OWNER: NEAPAL ELECTRICITY AUTHORITY(NEA)
SASEC : Power System Expansion Project
KALIGANDAKI TRANSMISSION CORRIDOR PROJECT
DANA - KUSHMA 220KV TRANSMISSION LINE & ASSOCIATED SUB STATIONS
(Design, Supply & Install) - Contract - PMD-KGTCP-071/72-03
I. Approved/ Released for Fabrication/ Construction
II. Approved/ Released for Fabrication/ Construction Subject to Incorporation of Comments, Modification as Noted Revised Drawing Required.
III. To be Resubmitted for Approval after Incorporating
IV. Not Approved
(Signature)
(Designation)
Consultant : Power Grid Corporation of India Ltd. Engg. (T. & S/S) Gurgaon (Haryana)

PROJECT:

SASEC: Power System Expansion Project
KALIGANDAKI TRANSMISSION CORRIDOR PROJECT
DANA - KUSHMA 220KV TRANSMISSION LINE & ASSOCIATED SUB STATIONS (Design, Supply & Installation)
Contract - PMD-KGTCP-071/72-03

CLIENT :

NEPAL ELECTRICITY AUTHORITY (NEA)
(An Undertaking of Government of Nepal)

EMPLOYER'S CONSULTANT :

पावरग्रिड

POWER GRID CORPORATION OF INDIA LIMITED
(A GOVERNMENT OF INDIA ENTERPRISE)

CONTRACTOR :

TATA PROJECTS LIMITED CHINT ELECTRIC CO., LTD.

JV OF TATA PROJECTS LTD & CHINT ELECTRIC CO.LTD.
C/o 'TATA Projects Limited, First Floor, Tower-1, Okaya Centre, B-5
Sector-62, Noida, Uttar Pradesh, India- 201307
Ph. No-+91-01206199999, Fax. +91-01206199990

SOIL RESISTIVITY TEST
of
220/132kV DANA & KUSHMA SUBSTATION SITES
at
Myagdi & Parbat Districts

PRESENTED BY:

Pashupati Drilling & Geo-technical Services Pvt. Ltd.
Krishna Kunj, Ramnagar, Lokanthali-15, Bhaktapur
Tel : 00977-1-5182310, 9851026210
E-mail: pashupatidrilling@gmail.com

JV of TATA PROJECTS LTD. & CHINT ELECTRIC CO.LTD. BAGLUNG

Kaligandaki Transmission Corridor Project NEPAL ELECTRICITY AUTHORITY

Jan. 2017

ACKNOWLEDGEMENT

Pashupati Drilling & Geo- Technical Services Pvt. Ltd., Lokanthali, Bhaktapur is very much grateful to ***TATA Projects Ltd & Chint Electric Co. J/V, Nepal*** on behalf of ***Nepal Electricity Authority (NEA), Nepal*** for entrusting the job of Soil Resistivity Works for the proposed **220/132kV Dana & Kushma Sub-station Project Sites at Myagdi & Parbat Districts** to reveal the facts and figures relating to the sub–soil exploration of Sub-station sites for the design of earthing electrical systems.

We hope this report will bring some useful parameters for a safe design of proposed structures. This report shall also be useful in positioning the depth, shape and size of the electrodes.

Last but not the least, we hope for an early and successful completion of the project.

Sanoj Bhattarai
Geotech. Engineer

Contents

1. Introduction

This report is prepared in accordance with the agreement between Tata Projects Ltd & Chint Electric Co. J/V, Nepal and Pashupati Drilling & Geo-technical Services Pvt. Ltd., Lokanthali, Bhaktapur to determine the Soil Resistivity Test of 220/132kV Dana & Kushma Sub-station Project construction sites of NEA, Nepal at Parbat & Myagdi District.

Ten (10) at Dana and six (6) locations at Kushma Sub-station sites have been proposed to conduct Soil Resistivity Test for sub-soil investigation program.

Electrical Resistivity Testing:

It is well known that the resistance of an earth electrode is heavily influenced by the resistivity of the soil in which it is driven and as such, soil resistivity measurements are an important parameter when designing earthing installations. Knowledge of the soil resistivity at the intended site, and how this varies with parameters such as moisture content, temperature and depth, provides a valuable insight into how the desired earth resistance value can be achieved and maintained over the life of the installation with the minimum cost and effort.

One of the main objectives of earthing electrical systems is to establish a common reference potential for the power supply system, building structure, plant steelwork, electrical conduits, cable ladders & trays and the instrumentation system.

The resistivity of a soil/rock depends upon the type of materials, its water contents, the concentration of dissolved ions and many other factors. Rocks & dry soils have a greater resistivity than saturated clays.

The table gives approximate values of resistivity of different rocks and soils.

Type of Soil/Rock	Sound Rock	Weathered Rock	Gravel	Sand	Clayey / Silty Sands	Saturated Clay and Silts
Resistivity (Ω-m)	>5000	1500 to 2500	1500 to 4500	500 to 1500	200 to 500	2 to 100

Further, this test is carried out in the field to find out the electrical resistivity profile/map of the soil required for designing safe – grounding system of the entire sub- station area.

2. Methodology & Analysis

As per the technical specification, the tests are conducted using Wenner Four-Point Electrode Method along two perpendicular lines parallel to co-ordinate axis on each line a 8 nos. of readings are taken by changing a set of 2.0, 4.0, 6.0 & 8.0m spacing of electrodes along the coordinate axis in two way direction upto total 48.0m length respectively.

By Wenner Method, the soil resistivity is found by,

$$\rho = 2\pi AR$$

Where,

ρ = ohm-m

π = 3.1414

A = spacing of the electrodes (m)

R = resistance value of the test in ohms

The soil resistivity measurements and their analysis are mentioned in the ***Annexes.***

Moreover, it gives the mean resistivity upto a depth of "A" below the ground surface as the depth of current penetration below the ground surface is approximately equal to the spacing of electrodes.

So, the method is also useful for establishing boundaries between different strata such as locating sands and gravel deposits within a fine grained (clayey or silty) soil deposits.

ANNEXES –

A. **Dana Soil Resistivity Tests Measurement & Results**

B. **Kushma Soil Resistivity Tests Measurement & Results**

C. **Photographs**

D. **Field Data**

ANNEX - A

Dana Soil Resistivity Tests Measurement & Results

SOIL RESISTIVITY TEST MEASUREMENTS & RESULTS

Date : Dec. 2016

Project: Soil Investigation Works For 220/132kV Dana Sub-station Project

Client: Nepal Electricity Authority (NEA), Nepal

Contractor: Tata Projects Ltd & Chint Electric Co. J/V, Nepal

Location: Dana, Myagdi

Area : Cultuvated/Barren Land

Terrain: Flat

Soil Type: *Sandy/gravelly soils & fissured rocks*

Position : 3157333.13 N
466083.75 E

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
1 (E)	0.0 - 6.0	2	171.00	2148.79	1193.77
	0.0 - 12.0	4	40.00	1005.28	
	0.0 - 18.0	6	21.00	791.66	
	0.0 - 24.0	8	16.50	829.36	
1 (W)	0.0 - 6.0	2	115.00	1445.09	926.74
	0.0 - 12.0	4	33.00	829.36	
	0.0 - 18.0	6	22.00	829.36	
	0.0 - 24.0	8	12.00	603.17	

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
1 (N)	0.0 - 6.0	2	139.00	1746.67	1086.96
	0.0 - 12.0	4	36.00	904.75	
	0.0 - 18.0	6	23.00	867.05	
	0.0 - 24.0	8	16.50	829.36	
1 (S)	0.0 - 6.0	2	170.00	2136.22	1005.28
	0.0 - 12.0	4	33.00	829.36	
	0.0 - 18.0	6	14.00	527.77	
	0.0 - 24.0	8	10.50	527.77	

Avg. Resistivity Value (Ω-m) = 1053.19

Soil Resistivity Profile :

ERT Point	Depth (m)	Avg. Resistivity Value within 48m Distance (Ω-m)	Remarks
1	2	1869.19	
	4	892.19	
	6	753.96	
	8	697.41	

Kalgandaki Transmission Corridor Project

TATA PROJECTS LTD & CHINT ELECTRIC CO.LTD JV

Pashupati Drilling and Geo-Technical Services Pvt. Ltd.

SOIL RESISTIVITY TEST MEASUREMENTS & RESULTS

Date : Dec. 2016

Project: Soil Investigation Works For 220/132kV Dana Sub-station Project

Client: Nepal Electricity Authority (NEA), Nepal

Contractor: Tata Projects Ltd & Chint Electric Co. J/V, Nepal

Location: Dana, Myagdi

Area : Cultuvated/Barren Land

Terrain: Flat

Soil Type: Sandy/gravelly soils & fissured rocks

Position : 3157376.00 N
466166.35 E

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
2 (E)	0.0 - 6.0	2	79.00	992.71	733.23
	0.0 - 12.0	4	25.00	628.30	
	0.0 - 18.0	6	17.00	640.87	
	0.0 - 24.0	8	13.35	671.02	
2 (W)	0.0 - 6.0	2	85.00	1068.11	1124.66
	0.0 - 12.0	4	45.00	1130.94	
	0.0 - 18.0	6	37.00	1394.83	
	0.0 - 24.0	8	18.00	904.75	

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
2 (N)	0.0 - 6.0	2	78.00	980.15	733.54
	0.0 - 12.0	4	26.00	653.43	
	0.0 - 18.0	6	16.50	622.02	
	0.0 - 24.0	8	13.50	678.56	
2 (S)	0.0 - 6.0	2	92.00	1156.07	882.76
	0.0 - 12.0	4	31.00	779.09	
	0.0 - 18.0	6	19.00	716.26	
	0.0 - 24.0	8	17.50	879.62	

Avg. Resistivity Value (Ω-m) = 868.55

Soil Resistivity Profile :

ERT Point	Depth (m)	Avg. Resistivity Value within 48m Distance (Ω-m)	Remarks
2	2	1049.26	
	4	797.94	
	6	843.49	
	8	783.49	

नेपाल विद्युत प्राधिकरण NEPAL ELECTRICITY AUTHORITY Kaligandaki Transmission Project

JV of TATA PROJECTS LTD. & CHINT ELECTRIC CO. LTD. BAGLUNG

Prabhuleni Drilling and Geo-Technical Services Pvt. Ltd.

SOIL RESISTIVITY TEST MEASUREMENTS & RESULTS

Date : Dec. 2016

Project: Soil Investigation Works For 220/132kV Dana Sub-station Project

Client: Nepal Electricity Authority (NEA), Nepal

Contractor: Tata Projects Ltd & Chint Electric Co. J/V, Nepal

Location: Dana, Myagdi

Area : Cultuvated/Barren Land

Terrain: Flat

Soil Type: Sandy/gravelly soils & fissured rocks

Position : 3157364.42 N
466037.19 E

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
3 (E)	0.0 - 6.0	2	119.00	1495.35	863.91
	0.0 - 12.0	4	32.00	804.22	
	0.0 - 18.0	6	16.00	603.17	
	0.0 - 24.0	8	11.00	552.90	
3 (W)	0.0 - 6.0	2	126.00	1583.32	848.21
	0.0 - 12.0	4	30.00	753.96	
	0.0 - 18.0	6	16.00	603.17	
	0.0 - 24.0	8	9.00	452.38	

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
3 (N)	0.0 - 6.0	2	135.00	1696.41	901.61
	0.0 - 12.0	4	27.00	678.56	
	0.0 - 18.0	6	18.00	678.56	
	0.0 - 24.0	8	11.00	552.90	
3 (S)	0.0 - 6.0	2	101.00	1269.17	769.67
	0.0 - 12.0	4	26.00	653.43	
	0.0 - 18.0	6	16.00	603.17	
	0.0 - 24.0	8	11.00	552.90	

Avg. Resistivity Value (Ω-m) = 845.85

Soil Resistivity Profile :

ERT Point	Depth (m)	Avg. Resistivity Value within 48m Distance (Ω-m)	Remarks
3	2	1511.06	
	4	722.55	
	6	622.02	
	8	527.77	

नेपाल विद्युत प्राधिकरण Est'd 1985 NEPAL ELECTRICITY AUTHORITY Kaligandaki Transmission Corridor Project

TATA PROJECTS LTD. & CHINT ELECTRIC CO.LTD JV BAGLUNG

Geotechnical Drilling and Geo-Technical Services Pvt. Ltd.

SOIL RESISTIVITY TEST MEASUREMENTS & RESULTS

Date : Dec. 2016

Project: Soil Investigation Works For 220/132kV Dana Sub-station Project

Client: Nepal Electricity Authority (NEA), Nepal

Contractor: Tata Projects Ltd & Chint Electric Co. J/V, Nepal

Location: Dana, Myagdi

Area : Cultuvated/Barren Land

Terrain: Flat

Soil Type: Sandy/gravelly soils & fissured rocks

Position : 3157397.16 N
466099.21 E

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
4 (E)	0.0 - 6.0	2	38.00	477.51	568.61
	0.0 - 12.0	4	24.00	603.17	
	0.0 - 18.0	6	15.00	565.47	
	0.0 - 24.0	8	12.50	628.30	
4 (W)	0.0 - 6.0	2	32.30	405.88	569.55
	0.0 - 12.0	4	23.00	578.04	
	0.0 - 18.0	6	17.00	640.87	
	0.0 - 24.0	8	13.00	653.43	

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
4 (N)	0.0 - 6.0	2	27.70	348.08	502.64
	0.0 - 12.0	4	23.00	578.04	
	0.0 - 18.0	6	16.50	622.02	
	0.0 - 24.0	8	9.20	462.43	
4 (S)	0.0 - 6.0	2	35.10	441.07	532.11
	0.0 - 12.0	4	21.10	530.29	
	0.0 - 18.0	6	15.36	579.04	
	0.0 - 24.0	8	11.50	578.04	

Avg. Resistivity Value (Ω-m) = 543.23

Soil Resistivity Profile :

ERT Point	Depth (m)	Avg. Resistivity Value within 48m Distance (Ω-m)	Remarks
4	2	418.13	
	4	572.38	
	6	601.85	
	8	580.55	

Kaligandaki Hydropower Generation Project

JV of TATA PROJECTS LTD. & CHINT ELECTRIC CO. LTD. BAGLUNG

Pashupati Drilling and Geo-Technical Services Pvt. Ltd.

SOIL RESISTIVITY TEST MEASUREMENTS & RESULTS

Date : Dec. 2016

Project: Soil Investigation Works For 220/132kV Dana Sub-station Project

Client: Nepal Electricity Authority (NEA), Nepal

Contractor: Tata Projects Ltd & Chint Electric Co. J/V, Nepal

Location: Dana, Myagdi

Area : Cultuvated/Barren Land

Terrain: Flat

Soil Type: Sandy/gravelly soils & fissured rocks

Position : 3157426.46 N
466145.49 E

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
5 (E)	0.0 - 6.0	2	52.10	654.69	553.22
	0.0 - 12.0	4	19.00	477.51	
	0.0 - 18.0	6	14.00	527.77	
	0.0 - 24.0	8	11.00	552.90	
5 (W)	0.0 - 6.0	2	49.00	615.73	562.96
	0.0 - 12.0	4	18.60	467.46	
	0.0 - 18.0	6	15.00	565.47	
	0.0 - 24.0	8	12.00	603.17	

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
5 (N)	0.0 - 6.0	2	49.00	615.73	515.21
	0.0 - 12.0	4	16.00	402.11	
	0.0 - 18.0	6	13.00	490.07	
	0.0 - 24.0	8	11.00	552.90	
5 (S)	0.0 - 6.0	2	46.60	585.58	594.06
	0.0 - 12.0	4	18.80	472.48	
	0.0 - 18.0	6	16.30	614.48	
	0.0 - 24.0	8	14.00	703.70	

Avg. Resistivity Value (Ω-m) = 556.36

Soil Resistivity Profile :

ERT Point	Depth (m)	Avg. Resistivity Value within 48m Distance (Ω-m)	Remarks
5	2	617.93	
	4	454.89	
	6	549.45	
	8	603.17	

JV of TATA PROJECTS LTD & CHINT ELECTRIC CO LTD BAGLUNG

Prabhupuri Drilling and Geo-Technical Services Pvt. Ltd.

SOIL RESISTIVITY TEST MEASUREMENTS & RESULTS

Date : Dec. 2016

Project: Soil Investigation Works For 220/132kV Dana Sub-station Project

Client: Nepal Electricity Authority (NEA), Nepal

Contractor: Tata Projects Ltd & Chint Electric Co. J/V, Nepal

Location: Dana, Myagdi

Area : Cultuvated/Barren Land

Terrain: Flat

Soil Type: Sandy/gravelly soils & fissured rocks

Position : 3157420.38 N
466046.78 E

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
6 (E)	0.0 - 6.0	2	91.00	1143.51	766.53
	0.0 - 12.0	4	19.00	477.51	
	0.0 - 18.0	6	17.00	640.87	
	0.0 - 24.0	8	16.00	804.22	
6 (W)	0.0 - 6.0	2	46.00	578.04	543.48
	0.0 - 12.0	4	18.00	452.38	
	0.0 - 18.0	6	17.00	640.87	
	0.0 - 24.0	8	10.00	502.64	

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
6 (N)	0.0 - 6.0	2	54.00	678.56	576.15
	0.0 - 12.0	4	19.00	477.51	
	0.0 - 18.0	6	14.00	527.77	
	0.0 - 24.0	8	12.35	620.76	
6 (S)	0.0 - 6.0	2	74.00	929.88	696.16
	0.0 - 12.0	4	25.30	635.84	
	0.0 - 18.0	6	19.00	716.26	
	0.0 - 24.0	8	10.00	502.64	

Avg. Resistivity Value (Ω-m) = 645.58

Soil Resistivity Profile :

ERT Point	Depth (m)	Avg. Resistivity Value within 48m Distance (Ω-m)	Remarks
6	2	832.50	
	4	510.81	
	6	631.44	
	8	607.57	

SOIL RESISTIVITY TEST MEASUREMENTS & RESULTS

Date : Dec. 2016

Project: Soil Investigation Works For 220/132kV Dana Sub-station Project

Client: Nepal Electricity Authority (NEA), Nepal

Contractor: Tata Projects Ltd & Chint Electric Co. J/V, Nepal

Location: Dana, Myagdi

Area : Cultuvated/Barren Land

Terrain: Flat

Soil Type: Sandy/gravelly soils & fissured rocks

Position : 3157452.86 N
466114.58 E

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
7 (E)	0.0 - 6.0	2	79.00	992.71	694.27
	0.0 - 12.0	4	22.00	552.90	
	0.0 - 18.0	6	16.00	603.17	
	0.0 - 24.0	8	12.50	628.30	
7 (W)	0.0 - 6.0	2	54.00	678.56	622.02
	0.0 - 12.0	4	21.00	527.77	
	0.0 - 18.0	6	16.00	603.17	
	0.0 - 24.0	8	13.50	678.56	

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
7 (N)	0.0 - 6.0	2	66.00	829.36	678.56
	0.0 - 12.0	4	25.00	628.30	
	0.0 - 18.0	6	16.00	603.17	
	0.0 - 24.0	8	13.00	653.43	
7 (S)	0.0 - 6.0	2	55.00	691.13	640.87
	0.0 - 12.0	4	27.00	678.56	
	0.0 - 18.0	6	17.00	640.87	
	0.0 - 24.0	8	11.00	552.90	

Avg. Resistivity Value (Ω-m) = 658.93

Soil Resistivity Profile :

ERT Point	Depth (m)	Avg. Resistivity Value within 48m Distance (Ω-m)	Remarks
7	2	797.94	
	4	596.89	
	6	612.59	
	8	628.30	

नेपाल विद्युत प्राधिकरण Nepal Electricity Authority Est. 1985 Kaligandaki Transmission Grid Project

TATA PROJECTS LTD. & CHINT ELECTRIC CO LTD JV BAGLUNG

Prashuram Drilling and Geo-Technical Services Pvt. Ltd.

SOIL RESISTIVITY TEST MEASUREMENTS & RESULTS

Date : Dec. 2016

Project: Soil Investigation Works For 220/132kV Dana Sub-station Project

Client: Nepal Electricity Authority (NEA), Nepal

Contractor: Tata Projects Ltd & Chint Electric Co. J/V, Nepal

Location: Dana, Myagdi

Area : Cultuvated/Barren Land

Terrain: Flat

Soil Type: Sandy/gravelly soils & fissured rocks

Position : 3157457.66 N
466013.79 E

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
8 (E)	0.0 - 6.0	2	121.00	1520.49	794.80
	0.0 - 12.0	4	26.00	653.43	
	0.0 - 18.0	6	14.00	527.77	
	0.0 - 24.0	8	9.50	477.51	
8 (W)	0.0 - 6.0	2	245.00	3078.67	1256.60
	0.0 - 12.0	4	37.00	929.88	
	0.0 - 18.0	6	13.00	490.07	
	0.0 - 24.0	8	10.50	527.77	

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
8 (N)	0.0 - 6.0	2	108.00	1357.13	725.69
	0.0 - 12.0	4	20.00	502.64	
	0.0 - 18.0	6	13.00	490.07	
	0.0 - 24.0	8	11.00	552.90	
8 (S)	0.0 - 6.0	2	67.00	841.92	647.15
	0.0 - 12.0	4	22.00	552.90	
	0.0 - 18.0	6	15.00	565.47	
	0.0 - 24.0	8	12.50	628.30	

Avg. Resistivity Value (Ω-m) = 856.06

Soil Resistivity Profile :

ERT Point	Depth (m)	Avg. Resistivity Value within 48m Distance (Ω-m)	Remarks
8	2	1699.55	
	4	659.72	
	6	518.35	
	8	546.62	

Kaligandaki Transmission Line Corridor

JV of TATA PROJECTS LTD & CHINT ELECTRIC CO LTD

Pashupati Drilling and Geo-Technical Services Pvt. Ltd.

SOIL RESISTIVITY TEST MEASUREMENTS & RESULTS

Date : Dec. 2016

Project: Soil Investigation Works For 220/132kV Dana Sub-station Project

Client: Nepal Electricity Authority (NEA), Nepal

Contractor: Tata Projects Ltd & Chint Electric Co. J/V, Nepal

Location: Dana, Myagdi

Area : Cultuvated/Barren Land

Terrain: Flat

Soil Type: Sandy/gravelly soils & fissured rocks

Position : 3157478.17 N
466055.77 E

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
9 (E)	0.0 - 6.0	2	30.40	382.01	422.22
	0.0 - 12.0	4	17.00	427.24	
	0.0 - 18.0	6	10.00	376.98	
	0.0 - 24.0	8	10.00	502.64	
9 (W)	0.0 - 6.0	2	20.00	251.32	362.06
	0.0 - 12.0	4	13.00	326.72	
	0.0 - 18.0	6	10.79	406.76	
	0.0 - 24.0	8	9.22	463.43	

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
9 (N)	0.0 - 6.0	2	32.00	402.11	446.09
	0.0 - 12.0	4	17.00	427.24	
	0.0 - 18.0	6	12.00	452.38	
	0.0 - 24.0	8	10.00	502.64	
9 (S)	0.0 - 6.0	2	34.00	427.24	399.91
	0.0 - 12.0	4	13.75	345.57	
	0.0 - 18.0	6	11.00	414.68	
	0.0 - 24.0	8	8.20	412.16	

Avg. Resistivity Value (Ω-m) = 407.57

Soil Resistivity Profile :

ERT Point	Depth (m)	Avg. Resistivity Value within 48m Distance (Ω-m)	Remarks
9	2	365.67	
	4	381.69	
	6	412.70	
	8	470.22	

TATA PROJECTS LTD. & CHINT ELECTRIC CO LTD JV of BAGLUNG

Pashupati Drilling and Geo-Technical Services Pvt. Ltd.

NEPAL ELECTRICITY AUTHORITY Kaligandaki Transmission Corridor Project

SOIL RESISTIVITY TEST MEASUREMENTS & RESULTS

Date : Dec. 2016

Project: Soil Investigation Works For 220/132kV Dana Sub-station Project

Client: Nepal Electricity Authority (NEA), Nepal

Contractor: Tata Projects Ltd & Chint Electric Co. J/V, Nepal

Location: Dana, Myagdi

Area : Cultuvated/Barren Land

Terrain: Flat

Soil Type: Sandy/gravelly soils & fissured rocks

Position : 315750308 N
466097.07 E

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
10 (E)	0.0 - 6.0	2	68.00	854.49	600.03
	0.0 - 12.0	4	20.00	502.64	
	0.0 - 18.0	6	13.00	490.07	
	0.0 - 24.0	8	11.00	552.90	
10 (W)	0.0 - 6.0	2	93.00	1168.64	772.81
	0.0 - 12.0	4	24.00	603.17	
	0.0 - 18.0	6	17.00	640.87	
	0.0 - 24.0	8	13.50	678.56	

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
10 (N)	0.0 - 6.0	2	59.00	741.39	529.34
	0.0 - 12.0	4	17.00	427.24	
	0.0 - 18.0	6	12.50	471.23	
	0.0 - 24.0	8	9.50	477.51	
10 (S)	0.0 - 6.0	2	70.00	879.62	757.10
	0.0 - 12.0	4	28.00	703.70	
	0.0 - 18.0	6	19.00	716.26	
	0.0 - 24.0	8	14.50	728.83	

Avg. Resistivity Value (Ω-m) = 664.82

Soil Resistivity Profile :

ERT Point	Depth (m)	Avg. Resistivity Value within 48m Distance (Ω-m)	Remarks
10	2	911.04	
	4	559.19	
	6	579.61	
	8	609.45	

Kaligandaki Transmission Line Project

TATA PROJECTS LTD. & CHINT ELECTRIC CO. LTD. J/V

Geotechnical Drilling and Geo-Technical Services Pvt. Ltd.

ANNEX - B

Kushma Soil Resistivity Tests Measurement & Results

Pashupati Drilling and Geo-Technical Services Pvt. Ltd.

JV of TATA PROJECTS LTD. & CHINT ELECTRIC CO LTD. BAGLUNG

SOIL RESISTIVITY TEST MEASUREMENTS & RESULTS

Date : Dec. 2016

Project: Soil Investigation Works For 220/132k Kushma Sub-station Project

Client: Nepal Electricity Authority (NEA), Nepal

Contractor: Tata Projects Ltd & Chint Electric Co. J/V, Nepal

Location: Keti Chor, Khurkot, Parbat

Area : Cultuvated Land

Terrain: Flat

Soil Type: Clayey/Sandy Soils

Position : 3124963.89 N
465520.46 E

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
1 (E)	0.0 - 6.0	2	30.00	376.98	439.81
	0.0 - 12.0	4	15.00	376.98	
	0.0 - 18.0	6	12.00	452.38	
	0.0 - 24.0	8	11.00	552.90	
1 (W)	0.0 - 6.0	2	27.50	345.57	301.58
	0.0 - 12.0	4	13.00	326.72	
	0.0 - 18.0	6	7.50	282.74	
	0.0 - 24.0	8	5.00	251.32	

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Remarks
1 (N)	0.0 - 6.0	2	29.00	364.41	312.58
	0.0 - 12.0	4	12.00	301.58	
	0.0 - 18.0	6	7.50	282.74	
	0.0 - 24.0	8	6.00	301.58	
1 (S)	0.0 - 6.0	2	19.00	238.75	278.81
	0.0 - 12.0	4	12.00	301.58	
	0.0 - 18.0	6	7.25	273.31	
	0.0 - 24.0	8	6.00	301.58	

Avg. Resistivity Value (Ω-m) = 333.20

Soil Resistivity Profile :

ERT Point	Depth (m)	Avg. Resistivity Value within 48m Distance (Ω-m)	Remarks
1	2	331.43	
	4	326.72	
	6	322.79	
	8	351.85	

नेपाल विद्युत प्राधिकरण NEPAL ELECTRICITY AUTHORITY Kaligandaki Transmission Line Project

TATA PROJECTS LTD. & CHINT ELECTRIC CO. LTD. JV BAGLUNG

Pashupati Drilling and Geo-Technical Services Pvt. Ltd.

SOIL RESISTIVITY TEST MEASUREMENTS & RESULTS

Date : Dec. 2016

Project: Soil Investigation Works For 220/132k Kushma Sub-station Project

Client: Nepal Electricity Authority (NEA), Nepal

Contractor: Tata Projects Ltd & Chint Electric Co. J/V, Nepal

Location: Keti Chor, Khurkot, Parbat

Area : Cultuvated Land

Terrain: Flat

Soil Type: Clayey/Sandy Soils

Position : 3124963.89 N
465616.96 E

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
2 (E)	0.0 - 6.0	2	24.00	301.58	361.78
	0.0 - 12.0	4	21.00	527.77	
	0.0 - 18.0	6	8.00	301.58	
	0.0 - 24.0	8	6.29	316.16	
2 (W)	0.0 - 6.0	2	29.00	364.41	568.61
	0.0 - 12.0	4	24.00	603.17	
	0.0 - 18.0	6	16.00	603.17	
	0.0 - 24.0	8	14.00	703.70	

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
2 (N)	0.0 - 6.0	2	16.00	201.06	304.73
	0.0 - 12.0	4	11.00	276.45	
	0.0 - 18.0	6	9.00	339.28	
	0.0 - 24.0	8	8.00	402.11	
2 (S)	0.0 - 6.0	2	38.00	477.51	551.65
	0.0 - 12.0	4	18.00	452.38	
	0.0 - 18.0	6	15.00	565.47	
	0.0 - 24.0	8	14.15	711.24	

Avg. Resistivity Value (Ω-m) = 446.69

Soil Resistivity Profile :

ERT Point	Depth (m)	Avg. Resistivity Value within 48m Distance (Ω-m)	Remarks
2	2	336.14	
	4	464.94	
	6	452.38	
	8	533.30	

TATA PROJECTS LTD & CHINT ELECTRIC CO LTD JV
BAGLUNG

Prabhuni Drilling and Geo-Technical Services Pvt. Ltd.

नेपाल विद्युत प्राधिकरण
NEPAL ELECTRICITY AUTHORITY
Estd. 1956

SOIL RESISTIVITY TEST MEASUREMENTS & RESULTS

Date : Dec. 2016

Project: Soil Investigation Works For 220/132k Kushma Sub-station Project

Client: Nepal Electricity Authority (NEA), Nepal

Contractor: Tata Projects Ltd & Chint Electric Co. J/V, Nepal

Location: Keti Chor, Khurkot, Parbat

Area : Cultuvated Land

Terrain: Flat

Soil Type: Clayey/Sandy Soils

Position : 3124963.89 N
465718.46 E

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
3 (E)	0.0 - 6.0	2	37.00	464.94	540.34
	0.0 - 12.0	4	21.50	540.34	
	0.0 - 18.0	6	16.00	603.17	
	0.0 - 24.0	8	11.00	552.90	
3 (W)	0.0 - 6.0	2	48.00	603.17	427.24
	0.0 - 12.0	4	18.00	452.38	
	0.0 - 18.0	6	8.00	301.58	
	0.0 - 24.0	8	7.00	351.85	

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
3 (N)	0.0 - 6.0	2	45.90	576.78	442.64
	0.0 - 12.0	4	17.00	427.24	
	0.0 - 18.0	6	11.00	414.68	
	0.0 - 24.0	8	7.00	351.85	
3 (S)	0.0 - 6.0	2	39.00	490.07	433.56
	0.0 - 12.0	4	18.40	462.43	
	0.0 - 18.0	6	9.71	366.05	
	0.0 - 24.0	8	8.27	415.68	

Avg. Resistivity Value (Ω-m) = 460.94

Soil Resistivity Profile :

ERT Point	Depth (m)	Avg. Resistivity Value within 48m Distance (Ω-m)	Remarks
3	2	533.74	
	4	470.60	
	6	421.37	
	8	418.07	

नेपाल विद्युत प्राधिकरण NEPAL ELECTRICITY AUTHORITY Kaligandaki Transmission Corridor

TATA PROJECTS LTD. & CHINT ELECTRIC CO. LTD. JV of BAGLUNG

Pashupati Drilling and Geo-Technical Services Pvt. Ltd.

SOIL RESISTIVITY TEST MEASUREMENTS & RESULTS

Date : Dec. 2016

Project: Soil Investigation Works For 220/132k Kushma Sub-station Project

Client: Nepal Electricity Authority (NEA), Nepal

Contractor: Tata Projects Ltd & Chint Electric Co. J/V, Nepal

Location: Keti Chor, Khurkot, Parbat

Area : Cultuvated Land

Terrain: Flat

Soil Type: Clayey/Sandy Soils

Position : 3124892.6 N
465637.96 E

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
4 (E)	0.0 - 6.0	2	23.70	297.81	233.29
	0.0 - 12.0	4	7.18	180.45	
	0.0 - 18.0	6	5.60	211.11	
	0.0 - 24.0	8	4.85	243.78	
4 (W)	0.0 - 6.0	2	18.30	229.96	196.16
	0.0 - 12.0	4	6.11	153.56	
	0.0 - 18.0	6	4.96	186.98	
	0.0 - 24.0	8	4.26	214.12	

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
4 (N)	0.0 - 6.0	2	16.40	206.08	365.67
	0.0 - 12.0	4	13.50	339.28	
	0.0 - 18.0	6	11.00	414.68	
	0.0 - 24.0	8	10.00	502.64	
4 (S)	0.0 - 6.0	2	13.52	169.89	192.26
	0.0 - 12.0	4	8.50	213.62	
	0.0 - 18.0	6	5.00	188.49	
	0.0 - 24.0	8	3.92	197.03	

Avg. Resistivity Value (Ω-m) = 246.84

Soil Resistivity Profile :

ERT Point	Depth (m)	Avg. Resistivity Value within 48m Distance (Ω-m)	Remarks
4	2	225.94	
	4	221.73	
	6	250.31	
	8	289.39	

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Panauti Drilling and Geo-Technical Services Pvt. Ltd.

SOIL RESISTIVITY TEST MEASUREMENTS & RESULTS

Date : Dec. 2016

Project: Soil Investigation Works For 220/132k Kushma Sub-station Project

Client: Nepal Electricity Authority (NEA), Nepal

Area : Cultuvated Land

Contractor: Tata Projects Ltd & Chint Electric Co. J/V, Nepal

Terrain: Flat

Location: Keti Chor, Khurkot, Parbat

Soil Type: Clayey/Sandy Soils

Position : 3124848.39 N
465630.46 E

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
5 (E)	0.0 - 6.0	2	12.90	162.10	174.76
	0.0 - 12.0	4	6.27	157.58	
	0.0 - 18.0	6	4.57	172.28	
	0.0 - 24.0	8	4.12	207.09	
5 (W)	0.0 - 6.0	2	16.40	206.08	201.94
	0.0 - 12.0	4	7.55	189.75	
	0.0 - 18.0	6	5.26	198.29	
	0.0 - 24.0	8	4.25	213.62	

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
5 (N)	0.0 - 6.0	2	22.50	282.74	215.04
	0.0 - 12.0	4	6.44	161.85	
	0.0 - 18.0	6	5.17	194.90	
	0.0 - 24.0	8	4.39	220.66	
5 (S)	0.0 - 6.0	2	18.50	232.47	272.21
	0.0 - 12.0	4	11.53	289.77	
	0.0 - 18.0	6	8.11	305.73	
	0.0 - 24.0	8	5.19	260.87	

Avg. Resistivity Value (Ω-m) = 215.99

Soil Resistivity Profile :

ERT Point	Depth (m)	Avg. Resistivity Value within 48m Distance (Ω-m)	Remarks
5	2	220.85	
	4	199.74	
	6	217.80	
	8	225.56	

OWNER: NEAPAL ELECTRICITY AUTHORITY(NEA)
SASEC : Power System Expansion Project
KALIGANDAKI TRANSMISSION CORRIDOR PROJECT
DANA - KUSHMA 220KV TRANSMISSION LINE & ASSOCIATED SUB STATIONS
(Design, Supply & Install) - Contract - PMD-KGTCP-071/72-03
I. Approved/ Released for Fabrication/ Construction
II. Approved/ Released for Fabrication/ Construction Subject to Incorporation of Comments, Modification
III. To be Resubmitted for Approval after Incorporating the Comments.
IV. For Information & Record.
V. Not Approved
Consultant : Power Grid Corporation of India Ltd.
Engg. (TL & S/S) Gurgaon (Haryana)
(Signature)
(Designation)
Dated

SOIL RESISTIVITY TEST MEASUREMENTS & RESULTS

Date : Dec. 2016

Project: Soil Investigation Works For 220/132k Kushma Sub-station Project

Client: Nepal Electricity Authority (NEA), Nepal

Area : Cultuvated Land

Contractor: Tata Projects Ltd & Chint Electric Co. J/V, Nepal

Terrain: Flat

Location: Keti Chor, Khurkot, Parbat

Soil Type: Clayey/Sandy Soils

Position : 3124848.39 N
465690.42 E

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
6 (E)	0.0 - 6.0	2	24.20	304.10	261.37
	0.0 - 12.0	4	12.00	301.58	
	0.0 - 18.0	6	5.00	188.49	
	0.0 - 24.0	8	5.00	251.32	
6 (W)	0.0 - 6.0	2	24.10	302.84	251.95
	0.0 - 12.0	4	11.80	296.56	
	0.0 - 18.0	6	5.50	207.34	
	0.0 - 24.0	8	4.00	201.06	

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Avg. Resistivity Value (Ω-m)
6 (N)	0.0 - 6.0	2	34.00	427.24	282.74
	0.0 - 12.0	4	11.00	276.45	
	0.0 - 18.0	6	6.00	226.19	
	0.0 - 24.0	8	4.00	201.06	
6 (S)	0.0 - 6.0	2	34.00	427.24	281.73
	0.0 - 12.0	4	10.84	272.43	
	0.0 - 18.0	6	6.00	226.19	
	0.0 - 24.0	8	4.00	201.06	

Avg. Resistivity Value (Ω-m) = 269.45

Soil Resistivity Profile :

ERT Point	Depth (m)	Avg. Resistivity Value within 48m Distance (Ω-m)	Remarks
6	2	365.36	
	4	286.76	
	6	212.05	
	8	213.62	

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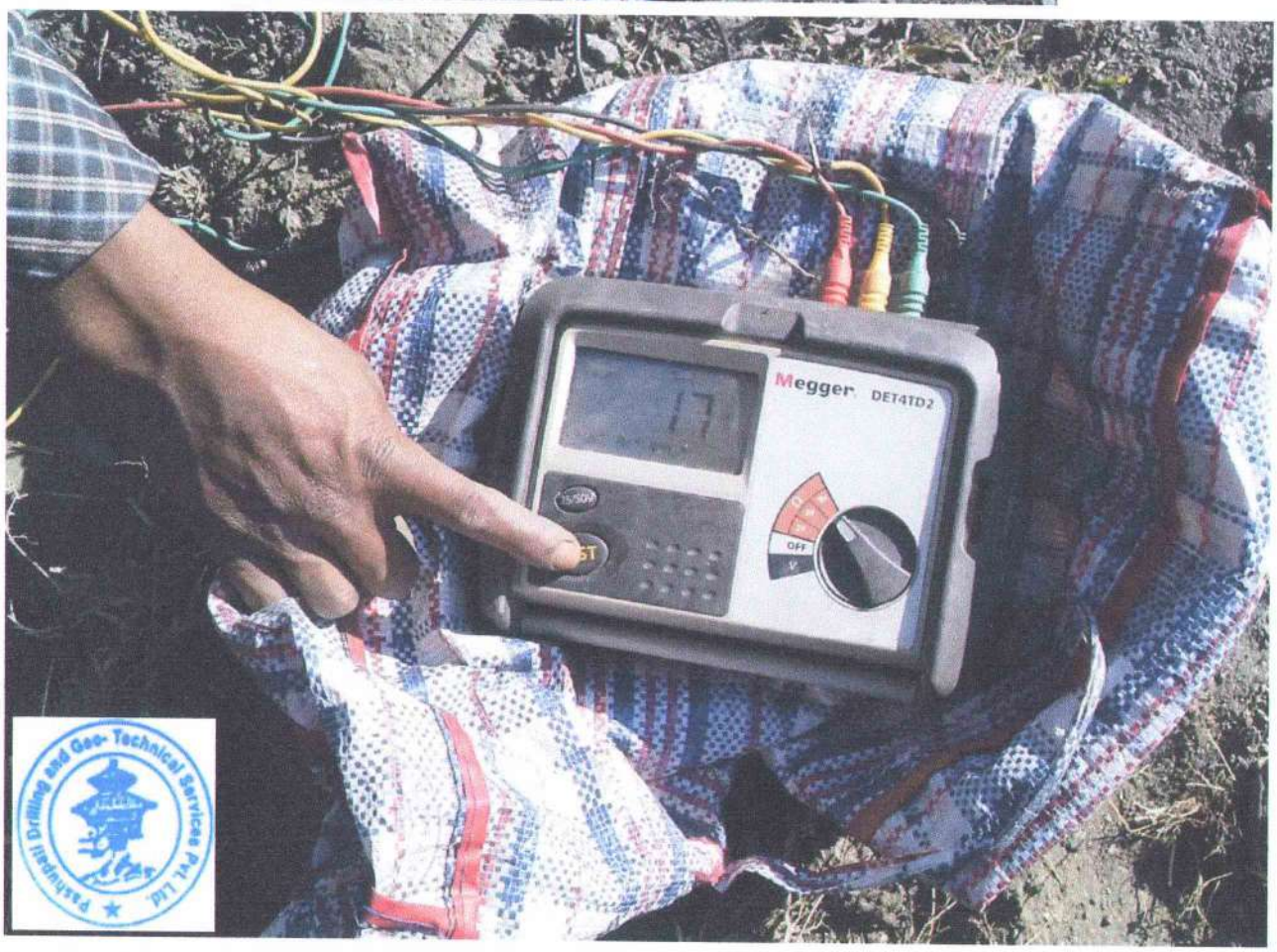
Pashupati Drilling and Geo-Technical Services Pvt. Ltd.

ANNEX - C

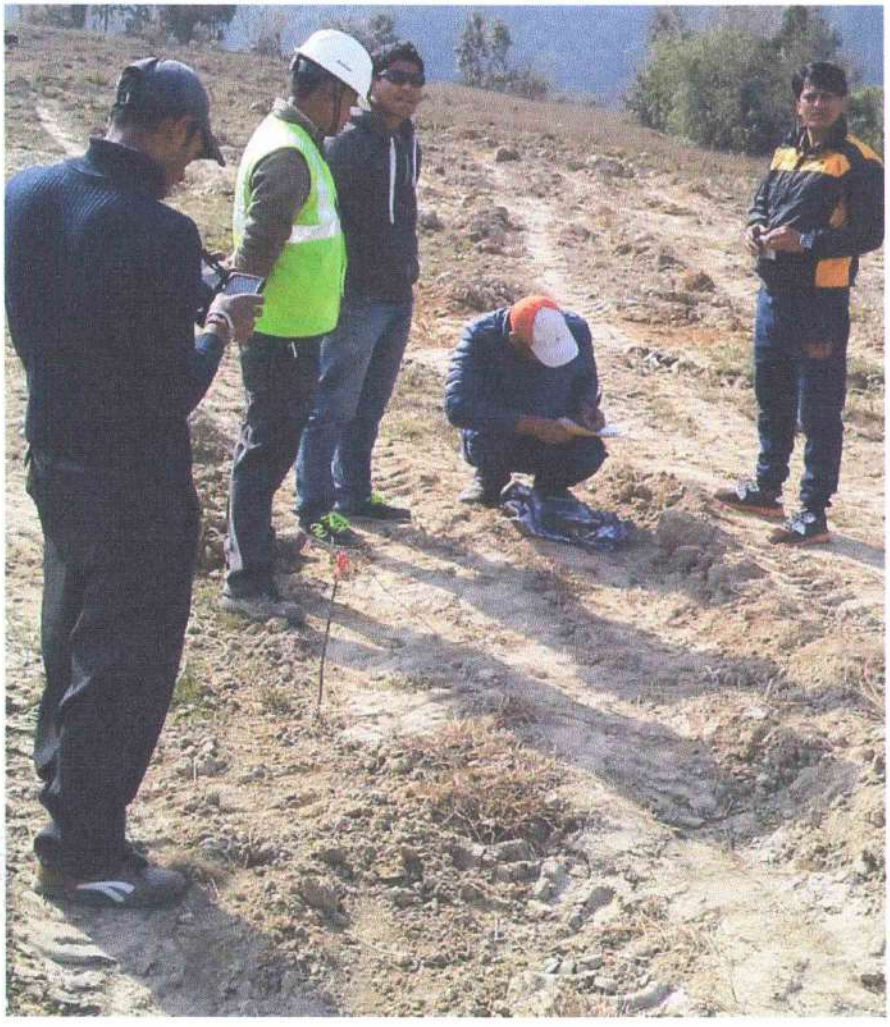
PHOTOGRAPHS

Pashupati Drilling and Geo- Technical Services Pvt. Ltd.

JV of TATA PROJECTS LTD. & CHINT ELECTRIC CO LTD
BAGLUNG



Conducting ERT Tests at Dana Sub-station Site



Conducting ERT Tests at Kushma Sub-station Site

ANNEX - D

FIELD DATA

Dana-Sub-Station Site (ERT)

(E)
0 - 6 - 2 : 79.0
0 - 12 - 4 : 25.0
0 - 18 - 6 : 17.0
0 - 24 - 8 : 13.35

(W)
0 - 6 - 2 : 85.0
0 - 12 - 4 : 45.0
0 - 18 - 6 : 37.0
0 - 24 - 8 : 18.0

(N)
0 - 6 - 2 : 78.0
0 - 12 - 4 : 26.0
0 - 18 - 6 : 16.5
0 - 24 - 8 : 13.5

(S)
0 - 6 - 2 : 92
0 - 12 - 4 : 31.0
0 - 18 - 6 : 19.0
0 - 24 - 8 : 17.5

(E)
0 - 6 - 2 : 35.1
0 - 12 - 4 : 21.1
0 - 18 - 6 : 15.36
0 - 24 - 8 : 11.5

(N)
0 - 6 - 2 : 27.7
0 - 12 - 4 : 23.0
0 - 18 - 6 : 16.5
0 - 24 - 8 : 9.20

(E)
0 - 6 - 2 : 38.0
0 - 12 - 4 : 24.0
0 - 18 - 6 : 15.0
0 - 24 - 8 : 12.5

(W)
0 - 6 - 2 : 32.3
0 - 12 - 4 : 23.0
0 - 18 - 6 : 17.0
0 - 24 - 8 : 13.0

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Panthapati Drilling and Geo-Technical Services Pvt. Ltd.

Dana-substation site (ERT)

(6) (S)
0 - 6 - 2 = 74.0
0 - 12 - 4 = 25.3
0 - 18 - 6 = 19.0
0 - 24 - 8 = 10

(N)
0 - 6 - 2 = 54
0 - 12 - 4 = 19.0
0 - 18 - 6 = 14.0
0 - 24 - 8 = 12.35

E
0 - 6 = 2 = 91.0
0 - 12 = 4 = 19.0
0 - 18 = 6 = 17.0
0 - 24 = 8 = 16.0

W
0 - 6 = 2 = 46.0
0 - 12 = 4 = 18.0
0 - 18 = 6 = 17.0
0 - 24 = 8 = 10.0

(7) (S)
0 - 6 - 2 = 55.0
0 - 12 - 4 = 27.0
0 - 18 - 6 = 17.0
0 - 24 - 8 = 11.0

(N)
0 - 6 - 2 = 66.0
0 - 12 - 4 = 25.0
0 - 18 - 6 = 16.0
0 - 24 - 8 = 13.0

E
0 - 6 - 2 = 79
0 - 12 = 4 = 22
0 - 18 = 6 = 16
0 - 24 = 8 = 17.5

W
0 - 6 - 2 = 54
0 - 12 - 4 = 21.0
0 - 18 - 6 = 16.0
0 - 24 - 8 = 13.5

(S)
0 - 6 - 2 = 46.6
0 - 12 - 4 = 18.8
0 - 18 - 6 = 16.3
0 - 24 - 8 = 14.0

(N)
0 - 6 - 2 = 49.0
0 - 12 - 4 = 16.0
0 - 18 - 6 = 13.0
0 - 24 - 8 = 11

(E)
0 - 6 - 2 = 52.1
0 - 12 = 4 = 19.0
0 - 18 - 6 = 14.0
0 - 24 - 8 = 11.0

(W)
0 - 6 - 2 = 49.0
0 - 12 - 4 = 18.6
0 - 18 - 6 = 15.0
0 - 24 - 8 = 12.0

SOIL RESISTIVITY TEST MEASUREMENTS & RESULTS

Project: Dana-Sub-station Site (ERT) Area :
Client: Terrain:
Contractor:
Location: Earth Voltage(V-Ω):

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Remarks
E	0-6	2.0	121.0		
	0-12	4.0	26.0		
	0-18	6.0	14.0		
	0-24	8.0	9.5		
W	0-6	2.0	245.0		
	0-12	4.0	37.0		
	0-18	6.0	13.0		
	0-24	8.0	10.5		
N	0-6	2.0	108.0		
	0-12	4.0	20.0		
	0-18	6.0	13.0		
	0-24	8.0	11.0		
S	0-6	2.0	57.0		
	0-12	4.0	22.0		
	0-18	6.0	15.0		
	0-24	8.0	12.5		

JV of TATA PROJECTS LTD & CHINA ELECTRIC CO LTD BAGLUNG

Pashupati Drilling & Geo- Technical Services Pvt. Ltd.
Krishna Kunj, Ramnagar, Lokanthali-15, Bhaktapur
Tel : 00977-1-6182310, 9851026210 E-mail: pashupatidrilling@gmail.com

Pashupati Drilling and Geo-Technical Services Pvt. Ltd.

SOIL RESISTIVITY TEST MEASUREMENTS & RESULTS

Project: Dana Sub-Station Site
Client:
Contractor:
Location:

Area :
Terrain:
Earth Voltage(V-Ω):

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Remarks
10 E	0-6	2.0	68.0		
	0-12	4.0	20.0		
	0-18	6.0	13.0		
	0-24	8.0	11.0		
W	0-6	2.0	93.0		
	0-12	4.0	24.0		
	0-18	6.0	17.0		
	0-24	8.0	13.5		
N	0-6	2.0	59.0		
	0-12	4.0	17.0		
	0-18	6.0	12.5		
	0-24	8.0	9.5		
S	0-6	2.0	70.0		
	0-12	4.0	28		
	0-18	6.0	19		
	0-24	8.0	14.5		

JV of TATA PROJECTS LTD. & CHINT ELECTRIC CO.LTD. BAGLUNG

Pashupati Drilling & Geo- Technical Services Pvt. Ltd.
Krishna Kunj, Ramnagar, Lokanthali-15, Bhaktapur
Tel : 00977-1-5182310, 9851026210 E-mail: pashupatidrilling@gmail.com

Pashupati Drilling and Geo-Technical Services Pvt. Ltd.

Dana - Sub - Station Site (ERT)

① 0 - 6 - 2 : 170.0

⑤ 0 - 12 - 4 : 33.0
0 - 18 - 6 : 14.0
0 - 24 - 8 : 10.5

Ⓝ 0 - 6 - 2 = 139
0 - 12 - 4 = 36.0
0 - 18 - 6 = 23.0
0 - 24 - 8 = 16.5

0 - 6 - 2 = 171.0
Ⓔ 0 - 12 - 4 = 40.0
0 - 18 - 6 : 21.0
0 - 24 - 8 = 16.5

0 - 6 - 2 : 115.0
Ⓦ 0 - 12 - 4 = 33.0
0 - 18 - 6 = 22.0
0 - 24 - 8 : 12.0

③ 0 - 6 - 2 = 135

Ⓝ 0 - 12 - 4 : 27.0
0 - 18 - 6 - 18.0
0 - 24 - 8 : 11.0

0 - 6 - 2 = 101.0
Ⓢ 0 - 12 - 4 : 26.0
0 - 18 - 6 : 16.0
0 - 24 - 8 = 11.0

0 - 6 - 2 = 119.0
Ⓔ 0 - 12 - 4 : 32.0
0 - 18 - 6 = 16.0
0 - 24 - 8 = 11.0

0 - 6 - 2 = 126
Ⓦ 0 - 12 - 4 : ~~126~~ 30.0
0 - 18 - 6 = 16.0
0 - 24 - 8 = 9.0

JV of DATA PROJECTS (P) LTD BAG...

Pashupati Drilling and Geo-Technical Services Pvt. Ltd.

SOIL RESISTIVITY TEST MEASUREMENTS & RESULTS

Project: Dana - Sub - Station Site
Client:
Contractor:
Location:

Area :
Terrain:

Earth Voltage(V-Ω):

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Remarks
① E	0 - 6.0	2.0	30.4		
	0 - 12.0	4.0	17.0		
	0 - 18.0	6.0	10.0		
	0 - 24.0	8.0	10.0		
②	0 - 6.0	2.0	20.0		
	0 - 12.0	4.0	13.0		
	0 - 18.0	6.0	10.79		
	0 - 24.0	8.0	9.22		
N	0 - 6	2.0	32.0		
	0 - 12	4.0	17.0		
	0 - 18	6.0	12.0		
	0 - 24	8.0	10.0		
S	0 - 6	2.0	34.0		
	0 - 12	4.0	13.75		
	0 - 18	6.0	11.0		
	0 - 24	8.0	8.2		

TATA PROJECTS LTD. & CHINA ELECTRIC CO. LTD. JV of BAGLUNG

Pashupati Drilling & Geo- Technical Services Pvt. Ltd.
Krishna Kunj, Ramnagar, Lokanthali-15, Bhaktapur
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Pashupati Drilling and Geo- Technical Services Pvt. Ltd.

Kushma - Sub-station - site (ERT)

(S)
0 - 6 - 2 = 16.40

(W)
0 - 12 - 4 = 7.55
0 - 18 - 6 = 5.26
0 - 24 - 8 = 4.25

0 - 6 - 2 = 12.90

(E)
0 - 12 - 4 = 6.27
0 - 18 - 6 = 4.57
0 - 24 - 8 = 4.12

0 - 6 - 2 = 22.5

(N)
0 - 12 - 4 = 6.44
0 - 18 - 6 = 5.17
0 - 24 - 8 = 4.39

0 - 6 - 2 = 18.5

(S)
0 - 12 - 4 = 11.59
0 - 18 - 6 = 8.11
0 - 24 - 8 = ~~5.19~~ 5.19

~~3~~ (4)

0 - 6 - 2 = 18.3

(W)
0 - 12 - 4 = 6.11
0 - 18 - 6 = 4.96
0 - 24 - 8 = 4.26

0 - 6 - 2 = ~~16.40~~ 23.7

(E)
0 - 12 - 4 = 7.18
0 - 18 - 6 = 5.60
0 - 24 - 8 = 4.85

0 - 6 - 2 = 16.40

(N)
0 - 12 - 4 = 13.5
0 - 18 - 6 = 11.0
0 - 24 - 8 = 10.0

0 - 6 - 2 = 13.52

(S)
0 - 12 - 4 = 8.5
0 - 18 - 6 = 5.0
0 - 24 - 8 = 3.92

JV of TATA PROJECTS LTD. & CHINT ELECTRIC CO LTD. ★ BAGLUNG

(1)

0 - 6 - 2 = ~~29~~

(N)
0 - 12 - 4 = 12.0
0 - 18 - 6 = 7.5
0 - 24 - 8 = 6.0

0 - 6 - 2 = 19.0

(S)
0 - 12 - 4 = 12.0
0 - 18 - 6 = 7.25

(E)
0 - 6 - 2 = 30.0
0 - 12 - 4 = 15.0
0 - 18 - 6 = 12.0
0 - 24 - 8 = 11.0

Panauti Drilling and Geo-Technical Services Pvt. Ltd. ★

(W)
0 - 6 - 2 = 27.5
0 - 12 - 4 = 13.0
0 - 18 - 6 = 7.5

SOIL RESISTIVITY TEST MEASUREMENTS & RESULTS

Project:
Client:
Contractor:
Location: Kushma sub-station

Area :
Terrain:
Earth Voltage(V-Ω):

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Remarks
(6)	0 - 6	2	34.0		
(5)	0 - 12	4	10.84		
	0 - 18	6	6.0		
	0 - 24	8	4.0		
	0 - 6	2	34.0		
	0 - 12	4	11.0		
(N)	0 - 18	6	6.0		
	0 - 24	8	4.0		
(E)	0 - 6.0	2	24.20		
	0 - 12.0	4	12.00		
	0 - 18.0	6	5.00		
	0 - 24.0	8	5.00		
	0 - 6.0	2	24.10		
	0 - 12.0	4	11.[illegible]3		
	0 - 18.0	6	5.5		
	0 - 24.0	8	4.0		

JV of TATA PROJECTS LTD. & CHINT ELECTRIC CO LTD. BAGLUNG

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Pashupati Drilling and Geo- Technical Services Pvt. Ltd.

Kushma - Sub Station Site (ERT)

(B)

0 - 6 - 2 = 27.0

(E)

0 - 12 - 4 = 21.5

0 - 18 - 6 = 16.0

0 - 24 - 8 = 11.0

0 - 6 - 2 = 48.0

(W)

0 - 8 - 4 = 18.0

0 - 18 - 6 = 8.0

0 - 24 - 8 = 7.0

0 - 6 - 2 = 45.90

(N)

0 - 12 - 4 = 17.00

0 - 18 - 6 = 11.00

0 - 24 - 8 = 7.0

0 - 6 - 2 = 39.0

S

0 - 12 - 4 = 18.90

0 - 18 - 6 = 9.71

0 - 24 - 8 = 8.27

JV of TATA PROJECTS LTD & CHINT ELECTRIC CO LTD ★ BAGLUNG

Pashupati Drilling and Geo-Technical Services Pvt. Ltd.

SOIL RESISTIVITY TEST MEASUREMENTS & RESULTS

Project:
Client:
Contractor:
Location: Krishna Sub-station

Area :
Terrain:

Earth Voltage(V-Ω):

ERT Point	Distance (m)	Spacing of Electrodes (m)	Resistance (Ω)	Resistivity Value (Ω-m)	Remarks
(2)	0-6	2	38		
(S) ~~(W)~~	0-12	4	18		
	0-18	6	15		
	0-24	8	14.15		
	0-6	2	29.0		
(W)	0-12	4	24.0		
	0-18	6	16.0		
	0-24	8	14.0		
	0-6	2	16.0		
(N)	0-12	4	11.0		
	0-18	6	9.0		
	0-24	8	8.0		
	0-6	2	24		
(E)	0-12	4	21.0		
	0-18	6	8.0		
	0-24	8	6.29		

JV of TATA PROJECTS LTD & CHINT ELECTRIC CO LTD ★ BAGLUNG

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