

## **APPENDIX 6**

# **GEOPHYSICAL PROSPECTING AND TEST DRILLING**

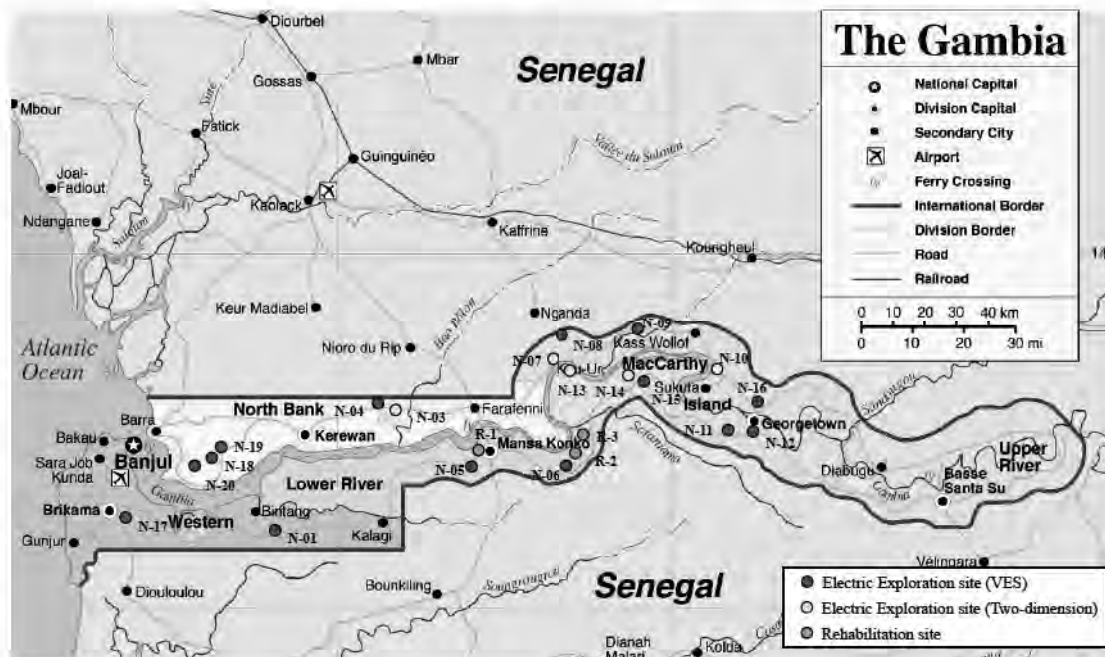
**APPENDIX 6 GEOPHYSICAL PROSPECTING AND TEST DRILLING**

**Table-1 Geo-electrical Prospecting list**

SiteNo.	Village Name	Region	Population (2020)	Resistivity Survey	
				VES (point)	TDE (line)
N-01	Kabocorr Tampapo & Killing	WR	1,369	3	
N-03	Kekuta Kunda Complex	NBR	1,639		2
N-04	Kerr Katim Wolof + Fula	NBR	1,334	3	
N-05	Madina Kaif (Sancha)	LRR	1,571	3	
N-06	Dongorpba	LRR	1,460	3	
N-07	Ballangharr Complex	CRR North	3,805		2
N-08	Jimbala Complex	CRR North	1,865	3	
N-09	Fass	CRR North	1,523	3	
N-10	Kuntaur Fula Kunda & Jakaba	CRR North	1,914		2
N-11	Kerewan Samba Sira	CRR South	2,583	3	
N-12	Fura Bantang & Sinchu Sora	CRR South	1,806	3	
N-13	Jissadi	CRR South	1,480		2
N-14	Sotokoi	CRR South	1,458		2
N-15	Maka and Njie Kunda	CRR South	2,035	3	
N-16	Lamin Koto + Badala + Sotokoi	CRR North	2,277		2
N-17	Gidda	WR	337	3	
N-18	Kerr Mama	NBR	911	3	
N-19	Kerr Cherno	NBR	1,305	3	
N-20	Banta Killing	NBR	1,176		2
Total				14 Village 40 point	5 Village 10 line

Remarks: VES = Vertical Electrical Sounding

TDE = Two-Dimension Exploration



**Figure -1 Survey Location Map**

(1) Geophysical Prospecting Site Map

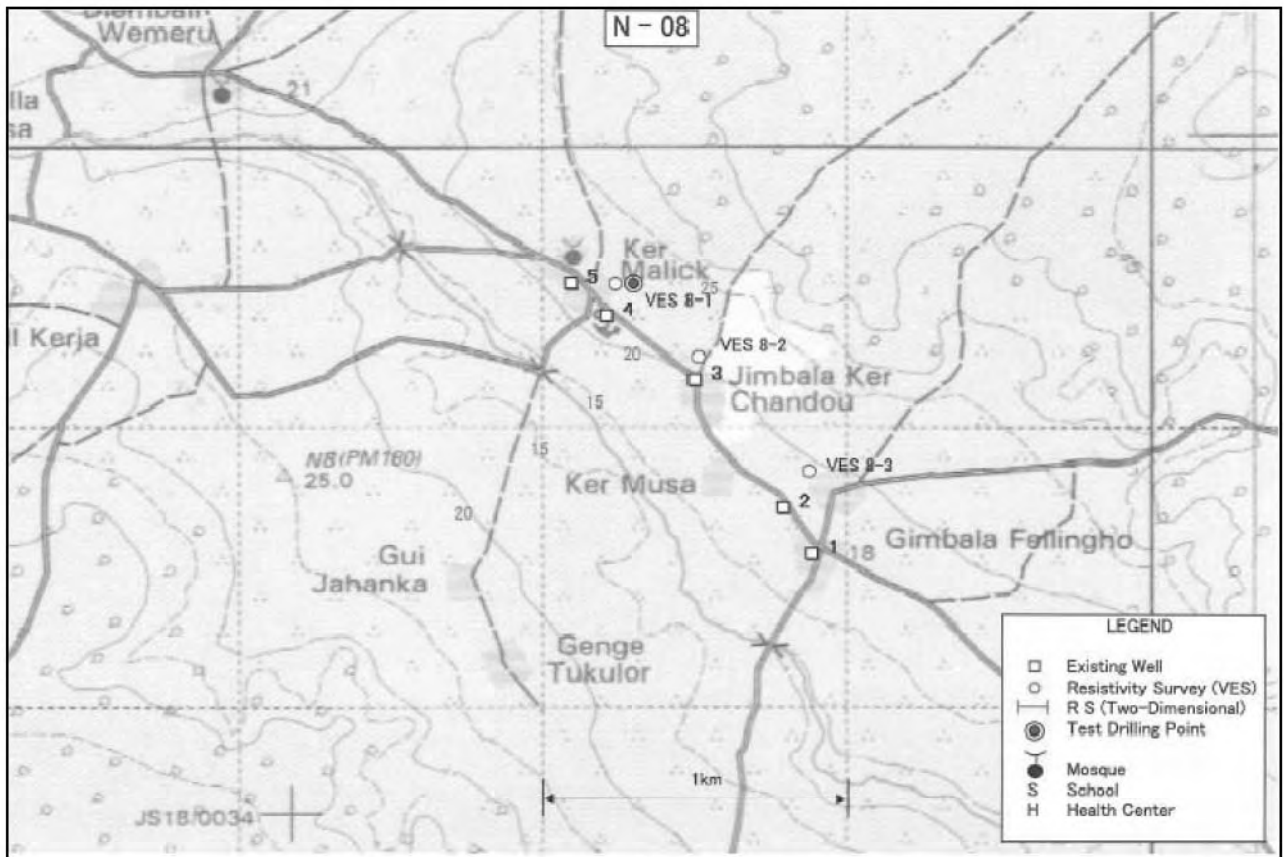


Figure -2 Survey Site N-08 Jimbala Complex

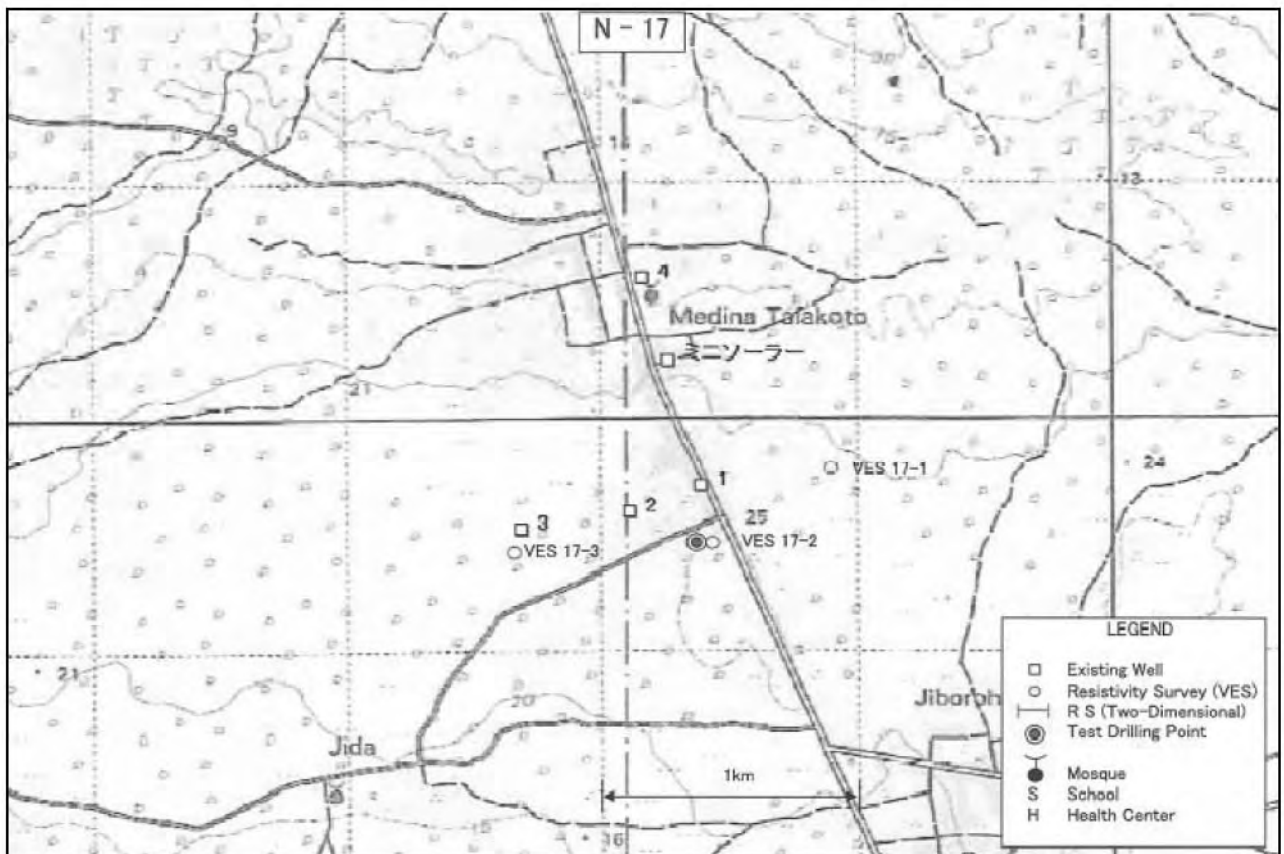


Figure -3 Survey Site N-17 Gidda

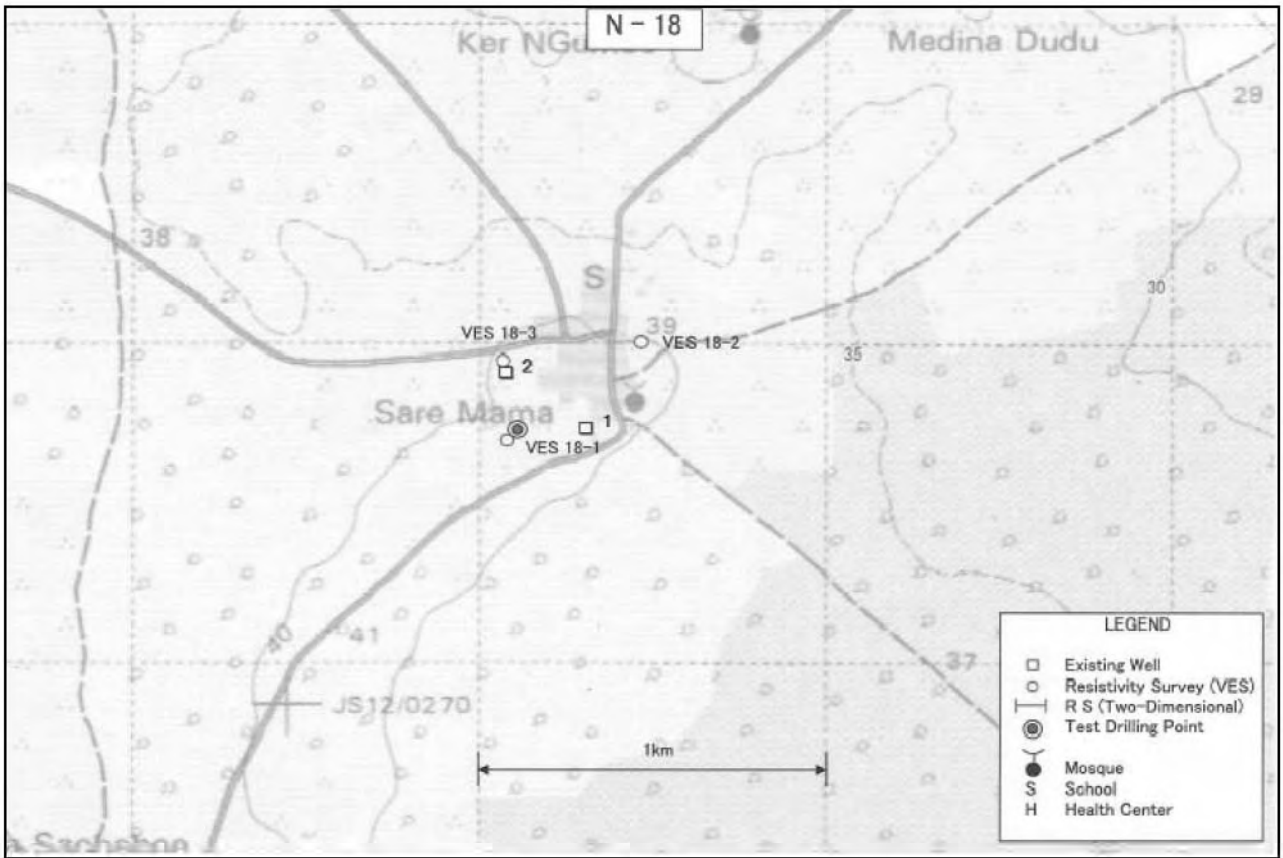


Figure -4 Survey Site N-18 Kerr Mamma

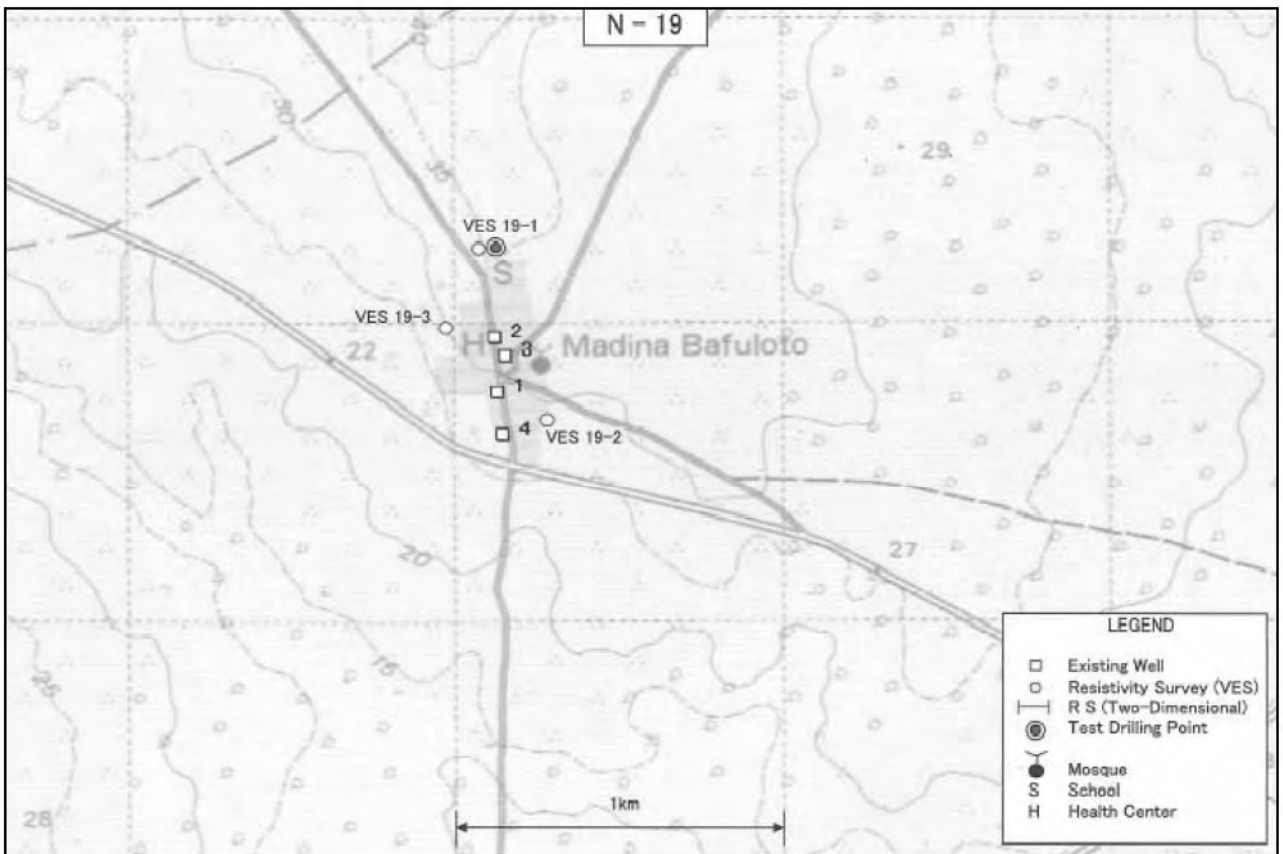


Figure -5 Survey Site N-19 Kerr Cherno (Madina Bafuloto)

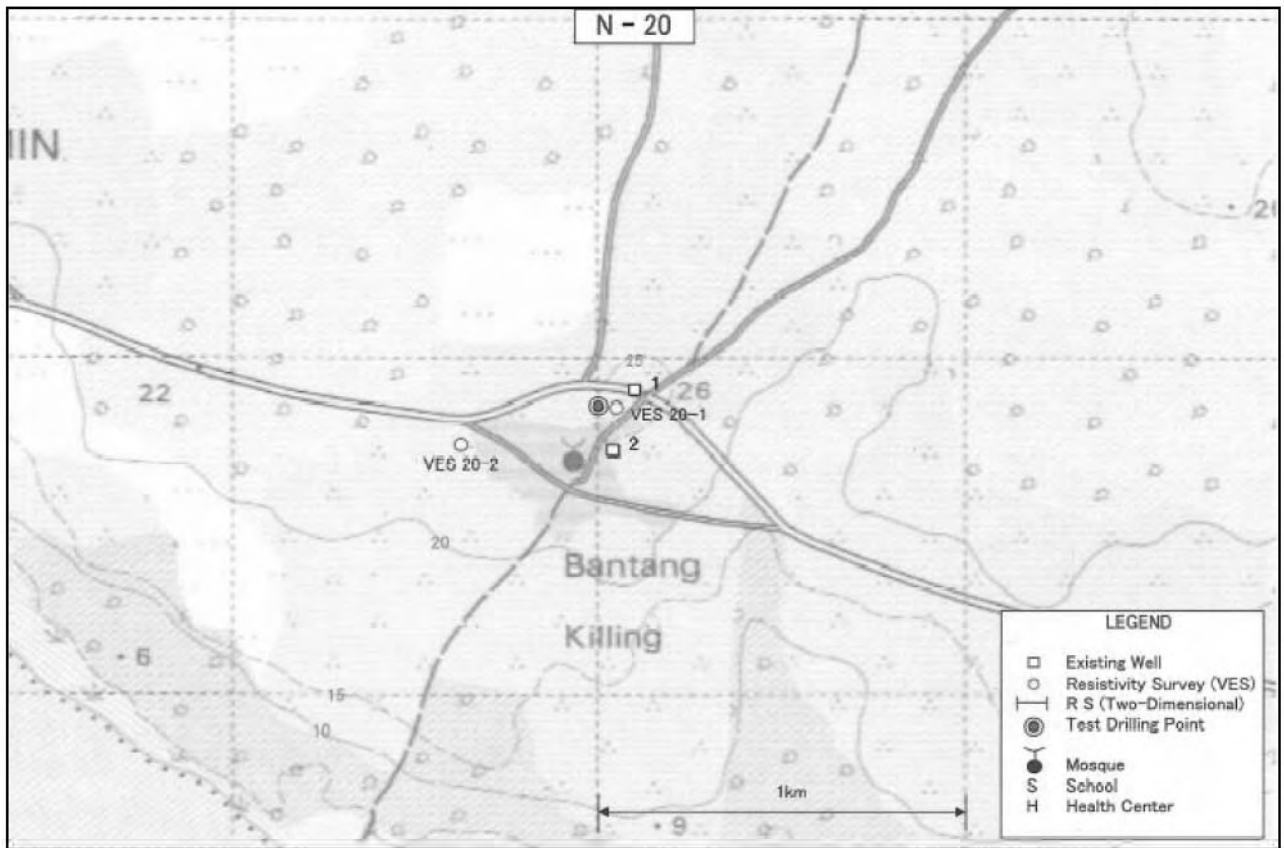
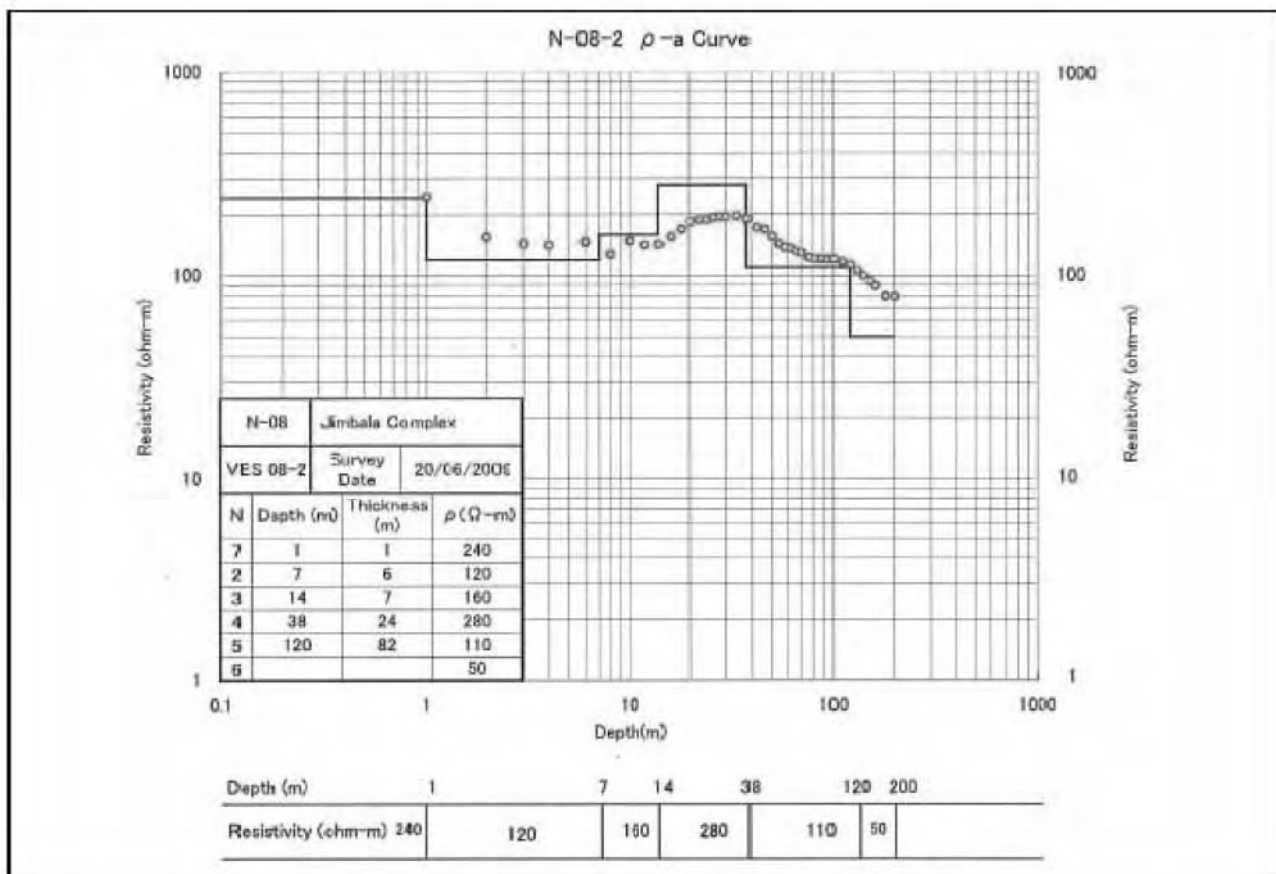
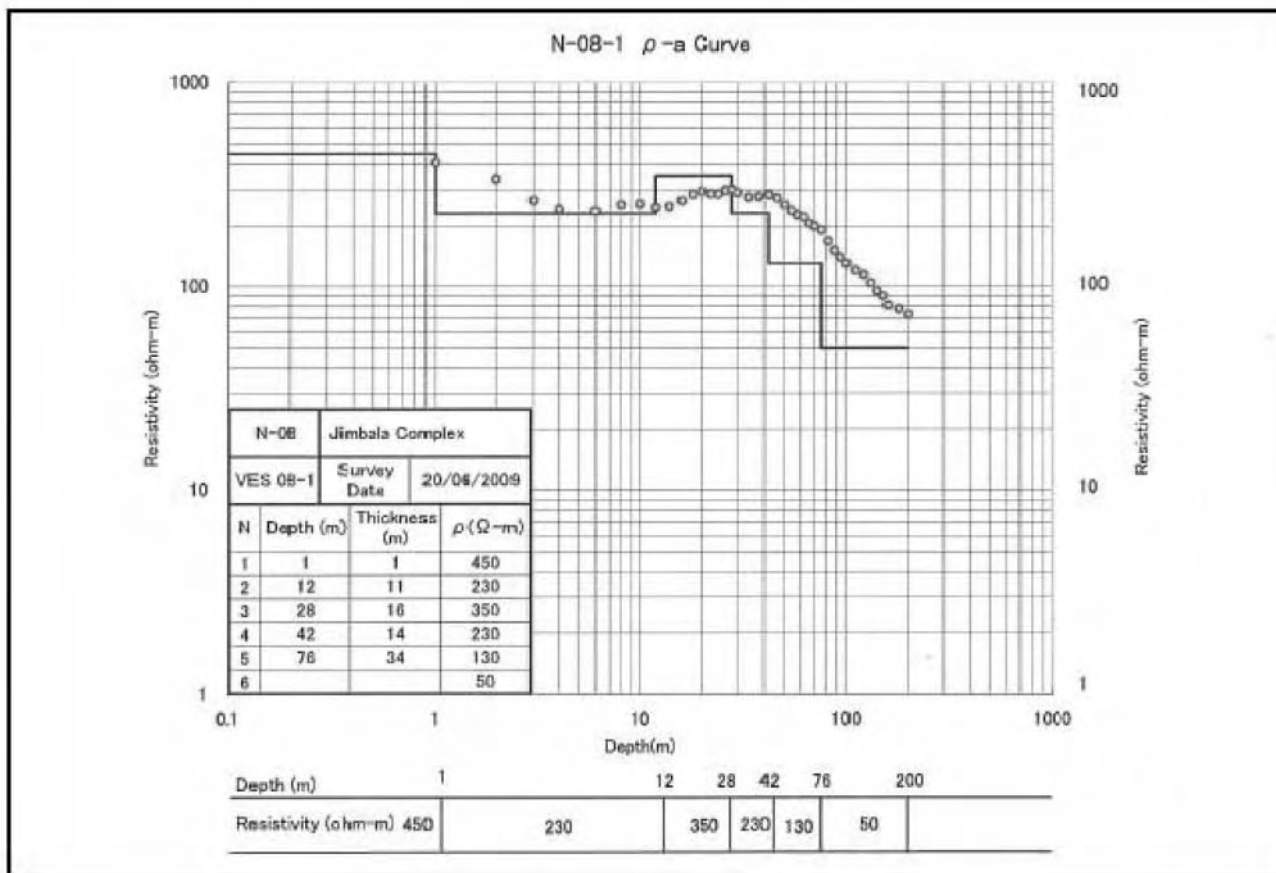
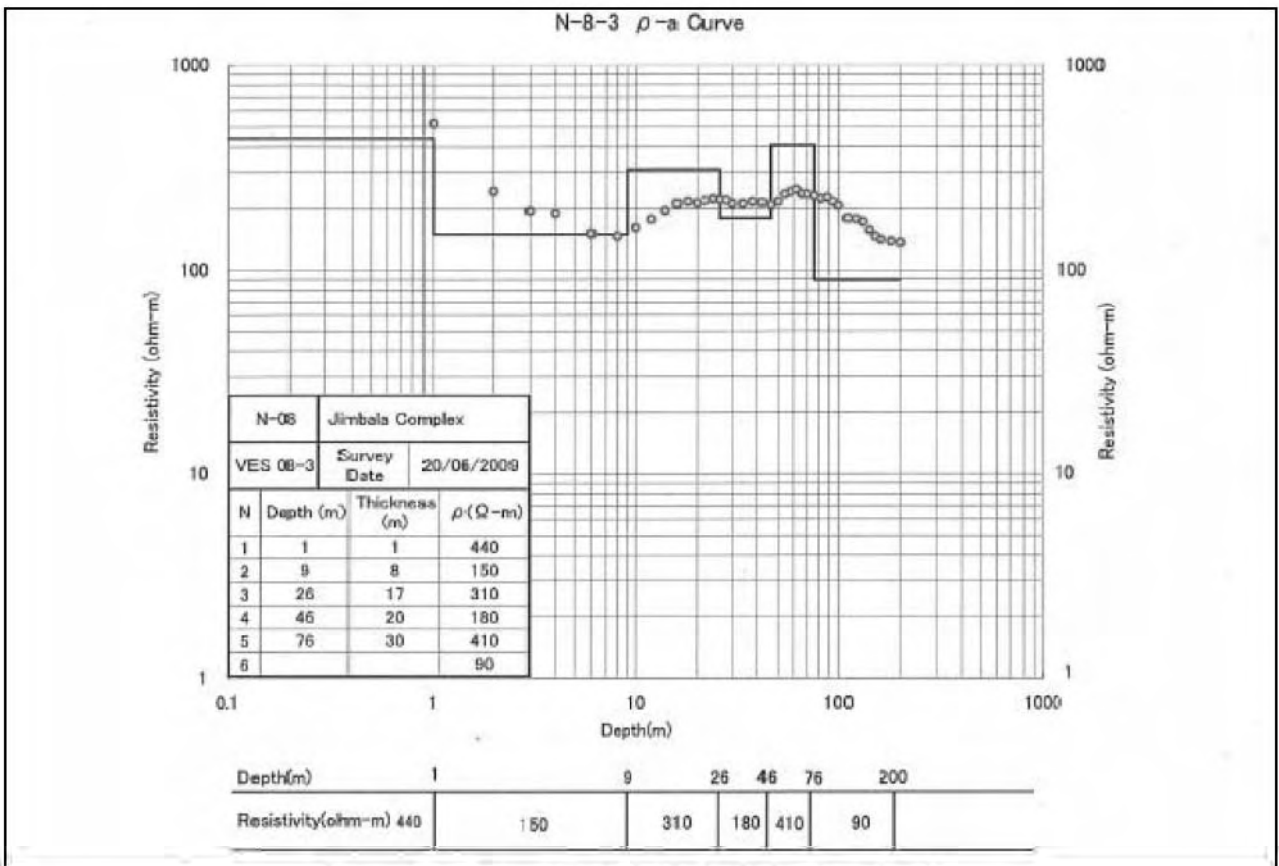


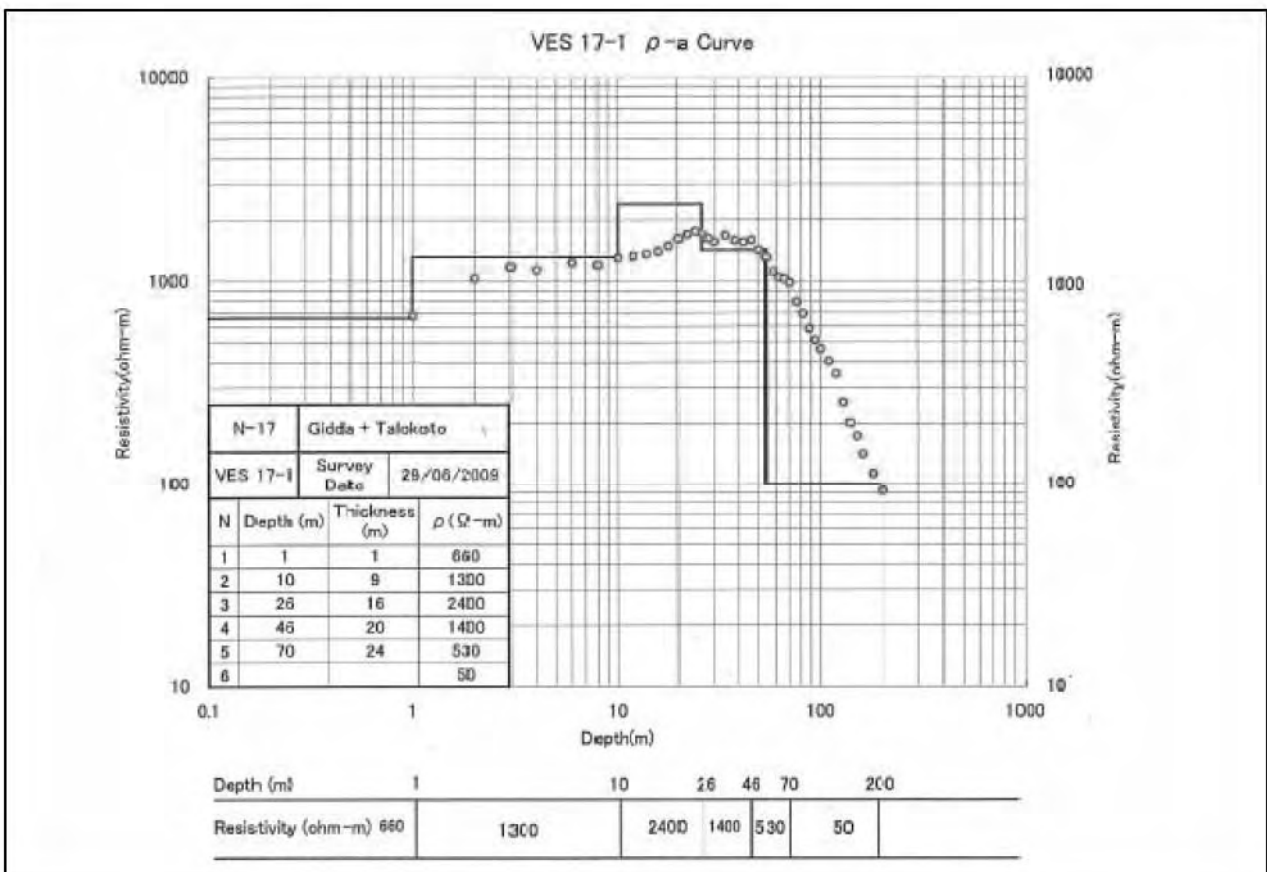
Figure -6 Survey Site N-20 Banta Killing

(2) Electric Resistivity Survey (Vertical Sounding by Wenner Method)





**Figure-7 Survey Site N-08 Jimbala Complex (1)**





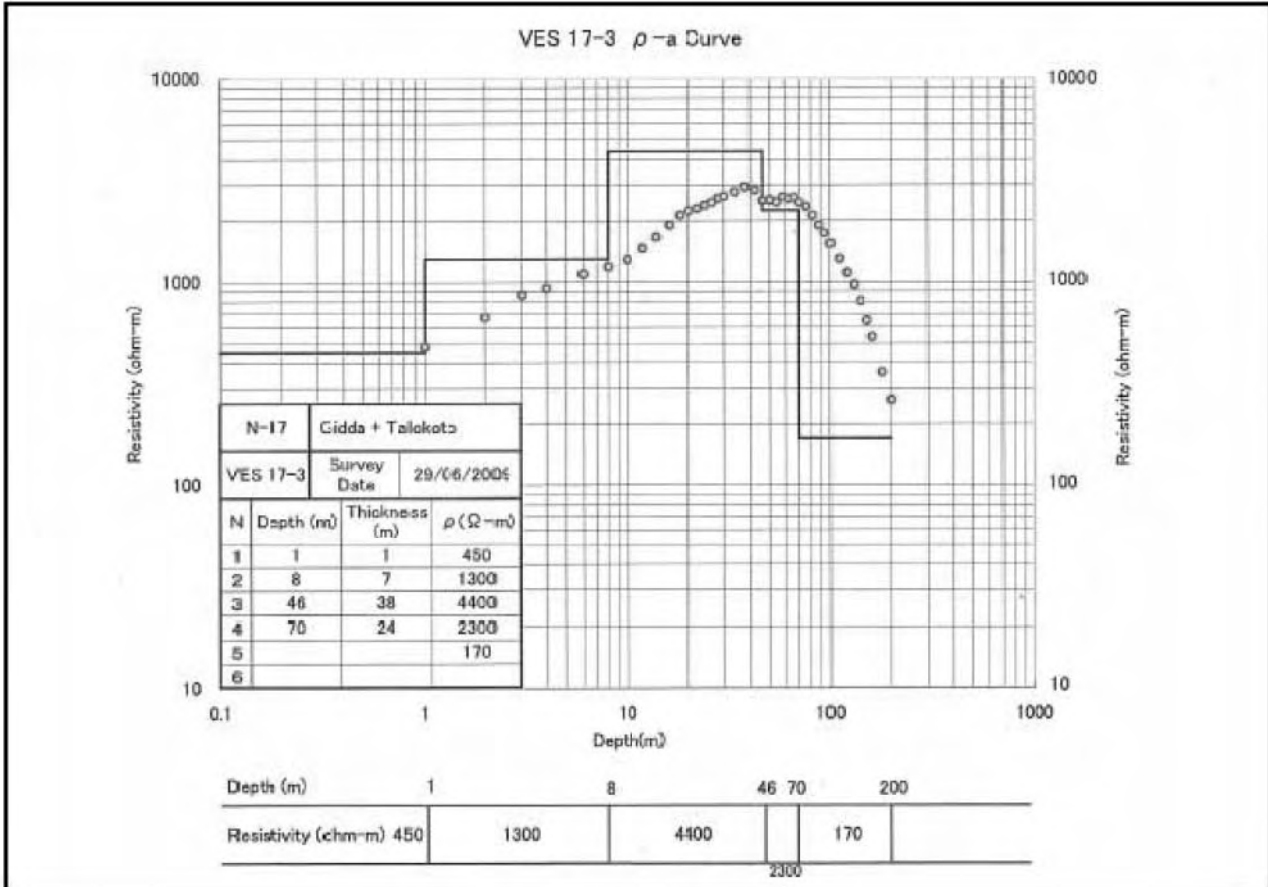
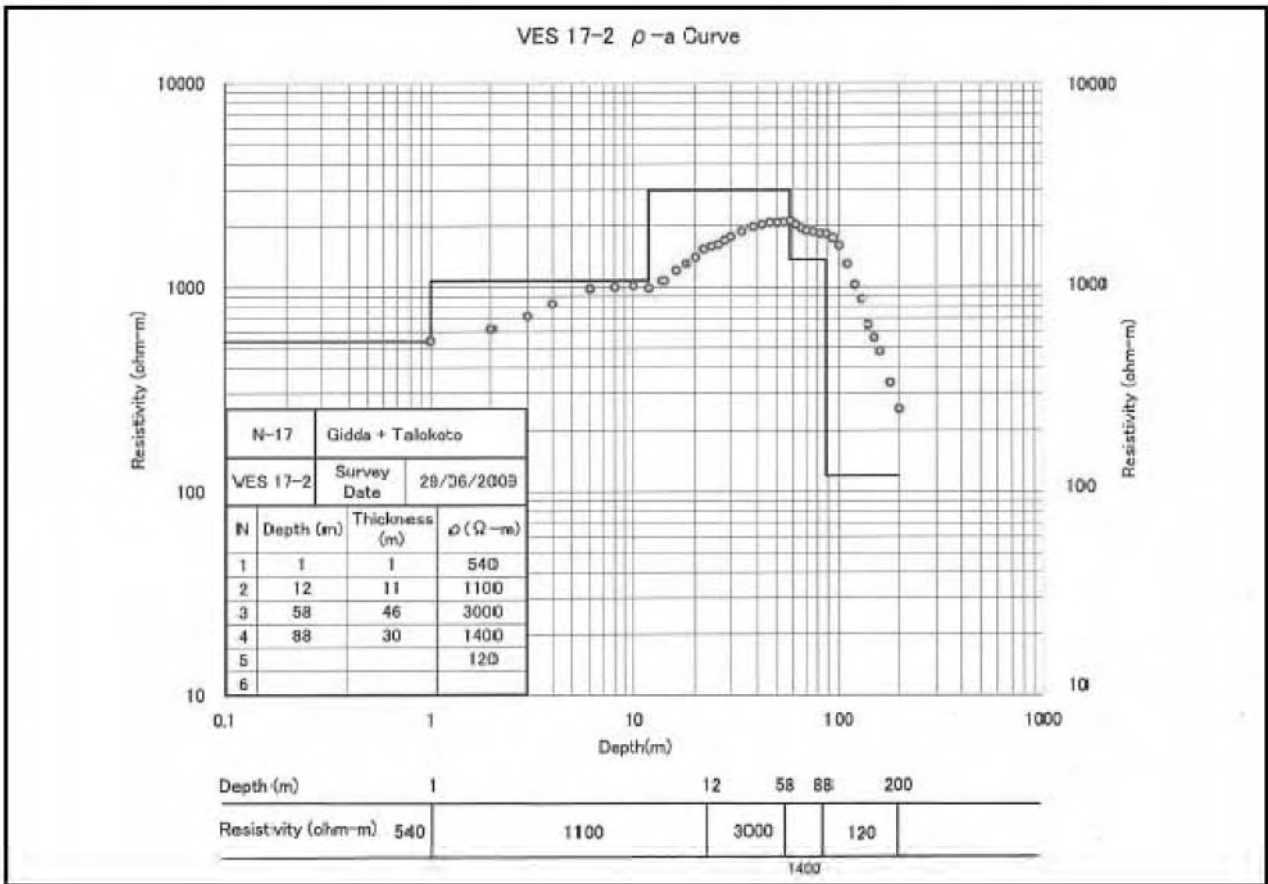
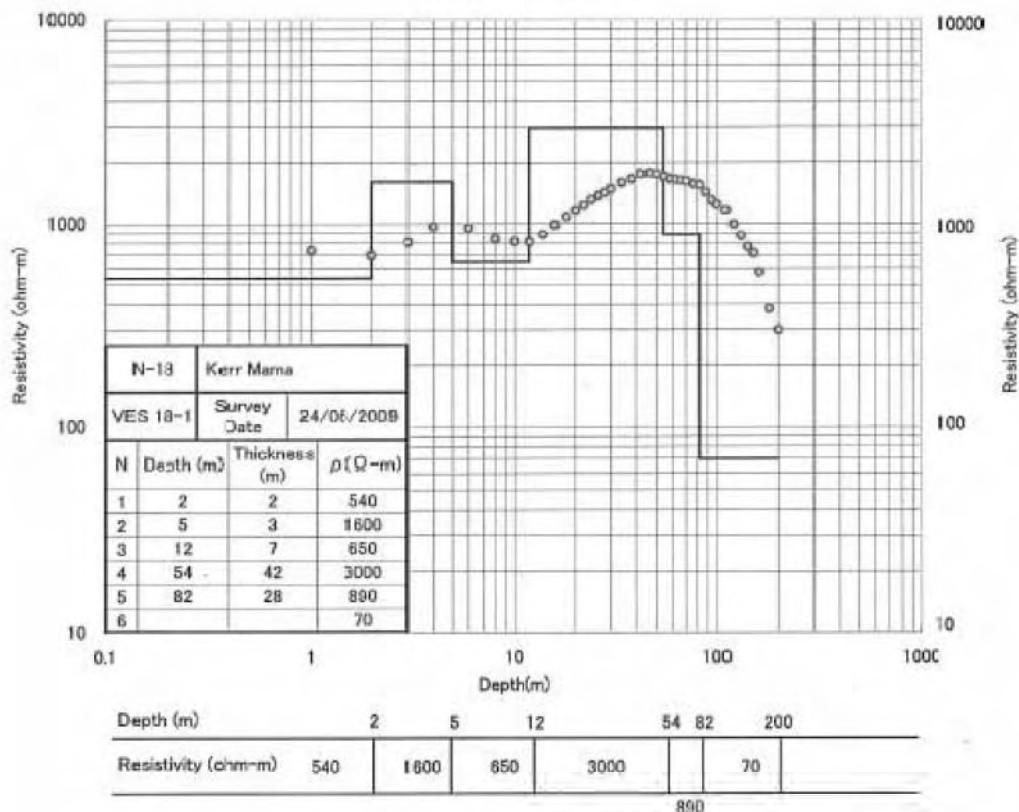


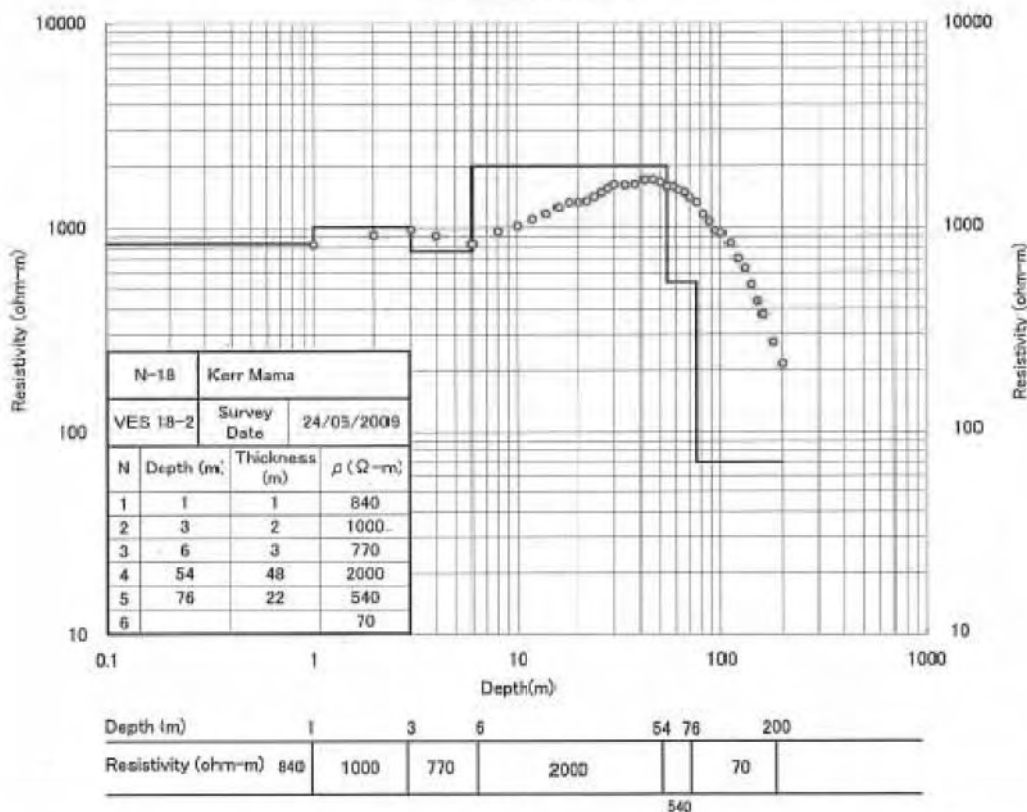
Figure-8 Survey Site N-17 Gidda

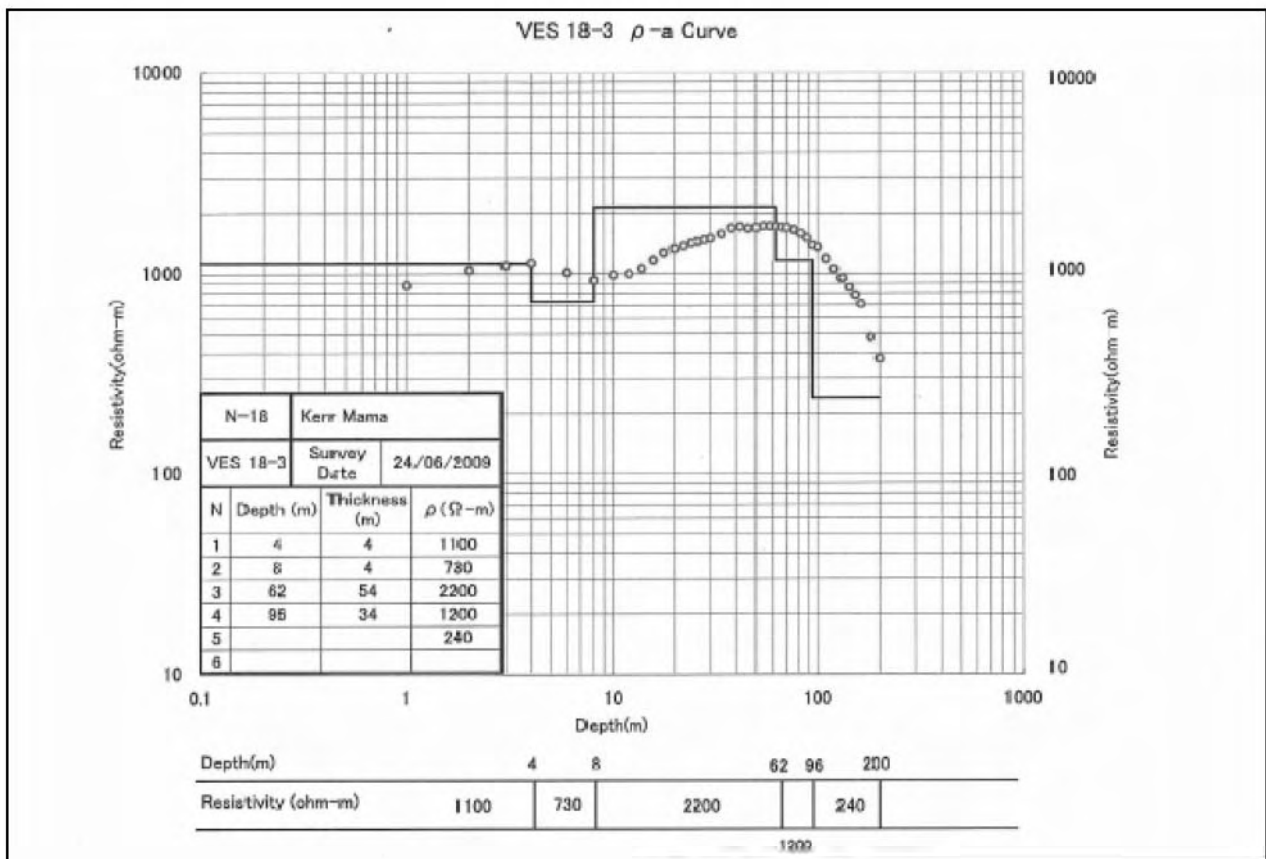


VES 18-1  $\rho$ -a Curve

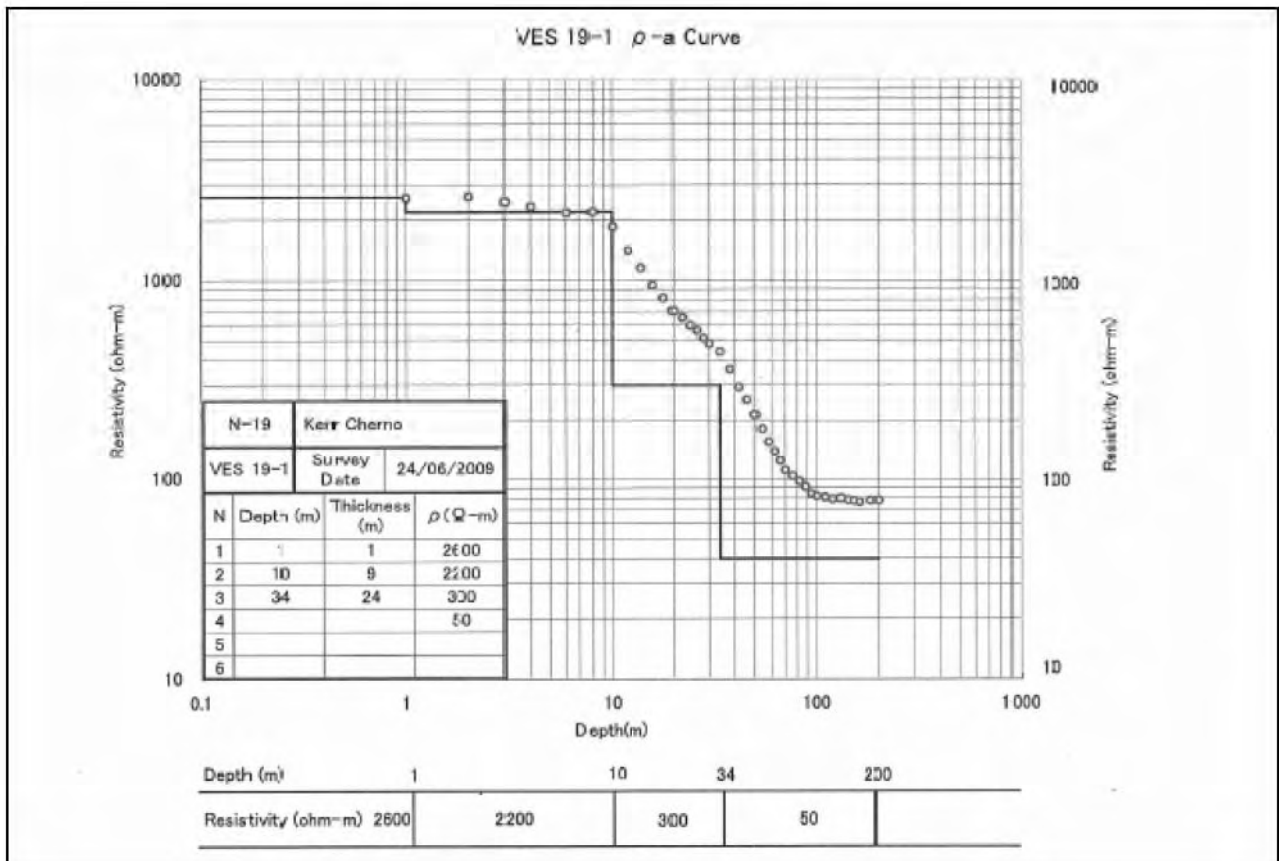


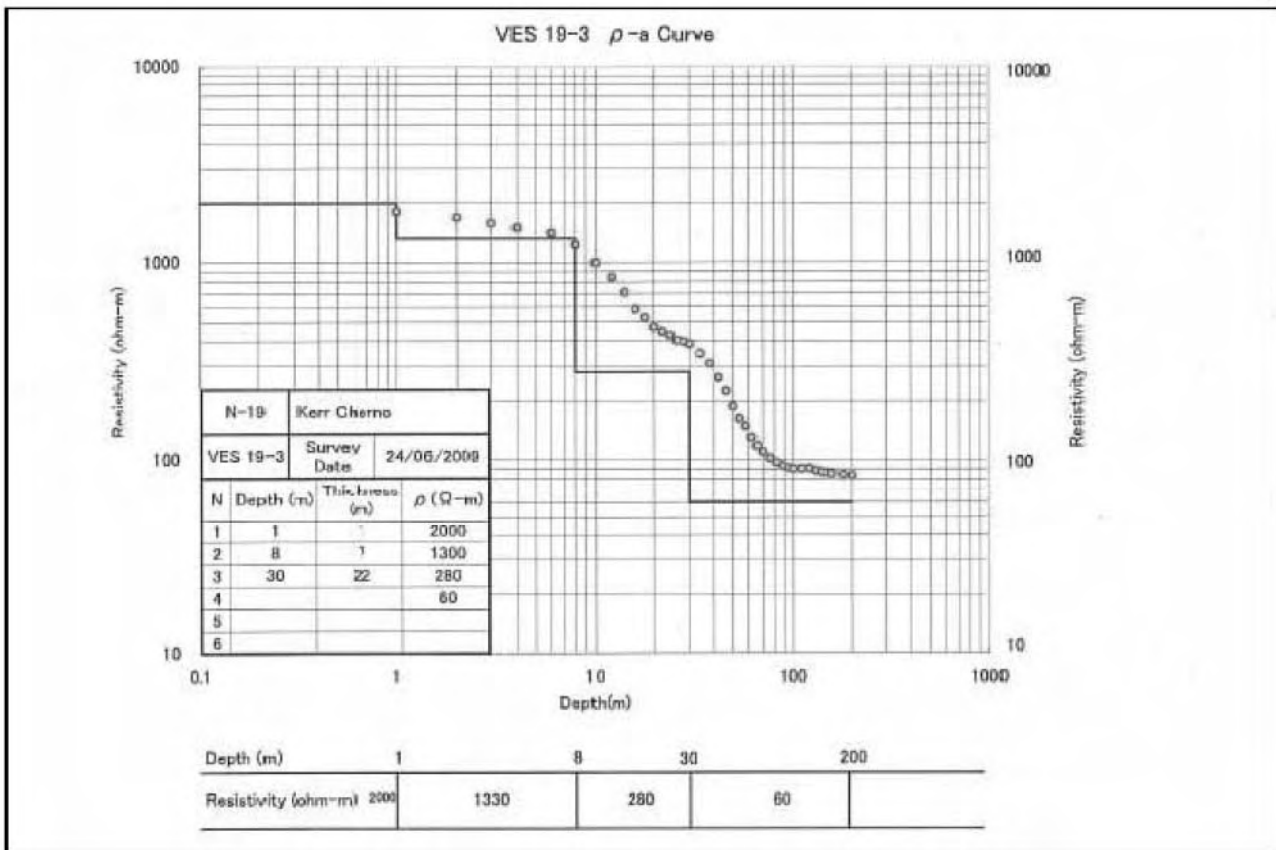
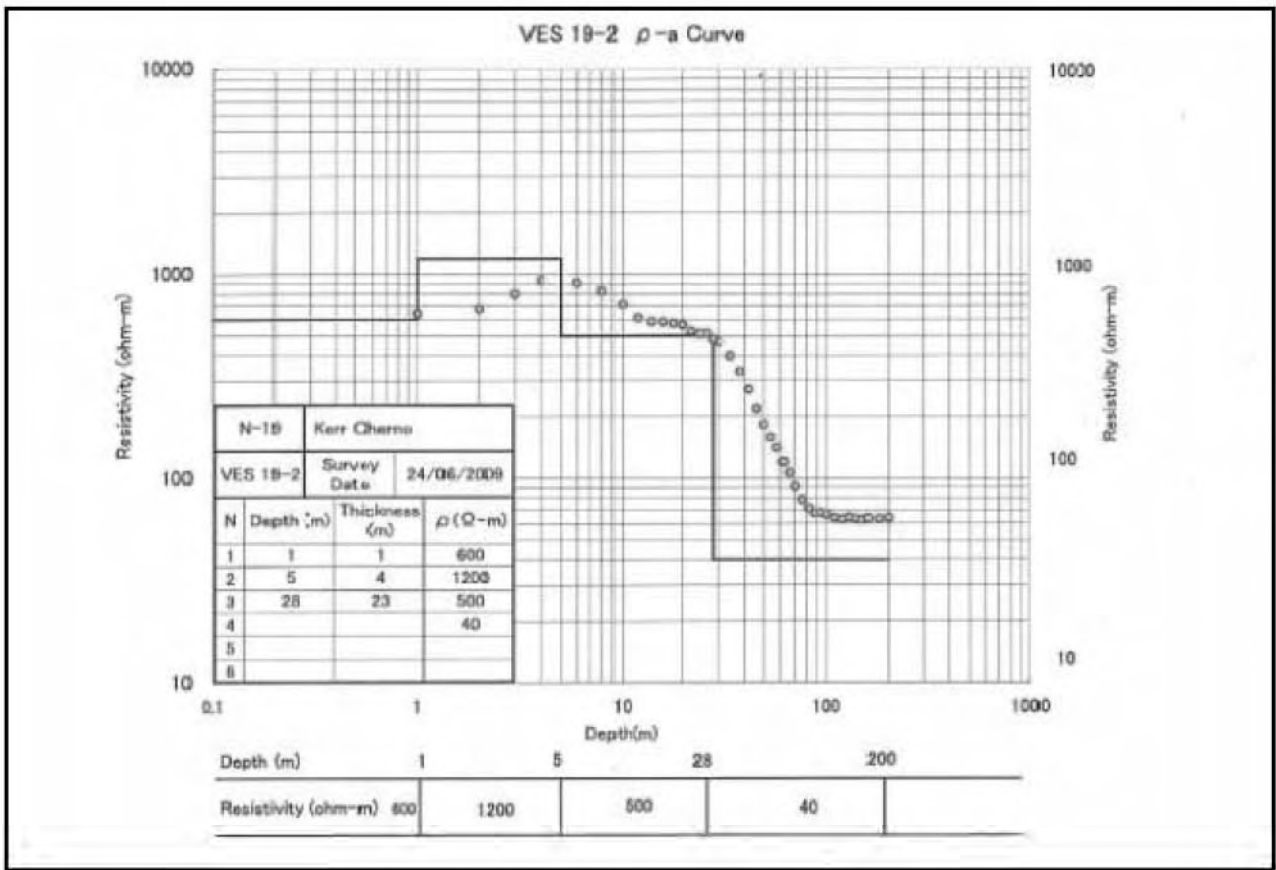
VES 18-2  $\rho$ -a Curve



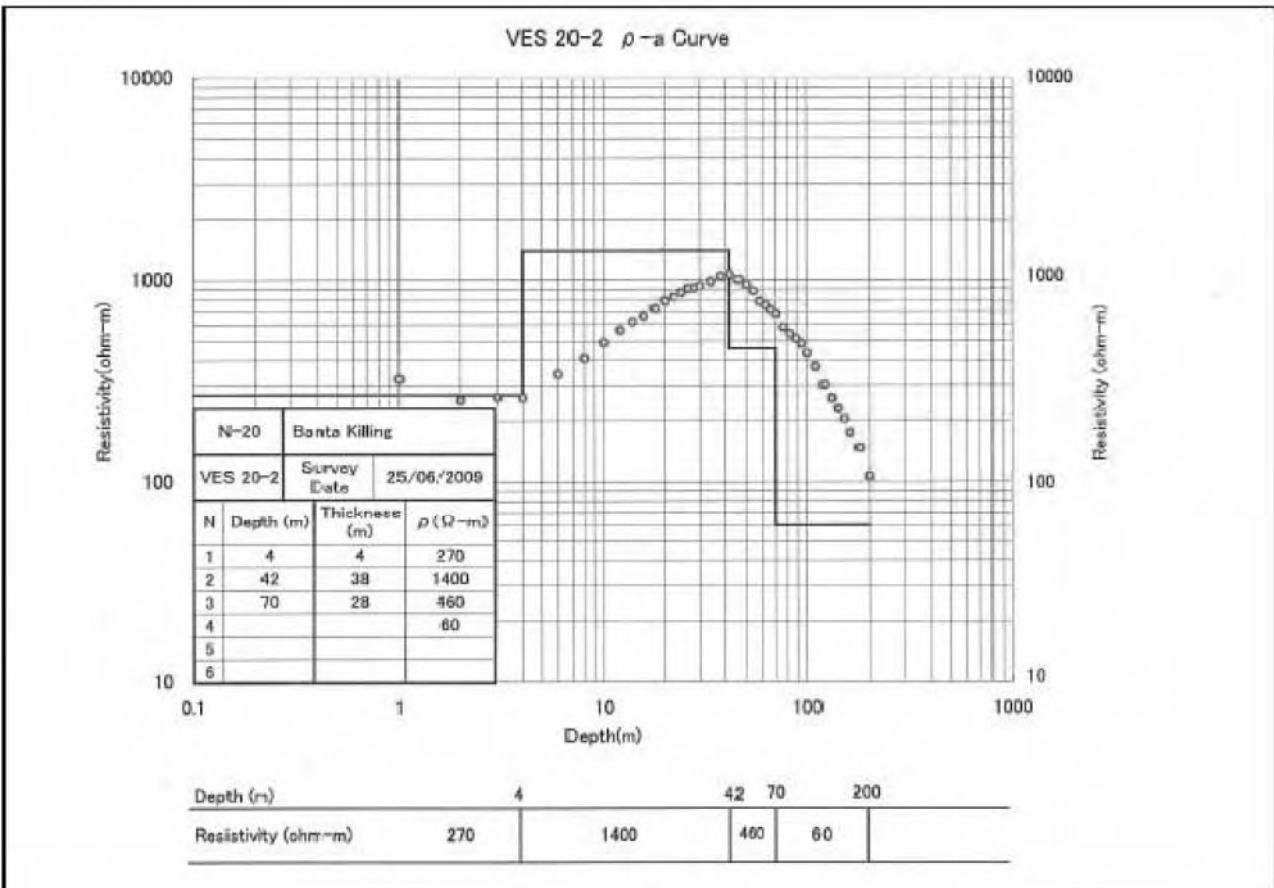
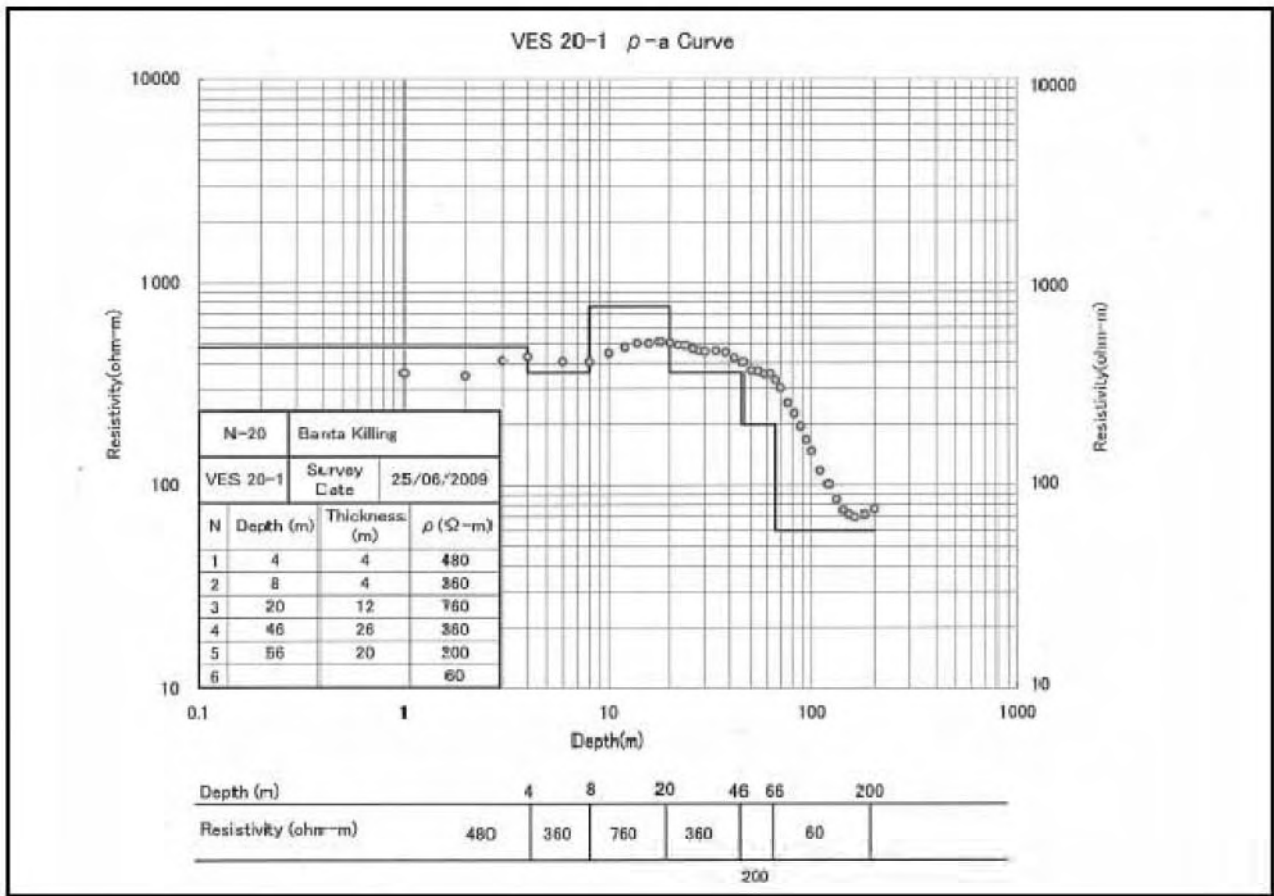


**Figure-9 Survey Site N-18 Kerr Mamma**





**Figure-10 Survey Site N-19 Ker Chernu (Madina Bafuloto)**



**Figure-11 Survey Site N-20 Banta Killing**

### (3) Two Dimensional Electric Resistivity Survey

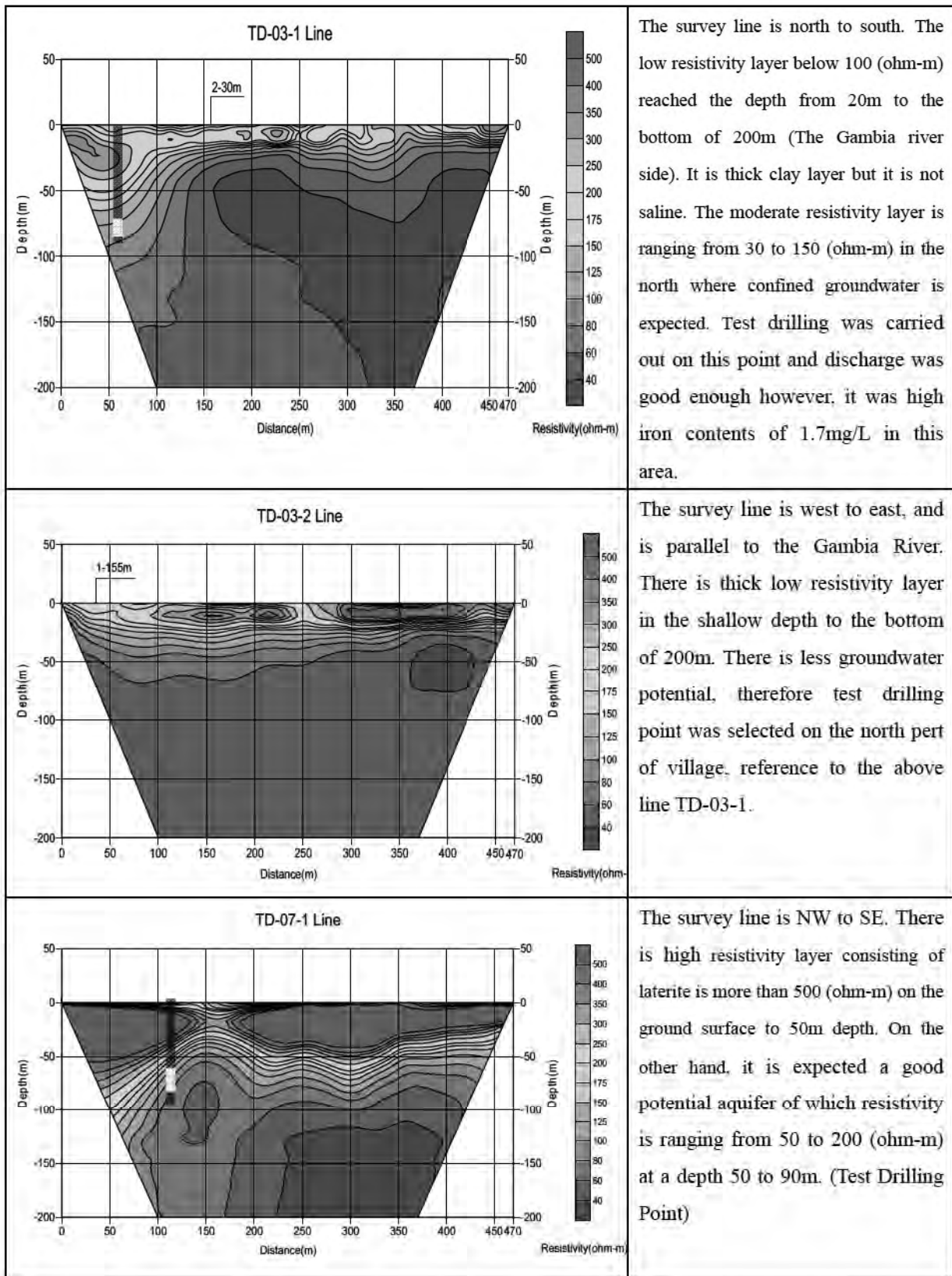
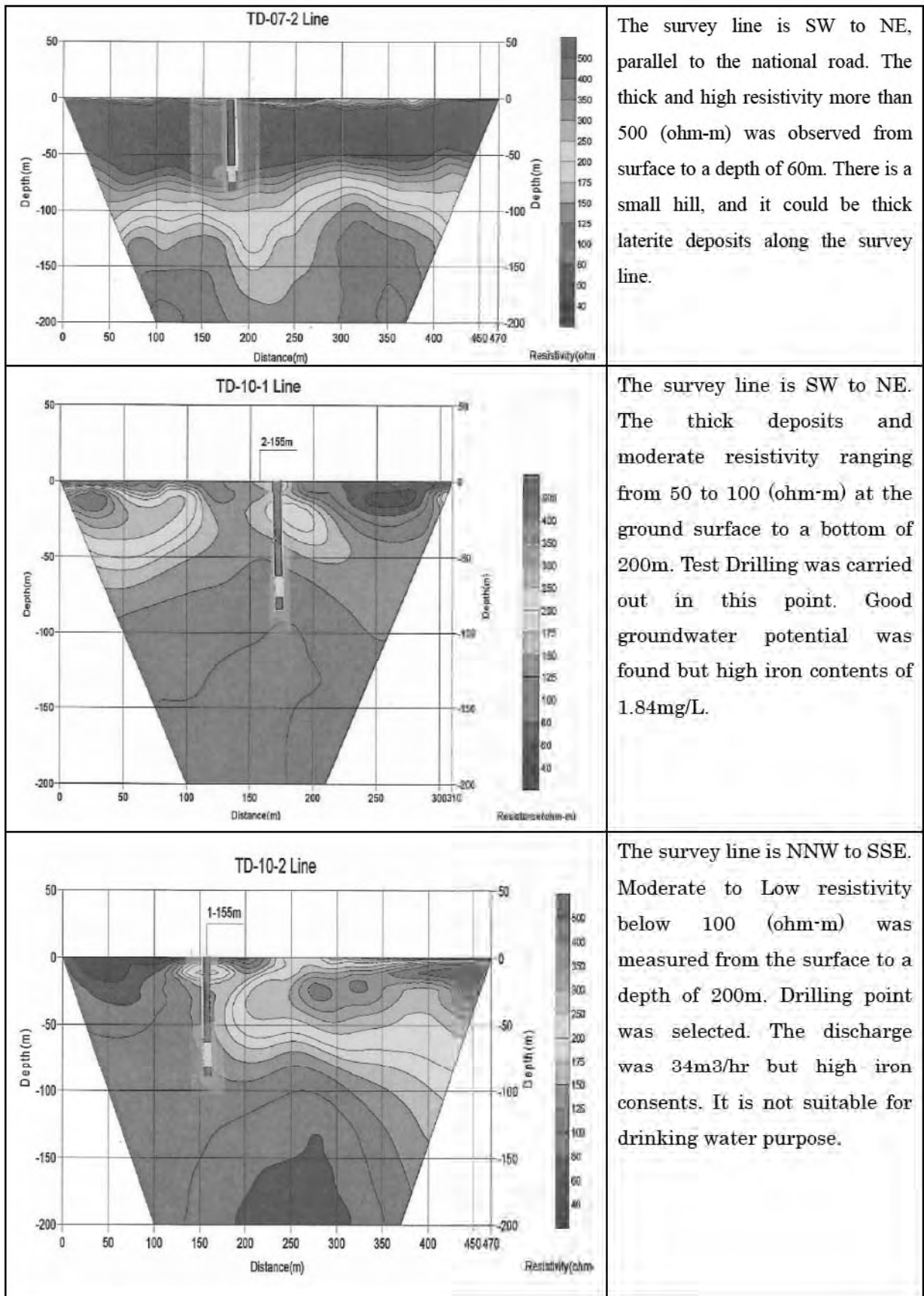


Figure-12 Two Dimensional Electric Resistivity Survey, N-03 and N-07



**Figure-13 Two Dimensional Electric Resistivity Survey, N-07 and N-10**



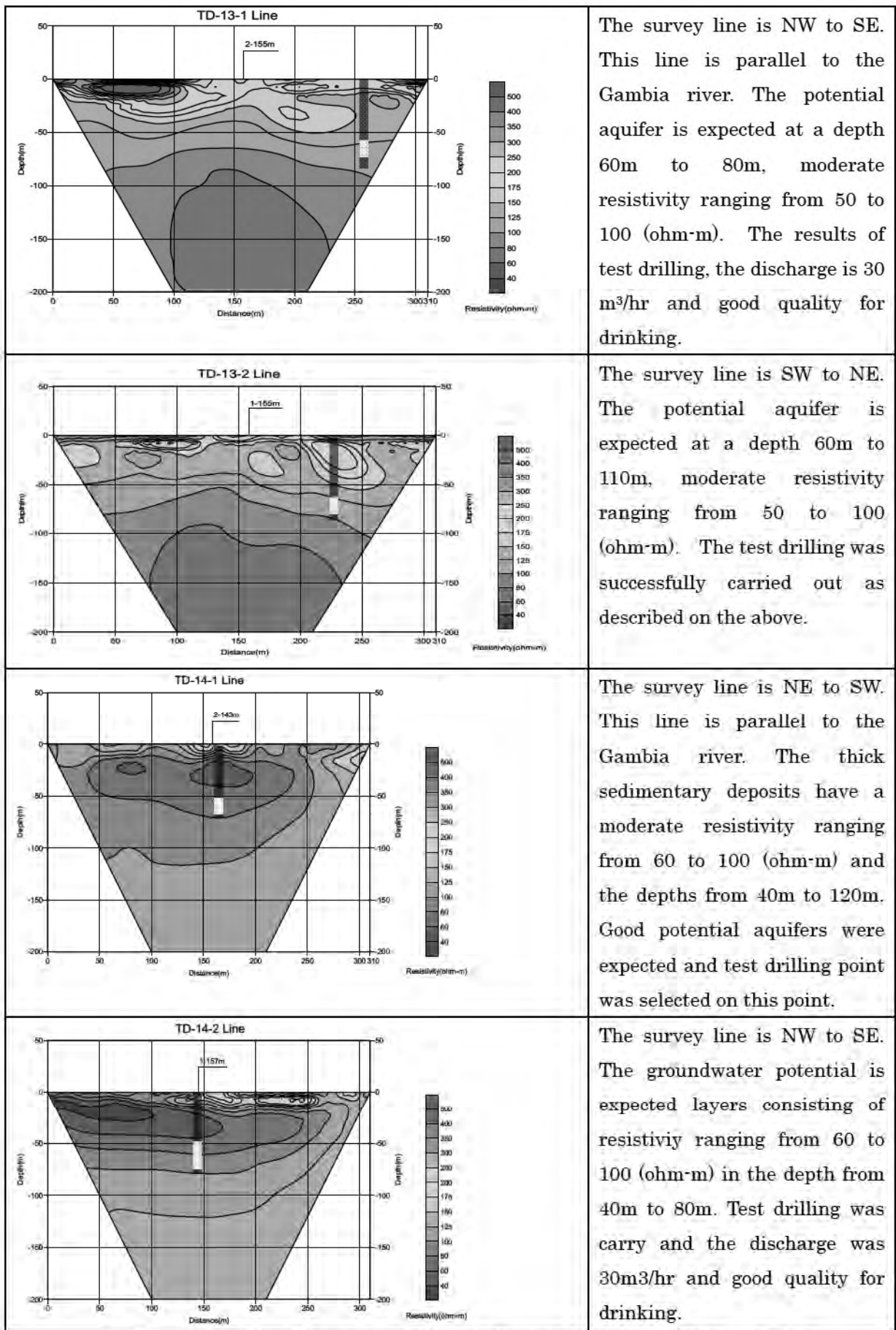


Figure-14 Two Dimensional Electric Resistivity Survey, N-13 and N-14



#### (4) Test Drilling

**Table-2 Test Drilling Site**

Site No.	Community	Region	Location (WGS84)		Drilling Depth	End Date
			Lat	Long		
N-01	Kabocorr, Tam papo, Killing	WR	13° 12' 29" N	16° 15' 22" W	63m	09/08/09
N-03	Kekuta Kunda Complex	NBR	13° 34' 11" N	15° 51' 17" W	87m	28/08/09
N-04	Kerr Katm	NBR	13° 35' 17" N	15° 52' 35" W	81m	31/08/09
N-05	Madna Kaif (Sancha)	NBR	13° 22' 02" N	15° 36' 11" W	77m	12/07/09
N-06	Dongoroba	LRR	13° 22' 54" N	15° 17' 34" W	87m	16/07/09
N-07	Balnghar Complex	LRR	13° 40' 14" N	15° 24' 00" W	79m	03/09/09
N-08	Jimba Complex	CRR North	13° 44' 42" N	15° 23' 11" W	-	-
N-09	Fass	CRR North	13° 47' 39" N	15° 4' 22" W	90m	23/08/09
N-10	Kuntaur Fula Kunda, Jakaba	CRR North	13° 39' 11" N	14° 52' 18" W	82m	15/08/09
N-11	Kerewan Samba Sira	CRR North	13° 31' 14" N	14° 53' 52" W	75m	04/08/09
N-12	Fula Bantang, S nchu Sora	CRR North	13° 29' 50" N	14° 49' 48" W	78m	31/07/09
N-13	Jissadi	CRR North	13° 38' 15" N	15° 17' 50" W	87m	19/07/09
N-14	Sotokoi	CRR North	13° 38' 36" N	15° 6' 18" W	72m	23/07/09
N-15	Maka, Nje Kunda	CRR North	13° 36' 53" N	15° 5' 34" W	84m	27/07/09
N-16	Lamin Kotb, Badala, Sotokoi	CRR North	13° 29' 49" N	14° 49' 48" W	84m	18/08/09
Substitutional Villages						
N-17	Gidda, Tabkoto	WR	13° 11' 50" N	16° 34' 59" W	-	-
N-18	Kerr Mاما	NBR	13° 25' 06" N	16° 21' 23" W	-	-
N-19	Kerr Chemo	NBR	13° 27' 33" N	16° 20' 18" W	-	-
N-20	Banta Killing	NBR	13° 20' 47" N	16° 24' 44" W	-	-

**Table-3 Test Drilling Schedule**

Site No.	June		July					August				September			
	W4	W1	W2	W3	W4	W5/W1	W1	W2	W3	W4	W1	W2	W3	W4	
N-05	■		■												
N-06		■		■											
N-13			■	■	■										
N-14				■	■	■									
N-15					■	■	■								
N-12						■	■	■							
N-11							■	■	■						
N-01								■	■	■					
N-10									■	■	■				
N-09										■	■	■			
N-03											■	■	■		
N-04												■	■	■	
N-16										■	■	■			
N-07											Drilling problem				
N-08											Test drilling stopped due to heavy rain				

■ Drilling & Development  
 ■ Pumping Test

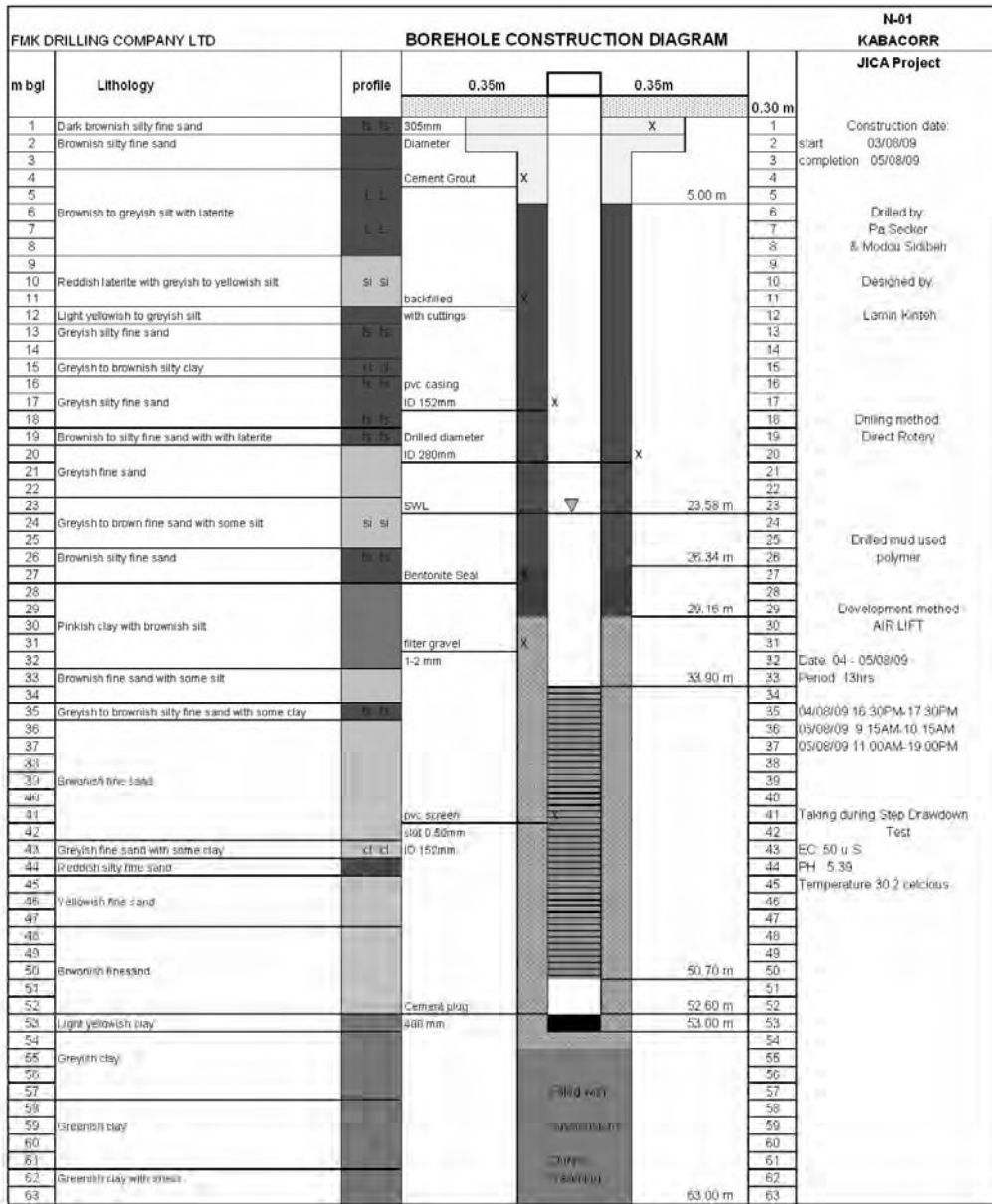


Figure-15 Borehole Construction Diagram, N-01

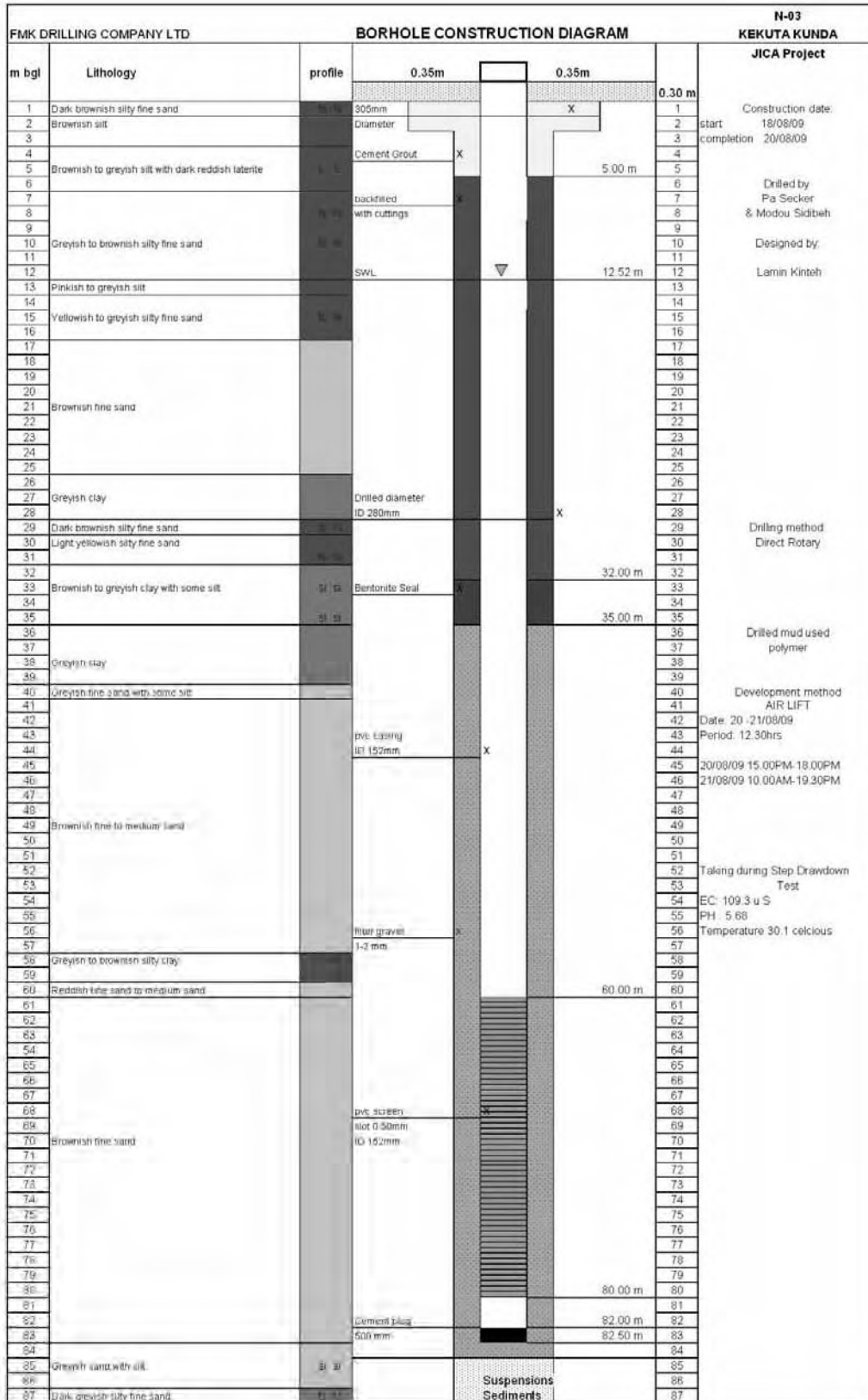


Figure-16 Borehole Construction Diagram, N-03

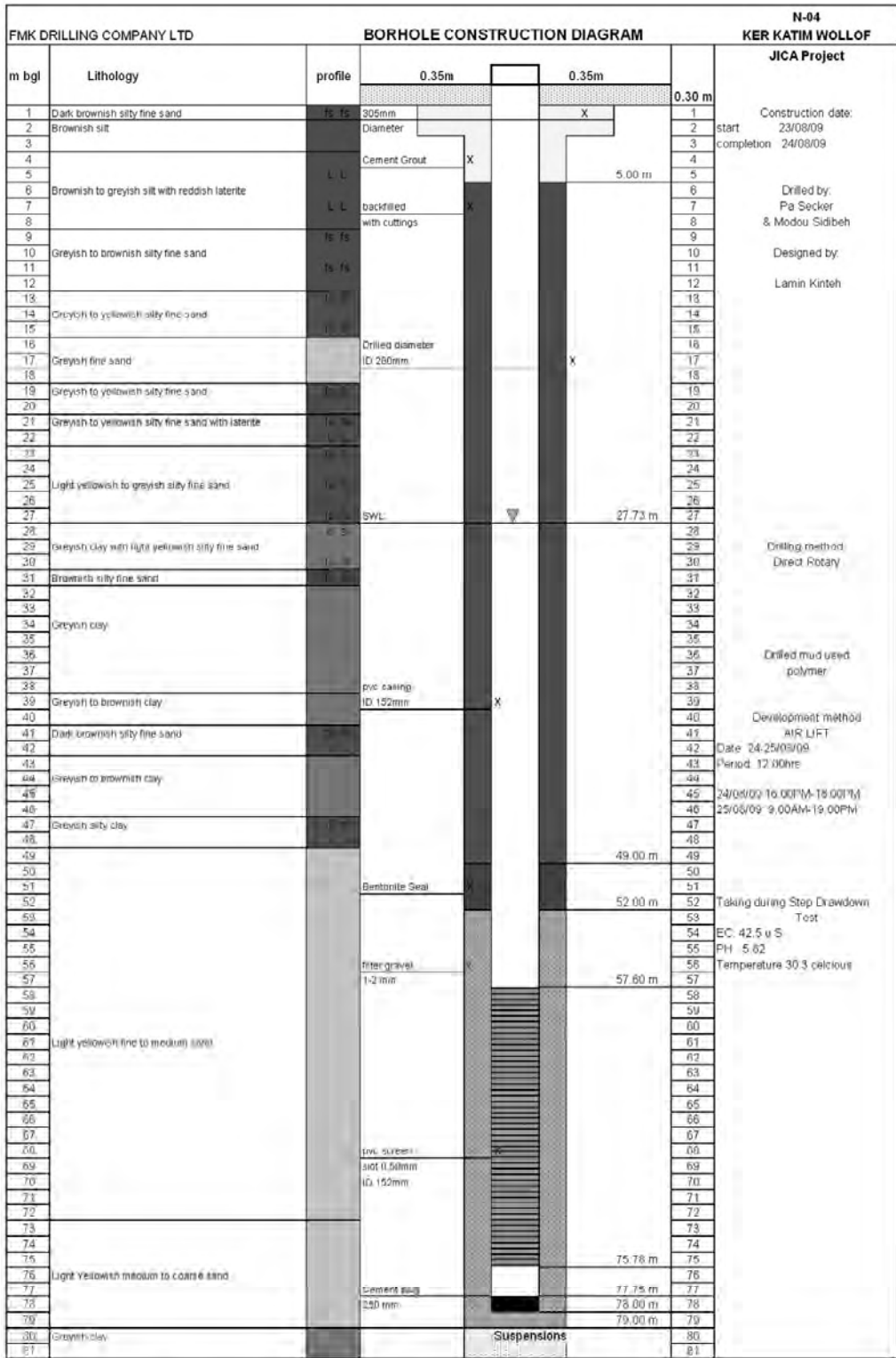


Figure-17 Borehole Construction Diagram N-04

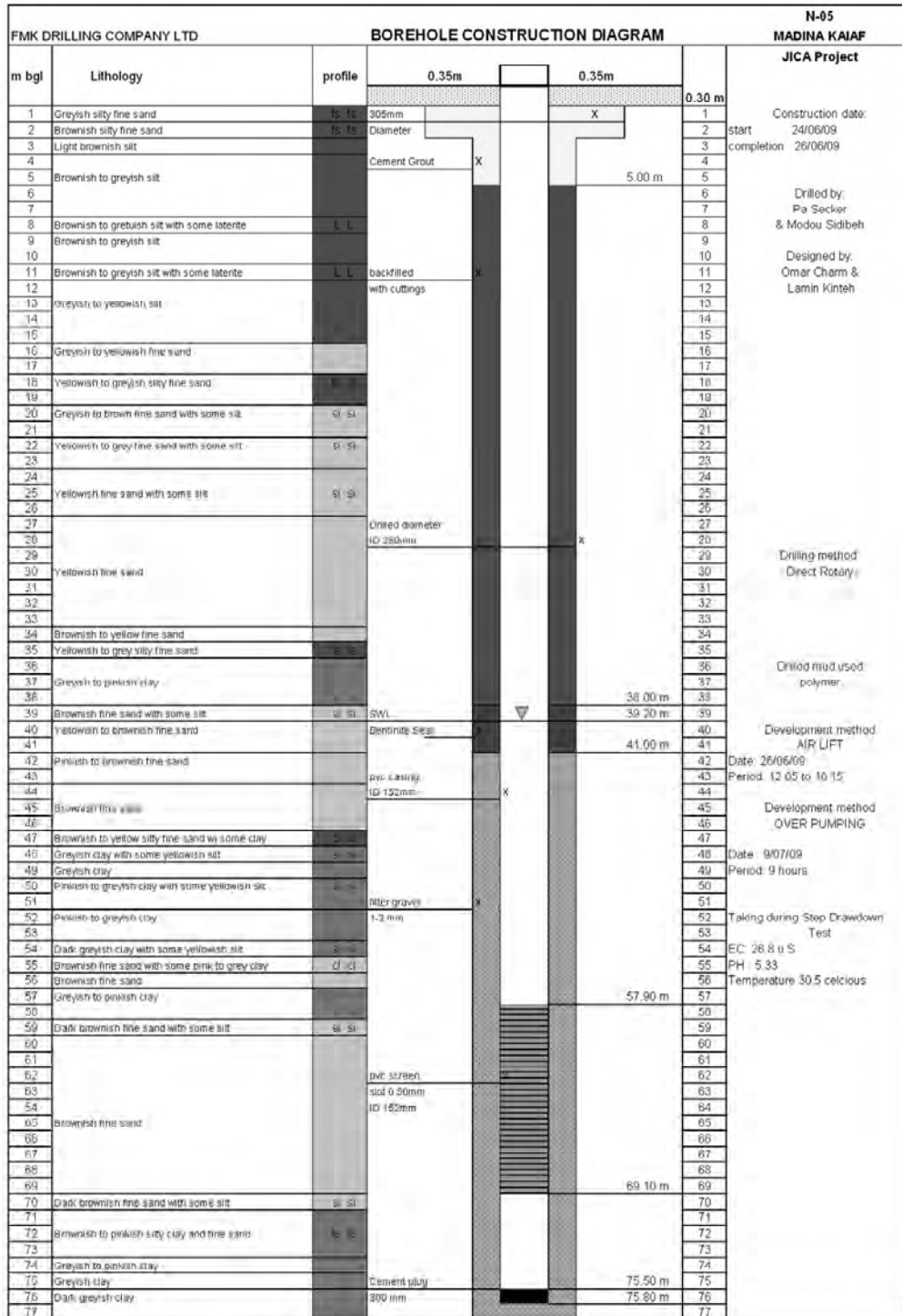


Figure-18 Borehole Construction Diagram, N-05

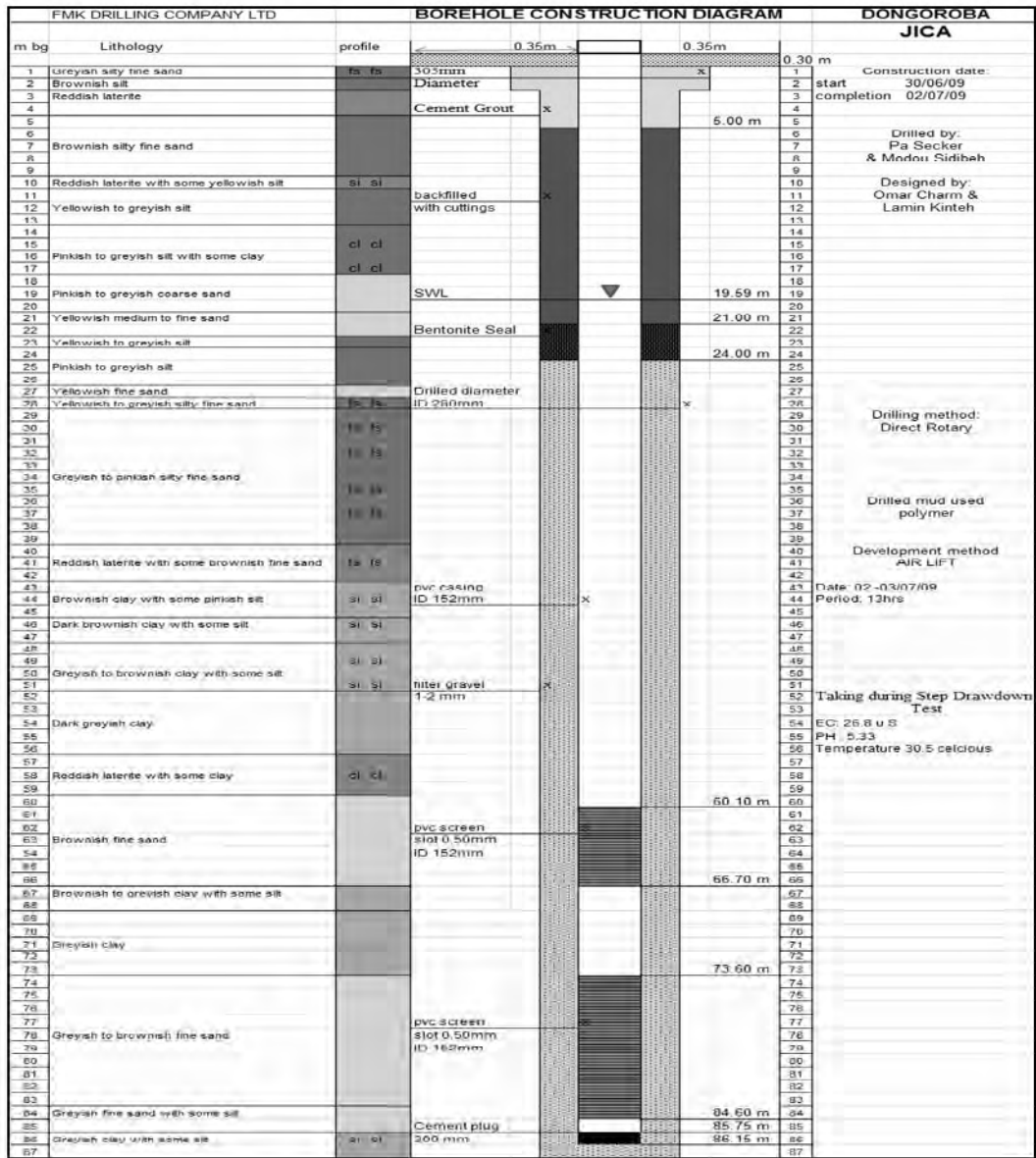


Figure-19 Borehole Construction Diagram, N-06

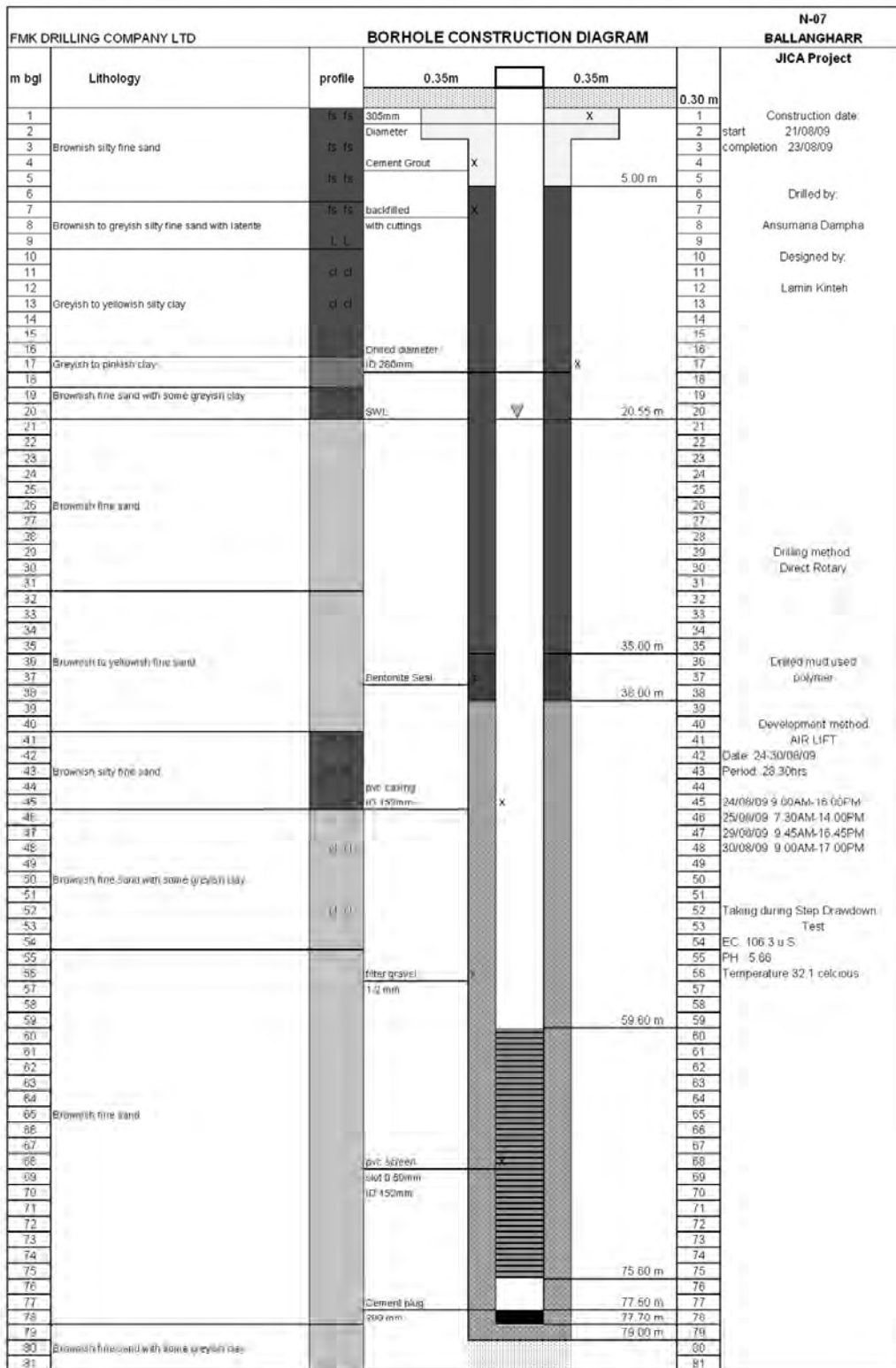


Figure-20 Borehole Construction Diagram, N-07



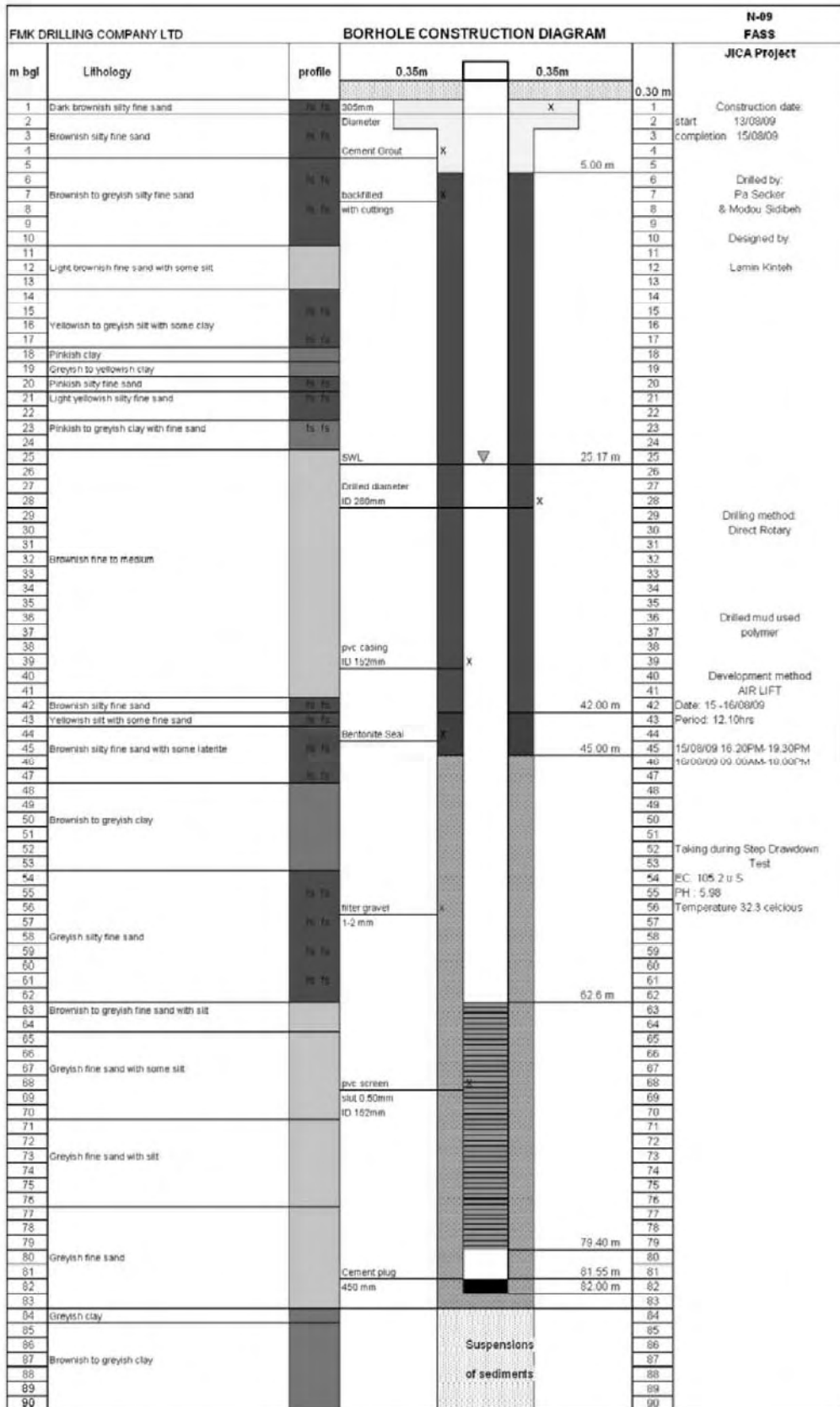


Figure-21 Borehole Construction Diagram, N-09

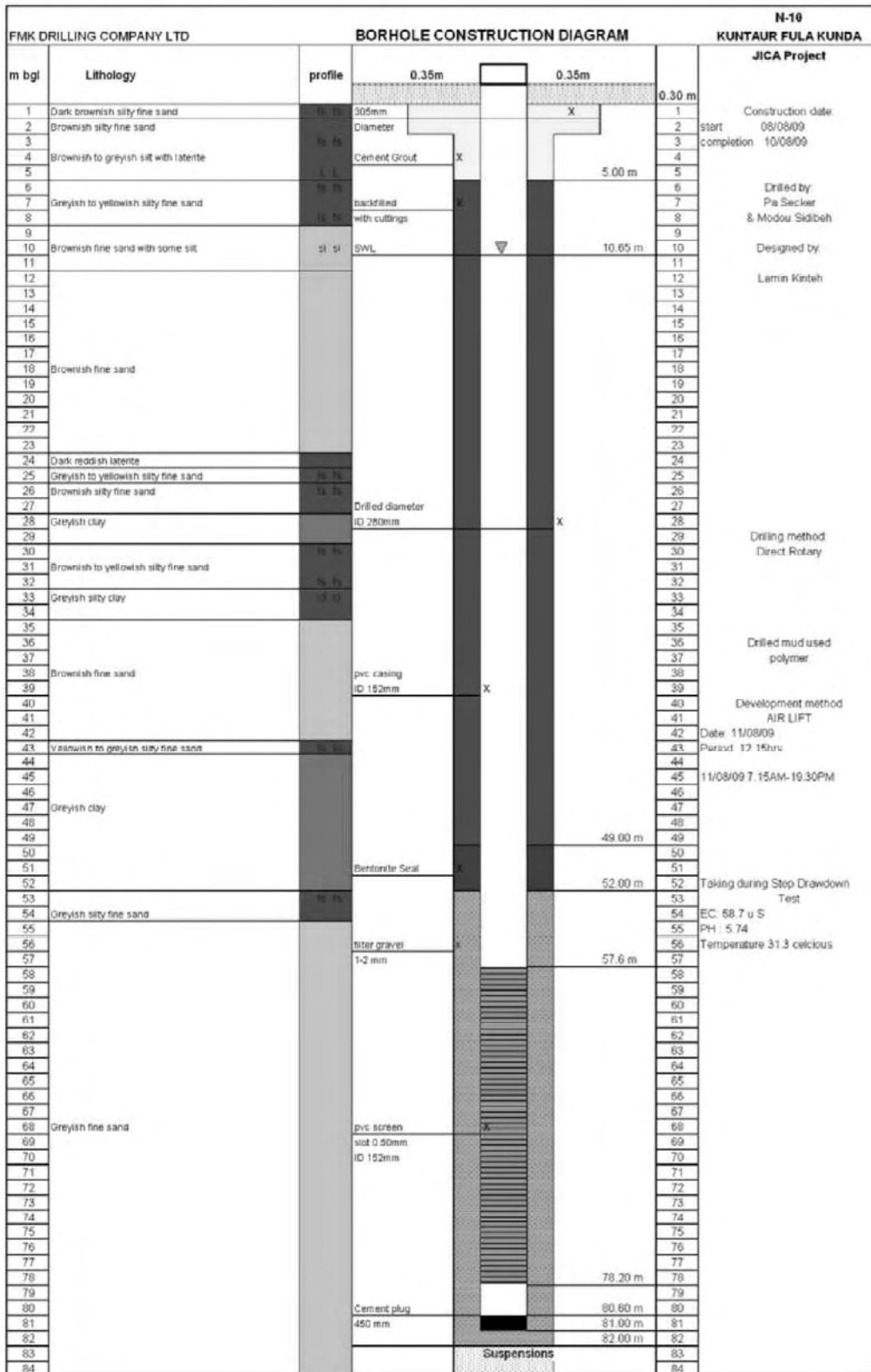


Figure-22 Borehole Construction Diagram, N-10

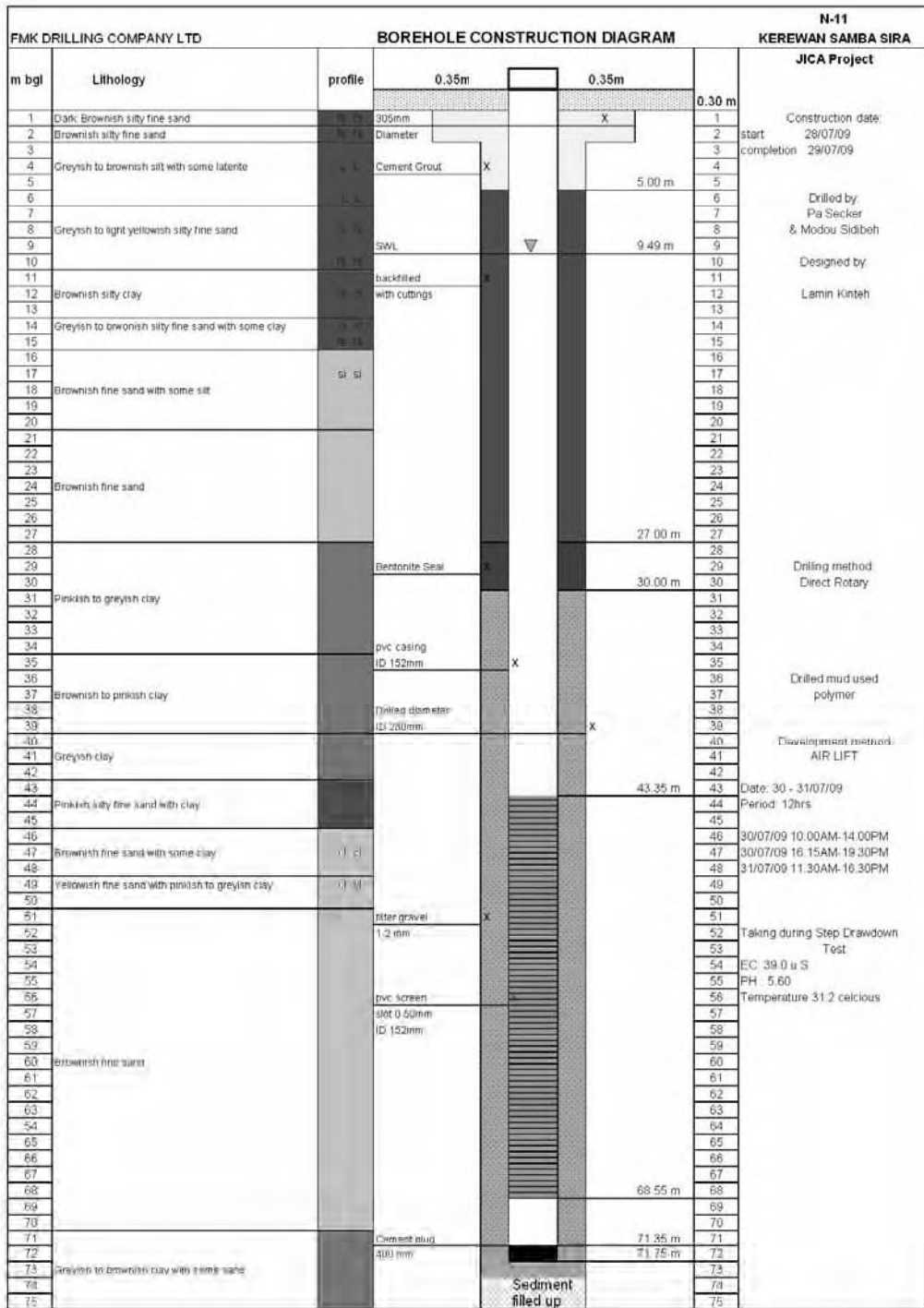


Figure-23 Borehole Construction Diagram, N-11

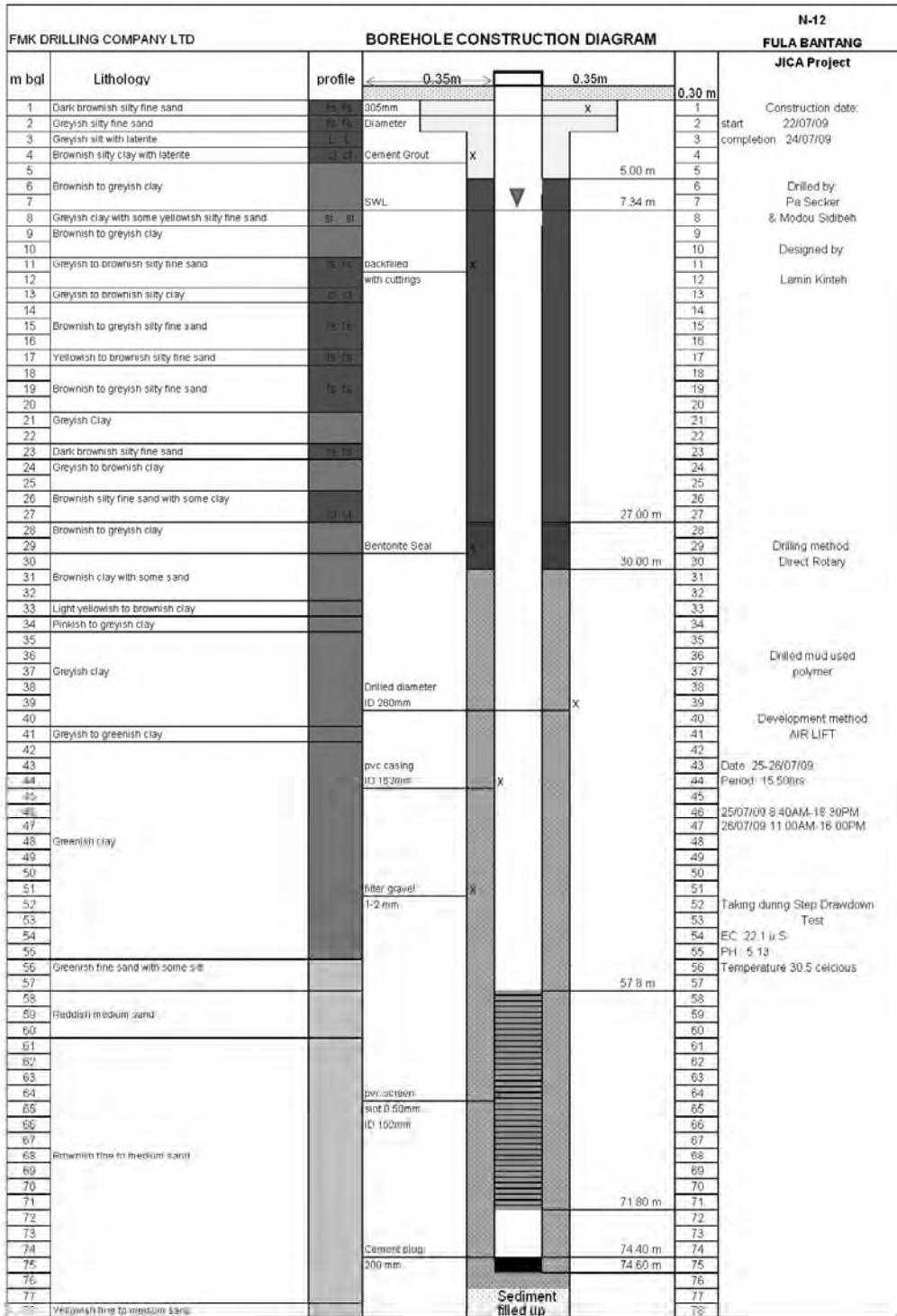


Figure-24 Borehole Construction Diagram, N-12

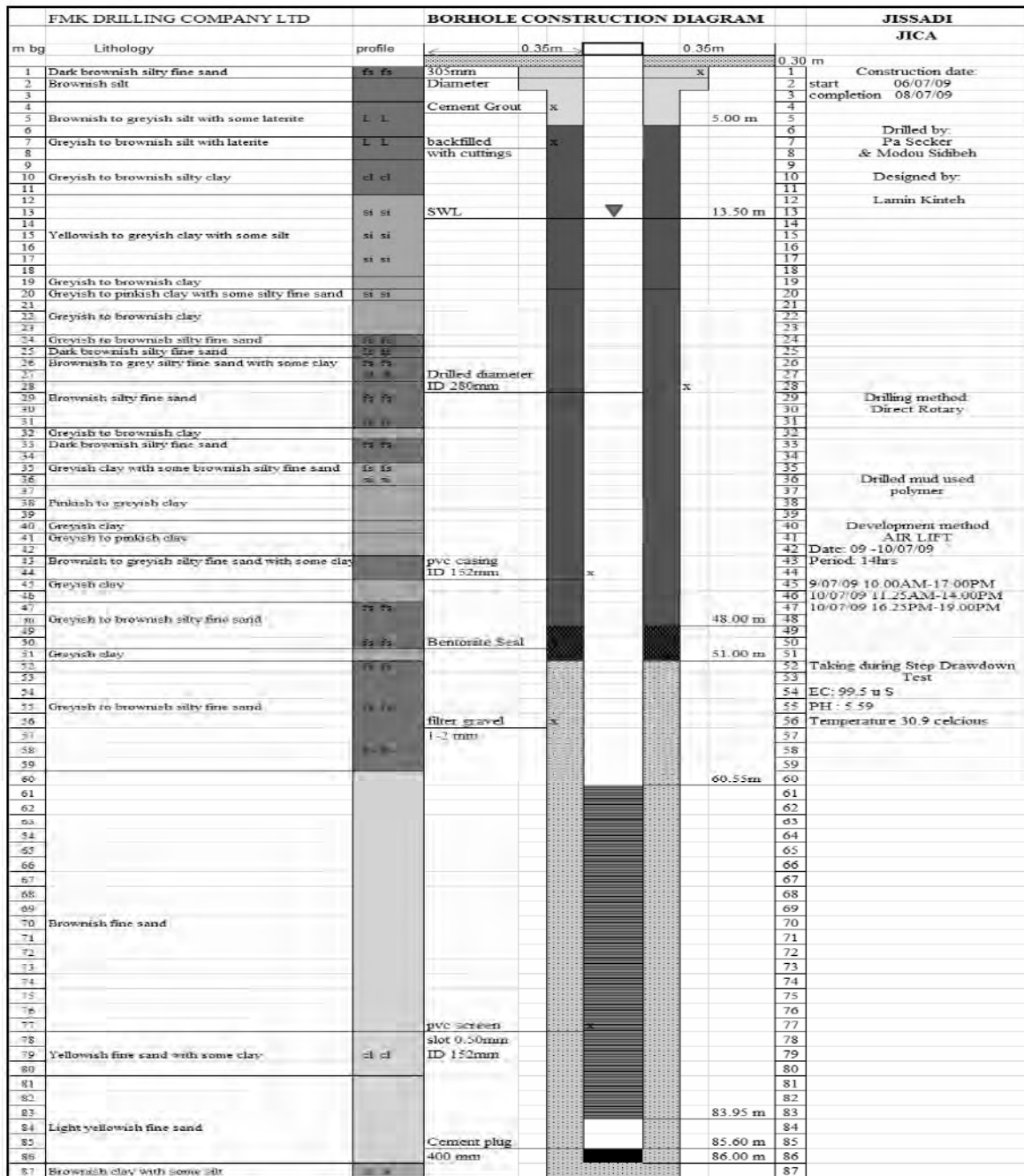


Figure-25 Borehole Construction Diagram N-13

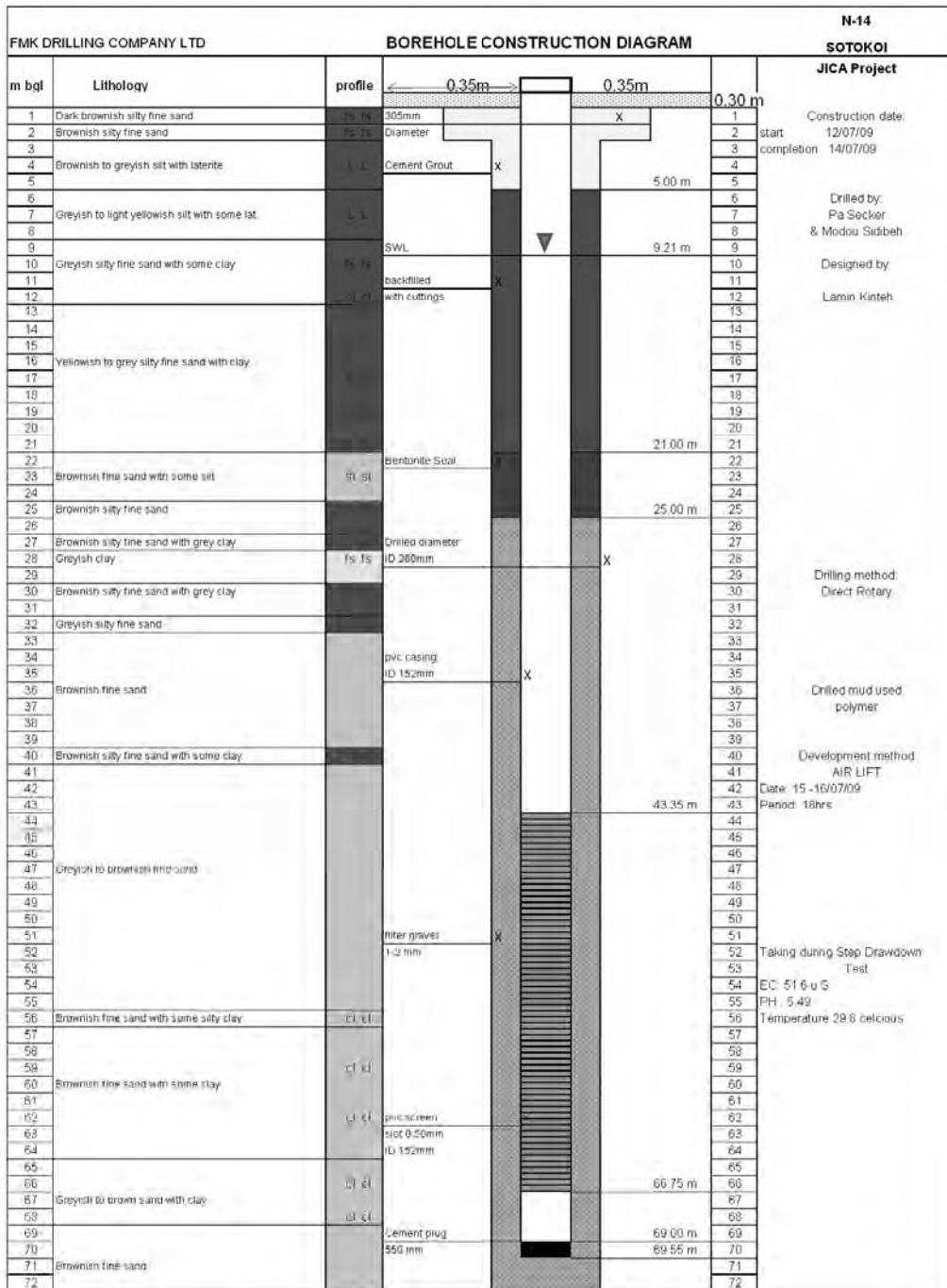


Figure-26 Borehole Construction Diagram, N-14

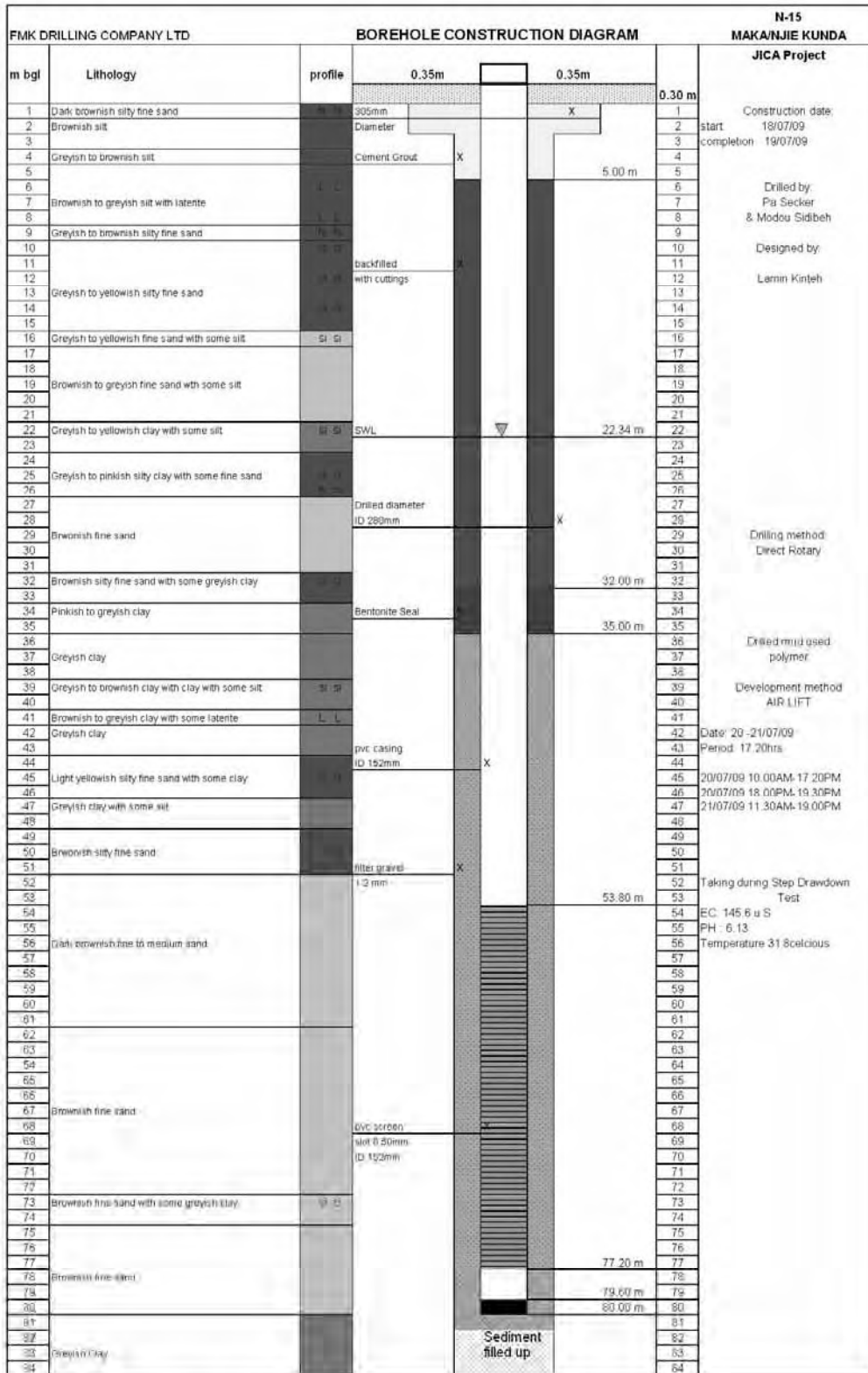


Figure-27 Borehole Construction Diagram, N-15



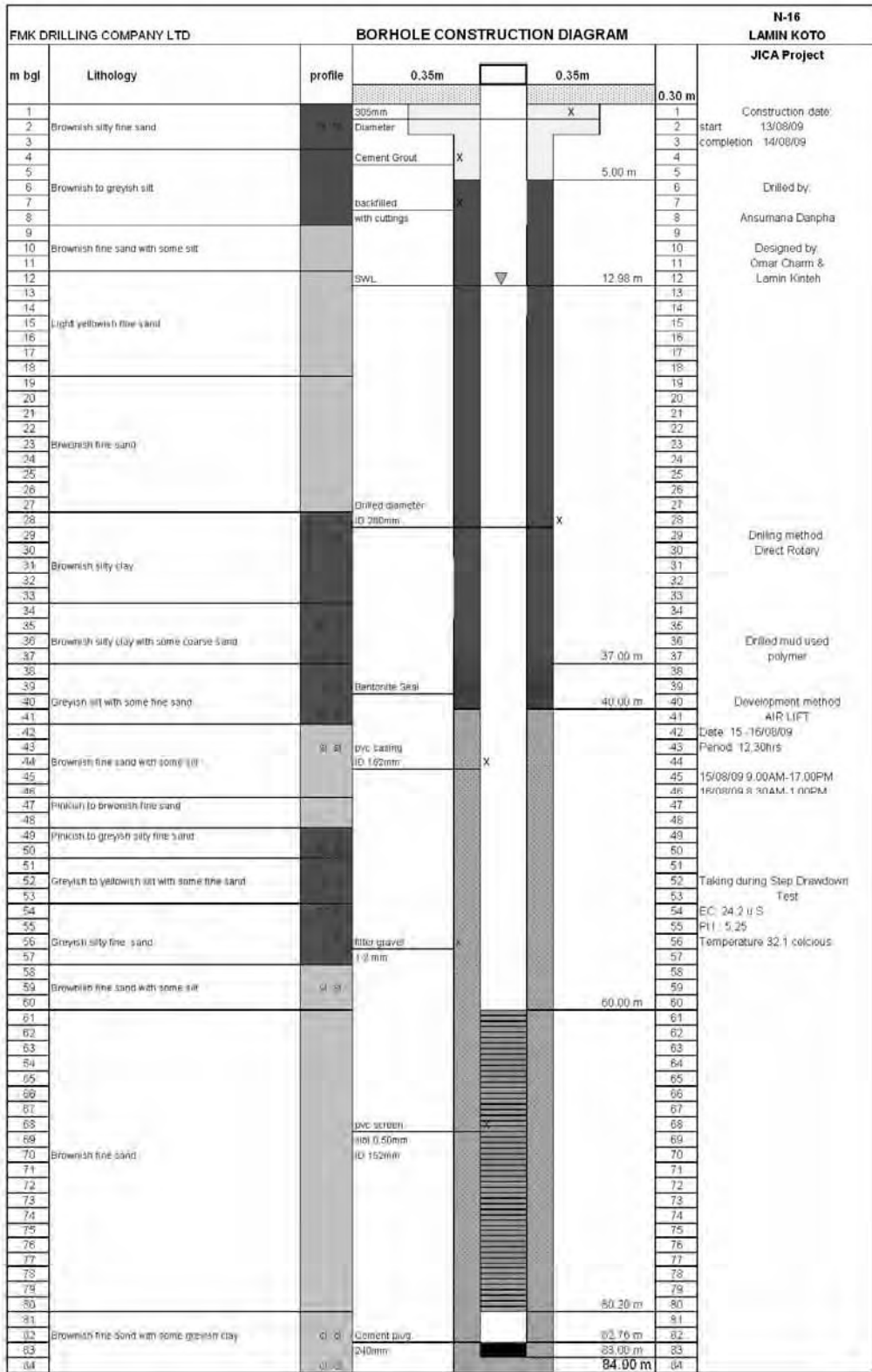


Figure-28 Borehole Construction Diagram, N-16

# Borehole Logging Results

date : 10/08/2009

Bor No.	N-10	Community	Kuntaur Fula Kunda, Jakaba	Contracter	FMK Drilling Co.,Ltd
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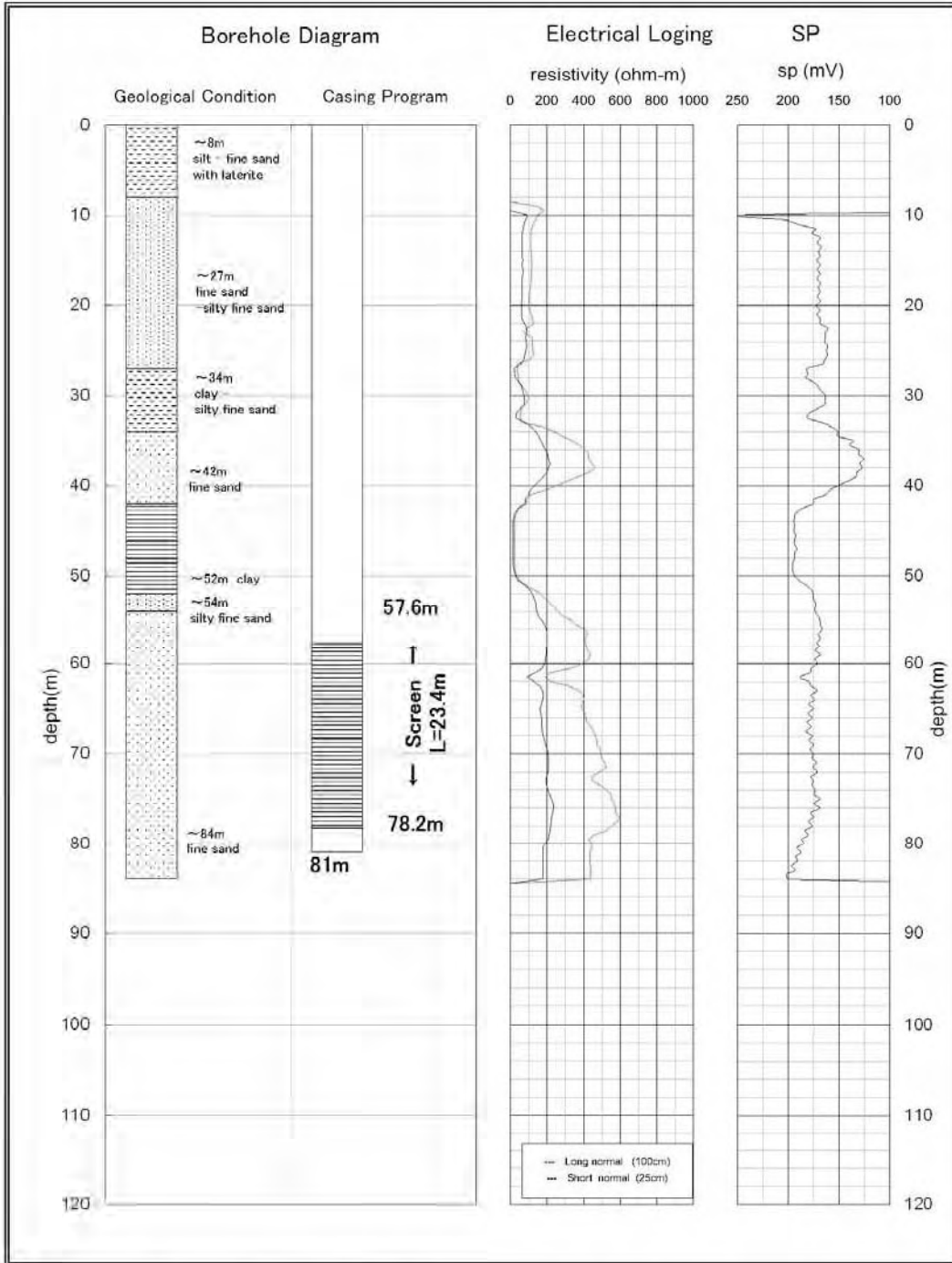


Figure-29 Borehole Diagram and Electric Logging, N-10

### Step Draw Down Pumping Test Results

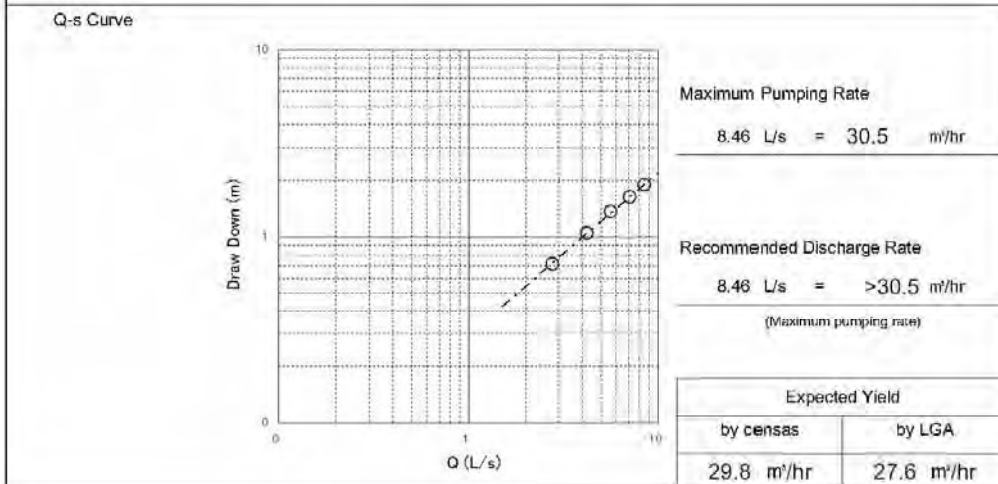
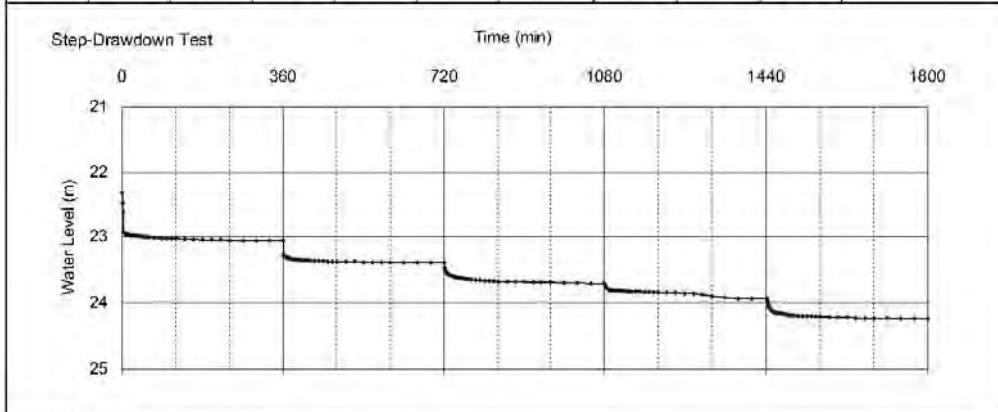
Date 24/07/09 - 25/07-09

Casing Depth(m)	80
Screen Position (m-m)	53.8-77.2
Static Water Level (m)	22.34

Borehole No.	N-15
Community	Maka, Njie Kunda
Contractor	FMK Drilling Co.,Ltd
Submersible Pump	Model: SP30-6
Riser Main	Material: Polyted Tube 3in Depth: 49 m

Record of Step Draw Down Test

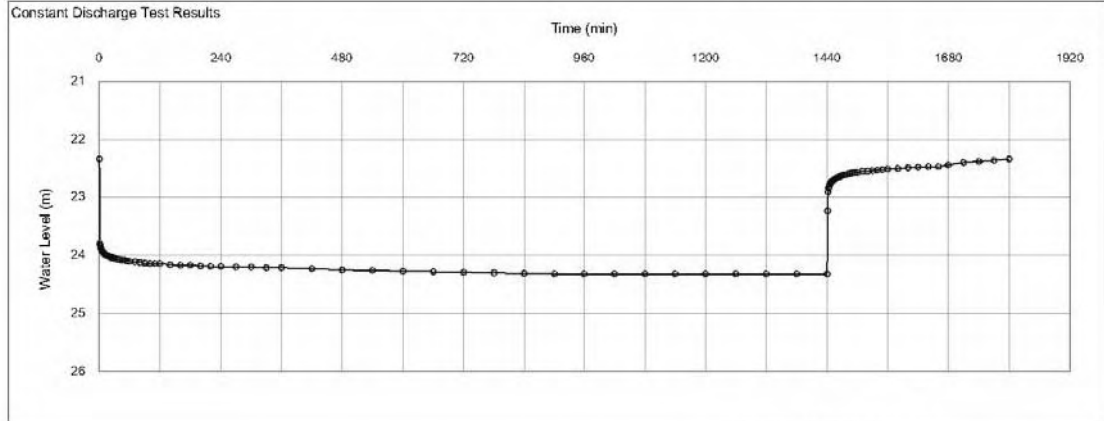
Step	Duration (min)	Q		Draw Down: s(m)	Q/s (L/s/m)	Cleanliness	Measurement of Water Quality			Remarks
		(L/s)	(m <sup>3</sup> /hr)				Ec (µs/cm)	pH	Temp	
1	360	2.78	10.0	0.72	3.9	Clean	149.1	6.20	32.1	
2	360	4.23	15.2	1.05	4.0	Clean	146.0	6.25	32.1	
3	360	5.64	20.3	1.37	4.1	Clean	145.6	6.13	31.8	
4	360	7.09	25.5	1.64	4.3	Clean	143.0	6.23	31.8	
5	360	8.46	30.5	1.90	4.5	Clean	141.4	6.22	31.5	



**Figure-30 Step Drawdown Pumping Test, N-15**

### Constant Discharge Test & Recovery Test Results

Borehole No.	<b>N-15</b>	Community	<b>Maka, Njie Kunda</b>	Division	<b>Central River Region</b>	Date	<b>26-27/07/09</b>
Casing Depth(m)	<b>80</b>	Screen Position (m-m)	<b>53.8-77.2</b>	Static Water Level (m)	<b>22.34</b>	Dynamic Water Level(m)	<b>24.32</b>
Pumping Rate	8.5 L/s = 30.5 m/hr	Expected Yield	by census :29.8 m/hr by LGA :27.6 m/hr	Q/s	4.3 L/s/m = 15.4 m/hr/m	Contractor	FMK Drilling Co.,Ltd

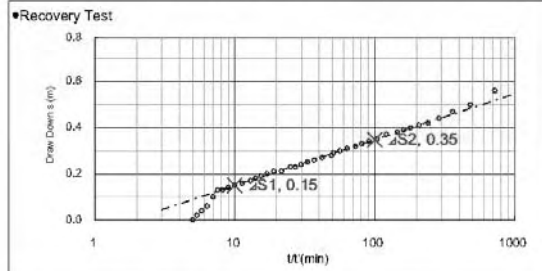
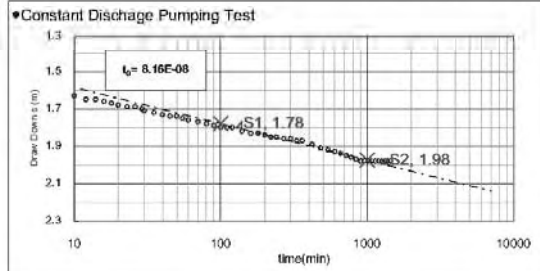


Measurement of Water Quality

Time (min)	Ec (µs/cm)	pH	temp (°C)
1170	9.5	6.18	29.6

### Analysis Results of Constant Discharge Pumping Test & Recovery Test

Borehole No.	<b>N-15</b>	Community	<b>Maka, Njie Kunda</b>	Contractor	<b>FMK Drilling Co.,Ltd</b>	Date	<b>26-27/07/09</b>
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•Analysis Results of Constant Discharge Pumping Test

Q: Pumping Rate	30.5 m/hr = 0.51 m/min	L: Screen Length	23.4m
ΔS: Δs <sub>1</sub> -Δs <sub>2</sub>	0.20 m	Δs <sub>1</sub> 1.78   Δt <sub>1</sub> 100   t <sub>0</sub> : t <sub>0</sub> = ΔS/D	8.2E-08min
	Δs <sub>2</sub> 1.98   Δt <sub>2</sub> 1000	r <sub>1</sub>	6in   0.006 (m)

•Analysis Results of Recovery Test

Q: Pumping Rate	30.5 m/hr = 0.51 m/min	L: Screen Length	23.4m
ΔS: Δs <sub>1</sub> -Δs <sub>2</sub>	0.20 m	Δs <sub>1</sub> 0.15   Δt <sub>1</sub> 10   r <sub>1</sub>	6in   0.006 (m)
	Δs <sub>2</sub> 0.35   Δt <sub>2</sub> 100		

Jacob's Method

$$T = \frac{0.183Q}{\Delta S(m)} = \frac{0.09}{0.20} = 4.76 \text{ E-}01 = 7.93 \text{ E-}03 \text{ (m/s)}$$

$$K = \frac{T(m/s)}{L(m)} = \frac{7.9 \text{ E-}03}{23.4} = 3.39 \text{ E-}04 = 3.39 \text{ E-}02 \text{ (cm/s)}$$

$$S = \frac{2.25T t_0}{r^2(m)} = \frac{8.7 \text{ E-}08}{0.006} = 1.50 \text{ E-}05$$

Jacob's Method (Recovery)

$$T = \frac{0.183Q}{\Delta S(m)} = \frac{0.09}{0.20} = 4.68 \text{ E-}01 = 7.80 \text{ E-}03 \text{ (m/s)}$$

$$K = \frac{T(m/s)}{L(m)} = \frac{7.8 \text{ E-}03}{23.4} = 3.33 \text{ E-}04 = 3.33 \text{ E-}02 \text{ (cm/s)}$$

**Figure-31 Constant Discharge Test and Recovery Test, N-15**