 - 90.0m  
 NL80 : 125.0 - 131.0m  
 NB72 : 166.0 - 172.0m

Figure. 98 GROUNDWATER LEVEL CHANGES AT STATION No. 97

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

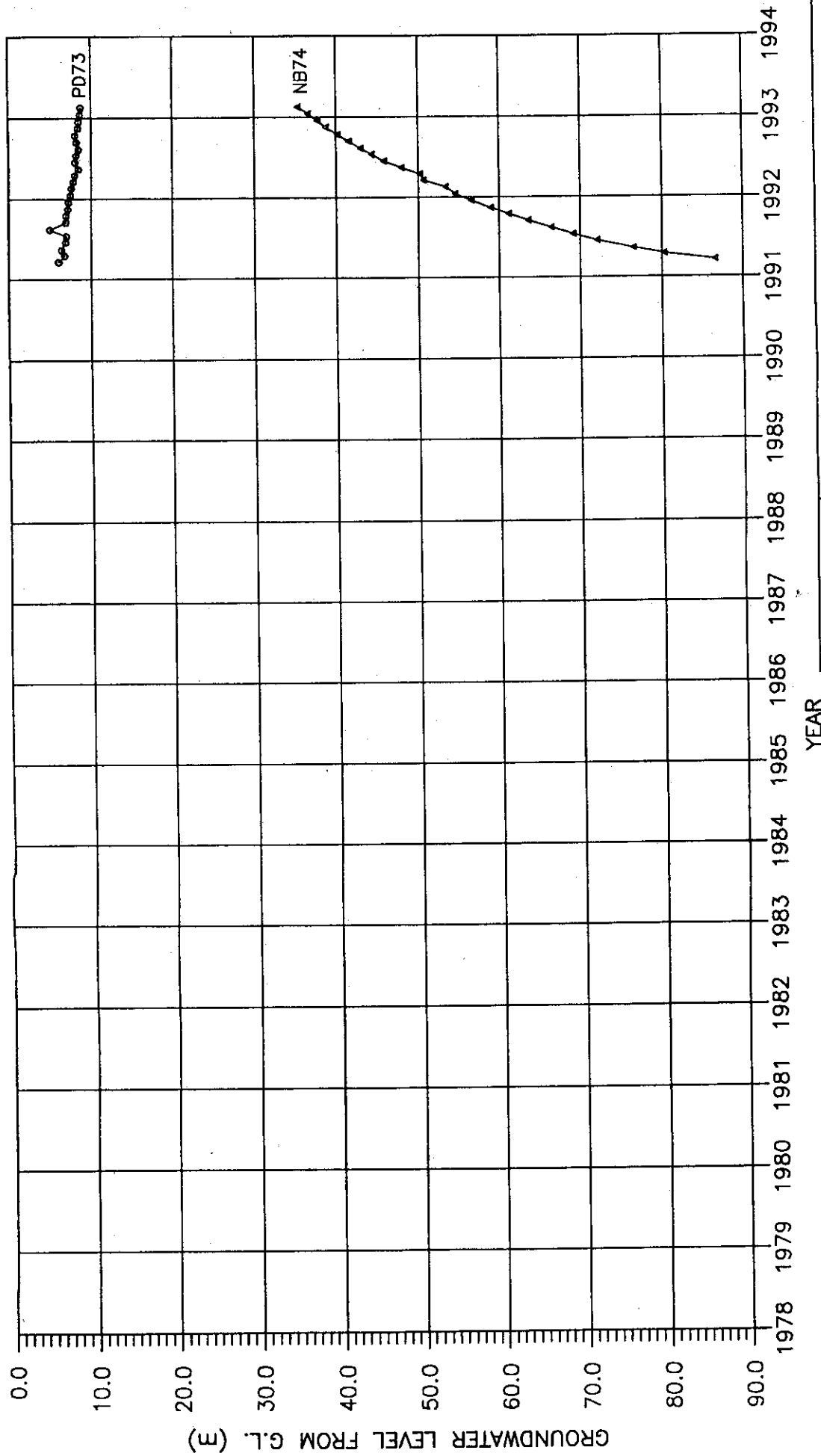


Figure. 99 GROUNDWATER LEVEL CHANGES AT STATION No. 98

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

LOCATION : Amphoe Office Compound  
 Tambon : Bung Ba  
 Amphoe : Nong Sua  
 Changwat : Pathum Thani  
 UTM Grid : 974632

SCREEN DEPTH  
 PD73 : 76.0 - 82.0m  
 NB74 : 218.0 - 224.0m

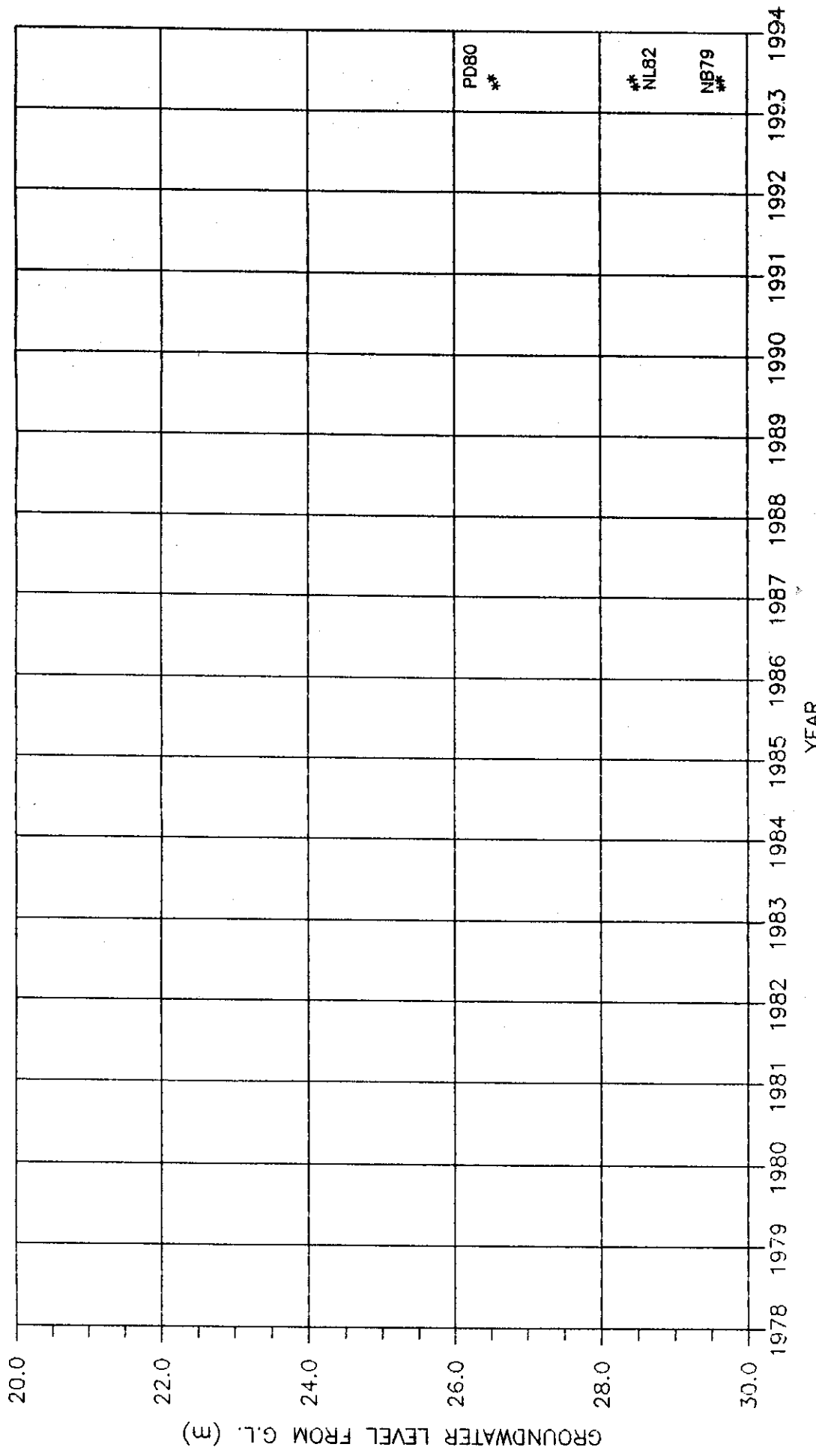


Figure. 100 GROUNDWATER LEVEL CHANGES AT STATION No. 99

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

LOCATION : Wat Kok  
 Tambon : Bang Khun Thain  
 Amphoe : Chorn Thong  
 Changwat : Bangkok  
 UTM Grid : 580120

SCREEN DEPTH  
 PD80 : 102.0-108.0m  
 NL82 : 163.0-169.0m  
 NB79 : 214.0-220.0m

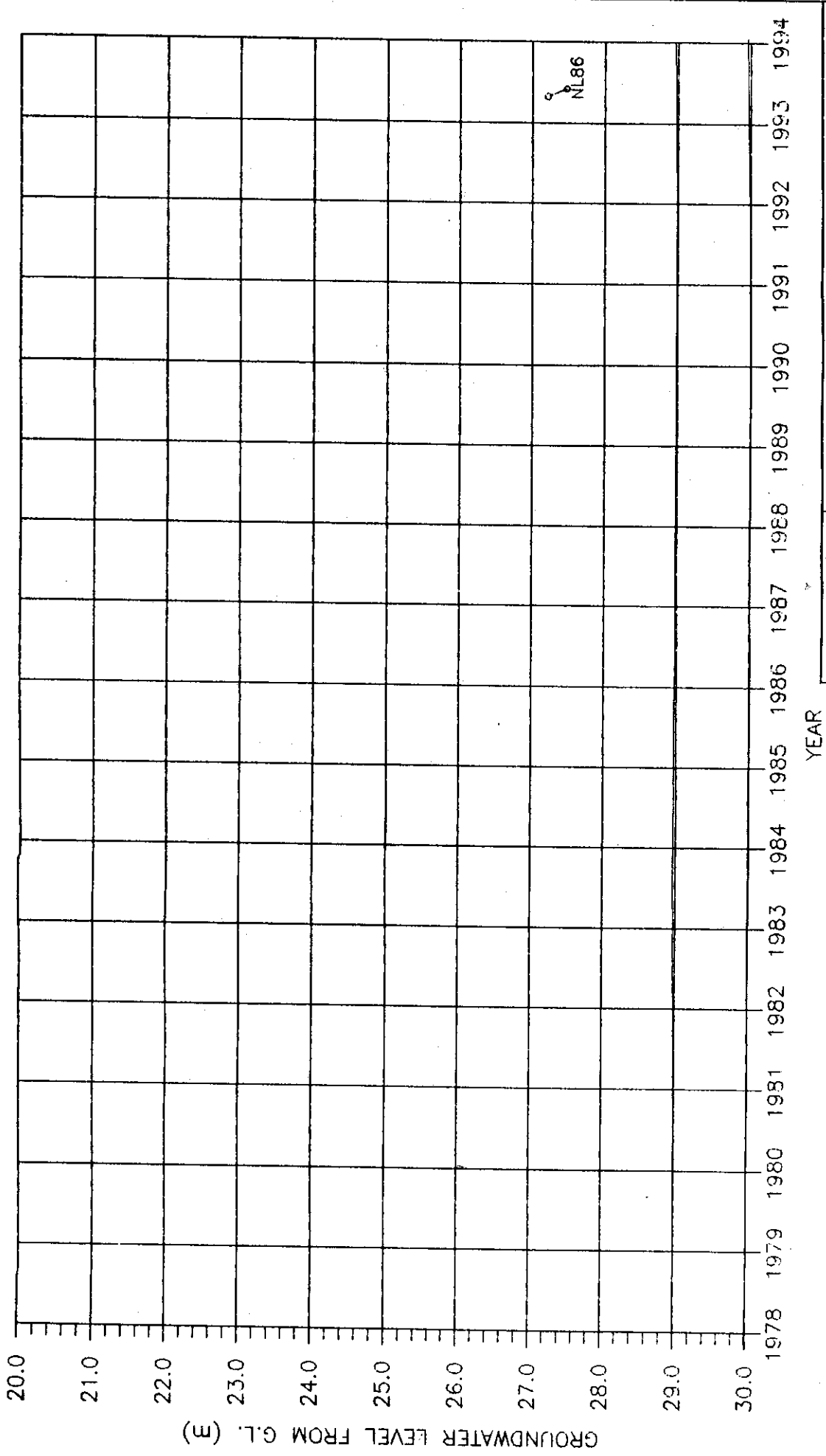


Figure. 101 GROUNDWATER LEVEL CHANGES AT STATION No. 100

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

LOCATION : National Housing Authority  
 Tambon : Samae Dam  
 Amphoe : Bang Khun Thian  
 Changwat : Bangkok  
 UTM Grid : 535088

SCREEN DEPTH : NL86 : 152.0-158.0 m

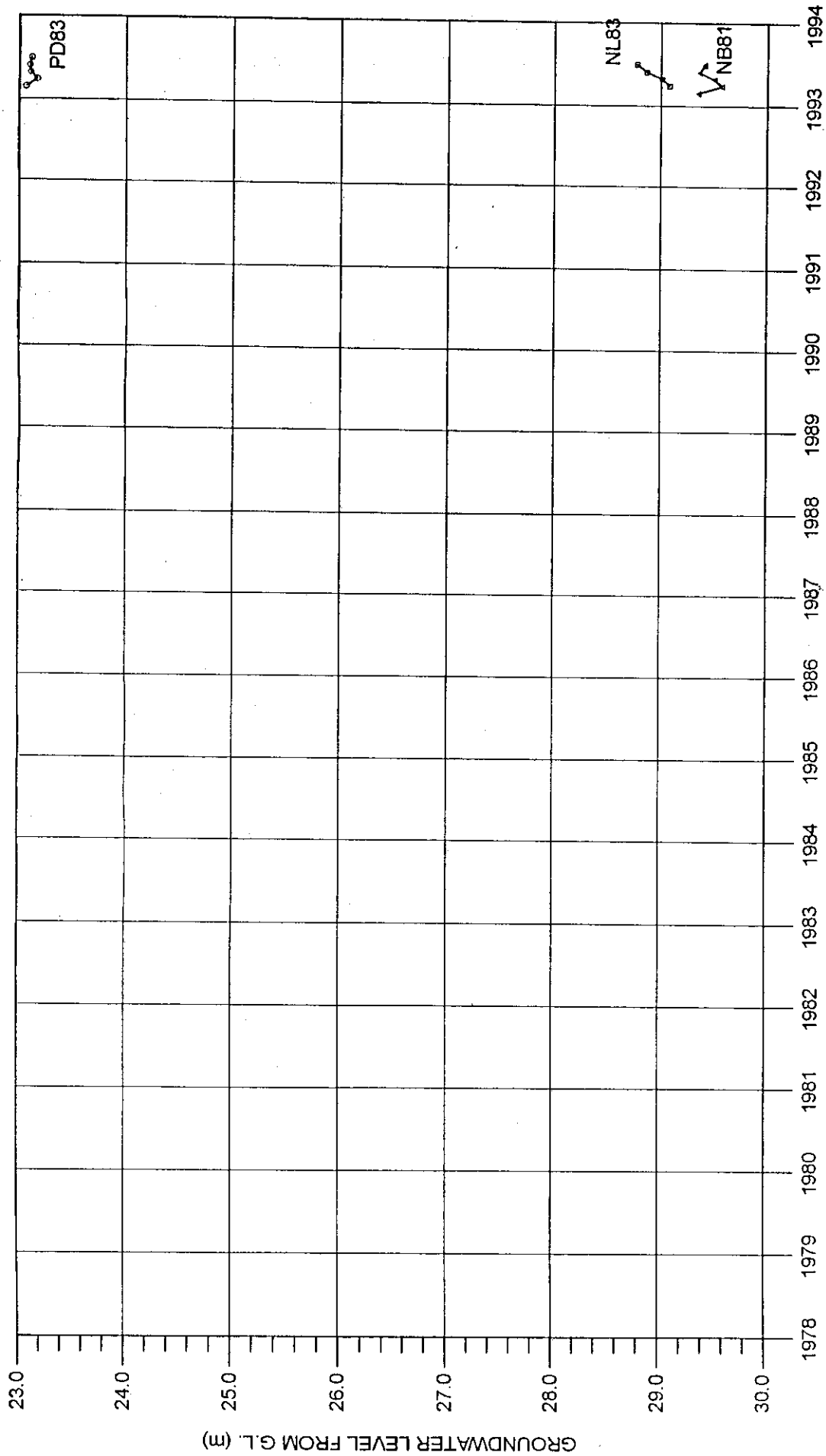


Figure. 102 GROUNDWATER LEVEL CHANGES AT STATION No. 101

LOCATION : Wat Taling Chan  
 Tambon : -  
 Amphoe : Taling Chan  
 Changwat : Bangkok  
 UTM Grid : 579234

SCREEN DEPTH  
 PD83 : 90.0-96.0m  
 NL83 : 168.0-174.0m  
 NB81 : 210.0-216.0m

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

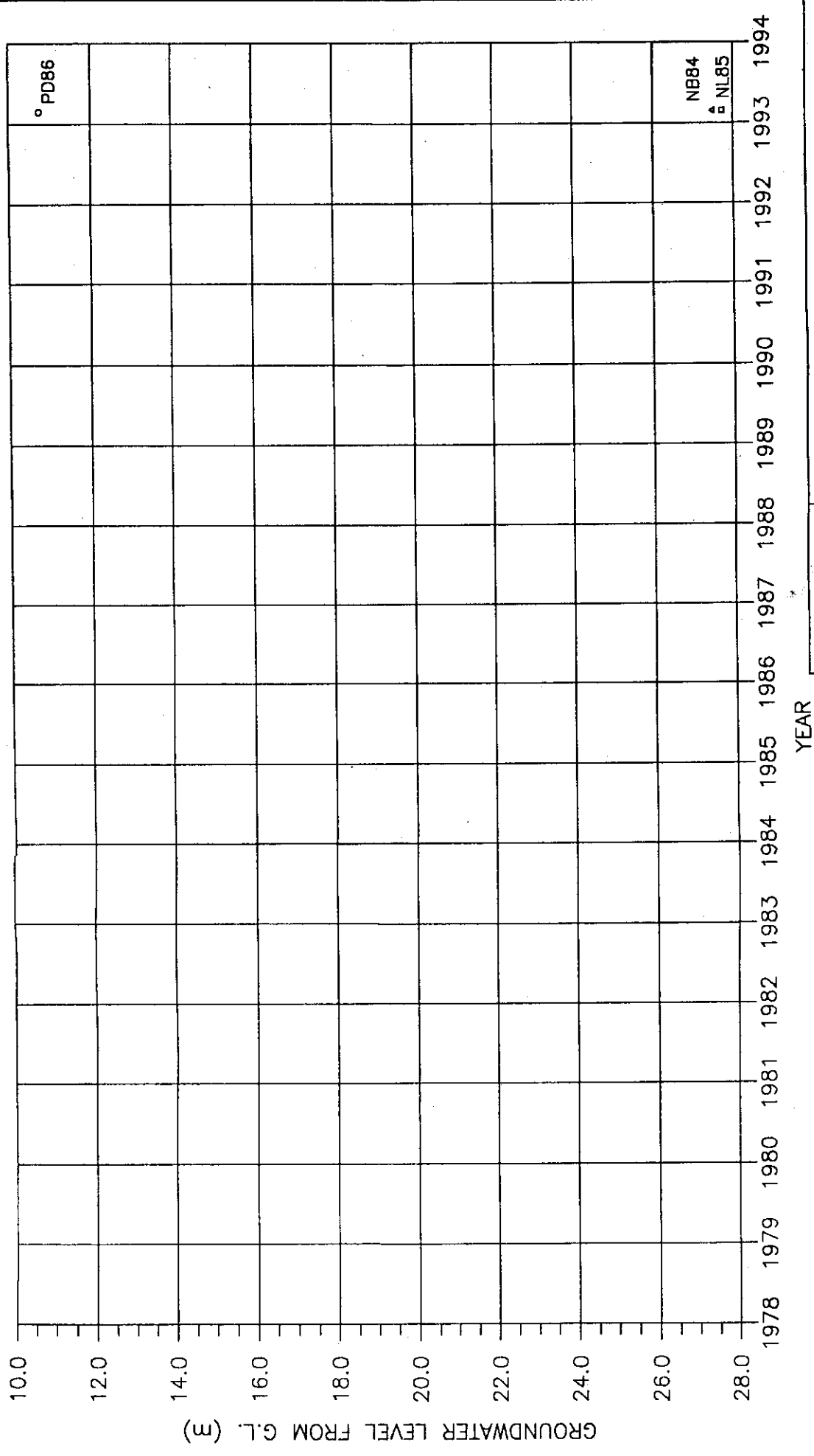
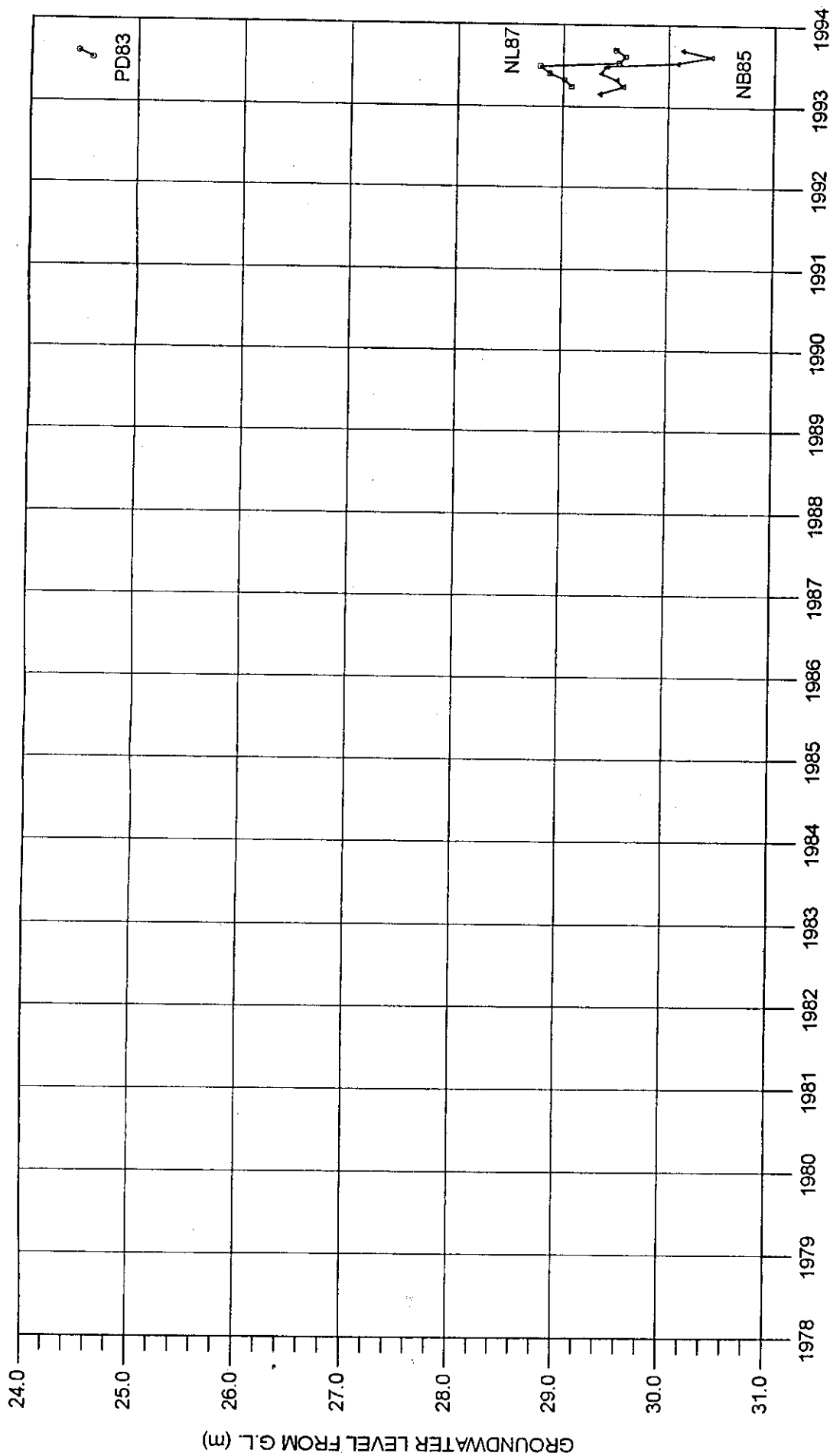


Figure. 103 GROUNDWATER LEVEL CHANGES AT STATION No. 102

LOCATION : Wat Lam Toiting  
 Tambon : Nong Chok  
 Amphoe : Bangkok  
 Changwat : Bangkok  
 UTM Grid : 046212

SCREEN DEPTH  
 PD86 : — m  
 NL85 : — m  
 NB84 : — m

DEPARTMENT OF MINERAL RESOURCES



LOCATION : Thawi Watthana School  
 Tambon : Khaeng Thawi Watthana  
 Amphoe : Taling Chan  
 Changwat : Bangkok  
 UTM Grid : 46T202

SCREEN DEPTH  
 PD83 : 90.0-96.0m  
 NL87 : 169.0-174.0m  
 NB85 : 204.0-210.0m

Figure. 104  
 GROUNDWATER LEVEL CHANGES  
 AT STATION No. 103

MITIGATION OF GROUNDWATER CRISIS AND LAND SUBSIDENCE  
 IN BANGKOK METROPOLITAN REGION PROJECT (MGL PROJECT)

DEPARTMENT OF MINERAL RESOURCES

พิมพ์ที่ โรงพิมพ์ชุมนุมสหกรณ์การเกษตรแห่งประเทศไทย จำกัด  
79 ถนนงามวงศ์วาน แขวงลาดยาว จตุจักร กรุงเทพฯ 10900 โทร. 5614567, 5614590-6